MB

COMMONWEALTH OF MASSACHUSETTS

CONTRACT DOCUMENTS AND SPECIAL PROVISIONS

PROPOSAL NO.	613642-136413
P.V. =	$5,644,000.00
PLANS	YES

FOR

Federal Aid Project No. HPP/STP-0035(073)X
Bridge Replacement, R-02-003 = T-01-004 (3M4), South Street East over the Taunton River

in the Municipalities of

RAYNHAM-TAUNTON

In accordance with the STANDARD SPECIFICATIONS
for HIGHWAYS and BRIDGES dated 2026

This Proposal to be opened and read: **TUESDAY, SEPTEMBER 15, 2026 at 2:00 P.M.**

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DOCUMENT 00104

NOTICE TO CONTRACTORS

Electronic proposals for the following project will be received through the internet using www.bidx.com until the date and time stated below and will be posted on www.bidx.com forthwith after the bid submission deadline. No paper copies of bids will be accepted. All Bidders must have a valid vendor code issued by MassDOT in order to bid on projects. Bidders need to apply for a Digital ID at least 14 days prior to a scheduled bid opening date with www.bidx.com.

TUESDAY, SEPTEMBER 15, 2026 at 2:00 P.M. **
RAYNHAM-TAUNTON
Federal Aid Project No. HPP/STP-0035(073)X
Bridge Replacement, R-02-003 = T-01-004 (3M4), South Street East over the Taunton River

****Date Subject to Change**

PROJECT VALUE = $5,644,000.00

Bidders must be pre-qualified by the Department in the BRIDGE - CONSTRUCTION category to bid on the above project. An award will not be made to a Contractor who is not pre-qualified by the Department prior to the opening of Proposals.

All prospective Bidders who intend to bid on this project must obtain "Request Proposal Form (R109)". The blank "Request Proposal Form (R109)" can be obtained at: https://www.mass.gov/prequalification-of-horizontal-construction-firms.

All prospective Bidders must complete and e-mail an electronic copy of "Request Proposal Form (R109)" to the MassDOT Director of Prequalification for approval: prequal.r109@dot.state.ma.us.

Proposal documents for official bidders are posted on www.bidx.com. Other interested parties may receive informational Contract Documents containing the Plans and Special Provisions, free of charge.

Bids will be considered, and the contract awarded in accordance with statutes governing such contracts in accordance with Massachusetts General Laws Chapter 30 § 39M.

The Project Bids File Attachments folder for proposals at www.bidx.com shall be used for submitting at the time of bid required information such as the Bid Bond required document, and other documents that may be requested in the proposal.

NOTICE TO CONTRACTORS (Continued)

All parties who wish to have access to information plans and specification must send a "Request for Informational Documents" to MassDOTBidDocuments@dot.state.ma.us.

A Proposal Guaranty in the amount of 5% of the value of the bid is required.

This project is subject to the schedule of prevailing wage rates as determined by the Commissioner of the Massachusetts Department of Labor and Workforce Development, and the Division of Occupational Safety, and the United States Department of Labor.

The Massachusetts Department of Transportation, in accordance with Title VI of the Civil Rights Act of 1964 (78 Stat. 252, 42 U.S.C. §§ 2000d to 2000d-4) and the Regulations, hereby affirmatively ensures that for any contract entered into pursuant to this advertisement, all bidders, including disadvantaged business enterprises, will be afforded full and fair opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, national origin in consideration for an Award.

This Proposal contains the "STANDARD FEDERAL EQUAL EMPLOYMENT OPPORTUNITY CONTRACT SPECIFICATIONS (EXECUTIVE ORDER 11246)". The goals and timetables applicable to this proposal for minority and female participation, expressed in percentage terms for the Contractor's aggregate work force in each trade on all work, are contained in Appendices A and B-80 of the above specifications.

The Contractor (hereinafter includes consultants) will comply with the Acts and Regulations relative to Non-discrimination in Federally-assisted programs of the U.S. Department of Transportation, Federal Highway Administration (FHWA), as they may be amended from time to time, which are herein incorporated by reference and made a part of this Contract as contained in Appendices C and D of the above specifications.

NOTICE TO CONTRACTORS (Continued)

PRICE ADJUSTMENTS

This Contract contains price adjustments for hot mix asphalt and Portland cement mixtures, diesel fuel, and gasoline. For reference the base prices are as follows: liquid asphalt $712.50 per ton, Portland cement $452.13 per ton, diesel fuel $4.372 per gallon, and gasoline $3.335 per gallon, and Steel Base Price Index 370.1. MassDOT posts the **Price Adjustments** on their Highway Division's website at
https://www.mass.gov/massdot-contract-price-adjustments

This Contract contains Price Adjustments for steel. See Document 00813 - PRICE ADJUSTMENT FOR STRUCTURAL STEEL AND REINFORCING STEEL for their application and base prices.

MassDOT projects are subject to the rules and regulations of the Architectural Access Board (521 CMR 1.00 et seq.)

Prospective bidders and interested parties can access this information and more via the internet at WWW.COMMBUYS.COM.

BY: Phillip Eng, Interim MassDOT Secretary
Jonathan L. Gulliver, Undersecretary and Highway Administrator
SATURDAY, AUGUST 15, 2026

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DOCUMENT 00210

REQUIREMENTS OF MASSACHUSETTS GENERAL LAWS
CHAPTER 30, SECTION 39R;
CHAPTER 30, SECTION 39O

July 1, 1981, updated October 2016

M.G.L. c. 30, § 39R. Award of Contracts; Accounting Statements; Annual Financial Statements; Definitions.

(a) The words defined herein shall have the meaning stated below whenever they appear in this section:

(1) “Contractor" means any person, corporation, partnership, joint venture, sole proprietorship, or other entity awarded a contract pursuant to sections thirty-eight A1/2 to thirty-eight O, inclusive, of chapter seven and any contract awarded or executed pursuant to section eleven C of chapter twenty-five A, section thirty-nine M of chapter thirty, or sections forty-four A to forty-four H, inclusive, of chapter one hundred and forty-nine, which is for an amount or estimated amount greater than one hundred thousand dollars.

(2) "Contract" means any contract awarded or executed pursuant to sections thirty-eight A1/2 to thirty-eight O, inclusive, of chapter seven and any contract awarded or executed pursuant to section eleven C of chapter twenty-five A, section thirty-nine M of chapter thirty, or sections forty-four A through forty-four H, inclusive, of chapter one hundred and forty-nine, which is for amount or estimated amount greater than one hundred thousand dollars.

(3) “Records" means books of original entry, accounts, checks, bank statements and all other banking documents, correspondence, memoranda, invoices, computer printouts, tapes, discs, papers and other documents or transcribed information of any type, whether expressed in ordinary or machine language.

(4) “Independent Certified Public Accountant" means a person duly registered in good standing and entitled to practice as a certified public accountant under the laws of the place of his residence or principal office and who is in fact independent. In determining whether an accountant is independent with respect to a particular person, appropriate consideration should be given to all relationships between the accountant and that person or any affiliate thereof. Determination of an accountant's independence shall not be confined to the relationships existing in connection with the filing of reports with the awarding authority.

(5) “Audit", when used in regard to financial statements, means an examination of records by an independent certified public accountant in accordance with generally accepted accounting principles and auditing standards for the purpose of expressing a certified opinion thereon, or, in the alternative, a qualified opinion or a declination to express an opinion for stated reasons.

(6) "Accountant's Report", when used in regard to financial statements, means a document in which an independent certified public accountant indicates the scope of the audit which he has made and sets forth his opinion regarding the financial statements taken as a whole with a listing of noted exceptions and qualifications, or an assertion to the effect that an overall opinion cannot be expressed. When an overall opinion cannot be expressed the reason therefor shall be stated. An accountant's report shall include as a part thereof a signed statement by the responsible corporate officer attesting that management has fully disclosed all material facts to the independent certified public accountant, and that the audited financial statement is a true and complete statement of the financial condition of the contractor.

(7) “Management", when used herein, means the chief executive officers, partners, principals or other person or persons primarily responsible for the financial and operational policies and practices of the contractor.

(8) Accounting terms, unless otherwise defined herein, shall have a meaning in accordance with generally accepted accounting principles and auditing standards.

(b) Subsection (a)(2) hereof notwithstanding, every agreement or contract awarded or executed pursuant to sections thirty-eight A 1/2 to thirty-eight O, inclusive, of chapter seven, or eleven C of chapter twenty-five A, and pursuant to section thirty-nine M of chapter thirty or to section forty-four A through H, inclusive, of chapter one hundred and forty-nine, shall provide that:

(1) The contractor shall make, and keep for at least six years after final payment, books, records, and accounts which in reasonable detail accurately and fairly reflect the transactions and dispositions of the contractor, and

(2) Until the expiration of six years after final payment, the office of inspector general, and the commissioner of capital asset management and maintenance shall have the right to examine any books, documents, papers or records of the contractor or of his subcontractors that directly pertain to, and involve transactions relating to, the contractor or his subcontractors, and

(3) If the agreement is a contract as defined herein, the contractor shall describe any change in the method of maintaining records or recording transactions which materially affect any statements filed with the awarding authority, including in his description the date of the change and reasons therefor, and shall accompany said description with a letter from the contractor's independent certified public accountant approving or otherwise commenting on the changes, and

(4) If the agreement is a contract as defined herein, the contractor has filed a statement of management on internal accounting controls as set forth in paragraph (c) below prior to the execution of the contract, and

(5) If the agreement is a contract as defined herein, the contractor has filed prior to the execution of the contracts and will continue to file annually, an audited financial statement for the most recent completed fiscal year as set forth in paragraph (d) below.

(c) Every contractor awarded a contract shall file with the awarding authority a statement of management as to whether the system of internal accounting controls of the contractor and its subsidiaries reasonably assures that:

(1) transactions are executed in accordance with management's general and specific authorization;

(2) transactions are recorded as necessary

i. to permit preparation of financial statements in conformity with generally accepted accounting principles, and

ii. to maintain accountability for assets;

(3) access to assets is permitted only in accordance with management's general or specific authorization; and

(4) the recorded accountability for assets is compared with the existing assets at reasonable intervals and appropriate action was taken with respect to any difference.

Every contractor awarded a contract shall also file with the awarding authority a statement prepared and signed by an independent certified public accountant, stating that he has examined the statement of management on internal accounting controls, and expressing an opinion as to:

(1) whether the representations of management in response to this paragraph and paragraph (b) above are consistent with the result of management's evaluation of the system of internal accounting controls; and

(2) whether such representations of management are, in addition, reasonable with respect to transactions and assets in amounts which would be material when measured in relation to the applicant's financial statements.

(d) Every contractor awarded a contract by the commonwealth or by any political subdivision thereof shall annually file with the commissioner of capital asset management and maintenance during the term of the contract a financial statement prepared by an independent certified public accountant on the basis of an audit by such accountant. The final statement filed shall include the date of final payment. All statements shall be accompanied by an accountant's report. Such statements shall be made available to the awarding authority upon request.

(e) The office of inspector general, the commissioner of capital asset management and maintenance and any other awarding authority shall enforce the provisions of this section. The commissioner of capital asset management and maintenance may after providing an opportunity for the inspector general and other interested parties to comment, promulgate pursuant to the provisions of chapter thirty A such rules, regulations and guidelines as are necessary to effectuate the purposes of this section. Such rules, regulations and guidelines may be applicable to all awarding authorities. A contractor's failure to satisfy any of the requirements of this section may be grounds for debarment pursuant to section forty-four C of chapter one hundred and forty-nine.

(f) Records and statements required to be made, kept or filed under the provisions of this section shall not be public records as defined in section seven of chapter four and shall not be open to public inspection; provided, however, that such records and statements shall be made available pursuant to the provisions of clause (2) of paragraph (b).

M.G.L. c. 30, § 39O: Suspension, Delay, or Interruption or Failure to Act by Awarding Authority; Adjustment in Contract Price; Submission of Claims.

Section 39O. Every contract subject to the provisions of section thirty-nine M of this chapter or subject to section forty-four A of chapter one hundred forty-nine shall contain the following provisions (a) and (b) in their entirety and, in the event a suspension, delay, interruption or failure to act of the awarding authority increases the cost of performance to any subcontractor, that subcontractor shall have the same rights against the general contractor for payment for an increase in the cost of his performance as provisions (a) and (b) give the general contractor against the awarding authority, but nothing in provisions (a) and (b) shall in any way change, modify or alter any other rights which the general contractor or the subcontractor may have against each other.

(a) The awarding authority may order the general contractor in writing to suspend, delay, or interrupt all or any part of the work for such period of time as it may determine to be appropriate for the convenience of the awarding authority; provided however, that if there is a suspension, delay or interruption for fifteen days or more or due to a failure of the awarding authority to act within the time specified in this contract, the awarding authority shall make an adjustment in the contract price for any increase in the cost of performance of this contract but shall not include any profit to the general contractor on such increase; and provided further, that the awarding authority shall not make any adjustment in the contract price under this provision for any suspension, delay, interruption or failure to act to the extent that such is due to any cause for which this contract provides for an equitable adjustment of the contract price under any other contract provisions.

(b) The general contractor must submit the amount of a claim under provision (a) to the awarding authority in writing as soon as practicable after the end of the suspension, delay, interruption or failure to act and, in any event, not later than the date of final payment under this contract and, except for costs due to a suspension order, the awarding authority shall not approve any costs in the claim incurred more than twenty days before the general contractor notified the awarding authority in writing of the act or failure to act involved in the claim.

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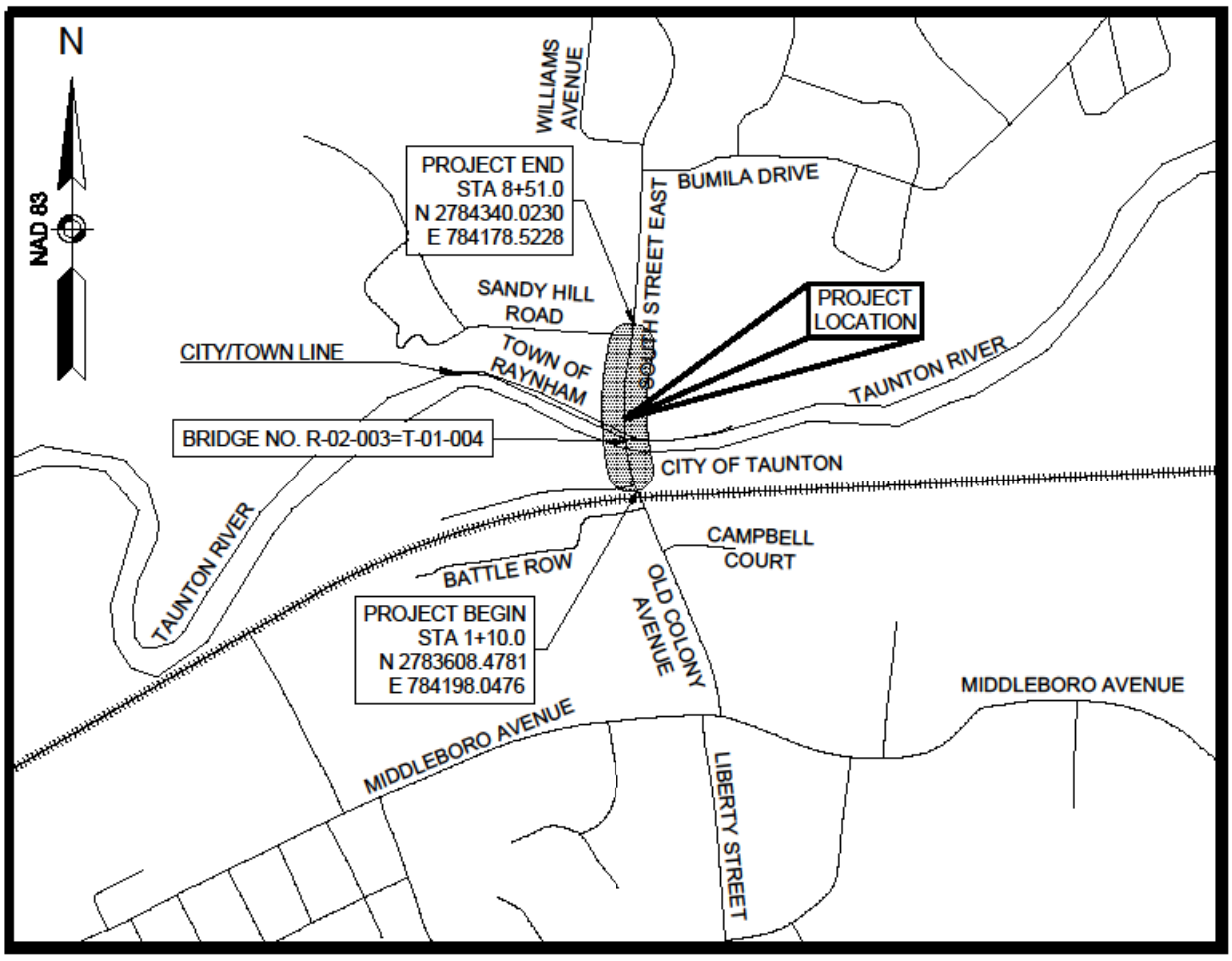
DOCUMENT 00331

LOCUS MAP

RAYNHAM-TAUNTON
Federal Aid Project No. HPP/STP-0035(073)X
Bridge Replacement, R-02-003 = T-01-004 (3M4), South Street East over the Taunton River



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DOCUMENT 00439

massDOT Massachusetts Department of Transportation Highway Division

Final Report ☐

Interim Report ☐

CONTRACTOR PROJECT EVALUATION FORM

For instructions on using this form, see Engineering Directive E-10-002, Dated 4/20/2010

Date: _____

City/Town: _____ Contractor: _____

Project: _____ Address: _____

F.A. No. _____ Contract Number: _____

Bid Price: _____ Notice to Proceed: _____

Funds: State: _____ Fed Aid: _____ Current Contract Completion Date: _____

Date Work Started: _____ Date Work Completed*: _____

Contractor's Superintendent: _____

Division: (indicates class of work) Highway: _____ Bridge: _____ Maintenance: _____

*If work was NOT completed within specified time (including extensions) give reasons on following page.

	Excellent 10	Very Good 9	Average 8	7	Fair 6	5	Poor 4	% Rating
1. Workmanship								x 2=
2. Safety								x 2=
3. Schedule								x 1.5=
4. Home Office Support								x 1=
5. Subcontractors Performance								x 1=
6. Field Supervision/ Superintendent								x 1=
7. Contract Compliance								x 0.5=
8. Equipment								x 0.5=
9. Payment of Accounts								x 0.5=
(use back for additional comments)						**Overall Rating:**		

(Give explanation of items 1 through 9 on the following page in numerical order if overall rating is below 80%. Use additional sheets if necessary.)

_____ _____

District Construction Engineer's Signature/Date Resident Engineer's Signature/Date

_____

Contractor's Signature Acknowledging Report/Date

Contractor Requests Meeting with the District: No ☐ Yes ☐ Date Meeting Held: _____

Contractor's Comments/Meeting Notes (extra sheets may be added to this form and noted here if needed): _____

_____

_____

CONTRACTOR PROJECT EVALUATION FORM (Continued)

Date: _____ Contract Number:_____

INFORMATION FOR DISTRICT HIGHWAY DIRECTORS RELATING TO PREQUALIFICATION

A deduction shall be recommended for unsatisfactory performance if computed overall rating is under 80%.
A deduction may be recommended for this project being completed late due to the Contractor's fault.

RECOMMENDATIONS FOR DEDUCTIONS FROM CONTRACTORS' ASSIGNED FACTOR
(*Write Yes or No in space provided*)

I recommend a deduction for Contractor's unsatisfactory performance: _____

I recommend a deduction for project completed late:_____

Signed: _____
District Highway Director

EXPLANATION OF RATINGS 1 – 9:_____

WORK NOT COMPLETED WITHIN SPECIFIED TIME: _____

Revised: 04/28/17

*** END OF DOCUMENT ***

DOCUMENT 00440

Final Report ☐

Interim Report ☐

SUBCONTRACTOR PROJECT EVALUATION FORM

For instructions on using this form, see Engineering Directive E-10-002, Dated 4/20/2010

Date: _____

City/Town: _____ Subcontractor: _____

Project: _____ Address: _____

F.A. No.: _____ Contract Number: _____

Prime Contractor _____ Current Contract Completion Date: _____

Date Work Started: _____ Date Work Completed*: _____

Subcontractor's Superintendent: _____

Type of Work Performed by Subcontractor: _____

*If work was NOT completed within specified time (including extensions) give reasons on following page.

	Excellent 10	Very Good 9	Average 8	7	Fair 6	5	Poor 4	% Rating
1. Workmanship								x 2=
2. Safety								x 2=
3. Schedule								x 1.5=
4. Home Office Support								x 1.5=
5. Field Supervision/ Superintendent								x 1=
6. Contract Compliance								x 1=
7. Equipment								x 0.5=
8. Payment of Accounts								x 0.5=
(use back for additional comments)							**Overall Rating:**	

(Give explanation of items 1 through 8 on the following page in numerical order if overall rating is below 80%. Use additional sheets if necessary.)

_____ _____

District Construction Engineer's Signature/Date Resident Engineer's Signature/Date

_____ _____

Contractor Signature Acknowledging Report/Date Subcontractor Signature Acknowledging Report/Date

Subcontractor Requests Meeting with the District: No ☐ Yes ☐ Date Meeting Held: _____

Subcontractor's Comments / Meeting Notes (extra sheets may be added to this form and noted here if needed):

_____

_____

Contractor's Comments: _____

_____

SUBCONTRACTOR PROJECT EVALUATION FORM (Continued)

Date: _____ Contract Number:_____

INFORMATION FOR DISTRICT HIGHWAY DIRECTORS RELATING TO PREQUALIFICATION

A deduction shall be recommended for unsatisfactory performance if computed overall rating is under 80%.
A deduction may be recommended for this project being completed late due to the Contractor's fault.

RECOMMENDATIONS FOR DEDUCTIONS FROM CONTRACTORS' ASSIGNED FACTOR
(*Write Yes or No in space provided*)

I recommend a deduction for Contractor's unsatisfactory performance: _____

I recommend a deduction for project completed late:_____

Signed: _____
District Highway Director

EXPLANATION OF RATINGS 1 – 8: _____

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WORK NOT COMPLETED WITHIN SPECIFIED TIME: _____

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Revised: 04/28/17

*** END OF DOCUMENT ***

DOCUMENT 00710
GENERAL CONTRACT PROVISIONS
Revised: 03-31-26

NOTICE OF AVAILABILITY

The STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES dated 2026, the SUPPLEMENTAL SPECIFICATIONS , the 1990 STANDARD DRAWINGS FOR SIGNS AND SUPPORTS; the 1968 STANDARD DRAWINGS FOR TRAFFIC SIGNALS AND HIGHWAY LIGHTING and the CONSTRUCTION STANDARD DETAILS are available online at https://www.mass.gov/massdot-highway-division-manuals-and-publications

SPECIAL PROVISIONS FOR RIGHT-TO-KNOW ACT REQUIREMENTS

The Contractor's attention is directed to Massachusetts General Laws, Chapter 111F, commonly known as the Right-To-Know Act, and to the regulations promulgated pursuant thereto. Among the provisions of the Right-To-Know Act is a requirement that employers make available to employees Materials Safety Data Sheets (MSDS) for any substance on the Massachusetts Substance List (MSL) to which employees are, have been, or may be exposed.

To ensure prompt compliance with these regulations and legislation, the Contractor shall:

1. Deliver to the Department, prior to the start of any work under this contract, copies of MSDS for all MSL substances to be used, stored, processed or manufactured at the worksite by the Contractor.

2. Train employees of the Department, who may be exposed to MSL substances as a result of the Contractor's work under this contract, with regard to those specific substances in accordance with requirements of the Right-To-Know Act.

3. Observe all safety precautions recommended on the MSDS for any MSL substance to be used, stored, processed, or manufactured at the worksite by the Contractor.

4. Inform the Department in writing regarding specific protective equipment recommended in the MSDS for MSL substances to which employees of the Department may be exposed as a result of the Contractor's work under this contract.

The Department shall not be liable for any delay or suspension of work caused by the refusal of its employees to perform any work due to the Contractor's failure to comply with the Right-To-Know Act. The Contractor agrees to hold the Department or the Commissioner of the Department harmless and fully indemnified for any and all claims, demands, fines, actions, complaints, and causes of action resulting from or arising out of the Contractor's failure to comply with the requirements of the Right-To-Know Act.

ALTERNATIVE DISPUTE RESOLUTION
Forum, Choice of Law and Mediations:

Any actions arising out of a contract shall be governed by the laws of Massachusetts and shall be brought and maintained in a State or federal court in Massachusetts which shall have exclusive jurisdiction thereof. MassDOT and the Contractor may both agree to mediation of any claim and will share the costs of such mediation pro rata based on the number of parties involved.

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DOCUMENT 00715

SUPPLEMENTAL SPECIFICATIONS

JUNE 30, 2026

The 2026 *Standard Specifications for Highways and Bridges* are amended by the following modifications, additions and deletions. These Supplemental Specifications prevail over those published in the Standard Specifications.

The Specifications Committee has issued these Supplemental Specifications for inclusion into each proposal until such time as they are updated or incorporated into the next Standard Specifications.

Contractors are cautioned that these Supplemental Specifications are dated and will change as they are updated.

DIVISION I

GENERAL REQUIREMENTS AND COVENANTS

SECTION 5.00: CONTROL OF WORK

Subsection 5.03: Conformity with Plans and Specifications
Change the MGL reference in the first sentence to Chapter 30, Section 39I (from Section 39L).

DIVISION II

CONSTRUCTION DETAILS

SECTION 200: DRAINAGE

SUBSECTION 227: DRAINAGE SYSTEM SEDIMENT

Subsection 227.30, Method of Measurement
Change the subsection number to 227.80

Subsection 227.31, Basis of Payment
Change the subsection number to 227.81

Subsection 227.31, Payment Items
Change the subsection number to 227.82

SECTION 400: SUB-BASE, BASE COURSE, SHOULDERS, PAVEMENT AND BERMS

SUBSECTION 430: CEMENT CONCRETE BASE COURSE

Subsection 430.40: General
Change Applied Crack Sealer to Hot Applied Crack Sealer.

SUBSECTION 476: CEMENT CONCRETE PAVEMENT

Subsection 476.20: Materials
Delete Preformed Bituminous Joint Filler for Concrete - M3.05.5 and add the following in M number sequence:

Preformed Expansion Joint Filler	M9.14.0

SUBSECTION 477: MILLED RUMBLE STRIPS

Subsection 477: Milled Rumble Strips
Replace this subsection with the following:

DESCRIPTION

477.20: General

The work consists of constructing rumble strips on roadways by milling grooves into finished surfaces. Milled Rumble Strips are categorized as Type A, Type B, Type C, or Type D. Type A are rectangular milled grooves at regular intervals in the paved surface, Type B rumble strips are rectangular grooves at regular intervals with designed gaps between intervals to accommodate bicyclists, and Type C and Type D rumble strips form continuous grooves in the paved surface in the form of a vertical sinusoidal wave pattern.

CONSTRUCTION METHODS

477.61: Equipment

The equipment shall self-align with the slope of the roadway surface and/or any irregularities in the roadway surface.

The Contractor shall demonstrate to the Engineer the ability to achieve the desired groove without tearing or snagging the roadway surface prior to beginning the work.

477.62: Installation of Rumble Strips

Rumble strips shall be installed in accordance with the locations, dimensions, and Type shown on the plans.

Type A and Type B rumble strips shall be installed after the longitudinal pavement markings they supplement (typically edge lines or channelizing lines) are in place. Installation of any diagonal or chevron pavement markings that cross the Type A or Type B rumble strips shall only occur after the rumble strips are in place.

Type C rumble strips shall be installed after the location of the longitudinal pavement markings they supplement (typically center lines) has been laid out, but before the pavement markings are installed. The pavement markings shall only be installed after the Type C rumble strips are in place.

Type D rumble strips shall be installed after the longitudinal pavement markings they supplement (typically center lines) are in place.

477.63: Control of the Work Area

At the end of each working day, all equipment shall be moved to a location where it does not present a hazard to traffic. The pavement shall be cleaned by sweeping and the work area shall be reopened to traffic.

Pavement millings shall become the property of the Contractor and shall be removed and disposed of off-site.

COMPENSATION

477.80: Method of Measurement

Milled Rumble Strip (Type A), Milled Rumble Strip (Type C), and Milled Rumble Strip (Type D) will be measured by the total length of installed rumble strip. Milled Rumble Strip (Type B) will be measured by the total length of installed rumble strip excluding the designed gaps. Breaks at castings, bridge decks, intersections or other breaks will not be measured for payment for all types.

477.81: Basis of Payment

Payment for Milled Rumble Strip (Type A), Milled Rumble Strip (Type B), Milled Rumble Strip (Type C), and Milled Rumble Strip (Type D) will be made at the contract unit price per foot of rumble strips, complete in place. Such payment will be full compensation for furnishing all equipment and labor for satisfactorily performing the work including cleanup and disposal of excess materials.

477.82: Payment Items

Item number	Description	Unit
477.	Milled Rumble Strip (Type A)	Foot
477.1	Milled Rumble Strip (Type B)	Foot
477.2	Milled Rumble Strip (Type C)	Foot
477.3	Milled Rumble Strip (Type D)	Foot

SUBSECTION 482: SAWCUTTING

Subsection 482.80: Method of Measurement
Replace this subsection with the following:

Sawcutting, when included in the Contract as its own bid item, will be measured for payment by the foot along the cut line, regardless of depth.

SECTION 600: HIGHWAY GUARD, FENCES AND WALLS

SUBSECTION 628: IMPACT ATTENUATORS

Subsection 628.82: Payment Items
Replace this subsection with the following:

Item number	Description	Unit
628.302	Permanent Impact Attenuator, Non-Redirective, TL-2	Each
628.303	Permanent Impact Attenuator, Non-Redirective, TL-3	Each
628.304	Temporary Impact Attenuator, Non-Redirective, TL-2	Each
628.305	Temporary Impact Attenuator, Non-Redirective, TL-3	Each
628.312	Permanent Impact Attenuator, Redirective, TL-2	Each
628.313	Permanent Impact Attenuator, Redirective, TL-3	Each
628.314	Temporary Impact Attenuator, Redirective, TL-2	Each
628.315	Temporary Impact Attenuator, Redirective, TL-3	Each
628.322	Permanent Impact Attenuator, Low-Maintenance, TL-2	Each
628.323	Permanent Impact Attenuator, Low-Maintenance, TL-3	Each

SECTION 800: TRAFFIC CONTROL DEVICES

SUBSECTION 813: WIRING, GROUNDING AND SERVICE CONNECTIONS

Subsection 813.20: General
Replace this subsection with the following:

This work shall consist of furnishing and installing wire and cable of the type and size indicated for traffic signals and other traffic control devices, ITS systems, highway lighting and related electrical systems, equipment grounding systems, new ground electrodes or connections to existing ground electrodes, power pedestals, and all materials and equipment necessary to deliver power to such systems.

Service points shown on the plans are approximate only. The Contractor shall determine exact locations for both overhead and underground service access points. The Contractor shall determine riser elevations or connections/routing to manhole facilities from the serving utility, and arrange to complete the service connections.

All work under this Subsection shall comply with the MEC and the National Electrical Safety Code.

Subsection 813.41: Grounding and Bonding Conductions
Replace this subsection with the following:

Grounding and bonding conductors shall conform to M8.16.10: Type 10 Grounding and Bonding Conductors (Solid or Stranded, Insulated or Bare).

Subsection 813.42: Ground Rods
Replace this subsection with the following:

Ground rods shall consist of driven rod(s) conforming to M8.17.0: Ground Rod or other devices approved for the purpose.

Subsection 813.44: Power Pedestal
Add this subsection in numerical order:

A Power Pedestals shall consist of a side-of-post mounted lockable load center enclosure, a load center with circuit breakers, an exterior-mounted electrical meter, signal post and base, equipment bonding, ground rod(s) conforming to 813.42: Ground Rods, and a cement concrete foundation. The enclosure, lock, circuit breakers, signal post and base, and foundation shall all be included in the Shop Drawing submission.

The enclosure shall be rated to meet or exceed NEMA 3R and be suitable for post-mounting and shall be sized appropriately to house the load center. The enclosure shall be capable of being secured with an integrated locking mechanism or by a Contractor-supplied padlock; regardless of locking mechanism, it shall be operated with a #2 key.

The circuit breakers shall be designed for single-phase, 3-wire, 120/240 VAC. Circuit breakers shall provide a means to manually operate a circuit and/or automatically open a circuit that is in overload or short circuit conditions. All circuit breakers shall be UL listed and have CSA certification.

The enclosure shall be furnished with a meter socket installed. The meter socket shall be approved by the servicing electrical utility.

The signal post and base shall conform to M10.05.1: Signal Posts and Bases and the Plans. The Contractor shall supply a square aluminum base with a natural or anodized finish and a Schedule 80 aluminum post with a brushed or spun finish, unless otherwise indicated in the Plans.

The Contractor shall supply mounting equipment recommended by the enclosure manufacturer to side-mount the cabinet to the post.

Bonding for the Power Pedestal shall utilize a #8 AWG or larger ASTM-B3 wire.

The cement concrete foundation shall conform to the Plans and M4.02.0: Concrete Produced by Stationary and Truck Mixers, M4.03.0: Concrete Produced by Volumetric Mixers, M4.06.1: Conventional Concrete, M4.09.0: Precast, Prestressed, and Prefabricated Concrete Products, M4.11.0: Evaporation Reducing Materials, and M4.12.0: Curing Materials, as applicable.

Subsection 813.64: Power Pedestal
Add this subsection in numerical order:

No work shall commence until Shop Drawings have been approved.

The Power Pedestal Cabinet shall be mounted side-of-post to the Signal Post, per the manufacturer's recommendations. The Power Pedestal Cabinet should be installed directly below the meter socket, per the Plans. If dissimilar metals are present, they shall be electrically insulated to prevent galvanic corrosion.

The Contractor shall supply the appropriate type (single pole or double pole) and number of circuit breakers included within the Power Pedestal Cabinet to provide the recommended AC power to each device receiving power from the Cabinet. The circuit breakers shall be clearly labeled as to which device they are powering (e.g. RRFB-1, RRFB-2, Warning Beacon, Speed Feedback Sign, etc.).

The Power Pedestal shall be grounded and bonded per 813.61: Equipment Grounding and Bonding and 813.62: Grounding Electrodes.

Subsection 813.80.E: Power Pedestal
Add this subsection in numerical order:

Power Pedestals will be measured by the number of Power Pedestals each furnished and installed.

Subsection 813.81.E: Power Pedestal
Add this subsection in numerical order:

Power Pedestals will be paid for at the contract unit price for each installed in place. This includes all labor and materials required for a working system.

All costs associated with grounding and bonding of Power Pedestals shall be considered incidental to the item.

All costs associated with providing service connections to Power Pedestals shall be paid for under their respective pay items.

Subsection 813.82: Payment Items
Change the unit of measure for items 813.80 and 813.81 to Each and add the following pay item:

Subsection 815.82: Payment Items
Delete payment items 818.90 to 818.94, 819.39, 819.832, 819.52, 819.53, 819.60 to 819.64, 819.70, 819.71, 819.72, 819.800, 819.801, 819.802, 819.803,:819.810, 819.811, 819.820, 819.821, 819.850, 819.851, 819.852.

Add the following payment item:

813.90	Power Pedestal	Each

SUBSECTION 819: TRAFFIC SIGNAL DETECTION

Subsection 819: Traffic Signal Detection
Add this subsection:

DESCRIPTION

819.20: General

Work under this Subsection consists of furnishing and installing detection devices for vehicles, bicycles, pedestrians, and other road users.

MATERIALS

819.40: General

Materials shall meet the requirements specified in the following Subsections of Division III, Materials:

Material	Section
Vehicle Detection Systems	M10.08.0
Passive Stop Line Detectors	M10.08.1
Passive Advanced Detectors	M10.08.2
Pedestrian Detectors	M10.09.0
Pedestrian Pushbutton Assembly	M10.09.1
APS Pushbutton Assembly	M10.09.2

The Contractor shall furnish Vehicle Detection Systems (VDS) and Pedestrian Detectors that are listed on the QTCE.

Any software, firmware, cables, or adapters required to program, adjust, fine-tune, or monitor VDS or Pedestrian Detectors shall be provided by the Contractor. VDS and Pedestrian Detectors shall have the latest versions of software and/or firmware installed prior to inspection. Manufacturer updates to software and/or firmware shall be included at no cost for the life of the products.

819.40.A: Vehicle Detection Systems

A VDS shall consist of one or more Internet Protocol (IP) -based detector/sensor assemblies and a cabinet interface device that is installed in a Traffic Signal Controller Cabinet or similar device.

Stop Line VDS shall be capable of providing motor vehicle and bicycle detection at all locations shown on the Plans. The Contractor may furnish a VDS that utilizes a single detector/sensor or multiple, as long as all stop line motor vehicle and bicycle detection zones are encompassed and the traffic signal or other device utilizing the detection can operate per the Plans. All Passive Stop Line Detectors required to provide stop line detection at an intersection shall be included in the cost of a single Stop Line Vehicle Detection System.

If the Contractor furnishes a Stop Line VDS that does not utilize an integrated video monitoring system, a separate video monitoring system per 819.41: Video Monitoring System shall be furnished and installed at no additional cost.

Advanced VDS shall be capable of providing motor vehicle detection on a single approach, at the location shown on the Plans. The Contractor Shall furnish Passive Advanced Detectors that utilize, and are compatible with, the same interface device installed in the Traffic Signal Controller Cabinet, or similar device, as the Stop Line VDS.

All VDSs shall be furnished with manufacturer-supplied mounting hardware.

If multiple VDSs over multiple locations are supplied under a single contract, all components furnished by the Contractor shall be of the same make and model.

819.40.B: Pedestrian Detectors

Pedestrian Pushbutton Assembly and Accessible Pedestrian Signal (APS) Pushbutton Assembly shall both include a pushbutton, sign, housing, manufacturer-specified mounting hardware, and wiring. The Contractor shall review the Contract Documents to determine if one or more in-cabinet control units are required to meet the pedestrian detector type and operational requirements. In-cabinet control units shall be considered incidental to the cost of the item.

The Contractor shall provide a pushbutton housing that conforms to the shape of the pole it is mounted to or shall furnish and install a manufacturer-supplied saddle to provide a flush, secure fit, at no additional cost.

An APS Pushbutton Assembly shall include a pedestrian pushbutton sign that conforms to the Plans. If the sign is not integral to the housing, separate mounting equipment shall be furnished and installed by the Contractor. All costs associated with the sign and mounting equipment shall be considered incidental to the cost of the item.

819.41: Video Monitoring System

When required by 819.40.A: Vehicle Detection Systems, the Contractor shall furnish and install a Video Monitoring System. The Video Monitoring System shall consist of one or more IP-based 4K, 1080p, H.264 dome-type CCTV cameras; mounting hardware, including but not limited to: brackets, bands, straps, posts, plates, and pole mount adapters; power distribution and conditioning equipment including surge suppression; and all necessary cabling and wiring.

All equipment provided for the Video Monitoring System shall be commercial, off-the-shelf products. Custom equipment designed specifically for the Contract will not be accepted. All cabling and wiring shall be recommended by the manufacturer and rated for outdoor use. Any special wiring or connectors required by the manufacturer shall be identified in the Shop Drawings.

The Video Monitoring System shall conform to National Electrical Manufactures Association (NEMA) standards, Underwriters' Laboratory (UL), and Military Standards (MIL), as applicable. All components of the Video Monitoring System shall be new and still under production by the manufacturer. Obsolete, no longer produced, and/or no longer supported components will not be accepted.

The Video Monitoring System shall be capable of operating in temperatures ranging from -29°F to +165°F.

The camera shall meet or exceed the requirements found in Table 819.41-1:

Table 819.41-1: Minimum Camera Requirements

Feature	Requirement
Zoom Ratio	The minimum zoom ratio shall be 30x Optical and 12x Digital
Camera Type	The camera shall be an IP-type CCTV camera.
Auto Focus	The camera shall include auto focus with a selection for manual override of auto focus.
Lens Aperture Ratio	Typical: F/1.6 to F/4.7 (wide to telephoto)
On-Screen Direction	The CCTV camera shall display on-screen azimuth indications.
Privacy Zones	The CCTV camera shall be programmable to blank out up to 8, four-sided areas to electronically block portions of the camera's field of view from being

Feature	Requirement
	displayed. These privacy zones shall move and adjust sizing synchronously with camera movements and degree of lens zooming.
On-Screen Labels, Text and Titles	The CCTV camera shall display a minimum of 20 programmable characters for on-screen camera ID, preset position, sector, and alarm titles.
On-Screen Labels, Text and Title Positioning	The position of the on-screen text shall be adjustable to appear at selectable positions on the CCTV camera screen image.
Number of Pixels	The camera shall provide a minimum of 1280H x 720V effective pixels. The camera shall be capable of being configured to operate at all standard lower resolutions down to 320H x 180V effective pixels.
Image Sensor Size	The camera shall include an image sensor of 1/1.8 in., nominal.
Lens Focal Length	The camera shall include a zoom lens of 4.3 mm to 129 mm, minimum focal length.
Color and Black & White Image Selection	The camera shall have Color and Black & White video image display modes incorporating both automatic and manual override image mode selection. The camera shall transition automatically to a Black & White mode (when in automatic mode) when the luminance level reaches a user predefined threshold. At all times the camera shall provide a full motion video output at 30 frames per second.
Image Stabilization	The CCTV camera shall incorporate electronic image stabilization to reduce the effects of vibration and wind gusts on the displayed video image.
Automatic Iris	The camera shall include both automatic iris control and an override for manual iris adjustments.
Wide Dynamic Range	The CCTV camera's wide dynamic range shall be 120 dB.
CCTV Camera Optical Sensitivity	The camera's sensitivity shall be sufficient to provide a clear, usable color video image display with a scene illumination of ≤ 0.1 lux at an aperture of F1.6, nominal.
Power Input	The power input for the CCTV camera and dome shall be PoE+.
Alarms	No alarm contacts shall be wired.

The Contractor shall mount the camera at a location that optimizes line-of-sight for all approaches. The view of each approach shall have a clear line of sight, free from obstructions from trees, overhead wires, buildings, and/or other obstructions. If the Contractor is unable to provide a clear line of sight for all approaches to the satisfaction of the Engineer, a second camera, including mounting hardware, cabling, and wiring, shall be furnished and installed on a different traffic signal structure at no additional cost.

The Contractor shall be responsible for the following items prior to installation:

- Ensure that all components are assembled and factory-tested prior to delivery to the project site.
- Fully configure the camera settings, including but not limited to: camera resolution, camera address, default settings, and pre-set and home positions, per the direction of the Engineer.
- Coordinate with the Engineer to set the camera address number to provide unique identification that is compatible with the CCTV camera addressing schema utilized by the Department.

The Contractor shall deliver the camera(s) fully assembled to the project site.

The Contractor shall provide up to 3 hard copy sets of operating manuals, service manuals, and maintenance instructions for all components of the system. At the request of the Engineer, the number of copies may be reduced if the manuals are provided in .pdf file format.

819.42: Material Warranties

All components of Vehicle Detection Systems, including Video Monitoring Systems, and Pedestrian Detectors shall include a minimum two-year manufacturer's replacement warranty that will commence upon acceptance by the Engineer. The warranty shall cover any manufacturing defects of the products.

Construction Methods

819.60: General

The Contractor shall use discretion in installing the detectors/sensors at locations that optimize the performance of the VDS and to eliminate false calls. The Contractor shall notify the Engineer if the size or location of the detection zones differs from what is shown in the Plans. At the direction of the Engineer, the Contractor will be required to readjust the location of the detection zones and/or modify the detection channels if false calls are observed or the traffic signal system is not operating per the Plans due to the performance of the VDS; this work shall be considered incidental to the cost of the item.

The Contractor shall use manufacturer-specified mounting hardware for all detectors/sensors. If mounted to mast arms or strain poles, any addition weight or wind loading from the detector/sensor shall be accounted for in the structural calculations.

The Contractor shall install the cabinet interface device in the traffic signal controller cabinet. The cabinet interface device shall be connected to the Field Monitoring Unit (FMU) or an ethernet switch in the traffic signal controller cabinet. All communication between devices shall be IP-based. Use of external communications that are not routed through the FMU is prohibited.

The Contractor shall furnish and install low voltage power cabling surge protection equipment required for all data and power lines associated with VDS, Video Monitoring Systems, and/or Pedestrian Detection Systems entering the traffic signal controller cabinet.

The Contractor shall install the manufacturer-specified cable between the detectors/sensors to the cabinet interface device in the traffic signal controller cabinet via traffic signal structures, conduit, and/or pullboxes. This shall include all connectors, sealing tape, and incidental work to complete the connection(s). All equipment installation and wiring shall be installed in a neat and orderly manner and per the manufacturer's specifications.

The VDS shall be powered through one of the power outlets available on the FMU. The VDS shall be capable of being powered down and remotely restarted through remote control of the power outlet on the FMU.

Under the supervision of the Engineer, the Contractor shall install the VDS software that allows visual confirmation of the detection zones on Department computers.

The Contractor shall install Pedestrian Detectors at the location(s) and mounting height shown on the Plans.

The Contractor shall mount and orient the APS Pushbutton Assembly in a manner so that the vibrotactile arrow is aligned parallel to the crosswalk.

Prior to acceptance, the Contractor shall furnish all passwords for Vehicle Detection Systems and Pedestrian Detectors to the Engineer. The use of default passwords is prohibited.

819.61: Programming APS Pushbuttons

Each APS Pushbutton shall have an audible walk indication during the associated walk interval. The duration of the audible walk indication shall match the duration of the walk interval unless the pedestrian signal is programmed to rest in walk. If programmed to rest in walk, the audible walk indication shall be limited to 7 seconds in length but may be recalled by a subsequent button press during the walk interval.

The APS Pushbutton locator tone and audible walk indication shall be programmed to broadcast at volume 5 dBA louder than ambient sound, except when audible beaconing is provided in response to an extended pushbutton press. The broadcast volume shall be programmed to not exceed 100 dBA at 3 ft. from the emitter, regardless of ambient noise conditions.

The locator tone shall have a duration of 0.15 seconds or less and shall repeat at 1-second intervals.

The locator tone shall be active during all signal intervals, except for the following conditions:

- When the audible walk indication is being broadcast.
- If the signal is programmed to rest in walk, the locator tone shall resume 7 seconds after the start of the walk interval.
- The locator tone shall be disabled if the traffic control signal or pedestrian hybrid beacon is operating in an emergency or fault flashing mode.

The locator tone shall be active during the flashing yellow and alternating flashing red intervals of a pedestrian hybrid beacon phasing sequence.

Upon button press, the locator tone at that pushbutton shall be interrupted and a speech message of “Wait” shall be broadcast.

The normal status of the pilot light shall be dark. The pilot light shall illuminate upon button press and stay illuminated until the start of the walk interval, when it shall return to dark. If the associated pedestrian phase is set to pedestrian recall, the pilot light shall stay illuminated for all intervals except for the walk interval.

The audible walk indication shall an audible tone unless a speech message is called for in the Plans. The audible tone shall repeat at 8 to 10 ticks per second, in multiple frequencies, with the dominant component at 880 Hz.

If a speech message is used, the following shall apply:

- For exclusive pedestrian phases, during the walk interval the speech message shall be: “walk sign is on for all crossings.” This message shall be broadcast a single instance.
- *For concurrent pedestrian phases, during the walk interval the speech message shall be: “[STREET NAME]. Walk sign is on for [STREET NAME].” This message shall be broadcast a single instance.
- If the signal is programmed to rest in walk, the concurrent pedestrian speech message shall be repeated upon each subsequent button press.

*Note: See Plans for Street Name information.

The vibrotactile arrow shall vibrate during the walk interval.

The Contractor shall include a fault relay that will default to placing a constant pedestrian call from any pushbutton assembly that fails to communicate back to the in-cabinet control unit.

The Contractor shall connect the in-cabinet control unit to the Field Monitoring Unit (FMU) via an open ethernet port.

819.62: VDS Testing and Evaluation

After the VDS is installed, but prior to acceptance, the Contractor shall conduct an evaluation of the system in the presence of the Engineer. The purpose of the evaluation is to certify the system is operating per the requirements of M10.08.0: Vehicle Detection Systems, M10.08.1: Passive Stop Line Detectors, and M10.08.2: Passive Advanced Detectors, as applicable. The Contractor shall submit their testing and evaluation plan as a part of the Shop Drawing submittal.

The testing and evaluation shall take place for a minimum of 30 minutes under moderate live traffic conditions. Testing shall not be conducted during inclement weather.

If the Engineer determines that the system does not meet the operational requirements, the Contractor will be required to adjust the location, orientation, and/or number of detector/sensors. The Contractor may also adjust the location of the detection zones at this time. Upon completion of this work, the system shall be reevaluated in the presence of the Engineer. This process shall be repeated until the operational requirements are met.

All costs associated with testing and evaluation of the VDS, including the repositioning or addition of new materials, shall be considered incidental to the item.

Compensation

819.80: Method of Measurement

Stop Line Vehicle Detection Systems will be measured as each system furnished and installed.

Advanced Vehicle Detection Systems will be measured as each system furnished and installed.

Pedestrian Pushbuttons and APS Pushbuttons will be measured as each pushbutton furnished and installed.

819.81: Basis of Payment

Stop Line Vehicle Detection Systems will be paid for each system installed at an intersection. For the purposes of this work, an intersection shall be defined as all roadway, path, and/or trail approaches controlled by a single traffic signal controller. Where a Video Monitoring System is required per 819.40: General, it shall be included in the cost of Item 819.840.

Advanced Vehicle Detection System will be paid for each system installed on an intersection approach.

Pedestrian Pushbutton and APS Pushbutton will be paid for each pushbutton assembly installed. The pedestrian sign mounted directly above the pushbutton shall be considered incidental to the item.

The unit cost of each vehicle detection system or pushbutton item shall include all wiring, cabling, mounting hardware, software, firmware, video monitoring system (if required), testing, calibrating, Department Acceptance, training, and all other labor and materials required for the system(s) to operate per the Plans.

819.82: Payment Items

Item number	Description	Unit
819.840	Stop Line Vehicle Detection System	Each
819.845	Advanced Vehicle Detection System	Each
819.850	Pedestrian Pushbutton	Each
819.855	APS Pushbutton	Each

SUBSECTION 850: TRAFFIC CONTROLS FOR CONSTRUCTION AND MAINTENANCE OPERATIONS

Subsection 850.25: Arrow Board
Subsection 850.45: Arrow Board
Subsection 850.65: Arrow Board
Delete these subsections.

Subsection 850.80: Method of Measurement
Delete the 7th paragraph beginning with "Arrow Board will be measured …"

Subsection 850.81: Basis of Payment
Delete the 7th paragraph beginning with "Arrow Board will be paid for …"

Subsection 850.82: Payment Items
Revise description and unit of item 852. to Safety Signing for Traffic Management / Square Foot.
Delete item number 856.

SUBSECTION 856: CONNECTED WORK ZONE NOTIFICATION SYSTEM AND ASSOCIATED DEVICES

Subsection 856: Connected Work Zone Notification System and Associated Devices
Add this new subsection.

DESCRIPTION

856.20: General

The Connected Work Zone Notification System (CWZNS) is a system of field devices that transmit real-time location-based data about work zones. CWZNS field device data is provided in a Work Zone Data Exchange (WZDx) Device Feed in accordance with the United States Department of Transportation (USDOT) WZDx Specification. The Device Feed is consumed by the MassDOT Work Zone Manager (WZM) application.

The Contractor shall be responsible for furnishing, installing, repositioning, operating, maintaining, and removing these CWZNS devices.

MATERIALS

856.40: General

Materials shall meet the requirements specified in the following Subsections of Division III, Materials:

Material	Section
Connected Work Zone Notification System Devices	M10.18.0
Location Marker	M10.18.1
Connected Arrow Board	M10.18.2

End Location Markers shall conform to M10.18.1: Location Marker and include power and communication status lights and an on/off switch.

856.41: Arrow Board

Arrow Boards shall consist of a matrix of yellow elements that may be illuminated in flashing or sequential patterns, on a non-reflective, black background. The light output from the Arrow Board shall meet the minimum legibility distance, per the MUTCD. The elements shall be capable of at least 50% dimming from full brilliance to avoid nighttime glare. Arrow Boards that are continuously operational in both daylight and nighttime conditions shall automatically adjust the light output based upon ambient light conditions.

The mounting height of the Arrow Board, when in operation, shall be per the Plans.

The minimum dimensions and number of elements for Arrow Boards shall be per Table 856.41-1.

Table 856.41-1: Arrow Board Dimensions and Elements

Item Numbers	MUTCD Type	Minimum Dimensions (width by height)	Minimum Number of Elements
856.060, 856.160	B	60 in. by 30 in.	13
856.096, 856.196	C	96 in. by 48 in.	15

Arrow Boards shall be capable of the following operating modes, per the MUTCD:

- Four Corners Flashing Caution
- Alternating Diamond Caution
- Flashing Arrow (left or right)
- Sequential Chevron (left or right)
- Flashing Double Arrow

Arrow Boards that are categorized as "Connected Arrow Boards" (Items 856.160 and 856.196) shall meet the requirements of M10.18.2: Connected Arrow Board in addition to the requirements of an Arrow Board described in this Subsection.

856.42: Shop Drawings

Within 30 days of the Notice to Proceed, the Contractor shall submit to the Engineer for review and approval cut sheets for each model of CWZNS device to be used. The cut sheets shall document device specifications, including details of how the CWZNS device will communicate. Work that requires the use of CWZNS devices shall not commence until the submission has been approved.

CONSTRUCTION METHODS

856.60: General

At least 15 days prior to deploying CWZNS devices, the Contractor shall visit the site to verify cellular coverage. If the devices the Contractor plans to deploy do not have coverage, the Contractor shall swap out the cellular modem, SIM card, or both to a carrier that provides coverage. If no adequate cellular coverage exists from 4G LTE or 5G providers, the Contractor shall immediately notify the Engineer.

The Contractor shall install CWZNS devices at the locations shown on the Plans.

Per the WZDx Specification Device Feed, an End Location Marker shall have a single MarkedLocation with the "type" property as "work-zone-end".

The Contractor shall install and power on the End Location Marker coinciding with the deployment of the temporary traffic control setup that calls for its use. The Contractor shall power down and remove the Location Marker at the conclusion of the removal of the temporary traffic control setup. If the location of the work moves during a work shift, the Contractor shall power down the Location Marker, relocate it, and then power it back on.

The operating mode for the Arrow Board or Connected Arrow Board shall be per the Plans. When activated, the minimum element on-time shall be 50% for the flashing mode, with equal intervals of 25% for each sequential phase. The flashing rate shall be not less than 25 or more than 40 flashes per minute.

If a Connected Arrow Board is being used to transmit its location without utilizing other arrow board functions, such as operating a Flashing Arrow, the arrow board shall remain dark and removed from the roadway or protected from approaching traffic while the data is being transmitted.

The Contractor shall be responsible for remediating any CWZNS device that is not operating as specified, at no additional cost to the Department.

CWZNS devices that are lost, stolen, vandalized, damaged, destroyed, or deemed unacceptable while their use is required on the project shall be replaced by the Contractor at no additional cost to the Department.

COMPENSATION

856.80: Method of Measurement

Arrow Boards and Connected Arrow Boards will be measured by the Day. Each period of up to 24 hours during which an Arrow Board or Connected Arrow Board is in use will be measured as one day, regardless of the number of times that the unit is positioned, repositioned, removed, or returned to service.

End Location Markers will be measured by the Day. Each period of up to 24 hours during which a End Location Marker is in use will be measured as one day, regardless of the number of times that the unit is positioned, repositioned, removed, or returned to service.

856.81: Basis of Payment

Arrow Boards and Connected Arrow Boards will be paid for at the contract unit price per day which shall include full compensation for labor and materials, positioning, repositioning, and removing or returning to service.

End Location Markers will be paid for at the contract unit price per day which shall include full compensation for labor and materials, positioning, repositioning, and removing or returning to service.

If an End Location Marker is attached to another traffic control device that is not otherwise called for in the Plans or Specifications, that ancillary device shall be considered incidental to the cost of the End Location Marker.

Licenses, fees, communication costs, power costs, and access to real-time and recorded data associated with the Device Feed for CWZNS devices shall be considered incidental to the cost of the item.

The Department will not pay for CWZNS devices that fail to operate as specified.

856.82: Payment Items

Item number	Description	Unit
856.060	Arrow Board (Type B)	Day
856.096	Arrow Board (Type C)	Day
856.160	Connected Arrow Board (Type B)	Day
856.196	Connected Arrow Board (Type C)	Day
856.201	End Location Marker	Day

SECTION 900: STRUCTURES

SUBSECTION 901: CEMENT CONCRETE

Subsection 901.20: Materials

Delete Asphaltic Materials – M3, Preformed Bituminous Fiber Joint Filler – M3.05.3 and add the following in M number sequence:

Preformed Expansion Joint Filler	M9.14.0

SUBSECTION 983: REVETMENT

Subsection 983.40: General
Delete Preformed Bituminous Fiber Joint Filler – M3.05.3 and add the following in M number sequence:

Preformed Expansion Joint Filler	M9.14.0

DIVISION III

MATERIALS SPECIFICATIONS

SECTION M3: ASPHALTIC MATERIALS

Subsection M3.05.5: Preformed Bituminous Joint Filler for Concrete
Delete this subsection.

SECTION M9: MISCELLANEOUS MATERIALS

Subsection M9.14.0: Preformed Expansion Joint Filler
Replace this subsection with the following:

Preformed expansion joint filler for concrete applications and structural construction shall meet the requirements specified herein. The Contractor shall provide certified test data which documents compliance with the required physical properties. The certified test data shall be submitted to the Engineer for approval.

Table M9.14.0-1: Types of Preformed Expansion Joint Filler

Specification	Type and Description
AASHTO M 153	Type I – Sponge Rubber Type II – Cork Type III – Self-Expanding Cork Type IV – Polyurethane-Bonded Recycled Rubber
AASHTO M 213	Type I – Asphalt-Saturated Cellulosic Fiber Type II – Asphalt Binder-Cork with Asphalt-Saturated or Glass Fiber Felt Type III – Polyurethane-Bonded Recycled Rubber
ASTM D1752	Type IV – Recycled PVC
ASTM D7174	Type I – Closed-Cell Polyethylene or Blended Polyethylene Foam
ASTM D8139	Type I – Closed-Cell Polypropylene Foam

Subsection M9.14.2: Closed Cell Foam Joint Filler
Delete this subsection:

M10.03.1: Field Monitoring Unit

All Field Monitoring Units (FMU) shall be compatible with the MassDOT Critical Operations Multi-jurisdictional Modular System (MCOMMS), cloud-based management system.

Subsection M9.14.2: Closed Cell Foam Joint Filler
Delete this subsection:

SECTION M10: TRAFFIC CONTROL DEVICES

Subsection M10.03.1: Field Monitoring Unit
Add these new subsections:

M10.03.1: Field Monitoring Unit

All Field Monitoring Units (FMU) shall be compatible with the MassDOT Critical Operations Multi-jurisdictional Modular System (MCOMMS), cloud-based management system.

FMUs shall be capable of operating independently from the brand of traffic signal controller, vehicle and pedestrian detection systems, battery backup system (BBS), and any other Ethernet-based, web accessible device present in the traffic signal controller cabinet.

M10.03.1.A: Hardware

The FMU shall communicate via an Ethernet port with an RJ45 connector and have an integrated Ethernet switch with a minimum of four ports.

The FMU shall be powered via standard 120 VAC input power. The FMU shall include an integrated battery and battery charging/monitoring circuit that will allow the FMU to fully function even if all other electrical service to the cabinet has been interrupted. The battery shall continue to supply the FMU with power for a minimum of 5 hours on a single charge.

The FMU shall have an integrated GPS that will allow for automated telemetry without additional configuration. The GPS shall be capable of providing a time sync pulse to the internal clock of a connected traffic signal controller. The FMU shall utilize the integrated GPS to geolocate itself on a map via the FMU management software.

M10.03.1.B: Software

The configuration of the FMU shall be accomplished by accessing FMU management software via an internet browser. It shall be possible to configure the FMU without any special software.

The FMU shall operate without requiring a static IP address. The only configuration required at the FMU is to enter the URL to the host of the FMU management software.

The FMU shall utilize HTTPS protocols and XML data structure for communications with the FMU management software. The data shall be scalable for future expansion; proprietary protocols shall not be used.

M10.03.1.C: Wireless Connectivity

The FMU shall be supplied with an internal 4G LTE cellular modem.

The modem shall support future upgrades to 5G service, when available, and shall be compatible with SIM cards from multiple cellular carriers.

M10.03.1.D: Remote Access

Remote access to any traffic signal cabinet component that has a web interface via the FMU shall not require the end user to create a separate Virtual Private Network (VPN) connection.

Subsection M10.08.0: Vehicle Detection Systems
Subsection M10.08.0: Vehicle Detection Systems
Subsection M10.08.0: Vehicle Detection Systems
Add theses new subsections:

M10.08.0: Vehicle Detection Systems

Vehicle Detection Systems (VDS) shall be capable of detecting the presence of all motor vehicle types and bicycles in designated areas and sending corresponding detector outputs to a traffic signal controller.

All in-cabinet components of VDS shall be compatible with the following standards:

- ATCC 5301 v02
- ATC 5201 v06
- NEMA TS2 environmental standards

Through an ethernet-based connection to the detection module and/or cabinet interface device in the field or through the internal network of the traffic signal controller cabinet, the VDS shall support remote management of motor vehicle and bicycle detection configurations and access to data including:

- The number, location, and size of detection zones.
- Configuration of the detector channel and assigned phase for each zone.
- Configuration of detection zones for signal performance measurement data collection.
- The ability to add and remove users.
- Signal performance data:
  - Monitoring and recording the status of the phase and detector channels from the traffic signal controller through the SIU bus at a frequency of no less than 10 times per second.
  - Estimation of the speed of vehicles at defined, user-configurable points, such as entering or exiting a detection zone.
  - Retrieval of the signal performance data through an http-based Application Programming Interface (API), or equivalent process, in .xml, .json, or .csv format.
  - The data shall be available in a per vehicle format, be viewable in real time, and store at least 168 hours of data locally on the device.

VDS shall be capable of supporting user-based restrictions to limit functionality, including:

- The ability to make changes to the VDS settings.
- The ability to view imagery or digital video streams.
- The ability to view and download signal performance data.

VDS shall be capable of automatically determining if the system's ability to accurately detect vehicles and shall default to a constant call state if this system error is detected.

VDS shall be capable of classifying vehicles based upon length and/or number of axles.

VDS shall be capable of performing all detection, classification, and data collection functions in the absence of an internet connection.

VDS shall be capable of providing remote access to the latest images or digital video stream of all IP video units through either an HTTP request or through a Real Time Streaming Protocol compatible with RFC2326 standards. VDS that do not utilize video shall be able to display the current state of the vehicle detection zones and approximate vehicle locations in a digital twin model of the intersection.

M10.08.1: Passive Stop Line Detectors

Passive Stop Line Detectors shall demonstrate a reliability of 99% or greater for vehicle detection functions.

Passive Stop Line Detectors shall be able to track and classify turning movements for all motor vehicle types and bicycles and shall demonstrate an accuracy of 95% or greater for turning movement counts.

M10.08.2: Passive Advanced Detectors

Passive Advanced Detectors shall be capable of detecting all motor vehicle types at a minimum distance of 600 ft upstream of the stop line.

Subsection M10.09.0: Pedestrian Detectors
Subsection M10.09.1: Pedestrian Pushbutton Assembly
Subsection M10.09.2: APS Pushbutton Assembly
Add theses new subsections:

M10.09.0: Pedestrian Detectors

Pedestrian Detectors shall be capable of detecting the presence of pedestrians and placing a corresponding call for a phase in a traffic signal controller or similar device.

Pedestrian Detectors may be pushbuttons or passive detection devices.

Components of Pedestrian Detectors shall meet NEMA TS2 compliance for temperature and humidity, mechanical shock and vibration, transient voltage protection, transient suppression, and electrical reliability.

If Pedestrian Detectors include an in-cabinet control unit, it shall meet the following requirements:

- Operate on a cabinet-supplied 120 VAC power source.
- Include labelled LED indicators for each channel operation.
- Include a 10/100BaseT, RJ45 ethernet connector port.
- Capable of communication with the Pedestrian Detectors to allow for remote programming and firmware updates via the ethernet connection.
- Capable of supporting a minimum of 4 pedestrian detectors per NEMA pedestrian phase and up to 16 pushbuttons.
- Will automatically reset upon loss of internal communication.

M10.09.1: Pedestrian Pushbutton Assembly

A Pedestrian Pushbutton Assembly shall consist of a pushbutton, a sign, and a housing to mount those devices to a post.

The pushbutton shall be a minimum of 2 in. in diameter and the force to activate it shall be no greater than 5 lbs. The pushbutton must be weather-tight and tamper-resistant.

The pushbutton shall meet one of the following criteria:

- A normally open, mechanical phenolic enclosed, positive-acting, spring-loaded, audible (i.e., click) snap-action switch with single pole, single throw contacts; or
- A piezo-driven solid state switch rated for a minimum of 50 V, a minimum of 20 million cycles, and capable of providing an audible indication of actuation.

The pushbutton shall have an operating voltage range of 12 to 36 VDC.

The housing shall be yellow.

Housings that include an integral sign mount for the pedestrian pushbutton sign shall be capable of mounting a 9 in. by 12 in. or 9 in. by 15 in. sign (width by height).

M10.09.2: APS Pushbutton Assembly

An APS Pushbutton Assembly shall meet all of the requirements of M10.09.1: Pedestrian Pushbutton Assembly, and the following.

The pushbutton shall have a vibrotactile arrow. The arrow shall have high visual contrast (light on dark or dark on light).

APS Pushbutton Assembly shall be capable of the following:

- Emitting a locator tone.
- Providing two types of audible walk indications: an audible tone in multiple frequencies and a speech message. The type of audible walk indication will be programmed by Contractor per the Plans.
- Emitting sound via one or more speakers that automatically adjust to ambient noise and shall also be capable of being capped at a preprogrammed level.
- Providing three functions as a result of an extended pushbutton press: increased crossing time, audible beaconing, and speech pushbutton information. The function of the extended pushbutton press will be programmed by the Contractor per the Plans.

APS Pushbutton Assembly shall include a latching red LED pilot light.

Subsection M10.18.: Connected Work Zone Notification System Devices
Add this new subsection.

M10.18.0: Connected Work Zone Notification System Devices

Connected Work Zone Notification System (CWZNS) devices shall include the following:

- An internal 4G LTE or 5G cellular modem. The modem shall be compatible with SIM cards from multiple cellular carriers, or the device shall be capable of using a cellular modem from more than one cellular carrier.
- An integrated GPS that will allow for automated telemetry without additional configuration.
- A self-contained power source that can be recharged without manual intervention. The power source shall enable uninterrupted operation of the CWZNS field device.
- Mounting and supporting hardware and wiring necessary to complete a working system.

CWZNS devices shall be capable of operating in temperatures ranging from -40°F to +122°F with no degradation in operation due to rain, fog, snow, ice, darkness, dust, or road debris.

CWZNS devices shall be physically and digitally secured to prevent unauthorized access.

When powered on, real-time data from CWZNS devices shall be provided in a USDOT Work Zone Data Exchange (WZDx) Specification Device Feed version 4.2. The Device Feed shall then be able to be consumed by the MassDOT Work Zone Manager (WZM) application. The Device Feed shall meet the following requirements:

- Each manufacturer of CWZNS field devices and Smart Work Zone (SWZ) field devices shall provide a single statewide Device Feed (a single URL) that consists of that manufacturer's field devices that are used by or under the direction of the Department.
- The Device Feed shall be made available via an HTTP GET request. The response shall be the WZDx Device Feed JSON object without a wrapper or paging.
- The Device Feed shall be public or use "Basic" HTTP Authentication.
- The Device Feed shall be provided over HTTPS.
- The Device Feed shall reflect changes in CWZNS field device status (e.g., display changed or device moved) no later than 60 seconds after they occur.
- For each CWZNS field device, the "update date" property shall be no older than 60 minutes, except when it has stopped communicating or is otherwise in error.
- The "id" property of each CWZNS field device feature in the Device Feed shall stay the same for the duration of the Contract and shall be a Universally Unique IDentifier (UUID) to guarantee uniqueness between feeds and over time.

M10.18.1: Location Marker

Location Markers shall meet the requirements of M10.18.0: Connected Work Zone Notification System Devices.

Location Markers may be standalone devices or an attachment to a channelizing device. Either type shall be certified to comply with the relevant minimum TL-3 testing requirements of the *Manual on Assessing Safety Hardware*.

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END OF SUPPLEMENTAL SPECIFICATIONS

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**CONTRACT PROVISIONS FOR
FEDERAL-AID CONSTRUCTION CONTRACTS**

I. General
II. Nondiscrimination
III. Davis-Bacon and Related Act Provisions
IV. Contract Work Hours and Safety Standards Act Provisions
V. Subletting or Assigning the Contract
VI. Safety: Accident Prevention
VII. False Statements Concerning Highway Projects
VIII. Implementation of Clean Air Act and Federal Water Pollution Control Act
IX. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion
X. Certification Regarding Use of Contract Funds for Lobbying
XI. Use of United States-Flag Vessels

ATTACHMENTS

A. Employment and Materials Preference for Appalachian Development Highway System or Appalachian Local Access Road Contracts (included in Appalachian contracts only).

I. GENERAL

1. Historically, contracting agencies using Federal-aid highway funds were required to ensure Form FHWA-1273 was physically incorporated into all contracts and subcontracts. Effective June 10, 2026, this requirement was eliminated [91 FR 25492]. Future use of Form FHWA-1273 is now optional on the part of the contracting agency using Federal-aid highway funds. FHWA continues to make Form FHWA-1273 available as a convenience to contracting agencies. Contracting agencies must continue to ensure compliance with the provisions cited in Form FHWA-1273 in accordance with the provisions regardless of the use of Form FHWA-1273. Accordingly, the contracting agency retains the authority to determine whether the contractor must use Form FHWA-1273 to physically incorporate required contract provisions in each subcontract and in lower tier contracts. Where permitted by the contracting agency, the contractor may choose other ways to include required contract provisions in each subcontract, besides incorporating Form FHWA-1273. Contract provisions in Form FHWA-1273 are not required to be physically included in subcontracts for design services on Federal-aid design-build contracts, or in purchase orders, rental agreements and other agreements for supplies or services.

The applicable provisions of Form FHWA-1273 are incorporated by reference for work done under any purchase order, rental agreement or agreement for other services. The prime contractor or design-builder shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider.

Contracting agencies may reference Form FHWA-1273 in solicitation-for-bids or request-for-proposals documents.

2. Subject to the applicability criteria noted in the following sections, these contract provisions shall apply to all work performed on the contract by the contractor's own organization and with the assistance of workers under the contractor's immediate superintendence and to all work performed on the contract by piecework, station work, or by subcontract.

3. A breach of any of the stipulations contained in these Required Contract Provisions may be sufficient grounds for withholding of progress payments, withholding of final payment, termination of the contract, suspension / debarment or any other action determined to be appropriate by the contracting agency and FHWA.

4. Selection of Labor: During the performance of this contract, the contractor shall not use convict labor for any purpose within the limits of a construction project on a Federal-aid highway unless it is labor performed by convicts who are on parole, supervised release, or probation. 23 U.S.C. 114(b). The term Federal-aid highway does not include roadways functionally classified as local roads or rural minor collectors. 23 U.S.C. 101(a).

II. NONDISCRIMINATION

The contractor and all subcontractors must comply with the following policies: 29 CFR Parts 1625-1627, 23 U.S.C. 140, Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. 794), Title VI of the Civil Rights Act of 1964, as amended (42 U.S.C. 2000d et seq.), and related regulations including 49 CFR Parts 21, 26, and 27, including any amendments thereto.

Note: The U.S. Department of Labor has exclusive authority to determine compliance with 29 CFR Parts 1625-1627. The contracting agency and the FHWA have the authority and the responsibility to ensure compliance with 23 U.S.C. 140, Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. 794), and Title VI of the Civil Rights Act of 1964, as amended (42 U.S.C. 2000d et seq.), and related regulations including 49 CFR Parts 21, 26, and 27, including any amendments thereto.

The provisions of the Americans with Disabilities Act of 1990 (42 U.S.C. 12101 et seq.) set forth under 28 CFR Part 35 and 29 CFR Part 1630 are incorporated by reference in this contract.

1.Assurances Required:

a. The requirements of 49 CFR Part 26, including any amendments thereto, and the State DOT's FHWA-approved Disadvantaged Business Enterprise (DBE) program are incorporated by reference.

b. The contractor, subrecipient or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR part 26, including any amendments thereto, in the award and administration of DOT-assisted contracts. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the recipient deems appropriate, which may include, but is not limited to:

(1) Withholding monthly progress payments;
(2) Assessing sanctions;
(3) Liquidated damages; and/or
(4) Disqualifying the contractor from future bidding as non-responsible.

c. The Title VI and nondiscrimination provisions of U.S. DOT Order 1050.2A at Appendixes A and E, including any amendments thereto, are incorporated by reference. 49 CFR Part 21.

III. DAVIS-BACON AND RELATED ACT PROVISIONS

This section is applicable to all Federal-aid construction projects exceeding $2,000 and to all related subcontracts and lower-tier subcontracts (regardless of subcontract size), in accordance with 29 CFR 5.5. The requirements apply to all projects located within the right-of-way of a roadway that is functionally classified as Federal-aid highway. 23 U.S.C. 113. This excludes roadways functionally classified as local roads or rural minor collectors, which are exempt. 23 U.S.C. 101. Where applicable law requires that projects be treated as a project on a Federal-aid highway, the provisions of this subpart will apply regardless of the location of the project. Examples include: Surface Transportation Block Grant Program projects funded under 23 U.S.C. 133 [excluding recreational trails projects], the Nationally Significant Freight and Highway Projects funded under 23 U.S.C. 117, and National Highway Freight Program projects funded under 23 U.S.C. 167.

The following provisions are from the U.S. Department of Labor regulations in 29 CFR 5.5 “Contract provisions and related matters” with minor revisions to conform to the FHWA-1273 format and FHWA program requirements.

1. Minimum wages (29 CFR 5.5)

a. *Wage rates and fringe benefits.* All laborers and mechanics employed or working upon the site of the work (or otherwise working in construction or development of the project under a development statute), will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of basic hourly wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics. As provided in paragraphs (d) and (e) of 29 CFR 5.5, the appropriate wage determinations are effective by operation of law even if they have not been attached to the contract. Contributions made or costs reasonably anticipated for bona fide fringe benefits under the Davis-Bacon Act (40 U.S.C. 3141(2)(B)) on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph 1.e. of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics must be paid the appropriate wage rate and fringe benefits on the wage determination for the classification(s) of work actually performed, without regard to skill, except as provided in paragraph 4. of this section. Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: *Provided,* That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classifications and wage rates conformed under paragraph 1.c. of this section) and the Davis-Bacon poster (WH–1321) must be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

b. *Frequently recurring classifications.* (1) In addition to wage and fringe benefit rates that have been determined to be prevailing under the procedures set forth in 29 CFR part 1, a wage determination may contain, pursuant to § 1.3(f), wage and fringe benefit rates for classifications of laborers and mechanics for which conformance requests are regularly submitted pursuant to paragraph 1.c. of this section, provided that:

(i) The work performed by the classification is not performed by a classification in the wage determination for which a prevailing wage rate has been determined;

(ii) The classification is used in the area by the construction industry; and

(iii) The wage rate for the classification bears a reasonable relationship to the prevailing wage rates contained in the wage determination.

(2) The Administrator will establish wage rates for such classifications in accordance with paragraph 1.c.(1)(iii) of this section. Work performed in such a classification must be paid at no less than the wage and fringe benefit rate listed on the wage determination for such classification.

c. *Conformance.* (1) The contracting officer must require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract be classified in conformance with the wage determination. Conformance of an additional classification and wage rate and fringe benefits is appropriate only when the following criteria have been met:

(i) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(ii) The classification is used in the area by the construction industry; and

(iii) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(2) The conformance process may not be used to split, subdivide, or otherwise avoid application of classifications listed in the wage determination.

(3) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the

classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken will be sent by the contracting officer by email to DBAconformance@dol.gov. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30–day period that additional time is necessary.

(4) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer will, by email to DBAconformance@dol.gov, refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30–day period that additional time is necessary.

(5) The contracting officer must promptly notify the contractor of the action taken by the Wage and Hour Division under paragraphs 1.c.(3) and (4) of this section. The contractor must furnish a written copy of such determination to each affected worker or it must be posted as a part of the wage determination. The wage rate (including fringe benefits where appropriate) determined pursuant to paragraph 1.c.(3) or (4) of this section must be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

d. *Fringe benefits not expressed as an hourly rate.* Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor may either pay the benefit as stated in the wage determination or may pay another bona fide fringe benefit or an hourly cash equivalent thereof.

e. *Unfunded plans.* If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, *Provided,* That the Secretary of Labor has found, upon the written request of the contractor, in accordance with the criteria set forth in § 5.28, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

f. *Interest.* In the event of a failure to pay all or part of the wages required by the contract, the contractor will be required to pay interest on any underpayment of wages.

2. Withholding (29 CFR 5.5)

a. *Withholding requirements.* The contracting agency may, upon its own action, or must, upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor so much of the accrued payments or advances as may be considered necessary to satisfy the liabilities of the prime contractor or any subcontractor for the full amount of wages and monetary relief, including interest, required by the clauses set forth in this section for violations of this contract, or to satisfy any such liabilities required by any other Federal contract, or federally assisted contract subject to Davis-Bacon labor standards, that is held by the same prime contractor (as defined in § 5.2). The necessary funds may be withheld from the contractor under this contract, any other Federal contract with the same prime contractor, or any other federally assisted contract that is subject to Davis-Bacon labor standards requirements and is held by the same prime contractor, regardless of whether the other contract was awarded or assisted by the same agency, and such funds may be used to satisfy the contractor liability for which the funds were withheld. In the event of a contractor's failure to pay any laborer or mechanic, including any apprentice or helper working on the site of the work all or part of the wages required by the contract, or upon the contractor's failure to submit the required records as discussed in paragraph 3.d. of this section, the contracting agency may on its own initiative and after written notice to the contractor, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

b. *Priority to withheld funds.* The Department has priority to funds withheld or to be withheld in accordance with paragraph 2.a. of this section or Section IV, paragraph 3.a., or both, over claims to those funds by:

(1) A contractor's surety(ies), including without limitation performance bond sureties and payment bond sureties;

(2) A contracting agency for its reprocurement costs;

(3) A trustee(s) (either a court-appointed trustee or a U.S. trustee, or both) in bankruptcy of a contractor, or a contractor's bankruptcy estate;

(4) A contractor's assignee(s);

(5) A contractor's successor(s); or

(6) A claim asserted under the Prompt Payment Act, 31 U.S.C. 3901–3907.

3. Records and certified payrolls (29 CFR 5.5)

a. *Basic record requirements* (1) *Length of record retention.* All regular payrolls and other basic records must be maintained by the contractor and any subcontractor during the course of the work and preserved for all laborers and mechanics working at the site of the work (or otherwise working in construction or development of the project under a development statute) for a period of at least 3 years after all the work on the prime contract is completed.

(2) *Information required.* Such records must contain the name; Social Security number; last known address, telephone number, and email address of each such worker; each worker's correct classification(s) of work actually performed; hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in 40 U.S.C. 3141(2)(B) of the Davis-Bacon Act); daily and weekly number

of hours actually worked in total and on each covered contract; deductions made; and actual wages paid.

(3) *Additional records relating to fringe benefits.* Whenever the Secretary of Labor has found under paragraph 1.e. of this section that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in 40 U.S.C. 3141(2)(B) of the Davis-Bacon Act, the contractor must maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits.

(4) *Additional records relating to apprenticeship.* Contractors with apprentices working under approved programs must maintain written evidence of the registration of apprenticeship programs, the registration of the apprentices, and the ratios and wage rates prescribed in the applicable programs.

b. *Certified payroll requirements* (1) *Frequency and method of submission.* The contractor or subcontractor must submit weekly, for each week in which any DBA- or Related Acts-covered work is performed, certified payrolls to the contracting agency. The prime contractor is responsible for the submission of all certified payrolls by all subcontractors. A contracting agency or prime contractor may permit or require contractors to submit certified payrolls through an electronic system, as long as the electronic system requires a legally valid electronic signature; the system allows the contractor, the contracting agency, and the Department of Labor to access the certified payrolls upon request for at least 3 years after the work on the prime contract has been completed; and the contracting agency or prime contractor permits other methods of submission in situations where the contractor is unable or limited in its ability to use or access the electronic system.

(2) *Information required.* The certified payrolls submitted must set out accurately and completely all of the information required to be maintained under paragraph 3.a.(2) of this section, except that full Social Security numbers and last known addresses, telephone numbers, and email addresses must not be included on weekly transmittals. Instead, the certified payrolls need only include an individually identifying number for each worker (*e.g.,* the last four digits of the worker's Social Security number). The required weekly certified payroll information may be submitted using Optional Form WH–347 or in any other format desired. Optional Form WH–347 is available for this purpose from the Wage and Hour Division website at *https://www.dol.gov/sites/dolgov/files/WHD/legacy/files/wh347/.pdf* or its successor website. It is not a violation of this section for a prime contractor to require a subcontractor to provide full Social Security numbers and last known addresses, telephone numbers, and email addresses to the prime contractor for its own records, without weekly submission by the subcontractor to the contracting agency.

(3) *Statement of Compliance.* Each certified payroll submitted must be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor, or the contractor's or subcontractor's agent who pays or supervises the payment of the persons working on the contract, and must certify the following:

(i) That the certified payroll for the payroll period contains the information required to be provided under paragraph 3.b. of this section, the appropriate information and basic records are being maintained under paragraph 3.a. of this section, and such information and records are correct and complete;

(ii) That each laborer or mechanic (including each helper and apprentice) working on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in 29 CFR part 3; and

(iii) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification(s) of work actually performed, as specified in the applicable wage determination incorporated into the contract.

(4) *Use of Optional Form WH–347.* The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH–347 will satisfy the requirement for submission of the "Statement of Compliance" required by paragraph 3.b.(3) of this section.

(5) *Signature.* The signature by the contractor, subcontractor, or the contractor's or subcontractor's agent must be an original handwritten signature or a legally valid electronic signature.

(6) *Falsification.* The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under 18 U.S.C. 1001 and 31 U.S.C. 3729.

(7) *Length of certified payroll retention.* The contractor or subcontractor must preserve all certified payrolls during the course of the work and for a period of 3 years after all the work on the prime contract is completed.

c. *Contracts, subcontracts, and related documents.* The contractor or subcontractor must maintain this contract or subcontract and related documents including, without limitation, bids, proposals, amendments, modifications, and extensions. The contractor or subcontractor must preserve these contracts, subcontracts, and related documents during the course of the work and for a period of 3 years after all the work on the prime contract is completed.

d. *Required disclosures and access* (1) *Required record disclosures and access to workers.* The contractor or subcontractor must make the records required under paragraphs 3.a. through 3.c. of this section, and any other documents that the contracting agency, the State DOT, the FHWA, or the Department of Labor deems necessary to determine compliance with the labor standards provisions of any of the applicable statutes referenced by § 5.1, available for inspection, copying, or transcription by authorized representatives of the contracting agency, the State DOT, the FHWA, or the Department of Labor, and must permit such representatives to interview workers during working hours on the job.

(2) *Sanctions for non-compliance with records and worker access requirements.* If the contractor or subcontractor fails to submit the required records or to make them available, or refuses to permit worker interviews during working hours on the job, the Federal agency may, after written notice to the contractor, sponsor, applicant, owner, or other entity, as the case may be, that maintains such records or that employs such workers, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available, or to permit worker interviews during working hours on the job, may be grounds for debarment action pursuant to § 5.12. In addition, any contractor or other person that fails to submit the required records or make those records available to WHD within the time WHD requests that the records be produced will be precluded from introducing as evidence in an administrative proceeding under 29 CFR part 6 any of the required records that were not provided or made available to WHD. WHD will take into consideration a reasonable request from the contractor or person for an extension of the time for submission of records. WHD will determine the reasonableness of the request and may consider, among other things, the location of the records and the volume of production.

(3) *Required information disclosures.* Contractors and subcontractors must maintain the full Social Security number and last known address, telephone number, and email address of each covered worker, and must provide them upon request to the contracting agency, the State DOT, the FHWA, the contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or other compliance action.

4. Apprentices and equal employment opportunity (29 CFR 5.5)

a. *Apprentices* (1) *Rate of pay.* Apprentices will be permitted to work at less than the predetermined rate for the work they perform when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship (OA), or with a State Apprenticeship Agency recognized by the OA. A person who is not individually registered in the program, but who has been certified by the OA or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice, will be permitted to work at less than the predetermined rate for the work they perform in the first 90 days of probationary employment as an apprentice in such a program. In the event the OA or a State Apprenticeship Agency recognized by the OA withdraws approval of an apprenticeship program, the contractor will no longer be permitted to use apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(2) *Fringe benefits.* Apprentices must be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringe benefits must be paid in accordance with that determination.

(3) *Apprenticeship ratio.* The allowable ratio of apprentices to journeyworkers on the job site in any craft classification must not be greater than the ratio permitted to the contractor as to the entire work force under the registered program or the ratio applicable to the locality of the project pursuant to paragraph 4.a.(4) of this section. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated in paragraph 4.a.(1) of this section, must be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under this section must be paid not less than the applicable wage rate on the wage determination for the work actually performed.

(4) *Reciprocity of ratios and wage rates.* Where a contractor is performing construction on a project in a locality other than the locality in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyworker's hourly rate) applicable within the locality in which the construction is being performed must be observed. If there is no applicable ratio or wage rate for the locality of the project, the ratio and wage rate specified in the contractor's registered program must be observed.

b. *Equal employment opportunity.* The use of apprentices and journeyworkers under this part must be in conformity with 29 CFR part 30, including any amendments thereto.

c. Apprentices and Trainees (programs of the U.S. DOT).

Apprentices and trainees working under apprenticeship and skill training programs which have been certified by the Secretary of Transportation as promoting EEO in connection with Federal-aid highway construction programs are not subject to the requirements of paragraph 4 of this Section III. 23 CFR 230.111(e)(2). The straight time hourly wage rates for apprentices and trainees under such programs will be established by the particular programs. The ratio of apprentices and trainees to journeyworkers shall not be greater than permitted by the terms of the particular program.

5. Compliance with Copeland Act requirements. The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract as provided in 29 CFR 5.5.

6. Subcontracts. The contractor or subcontractor must insert in any subcontracts the clauses set forth in paragraphs (1) through (11) of this section, along with the applicable wage determination(s) and such other clauses or contract modifications as the contracting agency may by appropriate instructions require, and a clause requiring the subcontractors to include these clauses and wage determination(s) in any lower tier subcontracts. The prime contractor is responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in this section. In the event of any violations of these clauses, the prime contractor and any subcontractor(s) responsible will be liable for any unpaid wages and monetary relief, including interest from the date of the underpayment or loss, due to any workers of lower-tier subcontractors, and may be subject to debarment, as appropriate. 29 CFR 5.5.

7. Contract termination: debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the

contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

8. Compliance with Davis-Bacon and Related Act requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract as provided in 29 CFR 5.5.

9. Disputes concerning labor standards. As provided in 29 CFR 5.5, disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

10. Certification of eligibility. a. By entering into this contract, the contractor certifies that neither it nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of 40 U.S.C. 3144(b) or § 5.12(a).

b. No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of 40 U.S.C. 3144(b) or § 5.12(a).

c. The penalty for making false statements is prescribed in the U.S. Code, Title 18 Crimes and Criminal Procedure, 18 U.S.C. 1001.

11. Anti-retaliation. It is unlawful for any person to discharge, demote, intimidate, threaten, restrain, coerce, blacklist, harass, or in any other manner discriminate against, or to cause any person to discharge, demote, intimidate, threaten, restrain, coerce, blacklist, harass, or in any other manner discriminate against, any worker or job applicant for:

a. Notifying any contractor of any conduct which the worker reasonably believes constitutes a violation of the DBA, Related Acts, this part, or 29 CFR part 1 or 3;

b. Filing any complaint, initiating or causing to be initiated any proceeding, or otherwise asserting or seeking to assert on behalf of themselves or others any right or protection under the DBA, Related Acts, this part, or 29 CFR part 1 or 3;

c. Cooperating in any investigation or other compliance action, or testifying in any proceeding under the DBA, Related Acts, this part, or 29 CFR part 1 or 3; or

d. Informing any other person about their rights under the DBA, Related Acts, this part, or 29 CFR part 1 or 3.

IV. CONTRACT WORK HOURS AND SAFETY STANDARDS ACT

Pursuant to 29 CFR 5.5(b), the following clauses apply to any Federal-aid construction contract in an amount in excess of $100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses shall be inserted in addition to the clauses required by 29 CFR 5.5(a) or 29 CFR 4.6. As used in this paragraph, the terms laborers and mechanics include watchpersons and guards.

1. Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek. 29 CFR 5.5.

2. Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph 1. of this section the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages and interest from the date of the underpayment. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchpersons and guards, employed in violation of the clause set forth in paragraph 1. of this section, in the sum currently provided in 29 CFR 5.5(b)(2)* for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph 1. of this section.

* $33 as of January 15, 2025 (See 90 FR 1859) as may be adjusted annually by the Department of Labor, pursuant to the Federal Civil Penalties Inflation Adjustment Act of 1990.

3. Withholding for unpaid wages and liquidated damages

a. *Withholding process.* The FHWA or the contracting agency may, upon its own action, or must, upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor so much of the accrued payments or advances as may be considered necessary to satisfy the liabilities of the prime contractor or any subcontractor for any unpaid wages; monetary relief, including interest; and liquidated damages required by the clauses set forth in this section on this contract, any other Federal contract with the same prime contractor, or any other federally assisted contract subject to the Contract Work Hours and Safety Standards Act that is held by the same prime contractor (as defined in § 5.2). The necessary funds may be withheld from the contractor under this contract, any other Federal contract with the same prime contractor, or any other federally assisted contract that is subject to the Contract Work Hours and Safety Standards Act and is held by the same prime contractor, regardless of whether the other contract was awarded or assisted by the same agency, and such funds may be used to satisfy the contractor liability for which the funds were withheld.

b. *Priority to withheld funds.* The Department has priority to funds withheld or to be withheld in accordance with Section III paragraph 2.a. or paragraph 3.a. of this section, or both, over claims to those funds by:

(1) A contractor's surety(ies), including without limitation performance bond sureties and payment bond sureties;

(2) A contracting agency for its reprocurement costs;

(3) A trustee(s) (either a court-appointed trustee or a U.S. trustee, or both) in bankruptcy of a contractor, or a contractor's bankruptcy estate;

(4) A contractor's assignee(s);

(5) A contractor's successor(s); or

(6) A claim asserted under the Prompt Payment Act, 31 U.S.C. 3901–3907.

4. Subcontracts. The contractor or subcontractor must insert in any subcontracts the clauses set forth in paragraphs 1. through 5. of this section and a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor is responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs 1. through 5. In the event of any violations of these clauses, the prime contractor and any subcontractor(s) responsible will be liable for any unpaid wages and monetary relief, including interest from the date of the underpayment or loss, due to any workers of lower-tier subcontractors, and associated liquidated damages and may be subject to debarment, as appropriate.

5. Anti-retaliation. It is unlawful for any person to discharge, demote, intimidate, threaten, restrain, coerce, blacklist, harass, or in any other manner discriminate against, or to cause any person to discharge, demote, intimidate, threaten, restrain, coerce, blacklist, harass, or in any other manner discriminate against, any worker or job applicant for:

a. Notifying any contractor of any conduct which the worker reasonably believes constitutes a violation of the Contract Work Hours and Safety Standards Act (CWHSSA) or its implementing regulations in this part;

b. Filing any complaint, initiating or causing to be initiated any proceeding, or otherwise asserting or seeking to assert on behalf of themselves or others any right or protection under CWHSSA or this part;

c. Cooperating in any investigation or other compliance action, or testifying in any proceeding under CWHSSA or this part; or

d. Informing any other person about their rights under CWHSSA or this part.

V. SUBLETTING OR ASSIGNING THE CONTRACT

This provision is applicable to all Federal-aid construction contracts on the National Highway System pursuant to 23 CFR 635.116.

1. The contractor shall perform with its own organization contract work amounting to not less than 30 percent (or a greater percentage if specified elsewhere in the contract) of the total original contract price, excluding any specialty items designated by the contracting agency. Specialty items may be performed by subcontract and the amount of any such specialty items performed may be deducted from the total original contract price before computing the amount of work required to be performed by the contractor's own organization (23 CFR 635.116).

a. The term “perform work with its own organization” in paragraph 1. of this section refers to workers employed or leased by the prime contractor, and equipment owned or rented by the prime contractor, with or without operators. Such term does not include employees or equipment of a subcontractor or lower tier subcontractor, agents of the prime contractor, or any other assignees. The term may include payments for the costs of hiring leased employees from an employee leasing firm meeting all relevant Federal and State regulatory requirements. Leased employees may only be included in this term if the prime contractor meets all of the following conditions: (based on longstanding interpretation)

(1) the prime contractor maintains control over the supervision of the day-to-day activities of the leased employees;
(2) the prime contractor remains responsible for the quality of the work of the leased employees;
(3) the prime contractor retains all power to accept or exclude individual employees from work on the project; and
(4) the prime contractor remains ultimately responsible for the payment of predetermined minimum wages, the submission of payrolls, statements of compliance and all other Federal regulatory requirements.

b. "Specialty Items" shall be construed to be limited to work that requires highly specialized knowledge, abilities, or equipment not ordinarily available in the type of contracting organizations qualified and expected to bid or propose on the contract as a whole and in general are to be limited to minor components of the overall contract. 23 CFR 635.102.

2. Pursuant to 23 CFR 635.116(a), the contract amount upon which the requirements set forth in paragraph 1. of this section is computed includes the cost of material and manufactured products which are to be purchased or produced by the contractor under the contract provisions.

3. Pursuant to 23 CFR 635.116(c), the contractor shall furnish (a) a competent superintendent or supervisor who is employed by the firm, has full authority to direct performance of the work in accordance with the contract requirements, and is in charge of all construction operations (regardless of who performs the work) and (b) such other of its own organizational resources (supervision, management, and engineering services) as the contracting officer determines is necessary to assure the performance of the contract.

4. No portion of the contract shall be sublet, assigned or otherwise disposed of except with the written consent of the contracting officer, or authorized representative, and such consent when given shall not be construed to relieve the contractor of any responsibility for the fulfillment of the contract. Written consent will be given only after the contracting agency has assured that each subcontract is evidenced in writing and that it contains all pertinent provisions and requirements of the prime contract. (based on long-standing interpretation of 23 CFR 635.116).

5. The 30-percent self-performance requirement of paragraph (1) is not applicable to design-build contracts; however,

contracting agencies may establish their own self-performance requirements. 23 CFR 635.116(d).

VI. SAFETY: ACCIDENT PREVENTION

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

1. In the performance of this contract the contractor shall comply with all applicable Federal, State, and local laws governing safety, health, and sanitation (23 CFR Part 635). The contractor shall provide all safeguards, safety devices and protective equipment and take any other needed actions as it determines, or as the contracting officer may determine, to be reasonably necessary to protect the life and health of employees on the job and the safety of the public and to protect property in connection with the performance of the work covered by the contract. 23 CFR 635.108.

2. It is a condition of this contract, and shall be made a condition of each subcontract, which the contractor enters into pursuant to this contract, that the contractor and any subcontractor shall not permit any employee, in performance of the contract, to work in surroundings or under conditions which are unsanitary, hazardous or dangerous to his/her health or safety, as determined under construction safety and health standards (29 CFR Part 1926) promulgated by the Secretary of Labor, in accordance with Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 3704). 29 CFR 1926.10.

3. Pursuant to 29 CFR 1926.3, it is a condition of this contract that the Secretary of Labor or authorized representative thereof, shall have right of entry to any site of contract performance to inspect or investigate the matter of compliance with the construction safety and health standards and to carry out the duties of the Secretary under Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 3704).

VII. FALSE STATEMENTS CONCERNING HIGHWAY PROJECTS

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

In order to assure high quality and durable construction in conformity with approved plans and specifications and a high degree of reliability on statements and representations made by engineers, contractors, suppliers, and workers on Federal-aid highway projects, it is essential that all persons concerned with the project perform their functions as carefully, thoroughly, and honestly as possible. Willful falsification, distortion, or misrepresentation with respect to any facts related to the project is a violation of Federal law. To prevent any misunderstanding regarding the seriousness of these and similar acts, Form FHWA-1022 shall be posted on each Federal-aid highway project (23 CFR Part 635) in one or more places where it is readily available to all persons concerned with the project:

18 U.S.C. 1020 reads as follows:

"Whoever, being an officer, agent, or employee of the United States, or of any State or Territory, or whoever, whether a person, association, firm, or corporation, knowingly makes any false statement, false representation, or false report as to the character, quality, quantity, or cost of the material used or to be used, or the quantity or quality of the work performed or to be performed, or the cost thereof in connection with the submission of plans, maps, specifications, contracts, or costs of construction on any highway or related project submitted for approval to the Secretary of Transportation; or

Whoever knowingly makes any false statement, false representation, false report or false claim with respect to the character, quality, quantity, or cost of any work performed or to be performed, or materials furnished or to be furnished, in connection with the construction of any highway or related project approved by the Secretary of Transportation; or

Whoever knowingly makes any false statement or false representation as to material fact in any statement, certificate, or report submitted pursuant to provisions of the Federal-aid Roads Act approved July 11, 1916, (39 Stat. 355), as amended and supplemented;

Shall be fined under this title or imprisoned not more than 5 years or both."

VIII. IMPLEMENTATION OF CLEAN AIR ACT AND FEDERAL WATER POLLUTION CONTROL ACT (42 U.S.C. 7606; 2 CFR 200.88; EO 11738)

This provision is applicable to all Federal-aid construction contracts in excess of $150,000 and to all related subcontracts. 48 CFR 2.101; 2 CFR 200.327.

By submission of this bid/proposal or the execution of this contract or subcontract, as appropriate, the bidder, proposer, Federal-aid construction contractor, subcontractor, supplier, or vendor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act (42 U.S.C. 7401-7671q) and the Federal Water Pollution Control Act, as amended (33 U.S.C. 1251-1387). Violations must be reported to the Federal Highway Administration and the Regional Office of the Environmental Protection Agency. 2 CFR Part 200, Appendix II.

The contractor agrees to include or cause to be included the requirements of this Section in every subcontract, and further agrees to take such action as the contracting agency may direct as a means of enforcing such requirements. 2 CFR 200.327.

IX. CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION

This provision is applicable to all Federal-aid construction contracts, design-build contracts, subcontracts, lower-tier subcontracts, purchase orders, lease agreements, consultant contracts or any other covered transaction requiring FHWA approval or that is estimated to cost $25,000 or more – as defined in 2 CFR Parts 180 and 1200. 2 CFR 180.220 and 1200.220.

1**. Instructions for Certification – First Tier Participants:**

a. By signing and submitting this proposal, the prospective first tier participant is providing the certification set out below.

b. The inability of a person to provide the certification set out below will not necessarily result in denial of participation in this

covered transaction. The prospective first tier participant shall submit an explanation of why it cannot provide the certification set out below. The certification or explanation will be considered in connection with the department or agency's determination whether to enter into this transaction. However, failure of the prospective first tier participant to furnish a certification or an explanation shall disqualify such a person from participation in this transaction. 2 CFR 180.320.

c. The certification in this clause is a material representation of fact upon which reliance was placed when the contracting agency determined to enter into this transaction. If it is later determined that the prospective participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the contracting agency may terminate this transaction for cause of default. 2 CFR 180.325.

d. The prospective first tier participant shall provide immediate written notice to the contracting agency to whom this proposal is submitted if any time the prospective first tier participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances. 2 CFR 180.345 and 180.350.

e. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180, Subpart I, 180.900-180.1020, and 1200. “First Tier Covered Transactions” refers to any covered transaction between a recipient or subrecipient of Federal funds and a participant (such as the prime or general contract). “Lower Tier Covered Transactions” refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). “First Tier Participant” refers to the participant who has entered into a covered transaction with a recipient or subrecipient of Federal funds (such as the prime or general contractor). “Lower Tier Participant” refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

f. The prospective first tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency entering into this transaction. 2 CFR 180.330.

g. The prospective first tier participant further agrees by submitting this proposal that it will include the clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transactions," provided by the department or contracting agency, entering into this covered transaction, without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the $25,000 threshold. 2 CFR 180.220 and 180.300.

h. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. 2 CFR 180.300; 180.320, and 180.325. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. 2 CFR 180.335. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the System for Award Management website (https://www.sam.gov/). 2 CFR 180.300, 180.320, and 180.325.

i. Nothing contained in the foregoing shall be construed to require the establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of the prospective participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

j. Except for transactions authorized under paragraph (f) of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause or default. 2 CFR 180.325.

* * * * *

2. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion – First Tier Participants:

a. The prospective first tier participant certifies to the best of its knowledge and belief, that it and its principals:

(1) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency, 2 CFR 180.335;

(2) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property, 2 CFR 180.800;

(3) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (a)(2) of this certification, 2 CFR 180.700 and 180.800; and

(4) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default. 2 CFR 180.335(d).

(5) Are not a corporation that has been convicted of a felony violation under any Federal law within the two-year period preceding this proposal (USDOT Order 4200.6 implementing appropriations act requirements); and

(6) Are not a corporation with any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted, or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability (USDOT Order 4200.6 implementing appropriations act requirements).

b. Where the prospective participant is unable to certify to any of the statements in this certification, such prospective participant should attach an explanation to this proposal. 2 CFR 180.335 and 180.340.

* * * * *

3. **Instructions for Certification - Lower Tier Participants:**

(Applicable to all subcontracts, purchase orders, and other lower tier transactions requiring prior FHWA approval or estimated to cost $25,000 or more - 2 CFR Parts 180 and 1200). 2 CFR 180.220 and 1200.220.

a. By signing and submitting this proposal, the prospective lower tier participant is providing the certification set out below.

b. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department, or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

c. The prospective lower tier participant shall provide immediate written notice to the person to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous by reason of changed circumstances. 2 CFR 180.365.

d. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180, Subpart I, 180.900 – 180.1020, and 1200. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations. “First Tier Covered Transactions” refers to any covered transaction between a recipient or subrecipient of Federal funds and a participant (such as the prime or general contract). “Lower Tier Covered Transactions” refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). “First Tier Participant” refers to the participant who has entered into a covered transaction with a recipient or subrecipient of Federal funds (such as the prime or general contractor). “Lower Tier Participant” refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

e. The prospective lower tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated. 2 CFR 1200.220 and 1200.332.

f. The prospective lower tier participant further agrees by submitting this proposal that it will include this clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transaction," without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the $25,000 threshold. 2 CFR 180.220 and 1200.220.

g. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the System for Award Management website (https://www.sam.gov/), which is compiled by the General Services Administration. 2 CFR 180.300, 180.320, 180.330, and 180.335.

h. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

i. Except for transactions authorized under paragraph e of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment. 2 CFR 180.325.

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4. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion--Lower Tier Participants:

a. The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals:

(1) is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency, 2 CFR 180.355;

(2) is a corporation that has been convicted of a felony violation under any Federal law within the two-year period preceding this proposal (USDOT Order 4200.6 implementing appropriations act requirements); and

(3) is a corporation with any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted, or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability. (USDOT Order 4200.6 implementing appropriations act requirements)

b. Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant should attach an explanation to this proposal.

* * * * *

X. CERTIFICATION REGARDING USE OF CONTRACT FUNDS FOR LOBBYING

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts which exceed $100,000. 49 CFR Part 20, App. A.

1. The prospective participant certifies, by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:

a. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

b. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

2. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31 U.S.C. 1352. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

3. The prospective participant also agrees by submitting its bid or proposal that the participant shall require that the language of this certification be included in all lower tier subcontracts, which exceed $100,000 and that all such recipients shall certify and disclose accordingly.

XI. USE OF UNITED STATES-FLAG VESSELS:

This provision is applicable to all Federal-aid construction contracts, design-build contracts, subcontracts, lower-tier subcontracts, purchase orders, lease agreements, or any other covered transaction. 46 CFR Part 381.

This requirement applies to material or equipment that is acquired for a specific Federal-aid highway project. 46 CFR 381.7. It is not applicable to goods or materials that come into inventories independent of an FHWA funded-contract.

When oceanic shipments (or shipments across the Great Lakes) are necessary for materials or equipment acquired for a specific Federal-aid construction project, the bidder, proposer, contractor, subcontractor, or vendor agrees:

1. To utilize privately owned United States-flag commercial vessels to ship at least 50 percent of the gross tonnage (computed separately for dry bulk carriers, dry cargo liners, and tankers) involved, whenever shipping any equipment, material, or commodities pursuant to this contract, to the extent such vessels are available at fair and reasonable rates for United States-flag commercial vessels. 46 CFR 381.7.

2. To furnish within 20 days following the date of loading for shipments originating within the United States or within 30 working days following the date of loading for shipments originating outside the United States, a legible copy of a rated, ‘on-board’ commercial ocean bill-of-lading in English for each shipment of cargo described in paragraph (b)(1) of this section to both the Contracting Officer (through the prime contractor in the case of subcontractor bills-of-lading) and to the Office of Cargo and Commercial Sealift (MAR-620), Maritime Administration, Washington, DC 20590. (MARAD requires copies of the ocean carrier's (master) bills of lading, certified onboard, dated, with rates and charges. These bills of lading may contain business sensitive information and therefore may be submitted directly to MARAD by the Ocean Transportation Intermediary on behalf of the contractor). 46 CFR 381.7.

ATTACHMENT A - EMPLOYMENT AND MATERIALS PREFERENCE FOR APPALACHIAN DEVELOPMENT HIGHWAY SYSTEM OR APPALACHIAN LOCAL ACCESS ROAD CONTRACTS (40 U.S.C. sections 14501(d) and 14701 and the Appalachian Regional Commission Code as authorized under 40 U.S.C. section 14302)
This provision is applicable to all Federal-aid projects funded under the Appalachian Regional Development Act of 1965.

1. During the performance of this contract, the contractor undertaking to do work which is, or reasonably may be, done as on-site work, shall give preference to qualified persons who regularly reside in the labor area as designated by the DOL wherein the contract work is situated, or the subregion, or the Appalachian counties of the State wherein the contract work is situated, except:

a. To the extent that qualified persons regularly residing in the area are not available.

b. For the reasonable needs of the contractor to employ supervisory or specially experienced personnel necessary to assure an efficient execution of the contract work.

c. For the obligation of the contractor to offer employment to present or former employees as the result of a lawful collective bargaining contract, provided that the number of nonresident persons employed under this subparagraph (1c) shall not exceed 20 percent of the total number of employees employed by the contractor on the contract work, except as provided in subparagraph (4) below.

2. The contractor shall place a job order with the State Employment Service indicating (a) the classifications of the laborers, mechanics and other employees required to perform the contract work, (b) the number of employees required in each classification, (c) the date on which the participant estimates such employees will be required, and (d) any other pertinent information required by the State Employment Service to complete the job order form. The job order may be placed with the State Employment Service in writing or by telephone. If during the course of the contract work, the information submitted by the contractor in the original job order is substantially modified, the participant shall promptly notify the State Employment Service.

3. The contractor shall give full consideration to all qualified job applicants referred to him by the State Employment Service. The contractor is not required to grant employment to any job applicants who, in his opinion, are not qualified to perform the classification of work required.

4. If, within one week following the placing of a job order by the contractor with the State Employment Service, the State Employment Service is unable to refer any qualified job applicants to the contractor, or less than the number requested, the State Employment Service will forward a certificate to the contractor indicating the unavailability of applicants. Such certificate shall be made a part of the contractor's permanent project records. Upon receipt of this certificate, the contractor may employ persons who do not normally reside in the labor area to fill positions covered by the certificate, notwithstanding the provisions of subparagraph (1c) above.

5. The provisions of 40 U.S.C. 14501 allow the contracting agency to provide a contractual preference for the use of mineral resource materials native to the Appalachian region.

6. The contractor shall include the provisions of Sections 1 through 4 of this Attachment A in every subcontract for work which is, or reasonably may be, done as on-site work.

DOCUMENT 00811

SPECIAL PROVISIONS
MONTHLY PRICE ADJUSTMENT FOR HOT MIX ASPHALT (HMA) MIXTURES
Revised: 02/03/2023

This provision applies to all projects using greater than 100 tons of hot mix asphalt (HMA) mixtures containing liquid asphalt cement as stipulated in the Notice to Contractors section of the bid documents.

Price Adjustments will be based on the variance in price, for the liquid asphalt component only, between the Base Price and the Period Price. They shall not include transportation or other charges. Price Adjustments will occur on a monthly basis.

Base Price
The Base Price of liquid asphalt on a project as listed in the Notice to Contractors section of the bid documents is a fixed price determined by the Department at the time of the bid using the same method as the determination of the Period Price detailed below. The Base Price shall be used in all bids.

Period Price
The Period Price is the price of liquid asphalt for each monthly period as determined by the Department using the average selling price per standard ton of PG64-28 paving grade (primary binder classification) asphalt, FOB manufacturer's terminal, as listed under the "East Coast Market - New England, Boston, Massachusetts area" section of the Poten & Partners, Inc. "Asphalt Weekly Monitor". This average selling price is listed in the issue having a publication date of the second Friday of the month and will be posted as the Period Price for that month. The Department will post this Period Price on its website at https://www.mass.gov/service-details/massdot-current-contract-price-adjustments following its receipt of the relevant issue of the "Asphalt Weekly Monitor". Poten and Partners has granted the Department the right to publish this specific asphalt price information sourced from the Asphalt Weekly Monitor.

Price Adjustment Determination, Calculation and Payment
The Contract Price of the HMA mixture will be paid under the respective item in the Contract. Price Adjustments, as herein provided, either upwards or downwards, will be made after the work has been performed using the monthly period price for the month during which the work was performed.

Price Adjustments will be paid only if the variance from the Base Price is 5% or more for a monthly period. The complete adjustment will be paid in all cases with no deduction of the 5% from either upward or downward adjustments.

The Price Adjustment applies only to the actual virgin liquid asphalt content in the mixture placed on the job in accordance with the approved Job Mix Formula.

Price Adjustments will be separate payment items. The pay item numbers are 999.401 for a positive price adjustment (a payment) and 999.402 for a negative price adjustment (a deduction). Price Adjustments will be calculated using the following equation:

Price Adjustment = Tons of HMA Placed X Liquid Asphalt Content % X RAP Factor X (Period Price - Base Price)

No Price Adjustment will be allowed beyond the Completion Date of this Contract, unless there is a Department-approved extension of time.

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DOCUMENT 00812

SPECIAL PROVISIONS
MONTHLY PRICE ADJUSTMENT FOR DIESEL FUEL AND GASOLINE –
ENGLISH UNITS
Revised: 02/01/2021

This monthly fuel price adjustment is inserted in this contract because the national and worldwide energy situation has made the future cost of fuel unpredictable. This adjustment will provide for either additional compensation to the Contractor or repayment to the Commonwealth, depending on an increase or decrease in the average price of diesel fuel or gasoline.

This adjustment will be based on fuel usage factors for various items of work developed by the Highway Research Board in Circular 158, dated July 1974. These factors will be multiplied by the quantities of work done in each item during each monthly period and further multiplied by the variance in price from the Base Price to the Period Price.

The Base Price of Diesel Fuel and Gasoline will be the price as indicated in the Department's web site https://www.mass.gov/service-details/massdot-current-contract-price-adjustments for the month in which the contract was bid, which includes State Tax.

The Period Price will be the average of prices charged to the State, including State Tax for the bulk purchases made during each month.

This adjustment will be effected only if the variance from the Base Price is 5% or more for a monthly period. The complete adjustment will be paid in all cases with no deduction of the 5% from either upward or downward adjustments.

No adjustment will be paid for work done beyond the extended completion date of any contract.

Any adjustment (increase or decrease) to estimated quantities made to each item at the time of final payment will have the fuel price adjustment figured at the average period price for the entire term of the project for the difference of quantity.

The fuel price adjustment will apply only to the following items of work at the fuel factors shown:

ITEMS COVERED	FUEL FACTORS	
	Diesel	Gasoline
Excavation: and Borrow Work: Items 120, 120.1, 121, 123, 124, 125, 127, 129.3, 140, 140.1, 141, 142, 143, 144, 150, 150.1, 151 and 151.1 (Both Factors used)	0.29 Gallons / CY.	0.15 Gallons / CY
Surfacing Work: All Items containing Hot Mix Asphalt	2.90 Gallons / Ton	Does Not Apply

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DOCUMENT 00813

SPECIAL PROVISIONS

PRICE ADJUSTMENTS FOR STRUCTURAL STEEL AND REINFORCING STEEL

July 15, 2026

This special provision applies to all projects containing the use of structural steel and/or reinforcing steel as specified elsewhere in the Contract work. It applies to all structural steel and all reinforcing steel, as defined below, on the project. Compliance with this provision is mandatory, i.e., there are no "opt-in" or "opt-out" clauses. Price adjustments will be handled as described below and shall only apply to unfabricated reinforcing steel bars and unfabricated structural steel material, consisting of rolled shapes, plate steel, sheet piling, pipe piles, steel castings and steel forgings.

Price adjustments will be variances between Base Prices and Period Prices. Base Prices and Period Prices are defined below.

Price adjustments will only be made if the variances between Base Prices and Period Prices are 5% or more. A variance can result in the Period Price being either higher or lower than the Base Price. Once the 5% threshold has been achieved, the adjustment will apply to the full variance between the Base Price and the Period Price.

Price adjustments will be calculated by multiplying the number of pounds of unfabricated structural steel material or unfabricated reinforcing steel bars on a project by the index factor calculated as shown below under Example of a Period Price Calculation.

Price adjustments will ***not*** include guardrail panels or the costs of shop drawing preparation, handling, fabrication, coatings, transportation, storage, installation, profit, overhead, fuel costs, fuel surcharges, or other such charges not related to the cost of the unfabricated structural steel and unfabricated reinforcing steel.

The weight of steel subject to a price adjustment shall not exceed the final shipping weight of the fabricated part by more than 10%.

Base Prices and Period Prices are defined as follows:

Base Prices of unfabricated structural steel and unfabricated reinforcing steel on a project are fixed prices determined by the Department and found in the table below. While it is the intention of the Department to make this table comprehensive, some of a project's unfabricated structural steel and/or unfabricated reinforcing steel may be inadvertently omitted. Should this occur, the Contractor shall bring the omission to the Department's attention so that a contract alteration may be processed that adds the missing steel to the table and its price adjustments to the Contract.

The Base Price Date is the month and year of the most recent finalized period price index at the time that MassDOT opened bids for the project. The Base Price Index for this contract is the Steel PPI listed in the Notice to Contractors.

Period Prices of unfabricated structural steel and unfabricated reinforcing steel on a project are variable prices that have been calculated using the Period Price Date and an index of steel prices to adjust the Base Price.

The Period Price Date is the date the steel was delivered to the fabricator as evidenced by an official bill of lading submitted to the Department containing a description of the shipped materials, weights of the shipped materials and the date of shipment. This date is used to select the Period Price Index.

The index used for the calculation of Period Prices is the U.S. Department of Labor Bureau of Labor Statistics Producer Price Index (PPI) Series ID WPU101702 (Not Seasonally Adjusted, Group: Metals and Metal Products, Item: Semi-finished Steel Mill Products.) As this index is subject to revision for a period of up to four (4) months after its original publication, no price adjustments will be made until the index for the period is finalized, i.e., the index is no longer suffixed with a "(P)".

Period Prices are determined as follows:

Period Price = Base Price X Index Factor
Index Factor = Period Price Index / Base Price Index

Example of a Period Price Calculation:

Calculate the Period Price for December 2009 using a Base Price from March 2009 of $0.82/Pound for 1,000 Pounds of ASTM A709 (AASHTO M270) Grade A36 Structural Steel Plate.

The Period Price Date is December 2009. From the PPI website*, the Period Price Index = 218.0.

The Base Price Date is March 2009. From the PPI website*, the Base Price Index = 229.4.

Index Factor = Period Price Index / Base Price Index = 218.0 / 229.4 = 0.950
Period Price = Base Price X Index Factor = $0.82/Pound X 0.950 = $0.78/Pound

Since $0.82 - $0.78 = $0.04 is less than 5% of $0.82, no price adjustment is required.

If the $0.04 difference shown above was greater than 5% of the Base Price, then the price adjustment would be 1,000 Pounds X $0.04/Pound = $40.00. Since the Period Price of $0.78/Pound is less than the Base Price of $0.82/Pound, indicating a drop in the price of steel between the bid and the delivery of material, a credit of $40.00 would be owed to MassDOT. When the Period Price is higher than the Base Price, the price adjustment is owed to the Contractor.

* To access the PPI website and obtain a Base Price Index or a Period Price Index, go to http://data.bls.gov/cgi-bin/srgate

End of example.

The Contractor will be paid for unfabricated structural steel and unfabricated reinforcing steel under the respective contract pay items for all components constructed of either structural steel or reinforced Portland cement concrete under their respective Contract Pay Items.

Price adjustments, as herein provided for, will be paid separately as follows:

Structural Steel
Pay Item Number 999.449 for positive (+) pay adjustments (payments to the Contractor)

Pay Item Number 999.457 for negative (-) pay adjustments (credits to MassDOT Highway Division)

Reinforcing Steel
Pay Item Number 999.466 for positive (+) pay adjustments (payments to the Contractor)

Pay Item Number 999.467 for negative (-) pay adjustments (credits to MassDOT Highway Division)

No price adjustment will be made for price changes after the Contract Completion Date, unless the MassDOT Highway Division has approved an extension of Contract Time for the Contract.

TABLE

Steel Type		Price per Pound
1	ASTM A615/A615M Grade 60 (AASHTO M31 Grade 60 or 420) Reinforcing Steel	$0.57
2	ASTM A27 (AASHTO M103) Steel Castings, H-Pile Points & Pipe Pile Shoes (See Note below.)	$0.80
3	ASTM A668 / A668M (AASHTO M102) Steel Forgings	$0.80
4	ASTM A108 (AASHTO M169) Steel Forgings for Shear Studs	$0.82
5	ASTM A709/A709M Grade 36 / AASHTO M270M/M270 Grade 36 or 250 Structural Steel Plate	$0.86
6	ASTM A709/A709M Grade 36 / AASHTO M270M/M270 Grade 36 or 250 Structural Steel Shapes	$0.81
7	ASTM A709/A709M Grade 50 / AASHTO M270M/M270 Grade 50 or 345 Structural Steel Plate	$0.86
8	ASTM A709/A709M Grade 50 / AASHTO M270M/M270 Grade 50 or 345 Structural Steel Shapes	$0.81
9	ASTM A709/A709M Grade 50WT / AASHTO M270M/M270 Grade 50WT or 345WT Structural Steel Plate	$0.89
10	ASTM A709/A709M Grade 50WT / AASHTO M270M/M270 Grade 50WT or 345WT Structural Steel Shapes	$0.82
11	ASTM A709/A709M Grade 50W / AASHTO M270M/M270 Grade 50W 345W Structural Steel Plate	$0.89
12	ASTM A709/A709M Grade 50W / AASHTO M270M/M270 Grade 50W or 345W Structural Steel Shapes	$0.82
13	ASTM A709/A709M Grade HPS 50W / AASHTO M270M/M270 Grade HPS 50W or 345W Structural Steel Plate	$0.93
14	ASTM A709/A709M Grade HPS 70W / AASHTO M270M/M270 Grade HPS 70W or 485W Structural Steel Plate	$1.00
15	ASTM A514/A514M-05 Grade HPS 100W / AASHTO M270M/M270 Grade HPS 100W or 690W Structural Steel Plate	$1.53
16	ASTM A992/A992M Grade 50S / AASHTO M270M/M270 Grade 50S or 345S Structural Steel Plate	$0.89
17	ASTM A992/A992M Grade 50S / AASHTO M270M/M270 Grade 50S or 345S Structural Steel Shapes	$0.82
18	ASTM A276 Type 316 Stainless Steel	$4.61
19	ASTM A240 Type 316 Stainless Steel	$4.61
20	ASTM A148 Grade 80/50 Steel Castings (See Note below.)	$1.58
21	ASTM A53 Grade B Structural Steel Pipe	$1.00
22	ASTM A500 Grades A, B, 36 & 50 Structural Steel Pipe	$1.00
23	ASTM A252, Grades 240 (36 KSI) & 414 (60 KSI) Pipe Pile	$0.80
24	ASTM 252, Grade 2 Permanent Steel Casing	$0.80
25	ASTM A36 (AASHTO M183) for H-piles, steel supports and sign supports	$0.84
26	ASTM A328 / A328M, Grade 50 (AASHTO M202) Steel Sheetpiling	$1.51
27	ASTM A572 / A572M, Grade 50 Sheetpiling	$1.51
28	ASTM A36/36M, Grade 50	$0.86
29	ASTM A570, Grade 50	$0.84
30	ASTM A572 (AASHTO M223), Grade 50 H-Piles	$0.86
31	ASTM A1085 Grade A (50 KSI) Steel Hollow Structural Sections (HSS), heat-treated per ASTM A1085 Supplement S1	$1.00
32	AREA 140 LB Rail and Track Accessories	$0.52

NOTE: Steel Castings are generally used only on moveable bridges. Cast iron frames, grates and pipe are not “steel” castings and will not be considered for price adjustments.

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DOCUMENT 00814

SPECIAL PROVISIONS
PRICE ADJUSTMENT FOR PORTLAND CEMENT CONCRETE MIXES

January 12, 2009

This provision applies to all projects using greater than 100 Cubic Yards (76 Cubic Meters) of Portland cement concrete containing Portland cement as stipulated in the Notice to Contractors section of the Bid Documents. This Price Adjustment will occur on a monthly basis.

The Price Adjustment will be based on the variance in price for the Portland cement component only from the Base Price to the Period Price. It shall not include transportation or other charges.

The Base Price of Portland cement on a project is a fixed price determined at the time of bid by the Department by using the same method as for the determination of the Period Price (see below) and found in the Notice to Contractors.

The Period Price of Portland cement will be determined by using the latest published price, in dollars per ton (U.S.), for Portland cement (Type I) quoted for Boston, U.S.A. in the **Construction Economics** section of *ENR Engineering News-Record* magazine or at the ENR website http://www.enr.com under **Construction Economics**. The Period Price will be posted on the MassDOT website the Wednesday immediately following the publishing of the monthly price in ENR, which is normally the first week of the month.

The Contract Price of the Portland cement concrete mix will be paid under the respective item in the Contract. The price adjustment, as herein provided, upwards or downwards, will be made after the work has been performed, using the monthly period price for the month during which the work was performed.

The price adjustment applies only to the actual Portland cement content in the mix placed on the job in accordance with the Standard Specifications for Highways and Bridges, Division III, Section M4.02.01. No adjustments will be made for any cement replacement materials such as fly ash or ground granulated blast furnace slag.

The Price Adjustment will be a separate payment item. It will be determined by multiplying the number of cubic yards of Portland cement concrete placed during each monthly period times the Portland cement content percentage times the variance in price between the Base Price and Period Price of Portland cement.

This Price Adjustment will be paid only if the variance from the Base Price is 5% or more for a monthly period. The complete adjustment will be paid in all cases with no deduction of the 5% from either upward or downward adjustments.

No Price Adjustment will be allowed beyond the Completion Date of this Contract, unless there is a Department-approved extension of time.

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DOCUMENT 00820

THE COMMONWEALTH OF MASSACHUSETTS SUPPLEMENTAL EQUAL EMPLOYMENT OPPORTUNITY, NON-DISCRIMINATION AND AFFIRMATIVE ACTION PROGRAM

I. Definitions

For purposes of this contract,

"Minority" means a person who meets one or more of the following definitions:

(a) American Indian or Native American means: all persons having origins in any of the original peoples of North America and who are recognized as an Indian by a tribe or tribal organization.
(b) Asian means: All persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian sub-continent, or the Pacific Islands, including, but Not limited to China, Japan, Korea, Samoa, India, and the Philippine Islands.
(c) Black means: All persons having origins in any of the Black racial groups of Africa, including, but not limited to, African-Americans, and all persons having origins in any of the original peoples of the Cape Verdean Islands.
(d) Eskimo or Aleut means: All persons having origins in any of the peoples of Northern Canada, Greenland, Alaska, and Eastern Siberia.
(e) Hispanic means: All persons having their origins in any of the Spanish-speaking peoples of Mexico, Puerto Rico, Cuba, Central or South America, or the Caribbean Islands.

"State construction contract" means a contract for the construction, reconstruction, installation, demolition, maintenance or repair of a building or capital facility, or a contract for the construction, reconstruction, alteration, remodeling or repair of a public work undertaken by a department, agency, board, or commission of the commonwealth.

"State assisted construction contract" means a contract for the construction, reconstruction, installation, demolition, maintenance or repair of a building or capital facility undertaken by a political subdivision of the commonwealth, or two or more political subdivisions thereof, an authority, or other instrumentality and whose costs of the contract are paid for, reimbursed, grant funded, or otherwise supported, in whole or in part, by the commonwealth.

II. Equal Opportunity, Non-Discrimination and Affirmative Action

During the performance of this Contract, the Contractor and all subcontractors (hereinafter collectively referred to as "the Contractor") for a state construction contract or a state assisted construction contract, for him/herself, his/her assignees and successors in interest, agree to comply with all applicable equal employment opportunity, non-discrimination and affirmative action requirements, including but not limited to the following:

In connection with the performance of work under this contract, the Contractor shall not discriminate against any employee or applicant for employment because of race, color, religious creed, national origin, sex, sexual orientation, genetic information, military service, age, ancestry or disability, shall not discriminate in the selection or retention of subcontractors, and shall not discriminate in the procurement of materials and rentals of equipment.

The aforesaid provision shall include, but not be limited to, the following: employment upgrading, demotion, or transfer; recruitment advertising, layoff or termination; rates of pay or other forms of compensation; conditions or privileges of employment; and selection for apprenticeship or on-the-job training opportunity. The Contractor shall comply with the provisions of chapter 151B of the Massachusetts General Laws, as amended, and all other applicable anti-discrimination and equal opportunity laws, all of which are herein incorporated by reference and made a part of this Contract.

The Contractor shall post hereafter in conspicuous places, available for employees and applicants for employment, notices to be provided by the Massachusetts Commission Against Discrimination setting forth the provisions of the Fair Employment Practices Law of the Commonwealth (Massachusetts General Laws Chapter l51 B).

In connection with the performance of work under this contract, the Contractor shall undertake, in good faith, affirmative action measures to eliminate any discriminatory barriers in the terms and conditions of employment on the grounds of race, color, religious creed, national origin, sex, sexual orientation, genetic information, military service, age, ancestry or disability. Such affirmative action measures shall entail positive and aggressive measures to ensure nondiscrimination and to promote equal opportunity in the areas of hiring, upgrading, demotion or transfer, recruitment, layoff or termination, rate of compensation, apprenticeship and on-the-job training programs. A list of positive and aggressive measures shall include, but not be limited to, advertising employment opportunities in minority and other community news media; notifying minority, women and other community-based organizations of employment opportunities; validating all job specifications, selection requirements, and tests; maintaining a file of names and addresses of each worker referred to the Contractor and what action was taken concerning such worker; and notifying the administering agency in writing when a union with whom the Contractor has a collective bargaining agreement has failed to refer a minority or woman worker. These and other affirmative action measures shall include all actions required to guarantee equal employment opportunity for all persons, regardless of race, color, religious creed, national origin, sex, sexual orientation, genetic information, military service, age, ancestry or disability. One purpose of this provision is to ensure to the fullest extent possible an adequate supply of skilled tradesmen for this and future Commonwealth public construction projects.

III. Minority and Women Workforce Participation

Pursuant to his/her obligations under the preceding section, the Contractor shall strive to achieve on this project the labor participation goals contained herein. Said participation goals shall apply in each job category on this project including but not limited to bricklayers, carpenters, cement masons, electricians, ironworkers, operating engineers and those classes of work enumerated in Section 44F of Chapter 149 of the Massachusetts General Laws. The participation goals for this project shall be 15.3% for minorities and 6.9% for women. The participation goals, as set forth herein, shall not be construed as quotas or set-asides; rather, such participation goals will be used to measure the progress of the Commonwealth's equal opportunity, non-discrimination and affirmative action program. Additionally, the participation goals contained herein should not be seen or treated as a floor or as a ceiling for the employment of particular individuals or group of individuals.

IV. Liaison Committee

At the discretion of the agency that administers the contract for the construction project there may be established for the life of the contract a body to be known as the Liaison Committee. The Liaison Committee shall be composed of one representative each from the agency or agencies administering the contract for the construction project, hereinafter called the administering agency, a representative from the Office of Affirmative action, and such other representatives as may be designated by the administering agency. The Contractor (or his/her agent, if any, designated by him/her as the on-site equal employment opportunity officer) shall recognize the Liaison Committee as an affirmative action body, and shall establish a continuing working relationship with the Liaison Committee, consulting with the Liaison Committee on all matters related to minority recruitment, referral, employment and training.

V. Reports and Records

The Contractor shall prepare projected workforce tables on a quarterly basis when required by the administering agency. These shall be broken down into projections, by week, of workers required in each trade. Copies shall be furnished one week in advance of the commencement of the period covered, and also, when updated, to the administering agency and the Liaison Committee when required.

The Contractor shall prepare weekly reports in a form approved by the administering agency, unless information required is required to be reported electronically by the administering agency, the number of hours worked in each trade by each employee, identified as woman, minority, or non-minority. Copies of these shall be provided at the end of each such week to the administering agency and the Liaison Committee.

Records of employment referral orders, prepared by the Contractor, shall be made available to the administering agency on request.

The Contractor will provide all information and reports required by the administering agency on instructions issued by the administering agency and will permit access to its facilities and any books, records, accounts and other sources of information which may be determined by the administering agency to effect the employment of personnel. This provision shall apply only to information pertinent to the Commonwealth's supplementary non-discrimination, equal opportunity and access and opportunity contract requirements. Where information required is in the exclusive possession of another who fails or refuses to furnish this information, the Contractor shall so certify to the administering agency and shall set forth what efforts he has made to obtain the information.

VI. Access to Work Site

A designee of the administering agency and a designee of the Liaison Committee shall each have a right to access the work site.

VII. Solicitations for Subcontracts, and for the Procurement of Materials and Equipment

In all solicitations either by competitive bidding or negotiation made by the Contractor either for work to be performed under a subcontract or for the procurement of materials or equipment, each potential subcontractor or supplier shall be notified in writing by the Contractor of the Contractor's obligations under this contract relative to non-discrimination and equal opportunity.

VIII. Sanctions

Whenever the administering agency believes the General or Prime Contractor or any subcontractor may not be operating in compliance with the provisions of the Fair Employment Practices Law of the Commonwealth (Massachusetts General Laws Chapter 151B), the administering agency may refer the matter to the Massachusetts Commission Against Discrimination ("Commission") for investigation.

Following the referral of a matter by the administering agency to the Massachusetts Commission Against Discrimination, and while the matter is pending before the MCAD, the administering agency may withhold payments from contractors and subcontractors when it has documentation that the contractor or subcontractor has violated the Fair Employment Practices Law with respect to its activities on the Project, or if the administering agency determines that the contractor has materially failed to comply with its obligations and the requirements of this Section. The amount withheld shall not exceed a withhold of payment to the General or Prime Contractor of 1/100 or 1% of the contract award price or $5,000, whichever sum is greater, or, if a subcontractor is in non-compliance, a withhold by the administering agency from the General Contractor, to be assessed by the General Contractor as a charge against the subcontractor, of 1/100 or 1% of the subcontractor price, or $1,000 whichever sum is greater, for each violation of the applicable law or contract requirements. The total withheld from anyone General or Prime Contractor or subcontractor on a Project shall not exceed $20,000 overall. No withhold of payments or investigation by the Commission or its agent shall be initiated without the administering agency providing prior notice to the Contractor.

If, after investigation, the Massachusetts Commission Against Discrimination finds that a General or Prime Contractor or subcontractor, in commission of a state construction contract or state-assisted construction contract, violated the provisions of the Fair Employment Practices Law, the administering agency may convert the amount withheld as set forth above into a permanent sanction, as a permanent deduct from payments to the General or Prime Contractor or subcontractor, which sanction will be in addition to any such sanctions, fines or penalties imposed by the Massachusetts Commission Against Discrimination.

No sanction enumerated under this Section shall be imposed by the administering agency except after notice to the General or Prime Contractor or subcontractor and an adjudicatory proceeding, as that term is used, under Massachusetts General Laws Chapter 30A, has been conducted.

IX. Severability

The provisions of this section are severable, and if any of these provisions shall be held unconstitutional by any court of competent jurisdiction, the decision of such court shall not affect or impair any of the remaining provisions.

X. Contractor's Certification

After award and prior to the execution of any contract for a state construction contract or a state assisted construction contract, the Prime or General Contractor shall certify that it will comply with all provisions of this Document 00820 Supplemental Equal Employment Opportunity, Non-Discrimination and Affirmative Action Program, by executing Document 00859 Contractor/Subcontractor Certification Form.

XI. Subcontractor Requirements

Prior to the award of any subcontract for a state construction contract or a state assisted construction contract, the Prime or General Contractor shall provide all prospective subcontractors with a complete copy of this Document 00820 entitled "Supplemental Equal Employment Opportunity, Non-Discrimination and Affirmative Action Program" and will incorporate the provisions of this Document 00820 into any and all contracts or work orders for all subcontractors providing work on the Project. In order to ensure that the said subcontractor's certification becomes a part of all subcontracts under the prime contract, the Prime or General Contractor shall certify in writing to the administering agency that it has complied with the requirements as set forth in the preceeding paragraph by executing Document 00859 Contractor/Subcontractor Certification Form.

Rev'd 03/07/14

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DOCUMENT 00821

ELECTRONIC REPORTING REQUIREMENTS
CIVIL RIGHTS PROGRAMS AND CERTIFIED PAYROLL

Implemented on March 2, 2009 Revised June 04, 2019

The Massachusetts Department Of Transportation (MassDOT) has replaced the CHAMP reporting system with Equitable Business Opportunity Solution (EBO), a new web-based civil rights reporting software system. This system is capable of handling both civil rights reporting requirements and certified payrolls. The program's functions include the administration of Equal Employment Opportunity (EEO) requirements, On-The-Job Training requirements (OJT), Disadvantage Business Enterprise (DBE) and/or Minority / Women's Business Enterprise (M/WBE) subcontracting requirements, and the electronic collection of certified payrolls associated with MassDOT projects. In addition, this system is used to generate various data required as part of the American Recovery and Reinvestment Act (ARRA). Contractors are responsible for all coordination with all sub-contractors to ensure timely and accurate electronic submission of all required data.

Contractor and Sub-Contractor EBO User Certification

All contractors and sub-contractors must use the EBO software system. The software vendor, Internet Government Solutions (IGS), has developed an online EBO Training Module that is available to contractors and sub-contractors. This module is a self-tutorial which allows all users in the company to access the training, complete the tutorial, and become certified as EBO users for a one time fee of $75.00. This is the only cost to contractors and sub-contractors associated with the EBO software system. The online EBO Training Module can be accessed at www.ebotraining.com. Click the "Register My Company" button on the login page to begin your training registration. Questions regarding EBO online training should be directed to Gerry Anguilano, IGS at (440) 238-1684.

MassDOT will track contractors and sub-contractors who have successfully completed the on-line training module. All persons performing civil rights program and/or certified payroll functions should be EBO certified.

Vetting of Firms and Designated Firm Individuals

Contractors must authorize a Primary Log-In ID Holder who has completed EBO on-line training to have access to the EBO system by completing and submitting the "Request For EBO System Log-In/Password Form" located on the MassDOT website at: https://www.mass.gov/how-to/how-to-get-an-ebo-login
Contractors must also agree to comply with the EBO system user agreement located on the MassDOT website.

All subcontracts entered into on a project must include language that identifies the submission and training requirements that the sub-contractor must perform. Sub-contractors will be approved by the respective District Office of MassDOT through the existing approval process. When new sub-contractors, who have not previously worked for MassDOT, are initially selected by a general contractor, the new sub-contractor must be approved by the District before taking the EBO on-line training module.

Interim Reporting Requirements

Until MassDOT is satisfied that the EBO system is fully operational and functioning as designed, contractors and sub-contractors will be required to submit certified payrolls manually. There will be a transition period where dual reporting, through manual and electronic submission, will be required. MassDOT, however, will notify contractors and sub-contractors when they may cease manual submission of certified payrolls.

*** END OF DOCUMENT ***

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DOCUMENT 00859

CONTRACTOR/SUBCONTRACTOR CERTIFICATION FORM ‡

The contractor shall submit this completed document 00859 to MassDOT for each subcontract.

_____ **(Contractor)** **Date:**_____

_____**(Subcontractor)** ☐ District Approved Subcontractor

Contract No: 136413 **Project No.** 613642 **Federal Aid No.:** STP/CMQ/TAP /PRC(PRC80)/ FLP-

Location: RAYNHAM-TAUNTON

Project Description: Bridge Replacement, R-02-003 = T-01-004 (3M4), South Street East over the Taunton River

PART 1 CONTRACTOR CERTIFICATION: I hereby certify, as an authorized official of this company, that to the best of my knowledge, information and belief, the company is in compliance with all applicable federal and state laws, rules, and regulations governing fair labor and employment practices, that the company will not discriminate in their employment practices, that the company will make good faith efforts to comply with the minority employee and women employee workforce participation ratio goals and specific affirmative action steps contained in Contract Document 00820 The Commonwealth of Massachusetts Supplemental Equal Employment Opportunity, Non-Discrimination and Affirmative Action Program, and that the company will comply with the special provisions and documentation indicated below (as checked).

I further hereby certify, as an authorized official of this company, that the special provisions and documentation indicated below (as checked) have been or are included in, and made part of, the Subcontractor Agreement entered into with the firm named above.

☐ **This is not a Federally-aided construction project**

Document #

☐ 00718 –Participation By Minority Or Women's Business Enterprises and SDVOBE†
☐ 00761 –Certification Regarding Debarment, Suspension, Ineligibility, and Voluntary Exclusion
☐ 00820 – MA Supplemental Equal Employment Opportunity, Non-Discrimination, and Affirmative Action Program
☐ 00821 – Electronic Reporting Requirements, Civil Rights Programs, and Certified Payroll
☐ 00859 – Contractor/Subcontractor Certification Form (this document)
☐ 00860 – MA Employment Laws
☐ 00861 – Applicable State Wage Rates in the Contract Proposal**
☐ B00842 – MA Schedule of Participation By Minority or Women Business Enterprises (M/WBEs)†
☐ B00843 – MA Letter of Intent – M/WBEs†

** Does not apply to Material Suppliers, unless performing work on-site
† Applies only if Subcontractor is a M/WBE; only include these forms for the particular M/WBE Entity

☐ B00844 - Schedule of Participation By SDVOBE
☐ B00845 - Letter of Intent – SDVOBE
☐ B00846 – M/WBE or SDVOBE Joint Check Arrangement Approval Form
☐ B00847 – Joint Venture Affidavit

☐ **This is a Federally-aided construction project (Federal Aid Number is present)**

Document #

☐ 00719 – Special Provisions for Participation by Disadvantaged Business Enterprises†
☐ 00760 - Form FHWA 1273 - Required Contract Provisions for Federal-Aid Construction Contracts
☐ 00820 – MA Supplemental Equal Employment Opportunity, Non-Discrimination and Affirmative Action Program
☐ 00821 – Electronic Reporting Requirements, Civil Rights Programs and Certified Payroll
☐ 00859 – Contractor/Subcontractor Certification Form (this document)
☐ 00860 – MA Employment Laws
☐ 00870 – Standard Federal Equal Employment Opportunity Construction Contract Specifications Executive Order 11246, (41 CFR Parts 60-4.2 and 60-4.3 (Solicitations and Equal Opportunity Clauses)*
☐ 00875 – Federal Trainee Special Provisions

☐ B00853 – Schedule of Participation by Disadvantaged Business Enterprise†
☐ B00854 – Letter of Intent – DBEs†
☐ B00855 – DBE Joint Check Arrangement Approval Form
☐ B00856 – Joint Venture Affidavit
☐ 00861/00880 - Applicable state and federal wage rates from Contract Proposal**

*Applicable only to Contracts or Subcontracts in excess of $10,000
**Does not apply to Material Suppliers, unless performing work on-site
† Applies only if Subcontractor is a DBE; only include these forms for the particular DBE Entity

Signed this _____ Day of _____, 20_____ Under The Pains And Penalties Of Perjury.

_____ _____
(Print Name and Title) (Authorized Signature)

PART 2

PART 2 SUBCONTRACTOR CERTIFICATION: I hereby certify, as an authorized official of this company, that the required documents in Part 1 above were physically incorporated in our Agreement/Subcontract with the Contractor and give assurance that this company will fully comply or make every good faith effort to comply with the same. I further certify that:

1. This company recognizes that if this is a Federal-Aid Project, then this Contract is covered by the equal employment opportunity laws administered and enforced by the United States Department of Labor ("USDOL"), Office of Federal Contract Compliance Programs ('OFCCP"). By signing below, we acknowledge that this company has certain reporting obligations to the OFCCP, as specified by 41 CFR Part 60-4.2.
2. This company further acknowledges that any contractor with fifty (50) or more employees on a Federal-aid Contract with a value of fifty-thousand ($50,000) dollars or more must annually file an EEO-1 Report (SF 100) to the EEOC, Joint Reporting Committee, on or before September 30th, each year, as specified by 41 CFR Part 60-1.7a.
3. For more information regarding the federal reporting requirements, please contact the USDOL, OFCCP Regional Office, at 1-646-264-3170 or EEO-1, Joint Reporting Committee at 1-866-286-6440.
4. This company ☐ has, ☐ has not, participated in a previous contract or subcontract subject to the Equal Opportunity clauses set forth in 41 CFR Part 60-4 and Executive Order 11246, and where required, has filed with the Joint Reporting Committee, the Director of the Office of Federal Contract Compliance Programs or the EEO Commission all reports due under the applicable filing requirements.
5. This company is in full compliance with applicable Federal and Commonwealth of Massachusetts laws, rules, and regulations and is not currently debarred or disqualified from bidding on or participating in construction contracts in any jurisdiction of the United States. See : https://www.mass.gov/service-details/contractors-and-vendors-suspended-or-debarred-by-massdot
6. This company is properly registered and in good standing with the Office of the Secretary of the Commonwealth.

Signed this _____ Day of _____, 20_____, Under The Pains And Penalties Of Perjury.

Firm: _____
Address: _____
_____
_____
Telephone Number:_____
Federal I.D. Number:_____
Estimated Start Date:_____
Estimated Completion Date:_____
Estimated Dollar Amount:_____

_____
(Print Name and Title)

_____
(Authorized Signature)

_____
(Date)

Rev'd 09/02/22

*** END OF DOCUMENT ***

DOCUMENT 00860

COMMONWEALTH OF MASSACHUSETTS PUBLIC EMPLOYMENT LAWS

Revised February 20, 2019

The Contractor's attention is directed to Massachusetts General Laws, Chapter 149, Sections 26 through 27H, and 150A. This contract is considered to fall within the ambit of that law, which provides that in general, the Prevailing Rate or Total Rate must be paid to employees working on projects funded by the Commonwealth of Massachusetts or any political subdivision including Massachusetts Department of Transportation (MassDOT).

A Federal Aid project is also subject to the Federal Minimum Wage Rate law for construction. When comparing a state minimum wage rate, monitored by the Massachusetts Attorney General, versus federal minimum wage rate, monitored by the U.S. Department of Labor Wage and Hour Division, for a particular job classification the higher wage is at all times to be paid to the affected employee.

Every contractor or subcontractor engaged in this contract to which sections twenty-seven and twenty-seven A apply will keep a true and accurate record of all mechanics and apprentices, teamsters, chauffeurs and laborers employed thereon, showing the name, address and occupational classification of each such employee on this contract, and the hours worked by, and the wages paid to, each such employee, and shall furnish to the MassDOT's Resident Engineer, on a weekly basis, a copy of said record, in a form approved by MassDOT and in accordance with M.G.L. c. 149, § 27B, signed by the employer or his/her authorized agent under the penalties of perjury.

Each such contractor or subcontractor shall preserve its payroll records for a period of three years from the date of completion of the contract.

The Prevailing Wage Rate generally includes the following:

> Minimum Hourly Wage + Employer Contributions to Benefit Plans = Prevailing Wage Rate or Total Rate
>
> Any employer who does not make contributions to Benefit Plans must pay the total Prevailing Wage Rate directly to the employee.

Any deduction from the Prevailing Wage Rate or Total Rate for contributions to benefit plans can only be for a Health & Welfare, Pension, or Supplementary Unemployment plan meeting the requirements of the Employee Retirement Income Security Act (ERISA) of 1974. The maximum allowable deduction for these benefits from the prevailing wage rate cannot be greater than the amount allowed by Executive Office of Labor (EOL) for the specified benefits. Any additional expense of providing benefits to the employees is to be borne by the employer and cannot be deducted from the Minimum Hourly Wage. If the employer's benefit expense is less than that so provided by EOL the difference will be paid directly to the employee. The rate established must be paid to all employees who perform work on the project.

When an employer makes deductions from the Minimum Hourly Wage for an employee's contribution to social security, state taxes, federal taxes, and/or other contribution programs, allowed by law, the employer shall furnish each employee a suitable pay slip, check stub or envelope notifying the employee of the amount of the deductions.

No contractor or subcontractor contracting for any part of the contract week shall require or permit any laborer or mechanic to be employed on such work in excess of forty hours in any workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times his basic rate of pay for all hours worked in excess of forty hours in such workweek, whichever is the greater number of overtime hours.

Apprentice Rates are permitted only when there is an Apprentice Agreement registered with the Massachusetts Division of Apprentice Training in accordance with M.G.L. c. 23, § 11E-11L.

The Prevailing Wage Rates issued for each project shall be the rates paid for the entire project. The Prevailing Wage Rates must be posted on the job site at all times and be visible from a public way.

In addition, each such contractor and subcontractor shall furnish to the MassDOT's Resident Engineer, within fifteen days after completion of its portion of the work, a statement, executed by the contractor or subcontractor or by any authorized officer or employee of the contractor or subcontractor who supervises the payment of wages, in the following form:

STATEMENT OF COMPLIANCE

Date: _____

I , _____do hereby state:
(Name of signatory party) (Title)

That I pay or supervise the payment of the persons employed by:

_____
(Contractor or Subcontractor)

on the _____
(MassDOT Project Location and Contract Number)

and that all mechanics and apprentices, teamsters, chauffeurs and laborers employed on said project have been paid in accordance with wages determined under the provisions of sections twenty-six and twenty-seven of chapter one hundred and forty-nine of the General Laws.

Signature _____

Title _____

The above-mentioned copies of payroll records and statements of compliance shall be available for inspection by any interested party filing a written request to the MassDOT's Resident Engineer for such inspection and copying.

Massachusetts General Laws c. 149, §27, requires annual updates to prevailing wage schedules for all public construction contracts lasting longer than one year. MassDOT will request the required updates and furnish them to the Contractor. The Contractor is required to pay no less than the wage rates indicated on the annual updated wage schedules.

MassDOT will request the updates no later that two week before the anniversary of the Notice to Proceed date of the contract to allow for adequate processing by the Department of Labor Standards (DLS). The effective date for the new rates will be the anniversary date of the contract (i.e. the notice to proceed date), regardless of the date of issuance on the schedule from DLS.

All bidders are cautioned that the aforementioned laws require that employers pay to covered employees no less than the applicable minimum wages. In addition, the same laws require that the applicable prevailing wages become incorporated as part of this contract. The prevailing minimum wage law establishes serious civil and criminal penalties for violations, including imprisonment and exclusion from future public contracts. Bidders are cautioned to carefully read the relevant sections of the Massachusetts General Laws.

*** END OF DOCUMENT ***

DOCUMENT 00861

STATE PREVAILING WAGE RATES

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THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF LABOR AND WORKFORCE DEVELOPMENT
DEPARTMENT OF LABOR STANDARDS
Prevailing Wage Rates

MAURA HEALEY
Governor
KIM DRISCOLL
Lt. Governor

As determined by the Director under the provisions of the Massachusetts General Laws, Chapter 149, Sections 26 to 27H

LAUREN JONES
Secretary
MICHAEL FLANAGAN
Director

Awarding Authority:	Massachusetts Highway	**City/Town:**	RAYNHAM
Wage Request No:	20260817173136-S1	**Job Location:**	RAYNHAM-TAUNTON Federal Aid Project No. HPP/STP-0035(073)X Bridge Replacement, R-02-003 = T-01-004 (
Description of Work:	RAYNHAM-TAUNTON Federal Aid Project No. HPP/STP-0035(073)X Bridge Replacement, R-02-003 = T-01-004 (3M4), South Street East over the Taunton River		
Contract Number:	136413		

§§ 26-27D Construction Project

This Prevailing Wage Schedule establishes the minimum wage rates that employees on this public works construction project must be paid. The project's Wage Request Number is listed above and on all pages of this Schedule. This schedule applies **only** to this specific project.

Awarding Authority Responsibilities

- You must include this Prevailing Wage Schedule (PWS) or an appropriate reference to it in all advertisements and calls for bids.
- The PWS must be incorporated in its entirety into all contracts for this project (G.L. c. 149, § 27).
- The wage rates on this PWS will remain in effect for the duration of the project. **Exception:** You must request an updated schedule for any multi-year construction project no later than 2 weeks before the project's yearly anniversary date.
  - For CM AT RISK projects, the anniversary date is the earlier of the signing date of: (a) the GMP Amendment; or (b) the first amendment to permit procurement of construction services.
  - For all other construction projects, the anniversary date is the date the contract was signed by the Awarding Authority and the General Contractor.
- You must also request an updated PWS if you have not opened bids or selected a contractor within 90 days of the date of issuance on this PWS.
  - For CM AT RISK projects, the earlier of (a) the signing date of the GMP Amendment; or (b) the bid for the first construction scope of work must be within 90 days of the date of issuance on this Schedule.
- You must provide any updated PWS to all contractors working on the project, including general and sub-contractors.
- You must keep the contractors' weekly certified payroll records and Statements of Compliance on file for **3 years.**
- Awarding authorities have other prevailing wage responsibilities not listed above. Learn more at: **[Prevailing wage: for awarding authorities | Mass.gov]** and G.L. c. 149, §§ 26-27D.

Contractor Responsibilities

- You must pay all employees who perform construction work on this project at least the wage rate listed on this PWS. **Warning!** If you do not follow this requirement, you can face civil fines, criminal charges, or private lawsuits.
- You must post this PWS at the worksite where it can be easily seen. (G.L. c. 149, § 27)
- You must file weekly payroll reports and a Statement of Compliance with the awarding authority (**not** DLS). You can file payroll reports by mail or email and must keep them on file for 3 years. Each weekly payroll report must include each employees' name, address, occupational classification(s), hours worked, and wages paid. Find a sample report at: mass.gov/dols/pw.
- You cannot pay any employees at the apprentice rates listed on this PWS unless they are registered with the Massachusetts Division of Apprentice Standards (DAS). Qualifying apprentices must be paid at the applicable step rate and must carry their apprentice ID card during all work hours on the project. Apprentices **not** registered with DAS must be paid at the listed journeyworker's rate, even if they are registered with a different federal/state public agency or private entity. For every week in which apprentice rates are paid, a copy of each apprentice's apprentice ID card issued by DAS shall be attached to the certified payroll records.
- If you don't know what classification or rate applies to the work being performed, you must ask DLS; paying the wrong rate subjects you to enforcement.
- Please contact DLS if you have any questions about the Prevailing Wage Schedule: (617) 626-6953 or **DLS.Feedback@mass.gov**

Employees who are **not** paid the wage listed on the Prevailing Wage Schedule (PWS) may file a complaint with the Attorney General's Fair Labor Division: **www.mass.gov/ago/fld**; **(617) 727-3465.**

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
(2 AXLE) DRIVER - EQUIPMENT TEAMSTERS JOINT COUNCIL NO. 10 TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	6/1/2026	$41.95	$16.17	$21.78	$0.00	$0.00	$79.90
	12/1/2026	$41.95	$16.17	$23.52	$0.00	$0.00	$81.64
	1/1/2027	$41.95	$16.77	$23.52	$0.00	$0.00	$82.24
(3 AXLE) DRIVER - EQUIPMENT TEAMSTERS JOINT COUNCIL NO. 10 TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	6/1/2026	$42.02	$16.17	$21.78	$0.00	$0.00	$79.97
	12/1/2026	$42.02	$16.17	$23.52	$0.00	$0.00	$81.71
	1/1/2027	$42.02	$16.77	$23.52	$0.00	$0.00	$82.31
(4 & 5 AXLE) DRIVER - EQUIPMENT TEAMSTERS JOINT COUNCIL NO. 10 TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	6/1/2026	$42.14	$16.17	$21.78	$0.00	$0.00	$80.09
	12/1/2026	$42.14	$16.17	$23.52	$0.00	$0.00	$81.83
	1/1/2027	$42.14	$16.77	$23.52	$0.00	$0.00	$82.43
ADS/SUBMERSIBLE PILOT PILE DRIVER LOCAL 56 PILE DRIVER LOCAL 56 (ZONE 1) For apprentice rates see "Apprentice- PILE DRIVER"	1/1/2024	$117.16	$10.08	$11.62	$12.67	$0.00	$151.53
AIR TRACK OPERATOR LABORERS LABORERS - ZONE 2 For apprentice rates see "Apprentice- LABORER"	6/1/2026	$42.41	$10.90	$9.75	$9.11	$0.00	$72.17
	12/1/2026	$43.85	$10.90	$9.75	$9.11	$0.00	$73.61
	6/1/2027	$45.30	$10.90	$9.75	$9.11	$0.00	$75.06
	12/1/2027	$46.75	$10.90	$9.75	$9.11	$0.00	$76.51
	6/1/2028	$48.25	$10.90	$9.75	$9.11	$0.00	$78.01
	12/1/2028	$49.75	$10.90	$9.75	$9.11	$0.00	$79.51
AIR TRACK OPERATOR (HEAVY & HIGHWAY) LABORERS LABORERS - ZONE 2 (HEAVY & HIGHWAY) For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"	6/1/2026	$42.41	$10.90	$9.75	$9.21	$0.00	$72.27
	12/1/2026	$43.85	$10.90	$9.75	$9.21	$0.00	$73.71
ASBESTOS WORKER (PIPES & TANKS) HEAT & FROST INSULATORS LOCAL 6 HEAT & FROST INSULATORS LOCAL 6 (SOUTHERN MASS)	12/1/2025	$44.80	$14.50	$4.30	$6.75	$0.00	$70.35
ASPHALT RAKER LABORERS LABORERS - ZONE 2 For apprentice rates see "Apprentice- LABORER"	6/1/2026	$41.91	$10.90	$9.75	$9.11	$0.00	$71.67
	12/1/2026	$43.35	$10.90	$9.75	$9.11	$0.00	$73.11
	6/1/2027	$44.80	$10.90	$9.75	$9.11	$0.00	$74.56
	12/1/2027	$46.25	$10.90	$9.75	$9.11	$0.00	$76.01
	6/1/2028	$47.75	$10.90	$9.75	$9.11	$0.00	$77.51
	12/1/2028	$49.25	$10.90	$9.75	$9.11	$0.00	$79.01
ASPHALT RAKER (HEAVY & HIGHWAY) LABORERS LABORERS - ZONE 2 (HEAVY & HIGHWAY) For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"	6/1/2026	$41.91	$10.90	$9.75	$9.21	$0.00	$71.77
	12/1/2026	$43.35	$10.90	$9.75	$9.21	$0.00	$73.21
ASPHALT/CONCRETE/CRUSHER PLANT-ON SITE OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS LOCAL 4 For apprentice rates see "Apprentice- OPERATING ENGINEERS"	6/1/2026	$59.38	$17.05	$13.35	$3.25	$0.00	$93.03
	12/1/2026	$60.83	$17.05	$13.35	$3.25	$0.00	$94.48

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
BACKHOE/FRONT-END LOADER	6/1/2026	$59.38	$17.05	$13.35	$3.25	$0.00	$93.03
OPERATING ENGINEERS LOCAL 4	12/1/2026	$60.83	$17.05	$13.35	$3.25	$0.00	$94.48
OPERATING ENGINEERS LOCAL 4							
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
BARCO-TYPE JUMPING TAMPER	6/1/2026	$41.91	$10.90	$9.75	$9.11	$0.00	$71.67
LABORERS	12/1/2026	$43.35	$10.90	$9.75	$9.11	$0.00	$73.11
LABORERS - ZONE 2	6/1/2027	$44.80	$10.90	$9.75	$9.11	$0.00	$74.56
	12/1/2027	$46.25	$10.90	$9.75	$9.11	$0.00	$76.01
	6/1/2028	$47.75	$10.90	$9.75	$9.11	$0.00	$77.51
	12/1/2028	$49.25	$10.90	$9.75	$9.11	$0.00	$79.01
For apprentice rates see "Apprentice- LABORER"							
BLOCK PAVER, RAMMER / CURB SETTER	6/1/2026	$42.41	$10.90	$9.75	$9.11	$0.00	$72.17
LABORERS	12/1/2026	$43.85	$10.90	$9.75	$9.11	$0.00	$73.61
LABORERS - ZONE 2	6/1/2027	$45.30	$10.90	$9.75	$9.11	$0.00	$75.06
	12/1/2027	$46.75	$10.90	$9.75	$9.11	$0.00	$76.51
	6/1/2028	$48.25	$10.90	$9.75	$9.11	$0.00	$78.01
	12/1/2028	$49.75	$10.90	$9.75	$9.11	$0.00	$79.51
For apprentice rates see "Apprentice- LABORER"							
BLOCK PAVER, RAMMER / CURB SETTER (HEAVY & HIGHWAY)	6/1/2026	$42.41	$10.90	$9.75	$9.21	$0.00	$72.27
LABORERS	12/1/2026	$43.85	$10.90	$9.75	$9.21	$0.00	$73.71
LABORERS - ZONE 2 (HEAVY & HIGHWAY)							
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"							
BOILER MAKER	1/1/2024	$48.12	$7.07	$14.60	$6.00	$0.00	$75.79
BOILERMAKERS LOCAL 29							
BOILERMAKERS LOCAL 29							

Apprentice: BOILER MAKER

Effective Date: 1/1/2024

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	65.00	$31.28	$7.07	$9.32	$3.90	$0.00	$51.57
2	65.00	$31.28	$7.07	$9.32	$3.90	$0.00	$51.57
3	70.00	$33.68	$7.07	$10.03	$4.20	$0.00	$54.98
4	75.00	$36.09	$7.07	$10.74	$4.50	$0.00	$58.40
5	80.00	$38.50	$7.07	$11.45	$4.80	$0.00	$61.82
6	85.00	$40.90	$7.07	$12.18	$5.10	$0.00	$65.25
7	90.00	$43.31	$7.07	$12.88	$5.40	$0.00	$68.66
8	95.00	$45.71	$7.07	$13.62	$5.70	$0.00	$72.10

Apprentice to Journeyworker Ratio: 1:4

BRICK/STONE/ARTIFICIAL MASONRY (INCL. MASONRY WATERPROOFING)	8/1/2026	$68.01	$12.84	$15.57	$7.33	$0.00	$103.75
BRICKLAYERS LOCAL 3	2/1/2027	$69.41	$12.84	$15.57	$7.33	$0.00	$105.15
BRICKLAYERS LOCAL 3 (FOXBORO)							

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate

Apprentice: BRICK/STONE/ARTIFICIAL MASONRY (INCL. MASONRY WATERPROOFING)

Effective Date: 8/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$34.01	$12.84	$15.57	$7.33	$0.00	$69.75
2	60.00	$40.81	$12.84	$15.57	$7.33	$0.00	$76.55
3	70.00	$47.61	$12.84	$15.57	$7.33	$0.00	$83.35
4	80.00	$54.41	$12.84	$15.57	$7.33	$0.00	$90.15
5	90.00	$61.21	$12.84	$15.57	$7.33	$0.00	$96.95

Apprentice: BRICK/STONE/ARTIFICIAL MASONRY (INCL. MASONRY WATERPROOFING)

Effective Date: 2/1/2027

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$34.71	$12.84	$15.57	$7.33	$0.00	$70.45
2	60.00	$41.65	$12.84	$15.57	$7.33	$0.00	$77.39
3	70.00	$48.59	$12.84	$15.57	$7.33	$0.00	$84.33
4	80.00	$55.53	$12.84	$15.57	$7.33	$0.00	$91.27
5	90.00	$62.47	$12.84	$15.57	$7.33	$0.00	$98.21

Apprentice to Journeyworker Ratio: 1:5

BULLDOZER/GRADER/SCRAPER OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS LOCAL 4	6/1/2026	$58.70	$17.05	$13.35	$3.25	$0.00	$92.35
	12/1/2026	$60.14	$17.05	$13.35	$3.25	$0.00	$93.79
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
CAISSON & UNDERPINNING BOTTOM MAN LABORERS LABORERS - FOUNDATION AND MARINE	6/1/2026	$50.40	$10.90	$9.75	$9.80	$0.00	$80.85
	12/1/2026	$51.90	$10.90	$9.75	$9.80	$0.00	$82.35
For apprentice rates see "Apprentice- LABORER"							
CAISSON & UNDERPINNING LABORER LABORERS LABORERS - FOUNDATION AND MARINE	6/1/2026	$49.25	$10.90	$9.75	$9.80	$0.00	$79.70
	12/1/2026	$50.75	$10.90	$9.75	$9.80	$0.00	$81.20
For apprentice rates see "Apprentice- LABORER"							
CAISSON & UNDERPINNING TOP MAN LABORERS LABORERS - FOUNDATION AND MARINE	6/1/2026	$49.58	$10.90	$9.75	$9.80	$0.00	$80.03
	12/1/2026	$51.08	$10.90	$9.75	$9.80	$0.00	$81.53
For apprentice rates see "Apprentice- LABORER"							
CARBIDE CORE DRILL OPERATOR LABORERS LABORERS - ZONE 2	6/1/2026	$41.91	$10.90	$9.75	$9.11	$0.00	$71.67
	12/1/2026	$43.35	$10.90	$9.75	$9.11	$0.00	$73.11
	6/1/2027	$44.80	$10.90	$9.75	$9.11	$0.00	$74.56
	12/1/2027	$46.25	$10.90	$9.75	$9.11	$0.00	$76.01
	6/1/2028	$47.75	$10.90	$9.75	$9.11	$0.00	$77.51
	12/1/2028	$49.25	$10.90	$9.75	$9.11	$0.00	$79.01
For apprentice rates see "Apprentice- LABORER"							

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
CARPENTER CARPENTERS CARPENTERS -ZONE 2 (Eastern Massachusetts)	3/1/2026	$50.85	$11.08	$11.47	$8.50	$0.00	$81.90
	9/1/2026	$52.10	$11.08	$11.47	$8.50	$0.00	$83.15
	3/1/2027	$53.35	$11.08	$11.47	$8.50	$0.00	$84.40

Apprentice: CARPENTER

Effective Date: 3/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	45.00	$22.88	$11.08	$0.00	$1.73	$0.00	$35.69
2	45.00	$22.88	$11.08	$0.00	$1.73	$0.00	$35.69
3	55.00	$27.97	$11.08	$0.00	$3.40	$0.00	$42.45
4	55.00	$27.97	$11.08	$0.00	$3.40	$0.00	$42.45
5	70.00	$35.60	$11.08	$11.41	$5.10	$0.00	$63.19
6	70.00	$35.60	$11.08	$11.41	$5.10	$0.00	$63.19
7	80.00	$40.68	$11.08	$11.44	$6.80	$0.00	$70.00
8	80.00	$40.68	$11.08	$11.44	$6.80	$0.00	$70.00

Apprentice: CARPENTER

Effective Date: 9/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	45.00	$23.45	$11.08	$0.00	$1.73	$0.00	$36.26
2	45.00	$23.45	$11.08	$0.00	$1.73	$0.00	$36.26
3	55.00	$28.66	$11.08	$0.00	$3.40	$0.00	$43.14
4	55.00	$28.66	$11.08	$0.00	$3.40	$0.00	$43.14
5	70.00	$36.47	$11.08	$11.41	$5.10	$0.00	$64.06
6	70.00	$36.47	$11.08	$11.41	$5.10	$0.00	$64.06
7	80.00	$41.68	$11.08	$11.44	$6.80	$0.00	$71.00
8	80.00	$41.68	$11.08	$11.44	$6.80	$0.00	$71.00

Apprentice to Journeyworker Ratio: 1:5

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
CARPENTER WOOD FRAME CARPENTERS CARPENTERS-ZONE 3 (Wood Frame)	10/1/2025	$27.37	$7.38	$4.47	$1.00	$0.00	$40.22
	10/1/2026	$28.47	$7.38	$4.47	$1.00	$0.00	$41.32

All Aspects of New Wood Frame Work

Apprentice: CARPENTER WOOD FRAME

Effective Date: 10/1/2025

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	60.00	$16.42	$7.38	$0.00	$0.00	$0.00	$23.80
2	60.00	$16.42	$7.38	$0.00	$0.00	$0.00	$23.80
3	65.00	$17.79	$7.38	$0.00	$1.00	$0.00	$26.17
4	70.00	$19.16	$7.38	$0.00	$1.00	$0.00	$27.54
5	75.00	$20.53	$7.38	$3.80	$1.00	$0.00	$32.71
6	80.00	$21.90	$7.38	$3.80	$1.00	$0.00	$34.08

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate

Apprentice: CARPENTER WOOD FRAME

Effective Date: 10/1/2025

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
7	85.00	$23.26	$7.38	$3.80	$1.00	$0.00	$35.44
8	90.00	$24.63	$7.38	$3.80	$1.00	$0.00	$36.81

Apprentice: CARPENTER WOOD FRAME

Effective Date: 10/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	60.00	$17.08	$7.38	$0.00	$0.00	$0.00	$24.46
2	60.00	$17.08	$7.38	$0.00	$0.00	$0.00	$24.46
3	65.00	$18.51	$7.38	$0.00	$1.00	$0.00	$26.89
4	70.00	$19.93	$7.38	$0.00	$1.00	$0.00	$28.31
5	75.00	$21.35	$7.38	$3.80	$1.00	$0.00	$33.53
6	80.00	$22.78	$7.38	$3.80	$1.00	$0.00	$34.96
7	85.00	$24.20	$7.38	$3.80	$1.00	$0.00	$36.38
8	90.00	$25.62	$7.38	$3.80	$1.00	$0.00	$37.80

Apprentice to Journeyworker Ratio: 1:5

CEMENT MASONRY/PLASTERING PLASTERERS AND CEMENT MASONS LOCAL 534 Plasterers and Cement Masons - Zone 1	7/1/2026	$54.49	$13.35	$16.43	$7.78	$1.80	$93.85
	1/1/2027	$55.94	$13.35	$16.43	$7.78	$1.80	$95.30
	7/1/2027	$57.29	$13.35	$16.43	$7.78	$1.80	$96.65
	1/1/2028	$58.64	$13.35	$16.43	$7.78	$1.80	$98.00

Apprentice: CEMENT MASONRY/PLASTERING

Effective Date: 7/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$27.25	$13.35	$16.43	$0.00	$0.00	$57.03
2	60.00	$32.69	$13.35	$16.43	$7.78	$1.80	$72.05
3	65.00	$35.42	$13.35	$16.43	$7.78	$1.80	$74.78
4	70.00	$38.14	$13.35	$16.43	$7.78	$1.80	$77.50
5	75.00	$40.87	$13.35	$16.43	$7.78	$1.80	$80.23
6	80.00	$43.59	$13.35	$16.43	$7.78	$1.80	$82.95
7	90.00	$49.04	$13.35	$0.00	$7.78	$0.00	$70.17

Apprentice: CEMENT MASONRY/PLASTERING

Effective Date: 1/1/2027

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$27.97	$13.35	$16.43	$0.00	$0.00	$57.75
2	60.00	$33.56	$13.35	$16.43	$7.78	$1.80	$72.92

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate

Apprentice: CEMENT MASONRY/PLASTERING

Effective Date: 1/1/2027

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
3	65.00	$36.36	$13.35	$16.43	$7.78	$1.80	$75.72
4	70.00	$39.16	$13.35	$16.43	$7.78	$1.80	$78.52
5	75.00	$41.96	$13.35	$16.43	$7.78	$1.80	$81.32
6	80.00	$44.75	$13.35	$16.43	$7.78	$1.80	$84.11
7	90.00	$50.35	$0.00	$16.43	$0.00	$0.00	$66.78

Apprentice to Journeyworker Ratio: 1:5

CHAIN SAW OPERATOR LABORERS LABORERS - ZONE 2	6/1/2026	$41.91	$10.90	$9.75	$9.11	$0.00	$71.67
	12/1/2026	$43.35	$10.90	$9.75	$9.11	$0.00	$73.11
	6/1/2027	$44.80	$10.90	$9.75	$9.11	$0.00	$74.56
	12/1/2027	$46.25	$10.90	$9.75	$9.11	$0.00	$76.01
	6/1/2028	$47.75	$10.90	$9.75	$9.11	$0.00	$77.51
	12/1/2028	$49.25	$10.90	$9.75	$9.11	$0.00	$79.01
For apprentice rates see "Apprentice- LABORER"							
CLAM SHELLS/SLURRY BUCKETS/HEADING MACHINES OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS LOCAL 4	6/1/2026	$60.61	$17.05	$13.35	$3.25	$0.00	$94.26
	12/1/2026	$62.09	$17.05	$13.35	$3.25	$0.00	$95.74
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
COMPRESSOR OPERATOR OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS LOCAL 4	6/1/2026	$37.63	$17.05	$13.35	$3.25	$0.00	$71.28
	12/1/2026	$38.58	$17.05	$13.35	$3.25	$0.00	$72.23
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
DELEADER (BRIDGE) PAINTERS LOCAL 35 PAINTERS LOCAL 35 - ZONE 2	1/1/2026	$59.56	$10.35	$12.00	$12.60	$0.00	$94.51

Apprentice: DELEADER (BRIDGE)

Effective Date: 1/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$29.78	$10.35	$0.00	$0.00	$0.00	$40.13
2	55.00	$32.76	$10.35	$0.00	$6.93	$0.00	$50.04
3	60.00	$35.74	$10.35	$0.00	$7.56	$0.00	$53.65
4	65.00	$38.71	$10.35	$0.00	$8.19	$0.00	$57.25
5	70.00	$41.69	$10.35	$12.00	$8.82	$0.00	$72.86
6	75.00	$44.67	$10.35	$12.00	$9.45	$0.00	$76.47
7	80.00	$47.65	$10.35	$12.00	$10.08	$0.00	$80.08
8	90.00	$53.60	$10.35	$12.00	$11.34	$0.00	$87.29

Apprentice to Journeyworker Ratio: 1:1

DEMO: ADZEMAN	6/1/2026	$49.30	$10.90	$9.75	$9.65	$0.00	$79.60

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
LABORERS LABORERS - ZONE 2	12/7/2026	$50.80	$10.90	$9.75	$9.65	$0.00	$81.10
	6/7/2027	$52.40	$10.90	$9.75	$9.65	$0.00	$82.70
	12/6/2027	$54.00	$10.90	$9.75	$9.65	$0.00	$84.30
	6/5/2028	$55.68	$10.90	$9.75	$9.65	$0.00	$85.98
	12/4/2028	$57.35	$10.90	$9.75	$9.65	$0.00	$87.65
For apprentice rates see "Apprentice- LABORER"							
DEMO: BACKHOE/LOADER/HAMMER OPERATOR LABORERS LABORERS - ZONE 2	6/1/2026	$50.30	$10.90	$9.75	$9.65	$0.00	$80.60
	12/7/2026	$51.80	$10.90	$9.75	$9.65	$0.00	$82.10
	6/7/2027	$53.40	$10.90	$9.75	$9.65	$0.00	$83.70
	12/6/2027	$55.00	$10.90	$9.75	$9.65	$0.00	$85.30
	6/5/2028	$56.68	$10.90	$9.75	$9.65	$0.00	$86.98
	12/4/2028	$58.35	$10.90	$9.75	$9.65	$0.00	$88.65
For apprentice rates see "Apprentice- LABORER"							
DEMO: BURNERS LABORERS LABORERS - ZONE 2	6/1/2026	$50.05	$10.90	$9.75	$9.65	$0.00	$80.35
	12/7/2026	$51.55	$10.90	$9.75	$9.65	$0.00	$81.85
	6/7/2027	$53.15	$10.90	$9.75	$9.65	$0.00	$83.45
	12/6/2027	$54.75	$10.90	$9.75	$9.65	$0.00	$85.05
	6/5/2028	$56.43	$10.90	$9.75	$9.65	$0.00	$86.73
	12/4/2028	$58.10	$10.90	$9.75	$9.65	$0.00	$88.40
For apprentice rates see "Apprentice- LABORER"							
DEMO: CONCRETE CUTTER/SAWYER LABORERS LABORERS - ZONE 2	6/1/2026	$50.30	$10.90	$9.75	$9.65	$0.00	$80.60
	12/7/2026	$51.80	$10.90	$9.75	$9.65	$0.00	$82.10
	6/7/2027	$53.40	$10.90	$9.75	$9.65	$0.00	$83.70
	12/6/2027	$55.00	$10.90	$9.75	$9.65	$0.00	$85.30
	6/5/2028	$56.68	$10.90	$9.75	$9.65	$0.00	$86.98
	12/4/2028	$58.35	$10.90	$9.75	$9.65	$0.00	$88.65
For apprentice rates see "Apprentice- LABORER"							
DEMO: JACKHAMMER OPERATOR LABORERS LABORERS - ZONE 2	6/1/2026	$50.05	$10.90	$9.75	$9.65	$0.00	$80.35
	12/7/2026	$51.55	$10.90	$9.75	$9.65	$0.00	$81.85
	6/7/2027	$53.15	$10.90	$9.75	$9.65	$0.00	$83.45
	12/6/2027	$54.75	$10.90	$9.75	$9.65	$0.00	$85.05
	6/5/2028	$56.43	$10.90	$9.75	$9.65	$0.00	$86.73
	12/4/2028	$58.10	$10.90	$9.75	$9.65	$0.00	$88.40
For apprentice rates see "Apprentice- LABORER"							
DEMO: WRECKING LABORER LABORERS LABORERS - ZONE 2	6/1/2026	$49.30	$10.90	$9.75	$9.65	$0.00	$79.60
	12/7/2026	$50.80	$10.90	$9.75	$9.65	$0.00	$81.10
	6/7/2027	$52.40	$10.90	$9.75	$9.65	$0.00	$82.70
	12/6/2027	$54.00	$10.90	$9.75	$9.65	$0.00	$84.30
	6/5/2028	$55.68	$10.90	$9.75	$9.65	$0.00	$85.98
	12/4/2028	$57.35	$10.90	$9.75	$9.65	$0.00	$87.65
For apprentice rates see "Apprentice- LABORER"							
DIRECTIONAL DRILL MACHINE OPERATOR OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS LOCAL 4	6/1/2026	$58.70	$17.05	$13.35	$3.25	$0.00	$92.35
	12/1/2026	$60.14	$17.05	$13.35	$3.25	$0.00	$93.79
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
DIVER PILE DRIVER LOCAL 56 PILE DRIVER LOCAL 56 (ZONE 1)	8/1/2024	$78.11	$10.08	$11.62	$10.04	$0.00	$109.85
as of 8-1-24, Apprentices with diving licenses begin at second year. % of Diver wage 70/80/90 2A $69.83, 3A $91.79,4A $102.14 Total Rate							
DIVER TENDER PILE DRIVER LOCAL 56 PILE DRIVER LOCAL 56 (ZONE 1)	8/1/2024	$55.79	$10.08	$11.62	$12.67	$0.00	$90.16
as of 8-1-24, Apprentices with diving licenses begin at second year. % of Piledriver wage 70/80/90 2A $54.20, 3A $73.93,4A $82.05 Total Rate							
DIVER TENDER (EFFLUENT) PILE DRIVER LOCAL 56 PILE DRIVER LOCAL 56 (ZONE 1)	8/1/2024	$83.69	$10.08	$11.62	$12.67	$0.00	$118.06
For apprentice rates see "Apprentice- PILE DRIVER"							
DIVER/SLURRY (EFFLUENT) PILE DRIVER LOCAL 56 PILE DRIVER LOCAL 56 (ZONE 1)	8/1/2024	$117.16	$10.08	$11.62	$12.67	$0.00	$151.53
For apprentice rates see "Apprentice- PILE DRIVER"							
DRAWBRIDGE OPERATOR (Construction) DRAWBRIDGE - SEIU LOCAL 888 DRAWBRIDGE - SEIU LOCAL 888	7/1/2020	$26.77	$6.67	$3.93	$0.00	$0.16	$37.53
ELECTRICIAN ELECTRICIANS LOCAL 223 ELECTRICIANS LOCAL 223	9/1/2025	$52.25	$12.25	$14.86	$3.75	$0.00	$83.11
	9/1/2026	$54.72	$12.50	$15.56	$4.00	$0.00	$86.78

Apprentice: ELECTRICIAN

Effective Date: 9/1/2025

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	40.00	$20.90	$12.25	$0.63	$0.00	$0.00	$33.78
2	45.00	$23.51	$12.25	$0.71	$0.00	$0.00	$36.47
3	50.00	$26.13	$12.25	$0.78	$0.00	$0.00	$39.16
4	55.00	$28.74	$12.25	$6.61	$2.50	$0.00	$50.10
5	60.00	$31.35	$12.25	$7.21	$2.50	$0.00	$53.31
6	65.00	$33.96	$12.25	$7.82	$2.50	$0.00	$56.53
7	70.00	$36.58	$12.25	$8.41	$2.50	$0.00	$59.74
8	75.00	$39.19	$12.25	$9.02	$2.50	$0.00	$62.96

Apprentice: ELECTRICIAN

Effective Date: 9/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	40.00	$21.89	$12.50	$0.66	$0.00	$0.00	$35.05
2	45.00	$24.62	$12.50	$0.74	$0.00	$0.00	$37.86
3	50.00	$27.36	$12.50	$0.82	$0.00	$0.00	$40.68
4	55.00	$30.10	$12.50	$6.92	$2.75	$0.00	$52.27
5	60.00	$32.83	$12.50	$7.54	$2.75	$0.00	$55.62

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate

Apprentice: ELECTRICIAN

Effective Date: 9/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
6	65.00	$35.57	$12.50	$8.18	$2.75	$0.00	$59.00
7	70.00	$38.30	$12.50	$8.81	$2.75	$0.00	$62.36
8	75.00	$41.04	$12.50	$9.43	$2.75	$0.00	$65.72

Apprentice to Journeyworker Ratio: 2:3

ELEVATOR CONSTRUCTOR	1/1/2026	$77.26	$16.38	$11.06	$10.70	$0.00	$115.40
ELEVATOR CONSTRUCTORS LOCAL 4 ELEVATOR CONSTRUCTORS LOCAL 4	1/1/2027	$80.55	$16.48	$11.16	$11.00	$0.00	$119.19

Apprentice: ELEVATOR CONSTRUCTOR

Effective Date: 1/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$38.63	$0.00	$0.00	$0.00	$0.00	$38.63
2	55.00	$42.49	$16.38	$11.06	$10.70	$0.00	$80.63
3	65.00	$50.22	$16.38	$11.06	$10.70	$0.00	$88.36
4	70.00	$54.08	$16.38	$11.06	$10.70	$0.00	$92.22
5	80.00	$61.81	$16.38	$11.06	$10.70	$0.00	$99.95

Apprentice: ELEVATOR CONSTRUCTOR

Effective Date: 1/1/2027

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$40.28	$0.00	$0.00	$0.00	$0.00	$40.28
2	55.00	$44.30	$16.48	$11.16	$11.00	$0.00	$82.94
3	65.00	$52.36	$16.48	$11.16	$11.00	$0.00	$91.00
4	70.00	$56.39	$16.48	$11.16	$11.00	$0.00	$95.03
5	80.00	$64.44	$16.48	$11.16	$11.00	$0.00	$103.08

Apprentice to Journeyworker Ratio: 1:1

ELEVATOR CONSTRUCTOR HELPER	1/1/2026	$54.08	$16.38	$11.06	$10.07	$0.00	$91.59
ELEVATOR CONSTRUCTORS LOCAL 4 ELEVATOR CONSTRUCTORS LOCAL 4	1/1/2027	$56.39	$16.48	$11.16	$11.00	$0.00	$95.03
For apprentice rates see "Apprentice - ELEVATOR CONSTRUCTOR"							
FENCE & GUARD RAIL ERECTOR (HEAVY & HIGHWAY)	6/1/2026	$41.91	$10.90	$9.75	$9.21	$0.00	$71.77
LABORERS LABORERS - ZONE 2 (HEAVY & HIGHWAY)	12/1/2026	$43.35	$10.90	$9.75	$9.21	$0.00	$73.21
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"							
FIELD ENG.INST.PERSON-BLDG,SITE,HVY/HWY	5/1/2026	$54.40	$16.55	$13.35	$3.25	$0.00	$87.55
OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS LOCAL 4	11/1/2026	$55.69	$16.55	$13.35	$3.25	$0.00	$88.84

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
	5/1/2027	$57.12	$16.55	$13.35	$3.25	$0.00	$90.27
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
FIELD ENG.PARTY CHIEF-BLDG,SITE,HVY/HWY	5/1/2026	$56.02	$16.55	$13.35	$3.25	$0.00	$89.17
OPERATING ENGINEERS LOCAL 4	11/1/2026	$57.32	$16.55	$13.35	$3.25	$0.00	$90.47
OPERATING ENGINEERS LOCAL 4	5/1/2027	$58.77	$16.55	$13.35	$3.25	$0.00	$91.92
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
FIELD ENG.ROD PERSON-BLDG,SITE,HVY/HWY	5/1/2026	$26.28	$16.55	$13.35	$3.25	$0.00	$59.43
OPERATING ENGINEERS LOCAL 4	11/1/2026	$27.04	$16.55	$13.35	$3.25	$0.00	$60.19
OPERATING ENGINEERS LOCAL 4	5/1/2027	$27.89	$16.55	$13.35	$3.25	$0.00	$61.04
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
FIRE ALARM INSTALLER	9/1/2025	$52.25	$12.25	$14.86	$3.75	$0.00	$83.11
ELECTRICIANS LOCAL 223	9/1/2026	$54.72	$12.50	$15.56	$4.00	$0.00	$86.78
ELECTRICIANS LOCAL 223							
For apprentice rates see "Apprentice- ELECTRICIAN"							
FIRE ALARM REPAIR / MAINTENANCE	9/1/2025	$52.25	$12.25	$14.86	$3.75	$0.00	$83.11
/ COMMISSIONING	9/1/2026	$54.72	$12.50	$15.56	$4.00	$0.00	$86.78
ELECTRICIANS LOCAL 223							
ELECTRICIANS LOCAL 223							
For apprentice rates see "Apprentice- TELECOMMUNICATIONS TECHNICIAN"							
FIREMAN (ASST. ENGINEER)	6/1/2026	$47.55	$17.05	$13.35	$3.25	$0.00	$81.20
OPERATING ENGINEERS LOCAL 4	12/1/2026	$48.73	$17.05	$13.35	$3.25	$0.00	$82.38
OPERATING ENGINEERS LOCAL 4							
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
FLAGGER & SIGNALER (HEAVY & HIGHWAY)	6/1/2026	$29.21	$10.90	$9.75	$9.21	$0.00	$59.07
LABORERS	12/1/2026	$29.21	$10.90	$9.75	$9.21	$0.00	$59.07
LABORERS - ZONE 2 (HEAVY & HIGHWAY)							
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"							
FLOORCOVERER	3/1/2026	$59.24	$10.33	$11.47	$8.80	$0.00	$89.84
FLOORCOVERERS LOCAL 2168	9/1/2026	$60.74	$10.33	$11.47	$8.80	$0.00	$91.34
FLOORCOVERERS LOCAL 2168 ZONE I	3/1/2027	$62.24	$10.33	$11.47	$8.80	$0.00	$92.84

Apprentice: FLOORCOVERER

Effective Date: 3/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	45.00	$26.66	$10.33	$0.00	$1.76	$0.00	$38.75
2	45.00	$26.66	$10.33	$0.00	$1.76	$0.00	$38.75
3	55.00	$32.58	$10.33	$0.00	$3.52	$0.00	$46.43
4	55.00	$32.58	$10.33	$0.00	$3.52	$0.00	$46.43
5	70.00	$41.47	$10.33	$11.47	$5.28	$0.00	$68.55
6	70.00	$41.47	$10.33	$11.47	$5.28	$0.00	$68.55
7	80.00	$47.39	$10.33	$11.47	$7.04	$0.00	$76.23
8	80.00	$47.39	$10.33	$11.47	$7.04	$0.00	$76.23

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
Apprentice: FLOORCOVERER							
Effective Date: 9/1/2026							
Step / Percent		**Apprentice Base Wage**	**Health**	**Pension**	**Annuity**	**Supplemental Unemployment**	**Total Rate**
1 / 45.00		$27.33	$10.33	$0.00	$1.76	$0.00	$39.42
2 / 45.00		$27.33	$10.33	$0.00	$1.76	$0.00	$39.42
3 / 55.00		$33.41	$10.33	$0.00	$3.52	$0.00	$47.26
4 / 55.00		$33.41	$10.33	$0.00	$3.52	$0.00	$47.26
5 / 70.00		$42.52	$10.33	$11.47	$5.28	$0.00	$69.60
6 / 70.00		$42.52	$10.33	$11.47	$5.28	$0.00	$69.60
7 / 80.00		$48.59	$10.33	$11.47	$7.04	$0.00	$77.43
8 / 80.00		$48.59	$10.33	$11.47	$7.04	$0.00	$77.43
Apprentice Notes							
Steps are 750 hrs.							
Apprentice to Journeyworker Ratio: 1:1							
FORK LIFT/CHERRY PICKER	6/1/2026	$59.38	$17.05	$13.35	$3.25	$0.00	$93.03
OPERATING ENGINEERS LOCAL 4	12/1/2026	$60.83	$17.05	$13.35	$3.25	$0.00	$94.48
OPERATING ENGINEERS LOCAL 4							
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
GENERATOR/LIGHTING PLANT/HEATERS	6/1/2026	$37.63	$17.05	$13.35	$3.25	$0.00	$71.28
OPERATING ENGINEERS LOCAL 4	12/1/2026	$38.58	$17.05	$13.35	$3.25	$0.00	$72.23
OPERATING ENGINEERS LOCAL 4							
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
GLAZIER (GLASS PLANK/AIR BARRIER/INTERIOR SYSTEMS)	6/1/2026	$44.73	$11.20	$8.40	$6.05	$0.00	$70.38
GLAZIERS LOCAL 1333	6/1/2027	$46.73	$11.60	$8.55	$6.60	$0.00	$73.48
GLAZIERS LOCAL 1333	6/1/2028	$48.73	$12.00	$8.70	$7.20	$0.00	$76.63
Apprentice: GLAZIER (GLASS PLANK/AIR BARRIER/INTERIOR SYSTEMS)							
Effective Date: 6/1/2026							
Step / Percent		**Apprentice Base Wage**	**Health**	**Pension**	**Annuity**	**Supplemental Unemployment**	**Total Rate**
1 / 50.00		$22.37	$11.20	$8.40	$6.05	$0.00	$48.02
2 / 56.25		$25.16	$11.20	$8.40	$6.05	$0.00	$50.81
3 / 62.50		$27.96	$11.20	$8.40	$6.05	$0.00	$53.61
4 / 68.75		$30.75	$11.20	$8.40	$6.05	$0.00	$56.40
5 / 75.00		$33.55	$11.20	$8.40	$6.05	$0.00	$59.20
6 / 81.25		$36.34	$11.20	$8.40	$6.05	$0.00	$61.99
7 / 87.50		$39.14	$11.20	$8.40	$6.05	$0.00	$64.79
8 / 93.75		$41.93	$11.20	$8.40	$6.05	$0.00	$67.58

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
HOISTING ENGINEER/CRANES/GRADALLS OPERATING ENGINEERS LOCAL 4	6/1/2026	$59.38	$17.05	$13.35	$3.25	$0.00	$93.03
OPERATING ENGINEERS LOCAL 4	12/1/2026	$60.83	$17.05	$13.35	$3.25	$0.00	$94.48

Apprentice: GLAZIER (GLASS PLANK/AIR BARRIER/INTERIOR SYSTEMS)

Effective Date: 6/1/2027

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$23.37	$11.60	$8.55	$6.60	$0.00	$50.12
2	56.25	$26.29	$11.60	$8.55	$6.60	$0.00	$53.04
3	62.50	$29.21	$11.60	$8.55	$6.60	$0.00	$55.96
4	68.75	$32.13	$11.60	$8.55	$6.60	$0.00	$58.88
5	75.00	$35.05	$11.60	$8.55	$6.60	$0.00	$61.80
6	81.25	$37.97	$11.60	$8.55	$6.60	$0.00	$64.72
7	87.50	$40.89	$11.60	$8.55	$6.60	$0.00	$67.64
8	93.75	$43.81	$11.60	$8.55	$6.60	$0.00	$70.56

Apprentice to Journeyworker Ratio: 3:1

Apprentice: HOISTING ENGINEER/CRANES/GRADALLS

Effective Date: 6/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	55.00	$32.66	$0.00	$0.00	$0.00	$0.00	$32.66
2	60.00	$35.63	$17.05	$13.35	$3.25	$0.00	$69.28
3	65.00	$38.60	$17.05	$13.35	$3.25	$0.00	$72.25
4	70.00	$41.57	$17.05	$13.35	$3.25	$0.00	$75.22
5	75.00	$44.54	$17.05	$13.35	$3.25	$0.00	$78.19
6	80.00	$47.50	$17.05	$13.35	$3.25	$0.00	$81.15
7	85.00	$50.47	$17.05	$13.35	$3.25	$0.00	$84.12
8	90.00	$53.44	$17.05	$13.35	$3.25	$0.00	$87.09

Apprentice: HOISTING ENGINEER/CRANES/GRADALLS

Effective Date: 12/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	55.00	$33.46	$0.00	$0.00	$0.00	$0.00	$33.46
2	60.00	$36.50	$17.05	$13.35	$3.25	$0.00	$70.15
3	65.00	$39.54	$17.05	$13.35	$3.25	$0.00	$73.19
4	70.00	$42.58	$17.05	$13.35	$3.25	$0.00	$76.23
5	75.00	$45.62	$17.05	$13.35	$3.25	$0.00	$79.27
6	80.00	$48.66	$17.05	$13.35	$3.25	$0.00	$82.31
7	85.00	$51.71	$17.05	$13.35	$3.25	$0.00	$85.36
8	90.00	$54.75	$17.05	$13.35	$3.25	$0.00	$88.40

Apprentice to Journeyworker Ratio: 1:6

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
HVAC (DUCTWORK) SHEETMETAL WORKERS LOCAL 17 SHEETMETAL WORKERS LOCAL 17 - A	2/1/2026	$62.93	$14.91	$18.74	$9.53	$2.98	$109.09
For apprentice rates see "Apprentice- SHEET METAL WORKER"							
HVAC (ELECTRICAL CONTROLS) ELECTRICIANS LOCAL 223 ELECTRICIANS LOCAL 223	9/1/2025	$52.25	$12.25	$14.86	$3.75	$0.00	$83.11
	9/1/2026	$54.72	$12.50	$15.56	$4.00	$0.00	$86.78
For apprentice rates see "Apprentice- ELECTRICIAN"							
HVAC (TESTING AND BALANCING - AIR) SHEETMETAL WORKERS LOCAL 17 SHEETMETAL WORKERS LOCAL 17 - A	2/1/2026	$62.93	$14.91	$18.74	$9.53	$2.98	$109.09
For apprentice rates see "Apprentice- SHEET METAL WORKER"							
HVAC (TESTING AND BALANCING -WATER) PLUMBERS & PIPEFITTERS LOCAL 51 PLUMBERS & PIPEFITTERS LOCAL 51	8/25/2025	$55.24	$10.80	$16.80	$4.60	$0.00	$87.44
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"							
HVAC MECHANIC PLUMBERS & PIPEFITTERS LOCAL 51 PLUMBERS & PIPEFITTERS LOCAL 51	8/25/2025	$55.24	$10.80	$16.80	$4.60	$0.00	$87.44
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"							
HYDRAULIC DRILLS LABORERS LABORERS - ZONE 2	6/1/2026	$42.41	$10.90	$9.75	$9.11	$0.00	$72.17
	12/1/2026	$43.85	$10.90	$9.75	$9.11	$0.00	$73.61
	6/1/2027	$45.30	$10.90	$9.75	$9.11	$0.00	$75.06
	12/1/2027	$46.75	$10.90	$9.75	$9.11	$0.00	$76.51
	6/1/2028	$48.25	$10.90	$9.75	$9.11	$0.00	$78.01
	12/1/2028	$49.75	$10.90	$9.75	$9.11	$0.00	$79.51
For apprentice rates see "Apprentice- LABORER"							
HYDRAULIC DRILLS (HEAVY & HIGHWAY) LABORERS LABORERS - ZONE 2 (HEAVY & HIGHWAY)	6/1/2026	$42.41	$10.90	$9.75	$9.21	$0.00	$72.27
	12/1/2026	$43.85	$10.90	$9.75	$9.21	$0.00	$73.71
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"							
INSULATOR (PIPES & TANKS) HEAT & FROST INSULATORS LOCAL 6 HEAT & FROST INSULATORS LOCAL 6 (SOUTHERN MASS)	9/1/2025	$54.31	$14.75	$9.52	$10.09	$0.00	$88.67
	9/1/2026	$57.38	$14.75	$9.52	$10.09	$0.00	$91.74

Apprentice: INSULATOR (PIPES & TANKS)

Effective Date: 9/1/2025

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$27.16	$14.75	$9.27	$5.05	$0.00	$56.23
2	60.00	$32.59	$14.75	$9.32	$6.05	$0.00	$62.71
3	70.00	$38.02	$14.75	$9.37	$7.06	$0.00	$69.20
4	80.00	$43.45	$14.75	$9.42	$8.07	$0.00	$75.69

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
Apprentice: INSULATOR (PIPES & TANKS)							
Effective Date: 9/1/2026							
Step / Percent		**Apprentice Base Wage**					
1 / 50.00		$28.69	$14.75	$9.27	$5.05	$0.00	$57.76
2 / 60.00		$34.43	$14.75	$9.32	$6.05	$0.00	$64.55
3 / 70.00		$40.17	$14.75	$9.37	$7.06	$0.00	$71.35
4 / 80.00		$45.90	$14.75	$9.42	$8.07	$0.00	$78.14
Apprentice to Journeyworker Ratio: 1:4							
IRONWORKER/WELDER	3/16/2021	$42.46	$7.70	$12.10	$5.00	$0.00	$67.26
IRONWORKERS LOCAL 37							
IRONWORKERS LOCAL 37							
Apprentice: IRONWORKER/WELDER							
Effective Date: 3/16/2021							
Step / Percent		**Apprentice Base Wage**					
1 / 70.00		$29.72	$7.70	$12.10	$5.00	$0.00	$54.52
2 / 75.00		$31.85	$7.70	$12.10	$5.00	$0.00	$56.65
3 / 80.00		$33.97	$7.70	$12.10	$5.00	$0.00	$58.77
4 / 85.00		$36.09	$7.70	$12.10	$5.00	$0.00	$60.89
5 / 90.00		$38.21	$7.70	$12.10	$5.00	$0.00	$63.01
6 / 95.00		$40.34	$7.70	$12.10	$5.00	$0.00	$65.14
Apprentice to Journeyworker Ratio: 1:4							
JACKHAMMER & PAVING BREAKER OPERATOR	6/1/2026	$41.91	$10.90	$9.75	$9.11	$0.00	$71.67
LABORERS	12/1/2026	$43.35	$10.90	$9.75	$9.11	$0.00	$73.11
LABORERS - ZONE 2	6/1/2027	$44.80	$10.90	$9.75	$9.11	$0.00	$74.56
	12/1/2027	$46.25	$10.90	$9.75	$9.11	$0.00	$76.01
	6/1/2028	$47.75	$10.90	$9.75	$9.11	$0.00	$77.51
	12/1/2028	$49.25	$10.90	$9.75	$9.11	$0.00	$79.01
For apprentice rates see "Apprentice- LABORER"							
LABORER	6/1/2026	$41.66	$10.90	$9.75	$9.11	$0.00	$71.42
LABORERS	12/1/2026	$43.10	$10.90	$9.75	$9.11	$0.00	$72.86
LABORERS - ZONE 2	6/1/2027	$44.55	$10.90	$9.75	$9.11	$0.00	$74.31
	12/1/2027	$46.00	$10.90	$9.75	$9.11	$0.00	$75.76
	6/1/2028	$47.50	$10.90	$9.75	$9.11	$0.00	$77.26
	12/1/2028	$49.00	$10.90	$9.75	$9.11	$0.00	$78.76
Apprentice: LABORER							
Effective Date: 6/1/2026							
Step / Percent		**Apprentice Base Wage**					

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate

Apprentice: LABORER

Effective Date: 6/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	60.00	$25.00	$10.90	$9.75	$9.11	$0.00	$54.76
2	70.00	$29.16	$10.90	$9.75	$9.11	$0.00	$58.92
3	80.00	$33.33	$10.90	$9.75	$9.11	$0.00	$63.09
4	90.00	$37.49	$10.90	$9.75	$9.11	$0.00	$67.25

Apprentice: LABORER

Effective Date: 12/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	60.00	$25.86	$10.90	$9.75	$9.11	$0.00	$55.62
2	70.00	$30.17	$10.90	$9.75	$9.11	$0.00	$59.93
3	80.00	$34.48	$10.90	$9.75	$9.11	$0.00	$64.24
4	90.00	$38.79	$10.90	$9.75	$9.11	$0.00	$68.55

Apprentice to Journeyworker Ratio: 1:5

LABORER (HEAVY & HIGHWAY) LABORERS LABORERS - ZONE 2 (HEAVY & HIGHWAY)	6/1/2026	$41.66	$10.90	$9.75	$9.21	$0.00	$71.52
	12/1/2026	$43.10	$10.90	$9.75	$9.21	$0.00	$72.96

Apprentice: LABORER (HEAVY & HIGHWAY)

Effective Date: 6/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	60.00	$25.00	$10.90	$9.75	$9.21	$0.00	$54.86
2	70.00	$29.16	$10.90	$9.75	$9.21	$0.00	$59.02
3	80.00	$33.33	$10.90	$9.75	$9.21	$0.00	$63.19
4	90.00	$37.49	$10.90	$9.75	$9.10	$0.00	$67.24

Apprentice: LABORER (HEAVY & HIGHWAY)

Effective Date: 12/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	60.00	$25.86	$10.90	$9.75	$9.21	$0.00	$55.72
2	70.00	$30.17	$10.90	$9.75	$9.21	$0.00	$60.03
3	80.00	$34.48	$10.90	$9.75	$9.21	$0.00	$64.34
4	90.00	$38.79	$10.90	$9.75	$9.21	$0.00	$68.65

Apprentice to Journeyworker Ratio: 1:5

LABORER: CARPENTER TENDER LABORERS	6/1/2026	$41.66	$10.90	$9.75	$9.11	$0.00	$71.42
	12/1/2026	$43.10	$10.90	$9.75	$9.11	$0.00	$72.86

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
LABORERS - ZONE 2	6/1/2027	$44.55	$10.90	$9.75	$9.11	$0.00	$74.31
	12/1/2027	$46.00	$10.90	$9.75	$9.11	$0.00	$75.76
	6/1/2028	$47.50	$10.90	$9.75	$9.11	$0.00	$77.26
	12/1/2028	$49.00	$10.90	$9.75	$9.11	$0.00	$78.76
For apprentice rates see "Apprentice- LABORER"							
LABORER: CEMENT FINISHER TENDER	6/1/2026	$41.66	$10.90	$9.75	$9.11	$0.00	$71.42
LABORERS LABORERS - ZONE 2	12/1/2026	$43.10	$10.90	$9.75	$9.11	$0.00	$72.86
	6/1/2027	$44.55	$10.90	$9.75	$9.11	$0.00	$74.31
	12/1/2027	$46.00	$10.90	$9.75	$9.11	$0.00	$75.76
	6/1/2028	$47.50	$10.90	$9.75	$9.11	$0.00	$77.26
	12/1/2028	$49.00	$10.90	$9.75	$9.11	$0.00	$78.76
For apprentice rates see "Apprentice- LABORER"							
LABORER: HAZARDOUS WASTE/ASBESTOS REMOVER	6/1/2026	$41.75	$10.90	$9.75	$9.65	$0.00	$72.05
LABORERS LABORERS - ZONE 2	12/7/2026	$43.19	$10.90	$9.75	$9.65	$0.00	$73.49
	6/7/2027	$44.64	$10.90	$9.75	$9.65	$0.00	$74.94
	12/6/2027	$46.09	$10.90	$9.75	$9.65	$0.00	$76.39
	6/5/2028	$47.59	$10.90	$9.75	$9.65	$0.00	$77.89
	12/4/2028	$49.09	$10.90	$9.75	$9.65	$0.00	$79.39
For apprentice rates see "Apprentice- LABORER"							
LABORER: MASON TENDER	6/1/2026	$41.91	$10.90	$9.75	$9.11	$0.00	$71.67
LABORERS LABORERS - ZONE 2	12/1/2026	$43.35	$10.90	$9.75	$9.11	$0.00	$73.11
	6/1/2027	$44.80	$10.90	$9.75	$9.11	$0.00	$74.56
	12/1/2027	$46.25	$10.90	$9.75	$9.11	$0.00	$76.01
	6/1/2028	$47.75	$10.90	$9.75	$9.11	$0.00	$77.51
	12/1/2028	$49.25	$10.90	$9.75	$9.11	$0.00	$79.01
For apprentice rates see "Apprentice- LABORER"							
LABORER: MASON TENDER (HEAVY & HIGHWAY)	6/1/2026	$41.91	$10.90	$9.75	$9.21	$0.00	$71.77
LABORERS LABORERS - ZONE 2 (HEAVY & HIGHWAY)	12/1/2026	$43.35	$10.90	$9.75	$9.21	$0.00	$73.21
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"							
LABORER: MULTI-TRADE TENDER	6/1/2026	$41.66	$10.90	$9.75	$9.11	$0.00	$71.42
LABORERS LABORERS - ZONE 2	12/1/2026	$43.10	$10.90	$9.75	$9.11	$0.00	$72.86
	6/1/2027	$44.55	$10.90	$9.75	$9.11	$0.00	$74.31
	12/1/2027	$46.00	$10.90	$9.75	$9.11	$0.00	$75.76
	6/1/2028	$47.50	$10.90	$9.75	$9.11	$0.00	$77.26
	12/1/2028	$49.00	$10.90	$9.75	$9.11	$0.00	$78.76
For apprentice rates see "Apprentice- LABORER"							
LABORER: TREE REMOVER	6/1/2026	$41.66	$10.90	$9.75	$9.11	$0.00	$71.42
LABORERS LABORERS - ZONE 2	12/1/2026	$43.10	$10.90	$9.75	$9.11	$0.00	$72.86
	6/1/2027	$44.55	$10.90	$9.75	$9.11	$0.00	$74.31
	12/1/2027	$46.00	$10.90	$9.75	$9.11	$0.00	$75.76
	6/1/2028	$47.50	$10.90	$9.75	$9.11	$0.00	$77.26
	12/1/2028	$49.00	$10.90	$9.75	$9.11	$0.00	$78.76
This classification applies to the removal of standing trees, and the trimming and removal of branches and limbs when related to public works construction or site clearance incidental to construction . For apprentice rates see "Apprentice- LABORER"							

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
LASER BEAM OPERATOR	6/1/2026	$41.91	$10.90	$9.75	$9.11	$0.00	$71.67
LABORERS LABORERS - ZONE 2	12/1/2026	$43.35	$10.90	$9.75	$9.11	$0.00	$73.11
	6/1/2027	$44.80	$10.90	$9.75	$9.11	$0.00	$74.56
	12/1/2027	$46.25	$10.90	$9.75	$9.11	$0.00	$76.01
	6/1/2028	$47.75	$10.90	$9.75	$9.11	$0.00	$77.51
	12/1/2028	$49.25	$10.90	$9.75	$9.11	$0.00	$79.01
For apprentice rates see "Apprentice- LABORER"							
LASER BEAM OPERATOR (HEAVY & HIGHWAY)	6/1/2026	$41.91	$10.90	$9.75	$9.21	$0.00	$71.77
LABORERS LABORERS - ZONE 2 (HEAVY & HIGHWAY)	12/1/2026	$43.35	$10.90	$9.75	$9.21	$0.00	$73.21
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"							
MARBLE & TILE FINISHERS	8/1/2026	$53.84	$12.84	$15.57	$5.78	$0.00	$88.03
BRICKLAYERS LOCAL 3 BRICKLAYERS LOCAL 3 - MARBLE & TILE	2/1/2027	$54.96	$12.84	$15.57	$5.78	$0.00	$89.15

Apprentice: MARBLE & TILE FINISHERS

Effective Date: 8/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$26.92	$12.84	$15.57	$5.78	$0.00	$61.11
2	60.00	$32.30	$12.84	$15.57	$5.78	$0.00	$66.49
3	70.00	$37.69	$12.84	$15.57	$5.78	$0.00	$71.88
4	80.00	$43.07	$12.84	$15.57	$5.78	$0.00	$77.26
5	90.00	$48.46	$12.84	$15.57	$5.78	$0.00	$82.65

Apprentice: MARBLE & TILE FINISHERS

Effective Date: 2/1/2027

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$27.48	$12.84	$15.57	$5.78	$0.00	$61.67
2	60.00	$32.98	$12.84	$15.57	$5.78	$0.00	$67.17
3	70.00	$38.47	$12.84	$15.57	$5.78	$0.00	$72.66
4	80.00	$43.97	$12.84	$15.57	$5.78	$0.00	$78.16
5	90.00	$49.46	$12.84	$15.57	$5.78	$0.00	$83.65

Apprentice to Journeyworker Ratio: 1:5

MARBLE MASONS,TILELAYERS & TERRAZZO MECH	8/1/2026	$70.17	$12.84	$15.57	$7.99	$0.00	$106.57
BRICKLAYERS LOCAL 3 BRICKLAYERS LOCAL 3 - MARBLE & TILE	2/1/2027	$71.57	$12.84	$15.57	$7.99	$0.00	$107.97

Apprentice: MARBLE MASONS,TILELAYERS & TERRAZZO MECH

Effective Date: 8/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$35.09	$12.84	$15.57	$7.99	$0.00	$71.49

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate

Apprentice: MARBLE MASONS,TILELAYERS & TERRAZZO MECH

Effective Date: 8/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
2	60.00	$42.10	$12.84	$15.57	$7.99	$0.00	$78.50
3	70.00	$49.12	$12.84	$15.57	$7.99	$0.00	$85.52
4	80.00	$56.14	$12.84	$15.57	$7.99	$0.00	$92.54
5	90.00	$63.15	$12.84	$15.57	$7.99	$0.00	$99.55

Apprentice: MARBLE MASONS,TILELAYERS & TERRAZZO MECH

Effective Date: 2/1/2027

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$35.79	$12.84	$15.57	$7.99	$0.00	$72.19
2	60.00	$42.94	$12.84	$15.57	$7.99	$0.00	$79.34
3	70.00	$50.10	$12.84	$15.57	$7.99	$0.00	$86.50
4	80.00	$57.26	$12.84	$15.57	$7.99	$0.00	$93.66
5	90.00	$64.41	$12.84	$15.57	$7.99	$0.00	$100.81

Apprentice to Journeyworker Ratio: 1:5

MECH. SWEEPER OPERATOR (ON CONST. SITES) OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS LOCAL 4	6/1/2026 12/1/2026	$58.70 $60.14	$17.05 $17.05	$13.35 $13.35	$3.25 $3.25	$0.00 $0.00	$92.35 $93.79

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

MECHANICS MAINTENANCE OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS LOCAL 4	6/1/2026 12/1/2026	$58.70 $60.14	$17.05 $17.05	$13.35 $13.35	$3.25 $3.25	$0.00 $0.00	$92.35 $93.79

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

MILLWRIGHT (Zone 2) MILLWRIGHTS LOCAL 1121 MILLWRIGHTS LOCAL 1121 - Zone 2	1/5/2026	$46.86	$10.58	$11.47	$10.00	$0.00	$78.91

Apprentice: MILLWRIGHT (Zone 2)

Effective Date: 1/5/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	55.00	$25.77	$10.58	$0.00	$5.50	$0.00	$41.85
2	65.00	$30.46	$10.58	$0.00	$6.50	$0.00	$47.54
3	75.00	$35.15	$10.58	$11.47	$7.50	$0.00	$64.70
4	85.00	$39.83	$10.58	$11.47	$8.50	$0.00	$70.38

Apprentice Notes

Step 1&2 Appr. indentured after 1/6/2020 receive no pension,

Apprentice to Journeyworker Ratio: 1:4

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
MORTAR MIXER LABORERS LABORERS - ZONE 2	6/1/2026	$41.91	$10.90	$9.75	$9.11	$0.00	$71.67
	12/1/2026	$43.35	$10.90	$9.75	$9.11	$0.00	$73.11
	6/1/2027	$44.80	$10.90	$9.75	$9.11	$0.00	$74.56
	12/1/2027	$46.25	$10.90	$9.75	$9.11	$0.00	$76.01
	6/1/2028	$47.75	$10.90	$9.75	$9.11	$0.00	$77.51
	12/1/2028	$49.25	$10.90	$9.75	$9.11	$0.00	$79.01
For apprentice rates see "Apprentice- LABORER"							
OILER (OTHER THAN TRUCK CRANES,GRADALLS) OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS LOCAL 4	6/1/2026	$25.07	$17.05	$13.35	$3.25	$0.00	$58.72
	12/1/2026	$25.74	$17.05	$13.35	$3.25	$0.00	$59.39
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
OILER (TRUCK CRANES, GRADALLS) OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS LOCAL 4	6/1/2026	$31.17	$17.05	$13.35	$3.25	$0.00	$64.82
	12/1/2026	$31.97	$17.05	$13.35	$3.25	$0.00	$65.62
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
OTHER POWER DRIVEN EQUIPMENT - CLASS II OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS LOCAL 4	6/1/2026	$58.70	$17.05	$13.35	$3.25	$0.00	$92.35
	12/1/2026	$60.14	$17.05	$13.35	$3.25	$0.00	$93.79
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
PAINTER (BRIDGES/TANKS) PAINTERS LOCAL 35 PAINTERS LOCAL 35 - ZONE 2	1/1/2026	$59.56	$10.35	$12.00	$12.50	$0.00	$94.41

Apprentice: PAINTER (BRIDGES/TANKS)

Effective Date: 1/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$29.78	$10.35	$0.00	$0.00	$0.00	$40.13
2	55.00	$32.76	$10.35	$0.00	$6.93	$0.00	$50.04
3	60.00	$35.74	$10.35	$0.00	$7.56	$0.00	$53.65
4	65.00	$38.71	$10.35	$0.00	$8.19	$0.00	$57.25
5	70.00	$41.69	$10.35	$12.00	$8.82	$0.00	$72.86
6	75.00	$44.67	$10.35	$12.00	$9.45	$0.00	$76.47
7	80.00	$47.65	$10.35	$12.00	$10.08	$0.00	$80.08
8	90.00	$53.60	$10.35	$12.00	$11.34	$0.00	$87.29

Apprentice to Journeyworker Ratio: 1:1

PAINTER (SPRAY OR SANDBLAST, NEW) * * If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used. PAINTERS LOCAL 35 PAINTERS LOCAL 35 - ZONE 2	1/1/2026	$50.46	$10.35	$12.00	$12.60	$0.00	$85.41

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate

Apprentice: PAINTER (SPRAY OR SANDBLAST, NEW) *

Effective Date: 1/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$25.23	$10.35	$0.00	$0.00	$0.00	$35.58
2	55.00	$27.75	$10.35	$0.00	$6.93	$0.00	$45.03
3	60.00	$30.28	$10.35	$0.00	$7.56	$0.00	$48.19
4	65.00	$32.80	$10.35	$0.00	$8.19	$0.00	$51.34
5	70.00	$35.32	$10.35	$12.00	$8.82	$0.00	$66.49
6	75.00	$37.85	$10.35	$12.00	$9.45	$0.00	$69.65
7	80.00	$40.37	$10.35	$12.00	$10.08	$0.00	$72.80
8	90.00	$45.41	$10.35	$12.00	$11.34	$0.00	$79.10

Apprentice to Journeyworker Ratio: 1:1

PAINTER (SPRAY OR SANDBLAST, REPAINT) PAINTERS LOCAL 35 PAINTERS LOCAL 35 - ZONE 2	1/1/2026	$48.52	$10.35	$12.00	$12.60	$0.00	$83.47

Apprentice: PAINTER (SPRAY OR SANDBLAST, REPAINT)

Effective Date: 1/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$24.26	$10.35	$0.00	$0.00	$0.00	$34.61
2	55.00	$26.69	$10.35	$0.00	$6.93	$0.00	$43.97
3	60.00	$29.11	$10.35	$0.00	$7.56	$0.00	$47.02
4	65.00	$31.54	$10.35	$0.00	$8.19	$0.00	$50.08
5	70.00	$33.96	$10.35	$12.00	$8.82	$0.00	$65.13
6	75.00	$36.39	$10.35	$12.00	$9.45	$0.00	$68.19
7	80.00	$38.82	$10.35	$12.00	$10.08	$0.00	$71.25
8	90.00	$43.67	$10.35	$12.00	$11.34	$0.00	$77.36

Apprentice to Journeyworker Ratio: 1:1

PAINTER / TAPER (BRUSH, NEW) * * If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used. PAINTERS LOCAL 35 PAINTERS LOCAL 35 - ZONE 2	1/1/2026	$49.06	$10.35	$12.00	$12.60	$0.00	$84.01

Apprentice: PAINTER / TAPER (BRUSH, NEW) *

Effective Date: 1/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$24.53	$10.35	$0.00	$0.00	$0.00	$34.88
2	55.00	$26.98	$10.35	$0.00	$6.93	$0.00	$44.26
3	60.00	$29.44	$10.35	$0.00	$7.56	$0.00	$47.35

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
Apprentice: PAINTER / TAPER (BRUSH, NEW) *							
Effective Date: 1/1/2026							
Step / Percent		**Apprentice Base Wage**					
4 / 65.00		$31.89	$10.35	$0.00	$8.19	$0.00	$50.43
5 / 70.00		$34.34	$10.35	$12.00	$8.82	$0.00	$65.51
6 / 75.00		$36.80	$10.35	$12.00	$9.45	$0.00	$68.60
7 / 80.00		$39.25	$10.35	$12.00	$10.08	$0.00	$71.68
8 / 90.00		$44.15	$10.35	$12.00	$11.34	$0.00	$77.84
Apprentice to Journeyworker Ratio: 1:1							
PAINTER / TAPER (BRUSH, REPAINT) PAINTERS LOCAL 35 PAINTERS LOCAL 35 - ZONE 2	1/1/2026	$47.12	$10.35	$12.00	$12.60	$0.00	$82.07
Apprentice: PAINTER / TAPER (BRUSH, REPAINT)							
Effective Date: 1/1/2026							
Step / Percent		**Apprentice Base Wage**					
1 / 50.00		$23.56	$10.35	$0.00	$0.00	$0.00	$33.91
2 / 55.00		$25.92	$10.35	$0.00	$6.93	$0.00	$43.20
3 / 60.00		$28.27	$10.35	$0.00	$7.56	$0.00	$46.18
4 / 65.00		$30.63	$10.35	$0.00	$8.19	$0.00	$49.17
5 / 70.00		$32.98	$10.35	$12.00	$8.82	$0.00	$64.15
6 / 75.00		$35.34	$10.35	$12.00	$9.45	$0.00	$67.14
7 / 80.00		$37.70	$10.35	$12.00	$10.08	$0.00	$70.13
8 / 90.00		$42.41	$10.35	$12.00	$11.34	$0.00	$76.10
Apprentice to Journeyworker Ratio: 1:1							
PAINTER TRAFFIC MARKINGS (HEAVY/HIGHWAY) LABORERS LABORERS - ZONE 2 (HEAVY & HIGHWAY)	6/1/2026	$41.66	$10.90	$9.75	$9.21	$0.00	$71.52
	12/1/2026	$43.10	$10.90	$9.75	$9.21	$0.00	$72.96
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)							
PANEL & PICKUP TRUCKS DRIVER TEAMSTERS JOINT COUNCIL NO. 10 TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	6/1/2026	$41.78	$16.17	$21.78	$0.00	$0.00	$79.73
	12/1/2026	$41.78	$16.17	$23.52	$0.00	$0.00	$81.47
	1/1/2027	$41.78	$16.77	$23.52	$0.00	$0.00	$82.07
PIER AND DOCK CONSTRUCTOR (UNDERPINNING AND DECK) PILE DRIVER LOCAL 56 PILE DRIVER LOCAL 56 (ZONE 1)	8/1/2024	$55.79	$10.08	$11.62	$12.67	$0.00	$90.16
For apprentice rates see "Apprentice- PILE DRIVER"							
PILE DRIVER PILE DRIVER LOCAL 56 PILE DRIVER LOCAL 56 (ZONE 1)	8/1/2024	$55.79	$10.08	$11.62	$12.67	$0.00	$90.16

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate

Apprentice: PILE DRIVER

Effective Date: 8/1/2024

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	45.00	$25.11	$10.08	$0.00	$2.53	$0.00	$37.72
2	55.00	$30.68	$10.08	$0.00	$5.07	$0.00	$45.83
3	70.00	$39.05	$10.08	$11.62	$7.60	$0.00	$68.35
4	80.00	$44.63	$10.08	$11.62	$10.14	$0.00	$76.47

Apprentice to Journeyworker Ratio: 1:5

PIPELAYER	6/1/2026	$41.91	$10.90	$9.75	$9.11	$0.00	$71.67
LABORERS	12/1/2026	$43.35	$10.90	$9.75	$9.11	$0.00	$73.11
LABORERS - ZONE 2	6/1/2027	$44.80	$10.90	$9.75	$9.11	$0.00	$74.56
	12/1/2027	$46.25	$10.90	$9.75	$9.11	$0.00	$76.01
	6/1/2028	$47.75	$10.90	$9.75	$9.11	$0.00	$77.51
	12/1/2028	$49.25	$10.90	$9.75	$9.11	$0.00	$79.01

For apprentice rates see "Apprentice- LABORER"

PIPELAYER (HEAVY & HIGHWAY)	6/1/2026	$41.91	$10.90	$9.75	$9.21	$0.00	$71.77
LABORERS	12/1/2026	$43.35	$10.90	$9.75	$9.21	$0.00	$73.21
LABORERS - ZONE 2 (HEAVY & HIGHWAY)							

For apprentice rates see "Apprentice- LABORER (Heavy and Highway)

PLUMBER & PIPEFITTER	8/25/2025	$55.24	$10.80	$16.80	$4.60	$0.00	$87.44
PLUMBERS & PIPEFITTERS LOCAL 51							
PLUMBERS & PIPEFITTERS LOCAL 51							

Apprentice: PLUMBER & PIPEFITTER

Effective Date: 8/25/2025

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	40.00	$22.10	$10.15	$2.50	$0.00	$0.00	$34.75
2	50.00	$27.62	$10.15	$2.50	$0.00	$0.00	$40.27
3	60.00	$33.14	$10.15	$8.40	$0.50	$0.00	$52.19
4	70.00	$38.67	$10.15	$13.44	$0.80	$0.00	$63.06
5	80.00	$44.19	$10.15	$16.80	$1.00	$0.00	$72.14

Apprentice to Journeyworker Ratio: 1:3

PNEUMATIC CONTROLS (TEMP.)	8/25/2025	$55.24	$10.80	$16.80	$4.60	$0.00	$87.44
PLUMBERS & PIPEFITTERS LOCAL 51							
PLUMBERS & PIPEFITTERS LOCAL 51							

For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"

PNEUMATIC DRILL/TOOL OPERATOR	6/1/2026	$41.91	$10.90	$9.75	$9.11	$0.00	$71.67
LABORERS	12/1/2026	$43.35	$10.90	$9.75	$9.11	$0.00	$73.11
LABORERS - ZONE 2	6/1/2027	$44.80	$10.90	$9.75	$9.11	$0.00	$74.56
	12/1/2027	$46.25	$10.90	$9.75	$9.11	$0.00	$76.01

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
	6/1/2028	$47.75	$10.90	$9.75	$9.11	$0.00	$77.51
	12/1/2028	$49.25	$10.90	$9.75	$9.11	$0.00	$79.01
For apprentice rates see "Apprentice- LABORER"							
PNEUMATIC DRILL/TOOL OPERATOR (HEAVY & HIGHWAY)	6/1/2026	$41.91	$10.90	$9.75	$9.21	$0.00	$71.77
LABORERS LABORERS - ZONE 2 (HEAVY & HIGHWAY)	12/1/2026	$43.35	$10.90	$9.75	$9.21	$0.00	$73.21
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"							
POWDERMAN & BLASTER	6/1/2026	$42.66	$10.90	$9.75	$9.11	$0.00	$72.42
LABORERS LABORERS - ZONE 2	12/1/2026	$44.10	$10.90	$9.75	$9.11	$0.00	$73.86
	6/1/2027	$45.55	$10.90	$9.75	$9.11	$0.00	$75.31
	12/1/2027	$47.00	$10.90	$9.75	$9.11	$0.00	$76.76
	6/1/2028	$48.50	$10.90	$9.75	$9.11	$0.00	$78.26
	12/1/2028	$50.00	$10.90	$9.75	$9.11	$0.00	$79.76
For apprentice rates see "Apprentice- LABORER"							
POWDERMAN & BLASTER (HEAVY & HIGHWAY)	6/1/2026	$42.66	$10.90	$9.75	$9.21	$0.00	$72.52
LABORERS LABORERS - ZONE 2 (HEAVY & HIGHWAY)	12/1/2026	$44.10	$10.90	$9.75	$9.21	$0.00	$73.96
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"							
POWER SHOVEL/DERRICK/TRENCHING MACHINE	6/1/2026	$59.38	$17.05	$13.35	$3.25	$0.00	$93.03
OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS LOCAL 4	12/1/2026	$60.83	$17.05	$13.35	$3.25	$0.00	$94.48
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
PUMP OPERATOR (CONCRETE)	6/1/2026	$58.70	$17.05	$13.35	$3.25	$0.00	$92.35
OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS LOCAL 4	12/1/2026	$60.14	$17.05	$13.35	$3.25	$0.00	$93.79
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
PUMP OPERATOR (DEWATERING, OTHER)	6/1/2026	$37.63	$17.05	$13.35	$3.25	$0.00	$71.28
OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS LOCAL 4	12/1/2026	$38.58	$17.05	$13.35	$3.25	$0.00	$72.23
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
READY-MIX CONCRETE DRIVER	1/1/2025	$27.60	$11.26	$6.15	$0.00	$0.00	$45.01
TEAMSTERS 170 TEAMSTERS 170 - Dauphinais (Bellingham)							
RECLAIMERS	6/1/2026	$58.70	$17.05	$13.35	$3.25	$0.00	$92.35
OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS LOCAL 4	12/1/2026	$60.14	$17.05	$13.35	$3.25	$0.00	$93.79
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
RIDE-ON MOTORIZED BUGGY OPERATOR	6/1/2026	$41.91	$10.90	$9.75	$9.11	$0.00	$71.67
LABORERS LABORERS - ZONE 2	12/1/2026	$43.35	$10.90	$9.75	$9.11	$0.00	$73.11
	6/1/2027	$44.80	$10.90	$9.75	$9.11	$0.00	$74.56
	12/1/2027	$46.25	$10.90	$9.75	$9.11	$0.00	$76.01
	6/1/2028	$47.75	$10.90	$9.75	$9.11	$0.00	$77.51
	12/1/2028	$49.25	$10.90	$9.75	$9.11	$0.00	$79.01
For apprentice rates see "Apprentice- LABORER"							

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
ROLLER/SPREADER/MULCHING MACHINE	6/1/2026	$58.70	$17.05	$13.35	$3.25	$0.00	$92.35
OPERATING ENGINEERS LOCAL 4	12/1/2026	$60.14	$17.05	$13.35	$3.25	$0.00	$93.79
OPERATING ENGINEERS LOCAL 4							

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

ROOFER (Inc.Roofer Waterproofng &Roofer Damproofg)	2/1/2026	$53.53	$14.53	$12.67	$9.03	$0.00	$89.76
ROOFERS LOCAL 33							
ROOFERS LOCAL 33							

Apprentice: ROOFER (Inc.Roofer Waterproofng &Roofer Damproofg)

Effective Date: 2/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$26.77	$14.53	$6.52	$9.03	$0.00	$56.85
2	60.00	$32.12	$14.53	$12.67	$9.03	$0.00	$68.35
3	65.00	$34.79	$14.53	$12.67	$9.03	$0.00	$71.02
4	75.00	$40.15	$14.53	$12.67	$9.03	$0.00	$76.38
5	85.00	$45.50	$14.53	$12.67	$9.03	$0.00	$81.73

Apprentice Notes

** 1:5, 2:6-10, the 1:10; Reroofing: 1:4, then 1:1

Apprentice to Journeyworker Ratio: 1:5

ROOFER SLATE / TILE / PRECAST CONCRETE	2/1/2026	$53.78	$14.53	$12.67	$9.03	$0.00	$90.01
ROOFERS LOCAL 33							
ROOFERS LOCAL 33							

For apprentice rates see "Apprentice- ROOFER"

SHEETMETAL WORKER	2/1/2026	$62.93	$14.91	$18.74	$9.53	$2.98	$109.09
SHEETMETAL WORKERS LOCAL 17							
SHEETMETAL WORKERS LOCAL 17 - A							

Apprentice: SHEETMETAL WORKER

Effective Date: 2/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	42.00	$26.43	$14.91	$6.19	$0.00	$0.00	$47.53
2	42.00	$26.43	$14.91	$6.19	$0.00	$0.00	$47.53
3	47.00	$29.58	$14.91	$10.93	$1.25	$1.62	$58.29
4	47.00	$29.58	$14.91	$10.93	$1.25	$1.62	$58.29
5	52.00	$32.72	$14.91	$11.66	$1.50	$1.74	$62.53
6	52.00	$32.72	$14.91	$11.66	$1.75	$1.75	$62.79
7	60.00	$37.76	$14.91	$12.84	$2.00	$1.93	$69.44
8	65.00	$40.90	$14.91	$13.58	$2.25	$2.04	$73.68
9	75.00	$47.20	$14.91	$15.06	$2.75	$2.28	$82.20
10	85.00	$53.49	$14.91	$16.53	$2.75	$2.49	$90.17

Apprentice to Journeyworker Ratio: 1:4

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
SPECIALIZED EARTH MOVING EQUIP < 35 TONS TEAMSTERS JOINT COUNCIL NO. 10 TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	6/1/2026	$42.24	$16.17	$21.78	$0.00	$0.00	$80.19
	12/1/2026	$42.24	$16.17	$23.52	$0.00	$0.00	$81.93
	1/1/2027	$42.24	$16.77	$23.52	$0.00	$0.00	$82.53
SPECIALIZED EARTH MOVING EQUIP > 35 TONS TEAMSTERS JOINT COUNCIL NO. 10 TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	6/1/2026	$42.53	$16.17	$21.78	$0.00	$0.00	$80.48
	12/1/2026	$42.53	$16.17	$23.52	$0.00	$0.00	$82.22
	1/1/2027	$42.53	$16.77	$23.52	$0.00	$0.00	$82.82
SPRINKLER FITTER SPRINKLER FITTERS LOCAL 550 SPRINKLER FITTERS LOCAL 550 - (Section A) Zone 1	1/1/2026	$72.05	$13.45	$7.45	$18.25	$0.00	$111.20

Apprentice: SPRINKLER FITTER

Effective Date: 1/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	35.00	$25.22	$13.45	$13.84	$0.00	$0.00	$52.51
2	40.00	$28.82	$13.45	$14.75	$0.00	$0.00	$57.02
3	45.00	$32.42	$13.45	$15.67	$0.00	$0.00	$61.54
4	50.00	$36.03	$13.45	$16.57	$0.00	$0.00	$66.05
5	55.00	$39.63	$13.45	$17.49	$0.00	$0.00	$70.57
6	60.00	$43.23	$13.45	$18.40	$0.00	$0.00	$75.08
7	65.00	$46.83	$13.45	$19.32	$0.00	$0.00	$79.60
8	70.00	$50.44	$13.45	$20.22	$0.00	$0.00	$84.11
9	75.00	$54.04	$13.45	$21.15	$0.00	$0.00	$88.64
10	80.00	$57.64	$13.45	$22.05	$0.00	$0.00	$93.14

Apprentice Notes

Apprentice entered prior 9/30/10:

Apprentice to Journeyworker Ratio: 1:3

STEAM BOILER OPERATOR OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS LOCAL 4	6/1/2026	$58.70	$17.05	$13.35	$3.25	$0.00	$92.35
	12/1/2026	$60.14	$17.05	$13.35	$3.25	$0.00	$93.79
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
TAMPERS, SELF-PROPELLED OR TRACTOR DRAWN OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS LOCAL 4	6/1/2026	$58.70	$17.05	$13.35	$3.25	$0.00	$92.35
	12/1/2026	$60.14	$17.05	$13.35	$3.25	$0.00	$93.79
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
TELECOMMUNICATION TECHNICIAN TELECOMMUNICATION TECHNICIAN ELECTRICIANS LOCAL 223 ELECTRICIANS LOCAL 223	9/1/2025	$42.52	$12.00	$12.05	$3.25	$0.00	$69.82
	9/1/2026	$44.41	$12.25	$12.59	$3.50	$0.00	$72.75
	9/1/2027	$46.51	$12.50	$13.18	$3.75	$0.00	$75.94
For apprentice rates and ratios see "Apprentice- ELECTRICIAN"							
TERRAZZO FINISHERS BRICKLAYERS LOCAL 3 BRICKLAYERS LOCAL 3 - MARBLE & TILE	8/1/2026	$69.09	$12.84	$15.57	$8.02	$0.00	$105.52
	2/1/2027	$70.49	$12.84	$15.57	$8.02	$0.00	$106.92

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate

Apprentice: TERRAZZO FINISHERS

Effective Date: 8/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$34.55	$12.84	$15.57	$8.02	$0.00	$70.98
2	60.00	$41.45	$12.84	$15.57	$8.02	$0.00	$77.88
3	70.00	$48.36	$12.84	$15.57	$8.02	$0.00	$84.79
4	80.00	$55.27	$12.84	$15.57	$8.02	$0.00	$91.70
5	90.00	$62.18	$12.84	$15.57	$8.02	$0.00	$98.61

Apprentice: TERRAZZO FINISHERS

Effective Date: 2/1/2027

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$35.25	$12.84	$15.57	$8.02	$0.00	$71.68
2	60.00	$42.29	$12.84	$15.57	$8.02	$0.00	$78.72
3	70.00	$49.34	$12.84	$15.57	$8.02	$0.00	$85.77
4	80.00	$56.39	$12.84	$15.57	$8.02	$0.00	$92.82
5	90.00	$63.44	$12.84	$15.57	$8.02	$0.00	$99.87

Apprentice to Journeyworker Ratio: 1:5

TEST BORING DRILLER	6/1/2026	$53.25	$10.90	$9.75	$9.80	$0.00	$83.70
LABORERS LABORERS - FOUNDATION AND MARINE	12/1/2026	$54.75	$10.90	$9.75	$9.80	$0.00	$85.20
For apprentice rates see "Apprentice- LABORER"							
TEST BORING DRILLER HELPER	6/1/2026	$49.37	$10.90	$9.75	$9.80	$0.00	$79.82
LABORERS LABORERS - FOUNDATION AND MARINE	12/1/2026	$50.87	$10.90	$9.75	$9.80	$0.00	$81.32
For apprentice rates see "Apprentice- LABORER"							
TEST BORING LABORER	6/1/2026	$49.25	$10.90	$9.75	$9.80	$0.00	$79.70
LABORERS LABORERS - FOUNDATION AND MARINE	12/1/2026	$50.75	$10.90	$9.75	$9.80	$0.00	$81.20
For apprentice rates see "Apprentice- LABORER"							
TRACTORS/PORTABLE STEAM GENERATORS	6/1/2026	$58.70	$17.05	$13.35	$3.25	$0.00	$92.35
OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS LOCAL 4	12/1/2026	$60.14	$17.05	$13.35	$3.25	$0.00	$93.79
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
TRAILERS FOR EARTH MOVING EQUIPMENT	6/1/2026	$42.82	$16.17	$21.78	$0.00	$0.00	$80.77
TEAMSTERS JOINT COUNCIL NO. 10 TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	12/1/2026	$42.82	$16.17	$23.52	$0.00	$0.00	$82.51
	1/1/2027	$42.82	$16.77	$23.52	$0.00	$0.00	$83.11
TUNNEL WORK - COMPRESSED AIR	6/1/2026	$61.48	$10.90	$9.75	$10.25	$0.00	$92.38
LABORERS LABORERS (COMPRESSED AIR)	12/1/2026	$62.98	$10.90	$9.75	$10.25	$0.00	$93.88

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- LABORER"							
TUNNEL WORK - COMPRESSED AIR (HAZ. WASTE)	6/1/2026	$63.48	$10.90	$9.75	$10.25	$0.00	$94.38
LABORERS LABORERS (COMPRESSED AIR)	12/1/2026	$64.98	$10.90	$9.75	$10.25	$0.00	$95.88
For apprentice rates see "Apprentice- LABORER"							
TUNNEL WORK - FREE AIR	6/1/2026	$53.55	$10.90	$9.75	$10.25	$0.00	$84.45
LABORERS LABORERS (FREE AIR TUNNEL)	12/1/2026	$55.05	$10.90	$9.75	$10.25	$0.00	$85.95
For apprentice rates see "Apprentice- LABORER"							
TUNNEL WORK - FREE AIR (HAZ. WASTE)	6/1/2026	$55.55	$10.90	$9.75	$10.25	$0.00	$86.45
LABORERS LABORERS (FREE AIR TUNNEL)	12/1/2026	$57.05	$10.90	$9.75	$10.25	$0.00	$87.95
For apprentice rates see "Apprentice- LABORER"							
VAC-HAUL	6/1/2026	$42.24	$16.17	$21.78	$0.00	$0.00	$80.19
TEAMSTERS JOINT COUNCIL NO. 10 TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	12/1/2026	$42.24	$16.17	$23.52	$0.00	$0.00	$81.93
	1/1/2027	$42.24	$16.77	$23.52	$0.00	$0.00	$82.53
WAGON DRILL OPERATOR	6/1/2026	$41.91	$10.90	$9.75	$9.11	$0.00	$71.67
LABORERS LABORERS - ZONE 2	12/1/2026	$43.35	$10.90	$9.75	$9.11	$0.00	$73.11
	6/1/2027	$44.80	$10.90	$9.75	$9.11	$0.00	$74.56
	12/1/2027	$46.25	$10.90	$9.75	$9.11	$0.00	$76.01
	6/1/2028	$47.75	$10.90	$9.75	$9.11	$0.00	$77.51
	12/1/2028	$49.25	$10.90	$9.75	$9.11	$0.00	$79.01
For apprentice rates see "Apprentice- LABORER"							
WAGON DRILL OPERATOR (HEAVY & HIGHWAY)	6/1/2026	$41.91	$10.90	$9.75	$9.21	$0.00	$71.77
LABORERS LABORERS - ZONE 2 (HEAVY & HIGHWAY)	12/1/2026	$43.35	$10.90	$9.75	$9.21	$0.00	$73.21
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"							
WASTE WATER PUMP OPERATOR	6/1/2026	$59.38	$17.05	$13.35	$3.25	$0.00	$93.03
OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS LOCAL 4	12/1/2026	$60.83	$17.05	$13.35	$3.25	$0.00	$94.48
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
WATER METER INSTALLER	8/25/2025	$55.24	$10.80	$16.80	$4.60	$0.00	$87.44
PLUMBERS & PIPEFITTERS LOCAL 51 PLUMBERS & PIPEFITTERS LOCAL 51							
For apprentice rates see "Apprentice- PLUMBER/PIPEFITTER" or "PLUMBER/GASFITTER"							

Marine Drilling

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
BLASTER MARINE DRILLING MARINE DRILLING	1/1/2018	$41.82	$7.63	$2.35	$1.25	$0.00	$53.05
BOAT CAPTAIN MARINE DRILLING MARINE DRILLING	1/1/2018	$33.87	$7.63	$2.35	$0.95	$0.00	$44.80
BOAT CAPTAIN / Over 1,000 hp MARINE DRILLING MARINE DRILLING	1/1/2018	$38.06	$7.63	$2.35	$1.25	$0.00	$49.29
CORE DRILLER MARINE DRILLING MARINE DRILLING	1/1/2018	$31.43	$7.63	$2.25	$0.65	$0.00	$41.96
CORE DRILLER HELPER MARINE DRILLING MARINE DRILLING	1/1/2018	$28.47	$7.63	$2.35	$0.65	$0.00	$39.10
DRILLER MARINE DRILLING MARINE DRILLING	1/1/2018	$39.70	$7.63	$2.35	$1.25	$0.00	$50.93
ENGINEER MARINE DRILLING MARINE DRILLING	1/1/2018	$39.69	$7.63	$2.25	$1.25	$0.00	$50.82
HELPER MARINE DRILLING MARINE DRILLING	1/1/2018	$34.24	$7.63	$2.35	$0.65	$0.00	$44.87
MACHINIST MARINE DRILLING MARINE DRILLING	1/1/2018	$38.88	$7.63	$2.35	$0.95	$0.00	$49.81
OILER - MARINE DRILLING MARINE DRILLING MARINE DRILLING	1/1/2018	$34.24	$7.63	$2.35	$0.65	$0.00	$44.87
TUG DECKHAND MARINE DRILLING MARINE DRILLING	1/1/2018	$27.61	$7.63	$2.35	$0.65	$0.00	$38.24
WELDER MARINE DRILLING MARINE DRILLING	1/1/2018	$38.88	$7.63	$2.35	$0.95	$0.00	$49.81

Op Eng Marine (Dredging Work)

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
BOAT OPERATOR OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS - MARINE DIVISION	10/1/2017	$29.26	$7.63	$2.35	$0.95	$0.00	$40.19
CERTIFIED WELDER OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS - MARINE DIVISION	10/1/2017	$31.09	$7.63	$2.35	$1.25	$0.00	$42.32
CHIEF WELDER/ CHIEF MATE OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS - MARINE DIVISION	10/1/2017	$33.02	$7.63	$2.35	$1.25	$0.00	$44.25
DERRICK / SPIDER / SPILLBARGE OPERATOR OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS - MARINE DIVISION	10/1/2017	$33.02	$7.63	$2.35	$1.25	$0.00	$44.25
DRAG BARGE OPERATOR / WELDER / MATE OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS - MARINE DIVISION	10/1/2017	$30.24	$7.63	$2.35	$0.95	$0.00	$41.17
ENGINEER / ELECTRICIAN OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS - MARINE DIVISION	10/1/2017	$33.02	$7.63	$2.35	$1.25	$0.00	$44.25
LICENSED BOAT OPERATOR OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS - MARINE DIVISION	10/1/2017	$33.02	$7.63	$2.35	$1.25	$0.00	$44.25
LICENSED TUG OPERATOR OVER 1000HP OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS - MARINE DIVISION	10/1/2017	$38.18	$7.63	$2.35	$1.25	$0.00	$49.41
MAINTENANCE ENGINEER OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS - MARINE DIVISION	10/1/2017	$33.03	$7.63	$2.35	$1.25	$0.00	$44.26
OILER - MARINE DIVISION OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS - MARINE DIVISION	10/1/2017	$24.30	$7.63	$2.35	$0.65	$0.00	$34.93
OPERATOR / LEVERMAN OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS - MARINE DIVISION	10/1/2017	$38.18	$7.63	$2.35	$1.25	$0.00	$49.41
RODMAN / SCOWMAN OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS - MARINE DIVISION	10/1/2017	$24.30	$7.63	$2.35	$0.65	$0.00	$34.93
SHOREMAN / DECKHAND OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS - MARINE DIVISION	10/1/2017	$24.30	$7.63	$2.35	$0.65	$0.00	$34.93

Outside Electrical

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
CABLE TECHNICIAN (Power Zone)	8/31/2025	$36.55	$10.75	$1.10	$1.00	$0.00	$49.40
OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	8/30/2026	$38.13	$11.00	$1.14	$1.00	$0.00	$51.27
OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	8/29/2027	$39.65	$11.25	$1.19	$1.00	$0.00	$53.09
For apprentice rates see "Apprentice- LINEMAN"							
CABLEMAN (Underground Ducts & Cables)	8/31/2025	$51.78	$10.75	$1.55	$10.71	$0.00	$74.79
OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	8/30/2026	$54.02	$11.00	$1.62	$11.14	$0.00	$77.78
OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	8/29/2027	$56.17	$11.25	$1.69	$11.57	$0.00	$80.68
For apprentice rates see "Apprentice- LINEMAN"							
DRIVER / GROUNDMAN CDL	8/31/2025	$42.64	$10.75	$1.28	$10.45	$0.00	$65.12
OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	8/30/2026	$44.49	$11.00	$1.33	$10.80	$0.00	$67.62
OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	8/29/2027	$46.26	$11.25	$1.39	$11.15	$0.00	$70.05
For apprentice rates see "Apprentice- LINEMAN"							
DRIVER / GROUNDMAN -Inexperienced (<2000 Hrs)	8/31/2025	$33.51	$10.75	$1.01	$1.00	$0.00	$46.27
OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	8/30/2026	$34.95	$11.00	$1.05	$1.00	$0.00	$48.00
OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	8/29/2027	$36.64	$11.25	$1.09	$1.00	$0.00	$49.98
For apprentice rates see "Apprentice- LINEMAN"							
EQUIPMENT OPERATOR (Class A CDL)	8/31/2025	$51.78	$10.75	$1.55	$14.79	$0.00	$78.87
OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	8/30/2026	$54.02	$11.00	$1.62	$15.22	$0.00	$81.86
OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	8/29/2027	$56.17	$11.25	$1.69	$15.65	$0.00	$84.76
For apprentice rates see "Apprentice- LINEMAN"							
EQUIPMENT OPERATOR (Class B CDL)	8/31/2025	$45.69	$10.75	$1.37	$11.27	$0.00	$69.08
OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	8/30/2026	$47.66	$11.00	$1.43	$11.65	$0.00	$71.74
OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	8/29/2027	$49.56	$11.25	$1.49	$12.03	$0.00	$74.33
For apprentice rates see "Apprentice- LINEMAN"							
GROUNDMAN	8/31/2025	$33.51	$10.75	$1.01	$1.00	$0.00	$46.27
OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	8/30/2026	$34.95	$11.00	$1.05	$1.00	$0.00	$48.00
OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	8/29/2027	$36.34	$11.25	$1.09	$1.00	$0.00	$49.68
For apprentice rates see "Apprentice- LINEMAN"							
GROUNDMAN -Inexperienced (<2000 Hrs.)	8/31/2025	$27.41	$10.75	$0.82	$1.00	$0.00	$39.98
OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	8/30/2026	$28.60	$11.00	$0.86	$1.00	$0.00	$41.46
OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	8/29/2027	$29.74	$11.25	$0.89	$1.00	$0.00	$42.88
For apprentice rates see "Apprentice- LINEMAN"							
JOURNEYMAN LINEMAN	8/31/2025	$60.92	$10.75	$1.83	$18.00	$0.00	$91.50
OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	8/30/2026	$63.55	$11.00	$1.91	$18.50	$0.00	$94.96
OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	8/29/2027	$66.08	$11.25	$1.98	$19.00	$0.00	$98.31

Apprentice: JOURNEYMAN LINEMAN

Effective Date: 8/31/2025

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate

Outside Electrical

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate

Apprentice: JOURNEYMAN LINEMAN

Effective Date: 8/31/2025

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	60.00	$36.55	$10.75	$1.10	$2.50	$0.00	$50.90
2	65.00	$39.60	$10.75	$1.19	$2.50	$0.00	$54.04
3	70.00	$42.64	$10.75	$1.28	$2.50	$0.00	$57.17
4	75.00	$45.69	$10.75	$1.37	$4.00	$0.00	$61.81
5	80.00	$48.74	$10.75	$1.46	$4.00	$0.00	$64.95
6	85.00	$51.78	$10.75	$1.55	$4.00	$0.00	$68.08
7	90.00	$54.83	$10.75	$1.64	$6.00	$0.00	$73.22

Apprentice: JOURNEYMAN LINEMAN

Effective Date: 8/30/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	60.00	$38.13	$11.00	$1.14	$2.50	$0.00	$52.77
2	65.00	$41.31	$11.00	$1.24	$2.50	$0.00	$56.05
3	70.00	$44.49	$11.00	$1.33	$2.50	$0.00	$59.32
4	75.00	$47.66	$11.00	$1.43	$4.00	$0.00	$64.09
5	80.00	$50.84	$11.00	$1.53	$4.00	$0.00	$67.37
6	85.00	$54.02	$11.00	$1.62	$4.00	$0.00	$70.64
7	90.00	$57.20	$11.00	$1.72	$6.00	$0.00	$75.92

Apprentice to Journeyworker Ratio: 1:2

TELEDATA CABLE SPLICER OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104 OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	2/4/2019	$30.73	$4.70	$0.92	$2.25	$0.00	$38.60
TELEDATA LINEMAN/EQUIPMENT OPERATOR OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104 OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	2/4/2019	$28.93	$4.70	$0.89	$2.25	$0.00	$36.77
TELEDATA WIREMAN/INSTALLER/TECHNICIAN OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104 OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	2/4/2019	$28.93	$4.70	$0.89	$2.25	$0.00	$36.77

Additional Apprentice Information

All apprentices must be registered with the Division of Apprenticeship Training(DAS) in accordance with M.G.L.c. 23, §§ 11E-11L. Minimum wage rates for apprentices employed on public works projects are listed above as a percentage of the hourly prevailing wage rate established by the Commissioner under the provisions of M.G.L.c. 149, §§ 26-27D.

Apprentice ratios are established by DAS pursuant to M.G.L.c. 23, §§ 11E-11L. Ratios are expressed as the allowable number of apprentices to journeymen or fraction thereof, unless otherwise specified. The ratios listed herein have been taken from relevant private collective bargaining agreements(CBAs) and are provided for illustrative purposes only. They have not been independently verified as being accurate or continuing to be accurate.

Parties having questions regarding what ratio to use should contact DAS.

THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF LABOR AND WORKFORCE DEVELOPMENT
DEPARTMENT OF LABOR STANDARDS
Prevailing Wage Rates

MAURA HEALEY
Governor
KIM DRISCOLL
Lt. Governor

As determined by the Director under the provisions of the Massachusetts General Laws, Chapter 149, Sections 26 to 27H

LAUREN JONES
Secretary
MICHAEL FLANAGAN
Director

Awarding Authority:	Massachusetts Highway	**City/Town:**	TAUNTON
Wage Request No:	20260817173136-S2	**Job Location:**	RAYNHAM-TAUNTON Federal Aid Project No. HPP/STP-0035(073)X Bridge Replacement, R-02-003 = T-01-004 (
Description of Work:	RAYNHAM-TAUNTON Federal Aid Project No. HPP/STP-0035(073)X Bridge Replacement, R-02-003 = T-01-004 (3M4), South Street East over the Taunton River		
Contract Number:	136413		

§§ 26-27D Construction Project

This Prevailing Wage Schedule establishes the minimum wage rates that employees on this public works construction project must be paid. The project's Wage Request Number is listed above and on all pages of this Schedule. This schedule applies **only** to this specific project.

Awarding Authority Responsibilities

- You must include this Prevailing Wage Schedule (PWS) or an appropriate reference to it in all advertisements and calls for bids.
- The PWS must be incorporated in its entirety into all contracts for this project (G.L. c. 149, § 27).
- The wage rates on this PWS will remain in effect for the duration of the project. **Exception:** You must request an updated schedule for any multi-year construction project no later than 2 weeks before the project's yearly anniversary date.
  - For CM AT RISK projects, the anniversary date is the earlier of the signing date of: (a) the GMP Amendment; or (b) the first amendment to permit procurement of construction services.
  - For all other construction projects, the anniversary date is the date the contract was signed by the Awarding Authority and the General Contractor.
- You must also request an updated PWS if you have not opened bids or selected a contractor within 90 days of the date of issuance on this PWS.
  - For CM AT RISK projects, the earlier of (a) the signing date of the GMP Amendment; or (b) the bid for the first construction scope of work must be within 90 days of the date of issuance on this Schedule.
- You must provide any updated PWS to all contractors working on the project, including general and sub-contractors.
- You must keep the contractors' weekly certified payroll records and Statements of Compliance on file for **3 years.**
- Awarding authorities have other prevailing wage responsibilities not listed above. Learn more at: **[Prevailing wage: for awarding authorities | Mass.gov]** and G.L. c. 149, §§ 26-27D.

Contractor Responsibilities

- You must pay all employees who perform construction work on this project at least the wage rate listed on this PWS. **Warning!** If you do not follow this requirement, you can face civil fines, criminal charges, or private lawsuits.
- You must post this PWS at the worksite where it can be easily seen. (G.L. c. 149, § 27)
- You must file weekly payroll reports and a Statement of Compliance with the awarding authority (**not** DLS). You can file payroll reports by mail or email and must keep them on file for 3 years. Each weekly payroll report must include each employees' name, address, occupational classification(s), hours worked, and wages paid. Find a sample report at: mass.gov/dols/pw.
- You cannot pay any employees at the apprentice rates listed on this PWS unless they are registered with the Massachusetts Division of Apprentice Standards (DAS). Qualifying apprentices must be paid at the applicable step rate and must carry their apprentice ID card during all work hours on the project. Apprentices **not** registered with DAS must be paid at the listed journeyworker's rate, even if they are registered with a different federal/state public agency or private entity. For every week in which apprentice rates are paid, a copy of each apprentice's apprentice ID card issued by DAS shall be attached to the certified payroll records.
- If you don't know what classification or rate applies to the work being performed, you must ask DLS; paying the wrong rate subjects you to enforcement.
- Please contact DLS if you have any questions about the Prevailing Wage Schedule: (617) 626-6953 or **DLS.Feedback@mass.gov**

Employees who are **not** paid the wage listed on the Prevailing Wage Schedule (PWS) may file a complaint with the Attorney General's Fair Labor Division: **www.mass.gov/ago/fld**; **(617) 727-3465.**

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
(2 AXLE) DRIVER - EQUIPMENT TEAMSTERS JOINT COUNCIL NO. 10 TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	6/1/2026	$41.95	$16.17	$21.78	$0.00	$0.00	$79.90
	12/1/2026	$41.95	$16.17	$23.52	$0.00	$0.00	$81.64
	1/1/2027	$41.95	$16.77	$23.52	$0.00	$0.00	$82.24
(3 AXLE) DRIVER - EQUIPMENT TEAMSTERS JOINT COUNCIL NO. 10 TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	6/1/2026	$42.02	$16.17	$21.78	$0.00	$0.00	$79.97
	12/1/2026	$42.02	$16.17	$23.52	$0.00	$0.00	$81.71
	1/1/2027	$42.02	$16.77	$23.52	$0.00	$0.00	$82.31
(4 & 5 AXLE) DRIVER - EQUIPMENT TEAMSTERS JOINT COUNCIL NO. 10 TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	6/1/2026	$42.14	$16.17	$21.78	$0.00	$0.00	$80.09
	12/1/2026	$42.14	$16.17	$23.52	$0.00	$0.00	$81.83
	1/1/2027	$42.14	$16.77	$23.52	$0.00	$0.00	$82.43
ADS/SUBMERSIBLE PILOT PILE DRIVER LOCAL 56 PILE DRIVER LOCAL 56 (ZONE 1) For apprentice rates see "Apprentice- PILE DRIVER"	1/1/2024	$117.16	$10.08	$11.62	$12.67	$0.00	$151.53
AIR TRACK OPERATOR LABORERS LABORERS - ZONE 2 For apprentice rates see "Apprentice- LABORER"	6/1/2026	$42.41	$10.90	$9.75	$9.11	$0.00	$72.17
	12/1/2026	$43.85	$10.90	$9.75	$9.11	$0.00	$73.61
	6/1/2027	$45.30	$10.90	$9.75	$9.11	$0.00	$75.06
	12/1/2027	$46.75	$10.90	$9.75	$9.11	$0.00	$76.51
	6/1/2028	$48.25	$10.90	$9.75	$9.11	$0.00	$78.01
	12/1/2028	$49.75	$10.90	$9.75	$9.11	$0.00	$79.51
AIR TRACK OPERATOR (HEAVY & HIGHWAY) LABORERS LABORERS - ZONE 2 (HEAVY & HIGHWAY) For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"	6/1/2026	$42.41	$10.90	$9.75	$9.21	$0.00	$72.27
	12/1/2026	$43.85	$10.90	$9.75	$9.21	$0.00	$73.71
ASBESTOS WORKER (PIPES & TANKS) HEAT & FROST INSULATORS LOCAL 6 HEAT & FROST INSULATORS LOCAL 6 (SOUTHERN MASS)	12/1/2025	$44.80	$14.50	$4.30	$6.75	$0.00	$70.35
ASPHALT RAKER LABORERS LABORERS - ZONE 2 For apprentice rates see "Apprentice- LABORER"	6/1/2026	$41.91	$10.90	$9.75	$9.11	$0.00	$71.67
	12/1/2026	$43.35	$10.90	$9.75	$9.11	$0.00	$73.11
	6/1/2027	$44.80	$10.90	$9.75	$9.11	$0.00	$74.56
	12/1/2027	$46.25	$10.90	$9.75	$9.11	$0.00	$76.01
	6/1/2028	$47.75	$10.90	$9.75	$9.11	$0.00	$77.51
	12/1/2028	$49.25	$10.90	$9.75	$9.11	$0.00	$79.01
ASPHALT RAKER (HEAVY & HIGHWAY) LABORERS LABORERS - ZONE 2 (HEAVY & HIGHWAY) For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"	6/1/2026	$41.91	$10.90	$9.75	$9.21	$0.00	$71.77
	12/1/2026	$43.35	$10.90	$9.75	$9.21	$0.00	$73.21
ASPHALT/CONCRETE/CRUSHER PLANT-ON SITE OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS LOCAL 4 For apprentice rates see "Apprentice- OPERATING ENGINEERS"	6/1/2026	$59.38	$17.05	$13.35	$3.25	$0.00	$93.03
	12/1/2026	$60.83	$17.05	$13.35	$3.25	$0.00	$94.48

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
BACKHOE/FRONT-END LOADER	6/1/2026	$59.38	$17.05	$13.35	$3.25	$0.00	$93.03
OPERATING ENGINEERS LOCAL 4	12/1/2026	$60.83	$17.05	$13.35	$3.25	$0.00	$94.48
OPERATING ENGINEERS LOCAL 4							
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
BARCO-TYPE JUMPING TAMPER	6/1/2026	$41.91	$10.90	$9.75	$9.11	$0.00	$71.67
LABORERS	12/1/2026	$43.35	$10.90	$9.75	$9.11	$0.00	$73.11
LABORERS - ZONE 2	6/1/2027	$44.80	$10.90	$9.75	$9.11	$0.00	$74.56
	12/1/2027	$46.25	$10.90	$9.75	$9.11	$0.00	$76.01
	6/1/2028	$47.75	$10.90	$9.75	$9.11	$0.00	$77.51
	12/1/2028	$49.25	$10.90	$9.75	$9.11	$0.00	$79.01
For apprentice rates see "Apprentice- LABORER"							
BLOCK PAVER, RAMMER / CURB SETTER	6/1/2026	$42.41	$10.90	$9.75	$9.11	$0.00	$72.17
LABORERS	12/1/2026	$43.85	$10.90	$9.75	$9.11	$0.00	$73.61
LABORERS - ZONE 2	6/1/2027	$45.30	$10.90	$9.75	$9.11	$0.00	$75.06
	12/1/2027	$46.75	$10.90	$9.75	$9.11	$0.00	$76.51
	6/1/2028	$48.25	$10.90	$9.75	$9.11	$0.00	$78.01
	12/1/2028	$49.75	$10.90	$9.75	$9.11	$0.00	$79.51
For apprentice rates see "Apprentice- LABORER"							
BLOCK PAVER, RAMMER / CURB SETTER (HEAVY & HIGHWAY)	6/1/2026	$42.41	$10.90	$9.75	$9.21	$0.00	$72.27
LABORERS	12/1/2026	$43.85	$10.90	$9.75	$9.21	$0.00	$73.71
LABORERS - ZONE 2 (HEAVY & HIGHWAY)							
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"							
BOILER MAKER	1/1/2024	$48.12	$7.07	$14.60	$6.00	$0.00	$75.79
BOILERMAKERS LOCAL 29							
BOILERMAKERS LOCAL 29							

Apprentice: BOILER MAKER

Effective Date: 1/1/2024

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	65.00	$31.28	$7.07	$9.32	$3.90	$0.00	$51.57
2	65.00	$31.28	$7.07	$9.32	$3.90	$0.00	$51.57
3	70.00	$33.68	$7.07	$10.03	$4.20	$0.00	$54.98
4	75.00	$36.09	$7.07	$10.74	$4.50	$0.00	$58.40
5	80.00	$38.50	$7.07	$11.45	$4.80	$0.00	$61.82
6	85.00	$40.90	$7.07	$12.18	$5.10	$0.00	$65.25
7	90.00	$43.31	$7.07	$12.88	$5.40	$0.00	$68.66
8	95.00	$45.71	$7.07	$13.62	$5.70	$0.00	$72.10

Apprentice to Journeyworker Ratio: 1:4

BRICK/STONE/ARTIFICIAL MASONRY (INCL. MASONRY WATERPROOFING)	8/1/2026	$68.01	$12.84	$15.57	$7.33	$0.00	$103.75
BRICKLAYERS LOCAL 3	2/1/2027	$69.41	$12.84	$15.57	$7.33	$0.00	$105.15
BRICKLAYERS LOCAL 3 (FOXBORO)							

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate

Apprentice: BRICK/STONE/ARTIFICIAL MASONRY (INCL. MASONRY WATERPROOFING)

Effective Date: 8/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$34.01	$12.84	$15.57	$7.33	$0.00	$69.75
2	60.00	$40.81	$12.84	$15.57	$7.33	$0.00	$76.55
3	70.00	$47.61	$12.84	$15.57	$7.33	$0.00	$83.35
4	80.00	$54.41	$12.84	$15.57	$7.33	$0.00	$90.15
5	90.00	$61.21	$12.84	$15.57	$7.33	$0.00	$96.95

Apprentice: BRICK/STONE/ARTIFICIAL MASONRY (INCL. MASONRY WATERPROOFING)

Effective Date: 2/1/2027

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$34.71	$12.84	$15.57	$7.33	$0.00	$70.45
2	60.00	$41.65	$12.84	$15.57	$7.33	$0.00	$77.39
3	70.00	$48.59	$12.84	$15.57	$7.33	$0.00	$84.33
4	80.00	$55.53	$12.84	$15.57	$7.33	$0.00	$91.27
5	90.00	$62.47	$12.84	$15.57	$7.33	$0.00	$98.21

Apprentice to Journeyworker Ratio: 1:5

BULLDOZER/GRADER/SCRAPER	6/1/2026	$58.70	$17.05	$13.35	$3.25	$0.00	$92.35
OPERATING ENGINEERS LOCAL 4	12/1/2026	$60.14	$17.05	$13.35	$3.25	$0.00	$93.79
OPERATING ENGINEERS LOCAL 4							
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
CAISSON & UNDERPINNING BOTTOM MAN	6/1/2026	$50.40	$10.90	$9.75	$9.80	$0.00	$80.85
LABORERS	12/1/2026	$51.90	$10.90	$9.75	$9.80	$0.00	$82.35
LABORERS - FOUNDATION AND MARINE							
For apprentice rates see "Apprentice- LABORER"							
CAISSON & UNDERPINNING LABORER	6/1/2026	$49.25	$10.90	$9.75	$9.80	$0.00	$79.70
LABORERS	12/1/2026	$50.75	$10.90	$9.75	$9.80	$0.00	$81.20
LABORERS - FOUNDATION AND MARINE							
For apprentice rates see "Apprentice- LABORER"							
CAISSON & UNDERPINNING TOP MAN	6/1/2026	$49.58	$10.90	$9.75	$9.80	$0.00	$80.03
LABORERS	12/1/2026	$51.08	$10.90	$9.75	$9.80	$0.00	$81.53
LABORERS - FOUNDATION AND MARINE							
For apprentice rates see "Apprentice- LABORER"							
CARBIDE CORE DRILL OPERATOR	6/1/2026	$41.91	$10.90	$9.75	$9.11	$0.00	$71.67
LABORERS	12/1/2026	$43.35	$10.90	$9.75	$9.11	$0.00	$73.11
LABORERS - ZONE 2	6/1/2027	$44.80	$10.90	$9.75	$9.11	$0.00	$74.56
	12/1/2027	$46.25	$10.90	$9.75	$9.11	$0.00	$76.01
	6/1/2028	$47.75	$10.90	$9.75	$9.11	$0.00	$77.51
	12/1/2028	$49.25	$10.90	$9.75	$9.11	$0.00	$79.01
For apprentice rates see "Apprentice- LABORER"							

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
CARPENTER CARPENTERS CARPENTERS -ZONE 2 (Eastern Massachusetts)	3/1/2026	$50.85	$11.08	$11.47	$8.50	$0.00	$81.90
	9/1/2026	$52.10	$11.08	$11.47	$8.50	$0.00	$83.15
	3/1/2027	$53.35	$11.08	$11.47	$8.50	$0.00	$84.40

Apprentice: CARPENTER

Effective Date: 3/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	45.00	$22.88	$11.08	$0.00	$1.73	$0.00	$35.69
2	45.00	$22.88	$11.08	$0.00	$1.73	$0.00	$35.69
3	55.00	$27.97	$11.08	$0.00	$3.40	$0.00	$42.45
4	55.00	$27.97	$11.08	$0.00	$3.40	$0.00	$42.45
5	70.00	$35.60	$11.08	$11.41	$5.10	$0.00	$63.19
6	70.00	$35.60	$11.08	$11.41	$5.10	$0.00	$63.19
7	80.00	$40.68	$11.08	$11.44	$6.80	$0.00	$70.00
8	80.00	$40.68	$11.08	$11.44	$6.80	$0.00	$70.00

Apprentice: CARPENTER

Effective Date: 9/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	45.00	$23.45	$11.08	$0.00	$1.73	$0.00	$36.26
2	45.00	$23.45	$11.08	$0.00	$1.73	$0.00	$36.26
3	55.00	$28.66	$11.08	$0.00	$3.40	$0.00	$43.14
4	55.00	$28.66	$11.08	$0.00	$3.40	$0.00	$43.14
5	70.00	$36.47	$11.08	$11.41	$5.10	$0.00	$64.06
6	70.00	$36.47	$11.08	$11.41	$5.10	$0.00	$64.06
7	80.00	$41.68	$11.08	$11.44	$6.80	$0.00	$71.00
8	80.00	$41.68	$11.08	$11.44	$6.80	$0.00	$71.00

Apprentice to Journeyworker Ratio: 1:5

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
CARPENTER WOOD FRAME CARPENTERS CARPENTERS-ZONE 3 (Wood Frame)	10/1/2025	$27.37	$7.38	$4.47	$1.00	$0.00	$40.22
	10/1/2026	$28.47	$7.38	$4.47	$1.00	$0.00	$41.32

All Aspects of New Wood Frame Work

Apprentice: CARPENTER WOOD FRAME

Effective Date: 10/1/2025

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	60.00	$16.42	$7.38	$0.00	$0.00	$0.00	$23.80
2	60.00	$16.42	$7.38	$0.00	$0.00	$0.00	$23.80
3	65.00	$17.79	$7.38	$0.00	$1.00	$0.00	$26.17
4	70.00	$19.16	$7.38	$0.00	$1.00	$0.00	$27.54
5	75.00	$20.53	$7.38	$3.80	$1.00	$0.00	$32.71
6	80.00	$21.90	$7.38	$3.80	$1.00	$0.00	$34.08

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate

Apprentice: CARPENTER WOOD FRAME

Effective Date: 10/1/2025

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
7	85.00	$23.26	$7.38	$3.80	$1.00	$0.00	$35.44
8	90.00	$24.63	$7.38	$3.80	$1.00	$0.00	$36.81

Apprentice: CARPENTER WOOD FRAME

Effective Date: 10/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	60.00	$17.08	$7.38	$0.00	$0.00	$0.00	$24.46
2	60.00	$17.08	$7.38	$0.00	$0.00	$0.00	$24.46
3	65.00	$18.51	$7.38	$0.00	$1.00	$0.00	$26.89
4	70.00	$19.93	$7.38	$0.00	$1.00	$0.00	$28.31
5	75.00	$21.35	$7.38	$3.80	$1.00	$0.00	$33.53
6	80.00	$22.78	$7.38	$3.80	$1.00	$0.00	$34.96
7	85.00	$24.20	$7.38	$3.80	$1.00	$0.00	$36.38
8	90.00	$25.62	$7.38	$3.80	$1.00	$0.00	$37.80

Apprentice to Journeyworker Ratio: 1:5

CEMENT MASONRY/PLASTERING PLASTERERS AND CEMENT MASONS LOCAL 534 Plasterers and Cement Masons - Zone 1	7/1/2026	$54.49	$13.35	$16.43	$7.78	$1.80	$93.85
	1/1/2027	$55.94	$13.35	$16.43	$7.78	$1.80	$95.30
	7/1/2027	$57.29	$13.35	$16.43	$7.78	$1.80	$96.65
	1/1/2028	$58.64	$13.35	$16.43	$7.78	$1.80	$98.00

Apprentice: CEMENT MASONRY/PLASTERING

Effective Date: 7/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$27.25	$13.35	$16.43	$0.00	$0.00	$57.03
2	60.00	$32.69	$13.35	$16.43	$7.78	$1.80	$72.05
3	65.00	$35.42	$13.35	$16.43	$7.78	$1.80	$74.78
4	70.00	$38.14	$13.35	$16.43	$7.78	$1.80	$77.50
5	75.00	$40.87	$13.35	$16.43	$7.78	$1.80	$80.23
6	80.00	$43.59	$13.35	$16.43	$7.78	$1.80	$82.95
7	90.00	$49.04	$13.35	$0.00	$7.78	$0.00	$70.17

Apprentice: CEMENT MASONRY/PLASTERING

Effective Date: 1/1/2027

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$27.97	$13.35	$16.43	$0.00	$0.00	$57.75
2	60.00	$33.56	$13.35	$16.43	$7.78	$1.80	$72.92

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
Apprentice: CEMENT MASONRY/PLASTERING							
Effective Date: 1/1/2027							
Step / Percent		**Apprentice Base Wage**					
3 / 65.00		$36.36	$13.35	$16.43	$7.78	$1.80	$75.72
4 / 70.00		$39.16	$13.35	$16.43	$7.78	$1.80	$78.52
5 / 75.00		$41.96	$13.35	$16.43	$7.78	$1.80	$81.32
6 / 80.00		$44.75	$13.35	$16.43	$7.78	$1.80	$84.11
7 / 90.00		$50.35	$0.00	$16.43	$0.00	$0.00	$66.78
Apprentice to Journeyworker Ratio: 1:5							
CHAIN SAW OPERATOR	6/1/2026	$41.91	$10.90	$9.75	$9.11	$0.00	$71.67
LABORERS LABORERS - ZONE 2	12/1/2026	$43.35	$10.90	$9.75	$9.11	$0.00	$73.11
	6/1/2027	$44.80	$10.90	$9.75	$9.11	$0.00	$74.56
	12/1/2027	$46.25	$10.90	$9.75	$9.11	$0.00	$76.01
	6/1/2028	$47.75	$10.90	$9.75	$9.11	$0.00	$77.51
	12/1/2028	$49.25	$10.90	$9.75	$9.11	$0.00	$79.01
For apprentice rates see "Apprentice- LABORER"							
CLAM SHELLS/SLURRY BUCKETS/HEADING MACHINES	6/1/2026	$60.61	$17.05	$13.35	$3.25	$0.00	$94.26
OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS LOCAL 4	12/1/2026	$62.09	$17.05	$13.35	$3.25	$0.00	$95.74
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
COMPRESSOR OPERATOR	6/1/2026	$37.63	$17.05	$13.35	$3.25	$0.00	$71.28
OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS LOCAL 4	12/1/2026	$38.58	$17.05	$13.35	$3.25	$0.00	$72.23
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
DELEADER (BRIDGE)	1/1/2026	$59.56	$10.35	$12.00	$12.60	$0.00	$94.51
PAINTERS LOCAL 35 PAINTERS LOCAL 35 - ZONE 2							
Apprentice: DELEADER (BRIDGE)							
Effective Date: 1/1/2026							
Step / Percent		**Apprentice Base Wage**					
1 / 50.00		$29.78	$10.35	$0.00	$0.00	$0.00	$40.13
2 / 55.00		$32.76	$10.35	$0.00	$6.93	$0.00	$50.04
3 / 60.00		$35.74	$10.35	$0.00	$7.56	$0.00	$53.65
4 / 65.00		$38.71	$10.35	$0.00	$8.19	$0.00	$57.25
5 / 70.00		$41.69	$10.35	$12.00	$8.82	$0.00	$72.86
6 / 75.00		$44.67	$10.35	$12.00	$9.45	$0.00	$76.47
7 / 80.00		$47.65	$10.35	$12.00	$10.08	$0.00	$80.08
8 / 90.00		$53.60	$10.35	$12.00	$11.34	$0.00	$87.29
Apprentice to Journeyworker Ratio: 1:1							
DEMO: ADZEMAN	6/1/2026	$49.30	$10.90	$9.75	$9.65	$0.00	$79.60

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
LABORERS LABORERS - ZONE 2	12/7/2026	$50.80	$10.90	$9.75	$9.65	$0.00	$81.10
	6/7/2027	$52.40	$10.90	$9.75	$9.65	$0.00	$82.70
	12/6/2027	$54.00	$10.90	$9.75	$9.65	$0.00	$84.30
	6/5/2028	$55.68	$10.90	$9.75	$9.65	$0.00	$85.98
	12/4/2028	$57.35	$10.90	$9.75	$9.65	$0.00	$87.65
For apprentice rates see "Apprentice- LABORER"							
DEMO: BACKHOE/LOADER/HAMMER OPERATOR LABORERS LABORERS - ZONE 2	6/1/2026	$50.30	$10.90	$9.75	$9.65	$0.00	$80.60
	12/7/2026	$51.80	$10.90	$9.75	$9.65	$0.00	$82.10
	6/7/2027	$53.40	$10.90	$9.75	$9.65	$0.00	$83.70
	12/6/2027	$55.00	$10.90	$9.75	$9.65	$0.00	$85.30
	6/5/2028	$56.68	$10.90	$9.75	$9.65	$0.00	$86.98
	12/4/2028	$58.35	$10.90	$9.75	$9.65	$0.00	$88.65
For apprentice rates see "Apprentice- LABORER"							
DEMO: BURNERS LABORERS LABORERS - ZONE 2	6/1/2026	$50.05	$10.90	$9.75	$9.65	$0.00	$80.35
	12/7/2026	$51.55	$10.90	$9.75	$9.65	$0.00	$81.85
	6/7/2027	$53.15	$10.90	$9.75	$9.65	$0.00	$83.45
	12/6/2027	$54.75	$10.90	$9.75	$9.65	$0.00	$85.05
	6/5/2028	$56.43	$10.90	$9.75	$9.65	$0.00	$86.73
	12/4/2028	$58.10	$10.90	$9.75	$9.65	$0.00	$88.40
For apprentice rates see "Apprentice- LABORER"							
DEMO: CONCRETE CUTTER/SAWYER LABORERS LABORERS - ZONE 2	6/1/2026	$50.30	$10.90	$9.75	$9.65	$0.00	$80.60
	12/7/2026	$51.80	$10.90	$9.75	$9.65	$0.00	$82.10
	6/7/2027	$53.40	$10.90	$9.75	$9.65	$0.00	$83.70
	12/6/2027	$55.00	$10.90	$9.75	$9.65	$0.00	$85.30
	6/5/2028	$56.68	$10.90	$9.75	$9.65	$0.00	$86.98
	12/4/2028	$58.35	$10.90	$9.75	$9.65	$0.00	$88.65
For apprentice rates see "Apprentice- LABORER"							
DEMO: JACKHAMMER OPERATOR LABORERS LABORERS - ZONE 2	6/1/2026	$50.05	$10.90	$9.75	$9.65	$0.00	$80.35
	12/7/2026	$51.55	$10.90	$9.75	$9.65	$0.00	$81.85
	6/7/2027	$53.15	$10.90	$9.75	$9.65	$0.00	$83.45
	12/6/2027	$54.75	$10.90	$9.75	$9.65	$0.00	$85.05
	6/5/2028	$56.43	$10.90	$9.75	$9.65	$0.00	$86.73
	12/4/2028	$58.10	$10.90	$9.75	$9.65	$0.00	$88.40
For apprentice rates see "Apprentice- LABORER"							
DEMO: WRECKING LABORER LABORERS LABORERS - ZONE 2	6/1/2026	$49.30	$10.90	$9.75	$9.65	$0.00	$79.60
	12/7/2026	$50.80	$10.90	$9.75	$9.65	$0.00	$81.10
	6/7/2027	$52.40	$10.90	$9.75	$9.65	$0.00	$82.70
	12/6/2027	$54.00	$10.90	$9.75	$9.65	$0.00	$84.30
	6/5/2028	$55.68	$10.90	$9.75	$9.65	$0.00	$85.98
	12/4/2028	$57.35	$10.90	$9.75	$9.65	$0.00	$87.65
For apprentice rates see "Apprentice- LABORER"							
DIRECTIONAL DRILL MACHINE OPERATOR OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS LOCAL 4	6/1/2026	$58.70	$17.05	$13.35	$3.25	$0.00	$92.35
	12/1/2026	$60.14	$17.05	$13.35	$3.25	$0.00	$93.79
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
DIVER PILE DRIVER LOCAL 56 PILE DRIVER LOCAL 56 (ZONE 1)	8/1/2024	$78.11	$10.08	$11.62	$10.04	$0.00	$109.85
as of 8-1-24, Apprentices with diving licenses begin at second year. % of Diver wage 70/80/90 2A $69.83, 3A $91.79,4A $102.14 Total Rate							
DIVER TENDER PILE DRIVER LOCAL 56 PILE DRIVER LOCAL 56 (ZONE 1)	8/1/2024	$55.79	$10.08	$11.62	$12.67	$0.00	$90.16
as of 8-1-24, Apprentices with diving licenses begin at second year. % of Piledriver wage 70/80/90 2A $54.20, 3A $73.93,4A $82.05 Total Rate							
DIVER TENDER (EFFLUENT) PILE DRIVER LOCAL 56 PILE DRIVER LOCAL 56 (ZONE 1)	8/1/2024	$83.69	$10.08	$11.62	$12.67	$0.00	$118.06
For apprentice rates see "Apprentice- PILE DRIVER"							
DIVER/SLURRY (EFFLUENT) PILE DRIVER LOCAL 56 PILE DRIVER LOCAL 56 (ZONE 1)	8/1/2024	$117.16	$10.08	$11.62	$12.67	$0.00	$151.53
For apprentice rates see "Apprentice- PILE DRIVER"							
DRAWBRIDGE OPERATOR (Construction) DRAWBRIDGE - SEIU LOCAL 888 DRAWBRIDGE - SEIU LOCAL 888	7/1/2020	$26.77	$6.67	$3.93	$0.00	$0.16	$37.53
ELECTRICIAN ELECTRICIANS LOCAL 223 ELECTRICIANS LOCAL 223	9/1/2025	$52.25	$12.25	$14.86	$3.75	$0.00	$83.11
	9/1/2026	$54.72	$12.50	$15.56	$4.00	$0.00	$86.78

Apprentice: ELECTRICIAN

Effective Date: 9/1/2025

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	40.00	$20.90	$12.25	$0.63	$0.00	$0.00	$33.78
2	45.00	$23.51	$12.25	$0.71	$0.00	$0.00	$36.47
3	50.00	$26.13	$12.25	$0.78	$0.00	$0.00	$39.16
4	55.00	$28.74	$12.25	$6.61	$2.50	$0.00	$50.10
5	60.00	$31.35	$12.25	$7.21	$2.50	$0.00	$53.31
6	65.00	$33.96	$12.25	$7.82	$2.50	$0.00	$56.53
7	70.00	$36.58	$12.25	$8.41	$2.50	$0.00	$59.74
8	75.00	$39.19	$12.25	$9.02	$2.50	$0.00	$62.96

Apprentice: ELECTRICIAN

Effective Date: 9/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	40.00	$21.89	$12.50	$0.66	$0.00	$0.00	$35.05
2	45.00	$24.62	$12.50	$0.74	$0.00	$0.00	$37.86
3	50.00	$27.36	$12.50	$0.82	$0.00	$0.00	$40.68
4	55.00	$30.10	$12.50	$6.92	$2.75	$0.00	$52.27
5	60.00	$32.83	$12.50	$7.54	$2.75	$0.00	$55.62

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
Apprentice: ELECTRICIAN							
Effective Date: 9/1/2026							
Step / Percent / Apprentice Base Wage							
6 / 65.00		$35.57	$12.50	$8.18	$2.75	$0.00	$59.00
7 / 70.00		$38.30	$12.50	$8.81	$2.75	$0.00	$62.36
8 / 75.00		$41.04	$12.50	$9.43	$2.75	$0.00	$65.72
Apprentice to Journeyworker Ratio: 2:3							
ELEVATOR CONSTRUCTOR	1/1/2026	$77.26	$16.38	$11.06	$10.70	$0.00	$115.40
ELEVATOR CONSTRUCTORS LOCAL 4	1/1/2027	$80.55	$16.48	$11.16	$11.00	$0.00	$119.19
ELEVATOR CONSTRUCTORS LOCAL 4							
Apprentice: ELEVATOR CONSTRUCTOR							
Effective Date: 1/1/2026							
Step / Percent / Apprentice Base Wage							
1 / 50.00		$38.63	$0.00	$0.00	$0.00	$0.00	$38.63
2 / 55.00		$42.49	$16.38	$11.06	$10.70	$0.00	$80.63
3 / 65.00		$50.22	$16.38	$11.06	$10.70	$0.00	$88.36
4 / 70.00		$54.08	$16.38	$11.06	$10.70	$0.00	$92.22
5 / 80.00		$61.81	$16.38	$11.06	$10.70	$0.00	$99.95
Apprentice: ELEVATOR CONSTRUCTOR							
Effective Date: 1/1/2027							
Step / Percent / Apprentice Base Wage							
1 / 50.00		$40.28	$0.00	$0.00	$0.00	$0.00	$40.28
2 / 55.00		$44.30	$16.48	$11.16	$11.00	$0.00	$82.94
3 / 65.00		$52.36	$16.48	$11.16	$11.00	$0.00	$91.00
4 / 70.00		$56.39	$16.48	$11.16	$11.00	$0.00	$95.03
5 / 80.00		$64.44	$16.48	$11.16	$11.00	$0.00	$103.08
Apprentice to Journeyworker Ratio: 1:1							
ELEVATOR CONSTRUCTOR HELPER	1/1/2026	$54.08	$16.38	$11.06	$10.07	$0.00	$91.59
ELEVATOR CONSTRUCTORS LOCAL 4	1/1/2027	$56.39	$16.48	$11.16	$11.00	$0.00	$95.03
ELEVATOR CONSTRUCTORS LOCAL 4							
For apprentice rates see "Apprentice - ELEVATOR CONSTRUCTOR"							
FENCE & GUARD RAIL ERECTOR (HEAVY & HIGHWAY)	6/1/2026	$41.91	$10.90	$9.75	$9.21	$0.00	$71.77
LABORERS	12/1/2026	$43.35	$10.90	$9.75	$9.21	$0.00	$73.21
LABORERS - ZONE 2 (HEAVY & HIGHWAY)							
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)							
FIELD ENG.INST.PERSON-BLDG,SITE,HVY/HWY	5/1/2026	$54.40	$16.55	$13.35	$3.25	$0.00	$87.55
OPERATING ENGINEERS LOCAL 4	11/1/2026	$55.69	$16.55	$13.35	$3.25	$0.00	$88.84
OPERATING ENGINEERS LOCAL 4							

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
	5/1/2027	$57.12	$16.55	$13.35	$3.25	$0.00	$90.27
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
FIELD ENG.PARTY CHIEF-BLDG,SITE,HVY/HWY	5/1/2026	$56.02	$16.55	$13.35	$3.25	$0.00	$89.17
OPERATING ENGINEERS LOCAL 4	11/1/2026	$57.32	$16.55	$13.35	$3.25	$0.00	$90.47
OPERATING ENGINEERS LOCAL 4	5/1/2027	$58.77	$16.55	$13.35	$3.25	$0.00	$91.92
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
FIELD ENG.ROD PERSON-BLDG,SITE,HVY/HWY	5/1/2026	$26.28	$16.55	$13.35	$3.25	$0.00	$59.43
OPERATING ENGINEERS LOCAL 4	11/1/2026	$27.04	$16.55	$13.35	$3.25	$0.00	$60.19
OPERATING ENGINEERS LOCAL 4	5/1/2027	$27.89	$16.55	$13.35	$3.25	$0.00	$61.04
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
FIRE ALARM INSTALLER	9/1/2025	$52.25	$12.25	$14.86	$3.75	$0.00	$83.11
ELECTRICIANS LOCAL 223	9/1/2026	$54.72	$12.50	$15.56	$4.00	$0.00	$86.78
ELECTRICIANS LOCAL 223							
For apprentice rates see "Apprentice- ELECTRICIAN"							
FIRE ALARM REPAIR / MAINTENANCE	9/1/2025	$52.25	$12.25	$14.86	$3.75	$0.00	$83.11
/ COMMISSIONING	9/1/2026	$54.72	$12.50	$15.56	$4.00	$0.00	$86.78
ELECTRICIANS LOCAL 223							
ELECTRICIANS LOCAL 223							
For apprentice rates see "Apprentice- TELECOMMUNICATIONS TECHNICIAN"							
FIREMAN (ASST. ENGINEER)	6/1/2026	$47.55	$17.05	$13.35	$3.25	$0.00	$81.20
OPERATING ENGINEERS LOCAL 4	12/1/2026	$48.73	$17.05	$13.35	$3.25	$0.00	$82.38
OPERATING ENGINEERS LOCAL 4							
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
FLAGGER & SIGNALER (HEAVY & HIGHWAY)	6/1/2026	$29.21	$10.90	$9.75	$9.21	$0.00	$59.07
LABORERS	12/1/2026	$29.21	$10.90	$9.75	$9.21	$0.00	$59.07
LABORERS - ZONE 2 (HEAVY & HIGHWAY)							
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"							
FLOORCOVERER	3/1/2024	$48.93	$10.33	$11.47	$8.80	$0.00	$79.53
FLOORCOVERERS LOCAL 2168							
FLOORCOVERERS LOCAL 2168 ZONE II							

Apprentice: FLOORCOVERER

Effective Date: 3/1/2024

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$24.47	$10.33	$0.00	$1.76	$0.00	$36.56
2	55.00	$26.91	$10.33	$0.00	$1.76	$0.00	$39.00
3	60.00	$29.36	$10.33	$0.00	$3.52	$0.00	$43.21
4	65.00	$31.80	$10.33	$0.00	$3.52	$0.00	$45.65
5	70.00	$34.25	$10.33	$11.47	$5.28	$0.00	$61.33
6	75.00	$36.70	$10.33	$11.47	$5.28	$0.00	$63.78
7	80.00	$39.14	$10.33	$11.47	$7.04	$0.00	$67.98
8	85.00	$41.59	$10.33	$11.47	$7.04	$0.00	$70.43

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
Apprentice Notes							
Steps are 750 hrs.							
Apprentice to Journeyworker Ratio: 1:1							
FORK LIFT/CHERRY PICKER	6/1/2026	$59.38	$17.05	$13.35	$3.25	$0.00	$93.03
OPERATING ENGINEERS LOCAL 4	12/1/2026	$60.83	$17.05	$13.35	$3.25	$0.00	$94.48
OPERATING ENGINEERS LOCAL 4							
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
GENERATOR/LIGHTING PLANT/HEATERS	6/1/2026	$37.63	$17.05	$13.35	$3.25	$0.00	$71.28
OPERATING ENGINEERS LOCAL 4	12/1/2026	$38.58	$17.05	$13.35	$3.25	$0.00	$72.23
OPERATING ENGINEERS LOCAL 4							
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
GLAZIER (GLASS PLANK/AIR BARRIER/INTERIOR SYSTEMS)	6/1/2026	$44.73	$11.20	$8.40	$6.05	$0.00	$70.38
GLAZIERS LOCAL 1333	6/1/2027	$46.73	$11.60	$8.55	$6.60	$0.00	$73.48
GLAZIERS LOCAL 1333	6/1/2028	$48.73	$12.00	$8.70	$7.20	$0.00	$76.63

Apprentice: GLAZIER (GLASS PLANK/AIR BARRIER/INTERIOR SYSTEMS)

Effective Date: 6/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$22.37	$11.20	$8.40	$6.05	$0.00	$48.02
2	56.25	$25.16	$11.20	$8.40	$6.05	$0.00	$50.81
3	62.50	$27.96	$11.20	$8.40	$6.05	$0.00	$53.61
4	68.75	$30.75	$11.20	$8.40	$6.05	$0.00	$56.40
5	75.00	$33.55	$11.20	$8.40	$6.05	$0.00	$59.20
6	81.25	$36.34	$11.20	$8.40	$6.05	$0.00	$61.99
7	87.50	$39.14	$11.20	$8.40	$6.05	$0.00	$64.79
8	93.75	$41.93	$11.20	$8.40	$6.05	$0.00	$67.58

Apprentice: GLAZIER (GLASS PLANK/AIR BARRIER/INTERIOR SYSTEMS)

Effective Date: 6/1/2027

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$23.37	$11.60	$8.55	$6.60	$0.00	$50.12
2	56.25	$26.29	$11.60	$8.55	$6.60	$0.00	$53.04
3	62.50	$29.21	$11.60	$8.55	$6.60	$0.00	$55.96
4	68.75	$32.13	$11.60	$8.55	$6.60	$0.00	$58.88
5	75.00	$35.05	$11.60	$8.55	$6.60	$0.00	$61.80
6	81.25	$37.97	$11.60	$8.55	$6.60	$0.00	$64.72
7	87.50	$40.89	$11.60	$8.55	$6.60	$0.00	$67.64
8	93.75	$43.81	$11.60	$8.55	$6.60	$0.00	$70.56

Apprentice to Journeyworker Ratio: 3:1

HOISTING ENGINEER/CRANES/GRADALLS	6/1/2026	$59.38	$17.05	$13.35	$3.25	$0.00	$93.03

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS LOCAL 4	12/1/2026	$60.83	$17.05	$13.35	$3.25	$0.00	$94.48

Apprentice: HOISTING ENGINEER/CRANES/GRADALLS

Effective Date: 6/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	55.00	$32.66	$0.00	$0.00	$0.00	$0.00	$32.66
2	60.00	$35.63	$17.05	$13.35	$3.25	$0.00	$69.28
3	65.00	$38.60	$17.05	$13.35	$3.25	$0.00	$72.25
4	70.00	$41.57	$17.05	$13.35	$3.25	$0.00	$75.22
5	75.00	$44.54	$17.05	$13.35	$3.25	$0.00	$78.19
6	80.00	$47.50	$17.05	$13.35	$3.25	$0.00	$81.15
7	85.00	$50.47	$17.05	$13.35	$3.25	$0.00	$84.12
8	90.00	$53.44	$17.05	$13.35	$3.25	$0.00	$87.09

Apprentice: HOISTING ENGINEER/CRANES/GRADALLS

Effective Date: 12/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	55.00	$33.46	$0.00	$0.00	$0.00	$0.00	$33.46
2	60.00	$36.50	$17.05	$13.35	$3.25	$0.00	$70.15
3	65.00	$39.54	$17.05	$13.35	$3.25	$0.00	$73.19
4	70.00	$42.58	$17.05	$13.35	$3.25	$0.00	$76.23
5	75.00	$45.62	$17.05	$13.35	$3.25	$0.00	$79.27
6	80.00	$48.66	$17.05	$13.35	$3.25	$0.00	$82.31
7	85.00	$51.71	$17.05	$13.35	$3.25	$0.00	$85.36
8	90.00	$54.75	$17.05	$13.35	$3.25	$0.00	$88.40

Apprentice to Journeyworker Ratio: 1:6

HVAC (DUCTWORK) SHEETMETAL WORKERS LOCAL 17 SHEETMETAL WORKERS LOCAL 17 - A	2/1/2026	$62.93	$14.91	$18.74	$9.53	$2.98	$109.09
For apprentice rates see "Apprentice- SHEET METAL WORKER"							
HVAC (ELECTRICAL CONTROLS) ELECTRICIANS LOCAL 223 ELECTRICIANS LOCAL 223	9/1/2025	$52.25	$12.25	$14.86	$3.75	$0.00	$83.11
	9/1/2026	$54.72	$12.50	$15.56	$4.00	$0.00	$86.78
For apprentice rates see "Apprentice- ELECTRICIAN"							
HVAC (TESTING AND BALANCING - AIR) SHEETMETAL WORKERS LOCAL 17 SHEETMETAL WORKERS LOCAL 17 - A	2/1/2026	$62.93	$14.91	$18.74	$9.53	$2.98	$109.09
For apprentice rates see "Apprentice- SHEET METAL WORKER"							
HVAC (TESTING AND BALANCING -WATER) PLUMBERS & PIPEFITTERS LOCAL 51 PLUMBERS & PIPEFITTERS LOCAL 51	8/25/2025	$55.24	$10.80	$16.80	$4.60	$0.00	$87.44
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"							

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
HVAC MECHANIC PLUMBERS & PIPEFITTERS LOCAL 51 PLUMBERS & PIPEFITTERS LOCAL 51	8/25/2025	$55.24	$10.80	$16.80	$4.60	$0.00	$87.44
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"							
HYDRAULIC DRILLS LABORERS LABORERS - ZONE 2	6/1/2026	$42.41	$10.90	$9.75	$9.11	$0.00	$72.17
	12/1/2026	$43.85	$10.90	$9.75	$9.11	$0.00	$73.61
	6/1/2027	$45.30	$10.90	$9.75	$9.11	$0.00	$75.06
	12/1/2027	$46.75	$10.90	$9.75	$9.11	$0.00	$76.51
	6/1/2028	$48.25	$10.90	$9.75	$9.11	$0.00	$78.01
	12/1/2028	$49.75	$10.90	$9.75	$9.11	$0.00	$79.51
For apprentice rates see "Apprentice- LABORER"							
HYDRAULIC DRILLS (HEAVY & HIGHWAY) LABORERS LABORERS - ZONE 2 (HEAVY & HIGHWAY)	6/1/2026	$42.41	$10.90	$9.75	$9.21	$0.00	$72.27
	12/1/2026	$43.85	$10.90	$9.75	$9.21	$0.00	$73.71
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"							
INSULATOR (PIPES & TANKS) HEAT & FROST INSULATORS LOCAL 6 HEAT & FROST INSULATORS LOCAL 6 (SOUTHERN MASS)	9/1/2025	$54.31	$14.75	$9.52	$10.09	$0.00	$88.67
	9/1/2026	$57.38	$14.75	$9.52	$10.09	$0.00	$91.74

Apprentice: INSULATOR (PIPES & TANKS)

Effective Date: 9/1/2025

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$27.16	$14.75	$9.27	$5.05	$0.00	$56.23
2	60.00	$32.59	$14.75	$9.32	$6.05	$0.00	$62.71
3	70.00	$38.02	$14.75	$9.37	$7.06	$0.00	$69.20
4	80.00	$43.45	$14.75	$9.42	$8.07	$0.00	$75.69

Apprentice: INSULATOR (PIPES & TANKS)

Effective Date: 9/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$28.69	$14.75	$9.27	$5.05	$0.00	$57.76
2	60.00	$34.43	$14.75	$9.32	$6.05	$0.00	$64.55
3	70.00	$40.17	$14.75	$9.37	$7.06	$0.00	$71.35
4	80.00	$45.90	$14.75	$9.42	$8.07	$0.00	$78.14

Apprentice to Journeyworker Ratio: 1:4

IRONWORKER/WELDER IRONWORKERS LOCAL 37 IRONWORKERS LOCAL 37	3/16/2021	$42.46	$7.70	$12.10	$5.00	$0.00	$67.26

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate

Apprentice: IRONWORKER/WELDER

Effective Date: 3/16/2021

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	70.00	$29.72	$7.70	$12.10	$5.00	$0.00	$54.52
2	75.00	$31.85	$7.70	$12.10	$5.00	$0.00	$56.65
3	80.00	$33.97	$7.70	$12.10	$5.00	$0.00	$58.77
4	85.00	$36.09	$7.70	$12.10	$5.00	$0.00	$60.89
5	90.00	$38.21	$7.70	$12.10	$5.00	$0.00	$63.01
6	95.00	$40.34	$7.70	$12.10	$5.00	$0.00	$65.14

Apprentice to Journeyworker Ratio: 1:4

JACKHAMMER & PAVING BREAKER OPERATOR	6/1/2026	$41.91	$10.90	$9.75	$9.11	$0.00	$71.67
LABORERS	12/1/2026	$43.35	$10.90	$9.75	$9.11	$0.00	$73.11
LABORERS - ZONE 2	6/1/2027	$44.80	$10.90	$9.75	$9.11	$0.00	$74.56
	12/1/2027	$46.25	$10.90	$9.75	$9.11	$0.00	$76.01
	6/1/2028	$47.75	$10.90	$9.75	$9.11	$0.00	$77.51
	12/1/2028	$49.25	$10.90	$9.75	$9.11	$0.00	$79.01

For apprentice rates see "Apprentice- LABORER"

LABORER	6/1/2026	$41.66	$10.90	$9.75	$9.11	$0.00	$71.42
LABORERS	12/1/2026	$43.10	$10.90	$9.75	$9.11	$0.00	$72.86
LABORERS - ZONE 2	6/1/2027	$44.55	$10.90	$9.75	$9.11	$0.00	$74.31
	12/1/2027	$46.00	$10.90	$9.75	$9.11	$0.00	$75.76
	6/1/2028	$47.50	$10.90	$9.75	$9.11	$0.00	$77.26
	12/1/2028	$49.00	$10.90	$9.75	$9.11	$0.00	$78.76

Apprentice: LABORER

Effective Date: 6/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	60.00	$25.00	$10.90	$9.75	$9.11	$0.00	$54.76
2	70.00	$29.16	$10.90	$9.75	$9.11	$0.00	$58.92
3	80.00	$33.33	$10.90	$9.75	$9.11	$0.00	$63.09
4	90.00	$37.49	$10.90	$9.75	$9.11	$0.00	$67.25

Apprentice: LABORER

Effective Date: 12/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	60.00	$25.86	$10.90	$9.75	$9.11	$0.00	$55.62
2	70.00	$30.17	$10.90	$9.75	$9.11	$0.00	$59.93
3	80.00	$34.48	$10.90	$9.75	$9.11	$0.00	$64.24
4	90.00	$38.79	$10.90	$9.75	$9.11	$0.00	$68.55

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
Apprentice to Journeyworker Ratio: 1:5							
LABORER (HEAVY & HIGHWAY)	6/1/2026	$41.66	$10.90	$9.75	$9.21	$0.00	$71.52
LABORERS	12/1/2026	$43.10	$10.90	$9.75	$9.21	$0.00	$72.96
LABORERS - ZONE 2 (HEAVY & HIGHWAY)							

Apprentice: LABORER (HEAVY & HIGHWAY)

Effective Date: 6/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	60.00	$25.00	$10.90	$9.75	$9.21	$0.00	$54.86
2	70.00	$29.16	$10.90	$9.75	$9.21	$0.00	$59.02
3	80.00	$33.33	$10.90	$9.75	$9.21	$0.00	$63.19
4	90.00	$37.49	$10.90	$9.75	$9.10	$0.00	$67.24

Apprentice: LABORER (HEAVY & HIGHWAY)

Effective Date: 12/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	60.00	$25.86	$10.90	$9.75	$9.21	$0.00	$55.72
2	70.00	$30.17	$10.90	$9.75	$9.21	$0.00	$60.03
3	80.00	$34.48	$10.90	$9.75	$9.21	$0.00	$64.34
4	90.00	$38.79	$10.90	$9.75	$9.21	$0.00	$68.65

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
Apprentice to Journeyworker Ratio: 1:5							
LABORER: CARPENTER TENDER	6/1/2026	$41.66	$10.90	$9.75	$9.11	$0.00	$71.42
LABORERS	12/1/2026	$43.10	$10.90	$9.75	$9.11	$0.00	$72.86
LABORERS - ZONE 2	6/1/2027	$44.55	$10.90	$9.75	$9.11	$0.00	$74.31
	12/1/2027	$46.00	$10.90	$9.75	$9.11	$0.00	$75.76
	6/1/2028	$47.50	$10.90	$9.75	$9.11	$0.00	$77.26
	12/1/2028	$49.00	$10.90	$9.75	$9.11	$0.00	$78.76
For apprentice rates see "Apprentice- LABORER"							
LABORER: CEMENT FINISHER TENDER	6/1/2026	$41.66	$10.90	$9.75	$9.11	$0.00	$71.42
LABORERS	12/1/2026	$43.10	$10.90	$9.75	$9.11	$0.00	$72.86
LABORERS - ZONE 2	6/1/2027	$44.55	$10.90	$9.75	$9.11	$0.00	$74.31
	12/1/2027	$46.00	$10.90	$9.75	$9.11	$0.00	$75.76
	6/1/2028	$47.50	$10.90	$9.75	$9.11	$0.00	$77.26
	12/1/2028	$49.00	$10.90	$9.75	$9.11	$0.00	$78.76
For apprentice rates see "Apprentice- LABORER"							
LABORER: HAZARDOUS WASTE/ASBESTOS REMOVER	6/1/2026	$41.75	$10.90	$9.75	$9.65	$0.00	$72.05
LABORERS	12/7/2026	$43.19	$10.90	$9.75	$9.65	$0.00	$73.49
LABORERS - ZONE 2	6/7/2027	$44.64	$10.90	$9.75	$9.65	$0.00	$74.94
	12/6/2027	$46.09	$10.90	$9.75	$9.65	$0.00	$76.39
	6/5/2028	$47.59	$10.90	$9.75	$9.65	$0.00	$77.89
	12/4/2028	$49.09	$10.90	$9.75	$9.65	$0.00	$79.39

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- LABORER"							
LABORER: MASON TENDER LABORERS LABORERS - ZONE 2	6/1/2026	$41.91	$10.90	$9.75	$9.11	$0.00	$71.67
	12/1/2026	$43.35	$10.90	$9.75	$9.11	$0.00	$73.11
	6/1/2027	$44.80	$10.90	$9.75	$9.11	$0.00	$74.56
	12/1/2027	$46.25	$10.90	$9.75	$9.11	$0.00	$76.01
	6/1/2028	$47.75	$10.90	$9.75	$9.11	$0.00	$77.51
	12/1/2028	$49.25	$10.90	$9.75	$9.11	$0.00	$79.01
For apprentice rates see "Apprentice- LABORER"							
LABORER: MASON TENDER (HEAVY & HIGHWAY) LABORERS LABORERS - ZONE 2 (HEAVY & HIGHWAY)	6/1/2026	$41.91	$10.90	$9.75	$9.21	$0.00	$71.77
	12/1/2026	$43.35	$10.90	$9.75	$9.21	$0.00	$73.21
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"							
LABORER: MULTI-TRADE TENDER LABORERS LABORERS - ZONE 2	6/1/2026	$41.66	$10.90	$9.75	$9.11	$0.00	$71.42
	12/1/2026	$43.10	$10.90	$9.75	$9.11	$0.00	$72.86
	6/1/2027	$44.55	$10.90	$9.75	$9.11	$0.00	$74.31
	12/1/2027	$46.00	$10.90	$9.75	$9.11	$0.00	$75.76
	6/1/2028	$47.50	$10.90	$9.75	$9.11	$0.00	$77.26
	12/1/2028	$49.00	$10.90	$9.75	$9.11	$0.00	$78.76
For apprentice rates see "Apprentice- LABORER"							
LABORER: TREE REMOVER LABORERS LABORERS - ZONE 2	6/1/2026	$41.66	$10.90	$9.75	$9.11	$0.00	$71.42
	12/1/2026	$43.10	$10.90	$9.75	$9.11	$0.00	$72.86
	6/1/2027	$44.55	$10.90	$9.75	$9.11	$0.00	$74.31
	12/1/2027	$46.00	$10.90	$9.75	$9.11	$0.00	$75.76
	6/1/2028	$47.50	$10.90	$9.75	$9.11	$0.00	$77.26
	12/1/2028	$49.00	$10.90	$9.75	$9.11	$0.00	$78.76
This classification applies to the removal of standing trees, and the trimming and removal of branches and limbs when related to public works construction or site clearance incidental to construction . For apprentice rates see "Apprentice- LABORER"							
LASER BEAM OPERATOR LABORERS LABORERS - ZONE 2	6/1/2026	$41.91	$10.90	$9.75	$9.11	$0.00	$71.67
	12/1/2026	$43.35	$10.90	$9.75	$9.11	$0.00	$73.11
	6/1/2027	$44.80	$10.90	$9.75	$9.11	$0.00	$74.56
	12/1/2027	$46.25	$10.90	$9.75	$9.11	$0.00	$76.01
	6/1/2028	$47.75	$10.90	$9.75	$9.11	$0.00	$77.51
	12/1/2028	$49.25	$10.90	$9.75	$9.11	$0.00	$79.01
For apprentice rates see "Apprentice- LABORER"							
LASER BEAM OPERATOR (HEAVY & HIGHWAY) LABORERS LABORERS - ZONE 2 (HEAVY & HIGHWAY)	6/1/2026	$41.91	$10.90	$9.75	$9.21	$0.00	$71.77
	12/1/2026	$43.35	$10.90	$9.75	$9.21	$0.00	$73.21
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"							
MARBLE & TILE FINISHERS BRICKLAYERS LOCAL 3 BRICKLAYERS LOCAL 3 - MARBLE & TILE	8/1/2026	$53.84	$12.84	$15.57	$5.78	$0.00	$88.03
	2/1/2027	$54.96	$12.84	$15.57	$5.78	$0.00	$89.15

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate

Apprentice: MARBLE & TILE FINISHERS

Effective Date: 8/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$26.92	$12.84	$15.57	$5.78	$0.00	$61.11
2	60.00	$32.30	$12.84	$15.57	$5.78	$0.00	$66.49
3	70.00	$37.69	$12.84	$15.57	$5.78	$0.00	$71.88
4	80.00	$43.07	$12.84	$15.57	$5.78	$0.00	$77.26
5	90.00	$48.46	$12.84	$15.57	$5.78	$0.00	$82.65

Apprentice: MARBLE & TILE FINISHERS

Effective Date: 2/1/2027

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$27.48	$12.84	$15.57	$5.78	$0.00	$61.67
2	60.00	$32.98	$12.84	$15.57	$5.78	$0.00	$67.17
3	70.00	$38.47	$12.84	$15.57	$5.78	$0.00	$72.66
4	80.00	$43.97	$12.84	$15.57	$5.78	$0.00	$78.16
5	90.00	$49.46	$12.84	$15.57	$5.78	$0.00	$83.65

Apprentice to Journeyworker Ratio: 1:5

MARBLE MASONS,TILELAYERS & TERRAZZO MECH BRICKLAYERS LOCAL 3 BRICKLAYERS LOCAL 3 - MARBLE & TILE	8/1/2026	$70.17	$12.84	$15.57	$7.99	$0.00	$106.57
	2/1/2027	$71.57	$12.84	$15.57	$7.99	$0.00	$107.97

Apprentice: MARBLE MASONS,TILELAYERS & TERRAZZO MECH

Effective Date: 8/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$35.09	$12.84	$15.57	$7.99	$0.00	$71.49
2	60.00	$42.10	$12.84	$15.57	$7.99	$0.00	$78.50
3	70.00	$49.12	$12.84	$15.57	$7.99	$0.00	$85.52
4	80.00	$56.14	$12.84	$15.57	$7.99	$0.00	$92.54
5	90.00	$63.15	$12.84	$15.57	$7.99	$0.00	$99.55

Apprentice: MARBLE MASONS,TILELAYERS & TERRAZZO MECH

Effective Date: 2/1/2027

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$35.79	$12.84	$15.57	$7.99	$0.00	$72.19
2	60.00	$42.94	$12.84	$15.57	$7.99	$0.00	$79.34
3	70.00	$50.10	$12.84	$15.57	$7.99	$0.00	$86.50
4	80.00	$57.26	$12.84	$15.57	$7.99	$0.00	$93.66
5	90.00	$64.41	$12.84	$15.57	$7.99	$0.00	$100.81

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
Apprentice to Journeyworker Ratio: 1:5							
MECH. SWEEPER OPERATOR (ON CONST. SITES) OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS LOCAL 4	6/1/2026	$58.70	$17.05	$13.35	$3.25	$0.00	$92.35
	12/1/2026	$60.14	$17.05	$13.35	$3.25	$0.00	$93.79
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
MECHANICS MAINTENANCE OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS LOCAL 4	6/1/2026	$58.70	$17.05	$13.35	$3.25	$0.00	$92.35
	12/1/2026	$60.14	$17.05	$13.35	$3.25	$0.00	$93.79
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
MILLWRIGHT (Zone 2) MILLWRIGHTS LOCAL 1121 MILLWRIGHTS LOCAL 1121 - Zone 2	1/5/2026	$46.86	$10.58	$11.47	$10.00	$0.00	$78.91

Apprentice: MILLWRIGHT (Zone 2)

Effective Date: 1/5/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	55.00	$25.77	$10.58	$0.00	$5.50	$0.00	$41.85
2	65.00	$30.46	$10.58	$0.00	$6.50	$0.00	$47.54
3	75.00	$35.15	$10.58	$11.47	$7.50	$0.00	$64.70
4	85.00	$39.83	$10.58	$11.47	$8.50	$0.00	$70.38

Apprentice Notes

Step 1&2 Appr. indentured after 1/6/2020 receive no pension,

Apprentice to Journeyworker Ratio: 1:4							
MORTAR MIXER LABORERS LABORERS - ZONE 2	6/1/2026	$41.91	$10.90	$9.75	$9.11	$0.00	$71.67
	12/1/2026	$43.35	$10.90	$9.75	$9.11	$0.00	$73.11
	6/1/2027	$44.80	$10.90	$9.75	$9.11	$0.00	$74.56
	12/1/2027	$46.25	$10.90	$9.75	$9.11	$0.00	$76.01
	6/1/2028	$47.75	$10.90	$9.75	$9.11	$0.00	$77.51
	12/1/2028	$49.25	$10.90	$9.75	$9.11	$0.00	$79.01
For apprentice rates see "Apprentice- LABORER"							
OILER (OTHER THAN TRUCK CRANES,GRADALLS) OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS LOCAL 4	6/1/2026	$25.07	$17.05	$13.35	$3.25	$0.00	$58.72
	12/1/2026	$25.74	$17.05	$13.35	$3.25	$0.00	$59.39
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
OILER (TRUCK CRANES, GRADALLS) OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS LOCAL 4	6/1/2026	$31.17	$17.05	$13.35	$3.25	$0.00	$64.82
	12/1/2026	$31.97	$17.05	$13.35	$3.25	$0.00	$65.62
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
OTHER POWER DRIVEN EQUIPMENT - CLASS II OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS LOCAL 4	6/1/2026	$58.70	$17.05	$13.35	$3.25	$0.00	$92.35
	12/1/2026	$60.14	$17.05	$13.35	$3.25	$0.00	$93.79

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
PAINTER (BRIDGES/TANKS) PAINTERS LOCAL 35 PAINTERS LOCAL 35 - ZONE 2	1/1/2026	$59.56	$10.35	$12.00	$12.50	$0.00	$94.41

Apprentice: PAINTER (BRIDGES/TANKS)

Effective Date: 1/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$29.78	$10.35	$0.00	$0.00	$0.00	$40.13
2	55.00	$32.76	$10.35	$0.00	$6.93	$0.00	$50.04
3	60.00	$35.74	$10.35	$0.00	$7.56	$0.00	$53.65
4	65.00	$38.71	$10.35	$0.00	$8.19	$0.00	$57.25
5	70.00	$41.69	$10.35	$12.00	$8.82	$0.00	$72.86
6	75.00	$44.67	$10.35	$12.00	$9.45	$0.00	$76.47
7	80.00	$47.65	$10.35	$12.00	$10.08	$0.00	$80.08
8	90.00	$53.60	$10.35	$12.00	$11.34	$0.00	$87.29

Apprentice to Journeyworker Ratio: 1:1

PAINTER (SPRAY OR SANDBLAST, NEW) * * If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used. PAINTERS LOCAL 35 PAINTERS LOCAL 35 - ZONE 2	1/1/2026	$50.46	$10.35	$12.00	$12.60	$0.00	$85.41

Apprentice: PAINTER (SPRAY OR SANDBLAST, NEW) *

Effective Date: 1/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$25.23	$10.35	$0.00	$0.00	$0.00	$35.58
2	55.00	$27.75	$10.35	$0.00	$6.93	$0.00	$45.03
3	60.00	$30.28	$10.35	$0.00	$7.56	$0.00	$48.19
4	65.00	$32.80	$10.35	$0.00	$8.19	$0.00	$51.34
5	70.00	$35.32	$10.35	$12.00	$8.82	$0.00	$66.49
6	75.00	$37.85	$10.35	$12.00	$9.45	$0.00	$69.65
7	80.00	$40.37	$10.35	$12.00	$10.08	$0.00	$72.80
8	90.00	$45.41	$10.35	$12.00	$11.34	$0.00	$79.10

Apprentice to Journeyworker Ratio: 1:1

PAINTER (SPRAY OR SANDBLAST, REPAINT) PAINTERS LOCAL 35 PAINTERS LOCAL 35 - ZONE 2	1/1/2026	$48.52	$10.35	$12.00	$12.60	$0.00	$83.47

Apprentice: PAINTER (SPRAY OR SANDBLAST, REPAINT)

Effective Date: 1/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate

Apprentice: PAINTER (SPRAY OR SANDBLAST, REPAINT)

Effective Date: 1/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$24.26	$10.35	$0.00	$0.00	$0.00	$34.61
2	55.00	$26.69	$10.35	$0.00	$6.93	$0.00	$43.97
3	60.00	$29.11	$10.35	$0.00	$7.56	$0.00	$47.02
4	65.00	$31.54	$10.35	$0.00	$8.19	$0.00	$50.08
5	70.00	$33.96	$10.35	$12.00	$8.82	$0.00	$65.13
6	75.00	$36.39	$10.35	$12.00	$9.45	$0.00	$68.19
7	80.00	$38.82	$10.35	$12.00	$10.08	$0.00	$71.25
8	90.00	$43.67	$10.35	$12.00	$11.34	$0.00	$77.36

Apprentice to Journeyworker Ratio: 1:1

PAINTER / TAPER (BRUSH, NEW) *	1/1/2026	$49.06	$10.35	$12.00	$12.60	$0.00	$84.01

* If 30% or more of surfaces to be painted are new construction,
NEW paint rate shall be used.
PAINTERS LOCAL 35
PAINTERS LOCAL 35 - ZONE 2

Apprentice: PAINTER / TAPER (BRUSH, NEW) *

Effective Date: 1/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$24.53	$10.35	$0.00	$0.00	$0.00	$34.88
2	55.00	$26.98	$10.35	$0.00	$6.93	$0.00	$44.26
3	60.00	$29.44	$10.35	$0.00	$7.56	$0.00	$47.35
4	65.00	$31.89	$10.35	$0.00	$8.19	$0.00	$50.43
5	70.00	$34.34	$10.35	$12.00	$8.82	$0.00	$65.51
6	75.00	$36.80	$10.35	$12.00	$9.45	$0.00	$68.60
7	80.00	$39.25	$10.35	$12.00	$10.08	$0.00	$71.68
8	90.00	$44.15	$10.35	$12.00	$11.34	$0.00	$77.84

Apprentice to Journeyworker Ratio: 1:1

PAINTER / TAPER (BRUSH, REPAINT)	1/1/2026	$47.12	$10.35	$12.00	$12.60	$0.00	$82.07

PAINTERS LOCAL 35
PAINTERS LOCAL 35 - ZONE 2

Apprentice: PAINTER / TAPER (BRUSH, REPAINT)

Effective Date: 1/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$23.56	$10.35	$0.00	$0.00	$0.00	$33.91
2	55.00	$25.92	$10.35	$0.00	$6.93	$0.00	$43.20
3	60.00	$28.27	$10.35	$0.00	$7.56	$0.00	$46.18
4	65.00	$30.63	$10.35	$0.00	$8.19	$0.00	$49.17

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
Apprentice: PAINTER / TAPER (BRUSH, REPAINT)							
Effective Date: 1/1/2026							
Step / Percent		**Apprentice Base Wage**					
5 / 70.00		$32.98	$10.35	$12.00	$8.82	$0.00	$64.15
6 / 75.00		$35.34	$10.35	$12.00	$9.45	$0.00	$67.14
7 / 80.00		$37.70	$10.35	$12.00	$10.08	$0.00	$70.13
8 / 90.00		$42.41	$10.35	$12.00	$11.34	$0.00	$76.10
Apprentice to Journeyworker Ratio: 1:1							
PAINTER TRAFFIC MARKINGS (HEAVY/HIGHWAY) LABORERS LABORERS - ZONE 2 (HEAVY & HIGHWAY)	6/1/2026	$41.66	$10.90	$9.75	$9.21	$0.00	$71.52
	12/1/2026	$43.10	$10.90	$9.75	$9.21	$0.00	$72.96
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)							
PANEL & PICKUP TRUCKS DRIVER TEAMSTERS JOINT COUNCIL NO. 10 TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	6/1/2026	$41.78	$16.17	$21.78	$0.00	$0.00	$79.73
	12/1/2026	$41.78	$16.17	$23.52	$0.00	$0.00	$81.47
	1/1/2027	$41.78	$16.77	$23.52	$0.00	$0.00	$82.07
PIER AND DOCK CONSTRUCTOR (UNDERPINNING AND DECK) PILE DRIVER LOCAL 56 PILE DRIVER LOCAL 56 (ZONE 1)	8/1/2024	$55.79	$10.08	$11.62	$12.67	$0.00	$90.16
For apprentice rates see "Apprentice- PILE DRIVER"							
PILE DRIVER PILE DRIVER LOCAL 56 PILE DRIVER LOCAL 56 (ZONE 1)	8/1/2024	$55.79	$10.08	$11.62	$12.67	$0.00	$90.16
Apprentice: PILE DRIVER							
Effective Date: 8/1/2024							
Step / Percent		**Apprentice Base Wage**					
1 / 45.00		$25.11	$10.08	$0.00	$2.53	$0.00	$37.72
2 / 55.00		$30.68	$10.08	$0.00	$5.07	$0.00	$45.83
3 / 70.00		$39.05	$10.08	$11.62	$7.60	$0.00	$68.35
4 / 80.00		$44.63	$10.08	$11.62	$10.14	$0.00	$76.47
Apprentice to Journeyworker Ratio: 1:5							
PIPELAYER LABORERS LABORERS - ZONE 2	6/1/2026	$41.91	$10.90	$9.75	$9.11	$0.00	$71.67
	12/1/2026	$43.35	$10.90	$9.75	$9.11	$0.00	$73.11
	6/1/2027	$44.80	$10.90	$9.75	$9.11	$0.00	$74.56
	12/1/2027	$46.25	$10.90	$9.75	$9.11	$0.00	$76.01
	6/1/2028	$47.75	$10.90	$9.75	$9.11	$0.00	$77.51
	12/1/2028	$49.25	$10.90	$9.75	$9.11	$0.00	$79.01
For apprentice rates see "Apprentice- LABORER"							
PIPELAYER (HEAVY & HIGHWAY)	6/1/2026	$41.91	$10.90	$9.75	$9.21	$0.00	$71.77

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
LABORERS LABORERS - ZONE 2 (HEAVY & HIGHWAY)	12/1/2026	$43.35	$10.90	$9.75	$9.21	$0.00	$73.21
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)							
PLUMBER & PIPEFITTER PLUMBERS & PIPEFITTERS LOCAL 51 PLUMBERS & PIPEFITTERS LOCAL 51	8/25/2025	$55.24	$10.80	$16.80	$4.60	$0.00	$87.44

Apprentice: PLUMBER & PIPEFITTER

Effective Date: 8/25/2025

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	40.00	$22.10	$10.15	$2.50	$0.00	$0.00	$34.75
2	50.00	$27.62	$10.15	$2.50	$0.00	$0.00	$40.27
3	60.00	$33.14	$10.15	$8.40	$0.50	$0.00	$52.19
4	70.00	$38.67	$10.15	$13.44	$0.80	$0.00	$63.06
5	80.00	$44.19	$10.15	$16.80	$1.00	$0.00	$72.14

Apprentice to Journeyworker Ratio: 1:3

PNEUMATIC CONTROLS (TEMP.) PLUMBERS & PIPEFITTERS LOCAL 51 PLUMBERS & PIPEFITTERS LOCAL 51	8/25/2025	$55.24	$10.80	$16.80	$4.60	$0.00	$87.44
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"							
PNEUMATIC DRILL/TOOL OPERATOR LABORERS LABORERS - ZONE 2	6/1/2026	$41.91	$10.90	$9.75	$9.11	$0.00	$71.67
	12/1/2026	$43.35	$10.90	$9.75	$9.11	$0.00	$73.11
	6/1/2027	$44.80	$10.90	$9.75	$9.11	$0.00	$74.56
	12/1/2027	$46.25	$10.90	$9.75	$9.11	$0.00	$76.01
	6/1/2028	$47.75	$10.90	$9.75	$9.11	$0.00	$77.51
	12/1/2028	$49.25	$10.90	$9.75	$9.11	$0.00	$79.01
For apprentice rates see "Apprentice- LABORER"							
PNEUMATIC DRILL/TOOL OPERATOR (HEAVY & HIGHWAY) LABORERS LABORERS - ZONE 2 (HEAVY & HIGHWAY)	6/1/2026	$41.91	$10.90	$9.75	$9.21	$0.00	$71.77
	12/1/2026	$43.35	$10.90	$9.75	$9.21	$0.00	$73.21
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)							
POWDERMAN & BLASTER LABORERS LABORERS - ZONE 2	6/1/2026	$42.66	$10.90	$9.75	$9.11	$0.00	$72.42
	12/1/2026	$44.10	$10.90	$9.75	$9.11	$0.00	$73.86
	6/1/2027	$45.55	$10.90	$9.75	$9.11	$0.00	$75.31
	12/1/2027	$47.00	$10.90	$9.75	$9.11	$0.00	$76.76
	6/1/2028	$48.50	$10.90	$9.75	$9.11	$0.00	$78.26
	12/1/2028	$50.00	$10.90	$9.75	$9.11	$0.00	$79.76
For apprentice rates see "Apprentice- LABORER"							
POWDERMAN & BLASTER (HEAVY & HIGHWAY) LABORERS LABORERS - ZONE 2 (HEAVY & HIGHWAY)	6/1/2026	$42.66	$10.90	$9.75	$9.21	$0.00	$72.52
	12/1/2026	$44.10	$10.90	$9.75	$9.21	$0.00	$73.96
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)							

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
POWER SHOVEL/DERRICK/TRENCHING MACHINE	6/1/2026	$59.38	$17.05	$13.35	$3.25	$0.00	$93.03
OPERATING ENGINEERS LOCAL 4	12/1/2026	$60.83	$17.05	$13.35	$3.25	$0.00	$94.48
OPERATING ENGINEERS LOCAL 4							
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
PUMP OPERATOR (CONCRETE)	6/1/2026	$58.70	$17.05	$13.35	$3.25	$0.00	$92.35
OPERATING ENGINEERS LOCAL 4	12/1/2026	$60.14	$17.05	$13.35	$3.25	$0.00	$93.79
OPERATING ENGINEERS LOCAL 4							
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
PUMP OPERATOR (DEWATERING, OTHER)	6/1/2026	$37.63	$17.05	$13.35	$3.25	$0.00	$71.28
OPERATING ENGINEERS LOCAL 4	12/1/2026	$38.58	$17.05	$13.35	$3.25	$0.00	$72.23
OPERATING ENGINEERS LOCAL 4							
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
READY-MIX CONCRETE DRIVER	1/1/2025	$27.60	$11.26	$6.15	$0.00	$0.00	$45.01
TEAMSTERS 170							
TEAMSTERS 170 - Dauphinais (Bellingham)							
RECLAIMERS	6/1/2026	$58.70	$17.05	$13.35	$3.25	$0.00	$92.35
OPERATING ENGINEERS LOCAL 4	12/1/2026	$60.14	$17.05	$13.35	$3.25	$0.00	$93.79
OPERATING ENGINEERS LOCAL 4							
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
RIDE-ON MOTORIZED BUGGY OPERATOR	6/1/2026	$41.91	$10.90	$9.75	$9.11	$0.00	$71.67
LABORERS	12/1/2026	$43.35	$10.90	$9.75	$9.11	$0.00	$73.11
LABORERS - ZONE 2	6/1/2027	$44.80	$10.90	$9.75	$9.11	$0.00	$74.56
	12/1/2027	$46.25	$10.90	$9.75	$9.11	$0.00	$76.01
	6/1/2028	$47.75	$10.90	$9.75	$9.11	$0.00	$77.51
	12/1/2028	$49.25	$10.90	$9.75	$9.11	$0.00	$79.01
For apprentice rates see "Apprentice- LABORER"							
ROLLER/SPREADER/MULCHING MACHINE	6/1/2026	$58.70	$17.05	$13.35	$3.25	$0.00	$92.35
OPERATING ENGINEERS LOCAL 4	12/1/2026	$60.14	$17.05	$13.35	$3.25	$0.00	$93.79
OPERATING ENGINEERS LOCAL 4							
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
ROOFER (Inc.Roofer Waterproofng &Roofer Damproofg)	2/1/2026	$53.53	$14.53	$12.67	$9.03	$0.00	$89.76
ROOFERS LOCAL 33							
ROOFERS LOCAL 33							

Apprentice: ROOFER (Inc.Roofer Waterproofng &Roofer Damproofg)

Effective Date: 2/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$26.77	$14.53	$6.52	$9.03	$0.00	$56.85
2	60.00	$32.12	$14.53	$12.67	$9.03	$0.00	$68.35
3	65.00	$34.79	$14.53	$12.67	$9.03	$0.00	$71.02
4	75.00	$40.15	$14.53	$12.67	$9.03	$0.00	$76.38
5	85.00	$45.50	$14.53	$12.67	$9.03	$0.00	$81.73

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
Apprentice Notes ** 1:5, 2:6-10, the 1:10; Reroofing: 1:4, then 1:1							
Apprentice to Journeyworker Ratio: 1:5							
ROOFER SLATE / TILE / PRECAST CONCRETE ROOFERS LOCAL 33 ROOFERS LOCAL 33 For apprentice rates see "Apprentice- ROOFER"	2/1/2026	$53.78	$14.53	$12.67	$9.03	$0.00	$90.01
SHEETMETAL WORKER SHEETMETAL WORKERS LOCAL 17 SHEETMETAL WORKERS LOCAL 17 - A	2/1/2026	$62.93	$14.91	$18.74	$9.53	$2.98	$109.09

Apprentice: SHEETMETAL WORKER

Effective Date: 2/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	42.00	$26.43	$14.91	$6.19	$0.00	$0.00	$47.53
2	42.00	$26.43	$14.91	$6.19	$0.00	$0.00	$47.53
3	47.00	$29.58	$14.91	$10.93	$1.25	$1.62	$58.29
4	47.00	$29.58	$14.91	$10.93	$1.25	$1.62	$58.29
5	52.00	$32.72	$14.91	$11.66	$1.50	$1.74	$62.53
6	52.00	$32.72	$14.91	$11.66	$1.75	$1.75	$62.79
7	60.00	$37.76	$14.91	$12.84	$2.00	$1.93	$69.44
8	65.00	$40.90	$14.91	$13.58	$2.25	$2.04	$73.68
9	75.00	$47.20	$14.91	$15.06	$2.75	$2.28	$82.20
10	85.00	$53.49	$14.91	$16.53	$2.75	$2.49	$90.17

Apprentice to Journeyworker Ratio: 1:4							
SPECIALIZED EARTH MOVING EQUIP < 35 TONS TEAMSTERS JOINT COUNCIL NO. 10 TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	6/1/2026	$42.24	$16.17	$21.78	$0.00	$0.00	$80.19
	12/1/2026	$42.24	$16.17	$23.52	$0.00	$0.00	$81.93
	1/1/2027	$42.24	$16.77	$23.52	$0.00	$0.00	$82.53
SPECIALIZED EARTH MOVING EQUIP > 35 TONS TEAMSTERS JOINT COUNCIL NO. 10 TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	6/1/2026	$42.53	$16.17	$21.78	$0.00	$0.00	$80.48
	12/1/2026	$42.53	$16.17	$23.52	$0.00	$0.00	$82.22
	1/1/2027	$42.53	$16.77	$23.52	$0.00	$0.00	$82.82
SPRINKLER FITTER SPRINKLER FITTERS LOCAL 550 SPRINKLER FITTERS LOCAL 550 - (Section A) Zone 1	1/1/2026	$72.05	$13.45	$7.45	$18.25	$0.00	$111.20

Apprentice: SPRINKLER FITTER

Effective Date: 1/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	35.00	$25.22	$13.45	$13.84	$0.00	$0.00	$52.51

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
Apprentice: SPRINKLER FITTER							
Effective Date: 1/1/2026							
Step / Percent		**Apprentice Base Wage**					
2 / 40.00		$28.82	$13.45	$14.75	$0.00	$0.00	$57.02
3 / 45.00		$32.42	$13.45	$15.67	$0.00	$0.00	$61.54
4 / 50.00		$36.03	$13.45	$16.57	$0.00	$0.00	$66.05
5 / 55.00		$39.63	$13.45	$17.49	$0.00	$0.00	$70.57
6 / 60.00		$43.23	$13.45	$18.40	$0.00	$0.00	$75.08
7 / 65.00		$46.83	$13.45	$19.32	$0.00	$0.00	$79.60
8 / 70.00		$50.44	$13.45	$20.22	$0.00	$0.00	$84.11
9 / 75.00		$54.04	$13.45	$21.15	$0.00	$0.00	$88.64
10 / 80.00		$57.64	$13.45	$22.05	$0.00	$0.00	$93.14
Apprentice Notes							
Apprentice entered prior 9/30/10:							
Apprentice to Journeyworker Ratio: 1:3							
STEAM BOILER OPERATOR	6/1/2026	$58.70	$17.05	$13.35	$3.25	$0.00	$92.35
OPERATING ENGINEERS LOCAL 4	12/1/2026	$60.14	$17.05	$13.35	$3.25	$0.00	$93.79
OPERATING ENGINEERS LOCAL 4							
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
TAMPERS, SELF-PROPELLED OR TRACTOR DRAWN	6/1/2026	$58.70	$17.05	$13.35	$3.25	$0.00	$92.35
OPERATING ENGINEERS LOCAL 4	12/1/2026	$60.14	$17.05	$13.35	$3.25	$0.00	$93.79
OPERATING ENGINEERS LOCAL 4							
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
TELECOMMUNICATION TECHNICIAN	9/1/2025	$42.52	$12.00	$12.05	$3.25	$0.00	$69.82
TELECOMMUNICATION TECHNICIAN	9/1/2026	$44.41	$12.25	$12.59	$3.50	$0.00	$72.75
ELECTRICIANS LOCAL 223	9/1/2027	$46.51	$12.50	$13.18	$3.75	$0.00	$75.94
ELECTRICIANS LOCAL 223							
For apprentice rates and ratios see "Apprentice- ELECTRICIAN"							
TERRAZZO FINISHERS	8/1/2026	$69.09	$12.84	$15.57	$8.02	$0.00	$105.52
BRICKLAYERS LOCAL 3	2/1/2027	$70.49	$12.84	$15.57	$8.02	$0.00	$106.92
BRICKLAYERS LOCAL 3 - MARBLE & TILE							
Apprentice: TERRAZZO FINISHERS							
Effective Date: 8/1/2026							
Step / Percent		**Apprentice Base Wage**					
1 / 50.00		$34.55	$12.84	$15.57	$8.02	$0.00	$70.98
2 / 60.00		$41.45	$12.84	$15.57	$8.02	$0.00	$77.88
3 / 70.00		$48.36	$12.84	$15.57	$8.02	$0.00	$84.79
4 / 80.00		$55.27	$12.84	$15.57	$8.02	$0.00	$91.70
5 / 90.00		$62.18	$12.84	$15.57	$8.02	$0.00	$98.61

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
Apprentice: TERRAZZO FINISHERS							
Effective Date: 2/1/2027							
Step / Percent		**Apprentice Base Wage**	**Health**	**Pension**	**Annuity**	**Supplemental Unemployment**	**Total Rate**
1 / 50.00		$35.25	$12.84	$15.57	$8.02	$0.00	$71.68
2 / 60.00		$42.29	$12.84	$15.57	$8.02	$0.00	$78.72
3 / 70.00		$49.34	$12.84	$15.57	$8.02	$0.00	$85.77
4 / 80.00		$56.39	$12.84	$15.57	$8.02	$0.00	$92.82
5 / 90.00		$63.44	$12.84	$15.57	$8.02	$0.00	$99.87
Apprentice to Journeyworker Ratio: 1:5							
TEST BORING DRILLER	6/1/2026	$53.25	$10.90	$9.75	$9.80	$0.00	$83.70
LABORERS	12/1/2026	$54.75	$10.90	$9.75	$9.80	$0.00	$85.20
LABORERS - FOUNDATION AND MARINE							
For apprentice rates see "Apprentice- LABORER"							
TEST BORING DRILLER HELPER	6/1/2026	$49.37	$10.90	$9.75	$9.80	$0.00	$79.82
LABORERS	12/1/2026	$50.87	$10.90	$9.75	$9.80	$0.00	$81.32
LABORERS - FOUNDATION AND MARINE							
For apprentice rates see "Apprentice- LABORER"							
TEST BORING LABORER	6/1/2026	$49.25	$10.90	$9.75	$9.80	$0.00	$79.70
LABORERS	12/1/2026	$50.75	$10.90	$9.75	$9.80	$0.00	$81.20
LABORERS - FOUNDATION AND MARINE							
For apprentice rates see "Apprentice- LABORER"							
TRACTORS/PORTABLE STEAM GENERATORS	6/1/2026	$58.70	$17.05	$13.35	$3.25	$0.00	$92.35
OPERATING ENGINEERS LOCAL 4	12/1/2026	$60.14	$17.05	$13.35	$3.25	$0.00	$93.79
OPERATING ENGINEERS LOCAL 4							
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
TRAILERS FOR EARTH MOVING EQUIPMENT	6/1/2026	$42.82	$16.17	$21.78	$0.00	$0.00	$80.77
TEAMSTERS JOINT COUNCIL NO. 10	12/1/2026	$42.82	$16.17	$23.52	$0.00	$0.00	$82.51
TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	1/1/2027	$42.82	$16.77	$23.52	$0.00	$0.00	$83.11
TUNNEL WORK - COMPRESSED AIR	6/1/2026	$61.48	$10.90	$9.75	$10.25	$0.00	$92.38
LABORERS	12/1/2026	$62.98	$10.90	$9.75	$10.25	$0.00	$93.88
LABORERS (COMPRESSED AIR)							
For apprentice rates see "Apprentice- LABORER"							
TUNNEL WORK - COMPRESSED AIR (HAZ. WASTE)	6/1/2026	$63.48	$10.90	$9.75	$10.25	$0.00	$94.38
LABORERS	12/1/2026	$64.98	$10.90	$9.75	$10.25	$0.00	$95.88
LABORERS (COMPRESSED AIR)							
For apprentice rates see "Apprentice- LABORER"							
TUNNEL WORK - FREE AIR	6/1/2026	$53.55	$10.90	$9.75	$10.25	$0.00	$84.45
LABORERS	12/1/2026	$55.05	$10.90	$9.75	$10.25	$0.00	$85.95
LABORERS (FREE AIR TUNNEL)							
For apprentice rates see "Apprentice- LABORER"							

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
TUNNEL WORK - FREE AIR (HAZ. WASTE) LABORERS LABORERS (FREE AIR TUNNEL)	6/1/2026	$55.55	$10.90	$9.75	$10.25	$0.00	$86.45
	12/1/2026	$57.05	$10.90	$9.75	$10.25	$0.00	$87.95
For apprentice rates see "Apprentice- LABORER"							
VAC-HAUL TEAMSTERS JOINT COUNCIL NO. 10 TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	6/1/2026	$42.24	$16.17	$21.78	$0.00	$0.00	$80.19
	12/1/2026	$42.24	$16.17	$23.52	$0.00	$0.00	$81.93
	1/1/2027	$42.24	$16.77	$23.52	$0.00	$0.00	$82.53
WAGON DRILL OPERATOR LABORERS LABORERS - ZONE 2	6/1/2026	$41.91	$10.90	$9.75	$9.11	$0.00	$71.67
	12/1/2026	$43.35	$10.90	$9.75	$9.11	$0.00	$73.11
	6/1/2027	$44.80	$10.90	$9.75	$9.11	$0.00	$74.56
	12/1/2027	$46.25	$10.90	$9.75	$9.11	$0.00	$76.01
	6/1/2028	$47.75	$10.90	$9.75	$9.11	$0.00	$77.51
	12/1/2028	$49.25	$10.90	$9.75	$9.11	$0.00	$79.01
For apprentice rates see "Apprentice- LABORER"							
WAGON DRILL OPERATOR (HEAVY & HIGHWAY) LABORERS LABORERS - ZONE 2 (HEAVY & HIGHWAY)	6/1/2026	$41.91	$10.90	$9.75	$9.21	$0.00	$71.77
	12/1/2026	$43.35	$10.90	$9.75	$9.21	$0.00	$73.21
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"							
WASTE WATER PUMP OPERATOR OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS LOCAL 4	6/1/2026	$59.38	$17.05	$13.35	$3.25	$0.00	$93.03
	12/1/2026	$60.83	$17.05	$13.35	$3.25	$0.00	$94.48
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
WATER METER INSTALLER PLUMBERS & PIPEFITTERS LOCAL 51 PLUMBERS & PIPEFITTERS LOCAL 51	8/25/2025	$55.24	$10.80	$16.80	$4.60	$0.00	$87.44
For apprentice rates see "Apprentice- PLUMBER/PIPEFITTER" or "PLUMBER/GASFITTER"							

Marine Drilling

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
BLASTER MARINE DRILLING MARINE DRILLING	1/1/2018	$41.82	$7.63	$2.35	$1.25	$0.00	$53.05
BOAT CAPTAIN MARINE DRILLING MARINE DRILLING	1/1/2018	$33.87	$7.63	$2.35	$0.95	$0.00	$44.80
BOAT CAPTAIN / Over 1,000 hp MARINE DRILLING MARINE DRILLING	1/1/2018	$38.06	$7.63	$2.35	$1.25	$0.00	$49.29
CORE DRILLER MARINE DRILLING MARINE DRILLING	1/1/2018	$31.43	$7.63	$2.25	$0.65	$0.00	$41.96
CORE DRILLER HELPER MARINE DRILLING MARINE DRILLING	1/1/2018	$28.47	$7.63	$2.35	$0.65	$0.00	$39.10
DRILLER MARINE DRILLING MARINE DRILLING	1/1/2018	$39.70	$7.63	$2.35	$1.25	$0.00	$50.93
ENGINEER MARINE DRILLING MARINE DRILLING	1/1/2018	$39.69	$7.63	$2.25	$1.25	$0.00	$50.82
HELPER MARINE DRILLING MARINE DRILLING	1/1/2018	$34.24	$7.63	$2.35	$0.65	$0.00	$44.87
MACHINIST MARINE DRILLING MARINE DRILLING	1/1/2018	$38.88	$7.63	$2.35	$0.95	$0.00	$49.81
OILER - MARINE DRILLING MARINE DRILLING MARINE DRILLING	1/1/2018	$34.24	$7.63	$2.35	$0.65	$0.00	$44.87
TUG DECKHAND MARINE DRILLING MARINE DRILLING	1/1/2018	$27.61	$7.63	$2.35	$0.65	$0.00	$38.24
WELDER MARINE DRILLING MARINE DRILLING	1/1/2018	$38.88	$7.63	$2.35	$0.95	$0.00	$49.81

Op Eng Marine (Dredging Work)

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
BOAT OPERATOR OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS - MARINE DIVISION	10/1/2017	$29.26	$7.63	$2.35	$0.95	$0.00	$40.19
CERTIFIED WELDER OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS - MARINE DIVISION	10/1/2017	$31.09	$7.63	$2.35	$1.25	$0.00	$42.32
CHIEF WELDER/ CHIEF MATE OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS - MARINE DIVISION	10/1/2017	$33.02	$7.63	$2.35	$1.25	$0.00	$44.25
DERRICK / SPIDER / SPILLBARGE OPERATOR OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS - MARINE DIVISION	10/1/2017	$33.02	$7.63	$2.35	$1.25	$0.00	$44.25
DRAG BARGE OPERATOR / WELDER / MATE OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS - MARINE DIVISION	10/1/2017	$30.24	$7.63	$2.35	$0.95	$0.00	$41.17
ENGINEER / ELECTRICIAN OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS - MARINE DIVISION	10/1/2017	$33.02	$7.63	$2.35	$1.25	$0.00	$44.25
LICENSED BOAT OPERATOR OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS - MARINE DIVISION	10/1/2017	$33.02	$7.63	$2.35	$1.25	$0.00	$44.25
LICENSED TUG OPERATOR OVER 1000HP OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS - MARINE DIVISION	10/1/2017	$38.18	$7.63	$2.35	$1.25	$0.00	$49.41
MAINTENANCE ENGINEER OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS - MARINE DIVISION	10/1/2017	$33.03	$7.63	$2.35	$1.25	$0.00	$44.26
OILER - MARINE DIVISION OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS - MARINE DIVISION	10/1/2017	$24.30	$7.63	$2.35	$0.65	$0.00	$34.93
OPERATOR / LEVERMAN OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS - MARINE DIVISION	10/1/2017	$38.18	$7.63	$2.35	$1.25	$0.00	$49.41
RODMAN / SCOWMAN OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS - MARINE DIVISION	10/1/2017	$24.30	$7.63	$2.35	$0.65	$0.00	$34.93
SHOREMAN / DECKHAND OPERATING ENGINEERS LOCAL 4 OPERATING ENGINEERS - MARINE DIVISION	10/1/2017	$24.30	$7.63	$2.35	$0.65	$0.00	$34.93

Outside Electrical

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
CABLE TECHNICIAN (Power Zone)	8/31/2025	$36.55	$10.75	$1.10	$1.00	$0.00	$49.40
OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	8/30/2026	$38.13	$11.00	$1.14	$1.00	$0.00	$51.27
OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	8/29/2027	$39.65	$11.25	$1.19	$1.00	$0.00	$53.09
For apprentice rates see "Apprentice- LINEMAN"							
CABLEMAN (Underground Ducts & Cables)	8/31/2025	$51.78	$10.75	$1.55	$10.71	$0.00	$74.79
OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	8/30/2026	$54.02	$11.00	$1.62	$11.14	$0.00	$77.78
OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	8/29/2027	$56.17	$11.25	$1.69	$11.57	$0.00	$80.68
For apprentice rates see "Apprentice- LINEMAN"							
DRIVER / GROUNDMAN CDL	8/31/2025	$42.64	$10.75	$1.28	$10.45	$0.00	$65.12
OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	8/30/2026	$44.49	$11.00	$1.33	$10.80	$0.00	$67.62
OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	8/29/2027	$46.26	$11.25	$1.39	$11.15	$0.00	$70.05
For apprentice rates see "Apprentice- LINEMAN"							
DRIVER / GROUNDMAN -Inexperienced (<2000 Hrs)	8/31/2025	$33.51	$10.75	$1.01	$1.00	$0.00	$46.27
OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	8/30/2026	$34.95	$11.00	$1.05	$1.00	$0.00	$48.00
OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	8/29/2027	$36.64	$11.25	$1.09	$1.00	$0.00	$49.98
For apprentice rates see "Apprentice- LINEMAN"							
EQUIPMENT OPERATOR (Class A CDL)	8/31/2025	$51.78	$10.75	$1.55	$14.79	$0.00	$78.87
OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	8/30/2026	$54.02	$11.00	$1.62	$15.22	$0.00	$81.86
OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	8/29/2027	$56.17	$11.25	$1.69	$15.65	$0.00	$84.76
For apprentice rates see "Apprentice- LINEMAN"							
EQUIPMENT OPERATOR (Class B CDL)	8/31/2025	$45.69	$10.75	$1.37	$11.27	$0.00	$69.08
OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	8/30/2026	$47.66	$11.00	$1.43	$11.65	$0.00	$71.74
OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	8/29/2027	$49.56	$11.25	$1.49	$12.03	$0.00	$74.33
For apprentice rates see "Apprentice- LINEMAN"							
GROUNDMAN	8/31/2025	$33.51	$10.75	$1.01	$1.00	$0.00	$46.27
OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	8/30/2026	$34.95	$11.00	$1.05	$1.00	$0.00	$48.00
OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	8/29/2027	$36.34	$11.25	$1.09	$1.00	$0.00	$49.68
For apprentice rates see "Apprentice- LINEMAN"							
GROUNDMAN -Inexperienced (<2000 Hrs.)	8/31/2025	$27.41	$10.75	$0.82	$1.00	$0.00	$39.98
OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	8/30/2026	$28.60	$11.00	$0.86	$1.00	$0.00	$41.46
OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	8/29/2027	$29.74	$11.25	$0.89	$1.00	$0.00	$42.88
For apprentice rates see "Apprentice- LINEMAN"							
JOURNEYMAN LINEMAN	8/31/2025	$60.92	$10.75	$1.83	$18.00	$0.00	$91.50
OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	8/30/2026	$63.55	$11.00	$1.91	$18.50	$0.00	$94.96
OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	8/29/2027	$66.08	$11.25	$1.98	$19.00	$0.00	$98.31

Apprentice: JOURNEYMAN LINEMAN

Effective Date: 8/31/2025

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate

Outside Electrical

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate

Apprentice: JOURNEYMAN LINEMAN

Effective Date: 8/31/2025

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	60.00	$36.55	$10.75	$1.10	$2.50	$0.00	$50.90
2	65.00	$39.60	$10.75	$1.19	$2.50	$0.00	$54.04
3	70.00	$42.64	$10.75	$1.28	$2.50	$0.00	$57.17
4	75.00	$45.69	$10.75	$1.37	$4.00	$0.00	$61.81
5	80.00	$48.74	$10.75	$1.46	$4.00	$0.00	$64.95
6	85.00	$51.78	$10.75	$1.55	$4.00	$0.00	$68.08
7	90.00	$54.83	$10.75	$1.64	$6.00	$0.00	$73.22

Apprentice: JOURNEYMAN LINEMAN

Effective Date: 8/30/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	60.00	$38.13	$11.00	$1.14	$2.50	$0.00	$52.77
2	65.00	$41.31	$11.00	$1.24	$2.50	$0.00	$56.05
3	70.00	$44.49	$11.00	$1.33	$2.50	$0.00	$59.32
4	75.00	$47.66	$11.00	$1.43	$4.00	$0.00	$64.09
5	80.00	$50.84	$11.00	$1.53	$4.00	$0.00	$67.37
6	85.00	$54.02	$11.00	$1.62	$4.00	$0.00	$70.64
7	90.00	$57.20	$11.00	$1.72	$6.00	$0.00	$75.92

Apprentice to Journeyworker Ratio: 1:2

TELEDATA CABLE SPLICER OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104 OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	2/4/2019	$30.73	$4.70	$0.92	$2.25	$0.00	$38.60
TELEDATA LINEMAN/EQUIPMENT OPERATOR OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104 OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	2/4/2019	$28.93	$4.70	$0.89	$2.25	$0.00	$36.77
TELEDATA WIREMAN/INSTALLER/TECHNICIAN OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104 OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	2/4/2019	$28.93	$4.70	$0.89	$2.25	$0.00	$36.77

Additional Apprentice Information

All apprentices must be registered with the Division of Apprenticeship Training(DAS) in accordance with M.G.L.c. 23, §§ 11E-11L. Minimum wage rates for apprentices employed on public works projects are listed above as a percentage of the hourly prevailing wage rate established by the Commissioner under the provisions of M.G.L.c. 149, §§ 26-27D.

Apprentice ratios are established by DAS pursuant to M.G.L.c. 23, §§ 11E-11L. Ratios are expressed as the allowable number of apprentices to journeymen or fraction thereof, unless otherwise specified. The ratios listed herein have been taken from relevant private collective bargaining agreements(CBAs) and are provided for illustrative purposes only. They have not been independently verified as being accurate or continuing to be accurate.

Parties having questions regarding what ratio to use should contact DAS.

DOCUMENT 00870

STANDARD FEDERAL EQUAL EMPLOYMENT OPPORTUNITY CONSTRUCTION CONTRACT SPECIFICATIONS
(EXECUTIVE ORDER 11246)
Revised April 9, 2019

1. As used in these specifications:

   a. "Covered area" means the geographical area described in the solicitation from which this contract resulted:

   b. "Director" means Director, Office of Federal Contract Compliance Programs, United States Department of Labor, or any person to whom the Director delegates authority.

   c. "Employer identification number" means the Federal Social Security number used on the Employer's Quarterly Federal Tax Return, U.S. Treasury Department Form 941.

   d. "Minority" includes:

      (i) Black (all persons having origins in any of the black African racial groups not of Hispanic origin);
      (ii) Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American or other Spanish Culture or origin, regardless of race);
      (iii) Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands); and
      (iv) American Indian or Alaskan Native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).

2. Whenever the Contractor, or any Subcontractor at any tier, subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of $ 10,000 the provisions of the specifications and the Notice which contains the applicable goals for minority and female participation and which is set forth in the solicitations from which this contract resulted.

3. If the Contractor is participating (pursuant to 41 CFR 60-4.5) in a Hometown Plan approved by the U.S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the Plan area (including goals and timetables) shall be in accordance with that Plan for those trades which have unions participating in the Plan. Contractors must be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each Contractor or Subcontractor participating in an approved Plan is individually required to comply with its obligations under the EEO clause, and to make a good faith effort to achieve each goal under the plan in each trade in which it has employees. The overall good faith performance by other Contractors or Subcontractors toward a goal in an approved Plan does not excuse any covered Contractor's or Subcontractor's failure to take good faith efforts to achieve the Plan goals and timetables.

4. The Contractor shall implement the specific affirmative action standards provided in Paragraphs 7a through p of these specifications. The goals set forth in the solicitation from which this contract resulted are expressed as percentages of the total hours of employment and training of minority and female utilization the Contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. The Contractor is expected to make substantially uniform progress toward its goals in each craft during the period specified.

5. Neither the provisions of any collective bargaining agreement, nor the failure by a union with whom the Contractor has a collective bargaining agreement, to refer either minorities or women shall excuse the Contractor's obligations under these specifications, Executive Order 11246, or the regulations promulgated pursuant thereto.

6. In order for the nonworking training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees must be employed by the Contractor during the training period, and the Contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U.S. Department of Labor.

7. The Contractor shall take specific affirmative actions to ensure equal employment opportunity. The evaluation of the Contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. The Contractor shall document these efforts fully, and shall implement affirmative action steps at least as extensive as the following:

   a. Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites, and all facilities at which the Contractor's employees are assigned to work. The Contractor, where possible, will assign two or more women to each construction project. The Contractor shall specifically ensure that all foremen, superintendents, and other on-site supervisory personnel are aware of and carry out the Contractor's obligation to maintain such a working environment, with specific attention to minority or female individuals working at such sites or in such facilities.

   b. Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when the Contractor or its unions have employment opportunities available, and maintain a record of the organizations' responses.

   c. Maintain a current file of the names, addresses and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the Contractor by the union or, if referred, not employed by the Contractor, this shall be documented in the file with the reason therefor, along with whatever additional actions the Contractor may have taken.

   d. Provide immediate written notification to the Director when the union or unions with which the Contractor has a collective bargaining agreement has not referred to the Contractor a minority person or woman sent by the Contractor, or when the Contractor has other information that the union referral process has impeded the Contractor's efforts to meet its obligations.

   e. Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the Contractor's employment needs, especially those programs funded or approved by the Department of Labor. The Contractor shall provide notice of these programs to the sources compiled under 7b above.

   f. Disseminate the Contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the Contractor in meeting its EEO obligations; by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc; by specific review of the policy with all management personnel and with all minority and female employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.

   g. Review, at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination or other employment decisions including specific review of these items with on-site supervisory personnel such as Superintendents, General Foremen, etc., prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.

   h. Disseminate the Contractor's EEO policy externally by including it in any advertising in the news media, specifically including minority and female news media, and providing written notification to and discussing the Contractor's EEO policy with other Contractors and Subcontractors with whom the Contractor does or anticipates doing business.

i. Direct its recruitment efforts both oral and written, to minority, female and community organizations, to schools with minority and female students and to minority and female recruitment and training organizations serving the Contractor's recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, the Contractor shall send written notification to organizations such as the above, describing the openings, screening procedures, and tests to be used in the selection process.

j. Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer and vacation employment to minority and female youth both on the site and in other areas of a Contractor's work force.

k. Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR Part 60-3.

l. Conduct, at least annually, an inventory and evaluation at least of all minority and female personnel for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., such opportunities.

m. Ensure that seniority practices, job classifications, work assignments and other personnel practices, do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that the EEO policy and the Contractor's obligations under these specifications are being carried out.

n. Ensure that all facilities and company activities are nonsegregated except that separate or single-user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.

o. Document and maintain a record of all solicitations of offers for subcontracts from minority and female construction contractors and suppliers, including circulation of solicitations to minority and female contractor associations and other business associations.

p. Conduct a review, at least annually, of all supervisor's adherence to and performance under the Contractor's EEO policies and affirmative action obligations.

8. Contractors are encouraged to participate in voluntary associations which assist in fulfilling one or more of their affirmative action obligations (7a through p). The efforts of a contractor association, joint contractor-union, contractor-community, or other similar group of which the contractor is a member and participant, may be asserted as fulfilling any one or more of its obligations under 7a through p of these Specifications provided that the Contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in the Contractor's minority and female work force participation, makes a good faith effort to meet its individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the Contractor. The obligation to comply, however, is the Contractor's and failure of such a group to fulfill an obligation shall not be a defense for the Contractor's noncompliance.

9. A single goal for minorities and a separate single goal for women have been established. The Contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and non-minority. Consequently, the Contractor may be in violation of the Executive Order if a particular group is employed in a substantially disparate manner (for example, even though the Contractor has achieved its goals for women generally, the Contractor may be in violation of the Executive Order if a specific minority group of women is underutilized).

10. The Contractor shall not use the goals and timetables of affirmative action standards to discriminate against any person because of race, color, religion, sex, or national origin.

11 The Contractor shall not enter into any Subcontract with any person or firm debarred from Government contracts pursuant to Executive Order 11246.

12. The Contractor shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, including suspension, termination and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations, by the Office of Federal Contract Compliance programs. Any Contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246, as amended.

13. The Contractor, in fulfilling its obligations under these specifications, shall implement specific affirmative action steps, at least as extensive as those standards prescribed in paragraph 7 of these specifications so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the Contractor fails to comply with the requirements of the Executive Order, the implementing regulations, or these specifications, the Director shall proceed in accordance with 41 CFR 60-4.8.

14. The Contractor shall designate a responsible official to monitor all employment related activity to ensure that the company EEO policy is being carried out, to submit reports relating to the provisions hereof as many be required by the Government and keep records. Records shall at least include for each employee the name, address, telephone numbers, construction trade, union affiliation if any, employee identification number when assigned, social security number, race, sex, status (e.g., mechanic, apprentice, trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, contractors shall not be required to maintain separate records.

15. Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon the application of requirements for the hiring of local or other area residents (e.g., those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).

APPENDIX A

The following goals and timetables for female utilization shall be included in all Federal and federally assisted construction contracts and subcontracts in excess of $ 10,000. The goals are applicable to the Contractor's aggregate on-site construction workforce whether or not part of that workforce is performing work on a Federal or federally-assisted construction contract or subcontract.

Area covered: Goal for Women apply nationwide

Goals and Timetables

Timetable	Goals (percent)
From Apr. 1, 1980 until further notice	6.9

APPENDIX B-80

Until further notice, the following goals for minority utilization in each construction craft and trade shall included in all Federal or federally assisted construction contracts and subcontracts in excess of $ 10,000 to be performed in the respective geographical areas. The goals are applicable to each nonexempt contractor's total on- site construction workforce, regardless of whether or not part of that workforce is performing work on a Federal, federally assisted or nonfederally related project, contract or subcontract.

Construction contractors participating in an approved Hometown Plan (see 41 CFR 6-4.5) are required to comply with the goals of the Hometown Plan with regard to construction work they perform in the area covered by the Hometown Plan. With regard to all their other covered construction work, such contractors are required to comply with the applicable SMSA or EA goal contained in this Appendix B-80.

Economic Areas

STATE:	Goals (percent)
MASSACHUSETTS	
004 Boston MA: SMSA Counties: 1123 Boston-Lowell-Brockton-Lawrence-Haverhill, MA-NH	4.0
MA Essex, MA Middlesex, MA Norfolk, MA Plymouth, MA Suffolk, NH Rockingham.	
5403 Fall River- New Bedford MA, Bristol	1.6
9243 Worcester-Fitchburg-Leominster, MA	1.6
6323 Springfield-Chicopee-Holyoke MA-CT MA Hampden, MA Hampshire	4.8
Non-SMSA Counties: MA Barnstable, MA Dukes, MA Nantucket	3.6
Non-SMSA Counties: MA Franklin	5.9

APPENDIX C

During the performance of this contract, the contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the "contractor") agrees as follows:

1. **Compliance with Regulations:** The contractor (hereinafter includes consultants) will comply with the Acts and Regulations relative to Non-discrimination in Federally-assisted programs of the U.S. Department of Transportation, Federal Highway Administration (FHWA), as they may be amended from time to time, which are herein incorporated by reference and made a part of this contract.

2. **Non-discrimination:** The contractor, with regard to the work performed by it during the contract, will not discriminate on the grounds of race, color, national origin (including limited English proficiency), age, sex, disability, or low-income status in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The contractor will not participate directly or indirectly in the discrimination prohibited by the Acts and the Regulations, including employment practices when the contract covers any activity, project, or program set forth in Appendix B of 49 CFR Part 21.

3. **Solicitations for Subcontractors, including Procurements of Materials and Equipment:** In all solicitations, either by competitive bidding, or negotiation made by the contractor for work to be performed under a subcontract, including procurements of materials, or leases of equipment, each potential subcontractor or supplier will be notified by the contractor of the contractor's obligations under this contract and the Acts and the Regulations relative to nondiscrimination on the grounds of race, color, national origin (including limited English proficiency), age, sex, disability, or low-income status.

4. **Information and Reports:** The contractor will provide all information and reports required by the Acts, the Regulations, and directives issued pursuant thereto, and will permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the Massachusetts Department of Transportation (MassDOT) or FHWA to be pertinent to ascertain compliance with such Acts, Regulations, and instructions. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish this information, the contractor will so certify to MassDOT or FHWA, as appropriate, and will set forth what efforts it has made to obtain the information.

5. **Sanctions for Noncompliance:** In the event of a contractor's noncompliance with the Nondiscrimination provisions of this contract, MassDOT will impose such contract sanctions as it or FHWA may determine to be appropriate, including, but not limited to:

    a. withholding payments to the contractor under the contract until the contractor complies; and/or
    b. cancelling, terminating, or suspending a control, in whole or in part.

6. **Incorporation of Provisions:** The contractor will include the provisions of paragraphs one through six in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Acts, the Regulations, and directives issued pursuant thereto. The contractor will take action with respect to any subcontract or procurement as MassDOT or FHWA may direct as a means of enforcing such provisions including sanctions for noncompliance. Provided, that if the contractor becomes involved in, or is threatened with litigation by a subcontractor, or supplier because of such direction, the contractor may request MassDOT to enter into any litigation to protect the interests of MassDOT. In addition, the contractor may request the United States to enter into the litigation to protect the interests of the United States.

APPENDIX D

During the performance of this contact, the contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the "contractor," which includes consultants) agrees to comply with the following non-discrimination statutes and authorities; including but not limited to:

PERTINENT NON-DISCRIMINATION AUTHORITIES:

- Title VI of the Civil Rights Act of 1964 (42 U.S.C. § 2000d *et seq.*, 78 stat. 252) (prohibits discrimination on the basis of race, color, national origin); and 49 CFR Part 21

- The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (42 U.S.C. § 4601) (prohibits unfair treatment of persons displaced or whose property has been acquired because of Federal or Federal-Aid programs and projects)

- Federal-Aid Highway Act of 1973 (23 U.S.C. § 324 *et seq.*) (prohibits discrimination on the basis of sex)

- Section 504 of the Rehabilitation Act of 1973 (29 U.S.C. § 794 *et seq.*), as amended (prohibits discrimination on the basis of disability) and 49 CFR Part 27

- The Age Discrimination Act of 1975, as amended (42 U.S.C. § 6101 *et seq.*) (prohibits discrimination on the basis of age)

- Airport and Airway Improvement Act of 1982 (49 U.S.C. § 471, Section 47123), as amended (prohibits discrimination based on race, creed, color, national origin, or sex)

- The Civil Rights Restoration Act of 1987 (PL 100-209) (broadened the scope, coverage, and applicability of Title VI of the Civil Rights Act of 1964, the Age Discrimination Act of 1975, and Section 504 of the Rehabilitation Act of 1973, by expanding the definition of the terms "programs or activities" to include all of the programs or activities of Federal-Aid recipients, sub-recipients, and contractors, whether such programs or activities are Federally funded or not)

- Titles II and III of the Americans with Disabilities Act (42 U.S.C. §§ 12131-12189), as implemented by Department of Transportation regulations at 49 CFR parts 37 and 38 (prohibits discrimination on the basis of disability in the operation of public entities, public and private transportation systems, places of public accommodation, and certain testing entities)

- The Federal Aviation Administration's Non-Discrimination Statute (49 U.S.C. § 47123) (prohibits discrimination on the basis of race, color, national origin, and sex)

- Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (ensures discrimination against minority populations by discouraging programs, policies, and activities with disproportionately high and adverse human health or environmental effects on minority and low-income populations)

- Executive Order 13166, Improving Access to Services for People with Limited English Proficiency, and resulting agency guidance, national origin discrimination includes discrimination because of limited English proficiency (LEP). To ensure compliance with Title VI, you must take reasonable steps to ensure that LEP persons have meaningful access to your programs (70 Fed. Reg. at 74087 to 74100)

- Title IX of the Education Amendments Act of 1972, as amended (20 U.S.C. 1681 *et seq*.) (prohibits discrimination on the basis of sex in education programs or activities)

*** END OF DOCUMENT ***

DOCUMENT 00875
TRAINEE SPECIAL PROVISIONS
Revised October, 2016

THE REQUIRED NUMBER OF TRAINEES TO BE TRAINED UNDER THIS CONTRACT WILL BE **3**

The contractor shall provide on-the job training aimed at developing full journeyworkers in the type of trade of job classification involved.

In the event that a contractor subcontracts a portion of the contract work, the General Contractor shall determine how many, if any, of the trainees are to be trained by the subcontractor, provided, however, that the contractor shall retain the primary responsibility for meeting the training requirements imposed by this special provision. The contractor shall also insure that this training special provision is made applicable to such subcontract. Where feasible, 25 percent of apprentices or trainees in each occupation shall be in their first year of apprenticeship or training.

The number of trainees shall be distributed among the work classifications on the basis of the contractor's needs and the availability of journeyworkers in the various classifications within a reasonable area of recruitment. Prior to commencing construction, the contractor shall submit to the Massachusetts Department Of Transportation (MassDOT) for approval the number of trainees to be trained in each selected classification and training program to be used. Furthermore, the contractor shall specify the starting time for training in each of the classifications. The contractor will be credited for each trainee employed on the contract work who is currently enrolled or becomes enrolled in an approved program and will be reimbursed for such trainees as provided hereinafter.

Training and upgrading of minorities and women toward journeyworker status is a primary objective of the Training Special Provision. Accordingly, the contractor shall make every effort to enroll minority and women trainees (e.g., by conducting systematic and direct recruitment through public and private sources likely to yield minority and women trainees) to the extent that such persons are available within a reasonable area of recruitment. The contractor will be responsible for demonstrating the steps that have been taken in pursuance thereof, prior to a determination as to whether the contractor is in compliance with this Training Special Provision. This training commitment is not intended, and shall not be used, to discriminate against any applicant for training.

No employee shall be trained under this Special Provision in any classification in which he or she has successfully completed a training course leading to journeyworker status or in which he or she has been employed as a journeyworker. The contractor should satisfy this requirement by including appropriate questions in the employee application or by other suitable means. Regardless of the method used the contractor's records should document the finding in each case.

The minimum length and type of training for each classification will be as established in the training program selected by the contractor and approved by the Massachusetts Department Of Transportation and the Federal Highway Administration. The Massachusetts Department Of Transportation and the Federal Highway Administration shall approve a program if it is reasonably calculated to meet the equal employment opportunity obligations of the contractor and to qualify the average trainee for journeyworker status in the classification concerned by the end of the training period. Furthermore, apprenticeship programs registered with the U.S. Department of Labor, Bureau of Apprenticeship and Training, or with a State apprenticeship agency recognized by the Bureau and training programs approved but not necessarily sponsored by the U.S. Department of Labor, Manpower Administration, Bureau of Apprenticeship and Training shall also be considered acceptable provided it is being administered in a manner consistent with the equal employment obligations of Federal-aid highway construction contracts. Approval or acceptance of a training program shall be obtained from the State prior to commencing work on the classification covered by the program. It is the intention of these provisions that training is to be provided in the construction crafts rather that clerk-typist or secretarial-type positions. Training is permissible in lower level management positions such as office engineers, estimators, timekeepers, etc. where the training is oriented toward construction applications. Training in the laborer classification may be permitted provided that significant and meaningful training is provided and approved by the Federal Highway Administration division office. Some offsite training is permissible as long as the training is an integral part of an approved training program and does not comprise a significant part of the overall training.

Reimbursement

Under these Training Special Provisions, reimbursement will be as follows:

The Contractor will only be reimbursed 80 cents for each hour of on the job training as specified in the approved Training Program.

The Contractor is advised and encouraged that it may train additional persons in excess of the number specified and will be reimbursed as stated above. Reimbursement will be made even though the contractor receives additional training program funds from other sources, provided such other source does not specifically prohibit the contractor from receiving other reimbursement.

If less than full training specified in the approved training programs is provided, payment to the contractor will be made at a rate of 80 cents for each hour of training completed under this contract. However, no payment shall be made to the contractor if either the failure to provide the required training, or the failure to hire the trainee as a journeyworker, is caused by the contractor and evidences a lack of good faith on the part of the contractor in meeting the requirements of this Training Special Provision.

Payment

Trainees will be paid:

1. Percentage (%) of the journeyworker's rate as provided in the existing programs approved by the Department of Labor or Transportation as of September 15, 1970.

2. For journeyworker programs submitted by the Contractor and approved by Massachusetts Department Of Transportation and the Federal Highway Administration at least 60 percent of the appropriate minimum journeyworker's rate specified in the contract for the first half of the training period, 75 percent for the third quarter if the training period, and 90 percent for the last quarter of the training period.

3. For skilled laborer programs, the minimum starting wage rate of unskilled laborer. At the conclusion of training, he or she will be paid the minimum wage rate of the Classification for programs submitted by the Contractor and approved by the Massachusetts Department Of Transportation and the Federal Highway Administration.

4. For the purposes of meeting the legal requirements of State Prevailing Wage Law, please be advised that no person may be paid the Apprentice wage rate as listed on a MA Prevailing Wage Rates schedule, unless that person and program is registered with the Department of Labor Standards/Division of Apprentice Standards (DLS/DAS). Any person or program not registered with DLS/DAS, regardless of whether or not they are registered with any other federal, state, local, or private entity must be paid the journeyworker’s rate for the trade.

The contractor shall provide each trainee with a certification showing the type and length of training satisfactorily complete.

The contractor will provide for the maintenance of records and furnish periodic reports documenting his performance under this Training Special Provision.

Form FHWA-1409, Federal-aid Highway Construction Contracting Semi Annual Training Report, shall be submitted as per instructions on the Form.

*** END OF DOCUMENT ***

DOCUMENT 00880

Revised January 12, 2022

DEPARTMENT OF LABOR

Employment Standards Administration

MINIMUM WAGES FOR FEDERAL AND FEDERALLY ASSISTED CONTRACTS

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"General Decision Number: MA20260017 05/18/2026

State: Massachusetts

Construction Types: Highway

Counties: Massachusetts Counties of
Bristol

Modification Number	Publication Date
0	01/02/2026
1	05/18/2026

ELEC0103-003 09/01/2025

	Rates	Fringes
ELECTRICIAN (INCLUDES TRAFFIC SIGNALIZATION).....	$ 66.17	37.08

ENGI0004-021 06/01/2025

	Rates	Fringes
POWER EQUIPMENT OPERATOR GROUP 2 BULLDOZER; GRADER/BLADE; MILLING MACHINE; ROLLER FOOTNOTE FOR POWER EQUIPMENT OPERATORS: A. PAID HOLIDAYS: NEW YEAR'S DAY, WASHINGTON'S BIRTHDAY, LABOR DAY, MEMORIAL DAY, INDEPENDENCE DAY, PATRIOT'S DAY, COLUMBUS DAY, VETERAN'S DAY, THANKSGIVING DAY, CHRISTMAS DAY.....	$ 57.18	33.70
POWER EQUIPMENT OPERATOR GROUP 1 BACKHOE/EXCAVATOR/TRACKHOE; BOBCAT/SKID STEER/SKID LOADER; BROOM/SWEEPER; CRANE; GRADALL; LOADER;		

PAVER (ASPHALT, AGGREGATE, AND CONCRETE); POST DRIVER (GUARDRAIL/FENCES) FOOTNOTE FOR POWER EQUIPMENT OPERATORS: A. PAID HOLIDAYS: NEW YEAR'S DAY, WASHINGTON'S BIRTHDAY, LABOR DAY, MEMORIAL DAY, INDEPENDENCE DAY, PATRIOT'S DAY, COLUMBUS DAY, VETERAN'S DAY, THANKSGIVING DAY, CHRISTMAS DAY.....$ 57.83
33.70

IRON0007-029 09/16/2025

	Rates	Fringes
IRONWORKER: ORNAMENTAL.....	$ 57.57	37.67

LABO0133-001 12/01/2024

	Rates	Fringes
LABORER: CONCRETE SURFACER.....	$ 46.20	29.85

LABO0385-001 12/01/2024

	Rates	Fringes
LABORER: FENCE ERECTION.....	$ 38.95	29.41
LABORER: COMMON OR GENERAL.....	$ 38.95	29.41

LABO0721-001 12/01/2024

	Rates	Fringes
LABORER: GUARDRAIL INSTALLATION.....	$ 38.95	29.81

LABO0876-002 06/01/2018

	Rates	Fringes
LABORER LANDSCAPE	$ 33.25	22.92

PAIN0035-023 07/01/2024

	Rates	Fringes
PAINTER: STEEL	$ 56.76	36.00

SUMA2014-007 01/11/2017

	Rates	Fringes
TRUCK DRIVER: FLATBED TRUCK	$ 48.53	0.00
TRUCK DRIVER: DUMP TRUCK	$ 39.03	12.89
TRUCK DRIVER: CONCRETE TRUCK	$ 33.69	15.79
TRAFFIC CONTROL: LABORER-CONES/ BARRICADES/BARRELS - SETTER/MOVER/SWEEPER	$ 53.35	12.78
TRAFFIC CONTROL: FLAGGER	$ 23.00	20.44
PAINTER: SPRAY (LINESTRIPING)	$ 47.30	6.42
OPERATOR: PILEDRIVER	$ 42.56	17.34
OPERATOR: MECHANIC	$ 48.74	11.79
OPERATOR: FORKLIFT	$ 64.67	0.00
LABORER: JACK HAMMER	$ 35.32	18.48
LABORER: CONCRETE SAW (HAND HELD/WALK BEHIND)	$ 44.43	14.18
LABORER: ASPHALT, INCLUDES RAKER, SHOVELER, SPREADER AND DISTRIBUTOR	$ 34.72	16.01

IRONWORKER, STRUCTURAL.....$ 45.19
17.30
IRONWORKER, REINFORCING.....$ 42.13
18.15
CEMENT MASON/CONCRETE FINISHER.....$ 56.70
21.08

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.
==========
Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at https://www.dol.gov/agencies/whd/government-contracts.

Note: Executive Order 13658 generally applies to contracts subject
to the Davis-Bacon Act that were awarded on or between January 1,
2015 and January 29, 2022, and that have not been renewed or
extended on or after January 30, 2022. Executive Order 13658 does
not apply to contracts subject only to the Davis-Bacon Related Acts
regardless of when they were awarded. If a contract is subject to
Executive Order 13658, the contractor must pay all covered workers
at least $13.65 per hour (or the applicable wage rate listed on this
wage determination, if it is higher) for all hours spent performing on
the contract from May 11, 2026, through December 31, 2026. The
applicable Executive Order minimum wage rate will be adjusted annually.
Additional information on contractor requirements and worker
protections under Executive Order 13658 is available at
www.dol.gov/whd/govcontracts.

Unlisted classifications needed for work not included within
the scope of the classifications listed may be added after
award only as provided in the labor standards contract clauses
(29CFR 5.5 (a) (1) (iii)).

The body of each wage determination lists the classifications
and wage rates that have been found to be prevailing for the
type(s) of construction and geographic area covered by the wage
determination. The classifications are listed in alphabetical

order under rate identifiers indicating whether the particular
rate is a union rate (current union negotiated rate), a survey
rate, a weighted union average rate, a state adopted rate, or a
supplemental classification rate.

Union Rate Identifiers

A four-letter identifier beginning with characters other than
"SU", "UAVG", "SA", or "SC" denotes that a union rate was
prevailing for that classification in the survey. Example:
PLUM0198-005 07/01/2024. PLUM is an identifier of the union
whose collectively bargained rate prevailed in the survey for
this classification, which in this example would be Plumbers.
0198 indicates the local union number or district council
number where applicable, i.e., Plumbers Local 0198. The next
number, 005 in the example, is an internal number used in
processing the wage determination. The date, 07/01/2024 in the
example, is the effective date of the most current negotiated
rate.

Union prevailing wage rates are updated to reflect all changes
over time that are reported to WHD in the rates
in the collective bargaining agreement (CBA) governing the
classification.

Union Average Rate Identifiers

The UAVG identifier indicates that no single rate prevailed for
those classifications, but that 100% of the data reported for
the classifications reflected union rates. EXAMPLE:
UAVG-OH-0010 01/01/2024. UAVG indicates that the rate is a
weighted union average rate. OH indicates the State of Ohio.

The next number, 0010 in the example, is an internal number used in producing the wage determination. The date, 01/01/2024 in the example, indicates the date the wage determination was updated to reflect the most current union average rate.

A UAVG rate will be updated once a year, usually in January, to reflect a weighted average of the current rates in the collective bargaining agreements on which the rate is based.

Survey Rate Identifiers

The "SU" identifier indicates that either a single non-union rate prevailed (as defined in 29 CFR 1.2) for this classification in the survey or that the rate was derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As a weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SUFL2022-007 6/27/2024. SU indicates the rate is a single non-union prevailing rate or a weighted average of survey data for that classification. FL indicates the State of Florida. 2022 is the year of the survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. The date, 6/27/2024 in the example, indicates the survey completion date for the classifications and rates under that identifier.

"SU" wage rates typically remain in effect until a new survey is conducted. However, the Wage and Hour Division (WHD) has the

discretion to update such rates under 29 CFR 1.6(c)(1).

State Adopted Rate Identifiers

The "SA" identifier indicates that the classifications and prevailing wage rates set by a state (or local) government were adopted under 29 C.F.R 1.3(g)-(h). Example: SAME2023-007 01/03/2024. SA reflects that the rates are state adopted. ME refers to the State of Maine. 2023 is the year during which the state completed the survey on which the listed classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. The date, 01/03/2024 in the example, reflects the date on which the classifications and rates under the "SA" identifier took effect under state law in the state from which the rates were adopted.

WAGE DETERMINATION APPEALS PROCESS

1) Has there been an initial decision in the matter? This can be:

a) a survey underlying a wage determination
b) an existing published wage determination
c) an initial WHD letter setting forth a position on a wage determination matter
d) an initial conformance (additional classification and rate) determination

On survey related matters, initial contact, including requests for summaries of surveys, should be directed to the WHD Branch

of Wage Surveys. Requests can be submitted via email to davisbaconinfo@dol.gov or by mail to:

Branch of Wage Surveys
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

Regarding any other wage determination matter such as conformance decisions, requests for initial decisions should be directed to the WHD Branch of Construction Wage Determinations.
Requests can be submitted via email to BCWD-Office@dol.gov or by mail to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2) If an initial decision has been issued, then any interested party (those affected by the action) that disagrees with the decision can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7).
Requests for review and reconsideration can be submitted via email to dba.reconsideration@dol.gov or by mail to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

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3) If the decision of the Administrator is not favorable,
an
interested party may appeal directly to the Administrative
Review Board (formerly the Wage Appeals Board).  Write to:
            Administrative Review Board
            U.S. Department of Labor
            200 Constitution Avenue, N.W.
            Washington, DC 20210.
================================================================
=====
          END OF GENERAL DECISION
"
```

"General Decision Number: MA20260006 05/18/2026

State: Massachusetts

Construction Types: Heavy

Counties: Massachusetts Counties of
Barnstable, Berkshire, Bristol, Dukes,
Essex, Franklin, Hampden, Hampshire,
Middlesex, Nantucket, Norfolk, Plymouth,
Suffolk and Worcester

Massachusetts All Dredging, except self-propelled hopper dredges, on the Atlantic Coast & tributary waters emptying into the Atlantic Ocean

Modification Number	Publication Date
1	01/30/2026
2	05/18/2026

ENGI0025-001 10/01/2025

Rates Fringes

DREDGING: CLASS D: OILER, DECKHAND, SHOREMAN, RODMAN, SCOWMAN, COOK, MESSMAN, PORTER/JANITOR.
INCENTIVE PAY: (ADD TO HOURLY RATE) OPERATOR (NCCCO LICENSE/CERTIFICATION) $1.80 LICENSED TUG OPERATOR OVER 1000 HP (ASSIGNED AS MASTER) (USCG LICENSED MASTER OF TOWING VESSELS (MOTV) $1.80; LICENSED BOAT OPERATOR (ASSIGNED AS LEAD BOAT CAPTAIN) USCG LICENSED BOAT OPERATOR $1.30; ENGINEER (QMED AND TANKERMAN ENDORSEMENT OR LICENSED ENGINEER (USCG) $1.80 OILER (QMED AND TANKERMAN ENDORSEMENT (USCG) $1.80; ALL CLASSIFICATIONS (TANKERMAN ENDORSEMENT ONLY) USCG $1.55; DECKHAND OR MATE (AB WITH LIFEBOATMAN

ENDORSEMENT (USCG) $1.80; ALL CLASSIFICATIONS
(LIFEBOATMAN ENDORSEMENT ONLY (USCG) $1.55; WELDER
(ABS CERTIFICATION) $1.55 FOOTNOTES APPLICABLE
TO ABOVE CRAFTS: A. PAID HOLIDAYS: NEW YEAR'S
DAY, MARTIN LUTHER KING, JR.'S BIRTHDAY, MEMORIAL
DAY, GOOD FRIDAY, INDEPENDENCE DAY, LABOR DAY,
VETERANS' DAY, THANKSGIVING DAY AND CHRISTMAS DAY
B. VACATION: EIGHT PERCENT (8%) OF THE STRAIGHT
TIME RATE, MULTIPLIED BY THE TOTAL HOURS WORKED.....$ 30.86
14.15
DREDGING: CLASS C2: BOAT OPERATOR. INCENTIVE
PAY: (ADD TO HOURLY RATE) OPERATOR (NCCCO
LICENSE/CERTIFICATION) $1.80 LICENSED TUG OPERATOR
OVER 1000 HP (ASSIGNED AS MASTER) (USCG LICENSED
MASTER OF TOWING VESSELS (MOTV) $1.80; LICENSED
BOAT OPERATOR (ASSIGNED AS LEAD BOAT CAPTAIN) USCG
LICENSED BOAT OPERATOR $1.30; ENGINEER (QMED AND
TANKERMAN ENDORSEMENT OR LICENSED ENGINEER (USCG)
$1.80 OILER (QMED AND TANKERMAN ENDORSEMENT (USCG)
$1.80; ALL CLASSIFICATIONS (TANKERMAN ENDORSEMENT
ONLY) USCG $1.55; DECKHAND OR MATE (AB WITH
LIFEBOATMAN ENDORSEMENT (USCG) $1.80; ALL
CLASSIFICATIONS (LIFEBOATMAN ENDORSEMENT ONLY
(USCG) $1.55; WELDER (ABS CERTIFICATION) $1.55
FOOTNOTES APPLICABLE TO ABOVE CRAFTS: A. PAID
HOLIDAYS: NEW YEAR'S DAY, MARTIN LUTHER KING,
JR.'S BIRTHDAY, MEMORIAL DAY, GOOD FRIDAY,
INDEPENDENCE DAY, LABOR DAY, VETERANS' DAY,
THANKSGIVING DAY AND CHRISTMAS DAY B. VACATION:
EIGHT PERCENT (8%) OF THE STRAIGHT TIME RATE,
MULTIPLIED BY THE TOTAL HOURS WORKED.....$ 37.15
14.57
DREDGING: CLASS C1: MATE, DRAG BARGE OPERATOR,
ASSISTANT FILL PLACER, WELDER, STEWARD.
INCENTIVE PAY: (ADD TO HOURLY RATE) OPERATOR
(NCCCO LICENSE/CERTIFICATION) $1.80 LICENSED TUG
OPERATOR OVER 1000 HP (ASSIGNED AS MASTER) (USCG
LICENSED MASTER OF TOWING VESSELS (MOTV) $1.80;
LICENSED BOAT OPERATOR (ASSIGNED AS LEAD BOAT
CAPTAIN) USCG LICENSED BOAT OPERATOR $1.30;
ENGINEER (QMED AND TANKERMAN ENDORSEMENT OR
LICENSED ENGINEER (USCG) $1.80 OILER (QMED AND
TANKERMAN ENDORSEMENT (USCG) $1.80; ALL

CLASSIFICATIONS (TANKERMAN ENDORSEMENT ONLY) USCG $1.55; DECKHAND OR MATE (AB WITH LIFEBOATMAN ENDORSEMENT (USCG) $1.80; ALL CLASSIFICATIONS (LIFEBOATMAN ENDORSEMENT ONLY (USCG) $1.55; WELDER (ABS CERTIFICATION) $1.55 FOOTNOTES APPLICABLE TO ABOVE CRAFTS: A. PAID HOLIDAYS: NEW YEAR'S DAY, MARTIN LUTHER KING, JR.'S BIRTHDAY, MEMORIAL DAY, GOOD FRIDAY, INDEPENDENCE DAY, LABOR DAY, VETERANS' DAY, THANKSGIVING DAY AND CHRISTMAS DAY B. VACATION: EIGHT PERCENT (8%) OF THE STRAIGHT TIME RATE, MULTIPLIED BY THE TOTAL HOURS WORKED.....$ 38.38
14.66
DREDGING: CLASS B2: CERTIFIED WELDER. INCENTIVE PAY: (ADD TO HOURLY RATE) OPERATOR (NCCCO LICENSE/CERTIFICATION) $1.80 LICENSED TUG OPERATOR OVER 1000 HP (ASSIGNED AS MASTER) (USCG LICENSED MASTER OF TOWING VESSELS (MOTV) $1.80; LICENSED BOAT OPERATOR (ASSIGNED AS LEAD BOAT CAPTAIN) USCG LICENSED BOAT OPERATOR $1.30; ENGINEER (QMED AND TANKERMAN ENDORSEMENT OR LICENSED ENGINEER (USCG) $1.80 OILER (QMED AND TANKERMAN ENDORSEMENT (USCG) $1.80; ALL CLASSIFICATIONS (TANKERMAN ENDORSEMENT ONLY) USCG $1.55; DECKHAND OR MATE (AB WITH LIFEBOATMAN ENDORSEMENT (USCG) $1.80; ALL CLASSIFICATIONS (LIFEBOATMAN ENDORSEMENT ONLY (USCG) $1.55; WELDER (ABS CERTIFICATION) $1.55 FOOTNOTES APPLICABLE TO ABOVE CRAFTS: A. PAID HOLIDAYS: NEW YEAR'S DAY, MARTIN LUTHER KING, JR.'S BIRTHDAY, MEMORIAL DAY, GOOD FRIDAY, INDEPENDENCE DAY, LABOR DAY, VETERANS' DAY, THANKSGIVING DAY AND CHRISTMAS DAY B. VACATION: EIGHT PERCENT (8%) OF THE STRAIGHT TIME RATE, MULTIPLIED BY THE TOTAL HOURS WORKED.....$ 39.46
14.73
DREDGING: CLASS B1: DERRICK OPERATOR (180 SWING), SPIDER/SPILL BARGE OPERATOR, ENGINEER, ELECTRICIAN, CHIEF WELDER, CHIEF MATE, FILL PLACER, OPERATOR II, MAINTENANCE ENGINEER, LICENSED BOAT OPERATOR, LICENSED CREW BOAT OPERATOR. INCENTIVE PAY: (ADD TO HOURLY RATE) OPERATOR (NCCCO LICENSE/CERTIFICATION) $1.80 LICENSED TUG OPERATOR OVER 1000 HP (ASSIGNED AS MASTER) (USCG LICENSED MASTER OF TOWING VESSELS (MOTV) $1.80; LICENSED

BOAT OPERATOR (ASSIGNED AS LEAD BOAT CAPTAIN) USCG LICENSED BOAT OPERATOR $1.30; ENGINEER (QMED AND TANKERMAN ENDORSEMENT OR LICENSED ENGINEER (USCG) $1.80 OILER (QMED AND TANKERMAN ENDORSEMENT (USCG) $1.80; ALL CLASSIFICATIONS (TANKERMAN ENDORSEMENT ONLY) USCG $1.55; DECKHAND OR MATE (AB WITH LIFEBOATMAN ENDORSEMENT (USCG) $1.80; ALL CLASSIFICATIONS (LIFEBOATMAN ENDORSEMENT ONLY (USCG) $1.55; WELDER (ABS CERTIFICATION) $1.55 FOOTNOTES APPLICABLE TO ABOVE CRAFTS: A. PAID HOLIDAYS: NEW YEAR'S DAY, MARTIN LUTHER KING, JR.'S BIRTHDAY, MEMORIAL DAY, GOOD FRIDAY, INDEPENDENCE DAY, LABOR DAY, VETERANS' DAY, THANKSGIVING DAY AND CHRISTMAS DAY B. VACATION: EIGHT PERCENT (8%) OF THE STRAIGHT TIME RATE, MULTIPLIED BY THE TOTAL HOURS WORKED.....$ 41.93
14.90
DREDGING: CLASS A2: CRANE OPERATOR (360 SWING) INCENTIVE PAY: (ADD TO HOURLY RATE) OPERATOR (NCCCO LICENSE/CERTIFICATION) $1.80 LICENSED TUG OPERATOR OVER 1000 HP (ASSIGNED AS MASTER) (USCG LICENSED MASTER OF TOWING VESSELS (MOTV) $1.80; LICENSED BOAT OPERATOR (ASSIGNED AS LEAD BOAT CAPTAIN) USCG LICENSED BOAT OPERATOR $1.30; ENGINEER (QMED AND TANKERMAN ENDORSEMENT OR LICENSED ENGINEER (USCG) $1.80 OILER (QMED AND TANKERMAN ENDORSEMENT (USCG) $1.80; ALL CLASSIFICATIONS (TANKERMAN ENDORSEMENT ONLY) USCG $1.55; DECKHAND OR MATE (AB WITH LIFEBOATMAN ENDORSEMENT (USCG) $1.80; ALL CLASSIFICATIONS (LIFEBOATMAN ENDORSEMENT ONLY (USCG) $1.55; WELDER (ABS CERTIFICATION) $1.55 FOOTNOTES APPLICABLE TO ABOVE CRAFTS: A. PAID HOLIDAYS: NEW YEAR'S DAY, MARTIN LUTHER KING, JR.'S BIRTHDAY, MEMORIAL DAY, GOOD FRIDAY, INDEPENDENCE DAY, LABOR DAY, VETERANS' DAY, THANKSGIVING DAY AND CHRISTMAS DAY B. VACATION: EIGHT PERCENT (8%) OF THE STRAIGHT TIME RATE, MULTIPLIED BY THE TOTAL HOURS WORKED.....$ 43.20
14.99
DREDGING: CLASS A1: DECK CAPTAIN; MECHANICAL DREDGE OPERATOR, LEVERMAN, LICENSED TUG OPERATOR OVER 1000 HP. INCENTIVE PAY: (ADD TO HOURLY RATE) OPERATOR (NCCCO LICENSE/CERTIFICATION) $1.80 LICENSED TUG OPERATOR OVER 1000 HP (ASSIGNED AS

MASTER) (USCG LICENSED MASTER OF TOWING VESSELS (MOTV) $1.80; LICENSED BOAT OPERATOR (ASSIGNED AS LEAD BOAT CAPTAIN) USCG LICENSED BOAT OPERATOR $1.30; ENGINEER (QMED AND TANKERMAN ENDORSEMENT OR LICENSED ENGINEER (USCG) $1.80 OILER (QMED AND TANKERMAN ENDORSEMENT (USCG) $1.80; ALL CLASSIFICATIONS (TANKERMAN ENDORSEMENT ONLY) USCG $1.55; DECKHAND OR MATE (AB WITH LIFEBOATMAN ENDORSEMENT (USCG) $1.80; ALL CLASSIFICATIONS (LIFEBOATMAN ENDORSEMENT ONLY (USCG) $1.55; WELDER (ABS CERTIFICATION) $1.55 FOOTNOTES APPLICABLE TO ABOVE CRAFTS: A. PAID HOLIDAYS: NEW YEAR'S DAY, MARTIN LUTHER KING, JR.'S BIRTHDAY, MEMORIAL DAY, GOOD FRIDAY, INDEPENDENCE DAY, LABOR DAY, VETERANS' DAY, THANKSGIVING DAY AND CHRISTMAS DAY B. VACATION: EIGHT PERCENT (8%) OF THE STRAIGHT TIME RATE, MULTIPLIED BY THE TOTAL HOURS WORKED.....$ 48.48 15.34

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is

like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at https://www.dol.gov/agencies/whd/government-contracts.

Note: Executive Order 13658 generally applies to contracts subject to the Davis-Bacon Act that were awarded on or between January 1, 2015 and January 29, 2022, and that have not been renewed or extended on or after January 30, 2022. Executive Order 13658 does not apply to contracts subject only to the Davis-Bacon Related Acts regardless of when they were awarded. If a contract is subject to Executive Order 13658, the contractor must pay all covered workers at least $13.65 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract from May 11, 2026, through December 31, 2026. The applicable Executive Order minimum wage rate will be adjusted annually. Additional information on contractor requirements and worker protections under Executive Order 13658 is available at www.dol.gov/whd/govcontracts.

Unlisted classifications needed for work not included within

the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses
(29CFR 5.5 (a) (1) (iii)).

The body of each wage determination lists the classifications
and wage rates that have been found to be prevailing for the
type(s) of construction and geographic area covered by the wage
determination. The classifications are listed in alphabetical
order under rate identifiers indicating whether the particular
rate is a union rate (current union negotiated rate), a survey
rate, a weighted union average rate, a state adopted rate, or a
supplemental classification rate.

Union Rate Identifiers

A four-letter identifier beginning with characters other than
"SU", "UAVG", "SA", or "SC" denotes that a union rate was prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2024. PLUM is an identifier of the union whose collectively bargained rate prevailed in the survey for
this classification, which in this example would be Plumbers.
0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next
number, 005 in the example, is an internal number used in processing the wage determination. The date, 07/01/2024 in the
example, is the effective date of the most current negotiated
rate.

Union prevailing wage rates are updated to reflect all changes over time that are reported to WHD in the rates in the collective bargaining agreement (CBA) governing the classification.

Union Average Rate Identifiers

The UAVG identifier indicates that no single rate prevailed for those classifications, but that 100% of the data reported for the classifications reflected union rates. EXAMPLE: UAVG-OH-0010 01/01/2024. UAVG indicates that the rate is a weighted union average rate. OH indicates the State of Ohio. The next number, 0010 in the example, is an internal number used in producing the wage determination. The date, 01/01/2024 in the example, indicates the date the wage determination was updated to reflect the most current union average rate.

A UAVG rate will be updated once a year, usually in January, to reflect a weighted average of the current rates in the collective bargaining agreements on which the rate is based.

Survey Rate Identifiers

The "SU" identifier indicates that either a single non-union rate prevailed (as defined in 29 CFR 1.2) for this classification in the survey or that the rate was derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As a weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SUFL2022-007

6/27/2024. SU indicates the rate is a single non-union prevailing rate or a weighted average of survey data for that classification. FL indicates the State of Florida. 2022 is the year of the survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. The date, 6/27/2024 in the example, indicates the survey completion date for the classifications and rates under that identifier.

"SU" wage rates typically remain in effect until a new survey is conducted. However, the Wage and Hour Division (WHD) has the discretion to update such rates under 29 CFR 1.6(c)(1).

State Adopted Rate Identifiers

The "SA" identifier indicates that the classifications and prevailing wage rates set by a state (or local) government were adopted under 29 C.F.R 1.3(g)-(h). Example: SAME2023-007 01/03/2024. SA reflects that the rates are state adopted. ME refers to the State of Maine. 2023 is the year during which the state completed the survey on which the listed classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. The date, 01/03/2024 in the example, reflects the date on which the classifications and rates under the "SA" identifier took effect under state law in the state from which the rates were adopted.

WAGE DETERMINATION APPEALS PROCESS

1) Has there been an initial decision in the matter? This can be:

a) a survey underlying a wage determination
b) an existing published wage determination
c) an initial WHD letter setting forth a position on a wage determination matter
d) an initial conformance (additional classification and rate) determination

On survey related matters, initial contact, including requests for summaries of surveys, should be directed to the WHD Branch of Wage Surveys. Requests can be submitted via email to davisbaconinfo@dol.gov or by mail to:

Branch of Wage Surveys
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

Regarding any other wage determination matter such as conformance decisions, requests for initial decisions should be directed to the WHD Branch of Construction Wage Determinations. Requests can be submitted via email to BCWD-Office@dol.gov or by mail to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2) If an initial decision has been issued, then any interested party (those affected by the action) that disagrees with the decision can request review and reconsideration from the Wage

and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7).
Requests for review and reconsideration can be submitted via
email to dba.reconsideration@dol.gov or by mail to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the
interested party's position and any information (wage payment
data, project description, area practice material, etc.) that
the requestor considers relevant to the issue.

3) If the decision of the Administrator is not favorable, an
interested party may appeal directly to the Administrative
Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210.

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END OF GENERAL DECISION

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"General Decision Number: MA20260008 05/18/2026

State: Massachusetts

Construction Types: Heavy

Counties: Massachusetts Counties of
Barnstable, Bristol, Dukes, Essex,
Middlesex, Nantucket, Norfolk, Plymouth
and Suffolk

Heavy and Marine Construction Projects

Modification Number	Publication Date
0	01/02/2026
1	05/18/2026

BOIL0029-001 01/01/2025

	Rates	Fringes
BOILERMAKER	$ 50.62	28.82

BRMA0001-011 02/01/2023

	Rates	Fringes
BRICKLAYER/CEMENT MASON (FOXBORO CHAPTER BRISTOL (ATTLEBORO, BERKLEY, DIGHTON, MANSFIELD, NORTH ATTLEBORO, NORTON, RAYNHAM, REHOBOTH, SEEKONK, TAUNTON); NORFOLK, (BELLINGHAM, CANTON, DEDHAM, FOXBORO, FRANKLIN, NORFOLK, NORWOOD, PLAINVILLE, SHARON, WALPOLE, WESTRWOOD, WRENTHAM); AND PLYMOUTH (LAKEVILLE))	$ 60.35	34.40

BRMA0001-012 02/01/2023

Rates
Fringes
BRICKLAYER (LOWELL CHAPTER MIDDLESEX (ACTON, ASHBY, AYER, BEDFORD, BILLERICA, BOXBORO, CARLISLE, CHEMSFORD, DRACUT, DUNSTABALE, FT DEVENS, GROTON, LITTLETON, LOWELL, NORTH ACTON, PEPPERELL, SHIRLEY, SOUTH ACTON, TEWKSBURY, TOWNSEND, TYNGSBORO, WEST ACTON, WESTFORD, WILMINGTON))..... $ 58.21
33.71

BRMA0001-013 08/01/2023

Rates
Fringes
BRICKLAYER (LOWELL CHAPTER MIDDLESEX (ASHLAND, FRAMINGHAM, HOLLISTON, HOPKINTON, HUDSON, MAYNARD, NATICK, SHERBVORN, STOW); AND NORFOLK (MEDFIELD, MEDWAY, MILLIS))..... $ 62.40
34.40

BRMA0003-001 08/01/2024

Rates
Fringes
TERRAZZO FINISHER..... $ 63.44
37.33
MARBLE, TILE & TERRAZZO WORKERS..... $ 64.52
37.51
MARBLE & TILE FINISHER..... $ 49.32
35.26

BRMA0003-003 08/01/2024

Rates
Fringes
BRICKLAYER (BOSTON CHAPTER MIDDLESEX (ARLINGTON, CAMBRIDGE, EVERETT, MALDEN, MEDFORD, MELROSE, SOMERVILLE); NORFOLK (BROOKLINE, MILTON); AND

SUFFOLK).....$ 64.50
37.54

BRMA0003-011 08/01/2024

Rates
Fringes
BRICKLAYER/CEMENT MASON (LYNN CHAPTER ESSEX
(AMESBURY, ANDOVER, BEVERLY, BOXFORD, DANVERS,
ESSEX, GEORGETOWN, GLOUCESTER, GROVELAND, HAMILTON,
HAVERHILL, IPSWICH, LAWRENCE, LYNN, LYNNFIELD,
MANCHESTER, MARBLEHEAD, MERRIMAC, METHUEN,
MIDDLETON, NAHANT, NEWBURY, NEWBURYPORT, NORTH
ANDOVER, PEABODY, ROCKPORT, ROWLEY, SALISBURY,
SALEM, SAUGUS, SWAMPSCOTT, TOPSFIELD, WAKEFIELD,
WENHAM, WEST NEWBURY); AND MIDDLESEX (NORTH
READING, READING, WAKEFIELD)).....$ 64.50
37.54

BRMA0003-012 08/01/2024

Rates
Fringes
BRICKLAYER (WALTHAM CHAPTER - MIDDLESEX (BELMONT,
BURLINGTON, CONCORD, LEXINGTON, LINCOLN, STONEHAM,
SUDBURY, WALTHAM, WATERTOWN, WAYLAND, WESTON,
WINCHESTER, WOBURN)).....$ 64.50
37.54

BRMA0003-014 08/01/2024

Rates
Fringes
BRICKLAYER/CEMENT MASON (QUINCY CHAPTER PLYMOUTH
COUNTY (ABINGTON, BRIDGEWATER, BROCKTON, CARVER,
DUXBURY, EAST BRIDGEWATER, HALIFAX, HANOVER,
HANSON, HINGHAM, HULL, KINGSTON, MARSHFIELD,
MIDDLEBORO, NORWELL, PEMBROKE, PLYMOUTH, ROCKLAND,
SCITUATE, WEST BRIDGEWATER, WHITMAN)).....$ 64.50
37.54

BRMA0003-025 08/01/2024

	Rates	Fringes
BRICKLAYER/CEMENT MASON (NEW BEDFORD CHAPTER BARNSTABLE; BRISTOL (ACUSHNET, DARMOUTH, FAIRHAVEN, FALL RIVER, FREETOWN, NEW BEDFORD, SOMERSET, SWANSEA, WESTPORT); DUKES; NANTUCKET; PLYMOUTH (MARION, MATTAPOISETT, ROCHESTER, WAREHAM))	$ 64.50	37.54

BRMA0003-033 08/01/2024

	Rates	Fringes
BRICKLAYER, PLASTERER (NEWTON CHAPTER MIDDLESEX (NEWTON); NORFOLK (DOVER, NEEDHAM, WELLESLEY))	$ 64.50	37.54

CARP0056-001 08/01/2024

	Rates	Fringes
PILEDRIVERMAN (ALL OF SUFFOLK COUNTY; AND THOSE AREAS OF BARNSTABLE, BRISTOL, ESSEX, MIDDLESEX, NORFOLK, AND PLYMOUTH COUNTIES SITUATED INSIDE BOSTON BELTWAY (I-495) AND NORTH OF CAPE COD CANAL. ALL OF DUKES AND NANTUCKET COUNTIES)	$ 55.79	35.47

CARP0056-002 08/01/2024

	Rates	Fringes
PILEDRIVERMAN (THE AREAS OF BARNSTABLE, BRISTOL, PLYMOUTH, AND NORFOLK COUNTIES SITUATED OUTSIDE BOSTON BELTWAY (I-495) AND SOUTH OF CAPE COD CANAL).	$ 51.97	35.47

CARP0056-003 08/01/2024

	Rates	Fringes
PILEDRIVERMAN (THOSE AREAS OF ESSEX AND MIDDLESEX COUNTIES SITUATED OUTSIDE BOSTON BELTWAY (I-495))...	$ 49.19	35.47

CARP0056-004 08/01/2024

	Rates	Fringes
DIVER TENDER.....	$ 61.70	35.47
DIVER.....	$ 78.11	35.47

CARP0327-002 09/01/2025

	Rates	Fringes
CARPENTER (MIDDLESEX (BELMONT, CAMBRIDGE, EVERETT, MALDEN, MEDFORD, SOMERVILLE); NORFOLK (BROOKLINE, DEDHAM, MILTON); AND SUFFOLK COUNTIES).....	$ 61.19	31.55

CARP0339-002 09/01/2025

	Rates	Fringes
CARPENTER (BRISTOL (ATTLEBOROUGH, NORTH ATTLEBOROUGH); ESSEX; MIDDLESEX (EXCEPT BELMONT, CAMBRIDGE, EVERETT, MALDEN, MEDFORD, SOMERVILLE); AND NORFOLK (BELLINGHAM, BRAINTREE, CANTON, COHASSETT, FOXBORO, FRANKLIN, MEDFIELD, MEDWAY, MILLIS, NEEDHAM, NORFOLK, NORWOOD, PLAINVILLE, QUINCY, SHARON, WALPOLE, WELLESLEY, WESTWOOD, WEYMOUTH, WRENTHAM) COUNTIES).....	$ 50.10	31.45

CARP0346-001 09/01/2025

	Rates	Fringes
CARPENTER (NORFOLK (BRAINTREE, QUINCY, COHASSET, WEYMOUTH, ETC.) PLYMOUTH (DUXBURY, HANOVER, HULL, HINGHAM, MARSHFIELD, NORWELL, PEMBROKE ROCKLAND, SCITUATE))	$ 50.10	31.45

CARP0624-002 09/01/2017

	Rates	Fringes
CARPENTER (DUKES; NANTUCKET)	$ 46.43	28.35

CARP0624-006 09/01/2017

	Rates	Fringes
CARPENTER (BARNSTABLE; BRISTOL (EXCEPT ATTLEBORO & NORTH ATTLEBORO); NORFOLK (AVON, HOLBROOK, RANDOLPH, STOUGHTON); PLYMOUTH (BRIDGEWATER, KINGSTON, LAKEVILLE, MIDDLEBORO, PLYMOUTH, S. HANOVER, WHITMAN))	$ 39.28	27.90

CARP1121-001 04/21/2025

	Rates	Fringes
MILLWRIGHT (SUFFOLK COUNTY)	$ 50.47	33.50

CARP1121-005 04/21/2025

	Rates	Fringes
MILLWRIGHT (BARNSTABLE, BRISTOL, DUKES, ESSEX, MIDDLESEX, NANTUCKET, NORFOLK AND PLYMOUTH COUNTIES)	$ 45.03	33.25

ELEC0096-001 09/07/2025

	Rates	Fringes
TELEDATA SYSTEM INSTALLER (MIDDLESEX (ASHBY, ASHLAND, AYER, FT. DEVENS, GROTON, HOPKINTON, HUDSON, MARLBORO, PEPPERELL, SHIRLEY, STOW, TOWNSEND))	$ 36.12	34.51
ELECTRICIAN (MIDDLESEX (ASHBY, ASHLAND, AYER, FT. DEVENS, GROTON, HOPKINTON, HUDSON, MARLBORO, PEPPERELL, SHIRLEY, STOW, TOWNSEND))	$ 48.16	36.20

ELEC0099-001 06/01/2025

	Rates	Fringes
TELEDATA SYSTEM INSTALLER (BRISTOL (ATTLEBORO, NORTH ATTLEBORO, SEEKONK))	$ 42.09	19.71
ELECTRICIAN (BRISTOL (ATTLEBORO, NORTH ATTLEBORO, SEEKONK))	$ 56.11	24.74

ELEC0103-002 09/01/2025

	Rates	Fringes
ELECTRICIAN (ESSEX (AMESBURY, ANDOVER, BOXFORD, GEORGETOWN, GROVELAND, HAVERHILL, LAWRENCE, MERRIMAC, METHUEN, NEWBURY, NEWBURYPORT, NORTH ANDOVER, ROWLEY, SALISBURY, WEST NEWBURY);		

MIDDLESEX (BEDFORD, BILLERICA, BOXBORO, BURLINGTON, CARLISLE, CHELMSFORD, DRACUT, DUNSTABLE LITTLETON, LOWELL, NORTH READING, TEWKSBURY, TYNGSBORO, WESTFORD, WILMINGTON))..... $ 66.17 37.08

ELEC0103-004 09/01/2025

Rates Fringes

ELECTRICIAN (ESSEX (BEVERLY, DANVERS, ESSEX, GLOUCESTER, HAMILTON, IPSWICH, MANCHESTER, MARBLEHEAD, MIDDLETON, PEABODY, ROCKPORT, SALEM, TOPSFIELD, WENHAM))..... $ 66.17 37.08

ELEC0103-005 09/01/2025

Rates Fringes

ELECTRICIAN (ESSEX (LYNN, LYNNFIELD, NAHANT, SAUGUS, SWAMPSCOTT); MIDDLESEX (ACTON, ARLINGTON, BELMONT, CAMBRIDGE, CONCORD, EVERETT, FRAMINGHAM, HOLLISTON, LEXINGTON, LINCOLN, MALDEN, MAYNARD, MEDFORD, MELROSE, NATICK, NEWTON, READING, SHERBORN, SOMERVILLE, STONEHAM, SUDBURY, WAKEFIELD, WALTHAM, WATERTOWN, WAYLAND, WESTON, WINCHESTER, WOBURN); NORFOLK (BELLINGHAM, BRAINTREE, BROOKLINE, CANTON, COHASSET, DEDHAM, DOVER, FOXBORO, FRANKLOIN, MEDFIELD, MEDWAY, MILLIS, MILTON, NEEDHAM, NORFOLK, NORWO..... $ 66.17 37.08

ELEC0104-001 09/01/2024

Rates Fringes

LINE CONSTRUCTION: LINEMAN A. PAID HOLIDAYS: NEW YEAR'S DAY; MEMORIAL DAY; INDEPENDENCE DAY; LABOR DAY; THANKSGIVING DAY; CHRISTMAS DAY AND COLUMBUS DAY, PROVIDED THE EMPLOYEE HAS BEEN

EMPLOYED 5 WORKING DAYS PRIOR TO ANY ONE OF THE
LISTED HOLIDAYS.....$ 58.41
30.19
LINE CONSTRUCTION: GROUNDMAN A. PAID HOLIDAYS:
NEW YEAR'S DAY; MEMORIAL DAY; INDEPENDENCE DAY;
LABOR DAY; THANKSGIVING DAY; CHRISTMAS DAY AND
COLUMBUS DAY, PROVIDED THE EMPLOYEE HAS BEEN
EMPLOYED 5 WORKING DAYS PRIOR TO ANY ONE OF THE
LISTED HOLIDAYS.....$ 32.13
12.70
LINE CONSTRUCTION: EQUIPMENT OPERATOR A. PAID
HOLIDAYS: NEW YEAR'S DAY; MEMORIAL DAY;
INDEPENDENCE DAY; LABOR DAY; THANKSGIVING DAY;
CHRISTMAS DAY AND COLUMBUS DAY, PROVIDED THE
EMPLOYEE HAS BEEN EMPLOYED 5 WORKING DAYS PRIOR TO
ANY ONE OF THE LISTED HOLIDAYS.....$ 49.65
26.72
LINE CONSTRUCTION: CABLEMAN A. PAID HOLIDAYS:
NEW YEAR'S DAY; MEMORIAL DAY; INDEPENDENCE DAY;
LABOR DAY; THANKSGIVING DAY; CHRISTMAS DAY AND
COLUMBUS DAY, PROVIDED THE EMPLOYEE HAS BEEN
EMPLOYED 5 WORKING DAYS PRIOR TO ANY ONE OF THE
LISTED HOLIDAYS.....$ 58.41
30.19

ELEC0223-002 09/01/2024

Rates
Fringes
ELECTRICIAN (BARNSTABLE, BRISTOL (EXCEPT ATTLEBORO,
NORTH ATTLEBORO, SEEKONK); DUKES; NANTUCKET;
PLYMOUTH (EXCEPT HINGHAM AND HULL TWPS); NORFOLK
(AVON, HALBROOK, RANDOLPH, SLOUGHTON)).....$ 50.02
31.05

ENGI0004-009 06/01/2025

Rates
Fringes
POWER EQUIPMENT OPERATORS: GROUP 6 OILER (ON TRUCK
CRANES AND GRADALLS) HOURLY PREMIUM FOR BOOM
LENGTHS (INCLUDING JIB): OVER 150 FT. +2.18

OVER 185 FT. +3.84 OVER 210 FT. +5.39
OVER 250 FT. +8.16 OVER 295 FT. +11.29 OVER
350 FT. +13.14 FOOTNOTE FOR POWER EQUIPMENT
OPERATORS: A. PAID HOLIDAYS: NEW YEAR'S DAY,
WASHINGTON,S BIRTHDAY, LABOR DAY, MEMORIAL DAY,
INDEPENDENCE DAY, PATRIOT'S DAY, COLUMBUS DAY,
VETERAN'S DAY, THANKSGIVING DAY, CHRISTMAS DAY.....$ 30.85
33.70
POWER EQUIPMENT OPERATORS: GROUP 5 OILER (OTHER
THAN TRUCK CRANES AND GRADALLS) HOURLY PREMIUM FOR
BOOM LENGTHS (INCLUDING JIB): OVER 150 FT.
+2.18 OVER 185 FT. +3.84 OVER 210 FT.
+5.39 OVER 250 FT. +8.16 OVER 295 FT.
+11.29 OVER 350 FT. +13.14 FOOTNOTE FOR POWER
EQUIPMENT OPERATORS: A. PAID HOLIDAYS: NEW
YEAR'S DAY, WASHINGTON,S BIRTHDAY, LABOR DAY,
MEMORIAL DAY, INDEPENDENCE DAY, PATRIOT'S DAY,
COLUMBUS DAY, VETERAN'S DAY, THANKSGIVING DAY,
CHRISTMAS DAY.....$ 25.02
33.70
POWER EQUIPMENT OPERATORS: GROUP 4 ASSITANT
ENGINEER (FIREMAN) HOURLY PREMIUM FOR BOOM LENGTHS
(INCLUDING JIB): OVER 150 FT. +2.18 OVER
185 FT. +3.84 OVER 210 FT. +5.39 OVER 250
FT. +8.16 OVER 295 FT. +11.29 OVER 350 FT.
+13.14 FOOTNOTE FOR POWER EQUIPMENT OPERATORS:
A. PAID HOLIDAYS: NEW YEAR'S DAY, WASHINGTON,S
BIRTHDAY, LABOR DAY, MEMORIAL DAY, INDEPENDENCE
DAY, PATRIOT'S DAY, COLUMBUS DAY, VETERAN'S DAY,
THANKSGIVING DAY, CHRISTMAS DAY.....$ 46.52
33.70
POWER EQUIPMENT OPERATORS: GROUP 3 PUMPS (1-3
GROUPED); COMPRESSOR; WELDING MACHINES (1-3
GROUPED); GENERATOR; SIGHTING PLANT; HEATERS
(POWER DRIVEN, 1- 5); SYPHON-PULSOMETER; CONCRETE
MIXER; VALVES CONTROLLING PERMANENT PLANT AIR
STEAM, CONVEYOR, WELLPOINT SYSTEM (OPERATING)
HOURLY PREMIUM FOR BOOM LENGTHS (INCLUDING JIB):
OVER 150 FT. +2.18 OVER 185 FT. +3.84
OVER 210 FT. +5.39 OVER 250 FT. +8.16
OVER 295 FT. +11.29 OVER 350 FT. +13.14
FOOTNOTE FOR POWER EQUIPMENT OPERATORS: A. PAID
HOLIDAYS: NEW YEAR'S DAY, WASHINGTON,S BIRTHDAY,
LABOR DAY, MEMORIAL DAY, INDEPENDENCE DAY,

PATRIOT'S DAY, COLUMBUS DAY, VETERAN'S DAY, THANKSGIVING DAY, CHRISTMAS DAY.....$ 37.02 33.70

POWER EQUIPMENT OPERATORS: GROUP 2 SONIC OR VIBRATORY HAMMER; GRADER; SCRAPER; TANDEM SCRAPER; BULLDOZER; TRACTOR; MECHANIC - MAINTENANCE; YORK RAKE; MULCHING MACHINE; PAVING SCREED MACHINE;STATIONARY STEAM BOILER; PAVING CONCRETE FINISHING MACHINE; GROUT PUMP; PORTABLE STEAM BOILER; PORTABLE STEAM GENERATOR; ROLLER; SPREADER; ASPHALT PAVER; LOCOMOTIVES OR MACHINES USED IN PLACE THEREOF; TAMPER (SELF PROPELLED OR TRACTOR-DRAW); CAL TRACKS; BALLAST REGULATOR;RAIL ANCHOR MACHINE; SWITCH TAMPER; TIRE TRUCK HOURLY PREMIUM FOR BOOM LENGTHS (INCLUDING JIB): OVER 150 FT. +2.18 OVER 185 FT. +3.84 OVER 210 FT. +5.39 OVER 250 FT. +8.16 OVER 295 FT. +11.29 OVER 350 FT. +13.14 FOOTNOTE FOR POWER EQUIPMENT OPERATORS: A. PAID HOLIDAYS: NEW YEAR'S DAY, WASHINGTON,S BIRTHDAY, LABOR DAY, MEMORIAL DAY, INDEPENDENCE DAY, PATRIOT'S DAY, COLUMBUS DAY, VETERAN'S DAY, THANKSGIVING DAY, CHRISTMAS DAY.....$ 57.18 33.70

POWER EQUIPMENT OPERATORS: GROUP 1 POWER SHOVEL; CRANE; TRUCK CRANE; DERRICK; PILE DRIVER; TRENCHING MACHINE; MECHANICAL HOIST PAVEMENT BREAKER; CEMENT CONCRETE PAVER; DRAGLINE; HOISTING ENGINE; THREE DRUM MACHINE; PUMPCRETE MACHINE; LOADERS; SHOVEL DOZER; FRONT END LOADER; MUCKING MACHINE; SHAFT HOIST; STEAM ENGINE; BACKHOE; GRADALL; CABLE WAY; FORK LIFT; CHERRY PICKER; BORING MACHINE; ROTARY DRILL; POST HOLE HAMMER; POST HOLE DIGGER; ASPHALT PLANT ON JOB SITE; CONCRETE BATCHING AND/OR MIXING PLANT ON JOB SITE; CRUSHER PLANT ON JOB SITE; PAVING CONCRETE MIXER; TIMBER JACK HOURLY PREMIUM FOR BOOM LENGTHS (INCLUDING JIB): OVER 150 FT. +2.18 OVER 185 FT. +3.84 OVER 210 FT. +5.39 OVER 250 FT. +8.16 OVER 295 FT. +11.29 OVER 350 FT. +13.14 FOOTNOTE FOR POWER EQUIPMENT OPERATORS: A. PAID HOLIDAYS: NEW YEAR'S DAY, WASHINGTON,S BIRTHDAY, LABOR DAY, MEMORIAL DAY, INDEPENDENCE DAY, PATRIOT'S DAY,

COLUMBUS DAY, VETERAN'S DAY, THANKSGIVING DAY,
CHRISTMAS DAY.....$ 57.83
33.70

IRON0007-001 09/16/2025

Rates
Fringes
IRONWORKER: (AREA 2).....$ 53.46
37.67
IRONWORKER: (AREA 1).....$ 57.87
37.67

IRON0007-010 09/16/2025

Rates
Fringes
IRONWORKER (MIDDLESEX (ASHBY, ASHLAND, AYER,
BOXBORO, HOLLISTON, HOPKINTON, HUDSON, MARLBORO,
SHIRLEY, STOW, TOWNSEND); NORFOLK (MEDWAY)).....$ 57.57
37.67

IRON0037-002 09/16/2025

Rates
Fringes
IRONWORKER (BARNSTABLE; BRISTOL (ACUSHNET,
ATTLEBORO, BERKLEY, DARTMOUTH, DIGHTON, FAIRHAVEN,
FALL RIVER, FREETOWN, MANSFIELD, NEW BEDFORD, NORTH
ATTLEBORO, NORTON, RAYNHAM, REHOBOTH, SEEKONK,
SOMERSET, SWANSEA, TAUNTON, WESTPORT); DUKES;
NANTUCKET; NORFOLK (BILLINGHAM, FRANKLIN,
PLAINVILLE, WRENTHAM); PLYMOUTH (LAKEVILLE, MARION,
MATTAPOISETT, MIDDLEBORO, ROCHESTER, WAREHAM)).....$ 43.03
33.53

LABO0022-006 12/01/2024

Rates Fringes

LABORERS: GROUP 6- ASBESTOS ABATEMENT; TOXIC AND HAZARDOUS WASTE LABORERS (SUFFOLK COUNTY (BOSTON, CHELSEA, REVERE, WINTHROP, DEER & NUT ISLANDS); MIDDLESEX COUNTY (ARLINGTON, BELMONT, BURLINGTON, CAMBRIDGE, EVERETT, MALDEN, MEDFORD, MELROSE, READING, SOMERVILLE, STONEHAM, WAKEFIELD, WINCHESTER, WINTHROP AND WOBURN ONLY); NORFOLK COUNTY (BROOKLINE, DEDHAM, AND MILTON ONLY)).....$ 46.20 29.70

LABORERS: GROUP 5- FLAGGER (SUFFOLK COUNTY (BOSTON, CHELSEA, REVERE, WINTHROP, DEER & NUT ISLANDS); MIDDLESEX COUNTY (ARLINGTON, BELMONT, BURLINGTON, CAMBRIDGE, EVERETT, MALDEN, MEDFORD, MELROSE, READING, SOMERVILLE, STONEHAM, WAKEFIELD, WINCHESTER, WINTHROP AND WOBURN ONLY); NORFOLK COUNTY (BROOKLINE, DEDHAM, AND MILTON ONLY)).....$ 27.01 29.70

LABORERS: GROUP 4- BLASTER; POWDERMAN (SUFFOLK COUNTY (BOSTON, CHELSEA, REVERE, WINTHROP, DEER & NUT ISLANDS); MIDDLESEX COUNTY (ARLINGTON, BELMONT, BURLINGTON, CAMBRIDGE, EVERETT, MALDEN, MEDFORD, MELROSE, READING, SOMERVILLE, STONEHAM, WAKEFIELD, WINCHESTER, WINTHROP AND WOBURN ONLY); NORFOLK COUNTY (BROOKLINE, DEDHAM, AND MILTON ONLY)).....$ 46.20 29.70

LABORERS: GROUP 3- AIR TRACK OPERATOR; BLOCK PAVER; RAMMER; CURB SETTER (SUFFOLK COUNTY (BOSTON, CHELSEA, REVERE, WINTHROP, DEER & NUT ISLANDS); MIDDLESEX COUNTY (ARLINGTON, BELMONT, BURLINGTON, CAMBRIDGE, EVERETT, MALDEN, MEDFORD, MELROSE, READING, SOMERVILLE, STONEHAM, WAKEFIELD, WINCHESTER, WINTHROP AND WOBURN ONLY); NORFOLK COUNTY (BROOKLINE, DEDHAM, AND MILTON ONLY)).....$ 46.20 29.70

LABORERS: GROUP 2- ASPHALT RAKER; FENCE AND GUARD RAIL ERECTOR; LASER BEAM OPERATOR; MASON TENDER; PIPELAYER; PNEUMATIC DRILL OPERATOR; PNEUMATIC TOOL OPERATOR; WAGON DRILL OPERATOR (SUFFOLK COUNTY (BOSTON, CHELSEA, REVERE, WINTHROP, DEER & NUT ISLANDS); MIDDLESEX COUNTY (ARLINGTON, BELMONT, BURLINGTON, CAMBRIDGE, EVERETT, MALDEN, MEDFORD,

MELROSE, READING, SOMERVILLE, STONEHAM, WAKEFIELD, WINCHESTER, WINTHROP AND WOBURN ONLY); NORFOLK COUNTY (BROOKLINE, DEDHAM, AND MILTON ONLY))........$ 46.20 29.70
LABORERS: GROUP 1- LABORERS; CARPENTER TENDERS; CEMENT FINISHER TENDERS (SUFFOLK COUNTY (BOSTON, CHELSEA, REVERE, WINTHROP, DEER & NUT ISLANDS); MIDDLESEX COUNTY (ARLINGTON, BELMONT, BURLINGTON, CAMBRIDGE, EVERETT, MALDEN, MEDFORD, MELROSE, READING, SOMERVILLE, STONEHAM, WAKEFIELD, WINCHESTER, WINTHROP AND WOBURN ONLY); NORFOLK COUNTY (BROOKLINE, DEDHAM, AND MILTON ONLY))........$ 46.20 29.70

LABO0022-012 12/01/2024

Rates Fringes
LABORERS: GROUP 6- ASBESTOS ABATEMENT; TOXIC AND HAZARDOUS WASTE LABORERS (COUNTIES OF BARNSTABLE; BRISTOL; DUKES; ESSEX; NANTUCKET; PLYMOUTH; MIDDLESEX (WITH THE EXCEPTION OF ARLINGTON, BELMONT, BURLINGTON, CAMBRIDGE, EVERETT, MALDEN, MELROSE, READING, SOMERVILLE, STONEHAM, WAKEFIELD, WINCHESTER, WINTHROP AND WOBURN); NORFOLK (WITH THE EXCEPTION OF BROOKLINE, DEDHAM, AND MILTON))........$ 46.10 29.70
LABORERS: GROUP 5- FLAGGER (COUNTIES OF BARNSTABLE; BRISTOL; DUKES; ESSEX; NANTUCKET; PLYMOUTH; MIDDLESEX (WITH THE EXCEPTION OF ARLINGTON, BELMONT, BURLINGTON, CAMBRIDGE, EVERETT, MALDEN, MELROSE, READING, SOMERVILLE, STONEHAM, WAKEFIELD, WINCHESTER, WINTHROP AND WOBURN); NORFOLK (WITH THE EXCEPTION OF BROOKLINE, DEDHAM, AND MILTON))..........$ 27.01 29.70
LABORERS: GROUP 4- BLASTER; POWDERMAN (COUNTIES OF BARNSTABLE; BRISTOL; DUKES; ESSEX; NANTUCKET; PLYMOUTH; MIDDLESEX (WITH THE EXCEPTION OF ARLINGTON, BELMONT, BURLINGTON, CAMBRIDGE, EVERETT, MALDEN, MELROSE, READING, SOMERVILLE, STONEHAM, WAKEFIELD, WINCHESTER, WINTHROP AND WOBURN);

NORFOLK (WITH THE EXCEPTION OF BROOKLINE, DEDHAM,
AND MILTON))..... $ 38.95
29.70
LABORERS: GROUP 3- AIR TRACK OPERATOR; BLOCK PAVER;
RAMMER; CURB SETTER; HYDRAULIC & SIMILAR SELF
POWERE DRILLS (COUNTIES OF BARNSTABLE; BRISTOL;
DUKES; ESSEX; NANTUCKET; PLYMOUTH; MIDDLESEX (WITH
THE EXCEPTION OF ARLINGTON, BELMONT, BURLINGTON,
CAMBRIDGE, EVERETT, MALDEN, MELROSE, READING,
SOMERVILLE, STONEHAM, WAKEFIELD, WINCHESTER,
WINTHROP AND WOBURN); NORFOLK (WITH THE EXCEPTION
OF BROOKLINE, DEDHAM, AND MILTON))..... $ 38.95
29.70
LABORERS: GROUP 2- ASPHALT RAKER; FENCE AND GUARD
RAIL ERECTOR; LASER BEAM OPERATOR; MASON TENDER;
PIPELAYER; PNEUMATIC DRILL OPERATOR; PNEUMATIC TOOL
OPERATOR; WAGON DRILLPERATOR (COUNTIES OF
BARNSTABLE; BRISTOL; DUKES; ESSEX; NANTUCKET;
PLYMOUTH; MIDDLESEX (WITH THE EXCEPTION OF
ARLINGTON, BELMONT, BURLINGTON, CAMBRIDGE, EVERETT,
MALDEN, MELROSE, READING, SOMERVILLE, STONEHAM,
WAKEFIELD, WINCHESTER, WINTHROP AND WOBURN);
NORFOLK (WITH THE EXCEPTION OF BROOKLINE, DEDHAM,
AND MILTON))..... $ 38.95
29.70
LABORERS: GROUP 1- LABORERS; CARPENTER TENDERS;
CEMENT FINISHER TENDERS (COUNTIES OF BARNSTABLE;
BRISTOL; DUKES; ESSEX; NANTUCKET; PLYMOUTH;
MIDDLESEX (WITH THE EXCEPTION OF ARLINGTON,
BELMONT, BURLINGTON, CAMBRIDGE, EVERETT, MALDEN,
MELROSE, READING, SOMERVILLE, STONEHAM, WAKEFIELD,
WINCHESTER, WINTHROP AND WOBURN); NORFOLK (WITH THE
EXCEPTION OF BROOKLINE, DEDHAM, AND MILTON))..... $ 38.95
29.70

LABO0022-013 12/01/2024

Rates
Fringes
LABORERS:(TUNNELS, CAISSON & CYLINDER WORK IN
COMPRESSED AIR), GROUP 6 HAZARDOUS WASTE WORK
WITHIN THE ""HOT"" ZONE. (A PREMIUM OF TWO DOLLARS
$2.00 PER HOUR OVER THE BASIC WAGE RATE. FOOTNOTE

FOR LABORERS: A. PAID HOLIDAYS: NEW YEAR'S DAY, WASHINGTON'S BIRTHDAY, PATRIOT'S DAY, MEMORIAL DAY, INDEPENDENCE DAY, LABOR DAY, COLUMBUS DAY, VETERAN'S DAY, THANKSGIVING DAY, AND CHRISTMAS DAY $ 58.43 29.70

LABORERS: LABORERS; TOP MAN ((OPEN AIR CASSONS, UNDERPINNING AND TEST BORING INDUSTRIES):).....$ 41.18 29.70

LABORERS: LABORERS; TOP MAN ((OPEN AIR CASSONS, UNDERPINNING AND TEST BORING INDUSTRIES):).....$ 46.20 29.70

LABORERS: LABORER ((OPEN AIR CASSONS, UNDERPINNING AND TEST BORING INDUSTRIES):).....$ 41.18 29.70

LABORERS: LABORER ((OPEN AIR CASSONS, UNDERPINNING AND TEST BORING INDUSTRIES):).....$ 46.20 29.70

LABORERS: GROUP 5 (ROCK SHAFT, CONCRETE LINING OF SAME AND TUNNEL IN FREE AIR).....$ 47.48 29.70

LABORERS: GROUP 5 (ROCK SHAFT, CONCRETE LINING OF SAME AND TUNNEL IN FREE AIR).....$ 52.50 29.70

LABORERS: GROUP 5 ((TUNNELS, CAISSON & CYLINDER WORK IN COMPRESSED AIR)).....$ 53.41 29.70

LABORERS: GROUP 5 ((TUNNELS, CAISSON & CYLINDER WORK IN COMPRESSED AIR)).....$ 58.43 29.70

LABORERS: GROUP 4 (ROCK SHAFT, CONCRETE LINING OF SAME AND TUNNEL IN FREE AIR).....$ 45.48 29.70

LABORERS: GROUP 4 (ROCK SHAFT, CONCRETE LINING OF SAME AND TUNNEL IN FREE AIR).....$ 50.50 29.70

LABORERS: GROUP 4 ((TUNNELS, CAISSON & CYLINDER WORK IN COMPRESSED AIR)).....$ 53.41 29.70

LABORERS: GROUP 4 ((TUNNELS, CAISSON & CYLINDER WORK IN COMPRESSED AIR)).....$ 58.43 29.70

LABORERS: GROUP 3 (ROCK SHAFT, CONCRETE LINING OF SAME AND TUNNEL IN FREE AIR).....$ 45.48 29.70

LABORERS: GROUP 3 (ROCK SHAFT, CONCRETE LINING OF SAME AND TUNNEL IN FREE AIR).....$ 50.50 29.70
LABORERS: GROUP 3 ((TUNNELS, CAISSON & CYLINDER WORK IN COMPRESSED AIR)).....$ 53.41 29.70
LABORERS: GROUP 3 ((TUNNELS, CAISSON & CYLINDER WORK IN COMPRESSED AIR)).....$ 58.43 29.70
LABORERS: GROUP 2 (ROCK SHAFT, CONCRETE LINING OF SAME AND TUNNEL IN FREE AIR).....$ 45.48 29.70
LABORERS: GROUP 2 (ROCK SHAFT, CONCRETE LINING OF SAME AND TUNNEL IN FREE AIR).....$ 50.50 29.70
LABORERS: GROUP 2 (CLEANING CONCRETE AND CAULKING TUNNEL (Both New & Existing)).....$ 45.48 29.70
LABORERS: GROUP 2 (CLEANING CONCRETE AND CAULKING TUNNEL (Both New & Existing)).....$ 50.50 29.70
LABORERS: GROUP 2 ((TUNNELS, CAISSON & CYLINDER WORK IN COMPRESSED AIR)).....$ 53.41 29.70
LABORERS: GROUP 2 ((TUNNELS, CAISSON & CYLINDER WORK IN COMPRESSED AIR)).....$ 58.43 29.70
LABORERS: GROUP 2 ((FREE AIR OPERATION): SHIELD DRIVEN AND LINER PLATE IN FREE AIR)).....$ 50.50 29.70
LABORERS: GROUP 1 (ROCK SHAFT, CONCRETE LINING OF SAME AND TUNNEL IN FREE AIR).....$ 42.93 29.70
LABORERS: GROUP 1 (ROCK SHAFT, CONCRETE LINING OF SAME AND TUNNEL IN FREE AIR).....$ 47.95 29.70
LABORERS: GROUP 1 (CLEANING CONCRETE AND CAULKING TUNNEL (Both New & Existing)).....$ 45.48 29.70
LABORERS: GROUP 1 (CLEANING CONCRETE AND CAULKING TUNNEL (Both New & Existing)).....$ 50.50 29.70
LABORERS: GROUP 1 ((TUNNELS, CAISSON & CYLINDER WORK IN COMPRESSED AIR)).....$ 42.93 29.70

LABORERS: GROUP 1 ((TUNNELS, CAISSON & CYLINDER WORK IN COMPRESSED AIR))..... $ 47.95 29.70
LABORERS: GROUP 1 ((FREE AIR OPERATION): SHIELD DRIVEN AND LINER PLATE IN FREE AIR))..... $ 50.50 29.70
LABORERS: DRILLER ((OPEN AIR CASSONS, UNDERPINNING AND TEST BORING INDUSTRIES):)..... $ 42.58 29.70
LABORERS: DRILLER ((OPEN AIR CASSONS, UNDERPINNING AND TEST BORING INDUSTRIES):)..... $ 50.20 29.70
LABORERS: BOTTOM MAN ((OPEN AIR CASSONS, UNDERPINNING AND TEST BORING INDUSTRIES):)..... $ 42.33 29.70
LABORERS: BOTTOM MAN ((OPEN AIR CASSONS, UNDERPINNING AND TEST BORING INDUSTRIES):)..... $ 47.35 29.70
((OPEN AIR CASSONS, UNDERPINNING AND TEST BORING INDUSTRIES):)..... $ 41.18 29.70
((OPEN AIR CASSONS, UNDERPINNING AND TEST BORING INDUSTRIES):)..... $ 42.33 29.70
((OPEN AIR CASSONS, UNDERPINNING AND TEST BORING INDUSTRIES):)..... $ 42.58 29.70

LABO1421-001 12/02/2024

Rates Fringes

LABORERS:, WRECKING: GROUP 6 ASBESTOS, LEAD PAINT, TOXIC AND HAZARDOUS WASTE..... $ 46.25 29.70
LABORERS:, WRECKING: GROUP 5 YARDMAN, BURNERS, SAWYERS..... $ 45.35 29.70
LABORERS:, WRECKING: GROUP 4 YARDMAN (SALVAGE YARD ONLY)..... $ 42.25 29.70
LABORERS:, WRECKING: GROUP 3 SMALL BACKHOES, LOADERS ON TRACKS, BOBCAT TYPE LOADERS, HYDRAULIC

""BROCK"" TYPE HAMMER OPERATORS, CONCRETE CUTTING SAWS.....$ 47.25 29.70
LABORERS:, WRECKING: GROUP 2 BURNERS, JACKHAMMERS...$ 47.00 29.70
LABORERS:, WRECKING: GROUP 1 ADZEMAN, WRECKING LABORER.....$ 46.25 29.70

PAIN0035-001 07/01/2024

Rates Fringes
PAINTER BRIDGE (BARNSTABLE BRISTOL; DUKES; ESSEX; NANTUCKET; PLYMOUTH (Remainder of NORFOLK; MIDDLESEX AND SUFFOLK COUNTIES)).....$ 56.76 36.00

PAIN0035-015 07/01/2024

Rates Fringes
PAINTER SPAY NEW CONSTRUCTION: SANDBLAST.....$ 47.66 36.00
PAINTER REPAINT: SPRAY, SANDBLAST.....$ 45.72 36.00
PAINTER BRUSH, TAPER (Repaint).....$ 44.32 36.00
PAINTER BRUSH, TAPER (NEw Construction).....$ 46.26 36.00
PAINTER BRIDGE (MIDDLESEX (Cambridge, Everett, Malden, Medford, Sommerville) SUFFOLK COUNTY (Boston, Chelsea) NORFOLK COUNTY (Brookline)).....$ 56.76 36.00

PLAS0534-001 07/01/2024

Rates Fringes
CEMENT MASON/CONCRETE FINISHER (ESSEX; MIDDLESEX;

NORFOLK AND SUFFOLK COUNTY).....$ 49.19
40.86

PLUM0004-001 09/01/2025

Rates
Fringes
PLUMBERS AND PIPEFITTERS (MIDDLESEX (ASHBY,
AYER-WEST OF GREENVILLE BRANCH OF BOSTON AND MAINE
RAILROAD, FT. DEVENS, GROTON, SHIRLEY, TOWNSEND))...$ 55.00
31.57

PLUM0012-001 03/02/2025

Rates
Fringes
PLUMBER (ESSEX (AMES, ANDOVER, BEVERLY, BOXFORD,
BYFIELD, DANVERS, ESSEX, GEORGETOWN, GLOUCESTER,
GROVELAND, HAMILTON, HAVERHILL, IPSWICH,
LAWRENCE,MANCHESTER, MARBLEHEAD, MERRIMAC, METHUEM,
MIDDLETON, NEWBURY, NEWBURYPORT, NORTH ANDOVER,
PEABODY, ROCKPORT, ROWLEY, SALEM, SALISBURY,
TOPSFIEILD, WENHAM, WEST NEWBURY)).....$ 69.84
36.43

PLUM0012-003 03/02/2025

Rates
Fringes
PLUMBER, PIPEFITTER, STEAMFITTER (ESSEX (AMES,
ANDOVER, BEVERLY, BOXFORD, BYFIELD, DANVERS, ESSEX,
GEORGETOWN, GLOUCESTER, GROVELAND, HAMILTON,
HAVERHILL, IPSWICH, LAWRENCE, MANCHESTER,
MARBLEHEAD, MERRIMAC, METHUEN, MIDDLETON, NEWBURY,
NEWBURYPORT, NORTH ANDOVER, PEABODY, ROCKPORT,
ROWLEY, SALEM, SALISBURY, TOPSFIELD, WENHAM, WEST
NEWBURY)).....$ 69.84
36.43

PLUM0012-006 03/02/2025

	Rates	Fringes
PLUMBER (ESSEX (LYNN, LYNNFIELD, NAHANT, SAUGUS, AND SWAMPSCOTT); MIDDLESEX (ACTON, ARLINGTON, ASHLAND, AYER - EXCEPT W. OF GREENVILLE BRANCH OF BOSTON & MAINE RR, BEDFORD, BELMONT, BILLERICA, BOXBORO, BURLINGTON, CAMBRIDGE, CARLISLE, CHELMSFORD, CONCORD, DRACUT, DUNSTABLE, EVERETT, FRAMINGHAM, HUDSON, HOLLISTON, HOPKINTON, LEXINGTON, LINCOLN, LITTLETON, LOWELL, MALDEN, MARLBORO, MAYNARD, MEDFORD, MELROSE, NATICK, NEWTON, NORTH READING, PEPPERELL, READING, SHERBORN, SOMERVILLE, STONEHAM, S	$ 69.84	36.43

PLUM0051-005 08/26/2024

	Rates	Fringes
PLUMBERS AND PIPEFITTERS (BARNSTABLE; BRISTOL; DUKES; NANTUCKET; NORFOLK (AVON, HOLBROOK, RANDOLPH, STOUGHTON) PLYMOUTH(REMAINDER OF COUNTY)).	$ 52.49	33.60

PLUM0537-001 03/01/2025

	Rates	Fringes
PIPEFITTER (MIDDLESEX (ARLINGTON, CAMBRIDGE, EVERETT, MALDEN, MEDFORD, MELROSE, READING, WAKEFIELD, WINCHESTER AND WOBURN); NORFOLK (BELLINGHAM, BRAINTREE, BROOKLINE, CANTON CASHASSET, DEDHAM, FOXBORO, FRANKLIN, MILLIS, MILTON, SHARON, WALPOLE, WESTWOOD, AND WRENTHAN); PLYMOUTH (HINGHAM, HULL, SCITUATE); ESSEX (AMES, ANDOVER, BEVERLY, BOXFORD, BYFIELD, DANVERS, ESSEX, GEORGETOWN, GLOUCESTER, GROVELAND, HAMILTON, HAVERHILL, IPSWICH, LAWRENCE,LYNN, LYNNFIELD, MANCHESTER, MARBLEHEAD, MERRIMAC, MET	$ 66.58	39.22

TEAM0379-001 06/01/2025

Rates Fringes

TRUCK DRIVERS: GROUP 7 TRAILERS FOR EARTH MOVING EQUIPMENT (DOUBLE HOOKUP) POWER TRUCKS $.25 DIFFERENTIAL BY AXLE TUNNEL WORK (UNDERGROUND ONLY) $.40 DIFFERENTIAL BY AXLE HAZARDOUS MATERIALS (IN HOT ZONE ONLY) $2.00 PREMIUM
FOOTNOTES: A. PAID HOLIDAYS: NEW YEAR'S DAY, WASHINGTON'S BIRTHDAY, MEMORIAL DAY, INDEPENDENCE DAY, LABOR DAY, PATRIOT'S DAY, COLUMBUS DAY, VETERAN'S DAY, THANKSGIVING DAY AND CHRISTMAS DAY
B. PAID VACATION: EMPLOYEES WITH 4 MONTHS TO 1 YEAR OF SERVICE RECEIVE 1/2 DAY'S PAY PER MONTH; 1 WEEK VACATION FOR 1 - 5 YEARS OF SERVICE; 2 WEEKS VACATION FOR 5 - 10 YEARS OF SERVICE; AND 3 WEEKS VACATION FOR MORE THAN 10 YEARS OF SERVICE.....$ 41.82 37.35

TRUCK DRIVERS: GROUP 6 SPECIALIZED EARTH MOVING EQUIPMENT OVER 35 TONS POWER TRUCKS $.25 DIFFERENTIAL BY AXLE TUNNEL WORK (UNDERGROUND ONLY) $.40 DIFFERENTIAL BY AXLE HAZARDOUS MATERIALS (IN HOT ZONE ONLY) $2.00 PREMIUM
FOOTNOTES: A. PAID HOLIDAYS: NEW YEAR'S DAY, WASHINGTON'S BIRTHDAY, MEMORIAL DAY, INDEPENDENCE DAY, LABOR DAY, PATRIOT'S DAY, COLUMBUS DAY, VETERAN'S DAY, THANKSGIVING DAY AND CHRISTMAS DAY
B. PAID VACATION: EMPLOYEES WITH 4 MONTHS TO 1 YEAR OF SERVICE RECEIVE 1/2 DAY'S PAY PER MONTH; 1 WEEK VACATION FOR 1 - 5 YEARS OF SERVICE; 2 WEEKS VACATION FOR 5 - 10 YEARS OF SERVICE; AND 3 WEEKS VACATION FOR MORE THAN 10 YEARS OF SERVICE.....$ 41.53 37.35

TRUCK DRIVERS: GROUP 5 SPECIALIZED EARTH MOVING EQUIPMENT UNDER 35 TONS OTHER THAN CONVENTIONAL TYPE TRUCKS; LOW BED; VACHUAL; MECHANICS, PAVING RESTORATION EQUIPMENT POWER TRUCKS $.25 DIFFERENTIAL BY AXLE TUNNEL WORK (UNDERGROUND ONLY) $.40 DIFFERENTIAL BY AXLE HAZARDOUS MATERIALS (IN HOT ZONE ONLY) $2.00 PREMIUM

FOOTNOTES: A. PAID HOLIDAYS: NEW YEAR'S DAY, WASHINGTON'S BIRTHDAY, MEMORIAL DAY, INDEPENDENCE DAY, LABOR DAY, PATRIOT'S DAY, COLUMBUS DAY, VETERAN'S DAY, THANKSGIVING DAY AND CHRISTMAS DAY
B. PAID VACATION: EMPLOYEES WITH 4 MONTHS TO 1 YEAR OF SERVICE RECEIVE 1/2 DAY'S PAY PER MONTH; 1 WEEK VACATION FOR 1 - 5 YEARS OF SERVICE; 2 WEEKS VACATION FOR 5 - 10 YEARS OF SERVICE; AND 3 WEEKS VACATION FOR MORE THAN 10 YEARS OF SERVICE.....$ 41.24
37.35
TRUCK DRIVERS: GROUP 4 FOUR AND FIVE AXLE EQUIPMENT
POWER TRUCKS $.25 DIFFERENTIAL BY AXLE TUNNEL WORK (UNDERGROUND ONLY) $.40 DIFFERENTIAL BY AXLE HAZARDOUS MATERIALS (IN HOT ZONE ONLY) $2.00
PREMIUM FOOTNOTES: A. PAID HOLIDAYS: NEW YEAR'S DAY, WASHINGTON'S BIRTHDAY, MEMORIAL DAY, INDEPENDENCE DAY, LABOR DAY, PATRIOT'S DAY, COLUMBUS DAY, VETERAN'S DAY, THANKSGIVING DAY AND CHRISTMAS DAY B. PAID VACATION: EMPLOYEES WITH 4 MONTHS TO 1 YEAR OF SERVICE RECEIVE 1/2 DAY'S PAY PER MONTH; 1 WEEK VACATION FOR 1 - 5 YEARS OF SERVICE; 2 WEEKS VACATION FOR 5 - 10 YEARS OF SERVICE; AND 3 WEEKS VACATION FOR MORE THAN 10 YEARS OF SERVICE.....$ 41.14
37.35
TRUCK DRIVERS: GROUP 3 THREE AXLE EQUIPMENT AND TIREMAN POWER TRUCKS $.25 DIFFERENTIAL BY AXLE TUNNEL WORK (UNDERGROUND ONLY) $.40 DIFFERENTIAL BY AXLE HAZARDOUS MATERIALS (IN HOT ZONE ONLY) $2.00
PREMIUM FOOTNOTES: A. PAID HOLIDAYS: NEW YEAR'S DAY, WASHINGTON'S BIRTHDAY, MEMORIAL DAY, INDEPENDENCE DAY, LABOR DAY, PATRIOT'S DAY, COLUMBUS DAY, VETERAN'S DAY, THANKSGIVING DAY AND CHRISTMAS DAY B. PAID VACATION: EMPLOYEES WITH 4 MONTHS TO 1 YEAR OF SERVICE RECEIVE 1/2 DAY'S PAY PER MONTH; 1 WEEK VACATION FOR 1 - 5 YEARS OF SERVICE; 2 WEEKS VACATION FOR 5 - 10 YEARS OF SERVICE; AND 3 WEEKS VACATION FOR MORE THAN 10 YEARS OF SERVICE.....$ 41.02
37.35
TRUCK DRIVERS: GROUP 2 TWO AXLE EQUIPMENT; &
FORKLIFT OPERATOR POWER TRUCKS $.25 DIFFERENTIAL BY AXLE TUNNEL WORK (UNDERGROUND ONLY) $.40 DIFFERENTIAL BY AXLE HAZARDOUS MATERIALS (IN HOT

ZONE ONLY) $2.00 PREMIUM FOOTNOTES: A. PAID HOLIDAYS: NEW YEAR'S DAY, WASHINGTON'S BIRTHDAY, MEMORIAL DAY, INDEPENDENCE DAY, LABOR DAY, PATRIOT'S DAY, COLUMBUS DAY, VETERAN'S DAY, THANKSGIVING DAY AND CHRISTMAS DAY B. PAID VACATION: EMPLOYEES WITH 4 MONTHS TO 1 YEAR OF SERVICE RECEIVE 1/2 DAY'S PAY PER MONTH; 1 WEEK VACATION FOR 1 - 5 YEARS OF SERVICE; 2 WEEKS VACATION FOR 5 - 10 YEARS OF SERVICE; AND 3 WEEKS VACATION FOR MORE THAN 10 YEARS OF SERVICE.....$ 40.95
37.35
TRUCK DRIVERS: GROUP 1 STATION WAGONS; PANEL TRUCKS; AND PICKUP TRUCKS POWER TRUCKS $.25 DIFFERENTIAL BY AXLE TUNNEL WORK (UNDERGROUND ONLY) $.40 DIFFERENTIAL BY AXLE HAZARDOUS MATERIALS (IN HOT ZONE ONLY) $2.00 PREMIUM FOOTNOTES: A. PAID HOLIDAYS: NEW YEAR'S DAY, WASHINGTON'S BIRTHDAY, MEMORIAL DAY, INDEPENDENCE DAY, LABOR DAY, PATRIOT'S DAY, COLUMBUS DAY, VETERAN'S DAY, THANKSGIVING DAY AND CHRISTMAS DAY B. PAID VACATION: EMPLOYEES WITH 4 MONTHS TO 1 YEAR OF SERVICE RECEIVE 1/2 DAY'S PAY PER MONTH; 1 WEEK VACATION FOR 1 - 5 YEARS OF SERVICE; 2 WEEKS VACATION FOR 5 - 10 YEARS OF SERVICE; AND 3 WEEKS VACATION FOR MORE THAN 10 YEARS OF SERVICE.....$ 40.78
37.35

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.
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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave
for Federal Contractors applies to all contracts subject to the
Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this
contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year.

Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at https://www.dol.gov/agencies/whd/government-contracts.

Note: Executive Order 13658 generally applies to contracts subject to the Davis-Bacon Act that were awarded on or between January 1, 2015 and January 29, 2022, and that have not been renewed or extended on or after January 30, 2022. Executive Order 13658 does not apply to contracts subject only to the Davis-Bacon Related Acts regardless of when they were awarded. If a contract is subject to Executive Order 13658, the contractor must pay all covered workers at least $13.65 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract from May 11, 2026, through December 31, 2026. The applicable Executive Order minimum wage rate will be adjusted annually.
Additional information on contractor requirements and worker

protections under Executive Order 13658 is available at www.dol.gov/whd/govcontracts.

Unlisted classifications needed for work not included within
the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses
(29CFR 5.5 (a) (1) (iii)).

The body of each wage determination lists the classifications
and wage rates that have been found to be prevailing for the
type(s) of construction and geographic area covered by the wage
determination. The classifications are listed in alphabetical
order under rate identifiers indicating whether the particular
rate is a union rate (current union negotiated rate), a survey
rate, a weighted union average rate, a state adopted rate, or a
supplemental classification rate.

Union Rate Identifiers

A four-letter identifier beginning with characters other than
"SU", "UAVG", "SA", or "SC" denotes that a union rate was prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2024. PLUM is an identifier of the union whose collectively bargained rate prevailed in the survey for
this classification, which in this example would be Plumbers.
0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next

number, 005 in the example, is an internal number used in processing the wage determination. The date, 07/01/2024 in the example, is the effective date of the most current negotiated rate.

Union prevailing wage rates are updated to reflect all changes over time that are reported to WHD in the rates in the collective bargaining agreement (CBA) governing the classification.

Union Average Rate Identifiers

The UAVG identifier indicates that no single rate prevailed for those classifications, but that 100% of the data reported for the classifications reflected union rates. EXAMPLE: UAVG-OH-0010 01/01/2024. UAVG indicates that the rate is a weighted union average rate. OH indicates the State of Ohio. The next number, 0010 in the example, is an internal number used in producing the wage determination. The date, 01/01/2024 in the example, indicates the date the wage determination was updated to reflect the most current union average rate.

A UAVG rate will be updated once a year, usually in January, to reflect a weighted average of the current rates in the collective bargaining agreements on which the rate is based.

Survey Rate Identifiers

The "SU" identifier indicates that either a single non-union rate prevailed (as defined in 29 CFR 1.2) for this classification in the survey or that the rate was derived by

computing a weighted average rate based on all the rates reported in the survey for that classification. As a weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SUFL2022-007 6/27/2024. SU indicates the rate is a single non-union prevailing rate or a weighted average of survey data for that classification. FL indicates the State of Florida. 2022 is the year of the survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. The date, 6/27/2024 in the example, indicates the survey completion date for the classifications and rates under that identifier.

"SU" wage rates typically remain in effect until a new survey is conducted. However, the Wage and Hour Division (WHD) has the discretion to update such rates under 29 CFR 1.6(c)(1).

State Adopted Rate Identifiers

The "SA" identifier indicates that the classifications and prevailing wage rates set by a state (or local) government were adopted under 29 C.F.R 1.3(g)-(h). Example: SAME2023-007 01/03/2024. SA reflects that the rates are state adopted. ME refers to the State of Maine. 2023 is the year during which the state completed the survey on which the listed classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. The date, 01/03/2024 in the example, reflects the date on which

the classifications and rates under the "SA" identifier took
effect under state law in the state from which the rates were
adopted.

WAGE DETERMINATION APPEALS PROCESS

1) Has there been an initial decision in the matter? This can
be:

a) a survey underlying a wage determination
b) an existing published wage determination
c) an initial WHD letter setting forth a position on
a wage determination matter
d) an initial conformance (additional classification
and rate) determination

On survey related matters, initial contact, including requests
for summaries of surveys, should be directed to the WHD Branch
of Wage Surveys. Requests can be submitted via email to
davisbaconinfo@dol.gov or by mail to:

Branch of Wage Surveys
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

Regarding any other wage determination matter such as
conformance decisions, requests for initial decisions should be
directed to the WHD Branch of Construction Wage Determinations.
Requests can be submitted via email to BCWD-Office@dol.gov or
by mail to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2) If an initial decision has been issued, then any interested party (those affected by the action) that disagrees with the decision can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Requests for review and reconsideration can be submitted via email to dba.reconsideration@dol.gov or by mail to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210.

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END OF GENERAL DECISION

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DOCUMENT A00801

SPECIAL PROVISIONS

RAYNHAM- TAUNTON
Federal Aid Project No. HPP/STP-0035(073)X
Bridge Replacement, R-02-003=T-01-004 (3M4), South Street
East Over the Taunton River

Labor participation goals for this Project shall be 15.3% for minorities and 6.9% for women for each job category. The goals are applicable to both Contractor's and Subcontractor's on-site construction workforce. Refer to Document 00820 for details.

SCOPE OF WORK

All work under this Contract shall be done in conformance with the *2026 Standard Specifications for Highways and Bridges, the Supplemental Specifications* contained in this book, the *Construction Standard Details* in effect as of July 2026, the *1990 Standard Drawings for Signs and Supports*, the 2015 *Overhead Signal Structure and Foundation Standard Drawings*, the *11th Edition of the Manual on Uniform Traffic Control Devices (MUTCD)* and the *January 2026 Massachusetts Amendments to the MUTCD*, *the 1968 Standard Drawings for Traffic Signals and Highway Lighting*, the latest edition of The *American Standard for Nursery Stock*, the Plans and these Special Provisions.

The work under this Contract includes the superstructure replacement of Bridge No. R-02-003=T-01-004 South Street East/Old Colony Avenue over Taunton River. The work includes removing and disposing of the existing bridge superstructure; removing and disposing of portions of the existing bridge abutments, wingwalls, and piers; installing abutment, pier, and wall caps; installing continuous steel beam and reinforced concrete deck superstructure; installing approach slabs, highway guardrail transitions, and metal bridge rail. The work also includes temporary water control, excavation, riprap channel protection, sidewalks, full depth roadway construction, fine milling and overlay, pavement markings, utility relocations, the provisions of safety controls and signing for construction operations, and other incidental work included in the contract documents.

SUBSECTION 7.05 INSURANCE REQUIREMENTS

The insurance requirements set forth in this subsection are in addition to the requirements of the Standard Specifications.

7.05.B: Public Liability Insurance 4.

Asbestos Liability Insurance shall be obtained for this project.

INSURANCE REQUIREMENTS

The insurance requirements set forth in this section are in addition to the requirements of the Standard Specifications.

Railroad Operations Directorate: Section F:

. The Contractor shall furnish, with respect to the operations of the Contractor or any of the Contractor's Subcontractors performing within the Railroad right-of-way, broad form Railroad Protective Liability Insurance covering all work performed under this Contract in the amount of not less than $5,000,000 per occurrence, $10,000,000 aggregate combined bodily injury and property damage. The Contractor shall carry Worker's Compensation Insurance, including Employers Liability Insurance as provided by Massachusetts General Laws, Chapter 152, as amended, covering all work performed by him under the Contract. The Contractor shall carry Umbrella Liability Coverage with limits of not less than $10,000,000 per occurrence, covering all work performed by him under this Contract. Automobile Liability Insurance: The Contractor shall provide Automobile Liability Insurance to include the use of all vehicles; owned, leased, hired and non-owned, with limits not less than $1,000,000 combined single limit covering all work performed under the Contract.

2. Such insurance shall be written on an occurrence basis.

3. The MBTA and applicable railroads shall be the named insureds on such insurance. Additional named insured are listed below. Original policies and certificates shall be made out to the MBTA and applicable railroads and mailed to:

MBTA: Treasurer-Controller
Massachusetts Bay Transportation Authority
10 Park Plaza
Boston, MA 02116
Tel. (617) 222-3064

Keolis: General Counsel
Keolis Commuter Services, LLC
470 Atlantic Avenue
Boston, MA 02210

AMTRAK: General Superintendent
230 Congress Street
Boston, MA 02110
Tel. (617) 654-2020

CSX: General Manager
CSX
1 Bell Crossing Road
RD. #2, Box 145
Selkirk, NY 12158-9618
Tel. (518) 767-6111

INSURANCE REQUIREMENTS (Continued)

4. The Contractor shall furnish to the MBTA and railroad companies a signed original of the Railroad Protective Liability Policy prior to entry upon the railroad right-of-way.

5. Such policies shall provide 30 days notice to each named insured by the insurance company before any change or cancellation of the policies.

6. Such Railroad Protective Insurance policies may be provided in forms commonly referred to as AAR/AASHTO or ISO/RIMA but not Oregon.

Questions regarding insurance should be directed to the MBTA's Risk Manager at 617-222-3064.

The contractor shall be aware of the latest MBTA insurance limits / requirements. See the following link for more information:
https://www.mbtarealty.com/licenses.html

CONTRACTOR QUESTIONS AND ADDENDUM ACKNOWLEDGEMENTS

Prospective bidders are required to submit all questions to the Construction Contracts Engineer by 3:00 P.M. on the Tuesday of the previous week before the scheduled bid opening date. Any questions received after this time will not be considered for review by the Department.

Contractors should email questions and addendum acknowledgements to the following email address massdotspecifications@dot.state.ma.us The MassDOT proposal number and municipality is to be placed in the subject line.

NONCONFORMING COMPRESSIVE STRENGTH OF CEMENT CONCRETE

Concrete with compressive strength test results failing to attain the limits specified in Table 901.64-3 of 901.64.B: Acceptance Testing shall be evaluated for structural adequacy and serviceability at the Contractors' expense. The Department will review all production records, the concrete test records, petrographic analysis report, field notes, and the placement records for the concrete in question. If the Engineer determines the material is found to be adequate to remain in place, payment shall be adjusted in accordance with the following formula:

$$P = \frac{2(fc - f'c)(UP)(Q)}{f'c}$$

Where:

P = pay adjustment for substandard concrete
$f'c$ = specified minimum compressive strength at 28 days
fc = substandard concrete cylinder compressive strength at 56 days
Q = quantity of concrete represented by the acceptance cylinders tested
UP = unit contract price or the lump sum breakdown price per cubic yard for the class of concrete involved complete in place

BUILD AMERICA BUY AMERICA PREFERENCE

On Federally-aid projects the Buy America (23.CFR § 635.410) and Build America, Buy America Act. requires the following,

(1) all iron and steel used in the project are produced in the United States--this means all manufacturing processes, from the initial melting stage through the application of coatings, must occur in the United States. Foreign steel and iron can be used if the cost of the materials does not exceed 0.1% of the total Contract cost or $2,500, whichever is greater. The action of applying a coating to a covered material (i.e., steel and iron) is deemed a manufacturing process subject to Buy America. Coating includes epoxy coating, galvanizing, painting and any other coating that protects or enhances the value of a material subject to requirements of Build America, Buy America. Steel used for temporary support of excavation, including H piles, soldier piles, and sheeting when the steel is required to be left in place is subject to requirements of Build America, Buy America. Temporary steel, shall remain in place when it falls within the influence zone of the soil supporting any structure or railroad tracks.

(2) all manufactured products used in the project are produced in the United States—this means the manufactured product was manufactured in the United States and

(3) all construction materials are manufactured in the United States—this means that all manufacturing processes for the construction material occurred in the United States. "Construction materials" includes an article, material, or supply—other than an item of primarily iron or steel; a manufactured product; cement and cementitious materials; aggregates such as stone, sand, or gravel; or aggregate binding agents or additives—that is or consists primarily of:
- non-ferrous metals,
- plastic and polymer-based products (including polyvinylchloride, composite building materials, and polymers used in fiber optic cables),
- glass (including optic glass),
- lumber; or
- drywall.

The Buy America preference only applies to articles, materials, and supplies that are consumed in, incorporated into, or affixed to an infrastructure project. As such, it does not apply to tools, equipment, and supplies, such as temporary scaffolding, brought to the construction site and removed at or before the completion of the infrastructure project. Nor does a Buy America preference apply to equipment and furnishings, such as movable chairs, desks, and portable computer equipment, that are used at or within the finished infrastructure project but are not an integral part of the structure or permanently affixed to the infrastructure project.

All articles, materials, and supplies should be classified as an iron or steel product, a manufactured product, or another product as specified by law or in 2 CFR part 184 (such other products specified by law or in 2 CFR part 184 include "excluded materials" and "construction materials"); an article, material, or supply must not be considered to fall into multiple categories.

HOLIDAY WORK RESTRICTIONS

(Supplementing Subsection 7.09)

The District Highway Director (DHD) may authorize work to continue during these specified time periods if it is determined by the District that the work will not negatively impact the traveling public. DHD may allow work in those areas on a case by case basis and where work is behind barrier and will not impact traffic

Below are the holiday work restrictions:

New Years Day (Federal Holiday)
No work on major arterial roadways from 5:00 AM on the day before until the normal start of business on the next subsequent business day. No work on local roadways on the holiday without permission by the DHD and the local police chief.

Martin Luther King's Birthday (Federal Holiday)
No work restrictions due to traffic concerns, however work on local roadways requires permission by the DHD and local police chief.

President's Day (Federal Holiday)
No work restrictions due to traffic concerns, however work on local roadways requires permission by the DHD and local police chief.

Evacuation Day (Suffolk County State Holiday)
No work restrictions due to traffic concerns.

Patriot's Day (State Holiday)
Work restrictions will be in place for Districts 3 and 6 along the entire Boston Marathon route and any other locations that the DHD in those districts determine are warranted so as to not to impact the marathon. All other districts work restrictions will be as per DHD.

Mother's Day
No work on Western Turnpike and Metropolitan Highway System from 5:00 AM on the Friday before, until the normal start of business on the following day.

Memorial Day (Federal Holiday)
No work on major arterial roadways from 5:00 AM on the Friday before, until the normal start of business on the following day.

Bunker Hill Day (Suffolk County State Holiday)
No work restrictions due to traffic concerns.

Juneteenth
No work restrictions due to traffic concerns, however work on local roadways requires permission by the DHD and local police chief.

HOLIDAY WORK RESTRICTIONS (Continued)

Independence Day (Federal Holiday)
No work on major arterial roadways from 5:00 AM on the day before until the normal start of business on the next subsequent business day. No work on local roadways on the holiday without permission by the DHD and the local police chief.

Labor Day (Federal Holiday)
No work on major arterial roadways from 5:00 AM on the Friday before, until the normal start of business on the following day.

Columbus Day (Federal Holiday)
No work on major arterials from 5:00 AM on the Friday before, until the normal start of business on the following day

Veterans' Day (Federal Holiday)
No work restrictions due to traffic concerns.

Thanksgiving Day (Federal Holiday)
No work on major arterials from 5:00 AM two days before until the normal start of business on the following Monday.

Christmas Day (Federal Holiday)
No work on major arterial roadways from 5:00 AM on the day before until the normal start of business on the next subsequent business day.

SOIL STOCKPILING DIRECTIVE P-22-001

Any stockpiling of soil must be performed in compliance with Policy Directive P-22-001, Off-Site Stockpiling of Soil from MassDOT Construction Projects. This directive limits the allowable locations for off-site stockpiling of soil generated during MassDOT projects and includes various requirements that must be satisfied by the contractor prior to off-site stockpiling. The Contractor is responsible for identifying a suitable stockpile location.

BIDDERS LIST

Pursuant to the provisions of 49 CFR Part 26.11 all official bidders will be required to report the names, addresses and telephone numbers of all firms that submitted bids or quotes in connection with this project. Failure to comply with a written request for this information within 15 business days may result in a recommendation to the Prequalification Committee that prequalification status be suspended until the information is received.

The Department will survey all firms that have submitted bids or quotes during the previous year prior to setting the annual goal and shall request that each firm report its age and gross receipts for the year.

SUBSECTION 8.02 SCHEDULE OF OPERATIONS

Replace this subsection with the following:

An integrated cost and schedule controls program shall be implemented by the Contractor to track and document the progress of the Work from Notice to Proceed (NTP) through the Contractor Field Completion (CFC) Milestone. The Contractor's schedules will be used by the Engineer to monitor project progress, plan the level-of-effort required by the Department's work force and consultants and as a critical decision-making tool. Accordingly, the Contractor shall ensure that it complies fully with the requirements specified herein and that its schedules are both accurate and updated as required by the specification throughout the life of the project. Detailed requirements are provided in Division II, Section 722 Construction Scheduling.

Work on this project is restricted to (1) 8-hour shift per day, 5 days a week, Monday through Friday, between the hours of 7:00 AM and 3:30 PM, with the Prime Contractor and all Subcontractors working on the same shift, unless otherwise approved by the Town

TRUCK SAFETY DEVICES

(Supplementing Subsection 7.04: Motor Vehicles)

All motor vehicles subject to Section 7 of Chapter 90 to be operated under this Contract shall be equipped with safety devices as provided therein and in 540 CMR 4.00.

The Contractor shall certify to the Registry of Motor Vehicles, in a manner prescribed by the Registrar, that all applicable vehicles are equipped with Lateral Protective Devices, Convex Mirrors, Cross Over Mirror(s) and Back Up Cameras in accordance with the requirements of 540 CMR 4.00.

The Contractor shall provide evidence satisfactory to the Department to demonstrate compliance with the above certification requirement for all applicable vehicles operated under this Contract by the Contractor and its subcontractors and vendors in a manner set forth by the Department. Thereafter, the Contractor shall have an affirmative obligation to continue to provide such evidence of compliance on an ongoing basis and no later than 7 days after certification with the Registry of Motor Vehicles of any additional vehicles operated under this Contract by the Contractor and its subcontractors and vendors.

Non-compliance with respect to a vehicle that is subject to 540 CMR 4.00 may subject the Contractor to statutory fines as established in M.G.L. c. 90, § 7 and/or contractual remedies up to and including termination of the Contract.

SUBSECTION 8.14 UTILITY COORDINATION, DOCUMENTATION, AND MONITORING RESPONSIBILITIES

A. GENERAL

In accordance with the provisions of Section 8.00 Prosecution and Progress, utility coordination is a critical aspect to this Contract. This section defines the responsibility of the Contractor and MassDOT, with regard to the initial utility relocation plan and changes that occur as the prosecution of the Work progresses. The Engineer, with assistance from the Contractor shall coordinate with Utility companies that are impacted by the Contractor's operations. To support this effort, the Contractor shall provide routine and accurate schedule updates, provide notification of delays, and provide documentation of the steps taken to resolve any conflicts for the temporary and/or permanent relocations of the impacted utilities. The Contractor shall provide copies to the Engineer of the Contractor communication with the Utility companies, including but not limited to:

- Providing advanced notice, for all utility-related meetings initiated by the Contractor.
- Providing meeting minutes for all utility-related meetings that the Contractor attends.
- Providing all test pit records.
- Request for Early Utility work requirements of this section (see below).
- Notification letters for any proposed changes to Utility start dates and/or sequencing.
- Written notification to the Engineer of all apparent utility delays within seven (7) Calendar Days after a recognized delay to actual work in the field – either caused by a Utility or the Contractor.
- Any communication, initiated by the Contractor, associated with additional Right-of-Way needs in support of utility work.
- Submission of completed Utility Completion Forms.

B. PROJECT UTILITY COORDINATION (PUC) FORM

The utility schedule and sequence information provided in the Project Utility Coordination Form (if applicable) is the best available information at the time of the bid and has been considered in setting the contract duration. The Contractor shall use all of this information in developing the bid price and the Baseline Schedule Submission, inclusive of the individual utility durations sequencing requirements, and any work that has been noted as potentially concurrent utility installations.

C. INITIATION OF UTILITY WORK

The Engineer will issue all initial notice-to-proceed dates to each Utility company based on either the:

1) Contractor's accepted Baseline Schedule
2) An approved Early Utility Request in the form of an Early Utility sub-net schedule (in accordance with the requirements of this Subsection)
3) An approved Proposal Schedule

C.1 - BASELINE SCHEDULE – UTILITY BASIS

The Contractor shall provide a Baseline Schedule submission in accordance with the requirements of Subsection 8.02 and inclusive of all of the information provided in the PUC Form that has been issued in the Contract documents. This is to include the utility durations, sequencing of work, allowable concurrent work, and all applicable considerations that have been depicted on the PUC Form.

SUBSECTION 8.14 (Continued)

C.2 – EARLY UTILITY REQUEST – (aka SUBNET SCHEDULE) PRIOR TO THE BASELINE
All early utility work is defined as any anticipated/required utility relocations that need to occur prior to the Baseline Schedule acceptance. In all cases of proposed early utility relocation, the Contractor shall present all known information at the pre-construction conference in the form of a 'sub-net' schedule showing when each early utility activity needs to be issued a notice-to-proceed. The Contractor shall provide advance notification of this intent to request early utility work in writing at or prior to the Pre-Construction meeting. Prior to officially requesting approval for early utility work, the Contractor shall also coordinate with MassDOT and all utility companies (private, state or municipal) which may be impacted by the Contract. If this request is acceptable to the Utilities and to MassDOT, the Engineer will issue a notice-to-proceed to the affected Utilities, based on these accepted dates.

C.3 – PROPOSAL SCHEDULE - CHANGES TO THE PUC FORM
If the Contractor intends to submit a schedule (in accordance with MassDOT Standard Specifications, Division I, Subsection 8.02) that contains durations or sequencing that vary from those provided in the Project Utility Coordination (PUC) Form, the Contactor must submit this as an intended change, in the form of a Proposal Schedule and in accordance with MassDOT Standard Specifications, Division I, Subsection 8.02. These proposed changes are subject to the approval of the Engineer and the impacted utilities, in the form of this Proposal Schedule and a proposed revision to the PUC form. The Contractor shall not proceed with any changes of this type without written authorization from the Engineer, that references the approved Proposal Schedule and PUC form changes. The submission of the Baseline Schedule should not include any of these types of proposed utility changes and should not delay the submission of the Baseline Schedule. As a prerequisite to the Proposal Schedule submission, and in advance of the utility notification(s) period, the Contractor shall coordinate the proposed utility changes with the Engineer and the utility companies, to develop a mutually agreed upon schedule, prior to the start of construction.

D. UTILITY DELAYS
The Contractor shall notify the Engineer upon becoming aware that a Utility owner is not advancing the work in accordance with the approved utility schedule. Such notice shall be provided to the Engineer no later than seven (7) calendar days after the occurrence of the event that the Contractor believes to be a utility delay. After such notice, the Engineer and the Contractor shall continue to diligently seek the Utility Owner's cooperation in performing their scope of Work.

In order to demonstrate that a critical path delay has been caused by a third-party Utility, the Contractor must demonstrate, through the requirements of the monthly Progress Schedule submissions and the supporting contract records associated with Subsection 8.02, 8.10 and 8.14, that the delays were beyond the control of the Contractor.

SUBSECTION 8.14 (Continued)

All documentation provided in this section is subject to the review and verification of the Engineer and, if required, the Utility Owner. In accordance with MassDOT Specifications, Division I, Subsection 8.10, a Time Extension will be granted for a delay caused by a Utility, only if the actual duration of the utility work is in excess of that shown on the Project Utility Coordination Form, and only if;

1) proper Notification of Delay was provided to MassDOT in accordance with the time requirements that are specified in this Section
2) the utility delay is a critical path impact to the Baseline Schedule (or most recently approved Progress Schedule)

E. LOCATION OF UTILITIES

The locations of existing utilities are shown on the Contract drawings as an approximation only. The Contractor shall perform a pre-construction utility survey, including any required test pits, to determine the location of all known utilities no later than thirty (30) calendar days before commencing physical site work in the affected area.

F. POST UTILITY SURVEY – NOTIFICATION

Following completion of a utility survey of existing locations, the Contractor will be responsible to notify the Engineer of any known conflicts associated with the actual location of utilities prior to the start of the work. The Engineer and the Contractor will coordinate with any utility whose assets are to be affected by the Work of this Contract. A partial list of utility contact information is provided in the Project Utility Coordination Form.

G. MEETINGS AND COOPERATION WITH UTILITY OWNERS

The Contractor shall notify the Engineer in advance of any meeting they initiate with a Utility Owner's representative to allow MassDOT to participate in the meeting if needed.

Prior to the Pre-Construction Meeting, the Contractor should meet with all Utility Owners who will be required to perform utility relocations within the first 6 months of the project, to update the affected utilities of the Project Utility Coordination Form and all other applicable Contract requirements that impact the Utilities. The Contractor shall copy the Engineer on any correspondence between the Utility Owner and the Contractor.

H. FORCE ACCOUNT / UTILITY MONITORING REQUIREMENTS

The Engineer will be responsible for recording daily Utility work force reports. The start, suspension, re-start, and completion dates of each of the Utilities, within each phase of the utility relocation work, will be monitored and agreed to by the Engineer and the Contractor as the work progresses.

I. ACCESS AND INSPECTION

The Contractor shall be responsible for allowing Utility owners access to their own utilities to perform the relocations and/or inspections. The Contractor shall schedule their work accordingly so as not to delay or prevent each utility from maintaining their relocation schedule.

COMPLIANCE WITH THE NATIONAL DEFENSE AUTHORIZATION ACT

(Supplementing Subsection 7.01)

On all projects, the "Prohibition on Certain Telecommunications and Video Surveillance Services or Equipment" Regulation (2 CFR 200.216) prohibits the Contractor from using or furnishing the following telecommunications equipment or services:

- Telecommunications equipment produced by Huawei Technologies Company or ZTE Corporation (or any subsidiary or affiliate of such entities).
- For the purpose of public safety, security of government facilities, physical security surveillance of critical infrastructure, and other national security purposes, video surveillance and telecommunications equipment produced by Hytera Communications Corporation, Hangzhou Hikvision Digital Technology Company, or Dahua Technology Company (or any subsidiary or affiliate of such entities).
- Telecommunications or video surveillance services provided by such entities or using such equipment.
- Telecommunications or video surveillance equipment or services produced or provided by an entity that the Secretary of Defense, in consultation with the Director of the National Intelligence or the Director of the Federal Bureau of Investigation, reasonably believes to be an entity owned or controlled by, or otherwise connected to, the government of a covered foreign country.

This prohibition applies to all products manufactured by the aforementioned companies, including any individual components or parts.

By submitting a bid on a project, the Contractor certifies that all work will be in compliance with the terms of 2 CFR 200.216. The Contractor shall submit a COC indicating compliance with the above provisions for all telecommunications equipment or services included in the Contract.

Payment for the item in which the materials are incorporated may be withheld until these COCs are received. Any cost involved in furnishing the certificate(s) shall be borne by the Contractor.

EMERALD ASH BORER ADVISORY

To the extent possible, all trees and brush shall be disposed on site, typically chipped and spread in place. When trees or brush must be removed, such as in urban, or otherwise populated areas, Contractor shall identify proposed location for disposal, and provide written notification to the Engineer for approval. Disposal shall be in city or town of project, or at minimum, within county, of construction operations.

ENVIRONMENTAL PERMITTING

The proposed work occurs in jurisdictional wetland resources subject to Section 401/404 of the Clean Water Act as well as the Taunton Wetlands Protection Ordinance and the Raynham Wetlands Protection Bylaw; therefore, a Water Quality Certification from the Massachusetts Department of Environmental Protection; a Nationwide Permit authorization from the US Army Corps of Engineers; and Orders of Conditions from both municipalities (under the local Ordinance/Bylaw only) have been obtained. The Contractor is advised that all terms and conditions within said permits shall be strictly adhered to. The proposed work qualifies for the bridge exemption authorized in the Transportation Bond Bill and is therefore not subject to the Massachusetts Wetlands Protection Act, the Massachusetts Public Waterfront Act (Chapter 91), or the Massachusetts Environmental Policy Act. The proposed work, however, is subject to the Raynham and Taunton wetlands bylaws.

If Contractor erection, demolition, storage, or other procedures not originally allowed by existing environmental permits require work to occur in or otherwise impact water or wetland resource areas, the Contractor is advised that no associated work can occur until all required environmental permits have been either amended or obtained allowing such work. The Contractor must notify the MassDOT Highway Division District 5 Highway Director and Resident Engineer in writing at least 60 days prior to commencement of the proposed activity. All environmental submittals, including any contact with Local, State, or Federal environmental agencies, must be coordinated through the MassDOT Highway Division District 5 Environmental Engineer. The Contractor is expected to fully cooperate with requests for information and provide same in a timely manner. The Contractor is further advised that the Department will not entertain a delay claim due to the time required to modify or obtain the environmental permits.

Army Corps of Engineers – Section 404 General Permit Coverage

Work under this project is subject to Section 404 of the Federal Clean Water Act, 33 U.S.C. 1251 et seq and is authorized under the Department of the Army Nationwide Permits (NWPs). Activities are eligible for coverage under the NWPs provided that 1) the activity meets the terms and conditions of applicable NWPs and General Conditions (GCs), and 2) the activity is demonstrated to qualify as non-reporting or a Pre-Construction Notification (PCN) is submitted to the Corps. A PCN was submitted at a point in time where the Massachusetts General Permits were still in effect, and the PCN therefore listed the applicable GPs (23 & 24) for the work proposed under this project. The verification letter from the Corps indicates that the project is authorized under NWP 14: Linear Transportation Projects. The NWP is considered part of this contract and a copy of the entire NWP document, PCN authorization and all associated plans/attachments shall be maintained on-site while activities regulated by the NWP are being performed.

ENVIRONMENTAL PERMITTING (Continued)

The Contractor is hereby notified that he/she will be responsible and held accountable for performing any/all work necessary to satisfy and comply with the entire NWP document. The Contractor is advised that no additional compensation will be allowed for work required to establish, achieve, and maintain compliance with the NWP, as payment for the work shall be included in the various bid items, unless specified elsewhere. This work may include, but is not limited to, the following: the hiring and paying for the services of a Professional Biologist, Botanist, Wetland Scientist, Engineer, Landscape Architect, etc.; preparation and submission of as-built plans; wetland flagging; wetland replication monitoring reports, etc.

MassDEP – Section 401 Water Quality Certification

This project is subject to Section 401 of the Federal Clean Water Act and has been issued a Water Quality Certification ("WQC") by the Department of Environmental Protection. The WQC and Application are to be considered part of this contract and a copy of the WQC and all plans/attachments shall be on-site while activities regulated by the WQC are being performed. The Contractor's attention is directed to the fact that special conditions and other requirements are associated with this WQC and Application. It is the Contractor's responsibility to be aware of and comply with these conditions and requirements and plan his/her work and schedule accordingly. **The Contractor is hereby notified that he/she will be responsible and held accountable for performing any/all work necessary to satisfy and comply with the entire WQC and Application**. The Contractor is advised that no additional compensation will be allowed for work required to establish, achieve, and maintain compliance with the WQC and Application, as payment for the work shall be included in the various bid items, unless otherwise specified. This work may include, but is not limited to, the following: preparation and submission of as-built plans; wetland flagging; wetland replication monitoring reports; preparation of the construction period erosion, sedimentation, and pollution prevention plan (CP/PP); etc.

Orders of Conditions

Orders of Conditions have been obtained from the Raynham and Taunton Conservation Commissions for work in and around the onsite resource areas. Payment for work required by the Orders of Conditions and any Special Conditions, unless otherwise provided for, shall be considered incidental to other items, and no additional payment shall be made for this work.

Wetlands Protection Signage

This project is subject to Taunton Wetlands Protection Ordinance and the Raynham Wetlands Protection Bylaw, refer Document A00861. Signs shall be in accordance with the latest MassDOT Construction Standards. All costs for the manufacture, erection, maintenance, moving, and removal of the signs shall be absorbed by the Contractor with no additional compensation other than the contract unit prices.

For this project, one (1) sign will be required in each municipality. The sign in Taunton shall read "Taunton ConCom N1394" and the sign in Raynham shall read "Approved by Town of Raynham Wetlands Protection Bylaw Ch. 336 on date: 4-27-2026".

Demolition Plan

A work plan describing the means of methods of demolition and associated measures for protecting the Taunton River from discharge of debris shall be provided in narrative format for review and approval by MassDEP as required by the 401 WQC.

ENVIRONMENTAL PERMITTING (Continued)

Dredged Material Dewatering Plan

A Dredged Material Dewatering Plan shall be prepared and submitted to MassDEP for review and approval as required by the 401 WQC. At a minimum, the Plan shall include but not be limited to the type of containment, method of dewatering (i.e. mechanical or by gravity), method of collecting the dewatered effluent and method of disposal.

Certification of Erosion and Sedimentation Control Measures

As required by the Order of Conditions issued by the Raynham Conservation Commission(Document A00861), a Massachusetts registered professional engineer must submit written certification to the Conservation Commission that all erosion control measures are properly installed before the beginning of any work. The location of the erosion control measures shall be certified by a Massachusetts registered land surveyor prior to start of any site work. The Contractor is responsible for retaining the required licensed professional to complete this task.

Wildlife Shelf

Dumped riprap shall be placed in a manner to create a wildlife shelf at the top of the streambank along the southern abutment as shown on the project plans. This shelf must be leveled out with chinked-in stones as required by the 401 WQC.

Recreational Boating Access

As required by the Corps NWP authorization letter, boating (canoe/kayak or other) shall be safely maintained throughout the duration of the project either through the existing river channel or through a temporary portage trail. If this boating cannot be safely maintained, signage must be posted at the upstream and downstream boating access sites to inform the public of the river closure.

Resource Area Flagging

All flagging demarcating boundaries of Resource Areas at the site shall be reestablished prior to construction as required by the 401 WQC and the Orders of Conditions.

Test Pits

As required by the 401 WQC, the Contractor shall complete test pits to confirm the elevations of Estimated Seasonal High Groundwater. The Engineer shall be contacted to witness test pit excavation.

TIME-OF-YEAR (TOY) RESTRICTIONS

As required by the environmental approvals obtained for the project, no in-water work shall take place during the spring TOY restriction from March 1 to July 15 or the fall TOY restriction from September 1 to November 15 of any year(s).

GENERAL REQUIREMENTS FOR DEMOLITION AND WORK INVOLVING PAINTED STEEL

(02/06/2020)

Demolition and work involving painted steel shall conform to the requirements of Document 00961.

Work Involving Painted Steel.

Hazardous materials shall be removed in the immediate area of any intended welding, heating, saw cutting or burning of steel. Hazardous material removal is required to allow the demolition of structural steel, railings, drainage systems, utility supports, steel lamp posts, etc.

The contractor shall assume that the coatings on the steel contain lead (Pb), unless otherwise determined by testing. The contractor shall certify in writing to the Engineer the results of all testing, and shall also certify that any lead (Pb) coated steel removed from the project was not reused or buried, but was sent to a scrap metal recycling facility.

Implement and maintain programs and procedures, which comply with the requirements of this specification and all applicable standards and regulations. Comply with all applicable regulations even if the regulation is not specifically referenced herein. If a state or local regulation is more restrictive than the regulation of this specification, follow the more restrictive requirements.

This requirement is intended only for the demolition and preparation prior to repair and does not include provisions for recoating of steel.

Environmental

All applicable portions of Subsections 961.65 “Worker Protection” and 961.66 “Environmental Protection and Monitoring” shall be followed when performing this work.

During chemical stripping a hand washing facility may be used in lieu of a decontamination/changing facility.

Hazardous material shall be collected during the disassembly and disposed of as outlined in Subsection 961.68 “Handling of Hazardous Waste and Reporting Release Programs”.

The applicable submittals shall be according to Subsection 961.69 “Submittals”.

GENERAL REQUIREMENTS FOR DEMOLITION AND WORK INVOLVING PAINTED STEEL (Continued)

Cleaning/Removal

Cutting Or Burning Of Steel

All surfaces to be welded, heated, saw cut or burned shall be cleaned so as to remove all contaminants and/or hazardous materials, which could be discharged to the environment as a function of the subsequent operations.

Lead paint shall be removed in its entirety in an area prescribed by a 6 inch (15 cm) minimum offset from the required work. The paint removal operation may be dry abrasive blasting, wet abrasive blasting or chemical stripping.

Proper level of containment shall be used when performing this work in accordance with Subsection 961.67 "Containment". Full containment is not required during chemical stripping operation however; the Contractor shall install proper shielding and/or tarpaulins under the chemical stripping operations in order to catch all debris generated during this procedure. A cleaned area must be inspected and approved before the demolition operations are started.

During cleaning operations the Contractor shall be required to furnish and erect temporary floodlights illuminating the steel surface at a minimum of 30-foot candles. This lighting shall be used in areas where there is insufficient lighting for proper cleaning operations and inspection. The Contractor shall supply electrical power.

The Contractor shall provide support for interim and final inspection of the bridge during cleaning operations. This support shall include the necessary traffic controls and safe access to the work.

Mechanical Disassembly Of Steel

All surfaces to be mechanically disassembled by shear cutting or removing bolts or rivets shall not require deleading. When shear cutting or removing bolts or rivets, the Contractor shall not use any method that will cause dust and/or particles to be emitted and/or dispersed into the environment to an extent that would expose the workers above the Action Levels of 30µg/m3.

For purposes of limiting the lead (Pb) dust, the Contractor will be required to dampen the lead paint work areas.

The contractor shall install a proper shielding and/or tarpaulins under all lead-paint-coated surfaces to be shear cut or bolts or rivets ordered removed in order to catch any loose lead paint chips, dust or particles.

NORTHERN LONG-EARED BAT AND TRICOLORED BAT PROTECTION

The northern long-eared bat (*Myotis septentrionalis*; NLEB) and tricolored bat (*Perimyotis subflavus*; TCB) are listed as federally endangered or proposed endangered, respectfully, under the Endangered Species Act (ESA). The U.S. Fish and Wildlife Service (USFWS) developed this guidance to address ESA compliance and promote conservation of NLEB and TCB. This project has been consulted with the USFWS through the Federal Highway Administration (FHWA), Federal Railroad Administration (FRA), and Federal Transit Administration (FTA) Programmatic Biological Opinion/Conference Opinion for Transportation Projects in the Range of the Indiana bat, northern long-eared bat, and tricolored bat, dated December 13, 2024. and generated a May Affect, Not Likely to Adversely Affect (NLAA) determination (see **Document A00844**). Subsequently, the project has completed Section 7 consultation under the ESA.

In advance of the uplisting of the TCB to endangered under the ESA, the following Avoidance and Minimization Measures (AMMs) must be strictly adhered to in order to protect NLEB and TCB and to be in compliance with the ESA. Contact MassDOT Environmental Services - Wildlife Unit Supervisor for questions about project limits, restrictions, or conservation measures.

General AMM

- The Contractor shall ensure all personnel working in on the project site are aware of all environmental commitments related to NLEB and TCB, including all applicable AMMs. NLEB and TCB information (https://www.fws.gov/midwest/endangered/mammals/nleb/ and https://www.fws.gov/species/tricolored-bat-perimyotis-subflavus) shall be made available to all personnel.
- On June 2, 2025, MassDOT Highway Division Environmental Services conducted a northern long-eared bat summer presence/absence survey, in accordance with the 2025 survey guidelines. The survey did not confirm the presence of NLEB and/or TCB. If work is proposed by the Contractor past June 2, 2030 additional review is required by the MassDOT Highway Division's Environmental Services Section, and additional review and restrictions may be required by the USFWS.

Bridge AMM

- On June 2, 2025, MassDOT Highway Division Environmental Services, conducted a northern long-eared bat bridge/structure bat assessment, in accordance with the USFWS guidelines. The assessment did not find presence of, or evidence of use by bats, and as stated within the guidelines, the assessment is valid for two years. If bridge work is not complete before June 2, 2027 assessment of the bridge for the presence of, or evidence of use by, bats shall be completed by the MassDOT Wildlife Unit prior to continuing bridge work. The Contractor shall notify the MassDOT Wildlife Unit no later than fourteen (14) days prior to June 2, 2027 to provide adequate time for inspection. If bats are found to be present, or, if there is evidence of bat usage, work at the bridge shall not commence until after the MassDOT Wildlife Unit has completed coordination with the US Fish and Wildlife Service to determine the appropriate follow up or mitigation actions.

PIGEON WASTE

The Contractor shall remove and dispose of the pigeon waste and any other debris accumulated on the steel members and bridge seats in areas where work is being performed. Pigeon waste and debris material contaminants will require special handling and disposal in accordance with all Federal, state, and local requirements. No separate payment will be made for removal and disposal of pigeon waste. Cost shall be incidental to the contract pay items.

NOTIFICATION OF FUNDING SOURCES FOR WORK TO BE PAID BY OTHERS

This contract has an agreement with the City of Taunton; whereas when the construction costs for the contract scope exceed the total participating contract bid price by more than ten percent (10%), the City of Taunton shall be responsible for the amount over 110% of the total participating contract bid price.

ASBESTOS CONDUIT

Utility conduits are considered suspect materials for asbestos. Please determine whether asbestos is present in existing drainage pipe and utility conduits to be removed throughout the project corridor. **Item 182.1 – Inspection and Testing for Asbestos** (if needed) and **Item 182.2 – Removal and Disposal of Asbestos** is included in the contract.

CONTAMINATED SOIL

Soil to be removed from the project area shall not be assumed to be uncontaminated and must be evaluated prior to off-site management for potential contamination with hazardous materials. No soil may be disposed of off-site without proper assessment by the contractor and approval from the Resident Engineer (RE), District Environmental Engineer (DEE), or the project designee.

NOTICE TO OWNERS OF UTILITIES

(Supplementing Subsection 7.13)

Written notice shall be given by the Contractor to all public service corporations or municipal and State officials owning or having charge of publicly or privately owned utilities of his intention to commence operations affecting such utilities at least one (1) week in advance of the commencement of such operations. Privately owned utility companies (ex: Eversource-Gas) require 30 days written notice before the start of any work. The Contractor shall, at the same time, file a copy of such notice with the Engineer. The Contractor shall ensure that all affected utilities / agencies are notified.

The following website lists the names and addresses of the utilities may be affected, but the completeness of the list is not guaranteed:

https://www.mass.gov/info-details/utility-contacts-by-district-and-municipality

Select District 5
Select the Raynham Town and Taunton City, and then locate the utility

Town/City officials are shown at website https://www.mass.gov/lists/massachusetts-cities-and-towns and select the required City/Town website.

State Police are shown at website https://www.mass.gov/info-details/massachusetts-state-police-troop-boundaries. Select the area of jurisdiction to find the local station.

The following is the name and addresses of the agency which may be affected and must be notified. Completeness is not guaranteed by the Department. The Contractor shall assure that all affected agencies are notified.

NOTICE TO OWNERS OF UTILITIES (Continued)

RAYNHAM - Pole Data

Municipality	Pole Set Responsibility	Updated
RAYNHAM & TAUNTON	Taunton Municipal Light/Verizon	1/11/2018

District Utility/Constructability Engineer

County	District	Contact	Phone	Email
Bristol	5	Christopher Lockett	857-368-5073	Christopher.lockett@state.ma.us

Utility Data

Electric

Company	Address	City	State	Zip	Updated
Taunton Municipal Lighting Plant	P.O. Box 870	Taunton	MA	02780	7/8/2009

Contact	Office	Extension	Email	
Joe Fernandes	508-824-5844	3179	josephfernandes@tmlp.com	9/4/2012

Gas

Company	Address	City	State	Zip	Updated
Eversource Gas	995 Belmont St.	Brockton	MA	02301	1/8/2021

Contact	Office	Extension	Email	
Brendan Pitts	508-895-4818		brendan.pitts@Eversource.com	12/4/2023

NOTICE TO OWNERS OF UTILITIES (Continued)

Telephone

Company	Address	City	State	Zip	Updated
Verizon	385 Myles Standish Blvd.	Taunton	MA	02780	11/8/2013

Contact	Office	Extension	Email	
Evan McSorley	774-409-3184		evan.mcsorley@verizon.com	9/29/2025

Water Raynham

Company	Address	City	State	Zip	Updated
Raynham Center Water District	P.O. Box 160	Raynham	MA	02767	

Contact	Office	Extension	Email	
William Ward	508-824-0020			4/24/2013

Water - Taunton

Company	Address	City	State	Zip	Updated
Taunton DPW-Water Division	90 Ingell Street	Taunton	MA	02780	7/28/2010

Contact	Office	Extension	Email	
Mike Arruda	508-823-3582		marruda@taunton-ma.gov	4/5/2022

Sewer – Raynham

Company	Address	City	State	Zip	Updated
Raynham Sewer Dept.	416 Titicut Rd.	Raynham	MA	02767	

Contact	Office	Extension	Email	
Carly Brady	508-824-2749		cbrady@raynhamsewer.com	7/29/2026

NOTICE TO OWNERS OF UTILITIES (Continued)

Sewer – Taunton

Company	Address	City	State	Zip	Updated
Veolia Water (Municipal)	825 West Water St	Taunton	MA	02780	3/24/2010

Contact	Office	Extension	Email	
Mike Arruda	508-823-3582		marruda@taunton-ma.gov	4/5/2022

Cable

Company	Address	City	State	Zip	Updated
Comcast Cable Corporation	PO Box 6505, 5 Omni Way	Chelmsford	MA	01824	8/8/2018

Contact	Office	Extension	Email	
Michael Cook			Michael_Cook7@comcast.com	12/24/2025

DPW – Raynham

Company	Address	City	State	Zip	Updated
Raynham Hwy. Dept.	1555 King Phillip Street	Raynham	MA	02767	

Contact	Office	Extension	Email	
Norm Sturtevant	508-824-2718		nsturtevant@town.raynham.ma.us	5/6/2025

Contact	Office	Extension	Email	
Elizabeth Glidden			elizabeth.glidden@vzw.com	3/25/2025

NOTICE TO OWNERS OF UTILITIES (Continued)

DPW – Taunton

City	State
Taunton	MA

Contact	Office	Extension	Email
Michael Patneaude	508-821-1027		mpatneaude@taunton-ma.gov 4/5/2022

Railroad

Company	Address	City	State	Zip	Updated
MBTA Archives & Digital Asset Preservation	10 Park Plaza	Boston	MA	02116	8/1/2024

Contact	Office	Extension	Email
Sylvia Welsh			archives@mbta.com 8/1/2024

Company	Address	City	State	Zip	Updated
Mass Coastal Railroad	12 Harding Street, Unit 202	Lakeville	MA	02347	6/18/2019

Contact	Office	Extension	Email
Chris Podgurski	508-291-2116		cpodgurski@capetrain.com 3/11/2015

Company	Address	City	State	Zip	Updated
CSX Transportation	2000 West Cabot Blvd - Suite 130	Langhorne	PA	19047	2/13/2023

Contact	Office	Extension	Email
Michael Sliper	518-767-6081		Michael_Sliper@csx.com 4/28/2025

The Contractor shall coordinate his/her work with the work required to be performed by any private utility owner for this project. No additional compensation or time extensions shall be allowed for delays as a result of work required to be performed by a private utility owner.

If a pole needs to be held by the utility in order to sustain them securely in place during placement of (drainage structures, pipe, etc.), the Contractor will be solely responsible for all costs charged by the utility owner for this service. All costs in connection shall be included in the unit prices for the various items.

EVERSOURCE EMERGENCY TELEPHONE NUMBERS

GAS:
Outage/ Emergency: 800-592-2000
New Service: 866-678-2744
Customer Support: 800-592-2000

MBTA FLAGGING

The Contractor shall provide a minimum two week notice for flagging support for MBTA bridges and railroads. This applies only to bridges and railroads operated by Keolis Commuter Services (KCS). This two week notice does not apply to emergency work, only to routine or scheduled work activities. The contact person for advance request for flagging services is Rich Arnold, MBTA Railroad Operations Department, Phone number (617)-222-3635, email address: rarnold@mbta.com.

MBTA COMMUTER RAIL

Keolis Commuter Service (KCS) operates the commuter rail for the MBTA. All references to MBCR in the provisions will mean Keolis Commuter Service (KCS).

MBTA RAILROAD COORDINATION / ACCESS TO MBTA PROPERTY

The Contractor shall be required to coordinate the work of this Contract with the MBTA and Keolis Commuter Services Co. ("KCS") through the MassDOT Resident Engineer and MassDOT designated Field Staff. A majority of the prerequisites for the Contractor to perform work on or adjacent to MBTA transit lines may be found in the "MBTA Special Instructions" provided herein. The Contractor shall be required to comply with the all applicable requirements of the latest edition of the MBTA Special Instructions available at the time of Contract Award.

The Contractor will have to perform construction related activities on, over, under, within or adjacent to railroad property owned or controlled by the MBTA. Any work that will affect Commuter Rail operations, involve work on, over, under, within or adjacent to the commuter rail right of way must be coordinated with MBTA Railroad Operations and KCS and shall comply with the latest version of the MBTA Railroad Operations Directorate.

An owner or Contractor who wishes permission to enter upon or perform work over, on, under or adjacent to MBTA property shall submit to the offices of the MBTA's designated representative, a request in writing prior to the owner or the Contractor's planned commencement of any of the above stated activities; and is required to enter into a license agreement with the MBTA (www.mbtarealty.com/licenses) to access the property.

MBTA COORDINATION – SUBSTITUTE BUSING

Substitute bus transportation will be required for weekend MBTA Commuter Rail shutdowns. The Contractor must coordinate with MBTA Operations Department for provision of bus service. The Contractor shall contact MBTA Operations Dept. a minimum of 6 weeks prior to any planned rail shutdown. The MBTA will be responsible for planning, procuring, and administering the necessary substitute bus transportation services and operations based on the Contractor's approved work schedule.

Prime Contact:
Eric Ciborowski
32 Cobble Hill Road
Somerville, MA 02143
617-634-2567
ECIBOROWSKI@MBTA.com

Secondary Contact:
Delrico Gomes
32 Cobble Hill Road
Somerville, MA 02143
857-366-0404
DGOMES@MBTA.COM

The Contractor shall be required to attend the MBTA Weekly Track Outage Schedule Coordination Meetings held Wednesdays at 10:00 am at 32 Cobble Hill Road in the small classroom located in the training area at the rear of the building.

EQUIVALENT SINGLE AXLE LOADS (ESALS)

The estimated traffic level to be used for SUPERPAVE HMA mixture designs for this contract, expressed in Equivalent Single Axle Loads (ESALs) for the design travel lane over a 20-year period, is 0.3-10.0 Million 18-kip (80-kn) ESALs.

VALUE ENGINEERING CHANGE PROPOSAL

This Subsection defines the conditions and requirements which apply to Value Engineering Change Proposals ("VECPs"). The purpose of this provision is to encourage the Contractor to propose changes in certain project requirements that will maintain the project's functional requirements at a savings in contract time, contract price, or both. The net savings obtained by using a VECP that meets the conditions and requirements set forth here will be shared by the Contractor and MassDOT.

VECP's under this provison are to be initiated, developed and submitted to MassDOT by the Contractor. The VECP must show the contemplated changes to the Drawings, Specifications and other requirements in the Contract. When a VECP submitted pursuant to this section is fully accepted by MassDOT, the VECP will be implemented by the Contractor and paid using the current cost and resource loaded schedule. Contractor shall demonstrate that the VECP is equal to, or better than, the original design or material; that there is an interest in public safety within the VECP; that there is a life-cycle cost benefit; and/or that end users will benefit from the shortened schedule. VECPs shall be consistent with the MassHighway/MassDOT Standard Specifications for Highways and Bridges and other applicable reference documents and directives. Any proposed deviation from these documents will need to be clearly identified in the VECP Proposal Documents, and must be approved by MassDOT's Chief Engineer before accepting this VECP.

A. In order to be considered for MassDOT review each VECP shall:
   1. Be clearly labeled pursuant to this Subsection;

   2. Yield a net savings at least two hundred and fifty thousand (250,000.00) Dollars and/or a net saving of contract completion duration of at least three (3) months;

   3. The proposed changes to contract items must:

      a. maintain the specified items' required functions (service life, reliability);

      b. meet applicable safety regulations and codes;

      c. material substitutions must be in accordance with DOT prequalified/preapproved products and must be tested in accordance with standard material specs/testing methods (and considering all relevant environmental, load, and other relevant factors);

      d. show economy of operation, ease of maintenance, ease of construction, and necessary standardized features and appearance; and

   4. Shall not require an extension of Contract Time or Contract Milestones, with the exception of cases when there are anticipated significant cost saving.

VALUE ENGINEERING CHANGE PROPOSAL (Continued)

The thresholds above are considered to be a general guideline. MassDOT will consider VECPs outside of these thresholds if a significant benefit is demonstrated. Additionally, notwithstanding this VECP process, MassDOT will consider minor revisions in the form of a Contract Modification.

Further, any VECP submitted shall be in sufficient detail to clearly define the proposed change. The Contractor's failure to provide information of the type, detail and in a format to facilitate the MassDOT's review, may be grounds for rejection of the VECP. Additionally, the Contractor will not be entitled to any equitable adjustment or increased Time, due to any aspect of any of the proposed VECP including permitting, right of way, utility coordination or delayed responses by MassDOT. If, after the progression of the work associated with the executed Contract Modification for the VECP, any additional costs are realized by the Contractor or any of the sub- consultants, sub-contractors, or suppliers, the Contractor shall be obligated to pay for any and all costs.

B. The following initial items shall be provided by the Contractor for MassDOT's review. *Items 1-6 need to be submitted prior to the start of MassDOT's review of the VECP and item 7 is an important consideration for the pricing of the VECP and the timeline of the proposed VECP schedule.*

1. ***VECP Description***: A description of the difference between the existing and the proposed Contract requirements, and the comparative advantages and disadvantages of each;

2. ***VECP Change Listing***: A listing of the Contract requirements that will need to be changed, modified, or reviewed as well as the proposed Contract document changes in the Instructions to Bidders, Contract, Standard Specifications, General Requirements and Special Provisions required by the VECP.

3. ***Construction Schedule Update*:** Any changes in the Contract Time(s) or Contract Milestone(s), that will result from acceptance of the VECP, shall be accompanied by a contemporaneous schedule analysis *(i.e, the Contractor's baseline schedule submission, all past/required monthly schedule updates, a detailed assessment of all past delays, and a resource loaded Crticial Path Method schedule as specified in Section 8.0 / Subsection 8.02 of this Contract)* of the projected Work that remains including the proposed VECP related schedule changes *(inclusive of the timeline to review accept the VECP and the timeline for implementing the design changes)* in the remaining work. This shall be submitted in the form of a Proposal Schedule until the VECP has been formally accepted. Note: All of this information is to be updated, recertified, and formally accepted by MassDOT before final acceptance of this this VECP is issued.

VALUE ENGINEERING CHANGE PROPOSAL (Continued)

4. ***Date for MassDOT's Acceptance***: A statement that clearly justifies the date by which the VECP must be accepted to obtain the maximum price reduction, noting any effect upon the Contract Time(s) and/or Contract Milestone(s). This statement must include a narrative that demonstrates the most recent construction schedule has been utilized to justify that proposed acceptance date *(e.g. "in order to start to fabricate critical materials, authorization must be provided to work on the shop drawings by no later than [date]").* The Contractor should allow for at least sixty (60) to ninety (90) days for acceptance by MassDOT once all of the VECP documentation has been provided. Acceptance shall mean that MassDOT has received a finalized and executed contract modification. However, this is a proposed Contract change.

   The Contractor is fully obligated to progress the Work of the original Contract and MassDOT is not liable for any delays or costs that may occur in the review phase of any VECP proposal.

5. ***Cost and Savings Estimates***: A detailed estimate of the anticipated net savings, calculated as follows:

   a. ***Original Scope:*** Isolate the cost of performing the original contract construction activities, in accordance with the original Contract Documents, as originally bid by the Contractor, that are anticipated to be superseded by the VECP. *This cost is to include any original contract scope that is anticipated to be altered or eliminated by the VECP such as, shop drawing preparation, inspection work, testing, maintenance of traffic, or any other original contract costs, that have yet to have been performed at the time of this VECP submission.*

   b. ***New VECP Scope:*** Calculate the cost of performing the comparable construction activities associated with the VECP.

   c. ***Contractor's Engineer & Inspection***: Calculate the cost of engineering, inspection, and design work by the Contractor's Engineer/Designer. This should be a realistic estimate of the costs of any required engineering, design and review work by the Contractor's Engineer.

   d. ***MassDOT's Costs:*** MassDOT's estimate of costs to perform engineering/design reviews, cost estimate reviews, schedule reviews, and any other administrative costs to review and recommend implementation of the proposed VECP. *(including all anticipated increased costs to MassDOT on other Contracts and all anticipated follow-on increased costs to MassDOT, if any)* as provided by MassDOT. MassDOT's estimated costs must be included the VECP calculation and will be provided by MassDOT in support of the VECP evaluation process.

   e. ***Other Costs:*** Estimated costs associated with any revisions to other project related costs, such as Environmental Permits or Right of Way acquisitions, including other agency or municipality costs, as provided by MassDOT.

VALUE ENGINEERING CHANGE PROPOSAL (Continued)

Net Savings:

The net savings to be split between MassDOT and the Contractor shall be calculated using the items above as follows: a - (b+c+d+e) = net savings

6. *The Contractor shall also provide:*

   a. A proposed Change Order, which explains and justifies any required Equitable Adjustment in the Contract Price.

   b. The Contractor's actual costs expended for developing the VECP as of the date of the VECP submission;

7. ***Design Changes and Drawings*:** The costs that are outlined above should be inclusive of the following design and engineering responsibilities.

   a. Design changes shall be prepared and stamped by the Contractor's professional designer and/or engineer. In addition, in the development of the VECP; the Contractor is responsible for anticipating and managing all aspects associated with any VECP design work that must be performed by a licensed Engineer.

   b. The Contractor's engineer must analyze and stamp all components of any aspect of the project that has been redesigned, changed, or altered as a result of this VECP.

   c. The Contractor's engineer shall provide all calculations and supporting design/engineering documentation that was utilized to develop the changes and stamped drawings. These will be used by MassDOT's Designer-of-Record to review the VECP changes. The Contractor is limited to selecting only those engineer's that have been pre-qualified by MassDOT's A&E Board.

   d. MassDOT's Designer-of-Record will review and respond to all completed design submissions related to this VECP within thirty (30) calendar days, unless determined to be a non-critical path item.

   e. MassDOT will be responsible for estimating and managing MassDOT's Designer-of-Record during the VECP review and implementation. Should any significant conflicts arise, between the Contractor's Engineer and MassDOT's Designer-of-Record, the DOT and the Contractor will work expeditiously to resolve the conflict. Should this type of conflict continue for greater than five (5) days, the Contractor is to bear all financial and time related impacts of such delay and must seek to resolve the design conflict, in an acceptable manner to MassDOT. The resolution of this conflict will be funded at the Contractor's expense – exclusive of the net saving that was agreed to at the execution of the contract modification for this VECP.

   f. The Contractor's Engineer may also be required to inspect the construction work. The Contractor is to include such anticipated inspection costs in the initial VECP.

VALUE ENGINEERING CHANGE PROPOSAL (Continued)

g. MassDOT's Designer of Record will remain the Designer-of-Record for the entire Project. Any costs incurred in the use of MassDOT's Designer-of-Record by MassDOT or Contractor associated with the review of a VECP are to be included in the calculated net savings.

C. Approval of the VECP shall not occur until a Contract Modification, incorporating the VECP, is issued by MassDOT and properly executed by the Contractor. MassDOT may accept or reject part or all of any VECP at any time prior to an executed Contract Modification for the applicable VECP. The decision of MassDOT, concerning acceptance or rejection of any VECP, shall be final and shall not be subject to dispute resolution.

It is expected that several weeks may go by before the final VECP documentation has been executed with a Contract Modification. Therefore, MassDOT intends to make certain that the initial cost estimate information has not changed before entering into a Contract Modification. As the VECP evaluation process is finalized, and prior to the signed Contract Modification for the VECP, the Contractor and MassDOT must re-certify the current status of the originally proposed cost and/or schedule savings.

Until a contract modification is issued and schedule and cost/savings re-certification is complete and accepted by MassDOT, the Contractor shall remain obligated to perform the Work in accordance with the terms and conditions of the original Contract Documents.

Upon completion of the work associated with the VECP, MassDOT may require verification that the VECP savings has been achieved.

D. VECPs will be processed (distributed, reviewed, commented upon, accepted or rejected) expeditiously (pursuant to M.G.L. c. 30, § 39R); however, as this is an elective modification to the contract, MassDOT shall not be liable for any delay or cost in the review and acceptance of the VECP. During the review of the VECP, the Contractor remains obligated to progress the original Contract scope, and schedule, as planned; until a Contract Modification, accepting the Contractor re-certified VECP, has been executed by MassDOT.

The Contractor has the right to withdraw part, or all of any VECP, prior to acceptance by MassDOT. Such withdrawal shall be made in writing to the Engineer. The Contractor shall state the period of time, from the date of the initial VECP submittal, that the VECP shall remain valid and feasible. Revision of this validity and feasibility period shall be allowed only by mutual agreement of the Contractor and the Engineer in writing.

If the Contractor desires to withdraw the proposal prior to the expiration of this period for non-technical reason, MassDOT reserves the right to recover all actual costs that have been incurred to MassDOT.

VALUE ENGINEERING CHANGE PROPOSAL (Continued)

If the Contractor withdraws the VEC Proposal, MassDOT reserves the right to proceed with the VECP or any portion of the VECP as a normal change and the Contractor waives any right it may have had to share in net savings thereunder.

For purposes of this provision, expiration of the time established by the Contractor for approval shall be considered as withdrawal by the Contractor if MassDOT requests an extension of that time and the Contractor does not provide a written extension.

E. With regard to unknown conditions or sub-surface work, in general, the expectation is that the Contractor and MassDOT will strive to gain enough knowledge about the risks in order to provide a forward-priced Change Proposal. Therefore, any costs to fully evaluate the proposal, such as additional borings and/or test pits, must be considered in the cost evaluation of whether the VECP is worth pursuing. However, if it is impractical to gather conclusive exploratory information, before the VECP is executed, MassDOT may consider provisions in the VECP that clearly identifies the risk sharing (cost and time) related specifically to the unknown/sub-surface conditions. If these VECP provisions are acceptable to MassDOT they are to include supplemental language to provide a determination of the final savings/cost, and time impacts, no later than 45 days after the sub-surface work is completed. All other aspects of the VECP, unrelated to these Provisions, will be binding upon execution of the VECP.

ITEM 102.2 TREE TRIMMING LUMP SUM

The work u der this item shall conform to the relevant provisions of Subsections 8.08 and 101 of the Standard Specifications.

Work shall consist of removing all living, dead, dying, broken and certain other limbs and branches in areas adjacent to proposed overhead wire relocations, highway lighting, traffic signals, traffic signage, and other areas as described on the plans, as required by the Engineer.

Tree trimming shall be done as directed by the Engineer. Any tree trimming for overhead wire relocations shall meet the current requirements of each Utility. Prior to commencing work the Contractor shall verify each location with the Utility Companies.

All pruning and tree work shall be in conformance with the most current version of the American National Standards Institute (ANSI) Standard Z-133.1 and A300 Standard Practices for Tree, Shrub, and Other Woody Plant Maintenance.

All tree trimming work within 10 feet of energized power lines and equipment shall be in conformance with the most current version of the United States Department of Labor (DOL) OSHA Standard 1910.269(r) along with subsections (1) through (8).

All work under this Item will be performed or supervised by a Massachusetts Certified Arborist.

Contractor shall be required to provide a crew, consisting of a bucket truck with operator and grounds man for pruning and removal. The minimum crew shall consist of the following: a supervisor and three tree-trimmers/laborers. The crew shall be equipped with all necessary equipment needed to complete the work including, but not limited to, pickup trucks, chippers, gas powered chain saws, hand saws, loppers, shears, pruners, branch trimmers, ladders, tree- climbing equipment, etc. Fuel for equipment shall also be considered incidental to this Item. The crew shall be OSHA certified as line-clearance tree trimmers to work within 10 feet of energized power lines and equipment.

SUBMITTALS

Prior to start of work, the Contractor shall submit to the Engineer the name, certification number and resume of the Massachusetts Certified Arborist referenced herein. Cost for Certified Arborist for all activities pertaining to this Item shall be incidental to this Item.

Incidental to this Item, the Contractor shall provide to the Engineer one (1) copy of the most current version of the American National Standards Institute (ANSI) Standard Z-133.1 and A300 Standard Practices for Tree, Shrub, and Other Woody Plant Maintenance, Part 1: Pruning. These references shall be kept by the Engineer at his/her office for the length of the Contract.

Prior to start of work, the Contractor shall coordinate with the MassDOT Landscape Design Section, the Electric Utility Company, and the Utility Company with pole set in the field to confirm number, location, and extent of selective tree trimming.

ITEM 102.2 (Continued)

DESCRIPTION OF WORK

Line-clearance Tree Trimming: Shall be defined as the pruning, trimming, repairing, maintaining, removing, or clearing of trees or the cutting of brush that is near (within 10 feet of) energized power lines.

TREE: Shall be defined as having a diameter of 4 inches or over, measured at a point 3 feet above the average ground.

LIMBS AND BRANCHES: Shall be defined as wood having a diameter of ½ inch or over and wood that has a diameter of less than ½ inch shall be considered a TWIG.

A DYING LIMB OR BRANCH: May have live growth at some point but shall be removed if found to be in an unhealthy condition.

While it is not the intent that every dead, dying and/or broken twig be removed from trees requiring trimming, the tree worker will be required to remove all such twigs accessible in the areas of the tree in which he/she is working.

If required by the Engineer, specific trees or parts thereof which are so located that damage may result from dropping shall be reduced by rope or cable lowering.

Tree shaping may be required on trees, where up-branching done under this contract has distorted the natural symmetry of the tree. Tree shaping shall consist of the removal of limbs and branches from other locations of the tree where removal is desirable to restore natural symmetry.

All sucker growth on all tree trunks within the limits of the contract shall be removed from the ground level to the beginning of the main branch system.

Any and all trees, branches, or brush conflicting with utility poles, equipment, overhead wires, and service connections, shall be removed and/or cut back using best practices to satisfy the requirements of all Utilities with an attachment to the pole line.

Any and all branches extending directly below a street luminaire as to limit the light reaching the street or path/sidewalk surfaces shall be removed and all branches shall be cut back to afford a minimum of 5-foot clearance on all sides of the luminaire. The path/sidewalk surface shall be considered as the area from the edge of the roadway surface to the edge of the path/sidewalk surface farthest from the roadway.

By cutting NEARLY, but not quite, flush with the trunk, limb or branch, the "collar" is left at the top of the wound (in the crotch of the union). This will permit the callus growth to cover the wound in a shorter period of time.

ITEM 102.2 (Continued)

BASIS OF PAYMENT

Item 102.2 will be paid for at the Contract Lump Sum Bid Price, which price shall include all labor, certifications, materials, equipment, apparatus, tools and incidental costs required to complete the work.

ITEM 102.3 HERBICIDE TREATMENT OF INVASIVE PLANTS HOUR

This work must be performed by persons who meet the qualifications below and are approved by the Landscape Design Section.

Work under this item consists of herbicide treatment of invasive plants currently existing within the project limits and as directed. An Invasive Plant Management Strategy (IPMS) shall be submitted to the Engineer for review and approval and the IPMS shall be implemented on-site. The IPMS shall be written and submitted per Item 102.33 Invasive Plant Management Strategy and shall be measured and paid for under that Item.

Work under this item shall be coordinated with work and schedule for Selective Clearing, Clearing and Grubbing, Mowing, Tree Removal, Planting, and Wetland Mitigation items.

Payment is per hour on-site and shall be compensation for a minimum crew of 2 licensed applicators, 2 back-pack sprayers and mist-blowers, a properly equipped spray truck with spray hoses, and a tank with sufficient capacity for a full day of work. If there is only one applicator, hourly payment shall be adjusted to 50 percent of the unit price.

Date and time stamped photos indicating start and stop time of work must be submitted if requested.

This item is not intended for manual removal of plants.

Management of plants determined to have been introduced to the site via imported loam, compost, mulch, plants, equipment, or other construction activities will be the Contractor's responsibility and at the Contractor's expense.

Herbicide shall be applied during daytime hours only.

Measures to prevent the introduction of invasive plant species to the site and to address introduction due to construction-related activities shall be covered under the Standard Specifications, Division I - Subsections 7.01(D) Plant Pest Control and 7.13 Protection and Restoration of Property as amended in these Special Provisions.

Plant species targeted for management under this item shall be as determined in the field per the site walk and as specified in the IPMS.

The definition of invasive plant species shall be as described by Massachusetts Invasive Plant Advisory Group (MIPAG): "non-native species that have spread into native or minimally managed plant systems in Massachusetts, causing economic or environmental harm by developing self-sustaining populations and becoming dominant and/or disruptive to those systems."

Control of invasive plants shall begin immediately with the initiation of construction activities and prior to any clearing or site disturbance. Treatment areas shall include stockpile locations and may, upon approval of the Engineer, extend outside the project limit. Treatment shall be done each consecutive year for the duration of the contract unless specified otherwise in the IMPS or unless directed otherwise by the MassDOT invasive species contact.

ITEM 102.3 (Continued)

Work shall be done during the growing season from May – October unless otherwise specified in the IPMS.

Areas identified for vegetation control measures shall be as shown on the plans and as determined in the field by the Engineer and a MassDOT Landscape Architect. Contact at MassDOT Landscape Design Section may be contacted at: Andrew.Schlenker@dot.state.ma.us. (DESIGNER: CJones@BETA-inc.com.)

QUALIFICATIONS

The applicators shall submit and meet the qualifications outlined below. A list of contractors specializing in invasive management and approved by MassDOT Landscape Design Section is available on the following website: https://www.mass.gov/lists/landscape-design-and-roadside-maintenance under Invasive Plant Management.

Requirements

1. Company must provide proof of qualifications by providing the following:
   a. Narrative describing company, its expertise and experience with invasive plant control.
   b. Demonstrate experience with herbicide treatment as part of restorations and in sensitive areas.
   c. Describe company's technical qualifications and past performance.

2. Company must meet licensing requirements:
   a. All crew applicators must have a Massachusetts Commercial Applicator License (CORE).
   b. At least one or more applicator must have a ROW certification, if required for work.
   c. Company must provide name(s) of applicator(s) and Applicator License/Certification number for all contractor crew leaders working on the project.
   d. Company must provide documentation of any warnings, penalties or fines received in the last three (3) years.

3. Company must provide proof of experience with invasive plant control and include following:
   a. At least five (5) references from prior invasive plant control work completed in last five (5) years. Provide contact information including address, phone number and email.
   b. Provide a summary of each of these projects including nature of the problem, specific invasive vegetation treated, dates and period of treatment, methodologies used, and summary of success or not in terms of meeting performance objectives. Include summary of equipment used.
   c. Photo documentation of these projects.
   d. GPS coordinates of project locations, if available.

4. Crew leader must have expertise with invasive plant control and provide the following:
   a. Have held Core license for at least five (5) years.
   b. Resume listing five (5) or more years of experience applying pesticides with the company or with another company specializing in vegetation management.

ITEM 102.3 (Continued)

SUBMITTALS

No work shall begin without approval of the submittals.

Submittals include the following items:

Invasive Plant Management Strategy (IPMS)

At least thirty (30) days prior to proposed treatment the IPMS shall be submitted for approval by the Engineer and MassDOT Landscape Architect. All chemicals, methods and work done under this item shall be consistent with the IPMS. The IPMS shall be as described under Item 102.33.

Herbicide Use Report

Within two (2) weeks after each application, the Contractor shall provide to the Engineer and the MassDOT Landscape Architect a completed and signed MassDOT Herbicide Use Report.

Photo Documentation

Digital photos with date and time of herbicide application work, showing start time and completion time, are required and must be submitted for measurement of payment upon request.

MATERIALS

All proposed herbicides shall be as approved in the IPMS. Herbicides shall be labeled for the method of treatment and shall meet all federal, state and local regulation requirements. Application rates will depend on herbicide proposed and shall be per the manufacturer's label for specific application.

METHODS

All methods used shall be as approved in the IPMS which shall be determined during the Initial Site Walk as described under Item 102.33 Invasive Plant Management Strategy.

The Contractor shall be responsible for marking delineated areas and plants to be preserved, removed, or otherwise treated. Fencing or other materials needed for marking and delineating protected areas shall be incidental to this item.

The Contractor shall notify the Engineer a minimum of 3 days prior to date of expected herbicide application. Applicators shall notify the Engineer upon arriving on-site and upon leaving the site.

ITEM 102.3 (Continued)

Herbicide Applications

All herbicide application shall conform to Massachusetts Pesticide Laws and Regulations per the Massachusetts Department of Agricultural Resources (MDAR) Pesticide Bureau.

Mixing, applying and/or disposing of herbicides shall always be in accordance with instructions on their labels and all applicable federal, state, and local regulations. Mixing shall not occur within sensitive areas, wetlands, or buffer zones.

Contractor shall not spray 2 hours prior to precipitation, during rain, or during windy conditions. The Contractor shall be responsible for monitoring weather conditions and adjusting the work schedule as appropriate for the herbicide and application method to be used.

Targeted vegetation shall be identified and marked prior to treatment. Plants treated by foliar spray, injection or glove application or other methods that leave standing vegetation, as opposed to cut-stump application, shall remain clearly marked for identification through the contract period.

Desirable vegetation shall be protected from both spray and other physical damage.

Contractor is responsible for any damage to vegetation not designated for removal or treatment. Vegetation damaged shall be restored. Cost of replacement plants and/or restoration shall be borne by the Contractor.

Contractor shall ensure that the public does not enter a work area while herbicide application or spraying is underway.

Disposal Of Invasive Plant Material

All material to be cleared shall become the property of the Contractor. The satisfactory disposal of all cleared plant material (seeds, roots, woody vegetation, associated soils, etc.) shall be the Contractor's responsibility.

The Contractor shall take measures to prevent viable plant material from leading to further infestations (seeds, roots, woody material, etc.) while stockpiled, in transit, or at final disposal locations. All precautions shall be taken to avoid contamination of natural landscapes with invasive plants or invasive plant material.

Chipping, shredding, or on-site burning of plant material must be approved by the Engineer and included in the IMPS.

For plant material taken to an incinerating facility per the IPMS, a receipt from that facility shall be submitted to the Engineer as proof of disposal.

ITEM 102.3 (Continued)

Where feasible, it is preferable to dispose of plants on-site or to bury them on-site with on-going monitoring for re-sprouting. Disposal locations and methods must be approved and included in the IPMS. Site work such as grading and seeding to stabilize and restore disposal area shall be incidental to this item.

The Contractor shall be responsible for treating or otherwise managing areas of re-growth due to improper disposal. Treatment shall be at the Contractor's expense.

Follow-Up Treatment

Plants and areas shall be re-treated as necessary and as appropriate to the time of year. Treatment shall be for the duration of the contract and per the IPMS.

MEASURE OF SUCCESS

The expectation is a minimum of 85-95 percent control achieved after the first treatment, depending on plants targeted and extent of population, and based on the expectations laid out in the IPMS. The expectation for the contract duration is 95-100% eradication by the end of the treatment period, unless otherwise specified in the IPMS.

METHOD OF MEASUREMENT

Item 102.3 will be measured for payment by the Hour of verified crew time spent on the project doing herbicide application as and where specified herein and in the IPMS. A crew shall be defined as a minimum of two licensed applicators each equipped with (at minimum) back-pack sprayer and mist blower. The crew shall also have a properly equipped spray truck with hoses and a tank with sufficient capacity for a full day of work.

BASIS OF PAYMENT

Item 102.3 will be paid at the contract unit price per Hour, which price shall include all labor, materials, equipment, tools, and all incidentals required to complete the work.

Payment will be based upon verified time spent on the project doing herbicide application as and where specified in the IPMS and upon receipt and approval of submittals. Payment will not include travel time to and from the Contractor's place of business and nor time for investigative field trips.

If there is only one applicator, hourly payment shall be adjusted to 50 percent of the unit price.

The Invasive Plant Management Strategy will be paid for under Item 102.33.

ITEM 102.33 INVASIVE PLANT MANAGEMENT STRATEGY HOUR

This item consists of providing an Invasive Plant Management Strategy (IPMS) for the control of invasive plants currently existing on the project site and/or as directed and shall be coordinated with Item 102.3 Herbicide Treatment of Invasive Plants. Unless otherwise approved, the IPMS shall be submitted in the form of the MassDOT Invasive Plant Management Strategy Report Form.

The IPMS shall be submitted for review and approval by the MassDOT Landscape Design Section or their representative, and the IPMS shall be implemented on-site.

The Invasive Plant Management Strategy Report Form is available online at https://www.mass.gov/lists/landscape-design-and-roadside-maintenance under Invasive Plant Management.

Herbicide treatment for invasive plants shall be as described under Item 102.3 Herbicide Treatment of Invasive Plants and shall be compensated per that Item.

Work under this item shall be coordinated with work and schedule for Selective Clearing, Clearing and Grubbing, Mowing, Tree Removal, Planting, and Wetland Mitigation as relevant to the project.

Individual attending the site walk and determining the Invasive Plant Management Strategy must demonstrate expertise with vegetation management and invasive plant control and submit qualifications as described below.

QUALIFICATIONS

Individual shall be from the same company as that providing services for Item 102.3 Herbicide Treatment of Invasive Plants and shall submit the following, if not submitted under Item 102.3:

- Submit copy of current Core license.
- Submit a resume listing five (5) or more years of experience managing invasive plants with a company specializing in vegetation management.
- References shall be submitted if requested.

SUBMITTALS

Task Summary & Reports

For measurement of payment, the contractor shall submit the total sum and a breakdown of hours for the tasks performed. At a minimum, the tasks shall include the Initial Site Walk, submittal of an approved IPMS, and if requested to accommodate project or site changes, a Follow-up Site Inspection and accompanying IPMS Amendment.

Interim Site Monitoring Reports and/or a Final Report shall be submitted if requested by the MassDOT Landscape Design contact. The MassDOT Landscape Design contact must be notified to attend the site inspection walk when an Interim or Final Report has been requested.

ITEM 102.33 (Continued)

Invasive Plant Management Strategy (IPMS)

At least thirty (30) days prior to construction activities and/or any proposed treatment, the contractor shall submit the IPMS for approval by the Engineer and MassDOT Landscape Architect. All chemicals and methods proposed shall be consistent with applicable Massachusetts Wetlands Protection Act Order of Conditions(Document A00861).

The IPMS shall be completed in coordination with the Prime Contractor and the Engineer and shall include the following as appropriate and applicable to the project and to the IPMS Report Form questions and Guidance:

I. Project Information
- a. Company writing the IPMS and performing the herbicide application.
- b. Date of site walk
- c. Attendees at site walk
- d. Expected end date of contract and expected last treatment (month/season)

II. Brief Description of Conditions
- a. Provide a free-hand sketch on construction plans or aerial image showing species, location, and as relevant, show or note extent of population as relevant to Strategy (i.e., population extends off ROW preventing eradication, small population and eradication deemed feasible within contract schedule, etc.).

III. Coordination with Roadway Contractor regarding other work
- a. Tree Work: Note coordination to be implemented with tree removal, clearing, and clearing and grubbing as applicable to the project.
- b. Wetland Mitigation - Include management proposed for wetland mitigation areas in the IPMS, if and as required.
- c. Planting: If there will be planting in areas proposed for treatment, propose treatment and schedule to avoid herbicide damage to plants.
- d. Mowing: If coordination is required with state mowers, note need in IPMS.

IV. Soil Management
- a. Provide specifics on how soil with invasive plant roots (in particular) or seeds will be handled (i.e., separate stockpiles, plant material will be buried on-site, re-used on-site, disposed off-site and if so, where?).
- b. Show stockpile locations on plan and include treatment schedule.
- c. Note measures that will be implemented to avoid spread through equipment, including how and where equipment will be cleaned.

V. Invasive Plant Treatment & Management
- a. Proposed chemical and methods of treatment for each species or area.
- b. Time of treatment based on target plant species.
- c. Submit product label including application methods and rates (entire MSDS information need not be submitted if available online).
- d. Proposed performance metrics or measure of treatment success if different from that specified under Item 102.3.

ITEM 102.33 (Continued)

e. Method for disposing invasive plant material. This includes material that may result in spread (i.e., seeds, roots) and material that has been treated and/or is not viable (foliage, dead wood, etc.). Methods may include grinding in place, stockpiling and treating, and incinerating offsite.
f. Expected follow-up treatment for duration of contract.

VI. Monitoring Schedule if requested by MassDOT.

Note: The IPMS is critical for identifying pre-construction conditions as well as strategies for minimizing import or spread of invasive plants. Failure to provide an approved IPMS may jeopardize this item, in which case, the contractor will be responsible for management of invasive plants found on-site at no cost to the contract.

Photo Documentation

Digital photos of site conditions, typical species, and extent of infestation must be provided with the IPMS and with any follow-up monitoring or reporting. Photos of follow-up monitoring and reporting must be date and time stamped for acceptance.

METHODS

Initial Site Walk

Prior to any construction activities and soil disturbance, the Contractor shall walk the site with the Engineer and the MassDOT Landscape Architect to determine the IPMS. During the site walk the Contractor shall identify limits of work and, as necessary, mark locations of areas designated for treatment and individual plants targeted for treatment or removal. The Contractor shall be responsible for marking delineated areas and plants to be preserved, removed, or otherwise treated. Fencing or other materials needed for marking and delineating protected areas shall be incidental to this item.

IPMS Follow-up Amendment

The IPMS may be amended to address additional concerns or adjust to conditions if required by the MassDOT Landscape Architect. The amended IPMS shall be submitted to the Engineer and MassDOT Landscape Architect for approval at least fourteen (14) days prior to any proposed treatment.

Interim Site Monitoring Inspection Reports

If required by the MassDOT Landscape Architect and Engineer, Interim Site Monitoring and an accompanying report shall be conducted. Interim Reports must include time and date stamped photos showing treated locations and species.

ITEM 102.33 (Continued)

Final Inspection

A final inspection and report documenting the status of the invasive control may be required for regulatory purposes or for instances where control will be continued by others. The report shall include photo documentation of pre-construction (existing) and post-treatment conditions, notations on a plan or aerial image of area treated, summary of treatment performed, and control achieved. Final reports submittal must include time and date stamped photos.

METHOD OF MEASUREMENT

Item 102.33 will be measured for payment by the Hour. The basis for measurement shall be per the completion of tasks as approved under the Task Summary submittal and acceptance of submittals and photos described above.

BASIS OF PAYMENT

Item 102.33 will be paid at the contract unit price per Hour, which price shall include all labor, materials, equipment, tools, and all incidentals required to complete the work. Payment shall not include travel time to and from the Contractor's place of business.

ITEM 102.511 TREE PROTECTION – ARMORING AND PRUNING EACH

The work under this item shall conform to the relevant provisions of Sections 771 of the Standard Specifications and the following:

Tree protection – armoring and pruning shall be used for instances where construction activity (the use of heavy equipment), comes within proximity to potentially damage tree trunk(s) or limbs.

The work shall include the furnishing and installing of temporary tree trunk protection, minor limb pruning, or removal of lower tree limbs to prevent injury to the tree from construction equipment and activities; as shown on the Drawings; and/or as required by the Engineer.

REFERENCES

If requested, the Contractor shall provide to the Engineer one copy of the latest edition of the American National Standards Institute (ANSI) A300 Standard Practices for Tree, Shrub, and Other Woody Plant Maintenance: Part 1-Pruning and Part 5-Construction Management Standard. Provision of reference shall be incidental to this item.

MATERIALS

Trunk armoring shall be such that it prevents damage to the trunk from construction equipment. Material used for trunk armoring or mounting shall be such that installation and removal shall not damage the trunk.

Acceptable trunk armoring materials shall include two by four (2x4) wood cladding, mounted with wire or metal strapping, or when duration of construction activities is less than three months, slotted corrugated plastic pipe, mounted with duct tape. Eight (8) once untreated burlap shall be used to wrap the tree trunk prior to installation of cladding.

Alternative armoring methods or materials may be acceptable if approved by the Engineer.

The height of tree trunk cladding shall be measured from the base of the tree (including root flare) to the bottom of the first branch, or to a height of eight (8) feet, or as may be required by the Engineer.

METHODS OF WORK

Prior to construction activities, the Engineer, Contractor, and the Arborist (if item is included in the contract), shall review trees noted on the Drawings to be protected. Final decision and selection of trees to be armored and/or pruned shall be per the Engineer.

Care shall be taken to avoid damage to the bark during installation and removal of armoring. Trunk armoring shall be maintained such that it is effective for as long as required or replaced when materials are found to be damaged or ineffective, as determined by the Engineer. Replacement, if required, shall be incidental to the work. Armoring shall be removed immediately upon completion of work activities adjacent to the protected tree(s).

ITEM 102.511 (Continued)

Pruning of limbs shall conform to the techniques and standards of the most recent ANSI A300 standards.

DAMAGES OR LOSS

If trees designated for protection under this item are damaged, including root damage from unapproved trespassing onto the root zone, the Contractor shall, at his own expense, secure the services of an Arborist. The Arborist shall be approved by MassDOT.

If, based on the recommendation of the Arborist, the Engineer determines that damages can be remedied by corrective measures, such as repairing trunk or limb injury; soil compaction remediation; pruning; soil injection fertilization; and/or watering; the damage shall be repaired as soon as possible, within the appropriate season for such work and according to industry standards.

If, based on the recommendation of the Arborist, the Engineer determines that damages are irreparable, or that the damages are such that the tree is sufficiently compromised to pose a future safety hazard, the tree shall be removed. Tree removal shall include cleanup of all wood, grinding of the stump to a depth sufficient to plant a replacement tree or plant, removal of all chips from the stump site, and filling the resulting hole with topsoil. Such tree removal(s), grinding, debris removal, and topsoil filling, shall be at the Contractor's expense.

Tree removal from improper or inadequate tree protection shall result in the Engineer assessing the Contractor monetary damages consistent with industry standards for assessed value and/or replacement.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 102.511 will be measured and paid at the contract unit price per EACH tree to be armored and pruned. This will include full compensation for all labor, equipment, materials, and incidentals for the satisfactory completion of the work and the subsequent removal and satisfactory disposal of the protective materials upon completion of the contract or as required by the Engineer.

Payment for work under this item will be scheduled as follows:

- 40% of the value shall be paid upon installation of trunk armoring and completion of pruning work, if required.

- 60% of the value shall be paid at the end of construction operations that would potentially damage the tree and after protection materials have been removed and properly disposed of by the Contractor. In the event of repairable damages, payment shall be made after the completion of remediation measures.

No separate payment will be made for costs of remedial actions, including Arborist services, tree removal, but all costs in connection therewith shall be included in the Contract unit price bid.

Tree damages assessed, due to lack of or improper tree and plant protective measures being taken, shall be deducted from the contract price of the work.

ITEM 102.521 TREE AND PLANT PROTECTION FENCE FOOT

The work under this Item shall conform to the relevant provisions of Sections 644 and 771 of the Standard Specifications and the following:

Work under this item shall consist of furnishing, installing, and maintaining tree and plant protection fence(s) in a vertical and taut position; removing and resetting fencing as may be required; and final removal of protection fence(s) at the completion of construction activities, or as otherwise required by the Engineer.

The purpose of the fencing is to signify a construction work-free zone and physical barrier, thereby preventing damage to tree roots, tree trunks, soil, and all other vegetation within this delineated Tree and Plant Protection Zone (TPPZ), as shown on the Drawings, as required by the Engineer, and as described herein.

Protection shall be for the duration of the construction activities unless otherwise required by the Engineer.

MATERIALS

Tree and plant protection fence(s) shall provide a minimum forty-eight (48) inch tall barrier, that remains vertical and taut. The Fence shall be orange plastic safety fence (recommended where high visibility is necessary), or wooden snow fencing, or other approved material. Posts and anchoring materials shall be incidental to the work.

Per requirements of the Engineer, additional posts, deeper post depths, and/or additional attachments shall be used if the fabric or fence sags, leans or otherwise is not providing visible or physical protection to the TPPZ.

REFERENCES

If requested, the Contractor shall provide to the Engineer one copy of the American National Standards Institute (ANSI) A300 Standard Practices for Tree, Shrub, and Other Woody Plant Maintenance Part 1, Pruning and Part 5, Construction Management Standard. Provision of reference shall be incidental to this item.

ESTABLISHMENT OF THE TPPZ

Fencing shall be used to delineate and establish the TPPZ, adjacent to construction areas, staging areas, stockpile areas, as shown on the Drawings, and/or as required by the Engineer.

Fencing shall be located as close to the work zone limit and as far from tree trunk(s) and plants as possible to maximize the area to be protected. Fence shall run parallel and adjacent to construction activity to create a barrier between the work zone and the root zone or designated limit of plants and soils to be protected.

ITEM 102.521 (Continued)

When construction activities surround (or have the potential to surround) trees or plants to be protected, a circular enclosure shall be used. In these instances, the TPPZ limit shall be the drip line of each tree or as close as possible to the drip line, and/or as shown on the Drawings. The drip line is defined as the outermost limit of tree canopy.

The Contractor shall not engage in any construction activity within the TPPZ without the approval of the Engineer. Activities may including operating, moving, or storing equipment, supplies, or materials; and locating temporary facilities, including trailers or portable toilets, Accessing or traversing the TPPZ shall not be permitted.

METHOD OF WORK

TPPZ fencing shall be installed prior to any construction work or staging activities. Fence(s) shall be repositioned where and as necessary for optimum tree and plant protection. Repositioning shall be incidental to this item. TPPZ fencing shall not be moved without prior approval by the Engineer.

The TPPZ shall be protected at all times from compaction of the soil; damage of any kind to trunks, bark, branches, leaves, and roots of all plants; and contamination of the soil with construction materials, debris, silt, fuels, oils, and any chemicals substance.

After construction activities are completed, or when required by the Engineer, fencing, stakes, and other anchoring materials, if any, shall be removed and disposed off-site by the Contractor.

REQUIRED WORK WITHIN THE TPPZ

In the event that grading, trenching, utility work, or storage is unavoidable within the TPPZ, the Engineer shall be notified. Measures may be required for tree protection and preservations, including air spading; the use of six (6) inch depth of wood chips or approved matting for root protection; pruning of branches; and/or trunk protection. These protection measures shall be paid under applicable contract items.

Landscaping work specified within the TPPZ shall be accomplished by hand tools. Where handwork is not feasible, with permission of the Engineer, work shall be conducted with the smallest mechanized equipment necessary.

TREE AND PLANT INJURY OR LOSS

If the TPPZ is encroached by construction activity without approval, at the discretion of the Engineer, the Contractor may be required to provide a more durable barrier (e.g., Jersey Barriers, chain link fence (if not already in use) to secure the area. Costs of furnishing and installing additional or more durable barrier(s) shall be borne by the Contractor.

In such cases of encroachment, soils shall be considered compacted and tree root injury will be assumed. Action shall be taken as specified below.

ITEM 102.521 (Continued)

In the event that trees designated for protection under this item are injured, including root injury from unapproved trespassing onto the root zone, the Contractor shall, at his own expense, secure the services of an Arborist. The Arborist shall be approved by MassDOT.

In the event of spills, compaction or injury, the Contractor shall take corrective action immediately using methods approved by the Engineer, in coordination with the Arborist.

If, based on the recommendations of the Arborist, the Engineer determines that injuries can be remedied by corrective measures, such as repairing trunk or limb injury, soil compaction remediation, pruning, and/or watering; the injury shall be repaired as soon as possible, within the appropriate season for such work, and according to industry standards.

If, based on the recommendations of the Arborist, the Engineer determines that injuries are irreparable, or that the injuries are such that the tree is sufficiently compromised to pose a future safety hazard, the tree shall be removed. Tree removal shall include cleanup of all wood, grinding of the stump to a depth sufficient to plant a replacement tree or plant, removal of all chips from the stump site, and filling the resulting hole with topsoil. Such tree removal(s), grinding, debris removal, and filling, shall be at the Contractor's expense.

Tree removal from improper or inadequate protection of the TPPZ shall result in the Engineer assessing the Contractor monetary damages consistent with industry standards for assessed value and/or replacement.

Shrubs removals from improper or inadequate protection of the TPPZ shall be replaced with plants of similar species and equal size or the largest size plants reasonably available. The Engineer shall approve the size, quality, and quantity of the replacement plant(s). Each replacement shall include a minimum of one year of watering and establishment care, specified under Section 771.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Tree and Plant Protection Fence will be measured by the FOOT, complete in place, by the length along the top of the fence.

Tree and plant protection fence will be paid for under the contract unit price per FOOT, complete in place and shall include all materials, labor, and equipment required to furnish, install, anchor, maintain, and remove the fence upon completion, as described herein. Posts, temporary footings, anchoring and removal upon completion, shall be incidental to this item.

No separate payment will be made for costs of remedial actions, including addition of more durable barriers, Arborist services, tree or plant removal, shrub replacement and establishment, but all costs in connection therewith shall be included in the Contract unit price bid.

ITEM 102.521 (Continued)

Tree damages assessed, due to lack of or improper tree and plant protective measures being taken, shall be deducted from the contract price of the work.

Payment for work under this item will be scheduled as follows:

- Forty (40) percent of the value payment will be made upon installation of fencing.

- Sixty (60) percent of the value payment will be made when fencing materials have been maintained to function as specified, for the intended duration, and removed and disposed off-site at the completion of protection measure requirement.

ITEM 106.29 GRAFFITI REMOVAL BY APPLICATION OF COATING SQUARE FOOT

The work under this Item shall conform to the relevant Provisions of Subsection 961.60 of the Standard Specifications and the following:

This work shall consist of the removal of graffiti from the surfaces of concrete substructures to the satisfaction of the Engineer.

The work shall be executed by application of coating to the area affected by graffiti. The removal limits shall be as directed by the Engineer.

Graffiti removal by application of coating means concealing graffiti completely out of sight by making use of approved coating application on a given structure.

MATERIALS

For graffiti removal conducted by application of coating, the proposed paint system shall be a two-coat system consisting of a primer coat and a topcoat. The primer shall be a quality primer with good hiding power and formulated specifically for the purpose of covering graffiti; It shall be compatible with the surface it is used on as per the manufacturer's data sheet.

The top coat shall be compatible with the primer and the existing substrate. Its color shall match the color of the adjacent surface to the satisfaction of the Engineer. The Contractor shall submit the graffiti removing coating products for the approval of the Engineer. Different coating products may be required for surfaces of different materials.

Any product approved by the Engineer shall be non-toxic, non-corrosive, biodegradable substance and comply with the volatile organic compound (VOC) requirements of the Massachusetts Department of Environmental Protection (MassDEP) regulation 310 CMR 7.25(11), Architectural and Industrial Maintenance (AIM) Coatings. The application of the product selected for graffiti removal shall be consistent with the recommendations of the coating manufacturer.

CONSTRUCTION DETAILS

The graffiti removal coating material shall be applied as per manufacturer's specification. The contractor shall provide product data and manufacturer’s recommendations for use by the Engineer for approval at least two weeks prior to starting of work.

The thoroughness of the graffiti removal from the graffitied surface is subject to the approval of the Engineer. If the Engineer establishes the work requires additional application, the Contractor shall remedy and remove any sign of the graffiti at no additional cost to the State. The Contractor shall also take appropriate precautions to prevent any solvent or coating chemical from falling into the river.

The substrate surfaces shall be thoroughly cleaned before applying coating. All dust, dirt, oil, grease, and other substances which might prevent the adhesion of the paint to the substrate shall be removed.

ITEM 106.29 (Continued)

The surface preparation and application procedure shall be consistent with the recommendations of the graffiti removal coating manufacturer.

Cleaned surfaces shall bear no evidence of graffiti paint layers. If after cleaning is completed, the cleaned surface becomes soiled because of the Contractor's operations, it shall be re-cleaned, at the expense of the Contractor.

METHOD OF MEASUREMENT

Item 106.29 will be measured for payment by the Square Foot of surface area where the graffiti was actually removed. Measurement shall be taken as a flat plane. No allowance will be made for depths of joints, overhangs, stone faces or concrete patterns.

BASIS OF PAYMENT

Item 106.29 will be paid for at the Contract unit prices per Square Foot, which price shall include all labor, materials, equipment and all incidental costs required to complete the work.

ITEM 107.855 PRESSURE INJECTION OF CRACKS FOOT

The work to be done under this Item consists of repairing cracks in sound concrete of the existing substructures. Existing cracks to be repaired by pressure injection shall be bonded by penetration with an epoxy adhesive in accordance with the epoxy manufacturer's recommendations and the following:

The epoxy adhesive shall be listed on MassDOT's Qualified Construction Materials List, and the Contractor shall submit manufacturer's literature completely describing the products to be used. The materials shall be delivered clearly marked with legible and intact labels containing the manufacturer's name, brand name, and identifications of the temperatures that conform to the manufacturer's recommendations and instructions.

The Contractor shall comply with all manufacturers' instructions and recommendations regarding safety. The surrounding work, vehicles, and vegetation shall be protected from damage by epoxy injection materials and operation.

Not included under this Item are the repairs to cracks that pass through areas of unsound concrete to be removed under Item 127.122. The Engineer will designate these areas.

The Contractor will perform his own investigations and will "evaluate" and mark out the cracks to be repaired. Before any repairs are made, the Contractor will provide the Engineer clear access to the areas designated for repair. During this time, the Engineer will perform an inspection of the areas and will approve and/or designate the areas where repair will be required. It shall be the responsibility of the Contractor to inform the Engineer, in writing, of the date that a structure(s) will be available for inspection operations. Notification shall be given to the Engineer at least seven (7) days prior to the date that the area in question will be in a condition acceptable to the Engineer.

The Contractor will not be allowed to do any repair work until all necessary inspection operations have been performed, unless given permission by the Engineer. The Contractor will include any costs related to this inspection in the general cost of the work.

As crack repair operations commence, the Contractor shall provide at least one 4″ diameter core at a location designated by the Engineer. The Engineer reserves the right to order additional cores at locations he/she designates. The core shall penetrate the full crack depth of the area being restored. The cores shall be tested by an independent testing laboratory.

Further crack repairs may not continue until the test results confirm that the methods and materials being utilized by the Contractor are deemed acceptable by the Engineer. The test will be considered acceptable if upon visual examination the injection has achieved more than 90 percent penetration of the crack, and the bond strength has conformed to the following: concrete failure before adhesive failure, or 6500 psi with no failure of either concrete or adhesive. If a core fails a test, an evaluation of the methods and materials used must be made before the area represented by the failed test is re-injected and re-tested. The Contractor will not be permitted to continue to inject cracks until the cause of failure is determined and the Engineer is satisfied that corrective measures have been taken to prevent additional failures. The Contractor shall make additional cores as necessary until the work is considered acceptable.

ITEM 107.855 (Continued)

The Contractor shall furnish to the Engineer samples of materials proposed for use at least six weeks prior to scheduled use.

The Contractor shall arrange with the materials manufacturer or distributor to have the services of a competent field representative at the work site prior to any mixing of components to instruct the work crews in the proper mixing and application procedures. The field representative shall remain at the job site after work commences and continue to instruct until the Engineer is satisfied that the crew has mastered the technique of installing the system successfully. The representative shall make periodic visits (minimum weekly) to the project as the work progresses and shall confer on each visit with the Contractor and the Engineer.

The manufacturer's field representative must be fully qualified to perform the work and shall be subject to the approval by the Engineer. The Contractor shall be completely responsible for the expense of the services of the required field representative.

METHOD OF MEASUREMENT

Item 107.855 will be measured for payment by the Foot of crack repaired.

BASIS OF PAYMENT

Item 107.855 will be paid for at the Contract unit prices per Foot, which price shall include all labor, materials, equipment, manufacturer's field representative, test cores, repairing all test core locations and all incidental costs required to complete the work.

ITEM 127.1 REINFORCED CONCRETE EXCAVATION CUBIC YARD

The work under this Item shall conform to the relevant provisions of Subsection 112 of the Standard Specifications and the following:

The work shall include the excavation, removal and proper disposal of portions of the existing bridge substructure, including but not limited to, abutment stems, backwalls, pier stem, and wingwall stems, to the limits indicated on the Plans and/or as directed by the Engineer, unless specifically approved by the Engineer in writing.

The work shall include removal of steel reinforcement, where necessary, and all saw cutting of the existing concrete where indicated on the Plans and/or as directed by the Engineer. Exposed rebar to remain shall be cleaned by abrasion blasting and shall be free of all oil, grease, rust and other foreign material. The Contractor will not be paid for the removal of any concrete beyond the limits described under this Item or shown on the Plans.

METHOD OF CONSTRUCTION

All materials resulting from the concrete demolition shall become the property of the Contractor who shall properly dispose of all such materials at approved locations. Debris from construction must be carefully contained within the work zones by the use of temporary shielding or other appropriate methods and prevented from falling into the water, or surface, below. Contractor shall be responsible for dust control as a result of the demolition operations.

The Contractor shall utilize two types of jackhammers. The first type of jackhammer shall not exceed a weight of forty (40) pounds. This equipment shall be used to remove the concrete to the full depth of the excavation as indicated on the Plans or as directed by the Engineer. The second type of jackhammer shall be a chipping hammer and shall not exceed a weight of fifteen (15) pounds. This equipment shall be used to dress the excavated area by removing loose, cracked, unsound or hollow areas between the unexcavated area and the excavated area.

The Contractor may propose the use of other demolition equipment, the use of which will be subject to the review and approval of the Engineer. The Engineer may reject the use of any equipment or demolition methods that, in his opinion, cause excessive vibration of the structure, or threaten to damage the bridge or any part thereof, or cause discomfort to the users of the bridge, or present a hazard of any kind to the structure, workers, or the public.

Any reinforcing steel which is to remain and has been loosened or dislodged, shall be realigned and retied by the Contractor. This shall be considered incidental to this Item of work. If during the course of this operation, the Contractor damages the existing reinforcing steel or structural steel that is not designated to be replaced, he shall submit to the Engineer for approval his method of repair. The approved repair shall be completed by the Contractor at no additional cost to the Department.

ITEM 127.1 (Continued)

The Contractor shall prepare a neat line between the unexcavated area and the excavated area. This shall be accomplished with a masonry saw which shall penetrate a minimum of 1 inch below the surface. The Contractor shall take extreme care so as to not damage any steel reinforcing or embedded structural steel. In the event that reinforcing steel is encountered within the outer 1 inch depth during sawing operations, the depth of sawcut shall immediately be adjusted to a shallower depth so as not to damage the steel bars. If so directed by the Engineer,sawcutting shall again be carried down to the 1 inch depth at other locations of repair provided reinforcing steel is not again encountered.

Areas to be capped must be clean, sound, and free of contaminants. All loose and deteriorated concrete shall be removed by mechanical means. Mechanically prepare the concrete substrate to obtain a surface profile of ±0.25 inch with a new exposed aggregate surface. After removals and edge conditioning are complete, remove bond inhibiting materials (dirt, grease, loosely bonded aggregate) by abrasion blasting or high pressure washing with water. Check the concrete surfaces after cleaning to ensure that surface is free from additional loose aggregate or additional delaminations.

METHOD OF MEASUREMENT

Item 127.1 will be measured for payment by the Cubic Yard. of reinforced concrete excavated as determined by field measurements conducted by the Contractor and verified by the Engineer.

BASIS OF PAYMENT

Item 127.1 will be paid for at the Contract unit prices per Cubic Yard, which price shall include all labor, materials, equipment, transportation, excavation, saw cutting, abrasion blasting, removal, satisfactory off-site disposal of all excavated materials, temporary shielding or other methods required to contain the debris within the work zone, and all incidental costs required to complete the work.

ITEM 127.122 REINFORCED CONCRETE EXCAVATION FOR REPAIRS CUBIC FOOT

The work under this Item shall conform to the relevant provisions of Subsection 112 of the Standard Specifications and the following:

The work under this Item includes the removal of deteriorated and/or spalled concrete in the bridge substructures, as may be required, for repairs as directed by the Engineer and Inspection Reports (Document A00881).

Existing deteriorated concrete within the existing substructures shall be removed to the limits of sound concrete as directed by the Engineer. The Contractor shall not damage any existing reinforcing steel in areas where deteriorated or spalled concrete is being removed. The Contractor will not be paid for the removal of any concrete beyond the limits described under this Item and approved by the Engineer.

CONSTRUCTION METHODS

A. Inspection of the Concrete Surfaces: The Contractor will perform their own investigations and will "evaluate" and mark out the surfaces of the concrete to determine the areas for repairs. Methods for evaluation shall include nondestructive methods such as visual observations and acoustic impact method using a hammer or chain drag (for horizontal surfaces only). The Contractor is referenced to ACI Report 201.1R-08 "Guide for Making a Condition Survey of Concrete in Service" and ACI Report 364.1R-07 "Guide for Evaluation of Concrete Structures Before Rehabilitation" in regards to evaluation methods. Before any existing concrete is removed, the Contractor will provide the Engineer clear access to the areas designated for repair. During this time, the Engineer will perform an inspection of the areas and will approve and/or designate the areas where concrete removal and repair will be required.

   It shall be the responsibility of the Contractor to inform the Engineer, in writing, of the date that a structure will be available for inspection operations. Notification shall be given to the Engineer at least seven (7) days prior to the date that the area in question will be in a condition acceptable to the Engineer.

   The Contractor will not be allowed to do any further repair work until all necessary inspection operations have been performed, unless given permission by the Engineer.
   The Contractor will include any costs related to this inspection in the general cost of the work.

B. Removal of Deteriorated Concrete: All deteriorated concrete designated for removal under this Item shall be removed within the limits approved by the Engineer. The lateral limits of each area to be repaired will be delineated by the Contractor and suitably marked and subsequently approved by the Engineer. Where several areas are to be repaired are very close together, the Engineer may combine these individual repairs into a larger area. The outlines of each such area shall first be cut to a depth of ½ inch with an approved power-saw capable of making straight cuts.

ITEM 127.122 (Continued)

In the event that reinforcing steel is encountered within the outer ½ inch depth during sawing operations, the depth of sawcut shall immediately be adjusted to a shallower depth so as not to damage the steel bars. If so directed by the Engineer, sawcutting shall again be carried down to the ½ inch depth at other locations of repair provided reinforcing steel is not again encountered. Where over-breakage occurs resulting in a featheredge, the featheredge shall be squared up to a vertical edge in an approved manner. Where sawing is impractical, the area shall be outlined by chisel or other approved means.

The removal of deteriorated concrete shall be accomplished by pneumatic or power hammers approved by the Engineer. For concrete removal, the weight of pneumatic or power hammers shall not exceed 30 pounds. Fillets at inside corners of intersecting limit lines shall be carefully removed. After completion of concrete removal, the sides of the patch shall be vertical down to the bottom of the patch.

The minimum depth of concrete removal shall not be less than the specified minimum thickness of repair material.

No debris, tools or incidental equipment of any kind will be permitted to fall into the river below. The Contractor shall provide any necessary shielding or other means to prevent debris from falling into the river below. Any material that accidentally falls into the river shall be removed immediately at his/her own expense. All debris shall be promptly removed and satisfactorily disposed of by the Contractor.

If removal of deteriorated concrete results in full or partial exposure of reinforcing steel, but less than 1 inch clearance exists between the sound concrete and the inside surface of exposed reinforcing steel, enough sound concrete as is necessary to achieve this 1 inch minimum clearance shall be removed. The removal of this sound concrete shall also be included for payment under Item 127.122.

Where the existing reinforcing steel is damaged or deteriorated it shall be supplemented with new reinforcing steel of the same size. Pneumatic tools shall not be placed in direct contact with reinforcing steel. Any sound reinforcing steel damaged during the concrete removal operations shall be repaired or replaced by the Contractor at his expense as directed by the Engineer. New steel shall be attached beside existing steel with a minimum splice length as indicated on the Plans, or as directed by the Engineer. The concrete shall be removed to a minimum depth of 1 inch below the new steel.

C. Surface Preparation: Areas to be repaired must be clean, sound, and free of contaminants. All loose and deteriorated concrete shall be removed by mechanical means. Mechanically prepare the concrete substrate to obtain a surface profile of +/- 0.25 inches with an exposed aggregate surface. Area to be patched shall not be less than the minimum depth specified by manufacturer of the rapid setting cement.

ITEM 127.122 (Continued)

If reinforcing steel is exposed, then clean by mechanical cleaning and then high pressure washing with water that does not contain detergents or any bond inhibiting chemicals. Where active corrosion has occurred that would inhibit bonding, abrasion blast steel to white metal finish.

After removals and edge conditioning are complete, remove bond inhibiting materials (dirt, grease, loosely bonded aggregate) by abrasion blasting or high pressure water blasting with water that does not contain detergents or any bond inhibiting chemicals. Check the concrete surfaces after cleaning to ensure that surface is free from additional loose aggregate or that additional delaminations are not present.

METHOD OF MEASUREMENT

Item 127.122 will be measured for payment by the Cubic Foot of reinforced concrete excavated as determined by field measurements conducted by the Contractor and verified by the Engineer.

BASIS OF PAYMENT

Item 127.122 will be paid for at the Contract unit prices per Cubic Foot, which price shall include all labor, materials, equipment, transportation, excavation, saw cutting, abrasion blasting, removal, satisfactory off-site disposal of all excavated materials, and all incidental costs required to complete the work.

New steel reinforcing required to supplement any existing steel that is found to be damaged or deteriorated will be paid for under Item 910.1.

ITEM 141.1 TEST PIT FOR EXPLORATION CUBIC YARD

The work under this Item shall conform to the relevant provisions of Subsection 140 of the Standard Specifications and the following:

The Contractor shall exercise extreme caution when performing the work of this section, and specialized techniques such as vacuum excavation or handwork as directed by the Engineer and shall be considered part of the work of this section. Test pits shall be no greater than 5'x3'x5' deep except for the following locations or otherwise directed by the Engineer:

- ST. 5+58 RT
- ST. 6+32 RT

The Contractor shall provide the Engineer 48 hours' notice prior to conducting test pits at the above locations so that subsurface soil conditions and groundwater elevations can be evaluated.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 141.1 will be measured and paid for at the contract unit price per Cubic Yard, which price shall include all labor, materials, equipment, tools, saw-cutting, excavation, including any special techniques such as hand or vacuum methods, survey or other measurement, backfilling, compacting, coordinating with others and all incidental costs required to satisfactorily complete the work.

Test pits made without the prior approval of the Engineer shall not be compensated for.

Temporary HMA patch will be paid for under Item 472.

ITEM 151.9 STREAMBED RESTORATION CUBIC YARD

This work shall consist of stockpiling, reinstallation, and restoration of riverbed material in the proposed bridge replacement and the upstream and downstream approaches in the limits of work. The streambed restoration shall replicate the existing natural channel bed outside the work area in terms of material, roughness, shape, profile, and appearance. The ultimate product will, to the extent possible, replicate the function and appearance of the natural stream channel.

The Contractor shall coordinate with his/her sub-contractors to ensure all required equipment is available on-site to complete the work in this manner. The streambed restoration is required to comply with environmental permits issued for the project. MassDOT Environmental Services will provide a Fluvial Geomorphologist (Geomorphologist) or environmental specialist to provide a pre-construction meeting, on-site oversight during construction, and assistance during streambed restoration construction to ensure the restoration is constructed as shown on the Plans, as required by these Special Provisions and in accordance with permit requirements.

At least 30 days prior to the commencement of construction, the Contractor shall coordinate with David Paulson (MassDOT Wildlife & Endangered Species Unit Supervisor, (857) 262-3378 / david.j.paulson@state.ma.us) to set up an initial (virtual or in person) meeting with MassDOT's Geomorphologist, Contractor, and Engineer. At this meeting, the Geomorphologist will provide an overview of the restoration work. The Contractor should be prepared to discuss the anticipated means, methods, and schedule.

Process Approval:

In lieu of a mockup, the Contractor shall schedule an onsite meeting to discuss the streambed restoration with the Geomorphologist and respective parties from MassDOT. The Geomorphologist shall be onsite during initial streambed restoration. The Contractor shall provide the Geomorphologist adequate access to observe, direct, and inspect the channel restoration work throughout the duration of the removal, stockpile, and reinstallation of the existing streambed material. If material is being brought to the site for streambed restoration, the Contractor shall provide the Geomorphologist with photographs to see the material.

MATERIAL

Material excavated from the existing streambed shall be removed and stockpiled to facilitate reinstallation and replication of the natural streambed and to fill the voids in the proposed riprap placed below the top streambed restoration layer.

In the event that the excavated material is not suitable or there is not enough available suitable material, additional streambed restoration material shall be locally sourced that matches the composition of the existing native streambed.

ITEM 151.9 (Continued)

The following gradation shall be used as a guide. For the streambed restoration material.

Stream Bed Material Gradation

Particle	**Percent (%) Composition**
Boulder	0
Cobble	0
Gravel (course) (passing	25
Gravel (medium/fine)	45
Sand	30

The median grain size (D50) of the existing streambed as measured from vibracore samples taken from the top 2′± of streambed is approximately 1.9 mm (medium sand). Based on this data, the existing streambed material will need to be supplemented with additional gravel to meet the gradation requirements in the table above. As noted previously, supplemental streambed restoration material shall be locally sourced that matches the composition of the existing native streambed.

The streambed material shall be approved by the Engineer and Geomorphologist prior to use.

CONSTRUCTION

Channel

The streambed material shall be reinstalled over dumped riprap, as depicted on the plans, to an average thickness of 2’-8”, with variations in thickness as necessary to create the channel shape as shown on the plans. The initial placement of streambed material shall fill / choke the voids in the underlying riprap. Fill voids by shaking stone with the teeth of an excavator bucket, hand tamping with metal tamping rods, and by spraying water to settle fines between large stones. Plate compactors shall not be used. The purpose of filling the voids is to prevent subsurface flow where surface water disappears into large voids between the stone fill below the channel bed surface during low flow conditions. The final streambed shape and appearance shall be finalized in the field as directed by the Geomorphologist.

Reinstallation of the stockpiled streambed material shall be placed on top of the riprap to restore streambed habitat and fish passage. The streambed materials shall be installed during normal low water conditions behind cofferdams in accordance with the environmental permits.

ITEM 151.9 (Continued)

Completion

Once all material has been placed in the stream channel and approved by the Geomorphologist and Engineer, the Contractor shall remove the cofferdams in such a way as to slowly wet the stream to minimize the initial sediment pulse. Every attempt shall be made to minimize the downstream movement of sediment.

The final streambed shall maintain the general configuration of the existing streambed bedform and there shall be minimal subsurface flow upon final inspection by the Engineer and Geomorphologist. The project must be passable by fish and other aquatic organisms following construction.

METHOD OF MEASUREMENT

Item 151.9 will be measured for payment by Cubic Yard, of streambed in place for the complete and accepted work for restoration of the streambed within the limits shown on the Plans as approved by the Engineer and Geomorphologist. Streambed material used for filling of voids in riprap will be measured as 15% of the volume of riprap.

BASIS OF PAYMENT

Item 151.9 will be paid for at the contract unit price per cubic yard which price shall include all labor, tools, equipment, testing, stockpiling, transporting, placing the material specified and incidental costs required to complete the work. .

Relocated boulders on the restored stream bed shall be located by Landscape Architect and/or Engineer and be incidental to Streambed restoration item.

The Geomorphologist will be provided by MassDOT at no cost to the Contractor.

Excavation of the existing streambed material will be paid for under Item 143.

Temporary cofferdams will be paid for under Item 991.1.

ITEM 163.1 DEFORMATION AND VIBRATION MONITORING LUMP SUM

The work under this Item shall include monitoring of potential movements and vibrations in the existing abutments and pier, the buildings at #96 and #103 Old Colony Avenue, and the pump station building at #9 South Street East during performance of the work. Monitoring shall include procurement and installation of instruments and collection and reporting of data as specified herein.

The work shall include monitoring of deformations and vibrations during demolition, installation of cofferdams, and bridge excavation.

Deformation monitoring shall be performed using survey methods at up to ten (10) locations as described in this Special Provision and/or as determined in the field by the Engineer. Deformation monitoring points shall be installed and baseline measurements performed and submitted prior to demolition, excavation behind and in front of the abutments and wingwalls, and installation of cofferdams. Monitoring shall be performed daily during the afore-mentioned construction activities, and on a weekly basis at all other times, for the duration of the Contract. Survey of deformation monitoring points shall be performed by a Registered Land Surveyor.

The Contractor shall perform vibration monitoring using a minimum of two (2) seismographs at the two closest structures to the vibration-inducing construction operations, or as directed by the Engineer. The locations of the seismographs may change during the work based on conditions and work sequence. Vibration monitoring shall be performed during demolition, excavation in front of and behind the abutments and wingwalls, and installation of cofferdams. Initial vibration monitoring data shall be collected and compared to Response Values on an hourly basis during the first 4-hours of usage of any new piece of vibration producing equipment and on an hourly basis during the first four hours of demolition activity activities. After performing the initial evaluation described above, vibration monitoring shall continue in continuous peak particle velocity recording mode with the peak values reported daily for the during of the vibration producing activity.

Crack deformation monitoring shall be performed at up to eight (8) locations as directed by the Engineer.

Data from the deformation and vibration monitoring will be compared to the Response Values indicated below. Should the data exceed the Response Values, the Contractor shall implement modifications to construction procedures to mitigate potential damage to the affected structures. The Contractor shall also be responsible for the repair, at no additional cost to the Department, of any damage to existing structures caused by the Contractor's actions.

Instruments that become damaged, destroyed, inoperable, or out of calibration during the Work shall be repaired or replaced at no additional cost to the Department. The Contractor shall be responsible for the protection of all instrumentation during the course of the Work.

Remove instruments at the end of the construction and restore the site of instrumentation locations unless otherwise directed by the Engineer.

ITEM 163.1 (Continued)

QUALIFICATIONS

The Chief Surveyor shall be a Registered Land Surveyor in the Commonwealth of Massachusetts with a minimum of three (3) years of experience in displacement measurements of types and accuracies specified in accordance with this Section.

The Field Survey Party Chief Shall have a minimum of one (1) year of experience in displacement survey measurement of the types and accuracies specified herein in accordance with this Section.

The vibration monitoring shall be performed by a technician familiar with the installation and operation of seismographs under the direction of a Professional Engineer registered in the Commonwealth of Massachusetts. The technician and Engineer shall each have a minimum of one (1) year of experience in vibration monitoring.

SUBMITTALS

At least thirty (30) days prior to start of the Work, submit for review and approval the following information:

1) Locations of proposed deformation monitoring points on a scaled sketch supplemented with at least one (1) photograph of each proposed location for review prior to installation of monitoring points.
2) Proposed means and methods for monitoring horizontal and vertical displacements of deformation monitoring points.
3) Resumes for the Chief Surveyor, Field Survey Party Chief, Field Technician and Registered Professional Engineer.
4) Proposed initial locations of seismograph instruments.
5) Manufacturer's information on proposed seismograph instruments.
6) Proposed daily and weekly data submittal formats with example data.

At least fourteen (14) days prior to the start of the work submit Formal Initial Readings for each deformation monitoring survey point.

During demolition, excavation behind and in front of the abutments and wingwalls, and installation of cofferdams submit daily monitoring data from crack gages and deformation monitoring points, along with continuous vibration monitoring data. Data collected each day shall be submitted by 4 PM on the following day.

During all other work activities, submit weekly monitoring data from crack gages and deformation monitoring points. Weekly data shall be submitted by 4 PM the following Monday (Tuesday for holiday weekends).

ITEM 163.1 (Continued)

Submitted deformation monitoring data shall include the following at a minimum:

1. A summary sheet showing the cumulative vertical movement, horizontal movement or crack elongation of each instrument from its Formal Initial Reading.
2. A statement to indicate whether any Response Value has been reached.
3. A summary of construction activities and weather conditions for the day of readings, along with a scaled sketch showing locations of construction activities in relation to monitoring points.
4. Names of individuals making measurements.
5. Accuracy of readings.
6. Horizontal and vertical locations of deformation monitoring points.
7. Changes from previous measurements and readings of all monitoring points and crack gages.
8. Cumulative movements and readings over time since the initial readings of the instrumentation.
9. Comparison of current instrument readings to previous readings.

Daily vibration data should be submitted in conjunction with and on the same schedule as daily deformation monitoring data. Submitted vibration monitoring data shall include at a minimum: 1) raw data and dated plotted on a graph of peak particle velocity versus frequency, 2) a scaled sketch showing the locations monitored, 3) name of person making measurements, and 4) a statement to indicate whether any Response Value has been reached. The sketch shall include locations of vibration producing construction activities. The submitted data shall be correlated to the scaled sketch to allow evaluation of vibration data collected from multiple locations during the day.

Within one week of installation of each deformation monitoring point and crack gage, submit the as-installed location on a scaled sketch showing the installed location supplemented with at least one (1) photograph of each installed instrument.

MATERIALS

Provide two (2) portable seismographs for monitoring the velocities of ground vibrations resulting from construction activities. Acceptable seismographs include Micromate by Instantel; MiniSupergraph II by Nomis Seismographs; 3000 LCP by Geosonics/Vibra-Tech; or approved equal. Factory calibration shall have been performed by the manufacturer within the past year using a shake table and a reference sensor traceable to the National Institute of Standards and Technology.

Each deformation monitoring point shall consist of a center-punched ⅜-inch (0.375″) diameter by minimum two-inch (2″) long, stainless steel, socket head cap screw ASTM A307-UNC with stainless steel washer, screwed into ⅜-inch (0.375″) machine screw anchor; a 2-inch long “PK” masonry nail; or a clearly marked existing feature on the surface to be monitored that allows reproducible survey of horizontal and vertical movement.

ITEM 163.1 (Continued)

Provide calibrated direct read building crack gages consisting of overlapping glass or acrylic plates. The crack gages shall be waterproof and weather resistant and shall be capable of being read to a resolution of 0.02 inch with a maximum horizontal range of at least 0.75 inch and a vertical range of at least 0.375.

METHOD OF CONSTRUCTION

The Contractor shall provide the Engineer with safe access at all times for reading instrumentation.

Formal Initial Readings and Accuracy:

1) Obtain Formal Initial Readings (FIRs) on all deformation monitoring points and crack gages for use as the baseline reference for the instrument. Before establishing the FIR for each instrument, a minimum of three readings shall be performed that demonstrate that changes resulting from the installation process have ceased. The three readings demonstrating that the installation has stabilized shall be performed on different days and may be used to establish the FIR.
2) The FIR for a deformation monitoring point shall consist of the average of at least two survey measurements of elevation and horizontal location obtained with independent survey set-ups. Where applicable, the initial readings will be taken after allowing sufficient time for the grout or epoxy to set. Each reading other than the FIR will consist of a single set of survey measurements. Reading accuracy shall be ±0.01 foot.
3) The FIR for a crack gage will be the reading of the cross hairs on the crack gage when the tape connecting the two plates is cut after the gage has been installed and/or the epoxy has set. Reading accuracy shall be ±0.5 millimeters.
4) Formal Initial Readings are not required for vibration monitoring. Vibration Monitoring accuracy shall be ±0.02 inches per second. The Contractor may, at his or her option, make baseline surveys of vibrations resulting from normal traffic on the bridge for comparison purposes only.

All survey data shall be collected and reported using project datums.

Measurements shall be made in a reproducible manner. For example, deformation monitoring point bolts shall be firmly seated before reading; crack gage measurements shall be made at approximately same time of day to reduce impacts of temperature expansion/contraction upon readings, and survey shall be made at reproducible locations (e.g. punchmark in bolt or nail).

Response Values and Interpretation of Data

1) Response values are relative to Formal Initial Readings and are subject to adjustment by the Engineer as indicated by prevailing conditions or circumstances.
2) The Engineer will retain prime responsibility for interpretation of data. In the event a Response Value is reached or exceeded or undesirable impacts to the monitored structure are otherwise indicated, the Engineer will inform the Contractor who shall take action as outlined in this Subsection. The Contractor may make their own interpretation of the data.

ITEM 163.1 (Continued)

3) If the Contractor's collected data indicates that a Response Value has been reached or exceeded, the Contractor shall immediately inform the Engineer.

4) The maximum allowable peak particle velocity (PPV) measured by the seismographs shall not exceed a threshold defined by linear interpolation between the following points on a plot of vibration frequency versus peak particle velocity:

Frequency (Hz)	PPV (in/sec)
1	0.19
4	0.75
15	0.75
40	2.0
100	2.0

5) The Response Values for surveyed vertical deformation movements are as follows: Threshold Value of 0. 25 inches (1/4″) and Limiting Value of 0.5 inches (1/2″).

6) The Response Values for surveyed horizontal deformation movements are as follows: Threshold Value of 0.5 (1/2″) and Limiting Value of 0.75 inches (3/4″).

7) The Response Values for crack elongation are as follows: Threshold Value of 0.05 inches and Limiting Value of 0.1 inches

8) If a Threshold Value is reached, the Contractor shall:
   a) Promptly inform the Engineer.
   b) Meet with the Engineer to discuss response action(s) within 24 hours.
   c) Provide a daily report to the Engineer until all instrument readings fall below the specified Threshold Values, or unless otherwise directed.

9) The Engineer may require the contractor to initiate one or more of the following response actions if the Threshold Value is reached:
   a) Increase instrument monitoring frequencies.
   b) Install and monitor additional instruments.
   c) Modify construction procedures.

10) If the Limiting Value is reached, the Contractor shall:
   a) Suspend activities in the affected area with the exception of those actions necessary to avoid further exceeding the Limiting Value. Work shall only resume at the sole discretion of the Engineer.
   b) Immediately commence monitoring deformation instruments at an increased frequency as directed by the Engineer.
   c) The Contractor shall meet with the Engineer to discuss additional response action(s) and prepare a mitigation plan within 24 hours.

ITEM 163.1 (Continued)

BASIS OF PAYMENT

Item 163.1 will be paid for at the Contract LUMP SUM bid price, which price shall include installation of instruments and collection, reporting of data as specified herein and all incidental costs required to complete the work.

ITEM 164. PRE- AND POST-CONSTRUCTION CONDITION SURVEYS EACH

The work under this Item shall include performance of a pre-construction and a post-construction condition survey of the following properties: #96, and #103, Old Colony Avenue, and #9 South Street East.

The intent of the pre- and post-construction condition surveys is to document conditions at these properties prior to and after construction. The pre-construction survey will form a baseline for later comparison to the post-construction survey to evaluate impacts (if any) from construction activities. The two surveys could also be useful to evaluate construction-related damage claims that could later arise from the property owners.

QUALIFICATIONS

The pre- and post-construction condition surveys shall be performed by a Professional Engineer registered in the Commonwealth of Massachusetts. The Contractor's Professional Engineer shall have been in business for at least five consecutive years and shall have completed in the past five years at least 5 building condition surveys similar to those specified herein.

SUBMITTALS

At least 30 days prior to the start of the Work, the Contractor shall submit the resume of the Registered Professional Engineer who will be performing the surveys.

At least 30 days prior to the start of the Work, the Contractor shall submit the methods to be used for building surveys, including contingencies for a) interior access to structures; b) exterior access to structures from the building property; and c) no access to property (survey from public property). The submittal shall include proposed agreement forms between the Contractor and building owners allowing access for surveys.

At least 14 days prior to the start of the Work, the Contractor shall submit a pre-construction condition survey conforming to the requirements specified herein.

No more than 30 days after substantial completion, the Contractor shall submit a post-construction condition survey conforming to the requirements specified herein.

METHOD OF CONSTRUCTION

The Contractor shall coordinate the pre- and post-construction survey schedule with the Engineer. The Contractor shall arrange for access to the buildings for surveys. Building access agreement forms shall be sent to Owner's via Certified Mail.

The Contractor's Professional Engineer and the Engineer must be present during each survey.

The pre- and post-construction condition surveys shall include the main buildings and dwellings; accessory buildings; hardscape elements; and all trees, shrubs, and landscaping elements within 100 feet of the limits of construction.

ITEM 164. (Continued)

Surveys shall be performed in accordance with the Contractor's reviewed and approved submittal. Written property owner access agreement forms must be obtained by the Contractor prior to entering each property.

The Contractor's Professional Engineer shall submit results of the survey in a report format, including checklists, sketches and photographs.

METHOD OF MEASUREMENT

Item 164 will be measured for payment by each survey of each property performed.

BASIS OF PAYMENT

Item 164 will be paid for at the Contract unit price per EACH, which price shall include all labor, materials, equipment, and incidental costs required to complete the work.

ITEM 180.01 ENVIRONMENTAL HEALTH AND SAFETY PROGRAM LUMP SUM

The work shall consist of ensuring the health and safety of the Contractor's employees and subcontracting personnel, the Engineer, their representatives, the environment, and public welfare from any on-site chemical contamination present in air, soil, water and sediment.

The Contractor shall prepare and implement a site-specific Environmental Health and Safety Plan (EHASP) which has been approved and stamped by a Certified Industrial Hygienist (CIH) and includes the preparer's name and work experience. The EHASP shall include appropriate components required by OSHA Standard 29 CFR 1910.120(b) and the Massachusetts Contingency plan (MCP) 310 CMR 40.0018 and must comply with all applicable state and federal laws, regulations, standards and guidelines, and provide a degree of protection and training appropriate for implementation on the project. The EHASP shall be a dynamic document with provision for change to reflect new information, new practices or procedures, changing site environmental conditions or other situations which may affect site workers and the public. The EHASP shall be developed and implemented independently from the standard construction HASP required to work on all MassDOT construction projects.

Health and safety procedures provided by the Contractor shall comply with all the appropriate regulations that address employee working conditions, including but not limited to standards established by OSHA and National Institute for Occupational Safety and Health (NIOSH). Equipment used for the purpose of health and safety shall be approved by and meet pertinent standards and specifications of the appropriate regulatory agencies.

A copy of the most up-to-date version of the EHASP shall be maintained on-site at all times by the Contractor. The on-site copy shall contain the signature of the Engineer and each on-site employee of the MassDOT, Contractor, and Subcontractors involved with on-site activities. The employee's signature on the EHASP shall be deemed prima facie evidence that the employee has read and understands the plan. Updated copies of signature sheets shall be submitted to the Engineer.

The EHASP shall specify a Contractor Site Safety and Health Officer responsible for implementation of the EHASP and to oversee all construction activities, including handling, storage, sampling and transport, which require contact with or exposure to potentially hazardous materials.

The level of protection, required to ensure the health and safety of on-site personnel will be stipulated in the EHASP. The Site Safety and Health Officer shall implement the EHASP based on changing site and weather conditions, type of operation or activity, chemical compounds identified on-site, concentration of the chemicals, air monitoring data, physical state of the hazardous materials, potential duration of exposure to hazardous materials, dexterity required to perform work, decontamination procedures, necessary personnel and type of equipment to be utilized.

During implementation of the EHASP, a daily log shall be kept by the Site Safety and Health Officer and a copy shall be provided weekly to the Engineer. This log shall be used to record a description of the weather conditions, levels of personal protection being employed, screening data and any other information relevant to on-site environmental safety conditions. The Site Safety and Health Officer shall sign and date the daily log.

ITEM 180.01 (Continued)

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Preparation and implementation of the Environmental Health and Safety Program, including the monitoring, protection and storage of all contaminated materials, as well as subsequent modifications to the EHASP, will be measured and paid for at the Lump Sum Bid Price.

Payment of 50% of the Environmental Health and Safety Program contract price will be made upon the initial acceptance of the EHASP by the Engineer. Payment of the remaining 50% of the Environmental Health and Safety Program contract price will be made upon completion of the work. The bid price shall include preparation and implementation of the EHASP as well as the cost for its enforcement by the Site Safety and Health Officer along with any necessary revisions and updates. The work of implementing the Environmental Health and Safety Program includes work involving, but not limited to, the monitoring, protection, and storage of all contaminated materials.

ITEM 180.02 PERSONAL PROTECTION LEVEL C UPGRADE HOUR

The work shall consist of providing appropriate personal protective equipment (PPE) for all personnel in an area either containing or suspected of containing a hazardous environment.

Contingencies for upgrading the level of protection for on-site workers will be identified in the EHASP and the Contractor shall have the capability to implement the personal protection upgrade in a timely manner. The protective equipment and its use shall be in compliance with the EHASP and all appropriate regulations and/or standards for employee working conditions.

Personal Protection Level C Upgrade will be measured and paid only upon upgrade to Level C and will be at the contract unit price, per hour, per worker, required in Level C personal protection. No payment will be made to the Contractor to provide Level D PPE.

ITEM 180.03 LICENSED SITE PROFESSIONAL SERVICES HOUR

Within limited areas of the project site, media (i.e. soils, sediments, surface water and/or groundwater) requiring evaluation and/or management under the Massachusetts Contingency Plan (MCP) may be encountered. A Licensed Site Professional (LSP) shall be required to provide the services necessary to comply with the requirements of the MCP. These services may include a site walk, field screening, sampling, analysis and characterization of potentially contaminated media, preparation and implementation of Immediate Response Action (IRA) Plans, Utility-Related Abatement Measure (URAM) and Release Abatement Measure (RAM) Plans, Imminent Hazard Evaluations, status reports, transmittal forms, release notification forms, risk assessments, completion statements, and related documents required pursuant to the MCP. LSP services shall also be necessary to temporarily move material generated on the project to an off-site storage location.

The name and qualifications of the LSP and all environmental technicians to be assigned to the project shall be submitted to the Engineer for approval at least four weeks prior to initial site activities. The LSP shall have a current, valid license issued by the Massachusetts Board of Registration of Hazardous Waste Site Cleanup Professionals. The LSP shall have significant experience in the oversight of MCP activities at active construction sites. Qualification packages for the LSP and each technician shall include a resume, all recent work assignments with responsibilities identified (previous 5 years), and applicable training and certifications. A list of all Notices of Noncompliance, Notice of Audit Findings and Enforcement Orders issued by the Massachusetts Department of Environmental Protection (DEP) shall be submitted for all work assignments listed for the LSP and environmental technicians. Upon approval of the LSP Qualifications, the LSP will be designated as the LSP of Record unless MassDOT designates in writing otherwise. The LSP of Record will serve as the primary point of contact for all hazardous material matters on the project.

The LSP shall evaluate soil and/or sediment with discoloration, odor, elevated field screening results, presence of petroleum liquid or sheen on the groundwater surface, or any abnormal gas or materials in the ground which are known or suspected to be oil or hazardous materials. Excavated soil and sediment which is suspected of petroleum contamination shall be field screened using the jar headspace procedures according to established DEP Guidance. All field screening equipment must be pre-approved by the Engineer. The LSP shall ensure proper on-site calibration of all field screening instrumentation.

The Engineer shall be contacted immediately when observations or any field screening results verify contamination requiring further analysis, and/or enhanced management of suspect media. Any enhanced management of contaminated soil to ensure proper stockpiling and storage is incidental to the LSP Services item. The LSP shall evaluate the need for confirmatory sampling prior to backfill in areas where contaminated material has been excavated and disposed off-site for compliance with applicable regulatory requirements. The Engineer shall approve the locations of the testing sites prior to the sampling.

ITEM 180.03 (Continued)

Contaminated media shall be handled in accordance with all applicable state and federal statutes, regulations, and policies. The LSP shall adequately evaluate contaminated media for compliance with the requirements of the MCP and Department Policies.

The Contractor and the LSP shall be aware of the reporting requirements for releases of oil and/or other hazardous material (OHM) as set forth in federal and state laws and regulations and both shall be held responsible for performing the work in accordance with all applicable Federal and State laws and regulations. The LSP shall maintain written records in a clear and concise tabular format which tracks the excavation, stockpiling, analysis and reuse/disposal of all known/suspect contaminated media. These records shall be up-to-date and submitted to the Engineer on a bi-weekly basis. The LSP shall review and summarize the laboratory data from any analyses performed on contaminated media in a tabular format and compare the results to applicable reporting thresholds. A report shall be delivered to the Engineer outlining the material sampling methods, laboratory analysis results, evaluation of applicable regulatory exemptions, reporting obligations, and proposed course of action. The laboratory report together with Chain of Custody forms for all analytical results shall be submitted to the Engineer within 14 days after completion of such analyses.

The LSP and Contractor shall be held responsible for the submission of all MCP-related documents to the Engineer at least 14 days in advance of any timeframe specified in the MCP and for the timely submission of data and tracking information as noted within this Item. All documents prepared under this Item must be reviewed and signed by the approved LSP. The Contractor and LSP shall be responsible for all fines, damages, and enforcement requirements imposed by applicable regulatory agencies for failure to meet regulatory and contract timeframes. No compensation will be provided for such fines, damages, and enforcement actions.

The Contractor and the LSP shall be aware of the reporting requirements for releases of oil and/or other hazardous material (OHM) as set forth in federal and state laws and regulations and shall both be held responsible for performing the work in accordance with all applicable Federal and State laws and regulations.

If the Contractor causes a release of OHM, the Contractor shall be responsible for assessing and remediating the release in accordance with all pertinent State and Federal regulations, including securing the services of a LSP, at his own expense.

The LSP shall coordinate all activities involving both MassDOT and the DEP through the Engineer. Any notification of release shall be approved by the Engineer before submittal to the DEP, except if an imminent hazard condition exists as defined in 309 CMR 4.03(4)(b).

LABORATORY TESTING IN SUPPORT OF LSP SERVICES

Laboratory testing provides for analytical testing in support of LSP services related to maintaining MCP compliance, such as delineating the extent and type of contamination present. Sampling and testing for disposal purposes are not included and are incidental to Items 181.11-181.14.

ITEM 180.03 (Continued)

In order to maintain compliance with the MCP and Department Policies or other regulatory requirements, the LSP shall request approval from the Engineer to obtain samples from various locations and depths within the project area and to perform laboratory analyses on those samples. No sampling shall be conducted without prior approval from the Engineer. The samples shall be delivered to a DEP-certified laboratory using proper chain-of-custody documentation for analyses which, depending upon site conditions and suspected and/or identified contaminants of concern, may include, but are not limited to, metals, polychlorinated biphenyls (PCBs), volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides, polycyclic aromatic hydrocarbons (PAHs), extractable petroleum hydrocarbons (EPHs) and volatile petroleum hydrocarbons (VPHs). Subsequent testing, depending upon initial results, may be required for Toxicity Characteristic Leaching Procedure (TCLP) analyses (EPA Method 1311) for metals.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

LSP Services for work under this item will be measured per person, per hour of service provided by LSP, Environmental Technicians and other approved personnel. Travel time shall not be included in the billable hours.

The quantity and type of laboratory tests must be approved by the Engineer beforehand. The Contractor will be reimbursed upon satisfactory written evidence of payment. The Contractor may be required to obtain cost estimates from three DEP certified laboratories for the Engineer to choose the service provider.

LSP Services will be paid at the Contractor bid price for each hour, or fraction thereof, spent to perform the work as described above. The bid price shall be a blended rate that includes the cost of the LSP, environmental technicians and other personnel, the performance of all work tasks and field screening, including required equipment, materials and instrumentation, and production of all documentation described above. All requests for payment must be accompanied by the following information: the names of the personnel associated with the work charged under LSP Services, dates and hours worked, work conducted, including, where appropriate, locations as identified on the construction plans, and a copy of the field diary for the dates submitted.

Laboratory testing will be reimbursed upon receipt of paid invoices for testing approved by the Engineer.

This item is for LSP work for compliance with the MCP and Department Policies. LSP hours and any laboratory testing related to off-site disposal of excess soil and sediment is incidental to Items 181.11-181.14 (including, but not limited to, disposal characterization, disposal package preparation, landfill acceptance, shipment paperwork preparation, field screening, and tracking).

ITEM 181.01 PHASE II SAMPLING AND ANALYSIS PLAN LUMP SUM

The work under this Item shall include the preparation and subsequent implementation of a Phase II Sampling and Analysis Plan (SAP) for submission to MassDOT, which will then require review and approval by MassDEP prior to implementation. The Contractor may be required to revise this plan based on MassDEP comments. Implementation of this plan (including all required labor, equipment, and laboratory fees) are incidental to this item. The Phase II SAP is required by Condition 38 of the 401 WQC issued for the project and is subject to the requirements of 314 CMR 9.00.

The original SAP which was prepared and implemented during the project design phase proposed to collect a total of three (3) composite samples and four (4) grab samples for analysis. Each sample was to be advanced to the proposed dredging depth within the river (6 feet) using geoprobe hand tools and a sediment samplers. Refer Document A00882. On December 1st, 2026, an attempt was made to conduct the prescribed sampling at the Site per the original SAP. However, hazardous water conditions were present at the time of sampling, and therefore only (1) composite sample and two (2) grab samples from the area upstream of the bridge could be procured. Results from this sampling is included in the Document A00882.

This Phase II SAP will be required to propose a total of two (2) composite samples and two (2) grab samples for analysis. The samples are to be collected by the Contractor under oversight of their LSP. Each sample is to be advanced to the proposed dredging depth within the river (6 feet) and is anticipated to be completed using geoprobe hand tools and a sediment sampler. Proposed sampling locations must be GPS located at time of sampling. To accomplish the proposed sampling safely in light of previously observed hazardous water conditions, the sampling areas may be phased to correlate with the 2-phase cofferdam approach being used for water controls (i.e., sampling once “dry” conditions are present within one half of the river at a time). Means and methods of sampling are the responsibility of the Contractor and will be detailed in the Phase II SAP.

Once samples are collected, the Contractor will be responsible for coordinating all required testing. The composite samples will be tested for the following:

- Conductivity
- MCP 14 Metals (includes arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc as required by 314 CMR 9.07))
- Ignitability
- Reactive Sulfide/cyanides
- Pesticides/herbicides to meet Aggregate reporting limits
- VOCs (volatile organic compounds) (Grab sample based upon highest PID)
- PCBs (polychlorinated biphenyls by EPA Method 8082 and NOAA analysis for congeners) **
- Total SVOCs (semi-volatile organic compounds)
- (PAH (polynuclear aromatic hydrocarbons) results will be a subset of the total SVOC results; Total SVOC results to conform with MassDEP Policy # Comm-97-001)
- Extractable Petroleum Hydrocarbons (EPH)
- TPH (total petroleum hydrocarbons)
- Total Organic Carbon

ITEM 181.01 (Continued)

- volatile solids (percent)
- water (percent)
- TCLP, as applicable

** PCB analysis will be conducted using EPA Method 8270C Modified (EPA Method 680); results will include the "NOAA" list of 22 congeners.

Additionally, each composite sediment sample will be analyzed for cyanide.

The grab samples will be tested for:

- VOCs
- EPH with PAHs

Work performed under this item is subject to all applicable regulatory requirements including the issued 401 WQC, 314 CMR 9.00, and 310 CMR 40.0000.

BASIS OF PAYMENT

Item 181.01 will be paid for at the Contract Lump Sum price, which price shall include all labor, materials, equipment, and incidental costs required for Preparation and implementation of the Phase II Sampling and Analysis Plan.

Payment of 50% of the Phase II Sampling and Analysis Plan contract price will be made upon the acceptance of the SAP by MassDEP. Payment of the remaining 50% of the Phase II Sampling and Analysis contract price will be made upon completion of the work.

ITEM 181.11	**DISPOSAL OF UNREGULATED SOIL**	**TON**
ITEM 181.12	**DISPOSAL OF REGULATED SOIL - IN-STATE FACILITY**	**TON**
ITEM 181.13	**DISPOSAL OF REGULATED SOIL - OUT-OF-STATE FACILITY**	**TON**
ITEM 181.14	**DISPOSAL OF HAZARDOUS WASTE**	**TON**

The work under these Items shall include the transportation and disposal of contaminated material excavated, or excavated and stockpiled. It shall also include the cost of any additional laboratory analyses required by a particular disposal facility beyond the standard disposal test set.

Excavation of existing subsurface materials may include the excavation of contaminated soils. The Contractor shall be responsible for the proper coordination of characterization, transport and disposal, recycling or reuse of contaminated soils. Disposal, recycling or reuse will be referred to as "disposal" for the purposes of this specification. However, regardless of the use of the term herein, there will be no compensation under these items for reuse within the project limits. The Contractor will be responsible for coordinating the activities necessary for characterization, transport and disposal of contaminated soils. Such coordination will include the Engineer and his/her designee overseeing management of contaminated materials. Contaminated soils must be disposed of in a manner appropriate for the soil classification as described below and in accordance with the applicable laws of local, state and federal authorities. The Contractor shall be responsible for identifying disposal facility (ies) licensed to accept the class of contaminated soils to be managed and assure that the facility can accept the anticipated volume of soil contemplated by the project. The Contractor shall be responsible for hiring a Licensed Site Professional (LSP) and all ancillary professional services including laboratories as needed for this work. The Contractor will be responsible for obtaining all permits, approvals, manifests, waste profiles, Bills of Lading, etc. subject to the approval of the Engineer prior to the removal of the contaminated soil from the site. The Contractor and LSP shall prepare and submit to the Engineer for approval all documents required under the Massachusetts Contingency Plan (MCP) and related laws and environmental regulations to conduct characterization, transport, and disposal of contaminated materials.

CLASSES OF CONTAMINATED SOILS

The Contractor and its LSP shall determine if soil excavated or soil to be excavated is unregulated soil or contaminated soil as defined in this section. Such materials shall be given a designation for purposes of reuse or disposal based on the criteria of the MCP. Soils and sediments which are not suitable for reuse will be given a designation for purposes of off-site disposal based on the characterization data and disposal facility license requirements. The Classes of Contaminated Soils are defined as follows:

ITEMS 181.11 through 181.14 (Continued)

UNREGULATED SOIL consists of soil, fill and dredged material with measured levels of oil and hazardous material (OHM) contamination at concentrations below the applicable Reportable Concentrations (RCs) presented in the MCP. Unregulated soil consists of material which may be reused (or otherwise disposed) as fill within the Commonwealth of Massachusetts subject to the non-degradation criteria of the MCP (310 CMR 40.0032(3), in a restricted manner, such that they are sent to a location with equal or higher concentrations of similar contaminants. Disposal areas include licensed disposal facilities, approved industrial settings in areas which will be capped or covered with pavement or loamed and seeded, and for purposes of this project should be reused as fill within the project site construction corridor whenever possible. The material cannot be placed in residential and/or environmentally sensitive (e.g. wetlands) areas. Under no circumstances shall contaminated soils be placed in an uncontaminated or less contaminated area (including the area above the groundwater table if this area shows no sign of contamination).

The Contractor shall submit to MassDOT the proposed disposal location for unregulated soils for approval. If such a disposal location is not a licensed disposal facility, the Contractor shall submit to the Engineer analytical data to characterize the disposal area sufficiently to verify that the unregulated material generated within the MassDOT construction project limits is equal to or less than the contaminant levels at the disposal site and meets the non-degradation requirements of the MCP. In addition, the Contractor shall provide written confirmation from the owner of the proposed disposal location that they have been provided with the analytical data for both the materials to be disposed as well as the disposal site characterization and that s/he agrees to accept this material. A Material Shipping Record or Bill of Lading, as appropriate, shall be used to track the off-site disposal of unregulated soil and a copy, signed by the disposal facility or property owner, shall be provided to the Engineer in order to document legal disposal of the unregulated material.

The cost of on-site disposal of unregulated soil within the project area will be considered incidental to the item of work to which it pertains.

ITEMS 181.11 through 181.14 (Continued)

REGULATED SOIL consists of materials containing measurable levels of OHM that are equal to or exceed the applicable Reportable Concentrations for the site as defined by the MCP, 310 CMR 40.0000. Regulated soil which meets the MCP reuse criteria of the applicable soil/groundwater category for this project area may be reused on site provided that it meets the appropriate geotechnical criteria established by the Engineer. Regulated Soil may be reused (as daily or intermediate cover or pre-cap contouring material) or disposed (as buried waste) at lined landfills within the Commonwealth of Massachusetts or at an unlined landfill that is approved by the Massachusetts Department of Environmental Protection (DEP) for accepting such material, in accordance with DEP Policy #COMM-97-001, or at a similar out-of-state facility. It should be noted that soils which exceed the levels and criteria for disposal at in-state landfills, as outlined in COMM-97-001, may be shipped to an in-state landfill, but require approval from the DEP Division of Solid Waste Management and receiving facility. An additional management alternative for this material is recycling into asphalt. Regulated Soils may also be recycled at a DEP approved recycling facility possessing a Class A recycling permit subject to acceptance by the facility and compliance with DEP Policy #BWSC-94-400. Regulated Soil removed from the site for disposal or treatment must be removed via an LSP approved Bill of Lading, Manifest or applicable material tracking form. This type of facility shall be approved/permitted by the State in which it operates to accept the class of contaminated soil in accordance with all applicable local, state and federal regulations.

HAZARDOUS WASTE consists of materials which must be disposed of at a facility permitted and operated in full compliance with Federal Regulation 40 CFR 260-265, Massachusetts Regulation 310 CMR 30.000, Toxic Substances Control Act (TSCA) regulations, or the equivalent regulations of other states, and all other applicable local, state, and federal regulations. All excavated materials classified as hazardous waste shall be disposed of at an out-of-state permitted facility. This facility shall be a RCRA hazardous waste or TSCA facility, or RCRA hazardous waste incinerator. This type of facility shall be approved/permitted by the State in which it operates to accept hazardous waste in accordance with all applicable local, state and federal regulations and shall be permitted to accept all contamination which may be present in the soil excavate. The Contractor shall ensure that, when needed, the facility can accept TSCA waste materials i.e. polychlorinated biphenyls (PCBs). Hazardous waste must be removed from the site for disposal or treatment via an LSP approved Manifest.

MONITORING/SAMPLING/TESTING REQUIREMENTS

The Contractor shall be responsible for monitoring, sampling and testing during and following excavation of contaminated soils to determine the specific class of contaminated material. Monitoring, sampling and testing frequency and techniques should be performed in accordance with Item 180.03 – LSP Services. Additional sampling and analysis may be necessary to meet the requirements of the disposal facility license. The cost of such additional sampling and analysis shall be included in the bid cost for the applicable disposal items. The Contractor shall obtain sufficient information to demonstrate that the contaminated soil meets the disposal criteria set by the receiving facility that will accept the material.

ITEMS 181.11 through 181.14 (Continued)

No excavated material will be permanently placed on-site or removed for off-site disposal until the results of chemical analyses have been received and the materials have been properly classified. The Contractor shall submit to the Engineer results of field and laboratory chemical analyses tests within seven days after their completion, accompanied by the classification of the material determined by the Contractor, and the intended disposition of the material. The Contractor shall submit to the Engineer for review all plans and documents relevant to LSP services, including but not limited to, all documents that must be submitted to the DEP.

WASTE TRACKING:

Copies of the fully executed Weight Slips/Bills of Lading/ Manifests/Material Shipping Records or other material tracking form received by the Contractor from each disposal facility and for each load disposed of at that facility, shall be submitted to Engineer and the Contractor's LSP within three days of receipt by the Contractor. The Contractor is responsible for preparing and submitting such documents for review and signature by the LSP or other appropriate person with signatory authority, three days in advance of transporting soil off-site. The Contractor shall furnish a form attached to each manifest or other material tracking form for all material removed off-site, certifying that the material was delivered to the site approved for the class of material. If the proposed disposition of the material is for reuse within the project construction corridor, the Contractor shall cooperate with MassDOT to obtain a suitable representative sample(s) of the material to establish its structural characteristics in order to meet the applicable structural requirements as fill for the project.

All material transported off-site shall be loaded by the Contractor into properly licensed and permitted vehicles and transported directly to the selected disposal or recycling facility and be accompanied by the applicable shipping paper. At a minimum, truck bodies must be structurally sound with sealed tail gates, and trucks shall be lined and loads covered with a liner, which shall be placed to form a continuous waterproof tarpaulin to protect the load from wind and rain.

DECONTAMINATION OF EQUIPMENT

Tools and equipment which are to be taken from and reused off site shall be decontaminated in accordance with applicable local, state and federal regulations. This requirement shall include, but not be limited to, all tools, heavy machinery and excavating and hauling equipment used during excavation, stockpiling and handling of contaminated material. Decontamination of equipment is considered incidental to the applicable excavation item.

ITEMS 181.11 through 181.14 (Continued)

REGULATORY REQUIREMENTS

The Contractor shall be responsible for adhering to regulations, specifications and recognized standard practices related to contaminated material handling during excavation and disposal activities. MassDOT shall not be responsible at any time for the Contractor's violation of pertinent State or Federal regulations or endangerment of laborers and others. The Contractor shall comply with all rules, regulations, laws, permits and ordinances of all authorities having jurisdiction including, but not limited to, Massachusetts DEP, the U.S. Environmental Protection Agency (EPA), Federal Department of Transportation (DOT), Massachusetts Water Resources Authority (MWRA), the Commonwealth of Massachusetts and other applicable local, state and federal agencies governing the disposal of contaminated soils.

All labor, materials, equipment and services necessary to make the work comply with such regulations shall be provided by the Contractor without additional cost to MassDOT. Whenever there is a conflict or overlap within the regulations, the most stringent provisions shall apply. The Contractor shall reimburse MassDOT for all costs it incurs, including damages and/or fines, as a result of the Contractor's failure to adhere to the regulations, specifications, recognized standard practices, etc., that relate to contaminated material handling, transportation and disposal.

SUBMITTALS

I. Summary of Sampling Results, Classification of Material and Proposed Disposal Option.

The following information, presented in tabular format, must be submitted to the Engineer for review and approval prior to any reuse on-site or disposal off-site. This requirement is on-going throughout the project duration. At least two weeks prior to the start of any excavation activity, the Contractor shall submit a tracking template to be used to present the information as stipulated below. Excavation will not begin until the format is acceptable to MassDOT.

Characterization Reports will be submitted for all soil, sediment, debris and groundwater characterized through the sampling and analysis program. Each report will include a site plan which identifies the sampling locations represented in the Report. The Construction Plan sheets may be used as a baseplan to record this information.

The Sampling Results will be presented in tabular format. Each sample will be identified by appropriate identification matching the sample identification shown on the Chain of Custody Record. The sample must also be identified by location (e.g. grid number or stockpile number). For each sample, the following information must be listed: the classification (unregulated, regulated, etc.), proposed disposal option for the stockpile or unit of material represented, and, all analytical results.

ITEMS 181.11 through 181.14 (Continued)

Each Characterization Report will include the laboratory analytical report and Chain of Custody Record for the samples included in the Report.

II. Stockpiling, Transport, and Disposal.

At least two weeks prior to the start of any excavation activity, the Contractor shall submit, in writing, the following for review and shall not begin excavation activity until the entire submittal is acceptable to MassDOT.

Excavation and Stockpiling Protocol:
Provide a written description of the management protocols for performing excavation and stockpiling and/or direct loading for transport, referencing the locations and methods of excavating and stockpiling excavated material.

Disposal and Recycling Facilities:

1. Provide the name, address, applicable licenses and approved waste profile for disposal and/or recycling location(s) where contaminated soil will be disposed. Present information substantiating the suitability of proposed sites to receive classifications of materials intended to be disposed there, including the ability of the facility to accept anticipated volumes of material.

2. Provide a summary of the history of compliance actions for each disposal/recycling facility proposed to be used by the Contractor. The compliance history shall include a comprehensive list of any state or federal citations, notices of non-compliance, consent decrees or violations relative to the management of waste (including remediation waste) at the facility. Material should not be sent to facilities which are actively considered by the DEP, USEPA or other responsible agency to be in violation of federal, state or local hazardous waste or hazardous material regulations. MassDOT reserves the right to reject any facility on the basis of poor compliance history.

Transportation:
The name, address, applicable license and insurance certificates of the licensed hauler(s) and equipment and handling methods to be used in excavation, segregation, transport, disposal or recycling.

III. Material Tracking and Analytical Documentation for Reuse/Disposal.

The following documents are required for all excavation, reuse and disposal operations and shall be in the format described. At least two weeks prior to the start of any excavation or demolition activity, the Contractor shall submit the tracking templates required to present the information as stipulated below. Excavation or demolition will not begin until the format is acceptable to MassDOT.

ITEMS 181.11 through 181.14 (Continued)

All soils, sediments and demolition debris must be tracked from the point of excavation to stockpiling to onsite treatment/processing operations to off-site disposal or onsite reuse as applicable.

Demolition Debris:
Demolition debris must be tracked if the debris is stockpiled at a location other than the point of origin or if treatment or material processing is conducted. Identification of locations will be based on the station-offset of the location. The tracking table will identify date and point of generation, any field screening such as PID or dust monitoring, visual observations/comments, quantity, and stockpile ID/processing operation location. For each unit of material tracked, the table will also track reuse of the material on-site, providing reuse date, location of reuse as defined by start and end station, width of reuse location by offset, the fill elevation range, quantity, and finish grade for said location. For demolition debris which is not reused on site, the table will also track disposal of the material as defined by disposal date, quantity and disposal facility. The table must provide a reference to any analytical data generated for the material.

Soil/Sediment:
Soil excavation will be identified based on the station-offset of the excavation location limits. The tracking table will identify date and point of generation, any field screening such as PID or dust monitoring, visual observations, quantity, and stockpile number/location. For each unit of material tracked, the table will also track reuse of the material on-site and disposal of the material off-site using the same categories identified for demolition debris above.

Method Of Measurement And Basis Of Payment

Disposal of contaminated soil shall be measured for payment by the Ton of actual and verified weight of contaminated materials removed and disposed of. The quantities will be determined only by weight slips issued by and signed by the disposal facility. The most cost-effective, legal disposal method shall be used. The work of the LSP for disposal under all of these items shall be incidental to the work with no additional compensation.

ITEM 181.11 Measurement for Disposal of Unregulated Soil shall be under the Contract Unit Price by the weight, in tons, of contaminated materials removed from the site and transported to and disposed of at an approved location or licensed facility, and includes any and all costs for approvals, permits, fees and taxes, additional testing/characterization required by the facility beyond the standard disposal test set, decontamination procedures, transportation and disposal.

ITEM 181.12 Measurement for Disposal of Regulated Soil – In-State Facility shall be under the Contract Unit Price by the weight in tons of contaminated materials removed from the site and transported to and disposed of at an approved in-state facility, and includes any and all costs for approvals, permits, fees and taxes, testing/characterization required by the facility beyond the standard disposal test set, decontamination procedures, transportation and disposal.

ITEMS 181.11 through 181.14 (Continued)

ITEM 181.13 Measurement for Disposal of Regulated Soil - Out-of-State Facility shall be under the Contract Unit Price by the weight in tons of contaminated materials removed from the site and transported to and disposed of at an approved out-of-state facility, and includes any and all costs for approvals, permits, fees and taxes, testing/characterization required by the facility beyond the standard disposal test set, decontamination procedures, transportation and disposal.

ITEM 181.14 Measurement for Disposal of Hazardous Waste shall be under the Contract Unit Price by the weight in tons of hazardous waste removed from the site and transported to and disposed of at the licensed hazardous waste facility, and includes any and all costs for approvals, permits, fees and taxes, testing/characterization required by the facility beyond the standard disposal test set, decontamination procedures, transportation and disposal.

ITEM 182.1 INSPECTION AND TESTING FOR ASBESTOS LUMP SUM

The work shall include the inspecting and testing of all materials suspected of containing asbestos. When any demolition is required to enable the inspection and testing of the suspected material it will be considered incidental to this Item and the Contractor must perform all asbestos handling and testing in accordance with the regulations stated below.

Dust suppression in the form of light water sprays, foams, dust suppressants and calcium chloride will be implemented as required to control dusting during any disturbance of asbestos suspected material. Alternatively, intrusive activities may be reduced or curtailed under high wind or heavy rain conditions, which in the opinion of the Health And Safety Plan (HASP) may pose a safety hazard to the workers.

The Contractor shall employ the services of a Massachusetts licensed "Asbestos Inspector" to inspect the material to determine whether or not "ITEM 182.2 REMOVAL OF ASBESTOS" is required. Should the asbestos inspector determine laboratory testing is required, a state certified laboratory shall be used to perform all necessary tests.

REGULATIONS

U.S. Department of Labor, Occupational Safety and Health Administration, (OSHA) including but not limited to:

29 CFR 1910 Section 1001 and 29 CFR 1926 Section 58 Occupational exposure to Asbestos, Tremolite, Anthophyllite and Actinolite, Final Rule
29 CFR 1910 Section 134 Respiration Protection
29 CFR 1926 Construction Industry
29 CFR 1910 Section 2 Access to Employee Exposure and Medical Records
29 CFR 1910 Section 1200 Hazard Communication
29 CFR 1910 Section 145 Specifications for Accident Prevention Signs and Tags

U.S. Environmental Protection Agency, (EPA) including but not limited to:

40 CFR 762, CPTS 62044, FRL 2843-9, Federal Register Vol. 50 no.134, July 12, 1985 p.28530 - 28540 Asbestos Abatement Projects Rule
40 CFR 61 Subpart A Regulation for Asbestos
40 CFR 61 Subpart M (Revised Subpart B) National Emission Standard for Asbestos

ITEM 182.1 (Continued)

U.S. Department of Transportation 49 CFR 172 and 173

Massachusetts Department of Labor and Industries Regulations, (DLI) including but not limited to:

453 CMR 6.00 Removal, Containment and Encapsulation of Asbestos

Massachusetts Department of Environmental Protection (DEP) including but not limited to (supplementing subsection 7.01):

310 CMR 7.00, Section 7.09 Odor and Dust, Section 7.10 Noise, Section 7.15 Air Pollution Control Regulations
310 CMR 18.00 and 19.00 Solid Waste Regulations

Massachusetts Division of Industrial Safety 45 CMR 10.00

Local Requirements including but not limited to those of Health Departments, Fire Departments and Inspection Services Departments

Wherever there is a conflict or overlap of the above references, the most stringent provision shall apply.

BASIS OF PAYMENT

Item 182.1 will be paid for at the Contract unit price per Lump Sum, which price shall include all labor, materials, tools, equipment, and all incidental costs required to complete the work as described and as required by the Engineer.

No separate payment will be made for the protection of general public, private property, the proper inspecting and testing of the material, but all costs in connection therewith shall be included in the Contract unit price bid.

ITEM 182.2 REMOVAL OF ASBESTOS FOOT

The work shall include the removal and satisfactory disposal of existing asbestos. The Contractor's attention is directed to the fact that existing asbestos shall be inspected and tested prior to removal, to determine if special removal and disposal is required. The Contractor shall follow all the rules and regulations stated in "ITEM 182.1 INSPECTION AND TESTING FOR ASBESTOS". If asbestos is present, the Contractor shall follow all the rules and regulations stated in the section "REMOVAL AND DISPOSAL OF ASBESTOS CONTAINING MATERIALS", under this item. The Contractor should notify and coordinate his/her efforts with the proper utility accordingly.

REMOVAL AND DISPOSAL OF ASBESTOS CONTAINING MATERIALS

This section specifies the requirements for the handling and removal of asbestos containing material. The Contractor must perform all asbestos handling and removal work in accordance with these specifications and the following additional requirements.

U.S. Department of Labor, Occupational Safety and Health Administration, (OSHA) including but not limited to:

29 CFR 1910 Section 1001 and 29 CFR 1926 Section 58Occupational exposure to Asbestos, Tremolite, Anthophyllite and Actinolite, Final Rule
29 CFR 1910 Section 134 Respiration Protection
29 CFR 1926 Construction Industry
29 CFR 1910 Section 2 Access to Employee Exposure and Medical Records
29 CFR 1910 Section 1200 Hazard Communication
29 CFR 1910 Section 145 Specifications for Accident Prevention Signs and Tags

U.S. Environmental Protection Agency, (EPA) including but not limited to:

40 CFR 762, CPTS 62044, FRL 2843-9, Federal Register Vol. 50 no.134, July 12, 1985 p.28530 - 28540 Asbestos Abatement Projects Rule
40 CFR 61 Subpart A Regulation for Asbestos
40 CFR 61 Subpart M (Revised Subpart B) National Emission Standard for Asbestos

U.S. Department of Transportation 49 CFR 172 and 173

Massachusetts Department of Labor and Industries Regulations, (DLI) including but not limited to:

453 CMR 6.00 Removal, Containment and Encapsulation of Asbestos

ITEM 182.2 (Continued)

Massachusetts Department of Environmental Protection (DEP) including but not limited to (supplementing subsection 7.01):

310 CMR 7.00, Section 7.09 Odor and Dust, Section 7.10 Noise, Section 7.15 Air Pollution Control Regulations
310 CMR 18.00 and 19.00 Solid Waste Regulations

Massachusetts Division of Industrial Safety 45 CMR 10.00

Local Requirements including but not limited to those of Health Departments, Fire Departments and Inspection Services Departments

Wherever there is a conflict or overlap of the above references, the most stringent provision shall apply.

All asbestos material shall be removed and properly disposed of by a contractor or subcontractor with a current Massachusetts Abatement Contractors License issued by the Department of Labor and Industries. Work shall be supervised by a competent person as required by OSHA in 29 CFR 1926 to ensure regulatory compliance. This person must have completed a course at an EPA Training Center or equivalent course in asbestos abatement procedures, have had a minimum of four years on-the-job training and meet any additional requirements set forth in 29 CFR 1926 for a Competent Person. This person must also be certified by the Commonwealth as an Asbestos Abatement Supervisor and Asbestos Abatement Project Designer as required by 453 CMR 6.00.

Asbestos removal work shall be coordinated with all other work under the contract and shall be completed prior to performing any activities which could disturb the asbestos material or produce airborne asbestos fibers.

Dust suppression in the form of light water sprays, foams, dust suppressants and calcium chloride will be implemented as required to control dusting during trenching and excavation. Alternatively, intrusive activities may be reduced or curtailed under high wind or heavy rain conditions, which in the opinion of the Health and Safety Plan (HASP) may pose a safety hazard to the workers.

NOTIFICATION AND PERMITS

The Contractor shall prepare a formal pre-notification form at least ten (10) days prior to the start of asbestos removal work. This form must be submitted to the appropriate Regional Office of the Massachusetts Department of Environmental Protection and to the U.S. Environmental Protection Agency Region I Air and Hazardous Material Division. A copy of the submitted forms must be provided to the Engineer and kept at the work site.

Prior to starting any work, the Contractor shall also obtain any required asbestos removal permit(s) from the city/town. A copy of the permit(s) must be provided to the Engineer and posted at the work site.

ITEM 182.2 (Continued)

The Contractor shall also obtain and pay all other applicable asbestos waste transportation and disposal permits, licenses and fees.

STANDARD OPERATING PROCEDURES

The standard operating procedure shall ensure the following:

1. Proper site security including posting of warning signs and restricting access to prevent unauthorized entry into the work spaces.

2. Proper protective clothing and respiratory protection prior to entering the work spaces.

3. Safe work practices including provisions for communications; exclusion of eating, drinking, smoking, or use of procedures or equipment that would in any way reduce the effectiveness of respiratory protection or other engineering controls.

4. Proper exit practices from the work space though the showering and decontamination facilities.

5. Removing asbestos containing material in ways that minimize release of fibers.

6. Packing, labeling, loading, transporting and disposing of contaminated material in a way that minimizes or prevents exposure and contamination.

7. Emergency evacuation of personnel, for medical or safety (fire and smoke) so that exposure will be minimized.

8. Safety from accidents in the work space, especially from electrical shocks, slippery surfaces and entanglements in loose hoses and equipment.

9. Provisions for effective supervision and OSHA - specified personnel air monitoring for exposure during work.

REQUIRED SUBMITTALS

The Contractor shall submit to the Engineer the following listed items at least ten (10) calendar days prior to the start of asbestos work. No asbestos removal work activities shall commence until these items are reviewed by the Engineer, unless otherwise waived. Submittals shall be clearly labeled and in sufficient detail to enable the Engineer to form an opinion as to its conformity to the specifications.

1. Name, experience and DLI certification of proposed Supervisors and Foreman responsible for asbestos work.

ITEM 182.2 (Continued)

2. Summary of workforce by disciplines and a notarized statement documenting that all proposed workers, by name, have received all required medical exams and have been properly trained and certified for asbestos removal work, respirator use and appropriate Massachusetts DLI, EPA and OSHA standards.

3. Notarized statement that workers are physically fit and able to wear and use the type of respiratory protection proposed for the project. Notarized certification signed by an officer of the abatement contracting firm that exposure measurements, medical surveillance and worker training records are being kept in conformance with 29 CFR 1926.

4. Written plan of action and standard operating procedures (HASP) to include: location and layout of decontamination areas; sequencing of asbestos work; detailed schedule of work activities by date and interface with other project activities which affect work performance; methods used to assure safety and security; worker protection and exposure monitoring; contingency and emergency evacuation procedures; detailed description of methods to be employed to control pollution; waste handling procedures.

5. Written respiratory protection program specifying level of protection intended for each operation required by the project and details of daily inspection and maintenance elements.

6. Copies of the U.S. EPA, State and local asbestos removal pre-notification forms. If applicable, lists and copies of all permits, licenses, or manifests which will be applied for and used.

7. Name, location and applicable approval certificates for primary and secondary landfill for disposal of asbestos-containing or asbestos contaminated waste. Name, address and licenses number(s) of hauler permitted to transport waste. (Submit copies of completed manifests upon disposal).

The Contractor must provide copies of daily inspection and record logs upon request of the Engineer, at any time during project. This information will include but is not limited to work area entry data, respirator inspections and maintenance, HEPA-exhaust inspections and maintenance and other work applicable activities or reports of accidents or unusual events.

ITEM 182.2 (Continued)

METHOD OF MEASUREMENT

ITEM 182.2 will be measured for payment by the FOOT for the complete removal and disposal of the asbestos containing material.

BASIS OF PAYMENT

Item 182.2 will be paid for at the Contract unit price per FOOT, which price shall include all labor, materials, tools, equipment, and all incidental costs required to complete the work specified above and as required by the Engineer.

No separate payment will be made for the protection of general public, private property, the proper inspecting and testing of the material, but all costs in connection therewith shall be included in the Contract unit price bid.

ITEM 184.1 DISPOSAL OF TREATED WOOD PRODUCTS TON
(Rev 08/09/2016)

Work under this item shall include the transportation and disposal of all treated existing wood product as directed by the Engineer.

The timber components of the existing structure are suspected to be treated with creosote, pentachlorophenol and/or CCA. This item shall include all costs for sampling, laboratory testing, loading, transportation and disposal of the treated wood. The Contractor is required to submit disposal manifests to the Engineer prior to the completion of the project. All aspects of this Item are to be completed in accordance with state and federal regulations.

Compensation

Measurement and payment will be by the weight, in tons, of treated timber transported and accepted at a licensed facility. The work shall be considered full compensation for all labor, tools, equipment, materials, testing, loading, transportation, approvals, and permits necessary for the completion of the work.

ITEM 201.	**CATCH BASIN**	**EACH**
ITEM 202.	**MANHOLE**	**EACH**
ITEM 202.15	**MANHOLE - 5 FOOT DIAMETER**	**EACH**
ITEM 204.11	**GUTTER INLET – SPECIAL**	**EACH**

The work under these Items shall conform to the relevant provisions of Subsection 200 of the Standard Specifications, and the following:

Item 201. shall be constructed as shown in MassDOT Standard Drawing 201.0.2 with 4 foot sump (deep sump), unless otherwise noted on the plans with the exception that catch basins with frame and covers shall have round openings.

Item 202.15 shall be constructed as shown in MassDOT Standard Drawing 202.0.2 with the exception that the inside diameter shall be five feet.

Item 204.11 shall be constructed as shown on the detail provided in the construction drawings and in accordance with applicable Sub-sections of Subsection 201 of the Standard Specifications.

Alternate flat top slabs shall be substituted for conical sections in areas of low cover. It shall be the responsibility of the Contractor to determine the appropriate type of top and alternate flat top slab thickness for each location. Alternate flat top slabs shall have a minimum 28-day compressive strength of 4000 psi, reinforced for AASHTO H-20 loading with ASTM A 615 Grade 60 steel. Shop drawings and design calculations shall be stamped by a Massachusetts Structural Engineer, where required. No additional payment will be made for alternate flat top slabs.

Alternate eccentric cone sections or alternate flat top sections with offset openings shall be used in areas where drainage structures are in close proximity to existing underground utilities, as shown on the plans or as directed by the Engineer. Alternate eccentric cone sections or alternate flat top sections with offset openings shall also be used where drainage manholes are proposed in travel or bike lanes and shall be oriented to locate covers outside wheel paths to the extent practical. No additional payment will be made for eccentric cones or alternate flat top structures with offset openings.

Frames shall be set using clay brick (3 courses allowed for) in a full mortar bed. Clay brick manufacturer shall be listed on MassDOT's Qualified Construction Materials List. Cement brick will not be allowed.

Concrete collars for new structures shall be High Early Strength cement concrete. The Contractor shall submit a mix design for High Early Strength concrete to the Engineer for approval. The dimensions of the concrete collars shall be as shown on MassDOT Construction Standard Drawing 223.0.1. Concrete collars shall be incidental to the item of work to which they pertain.

The concrete collars shall be placed up to a height that allows for the placement of a minimum of 3 inches of Hot Mix Asphalt above the collar.

Catch basins, manholes, and gutter inlets shall be placed on 6" crushed stone (M2.01.4) foundation as directed by the Engineer.

ITEMS 201., 202., 202.15 & 204.11 (Continued)

Connections to existing pipe shall be included in the cost of the catch basins or manholes. If existing pipe is to be abandoned, end of existing pipe shall be plugged as specified in Section 200.

Excavation support and excavation techniques such as vacuum excavation may be required for installation of structures due to the proximity of existing utilities. All work to install drainage structures complete in place shall be considered part of work of this section.

METHOD OF MEASUREMENT

Item 201., Item 202., Item 202.15, and Item 204.11 will be measured for payment respectively by the Each unit installed, complete in place.

BASIS OF PAYMENT

Item 201., Item 202., Item 202.15, and Item 204.11 will be paid for at the respective Contract unit prices per Each, which prices shall include all labor, materials, equipment, tools, sawcut, excavation, excavation support, Concrete collars, installation of frame and grate or cover, and incidental costs required to complete the work.

Crushed stone foundation shall be paid for under Item 156.

Furnishing and delivering new frames and grates or covers shall be paid for under Item 222.3

Masonry plugs shall be paid for under Item 227.4.

ITEM 210.02 SANITARY SEWER MANHOLE REMOVED EACH

The work under this Item shall conform to the relevant provisions of Subsections 140 and 201 of the Standard Specifications and the following:

The work shall include removing and disposing of Sanitary Sewer Manholes as shown on the Plans, and/or as directed by the Engineer.

Manhole and connecting pipes may have concrete fill if previously abandoned.

METHOD OF MEASUREMENT

Item 210.02 will be measured for payment by Each, sanitary sewer manhole removed regardless of depth.

BASIS OF PAYMENT

Item 210.02 will be paid for at the contract unit price per Each, which prices shall include all labor, materials, equipment, tools, excavation, disposal of solid waste and debris, backfill, discarding of manhole frame and cover, brick leveling course, and existing manhole, and incidental costs required to complete the work.

ITEM 222.3 FRAME AND GRATE (OR COVER) MUNICIPAL STANDARD EACH

The work under this Item shall conform to the relevant provisions of Subsections 201, 220 of the Standards Specifications and the following:

The work shall include furnishing and delivering frames and grates or covers to the site.

Frames shall be 8 inches in height unless otherwise noted on the contract drawings and shall have 4 flanges with the exception of grates at curb inlet stone locations which shall have 3 flanges.

Drainage manhole covers and frames shall be as shown on the 2025 MassDOT Construction Standards No. 221.0.2 and 221.0.3 and shall have the letters “DRAIN” inscribed on the cover.

Frame and Grate (or Cover) shall be listed on MassDOT’s Qualified Construction Materials List.

METHOD OF MEASUREMENT

Item 222.3 will be measured for payment by the EACH Frame and Grate (or Cover) – Municipal Standard furnished and delivered to the site.

BASIS OF PAYMENT

Item 222.3 will be paid for at the Contract unit price per EACH Frame and Grate furnished and delivered to the site, which price shall include all labor, materials, equipment and incidental costs related to the work.

Frame and Grate (or Cover) shall be considered as a one unit.

ITEM 271.1 DRAINAGE PIPE REMOVED AND DISCARDED FOOT

This work under this Item shall conform to the relevant provisions of Subsection 270 of the Standard Specifications and the following.

The work shall include all labor, materials and equipment necessary to remove and discard the existing pipes. The work shall consist of the removal of existing drain pipe (regardless of size) where noted on the plans, and as directed by the Engineer. Where existing pipe is located within the same trench as new pipe or drainage structures, the removal and discarding of the existing pipe shall be considered incidental to the installation of the new pipe or structure. The work includes all excavation, shoring, and bracing. A trench shall be excavated and the pipe cut and removed. The remaining open pipe ends shall be plugged watertight. All materials excavated from the trench, when deemed suitable for reuse by the Engineer, shall be placed in 6 inch loose lift depths and compacted to not less than 95 percent of the maximum dry density of the material. If additional material is needed to backfill the trench it shall meet the requirements for Gravel Borrow. All unused and unsuitable material shall be disposed of off-site.

METHOD OF MEASUREMENT

Item 271.1 will be measured for payment by the Foot, drainage pipe removed and discarded off the project, except for pipe located in the same trench as new pipe.

BASIS OF PAYMENT

Item 271.1 will be paid for at the contract unit price per Foot, which price shall be full compensation for all labor, materials, equipment, excavation, saw cutting, removal of pipes, disposal of unsuitable material, and incidental costs required to complete the work.

If in situ material is unsatisfactory for backfill, as determined by the Engineer, payment will be made separately for backfill under Item 151. Gravel Borrow.

Masonry plug will be paid under Item 227.4

ITEM 302.041 4 INCH DUCTILE IRON SEWER PIPE (RUBBER GASKET) FOOT

The work under this Item shall conform to the relevant provisions of Subsection 301 of the Standard Specifications, Town of Raynham Water Division Regulations, the details shown on the plans and the following:

Town of Raynham Water Division Regulations can be found at the following link:
http://raynhamcenterwater.com/randr.pdf

The work shall include all materials, labor and equipment to furnish, lay, joint, and test ductile iron pressure pipe, fittings (including special castings), and appurtenant materials and equipment indicated on the Drawings and specified in this Section.

Testing of new sewer force main shall conform to all applicable sections of AWWA Standards and Town of Raynham's Water Division Regulations.

METHOD OF MEASUREMENT

Item 302.041 will be measured for payment by Foot, of 4 inch ductile iron sewer pipe installed, complete in place.

BASIS OF PAYMENT

Item 302.041 will be paid for at the contract unit price per Foot, which price shall include all labor, materials, equipment, excavation regardless of depth, backfill regardless of depth, dense graded crushed stone for backfilling, pressure and leak testing, providing as-built drawings, saw cutting, removal of pipes, disposal of unsuitable material, and incidental costs required to complete the work.

Ductile Iron Fittings for Sewer Pipe shall be paid for under Item 309. Sewer gate valves and boxes shall be paid for under Item 349.04, as needed.

ITEM 309. DUCTILE IRON FITTINGS FOR WATER PIPE POUND

The work under this item shall conform to the relevant provisions of Subsection 301 of the Standard Specifications, Town of Raynham Water Division Regulations, and the following:

Town of Raynham Water Division Regulations can be found at the following link:
http://raynhamcenterwater.com/randr.pdf

Fittings under this item include elbows, bends, reducers, caps, tees, couplings, mechanical joint restraints and all other fittings not measured and paid for elsewhere. All edges of excavation shall be sawcut. Fittings shall be used for proposed sewer force main and for tee and fittings needed to connect proposed hydrant to water main.

All pipe shutdowns shall be approved by Town of Raynham's DPW and the Fire Department prior to performing any work. The work shall be coordinated in a manner to minimize the number and duration of shutdowns.

ITEM 336.1 1 INCH PLASTIC WATER PIPE FOOT

The work under this item shall conform to the relevant provisions of Subsection 301 of the Standard Specifications, Town of Raynham Water Division Regulations, and the following:

Town of Raynham Water Division Regulations can be found at the following link:

http://raynhamcenterwater.com/randr.pdf

Testing of new plastic water pipe shall conform to all applicable sections of AWWA Standards and Town of Raynham's Water Division Regulations.

Plastic water pipe shall be relocated where it conflicts with proposed infiltration trench . If existing water service line is not plastic, Contractor shall inform Raynham Water Department. Existing water service pipe in conflict shall be removed and discarded and new 1 inch water plastic pipe shall be installed and connected to existing.

The work shall be coordinated in a manner to minimize the number and duration of shutdowns.

METHOD OF MEASUREMENT

Item 336.1 will be measured for payment by Foot, of 1 inch plastic water pipe installed.

BASIS OF PAYMENT

Item 336.1 will be paid for at the contract unit price per Foot, which price shall include all labor, materials, equipment, testing, flushing, chlorination, disinfection, tools, fittings, couplings, and incidental costs required to connect to existing and complete the work.

The removal of existing water service that is in conflict with proposed will be incidental to Item 336.1.

ITEM 372.02 2 INCH SEWER PIPE INSULATION FOOT

The work under this item shall conform to the relevant provisions of Subsection 301 of the Standard Specifications, Town of Raynham Water Division Regulations, and the following:

Town of Raynham Water Division Regulations can be found at the following link:

http://raynhamcenterwater.com/randr.pdf

2-inch insulation shall be installed on proposed sewer force main over the bridge and for a distance of 10' off the bridge on either side of the bridge.

MATERIALS

Insulation shall be Urethane material or other approved material. Material must be approved by the Engineer.

METHOD OF MEASUREMENT

Item 372.02 will be measured for payment by Foot, of 2 inch sewer pipe furnished and installed, complete in place.

BASIS OF PAYMENT

Item 372.02 will be paid for at the contract unit price per Foot, which price shall include all labor, materials, equipment, testing, flushing, chlorination, disinfection, tools, fittings, couplings, and incidental costs required to connect to existing and complete the work.

ITEM 376.1 HYDRANT-EXCLUDING COST OF HYDRANT EACH

The work under this item shall conform to the relevant provisions of Subsection 301 of the Standard Specifications, standard details supplemented by American Waterworks Association Standard Specifications, and the following:

The work shall include installation of hydrant and new gate. The new hydrant will be provided by City of Taunton before installation at location as shown on the plans.

Town will provide hydrant for STA 2+25 LT, replacing existing hydrant located at STA 2+67 RT. The Contractor will provide a new 6-inch service line, 6-inch gate valve and box, and 6-inch by 12-inch tee as shown on the plan off the 12-inch Ductile Iron Transmission Water Main. This 12-inch water line is a transmission water main, and the Contractor shall pay special attention, while working close to the main and not to damage.

The hydrants will be picked up at the Taunton DPW yard located at 90 Ingell Street, Taunton, MA, and the Contractor shall coordinate with DPW for the schedule.

METHOD OF MEASUREMENT

Item 376.1 will be measured for payment by Each, hydrant installed, complete in place and in working order.

BASIS OF PAYMENT

Item 376.1 will be paid for at the contract unit price per Each, which price shall include all labor, materials, equipment, excavation, sawcutting, shoring, bracing, bedding, gravel borrow backfill, pressure testing, chlorination, flushing, sampling, analysis, and incidental costs required to complete the work.

Removed and stacked old hydrant will be paid for under Item 376.3

6-inch service line shall be paid under Item 302.06.

6-inch gate valve and box shall be paid under Item 350.06.

6" x12" Tee shall be paid under Item 309 -Ductile Iron Fittings for Water Pipe

New gate and box shall be paid under Item 350.06

ITEM 376.3 HYDRANT - REMOVED AND STACKED EACH

The work under this item shall conform to the relevant provisions of Subsection 301 of the Standard Specifications and the following:

The work shall include removal and stacking of existing hydrant as directed by the Engineer and delivered to the City of Taunton at the Department or Public Works Facility located at 90 Ingell Street, Taunton, MA. Unit price bid shall also included necessary excavation, gravel backfill, restoration of surfaces over trenches and all other necessary and incidental work not paid for under other items for complete removal, stacking, and delivery. Nonsalvageable hydrant as determined by the Engineer shall become the property of the Contractor and shall be properly disposed of off the site with no additional payment made.

METHOD OF MEASUREMENT

Item 376.3 will be measured for payment by Each, existing hydrant removed and stacked.

BASIS OF PAYMENT

Item 376.3 will be paid for at the Contract unit price per EACH; which price shall include all labor, materials, equipment, and incidental costs required to complete the work.

ITEM 390.01 IRRIGATION SYSTEM REMOVED AND RESET FOOT

Where a sprinkler system is encountered during the construction, the piping system and sprinkler heads shall be removed and reset at new locations or modified as directed by the Engineer. The exact locations will be determined by the Engineer in the field to the satisfaction of the owner.

Existing sprinkler system impacted due to the construction as identified on the plan or encountered during construction operations shall be carefully removed and reset on the property as directed by the Engineer. The work also includes disconnecting existing system with coordination with owner.

All sprinkler heads and pipes etc. shall be removed carefully. The Contractor will be held responsible for any damage done during the removal and resetting of these items and shall replace or repair the damaged item as directed by the Engineer at his own expense.

Sprinkler heads and the pipes shall be relocated to new locations or eliminated as determined by the Engineer. All necessary piping shall be provided and installed by the Contractor.

The irrigation system to be R&R may not be out of service for more than two weeks (except October thru April). Any temporary work required to keep system in service shall be considered incidental to this pay item.

The operation of the sprinkler system shall be guaranteed by the Contractor for a period of one month from the date of completion of work.

METHOD OF MEASUREMENT

Item 390.01 will be measured for payment by Foot, of irrigation tubing removed and reset , complete in place in its final position.

BASIS OF PAYMENT

Item 390.01 will be paid for at the contract unit bid price per Foot, which price shall include all labor, materials, equipment, testing, and incidental costs required to complete in place relocated sprinkler irrigation tubing and sprinkler heads.

ITEM 402.13 PAVEMENT MILLING MULCH FOR SHOULDERS FOOT

Work to be done shall conform to the relevant provisions of Subsection 769 of the Standard Specifications and the following:

The work consists of earthworks to install pavement millings mulch for shoulders at the edge of pavement. The existing shoulder shall be prepared for pavement milling mulch as necessary and directed by the Engineer. The work shall consist of excavation and leveling shoulder area to be mulched. The excavation and leveling of shoulder shall be pushed back down slope on embankment and/or excavated and disposed of on-site level and compacted as directed by the Engineer. Milling mulch shall be graded and compacted to a width of 3 feet and a depth of 4 inches level with the edge of the pavement, top of edging or curb or as directed by the Engineer. No geotextile fabric under the pavement millings shall be installed.

Materials

Pavement milling mulch shall be smaller than the Standard 1-1/2 inch sieve.

The on-site recycling of pavement millings sourced from the project is encouraged. All pavement milling mulch for shoulders will be accepted based on visual inspection by the Engineer. Mulch material greater than 1 ½ inch shall be removed off-site by the Contractor.

Method of Measurement

Item 402.13 will be measured per FOOT in the longitudinal direction parallel to the edge of road, complete in place.

Basis of Payment

Item 402.13 will be paid per FOOT of material installed which price shall include materials, excavation, grading and leveling and disposing on site, compacting and all incidental costs required to complete the work to the satisfaction of the Engineer.

ITEM 504.2 GRANITE CURB TYPE VA4 – SPLAYED END EACH
ITEM 504.3 GRANITE CURB TYPE VA4 – SLOPED FOOT

The work under these Items shall conform to the relevant provisions of Section 500 and the following:

Granite curbing shall conform to Section M9.04 of the Standard Specifications and as shown on construction detail drawing in plan set.

Splayed and Sloped Granite Curb shall have a beveled, mountable edge as shown on the drawings and shall be used in straight curb applications and curved radii of 10 feet or greater.

Splayed Granite Curb shall be used as a transition between granite curb type VB and sloped concrete bridge curb or Granite Curb Type VA4 - Sloped or as directed by the Engineer. Typical length of the Splayed Granite Curb shall be 6 feet.

The curb shall be set at the line and grade required as shown on the plans.

METHOD OF MEASUREMENT

Item 504.2 will be measured for payment by each, granite curb type VA4-splayed end installed, complete and in place, along the gutter line.

Item 504.3 will be measured for payment by the Foot of granite curb type VA4-sloped, complete and in place.

BASIS OF PAYMENT

Item 504.2 will be paid for at the Contract Unit Prices bid per each. Item 504.3 will be paid for at the Contact Unit Price per foot. The unit prices shall include all labor, materials, equipment, sawcutting, excavation, concrete support, compacted gravel borrow bedding, backfill and all incidental costs required to complete the work.

Typical granite curb and transition curb for driveways and pedestrian curb ramp shall be paid under their respective items.

ITEM 620.13 GUARDRAIL, TL-3 (SINGLE-FACED) FOOT
ITEM 628.24 TRANSITION TO BRIDGE RAIL EACH

The work under these Items shall conform to the relevant provisions of Section 600 of the Standard Specifications and the following:

Transition to bridge rail shall include curved sections in the guardrail as shown on the southeast corner of the bridge with radius 10 feet. No separate pay item shall be required for this curved section within the Transition to Bridge Rail.

Terminal end section shall follow the end unit detail shown in standard detail drawing number 627.1.1 and be incidental to the respective Item that it is connected to either Item 620.13 Guardrail, TL-3 (Single Faced) or Item 628.24 Transition to Bridge Rail.

ITEM 657. TEMPORARY FENCE FOOT

The work under this Item shall conform to the relevant provisions of Subsection 644 of the Standard Specifications and the following:

The work under this item shall include furnishing, installing, removing and resetting and, subsequently, removing a chain link fence located around the work area, river, staging area and/or field office as necessary for safety and security. The Contractor will be responsible for providing an acceptable method for the installation of the fence that will provide for the safety and security for which it is intended.

Fence gates for access/egress shall be furnished, installed and maintained by the Contractor, and shall be included in the unit cost. All posts including end, gate, corner and intermediate brace posts shall be included in the unit cost. The fencing height shall be 6 feet minimum from ground level. Material need not be new, but shall not be deteriorated, nor in any way jeopardize the security purposes intended. All fencing shall meet the approval of the Engineer.

The Contractor shall be responsible for maintenance of the temporary fence, and shall be responsible and cognizant that it remains secure, and that the area is sealed off at all times to the general public. It may be necessary to remove and reset sections of temporary fence at times to conform to current stage construction.

Fence fabric shall be placed on the face of the post away from the work area. A top tension wire, rather than a pipe top rail, shall be used. The top edge of the fabric shall be finished with a "Knuckled" selvage. The fence shall not be removed until the bridge work is complete and safe pedestrian passage is provided. No additional compensation will be paid for resetting and removing the temporary fence.

METHOD OF MEASUREMENT

Item 657. will be measured for payment by Foot, of temporary fence furnished, installed including foundations and finally removed.

BASIS OF PAYMENT

Item 657. will be paid for at the Contract unit price per FOOT, which price shall include all labor, materials, equipment, if required, removing and resetting for each construction stage, and final removal of fence, all components of fence and foundations and all incidental costs required to complete the work.

No payment shall be made for the replacement and/or restoration of fence damaged due to construction accidents, vandalism and/or any other manner, but shall be provided by the Contractor without additional compensation.

ITEM 697.1 SILT SACK EACH

Work under this item shall conform to the relevant provisions of Subsections 227 and 670 of the Standard Specifications and the following:

The work under this item includes the furnishing, installation, maintenance and removal of a reusable fabric sack to be installed in drainage structures for the protection of wetlands and other resource areas and the prevention of silt and sediment from the construction site from entering the storm water collection system. Devices shall be ACF Environmental (800)-448-3636; Reed & Graham, Inc. Geosynthetics (888)-381-0800; The BMP Store (800)-644-9223; or approved equal.

CONSTRUCTION

Silt sacks shall be installed in retained existing and proposed catch basins and gutter inlets within the project limits and as directed by the Engineer.

The silt sack shall be as manufactured to fit the opening of the drainage structure under regular flow conditions, and shall be mounted under the grate. The insert shall be secured from the surface such that the grate can be removed without the insert discharging into the structure. The filter material shall be installed and maintained in accordance with the manufacturer's written literature and as directed by the Engineer.

Silt sacks shall remain in place until the placement of the pavement overlay or top course and the graded areas have become permanently stabilized by vegetative growth. All materials used for the filter fabric will become the property of the Contractor and shall be removed from the site.

The Contractor shall inspect the condition of silt sacks after each rainstorm and during major rain events. Silt sacks shall be cleaned periodically to remove and dispose of accumulated debris as required at no additional cost. Silt sacks, which become damaged during construction operations, shall be repaired or replaced immediately at no additional cost to the Department.

When emptying the silt sack, the contractor shall take all due care to prevent sediment from entering the structure. Any silt or other debris found in the drainage system at the end of construction shall be removed at the Contractor's expense.

All curb openings shall be blocked to prevent stormwater from bypassing the device.

All silt, sediment, and debris accumulated in silt sacks shall be handled and disposed of as specified in Section 227 of the Standard Specifications. Under no condition shall silt and sediment from the insert be deposited on site and used in construction.

COMPENSATION

Silt sacks will be measured and paid at the Contract unit price per each, complete in place, which price shall include all labor, materials, equipment and incidental costs required to complete the work. No separate payment will be made for removal and disposal of the sediment from the insert, but all costs in connection therewith shall be included in the Contract unit price bid.

ITEM 698.1 GEOTEXTILE FABRIC FOR STABILIZATION SQUARE YARD

The work under this item shall conform to the requirements of Section M9.50.0 of the Standard Specifications and the following:

Geotextile for Stabilization shall conform to the requirements of AASHTO M 288 and shall be listed on MassDOT's Qualified Construction Materials List. Geotextile for Stabilization shall be used for areas placed under proposed dumped riprap as shown on the Plans.

METHOD OF MEASUREMENT

Item 698.1 will be measured for payment by the Square Yard, complete in place; any overlaps shall be measured as a single layer of cloth.

BASIS OF PAYMENT

Item 698.1 will be paid for at the contract unit price per Square Yard, which price shall include all labor, materials, equipment and incidental costs required to complete the work.

Overlaps between sheets and fold-overs detailed on the plans are considered incidental to the unit price per square yard and shall not be measured separately for payment. Geotextile which become damaged during construction operations, shall be repaired or replaced immediately at no additional cost to the Department.

ITEM 698.4 GEOTEXTILE FABRIC FOR PERMANENT EROSION CONTROL SQUARE YARD

The work under this item shall conform to the requirements of Section M9.50.0 of the Standard Specifications and the following:

Geotextile Fabric and Geotextile for Permanent Erosion Control shall conform to the requirements of AASHTO M 288, shall be listed on MassDOT's Qualified Construction Materials List, and shall be approved by the Engineer. Geotextile for Permanent Erosion Control shall be used under stone for pipe ends and modified rockfill including two feet of overlapping width. If geotextile requires anchor pins, they shall be included under this item.

METHOD OF MEASUREMENT

Item 698.4 will be measured for payment by the Square Yard, complete in place; any overlaps shall be measured as a single layer of cloth.

BASIS OF PAYMENT

Item 698.4 will be paid for at the contract unit price per Square Yard, which price shall include all labor, materials, equipment, fabric , tool, and incidental costs required to complete the work.

Overlaps between sheets are considered incidental to the unit price per square yard and shall not be measured separately for payment. Geotextile which becomes damaged during construction operations shall be repaired or replaced immediately at no additional cost to the Department.

ITEM 740. ENGINEER'S FIELD OFFICE AND EQUIPMENT (TYPE A) MONTH

The work under this Item shall conform to the relevant provisions of Subsection 740 of the Standard Specifications and the following:

Two computer systems and printer systems meeting minimum requirements set forth below including installation, maintenance, power, paper, disks, and other supplies shall be provided at the Resident Engineer's Office:

All equipment shall be UL approved and Energy Star compliant.

The Computer System shall meet the following minimum criteria or better:

Processor:	Intel, 3.5 GHz
System Memory (RAM):	12 GB
Hard Drive:	500 GB
Optical Drive:	DVD-RW/DVD+RW/CD-RW/CD+RW
Graphics Card:	8 GB
Network Adapter:	10/100 Mbit/s
USB Ports:	6 USB 3.0 ports
Keyboard:	Generic
Mouse:	Optical mouse with scroll, MS-Mouse compliant
Video/Audio	the computer system shall be capable of allow video calling and recording:
Video camera	shall be High Definition 1080p widescreen capable video calling and recording with built in microphone. The microphone system shall capture natural audio while filtering out background noise.
Audio	shall be stereo multimedia speaker system delivering premium sound.
OS:	Latest Windows Professional with all security updates
Web Browser:	Latest Internet Explorer with all security updates
Applications:	Latest MS Office Professional with all security updates Latest Adobe Acrobat Professional with all security updates Latest Autodesk AutoCAD LT Antivirus software with all current security updates maintained through the life of the contract.
Monitors:	Two 27" LED with Full HD resolution. Max. resolution 1920 x 1080
Flash drives:	2 (two) - 128GB USB 3.0
Internet access:	High Speed (min. 24 mbps) internet access with wireless router.

ITEM 740. (Continued)

The Multifunction Printer System shall meet the following minimum criteria or better:

Color laser printer, fax, scanner, email and copier all in one with the following minimum capabilities:

- Estimated volume 8,000 pages per month
- LCD touch panel display
- 50 page reversing automatic document feeder (RADF) (not including the bypass tray)
- Reduction/enlargement capability
- Ability to copy and print 11” x 17” paper size
- email and network pc connectivity
- Microsoft and Apple compatibility
- ability to overwrite latent images on hard drive
- 600 x 600 dpi capability
- 30 pages per minute print speed (color),
- 4 Paper Trays Standard
- Automatic duplexing
- Finisher with staple functions
- Standard Ethernet. Print Controller
- Scan documents to PDF, PC and USB
- ability to print with authenticated access protection

The Contractor shall supply a maintenance contract for next day service, and all supplies (toner, staples, paper) necessary to meet estimated monthly usage.

The Engineer's Field Office and the equipment included herein including the computer system, and printer shall remain the property of the Contractor at the completion of the project. Disks, flash drives, and card readers with cards shall become the property of the Department.

Compensation for this work will be made at the contract unit price per month which price includes full compensation for all services and equipment, and incidentals necessary to provide equipment, maintenance, insurance as specified and as directed by the Engineer.

ITEM 751.765 COMPOST AND SEED OVER MODIFIED ROCKFILL CUBIC YARD

The work under this Item shall conform to the relevant provisions of Subsection 751, 767, and 765 of the Standard Specifications and the following.

The work shall consist of furnishing and pneumatically applying compost in conjunction with the specified native seed on designated areas of modified rock and achieving satisfactory establishment of seeded species as specified herein.

QUALIFICATIONS

Compost application and seeding shall be done by a company having a minimum of five years of experience with native seed establishment. Prior to beginning work, the seeding Contractor shall furnish proof of qualifications to the Engineer for approval. Proof of qualifications shall include providing documentation (photos and contacts) to demonstrate knowledge and expertise with native seeding and establishment and proof of having completed successful native seeding projects.

MATERIAL AND SUBMITTALS

Compost

Compost shall meet the relevant provisions for Type 2 Compost, found in Section M1.06 of the Supplemental Standard Specifications.

The Engineer shall approve the Contractor's equipment for application.

Seed Mix

Seed Mixes and Submittals shall be per the item(s) for the permanent seed mix. Mix shall be:

765.442 Roadside Riverbank Mix See special provision for additional information

SEEDING SEASON

The season for seeding native mixes is April 1 - May 15 and October 1 - December 1 for dormant seeding. Written approval must be obtained for seeding outside the seeding season and, if approved, the permanent seed rate shall be increased by 50%

CONSTRUCTION METHODS

Method of application and equipment to be used shall be reviewed and approved by the Engineer prior to placement of material.

ITEM 751.765 (Continued)

Placement of Compost

Compost shall be placed as shown on the Plans and in the Detail and as required by the Engineer. Material shall be placed so that settled material is at or slightly below the surface plane of the stone. The Contractor shall ensure that there will be adequate quantity, including adjustment for settlement.

For purposes of estimation, required compost quantities should be 300 cubic yards per acre to achieve the target depth.

Seeding

For areas smaller than half an acre, unless otherwise approved by the Engineer, seeding shall be done by broadcast method. Seeding shall be done in conjunction with or immediately following Compost application. Alternative seeding methods must be submitted and approved by the Engineer 14 days in advance of compost and seed application.

Hydroseeding

Hydroseeding may be used for sites over half an acre in size or when the rock slope does not permit safe application via a broadcasting method. Hydroseed shall be per the manufacturer's directions and as follows.

Tank and hoses shall be cleaned from all previous hydroseeding and hydromulching projects. Seed shall be mixed into the slurry immediately before application and slurry applied within 30 minutes after seeds have been placed in the tank. Once seed has been placed in the tank, tank shall be agitated only enough to mix the seeds and keep slurry from separating.

When Seeding Occurs after Application of Compost or after December 1

When seeding is done more than 3 days after Compost application or when Compost is applied after December 1, seeding rate shall be increased by 50%.

Over-Seeding

Large extents of bare area (greater than 5-6 feet and depending on modified rock slope conditions) shall be over-seeded with the specified mix during the appropriate season for seeding. Rates, methods, and submittals shall be as specified under the relevant Seed Mix Item and Materials above.

Over-seeding, mulch, watering, and all work for over-seeding shall be incidental.

ITEM 751.765 (Continued)

Determining Satisfactory Establishment

A reasonably well-established stand of the specified seeded species as determined by the Engineer and the MassDOT Landscape Architect or designated Specialist will be required for Final Acceptance. The expectation is that an acceptable number and variety of the desired permanent seeded species will be visible. For seeding with compost over modified rock this shall generally be:

- A minimum of 50% coverage by the specified permanent seeded species after one growing season (considered June-September 15). Of that percentage, generally, depending on the mix species:
  - At least 2 types of permanent seeded grass species shall be visible.
  - At least 2 species of wildflowers shall be visible.
- There will be no more than 25% coverage by weed species.
- There will be no invasive or aggressive species within the stand at the time of acceptance.
- There shall be no evidence of seed from non-native mixes (ex., clover) due to using an incorrect or modified mix or due to failure to clean the hydroseeding tank if a hydroseeder is used.

Invasive and aggressive weeds (such as mugwort, vetch, knapweed, and chicory) must be cut, pulled with roots removed, or treated with herbicide by a licensed and approved applicator prior to going to seed for Interim Acceptance. Weed removal shall be coordinated with MassDOT Landscape Architect. No herbicides shall be used without approval and coordination with MassDOT Landscape Design Section.

Acceptance of Seeding and Establishment Work

Conditional Acceptance shall be based on approval of seed mix submittals and proper application of seed as specified herein.

Final Acceptance of Seed Establishment shall be given upon satisfactory Establishment as described above. If the seeded area fails to meet the requirements of Establishment by the end of the growing season, contractor shall propose and implement remediations and site shall be inspected during the following growing season after July 1st. Otherwise, Contractor shall forego the payment for Final Acceptance. All remediation shall be at the contractor's expense.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 751.765 will be measured and paid for at the Contract unit price per Cubic Yard which price shall include all labor, materials, equipment, site preparation, and all incidental costs required to complete the work.

Native Seed Mix will be paid for separately under Item 765.635.

Schedule of payment shall be as follows:

60% upon approval of Compost application and Conditional Acceptance of seeding as specified above
40% upon Final Acceptance of Seed Establishment

ITEM 756. NPDES STORMWATER POLLUTION PREVENTION PLAN LUMP SUM

This Item addresses the preparation and implementation of a Storm Water Pollution Prevention Plan required by the National Pollutant Discharge Elimination System (NPDES) and applicable Construction General Permit (CGP) issued by the U.S. Environmental Protection Agency (EPA).

Pursuant to the Federal Clean Water Act, construction activities which disturb one acre or more are required to apply to the EPA for coverage under the NPDES General Permit for Storm Water Discharges from Construction Activities. The Contractor shall be fully responsible for compliance with the most recently issued CGP and any subsequent revisions. Should a fine or damages be assessed against it, or MassDOT, as a result of a local, state, or federal enforcement action due to non-compliance with the CGP, the Contractor shall take full responsibility.

The NPDES CGP requires the submission of a Notice of Intent (NOI) to the EPA prior to the start of construction (defined as any activity which disturbs land, including clearing and grubbing). There is a fourteen (14) day review period commencing from the date on which EPA enters the Notice into their database. Based on the review of the NOI, EPA may require additional information, including but not limited to, the submission of the Storm Water Pollution Prevention Plan (SWPPP) for review. Work may not commence on the project until final authorization has been granted by EPA. Any additional time required by EPA for review of submittals will not constitute a basis for claim of delay.

In addition, if the project discharges to an Outstanding Resource Water, vernal pool, or is within a coastal ACEC as identified by the Massachusetts Department of Environmental Protection (DEP), a separate notification to DEP is required. DEP may also require submission of the Storm Water Pollution Prevention Plan for review and approval. Filing fees associated with the notification to DEP and, if required, the SWPPP filing to DEP shall be paid by the Contractor.

The CGP also requires the preparation and implementation of a SWPPP in accordance with the afore-mentioned statutes and regulations. The Plan will include the CGP conditions and detailed descriptions of controls of erosion and sedimentation to be implemented during construction. The contractor shall prepare the SWPPP and update it as necessary. The Contractor shall submit the Plan to the Engineer for approval at least four (4) weeks prior to any site activities. It is the responsibility of the Contractor to comply with the CGP conditions and the conditions of any state Wetlands Protection Act Order, Water Quality Certification, Corps of Engineers Section 404 Permit and other environmental permits applicable to the project and to include in the SWPPP the methods and means necessary to comply with applicable conditions of said permits.

It is the responsibility of the Contractor to complete the SWPPP in accordance with the EPA CGP, provide all information required, and obtain any and all certifications as required by the CGP. Any amendments to the SWPPP required by site conditions, schedule changes, revised work, regulations, construction methodologies, and the like are the responsibility of the Contractor. Amendments will require the approval of the Engineer prior to implementation.

ITEM 756. (Continued)

In addition to the CGP requirements for inspections, MassDOT requires inspection of all erosion controls and site conditions on a weekly basis. Inspections are also required at portions of sites that discharge to sediment or nutrient impaired or high quality waters per the CGP when each incidence of rainfall exceeding 0.25 inches in twenty-four hours or after snowmelt discharge from a storm event that produces 3.25 inches or more of snow within twenty-four hours occurs. The CGP requires that inspections be performed by a qualified individual as outlined in the CGP. MassDOT requires proof of completion of a 4 hour minimum sedimentation and erosion control training class current to the latest CGP. This individual can be, but not limited to, someone that is either a certified inspector, certified professional, or certified storm water inspector. The documentation shall be included as an appendix in the SWPPP. The inspector's qualifications shall be submitted to the Engineer for approval prior to beginning any work. This individual shall be on-site during construction to perform these inspections. In addition, if the Engineer determines at any time that the inspector's performance is inadequate, the Contractor shall provide an alternate inspector. Written weekly inspection forms, storm event inspection forms, and Monthly Summary Reports must be completed and provided to the Engineer. Monthly Summary Reports must include a summary of construction activities undertaken during the reporting period, general site conditions, erosion control maintenance and corrective actions taken, the anticipated schedule of construction activities for the next reporting period, any SWPPP amendments, and representative photographs.

The Contractor is responsible for preparation of the Plan, all SWPPP certifications, inspections, reports and any and all corrective actions necessary to comply with the provisions of the CGP. The Standard Specifications require adequate erosion control for the duration of the Contract. All control measures must be properly selected, installed, and maintained in accordance with manufacturer specifications and good engineering practices. If periodic inspections or other information indicates a control has been used inappropriately or is no longer adequate, it is the responsibility of the Contractor to replace or modify the control for site conditions at no additional cost to the Department. Contractor must maintain all control measures and other protective measures in effective operating conditions and shall consider replacement of erosion controls for each construction season.

The work under this item shall also include the preparation, submission and implementation of a Flood Contingency Plan. The plan shall address the potential need for the temporary relocation of construction and auxiliary equipment situated within the 1% annual chance of flooding zone to designated upland locations above the Base Flood Elevation during flood events. The Flood Contingency Plan shall address any additional MassDEP-required information requirements, as applicable. The Flood Contingency Plan shall be submitted to the Engineer for review and approval at the same time as the SWPPP.

This Item addresses acceptable completion of the SWPPP, any revisions/amendments required during construction, preparation of monthly reports and Flood Contingency Plan. In addition, any erosion controls beyond those specified in bid items which are selected by the Contractor to facilitate and/or address the Contractor's schedule, methods and prosecution of the work shall be considered incidental to this item.

ITEM 756. (Continued)

The CGP provides specific requirements for temporary and final stabilization. This shall be incorporated into the project schedule. The permit defines specific deadline requirements for Initial Stabilization ("immediately", i.e., no later than the end of the next work day following the day when earth-disturbing activities have temporarily or permanently ceased) and for Complete Stabilization Activities (no later than 14 calendar days after the initiation of stabilization). Stabilization criteria for vegetative and non-vegetative measures are provided in the CGP.

The CGP requires the submission of a Notice of Termination (NOT) from all operators when final stabilization has been achieved, as well as removal and proper disposal of all construction materials, waste and waste handling devices, removal of all equipment and construction vehicles, removal of all temporary stormwater controls, etc. Approval of final stabilization by the Engineer and confirmation of submission of the NOT will be required prior to submission of the Resident Engineer's Final Estimate. The permittee shall use EPA's website to prepare and submit the NOT.

BASIS OF PAYMENT

Item 756 will be paid for at the Contract unit price Lump Sum, which price shall include all labor, materials, equipment, SWPPP & Flood Contingency Plan preparation, revisions/addenda during construction, monthly reports, filing fees, and all incidental costs required to complete the work.

Payment of 50% of the Lump Sum price of this item will be made upon acceptance of the NPDES Stormwater Pollution Prevention Plan & Flood Contingency Plan.

Payment of 40% of the Lump Sum price of this item will be paid in equal monthly installments distributed across the time remaining in the accepted baseline schedule until substantial completion.

The remaining 10% of the Lump Sum price of this Item will be paid following accepted submission of a Notice of Termination (NOT) when final stabilization has been achieved.

ITEM 765.442 ROADSIDE RIVERBANK MIX POUND

Work under this item shall consist of furnishing the mix(es) specified below in the required quantity.

SUBMITTALS

1) Pre-Verification of Seed Availability. Within 30 days after the Notice to Proceed, the Contractor shall submit to the Engineer the supplier's verification of availability of seed species in the required quantities and for the anticipated date of seeding. Verification shall be on the supplier's letterhead and notarized by the supplier's notary. Species not expected to be available should be noted and substitutions recommended.

2) Final Verification of Seed Availability. No earlier than 21 days prior to ordering, the Contractor shall submit to the Engineer the supplier's verification of availability of seed species and in the required quantities. Verification shall be on the supplier's letterhead and notarized by the supplier's notary. A copy of this submittal shall be forwarded to the MassDOT Landscape Design Section. Substitutions or changes in the mix at this time must be approved by MassDOT Landscape Design Section.

3) Seed Worksheet provided herein shall be submitted to the Engineer prior to ordering seed to determine the number of pounds of Pure Live Seed required.

4) Seed Tags. The contractor shall submit original seed tags from each bag of seed used on the project or ensure that each tag is photo documented by the Engineer while on the unopened bag.

   Number of tags submitted must correspond to number of bags delivered.

   Species listed on the seed tag shall match the Final Verification of Seed Availability (Submittal #2) unless approved otherwise. Tag must include variety and species name; lot number; purity; percentage of inert matter; percentage of weeds, noxious seeds, and other crop seeds; germination, dormant or hard seed; total viability; origin of seed; germination test date, net weight, and name and address of seller. The origin of seed must be listed on the seed tag for all species in the mix to provide verification of original (generation 0) seed source. The smallest known geographic area (township, county, ecotype region, etc.) shall be listed. Ecotypes and cultivars shall be as close to Massachusetts as possible and appropriate to the site conditions.

   A copy of this submittal shall be forwarded to the MassDOT Landscape Design Section.

5) Verification of Seed Delivery. Prior to payment, contractor shall submit the Seed Delivery Verification form contained within the contract or the Supplier's Verification on company letterhead or a bill of lading. Supplier verification must include all information requested on the Verification form within this contract. The bill of lading must include variety and species name, lot number, net weight shipped, date of sale, invoice, project or seeding location, and name and address of Supplier. All information must be filled in and complete for acceptance. Information must match the seed tags and quantity of seed used on the job. A copy of this submittal shall be forwarded to the MassDOT Landscape Design Section

ITEM 765.442 (Continued)

6) Seed Sample. If requested or if seed is from a previously opened bag, the contractor may be asked to submit to the Engineer a sample of seed from the seed bag (1-2 cups) at the time of seeding.

SEEDING SEASON

The appropriate seeding seasons are:

Spring: April 1 - May 15
Fall: October 1 - December 1 for dormant seeding

PERMANENT SEED MIX(ES)

Calculating Pure Live Seed (PLS)

Quantities specified are PURE LIVE SEED. Greater quantities of ordered seed may be required to achieve actual specified seeding rates.

Pure Live Seed (PLS) is defined as a percentage calculated by multiplying the percent of pure seed by the percent of viable seed (total germination, hard seed, and dormant seed). For example:

If a seed label indicates 90% purity, 78% germination, 10% hard seed, and 2% dormancy, it is calculated to be 90% x [78 + 10 + 2]% = 81% PLS.

Therefore, each pound of PLS would need 1 pound / 0.81 = 1.2 pounds of seed with a 90% purity and 90% total germination

Seed Mix(es) shall be as specified below. Ecotypes and cultivars shall be as close to Massachusetts as possible and appropriate to the site conditions.

ITEM 765.442 (Continued)

765.442 Roadside Riverbank Mix

Botanical Name	Common Name	% Mix by Weight (PLS)
Grass		
Elymus virginicus	Virginia Wild Rye	27.0%
Schizachyrium scoparium 'Albany Pine'	Little Bluestem 'Albany Pine'	22.5%
Andropogon gerardii NY Eco	Big Bluestem NY Eco	14.0%
Elymus riparius	Riverbank Wild Rye	14.0%
Panicum virgatum	Switch Grass	5.0%
Dichanthelium clandestinum 'Tioga'	Deertongue grass 'Tioga'	5.0%
Carex vulpinoidea	Fox Sedge	2.5%
Agrostis perennans	Upland Bentgrass	1.5%
Poa palustris	Fowl Bluegrass	0.3%
Juncas effusus Soft Rush		0.1%
Juncus tenuis	Path Rush	0.1%
		92.0%
Herb/Forb		
Chamaecrista fasciculata	Partridge Pea	3.0%
Penstemon digitalis	Beard-tongue	1.0%
Vernonia noveboracensis	New York Ironweed	0.6%
Helenium autumnale	Common Sneezeweed	0.5%
Verbena hastata	Blue Vervian	0.4%
Aster laevis NY Ecotype	Smooth Aster NY Ecotype	0.3%
Aster puniceus	Aster – Swamp	0.4%
Aster cordifolius	Blue Wood Aster	0.3%
Asclepias incarnata	Swamp Milkweed	0.3%
Monarda fistulosa	Wild Bergamot	0.2%
Aster novae-angliae	New England Aster	0.2%
Solidago odora	Licorice Scented Goldenrod	0.2%
Desmodium canadense	Showy Tick Trefoil	0.2%
Eupatorium perfoliatum	Bonset	0.2%
Eupatorium maculatum	Spotted Joe Pye Weed	0.2%
Solidago juncea	Early Goldenrod	0.1%
Euthamia graminifolia	Grass-leaved Goldenrod	0.1%
Lobelia cardinalis	Cardinal Flower	0.1%
		8.0%
		100.0%

ITEM 765.442 (Continued)

Application Rate

Roadside Riverbank Mix: 15 lbs/acre PLS. Option1: In addition, apply 30 pounds of cover crop (grain oats or grain rye) as appropriate to the season.

Any species substitutions shall be with a species having similar characteristics and function. Substitutions must be approved by MassDOT Landscape Design Section per the documentation submittal process.

50% Increase Adjustment for Field Conditions

Seeding under the following conditions requires a 50% increase in the permanent mix at the time of construction:

- Seeding out of season
  OR
- Seeding after Compost Blanket has been applied (unless already increased for out of season).

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 765.442 Roadside Riverbank Mix will be measured for payment by the pound of Pure Live Seed delivered and complete in place.

Item 765.442 Roadside Riverbank Mix will be paid at the contract unit price per pound of Pure Live Seed delivered upon approval of all Seed Submittal Documentation. Overseeding required to correct poor germination or establishment shall be incidental to the item.

Application and care of native seed mix will be paid for separately under Item 765.635 Native Seeding and Establishment.

ITEM 765.442 (Continued)

NATIVE SEED WORKSHEET

Project Description: _____ Project No: _____

Contractor: _____ Contract No: _____

Seed Mix Number & Description: _____

Contractor: Complete Prior To Ordering

Pounds of Seed Required Per Contract:

_____lbs./acre for _____Acre(s) OR _____ SY

Additional 50% increase if required (out of season or seeding over compost blanket):

_____**lbs. Total Seed Required**

Calculated Quantity for **P**ure **L**ive **S**eed (PLS[1]):

_____ **Total Pounds PLS**

Engineer: Verification at Time of Application

Number pounds delivered to site[2]: _____ Date(s): _____

Actual Seed Bag Tag/s Received or photo documented by Engineer: _____

[1] PLS=% pure seed x % viable seed (total germination, hard seed, and dormant seed).
*[2]Quantity delivered should match pounds **Total Pounds PLS** and **Verification of Seed Delivery**. Pounds should be shown on each Seed Tag.*

ITEM 765.442 (Continued)

SUPPLIER VERIFICATION OF SEED DELIVERY FOR MASSDOT PROJECTS

We hereby certify that (*Seed Supplier*):_____

Furnished to (*Contractor*): _____

For use on: (*Project Description*) _____

Project #: _____ Contract #: _____

Pounds of Pure Live Seed: _____

Of Mix (*Description*): _____

Lot Number _____

The material was delivered on (*Date*)_____.

The labels and contents meet all State and Federal regulations. The mixture consists of the following species, including cultivars (as applicable) and ecotype region, and at the following percentages (may be attached separately):

Name (print): _____ Title: _____

Supplier: _____

Signature and Seal: _____

ITEM 765.635 NATIVE SEEDING AND ESTABLISHMENT SQUARE YARD

Work shall conform to the relevant provisions of Subsections 765 and 767 of the Standard Specifications and the following:

The work under this item shall consist of seeding, mowing, and other care to establish a stand of grass in the areas shown on the plans or as required by the Engineer. For the purposes of these specifications, the term "grass" shall apply to all the forbs, grasses, sedges, and rushes included in the materials.

QUALIFICATIONS

Seeding shall be done by a company having a minimum of five years of experience with native seed establishment. Prior to beginning work, the seeding Contractor shall furnish proof of qualifications to the Engineer for approval. Proof of qualifications shall include providing documentation (photos and contacts) to demonstrate knowledge and expertise with native seeding and establishment and proof of having completed successful native seeding projects.

SEEDING SEASON

Seeding seasons for native mixes is April 1 - May 15 and October 1 - December 1 for dormant seeding. Written approval must be obtained for seeding outside the seeding season and, if approved, the permanent seed rate shall be increased by 50%.

Seeding season for cover crops shall be grain oats January 1 – July 31 and grain rye August 1 – December 1.

MATERIAL AND SUBMITTALS

Seed Mixes and Submittals shall be per the item(s) for permanent and annual (cover crop) seed mixes.

Compost Blanket, if used, shall meet the material and submittal requirements for that item.

Hydromulch shall be wood fiber or straw applied per the Standard Specifications and at the rates specified below and per the manufacturer.

A certified statement shall be furnished, prior to start of work, to the Engineer by the Contractor as to the number of pounds of hydromulch, tackifier, and seed, per 100 gallons of water and as applicable to products used. This statement should also specify the number of square yards of seeding that can be covered with the solution specified above.

Fertilizer

No fertilizers shall be applied.

ITEM 765.635 (Continued)

Water

Water, including hose and all other watering equipment required for the work, shall be furnished by the Contractor to the site at no additional cost. Water shall be suitable for irrigation and free from ingredients harmful to plant life. All plants injured or work damaged due to the lack of water or the use of too much water shall be the Contractor's responsibility to correct.

SEEDING

Hand broadcast method shall be used for all areas smaller than half an acre and when specified on the plans for areas over half an acre.

Seeding shall occur within 72 hours of placement of loam and final grading or the Contractor shall propose a reasonable, alternative schedule that shall be approved by the Engineer.

Surface Preparation

No seeding or soil preparation shall be done if soils are muddy or dry and compacted. Bare soils shall be raked to remove large stiff clods, lumps, brush, roots, stumps, litter and other foreign matter. Ruts and depressions shall be filled with additional loam or compost and the soil shall be re-graded to a relatively smooth finish corresponding to the required grades.

When seeding over existing or compacted soil or soil that has sat bare for more than 30 days, surface will be prepared by tilling or raking to a minimum depth of 2 inches prior to seeding and prior to Compost Blanket application (when applied).

Surface preparation shall be compensated for under for loam placement or topsoil rehandled and spread as appropriate to the project.

Jute or coir mesh, when specified in the contract, shall be placed after seeding and per the Standard Specifications and the manufacturer’s instruction.

Surface preparation shall be approved by the Engineer prior to seeding.

Seeding over Various Substrates

Loam: Seeding shall occur within 72 hours of loam placement to prevent loss of topsoil. Seed shall be manually broadcast for areas less than half an acre (each area, not cumulative area) and when specified on the plans. Broadcasting shall be immediately followed by hydromulching as specified below. When not specified on the plans, larger areas may be hydroseeded as specified below.

Compost Blanket: Compost Blanket shall be applied as specified under that item. Seed should be hand broadcast at the same time as compost application to ensure a thin cover of compost over seed.

ITEM 765.635 (Continued)

When seeding is done after application of Compost Blanket the rate shall be increased by 50%. If the Compost Blanket is applied after December 1, seed shall be broadcast or hydroseeding over the compost in the Spring and the rate increased by 50% specified under Seed Application.

Compost Mulch over Modified Rock: Compost Mulch and seed shall be applied as specified under that item. No hydromulch is required.

Cover Crop

Cover crop shall be used when seeding out of season, when specified with the permanent native seed mix under that item, and as required to prevent erosion until the permanent seed establishes. A cover crop should not be used with a steep slope mix or other permanent mix which already contains either cereal rye or oats in the composition of the mix. A cover crop is not necessary for wetland seeding and is not typically necessary for soil stabilization when seeding in conjunction with a compost blanket application.

Seed Application

All seed shall be mulched as specified herein.

Seed application shall be by broadcast seeding or by hydroseeding as described below.

Broadcast Seeding

Seed shall be broadcast spread using a cyclone or whirlwind seeder or hand broadcast. Small or light-seeded species such as bluestem may be mixed with approved filler to achieve an even distribution. Seed shall not be broadcast when wind velocities are greater than 15 mph.

Broadcast seeding shall be undertaken in two separate passes at ninety degrees to each other. One-half the seeding rate shall be applied in each direction (horizontally and vertically). To ensure seed to soil contact with broadcasting of seed, seeding shall be followed by rolling or tracking with equipment approved by the Engineer.

Broadcast seed shall be mulched with weed-free straw mulch unless seeding is done as part of Compost Blanket in which case it shall be as specified above under seeding with Compost Blanket application. Hydromulching shall be as specified under Hydromulching.

Hydroseeding and Hydromulching

Hydroseed and mulching shall be per the manufacturer's directions and as follows.

Hydroseeding shall only be used for sites over half an acre in size or with permission of the Engineer.

ITEM 765.635 (Continued)

Tank and hoses shall be cleaned from all previous hydroseeding and hydromulching projects. Seed shall be mixed into the slurry immediately before application and slurry applied within 30 minutes after seeds have been placed in the tank. Once seed has been placed in the tank, tank shall be agitated only enough to mix the seeds and keep slurry from separating.

A 2-step process shall be used for seeding in conjunction with hydromulch. Seed shall be applied with 500 lbs/acre of hydromulch in the first pass. A second pass with 1,000 lbs/ acre of hydromulch shall be applied in a second pass. Each pass shall be applied in a different direction.

Once the seed has been added to the tank mixture a one-hour time limit is set for spreading the mixture on the soil. Once the one hour has passed the excess mixture must be discarded.

For broadcast seeding, hydromulch shall be applied immediately following seeding at a rate of 1,000 lbs/acre. Tank shall be cleaned from any previous hydroseeding.

CARE DURING GERMINATION AND ESTABLISHMENT

Contractor shall care for seeded areas as necessary for successful germination. Care will include watering and weed control as necessary to achieve establishment of the specified seeded species after one growing season as specified below.

The contractor shall maintain the stand of grasses to ensure healthy growth of the seeded species. Work shall include mowing or weed-whacking for weed control, watering if necessary, and removal of invasive plants.

Watering shall be sufficient to achieve soil moisture to a depth of 2 inches or more and such moisture is uniform. Method of watering shall not erode or damage soil or grassed surfaces.

General Weed Control: Unless otherwise directed, mowing shall be as specified under Mowing for Weed Control for seed establishment. Weeds shall be mowed prior to weeds setting seed (by the end of July unless otherwise approved).

Control of Invasive and Aggressive Weeds: Invasive and aggressive weeds, including but not limited to mugwort, ragweed, knapweed, foxtail, crabgrass, and chicory must be cut or treated prior to going to seed. Herbicide treatment must be coordinated with MassDOT. Undesired species (such as chicory) introduced due to use of incorrect seed mix shall be removed at the Contractor's expense.

MOWING FOR WEED CONTROL

Mowing for weed control shall be completed after weeds have sprouted and show leaf and bud growth, but prior to setting seed, generally between July 7th and August 1st, unless directed otherwise by the MassDOT Landscape Architect and the Engineer.

ITEM 765.635 (Continued)

Mowing height shall be as needed for weed control, generally to a height of 8 inches and not below 4 inches, unless directed otherwise. Mowing shall be with a brush hog mower or string trimmer other approved equipment. Conventional lawn mowers which cannot achieve the appropriate cut shall not be used.

Contractor shall give 48-hour notice prior to mowing work. Mowing shall only occur in dry sunny weather. Litter pickup should occur prior to mowing in all areas. If required, cut grass shall be raked and removed. Litter pickup and raking and removal of grass shall be incidental to the work.

Mowing equipment shall be approved by the Engineer prior to work.

OVER-SEEDING

Areas of bare ground greater than 2-3 feet in diameter shall be over-seeded with the specified mix during the appropriate season for seeding. Where required for overseeding mowing shall be as close to the soil as possible. Soil that is compacted shall be raked or otherwise roughened prior to over-seeding.

Over-seeding rates and methods shall those specified above under Materials and Methods. Following over-seeding, soil shall be lightly tamped to ensure seed to soil contact and areas shall be mulched with straw mulch and watered with a fine mist to moisten soil to a depth of at least 2 inches.

Over-seeding, mulch, watering, and all work for over-seeding shall be incidental.

DETERMINING SATISFACTORY GRASS ESTABLISHMENT

A well-established stand of the specified seeded species as determined by the Engineer and the MassDOT Landscape Architect will be required for Final Acceptance. The expectation is that an acceptable number and variety of the desired permanent seeded species (not the cover crop) will be visible. Generally:

- A minimum of 75% coverage by the specified permanent seeded species after one growing season. Of that percentage, generally, depending on the mix species:
    - At least 3 types of the permanent seeded grass species shall be visible.
    - At least 3 species of wildflowers shall be visible.
- There will be no significant gaps or bare soil (generally 2-3 feet in diameter or greater).
- There will be no more than 25% coverage by weed species.
- All soil shall be stabilized and there shall be no channeling or erosion.
- There will be no invasive or aggressive species within the stand at the time of acceptance.
- There shall be no evidence of seed from non-native mixes (i.e., clover) due to failure to clean the hydroseeding tank or using incorrect mix.

Invasive and aggressive weeds (such as mugwort, ragweed, knapweed, and chicory) must be cut or treated prior to going to seed for Interim Acceptance. Herbicide treatment must be coordinated with MassDOT.

ITEM 765.635 (Continued)

A warm-season grass mix with perennials will not have uniform growth. A uniform stand of grass may indicate use of an incorrect mix.

ACCEPTANCE OF SEEDING AND ESTABLISHMENT WORK

Conditional Acceptance shall be based on proper application of seed as specified herein.

Interim Acceptance of Care. Seeding will be inspected by mid-July to assess germination and Establishment conditions as described above. When necessary for Interim Acceptance, areas shall be mowed prior to weed species producing seed and as specified above under Weed Control. ***Areas requiring weed control that are not mowed prior to weed seed dispersal will not be approved for Interim Acceptance.*** Seeding that shows good germination and is determined by the Engineer and Landscape Architect to not require weed control at time of inspection shall be accepted for Interim Acceptance payment.

Final Acceptance of Establishment shall be given upon satisfactory Establishment as described above.

If the seeded area fails to meet the requirements of Establishment by the end of the growing season, contractor shall propose and implement remediations and site shall be inspected during the following growing season after July 1st. All remediation shall be at the contractor's expense.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Native Seeding and Establishment will be measured for payment by the square yard, complete in place.

Native Seeding and Establishment will be paid at the Contract unit price by the square yard upon Conditional, Interim, and Final Acceptances as described above. This price shall include all submittals, seeding, rolling to ensure seed-to-soil contact, weed control other than mowing, water, over-seeding, labor, materials, equipment, and all incidental costs required to complete the work of establishing a satisfactory stand of grass.

Native seed and cover crop mixes shall be compensated under the respective items.

Site preparation, including raking, tilling, removal of debris and stones, and other work to the prepare site for seeding shall be compensated under loam placement or topsoil rehandled and spread as relevant to the project. If used, Compost Blanket shall be compensated under the respective item.

Mowing for weed control will be incidental to this item. Schedule of payment shall be as follows:

30% upon Conditional Acceptance

20% upon Interim Acceptance of Care, except this amount will be reduced to zero and final payment will be reduced accordingly when areas requiring weed control are not mowed as specified in the Interim Acceptance criteria.

50% upon Final Acceptance of Establishment

ITEM 767.121 SEDIMENT CONTROL BARRIER FOOT

The work under this item shall conform to the relevant provisions of Subsections 670, 751 and 767 of the Standard Specifications and shall include the furnishing and placement of a sediment control barrier. Sediment control barrier shall be installed prior to disturbing upslope soil.

The purpose of the sediment control barrier is to slow runoff velocity and filter suspended sediments from storm water flow. Sediment barrier may be used to contain stockpile sediments, to break slope length, and to slow or prevent upgradient water or water off road surfaces from flowing into a work zone. Contractor shall be responsible for ensuring that barriers fulfill the intent of adequately controlling siltation and runoff.

Twelve-inch diameter (after installation) compost filter tubes with biodegradable natural fabric (i.e., cotton, jute, burlap) are intended to be the primary sedimentation control barrier. Photo-biodegradable fabric shall not be used.

For small areas of disturbance with minimal slope and slope length, the Engineer may approve the following sediment control methods:

- 9-inch compost filter tubes
- Straw bales which shall be trenched

No straw wattles may be used. Additional compost filter tubes (adding depth or height) shall be used at specific locations of concentrated flow such as at gully points, steep slopes, or identified failure points in the sediment capture line.

When required by permits, additional sediment barrier shall be stored on-site for emergency use and replacement for the duration of the contract.

Where shown on the plans or when required by permits, sedimentation fence shall be used in addition to compost filter tubes and straw bales and shall be compensated under that item.

Sediment control barriers shall be installed in the approximate location as shown on the plans and as required so that no excavated or disturbed soil can enter mitigation areas or adjacent wetlands or waterways. If necessary to accommodate field conditions and to maximize effectiveness, barrier locations may be shifted with approval from the Engineer. Barriers shall be in place prior to excavation work. No work shall take place outside the barriers.

MATERIALS AND CONSTRUCTION

Prior to initial placement of barriers, the Contractor and the Engineer shall review locations specified on the plans and adjust placement to ensure that the placement will provide maximum effectiveness.

Barriers shall be staked, trenched, and/or wedged as specified herein and according to the Manufacturer’s instructions. Barriers shall be securely in contact with existing soil such that there is no flow beneath the barrier.

ITEM 767.121 (Continued)

Compost Filter Tube

Compost material inside the filter tube shall meet M1.06.0, except for the following: no peat, manure or bio-solids shall be used; no kiln-dried wood or construction debris shall be allowed; material shall pass through a 2-inch sieve; and the C:N ratio shall be disregarded.

Outer tube fabric shall be made of 100% biodegradable materials (i.e., cotton, hemp or jute) and shall have a knitted mesh with openings that allow for sufficient water flow and effective sediment capture.

Tubes shall be tamped, but not trenched, to ensure good contact with soil. When reinforcement is necessary, tubes shall be stacked as shown on the detail plans.

Straw Bales

Straw bales shall be used if shown on the plans or when specified by Orders of Condition or other permit requirements.
Bales should be placed in a single row, lengthwise on the contour, with ends of adjacent bales tightly abutting one another. All bales should be either wire-bound or string-tied. Straw bales should be installed so that bindings are oriented around the sides (rather than along the tops and bottoms) of the bales in order to prevent deterioration of the bindings.
The barrier should be entrenched and backfilled. A trench should be excavated the width of a bale and the length of the proposed barrier to a minimum depth of 4 inches. The trench must be deep enough to remove all grass and other material which might allow underflow. After the bales are staked and chinked (filled by wedging), the excavated soil should be backfilled against the barrier. Backfill soil should conform to the ground level on the downhill side and should be built up to 4 inches against the uphill side of the barrier.
Each bale should be securely anchored by at least 2 stakes or re-bars driven through the bale. The first stake in each bale should be driven toward the previously laid bale to force the bales together. Stakes or re-bars should be driven deep enough into the ground to securely anchor the bales. For safety reasons, stakes should not extend above the bales but should be driven in flush with the top of the bale.
The gaps between the bales should be chinked (filled by wedging) with straw to prevent water from escaping between the bales. Loose straw scattered over the area immediately uphill from a straw bale barrier tends to increase barrier efficiency. Wedging must be done carefully in order not to separate the bales.
When used in a swale, the barrier should be extended to such a length that the bottoms of the end bales are higher in elevation than the top of the lowest middle bale to assure that sediment-laden runoff will flow either through or over the barrier but not around it.
Sedimentation Fence

Materials and Installation shall be per Section 670.40 and 670.60 of the Standard Specifications and the following:

ITEM 767.121 (Continued)

Sedimentation fence shall only be used if shown on the plans or when specified by Orders of Condition or other permit requirements.

When used with compost filter tubes, the tube shall be placed on a minimum of 8 inches of folded fabric on the upslope side of the fence. Fabric does not need to be trenched.

When used with straw bales, an 8-inch deep and 4-inch wide trench or V-trench shall be dug on the upslope side of the fence line. One foot of fabric shall be placed in the bottom of the trench followed by backfilling with compacted earth or gravel. Stakes shall be on the down slope side of the trench and shall be spaced such that the fence remains vertical and effective.

Width of fabric shall be sufficient to provide a 36-inch high barrier after fabric is folded or trenched. Sagging fabric will require additional staking or other anchoring.

MAINTENANCE

Maintenance of the sediment control barrier shall be per Section 670.60 of the Standard Specifications or per the Stormwater Pollution Prevention Plan (SWPPP), whichever is more restrictive.

The contractor shall inspect the sediment barrier in accordance with relevant permits. At a minimum, barriers shall be inspected at least once every 7 calendar days and after a rain event resulting in 0.25 inches or more of rainfall. Contractor shall be responsible for ensuring that an effective barrier is in place and working effectively for all phases of the Contract.

Barriers that decompose such that they no longer provide the function required shall be repaired or replaced as directed. If the resulting berm of compost within the fabric tube is sufficiently intact (despite fabric decay) and continues to provide effective water and sediment control, barrier does not necessarily require replacement.

DISMANTLING & REMOVING

Barriers shall be dismantled and/or removed, as required, when construction work is complete and upslope areas have been permanently stabilized and after receiving permission to do so from the Engineer.

Regardless of site context, nonbiodegradable material and components of the sediment barriers, including photo-biodegradable fabric, plastic netting, nylon twine, and sedimentation fence, shall be removed and disposed off-site by the Contractor.

For naturalized areas, biodegradable, natural fabric and material may be left in place to decompose on-site. In urban, residential, or other locations where aesthetics is a concern, the following shall apply:

ITEM 767.121 (Continued)

- Compost filter tube fabric shall be cut and removed, and compost shall be raked to blend evenly (as would be done with a soil amendment or mulch). No more than a 2-inch depth shall be left on soil substrate.
- Straw bales shall be removed and disposed off-site by the Contractor. Areas of trenching shall be raked smooth and disturbed soils stabilized with a seed mix matching adjacent seeding or existing grasses (i.e., lawn or native grass mix).
- Sedimentation fence, stakes, and other debris shall be removed and disposed off-site. Site shall be restored to a neat and clean condition.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 767.121 will be measured and paid for at the contract unit price per foot of sediment control barrier which price shall include all labor, equipment, materials, maintenance, dismantling, removal, restoration of soil, and all incidental costs required to complete the work.

Additional barrier, such as double or triple stacking of compost filter tubes, will be paid for per foot of tube installed.

Barriers that have been driven over or otherwise damage by construction activities shall be repaired or replaced as directed by the Engineer at the Contractors expense.

ITEM 796.1 LIVE CUTTINGS EACH

The work under this Item shall conform to the relevant provisions of Subsection 771, Planting Trees, Shrubs, and Groundcover, of the Standard Specifications and the following.

The work shall consist of furnishing, transporting, storing, and installing live cuttings, including dormant stakes or tubelings where specified, cardboard construction tubes where required, loam, mulch, watering, maintenance, replacement of failed plantings during the establishment period, and all incidental labor, materials, tools, and equipment necessary to complete the work at the locations shown on the Plans or as directed by the Engineer.

Live cuttings shall be harvested, handled, stored, and installed in a manner that maintains plant viability. The Contractor shall coordinate harvesting and installation to ensure dormant stakes are planted within the specified planting season and are protected from drying prior to installation. Any live cuttings determined by the Engineer to be dead, damaged, dried, or otherwise unsuitable shall be removed and replaced by the Contractor at no additional cost to the Department.

Where live cuttings are installed within riprap or modified rock fill, the Contractor shall coordinate the installation with the associated work to ensure the cardboard construction tubes and live cuttings are properly placed without disrupting the stability or interlock of the rock fill.

MATERIAL

Provide all materials, equipment and labor necessary to complete the work as indicated on the drawings or as specified herein.

Submittals

Certifications and/or labels of proposed plant materials or substitutions, listing supplier source, common and scientific names of each.

The plant list for the project is presented below.

Live Cuttings

CEPHALANTHUS OCCIDENTALIS	3-4’
CLETHRA ALNIFOLIA	3-4’
CORNUS AMOMUM	3-4’

If specified species of landscape material is not available, obtain approval for substitution from the Engineer before ordering material.

Live cuttings referred to herein shall be dormant stakes. The stakes shall be 3-4 feet or longer and a minimum of ½ inch in diameter. Stakes must be alive, with side branches removed and with bark intact. Any leaves and branches on stakes shall be removed prior to planting to prevent the stake from drying out.

ITEM 796.1 (Continued)

Dormant stakes shall be planted only during dormancy, prior to any growth or blooms (typically mid-November through midMarch). Stakes must be fresh (no more than one day old) and must be kept moist after they have been prepared into appropriate lengths. They must be kept in cool, moist and shaded conditions and shall be wetted daily until planted. Dried stakes shall be rejected.

Tubelings (rooted cuttings) may be used in place of dormant stakes when outside of the dormant period for Live Cuttings. Tubelings shall be 5-inch deep plug cells and shall have a minimum of 12 inches stem height.

Cardboard construction tubes shall be 18 inches in diameter and shall be perforated with 0.5 inch diameter holes evenly spaced every 4 inches

Mulch shall be aged pine bark mulch per the Standard Specifications.

Loam shall meet the Standard Specifications for 751.

INSTALLATION

In Rip Rap or Modified Rock Fill

Installation of tubes shall be coordinated with Item 986 Modified Rock Fill. Tubes must be bio-degradable. No PVC piping shall be used. Tubes must be filled with soil at time of placement to prevent collapse of tube.

Live cuttings shall be planted within perforated cardboard tubes that have been installed through the riprap blanket and filter and into the underlying soil. Due to the fact that the cuttings must be planted during the dormant season (no later than March) cardboard tubes may be installed prior to installing the cuttings.

Tubes shall be installed in irregular groups of three to five tubes such that the tubes are spaced five to eight feet apart. The tubes shall be installed so that they do not interfere with the normal interlocking of the rock fill. Three stakes shall be planted in each cardboard tube.

The basal or butt ends of the stakes shall be cut cleanly at an angle to facilitate easy insertion into the soil. The top should be cut straight or blunt. Cuttings must be fresh (no more than one day old) and must be kept moist after they have been prepared into appropriate lengths. Stakes that split or have been stripped during removal of side branches shall be replaced. Stakes that have leaves or branches shall be rejected.

Stakes may be driven into the soil with a rubber mallet. At least two thirds of the length of the live stake needs to be in the ground below the rock layer. After planting, the cardboard tubes shall be mulched.

ITEM 796.1 (Continued)

If planting is outside of the dormant period, tubelings shall be used instead. Two tubelings of the same species shall be planted in each cardboard tube. Tubelings shall be planted and mulched per MassDOT standard planting specifications.

Soil shall be covered with 2 inches of aged pine bark mulch after installation.

The Contractor shall be responsible for maintaining the cuttings, including watering as necessary, and for replacing those that do not survive for 1 year from the time of the original planting.

In Soil

Stakes shall be driven into the ground with a rubber mallet. Pilot holes must be made in harder soils prior to inserting the stakes. Stakes shall be planted at least one foot deep, preferable more, with at least 2 to 3 nodes in the ground. Spacing shall be randomly placed with two to four stakes per square yard or, if in rows, shall be placed approximately 3 feet apart.

When planting where there are existing invasive species, stakes shall be planted at a denser spacing of 18–24 inches apart.

If tubelings are planted in lieu of stakes, they shall be planted per MassDOT standard planting specifications with spacing at 18–24 inches apart.

METHOD OF MEASURMENT

Item 796.1 will be measured for payment by Each, measured by the number of live cutting installations, complete in place and accepted by the Engineer.

BASIS OF PAYMENT

Item 796.1, Live Cuttings, will be paid for at the Contract unit price per Each, which price shall include all labor, materials, tools, equipment, furnishing, transporting, harvesting, storing, and installing live cuttings, including dormant stakes or tubelings, cardboard construction tubes where required, loam, mulch, watering, maintenance, replacement of unsuccessful plantings during the establishment period, excavation, preparation of planting holes, backfilling, disposal of excess material, coordination with adjacent work, and furnishing and incidentals costs required to complete the work in accordance with the Plans, these Specifications, and as directed by the Engineer.

No separate payment will be made for incidental materials or work required to complete the installation, all costs of which shall be included in the Contract unit price bid for Item 796.1.

ITEM 874.45 MISCELLANEOUS SIGNS REMOVED AND RESET EACH

The work under this item shall conform to the relevant provision of Subsections 828 and 840 of the Standard Specifications and the following:

The work shall include removing and resetting existing informational, guide, and directional sign panels on new ground-mounted supports at the current or new locations as indicated on the plans. The work will also include the restoration to original condition, of any natural features disturbed in any way or manner by the operation, and the proper disposal of the existing sign supports.

MATERIALS

Materials for signs removed and reset shall be the existing signs and supports. If in the opinion of the Engineer, the existing sign panel is unsuitable for reuse, a new sign panel of a size and composition equal to the existing sign panel shall be furnished, as directed by the Engineer.

The hardware used to attach the sign panel to the new sign support shall be the existing bolts, brackets or clamps, or new and equal quality equipment furnished by the Contractor, as directed by the Engineer.

CONSTRUCTION METHODS

Sign panels to be removed and reset shall be cleaned before being remounted on new sign supports.

Work shall include the dismantling, removal, transporting, storing and resetting of existing traffic signs on new supports at the locations shown on the plans. The Contractor shall completely remove the sign and post and reset said sign at the new location. If existing signs are not suitable for reuse as determined by the Engineer, the contractor shall provide new signs under item 832. New supports shall be provided under item 847.1. New attachment hardware shall be furnished as necessary to replace any missing or unusable existing hardware.

Existing sign damaged or lost by the Contractor’s operations shall be replaced in-kind by the Contractor at no additional compensation

The Contractor shall backfill with compacted gravel all holes resulting from the removal of the existing signs and their foundations and restore the area to match existing conditions of adjacent areas.

ITEM 874.45 (Continued)

METHOD OF MEASUREMENT

Item 874.45 will be measured for payment by the each sign removed and reset in its final position on a new post, complete in place.

BASIS OF PAYMENT

Item 874.45 will be paid for at the Contract unit price per each, which price shall include all labor, materials, equipment and incidental costs required to complete the work, including dismantling, excavating and removing, loading, transporting, and resetting of the signs on new supports; gravel backfill; and concrete foundations where required.

Replacement of sign panels that have been determined to be unsuitable for reuse shall be paid for under Item 874.51, Miscellaneous Signs Removed and Discarded. No payment shall be made for any sign panels that have been damaged by the Contractor's operation.

The new singes will be paid for under Item 823, as required by the engineer.

The new supports will be paid for under Item 847.1 as required by the engineer.

ITEM 874.51 MISCELLANEOUS SIGNS REMOVED AND DISCARDED EACH

The work under this Item includes the dismantling, removal, transportation and discarding of the existing roadside signs shown on the plans and removal and disposal of the sign supports and their foundations.

The existing signs shall not be removed until the new signs and structures replacing them are ready for traffic or until the Engineer shall permit.

If signs are attached to existing light poles, utility poles or traffic poles, only the sign and attached hardware shall be removed and discarded.

METHOD OF MEASUREMENT

Item 874.51 will be measured for payment by the each sign removed and discarded.

BASIS OF PAYMENT

Item 874.51 will be paid for at the Contract unit price per each, which price shall include all labor, materials, equipment and all incidental costs required for dismantling, loading, transporting, and discarding of the signs as designated above, the excavating and disposal of the existing foundation and supports of the sign, and the supplying and placing of compacted gravel backfill where foundations and posts are removed and restoration of surface.

ITEM 874.7 MISCELLANEOUS SIGNS REMOVED AND STACKED EACH

The work under this item shall conform to the relevant provision of Section 800 of the Standard Specifications and the following:

The work shall include the dismantling, removal, transporting, and stacking as indicated on the plans or as directed by the Engineer.

The Contractor shall exercise particular care in the dismantling, removal, transporting, and resetting of the existing signs designated on the plans to be reset or stacked. Any sign panel damaged through carelessness or lack of protection by the Contractor shall be replaced at the Contractor's expense.

The existing signs shall not be removed until the new signs and structures replacing them are ready for installation or until the Engineer shall permit.

Existing foundations shall be excavated (including Class "B" Rock) to a depth of at least six inches below grade and the resulting hole shall be backfilled with compacted gravel and the surface restored to match existing conditions of adjacent areas. Existing foundations within the proposed roadway areas shall be excavated (including Class "B" Rock) to a depth of at least three feet below grade and the resulting hole shall be backfilled with compacted gravel and the surface restored to match existing conditions of adjacent areas.

Signs to be removed and stacked shall be stacked on site at 103 Old Colony Avenue, East Taunton, MA, and the Contractor shall coordinate with the property owner for specific stacked location.

METHOD OF MEASUREMENT

Item 874.7 will be measured for payment by the each, sign removed and stacked.

BASIS OF PAYMENT

Item 874.7 will be paid for at the Contract unit price per each, which price shall include all labor, materials, equipment, any excavation, including Class "B" Rock Excavation, dismantling, loading, transporting and stacking of signs; the excavating and disposal of the existing supports and foundations, of the same; the supplying and placing of compacted gravel backfill where foundations and posts are removed; and surface restoration and incidental costs required to complete the work.

ITEM 905.2 5000 PSI, 3/8 INCH, 710 HP CEMENT CONCRETE CUBIC YARD

The work under this Item shall conform to the relevant provisions of Subsection 901 of the Standard Specifications and the following:

a) The work to be done under this Item shall consist of replacing concrete removed in deteriorated or spalled areas for substructure repairs greater than 1½" deep.

b) The work under this item consists of furnishing and placing 5,000 PSI, 3/8 IN., 710 HP Cement Concrete Masonry to repair substructures, as directed.

c) The Contractor shall have the approval of the Engineer certifying that the existing concrete has been removed to the required limits and that adequate surface preparation has been achieved before any concrete is placed.

d) Bonding Agent: Immediately prior to all concrete pours, the Contractor will apply a bonding agent from the MassDOT Qualified Construction Materials List to the excavated surfaces of the concrete. The bonding agent will be worked into the surfaces with stiff brushes or brooms. Bonding Agent will be considered incidental to this Item. Products to be used for this item shall be approved by the Engineer before the Contractor begins his operations. If the bonding compound prematurely hardens, additional bonding compound shall be applied, if allowed by the bonding compound manufacturer or the hardened bonding compound shall be addressed as per the bonding compound manufacturer's recommendations.

Any steel that is unsuitable for further use through no fault of the Contractor shall be replaced under Item 910.1 Steel Reinforcement for Structures - Epoxy Coated. All reinforcing steel that is loose shall be tied tightly together using wire ties.

Concrete removal and satisfactory disposal of the deteriorated and spalled concrete of the substructure will be paid for under Item 127.122 Reinforced Concrete Excavation for Repairs.

ITEM 909.2 CEMENTITIOUS MORTAR FOR PATCHING SQUARE FOOT

The work under this item shall conform to the relevant Provisions of Subsection 901 of the Standard Specification and the following:

The work consists of furnishing and placing a polymer-modified, cementitious, 2-component, fast-setting, trowel grade patching mortar to patch vertical, horizontal and overhead surfaces on the existing structure in areas of spalled concrete on the bridge substructures, and as directed by the Engineer.

This Item does not include the repair of any horizontal or vertical spalls which exceed 1½ inches in depth. The repairs to those areas shall be made with 5000 PSI, 3/8 IN., 710 HP Cement Concrete under Item 905.2.

MATERIAL

The polymer modified cementitious patching mortar shall be selected from the MassDOT Qualified Construction Materials List.

The Contractor shall furnish notarized certification that all materials conform to the above requirements. Only those products previously approved for the purpose intended herein and listed on the Qualified Construction Materials List maintained by the MassDOT Research and Materials Section may be used.

No Materials will be ordered or used before the approval of the Engineer.

SURFACE PREPARATION

Concrete at the edges of all areas to be patched using Cementitious Mortar for Patching shall be removed to a minimum depth of half (1/2) inch prior to the application of the mortar.

Areas to be patched must be clean and sound. All loose and disintegrated concrete shall be removed by means of abrasive blasting, or an equivalent method, to a depth where sound concrete is exposed. The Contractor shall remove all deteriorated and spalled areas as designated by the Engineer. All costs to remove the deteriorated and spalled concrete shall be compensated for under Item 127.122.

The Contractor shall have the approval of the Engineer certifying that all spalled and deteriorated concrete has been removed prior to patching deteriorated areas.

MIXING

Mix manually or mechanically. The mortar shall be prepared in accordance with the Manufacturer's instructions.

ITEM 909.2 (Continued)

APPLICATION METHODS

At the time of application, surfaces should be damp (saturated surface dry) with no glistening water. Mortar must be worked into the substrate filling all pores and voids. Force the material against the edge of the repair, working towards the center. After filling, consolidate, then screed.

The maximum thickness of application in one pass shall be 1". If the depth of patch exceeds 1", the mortar shall be placed in two passes of approximate equal thickness. Before the first pass has achieved an initial set, the surface shall be prepared for the second pass by scratching with a trowel to form a grid of deformation on the surface.

Work the mix into the substrate, filling all pores and voids.

CURING

Use of fine mist spray of water, wet burlap, or non-solvent approved curing compound if ambient conditions might cause premature surface drying, i.e., high temperature, low humidity, strong winds. If necessary, protect newly applied mortar from rain. To prevent freezing, the Contractor shall cover the application area with insulating material, to the satisfaction of the Engineer.

MANUFACTURER'S FIELD REPRESENTATIVE

The Contractor shall arrange with the materials manufacturer or distributor to have the services of a competent field representative at the work site prior to any mixing of components to instruct the work crews in the proper mixing and application procedures. The field representative shall remain at the job site after work commences and continue to instruct until the representative and the Contractor, Inspector and/or Engineer are satisfied that the crew has mastered the technique of installing the system successfully. The representative shall make periodic visits (minimum weekly) to the project as the work progresses and shall confer on each visit with the Contractor, Inspector and/or Engineer.

The Manufacturer's field representative must be fully qualified to perform the work and shall be subject to the approval of the Engineer.

The Contractor shall be completely responsible for the expense of the services of the required field representative and the bid contract price shall be full compensation for all costs in connection therewith.

METHOD OF MEASUREMENT

Item 909.2 will be measured for payment by the Square Foot, of cementitious mortar patched area, complete in place.

ITEM 909.2 (Continued)

BASIS OF PAYMENT

Item 909.2 will be paid for at the Contract unit price per Square Foot, which price shall include all labor, materials, equipment, manufacturer representative and incidental costs required to complete the work.

ITEM 912. DRILLING AND GROUTING DOWELS EACH
ITEM 912.01 DRILLING AND ADHESIVE ANCHORING DOWELS EACH

The work under these Items shall consist of drilling and grouting (i.e. non-shrink cementitious mortar) or applying anchoring adhesive in holes in the existing substructure for steel reinforcing dowels as shown on the Plans, or as directed by the Engineer.

MATERIALS

Grout for dowels shall be a non-shrink cementitious mortar. Grouting material, which has been tested, is approved, and is listed on the Qualified Construction Materials List is acceptable for use.

Adhesive for dowels shall be an epoxy, vinyl, or polyester resin adhesive. The resin adhesive shall be a moisture-insensitive, high-modulus, high-strength resin. If the resin adhesive is an epoxy it shall conform to ASTM C 881, Type IV, Grade 3, Classes B and C. Adhesive material that has been tested, approved, and listed on the Qualified Construction Materials List is acceptable for use.

The steel dowels shall meet the requirements of AASHTO M31 (ASTM A615) Grade 60 for reinforcement. All steel reinforcement dowels shall be epoxy coated. Steel dowels shall be incidental to the work under this Item.

CONSTRUCTION METHODS

Dowel hole diameter shall be per the grout or adhesive manufacturer's recommendations for each size dowel.

That Contractor shall install two test dowel bars of each dowel size in the existing concrete and test them for pullout. The pullout force shall correspond to 90% of the yield strength of the bar. If any of the tested bars pull out or if the surrounding concrete shows signs of cracking, the Contractor must adjust the hole diameter, embedment length, and/or grouting material to meet this test requirement.

All testing of the drilled and grouted dowels shall be performed by the Contractor and is incidental to the work under these items. The method of applying the tension test load to the dowels shall conform to ASTM E488. The details of the testing equipment used and the locations and details of the test dowels shall be submitted to the Engineer for approval. The Contractor shall perform this test as soon as possible in order to eliminate delays in construction due to the approval process. Dowels shall not be ordered until the embedment lengths have been approved by the Engineer.

All dowel holes shall be air drilled provided that the minimum edge distance of 6 inches is observed. Should, in the Engineer's opinion, air drilling be inappropriate due to questionable strength of the existing concrete or insufficient edge distance, the dowel holes shall be diamond core drilled. The inner surfaces of diamond core drilled dowel holes shall be scored to develop sufficient keying action.

ITEMS 912. & 912.01 (Continued)

The method of scoring of the dowel hole's inner surfaces shall be subject to the approval of the Engineer. The depth of the drilled dowel holes shall be as shown on the Plans, except that the depth of drilled hole shall be modified by the Contractor as required to comply with the minimum depth of hole specified in the product literature of the cementitious mortar to develop 125% of the yield strength of the reinforcing bars. The diameter of the dowel holes shall be as specified in the product literature of the cementitious mortar to develop 125% of the yield strength of the reinforcing bars. The holes shall be blown clear of any debris and shall have the approval of the Engineer prior to the placement of any grout material.

The drilling operation shall be performed without damage to any existing reinforcing or portion of the structure that is to remain in place. Any damage to any existing portion of the structure that is to remain in place shall be repaired to a condition equal to or better than existing condition prior to the beginning of the Contractor's operations and shall be repaired at the Contractor's expense.

The Contractor shall strictly follow the recommendations of the manufacturer for mixing and placing the grout material prior to the placement of the dowels. The Contractor shall, at a minimum, adhere to the ACI code requirements regarding minimum and maximum temperatures while placing the grout. Any excessive grout around the hole after placement of the dowel shall be struck off smooth while the grout is still fresh.

SUBMITTALS

The Contractor shall submit the grout manufacturer's literature completely describing the products to be utilized. The materials shall be delivered clearly marked with legible and intact labels containing the manufacturer's name, brand name, and identification of the areas where temperatures conform to manufacturer's instructions and recommendations.

METHOD OF MEASUREMENT

Item 912. and Item 912.01 will be measured respectively for payment by unit EACH of drilled and grouted hole or drilled and adhesive anchored hole, regardless of depth, complete in place with the dowel, and accepted by the Engineer regardless of length or size of the actual rebar dowels.

BASIS OF PAYMENT

Item 912. and Item 912.01 will be paid for at the respective Contract unit price per EACH drilled/cored and grouted dowel or adhesive anchored dowel installed, which price shall include all labor, materials, tools, equipment, and other incidental costs required to perform the work described above. The Contractor shall have no claim for any variations in the diameter of the hole, the method of drilling the hole, or the type of grout or adhesive used in anchoring the proposed dowels. The supply, testing, and installation of reinforcing steel dowels shall be considered incidental to the work performed under these items.

ITEM 950.1 TEMPORARY SHORING LUMP SUM

The work under this Item shall conform to the relevant provisions of Subsection 950. of the Standard Specifications and the following:

The work shall include designing, furnishing, installing and subsequent removal of all temporary shoring to facilitate the Contractor's demolition and construction operations.

MATERIALS

The temporary shoring shall include all necessary shoring, sheeting, soldier piles and lagging or other means and methods of providing temporary excavation support. References to temporary shoring or earth support under this Item or on the Plans are to be considered a generic term for temporary earth support system(s). It is the responsibility of the Contractor to determine the appropriate means, methods, and materials to provide the appropriate temporary excavation support for each of his/her operations and/or work tasks.

SUBMITTALS

The Contractor shall prepare and submit working drawings and associated design calculations to the Engineer, for review and approval. Complete working drawings shall be submitted for the temporary shoring in which are shown all materials, member sizes, connections, methods and sequence of installation, location, and depths of system components; and the complete description of equipment and instrumentation to be used with installation, operation, and maintenance procedures. The working drawings, and associated calculations, shall be stamped by a Professional Engineer registered in Massachusetts. Approval of the working drawing does not relieve the Contractor of the responsibility of providing for the safety of the work and its successful completion, and the protection of adjacent structures from damage caused by the construction.

The temporary shoring shall be designed in accordance with the American Association of State Highway and Transportation Officials Standard Specifications for Highway Bridges, 17th Edition. Changes in the temporary shoring subsequent to approval from the Engineer, shall be re-submitted to the Engineer for additional review prior to installation.

CONSTRUCTION METHODS

Temporary shoring shall be installed without causing damage or misalignment of existing adjacent structures, utilities, and pavements. To mitigate vibration impacts, vibratory hammers used to install sheet piling shall be a variable moment hammer with a minimum operating frequency of 30 Hz. Solider piles shall be installed either in holes pre-drilled to their full embedment depth and filled with concrete or driven with a vibratory variable moment hammer with a minimum operating frequency of 30 Hz.

Any damage to existing adjacent facilities as a result of the temporary shoring operations shall be promptly repaired or replaced in kind at no additional cost.

The Contractor, in order to ensure the integrity and stability of the temporary shoring, shall be solely responsible for monitoring the support systems to identify and correct bulges, breakage or other evidence of movement.

ITEM 950.1 (Continued)

All temporary shoring shall be installed in strict accordance with the design and recommendations of the design engineer employed by the Contractor, and in accordance with any review requirements of the Engineer.

Any part of the temporary shoring that protrudes into the supporting soil below the bridge structure shall not be removed but shall be cut off and left in place with no additional payment. Supporting soil shall be defined as all soil directly below the footing contained within a series of planes that originate at the perimeter of the bottom of the footing and project down and away from the footing at an angle of 45° from the horizontal.

BASIS OF PAYMENT

Item 950.1 will be paid for at the Contract Lump Sum bid price, which price shall include all labor, materials, equipment, design, furnishing, installing, maintenance, and subsequent removal or cutting off and disposal of all temporary shoring, and incidental costs required to complete the work regardless of the actual system utilized.

ITEM 991.1 CONTROL OF WATER – STRUCTURE NO. R-02-003 = T-01-004 LUMP SUM

The work under this Item shall conform to the relevant provisions of Subsections 7.02 and 140 of the Standard Specifications, all applicable environmental regulations and permits, and the following:

The work shall include all work necessary for the control of water within the excavations and cofferdam to construct the project in the dry. The work shall include designing, furnishing, installing, maintaining, operating, and removing temporary dewatering systems as required, to lower and control water levels. Work also includes properly disposing of pumped water, constructing, maintaining, observing, and removing of equipment and instrumentation for control of the system. Water shall be discharged as specified in the environmental permits obtained for this project. No direct discharge shall be allowed into the Taunton River during the dewatering operations.

It is the responsibility of the Contractor to determine the need and extent of dewatering required, sedimentation and dewatering techniques and controls and submit method and materials he/she proposes to use for approval by the Engineer.

The Contractor is cautioned that flow rates in the river can increase substantially during and after storm events. The flow diversion operations shall include contingencies for accommodating the increased flow during such events. At a minimum, the flow diversion operations shall be designed to accommodate a 2-year storm event with a flow rate of 2150 cubic feet per second and a water surface elevation of EL 10.05. In the event of a storm exceeding this capacity, the contractor shall be responsible for stabilizing the work zone and allowing the excess flow to overflow the diversion/bypass mechanisms and flow through the work zone.

Plans and calculations for the water control measures shall be developed by the Contractor for this Item. These plans and calculations shall be prepared and stamped by a Professional Engineer registered in the Commonwealth of Massachusetts and shall be submitted for review and approval prior to the start of construction.

The Contractor shall use such equipment and shall perform the operations in such a manner that boiling or other disturbances of the soil in the foundation area will be prevented. The Contractor shall keep the excavated area dry by such means that the water will be prevented from entering the excavations and adversely affecting the stability of the foundation material or supporting soils.

The pumping discharge shall not be allowed to enter directly into the water from the work areas, rather it shall be pumped to a temporary stilling basin or other appropriate treatment or containment device. The criteria that shall be implemented for the control of water must meet the following:

1. The enclosure shall be adequately sized and designed to achieve adequate water quality treatment/sedimentation trapping and prevent overtopping from dewatering and to provide the required filtering or containment.
2. The outlet from the containment structure shall not cause erosion of the surrounding area. An approved method of controlling erosion, such as an erosion control blanket, stone, etc. shall be used at the outlet.

ITEM 991.1 (Continued)

3. Dewatering pumps shall include a two-part screen design to limit entrainment and entrapment of sensitive diadromous species that may be present during the construction period.
4. Impacts from dewatering will be minimized by designing support walls for minimal leakage, covering trucks, barges and stockpiles during rain events and land contouring to limit surface runoff from leaving the dewatering site.
5. Dewatered excavated material will be transported to the disposal site in accordance with local, state, and federal regulations.
6. The control of water containment structure shall be maintained as follows:
   a. Inspect at least twice daily during dewatering operations.
   b. Repair any damage immediately.
   c. Clean containment structure daily. Remove any debris immediately.
   d. Remove sediments when accumulated deposits reach a depth of 6 inches

The Contractor shall inspect the outlet daily and maintain the erosion controls at the outfall.

Placement of the dewatering stilling structure will be specified in the dewatering plan and will be submitted for approval by the Engineer. Pumping shall be conducted in a manner which will not adversely affect the freshly placed concrete within the excavation.

The Contractor shall provide and maintain pumps, pipes and other devices to promptly and continually remove and dispose of water from the excavation areas. The size and configuration of pumps and pipes shall be selected by the Contractor.

The Contractor is advised that the effectiveness of the water control method used will vary based on the field conditions and the time at which the actual excavation work is being performed. The Engineer shall to order the Contractor to stop all excavation operations when in his judgment the Contractor's water control operations are failing to produce adequate results or are posing a threat to the environment.

BASIS OF PAYMENT

Item 991.1 will be paid for at the contract unit bid price lump sum, which price shall include all labor materials, equipment, tools, and incidental costs required to complete the work including all water control work, design for the dewatering and treatment operations, used to maintain a water free excavation, installation, piping, pumping, maintenance, subsequent removal of all related materials and equipment all as outlined above; and restoration of site. This work will include preparation of the Construction Dewatering Plan and cofferdam design.

ITEM 994.01 TEMPORARY PROTECTIVE SHIELDING LUMP SUM
BRIDGE NO. R-02-003 = T-01-004

The work under this Item shall consist of designing, furnishing, fabricating, erecting, maintaining, and subsequent removal of temporary side and deck underside protective shielding to provide for the safety beneath the bridge from falling debris during the removal of the existing bridge.

CONSTRUCTION METHODS

The Contractor is responsible for preventing any debris resulting from demolition, excavation or construction from falling into the water below. All precautions and costs to install netting, scaffolding, shielding, etc., necessary to assure this shall be considered incidental to this Item. Any debris that falls into the water below shall be immediately removed by the Contractor at his/her expense, as directed by the Engineer.

The temporary shielding shall be placed in a manner as to prevent it from being blown out by the wind. If, in the opinion of the Engineer, the shielding is not secure, then the Contractor shall remove it and install it to the satisfaction of the Engineer at no additional cost.

The shielding shall at a minimum conform to the following:

1. Shielding shall be in place prior to the start of any demolition.

2. Shielding shall extend the full length of the bridge and a sufficient distance above and beyond the deck overhang at the fascias (2 feet minimum) and vertically adjacent to the bridge fascias (4 feet minimum).

3. Shielding shall have all spaces along the perimeter and at the seams sealed to prevent dust and debris from escaping and falling below the bridge.

4. Shielding shall be designed to safely withstand all loads that it will be subjected to. The allowable design stresses shall be in accordance with AASHTO Standard Specifications for Highway Bridges. The design shall also include a complete description of the equipment and construction methods proposed for the deck removal and also indicate the maximum size of deck area being excavated. The shielding shall also be designed to withstand the maximum size of excavated area should it fall during excavation or removal.

5. Shielding shall be installed or removed only upon approval of the Engineer.

6. Shielding design, calculations and sketches shall be stamped by a Professional Engineer registered in Massachusetts.

All materials used in the shielding system shall become the property of the Contractor and shall be removed from the site at the completion of the project.

ITEM 994.01 (Continued)

SUBMITTALS

The Contractor shall submit shop drawings, working drawings, and associated design calculations, stamped by a Professional Engineer registered in Massachusetts, of all proposed shielding to the Engineer for approval prior to installation. The drawings shall include all details of all connections, brackets, and fasteners. The protective shielding shall be designed to support all construction and dead loads safely; and to be sealed tightly at all joints.

BASIS OF PAYMENT

Item 994.01 will be paid for at the Contract Lump Sum bid price, which price shall include all labor materials, equipment, tools, engineering services, submittals, and incidental costs required to complete the work.

The first payment of 70 percent of the lump sum bid price of this Item will be made upon completion of the installation of the shielding system to the satisfaction and approval of the Engineer. The second payment of 30 percent of the lump sum bid prices of this Item will be made upon the complete construction of the proposed bridge and proper disposal of the shielding from the project site.

ITEM 995. BRIDGE SUPERSTRUCTURE, BRIDGE NO. R-02-003 = T-01-004 LUMP SUM

The work under this Item shall conform to the relevant provisions of Subsection 995. of the Standard Specifications and the specific requirements stipulated below for the component parts of this item. For those components where no specific requirement is stipulated, the Standard Specification shall apply, except for payment.

The work under this item includes all material, equipment and labor needed to construct the following: sawing and sealing joints in asphalt pavement at bridges, cast-in-place reinforced concrete abutment caps, wingwalls, wingwall caps, pier cap, and approach slabs; steel superstructure with cast-in-place reinforced concrete deck, sidewalk and safety curb; bridge railings; precast concrete highway guardrail transitions; bearings; controlled low-strength material (>300 PSI) around the precast highway guardrail transitions; and all other work not specifically provided for in the contract.

The work does not include any items listed separately in the proposal. Payment for materials shown on the Plans as being part of this bridge structure or which may be incidental to its construction and are not specifically included for payment under another item shall be considered incidental to the work performed under this Item and shall be included in the unit price of the component of which they are a part.

SAWING AND SEALING JOINTS IN ASPHALT PAVEMENT AT BRIDGES

The work to be done under this heading consists of making a sealed kerf across the full width of the finished asphalt pavement at bridge abutments where called for on the Plans. The shape, width, and depth of the kerf shall be as shown on the Plans.

Prior to the start of the asphalt pavement operation, the Contractor shall place a mark on each curb or barrier on either side of the paved roadway. These marks shall be aligned with the actual end of the bridge deck and shall be placed so that they will not be covered or otherwise obscured by the asphalt pavement.

After the completion of the paving operation, the Contractor shall snap a straight chalk line on the pavement between these two marks. The Contractor shall then saw cut the pavement along this line to the depth, width and shape as shown on the Plans. The equipment shall be approved by the Engineer prior to commencing work.

After completing the saw cutting, the Contractor shall clean the saw groove of any dust and debris with an oil free air blast. If the groove was wet sawn, the groove shall be cleaned with a water blast to remove any remaining slurry and debris, vacuumed with a Wet-or-Dry vacuum to remove any standing water, and then dried with an air blast from a Hot-Air-Lance.

Once the groove is clean and dry, the Contractor shall fill it completely with a Hot Applied Crack Sealer meeting the requirements of M3.05.2 in accordance with the manufacturer's application instructions and restrictions regarding ambient and material temperatures. The crack sealer shall be thoroughly cured prior to opening the road to traffic. To reduce tackiness, only boiler slag aggregate (black beauty) shall be scattered over the sealer when required by the Engineer. Conventional sand shall not be used for this purpose.

ITEM 995. (Continued)

HOT DIP GALVANIZED COATING FOR NEW STRUCTURAL STEEL

A. GENERAL

Fabricated steel shall be galvanized as indicated on the plans. All fabrication shall be completed prior to surface preparation and the application of any coating.

The faying surfaces of all field bolted connections shall be coated based on the design of the connection. Class B connections shall be masked prior to galvanizing to allow for application of an approved class B slip coefficient primer. After galvanizing the masked surface will be cleaned in accordance with SSPC-SP11 and coated with the approved zinc rich primer. A galvanized connection will result in a faying surface meeting a class C slip coefficient.

When grinding, drilling or any other operation produces steel turnings, filings, shavings, etc. the contractor shall completely clean all areas of all accumulation prior to the end of the work shift.

Locations of field applied studs shall require masking or removal of galvanizing and paint prior to welding.

The Engineer shall provisionally accept the shop coated items before shipment to the jobsite but final acceptance of the coating system will occur after erection of the coated items, and after all required repairs and coating application has been completed.

The contractor shall be responsible for failure and damage of all applied coating. Failures include but are not limited to, visible corrosion, blistering, checking, cracking, or delamination (peeling) and loss of gloss and color of the coating system. Damage includes but is not limited to damage from installation or from external agents, such as scraping, vandalism, debris impacts, and collisions. The extent and method of repair must be approved by the Engineer.

B. GALVANIZING

The following shall be hot dipped galvanized in accordance with Section M7 of these Specifications:

1. Members identified on the contract documents.
2. Diaphragms, cross frames, utility supports and bottom lateral bracing elements that are composed of non-weathering steels or weathering steels designated to be coated.
3. All sole plates and masonry plates (except sole plates for sliding elastomeric bearings).

Galvanized members requiring shop fabrication and assembly shall be cut, welded, and/or drilled prior to galvanizing. Bearing members to be milled shall be galvanized prior to milling. A thin layer of a rust inhibitor shall be applied to the milled surface. Material to be painted shall not be quenched after galvanizing.

Where material is required to be welded after galvanizing, the steel shall be masked 3 inches on each side of the weld center line. Prior to field welding the masked surface shall be cleaned in accordance with SSPC-SP11. After welding the area shall be repaired in accordance with ASTM A780 “Repair of Hot Dip Galvanizing” section 4.2.2, “Paints Containing Zinc Dust” and Annex 2. Repair paint shall meet M7.04.11 and application shall be in accordance with the manufacturer’s recommendations.

ITEM 995. (Continued)

Damaged galvanized surfaces shall be repaired in accordance with ASTM A780 "Repair of Hot Dip Galvanizing" section 4.2.2 Paints Containing Zinc Dust "High Zinc Dust Content". The paint shall be applied to achieve a minimum dry film thickness of 3 mils and not more than 5 mils. Repair paint shall meet M7.04.11 and application shall be in accordance with the manufacturer's recommendations.

The contractor shall provide protection of the adjacent coating in areas that will be field welded. After welding, the weld areas shall be prepared in accordance with SSPC-SP-11.

PRECAST HIGHWAY GUARDRAIL TRANSITIONS

General.

The work under this Heading consists of fabricating, transporting and installing Precast Highway Guardrail Transitions and includes all necessary labor, materials, and equipment to complete the work as shown on the Plans. The Precast Concrete Bridge Elements shall meet the requirements of Section M4: Cement Concrete and Related Materials.

MATERIALS

Materials.

Materials shall conform to M4.09.1 and the following:

Non-Shrink Grout Products	M4.04.5
Controlled Low-Strength Material – Structural Non-Excavatable	M4.08.0
Welded Steel Wire Fabric	M8.01.2
Mechanical Reinforcing Bar Splicer	M8.01.9
Lifting Devices	PCI MNL-116
Corrugated Metal Pipe	AASHTO M 36

1. **Vertical Adjustment Assembly.**

Vertical Adjustment Assembly details and material requirements shall be as shown on the plans. Alternate devices may be used provided that they are adjustable and can support the anticipated loads. The design of the leveling devices, with necessary calculations, shall be submitted to the Engineer of Record for approval.

2. **Threaded Inserts.**

Threaded inserts are permissible to facilitate forming the keyway pours. Threaded inserts shall be hot dip galvanized or made of stainless steel. The number of threaded inserts shall be minimized, and the inserts shall not come in contact with the reinforcing steel.

3. **Corrugated Metal Pipe.**

Corrugated Metal Pipe to be used for forming voids as specified on the plans shall be fabricated from steel and shall have a protective metallic coating of zinc (galvanizing).

ITEM 995. (Continued)

CONSTRUCTION METHODS – PLANT FABRICATION

B. Pre-Production Meeting.

The Contractor shall notify the MassDOT Research and Materials Section to determine if a pre-production meeting will be required to review the specification, shop drawings, curing plan, schedule, and discuss any specific requirements. The meeting shall be held prior to scheduling a MassDOT Inspector (refer to M4.09.4 *Department Acceptance*), and at least seven (7) days prior to the scheduled casting of any Precast Concrete Bridge Element or control section. The Contractor shall schedule the meeting, which shall include representatives of the Fabricator and MassDOT.

a. Reinforcement.

The reinforcing bars shall be installed in accordance with Subsection 901.35, including tolerances for cover and horizontal spacing of bars. Components of mechanical reinforcing bar splicers shall be set with the tolerances shown on the plans. The reinforcing bars and mechanical reinforcing bar splicers shall be assembled into a rigid cage that will maintain its shape in the form and which will not allow individual reinforcing bars to move during the placement of concrete. This cage shall be secured in the form so that the clearances to all faces of the concrete, as shown on the plans, shall be maintained.

Where reinforcing bars are to protrude from one Precast Concrete Bridge Element in order to mate with reinforcing bar splicers in a second precast concrete element, the fabricator shall set the reinforcing bars and the reinforcing bar splicers with a template in order to ensure proper fit up within the tolerances specified on the plans.

C. Tolerances.

Fabrication shall comply with tolerances specified on the plans. Tolerances for steel reinforcement placement shall be in accordance with Subsection 901.35. In the absence of specifications on the plans, tolerances shall comply with the latest version of the PCI MNL 135, Precast Tolerance Manual.

D. Forms.

Concrete shall be cast in rigidly constructed forms, which will maintain the Precast Concrete Bridge Elements within specified tolerances to the shapes, lines and dimensions shown on the approved fabrication drawings. Forms shall be constructed from flat, smooth, non-absorbent material and shall be sufficiently tight to prevent the leakage of the plastic concrete. When wood forms are used, all faces in contact with the concrete shall be laminated or coated with a non-absorbent material. All worn or damaged forms, which cause irregularities on the concrete surface or damage to the concrete during form removal, shall be repaired or replaced before being reused. If threaded inserts are cast into the elements for support of formwork, the inserts shall be recessed a minimum of 1 inch and shall be plugged after use with a grout of the same color as that of the precast cement concrete.

ITEM 995. (Continued)

CONSTRUCTION METHODS – FIELD CONSTRUCTION

A. General.

All of the Contractor's field personnel involved in the erection and assembly of the Precast Concrete Bridge Elements shall have knowledge of and follow the approved Erection Procedure.

Prior to installation, the following documentation shall be reviewed and confirmed by the MassDOT Resident Engineer or designee:

(a) QC Compressive Strength Test Report Forms attaining Design Strength, f'c for the Precast Concrete Bridge Element's representative sublot.
(b) Certificate of Compliance generated by the Fabricator as described under the Fabricator Quality Control section.
(c) QC Inspection Reports signed by the Quality Control Manager.

Field construction staff shall verify that the Resident Engineer has accepted all Precast Concrete Bridge Elements prior to installation.

B. Erection Procedure.

Prior to the erection, the Contractor shall submit an Erection Procedure for approval by the Engineer. This submittal shall include computations and drawings for the transport, hoisting, erection and handling of the Precast Concrete Bridge Elements. The Erection Procedure shall be prepared and stamped by a Professional Engineer registered in the Commonwealth of Massachusetts with working knowledge of the Contractor's equipment, approved shop drawings, and materials to build the bridge. The Erection Procedure shall, at a minimum, include the following:

1. **Erection Procedure**

The Erection Procedure shall be prepared to conform to the requirements of 960.61, Design, Fabrication and Erection and the applicable sections in Chapter 8 of the PCI Design Handbook (eighth edition) for handling, erection, and bracing requirements. At a minimum, the Erection Procedure shall provide:

(a) Minimum concrete compressive strength for handling the Precast Concrete Bridge Elements.
(b) Concrete stresses during handling, transport, and erection.
(c) Crane capacities, pick radii, sling geometry, and lifting hardware.
(d) Verification that the equipment can handle all pick loads and weights with the required factor of safety.
(e) Evaluation of construction sequence and evaluation of any geometric conflicts in the lifting of the Precast Concrete Bridge Elements and setting them as shown on the plans.
(f) Design of crane supports including verification of subgrade for support.
(g) Location and design of all temporary bracing that will be required during erection.

Non-shrink grout and concrete materials, approved by the Engineer, shall be placed as shown on the plans. Fill joints, keyways, and voids, in strict accordance with the specifications and manufacturer's recommendations and instructions.

ITEM 995. (Continued)

For footings, approach slabs and highway guardrail transitions, once these Precast Concrete Bridge Elements have been set to the correct horizontal and vertical alignment, the void between them and the supporting soil shall be filled with Controlled Low-Strength Material – Structural Non-Excavatable to the limits as shown on the plans. Add additional grout ports in the footings to facilitate the bedding process if required.

Except in approach slabs, joints shall be filled flush to the top with non-shrink grout, and any vertical misalignment between adjacent elements shall be feathered out on a slope of 1 to 12.

Curing of grout or concrete shall be performed in strict accordance with the specifications and manufacturer's recommendations. Filling shall not be completed in cold weather when either the ambient temperature or the precast member's temperature is below the manufacturer's recommendation. No localized heating of either the precast members or of the air surrounding the element will be permitted in an attempt to reach application temperatures.

If the joints or voids are not filled within five days after the Precast Bridge Elements are erected, the Contractor shall cover and protect the openings from weather and debris until they are filled.

C. Survey and Layout.

Working points, working lines, and benchmark elevations shall be established prior to placement of all elements. The Contractor is responsible for field survey as necessary to complete the work. MassDOT reserves the right to perform additional independent survey. If discrepancies are found, the Contractor may be required to verify previous survey data.

D. Preparation of Closure Pours and Grouted Keyways.

Immediately prior to erecting the Precast Concrete Bridge Elements, the closure pours and grouted keyways shall be cleaned at the job site of all dust, dirt, carbonation, laitance, and other potentially detrimental materials which may interfere with the bonding of the closure pour concrete or grout and precast concrete using a high-pressure water blast. Any exposed reinforcing steel in the precast concrete shall be protected from damage during the cleaning of the keyways. Damaged epoxy coating of steel reinforcement shall be repaired, and the reinforcing steel shall be cleaned as directed by the Engineer. The surfaces of the closure pours and grouted keyways shall be wetted so that the surfaces shall have a Saturated Surface Dry (SSD) condition for at least 24 hours prior to the placement of the closure pour concrete.

E. Erection.

The elements shall be placed in the sequence and according to the methods outlined in the Erection Procedure. As the erection proceeds, the Contractor shall constantly monitor the assembly to ensure that the precast concrete bridge element is within proper horizontal and vertical location and tolerances prior to releasing it from the crane and setting the next unit. The Contractor may use shims to maintain proper setting tolerances.

The concrete elements shall be lifted only by the lifting devices, and the utmost care shall be taken to prevent distortion of the elements during handling, transportation or storage.

This approval will be contingent on the Contractor demonstrating by calculations, prepared by a Professional Engineer registered in Massachusetts, that the elements will not be damaged by the non-vertical lifting force and by documentation that the capacity of the lifting devices is adequate for the non-vertical lifting force.

ITEM 995. (Continued)

After all Precast Concrete Bridge Elements have been placed, the actual overall dimensions of the structure both horizontal and vertical, as laid out shall not deviate from the nominal dimensions shown on the plans beyond a tolerance of +0 inches and -1 inches. Once the layout of Precast Concrete Bridge Elements has been accepted by the Engineer, the Contractor shall cut all lifting devices off below the surfaces of the elements.

E. **Filling of Blockouts for Lifting Devices and Threaded inserts.**

If the blockouts in the Precast Concrete Bridge Elements where the lifting devices were located will be exposed and visible after assembly is complete, the Contractor shall fill these blockouts with Mortar (M4.04.5).

After the formwork has been removed, all threaded inserts that have been cast into the precast concrete bridge deck for support of the formwork shall be filled with a grout of the same color as that of the precast concrete.

SHEAR CONNECTORS

The work under this heading shall conform to the applicable provisions of Subsection 960 of the Standard Specifications and the following: Stud Shear Connectors shall meet the requirements in Section M8.04.1, and as shown on the Contract Plans.

STRUCTURAL STEEL – COATED STEEL

The work under this heading shall conform to the applicable provisions of Subsection 960 of the Standard Specifications and the following:

Structural Steel shall hot dip galvanized, metallized, or metallized and painted in accordance with the Contract Plans. Hot dip galvanizing shall be in accordance with the requirements of Section M7.10.0 and these Special Provisions. Metallizing, and painting over metallizing, shall be in accordance with the requirements of Section M7.15.0.

BASIS OF PAYMENT

Item 995. will be paid for at the Contract unit price per Lump Sum, which price shall include all labor, materials, equipment, and all incidental costs required to complete the work.

SCHEDULE OF BASIS FOR PARTIAL PAYMENT

Within ten (10) days after the Notice to Proceed, the Contractor shall submit on his/her proposal form a schedule of unit prices for the major component Sub-Items that make up Item 995. as well as his/her total bridge structure Lump Sum cost for Bridge Structure No. R-02-003=T-01-004 (3M4). The bridge structure Lump Sum breakdown quantities provided in the proposal form are estimated and not guaranteed. The total of all partial payments to the Contractor shall equal the Lump Sum contract price regardless of the accuracy of the quantities furnished by the Engineer for the individual bridge components. The cost of labor and materials for any Item not listed but required to complete the work shall be considered incidental to Item 995. and no further compensation will be allowed.

ITEM 995. (Continued)

Sub-Item	Description	Quantity	Unit	Unit Price	Total
482.31	Sawing & Sealing Joints In Asphalt Pavement At Bridges	60	FT		
904.3	5000 psi, 3/4 in., 685 HP Cement Concrete	250	CY		
910.	Steel Reinforcement for Structures	8700	LB		
910.1	Steel Reinforcement For Structures - Epoxy Coated	51,000	LB		
911.1	Shear Connectors	3456	EA		
922.	Laminated Elastomeric Bearing Pad without Anchor Bolts	12	EA		
923.	Laminated Sliding Elastomeric Bearing Pad with Anchor Bolts	6	EA		
930.64	Precast Concrete Highway Guardrail Transition	4	EA		
960.1	Structural Steel – Coated Steel	69,600	LB		
965.	Membrane Waterproofing For Bridge Decks	2700	SF		
970	Damp-Proofing	788	SF		
975.1	Metal Bridge Railing (3 Rail), Steel (Type S3-TL4)	242	FT		

Total Lump Sum Price for Item 995. =

The above schedule applies only to Bridge No. R-02-003=T-01-004 (3M4). Payment for similar materials and construction at locations other than at this bridge structure shall not be included under this Item. Sub-Item numbering is presented for information only in accordance with MassDOT Standard Nomenclature.

ITEM 997. EXPANDED POLYSTYRENE (EPS) GEOFOAM CUBIC YARD

The work under this item shall include furnishing and installation of block-molded Expanded Polystyrene for use as lightweight fill in bridge approaches and highway embankments constructed on soft ground referred to herein after as "EPS-Block Fill Structures / Highway Embankment," as indicated on the Contract Drawings. Provide all labor, materials and equipment necessary to complete the work of this section.

DEFINITIONS

EPS-Block Fill Structure / Highway Embankment:
An assemblage of EPS blocks forming a single transition structure, highway fill or bridge embankment designated to carry highway traffic which constitutes part of this Project.

EPS Block Grade:
Refers to one of NCHRP material designation types indicated in table 1 of this Specification.

Molder:
Is the company actually manufacturing the EPS blocks used for the proposed EPS-Block fill structures on this Project. In the event several EPS molders are supplying EPS blocks to this Project, one Molder shall be designated as the Primary Molder and assume the responsibility for all EPS block material supplied to this contract and its compliance with the requirements of this specification. All references herein after to the "Molder" shall be taken to mean the Primary Molder if there are multiple molders.

Supplier:
Is the company having the contractual relationship with the Contractor for the supply of the EPS blocks. This may be the Molder (or Primary Molder in case of multiple molders) directly or an intermediary company (typically a distributor of construction and / or geosynthetic products manufactured by others). Where appropriate, the Supplier may delegate certain tasks of this Specification to the Molder or Primary Molder.

Inter-Block Connectors:
Galvanized steel mechanical connectors provided for the purpose of enhancing the frictional force between two EPS blocks at their interfacing surfaces. Such connectors are typically fabricated of thin galvanized steel plates with barbs protruding in two opposite directions to allow anchoring of the connector into the adjoining surfaces of two successive or adjacent EPS blocks.

Rebar / Shear Connectors:
Reinforcing steel rebars provided for the purpose of enhancing the frictional force between the load distribution slab and the underlying EPS blocks in resisting lateral loads. These inverted L-shape rebars are typically embedded into the load distribution slab at one end and into the top most layer of EPS blocks at another.

ITEM 997. (Continued)

REFERENCES

Comply with the provisions of the following codes, specifications and standards except as otherwise indicated:

A. ASTM C 203 – Standard Test Method for Breaking Load and Flexural Properties of Block-type Thermal Insulation.
B. ASTM C 303 – Standard Test Method for Dimensions and Density of Board and Block-Type Thermal Insulation.
C. ASTM C 578 – Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.
D. ASTM C 165 – Standard Test Method for Compressive Properties of Thermal Insulations.
E. ASTM D 1621 – Standard Test Method for Compressive Properties of Rigid Cellular Plastics.

SUBMITTALS

Product Data

Molder's production and product data, installation instructions, use limitations and recommendations for each material specified herein shall all be submitted for review and approval by the Engineer. Certifications shall be provided stating that equipment and materials comply with requirements of this Specification.

Shipping Plan

As part of Phase I Manufacturing Acceptance Supplier Pre-Certification requirements described in this Special Provision, Contractor shall submit their proposed EPS block shipping procedure to the Engineer for review. Such procedure shall include method proposed for transporting the blocks, protective measures during shipping to avoid any damage to the blocks including crushing to the edges, sides and corners of blocks. If flat bed trucks are being proposed, timber cribbing with straps, tarp attached to the truck or other effective means may be proposed to secure the blocks to the transporting vehicle. Alternatively, closed container trucks may be used to transport the blocks to the Project construction site.

Shop Drawings

The Contractor shall submit full-size shop drawings to scale for each EPS-Block fill structure / highway embankment constructed on this Project. The shop drawings shall indicate the proposed location and layout of all EPS blocks, inter-block connectors, rebar / shear connectors and all accessory items to be used. The submitted drawings shall include, but are not limited to, plans, elevations, cross-sections showing profiles and cross-slopes, location of connectors between EPS blocks, connections, and accessory items as necessary.

Contractor shall include on the shop drawings any specific control geometry, survey or control points or other information necessary for adequate placement of the blocks to conform to the design, geometry and all other requirements of this Specification.

ITEM 997. (Continued)

Contractor shall include on the submitted shop drawings a step-by-step description of the installation and construction procedure proposed for the EPS-Block fill structure / highway embankment constructed on this Project. Installation and construction sequence, supplemented by drawings as necessary, of the EPS blocks, pavement system and utilities shall all be included. EPS block sizes and laying pattern as well as methods of temporarily ballasting and stabilizing the EPS blocks to prevent movement during construction prior to placement of the load distribution slab (LDS) shall all be identified.

Shop drawings, working drawings, installation and construction procedures and supporting calculations shall all be stamped by a Professional Engineer registered in the Commonwealth of Massachusetts. The Professional Engineer stamping this submission shall be experienced in EPS design and construction, with a minimum of three (3) EPS roadway fill projects of similar complexity and size.

All details different than those depicted on the contract drawings, or required in support of the construction procedures shall be engineered by the Contractor. All Contractor engineered items shall be stamped by a Professional Engineer registered in the Commonwealth of Massachusetts. All such details shall be reviewed and approved by the Engineer prior to construction.

Review of the shop drawings and construction procedures shall be the primary responsibility of the Engineer. The Engineer, however, may select to conduct parallel secondary reviews of shop drawings and construction procedures during the early phases of submittal reviews or for any part of the EPS-Block fill structure / highway embankment of this project as appropriate. Contractor shall be notified of such reviews through Standard MassDOT procedures.

The layout of all EPS blocks and other members of the EPS-Block fill structure / highway embankment shall be in conformance with the design requirements and details shown on the contract documents.

Risk Management Plan

Contractor shall submit a risk management plan to ensure safe and adequate EPS construction. This plan shall outline risks and measures proposed to mitigate such risks during EPS construction.

Installer Qualifications

Contractor shall submit a detailed resume of the EPS/Geomembrane/Geotextile Installer, which must be a firm with a minimum of six (6) years of EPS block construction experience and with at least one supervisor experienced in the handling and installation of EPS in the same capacity, with a minimum of three (3) EPS roadway fill projects of similar complexity and size. The EPS/Geomembrane/Geotextile Installer shall furnish the Engineer a certified report after installation confirming that the EPS fill system and all appurtenances have been installed in compliance with all project requirements.

ITEM 997. (Continued)

Manufacturing Quality Control (MQC) Submittals

Contractor shall submit the following in accordance with MassDOT requirements:

A. Test Compliance:

1. The Contractor shall supply for review and approval by the Engineer a summary of testing compliance with the specified performance characteristics and physical properties for the EPS Block material supplied and the Inter-Block Connectors.

B. Certificates:

1. The Contractor shall supply, for review and approval by the Engineer, hard copy product Certificates showing compliance with the block manufacturing requirements and material properties stated in this Specification. Product Certificates shall be signed by the Supplier to certify material compliance with the specified performance characteristics, criteria and physical requirements outlined in this Specification.

2. The Contractor shall indicate in writing to the Engineer whether or not the Supplier has a Third Party Certification. If Third Party Certification is offered, this notification shall be accompanied by documentation that indicates the business entity providing the Third Party Certification and describes in detail the steps to be taken by this agency to verify the Molder's compliance with the specific requirements of this specification. Acceptance of the Molder's Third Party Certification by the Engineer will not waive the need for pre-construction product submittal and testing as specified in this Specification.

3. The Contractor shall submit, for MassDOT's acceptance, Supplier's Standard Warranty document or certificate executed by an authorized company official. Supplier's Warranty is in addition to, and not a limitation of, other rights MassDOT may have under Contract Documents.

MANUFACTURING ACCEPTANCE

General Requirements

Manufacturing Acceptance of the EPS-Block product will be conducted to verify the Molder's Quality Control (MQC) procedures. The Engineer will have primary responsibility for all Manufacturing Acceptance activities unless MassDOT notifies the Contractor otherwise. The Engineer will communicate directly only with the Contractor in matters and questions of Manufacturing Acceptance unless all parties agree otherwise. The Engineer may designate an Engineer's Representative to assume all or part of the Engineer's responsibilities for Manufacturing Acceptance activities.

ITEM 997. (Continued)

Manufacturing Acceptance of the EPS-Block will consist of two phases:

- Phase I Manufacturing Acceptance – Supplier Pre-Certification, which shall be conducted prior to shipment of any EPS blocks to the Project construction site.

- Phase II Manufacturing Acceptance – Block Verification, which shall be conducted prior to assembling of any EPS blocks on the structure / highway embankment of the Project.

Regulatory Requirements: Installation of all items including EPS blocks must comply with the requirements of all applicable local, state and national jurisdictions.

Phase I Manufacturing Acceptance – Supplier Pre-Certification

No EPS blocks shall be shipped to the Project construction site until all activities required by Phase I Manufacturing Acceptance – Supplier Pre-Certification, as specified in this section, have been completed and reviewed successfully by the Engineer as demonstrated by the approved submittals. Supplier Pre-Certification shall proceed in the order listed below:

The Shipping Plan proposed by the Contractor in compliance with this Specification has been submitted and approved by the Engineer. Contractor's Shipping Plan shall also include Contractor's confirmation for compliance with all Product Delivery, Storage and Handling requirements described in this Specification.

The Contractor shall supply a scale with sufficient capacity and precision for weighing of the EPS blocks. This scale shall be delivered to the Project construction site or to an alternate location specified by the Engineer. This scale shall be recently calibrated and certification of such calibration shall be made available to the Engineer.

At least five (5) working days prior to the scheduled shipment of any blocks to the Project construction site, the Contractor shall deliver to a location specified by the Engineer a minimum of three full-size EPS blocks of the AASHTO EPS block grade material to be used on this Project. These blocks shall be the same in all respects as the blocks to be supplied for construction, including required seasoning as described in this Specification.

The Engineer will weigh and measure each of the three blocks for the grade of material supplied. The Engineer will sample and test at least one of the three blocks, selected randomly, to evaluate the ability of the supplier to deliver EPS blocks of the quality and properties specified herein. The sampling and testing protocol will be the same as for Phase II Manufacturing Acceptance . Any EPS blocks not used for testing may be utilized for construction provided they satisfy all the requirements outlined in this Specification.

The Contractor shall submit shop drawings as required by this Specification, and such drawings have been reviewed and approved for construction in conformance with Project Standards.

ITEM 997. (Continued)

Prior to shipment of any EPS blocks to the Project construction site, a meeting shall be held at a minimum between the Engineer and Contractor to review the results of Phase I Manufacturing Acceptance and discuss plans and any matters related to Phase II Manufacturing Acceptance . The meeting may also address other aspects of construction to ensure that all parties are familiar with the requirements of this Specification. The Supplier and/or Molder of the EPS blocks may also attend the meeting at the Contractor's discretion to facilitate answering any questions that may arise first hand.

At the satisfactory conclusion of this meeting, the Contractor shall be allowed to begin shipment of the blocks including on-site delivery, receipt, and storage (if desired) of the EPS blocks in accordance with this Specification. Assembly or construction of the EPS blocks on any segment of the EPS Block-fill structure / highway embankment shall not be allowed until the requirements of Phase II Manufacturing Acceptance have been satisfied.

Product Delivery, Storage and Handling

Prior to shipment of the EPS block to the Project construction site, the Contractor shall review, plan and implement, with the assistance of the Supplier, a material handling procedure that shall include and satisfy the following as a minimum:

Care should be exercised during shipping to prevent any damage to the EPS blocks. Particular attention should be paid to avoid crushing to the edges, sides and corners of the blocks during shipping from the Molder to the Project construction site. All shipment shall conform to shipping plan as indicated in this Specification.

The Contractor shall prevent any damage to the EPS blocks during delivery, handling and storage. EPS blocks with cracks of any size are considered not acceptable and shall be rejected and replaced by the Contractor with undamaged equal EPS blocks at no additional charge in cost or schedule to MassDOT. Holes shall not be created in the blocks at any stage of manufacturing or construction to facilitate shipping or handling or placement of the blocks during construction.

C. Each EPS block shall be labeled to include the following information:

1. Name of the Molder (if there is more than one for any segment of the EPS-Block fill structure / highway embankment.
2. Production Lot Identification which shall include as a minimum the date the block was molded.
3. Mass of the entire block in pounds as measured after a satisfactory period of seasoning as specified in this Specification.
4. Dimensions of the block in inches and the actual dry unit weight in pounds per cubic foot.
5. Additional identification markings such as North arrow, and other alphanumeric characters and/or symbols, applied as necessary by the Supplier, to clearly identify the location, orientation and position of each block relative to the shop drawing shall also be provided. Any paint or other markings used to mark EPS blocks shall be chemically compatible with EPS and not cause any dissolution of the EPS during application of the paint or other marking material.

ITEM 997. (Continued)

If the EPS blocks are to be stockpiled at the construction site until placement, a secure storage area shall be identified and designated by the Contractor for this purpose. Contractor shall notify the Engineer of their selection for a storage area. The storage area shall be safe, provide access only to construction personnel, adequate to protect the stored blocks from the weather elements and ultraviolet (UV) rays, and shall be away from any heat source or construction activity that may produce heat or flame or would expose the blocks to hydrocarbon fuels (diesel, kerosene, gasoline). In addition, personal tobacco smoking shall not be allowed in the storage area. While in temporary on-site storage, EPS blocks shall be secured with sandbags and similar "soft" weights to prevent their being dislodged by wind which may possibly pose a safety hazard. The blocks shall not be covered in any manner that might allow the build up of heat beneath the cover. The blocks shall not be trafficked by any vehicle or equipment or unauthorized individuals. In addition, foot traffic by authorized personnel shall be kept to a minimum.

Unless authorized otherwise by the Engineer, the maximum amount of time during which EPS blocks can be stored at the Project construction site prior to their placement on the structure shall be limited to a maximum of 30 calendar days.

EPS is not an inherently dangerous or toxic material so there are no particular safety issues to be observed other than normal construction safety and protection against heat and flame and hydrocarbon fuels (diesel, kerosene, gasoline) which can cause EPS to melt. However, extra caution is required during wet or cold weather since surfaces of the EPS blocks tend to be more slippery wet than dry. In addition, when air temperatures approach or go below freezing, a thin layer of hoarfrost (ice) can readily develop on the exposed surfaces of EPS blocks if the dew-point is sufficiently high. Thus, the surfaces of the EPS blocks can pose particular slip hazards in this condition.

Phase II Manufacturing Acceptance – Block Verification

The Engineer or designated representative shall assume the primary responsibility for conducting this phase of the work with the exception of the testing described below. Contractor shall cooperate with and assist the Engineer in implementing Phase II Manufacturing Acceptance – Block Verification.

No EPS blocks shall be placed on any segment of the EPS Block-fill structure / highway embankment of this Project until all activities required by Phase II Manufacturing Acceptance – Block Verification, as specified in this section, have been completed and successfully reviewed by the Engineer as demonstrated by the approved submittals. Block Verification shall proceed in the order listed below:

Each EPS block delivered on any truck to the construction site shall be inspected on-site visually to check for damage as well as for verification of the labeled information provided on each block. Any blocks with damage, or without proper labels as specified in this Specification, or not meeting the requirements of these Specifications shall be rejected on the spot. Damaged blocks shall be replaced by the Contractor with undamaged equal EPS blocks at no additional charge in cost or schedule to MassDOT.

ITEM 997. (Continued)

B. At least one block of the EPS delivered on every truck to the construction site shall be checked to verify its compliance with the requirements of the specifications for the minimum block dry unit weight as well as all the physical tolerances. Weighing of blocks shall be conducted onsite using a scale with sufficient capacity and precision for weighing of EPS blocks to be supplied by the Contractor in conformance with this Specification.

Should verification of the parameters of item B above indicate lack of compliance, at least three additional blocks of the same grade EPS delivered from the same truck-load will be individually checked. The entire shipment of the grade of EPS in question shall be rejected should any one of the three additional blocks fail to meet the requirements of the specifications for minimum block dry unit weight and physical tolerances outlined above.

D. At least one EPS block delivered on the first truck to the construction site for use on the EPS-Block fill structure / highway embankment, shall be selected for sampling and testing. Additional EPS blocks shall be selected by the Engineer, as deemed necessary, for sampling and testing during the course of construction at a rate of sampling to be determined by the Engineer. As a general guidance, the rate of sampling shall be approximately one block for every 500 cubic yards of EPS delivered.

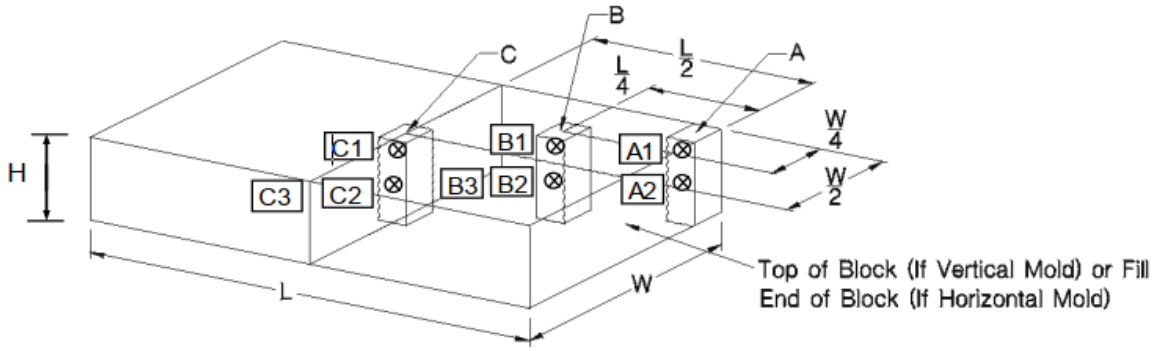
Sampling will be at locations A, B and C shown in Figure 1. The samples should be approximately square in cross-section and of sufficient width to enable preparing the test specimen required by this specification. The Contractor shall employ an accredited independent lab qualified to perform this testing. The lab shall perform the sampling and testing and provide certified results prior to installation of the EPS blocks.

Laboratory tests will check for compliance with the material properties shown on table 2 of this specification and will be reviewed by the Engineer.

Portions of sampled blocks that are used for testing are not acceptable for construction. Portions of sampled blocks that are otherwise acceptable can be used as desired by the Contractor provided that they comply with all other requirements of this specification.

G. The Contractor shall allow for early delivery of the EPS blocks to the construction site to allow for conducting laboratory testing of the blocks by the independent lab. For those truckloads and production lots where EPS blocks will be selected for sampling and testing, a minimum of 3 business days are required prior to their scheduled installation to allow for samples to be taken and laboratory testing conducted. Any shipment or production lot of EPS blocks, for which the representative samples fail to meet the material property or other parameters outlined in this specification, are considered defective and shall be replaced by the Contractor with non-defective EPS block at no additional charge in cost or schedule to MassDOT.

ITEM 997. (Continued)



Sampling locations A1, B1 and C1 are at or near the top or bottom (contact) surface of the block.
Sampling locations A2, B2, B3, C2 and C3 are at or near the center (or mid-height) of the block.
L = Length of block; W = Width of Block; H = Height of block

Figure 1. Locations of required EPS block sampling

H. Pre-installation Meeting: Prior to installing the blocks at the Project site, a pre-installation meeting shall be held to verify results of Phase II Manufacturing Acceptance , Project requirements, substrate conditions, and details relative to the manufacturing, shipping, storage and placement of the EPS blocks. The meeting shall involve the Contractor, Engineer, Design Engineer and the EPS Supplier. At the satisfactory conclusion of this meeting, the Contractor shall be allowed to begin construction and installation of the blocks in accordance with the approved shop drawings. Assembly or construction of the EPS blocks on the EPS Block-fill structure / highway embankment shall not be allowed until the requirements of Phase II Manufacturing Acceptance have been satisfied.

MANUFACTURING QUALITY CONTROL (MQC)

General Requirements

MQC of the EPS blocks product is the primary responsibility of the Molder. The purpose of this section is to define the parameters for use by a Molder in developing an MQC plan. These parameters will also be those measured as part of the Manufacturing Acceptance to be conducted by the Engineer. Manufacturing Acceptance requirements are detailed elsewhere in this Specification.

Manufacturing Requirements

All EPS blocks produced for this Project shall be manufactured through the use of vacuum assisted molding equipment. No other type of block manufacturing mold is acceptable or could be substituted for a vacuum mold.

ITEM 997. (Continued)

Material Requirements

All EPS blocks shall consist entirely of expanded polystyrene. All EPS blocks shall consist of virgin raw material (expandable polystyrene bead or resin). No regrind material is allowed under any condition for manufacturing EPS blocks on any segment of the EPS-Block fill structure / highway embankment on this Project. Previously used EPS blocks are not allowed in part or in full on any segment of the EPS-Block fill structure / highway embankment on this Project.

All EPS blocks shall be adequately seasoned prior to shipment to the Project construction site. For the purposes of this specification, seasoning is defined as storage in an area suitable for the intended purpose as subsequently defined herein for a minimum of 72 hours after an EPS block is released from the mold. Seasoning shall be done within a building or other structure that protects the EPS blocks from moisture as well as UV radiation. The area in which EPS blocks are stored for seasoning shall also be such that adequate space is allowed between blocks and positive air circulation and venting of the structure provided so as to foster the out-gassing of blowing agent and trapped condensate from within the blocks. The Engineer shall be allowed to inspect the structure to be used for seasoning upon request and during normal business days and hours. The supplier may request a shortened seasoning period if the EPS blocks are seasoned within an appropriate heated storage space and the Molder demonstrates to the satisfaction of the Engineer that the alternative seasoning treatment produces blocks that equal or exceed the quality of blocks subjected to the normal 72-hour seasoning period.

All EPS blocks shall satisfy the product flammability requirements specified in ASTM C 578.

All EPS blocks shall satisfy the Material Property requirements outlined in this specification.

All inter-block connectors shall be fabricated of galvanized steel and shall satisfy the requirements outlined in this Specification.

PROJECT CONDITIONS

Provide inserts and anchorages which must be built into other work at the time they are needed.

MATERIALS

EXPANDED POLYSTYRENE BLOCKS

A. Only National Cooperative Highway Research Program (NCHRP) Material type designations shall be used on all drawings, correspondence and communication related to this Project. Table 1 indicates the NCHRP material type designation and the corresponding unit weight for EPS blocks that are covered by this Specification. For a given material type, the dry unit weight of each EPS block (as measured for the overall block as a whole) after the period of seasoning as defined in this Specification shall meet or exceed that shown in Table 1. The dry unit weight shall be determined by measuring the mass of the entire block by weighing on a scale and dividing the mass by the volume of the block.

ITEM 997. (Continued)

Table 1. Dry unit weights of EPS blocks

NCHRP Material Designation	Minimum Allowable Dry Unit Weight of Entire EPS Block Lbs/ft^3
EPS100	2.00

Table 2 gives the minimum allowable values for the Material Properties corresponding to the NCHRP Material type shown in table 1. These material properties shall be obtained by testing specimens prepared from samples taken from actual EPS blocks produced for the Project in compliance with this Specification and which has satisfied both MQC requirements by the Molder and Manufacturing Acceptance by the Engineer as described in this specification. Testing for material properties shall comply with the following requirements:

- All test specimens shall be seasoned as specified in ASTM C 578.
- Dry density, compressive strength and flexural strength shall all be measured as specified in ASTM C 578.
- The specimens used for compressive strength testing shall be cubic in shape with a two (2) inch side length.
- A strain rate of 10% per minute shall be used for the compressive strength tests.
- Both the elastic-limit stress and initial tangent Young's modulus shall be determined in the same test used to measure compressive strength.
- The elastic-limit stress is defined as the measured compressive normal stress at a compressive normal strain of 1%. The initial tangent Young's modulus is defined as the average slope of the compressive stress versus compressive strain curve between 0% and 1% strain.

Table 2. Minimum allowable values of MQC/ Manufacturing Acceptance material properties for individual test specimens

NCHRP Material Designation	Dry Density Pcf	Compressive Strength Psi	Flexural Strength Psi	Elastic Limit Stress Psi	Initial Tangent Young's Modulus Psi
EPS100	1.80	25	50	14.5	1450

Each EPS block shall meet dimensional tolerances as determined in three distinct areas:

- Variations in linear dimensions as defined in Item D of this section.
- Deviation from perpendicularity of block faces as defined in Item E of this section.
- Overall warp of block faces as defined in Item F of this section.

ITEM 997. (Continued)

The thickness, width and length dimensions of an EPS block are defined herein as the minimum, intermediate and maximum overall dimensions of the block, respectively, as measured along a block face. These dimensions of each block shall not deviate from the theoretical dimensions by more than ± 0.5%.

The corner or edge formed by any two faces of an EPS block shall be perpendicular, i.e. form an angle of 90°. The deviation of any face of the block from a theoretical perpendicular plane shall not exceed one eighth (1/8) inch over a distance of twenty (20) inches

Any one face of a block shall not deviate from planarity by more than one quarter (1/4) inch when measured using a straightedge with a length of ten (10) feet.

The EPS shall contain a flame retardant additive and shall have UL Certification of Classification as to External Fire Exposure and Surface Burning Characteristics so as to comply with the Oxygen Index requirements of ASTM C 578.

INTER-BLOCK CONNECTORS

Inter-block connectors shall be used to restrain EPS blocks from moving laterally in layer over layer applications. Contractor shall supply samples and test data for the proposed inter-block connectors to comply with this Specification for review and approval by the Engineer prior to construction.

Inter-block connectors shall be made of 20 gauge (minimum) galvanized steel with two-sided multi-barbed design, or approved equal, capable of piercing the EPS up to three quarters (3/4) inch. Each plate shall be capable of a lateral holding strength of at least 60 lbs.. Refer to Contract Drawings for suggested layout and number of inter-block connectors required.

Should the size of supplied EPS blocks be different than that shown on the Contract Drawings, Contractor shall propose a revised layout for the inter-block connectors satisfying the design requirements for review and approval by the Engineer prior to the start of Construction. The revised layout shall be incorporated on the shop drawings in conformance with this Specification.

CONSTRUCTION METHODS

CONSTRUCTION QUALITY CONTROL (CQC)

The Contractor shall be directly responsible for all Construction Quality Control (CQC). Items covered by CQC include, but are not limited to, all earthwork and all construction activities associated with the construction of EPS-Block fill structures / highway embankments in addition to manufacturing and shipment of the EPS blocks.

ITEM 997. (Continued)

The Contractor shall prevent any damage to the EPS blocks during handling, placement and construction. Any EPS blocks with cracks of any size or other damage incurred during shipping, handling or in storage prior to their placement are considered not acceptable and shall be rejected and replaced by the Contractor with undamaged equal EPS blocks at no additional charge in cost or schedule to MassDOT. Holes shall not be created in the blocks at any stage of construction or block assembly to facilitate placement or hauling of the blocks during construction.

The Engineer will be responsible for providing Construction Quality Acceptance (CQA) of the contractor's construction activities.

The Contractor shall engage the services of an expert familiar with EPS design and construction. This expert shall review the construction documents and advise the Contractor on the adequate EPS construction practices.

SITE PREPARATION

The natural soil subgrade shall be cleared of vegetation, any large or sharp-edged soil particles, any kind of debris and shall be reasonably planar prior to placing a geotextile and a leveling or bedding layer. Reasonably planar is defined as ± one (1) inch over ten (10) feet .

Unless identified otherwise on the Contract Drawings, the bedding layer shall consist of Expanded Shale Lightweight Fill or other adequate material as approved by the Engineer conforming to the applicable Specification. The required smoothness of the bedding layer prior to placement of the first layer of EPS blocks shall be no more than ± three-eighth (3/8) of one inch over any ten (10) foot distance.

At locations where the subgrade is stepped under the lowermost layers of blocks, as required by design, every effort shall be made by the Contractor to adequately compact the soil subgrade at such locations to prevent any possible undermining of the subgrade under the first layer of blocks.

There shall be no debris of any kind on the bedding surface at the time EPS blocks are placed.

E. Unless directed otherwise by the Engineer, there shall be no standing water or accumulated snow or ice on the bedding layer within the area where EPS blocks are placed at the time of block placement.

EPS blocks shall not be placed on a frozen subgrade nor shall de-icing salts be used except as directed by the Engineer.

EPS BLOCK PLACEMENT

EPS blocks shall be placed at the locations and elevations shown on the approved shop drawings submitted by the Contractor.

There shall be no debris of any kind between adjacent surfaces of EPS blocks at the time adjacent EPS blocks are placed.

ITEM 997. (Continued)

C. There shall be no standing water or accumulated snow or ice on the previously placed EPS block layer within the area where subsequent EPS blocks are to be placed at the time of block placement.

EPS blocks shall be placed so that all vertical and horizontal joints between blocks are tight.

In addition to surveys performed throughout the course of construction, following placement of the first layer of EPS blocks, Contractor shall conduct a survey of the placed blocks to determine and verify the as-built elevations and geometry controls such as width, length, elevations, slopes, etc. against those called for on the approved shop drawings. Contractor shall report to the Engineer any resulting discrepancies and their proposed measures for correction. Contractor shall not proceed to resume placement of blocks on successive layers until such corrective measures have been reviewed and approved by the Engineer.

While placing successive layers of EPS blocks, Contractor should exercise care to guarantee that all placed blocks are supported over their entire bearing area. In the event the top constructed surface of an assembly of blocks becomes uneven or where rocking of the blocks is observed, Contractor shall notify the Engineer and propose a remedial procedure for corrective action. Such procedure shall be submitted for review and approval by the Engineer prior to resuming construction.

When placing successive layers of EPS blocks, Contractor shall conduct necessary surveys for each constructed layer to confirm that the as-built conditions agree with the geometry indicated on the approved shop drawings. Contractor shall report to the Engineer any resulting discrepancies and their proposed measures for correction. Contractor shall not proceed with any repairs or resume block placement until such corrective measures have been reviewed and approved by the Engineer.

Blocks shall be placed such that the resulting exterior surfaces on the sides of the EPS blocks are vertical and planar within a tolerance of ± one-quarter (1/4) inch between blocks.

The inter-block connectors shall be placed at the locations shown on the shop drawings and shall be set into the EPS block such that the inter-block connectors do not cause a gap to exist between adjacent layers of EPS blocks.

The final surface of the EPS blocks shall be covered as shown on the Contract Drawings. Care shall be exercised during placement of the cover material so as not to cause any damage to the EPS blocks.

FIELD QUALITY REQUIREMENTS

Field cutting of EPS blocks shall be permitted, but limited to the use only of hot wire cutters.

With the exception of sand bags or similar "soft" weights used to temporarily restrain EPS blocks against wind and buoyancy forces, no construction material other than that shown on the contract drawings shall be placed or stockpiled on the EPS blocks.

ITEM 997. (Continued)

In the temporary condition prior to the installation and construction of the pavement system, all EPS blocks installed-in-place shall be secured at the end of each work day with an adequate number of sandbags or similar "soft" weights to prevent their being dislodged by wind or buoyancy forces. At all times, the Contractor shall maintain a minimum of two (2) redundant pumping systems; each capable of preventing water accumulation in the vicinity of the placed EPS blocks. These pumping systems shall be intended solely for the purpose of safeguarding the placed EPS blocks against extreme water events / buoyancy conditions during construction. An autodialer shall be installed by the Contractor to alert them of a buoyancy condition or other extreme weather events during construction.

At no time shall heat, open flame or motor vehicle fuels be used in proximity to the EPS blocks so as to cause combustion or melting of the EPS.

The final top surface of the EPS blocks shall be covered with a cast-in-place (CIP) reinforced concrete load distribution slab (LDS) as shown on the Contract Drawings. Care shall be exercised during placement of the cover material so as not to cause any damage to the EPS blocks.

The surfaces of the EPS blocks shall not be directly traversed by any vehicle or construction equipment during or after placement of the blocks.

PAVEMENT CONSTRUCTION

The pavement system is defined for the purposes of this specification as all material placed above the EPS blocks, including the LDS, within the limits of the roadway, including any shoulders.

The pavement system shall be constructed above the EPS blocks as shown on the contract drawings. Specifications covering construction of the pavement system are given elsewhere in the contract documents.

Concrete and reinforcement steel for the LDS shall be installed over the EPS blocks using appropriate labor and equipment that will not damage the EPS blocks. Construction of the LDS shall be in conformance with all the requirements of the applicable Reinforced Concrete Structures Specification.

PROTECTION

Protect partial installation and installed product and finish surfaces from damage during construction in accordance with this Specification.

EPS DISPOSAL

Contractor shall assume total responsibility for disposal of EPS block material or portions of unused blocks resulting from testing or construction by returning it to the Supplier/Molder for recycling. Such process shall be conducted on a regular basis or as instructed by the Engineer.

ITEM 997. (Continued)

METHOD OF MEASUREMENT

Item 997. "Expanded Polystyrene (EPS) Geofoam" will be measured for payment by the Cubic Yard, complete in-place.

BASIS OF PAYMENT

Item 997. "Expanded Polystyrene (EPS) Geofoam" will be paid for at the Contract unit price per Cubic Yard, which price shall include all labor, materials, equipment, engineering services, submittals, and incidental costs required to complete the work. The cost of laboratory tests as required in this Specification will be incidental to this Item.

ITEM 997.1 GASOLINE RESISTANT GEOMEMBRANE FOR EPS SQUARE FOOT

The work under this item shall include furnishing and installation of Gasoline Resistant Geomembrane for EPS over "EPS-Block Fill Structures / Highway Embankment," as indicated on the Contract Drawings.

The Geomembrane shall consist of textured-surface materials, made of high-density polyethylene (HDPE), tri-polymer membrane manufactured from polyvinyl chloride (PVC), ethylene interpolymer alloy (EIA), or a comparable polymer combination. The geomembrane shall be suitable for the containment of spilled liquid hydrocarbons, including gasoline, diesel fuel, kerosene, hydraulic fluid, methanol, ethanol, mineral spirits, and naphtha.

The geomembrane shall be sufficiently flexible to cover and closely conform to 90-degree edges and corners of EPS blocks, and subgrade material, at ambient temperatures as low as 45°F without application of heat. The Geomembrane thickness shall be 30 mils minimum and factory produced seams bonded width shall be 1.25 inch minimum.

Physical Property	**ASTM Designation**	**Acceptance Value**
Unleaded Gasoline Permeability (VTR)	D 814	0.4 oz/ft^2 Maximum per 24 hours
Grab Tensile Strength (1" grip, 4"x8" sample)	D 751	550 lbs Minimum in each direction
Elongation at Break	D 751	20% Minimum
Bursting/Puncture Resistance (ball tip)	D 751	750 lb Minimum
Factory Produced Seams, Shear Strength	D 751 Procedure A	550 lb Minimum
Field Produced Seams, Vapor Tight Seal	D 5641	Pass

The Contractor shall submit, to MassDOT's representative, samples and properties of the Geomembrane in accordance with the relevant materials specifications for Geomembranes (GM) per the Geosynthetic Research Institute (GRI):

GM1 Seam Evaluation by Ultrasonic Shadow Method.
GM4 Three Dimensional Geomembrane Tension Test (see ASTM D5617).
GM5(a) Notched Constant Tensile Load (NCTL) Test for Polyolefin Geomembranes (ASTM D5397).
GM6 Pressurized Air Channel Test for Dual Seamed Geomembranes.
GM10 The Stress Crack Resistance of HDPE Geomembrane Sheet.
GM12 Asperity Measurement of Textured Geomembranes using a Depth Gage (ASTM D7466).
GM13 Test Methods, Properties and Testing Frequency for High Density Polyethylene (HDPE) Smooth and Textured Geomembranes.
GM15 Determination of Ply Adhesion of Reinforced Geomembranes (see ASTM D6636).
GM19 Seam Strength and Related Properties of Thermally Bonded Polyolefin Geomembranes.

ITEM 997.1 (Continued)

Submittals

Certificate of Compliances for the Gasoline Resistant Geomembrane (GRG) to the Engineer for review and approval.

Shipping and on-site storage plan of the Gasoline Resistant Geomembrane to the construction site, for the Engineer's review. This plan shall include protective measures during shipping and on-site storage to avoid any damage to the Geomembrane.

Certified Test Reports for each of the materials to be used.

Construction Methods

Geomembrane (gasoline resistant) shall be placed directly on the surface of the EPS blocks, which shall be clean and free of sharp objects. Encase the top of EPS blocks with the Geomembrane within the limits shown on the Plans. Field seams shall be bonded with an electrically-heated hot-wedge device or other method as recommended by the manufacturer. The temperature of the bonded geomembrane shall not exceed 165°F immediately before contacting the EPS blocks.

Before installation of geomembrane, the Contractor shall demonstrate to the Engineer that the equipment, techniques, and personnel proposed for the bonding of field seams can produce vapor-tight seams under similar weather and work conditions near the job site. The Contractor shall provide a typical "test panel" as a basis for testing acceptance.

Field seams shall be inspected by the Installer and, when ordered by the Engineer, shall be tested by the Installer and shall pass the Vacuum Chamber test.

Construction equipment shall not be operated directly on the geomembrane. Any material damaged by the Contractor's equipment or operations shall be replaced or repaired to the satisfaction of the Engineer.

METHOD OF MEASUREMENT

Item 997.1 "Gasoline Resistant Geomembrane for EPS" will be measured for payment by the Square Foot, complete in-place.

BASIS OF PAYMENT

Item 997.1 "Gasoline Resistant Geomembrane for EPS" will be paid for at the Contract unit price per Square Foot, which price shall include all labor, materials, equipment and incidental costs required to complete the work. Overlaps and fold-overs will be incidental to this item.

END OF DOCUMENT
****

DOCUMENT A00802

DETAIL SHEETS

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MASSACHUSETTS DEPARTMENT OF TRANSPORTATION
TEN PARK PLAZA – BOSTON, MA

- ESTIMATE OF QUANTITIES – DETAIL SHEETS -

TOWN/CITY: TAUNTON/RAYNHAM YEAR: 2026
STA.: 1+10.0 TO 8+51.0 ROAD: OLD COLONY AVE/SOUTH STREET E.

Unclassified Excavation	700 CY	Class B Trench	10 CY
		Gravel Borrow	...420 CY
Class A Trench	40 CY		
Test Pit For Exploration	30 CY		
Class B Rock Excavation.	5 CY	Gravel Borrow for Backfilling	
Muck Excavation	350 CY	Structures and Pipe	130 CY

PROPOSED FULL DEPTH CONSTRUCTION **Area = 6,950 SF**

SURFACE COURSE:	1-3/4" Superpave Surface Course-12.5 (SSC-12.5) over Asphalt Emulsion for Tack Coat over
INTERMEDIATE COURSE:	1/4" Superpave Intermediate Course- 19.0 (SIC-19.0) over Asphalt Emulsion for Tack Coat Over
BASE COURSE:	4" Superpave Base Course-37.5 (SBC-37.5) over
SUB-BASE:	4" Dense Graded Crushed Stone for Sub-Base over 8" Gravel Borrow, Type b (Min)

PROPOSED FULL DEPTH CONSTRUCTION ≤ 4' WIDE **Area = 850 SF**

SURFACE COURSE:	1-3/4" Superpave Surface Course -12.5 (SSC-12.5) over Asphalt Emulsion for Tack Coat over
INTERMEDIATE COURSE:	2-1/4" Superpave Intermediate Course -19.0 (SIC-19.0) over Asphalt Emulsion for Tack Coat over
BASE COURSE:	6" HES Cement Concrete Base Course over
SUB BASE:	8" Gravel Borrow, Type b (Min) OR Combination of existing suitable subbase as approved by the engineer.

HMA BRIDGE WEARING COURSE **Area = 2,700 SF**

SURFACE COURSE:	1-1/2" Superpave Bridge Surface Course- 9.5 Polymer (SSC-B-9.5-P) over
INTERMEDIATE COURSE:	1-1/2" Superpave Bridge Protective Course- 9.5 Polymer (SPC-B-9.5-P) Course
BASE:	Membrane Waterproofing for Bridge Decks

PROPOSED PAVEMENT FINE MILLING AND OVERLAY **Area = 12,150 SF**

SURFACE COURSE:	1-3/4" Superpave Surface Course- 12.5 (SSC-12.5) over Asphalt Emulsion for Tack Coat over
PAVEMENT MILLING:	1-3/4" Pavement Fine Milling

CEMENT CONCRETE SIDEWALKS AND PEDESTRIAN CURB RAMPS **Area = 3,040 SF**

SURFACE:	4" Cement Concrete Walk Surface 4000 psi, 3/4", 610 over
FOUNDATION:	8" Gravel Borrow, Type B

CEMENT CONCRETE DRIVEWAY APRON **Area = 450 SF**

SURFACE:	6" Cement Concrete Walk Surface 4000 psi, 3/4", 610 over
FOUNDATION:	8" Gravel Borrow, Type B

HMA DRIVEWAYS **Area = 1,350 SF**

SURFACE COURSE:	1-1/2" Superpave Surface Course-12.5 (SSC-12.5) over 2-1/2" Superpave Intermediate Course-19.0 (SIC-19.0) over
BASE COURSE:	8" Gravel Borrow, Type B

ITEM 102.2 TREE TRIMMING

LOCATION	TREE	STA.	LT/RT
OLD COLONY	36”	6+86	LT
	24”	7+24	LT
	24”	7+46	LT

ITEM 102.511 TREE PROTECTION – ARMORING AND PRUNING

LOCATION	STA.	LT/RT
Old Colony Ave	7+24	LT
	7+46	LT

ITEM 102.521 TREE AND PLANT PROTECTION FENCE

LOCATION	STA.	LT/RT
Old Colony Ave	1+97 to 2+28	LT
Sandy Hill Street	10+53 to 10+65	LT

ITEM 105. STUMP REMOVED

LOCATION	STA.	LT/RT
Old Colony Ave	6+84	LT

ITEM 146. DRAINAGE STRUCTURE REMOVED

LOCATION	STA.	LT/RT
Old Colony Ave	2+77	RT
	2+84	LT

ITEM 182.2 REMOVAL OF ASBESTOS

LOCATION	STA. TO	STA.	LT/RT
Old Colony Ave	2+43	2+72	LT

ITEM 184.1 DISPOSAL OF TREATED WOOD PRODUCTS

Guardrail at Parking Lot

LOCATION	STA. TO	STA.	LT/RT
Old Colony Ave	2+54	2+58	RT

ITEM 220. DRAINAGE STRUCTURE ADJUSTED

New CB's, MH's, GI's and CIT's, in addition to the following existing structures:

STREET	STA	OFFSET
Old Colony Ave	5+99	LT
	7+33	LT
	7+25	LT
	7+33	RT
	8+22	LT
	8+43	LT
	8+48	LT

ITEM 223.2 FRAME AND GRATE (OR COVER) REMOVED AND DISCARDED

LOCATION	STA.	LT/RT
Old Colony Ave	2+77	RT
	2+84	LT

Contingency of 2 from Adjusted Structures (220.)

ITEM 302.06 6 INCH DUCTILE IRON WATER PIPE (RUBBER GASKET)

LOCATION	STA	LT/RT
Old Colony Ave	2+25	LT

ITEM 309. DUCTILE IRON FITTINGS FOR WATER PIPE

LOCATION	STA	LT/RT
Old Colony Ave	2+25	LT

ITEM 350.06 6 INCH GATE AND GATE BOX

LOCATION	STA.	LT/RT
Old Colony Ave	2+25	LT

ITEM 376.1 HYDRANT-EXCLUDING COST OF HYDRANT

LOCATION	STATION	LT/RT
		LT
Old Colony Ave	2+25	

ITEM 376.3 HYDRANT – REMOVED AND STACKED

LOCATION	STATION	LT/RT
Old Colony Ave	2+67	RT

ITEM 390.01 IRRIGATION SYSTEM REMOVED AND RESET

LOCATION	STATION	LT/RT
96 Old Colony Ave	1+60 TO 2+27	LT

ITEM 451. HMA FOR PATCHING

Permanent patching of utility trenches (drainage, water main, and conduit) crossing mill & overlay area in roadway, 6” wide trench on top of cement concrete curb setting in mill & overlay areas, and other miscellaneous hand work throughout the project.

ITEM 472. TEMPORARY ASPHALT PATCHING

Temporary patching of utility trenches (drainage, water main, and conduit) crossing full depth pavement area in roadway, and other miscellaneous work throughout the project.

ITEM 504.2 GRANITE CURB TYPE VA4 – SPLAYED END

STREET	STATION	STATION	LT/RT
Old Colony Ave	2+79	2+85	LT
	2+84	2+90	RT
	4+25	4+31	LT
	3+92	3+98	RT

ITEM 504.3 GRANITE CURB TYPE VA4 – SLOPED

STREET	STATION	STATION	LT/RT
Old Colony Ave	2+90	3+03	RT
	3+97	4+25	LT

ITEM 506. GRANITE CURB TYPE VB – STRAIGHT

STREET	CURB	STATION	STATION	LT/RT
Old Colony Ave	STRAIGHT	1+52	1+94	RT
	STRAIGHT	1+84	2+79	LT
	STRAIGHT	2+53	2+60	RT
	STRAIGHT	2+59	2+84	RT
	STRAIGHT	3+98	4+30	RT
	STRAIGHT	4+31	4+90	LT
	STRAIGHT	5+30	7+59	LT
	STRAIGHT	8+42	8+51	LT

ITEM 506.1 GRANITE CURB TYPE VB – CURVED

STREET	CURB	STATION	STATION	LT/RT
Old Colony Ave	CURVE	1+64	1+84	LT
	CURVE	2+49	2+59	RT

ITEM 509. GRANITE TRANSITION CURB FOR PEDESTRIAN CURB RAMPS – STRAIGHT

STREET	STATION	STATION	LT/RT
Old Colony Ave	1+55	1+57	LT
	4+90	4+99	LT
	5+23	5+30	LT
	7+61	7+62	LT
	8+47	8+51	LT

ITEM 509.1 GRANITE TRANSITION CURB FOR PEDESTRIAN CURB RAMPS – CURVED

STREET	STATION	STATION	LT/RT
Old Colony Ave	1+26	1+29	LT
	1+57	1+57	LT
	1+59	1+64	LT
	7+62	7+68	LT
	8+26	8+33	LT

ITEM 514. GRANITE CURB INLET – STRAIGHT

LOCATION	STATION	LT/RT
Old Colony Ave		LT
	2+57	
	2+78	LT
	5+39	LT
	7+09	LT

ITEM 580. CURB REMOVED AND RESET

LOCATION	STATION	TO STATION	LT/RT
Old Colony Ave	1+14	1+23	LT

ITEM 594. CURB REMOVED AND DISCARDED

Existing curb varies, contractor will need to work with Resident Engineer in the field to determine best locations for install and curb condition

LOCATION	STATION	TO STATION	LT/RT
Old Colony Ave	1+15	1+30	LT
	1+55	1+60	LT
	1+64	2+89	LT
	2+61	2+90	RT
	3+85	3+96	RT
	3+96	7+30	LT

ITEM 698.4 GEOTEXTILE FABRIC FOR PERMANENT EROSION CONTROL

Used at pipe outfalls and areas containing modified rockfill.

ITEM 767.121 SEDIMENT CONTROL BARRIER

LOCATION	STATION	STATION	LT/RT
Old Colony Ave	2+38	2+87	RT
	3+04	3+24	LT
	3+73	4+34	RT
	4+13	7+74	LT
	4+65	7+88	RT

ITEM 767.6 AGED PINE BARK MULCH

LOCATION	STA to	STA	LT/RT
Old Colony Ave	2+34	2+90	LT

ITEM 874.45 MISCELLANEOUS SIGNS REMOVED AND RESET

LOCATION	STATION	LT/RT
Old Colony Ave	1+22	LT
	2+37	LT
	2+62	RT
	7+80	RT

ITEM 874.51 MISCELLANEOUS SIGNS REMOVED AND DISCARDED

LOCATION	STATION	LT/RT
Old Colony Ave	4+01	LT
Old Colony Ave	6+51	LT
Old Colony Ave	2+85	RT
Sandy Hill Road	10+12	RT
Sandy Hill Road	10+63	RT

ITEM 874.7 MISCELLANEOUS SIGNS REMOVED AND STACKED

LOCATION	STATION	LT/RT
Old Colony Ave	2+66	RT

ITEM 901. 4000 PSI, 1.5 IN., 565 CEMENT CONCRETE

Headwalls for 18” pipe – Sta 2+74 RT

ITEM 903. 3000 PSI, 1.5 IN., 470 CEMENT CONCRETE

Thrust block for new hydrant

ITEM 910.1 STEEL REINFORCEMENT FOR STRUCTURES – EPOXY COATED

Headwall for 18” pipe outfall of HW-1 STA 2+74 RT

ITEM 986. MODIFIED ROCKFILL

LOCATION	STATION	LT/RT
Old Colony Ave	2+60 to 2+86	RT
	3+74 to 3+93	RT
	4+13 to 4+24	LT

DOCUMENT A00808

PROJECT UTILITY COORDINATION FORM

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Project Utilities Coordination (PUC) Form

CONTACTS AND GENERAL UTILITY INFORMATION

Revision Date:
5/13/2026

City/Town:	Project File #:	PUC Completed by:	Utility Pole Set:	
Raynham	613642		Taunton Municipal Light Plant	
Route/Street:	**Resident Engineer:**	**Mass DOT PM:**	**Scheduled Ad Date:**	**Total Poles Relocated:**
South Street East Over Taunton River		Herrio Lamothe	8/15/2026	6

5/13/2026
PRINTED

Consultant:	Contact:	Office #	Extension #	Email
BETA Group	Christopher Jones	(781) 255-1982	x7017	Cjones@BETA-Inc.com

Utility Company	Contact	Office #	Cell #	Email	Scope, Budget, Duration Submitted		Reimbursement			Potential for District Initiated Early Relocation *		Utilities On Bridge/Structure		Utilities Underground (UG) /Aerial (OH)	
					Yes	No	Agreement	Non-Reimb'le	Notes	YES	NO	YES	NO	UG	OH
Taunton Municipal Lighting Plant	Tyler Arruda	(508) 824-3128		tylerarruda@tmlp.com	x		x		100% reimbursable	x			x		x
Verizon	Gene Butterfield	(781) 917-2054		Eugene.Butterfield.Jr@Verizon.com	x		x				x		x		x
Comcast	Michael Cook	(978) 848-5163		Michael_Cook7@comcast.com	x		x				x		x		x
Eversource-Gas	Brendan Pitts	(508) 895-4818		Brendan.Pitts@Eversource.com	x		x				x	x		x	

Utility Relocation Notes for MassDOT Contractor

Unless otherwise noted by Contract, the MassDOT Contractor is to provide the District Construction Office**with 7 Calendar Days advance** notification in order to validate the current progress and provide the required 30 Days advance notice-to-proceed for the first Utility - and each subsequent Utility. These advance notifications are to be identified in the Contractor's Schedules (Pre-Con preparation, Baseline, Subnets, and Updated/Monthly Schedules) as specified in Subsection 8.02 (for DBB Contracts) and/or Section 9 (of DB Contracts). Note: The durations included below do not include these lead-times. See Additional 'Important Basis notes for Contractor' - on last PUC Form page.

Additional notes:

Suggested Sequence of Relocation (Based on Consultant proposed construction staging)

The sequence as detailed on the following pages is based on the consultants proposed staging plan. This information was compiled through meetings that included all of the utilities listed below along with the designer and the Town of Raynham. The information provided is the best available information prior to project advertisement.

PUC FORM - CONTINUED

Is 'enabling' (prep) work, by the Contractor, necessary prior to the start of the first series of utility relocations:	Yes	No
	x	

Has any of the Utility work been identified to work concurrently	Yes	No
		x

5/13/2026
PRINTED

massDOT Massachusetts Department of Transportation Highway Division

	RESPONSIBLE PARTY		DESCRIPTION - Utility Relocation Phases, Tasks and Activities	Estimated Duration (Work Days) by Utilities (Lead time not included)	Concurrent / Exclusive Utility Work Contractor note: In planning and executing the work, the information in these 4 columns is intended to supplement any related Access Restraints that are described in the Special Provisions.				Access Restraint (AR) & Limitations of Operations Notes	
					Exclusive Utility on site	Concurrent Utilities	Contractor Off-Site	Contractor Concurrent		
	C = Contractor	U = Utility Co.			Utility working with no other Utilities in vicinity	Utility working with other Utilities on site	No Contractor physical construction operations on-site (while Utility is working)	Contractor and Utility are working on-site - but NOT in the same vicinity	Potential Access Restraint (Yes/No)	Reason/Note (optional)
Stage 1	C		> Contractor to notify Utilities 30 days prior to start of work.							
			Overhead							
Task: 1			***TMLP***							
		U	TMLP - lead time = 3 weeks notice to schedule installation of new wood poles and anchors.	15	x			x		
		U	TMLP - Installing wood poles and anchors	15	x			x		
		U	TMLP - Trim trees to make room for installation of new electric overhead lines.	2	x			x		
		U	TMLP - lead time = 3 weeks notice to schedule installation of overhead lines and equip. on new poles after new poles are installed.	15	x			x		
		U	TMLP - Installing overhead lines and equipment on new poles.	40	x			x		
		U	TMLP - Installing Fiber optic cables and hardware.	15	x			x		
		U	TMLP - Removal of replaced overhead electric lines.	5	x					
			Sub-Total	**107**						
Task: 2			***Comcast***							
		U	Comcast - Construct new aerial plant	2	x			x		
		U	Comcast - Activate new plant, swap drops and wreck-out old	2	x			x		
			Sub-Total	**4**						
Task: 3			***Verizon***							
		U	Verizon - Place all new strand and guying.	3	x			x		
		U	Verizon - Place new fiber cable and associated plant.	1	x			x		
		U	Verizon - Transfer all cables where applicable.	2	x			x		
		U	Verizon - Join all new fiber cables.	2	x			x		
		U	Verizon - Trim all old copper cable.	1	x			x		
			Verizon - Trim all old fiber cable.	1	x			x		
			Verizon - Remove all old cables (copper & fiber), anchoring, and guying.	2	x			x		
			Verizon - Remove all old poles.	3	x			x		
			Sub-Total	**15**						
Task: 4			***TMLP***							
		U	TMLP - lead time = 2 wks notice to schedule removal of old poles once all utilities have removed their plant from poles.	10	x			x		
		U	TMLP - Removal of old poles and anchors once all utilities have removed their plant from poles.	5	x			x		
			Sub-Total	**15**						

	RESPONSIBLE PARTY		DESCRIPTION - Utility Relocation Phases, Tasks and Activities	Estimated Duration (Work Days) by Utilities (Lead time not included)	Concurrent / Exclusive Utility Work Contractor note: In planning and executing the work, the information in these 4 columns is intended to supplement any related Access Restraints that are described in the Special Provisions.				Access Restraint (AR) & Limitations of Operations Notes	
	C = Contractor	U = Utility Co.			Exclusive Utility on site: Utility working with no other Utilities in vicinity	Concurrent Utilities: Utility working with other Utilities on site	Contractor Off-Site: No Contractor physical construction operations on-site (while Utility is working)	Contractor Concurrent: Contractor and Utility are working on-site - but NOT in the same vicinity	Potential Access Restraint (Yes/No)	Reason/Note (optional)
			Underground							
Task: 1			***Eversource-Gas***							
		U	Eversource-Gas - Relocate ~350 LF of new 8" CS high pressure gas main, installed on the new bridge spanning the Taunton River.	30	x			x		
		U	Eversource-Gas - Tie over the exist 2" HDPE high pressure gas main servicing #103 Old Colony Ave to the new 8" CS gas main.	5	x			x		
		U	Eversource-Gas - Tie over the exist PL gas services to #96 Old Colony Ave & the Sewer Pump Station to the new 8" CS gas main.	5	x			x		
		U	Eversource-Gas - Isolate, purge, and abandon in place the exist 6" CS gas main spanning the exist bridge being demolished.	5	x			x		
			Sub-Total	**45**						

IMPORTANT BASIS NOTES - FOR CONTRACTOR

1	Unless otherwise specified in the MassDOT Construction Contract, or unless specifically noted within this PUC Form, these durations (herein) are based upon the Contractor providing *unimpeded access* to the Utility company to perform Utility relocations (see Note 5 - Access).
2	"Concurrent Utilities" operations noted herein, are to signify those Utility Company operations that can be worked concurrently (e.g. Utility A and Utility B work on-site together) - MassDOT and the Contractor are to prepare NTPs to Utilities accordingly.
3	"Potential Access Restraints" noted within this PUC Form are for planning purposes. See MassDOT Contract for Contractual Access Restraints (refer to Subsections 8.02, 8.03, and/or 8.06 for Design Bid Build Contracts and Volume II Section 9 for Design Build Contracts).
4	Utility non-work periods - For planning purposes, the durations above contain some non work days (contingency) for New England conditions (precipitation, high temperatures, low temperatures, snow, ice). Gas line work however, typically has a seasonal restriction and can NOT be installed from 15-November to 15-March. Municipally Owned Electric and Gas Utilities are also restricted from proceeding from 15-November to 15-March. The Contractor shall (and the CTD plan) reflect this calendar restriction within the schedule (unless otherwise note).
5	Access - Unless otherwise noted in the Contract, and in addition to the 'enabling' notes above, the Contractor must provide safe and unimpeded access (for trucks, lifts, cranes, etc.) to the Utilities, to allow for the proposed relocation(s) - including but not limited to snow removal, clearing and grubbing, guard rail removal, barrier removal, tree removal, and grading.
6	For all MassDOT construction contracts issued after January 2014, the new Utility Coordination/documentation specification is required. This is Section 8.14 in Design-Bid-Build Contracts (see Design-Build index reference for applicable section #).
7	Prior to starting any and all enabling work for Utilities, the Contractor is to plan in advance with submittals and approved durations.
8	* Potential District Initiated Early Utility Relocation - if noted herein, the District reserves the right to initiate early utility relocation in advance of the Contract NTP. In submitting a bid price and in the development/basis of the Baseline Schedule, the Contractor shall not plan the Work with the potential benefit of any form of 'early utility relocation.' As a requirement of the Baseline submission, unless otherwise noted in this Specification, the earliest that the first Utility company is to receive the 30 days advance notification to mobilize to the site, will be 7 calendar days after the pre-construction meeting and never sooner than 7 days after the Contract NTP.
9	* *Assumed Duration, Not Provided By Utility Company.

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DOCUMENT A00810

MassDOT Herbicide Use Report

Proposal No. 613642-136413

MassDOT Herbicide Use Report

Date Submitted:

Use multiple sheets for multiple application techniques or sites as needed.

Contractor Performing Work:

Project or Contract No:

Town/s:

Associated Route:

Project Description:

MDAR ALERT*:

Treatment Description:

Area Treated (as applicable)

Acres: **Sq Yds:** **Miles:**

Weeds Targeted:

Gallons Formula Used:

Application Method:

Date/Time Began:

Date/Time End:

Product Used:

Name: _____	Name: _____	Name: _____
EPA Reg. No: _____	EPA Reg. No: _____	EPA Reg. No: _____
% Active Ingredient	% Active Ingredient	% Active Ingredient
Dry: _____	Dry: _____	Dry: _____
Liquid: _____	Liquid: _____	Liquid: _____
Formulation (dilution rate): _____	Formulation (dilution rate): _____	Formulation (dilution rate): _____

Additional products used (surfactants, etc.) or other information:

Applicators: **License Numbers:**

* Please note:
EDRR Species (MAM, Hogweed, Pepperweed, Kudzu, etc.)
Tree of Heaven 1) stands of >20 trees; 2) >5 trees near nursery, landscape company, or highway rest area where trucks stop

Upon completion, please submit form to MassDOT District Engineer and Landscape Design Section in Boston office.

07/18/2018

DOCUMENT A00811

WATERING LOG
for
MassDOT Plantings

Watering Log for MassDOT Plantings

Project Description:

Contract No:

Project No:

Plant Locations/s: (Attach planting plan/s as necessary)

Notes:

	Separate logs shall be kept to track areas or plants with different watering schedules. Trees shall receive a minimum of 10 gallons with each watering and shrubs a minimum of 5 gallons. Provide note that if watering is not performed as scheduled due to rain. Record date of rainfall and amount.												
Date Watered													
Landscape Contractor Initial													
Prime Contractor Initial													
Date Watered													
Landscape Contractor Initial													
Prime Contractor Initial													

Each week, following watering, Log shall be submitted to the MassDOT Engineer.
6/15/2018

DOCUMENT A00812

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

FLAGGING REQUEST FORM

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Massachusetts Bay Transportation Authority

massDOT Massachusetts Department of Transportation Rail & Transit Division

Flagging Request

Date:_____

Company/Agency: _____

Project Name: _____

Project Location: _____

Point of Contact: _____

Email: _____ Phone: _____

Project Number: _____ Funding Source: _____

RAILROAD OPERATIONS TRACKING NUMBER _____

Date Needed:_____

Start/Finish:_____

Flaggers Required:_____

Scope of Work:

(Attach additional SOW, if necessary.)

Schedule:

(Attach additional info, if necessary.)

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DOCUMENT A00813

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

SPECIAL INSTRUCTIONS

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MBTA SPECIAL INSTRUCTIONS
April 1, 2003
PAGE 1

APPENDIX M
MBTA SPECIAL INSTRUCTIONS
MARCH 2003

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MBTA SPECIAL INSTRUCTIONS

APRIL 2003

LETTER OF TRANSMITTAL REGARDING SPECIAL INSTRUCTIONS

The Subway Operations, Bus Operations, Safety, Systemwide Maintenance & Improvements, Operations Support, and the Design and Construction Departments of the MBTA have determined that certain limitations regarding Contractor's activities are required while working on a construction project.

These Supplementary Conditions are included herein to augment the MBTA Standard Specifications, Division I - General Requirements, Section 00700 - General Conditions, Article 6 - Prosecution and Progress, Paragraph 6.04 - Limitations of Operations with additional information, which is applicable to construction projects.

However, for non-MBTA construction projects where Division I does not apply, such as in the case of rights to construct on MBTA property granted under a lease or license agreement, the enclosed Special Instructions are still applicable unless otherwise directed.

Contract drawings and specifications for non-MBTA construction projects, relative to all work that will be performed within or directly adjacent to MBTA property, must be submitted to the Authority's Chief Engineer of Design and Construction, Director of Subway Operations, Director of Bus Operations, Director, of Systemwide Maintenance & Improvements, Director of Operations Support, Director of Safety, and the Director of Real Estate. The addresses and phone numbers are listed on. the next page. The, special instructions contain information to be complied with by the owner, contractors, and others associated with the project.

Applicable provisions of the special instructions plus additional requirements from other MBTA departments must be included in the contract specifications as instructions to the contractor when performing work on or adjacent to MBTA property. Permission to perform work on MBTA property will be granted by the Director of Real Estate only when contract plans and specifications are approved by the MBTA.

The enforcement of any of the following conditions shall not be construed as waiving any of the rights of the Authority in any of the other conditions of an MBTA contract.

A meeting to further discuss MBTA requirements may be arranged by contacting the offices of those listed in Article l.a. and/or b. herein.

1. ACCESS TO AUTHORITY PROPERTY

A. For MBTA Contractors Only: An owner or Contractor who wishes permission to enter upon or perform work over, on, under or adjacent to Authority property shall submit to the offices of the Authority's Chief Engineer of Design and Construction, the Director of Bus Operations, the Director of Subway Operations, Director of Systemwide

Maintenance & Improvements, and the Director of Operations Support, a request in writing, a minimum of forty-two (42) days prior to the owner or the Contractor's planned commencement of any of the above stated activities. Addresses of the above are as follows:

MBTA' s Chief Engineer of Design and Construction
6th Floor
10 Park Plaza
Boston, MA 02116
617 222-3116

Director of Systemwide Maintenance & Improvements
500 Arborway
Jamaica Plain, MA 02130
617 222-5454

Director of Subway Operations
10th Floor
45 High Street
Boston, MA 02110
617 222-4554

Director of Bus Operations
10th Floor
45 High Street
Boston, MA 02110
617 222-3368

Director of Operations Support
10th Floor
45 High Street
Boston, MA Q2110
617 222-5460

Director of Safety
2nd Floor
21 Arlington Avenue
Charlestown, MA 02129
617 222-4244

B. Non-MBTA Construction Contractors For Lessees or Licenses of the MBTA Only: An owner or Contractor who wishes permission to enter upon or perform work over, on, under or adjacent to Authority property shall submit to the offices of the MBTA's designated representative for real estate listed below, a request in writing, a minimum of forty-two (42) days prior to the owner or the Contractor's planned commencement of any of the above stated activities. The designated representative will distribute plan sets to the above MBTA departments and will coordinate departmental approvals. Application forms and instructions for obtaining access to MBTA property

can be obtained by visiting the designated representative's website listed below and selecting "MBTA" and "Licensing."

License Administrator
Massachusetts Realty Group
20 Park Plaza, Suite 1120
Boston, MA 02116
617-316-1654
www.mbtarealty.com

The designated representative reports directly to:

MBTA Director of Real Estate
5th Floor
10 Park Plaza
Boston, MA 02116
617 222-3255

C. Requests shall specify the name of the owner or the contractor, the reasons for entering the property, where the property will be entered, each individual location where work of a different nature is to be performed, the nature of such work, and the number of days, including time schedule, the owner or the contractor intends to remain on the property at each location. The Authority will process such requests and meet with the owner or contractor to work out a schedule and phasing .for the work plus other arrangements including financial. The Authority shall request a list of the names of each individual who will enter upon or perform work on Authority property.

D. The owner or contractor shall. notify the representative of the Design and Construction Department and the appropriate Operations Director at least seventy-two (72) hours prior to entering the property as agreed upon earlier with the Authority. The owner or contractor shall notify the Design and Construction, and Operations Departments immediately if the job is to be closed down unexpectedly and shall again notify the Authority as specified above when work will commence.

E. The owner or contractor shall make all necessary arrangements with the Authority before entering upon the property and perform the work in accordance with an MBTA approved work schedule. The owner or contractor shall not enter MBTA property or perform any work on Authority property without the presence of an assigned MBTA representative from the Design and Construction Department or the Operations Department who is responsible for monitoring the work of that owner or contractor for the Authority. Working on Authority property without an assigned MBTA representative present shall be cause for immediate eviction from the property.

F. The owner or contractor must have in place a method of payment for all Authority support services such as flagging, work trains, power shut offs, etc., prior to commencement of any work. This will be processed through a written force account agreement between the Authority and the owner or contractor prior to commencement of work. Direct billing to contractors for Authority support services requires the contractor's authorized representative to agree in writing that the company will reimburse the Authority for those support services, including overhead and fringe benefits. Once the Authority receives the signed statement from the contractor, the General Accounting

Office will open a reimbursable account for specific Authority department(s) to charge costs, and the contractor will be billed directly.

G. The work associated with this project, except as hereinafter expressly provided, will be done without interruption of or change in the regular work or operation of vehicles of the Authority. No work shall be done affecting the operations of vehicles or operations of stations until the contractor has submitted details of his procedures to the Design and Construction and the applicable Operations representatives thirty (30) working days prior to start of work and has secured written permission to proceed.

H. The Authority reserves the right to require work affecting the safety of the operations to be performed at prescheduled non-operating periods from approximately 1:30 a.m. to 5:00 a.m. daily (1:30 a.m. - 4:30 a.m. effective); 1:30 a.m. to 6:00 a.m. Sunday (1:30 a.m.-5:30 a.m. effective). The contractor will not be permitted to remain within the track right-of-way after 5:00 am. (6:00 a.m. Sunday). The Authority may, during emergencies or at times when the Authority work forces are required to work in the area of the contractors work, order the contractor to cease work and remove his work forces and equipment from the property leaving the right-of-way in a safe operating condition. The Authority also reserves the right to stop or postpone any contractor's previously approved work if, in the Authority's opinion, such work is being performed in a manner that will endanger and/or delay the Authority's regular work or operations.

I. The owner or contractor shall make their own provisions for electric power, compressed air, water, ventilation, and disposal of seepage water. No use of existing MBTA utilities will be permitted unless approved in advance by the Authority.

J. The owner or the contractor's attention is directed to other projects that will be ongoing simultaneously in the work area. The Authority will determine priorities for site access between this project and others.

K. The Authority reserves the right to deny the contractor access to the right of way because of operational requirements, adverse weather conditions or emergency track, signal, and power repairs. The contractor shall reasonably expect to be denied access to the site a total of 10 (ten) days per calendar year, this does not include the following holidays; New Year's Day, President's Day, Patriot's Day, Memorial Day, Bunker Hill Day, Independence Day, Labor Day, Columbus Day, Veteran's Day, Thanksgiving Day, and Christmas Day. In addition, right of way access may be denied on days when various Special Events impact service as well as during Red Sox home games on the Green Line.

Furthermore, the contractor shall also expect to have his access to the site delayed a total of 4 (four) times per month. Each delay shall be 60 (sixty) minutes or less. The contractor shall make allowances for these possible events in their bid. Due to increased stopping distances associated with slippery rail conditions, non-emergency access will not be allowed within ten (10) feet of the centerline of the track under adverse weather conditions.

L. The contractor shall perform his work at all times so as to cause no interruption of service during operating hours and shall at all times after performing work during either operating hours or non-operating hours leave the Authority's property in a clean and safe operating condition.

M. On occasion, the Authority will operate work cars, test trains, security trains, and/or hirait Vehicles in, the area of the work. At no time during these occurrences will the contractor be allowed to work on the right-of-way, except with the approval of the Authority or the Authority personnel providing protection services as defined in Protection Services.

2. INSURANCE REOUIREMENTS

A. The owner or Contractor's for MBTA Construction Contracts insurance requirements shall conform to the latest version of MBTA Standard Specifications, Division 1 - General Requirements, Section 00700 - General Conditions, Article *5* - Legal Relations and Responsibility to the Public, Paragraph *5.04* - Insurance Requirements. Owners or Contractors under a lease or license agreement with the MBTA shall provide insurance in accordance with the requirements of said agreement.

3. SUBMITTAL OF SPECIFICATIONS DRAWINGS. DESIGN AND METHODS OF CONSTRUCTION

(Applies to non-MBTA Construction Contracts. MBTA Construction Contracts are covered under Division I)

A. An owner or contractor or others performing a non-MBTA construction contract that requires performing construction over, on, under or adjacent to the Authority's property shall submit to both the Design and Construction Department and to the appropriate Operations Department two (2) sets each of contract drawings and specifications at the 30%, 60%, 90% and 100% phases of design of the project. 100% drawings and specifications must be submitted forty-two (42) days prior to the planned commencement of any work.

B. The contractor's drawings and specifications shall define the work in detail and a Professional Engineer registered in the Commonwealth of Massachusetts shall stamp the final drawings. The contractor or owner shall also submit a crane or heavy equipment location, if used, with dimensions to the face of abutments and structures and calculations of crane equipment loading on Authority structures showing no adverse effect on any structures. All calculations shall be stamped by a Professional Engineer registered in the Commonwealth of Massachusetts. The drawings must include any excavation support systems, shoring, underpinning, protective shielding, or any work required for the protection of MBTA property.

C. Unless otherwise agreed to in advance, the owner or contractor's structures shall not attach to, be placed against, pass through, or impose any loads upon any structures or facilities owned by the MBTA.

D. All construction work shall be performed in strict conformity with final plans and specifications that have been reviewed and approved by the MBTA. Any changes requested by the owner or contractor which affect MBTA property or operations must be submitted to the MBTA for review and approval at least 30 days prior to the planned commencement of the work. Approvals or rejections shall be submitted by the MBTA within thirty (30) days following submission to the MBTA for review.

E. The owner or the contractor performing construction work over, on, under, or adjacent to Authority property shall submit to the Director of Design four (4) sets each of the design, drawings and specifications of any earth support system, shoring, underpinning, protective shielding, or any work required for the protection of the Authority's facilities and property, a minimum of forty-two (42) working days prior to the planned commencement of any of the above work. The design, drawings and specifications shall define in detail the methods of construction and materials to be used. The design and drawings shall be stamped and signed by a Professional Engineer registered in the Commonwealth of Massachusetts.

F. Unless otherwise agreed to in advance, earth support structures or shoring systems shall not be attached to any structure owned by the MBTA, nor shall MBTA structures be use to support loadings or be used for excavation support.

G. Engineering drawings of MBTA structures are available for reference or duplication at the MBTA Plan Room, 500 Arborway, Jamaica Plain, MA 02130. For information call the Technical Librarian at 617-222-5285.

4. OPERATIONAL RESTRICTIONS

A. The owner or contractor is made aware that the work will be performed adjacent to or over operating tracks, signal lines, communication lines, power lines, cables and other facilities belonging to the Authority. The owner or contractor is to take all due precautions to protect the Authority's facilities, utilities, and operations during the course of his work. When in the opinion of the Authority's Chief Engineer of Design and Construction, Director of Subway Operations, Director of Systemwide Maintenance & Improvements, Director of Operations Support, or their representatives, the contractor's work would cause hazard to the Authority's facilities, infrastructure, or to the safe operation of the transit system, the Authority will assign qualified personnel deemed necessary to protect the property, facilities and operations, all at the expense of the contractor.

B. The contractor is specifically prohibited from conducting any operations next to or over the right-of-way that have the potential to adversely impact the operations of Authority revenue service during normal operating hours (approximately 5:00 a.m. to 1:30 a.m.). Certain work adjacent to the right-of-way, described below as hazardous work, may take place during restricted revenue hours at the discretion of the Chief of Orange, Red, Green, or Blue Line Operations as applicable and require flagmen present.

C. Access to the MBTA right-of-way, which encompasses all MBTA property (fence to fence, wall to wall, and property line to property line over which Authority vehicles operate, including sidings and yards), is. contingent upon Owner or Contractor compliance with the "MBTA Right-of-Way Safety Rulebook" that outlines Right-of-Way Safe Practices for Access on or Near the Right-Of-Way.

As specified in the Right of Way Safety Rulebook, all persons who access the MBTA right of way must attend a one-day, eight-hour training class conducted by Subway Operations Training and the Safety Department Attendees must successfully complete the Right of Way Safety Training in order to

receive a Right of Way license. The license is valid for a two-year period after which the person must attend the Authority's Right of Way re-certification class. To register for the "Right of Way Safety" class, contact:

Supervisor and Chief Rules Examiner of Training
Cabot RTL Training
275 Dorchester Avenue, 2nd floor
South Boston, MA 02127
Telephone: (617) 222-5377

D. The Authority will consider the property; facilities and operations fouled or subject to hazard when the following occurs:

1. When any object or operation is or can be brought nearer than ten (10) feet to the centerline of operating track.
2. When an object or excavation is brought nearer than four (4) feet to a signal or communication line.
3. When an object or excavation is brought nearer than ten (10) feet to a power line or cable.
4. When explosives are used in the vicinity of the premises. Explosives shall not be used on or adjacent to the Authority's property or facilities without written consent of the Authority's Chief Engineer of Design and Construction and then shall be used only by a licensed blaster, licensed in the Commonwealth of Massachusetts, at times and under conditions acceptable to the Authority.
5. When cranes, trucks, power shovels, pile driver or any other equipment are working in positions that failure with or without load could occur nearer than 10 feet to the centerline of an operating track.

It shall be the responsibility of the contractor to inform the Chief of Orange, Red, Green, or Blue Line Operations as applicable in writing thirty (30) working days prior to all times when they intend to perform hazardous work as described above. Submittal must include a site plan, the reasons for entering the property, where the property will be entered, each individual location where work of a different nature is to be performed, the nature of such work, and number of days, including time schedule, the contractor intends to remain on the property at each location. Failure of the contractor to provide the appropriate Line Chief with the specified advanced notice of hazardous work will result in the stoppage of work by the Authority.

D. The Contractor will be allowed on the right-of-way only after normal revenue service (approximately 1:30 a.m. to 5:00 a.m.). On occasion, the Authority will operate work cars in the area of the project work during non-revenue hours. At no time during these occurrences will the contractor be allowed to work on the right-of-way except with the approval of the Authority. The contractor shall coordinate their schedule at least twenty-four (24) hours in advance with the Authority.

E. No weekday/weekend transit service interruptions will be allowed on this project. The contractor must schedule all work requiring a shutdown of revenue service and/or station and/or platform operations during non-revenue hours.

F. Prior to the contractor leaving any work site, at the completion of each workday, the contractor shall ensure that the site is in proper condition to permit normal transit operations to resume. If, in the opinion of the Authority, the site is not suitable for normal transit operations due to conditions caused by the contractor, the Authority will allocate a suitable number of personnel to rectify the site. The owner or his contractor shall be charged full costs of such personnel and necessary equipment, including the full cost of replacement services during the cleanup period.

G. In the event that the contractor does not adhere to the work period limitations of the special conditions and causes delay in returning the right-of-way to revenue service at the end of any work period, the owner or his contractor shall pay the Authority for substitute bus service a sum not to exceed $120.00 per hour per bus for the entire duration of the delay and including mobilization and demobilization of the bus service. The minimum charge shall be (3) hours per bus per delay... The owner or the ‘contractor will reimburse the Authority for the hourly costs of personnel used during such delays (egg., supervisors, officials, gatepersons, flagpersons, and automotive). The required number of buses to adequately accommodate all Authority customers who are inconvenienced by the delay shall be at the sole discretion of the Authority’s Bus Operations Department. Whatever sum of money may become due and payable to the Authority by the owner or his contractor under this article may be retained out of money belonging to the contractor in the hand and possession of the Authority. This article shall be construed and treated by the parties to the contract not as imposing a penalty upon the contractor for failing fully to complete the work within the periods as specified herein, but as liquidation damages to compensate the Authority for additional costs incurred by the Authority because of the failure of the contractor to fully complete said work within the work periods specified.

H. The contractor shall assume full responsibility for the safety of all their work. They shall perform the work in a manner that will ensure the safety of both personnel and property. The contractor shall prevent against safety hazards, and the exposure of persons and equipment to hazardous and/or potentially hazardous conditions. All, work in the construction of the project shall comply with the requirements of the Authority, Department of Labor, Occupational Safety and Health Administration (OSHA) provisions, as well as those of state and local regulations. Safe breathing levels must conform to the Massachusetts Department of Environmental Protection (DEP) standards. In the case of conflict of regulations, the most stringent will apply. If the standards are not met, the Authority has the right to stop the work until such time as the contractor is in compliance with standards.

5. PROTECTION SERVICES

A. When the contractor is performing work in the vicinity of Authority rights-of-way or public areas, the Authority will require the contractor to have at the site such authorized and qualified personnel as may be required to adequately protect the Authority’s customers, employees, property, facilities and operations from hazardous conditions.

B. The need for protection services is outlined and described in the Authority’s Right-of-Way Safety Rulebook. The appropriate Line Chief, or their representative, shall determine what protection services are required and assign flagging personnel, officials, supervisors, coordinators or any other such personnel as may be required to ensure the safety of the Authority’s operations. Personnel shall be provided from the Authority’s workforce in such numbers as the Line Chief determines.

Costs for all protection services and supplies shall be the responsibility of the owner or contractor. No work will be allowed if flagmen are required, but not on duty.

C. When it is determined that protection services are required, the contractor must notify the Authority twenty-four (24) hours in advance and before 10.00 a.m. on the workday preceding the day that protection services will be required. Requests for protection services for weekends and/or holidays, must be made on the preceding Friday before 10.00 a.m., or before 10.00 a.m. on the workday preceding the holiday.

Requests for protection services for Non-Operating hours 1.30 *a.m.—5.00* a.m. and in order for the work to be included on the Night Orders you must contact the:

Planning and Scheduling Coordinator
Maintenance of Way
617-222-5419.

Requests for protection services for Operating hours 5.00 a.m.-l.30 a.m. and in order for the work to be included on the Day Orders, you must contact:

Orange, Red, Green, or Blue Line Superintendent as applicable.
617-222-5844 (Orange); 617-222-5099(Red);
617-222-5982 (Green); 617-222-5532 (Blue).

It will be at the sole discretion of the Authority whether the contractor will be allowed to perform work on any particular day or night.

D. The contractor will be required to provide each flagperson on duty with properly functioning safety equipment as approved by the Authority's Safety Department. This equipment includes but is not limited to: orange safety cones, red, yellow, and green flags, airhoms, hardhats, safety goggles, and hearing protection. The contractor will not be allowed on or adjacent to the right-of-way if flagging personnel are not equipped with required safety personal protective equipment.

E. The contractor will supply properly functioning Authority-frequency portable radios to each flagperson on duty on a daily basis.. The contractor will be responsible for storing and maintaining radios throughout the life of the contract.

F. All workers employed by the contractor who are to work within the Authority's stations, track area, right-of-way or adjacent to the traction power system or any high voltage electrical cables, shall be required to attend a safety awareness course at the Authority's Subway Operations Training School. The course is to make the contractor's personnel aware of the particular hazards related to the Authority's operations.

G. All personnel working on the project site in the immediate vicinity of, or within the right-of-way, are required to wear orange reflective safety vests, similar to standard Authority equipment as specified in the Right-of-Way safety Rulebook.

H. Work activities necessitating the traction power system (third rail and catenary) deenergization will require the services of an Authority power lineperson on site at all times and the contractor is responsible for any. costs incurred by the Authority as. a result of this action.

I. Prior to the implementation of the contracted work, and throughout the life of the contract, the contractor will be required to supply professionally rendered signs, as directed by the Authority's Marketing Department. These signs will include, but are not limited to, the following:

1. Informational signs for revenue service diversion.
2. Station directional and stairway, platform, exit closing signs.
3. General project informational signs for Authority customers.

J. Upon the direction of the Authority's Chief Engineer of Design and Construction, Director of Safety, and or Director of Subway Operations or their representatives, the contractor will be required to supply and install partitions and wooden barricades to cordon off the work site; such partitions and barricades shall be maintained and remain graffiti free by the contractor for the duration of the project.

K. Upon direction from the Authority's Chief Engineer of Design and Construction and / or Director of Subway Operations or their representatives, the contractor will supply the following when site conditions warrant:

1. Emergency and temporary lighting.
2. Exhaust fans of sufficient size and numbers to adequately ventilate the work site, tunnel and or adjacent stations.
3. Fire and / or garden hose for the purpose of dust control.

L. It shall be the responsibility of the contractor to keep the Authority informed prior to all times when they intend to perform hazardous work. Failure of the contractor to provide the Authority with suitable advance notice of hazardous work will result in the stoppage of the work by the Authority until such time as sufficient numbers of protection personnel are on duty at the site.

6. ANNUAL CERTIFICATION OF HI-RAIL EQUIPMENT

A. All equipment used by the contractor on Authority property shall be inspected by the Maintenance of Way engineer and/or the MBTA Safety Department for clearance and safety standards, and shall not be used if considered unsafe. All contractor/ subcontractor equipment (including hi-rail) operators must be trained, certified, and properly licensed. Documentation of same must be readily available and provided to the Authority upon request. If the contractor equipment is involved in a derailment or near miss incident or an accident, which caused injury or exposed personnel to injury and or caused damage to Authority property, that equipment will be subject to the Impound Policy Procedure.

B. Contractor equipment to be .used on or in the vicinity of the track shall be in first class condition, so as to positively prevent any failure that would cause delay in Authority operations or damage to its property or compromise the health and safety of personnel working on the project. Equipment shall not be placed or operated within the fouling distance of track without first obtaining the permission of the Authority.

C. The contractor shall not, at any time, operate equipment or machinery over Authority's right-of-

way without the use of hi-rail gear. All equipment that the contractor proposes to operate shall 'be modified to operate over the Authority's track and special work (e.g., switches, crossover frogs third rail, and restraining rail). Qualified Authority personnel shall control the movement of all hi-rail equipment at all times while operating on the Authority right-of-way. The contractor shall supply a portable radio for each hi-rail vehicle entering the Authority's right-of-way. No hi-rail equipment will be allowed on Authority's property without a functioning portable radio tuned to an Authority frequency.

D. The contractor shall furnish hi-rail equipment capable of operating within the strict confines of the right-of-way. No Authority owned equipment is available for the contractor's use. In addition to equipment necessary to complete the work on a regular basis, the contractor shall be required to have on site sufficient standby equipment capable of: a) removing disabled equipment from the right-of way, and b) replacing disabled equipment in order to return the right-of-way to normal operating status by the end of the designated work period. As part of the pre-qualification statement, the contractor shall furnish an itemized list of all equipment to be used on the project, including:

1. Type of equipment (e.g., pickup, flatbed or dump trucks, excavator, cranes, etc.).
2. Make, model and date of manufacture.
3. Ownership.
4. Present use and date of availability.
5. Location where equipment may be inspected by Authority personnel during the prequalification period.

E. The contractor shall have proof of competency for hi-rail operators (e.g., documentation, that the operator of hi-rail equipment is certified to operate that specific piece of equipment). The Authority reserves the right to review the lesson plan and audit the training class. The hi-rail operator will be responsible for ensuring and documenting that the vehicle is safe for operation and that all required equipment is present and properly secured. This must be done on a daily basis prior to operating the equipment.

F. The contractor is required to have an Annual Certification of hi-rail equipment (separate form the Registry Inspection) signed by a competent person (e.g. Manufacturer's representative) asserting to the fact that the equipment is Original Equipment Manufacturer (OEM), that it conforms to the latest standards, was installed per the manufacturer's specification, and is functioning properly.

G. The contractor must keep a copy of the Manufacturer's Operating Manual or instructions onboard the hi-rail equipment at all times.

H. The operator shall operate the hi-rail equipment at a reasonable speed for the existing conditions, being alert for another vehicle (or any other obstruction along the right of way).
In addition, said operator must maintain a safe spacing of traveling equipment.

I. The contractor's hi-rail vehicles must be equipped with a horn (warning device), and an exhaust gas purifier.

J. All equipment when used in tunnels and or darkness must conform to the Authority's standards for

headlights and marker lights. In addition, when vehicles are operating in tandem such as rail carts; flat cars, etc., such vehicles must be equipped with a flashing/strobe light when the lead vehicle is other than the operating vehicle. Diesel powered equipment only will be allowed in the tunnel and shall be removed from the tunnel each night unless otherwise permitted by the Director of Subway Operations.

K. Contractors must comply with the Authority's Propane Gas policy.

L. Contractor's doing "hot work" must have appropriate permits and follow all applicable rules and procedures for same.

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MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

CONSTRUCTION SAFETY

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SECTION 01568

CONSTRUCTION SAFETY

PART 1 - GENERAL

1.1 DESCRIPTION

A. This Section specifies requirements to establish a practical, sound, and effective program for the prevention of construction accidents, and to assign specific responsibilities to Contractors for program compliance.

B. Contractors and their supervisors must control hazardous activities and conditions within their respective areas of contract responsibility.

1.2 SUBMITTALS

A. Safety and Health Plan: The contractor shall, within thirty (30) days after receipt of the award of a contract, submit for approval to the MBTA, a detailed operational Safety and Health Plan.

B. Safety Supervisor: The Contractor shall within thirty (30) days after receipt of the award of a contract submit the resume of the qualifications and work experience of the designated Safety Supervisor proposed for assignment to the Project. No construction work shall begin until the project Safety Supervisor has been approved by the MBTA. The Safety Supervisor shall have a minimum of 5 years of experience in construction safety or a related field.

C. Monthly Accident Experience Summary: The Contractor shall submit an Accident Experience Report monthly during the course of construction to the MBTA.

D. Industrial Industry Records: Prior to start of work, the Contractor shall submit their Injury/Illness Record**s** for the previous 3 years. In addition, the Contractor shall submit annually to the MBTA all subsequent Illness/Injury Reports for the duration of the project.

PART 2 - PRODUCTS

None

PART 3 - EXECUTION

3.1 SAFETY AND HEALTH PLAN

A. The Contractor shall submit a project Safety and Health Plan. At a minimum, the plan shall include the following sections:

i. Emergency Action Plan
ii. First Aid Facilities
iii. Serious Accidents
iv. Emergency Telephone Numbers
v. Protection of the Public
vi. Site Visits
vii. Substance Abuse/Prevention/Testing

3.2 SAFETY SUPERVISOR

A. Complete daily safety inspections of the job site and contiguous public areas, and take any corrective actions to eliminate unsafe conditions.

B. Establish and implement a project safety training program for supervisors and employees as applicable to their job.

C. Attend project safety meetings.

D. Review Foreman accident and investigation reports, and initiate corrective action to prevent reoccurrence.

E. Maintain copies of all Contractor Safety Reports.

F. Assist Foremen in accident investigations.

G. Encourage establishment of incentive programs designed to recognize individual employee safety efforts and contributions towards improved safety.

H. Prepare a Safety Audit Checklist and complete the checklist each week during the course of construction. The completed Audit Checklists shall be submitted to the Authority weekly.

I. The Safety Supervisor needs to be on the project site when major work tasks are being performed. During work periods when the Contractor is not performing contract work, the Safety Supervisor can be absent from the project site with permission from the Authority.

3.3 ACCIDENT INVESTIGATION

A. Serious accidents shall be reported immediately to the MBTA Resident Engineer. Contractors shall issue standing orders to all supervisors directly in charge of operations that the scene of the accident shall not be disturbed, except for rescue or other emergency measures, until otherwise directed. Contractor's forces either witnessing or party to the accident shall be detained at the site to provide detailed accounting of facts.

B. All reports shall be submitted to the MBTA. The accident investigation shall generate appropriate recommendations for corrective actions to prevent similar recurrence of similar accidents.

C. The requirements of MBTA Safety Procedure 7.3 Contractor Safety Violation Program shall be followed by the Contractor when completing an accident report.

3.4 FIRST AID FACILITIES

A. In formulating the Health and Safety Plan, the Contractor shall provide for the establishment and staffing of appropriate first aid facilities for the treatment of on the job injuries.

B. Off-site medical treatment of employee injuries shall be performed at medical facilities named in the Contractor's Safety Submittal.

3.5 EMERGENCY TELEPHONE NUMBERS

To ensure that emergency actions are promptly taken, Contractors shall post emergency telephone numbers in conspicuous places.

3.6 ORIENTATION PROGRAM

A. The Contractor shall establish and maintain an orientation program for new employees which shall include:

i. For each individual the hazards present in their work assignment and in the general area in which he will be working.
ii. Personal protective equipment required.
iii. Instruction in the proper procedure for reporting unsafe job conditions which he/she may encounter.

3.7 RIGHT OF WAY SAFETY AWARENESS

A. All Contractor and sub-contractor personnel shall complete either the MBTA Rapid Transit right-of-way safety training or the MBCR Commuter Rail right-of-way safety training prior to entering the project site. ROW safety training will be required on all MBTA property including the RR track, stations, parking garages and maintenance car houses. Personnel will not be allowed on the job site unless they have attended a Right-of-Way Safety Awareness training session. Workers are required to carry their certification card while on site.

3.8 OSHA

A. The Contractor shall comply with the OSHA 1926 Construction Safety Standards that apply to the project work. The Contractor shall meet the reporting requirements, and employers with eleven (11) or more employees must meet recordkeeping requirements.

B. All Contractor and Sub-Contractor personnel shall possess an OSHA 10 Hour Certification card when working on the project site.

C. All fatality cases and/or serious accidents and illness shall be reported to OSHA immediately by phone to an Occupational Safety and Health Area Office. Employers must report immediately all blasting accidents.

D. Part of the OSHA requirements is that each employer must post in a prominent location the "Safety and Health Protection on the Job" poster. The poster briefly states the intent and coverage of the Act. Failure to post this document is a citable offense under the Act.

3.9 PROSECUTION OF THE WORK

A. The Contractor shall take all reasonable precautions in the performance of the work to protect the safety and health of its employees and members of the public and shall comply with all applicable MBTA, Local, State and Federal safety and health regulations and associated reporting requirements.

B. The Contractor Safety Supervisor is charged with sole responsibility of on-site safety management under the direction of the Contractor Project Superintendent. All potential safety hazards identified shall be promptly corrected. The Safety Supervisor shall complete daily reviews of the project site and document then results on the inspection.

C. The MBTA shall notify the Contractor of any non-compliance and of the corrective action required. This notice, when delivered the Contractor or the Contractor's representative at the site of the work, shall be deemed sufficient notice of the non-compliance and corrective action required after receiving the notice, the contractor shall immediately take corrective action. If the contractor fails or refuses to take corrective action promptly, the MBTA may, without prejudice to other legal or contractual rights, issue an order stopping all or part of the work; and may subject contractor to safety violation assessments as deemed appropriate by the MBTA. Resumption **of work** may be issued by the MBTA Safety Department.

D. The Contractor shall maintain an accurate record of exposure data on all accidents and incidents occurring under this contract and report this data in a manner prescribed by the MBTA.

E. The Contractor shall be responsible for all its lower-tier sub-contractor's and vendor's compliance.

F. Contractor management shall make a commitment for accident prevention and fire prevention. Safety shall take precedence over schedule and production. Enforcement action is mandatory.

3.10 WORK AUTHORIZATIONS

A. The following work authorizations will be issued by the MBTA:

i. Excavation

ii. Hot Work

iii. Confined Space Entry

iv. Cranes and Suspended Platforms

3.11 WORKING NEAR THE THIRD RAIL

A. When working on or near the third rail, when the power is off, the contractor must have a third rail high-voltage warning device on the job site approved by the MBTA Power Department. This device will warn work crews if the third rail becomes energized at any time during work activity involving the right-of-way.

3.12 HAZARDOUS SUBSTANCES

A. Any Contractor who uses substances on the hazardous substances list to which workers might be exposed under either normal work conditions or reasonable foreseeable emergency conditions resulting from work place operations must provide those workers with the required hazardous substance information.

3.13 PERSONAL PROTECTIVE EQUIPMENT

A. All Contractor personnel must wear the required personal protective equipment when on the job site. Personal protective equipment includes hard hats, safety vest, safety glasses and proper footwear.

3.14 PROTECTION OF THE PUBLIC

A. All necessary precautions to prevent injury to the public or damage to property of others shall be taken. The public is defined as all persons not employed by or under contract or subcontract to the MBTA. Installation of temporary barriers and/or fencing designated to protect the public shall be reviewed and approved by the MBTA. Precautions shall include but not be limited to the following:

B. Work shall not be performed in any area occupied by the public unless specifically permitted by the contract or in writing by the MBTA.

3.15 SUBSTANCE ABUSE/PREVENTION/TESTING PROGRAM

A. The Contractor shall establish a substance abuse policy and testing program that includes the following elements:

☐ Deterrence

☐ Treatment and Rehabilitation
☐ Detection
☐ Enforcement

The MBTA reserves the right to approve the proposed substance abuse program prior to commencing the contract.

3.16 CONDUCT OF TOURS

A. Group tours must be cleared through the MBTA, allowing maximum advance notice and in compliance with MBTA Policy and Procedures.

B. MBTA will coordinate the tour arrangements and ensure notification to the Contractors Project Manager.

3.17 HOUSEKEEPING

A. A basic concept in any effective accident prevention program is "good housekeeping." No one item has a great impact on the overall success of a safety program for a construction project. The importance of good housekeeping is such that it must be planned from the beginning of the job and carefully supervised through the final cleanup.

B. During the course of construction, work areas, passageways and stairs, in an around buildings and structures, shall be kept clear of debris. Construction materials shall be stored in an orderly manner. Storage areas and walkways on the site shall be maintained free of depressions, obstructions and debris.

PART 4 - MEASUREMENT AND PAYMENT

A. No separate measurement or payment will be made for work required under this Section.

UNITED STATES DEPARTMENT OF LABOR

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SOURCE: 44 FR 8577, Feb. 9, 1979; 44 FR 20940, Apr. 6, 1979, unless otherwise noted.

EDITORIAL NOTE: At 44 FR 8577, Feb. 9, 1979, and corrected at 44 FR 20940, Apr. 6, 1979, OSHA reprinted without change the entire text of 29 CFR Part 1926 together with certain General Industry Occupational Safety and Health Standards contained in 29 CFR Part 1910, which have been identified as also applicable to construction work. This republication developed a single set of OSHA regulations for both labor and management forces within the construction industry.

Editorial Note: The Federal Register of August 2, 1995, page 39254 issued a Final Rule; correcting amendment. OSHA will maintain the existing fall protection requirements for steel erection activities pending rulemaking that addresses the steel erection industry. This affected 1926.104, 1926.105, 1926.107, 1926.500, and 1926.753.

[55 FR 42328, Oct. 18, 1990; 55 FR 47687, Nov. 14, 1990; 58 FR 26627, May 4, 1993; 58 FR 35077, June 30, 1993; 59 FR 215, Jan. 3, 1994; 59 FR 36695, July 19, 1994; 59 FR 40729, Aug. 9, 1994; 59 FR 40964, Aug. 10, 1994; 60 FR 5131, Jan. 26, 1995; 60 FR 39254, Aug. 2, 1995; 61 FR 5507; Feb. 13, 1996; 61 FR 9227, March 7, 1996; 61 FR 31427, June 20, 1996; 61 FR 46025, Aug. 30, 1996; 62 FR 1493, Jan. 10, 1997; 63 FR 1152, Jan. 8, 1998; 63 FR 1919, Jan. 13, 1998; 63 FR 3813, Jan. 27, 1998; 63 FR 13338, March 19, 1998; 63 FR 17093, April 8, 1998; 63 FR 20098, April 23, 1998; 63 FR 33450, June 18, 1998; 63 FR 35137, June 29, 1998; 64 FR 18810, April 16, 1999; 66 FR 5265, Jan. 18, 2001; 70 FR 76985, Dec. 29, 2005; 71 FR 2885, Jan. 18, 2006; 71 FR 16675, April 3, 2006; 75 48130, Aug. 9, 2010]

Next Standard (1926 Subpart A)

DOCUMENT A00815

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS DIRECTORATE

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MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS DIRECTORATE

The attached Specifications are required for any construction and/or related activities on, over, under, within or adjacent to railroad property owned or controlled by the Massachusetts Bay Transportation Authority. They are intended to provide general guidelines and safeguards. Attachment "A" of Construction Guidelines and Procedures contains a summary of MBTA Railroad Operations Specifications which may be required. It is the responsibility of the Contractor to obtain all the necessary specifications for each project.

AUGUST 2014

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS DIRECTORATE

GUIDELINES AND PROCEDURES

FOR CONSTRUCTION ON

MBTA RAILROAD PROPERTY

AUGUST 2014

SECTION 1. SCOPE

1.01 These specifications provide general safeguards to railroad property owned or controlled by the Massachusetts Bay Transportation Authority and to railroad operations upon that property during the performance of construction and/or related activities on, over, under, within or adjacent to the railroad property. They are intended as guidelines and do not represent all legal requirements which are or may be associated with construction and/or related activities. The MBTA reserves the right to require additional information and clarification and to make unilateral changes to these specifications at any time, at its sole discretion.

SECTION 2. DEFINITIONS

MBTA

Massachusetts Bay Transportation Authority; Massachusetts Realty Group, Designated Representative of MBTA Real Estate

RAILROAD COMPANY

The particular reference for the purpose of these specifications is the railroad company which maintains and/or operates or has trackage rights on the subject MBTA Railroad Property, including, but not limited to:

- Massachusetts Bay Transportation Authority (MBTA")
- Keolis Commuter Services
- Providence and Worcester Railroad (PW)
- National Railroad Passenger Corporation ("Amtrak")
- CSX Transportation ("CSX")
- Pan Am Railways (PAR) and subsidiaries The Boston and Maine Corporation (BM), The Springfield Terminal Railway Company (ST), its affiliates, successors and assigns
- Bay Colony Railroad Corporation (BLCR)

MBTA RAILROAD PROPERTY

All railroad rights of way and adjacent owned and/or controlled by the MBTA.

OWNER

The individual, utility, government, or corporation having title to the structure to be constructed upon, over or adjacent to the railroad property owned or controlled by the MBTA.

UTILITY

Public or private communication, water, sewer, electric, gas and petroleum companies or other entity governed by the Massachusetts Department of Public Utilities.

GOVERNMENT

Federal, State, Town, City, County and other forms of government.

CORPORATION

Any firm duly incorporated under laws of a state government.

INDIVIDUAL

Any party not defined by "Owner, Utility, Government or Corporation".

CONTRACTOR

The individual, partnership, firm, corporation or any combination thereof, or joint venture, contracting with a Utility. Government, Firm, Company, Corporation or Individual for work to be done on, over, under, within or adjacent to MBTA Railroad Property.

OWNER OR ITS CONTRACTOR

As used in these specifications, does not affect the responsibilities of either party for work conducted on, over, under, within or adjacent to MBTA Railroad Property.

CONSTRUCTION DRAWINGS

Original drawings, submitted to the Engineer by the Contractor pursuant to the Work, including, but not limited to: stress sheets, working drawings, diagrams, illustrations, schedules, performance charts, brochures, erection plans, falsework plans, framework plans, cofferdam plans, bending diagrams for reinforcing steel, or other supplementary plans or similar data which are prepared by the Contractor or a Subcontractor, manufacturer, supplier or distributor, and which the Contractor is required to submit for review and approval by the MBTA. Working Drawings: Contractor prepared plans for temporary

structures and facilities. Working Drawings for elements of work which may affect safety of persons or property included but are not limited to Contractor's plans for temporary structures such as decking, temporary bulkheads, support of utilities, and for such other work as may be required for construction but which do not become an integral part of completed project.

SECTION 3. SUBMITTALS

3.01 INITIAL CONTACT

A. The MBTA owns the majority of the railroad lines in eastern Massachusetts. Many of these railroad lines are operated for passenger service, using a Railroad Company as an operating and maintaining Contractor. Some of the railroad lines are used for freight-only service, operated and maintained by other Railroad Company(s). In most instances, both passenger and freight service are operated over the same railroad lines.

B. All of the MBTA railroad lines are maintained by a designated Railroad Company(s), excepting rapid transit and light rail lines. The maintaining Railroad Company(s) has rights and responsibilities, in addition to the MBTA's property owner's rights.

C. To obtain further information concerning License Agreements, Easements, Licenses for Entry and performance of construction related activities which affect MBTA Railroad Property, a written request may be forwarded to:

License Administrator
Massachusetts Realty Group
20 Park Plaza, Suite 1120
Boston, MA 02116

or you may access the website at www.mbtarealty.com

The License Administrator is also the contact person for information concerning rapid transit and light rail lines.

SECTION 4. PLANS AND SPECIFICATIONS

4.01 SCOPE: It is the intent of the MBTA to eliminate or minimize any risk involved with construction or related activities on, over, under, within or adjacent to MBTA Railroad Property. Therefore, MBTA approval and

frequently one or more Railroad Company(s) approval of construction plans and specifications for all phases of a proposed project affecting MBTA Railroad Property is required.

4.02 GENERAL: If requested by the License Administrator, the applicant must provide six (6) sets of plans and specifications to the License Administrator. These plans and specifications must meet the approval of the Railroad Company(s) and the MBTA prior to the start of construction. These plans are to be prepared in sizes as small as possible (no smaller than 11" x 17") and are to be folded to an 8-1/2 inch by 11 inch size (folded dimensions) with a 1-1/2 inch margin on the left side and a 1 inch margin on the top.

A. After folding, the title block and other identification of the plans shall be visible at the lower right corner, without the necessity of unfolding. Each plan shall bear an individually identifying number and an original date, together with subsequent revision dates, clearly identified on the plan.

B. All plans are to be individually folded or rolled and where more than one plan is involved, they shall be assembled into complete sets before submission to the MBTA.

4.03 PLANS: The plans are to show all the work which may affect MBTA Railroad Property, and contain a location map and plan view of the project, with appropriate cross sections and sufficient details. The proposed construction or related activities must be (orated with respect to top of rail (vertical) and center line of track (horizontal). The plan must also include railroad stationing, property lines and subsurface soil conditions. The subsurface information is to be in the form of boring logs with the borings located on the plan view. The plans must be stamped by a Professional Engineer registered in the state of Massachusetts. (The purchase of railroad valuation plans may be arranged by contacting MBTA Engineering offices at (617) 222-6178).

4.04 SPECIFICATIONS: The specifications summarized on Attachment "A" attached hereto are the Standard Specifications of the MBTA Railroad Operations Department and apply to all types of construction work affecting MBTA Railroad Property.

A. In addition to "Maintenance and Protection of Railroad Traffic" and "Insurance Specifications" which are required for all work on, over, under, within or adjacent to MBTA Railroad Property, certain other Specifications contained in Attachment "A" shall be incorporated into construction/engineering submittals when deemed necessary by the MBTA and/or Railroad Company(s). (The purchase

of additional specifications may be arranged by contacting MBTA offices at (617) 222-3448 or visiting Massachusetts Realty Group website at www.mbtarealty.com.

SECTION 5. SUBMISSION REVIEW

5.01 An initial submission of six (6) sets of plans and specifications for MBTA review must be forwarded to the License Administrator, along with a completed MBTA Application for Entry (Attachment "B"). The submission will be circulated for review and comment to MBTA departments which may be impacted by the proposed project. If approved by the MBTA, the Railroad Company(s) will review.

5.02 The applicant is advised that the MBTA's initial review process requires a minimum forty-five (45) day period, prior to the Railroad Company(s) involvement, and additional processing time may be required for specific documents (See Section 9).

SECTION 6. INSPECTIONS/PAYMENTS

6.01 The MBTA may inspect all projects affecting MBTA Railroad Property at least twice, at the applicant's sole expense. The actual number of MBTA inspections will depend on the size and complexity of the project.

6.02 The MBTA may utilize Railroad Company inspectors and flagmen for daily inspection and protection of rail traffic during the term of the construction period or related activities. The Owner or Contractor will be responsible for advance payment of all associated fees.

6.03 Advance payments to the MBTA for construction/engineering review of plans and specifications by MBTA staff must be submitted when initial contact is made with the License Administrator. Payments shall be in the form of check or money order, made payable to the Massachusetts Bay Transportation Authority.

6.04 Advance payments covering the services for Railroad Company(s) construction/engineering review of plans and specifications, or services of an inspector or flagman, will be paid directly to the Railroad Company(s). The MBTA will advise when such services are required, and the Railroad Company(s) will advise of the amount of the required advance payment.

SECTION 7. EXAMINATION OF PLANS OR PROPERTY

7.01 The Contractor/Applicant shall have no claim for any differences between MBTA valuation plans and the actual conditions encountered in the field.

SECTION 8. INSURANCE AND INDEMNIFICATION

8.01 Prior to entry upon MBTA Railroad Property, insurance will be provided to and approved by the MBTA and affected Railroad Company(s), as outlined in “Insurance Specifications."

8.02 Additionally, all MBTA Licenses and Letters of Authorization contain a clause for Indemnifying MBTA and the Railroad Company(s) from and against any and all liabilities, losses, damages, costs, expenses, causes of action, suits, claims, demands and/or judgments of any nature whatsoever that may be imposed upon or incurred by or asserted against the MBTA or the Railroad Company(s).

SECTION 9. LEGAL DOCUMENTS FOR TEMPORARY AND PERMANENT INSTALLATIONS

9.01 The nature of entry upon or installation within MBTA Railroad Property will determine the authorizing document to be issued. Listed below are brief descriptions of MBTA documents:

A. **License for Entry**: Authorizes short-term entry for purposes of survey, Inspection, test borings, access, etc. One time administrative/ engineering/legal review and access fees.

B. **License Agreement**: Authorizes installations, subject to termination clause, if Applicant chooses not to pursue an Easement. One time administrative/engineering/legal review fee as well as annual rental fee.

C. **Easement**: Authorizes permanent installations in form suitable for recording at Registry Deeds. All easements are non-exclusive and subject to relocation at the Owner's expense, for Mass transportation purposes:

1. Easements must receive MBTA Board of Directors approval, which involves considerable time. Once approved by the Board of Directors and upon payment in full to the MBTA, a License for Construction is issued. Upon final inspection and acceptance of the installation by the MBTA the Easement document is issued.

2. Permanent Subsurface Easement widths are limited to a maximum three-foot distance on either side of the occupation.

3. a) A one-time administrative/engineering/legal review fee, in addition to value of easement, as established by independent appraisal conducted at the Applicant's expense.

   b) If easement size is minimal, as determined by the MBTA, a fixed fee, encompassing administrative/engineering/legal review fee.

D. **Letter of Authorization**: Authorizes installations and construction activities in association with Master License Agreements. One-time administrative/engineering/legal review as well as access and/or annual fees.

ATTACHMENT "A"

SUMMARY OF MBTA RAILROAD OPERATIONS SPECIFICATIONS

I. GUIDELINES AND PROCEDURES FOR CONSTRUCTION ON MBTA RAILROAD PROPERTY

This general specification outlines the immediate design requirements and methodology for progressing construction activities on MBTA Railroad Property.

II. MAINTENANCE AND PROTECTION OF RAILROAD TRAFFIC

This specification will be included in ALL work requirements on MBTA Railroad Property, and covers rules, requirements, and protective services or any construction-related activity on MBTA Railroad Property. Supplemental specifications are listed below.

III. INSURANCE SPECIFICATIONS

This specification details the required insurance coverages and limits of the MBTA and Railroad Company(s).

IV. PIPELINE OCCUPANCY SPECIFICATIONS

This specification details requirements for all pipeline borings/jacking's and open cuts on or adjacent to MBTA Railroad Property, as well as requirements for Drawing submittals.

V. SPECIFICATIONS FOR WIRE CONDUIT AND CABLE OCCUPATIONS

This specification details requirements for clearances and installations of parallel and overhead crossings on MBTA Railroad Property, as well as requirements for Drawing submittals.

VI. BRIDGE ERECTION DEMOLITION AND HOISTING OPERATIONS

This specification details plan preparation for demolition and/or hoisting and erection of structures on and over MBTA Railroad Property.

VII. TEMPORARY SHEETING AND SHORING

This specification details requirements for plan preparation and calculations necessary for sheeting and shoring for construction on or adjacent to MBTA Railroad Property.

VIII. BLASTING SPECIFICATIONS

This specification outlines submittals, details and requirements for blasting on or adjacent to MBTA Railroad Property.

IX. TEMPORARY PROTECTION SHIELDS FOR DEMOLITION AND CONSTRUCTION

This specification outlines criteria for plan preparation related to protection of MBTA Railroad Property when work takes place on overhead structures.

X. INDUSTRIAL SIDE TRACK SPECIFICATIONS

This specification outlines minimal requirements for materials and installation submission for private railroad side tracks up to MBTA property line and/or clearance point. Other provisions, site-specific, may be required, including signal protection maintenance and protection of railroad traffic.

XI. RIGHT OF WAY FENCING SPECIFICATIONS

This specification details the requirements for the materials, construction and installation of standard right of way fence.

XII. TEST BORING SPECIFICATIONS

This specification outlines procedures and requirements for the performance of test borings on MBTA Railroad Property.

XIII. FIBER OPTIC CABLE SPECIFICATIONS

This specification details requirements for design and installation of fiber optic cables on MBTA Railroad Property; and is modified by site-specific requirements, including the construction methodology, location and type of fiber optic cables and protection conduits.

XIV. RAILROAD OPERATIONS BOOK OF STANDARD PLANS, TRACK AND ROADWAY, MW-I SPECIFICATIONS FOR CONSTRUCTION AND MAINTENANCE OF TRACK

Certain construction activities may require obtaining this comprehensive package if rail construction details and requirements are related to the track operation.

XV. COMMUTER RAIL DESIGN STANDARDS

ATTACHMENT "B"

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
APPLICATION FOR ENTRY UPON MBTA RAILROAD, TRANSIT,
OR OTHER PROPERTY

Date_____

1. Name of Applicant: _____
2. Type of Entity (Partnership, Corporation, Proprietorship, Public Authority, etc.):

   _____
3. Mailing Address: _____
4. Contact info:_____
5. If incorporated, state of incorporation:_____
6. Proposed license term commencement date:_____
7. Agents for applicant for service of notice or process: _____

   _____

   _____
8. Administrative Fee: 1,000.00 paid with application
9. *If plan reviews by The MBTA Design and Construction are deemed necessary the following fee shall apply:*

   Design and Construction Plan Review Fee: 1,600.00 Paid with Application Fee
10. Applicant shall submit Drawings in pdf form and one set of paper Drawings to License Administrator
11. If applicant is self-insured, please provide limits of self-insurance and attach copies of authorizing legislation or certification thereof:_____

    _____
12. If applicant is authorized by public authority to enter into such license agreement, please provide:

    Motion, Resolution, or Ordinance No.: _____

    Date of Adoption: _____

Adopted by: _____

13. Is the applicant seeking permission to perform environmental testing and/or assessment on Authority property?

_____

a) Is the proposed testing and/or assessment required by the Massachusetts Contingency Plan ("MCP")?

_____

b) What is the Release Tracking number and current status of the MCP work?

_____

_____

_____

_____

14. Name, title and email of applicant's officer authorized to sign agreement: _____

_____

_____

Project Description

1. Brief description of construction (including types of pipes and other attachments or ancillary facilities to be installed on MBTA Railroad Property): _____

_____

_____

_____

_____

2. Brief description of purpose of entry and/or installation: _____

_____

_____

_____

Space Requirements
[*To Be Provided*]

Technical Information

1. Is this occupancy within the limits of a public road? _____
   Attach copies of applicant's franchise to occupy such space.

2. If occupancy is under, over, though, or attached to undergrade or overhead bridge, who owns such bridge? _____

   _____

3. Type of occupancy (facility):
   a) Exact Length of MBTA Railroad Property to be burdened by occupancy: ____

   _____

   b) Width of excavation facility on MBTA Railroad Property:

   _____

   c) Number of manholes: _____

   A. Aerial or underground wire and cable:

   (1) Telephone and other communication cables:

   Number of cables: _____

   Number of pairs/cable: _____

   Are these composite coaxial cables? _____

   (2) Power Cables:

   Number of cables/size: _____

   Number of volts per conductor: _____

   Are these pipe-type cables consisting of one or more high voltage cables encased in steel pipe under inert oil pressure? _____

   (3) Fiber optic cables:

   Number of cables: _____

   Number of distribution cables: _____

   Number of transmission cables: _____

   Number of strands in each cable: _____

Number of repeater stations on MBTA Railroad Property: _____

Systems (check one):

Transmission _____

Distribution _____

Sensor _____

(4) Number of spare or unoccupied ducts to be installed: _____

B. Pipes and Sewers

(1) Circular line carrying no pressure:

Number of pipes: _____

Number of inches of inside nominal diameter per pipe: _____

(2) Circular lines under pressure and carrying non-flammable, non-explosive, or non-combustible supporting materials, except coal and slurry:

Number of pipes: _____

Number of inches of inside nominal diameter per pipe: _____

(3) Circular lines under pressure and carrying flammable, explosive, or combustible supporting material:

Number of pipes: _____

Number of inches of inside nominal diameter per pipe: _____

(4) Non-circular pipe: _____

(5) Will a pipe tunnel be constructed? _____

(6) Will pipe be supported by MBTA structures, bridges, etc.? _____

Explain: _____

_____

(7) Will pipe be attached to MBTA structures, bridges, etc.? _____

Explain: _____

_____

C. Ancillary Facilities

Number of wooden poles to be installed on MBTA Railroad Property:

_____

Other wooden supporting structures: _____

_____

Steel supporting structures: _____

Explain: _____

Number of braces, stub poles: _____

Number of guy wires anchored on MBTA Railroad Property: _____

Number of span guy wires crossing MBTA Railroad Property: _____

D. Attachments

(1) Attachment of aerial wires and cables to poles or other structures of MBTA used in wire line construction or support:

Number of wires attached to MBTA cross-arm: _____

Voltage of wire: _____

Number of wires attached to applicant's cross-arm or bracket: ____

Voltage of wire: _____

Number of cross-arms or brackets attached to MBTA poles: _____

(2) Attachment of aerial wires and cables to building or structures other than those used in wire line construction or support:

Number of wires or cables attached to MBTA's building or structures:

_____

(3) Attachment of cable terminals to poles, buildings, or structures including highway bridges, railroad bridges over highways, or other bridges of MBTA:

Number of cable terminals, loading coils, transformers, or like devices attached:

_____

Explain: _____

E. Guy wire crossings and overhanging cross-arms and power wires of pole lines outside MBTA right-of-way.

Number of guy wires crossing MBTA Railroad property but not anchored thereon: _____

Number of cross-arms overhanging MBTA Railroad Property from poles located outside thereof: _____

Number of cross-arms on any poles: _____

It is hereby understood and agreed that the undersigned applicant will bear any and all costs associated with MBTA's preliminary and final engineering review in connection with this application. Any charges in excess of the initial advance payment will be billed directly to the address indicated in Item #3 above.

Agent: _____

For: _____
Name of Applicant

By: _____
(Title)

_____
(Date)

REVENUE ENFORCEMENT AND PROTECTION PROGRAM CERTIFICATION

Pursuant to M.G.L. Ch. 62C, Sec. 49A, I certify under penalties of perjury that I (my company), to my best knowledge and belief, have (has) filed all state tax returns and paid all state taxes required under law.

_____ _____

Social Security Number or
Federal Identification Number

Signature of Individual or Corporate Name

By: _____
Corporate Officer
(If applicable)

Date: _____

EMPLOYER'S CERTIFICATE OF COMPLIANCE WITH
MASSACHUSETTS EMPLOYMENT SECURITY LAW

Pursuant to G. L. C. 151A, Sec. 19A (b), I _____

on behalf of (Name of Employer) _____,

D.E.T. ID Number _____, certify under the penalties of perjury[1] that the aforementioned employer has complied with all laws of the Commonwealth relating to contributions and payments in lieu of contributions.

Signed under the penalties of perjury this _____ day of _____, 20__.

_____
Name of Employer

_____
Signature

_____
Name (Printed)

_____
Title (Printed)

[1] The employer may certify its compliance if it has entered into and is complying with a repayment agreement satisfactory to the Commissioner or there is a pending adjudicatory proceeding or court action contesting the amount due pursuant to G. L. C. 161A, Sec. 19A(c).

STATEMENT REGARDING BENEFICIAL INTEREST

In compliance with the provisions of Chapter 7, Sec. 40J of the General Laws, I hereby state, under the penalties of perjury, that the true names and addresses of all persons who have or will have a direct or indirect beneficial interest in the real property subject to this Application dated _____, 20__,

between _____ as applicant/tenant, for premises in the building (on the site) know as _____, and located at _____ _____ are listed below.

Name and residence of all persons with beneficial interests:

1. _____
2. _____
3. _____
4. _____
5 _____
6. _____

Signed: _____

Title: _____

Date: _____

ATTACHMENT "C"

REFERENCED STANDARDS AND SPECIFICATIONS

A. Wherever standards or specifications issued by a recognized industry association or regulatory body are referenced in these Specifications, the reference shall be interpreted as incorporating the referenced standard or specification in total into these Specifications as applicable. In the event of a difference between referenced standard or specifications and these Specifications, the latter shall govern.

B. Technical Reference Abbreviations - References are made to recognized standards by use of the acronyms listed below. Addresses are included for convenience, and the accuracy of the addresses is not warranted:

AA The Aluminum Association
900 19th Street NW
Washington, DC 20006

AAR The Association of American Railroads
American Railroads Building
50 F Street NW
Washington, DC 20001

AASHTO American Association of State Highway and Transportation Officials
444 North Capitol Street NW
Suite 249
Washington, DC 20001

ACGIH American Conference of Governmental Industrial Hygienists
1330 Kemper Meadow Drive
Cincinnati, OH 45240

ACI American Concrete Institute
P. O. Box 19150
Detroit, MI 48219

AFPA American Forest and Paper Association
1111 19th Street, NW
Suite 700
Washington, DC 20036

AIA	American Insurance Association 1130 Connecticut Avenue NW Washington, DC 20036
AISC	American Institute of Steel Construction Inc. 1 East Wacker Drive Suite 1300 Chicago, IL 60601
AISI	American Iron and Steel Institute 1101 17th Street NW Suite 1300 Washington, DC 20036-4700
AITC	American Institute of Timber Construction 7012 South Revere Parkway Suite 140 Englewood, CO 80112
ANSI	American National Standards Institute 11 West 42nd Street New York, NY 10036
APA	American Plywood Association P. O. Box 11700 Tacoma, WA 98411
APHA	American Public Health Association 1015 15th Street NW Washington, DC 20005
AREA	American Railway Engineering Association 50 F Street NW Washington, DC 20001
ASCE	American Society of Civil Engineers 345 East 47th Street New York, NY 10017
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers 1791 Tullie Circle, NE Atlanta, GA 30329
ASME	American Society of Mechanical Engineers 345 East 47th Street New York, NY 10017

ASTM	American Society for Testing and Materials 1916 Race Street Philadelphia, PA 19103
AWPA	American Wood Preservers' Association P. O. Box 286 Woodstock, MD 21163-0286
AWS	American Welding Society 550 NW 42nd Avenue Miami, FL 33126
AWWA	American Water Works Association, Inc. 6666 W. Quincy Avenue Denver, CO 802350
CSI	Construction Specifications Institute 601 Madison Avenue Alexandria, VA 22314-1791
FHA	Federal Highway Administration 400 7th Street SW Washington, DC 20590
FRA	Federal Railroad Administration 403 7th Street SW Washington, DC 20590
ICBO	International Conference of Building Officials 5360 Workman Mill Road Whittler, CA 90601
IIA	Incinerator Institute of America 60 East 42nd Street New York, NY 10017

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS DIRECTORATE

II

MAINTENANCE AND PROTECTION OF RAILROAD TRAFFIC

AUGUST 2014

SECTION 1. GENERAL

1.01 The Contractor should note that these specifications govern proposed work that involves construction on, over, under, within or adjacent to MBTA Railroad Property. Requirements must be strictly observed whenever the tracks, structures, or properties of the MBTA are involved or affected.

1.02 If the tracks or other facilities of the MBTA are endangered, the Contractor shall immediately perform such work as directed by the Railroad Company(s), and upon failure of the Contractor to carry out such orders immediately, the Railroad Company(s) may take whatever steps are necessary to restore safe conditions. The cost and expense to the Railroad Company(s) and/or MBTA of restoring safe conditions or of any damage to the MBTA's trains, tracks, or other facilities caused by the Contractors' or subcontractors' operations, shall be at the sole expense of the Contractor and will be collected as appropriate. This cost shall be paid for by the Contractor and may be deducted from any monies due and that may become due to the Contractor.

1.03 Before entering upon MBTA Railroad Property:

A. The Owner or its Contractor shall be fully informed of all requirements of the MBTA pertaining to the specific project and shall conduct all their work accordingly. Any questions relating to the requirements of the MBTA should be directed to the Director of Engineering for MBTA Railroad Operations or their authorized representative.

B. The Owner or its Contractor shall execute an MBTA License for Entry, and shall provide the MBTA and Railroad Company(s) with the information required in the "Insurance Specifications".

C. The Owner or its Contractor shall take note that if an excavation is to be made within a 2 to 1 slope line commencing 5.5 feet from the centerline of track, they shall be required to submit the proposed method of soil stabilization for approval by the Director of Engineering for MBTA Railroad Operations.

D. The Owner or its Contractor shall furnish detailed plans for falsework, bracing, sheeting, or other supports adjacent to the tracks for approval by the Director of Engineering for MBTA Railroad Operations and the Railroad Company(s), and the work shall be performed in accordance with temporary “Sheeting and Shoring". All plans and calculations shall be stamped by a Registered Professional Engineer.

E. The Owner or its Contractor shall give written notice to the Director of Engineering for MBTA Railroad Operations and the applicable

Railroad Company(s) at least 21 days in advance of starting work or locating equipment at the site.

F. The Owner or its Contractor shall make all necessary arrangements with the MBTA before entering upon MBTA Railroad Property.

1.04 After entering upon MBTA Railroad Property:

A. The Owner or its Contractor shall have, in their possession on the job site, the contract plans and specifications which bear the stamp of approval of the Director of Engineering for MBTA Railroad Operations or Railroad Company(s). The Owner or its Contractor shall conduct all their work according to these plans and specifications.

B. All work shall be performed and completed in a manner fully satisfactory to the MBTA Chief Engineering Officer or authorized representative(s). Railroad Company(s) inspection of the work shall be conducted at any time and the Owner or its Contractor shall cooperate fully with the MBTA and Railroad Company(s) representatives.

C. All equipment used by the Owner or its Contractor on MBTA Railroad Property may be inspected by the Railroad Company(s) and shall not be used if considered unsatisfactory by the Railroad Company(s) representative. Equipment of the Owner or its Contractor to be used adjacent to tracks shall be in first class condition so as to positively prevent any failure that would cause delay in the operation of trains or damage to MBTA or railroad facilities. Equipment shall not be placed or put into operation adjacent to a track without first obtaining the permission of the Railroad Company(s).

D. Operators of such equipment must be properly licensed and may be examined by the Railroad Company(s) representative to determine their fitness. If it is determined that they are unfit to work, then the Owner or its Contractor shall remove them from MBTA Railroad Property.

E. If the Director of Engineering for MBTA Railroad Operations deems it necessary, the Owner or its Contractor shall furnish and erect in close proximity to the site of the work a suitable, furnished shelter with lights, heat, telephone, etc., for use by Railroad Company(s) personnel providing services to the Owner's or Contractor’s work.

F. The Owner or its Contractor's work shall be performed in such manner that the tracks, train operations and appurtenances of the MBTA and the Railroad Company(s) will be safeguarded.

G. Open excavations shall be suitably planked and safeguarded when construction operations are not in progress.

H. Blasting will be permitted under or adjacent to tracks only after proof that blasting is required and all methods have been approved by the Director of Engineering for MBTA Railroad Operations and the Railroad Company(s). All blasting operations must comply with the MBTA's "Blasting Specifications".

I. The Owner or its Contractor shall be fully responsible for all damages arising from their failure to comply with the requirements of these specifications. Failure to comply may result in their removal from MBTA Railroad Property, at the MBTA's sole discretion.

SECTION 2. RULES, REGULATIONS, AND REQUIRMENTS.

2.01 Railroad traffic shall be maintained at all times with safety and continuity, and the Contractor shall conduct all operations on, over, under, within or adjacent to MBTA Railroad Property within the rules, regulations, and requirements of the Railroad Company(s) and/or MBTA. The Contractor shall be responsible for acquainting themselves with such requirements as the Railroad Company(s) and/or MBTA may demand.

2.02 The Contractor shall obtain verification of the time and schedule of track occupancy from the Railroad Company(s) before proceeding with any construction or demolition work on, over, under, within or adjacent to MBTA Railroad Property. The work shall not proceed until the plans and method of procedure have been approved by the Director of Engineering for MBTA Railroad Operations or their authorized representative.

2.03 All work to be done on, over, under, within or adjacent to MBTA Railroad Property shall be performed by the Contractor in a manner satisfactory to the MBTA and the Railroad Company(s), and shall be performed at such times and in such manner, as to not interfere with the movement of trains or operations upon the tracks of the MBTA. The Contractor shall use all necessary care and precaution in order to avoid accidents, delays or interference with the MBTA's trains or other property.

2.04 The Contractor shall give written notice to the Railroad Company(s) at least twenty- one (21) days prior to the commencement of any work, or any portion of the work, by the Contractor or their subcontractors on, over, under, within or adjacent to MBTA Railroad Property, in order that necessary arrangements may be made by the Railroad Company(s) to protect railroad operations.

2.05 If deemed necessary by the Railroad Company(s), it may assign an inspector and/or engineer who will be placed on the work site during the time the Contractor or any subcontractor is performing work on, over, under, within or adjacent to MBTA Railroad Property. The cost and expense will be paid directly by the contracting party with an advance deposit to the Railroad Company(s), unless otherwise approved.

2.06 Before proceeding with any construction or demolition work, on, over, under, within or adjacent to the MBTA's Railroad Property, a pre-construction meeting shall be held at which time the Contractor shall submit for approval of the MBTA and Railroad Company(s), Drawings, computations, and a detailed description of the method for accomplishing the construction work, including methods of protecting railroad operations. Such approval shall not serve in any way to relieve the Contractor of complete responsibility for the adequacy and safety of the referenced methods.

2.07 During any demolition procedure, the Contractor must provide an approved shield to prohibit all debris from falling onto MBTA Railroad Property. A protective fence must be erected at both ends of the project to prohibit trespassers from entering MBTA Railroad Property.

2.08 Cranes, shovels, or any other equipment shall be considered to be fouling the track when located in such position that failure of same with or without load brings the equipment within the fouling limit. The Contractor's employees and equipment will not be permitted to work near overhead wires or apparatus.

2.09 The Contractor shall conduct their work and handle their equipment and materials so that no part of any equipment should foul an operated track or wire line without the written permission of the Railroad Company(s). When it becomes necessary for the Contractor to foul any track, they must give the Railroad Company(s) written notice of their intentions twenty-one (21) days in advance, so that if approved, arrangements may be made for proper protection of the Railroad Company(s).

2.10 The Contractor's equipment shall not be placed or put into operation adjacent to tracks without first obtaining permission from the Railroad Company(s). Under no circumstances shall any equipment or materials be placed or stored within fifteen (15) feet from the centerline of the closest track.

2.11 Materials and equipment belonging to the Contractor shall not be stored on MBTA Railroad Property without first having obtained permission from the Railroad Company(s), and such permission will be on the condition that the MBTA and/or Railroad Company(s) will not be liable for damage to such materials and equipment from any cause. The Contractor shall keep the

tracks adjacent to the site clear of all refuse and debris that may accumulate from construction operations, and shall leave the MBTA Railroad Property in the condition existing before construction commencement. Equipment repair, refueling or extended storage is prohibited on MBTA Railroad Property.

2.12 The Contractor shall consult the Railroad Company(s) in order to determine the type of protection required to insure safety and continuity of railroad operations. The railroad field engineer may assign track foremen, flagmen, signalmen or other employees deemed necessary for protective services by the Railroad Company(s), to insure the safety of trains and MBTA Railroad Property. The cost of same shall be paid directly by the contracting party with an advance deposit to the Railroad Company(s), unless otherwise approved.

2.13 The provision of such protective services, and other precautionary measures, shall not relieve the Contractor from liability for the cost of any and all damages caused by their operations.

2.14 The Railroad Company(s) will require protection during all periods when the Contractor is working on, over, under, within or adjacent to MBTA Railroad Property or as may be deemed necessary. When protection is required, the Contractor shall make the request in writing to the Railroad Company(s) at least twenty-one (21) days before such protection is required.

2.15 The Contractor shall not bill the Railroad Company(s) or MBTA for any work which they are proposing to perform, unless the Railroad Company(s) or MBTA authorizes the said work in writing. This work must be to the benefit of the MBTA or Railroad Company(s).

2.16 The Contractor, subcontractor and respective employees who will come within the limits of the MBTA Railroad Property, must first attend the Railroad Company(s) Safety Orientation Class. They are required to comply with the Railroad Company(s) Safety Requirements throughout the entire construction period. All costs associated with compliance of the Railroad Company(s) Safety Requirements will be at the sole expense of the Contractor and subcontractors.

A. The Contractor for the project must appoint a qualified person who will be designated as a Safety Representative. They must be approved by the Railroad Company(s) Safety Representative. The Contractor's designee will be responsible to give Safety Orientation to the Contractor's/subcontractor's employees who will come onto the MBTA's Railroad Property for short periods of time after the initial Safety Orientation Class has been given by the Railroad Company(s). The Contractor's designee will keep the Railroad Company(s) Safety Representative informed of the temporary employees who received Safety Orientation. The Railroad Company(s)

Safety Orientation Class will be repeated when employee turnover or groups of Contractor's and subcontractor's employees are such that another Railroad Company(s) Safety Orientation Class is justified.

B. All Contractors shall follow established safety procedures and remain 15 feet or more from the closest rail of the closest track. When it becomes necessary for Contractors to encroach on this 15 foot limitation, the proper fouling procedures will be arranged with the Railroad Company(s).

C. Contractors will establish the 15 foot foul line by installing stakes and taping off the area prior to beginning work.

2.17 Upon completion of the work, the Contractor shall remove from the MBTA Railroad Property, all machinery, equipment, surplus materials, falsework, rubbish, temporary buildings and other property of the Contractor, or any subcontractor, and shall leave MBTA Railroad Property in a condition satisfactory to the MBTA and Railroad Company(s). Failure to comply will result in Railroad Company(s) forces restoring MBTA Railroad Property at the Contractor's expense.

2.18 The Contractor will pay the Railroad Company(s) directly, for all protective services unless otherwise approved. The services are performed to insure safe operation of trains when construction work would, in the Railroad Company(s) opinion, be a hazard.

SECTION 3. DEFINITION OF HAZARD

3.01 Protection Services will be required whenever the Contractor is performing work on, over, under, within or adjacent to MBTA Railroad Property. This will include excavating, sheeting, shoring, erection, removal of forms, handling material, using equipment which by swinging or by failure could foul the track, and when any other type of work being performed, in the opinion of the Railroad Company(s), requires such service.

3.02 Railroad operations will be considered subject to hazard when explosives are used in the vicinity of MBTA Railroad Property during the driving or pulling of sheeting for footings adjacent to a track, when erecting structural steel across or adjacent to a track, when operations involve swinging booms or chutes that could in any way come closer than 5 feet to the center line of a track or wire line. None of these or similar operations, shall be carried on without Railroad Company(s) protective services personnel on site.

3.03 A signal line or communication line shall be considered fouled and subject to hazard when any object is brought closer than ten (10) feet to any wire or cable. An electrical supply line shall be considered fouled and subject to hazard when any object is brought closer than ten (10) feet to any

wire of the line.

3.04 As excavation approaches pipes, conduits, or other underground structures on or adjacent to MBTA Railroad Property, digging by machinery shall be discontinued and the excavation shall continue by means of hand tools. All existing pipes, poles, wires, fences, property line markers, and other structures, which the MBTA and/or Railroad Company(s) decides must be preserved in place, shall be carefully protected from damage by the Contractor or its Owner. Should such items be damaged, they shall be restored by the Railroad Company(s), at the Owner's or Contractor's sole expense to the original condition prior to construction commencement. If any excavation is taken beyond the work limit indicated on the approved Drawings or prescribed herein, the Owner or its Contractor shall backfill and compact to the satisfaction of the Railroad Company(s) at the Contractors expense.

SECTION 4. BACKFILL

4.01 Backfilling

A. All backfill material adjacent to any Railroad Company(s) facility shall be approved by the Railroad Company(s). Backfill material shall be free from hard lumps and clods larger than 3 inches in diameter, and free from large rocks or stumps. Uniformly fine material shall be placed next to any pipe liable to dent or break.

B. All backfill material shall be compacted at or near optimum moisture content, in layers not exceeding 6 inches in compacted thickness by pneumatic tampers, vibrator compactors, or other approved means to the base of the railroad subgrade. Material shall be compacted to not less than 95 percent of AASHTO T 99, Method C. The Contractor will be required to supply to the job site, ballast stone (AREA #4) to be installed by the Railroad Company(s).

4.02 Certification

The Owner or its Contractor shall provide testing, through the use of a testing lab or Professional Engineer, to insure that the in place density of the backfill meets or exceeds the requirements of Section 4.01(B). Written certification of the tests shall be given to the Railroad Company(s) immediately upon completion of the test.

4.03 Alternate

In the case of an open cut crossing of the MBTA Railroad Property, the Owner or its Contractor may backfill with concrete having a three-day compressive strength of 1000 psi to the base of the track subgrade. This

may be used in lieu of providing the certification of proper compaction when using gravel backfill. The Owner or its Contractor will be required to supply to the job site, ballast stone (AREA #4) to be installed by the Railroad Company(s).

SECTION 5. CLEARANCES

5.01 Staging falsework or forms shall at all times be maintained with a minimum vertical clearance of 226" above top of the high rail and a minimum horizontal clearance of 15' from the center line of track.

SECTION 6. PROTECTION SERVICES

6.01 The MBTA shall require railroad inspection and may require railroad flagging. Prior to the start of any work on MBTA Railroad Properly, the Owner or its Contractor shall submit a deposit to the amount required by the Railroad Company(s). If Railroad Company(s) expenses are greater than the amount of deposit, the Owner or its Contractor shall reimburse the Railroad Company(s) for the balance when billed, and, if the Railroad Company(s) expenses are less than the amount of deposit, the Railroad Company(s) will refund the balance to the Owner or its Contractor. The Railroad Company(s) reserves the right to request additional deposits as project work progresses.

6.02 If the MBTA or Railroad Company(s) determines that flagmen are necessary, the number required shall be on duty at the site during the hours of hazard described under Section 3. No work shall be performed if flagmen are required but are not on duty.

6.03 It shall be the responsibility of the Owner or its Contractor to keep the MBTA and Railroad Company(s) informed at all times when the Owner or its Contractor shall be working on, over, under, within or adjacent to MBTA Railroad Property and creating the hazards described under Section 3. Failure of the Owner or its Contractor to give the MBTA and Railroad Company(s) suitable advance notice of hazardous operation shall result in the shutdown of the work by the Railroad Company(s), until such time as sufficient numbers of flagmen are on duty at the site. If this becomes a repeat occurrence, the Contractor will be removed from the project.

6.04 The Railroad Company(s) will make its best effort to provide protective services personnel. Should the situation arise where such personnel are not available, Contractor operations must cease. The Railroad Company(s) is not liable for any monetary claims incurred during the absence of protective services personnel.

SECTION 7. INSPECTION

7.01 If deemed necessary by the Director of Engineering for MBTA Railroad Operations, the MBTA will furnish and assign an engineer(s) for inspection and the Railroad Company(s) will furnish an appropriate inspector for general inspection purposes or for general protection of MBTA Railroad Property and operations during construction. All protection services will be at the expense of the Owner or its Contractor.

SECTION 8. EXTRA-CONTRACT SERVICES

8.01 Temporary and permanent changes of tracks and all railroad utilities made necessary by the work of the Contractor, will be made by the MBTA or Railroad Company(s) at the expense of the Owner or its Contractor.

8.02 All other changes made or services furnished by the Railroad Company(s), at the request of the Owner or its Contractor, will be at the Owner's or its Contractor's expense.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS DIRECTORATE

III

INSURANCE SPECIFICATIONS

The insurance outlined in these Specifications is required of the Owner or Contractor, and shall be provided by or in behalf of all subcontractors performing any portion of the work. The Owner or Contractor shall be responsible for any modifications, deviations or omissions of the required insurance as it applies to subcontractors.

All insurance policies, unless otherwise specified under Railroad Protective Liability Insurance, are to be written either on an occurrence basis or, if a claims-made form, applicable renewals must have a date retroactive to the construction start date and shall be maintained in force for one year following the acceptance of the work by the MBTA or its duly authorized representative.

With the exception of Railroad Protective Liability Insurance, all insurance policies must name the MBTA as an additional insured as its interest appears and waive any rights of subrogation against the MBTA.

Certificates of Insurance evidencing (1) either the claims-made or occurrence form coverage, (2) work description/location, (3) Owner or Contractor's corporate name, and (4) individual, company, government agency or municipality for which the work is being performed, are to be furnished to the MBTA prior to work commencement, and within fifteen (15) days of expiration of the insurance coverage, when applicable.

All policies must contain a minimum thirty (30) day written notice of cancellation clause, and provide that the Insurance Company shall notify the Owner, Contractor, MBTA and Railroad Company(s), via registered mail, of any cancellation, change or expiration of the policy.

Original Insurance Certificate(s) shall be received and approved by the MBTA before the Owner or Contractor will be allowed entry upon MBTA Railroad Property. Certificates, including any required endorsements, shall be furnished to the MBTA, c/o Risk Manager, Office of the Treasurer-Controller, Ten Park Plaza, Room 8450, Boston, MA 02116, and shall provide stated coverage and a provision that Notice of Accident (occurrence) and Notice of Claim shall be given to the Insurance Company as soon as practicable after notice to the insured(s).

Original Insurance Binders reflecting Railroad Protective Insurance shall be received and approved by the MBTA and the appropriate Railroad Company(s) prior to entry upon MBTA Railroad Property. Mailing addresses for transmittal of original Insurance Binders to the named insured Railroad Company(s) are contained on Page Four of these Specifications.

The Owner or Contractor shall indemnify, defend and save harmless the MBTA and the appropriate Railroad Company(s) from and against any and all liabilities, losses (including losses of revenue), claims, costs, damages and expenses (including reasonable attorney's fees and expenses) that may be asserted against or incurred by the MBTA and the Railroad Company(s) arising from or as a result of the Owner or Contractor's work, or its use of adjacent land. Said indemnification shall include claims, whether covered by insurance or not, including, but not limited to

Workers Compensation and similar insurance.

The Owner or Contractor shall maintain, during the life of the contract, from company (s} authorized to do business in the Commonwealth of Massachusetts and satisfactory to the MBTA:

A. **COMMERCIAL GENERAL LIABILITY INSURANCE** for personal injury, bodily injury and property damage in an amount not less than $1,000,000 per occurrence and $3,000,000 in the aggregate covering all work performed on over or adjacent to MBTA Railroad Property (the “work"), including:

1. All operations;

2. Contractual liability;

3. Coverage for the so-called "X, C, U" hazards, i.e., collapse of building, blasting, and damage to underground property;

4. Asbestos abatement, when applicable.

B. **AUTOMOBILE LIABILITY INSURANCE** including the use of all vehicles owned, non-owned, leased and hired, in an amount not less than $1,000,000 combined single limit covering all the work.

C. **WORKER'S COMPENSATION INSURANCE** including Employees, Liability Insurance, as provided by Massachusetts General Laws, Chapter 152, as amended, covering all the work.

D. **UMBRELLA LIABILITY COVERAGE** in an amount not less than $10,000,000 per occurrence covering all the work.

E. **HAZARDOUS MATERIALS INSURANCE** if the work involves hazardous materials, the following coverage is required:

1. **Pollution Liability insurance** for sudden and gradual occurrences in an amount not less than $1,000,000 per occurrence and $5,000,000 in the aggregate arising out of the work, including but not limited to all hazardous materials identified in the contract.

2. When applicable, the Owner or Contractor shall designate the disposal site and furnish a Certificate of Insurance from the Disposal Facility for Environmental Impairment Liability Insurance for (a) sudden and accidental occurrences in an amount not less than $3,000,000 per occurrence and $6,000,000 in the aggregate and (b) non-sudden occurrences in an amount not less than $5,000,000 per occurrence and $10,000,000 in the aggregate.

3. Certificates of insurance shall clearly state the hazardous materials exposure work being performed.

F. **RAILROAD PROTECTIVE LIABILITY INSURANCE** is specifically designed for insuring Railroads, and is purchased by the Owner or Contractor in the name of the MBTA and the Railroad Company(s). **The Railroad Company(s) is the named insured on the policy.** Railroad Protective Liability Insurance is required for any work performed within fifty (50) feet from center line of the nearest railroad track; it is not a substitute for any types of insurance outlined in these Specifications. Required limits are:

Bodily injury: not less than $5,000,000 for all damages arising out of bodily injuries to or death of one person, and subject to that limit for each person, a total limit of $6,000,000 for all damages arising out of bodily injury to or death of two or more persons in any one accident;

Property Damage: not less than $10,000,000 or all damages arising out of injury to or destruction of MBTA property in any one accident, and subject to that limit per accident, a total of $10,000,000 in the aggregate for all damages arising out of injury to or destruction of MBTA property.

Questions regarding insurance should be directed to MBTA's Risk Manager at (617) 222-3064.

Questions regarding train counts and train speeds should be directed to the appropriate Railroad Company(s) listed on Page Four.

PROOF OF INSURANCE

MAILING ADDRESSES:

MBTA	Risk Manager c/o Treasurer-Controller 10 Park Plaza Boston, MA 02116 cc: Massachusetts Realty Group
National Railroad Passenger Corporation (Amtrak)	Boston Division Office c/o Division Engineer 2 South Station 5th Floor Boston, MA 02110
CSX Transportation Inc.	500 Water St. Jacksonville, FL 32202
Bay Colony Railroad Corporation	General Manager 4 Freight House Road East Wareham, MA 02571

Boston and Maine Corporation and Springfield Terminal Railway Co.	Chief Engineer 402 Amherst Street Suite 300 Nashua, NH 03063-1287
Providence and Worcester Railroad Company	P. O. Box 1188 Worcester, MA 01601
Keolis Commuter Services	Chief Engineering Officer 470 Atlantic Ave. Boston, MA 02110

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS DIRECTORATE

IV

PIPELINE OCCUPANCY SPECIFICATIONS

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SECTION 1. GENERAL REQUIREMENTS

1.01 DESCRIPTION OF WORK AND LOCATION

These specifications apply to the design and construction of pipelines carrying flammable and non-flammable substances and to casings over 4-inches in diameter containing wires and cables, under, across or along MBTA Railroad Property, facilities and tracks.

1.02 LICENSE TO ENTER RAILROAD PROPERTY

A. Entry upon MBTA Railroad Property for the purpose of conducting surveys, field inspections, obtaining soil information, or any other purpose associated with the design and engineering of the proposed occupancy, will be authorized by an MBTA License for Entry (See "Guidelines and Procedures for Construction on MBTA Railroad Property").

B. Issuance of the License does not constitute authority to proceed with the actual construction.

1.03 WORK ON RAILROAD PROPERTY

A. The safety and continuity of train operations shall be the first priority. The Applicant shall arrange the work so that the trains will be protected and safeguarded at all times. Whenever the work may affect the safety and movement of trains, the method, sequence and time schedule of performing such work shall be submitted to the Director of Engineering for MBTA Railroad Operations or their authorized representative for approval.

B. The Applicant waives all claims against the Railroad Company(s) and/or the MBTA for delays or any interference occasioned by railroad traffic or railroad maintenance.

C. All Applicant-designed temporary construction on MBTA Railroad Property shall be designed in accordance with the appropriate railroad criteria and all construction performed on, over, under, within or adjacent to MBTA Railroad Property will be subject to the inspection and approval of the Railroad Company(s) and/or MBTA.

D. A minimum of fourteen (14) days advance written notice shall be given to the Railroad Company(s) prior to construction related activities.

E. The Railroad Company(s) will furnish such qualified flagmen, signalmen or protection men as may be required to insure complete

protection of train operations and railroad facilities. The need for this type of service will be determined by the Railroad Company(s) on the basis of railroad regulations and the Applicant's approved construction schedule. No work shall proceed without proper protection on the site.

F. All expenses incurred in connection with protection of railroad facilities by Railroad Company(s) employees will be borne by the Applicant. Billings for such service or expense, including labor, materials and equipment will be made directly to the Applicant for payment.

G. During construction, railroad traffic shall be maintained at all times without interruption, except when approved in advance, in writing, by the Director of Engineering for MBTA Railroad Operations or their authorized representative.

H. All construction operations shall be conducted so as not to interfere with, interrupt, or endanger the operation of trains, nor damage, destroy, or endanger the integrity of railroad facilities. All work on or near MBTA Railroad Property shall be conducted in accordance with the Railroad safety rules and regulations. The Applicant shall secure and comply with the Railroad safety rules and shall give written acknowledgment to the Railroad Company(s) that they have been received, read, and understood by the Applicant and their employees. Construction operations will be subject to Railroad Company(s) inspection at any and all times.

I. All cranes, lifts, or other equipment that will be operated in the vicinity of the MBTA's electrification and power transmission facilities shall be electrically grounded as directed by the Railroad Company(s).

J. At all times when the work is progressing, a field supervisor for the work with no less than twelve (12) months experience in the operation of the equipment being used shall be present. Certification of the above must be submitted to the Railroad Company(s).

K. Whenever equipment or personnel are working closer than fifteen (15) feet to the closest rail of an adjacent track, that track shall be considered as being obstructed. As best possible, all construction operations shall be conducted no less than this distance. Construction operations closer than fifteen (15) feet to the closest rail of a track shall be conducted only with the permission of, and as directed by, a qualified Railroad Company(s) employee present at the work site.

L. Crossing of tracks at grade by equipment and personnel is prohibited except by prior arrangement with, and as directed by, the Director of

Engineering for MBTA Railroad Operations or their authorized representative.

M. All tunneling, jacking and boring operations within railroad influence lines will be done on a 24 hour per day basis to minimize Railroad exposure to construction hazards.

1.04 COORDINATION

The Applicant shall coordinate the work with their Contractors, subcontractors, utility companies, governmental units, and any affected Railroad Company(s) with regard to site access, establishment and use of temporary facilities, work schedules, and other elements of the specified work which require interfacing with others.

1.05 LAYOUT OF WORK

The Applicant shall lay out their work true to lines and grades indicated on the Drawings and shall be responsible for all measurements in connection therewith. The Applicant will be held responsible for the execution of the work to such lines and grades indicated on the approved construction Drawings or such other lines and grades as may be directed or established by the Director of Engineering for MBTA Railroad Operations or their authorized representative.

1.06 INDEMNIFICATION AND INSURANCE

See requirements in "Guidelines and Procedures for Construction on MBTA Railroad Property" and "Insurance Specifications."

1.07 SCIENTIFIC OR HISTORIC ARTIFACTS

The Applicant shall immediately notify the Director of Engineering for MBTA Railroad Operations of the discovery of scientific or historical artifacts and shall protect same until identified and removed by the appropriate Authorities exercising jurisdiction.

1.08 RECORD DOCUMENTS

A. The Applicant shall furnish the Railroad Company(s) and the MBTA with one reproducible "As Built" copy of each approved Construction Drawing, marked to indicate all changes and deviations from same.

B. All project record documents shall be received and accepted by the MBTA and the Railroad Company(s) prior to final inspection.

SECTION 2. SUBMITTALS

2.01 APPLICATION FOR OCCUPANCY

The Applicant must agree, upon approval of the construction details by the Director of Engineering for MBTA Railroad Operations, to execute the MBTA Pipeline Occupancy Agreement and pay any required fees and/or rentals outlined therein. Refer to "Guidelines and Procedures for Construction on MBTA Railroad Property" for application policy.

2.02 SUBMISSION OF CONSTRUCTION DRAWINGS AND SPECIFICATIONS

A. Six (6) sets of Drawings and specifications for proposed pipeline occupations shall be submitted to the AGM for Real Estate and Asset Development and meet the approval of the Railroad Company(s) and the MBTA prior to the start of construction. These plans are to be prepared in sizes as small as possible arid are to be folded to an 8-1/2 inch by 11-inch size (folded dimensions) with a 1-1/2 inch margin on the left side and a 1-inch margin on the top.

1. After folding, the title block and other identification of the Drawings shall be visible at the lower right corner, without the necessity of unfolding. Each Drawing shall bear an individually identifying number and an original date, together with subsequent revision dates, clearly identified on the Drawing.
2. All Drawings are to be individually folded or rolled and where more than one Drawing is involved, they shall be assembled into complete sets before submission to the MBTA.

B. Drawings shall be to scale and show the following (see attached Plates).

1. Plan view of proposed pipeline in relation to all railroad facilities.
2. Location of pipe (in feet) from nearest railroad milepost, centerline of a railroad bridge (giving bridge number), or centerline of an existing or former passenger station, or other fixed point. In all cases, the name of the City or Town and County in which the proposed facilities are located must be shown.
3. Profile of ground on centerline of pipe from field survey showing relationship of pipe and casing to ground level, tracks and other facilities. For longitudinal occupations, the profile of adjacent track(s) must be shown.

4. All MBTA property lines. If pipeline is in a public highway, the limits of the right-of-way for the highway shall be clearly indicated with dimensions from centerline.
5. The angle of crossings in relation to centerline of tracks.
6. Location of valves or control stations of the pipeline.
7. "Pipe Crossing Data Sheet" completed and out on Plan.

C. The Drawing must be specific (both on MBTA Railroad Property and under tracks that are not on MBTA Railroad Properly) as to:

1. Method of installations.
2. Size and material of casing pipe.
3. Size and material of carrier pipe.

These items shall not have an alternative.

D. Once an application is approved by the Director of Engineering for MBTA Railroad Operations or their authorized representative, proposed variances from the approved plans, specifications, method of construction, etc., will be resubmitted for approval.

E. Location and dimensions of jacking, boring, or tunneling pits shall be shown with details of their sheeting and shoring. If the bottom of the pit excavation nearest the adjacent track intersects a line from a point 5.5 feet horizontally from center line of adjacent track at the plane of the base of fall drawn on a slope of 2 horizontal to 1 vertical, submit design and details of the pit construction to the MBTA for approval complete with computations prepared by a Registered Professional Engineer. In any event, the face of the pit shall be no less than 25 feet from adjacent track, unless otherwise approved by the Director of Engineering for MBTA Railroad Operations or their authorized representative. Pits shall be fenced, lighted, and otherwise protected as directed by the Railroad Company(s).

F. All Drawings and computations, including those submitted by Contractors, must bear the seal of a Registered Professional Engineer.

G. Computations for all structures involving the support or protection of railroad track, embankment and facilities must be prepared by and bear the seal of a Registered Professional Engineer and shall be submitted within the construction Drawings.

H. When computer calculations are included with design calculations, the following documentation shall be furnished:

1. A synopsis of the computer program(s) stating briefly required input, method of solution, approximations used, second order analysis incorporated, specifications or codes used, cases considered, output generated, extent of previous usage of certification of program(s) and program(s) author.

2. Identification by number, indexing and cross-referencing of all calculation sheets, including supplemental "long-hand" calculation sheets.

3. Fully identified, dimensioned, and annotated diagram of each member or structure being considered.

4. Clear identification and printing of all input and output values, including intermediate values if such values are necessary for orderly review.

5. Identification of the processing unit, input/output devices, storage requirements, etc., if such supplemental information is significant and necessary for evaluation of the submittal.

I. Specifications shall conform to Construction Specifications Institute (CSI) 16 Division, 3-part Section Format.

J. If other than American Railway Engineering Association (AREA), American Society for Testing and Materials (ASTM), or American National Standards Institute (ANSI) specifications are referred to for design, materials or workmanship on the Construction Drawings and specifications for the work, then copies of the applicable sections of such other specifications referred to shall accompany the Construction Drawings and specifications for the work.

SECTION 3. TEMPORARY FACILITIES AND CONTROLS

3.01 REQUIREMENTS OF REGULATORY AGENCIES

Applicant shall:

A. Obtain and pay all costs for required permits for installation and maintenance of temporary facilities and controls.

B. Comply with all applicable Federal, State and local codes, regulations and ordinances.

C. Comply with regulations and requirements of all utility or service companies from which temporary utilities or services are obtained, and pay all costs incurred therewith.

3.02 INSTALLATION AND COORDINATION - GENERAL

Applicant shall:

A. Install all temporary facilities and controls in a neat and orderly manner.

B. Make all temporary facilities structurally and functionally sound throughout.

C. Construct temporary facilities and controls to give continuous service and to provide safe working conditions.

1. Enforce conformance with applicable standards
2. Enforce safe practices.

D. Modify, extend or relocate temporary facilities and controls as work progress requires.

E. Locate temporary facilities and controls to avoid interference with, or hazards to:

1. Work or movement of railroad personnel or traffic.
2. Vehicular traffic.
3. General Public.
4. Work of other contracts.
5. Railroad Passengers.

F. Obtain easements as may be required across non-MBTA Railroad Property.

G. Provide materials for temporary facilities and controls for the purpose intended and shall not violate requirements of applicable codes and shall not create unsafe conditions.

3.03 SANITARY FACILITIES

Prior to the start of work, the Applicant shall furnish necessary toilet conveniences, secluded from public observation. They shall be kept in a clean and sanitary condition and comply with the requirements and regulations of the area in which the work is performed.

3.04 LIGHT AND POWER

Applicant shall make their own arrangements for obtaining temporary light and power as required for the work, and shall maintain such temporary facilities in a proper and safe condition, including compliance with applicable codes.

3.05 TEMPORARY WATER

Applicant shall make their own arrangements for obtaining all temporary water service as required for the work.

3.06 TEMPORARY TRAFFIC CONTROLS

Applicant shall cooperate with the directives of the MBTA and/or Railroad Company(s) regarding vehicular traffic control and provide any temporary controls or devices required to eliminate or minimize congestion or obstruction of vehicular traffic caused by the work, including use of designated routes of ingress and egress from the work area.

3.07 TEMPORARY WORK AND STORAGE AREAS

A. The areas designated by the MBTA as the temporary parking, work and storage area(s) will be provided to the Applicant in accordance with the terms of the MBTA License Agreement.

B. All designated temporary parking, work and storage areas used by the Applicant shall be restored to their original condition prior to completion of the work, subject to inspection and approval of the MBTA and the Railroad Company(s).

3.08 POLLUTION ABATEMENT CONTROLS

Applicant shall:

A. Conduct operations in a manner to minimize pollution of the environment surrounding the area of work by every means possible. Specific controls shall be provided as follows:

1. Vehicles: All vehicles and material transport trucks leaving the site and entering paved public streets shall be cleaned of mud and dirt clinging to the body and wheels of the vehicle. Trucks arriving at or leaving the site with materials shall be loaded in a manner which will prevent dropping of materials or debris on the streets. Spills of materials in public areas shall be removed immediately at no cost to the MBTA or Railroad Company(s).

2. Waste Materials: No waste or erosion materials shall be allowed to enter natural or man-made water or sewage removal systems. Erosion materials from excavations, borrow areas or stockpiled fill shall be contained within the work area. The Applicant shall develop methods for control of waste and erosion which shall include such means as filtration, settlement and manual removal to satisfy the above requirements. Do not dispose of machinery lubricants, fuels, coolants and solvents on the site. If hazardous waste is encountered, the Applicant shall dispose of it in accordance with all federal, state and local codes. Verification of proper disposal must be provided, in writing, to the MBTA and the Railroad Company(s).

3. Burning: No burning of waste shall be allowed without prior written permission. In cases where permission is granted, burning shall be conducted in accordance with the regulations of the appropriate jurisdictional agency.

4. Dust Control: The Applicant shall at all times control the generation of dust by their operations. Control of dust is mandatory and shall be accomplished by water sprinkling or by other methods approved by the MBTA or Railroad Company(s).

5. Noise Control: The Applicant shall take every action possible to minimize the noise caused by their operation. When required by agencies having jurisdiction, noise producing work shall be performed during less sensitive hours of the day or week as directed by the MBTA or Railroad Company(s) or as required by local ordinance.

6. Environmental: All local and state environmental laws will be strictly adhered to. All applications, permits, licenses, approvals, etc., will be the sole responsibility of the Applicant.

B. Submit a program for pollution control with applicable licenses and permits for all piping carrying non-potable liquids, gases or other pollutants.

3.09 PROTECTION OF PERSONS AND PROPERTY

A. Safety Requirements

1. The Applicant must adhere to the most stringent provisions of the applicable statutes and regulations of the political subdivision in which the work is being performed. The Applicant must also observe the Department of Labor-

Occupational Safety, Health Administration provision, pertaining to the safe performance of the work, and further, the methods of performing the work must not involve undue danger to the personnel employed thereon, Railroad Company(s) employees, the public, or to public and private property. Should charges of violation of any of the above be issued to the Applicant in the course of the work, a copy of each charge shall immediately be forwarded to the Railroad Company(s). The Applicant shall pay all fines and penalties levied against him.

2. The Applicant shall erect and maintain, as required by existing conditions and progress of the work, all reasonable safeguards for safety and protection. This includes posting danger signs and other warnings against hazards, promulgating safety regulations and notifying owners and users of adjacent utilities.

B. Safety of Persons and Property - The Applicant shall take all reasonable precautions for the safety of, and shall provide all reasonable protection to prevent damage, injury or loss to:

1. All employees on the work site and all other persons who may be affected.

2. All materials and equipment, whether in storage on or off the site, under the care, custody or control of the Contractor or any of their subcontractors.

3. Other property at the site or adjacent thereto, including walks, pavements, roadways, structures, and utilities not designated for removal, relocation or replacement in the course of construction. Any damage to such items shall be restored to original condition by the Applicant at no cost to the MBTA or Railroad Company(s).

C. First Aid

The Applicant shall maintain adequate first aid supplies at the site as prescribed by Federal, State or Local codes and regulations.

D. Use of Explosives

Non blasting methods are preferred. See "Blasting Specifications."

E. Site Security

The Applicant shall:

1. Maintain a secure work site protecting the MBTA and the Railroad Company(s) interests and property from claims arising from trespass, theft and vandalism.

2. Permit access to the work site only to employees, Contractors and those persons having business related to the work.

3. Provide security measures as required to protect Contractor or subcontractor's tools, equipment and property from damage, theft or vandalism.

4. Assume all costs for any MBTA and/or local police details required by the work.

3.10 VERMIN CONTROL

A. Do not permit food scraps, lunch bags, food wrappers or other items which would attract rats or other vermin to be left lying around the site. Deposit such items in closed, rat-proof metal containers for disposal on a regular basis.

B. The Applicant must provide vermin control as required by the MBTA or Railroad Company(s).

3.11 RUBBISH AND DEBRIS REMOVAL

A. Rubbish and debris resulting from the work must be neatly piled in a single location and legally disposed of at least once a week. If rubbish or debris interferes with railroad activities, or creates a fire or safety hazard, it must be removed on a more frequent basis.

B. Volatile waste such as mineral spirits, oil, or paint thinner shall not be disposed of in storm or sanitary drains, streams or waterways or any location upon the site.

SECTION 4. PIPELINE OCCUPANCY GENERAL CRITERIA

GENERAL:

4.01 METHOD OF INSTALLATION:

A In a public way:

1. No work shall be done without a Railroad Company(s) Inspector present.

2. Open cuts will not be allowed in or immediately adjacent to an at

grade crossing. Sleeves will be installed by the jerking method, unless otherwise approved by the Director of Engineering for MBTA Railroad Operations.

3. Jerking is the preferred method of installation in or immediately adjacent to and at grade crossing. The sleeve may be installed by the open cut method with the Applicant paying for the complete rebuilding of the crossing, pending approval of the Director of Engineering for MBTA Railroad Operations. Approval will be given only under very unusual circumstances.

4. Jacking is the preferred method of installation in or immediately adjacent to and at grade crossing scheduled for rebuilding. The sleeve may be installed by the open cut method within seven (7) calendar days of the scheduled date of the crossing reconstruction. In the case of any open cut, strict adherence shall be made to the backfill specifications which provide the MBTA with written certification from a testing lab or Professional Engineer, that the backfill density requirements of the MBTA specifications have been met or exceeded.

B. Not within a Public Way:

The preferred method of crossing the railroad is by jacking of a pipe sleeve under the railroad. Only upon written request, will an alternate of open cut be given consideration. The engineering decision shall be based upon, but not limited to, the following: (1) track usage, (2) depth of cut, (3) soil conditions, (4) physical restraints. In the event an open cut is allowed, the following items shall be adhered to, and (5) any other circumstances which may necessitate an open cut.

1. The installation is to be a continuous operation and performed according to an MBTA approved schedule.

2. No work shall be done without a Railroad Company(s) Inspector present.

3. MBTA backfill specifications by the Owner or its Contractor.

4. The Owner or its Contractor may be required to provide a non-refundable lump sum payment for "after the fact maintenance." The determination of this amount is based on the individual situation. No work will be allowed until this payment is received. This payment is not to be confused with payments for Drawings and specification review, flagging, inspection, etc. (also required from the Owner or its Contractor before they enter upon MBTA property.)

4.02 GENERAL REQUIREMENTS

A. Pipelines under or across MBTA tracks on rights-of-way shall be encased in a larger pipe or conduit called the casing pipe as indicated in Plate II.

B. Casing pipe will be required for all pipelines carrying oil, gas, petroleum products, or other flammable, highly volatile substances which, from their nature or pressure, might cause damage if escaping on or near MBTA Railroad Property.

C. For non-pressure sewer or drainage crossings where the installation can be made without interference to railroad operations, the casing pipe may be omitted when the pipe strength is capable of withstanding railroad loading. This type of installation must be approved by the Director of Engineering for MBTA Railroad Operations.

D. The casing pipe shall be laid across the entire width of the right-of-way. Casing pipe shall extend beyond the right-of-way when the right-of-way line on either side of the tracks is less than the minimum length of casing specified in Section 6, Para. 6.01(E).

E. Pipelines laid longitudinally on railroad right-of-way shall be located in accordance with Plate III. If located within 25 feet of the closest rail of any track or closer than 45 feet to nearest point of any bridge, building or other structure, the carrier pipe shall be encased.

F. Where practicable, pipelines shall be located to cross the tracks at approximate right angles, but preferably at not less than 45 degrees.

G. Pipelines shall not be placed within a culvert, under railroad bridges, or closer than 45 feet to any portion of a railroad bridge, building, or other structure, except in special cases, and then by special design, as approved by the Director of Engineering for MBTA Railroad Operations.

H. Pipelines carrying liquefied petroleum gas shall, where practicable, cross the railroad where tracks are carried on embankment.

I. Any replacement or modification of an existing carrier pipe and/or casing shall be considered a new installation, subject to the requirements of these Specifications.

J. Where laws or orders of public authority prescribe a higher degree of protection than specified herein, the higher degree so prescribed shall be deemed a part of these Specifications.

K. Pipelines and casings shall be suitably insulated from underground conduits carrying electric wires on MBTA Railroad Property.

4.03 INSPECTION AND TESTING

For pipelines carrying flammable or hazardous materials, ANSI Codes B 31.8 and B 31.4, current at time of constructing the pipeline, shall govern the inspection and testing of the facility on MBTA Railroad Property, except that proof-testing of strength of carrier pipe shall be in accordance with the requirements of ANSI Code B 31.4, as applicable, for all pipelines carrying all liquefied petroleum gas, natural or manufactured gas, and other flammable substances.

4.04 CATHODIC PROTECTION

A. Cathodic protection shall be applied to all pipelines and casings carrying flammable substances.

B. Where casing and/or carrier pipe is cathodically protected by other than anodes, the Director of Engineering for MBTA Railroad Operations shall be notified and suitable testing shall be made. This testing shall be witnessed by the Railroad Company(s) to insure that other railroad structures and facilities are adequately protected from the cathodic current in accordance with the recommendations of Reports of Correlating Committee on Cathodic Protection, current issue by the National Association of Corrosion Engineers.

4.05 SOIL INVESTIGATIONS

A. Soil borings (or other soil investigations approved by the Railroad Company(s) will be performed to determine the nature of the underlying material for all pipe crossings under tracks. See Test Boring Specifications.

B. Borings shall be made on each side of the tracks, on the centerline of the pipe crossing, and as close to the tracks as practicable.

C. Soil borings shall be in accordance with the current issue of the American Railway Engineering Association Specifications, Chapter 1, Part 1, "Specifications for Test Borings". Soils shall be investigated by the split- spoon and/or thin-walled tube method and rock shall be investigated by the Boring method specified therein.

D. Soil boring logs shall clearly indicate all of the following:

1. Boring number as shown on boring location Drawing.

2. Elevation of ground at boring, using same datum as the pipeline Construction Drawings.

3. Description or soil classification of soils and rock encountered.

4. Elevations or depth from surface for each change in strata.

5. Identification of where samples were taken and percentage of recovery.

6. Location of ground water at time of sampling and, if available, subsequent readings.

7. Natural dry density in lbs./sq.ft. for all strata.

8. Unconfined compressive strength in tons/sq.ft., for all strata.

9. Water content (percent). Liquid limit (percent) and plastic limit (percent).

10. Standard penetration in blows/ft.

E. The location of the carrier pipe and casing shall be superimposed on the boring logs before submission to the Director of Engineering for MBTA Railroad Operations.

F. Soil investigation by auger, wash, or rotary drilling method is not acceptable.

G. Soil boring logs shall be accompanied by a Drawing drawn to scale showing location of borings in relation to the tracks and the proposed pipe location, the elevation of around surface at each boring, and the elevation of the base of rail of the tracks.

4.06 GROUND STABILIZATION

Soil stabilization shall take place prior to the start of jacking. Stabilization shall be achieved by dewatering, grouting or a combination of both to maintain the stability of the face of the heading.

A. The Owner or its Contractor shall lower and maintain the ground water level a minimum of two (2) feet below the invert at all times during construction by well points, vacuum well points, or deep wells to prevent inflow of water and/or soil into the heading. Ground water observation wells shall be installed in the area to be dewatered to demonstrate that the dewatering requirements are being complied with.

B. The grouting Contractor shall be a specialist in the field with a minimum

of five (5) continuous years of successfully grouting soils. All granular soils (silty sands, sand or sand and gravel) shall be stabilized by injection of a cement or chemical grout from the ground surface or from the pipe heading. The stabilization shall extend as far as necessary outside the periphery of the casing pipe in order to maintain a stable face at the heading.

C. Railroad Company(s) forces will survey the crossing prior to, during and after construction. If it is necessary to align or surface the tracks as a result of construction, the Railroad Company(s) will perform the work at the expense of the Owner or the Owner's Contractor.

4.07 SUPPORT OF TRACKS

A. When jacking, boring, or tunneling, temporary track support structures shall be installed. The track support structures shall be provided by the Applicant and installed by the Railroad Company(s) at the Applicant's expense. The Contractors proposed type of temporary track support structures shall be subject to the approval of the Railroad Company(s)'

B. All work involving rail, signals, ties and other track material will be performed by the Railroad Company(s) at the Applicant's expense.

C. The Applicant shall deliver the track support structures to a site approved by the Railroad Company(s). Provisions for unloading shall be provided by the Applicant at no expense to the Railroad Company(s) and the Applicant shall provide the necessary labor to handle the material for pre-installation inventory.

4.08 GEOTECHNICAL MONITORING

THE FOLLOWING SPECIFICATIONS ARE REQUIRED FOR ALL PIPE JACKING OPERATIONS.

A. Jacking shall be performed on a continuous basis, 24 hours per day, and 7 days per week.

B. The monitoring points shall be set up one week before the jacking operation begins. The MBTA and Railroad Company(s) shall be notified. Elevation readings shall begin two days prior to the start of jacking and continue for a minimum of two weeks after the completion of the jacking operation. Initial readings immediately after any surfacing operations shall serve as new baseline figures. All future elevation readings shall be compared to the adjusted baseline. If the

track deviates to a condition not acceptable to the MBTA or Railroad Company(s), corrections shall be made at the proponent's expense.

C. Elevation readings shall be taken from the top rail of each track.

D. Elevation readings shall be taken every four hours or two times per shift, i.e., six times per day. The readings shall be faxed to the MBTA and Railroad Company(s) on a daily basis and all information is to be presented in legible print. Additional readings may be required by the MBTA or Railroad Company(s).

E. Stations shall be spaced at 15-1/2 foot intervals. The number of stations required shall be determined by the depth of the pipe. There shall be a minimum of two stations on either side of the centerline jacking. Additional stations may be required at the discretion of the MBTA or Railroad Company(s),

F. Elevation readings must show the date, time, weather conditions and temperature. Each reading must also provide the following information: track number, compass direction, station number, base elevation (with date), static elevation, change in elevation (recorded in hundredths and in inches), dynamic reading and total deflection in inches. See sample sheet attached.

G. Station "0" shall be located at the centerline of the pipe jacking with Stations 1 and being to the right and Stations -1 and -2 being to the left when standing in the gauge of the near track and looking at the receiving pit. In multiple track areas the stations as determined herein are to be carried across each track perpendicular to the near track.

H. Elevation readings taken from the top of the rail for static measurement and the dynamic readings shall be combined and the sum compared to the adjusted baseline. This reading will demonstrate the difference in elevation caused by the jacking operation.

I. The MBTA requires that the truck be maintained at all times within established criteria for the specific track classification. At the completion of the project the requirement for tamping and realigning the tracks, caused by the settlement from the construction activity, remains with the Contractor for the duration as specified by the MBTA in their initial review of the work plans. This tamping and track realignment will be performed by the MBTA or Railroad Company(s) at the sole expense of the Contractor.

4.09 PIPELINES ON BRIDGES

A. Pipelines carrying flammable or non-flammable substances which by their nature might cause damage if escaping on or near railroad facilities or personnel shall not be installed on bridges over railroad tracks or bridges carting railroad tracks.

B. The Director of Engineering for MBTA Railroad Operations may approve such an installation when it is demonstrated that no practicable alternative is available.

C. When allowed by the Director of Engineering for MBTA Railroad Operations, pipelines on bridges shall be located in a way to minimize the possibility of damage from vehicles, railroad equipment, vandalism and other external causes. Pipelines on bridges may be installed in a utility bay that is constructed between the girders of the bridge. The utility bay shall be protected from the environment by a removable shield bolted to the girders. This will allow utility companies to comply with the Code of Federal Regulations for Periodic Inspection.

D. In the event of pipe relocation due to the reconstruction of a bridge, the installation of the new pipe must comply with the requirements in these Specifications.

4.10 BONDING AND GROUNDING OF PIPELINES IN ELECTRIFIED TERRITORY

A. Carrier pipe shall be enclosed in a metal casing that is isolated from carrier pipe by approved insulators having a dielectric value of not less than 25 kV that provide an air gap between carrier pipe and casing of not less than 2 inches.

B. Carrier pipe supporting hangers, mountings or cradles shall provide an insulation value of not less than 25 kV and an air gap of not less than 2 inches between casing and any portion of mounting assembly.

C. Any grounding or isolation methods used must have a minimum dielectric of 25,000 volts.

4.11 ABANDONED PIPELINES OR FACILITIES

A. For all pipeline occupations on the railroad right-of-way, the owner of the pipeline shall notify the MBTA, in writing, of the intention to abandon the pipeline. Upon abandonment the carrier pipe shall be removed and the casing shall be filled with cement grout, compacted sand or other material approved by the Director of Engineering for

MBTA Railroad Operations. If it is impractical to remove the carrier pipe, then the carrier must be filled along with the annular space between the casing and carrier.

B. Facilities other than pipelines shall be removed or altered at abandonment to the satisfaction of the Director of Engineering for MBTA Railroad Operations.

4.12 DRAINAGE

A. Occupancies shall be designed, and constructed, so that adequate and uninterrupted drainage of railroad right-of-way is maintained. If it becomes necessary to block a ditch, pipe or other drainage facility, the applicant shall install temporary pipes, ditches or other drainage facilities as required to maintain adequate drainage, as approved by the MBTA or Railroad Company(s). Upon completion of the work, the temporary drainage facilities shall be removed and the permanent facilities restored.

B. Water may not be pumped or disposed of onto railroad rights-of-way unless discharged into an existing drainage facility, providing discharge does not cause erosion or leave sediment.

C. When water runoff is disposed of onto MBTA Railroad Property, it must be demonstrated to the Railroad Company(s) that the existing drainage facility can accommodate the increased runoff. Drainage calculations stamped by a Registered Professional Engineer must accompany all requests to use railroad culverts or drainage ditches.

D. If in the estimation of the Director of Engineering for MBTA Railroad Operations or their authorized representative, the railroad culvert or drainage ditch has to be cleaned in order to allow the increased flow to safely pass through the culvert, it must be cleaned at the expense of the applicant.

SECTION 5. CARRIER PIPE

GENERAL:

5.01 DESIGN CRITERIA

A. If the maximum allowable stress in the carrier pipe on either side of the occupancy of MBTA Railroad Property is less than specified herein, the carrier pipe on MBTA Railroad Property shall be designed at the same stress as the adjacent carrier pipe.

B. Requirements for carrier pipe under railroad tracks shall apply for a minimum distance equal to that of the casing pipe.

C. Carrier pipes within a casing shall be designed for railroad live loads as if they were not encased.

D. All pipes, ditches and other structures carrying surface drainage on MBTA Railroad Property and/or crossing under railroad tracks shall be designed to carry the run-off from a one hundred (100) year storm. Computations indicating this design and suitable topographic plans, prepared by a Registered Professional Engineer, shall be submitted to the Director of Engineering for MBTA Railroad Operations, or their authorized representative, for approval. If the drainage is to discharge into an existing drainage channel on railroad right- of-way and/or under railroad tracks, the computations should include the hydraulic analysis of any existing structures. Submitted with the computations should be formal approval of the proposed design by the appropriate governmental agency.

PRODUCTS:

5.02 GENERAL

A. All pipes shall be designed for the external and internal loads to which they will be subjected. The dead load of earth shall be considered 120 pounds per cubic foot. Railroad live loading shall be Cooper's E-8O with 50% added for impact. On railroad right-of-way or where railroad loading will be experienced, the following shall be the minimum requirements for carrier pipes:

1. Reinforced concrete pipe - ASTM Spec. C-76, Class V, Wall C.
2. Ductile Iron Pipe - For Culverts and Gravity Sewers - ASTM Spec, A-142 Extra Heavy.

5.03 OIL AND GAS PIPES

A. Pipelines carrying oil, liquefied petroleum gas, natural or manufactured gas and other flammable products shall conform to the requirements of the current ANSI B 31.4, with Addenda, "Liquefied Petroleum Transportation Piping Systems," ANSI B 31.8, "Gas Transmission and Distribution Piping Systems," and other applicable ANSI codes, except that the minimum allowable stresses for the design of steel pipe shall not exceed the following percentages of the specified minimum yield strength (multiplied by the longitudinal joint factor) of the pipe as defined in the ANSI Codes:

1. Steel pipe within a casing under, across and longitudinally on MBTA Railroad Property. (The following percentages apply to hoop stress):

   a. Seventy-two percent for installation on oil pipelines.

   b. Fifty percent for pipelines carrying liquefied petroleum gas and other flammable Liquids with low flash point.

   c. Sixty percent for installations on gas pipelines.

2. Steel pipe without a casing laid longitudinally on MBTA Railroad Property. (The following percentages apply to hoop stress):

   a. Sixty percent for installations on oil pipelines.

   b. Forty percent for pipelines carrying liquefied petroleum gas and other flammable Liquids with low flash point.

   c. Forty percent for installations on gas pipelines.

B. Design computations showing compliance with the requirements of Paragraph 5.03(A) above, and prepared by a Registered Professional Engineer, shall accompany the application for occupancy.

5.04 CAST IRON PIPE: For water and other materials under pressure shall conform to the current ANSI specifications A-21 Series 21/45 Iron strength with plain end, compression type or mechanical joints. The strength to sustain external railroad and other loadings shall be computed in accordance with the current ANSI A-21.1 “Thickness Design of Cast Iron Pipe."

5.05 VITRIFIED CLAY PIPE: ASTM Spec C-700, Extra Strength.

5.06 CORRUGATED METAL PIPE: AREA Spec Chapter I, Part 4

5.07 ASBESTOS CEMENT PIPE (Non-pressure): ASTM Spec. C-428, C1. 5000 Min. Pressure: AWWA Spec. C400, C1. 150 Min.

5.08 OTHER: Other miscellaneous piping not specified above shall be submitted to approval by the Director of Engineering for MBTA Railroad Operations.

5.09 SHUT-OFF VALVE

A. Provide accessible emergency shut-off valves at each side of the railroad within distances and at locations as directed by the Chief Engineering Officer.

B. Where pipelines are provided with automatic control stations and within distances approved by the Director of Engineering for MBTA Railroad Operations, no additional valves will be required.

5.10 SIGNS

A. Prominently identify all pipelines at rights-of-way by durable, weatherproof signs located over the centerline of the pipe. Mark pipelines at under crossings on both sides of track. Signs shall display the following:

1. Name and address of pipeline Owner.
2. Contents of Pipe.
3. Pressure in Pipe.
4. Depth below grade at point of sign.
5. Emergency telephone in event of pipe rupture.
6. Railroad File Number.

B. For pipelines running longitudinally on MBTA Railroad Property, place signs over the pipe (or offset and appropriately mark) at all changes in direction the pipeline. Locate signs so that when standing at one sign, the next adjacent marker in either direction is visible. In no event shall pipeline identification signs be placed more than 500 feet apart, unless otherwise directed by the Director of Engineering for MBTA Railroad Operations.

C. Submit details of signs (materials, size, methods of support, etc.) to the Director of Engineering for MBTA Railroad Operations for approval.

EXECUTION:

5.11 INSTALLATION:

A. Install carrier pipes in accordance with approved Construction Drawings, requirements of this specification, and all applicable codes and ordinances.

B. Install carrier pipes with sufficient slack so they are not in tension.

SECTION 6. CASING PIPE

GENERAL:

6.01 DESIGN CRITERIA

A. Casing pipe and joints shall be of metal and of leak-proof construction.

B. Casing pipe shall be designed for the earth and/or other pressures present, and for railroad live load. The dead load of earth shall be considered 120 pounds per cubic foot. Railroad Live load shall be Cooper E-80 with 50g added for impact.

C. The inside diameter of the casing pipe shall be such as to allow the carrier pipe to be removed subsequently without disturbing the casing or the roadbed. For carrier pipe less than six (6) inches in diameter, the inside diameter of the casing pipe shall be at least two (2) inches greater than the largest outside diameter of the carrier pipe joints or couplings. For carrier pipe six (6) inches and over in diameter, the inside diameter of the carrier pipe shall be at least four (4) inches greater than the largest outside diameter of the carrier pipe joints or couplings.

D. For flexible casing pipe, a minimum vertical deflection of 3 percent of its diameter, plus 1/2 inch, shall be provided so that no loads from the roadbed, track, traffic or casing pipe itself are transmitted to the carrier pipe. When insulators are used on the carrier pipe, the inside diameter of the flexible casing pipe shall be at least two (2) inches greater than the outside diameter of the carrier pipe for pipe less than eight (8) inches in diameter; at least 3-
1/4 inches greater for pipe 8 to 16 inches in diameter, and at least 4-1/2 inches greater for pipe 18 inches and over in diameter. In no event shall the casing pipe diameter be greater than is necessary to permit the insertion of the carrier pipe.

E. Casing pipe under railroad tracks and across MBTA Railroad Property shall extend the greater of the following distances, measured at right angles to centerline of track:

1. Across the entire width of MBTA Railroad Property.
2. Two (2) feet beyond ditch line.
3. Three (3) feet beyond toe of slope.
4. A minimum distance of 25 feet each side from centerline of outside track when casing is sealed at both ends.
5. A minimum distance of 45 feet from centerline of outside track when casing is open at both ends.

F. If additional tracks are constructed in the future, the casing shall be extended at the expense of the Applicant.

G. Table of Live Loads

LIVE LOADS, INCLUDING IMPACT, FOR VARIOUS HEIGHTS OF COVER FOR COOPER E- 80

COVER (FT) LOAD (PSF)	COVER (FT) LOAD (PSF)	COVER (FT) LOAD (PSF)
2 ….. 3800	10 1100	20 300
5 2400	12 800	30 100
8 1600	15 600	

6.02 PROTECTION AT ENDS OF CASING

A. Casings for carriers of flammable substances shall be sealed to the outside of the carrier pipe. Details of seals shall be shown on the Drawings.

B. Casings for carriers of non-flammable substances shall have both ends of the casing blocked in such a way as to prevent the entrance of foreign material, but allowing leakage to pass in the event of a carrier break.

C. Where ends of casing are at or above ground surface and above high water level, they may be left open, provided drainage is afforded in such a manner that leakage will be conducted away from railroad tracks and structures.

6.03 VENTS

A. Sealed casings for flammable substances shall be properly vented. Vent pipes shall be of sufficient diameter, but in no case less than two (2) inches in diameter, and shall be attached near each end of the casing and project through the ground surface at right-of-way lines or not less than 45 feet (measured at right angles from centerline of nearest track).

B. Vent pipes shall extend at least four (4) feet above the ground surface. Top of vent pipe shall have a down-turned elbow, properly screened, or a relief valve. Vents in locations subject to high water shall be extended above the maximum elevation of high water and shall be supported and protected in a manner approved by the Director of Engineering for MBTA Railroad Operations.

C. Vent pipes shall be at least four (4) feet from the closest aerial electric

wires.

D. When the pipeline is in a public highway, street-type vents shall be installed.

PRODUCTS:

6.04 STEEL PIPE

The minimum yield strength for steel pipe shall be 35,000psi. Smooth wall pipes with a nominal diameter greater than 70 inches require special approval by the Director of Engineering for MBTA Railroad Operations. See Plate V, "Table of Minimal Wall Thickness for Steel Casing Pipe."

6.05 CAST IRON PIPE

May be used for a casing, provided the method of installation is by open trench. Cast iron pipe shall conform to ASTM Specification A-142, Extra Heavy. The pipe shall be of the mechanical joint type or plain end type with compression type couplings.

6.06 CORRUGATED METAL PIPE AND CORRUGATED STRUCTURAL PLATE PIPE

May be used for casing only when emplaced by the open-cut method. Jacking or boring through railroad embankment is not permitted. Pipe shall be bituminous coated and shall conform to AREA Specifications Chapter 1, Part 4.

6.07 REINFORCED CONCRETE PIPE

Shall conform to ASTM Specification C 76, Class V, Wall C. It shall be used only in the open cut and jacking methods of installation. If concrete pipe is to be jacked into place, grout holes tapped for at least 1-1/2 inch pipe spaced at approximately 8 feet around the circumference and approximately 4 feet longitudinally shall be cast into the pipe at manufacture. Immediately upon completion of jacking operations, the installation shall be pressure grouted.

6.08 TUNNEL LINER PLATES

Shall be four flange and otherwise conform to American Railway Engineering Association Specifications Chapter 1, Part 4. In no event shall the liner plate thickness be less than 0.1046 inches. Tunnel liner plates are to be used only to maintain a tunneled opening until the carrier pipe is installed. After installation the annular space between the carrier and liner must be filled

with 1:6 cement grout or lined with 6 inches of concrete, reinforced with 6x6-6/6 wire mesh for tunnels up to 108 inches in diameter. Required thickness of lining for larger tunnels shall be determined by span and structural analysis. Manufacturer's Shop Detail Drawings and manufactures computations showing the ability of the tunnel liner plates to resist the jacking stresses shall be submitted to the Director of Engineering for MBTA Railroad Operations for approval.

EXECUTION:

6.09 DEPTH OF INSTALLATION:

A. Casing pipe under railroad tracks and across MBTA Railroad Property shall be at least 6-1/2 feet from top of rail to top of casing at its closest point. Under secondary or industrial tracks this distance shall be at least 5-1/2 feet. On other portions of MBTA Railroad Property where casing is not directly beneath any track, the depth from ground surface or from bottom of ditches to top of casing shall be at least four (4) feet, unless otherwise specified herein.

B. Pipelines laid longitudinally on MBTA Railroad Property 50 feet or less from centerline of track shall be buried not less than five (5) feet from ground surface to top of pipe. This applies to all pipelines carrying oil, gas, petroleum products, or other flammable or highly volatile substances under pressure, and all non-flammable substances which by their nature or presence in the judgment of the Director of Engineering for MBTA Railroad Operations may be hazardous to life or property. For pipelines carrying water, sewage and non-flammable substances, the distance from surface of ground to top of pipe shall not be less than four (4) feet.

C. Pipelines located within the line of track live load influence (as shown on Plates II and III) are subject to railroad loading and require a casing or are to be of special design approved by the Director of Engineering for MBTA Railroad Operations. All longitudinal occupation locations must be approved by the Chief Engineering Officer.

D. The minimum cover shall be at least three (3) feet when pipeline is laid more than 50 feet from center line of track.

E. Pipelines installed under or adjacent to any overhead structure must be a minimum of 29 feet from the bottom of the structure to the top of the casing. Such installations must comply with the above requirements.

6.10 METHOD OF INSTALLATION

A. The Owner or its Contractor shall submit to the Director of Engineering for MBTA Railroad Operations, data and information demonstrating that the Contractor or their subcontractors have had successful previous experience in jacking, or using the proposed method of installation, in similar situations.

B. Before any work is begun within the limits of jacking, the Owner or its Contractor shall have assembled all tools, materials, and equipment which will be required. When the Owner or its Contractor has started the jacking operation, they shall proceed in a continuous operation without stopping. This will minimize the tendency of the material to freeze around the pipe.

C. A jacking shield shall be used and jacked ahead of the casing pipe. The excavation within the jacking pipe should not advance beyond the head of the pipe shield. If the stability at the face needs to be maintained from raveling or running soil, suitable temporary bulkheads, struts, and bracing shall be required. After completion of the sleeve installation the annular space around it shall be completely grouted with cement grout under pressure.

D. Casing pipe ends shall be beveled with a single V-groove toe field welding. Pipe joints shall be butt welded and shall be a full penetration on the outside circumference of the pipe. The single V-groove butt weld shall conform to the latest A.W.S. Welding Code. All joints of the easing pipe shall be butt welded, by a certified welder, prior to being subject to the jacking operation.

Alternate method: The casing pipe may be jacked without being butt welded through the use of a continuous 1/2"x12" interior collar plate. The collar plate shall be welded completely upon completion of the jacking operation. All welding shall conform to the latest A.W.S. Welding Code, and shall be performed by a certified welder.

6.11 CONSTRUCTION:

A. The casing pipe shall be constructed so as to prevent leakage of any substance from the casing throughout its length, except where the ends are left open, or through vent pipes when the ends are sealed. The casing shall be installed so as to prevent the formation of a waterway under the railroad, shall have an even bearing throughout its length, and shall slope to one end (except for longitudinal occupancy).

B. Casing pipes shall be installed by the following methods:

1. Jacking

   a. This method shall be in accordance with the most current edition of the American Railway Engineering Association Specifications, “Jacking Culvert Pipe Through Fills." This operation shall be conducted without hand mining ahead of the pipe and without the use of any type of boring, auguring, or drilling equipment.

   b. Bracing and backstops shall be designed and jacks of sufficient rating used so that the jacking will be continuous.

2. Drilling

   This method employs the use of an oil field type rock roller bit or a plate bit made up of individual roger cutter units which are welded to the pipe casing being installed and which are turned as it is advanced. The pipe is turned for its entire length from the drilling machine to the ground being drilled. A high density slurry is injected through a small supply line to the head which acts as a cutter lubricant. This slurry is injected at the rear of the cutter units to prevent any jetting action ahead of the pipe. The drilling machine runs on a set of steel rails and is advanced (thus advancing the pipe) by a set of hydraulic jacks. The method is the same whether earth or rock is being drilled. Any other drilling methods shall be submitted to the Director of Engineering for MBTA Railroad Operations for approval.

3. Tunneling

   a. Tunneling operations shall be conducted as approved by the Railroad Company(s). Care shall be exercised in trimming the surface of the excavated section in order that the steel liner plates fit snugly against the undisturbed material. Excavation shall not be advanced ahead of the previously installed liner plates any more than is necessary for the installation of the succeeding liner plate. The vertical face of the excavation shall be supported as necessary to prevent sloughing. At any interruption of the tunneling operation, the heading shall be completely bulkheaded. Tunneling shall be conducted continuously, on a 24 hour basis until the tunnel liners extend at least one foot beyond the railroad line of influence.

   b. When tunneling, tight breasting must be maintained around the entire face. On any shutdowns (under or beyond railroad influence line, see Plate II), the entire

face shall be fully breasted and packed with hay.

c. The tail void shall be filled with pea stone (or other approved material) simultaneously with each advancement of the shield.

d. An ample supply of hay and/or sandbags must be kept at the site to fill any voids caused by the removal of large stones or other obstructions extending outside the shield.

e. A uniform mixture of 1:6 cement grout shall be placed under pressure behind the liner plates, in addition to the previously placed pea stone. Grout holes, tapped for at least 1-1/2 inch pipe and spaced 3 feet around the tunnel liner, shall be placed in every other ring. Grouting shall start at the lowest dole and proceed upwards. A threaded plug shall be installed in each grout hole as the grunting is completed at that hole.

f. Grouting shall be kept as close to the heading as possible, using grout stops behind the liner plates. If necessary, grouting shall proceed as directed by the Railroad Company(s), but in no event shall more than six lineal feet of tunnel be progressed beyond the grouting.

4. Tunneling Shields

a. All pipes 70 inches and larger in diameter shall be emplaced with the use of a tunneling shield, unless otherwise approved by the Director of Engineering for MBTA Railroad Operations. Pipes of smaller diameter may also require a shield when, at the sole discretion of the Director of Engineering for MBTA Railroad Operations, soil, or other conditions indicate its need.

b. The shield shall be of steel construction, designed to support railroad track loading as specified in Paragraph 6.01 B herein, in addition to other loadings it must sustain. The advancing face shall be provided with a hood, extending no less than 20 inches beyond the face and extending around no less than the upper 240 degrees of the total circumference. Installations made with linear plates shall be provided with a full 360 degree shield. It shall be of sufficient length to permit the installation of at least one complete ring of liner plates within the shield before it is advanced for the installation of the next ring of liner plates, It shall conform to and not exceed the outside dimensions of the pipe being emplaced by more than one inch at any point in the periphery.

c. The shield must be adequately braced and provided with necessary appurtenances for completely bulkheading the face with horizontal breastboards, and arrange so that the excavation can be benched as may be necessary. Excavation shall not be advanced beyond the edge of the hood, unless otherwise approved by the Railroad Company(s).

d. Manufacturer's Shop Detail Drawings and computations showing the ability of the tunnel liner plates to resist the jacking stresses shall be submitted to the Director of Engineering for MBTA Railroad Operations for approval.

e. For jacking reinforced concrete pipe, the shield shall be fabricated as a special section of reinforced concrete pipe with the steel cutting edge, hood, breasting attachments, etc., cast into the pipe. The wall thickness and reinforcing shall be designed for the jacking stresses.

f. Grout holes tapped for no less than 1-1/2 inch pipe, spaced at approximately 3 foot centers around the circumference of the shield (or the aforementioned special reinforced concrete section) and no more than 4 foot centers longitudinally shall be provided.

g. Detail Drawings sufficient to determine the adequacy of the shield, accompanied with design calculations prepared by a Registered Professional Engineer, shall be submitted to the Director of Engineering for MBTA Railroad Operations for approval and no work shall proceed until such approval is obtained.

5. Boring

a. This method consists of pushing the pipe into the fill with a boring auger rotating within the pipe to remove the spoil. When augers, or similar devices, are used for pipe emplacement, the front of the pipe shall be provided with mechanical arrangements or devices that will positively prevent the auger and cutting head from leading the pipe so that there will be no unsupported excavation ahead of the pipe. The auger and cutting head arrangement shall be removable from within the pipe in the event an obstruction is encountered. The over-cut by the cutting head shall not exceed the outside diameter of the pipe by more than one-half inch. The face of the cutting head shall be arranged to provide reasonable obstruction to the free flow of soft or poor material.

b. Drawings and descriptions of the auger stop arrangement to be used shall be submitted to the Director of Engineering for MBTA Railroad Operations for approval,

and no work shall proceed until such approval is obtained and the arrangement is inspected in the field by the Railroad Company(s).

c. The use of water or other Liquids to facilitate casing emplacement and/or spoil removal is prohibited.

d. Any method which employs simultaneous boring and jacking or drilling and jacking for pipes over 8 inches in diameter which does not have the above approved arrangement WILL NOT BE PERMITTED. For pipes 8 inches and less in diameter, augering or boring without this arrangement may be considered for use only as approved by the Director of Engineering for MBTA Railroad Operations.

C. If an obstruction is encountered during the installation which stops the forward action of the pipe, and it becomes evident that it is impossible to advance the pipe, operations shall cease and the pipe shall be abandoned in place and filled completely with grout, in accordance with Section 4, Paragraph 4.10.

D. Bored or jacked installations shall have a bored hole essentially the same as the outside diameter of the pipe plus the thickness of the protective coating. If voids should develop or if the bored hole diameter is greater than the outside diameter of the pipe (plus coating) by more than 1 inch, grouting or other methods approved by the Railroad Company(s) shall be employed to fill such voids.

E. Pressure grouting or freezing of the soils before or during jacking, boring, or tunneling may be required at the direction of the Railroad Company(s) to stabilize the soils, control water, prevent loss of material and prevent settlement or displacement of the embankment and/or tracks. Grout shall be cement, chemical or other special injection material selected to accomplish the necessary stabilization.

F. The materials to be used and the method of injection shall be prepared by a Registered Professional Engineer (Geotechnical), or by an experienced and qualified company specializing in this work and submitted for approval to the Railroad Company(s) before the start of work. Proof of experience and competency shall accompany the submission.

G. When water is expected to be encountered, pumps of sufficient capacity shall be provided and maintained at the site, and continually attended on a 24-hour basis, until in the sole judgment of the Railroad Company(s), their operation can be safely halted.

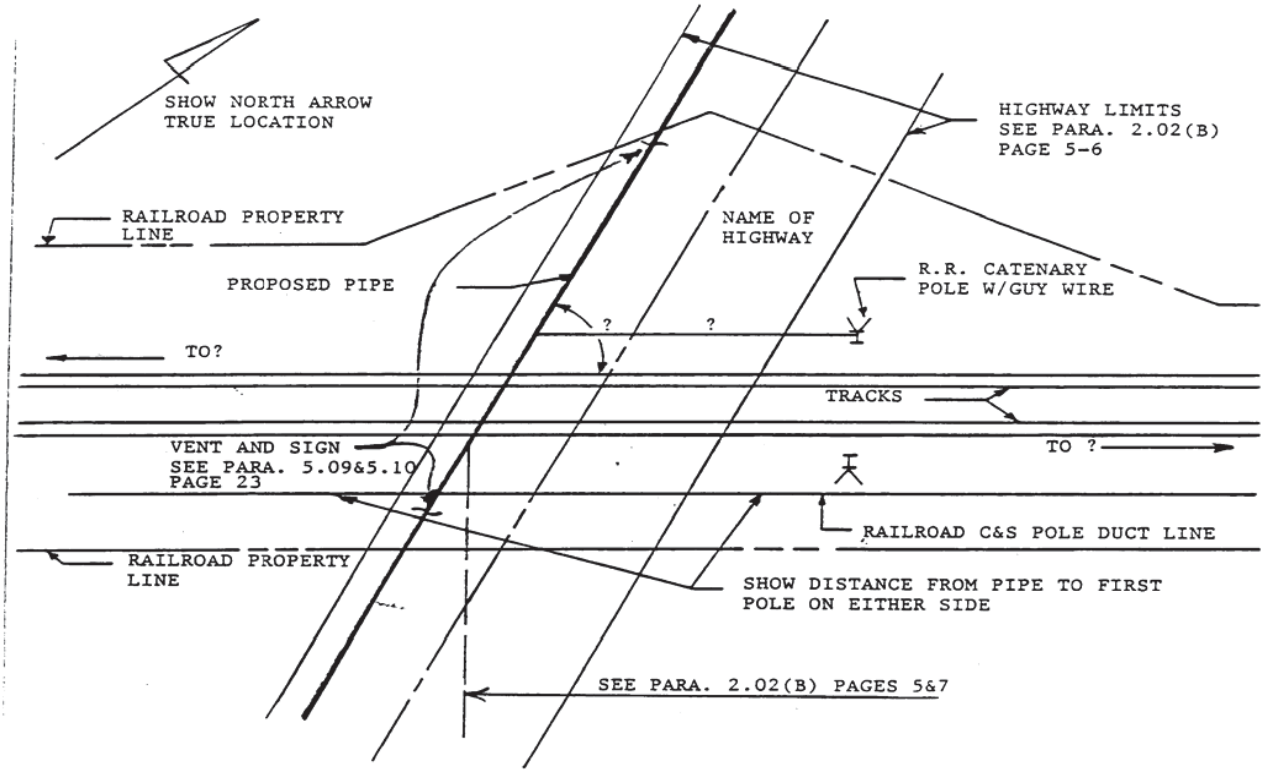
When dewatering, close observation shall be maintained to detect any settlement or displacement of railroad embankment, tracks, and facilities.

H. Proposed methods of dewatering must be submitted to the Railroad Company(s) for approval prior to implementation. The discharge from the dewatering operations in the vicinity of the railroad shall be carefully monitored. If in the opinion of the Railroad Company(s), there is an excessive loss of fine soil particles at any time during the dewatering process, the dewatering shall be halted immediately. The dewatering operation cannot resume until the unsatisfactory condition is remedied to the satisfaction of the Railroad Company(s).

PLATE I

PIPE CROSSING

INFORMATION TO BE SHOWN ON PLAN SECTION OF DRAWING



(SCALE OF DRAWING TO BE SHOWN)

NOTE:

IF MANHOLES ARE PLACED ON MBTA RAILROAD PROPERTY, DETAILS OF SAME, WITH CLEARANCES TO THE CENTERLINE OF THE NEAREST TRACK ARE TO BE SHOWN ON THE DRAWINGS.

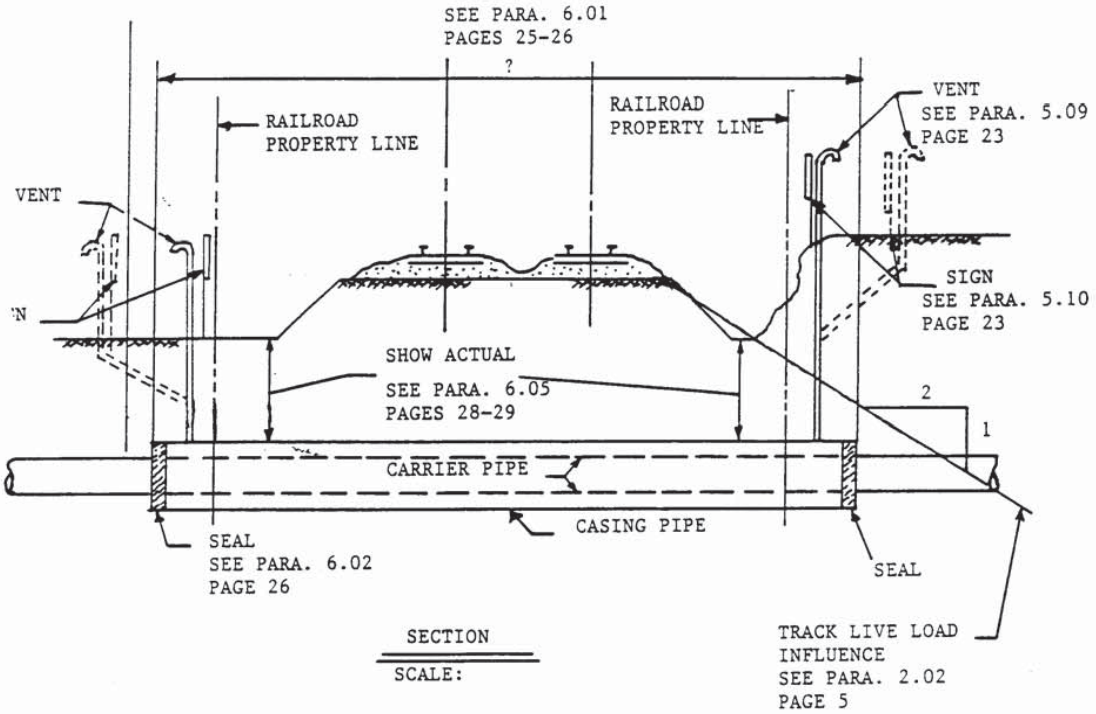
IF THE PROPOSED PIPE IS TO SERVE A NEW DEVELOPMENT, A MAP SHOWING THE AREA IN RELATION TO ESTABLISHED AREAS AND ROADS IS TO BE SENT WITH THE REQUEST.

THE PROPOSED PIPE IS NOT WHOLLY WITHIN HIGHWAY LIMITS, THE SAME INFORMATION IS REQUIRED AS SHOWN ON THIS PLATE.

PLATE II

PIPE CROSSING

INFORMATION TO BE SHOWN ON PROFILE SECTION OF DRAWING

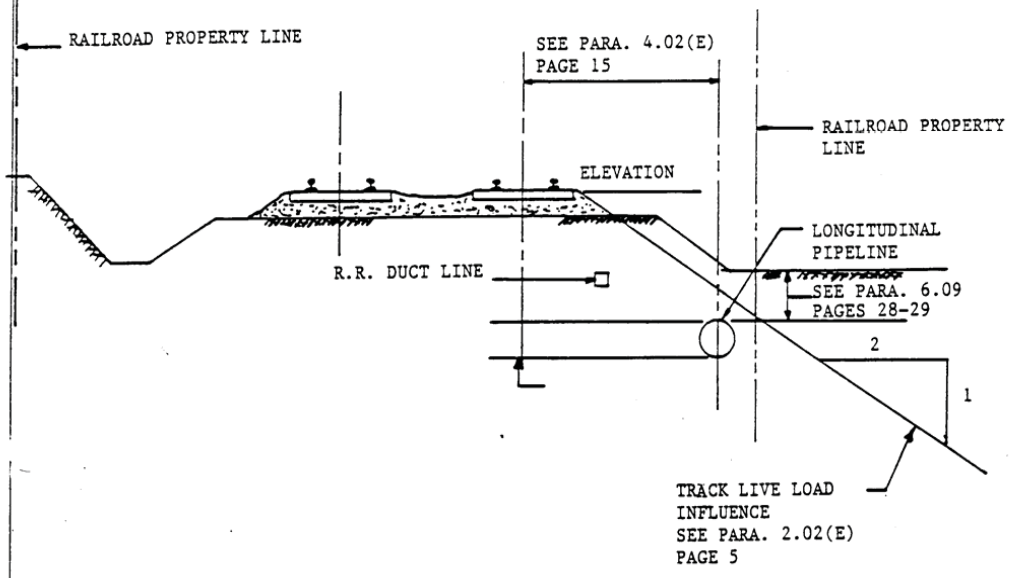


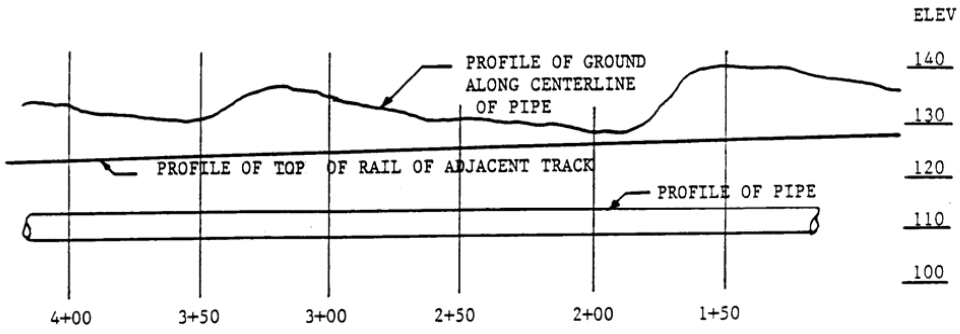
SECTION

SCALE:

PLATE III

LONGITUDINAL OCCUPANCY





STATIONING

PROFILE - SEE PARA. 2.02
PAGES 5-7

SCALE - HOR:
VER:

PIPE CROSSING DATA SHEET

PLATE IV

In addition to plan and profile of crossing, Drawings submitted for the Railroad Company(s) approval shall contain the following information:

	Pipe Date	
	Carrier Pipe	Casing Pipe
Contents To Be Handled		
Normal Operating Pressure		
Normal Size of Pipe		
O.S. Diameter		
I.S. Diameter Wall		
Thickness Weight		
Per Foot Material		
Process of Manufacture		
Specification		
Grade or Class		
Test Pressure		
Type of Joint		
Type of Coating		
Details of Cathodic Protection		
Details of Seal or Protection at Ends of Casing:		
Method of Installation		
Character of Subsurface: Material At the Crossing Location		
Approximate Ground Water Level		
Source of Information on Sub- surface conditions (Test Pits, Borings or Other)		

NOTE: Any soil investigation made on MBTA Railroad Property, or adjacent to tracks shall be carried on under the supervision of the Railroad Company(s).

PLATE V

TABLE OF MINIMUM WALL THICKNESS FOR STEEL CASING PIPE
(FOR INFORMATION ONLY)

PROTECTED WALL THICKNESS

PIPE SIZE (INCHES)	WALL THICKNESS (PROTECTED)
10	0.375
12	0.375
14	0.375
16	0.375
18	0.375
20	0.375
22	0.375
24	0.375
26	0.375
28	0.406
30	0.469
32	0.501
34	0.532
36	0.532
38	0.569
40	0.569
42	0.569
44	0.594
46	0.688
48	0.688
50	0.688
52	0.813
54	0.813
56	0.876
58	0.876
60	0.876
62	0.876
64	0.876
66	0.876
68	0.876
70	0.906

NOTE: FOR UNPROTECTED PIPE 26" AND UNDER ADD 0.032" TO PROTECTED WALL THICKNESS. FOR UNPROTECTED PIPE 28" AND OVER, ADD 0.063" TO PROTECTED WALL THICKNESS.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS DIRECTORATE

V

SPECIFICATIONS FOR WIRE CONDUIT AND CABLE OCCUPATIONS

SECTION 1. SCOPE

1.01 These specifications apply to the design of electric transmission wires and cables (power and communication) which are to be located over, under, across or upon property, facilities, and tracks owned by the MBTA.

SECTION 2. LICENSE TO ENTER MBTA RAILROAD PROPERTY

2.01 Individuals, corporations, or municipalities desiring wire or cable occupations must agree, upon approval of the construction details by the Director of Engineering for MBTA Railroad Operations, to execute an appropriate occupational agreement and pay any required fees and/or rentals outlined therein.

2.02 Application for an occupancy shall be submitted in writing to:

AGM for Real Estate and Asset Development
MBTA, 10 Park Plaza
Boston, Massachusetts 02116

See "Guidelines and Procedures for Construction on MBTA Railroad Property."

2.03 All applications shall be accompanied with six (6) copies of all Construction Drawings, specifications and computations concerning the proposed occupancy.

SECTION 3. APPROVAL OF DRAWINGS

3.01 Entry upon MBTA Railroad Property for the purpose of conducting surveys, field inspections, obtaining soil information, or any other purpose associated with the design and engineering of the proposed occupancy will be permitted only with a proper entry permit prepared by the MBTA Real Estate Department. The issuance of such a permit does not constitute authority to proceed with the actual construction. Construction cannot begin until the proper insurance certificate is received and a formal agreement is executed by the MBTA and permission is received by the Railroad Company(s).

3.02 Drawings shall be drawn to scale and show the following: (See attached plates I -VI)

A. Plan view of crossing or occupation in relation to all Railroad Company(s) facilities. (See Plate 1)

B. Location of wire or cane (in feet) from nearest railroad mile post, center line of a railroad bridge (giving bridge number), or center line of a passenger station. In all cases, the name of the County and City or

Town in which the proposed facilities are located must be shown.

C. Profile of ground on center line of pole or tower line, showing clearances between top of rail and bottom of sag, as well as clearances from bottom wire or cable to top wire or cable of the MBTA's transmission, signal and communication lines and catenary. If none of these facilities are in existence at the point of crossing, the plan should so indicate. Actual under-clearances are to be shown. (See Plate V for the required clearances).

D. Show all known property lines. If wires, cables or conduits are within public highway limits, such limits should be clearly indicated with dimensions from center line.

E. The Drawing must be specific as to:

1. Base diameter, height, class and bury of poles. Poles shall be set no closer than 13' 6" from face of pole to center line of nearest track. When necessary, however, each location will be analyzed by the MBTA to consider speed, traffic, access, etc.

2. Number, size and material of power wires, as well as number of pairs in communication cables.

3. Nominal voltage of line, type of current and frequency.

4. Number, location, size and material of anchors and all guying for poles and arms.

NOTE: Double cross-arms are required on poles adjacent to track. Any tower designs must be accompanied by engineering computations and data.

SECTION 4. CONSTRUCTION REQUIREMENTS

4.01 Power and communication lines shall be constructed in accordance with "Safety Rules for the Installation and Maintenance of Electric Supply and Communication Lines, National Electrical Safety Code Handbook, Part 2" (current issue), with the following exceptions:

A. Item 3 (c), page 2.

B. Casing pipes to contain power or communication wires or cables having an outside diameter of over four (4) inches shall be constructed in accordance with the current issue of MBTA Railroad Operations "Pipeline Occupancy Specifications".

SECTION 5. LONGITUDINAL OCCUPATIONS

5.01 Wires and cables running longitudinally along railroad right-of-way shall be

constructed as close to MBTA property lines as possible in accordance with Plate III. For electrical power lines and cables with voltages of 34,500 or over and communication canes containing over 180 pairs, the following information must be submitted in addition to the detail of the pole top configuration as called for on Plate IV of these specifications:

A. Voltage of circuit(s) or number of pairs. B. Phase of electrical circuit(s).

B. Number of electrical circuits.

C. Size (AWG or CM) and material of wires and cables.

5.02 Any facilities overhanging MBTA Railroad Property must have approval of the MBTA and appropriate rental charges will be applied.

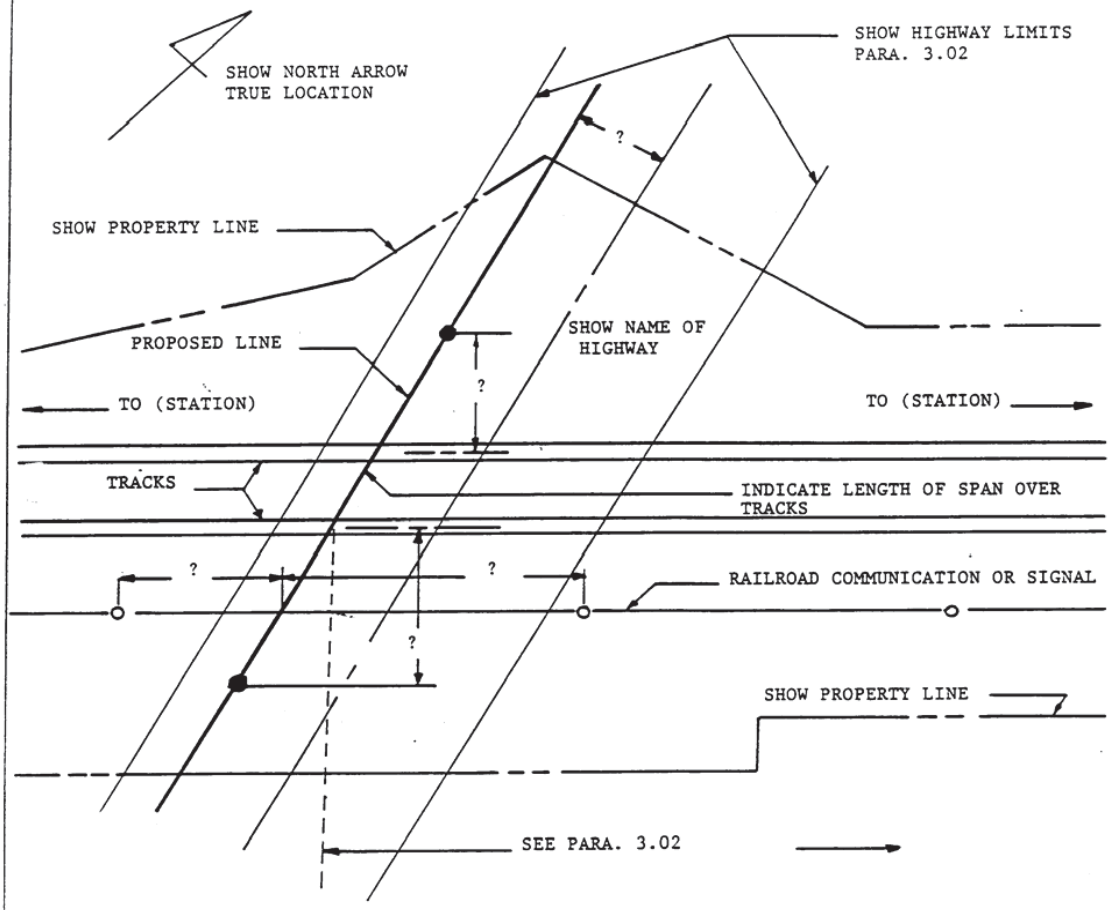
SECTION 6. INDUCTIVE INTERFERENCE

6.01 On agreements covering longitudinal occupations, provisions shall be included that hold the Applicant responsible to provide appropriate remedies, at their own expense, to correct any inductive interference with MBTA facilities.

PLATE I

PLAN VIEW

INFORMATION TO BE SHOWN ON PLAN SECTION OF DRAWINGS
WHEN FACILITY IS A CROSSING



SCALE OF DRAWING TO BE SHOWN

NOTE:

IF THE PROPOSED LINE IS TO SERVE A NEW DEVELOPMENT, A MAP SHOWING THE AREA IN RELATION TO ESTABLISHED AREAS AND ROADS IS TO BE SENT WITH THE REQUEST.

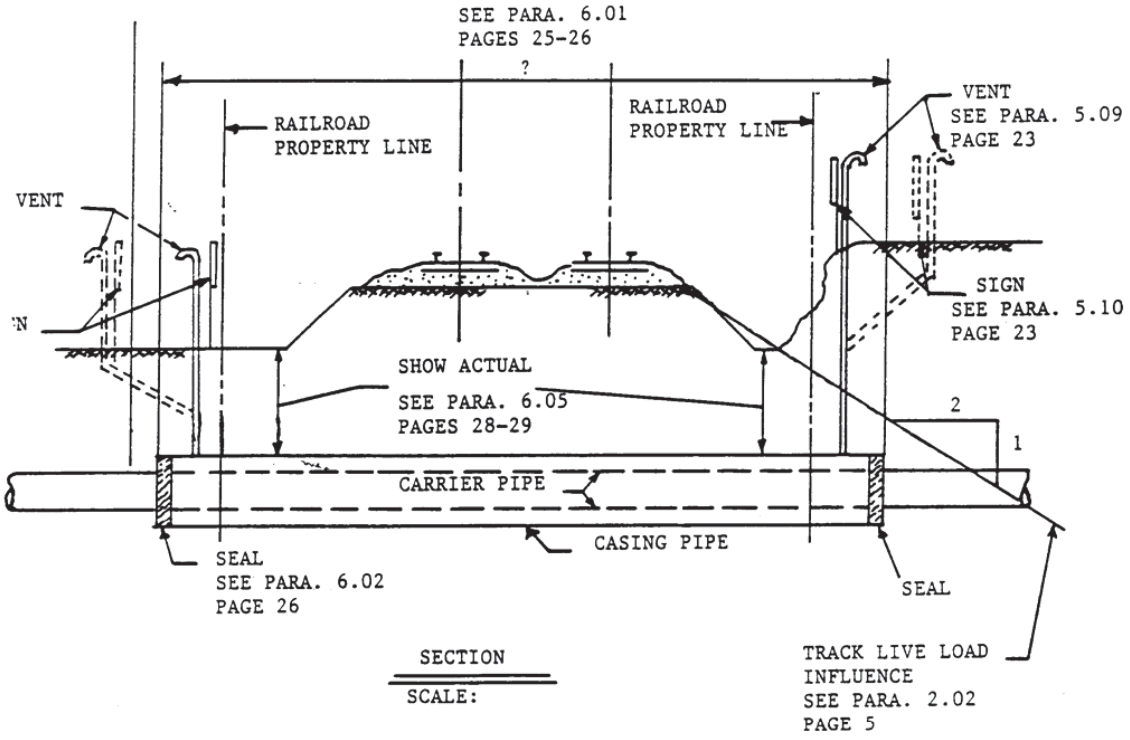
IF THE PROPOSED LINE IS NOT WHOLLY (OR PARTIALLY) WITHIN HIGHWAY LIMITS, THE SAME INFORMATION IS REQUIRED AS SHOWN ON THIS PLATE.

4

PLATE II

PIPE CROSSING

INFORMATION TO BE SHOWN ON PROFILE SECTION OF DRAWING



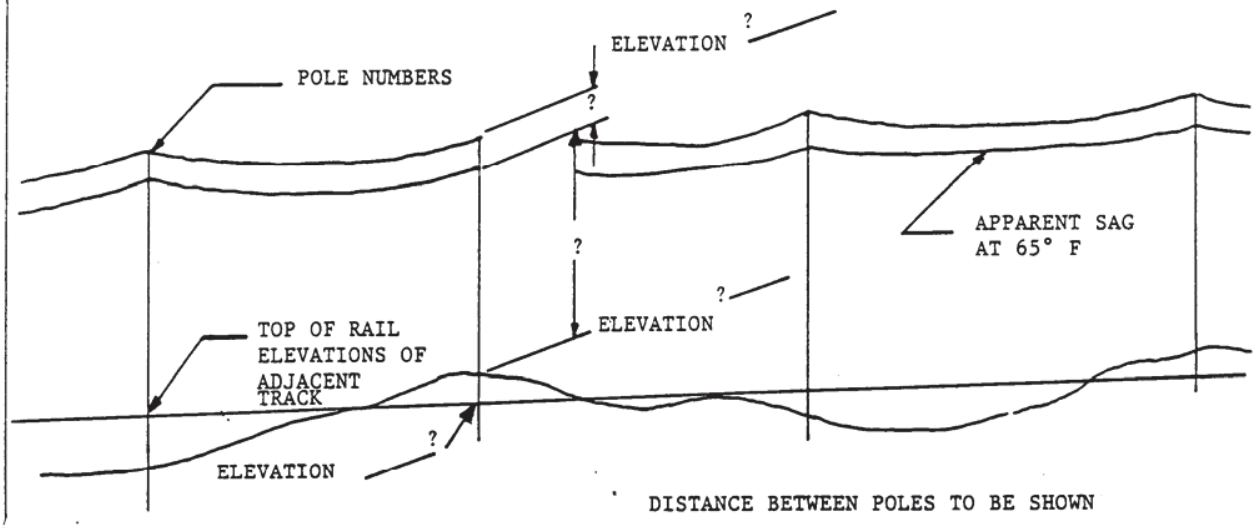
SECTION

SCALE:

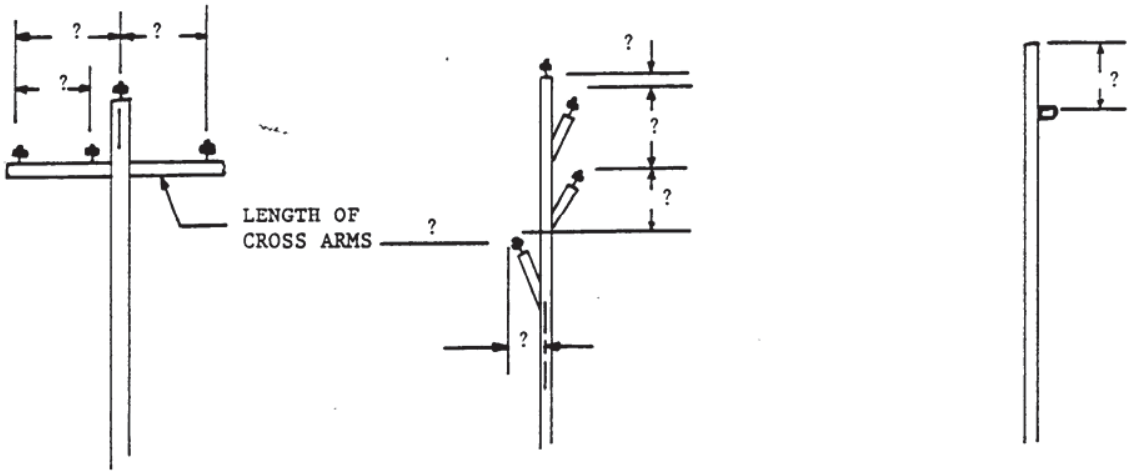
PLATE III

PROFILE VIEW

INFORMATION TO BE SHOWN ON PROFILE SECTION OF DRAWINGS
IN CASES OF LONGITUDINAL OCCUPATIONS



DISTANCE BETWEEN POLES TO BE SHOWN



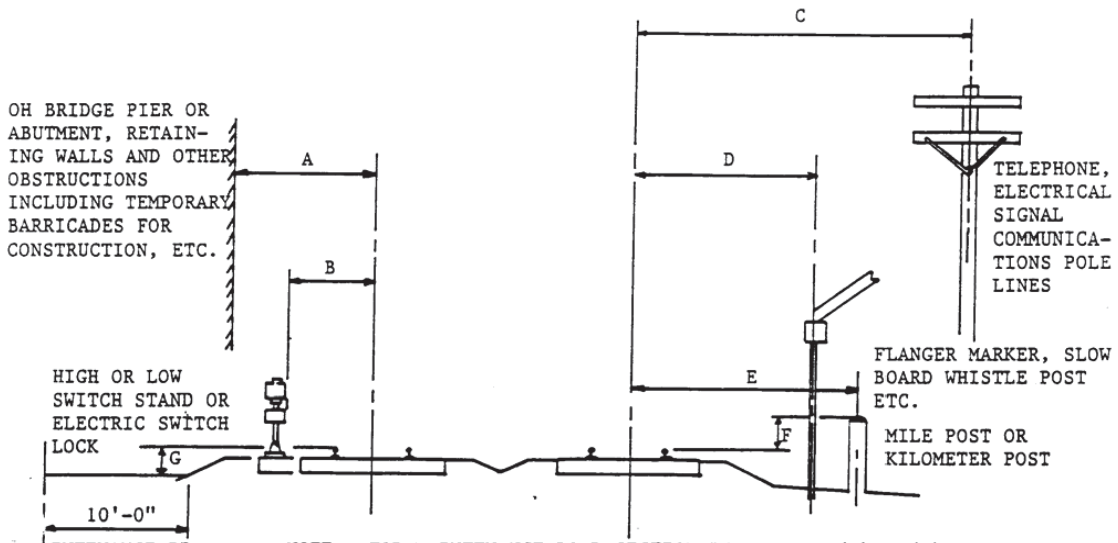
POLE TOP CONFIGURATION TO BE SHOWN SIMILAR TO SAMPLES ABOVE

NOTE: IF POWER LINE CROSSES ANY TRACK, THEN INFORMATION SHOWN ON PLATE II IS ALSO REQUIRED.

PLATE IV

STANDARD SIDE CLEARANCES - TANGENT TRACK

(FOR OBSTRUCTIONS OTHER THAN PASSENGER STATIONS)



NOTE: FOR MAINTENANCE ROAD SECTION DIMENSIONS (A) & (C) TO BE INCREASED ACCORDINGLY - DIMENSIONS (D) & (E) MAY BE REDUCED TO 8'-6" CLEARANCE.

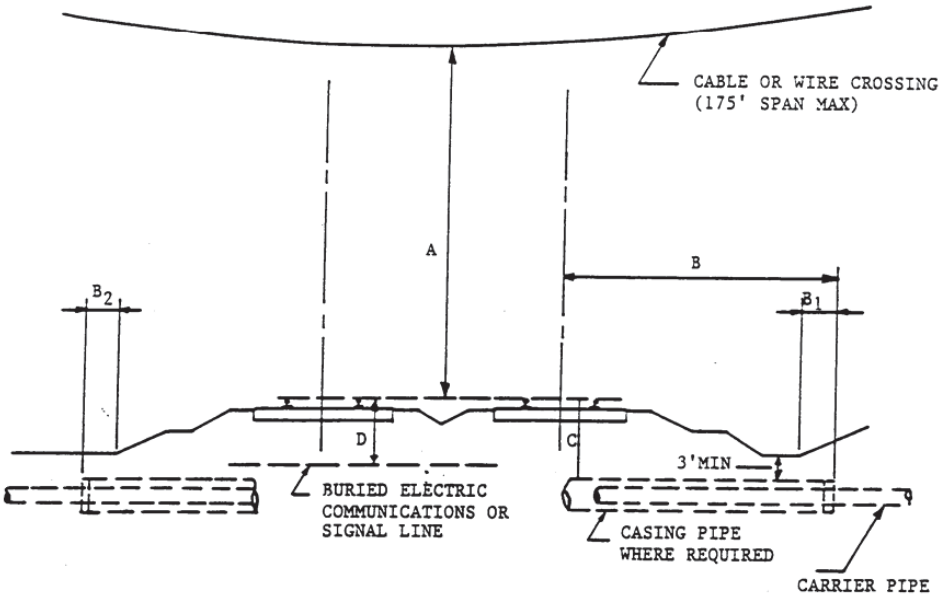
DIMENSION	DESCRIPTION	
A	GENERAL MINIMUM SIDE CLEARANCE	8'-6"
	OVERHEAD BRIDGE PIERS & ABUTMENT, RETAINING WALLS & OTHER EXISTING STRUCTURES	8'-6"
B	LOW SWITCH STANDS (3'-0" MAX HEIGHT)	6'-6"
	HIGH SWITCH STANDS (OVER 3'-0" HEIGHT)	9'-0"
	ELECTRIC SWITCH LOCKS	6'-6"
C	POLE LINES - TELEPHONE, ELECTRIC, SIGNAL COMMUNICATIONS (MIN)	13'-6"
D	CENTERLINE WHISTLE POSTS, FLANGER MARKERS, SLOW OR SPEED BOARDS AND OTHRE WAYSIDE SIGNS	12'-0"
	AUTOMATIC HIGHWAY CROSSING PROTECTION (MIN)	8'-6"
	AUTOMATIC HIGHWAY CROSSING PROTECTION (DESIRED)	15'-0"
E	MILE POSTS - HORIZONTAL	13'-6"
F	MILE POSTS - VERTICAL	7'-0"
G	DEPRESSION OF MAINTENANCE ROAD	

PLATE V

VOLTAGE	OVERHEAD CLEARANCE (Top of Rail to Bottom of Sag)	
0- 750	27'0"	At 120°F Ambient Temperature
750- 15,000	28'0"	
15,000 - 50,000	30'0"	
69,000	30'8"	
115,000	32'2"	
138,000	33'0"	
345,000	39'10"	
500,000	45'0"	
745,000	53'2"	
765,000	53'10"	
Other than power lines	27'0"	

(Calculation is 30'0" + 0.4" per 1,000 volts over 50,000 volts)

CLEARANCES FOR OVERHEAD AND BURIED UTILITY CROSSINGS **PLATE VI**



DIMENSION	DESCRIPTION		
A	POWER LINES 0 TO 750V	27'-0"	At 120°F Ambient Temperature
	POWER LINES 750V to 15,000V	28'-0"	
	POWER LINES 15 to 50KV	30'-0"	
	OTHER THAN POWER LINES	27'-0"	
B	SEALED ENDED CASINGS	25'-0"	
	OPEN ENDED CASINGS	45'-0"	
B_1	END CASING DEYOND DITCH	2'-0"	
B_2	END CASING BEYOND SLOPE	3'-0"	
C	CASING PIPE	4'-6"	
	CARRIER PIPE WITHOUT CASING	6'-6"	
D	BURIED ELECTRIC LINES	6'-6"	
	RAILROAD SIGNAL LINES (220V)	2'-6"	
	COMMUNICATIONS LINES	3'-6"	

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MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS DIRECTORATE

VI

BRIDGE ERECTION, DEMOLITION AND HOISTING OPERATIONS

Submittals for bridge erection, demolition, or other hoisting operations shall be prepared and stamped by a Registered Professional Engineer and must include the following:

1. Plan view showing locations of crane or cranes, operating radii, with delivery or disposal locations shown.

2. Crane rating sheets showing cranes to be adequate for 150% of the lift. Crane and boom nomenclature is to be indicated.

3. Drawings and computations showing weight of picks.

4. Location plan showing obstructions, indicating that the proposed swing is possible.

5. Data sheet listing type and size of slings or other connecting equipment. Include copies of catalog cuts or information sheets of specialized equipment. The method of attachment must be detailed on the erection plan. All lifting components must be adequate for 150% of the lift.

6. A complete procedure indicating the order of lifts and any repositioning or re-hitching of the crane or cranes.

7. Drawings detailing temporary support of any components or intermediate stages.

8. A time schedule (by hour and day) of the various stages, as well as a schedule for the entire lifting procedure.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS DIRECTORATE

VII

TEMPORARY SHEETING AND SHORING

The following items are to be included in the design and construction procedures for all permanent and temporary facilities on, over, under, within or adjacent to MBTA Railroad Property:

1. Footings for all piers, columns, walls or other facilities shall be located and designed so that any temporary sheeting and shoring for support of adjacent track or tracks during construction will not be closer than toe of ballast slope. (See dimensions in the MBTA's Book of Standard Plans, #1000 and #1002 for tangent and curved track). Sheeting shall be required when excavation is inside of a line which extends horizontally from 5.5 feet off center line of adjacent track, then on a 2 (horizontal) to 1 (vertical) slope. This is known as the zone of influence.

2. Where physical condition of design impose insurmountable restrictions requiring the placing of sheeting closer than specified above, the matter must be submitted to the Director of Engineering for MBTA Railroad Operations for approval of any modifications.

3. When support of track or tracks is necessary during construction of above mentioned facilities, interlocking steel sheeting adequately braced and designed to carry E-80 live load plus 50% impact is required. Soldier piles and lagging will be permitted for supporting adjacent track or tracks only when required penetration of steel sheet piling cannot be obtained or when in the opinion of the Director of Engineering for MBTA Railroad Operations, or their authorized representative, steel sheet piling would be impracticable to place.

4. Exploratory trenches, three (3) feet deep and fifteen (15) inches wide in the form of an "H" with outside dimensions matching the outside of sheeting dimensions are to be hand dug, prior to placing and driving steel sheeting, in areas where railroad underground installations are known to exist. These trenches are for exploratory purposes only and are to be backfilled and compacted immediately. This work must be done in the presence of a railroad inspector.

5. Absolute use of track is required white driving sheeting adjacent to any track. Procedure for arranging the use of track shall be through the Railroad Company(s) representative on the project.

6. Cavities adjacent to sheet piling, created by driving of sheet piling, shall be filled with sand and any disturbed ballast must be restored and tamped immediately as required by the Railroad Company(s).

7. Sheet piling shall be cut off at top of tie during construction. After construction and backfilling has been completed, the piling within twelve (12) feet from centerline of track shall be cut off 24" below bottom of tie or 24" below finished grade, whichever is greater. Sheeting, used as a form on a permanent

structure, shall be cut as directed by the Railroad Company(s).

8. The excavation adjacent to the track shall be covered and protected by handrails and barricades, warning lights shall be provided by the Contractor as directed by the Railroad Company(s).

9. Graded backfill material shall be compacted at near optimum moisture content, in layers not exceeding 6 inches in compacted thickness, by pneumatic tampers, vibrator compactors, or other approved means to the base of the railroad subgrade. Material in the vicinity of sheet pile shall be compacted to not less than 95 percent of AASHTO T 99, Method C. The Contractor shall be required to supply, to the job site, ballast stone as prescribed herein to be installed by the Railroad Company(s).

10. The Contractor is to advise the Railroad Company(s) of the time schedule of each operation and obtain approval of the Railroad Company(s) for all work to be performed adjacent to MBTA tracks so that it may be properly supervised by railroad personnel.

11. AII Drawings for temporary sheeting and shoring shall be prepared and stamped by a Registered Professional Engineer and shall be accompanied by complete design computations when submitted for approval.

12. Particular care shall be taken to avoid erosion or filling of the Railroad Company(s) drainage facilities. Erosion and sediment control in the vicinity of the railroad shall be as approved by the Director of Engineering for MBTA Railroad Operations. Correction of disrupted Railroad Company(s) drainage facilities shall be at the Contractor's sole expense.

MBTA REQUIREMENTS FOR GEOTECHNICAL MONITORING

THE FOLLOWING SPECIFICATIONS ARE REQUIRED FOR ALL PILE DRIVING/EXCAVATING OPERATIONS:

1. Pile driving shall be on a continuous basis for each pile driven. Once a pile is started, it shall be driven or cut off at an elevation not to exceed the plane across the top of the rails of any track within 8'-6" plus 2" for each degree of curvature from centerline of track to the closest edge of the edge or excavation.

2. The monitoring points shall be set up one week before the pile driving or excavation operations begin. The MBTA and the Railroad Company(s) shall be notified. Elevation readings to establish the initial baseline reading shall begin two days prior to the start of driving. Readings shall be for a minimum of two weeks after the completion of the driving or backfilling of the excavation, whichever is longer. Initial readings immediately after any surfacing operations shall serve as new baseline figures. All future elevation readings shall be compared to the adjusted baseline. If the track deviates to a condition that is unacceptable to the MBTA or Railroad Company(s), corrections shall be made at the Contractor's expense.

3. Elevation readings shall be taken from the top of each rail of each track within the "zone of influence" the excavation. See Section 1, Page 1 of this specification.

4. Elevation readings will be taken once per eight hour shift. The readings shall be faxed to the MBTA Railroad Company(s) on a daily basis and all information is to be presented in legible print. During excavation within the sheet pile protected area, the top of rail elevations shall be checked every hour. Additional readings may be required by the MBTA or Railroad Company(s).

5. Stations shall be spaced at 15-1/2 foot intervals. The number of distractions required will be determined by the length of the excavation parallel to the tracks. There will be four additional stations on each end of the pile driving/excavation operation along the track. Extra stations may be required by the MBTA or Railroad Company.

6. Elevation readings must show the date, time, weather conditions and temperature. Each reading must also provide the following information: track number, compass direction, station number, base elevation (with date), static elevation, change in elevation (recorded in hundredths and in inches), dynamic reading and total deflection in inches. See sample sheet attached.

7. Station "0" will be located at the centerline of the project with Stations 1, 2. 3, etc., being to the right and Stations -1, -2, -3, etc., being to the left when

standing on the near track and looking at the work. In multiple track areas the stations as determined herein are to be carried across each track located within any part of the zone of influence. See Plate I.

8. At each monitoring station a dynamic load measurement shall be taken. The dynamic load measurement device shall consist of a wooden stake placed firmly in the ballast and in initially in contact with the bottom of the rail. The loaded measurement is the resultant gap between the bottom of the rail and the top of the stake caused by the deflection of the rail under the load of a passing train. Based on field observations of the excavation, and at the option of the MBTA or railroad company(s), this requirement may be reduced.

9. Elevation readings taken from the top of rail for static measurement and the dynamic reading shall be combined and the sum compared to the adjusted baseline. This reading will demonstrate the difference in elevation caused by the excavation.

10. The MBTA requires that the track be maintained at all times within established criteria for the specific track classification. At the completion of the project the requirement for tamping and realigning the tracks, caused by the settlement from the construction activity, remains with the Contractor for the duration as specified by the MBTA in their initial review of the Construction Drawings. This tamping and track realignment will be performed by the MBTA or railroad company(s) at the sole expense of the Contractor.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS DIRECTORATE

VIII

BLASTING SPECIFICATIONS

Blasting on, over, under, within or adjacent to MBTA Railroad Property will be permitted only in special cases where it is demonstrated to the Director of Engineering for MBTA Railroad Operations that there is no practicable alternative to perform the work.

In such cases when blasting is permitted, the Contractor must submit a detailed blasting program to the MBTA and Railroad Company(s) for approval prior to the commencement of any work. The blasting program must contain the following information:

a. Site plan with location of nearest MBTA structure.

b. Plan of each blast showing hole spacing and delay pattern. c. Diameter and depth of each hole.

c. Amount of explosives per hole.

d. Total pounds of explosives per day.

e. Total amount of explosives per blast.

f. Type of non-electric delays to be used. h. Amount of stemming in each hole.

g. Type of explosive to be used.

h. Soil and rock profile in blast zone.

i. Scaled distance to the nearest MBTA facility.

j. Type and location of seismograph to be used. m. Size of blasting mats to be used.

k. Safety precautions to be followed.

The following general requirements are to be adhered to:

a. Obtain the services of a qualified vibration and blasting consultant to monitor the blasting.

b. Use a non-electric detonation system whenever possible. If electric caps are used, a check must be made for stray currents, induced current and radio frequency energy to insure that this hazardous extraneous electricity is at an acceptable safe level.

c. Provide an open face for maximum relief of burden.

d. Limit the maximum peak particle velocity to 1 inch per second. Depending on existing conditions, this may be modified to 2 inches per second.

e. Maintain an initial scale distance of 60 ft. per 1-1/2 lbs. After initial blasting, scale distance may be modified to a minimum of 50 ft. per 1-1/2 lbs., if conditions permit.

Scale distance -- Distance from blast to structure (in feet)

Weight of explosives per delay (in pounds)

The Contractor shall provide for a pre-blast and post blast survey, including photographs. An inspection of all nearby MBTA facilities shall be made to determine any changes that may occur due to blasting operations.

The Contractor shall coordinate all blasting with the MBTA and Railroad Company(s) in advance to determine when the charges may be set. The Contractor is advised that the MBTA and Railroad Company(s) use two way radios for train control. The radios operate in the 160 MHz area. These radios cannot be turned off at any time.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS DIRECTORATE

IX

TEMPORARY PROTECTION SHIELDS FOR DEMOLITION AND CONSTRUCTION

The Railroad Company(s) will determine when and where protection shields are required. The designated construction of temporary protection shields must adhere to the following specifications:

1. The construction of temporary protection shields shall be designed to prevent any dust, debris, concrete, formwork, paint, or tools from falling on MBTA Railroad Property below.
2. The temporary protection shields shall be erected prior to the start of work. The Railroad Company(s) will determine whether or not sufficient protection has been provided to perform the work over any particular area.
3. The temporary protection shields shall remain in place until all work over the railroad has been completed and shall be removed only when ordered by the Railroad Company(s).
4. To minimize the inconvenience to the users of any properties below and adjacent to the project, the Contractor shall be required to complete the actual erection and removal of the temporary shields within time limits acceptable to the Railroad Company(s).
5. The erected temporary protection shields shall not infringe on any existing minimum vertical clearance.
6. The Contractor shall be required to obtain the approval of the Railroad Company(s) before commencing any work beneath the shield. In certain areas, depending on the nature of the work, the Railroad Company(s) may require a specific method of protection.
7. The horizontal shield shall be designed to carry a live load of 100 pounds per square foot and a single concentrated load of 2,000 pounds located to produce maximum stress. The vertical shield shall be designed to carry a wide load of 30 pounds per square foot.
8. Prior to the start of construction, the Contractor shall be required to submit the details of the temporary protection shield to the Railroad Company(s), who will review and approve the details only as to the methods of erection and as to whether or not the proposed installation will provide the level of protection required at the various locations. It is the Contractor's responsibility to design these protections so that they are in conformance with all existing laws, regulations and specifications that govern this type of work. Shield plans must include a material list and shall be designed by a Registered Professional Engineer. The Drawings and calculations must bear their seal when they are submitted to the Railroad Company(s).
9. If during the actual construction, the Railroad Company(s) deems that the shield is not providing the desired level of protection or that the Contractor has failed to properly maintain the shield, all work at the

affected location shall cease until corrective measures acceptable to the Railroad Company(s) are instituted.

10. All temporary shields shall be constructed using new material.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS DIRECTORATE

X

INDUSTRIAL SIDE TRACK SPECIFICATIONS

SECTION 1. GENERAL

1.01 All railroad track construction shall be performed under competent supervision of personnel experienced in railroad construction and shall conform to the standards of the MBTA. The MBTA and Railroad Company(s) will inspect and approve all side tracks prior to being put in service. This specification shall be used for side tracks directly on or within 15 feet of the MBTA property line. Any construction outside of the MBTA property line shall be in compliance with the standards of the serving freight railroad.

SECTION 2. MATERIALS

2.01 MATERIAL

Rails, ties, switches, frogs, etc. shall conform to the standards of the MBTA for various types of turnouts and track installations thereby insuring replacement availability.

2.02 RAIL

The rails shall be 100# ASCE Section or of a heavier rail section in common use, new or relay. Relay rails shall not have more than 1/4" top wear measured vertically along center line of rail and not more than 3/8" side wear measured horizontally 3/4" below the normal top of rail. Rails shall be free from kinks, excessive rust and excessive head flow. Rails having line or surface bends that cannot be spiked will be rejected. Rail shall be free of internal defects. Rail used on the limits of MBTA Railroad Property shall be equal in weight and in section to the attached main line.

2.03 CROSS TIES

Cross ties shall conform to MBTA specifications, minimum size shall be 7" x
8" x 8'6" and shall be treated with creosote in accordance with MBTA specifications. Relay ties may be approved after inspection by the MBTA and Railroad Company(s) prior to installation.

2.04 SWITCH TIMBER

Switch timber shall be new hardwood and conform to MBTA specifications 7" x 9" and of lengths required by MBTA standard turnout bill of materials. All timber shall be creosote treated as specified for cross ties. Relay timber as above.

Tie plates shall be new or relay at least 7-1/2" x 10-3/4", 1/2" thick,

double shoulder and should be canted. Tie plates must conform to MBTA specifications. Damaged plates or plates showing more than 25% reduction in section due to corrosion or wear will be rejected.

2.06 JOINT BARS

Joint bars shall be new or relay, 100% toeless, 24" long or equal and conform to MBTA specifications. Relay bars must be free from appreciable wear. Joint bars shall have a minimum of four holes and the holes are to fit the punching's of the rail. Holes to have a clearance of 1/16". Joint bars that cannot be drawn up to give a tight fit will be rejected. No fewer than 4 bolts per joint will be allowed.

2.07 BOLTS, NUTS AND WASHERS

Bolts and nuts shall be new and of a size to fit the rail punching's. They shall conform to AREA specifications for low carbon steel track bolts and nuts. Washers shall be new spring type of appropriate size and shall conform to MBTA specifications.

2.08 TRACK SPIKES

Track spikes shall be 6" long, 5/8" square with an oval head and conform to MBTA specifications for soft steel track spikes. Tangent track shall have at least 2 rail holding spikes per tie plate and all curves over 3" shall have 3 spikes per tie plate.

2.09 BALLAST

Ballast shall conform to MBTA Material Specification 9248.

2.10 BUMPING POSTS

Bumping posts shall be Hayes type, Durable "D" or equal, unless otherwise specified, and will conform to MBTA Material Specification 9206.

2.11 DERAIL

Type and quality of derail shall be specified for each individual side track requirement. Derail shall be connected into the railroad signal system, which will be performed by the Railroad Company(s) at the Owner's expense. Two pairs of insulated joints shall be installed by the Contractor at a location to be determined by the MBTA. Side tracks with a descending grade toward the main track shall require a split switch type derail.

SECTION 3. INSTALLATION

3.01 The track shall be properly installed with a standard gauge of 4'8-1/2" except on sharp curves. In cases of sharp curves, gauge will be specified by the MBTA or the Railroad Company(s).

3.02 Ballast shall be installed on top of subgrade for a depth of at least 6" below the bottom of tie and brought up to the top of the tie at the center and slope off to 1" below top of tie at the ends. It shall then extend 1' beyond the end of the tie at that height, at which point it shall slope off at a rate of 2:1 to the sub- ballast.

3.03 Cross ties shall be placed not more than 24" on center on tangent track and19 ½ " on center on curved track. When relay rails are used the unworn side shall be placed on the gauge side. Tie plates shall be installed on each cross tie. The center of the joint shall be installed so as to be suspended by two ties.

3.04 It shall be the responsibility of the builder of that portion of track designated as "property line to end" to connect to that portion of track designated as "clearance to property line" and provide the necessary joints or compromise joints with bolts as the weights of rail would dictate.

SECTION 4. BONDING

4.01 Where track bonding is necessary, it will be performed by the Railroad Company(s) in accordance with MBTA standards.

SECTION 5. APPROVAL

5.01 Plans for track installation must be approved by the MBTA and Railroad Company(s) before the design of the facility to receive rail service is finalized.

SECTION 6. CURVATURE OF TRACK

6.01 The recommended curvature shall be 8^{o} or less. The maximum allowable degree of curve is not to exceed 12^{o} 30', unless approved by the Director of Engineering for MBTA Railroad Operations.

SECTION 7. GRADE OF TRACK

7.01 The maximum allowable grade for all tracks shall not exceed 1.5% descending towards mainline or 3% descending from mainline using 100 foot vertical curves.

SECTION 8. ELEVATION

8.01 Super elevation shall not exceed 1 inch.

SECTION 9. SUBGRADE

9.01 Subgrade shall be prepared to a grade 18" - 20" below the proposed top of rail and shall be of a material that is compacted to 95% and provides for adequate drainage.

SECTION 10. ACCEPTANCE

10.01 Before track is placed into service to receive cars, it shall be inspected and approved by a qualified track inspector from the MBTA, the Railroad Company, and the freight carrier.

10.02 No exceptions to these specifications are authorized without the written approval of the Director of Engineering for MBTA Railroad Operations.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS DIRECTORATE

XI

RIGHT OF WAY FENCING SPECIFICATIONS

SECTION 1. GENERAL

1.01 DESCRIPTION

This section specifies the furnishing and installing of new Type I galvanized steel or Type II aluminum coated steel chain link fence. Right of way fence shall be 6', 8' or 10’ as required by site specific conditions.

1.02 SUBMITTALS

Shop Drawings

1. Include cross sectional dimension of posts, braces, rails, fittings, accessories and gate frames, design of gates, and details of gate hardware.
2. Include a layout drawing showing the spacing of posts and location of all gates, abrupt changes in grade, and all corner, gate, anchor, end and pull posts.

SECTION 2. PRODUCTS

2.01 MATERIALS

A. General

1. Steel pipe dimensions and weights: ASTM A-53, Schedule 40 (except the hydrostatic testing requirement is waived). Dimensions specified are outside diameter (O.D.).
2. Provide post with accepted semi-steel or pressed steel tops, so designed as to fit securely over post and carry top rail or spring tension wire; the base of post top fitting shall fit over the outside of post and shall exclude moisture from post. All fittings and accessories shall be hot dipped galvanized in accordance with ASTM A-53.

B. Line Post: For all post heights, unless otherwise noted, Schedule 40, 2.375” O.D. pipe weighing 3.65 lbs./ft. ASTM A-53 with a 2 oz. hot dipped galvanized coating shall be used.

C. Gate post: Furnish post to support single gate leaf, or one leaf of a double gate installation, for the following gate widths:

Leaf Width	Gate Post	Sch. 40
up to 6'	2.875" O.D.	5.79 lb./ft.
6' to 12’	4.000" O.D.	9.11 lb./ft.
12' to 18'	6.625" O,D.	18.97 lb./ft.
18' to 32'	8.625" O.D.	28.55 lb./ft.

D. End, Corner and Intermediate Posts

For all post heights, unless otherwise noted, Schedule 40, 2.875" O.D. pipe weighing 5.79 lbs./ft. ASTM A-53 with a 2 oz. hot dipped galvanized coating shall be used.

E. Top rail and Spring Tension Wire

1. Top Rail

a. Schedule 40, 1.66" O.D, pipe weighing 2.27 lbs./ft. ASTM A-53 with a 2 oz. hot dipped galvanized coating.

b. Couplings and expansion sleeves: Outside sleeve type, minimum six inches long.

2. Spring tension wire: shall be marcelled (spiraled or crimped) #7 gauge (.177 inches) plus or minus 0.005 inches in diameter. ASTM A-824. 1.2 oz. zinc per sq. ft.

F. Braces and Tension Rods

1. Compression braces: Same type and size as top rail.

2. Tension rods: 3/8" round rods with drop forged turnbuckles or other approved type of adjustment.

G. Fence Fabric

1. Type I galvanized steel ASTM A-392 Class 2 coating 2 oz.

a. Typical-2" diamond mesh 6 gauge (192") 2 oz.

b. Hot dipped galvanizing after weaving.

2. Type II aluminum coated steel ASTM A-491 size 2. 3/8" mesh.

3. Selvages: All types

a. Fabric shall be knuckled at both selvages.

b. Fabric over 60 inches high: knuckled at one selvage and twisted and barbed at the other.

H. Fabric Bands, Brace Bands and Stretcher Bars

1. Fabric Bands: 12 gauge pressed steel 7/8 inch wide.

2. Brace Bands: 11 gauge pressed steel 1 inch wide.

3. Stretcher Bars: 3/16" x 3/4" galvanized steel.

I. Tie wire and miscellaneous Items

1. Tie Wire: Galvanized steel 6 gauge (.192") for post and rails.

2. Hog rings: Galvanized steel 6 gauge (.192") for spring tension wire.

3. Rail and Truss Cups: Galvanized semi-steel or pressed steel.

J. Barbed Wire and Extension Arms

1. Barbed Wire; ASTM AI21, 12-1/2 gauge, 4-point round barbs, Class 3 coating.

2. Extension Arms: Projecting at an angle of approximately 45 degrees, fitted with clips or other means of attaching three strands of barbed wire, the top outside wire approximately 12 inches from the fence line and the other wires spaced uniformly between the top outside wire and the fence fabric.

K. Gates

1. General: Furnish gates complete with necessary hinges, latches, and drop bar locking devices; corners shall be welded or fastened and reinforced with suitable fittings.

2. All gates fabricated from 1.90" O.D. Schedule 40 pipe weighing 2.72 lbs./ft. with a 2 oz. hot dipped galvanized coating.

L. Concrete: Class 2500 psi concrete consisting of aggregate passing the No. 8 sieve.

SECTION 3. EXECUTION

3.01 INSTALLATION

A. Place terminal post at each end, corner, gate post, pull post (minimum 500'), or any change in grade or direction greater than 30 degrees.

B. Line posts shall be spaced on a maximum of 10 foot centers. In determining the post spacing, measure parallel to slope of finished grade. All posts to be set plumb and in line. Post spacing on radius as follows:

200'- 500' radius 8' O.C.
100’ - 200' radius 6’ O.C.
less than 100’ radius 5' O.C.

C. When fencing is installed on the top of concrete structures, use galvanized sleeve and grout posts or install with suitable galvanized flange casing and galvanized anchor bolts. Set all other posts permanently in concrete.

D. Excavate post hole footings at least 12" in diameter for line post and I6" for terminal and gate posts up to 4" O.D. Larger gate posts require 18" diameter footings. All footings excavated to a depth of 42" with a minimum post embedment of 36". Crown top of concrete to shed water and allow curing for not less than 72 hours before proceeding with further work on the post.

E. Brace end, corner pull, and gate posts to the nearest line post with diagonal or horizontal brace rails used as compression chambers, and with truss rods with turnbuckles used as tension members. Brace line posts horizontally and truss in both directions as required, at approved intervals.

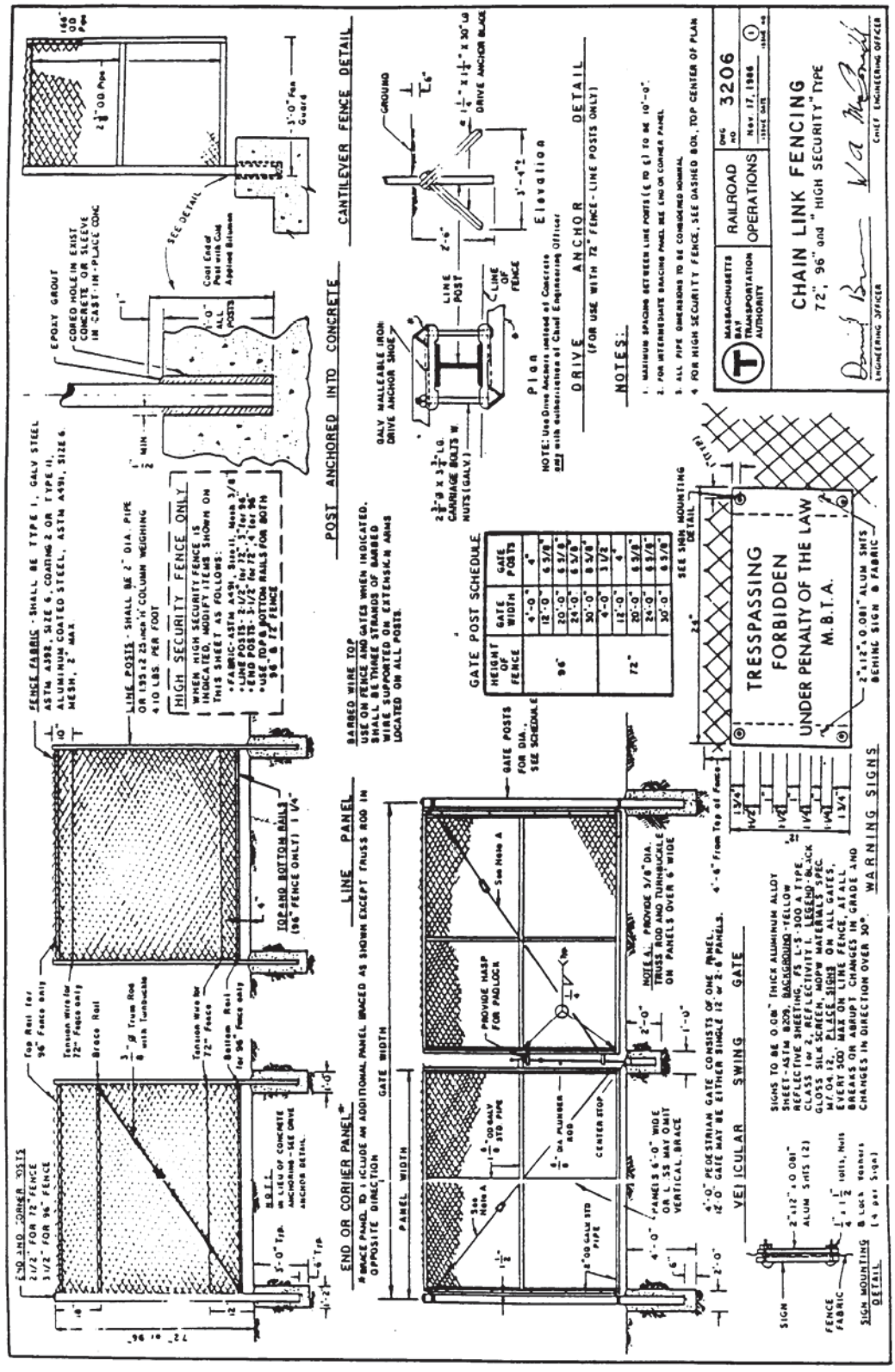
F. Install fabric on post side which best secures MBTA's Railroad Property. Pull fabric taut and tie to all line posts, rails, braces and spring tension wire spacing all ties at 12" intervals. Use hook shaped steel ties confined to the diameter of the pipe to which it is attached, clasping pipe and fabric firmly with both ends twisted at least 2 turns.

G. Barbed wire and tension wire must be taut and properly secured with brace bands at each terminal and gate post.

H. Electric Ground: Where a power line carrying more than 600 volts passes over fence, install ground rod at the nearest point directly below each point of crossing. Ground all substation fences and gates and perform other electrical grounding as indicated.

3.02 TOUCH-UP AND REPAIR WORK

Remove and replace fencing which is improperly located or is not true to line, grade and plumb within tolerances as indicated.


CHAIN LINK FENCING
72", 96" and "HIGH SECURITY" TYPE
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
RAILROAD OPERATIONS
DWG NO 3206
Nov. 17, 1986
CANTILEVER FENCE DETAIL
POST ANCHORED INTO CONCRETE
HIGH SECURITY FENCE ONLY
GATE POST SCHEDULE
DRIVE ANCHOR DETAIL
(FOR USE WITH 72" FENCE - LINE POSTS ONLY)
NOTES:
END OR CORNER PANEL
LINE PANEL
SWING GATE
VEHICULAR
WARNING SIGNS
TRESSPASSING FORBIDDEN
UNDER PENALTY OF THE LAW
M.B.T.A.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS DIRECTORATE

XII

TEST BORINGS SPECIFICATIONS

SECTION 1. GENERAL

All borings on MBTA Railroad Property are to be performed according to the following requirements:

1.01 Work on MBTA Railroad Property must be performed with a Railroad Company(s) inspector and/or flagman present.

1.02 Where access can only be gained by crossing the tracks, a temporary crossing must be used. This crossing shall adhere to the following:

A. The location and material must be approved in advance by the Chief Engineering Officer or Railroad Company(s).

B. The crossing will be constructed by Railroad Company(s) forces at the Contractor's expense.

C. The crossing must be protected at all times when not in use. Access shall be prohibited through the use of right-of-way gates which will be constructed by Railroad Company(s) forces at the Contractor's expense.

D. No crossing of the track shall be made without a railroad flagman and/or inspector present.

E. The crossing of tracks shall be kept to a minimum.

1.03 Boring locations, including positioning of the boring rig, shall be kept at least 8'-6" from the center line of track.

1.04 All borings must be cased to insure adequate return (of mud and water) and to avoid undermining of the track.

1.05 All holes shall be backfilled with cement grout to fill the voids and protect against an artesian condition.

1.06 The location of all utilities owned or private, shall be located and suitably marked by the Railroad Company(s) and/or the private owner at the Contractor’s expense to avoid damage to the utility and/or track structure.

1.07 Prior to entry upon the MBTA Railroad Property, all necessary contracts, insurance policies and financial obligations shall be provided in a form acceptable to the Railroad Company(s).

1.08 Work within the operating right-of-way that has potential to foul the tracks, shall be restricted to periods of non-peak passenger operations.

1.09 While performing the work, full cooperation with the inspector and flagman is essential. The work will be terminated immediately if the safety of all traffic and personnel is jeopardized in any way.

SECTION 2. TESTING

2.01 Soil borings shall be in accordance with the current issue of the American Railway Engineering Association Specifications, Chapter 1, Part 1, "Specifications for Test Borings". Soils shall be investigated by the split-spoon and/or thin-walled tube method and rock shall be investigated by the Coring method specified therein.

2.02 Soil boring logs shall clearly indicate all of the following:

1. Boring number as shown on boring location plan.
2. Elevation of ground at boring.
3. Description or soil classification of soils and rock encountered.
4. Elevations or depth from surface for each change in strata.
5. Identification of where samples were taken and percentage of recovery.
6. Location of ground water at time of sampling and, if available, subsequent readings.
7. Natural dry density in Ibs./sq. ft. for all strata.
8. Unconfined compressive strength in tons/sq. ft. for all strata.
9. Water content (percent). Liquid Limit (percent) and plastic limit (percent).
10. Standard penetration in blows/ft.

2.03 Soil boring logs shall be accompanied by a plan drawn to scale showing location of borings in relation to the tracks, the elevation of ground surface at each boring, and the elevation of the top of rail of the tracks.

2.04 Soil investigation by auger, wash, or rotary drilling method is not acceptable.

2.05 Borings shall be taken no more than two (2) feet from the field stake which marks the boring location. The stake should not be disturbed during boring operations. Lost stakes shall be reinstalled.

2.06 Unless a boring hole is actively being worked, it shall be securely covered or otherwise protected until permanently filled. When work at each boring hole is completed, the hole shall be properly filled.

2.07 Access to the boring locations must be approved by the Railroad

Company(s). When possible, access shall be from public roads. Licenses for Entry, Insurance and Flag Protection must be obtained by the Contractor in accordance with all applicable MBTA Specifications.

2.08 Boring operations shall be confined to each boring location to the extent possible.

The Contractor shall take necessary precautions to prevent damage to structures and facilities. The site shall be restored to a condition satisfactory to the Railroad Company(s).

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

RAILROAD OPERATIONS DIRECTORATE

XIII

FIBER OPTIC CABLE SPECIFICATIONS

SECTION 1. GENERAL

1.01 The purpose of the following standards is to provide basic information about the MBTA's requirements with respect to the design and construction of fiber optic cables on MBTA Railroad Property to fiber optic cable companies and their Contractors.

1.02 All work performed on or affecting MBTA Railroad Property must be designed and constructed in accordance with the Commuter Rail Design Standards (Vol. I and II), MBTA Book of Standards, Railroad Operations Specifications and the following standards. Additional job specific requirements will be contained in the MBTA's Fiber Optic License Agreement and can be obtained by contacting:

AGM for Real Estate and Asset Development
Ten Park Plaza
Boston, MA 02116

The Director of Engineering for MBTA Railroad Operations or their designated representative will be responsible for the approval of all work. No modifications, changes or deletions will be made without their approval.

SECTION 2. PROJECT REVIEW AND COORDINATION

2.01 All Drawings and specifications shall be reviewed and approved by the MBTA and Railroad Company(s) prior to construction. The MBTA must approve the construction schedule and sufficient Railroad Company(s) personnel must be available before work begins.

2.02 If another fiber optic cable company has previous or exclusive rights along the proposed route, the alignment and cable location must be approved in accordance with existing agreements.

2.03 The fiber optic cable companies must coordinate the construction with others to minimize the disruptions to the MBTA railroad operations.

SECTION 3. CONDUCT OF WORK

3.01 In order to minimize the manpower requirements of the Railroad Company(s) and afford better control, supervision, and protection, the Contractor will conduct their work sequentially and minimize the number of crews and their proximity. Crews should be confined geographically to an area that can be covered easily by a minimum number of Railroad Company(s) personnel. This can be accomplished by a block method of construction. A construction block will be used and is a 1-4 mile segment of right of way in which up to 3 fiber optic cable installation crews can work. The crews can work within the construction block, but cannot work outside of it. The construction block

must move as a unit along the right of way. The crews cannot work two blocks concurrently.

SECTION 4. CONSTRUCTION SCHEDULE

4.01 The fiber optic company or its Contractor will submit a schedule of work to the MBTA for approval. The schedule will be based on methods of construction acceptable to the MBTA and Railroad Company(s). No work shall begin prior to approval by the MBTA.

4.02 Any changes or modifications to the schedule proposed by the fiber optic company or its Contractor must be submitted to and approved by the MBTA prior to implementation. The MBTA, however, may be required to change or modify the construction schedule on account of its operations, maintenance requirements, or manpower shortages. In this event, the MBTA will give the fiber optic cable company as much advance notice as possible.

4.03 Construction schedules will be reviewed and updated every two (2) weeks or as required.

SECTION 5. ESTIMATE OF EXPENSES

5.01 An estimate of anticipated expenses will be provided based on durations provided by the fiber optic cable company or their Contractor and construction schedules approved by the Railroad Company(s). Any changes in the schedule will cause the estimate to be revised. The fiber optic cable company or their Contractor will be responsible for all of the costs incurred by the MBTA and Railroad Company(s) in support of the construction activities. This includes design review, engineering support, administration and supervision.

SECTION 6. BILLING

6.01 The fiber optic cable company or its Contractor will be required to pay for railroad protective services in advance of costs incurred.

DOCUMENT A00820

Massachusetts Department of Transportation
Conditions of Custody

REQUEST FOR RELEASE OF MASSDOT AUTOCAD FILES FORM
(Only to be used following award of contract)

City/Town: RAYNHAM-TAUNTON Project File Number: 613642

Contract Number: 136413

Project Description: Bridge Replacement, R-02-003 = T-01-004 (3M4), South Street East over the Taunton River

All AutoCAD files are provided solely as a courtesy to facilitate public access to information. MassDOT attempts to provide current and accurate information but cannot guarantee so. MassDOT provides such documents, files or other data "as is" without any warranty of any kind, either expressed or implied, including but not limited to, accuracy, reliability, omissions, completeness and currentness. The Commonwealth of Massachusetts and its Consultants shall not be liable for any claim for damages, including lost profits or other consequential, exemplary, incidental, indirect or special damages, relating in any way to the documents, files or other data accessible from this file, including, but not limited to, claims arising out of or related to electronic access or transmission of data or viruses. Because data stored on electronic media can deteriorate undetected or be modified without our knowledge, MassDOT cannot be held liable for its completeness or correctness. MassDOT makes no representation as to the compatibility of these files beyond the version of the stated CAD software.

By signing this form, I agree that it shall be my responsibility to reconcile this electronic data with the conformed contract documents, and that only the conformed contract documents shall be regarded as legal documents for this Project. I understand that this authorization does not give me the right to distribute the files. I agree to the terms above and wish to receive the AutoCAD files.

This signed form shall be emailed to the Highway Design Engineer at the MassDOT -Highway Division at the following email address:

DOTHighwayDesign@dot.state.ma.us
Attn: AutoCAD Files

Name of person requesting AutoCAD files: _____

Affiliation/Company: _____

Address: _____

_____

Telephone number: _____

Email address: _____

Signature/Date: _____

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DOCUMENT A00831

ARMY CORPS OF ENGINEERS

GENERAL PERMIT

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Regulatory Division
Regulatory File No. NAE-2025-02437

Katherine Nunes
City of Taunton
90 Ingell Street
Taunton, Massachusetts 02780
knunes@taunton-ma.gov

Dear Katherine Nunes:

This letter is in response to a request made by BETA Group, Inc., on behalf of the City of Taunton, dated June 2, 2026, to modify a project that is authorized under the Nationwide Permits. Our Department of the Army verification letter number NAE-2025-02437, dated May 14, 2026, authorized the permanent discharge fill material within 8,570 square feet below the Ordinary High Water (OHW) mark of the Taunton River associated with the replacement of the bridge conveying Old Colony Avenue over the Taunton River in Raynham and Taunton, Massachusetts, at latitude 41.886117° and longitude -71.030069°. The bridge deck will be replaced, while the substructure will be retained. Scour protection will be installed below the bridge to protect the abutments and center pier. Scour protection will consist of a 2'-8" layer of natural streambed material over a 2'-0" layer of dumped riprap over 1' of crushed stone for a total depth of 5'-8". The project also includes temporary impacts within 4,699 square feet below OHW due to cofferdams and associated dewatering. This letter supersedes the verification letter issued by this office dated May 14, 2026.

The proposed changes are limited to revising the special conditions. The proposed regulated activities associated with this project remain unchanged and are detailed on the attached drawings titled "PRE-CONSTRUCTION NOTIFICATION TAUNTON AND RAYNHAM, MASSACHUSETTS OLD COLONY AVENUE OVER TAUNTON RIVER BRIDGE R-02-003=T-01-004," on 10 sheets dated February 3, 2026.

Based on the information provided, the Corps has verified that the proposed actions are authorized under Nationwide Permit (NWP) NWP 14, Linear Transportation Projects, pursuant to authorities under Section 404 of the Clean Water Act (33 U.S.C. § 1344). You must ensure the proposed work is performed in accordance with the enclosed applicable terms and conditions. You can find a copy of these permits at: https://www.nae.usace.army.mil/Missions/Regulatory/State-General-Permits/.

Special Conditions

In addition, this verification is subject to the following special conditions:

1. The permittee shall complete and return the enclosed Work-Start Notification Form to this office at least two weeks prior to the anticipated construction start date.

2. The permittee shall complete and return the enclosed Completion Certification Form to this office at least one month following the completion of the authorized work.

3. To protect diadromous fishes, no in-water work shall take place during the spring time-of-year (TOY) restriction from March 1 to July 15 or the fall TOY restriction from September 1 to November 15 of any year(s).

4. Work may take place during the above-mentioned TOY restrictions provided it is done in phases behind dewatered cofferdams. Cofferdams shall be installed outside of the TOY restrictions and be designed to ensure adequate water depth for safe fish passage throughout the TOY restrictions. Dewatering pumps shall include a two-part screen designed to limit entrainment and entrapment of sensitive diadromous fish species that may be present during the construction period. Any diadromous fishes observed within the dewatered area shall be removed and relocated to the water. Hand nets shall be kept onsite, and any fish relocation reported to the Massachusetts Division of Marine Fisheries.

5. **Scour Protection (abutments, piers, etc.)**: Rock riprap shall be used in the stream bed only where a shear stress analysis has determined that scour protection is necessary to ensure stability of the structure. All stone fill shall be depressed (recessed) to a minimum of 2 feet and the overlying stream bed reconstructed to its pre-construction contours, elevations, and substrate sizes and types using existing stockpiled native substrate.

6. **Erosion Control:** No hay bales shall be used for erosion and sediment controls; certified weed-free, chemical-free straw bales are acceptable.

7. **Fabrics:** Woven and mechanically bound biodegradable erosion control matting shall be used to stabilize all slopes steeper than 3H:1V. No plastic netting or welded joint poly-based matting shall be used.

8. **Revegetation:** Native seed mixes and plant species shall be used to reestablish vegetation. Plantings shall include a mix of woody shrub and tree species. No borrow, loam, or fill material shall contain invasive species.

9. **Flow Maintenance**: Downstream flows shall always be maintained, with water from dewatering operations filtered to remove excessive sediments and

discharged in a manner that prevents a release of turbid water into downstream areas. Entrapped fish or mussels shall be timely collected and relocated to the stream channel in a manner that promotes their safe recovery.

10. **Construction:**
    a. Prior to moving construction equipment into the project area, the contractor must take reasonable measures to ensure that each piece of equipment is free of soil, seeds, vegetative matter, or other debris that may contain seeds of non-native terrestrial and aquatic invasive species.
    b. If painting, sand or water blasting any portion of the bridge is necessary, appropriate aprons shall be utilized to provide for complete containment of all paint, and/or sealant over-spray particles and other debris during bridge removal, installation, or maintenance operations.
    c. Aprons, tarps, shrouds, and/or other containment devices must be in place during bridge demolition, bridge maintenance, bridge construction and/or bridge surfacing activities to capture falling debris, paints, welding slag, sealant overspray, asphalt deck materials, or other debris.
    d. All concrete chunks, asphalt, grindings, concrete materials, wood, rebar, and other debris generated during demolition or construction that enters the river shall be immediately removed and taken to an appropriate disposal facility outside of the floodplain.
    e. All tools, equipment, barricades, signs, surplus materials, and rubbish from the project work limits shall be removed upon project completion. All construction debris and litter must be completely removed off site and disposed of properly upon completion of the project.
    f. All debris, excess fill material and material excavated shall be disposed of at an approved upland location (above 100-year flood elevations). Disposal in wetlands, floodplains or within 1000 feet of the Taunton River is prohibited.

11. **Recreational Access:** Boating (canoe/kayak or other) shall be safely maintained throughout the duration of the project either through the existing river channel or through a temporary portage trail. If this boating cannot be safely maintained, signage must be posted at the upstream and downstream boating access sites to inform the public of the river closure.

A change in location or project plans may require re-evaluation of your project. Proposed changes must be coordinated with this office prior to construction. Failure to comply with all terms and conditions of these permits (NWP) invalidate this authorization and could result in a violation of Section 301 of the Clean Water Act or Section 10 of the Rivers and Harbors Act of 1899. You must also obtain all local, state, Tribal, and other Federal permits that apply to this project.

Water Quality Certification (WQC)

The Commonwealth of Massachusetts issued a conditioned WQC decision for your project (enclosed). You must comply with the conditions specified in the WQC decision for this NWP authorization to be valid.

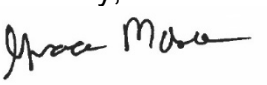
Permit Expiration

The Corps verification of this NWP authorization is valid until March 14, 2031, unless the NWP is modified, reissued, or revoked prior to that date. If the authorized work for the NWP authorization has not been completed by that date and you have commenced or are under contract to commence this activity before March 14, 2031, you will have until March 14, 2032, to complete the activity under the enclosed terms and conditions of this NWP.

Contact Information

If you have any questions, please contact Daniel Vasconcelos at 978-318-8653, or by email at daniel.b.vasconcelos@usace.army.mil. To better serve you, please complete the Customer Service Survey located at: https://regulatory.ops.usace.army.mil/customer-service-survey/.

Sincerely,



Grace Moses
Chief, Technical Support Branch
Regulatory Division

Enclosures:
Project Plans
Work Start Notification Form
Compliance Certification Form
Water Quality Certification
NWP 14, Linear Transportation Projects and General/Regional Conditions

cc (w/enclosures):
Lauren Bonatakis, NPS, lauren_bonatakis@nps.gov
Jonathan Niro, BETA Group, Inc., jniro@BETA-Inc.com
Courtney Walker, MassDOT – Highway Division, courtney.l.walker@dot.state.ma.us
Heidi Davis, MassDEP, via heidi.davis@mass.gov

Work-Start Notification Form

File Number: NAE-2025-02437 **State: Massachusetts** **County: Bristol**

Permittee: City of Taunton, Katherine Nunes
Date Verification Issued: 6/3/2026
Project Manager: Daniel Vasconcelos

At least two weeks prior to commencing the activity authorized by this permit, sign this certification and return it to the following address:

US ARMY CORPS OF ENGINEERS
New England District
Attn: Daniel Vasconcelos
696 Virginia Road
Concord, MA 01742
or
daniel.b.vasconcelos@usace.army.mil
978-318-8653

Please note that your permitted activity is subject to a compliance inspection by a U. S. Army Corps of Engineers (USACE) representative. Failure to comply with any terms or conditions of this authorization may result in the USACE suspending, modifying or revoking the authorization and/or issuing a Class I administrative penalty, or initiating other appropriate legal action.

The people (e.g. contractor) listed below will do the work, and they understand the permit's conditions and limitations.

Contractor Name/Contractor Firm: _____

Business Address: _____

_____

Contractor Phone and Email: _____

Proposed Construction Dates: Start: _____ Finish: _____

_____ **_____**

Signature of Permittee **Date**

U.S. Army Corps of Engineers (USACE)

CERTIFICATION OF COMPLIANCE WITH DEPARTMENT OF THE ARMY PERMIT

For use of this form, see Section 404 of the Clean Water Act, Section 10 of the Rivers and Harbors Act of 1899, and Section 103 of the Marine Protection, Research, and Sanctuaries Act; the proponent agency is CECW-COR.

Form Approved - OMB No. 0710-0003

Expires 2027-10-31

The Agency Disclosure Notice (ADN)

The Public reporting burden for this collection of information, 0710-0003, is estimated to average 10 minutes per response, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or burden reduction suggestions to the Department of Defense, Washington Headquarters Services, at whs.mc-alex.esd.mbx.dd-dod-information-collections@mail.mil. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

PURPOSE: This form is used by recipients of U.S. Army Corps of Engineer Regulatory permits to certify compliance with the permit terms and conditions.

Your permitted activity is subject to a compliance inspection by a U.S. Army Corps of Engineers representative. If you fail to comply with this permit, you are subject to permit suspension, modification, or revocation.

Upon completion of the activity authorized by this permit and any mitigation required by the permit, sign this certification and return it to the U.S. Army Corps of Engineers, New England District, Regulatory Office.

The certification can be submitted by email at daniel.b.vasconcelos@usace.army.mil or by mail at the below address:

U.S. Army Corps of Engineers

New England District Office

Street Address: 696 Virginia Road

City: Concord State: Massachusetts Zip Code: 01742-2751

COMPLETED BY THE CORPS

Corps Action Number: NAE-2025-02437

Permit Type: General Permit

General Permit Number and Name (*if applicable*): NWP 14 (Linear Transportation Projects)

Name of Permittee: Katherine Nunes

Project Name: MassDOT - Highway Division Bridge Rehabilitation

Project Location (*physical address*): Old Colony Avenue over Taunton River

Raynham and Taunton, Massachusetts

PERMITTEE'S CERTIFICATION

Date Work Started: _____

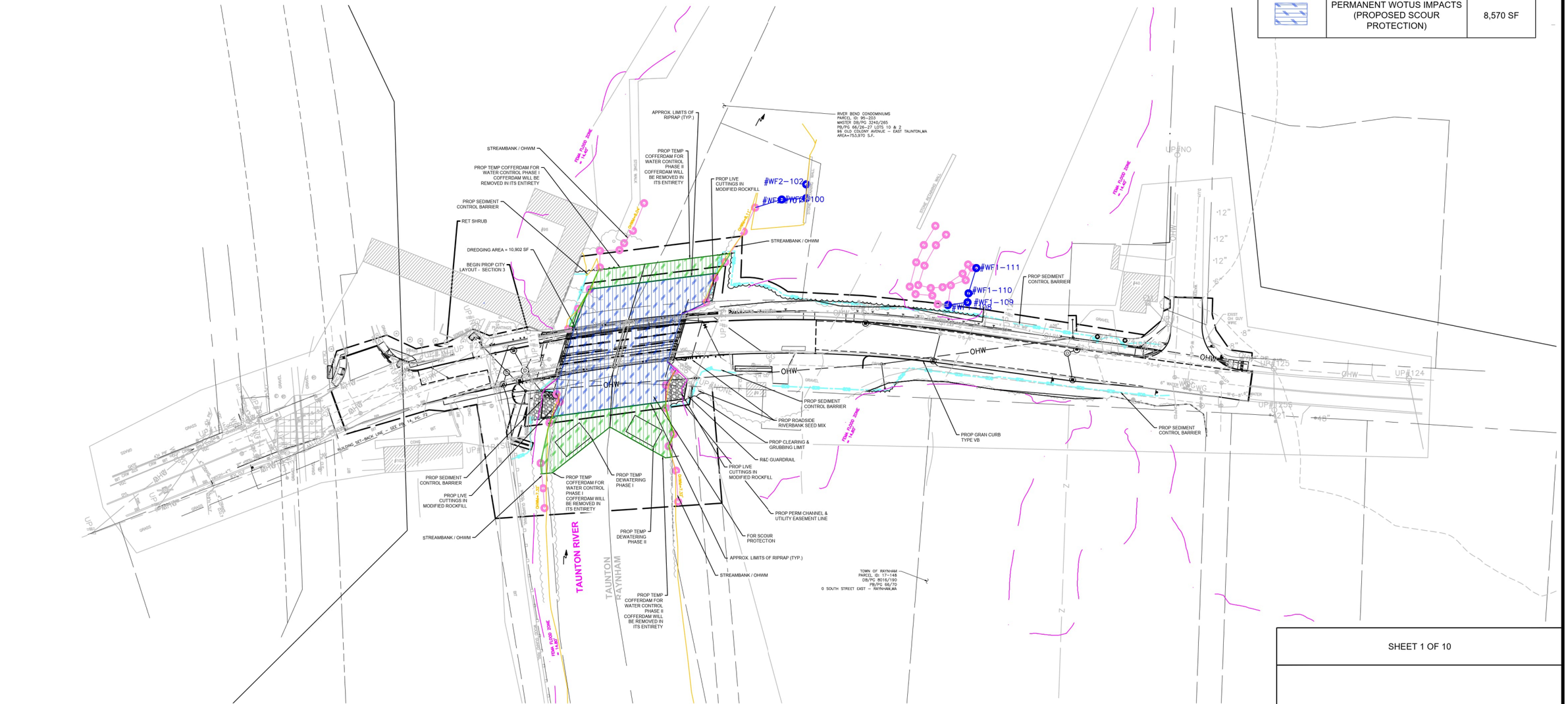
Date Work Completed: _____

Enclose photographs showing the completed project (*if available*).

I _____ hereby certify that the work authorized by the above referenced permit has been completed in accordance with all of the permit terms and conditions, and that any required compensatory mitigation has been completed in accordance with the permit conditions.

Name	Date	Signature

SUMMARY OF RESOURCE AREA IMPACTS		
LINETYPE/ HATCH	DESCRIPTION	IMPACT QUANTITY
	TEMPORARY BANK IMPACT	164 LF
	PERMANENT BANK IMPACT	72 LF
	TEMPORARY IMPACTS FOR WATER CONTROLS AND DEWATERING (WOTUS)	4,699 SF
	PERMANENT WOTUS IMPACTS (PROPOSED SCOUR PROTECTION)	8,570 SF



ENVIRONMENTAL IMPACTS PLAN

40 30 20 10 0 20 40 80

(IN FEET)
1 inch = 40 ft.

NOTES:

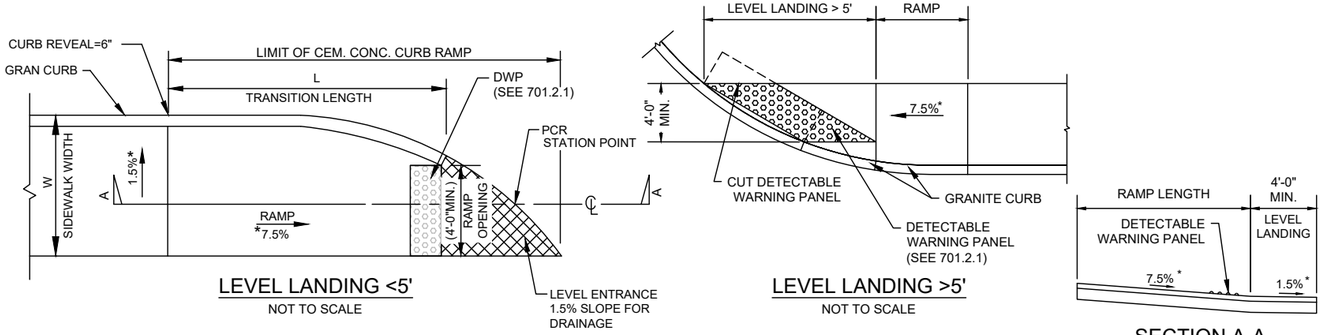
1. THE HORIZONTAL DATUM IS THE NORTH AMERICAN DATUM OF 1983 (NAD83) MASSACHUSETTS STATE PLAN COORDINATE SYSTEM IN U.S. SURVEY FEET.
2. THE VERTICAL DATUM IS THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).

SHEET 1 OF 10

PRE-CONSTRUCTION NOTIFICATION
TAUNTON AND RAYNHAM, MASSACHUSETTS
OLD COLONY AVENUE OVER TAUNTON RIVER
BRIDGE R-02-003=T-01-004
FEBRUARY, 2025

613642_EV_WQC_PCN(IMPACTS)_USACE COMMENTS.DWG Plotted on 3-Feb-2026 2:52 PM

CURB RAMP TYPE A DATA								
PCR NO.	LOCATION	RAMP REFERENCE POINT		GUTTER PROFILE SLOPE	LENGTH OF PRIMARY RAMP L	WIDTH OF RAMP OPENING W	SIDEWALK WIDTH	LANDING AREA
		STATION	OFFSET					
3	SOUTH STREET EAST	7+72.5	15.1' LT	1.2%	6.5'	4.4'	5.5'	> 5'
4	SOUTH STREET EAST	8+23.2	17.0' LT	0.4%	4.0' 3"R	4.0'	5.5'	> 5'



LEVEL LANDING <5'
NOT TO SCALE

LEVEL LANDING >5'
NOT TO SCALE

SECTION A-A
NOT TO SCALE

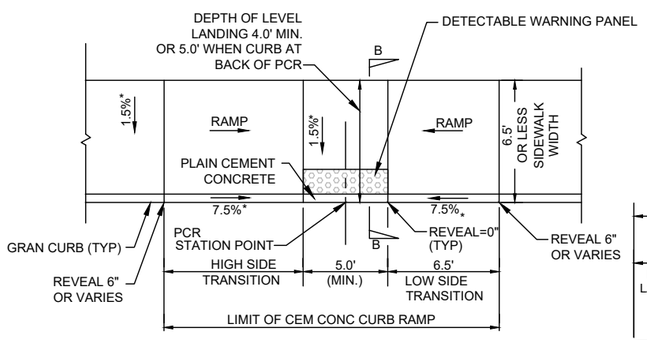
CURB RAMP TYPE "A"
SEE MASSDOT S.D. E107.6.0
NOT TO SCALE

NOTES:

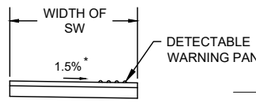
1. ALL PEDESTRIAN CURB RAMPS SHALL CONFORM TO THE REQUIREMENTS OF THE MASSACHUSETTS ARCHITECTURAL ACCESS BOARD (AAB) AND THE AMERICAN WITH DISABILITIES ACT (ADA) AND THE LATEST MASSDOT STANDARDS.
2. THE LOCATIONS OF PROPOSED PEDESTRIAN CURB RAMPS ARE SHOWN ON CONSTRUCTION PLANS AND THE PEDESTRIAN CURB RAMP DETAILS SHEETS. EXACT LOCATIONS MAY BE ADJUSTED, IF NECESSARY, BY THE ENGINEER IN THE FIELD.

CURB RAMP TYPE B DATA									
PCR NO.	LOCATION	RAMP REFERENCE POINT		GUTTER PROFILE SLOPE	WIDTH OF RAMP OPENING W	DEPTH OF LEVEL LANDING (MIN. 4.0')	TRANSITION LENGTH		SIDEWALK WIDTH
		STATION	OFFSET				LEFT	RIGHT	
1	OLD COLONY WAY	1+24.9	27.4' LT	-2.8%	6.0'	5.4'	8.0' ** 4.5"R±	6.5'	5.5'
2	OLD COLONY WAY	1+58.3	29.6' LT	-0.8%	5.0'	6.0'	7.67'	6.5'	6.0'

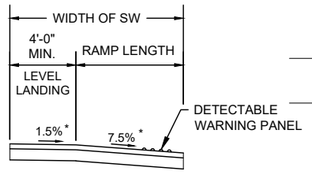
** MATCH EXISTING REVEAL



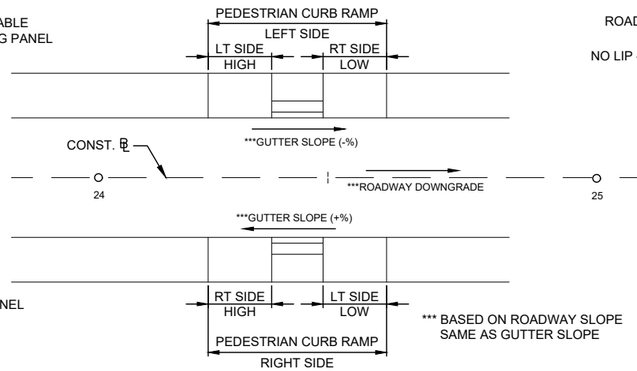
CURB RAMP DETAIL TYPE "B"
SEE MASSDOT STD DETAIL 701.2.2 (JAN 2025)
NOT TO SCALE



SECTION B-B
NOT TO SCALE



SECTION C-C
NOT TO SCALE

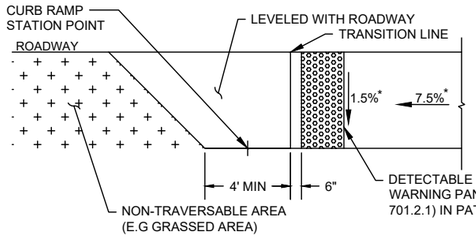


*** BASED ON ROADWAY SLOPE
SAME AS GUTTER SLOPE

GUTTER SLOPE DIAGRAM
NOT TO SCALE

TABLE I	
ROADWAY PROFILE GRADE	* HIGH SIDE TRANSITION LENGTH
%	ENGLISH UNITS
=0%	6'-6"
>0% TO 1%	7'-8"
>1% TO 2%	9'-0"
>2% TO 3%	11'-0"
>3% TO 4%	14'-0"
>4% TO 5%	15'-0" MAX.

CURB TRANSITION LENGTH
FOR CURB RAMPS
MASSDOT CONST. STD DETAIL 701.2.8 (JAN 2025)



CURB RAMP TYPE "C"
NOT TO SCALE

PEDESTRIAN TRANSITION RAMP TO SHOULDER NOTES:

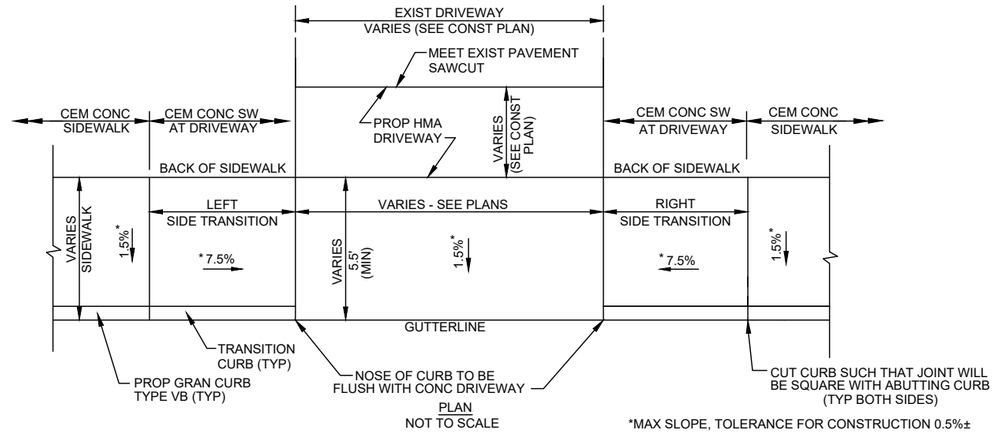
1. DETECTABLE WARMING PANEL TO BE ALIGNED TO THE DIRECTION OF TRAVEL.
2. PEDESTRIAN PATH OF TRAVEL SHALL BE NO LESS THAN 4'-0" WIDE AND FREE OF VERTICAL OBSTRUCTIONS (FOR ALL CONSTRAINED CONDITIONS).
3. ALL SLOPE VALUES LISTED HERE ARE MAXIMUM VALUES WITH CONSTRUCTION TOLERANCE OF ±0.5%.
4. THE DETECTABLE WARNING PANEL IS 2 FEET DEEP MINIMUM AT ALL LOCATIONS IN THE PEDESTRIAN PATH OF TRAVEL

CURB RAMP TYPE C DATA								
PCR NO.	LOCATION	RAMP REFERENCE POINT		GUTTER PROFILE SLOPE	WIDTH OF RAMP OPENING W	DEPTH OF LEVEL LANDING (MIN. 4.0')	TRANSITION LENGTH	SIDEWALK WIDTH
		STATION	OFFSET					

SOUTH STREET E./OLD COLONY AVE.

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	######	2	10
PROJECT FILE NO.	613642		

CONSTRUCTION DETAILS

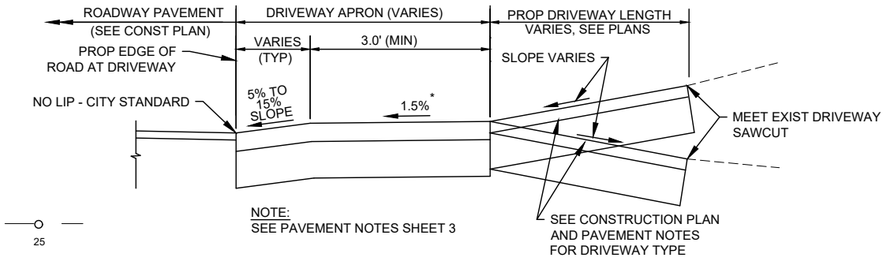


PLAN
NOT TO SCALE

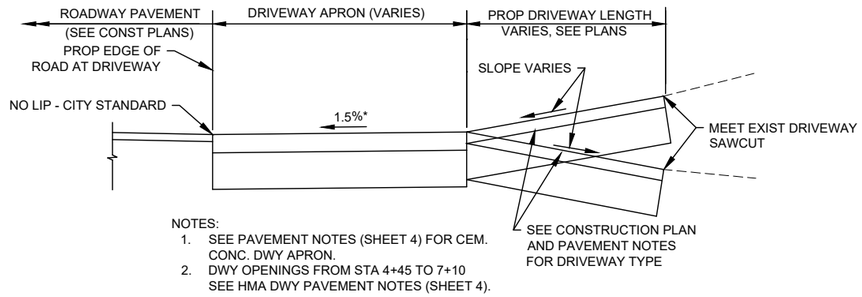
*MAX SLOPE, TOLERANCE FOR CONSTRUCTION 0.5%±

DETAIL FOR DEPRESSED DRIVEWAY WITH SIDEWALK - TYPE A

**DRIVEWAY OPENING DATA- TYPE A								
DWY NO.	LOCATION	℄ DRIVEWAY OPENING AT GUTTER		DRIVEWAY OPENING WIDTH	GUTTER PROFILE SLOPE	DEPTH OF GUTTER TO BACK OF SIDEWALK	PATH OF TRAVEL WIDTH ACROSS DRIVEWAY	TRANSITION LENGTH	
		STATION	OFFSET					LEFT	RIGHT
3	SOUTH STREET EAST	5+11.1	12.0' LT	25.0'	-0.7%	6.0'	6.0'	9.0'	6.5'



SECTION FOR TYPICAL DRIVEWAY WITH SIDEWALK - TYPE A
NOT TO SCALE

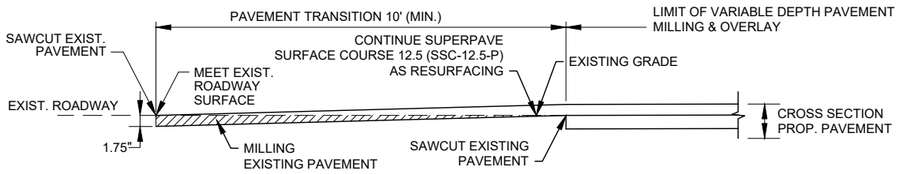


SECTION FOR DEPRESSED DRIVEWAY WITH SIDEWALK - TYPE B
NOT TO SCALE

SOUTH STREET E/OLD COLONY AVE.

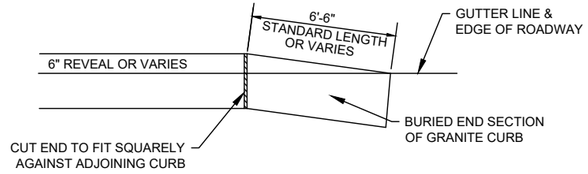
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	######	3	10
PROJECT FILE NO.	613642		

CONSTRUCTION DETAILS



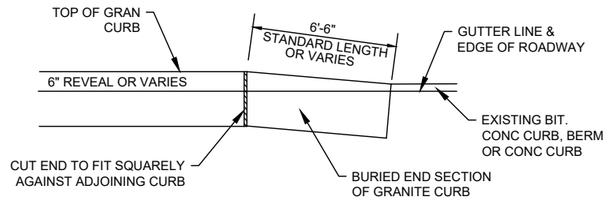
DETAIL FOR PAVEMENT TRANSITION AT LIMIT OF WORK

NOT TO SCALE



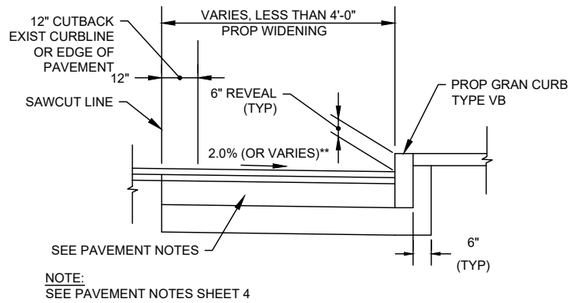
DETAIL FOR TRANSITION CURB
PROP CURB TO EXISTING EDGE OF TRAVEL WAY

NOT TO SCALE



DETAIL FOR TRANSITION CURB
TRANSITION CURB - PROP CURB TO EXISTING CURB

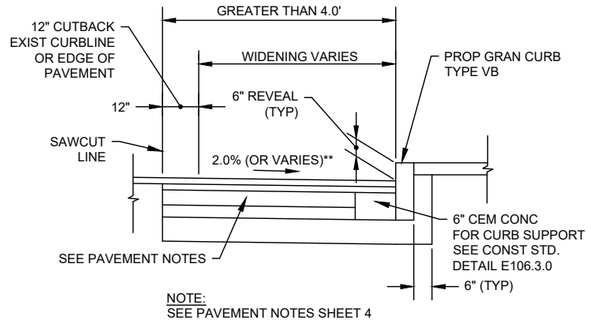
NOT TO SCALE



NOTE:
SEE PAVEMENT NOTES SHEET 4

DETAIL FOR BOX WIDENING 4.0' OR LESS

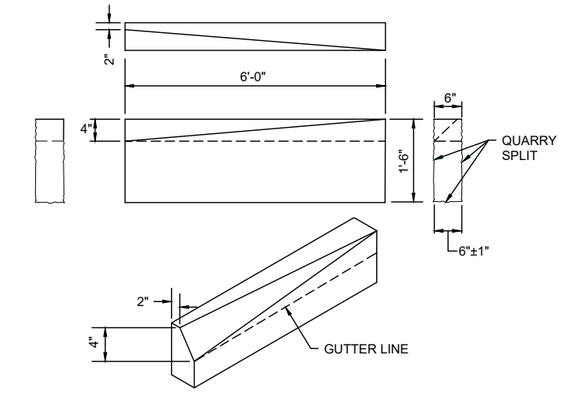
NOT TO SCALE



NOTE:
SEE PAVEMENT NOTES SHEET 4

DETAIL FOR BOX WIDENING GREATER THAN 4.0'

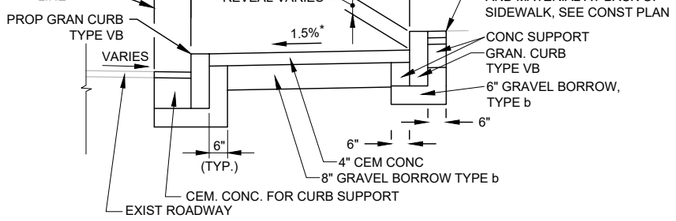
NOT TO SCALE



NOTES:
1. TOP SURFACE AND SLOPED SURFACE TO BE DRESSED BY SAW. REMAINDER TO BE QUARRY SPLIT.
2. DRAWING SHOWS TRANSITION CURB FOR ONE DIRECTION. FOR OTHER DIRECTION USE OPPOSITE HAND.

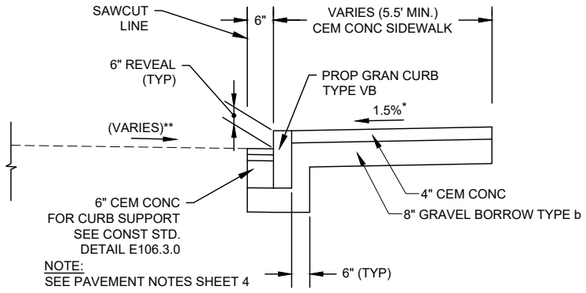
GRANITE CURB TYPE VA4-SPLAYED END
(ITEM 504.2)

NOT TO SCALE



DETAIL FOR GRANITE CURB AT BACK OF SIDEWALK

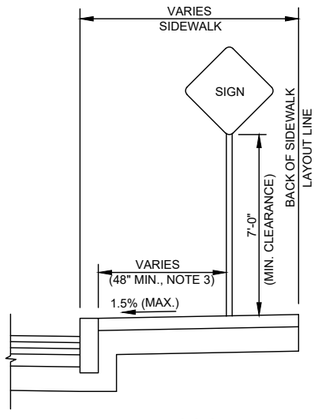
NOT TO SCALE



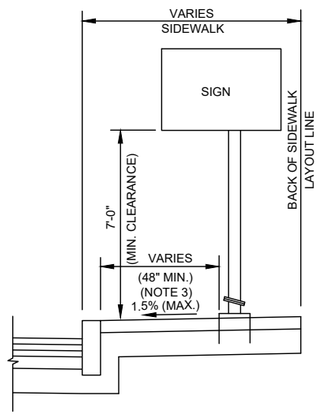
NOTE:
SEE PAVEMENT NOTES SHEET 4

DETAIL FOR SIDEWALK W/ GRANITE CURB - NO ROADWAY WORK

NOT TO SCALE



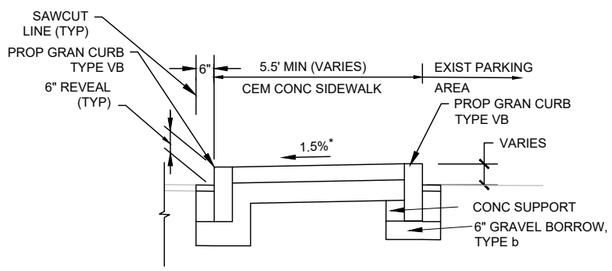
TRAFFIC SIGN



D6/D8 SIGN SUPPORT

NOTES:
1. MINIMUM CLEAR PATH ON ALL SIDEWALKS SHALL BE 48 INCHES, EXCLUDING THE CURB.
2. CONTRACTOR TO ATTAIN 60" CLEAR

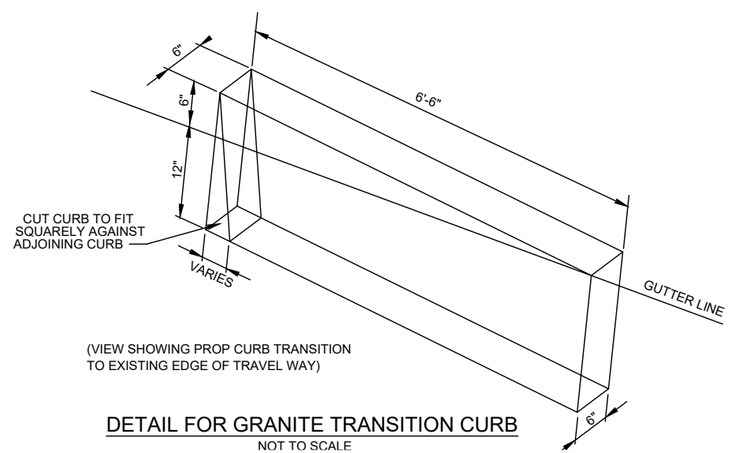
DETAIL FOR MINIMUM OFFSET DISTANCES



CURB AT BACK OF SIDEWALK
NEAR PARKING LOT AREAS

STA 50+45 TO 54+36±

NOT TO SCALE

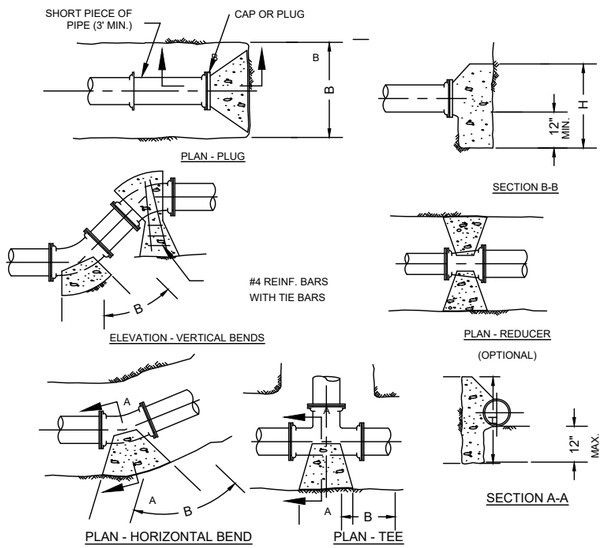


(VIEW SHOWING PROP CURB TRANSITION TO EXISTING EDGE OF TRAVEL WAY)

DETAIL FOR GRANITE TRANSITION CURB

NOT TO SCALE

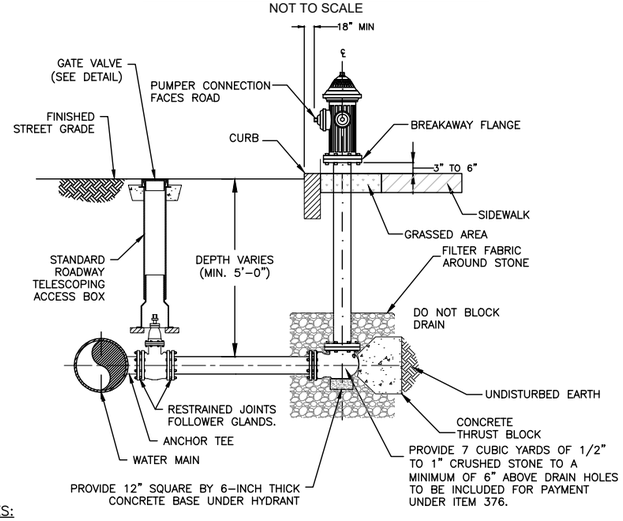
FITTING	MIN. BEARING AREA (H X B)
6" - 1/8 BEND	32" x 32"
8" - 1/8 BEND	24" x 24"
8" x 6" TEE	20" x 20"
12" - 1/8 BEND	32" x 32"
12" x 12" TEE	24" x 24"
12" x 6" TEE	24" x 24"
12" x 8" TEE	32" x 32"
16' x 12" TEE	24" x 24"
HYDRANT	24" x 24"
8" PLUG	32" x 32"
150 mm PLUG	24" x 24"
8" x 6" REDUCER	24" x 24"
8" - 1/16 BEND	20" x 20"
12' x 8" REDUCER	24" x 24"



NOTE:
ALL CONCRETE TO BE PLACED AGAINST UNDISTURBED EARTH

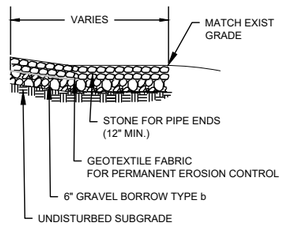
CONCRETE ANCHORAGE DETAILS

NOT TO SCALE



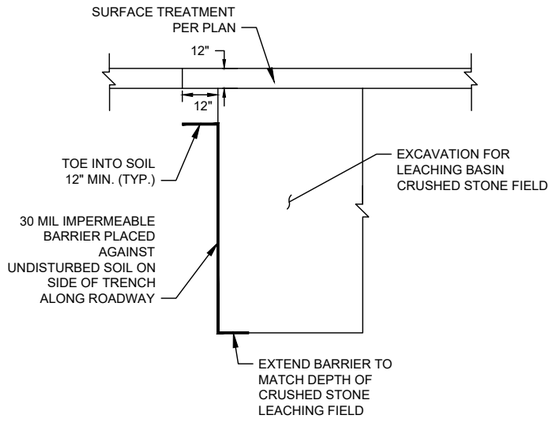
NOTES:

1. HYDRANTS SHALL BE OFFSET 1' FROM THE BACK OF SIDEWALK.
2. HYDRANTS SHALL BE PROVIDED BY THE CITY OF TAUNTON.
3. PROVIDE HYDRANT AND VALVE JOINTS WITH RESTRAINED MECHANICAL JOINTS.
4. ALL JOINTS BETWEEN ANCHOR TEE AND HYDRANT SHALL BE RESTRAINED.
5. SUPPORT BLOCKS TO BE CONCRETE MASONRY BLOCK.
6. SEE HYDRANT TABLE ON THRUST BLOCK BEARING AREAS FOR THE AREA OF CONCRETE REQUIRED.
7. ALL HYDRANTS OUT OF SERVICE MUST BE BAGGED.



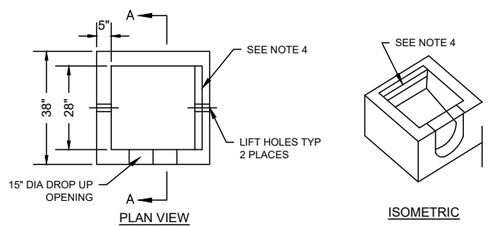
STONE FOR PIPE ENDS

NOT TO SCALE



DETAIL FOR IMPERMEABLE BARRIER INSTALLATION IN EXCAVATION WALL

NOT TO SCALE



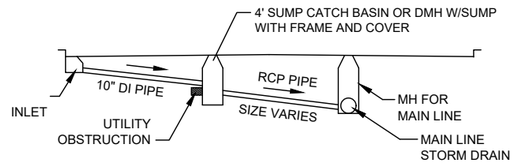
NOTES:

1. DESIGNED FOR AASHTO HS25-44 LOADING
2. CONCRETE STRENGTH fc=4000 PSI
3. REINFORCING STEEL: ASTM A185 (wwf) fy=60,000 PSI
4. CURB INLETS ARE REQUIRED WHEN GUTTER INLETS ARE INSTALLED AGAINST CURBING. PROVIDE 3"X6" OPENING WHERE CURB INLETS ARE PROPOSED.

SPECIAL GUTTER INLET (ITEM 204)

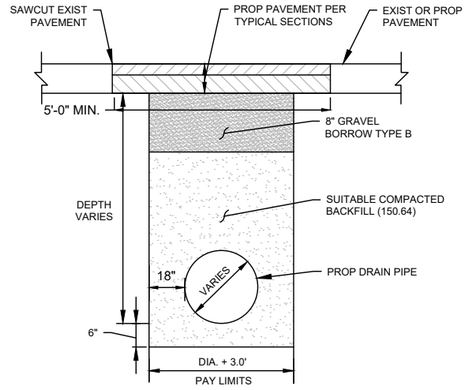
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	######	4	10
PROJECT FILE NO.	613642		

CONSTRUCTION DETAILS



CONTINGENCY DETAIL FOR STORM DRAIN LATERAL LINES

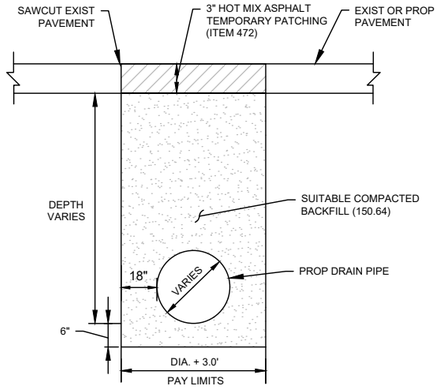
(USE ONLY IF OBSTRUCTION IS ENCOUNTERED)
NOT TO SCALE



NOTES:
1. ANY EXCAVATED MATERIALS DETERMINED BY THE ENGINEER TO BE UNSUITABLE FOR BACKFILL SHALL BE REPLACED WITH GRAVEL BORROW FOR BACKFILLING STRUCTURES AND PIPES AND PAID FOR UNDER ITEM 151.2.

PERMANENT DRAINAGE TRENCH IN MILL AND OVERLAY AREAS

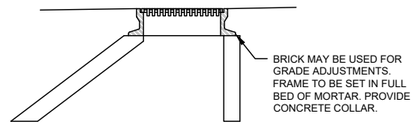
NOT TO SCALE



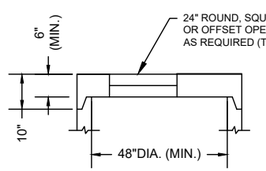
NOTES:
1. ANY EXCAVATED MATERIALS DETERMINED BY THE ENGINEER TO BE UNSUITABLE FOR BACKFILL SHALL BE REPLACED WITH GRAVEL BORROW FOR BACKFILLING STRUCTURES AND PIPES AND PAID FOR UNDER ITEM 151.2.

TEMPORARY DRAINAGE TRENCH IN FULL DEPTH AREAS

NOT TO SCALE



ALTERNATE ECCENTRIC CONE SECTION



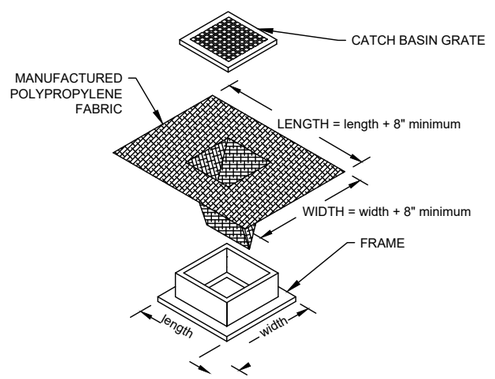
ALTERNATE FLAT TOP SLAB

NOTES:

1. BASED ON ACTUAL FIELD CONDITIONS; THE CONTRACTOR SHALL DETERMINE WHICH STYLE OF TOP SECTION SHOULD BE USED.

ALTERNATE DRAINAGE STRUCTURE TOP CONFIGURATIONS

NOT TO SCALE



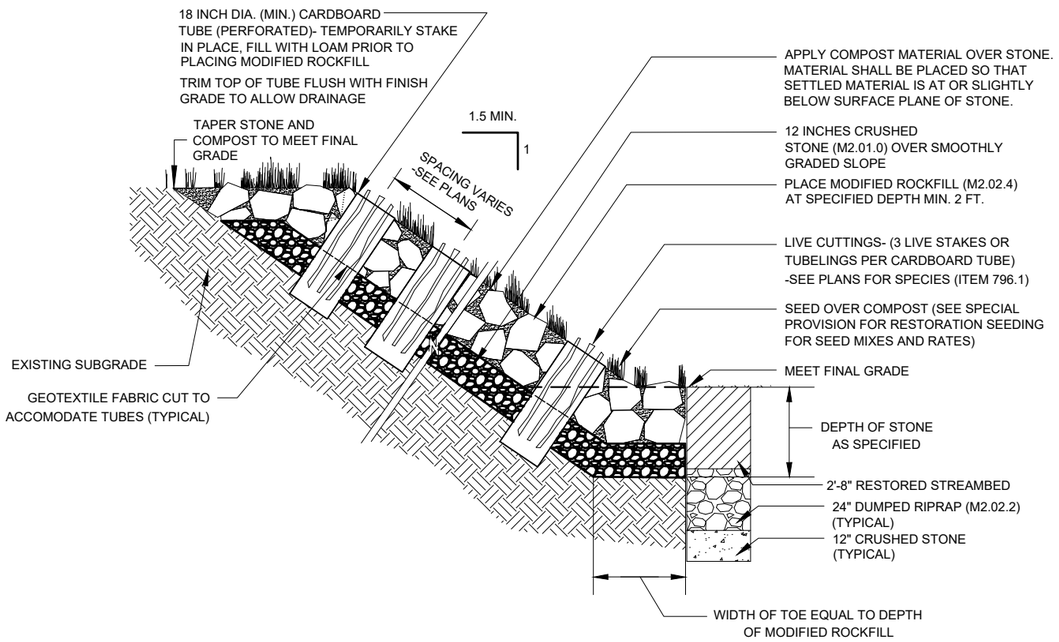
NOTES
1. LENGTH AND WIDTH OF POLYPROPYLENE FABRIC MUST EXCEED EXISTING CATCH BASIN FRAME DIMENSIONS BY A MINIMUM OF 8".
2. REMOVE CATCH BASIN GRATE AND INSTALL POLYPROPYLENE FABRIC OVER CATCH BASIN FRAME. REPLACE CATCH BASIN GRATE TO SECURE POLYPROPYLENE FABRIC IN PLACE.
3. PROVIDE EROSION CONTROL PROTECTION AT ALL EXISTING AND PROPOSED CATCH BASINS WITHIN THE PROJECT LIMITS.

CATCH BASIN EROSION CONTROL PROTECTION (TYP)

NOT TO SCALE

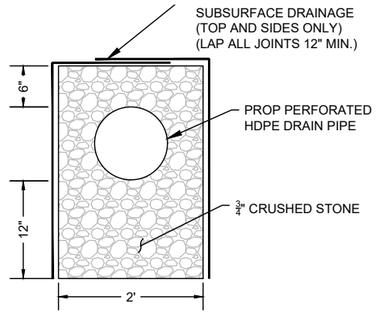
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	######	5	10
PROJECT FILE NO.	613642		

CONSTRUCTION DETAILS



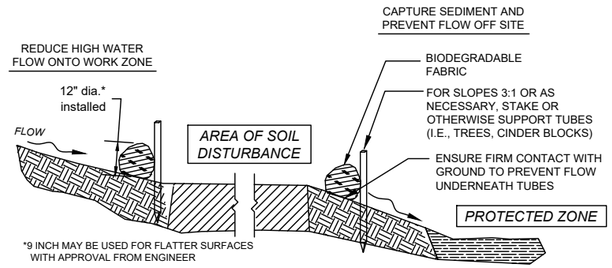
LIVE CUTTINGS IN MODIFIED ROCKFILL

NOT TO SCALE



PERFORATED HDPE INFILTRATION TRENCH

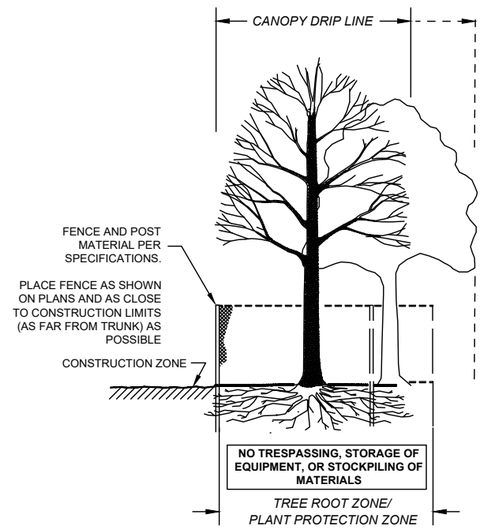
NOT TO SCALE



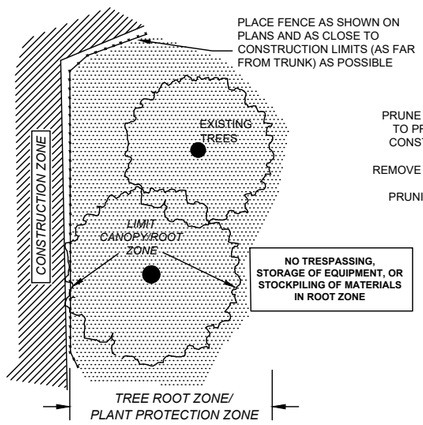
SECTION

SEDIMENT BARRIER - COMPOST FILTER TUBE

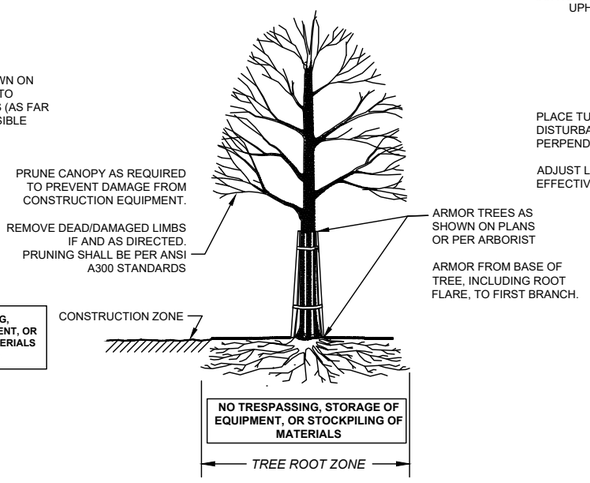
NOT TO SCALE



SECTION - FENCE PROTECTION OF ROOT ZONE

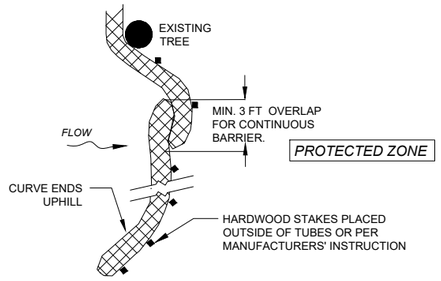


PLAN VIEW - FENCE PROTECTION OF ROOT ZONE



SECTION - TRUNK ARMORING & PRUNING

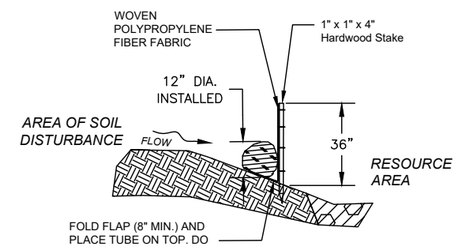
TREE PROTECTION DETAILS



PLACE TUBE AS CLOSE TO LIMIT OF SOIL DISTURBANCE AS POSSIBLE, ALONG CONTOURS, AND PERPENDICULAR TO FLOW.

ADJUST LOCATION AS REQUIRED FOR OPTIMUM EFFECTIVENESS. DO NOT INSTALL IN WATERWAYS.

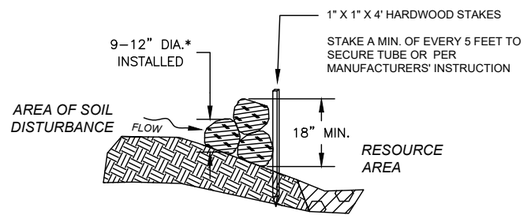
PLAN VIEW



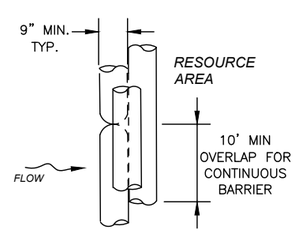
SECTION

COMPOST FILTER TUBE & SILT FENCE

NOT TO SCALE



SECTION



PLAN VIEW

COMPOST FILTER TUBE BERM (SLOPES 2:1 OR STEEPER)

NOT TO SCALE

SOUTH STREET E/OLD COLONY AVE.

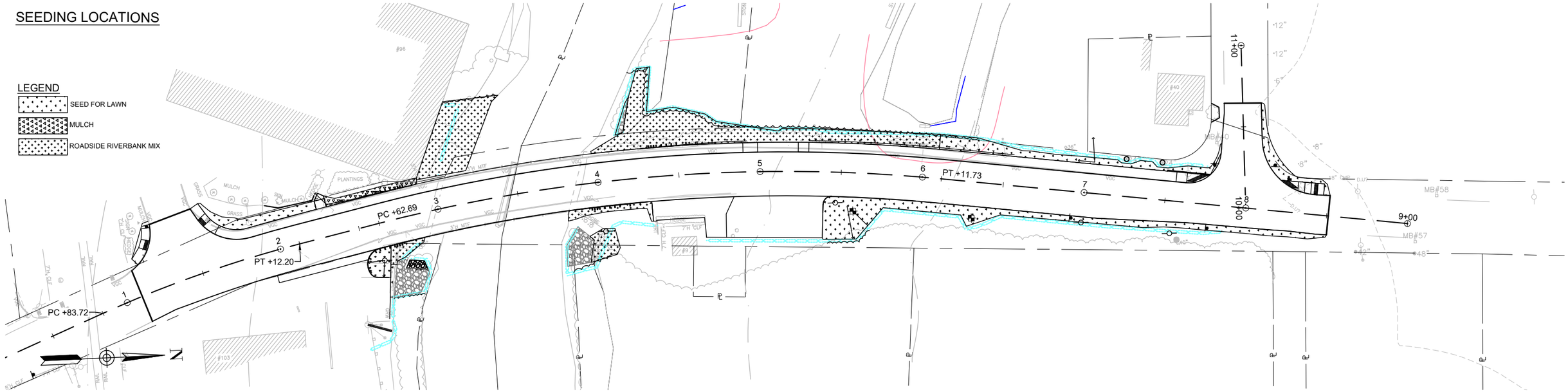
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	######	6	10
PROJECT FILE NO.	613642		

CONSTRUCTION DETAILS

SEEDING LOCATIONS

LEGEND

- SEED FOR LAWN
- MULCH
- ROADSIDE RIVERBANK MIX



HIGHWAY GUARD DETAILS

TRAILING ANCHORAGE - STA 2+41 TO 2+50 LT
GUARDRAIL, TL-3 (SINGLE FACED) - STA 2+50 TO 2+54 LT
TRANSITION TO BRIDGE RAIL - STA 2+54 TO 2+88 LT

TERMINAL END TREAMENT - STA 2+50 RT
CURVED TRANSITION TO BRIDGE RAIL - STA 2+50 TO 2+80 RT

TERMINAL END TREATMENT - STA 2+54 RT (ALONG PARKING)
GUARDRAIL, TL-3 (SINGLE FACED) - STA 2+54 TO 2+64 RT
TERMINAL END TREATMENT - STA 2+64 RT

TRANSITION TO BRIDGE RAIL - STA 3+88 TO 4+22 RT
TRAILING ANCHORAGE - STA 4+22 TO 4+32 RT

TRANSITION TO BRIDGE RAIL - STA 4+26 TO 4+60 LT
GUARDRAIL, TL-3 (SINGLE FACED) - STA 4+60 TO 4+67 LT
TANGENT END TREATMENT - STA 4+67 TO 4+92 LT

TRAILING ANCHORAGE - STA 5+30 TO 5+39 LT
GUARDRAIL, TL-3 (SINGLE FACED) - STA 5+30 TO 5+70 LT
GUARDRAIL, TL-3 (SINGLE FACED) DEEP POST - STA 5+70 TO 6+30 LT
TANGENT END TREATMENT - STA 6+30 TO 6+55 LT

N

CURB TIE AND GRADING PLAN

SEE SHEET 13

DRAINAGE AND UTILITY PLAN

SEE SHEET 15

SIGN & PAVEMENT MARKING PLAN

SEE SHEET 17

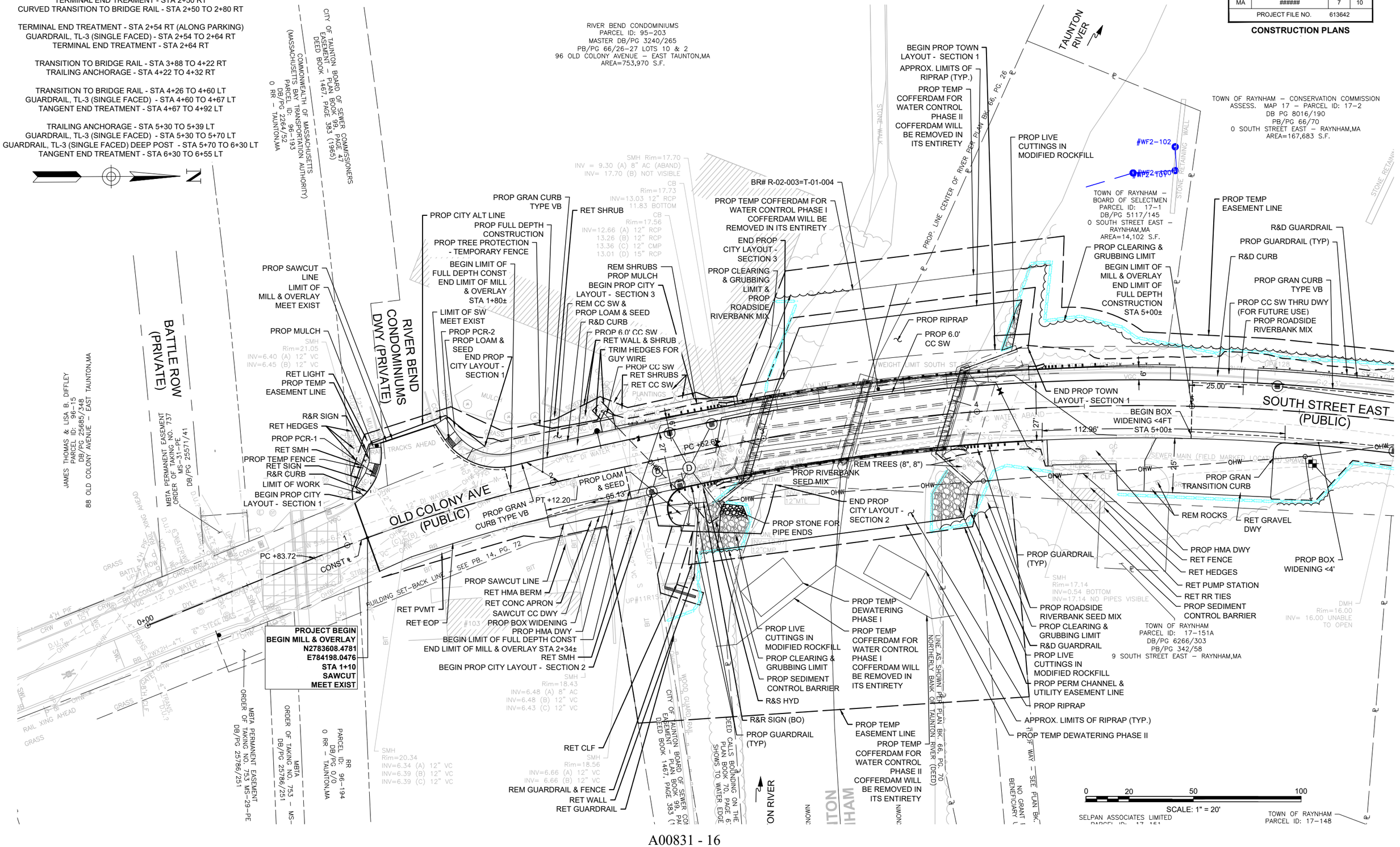
WATER SUPPLY PLAN

SEE BELOW

RAYNHAM/TAUNTON
SOUTH STREET E./OLD COLONY AVE.

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	######	7	10
PROJECT FILE NO.	613642		

CONSTRUCTION PLANS



SEE SHEET 14 | SEE SHEET 16 | SEE SHEET 18 | SEE BELOW

TRAILING ANCHORAGE - STA 4+22 TO 4+32 RT

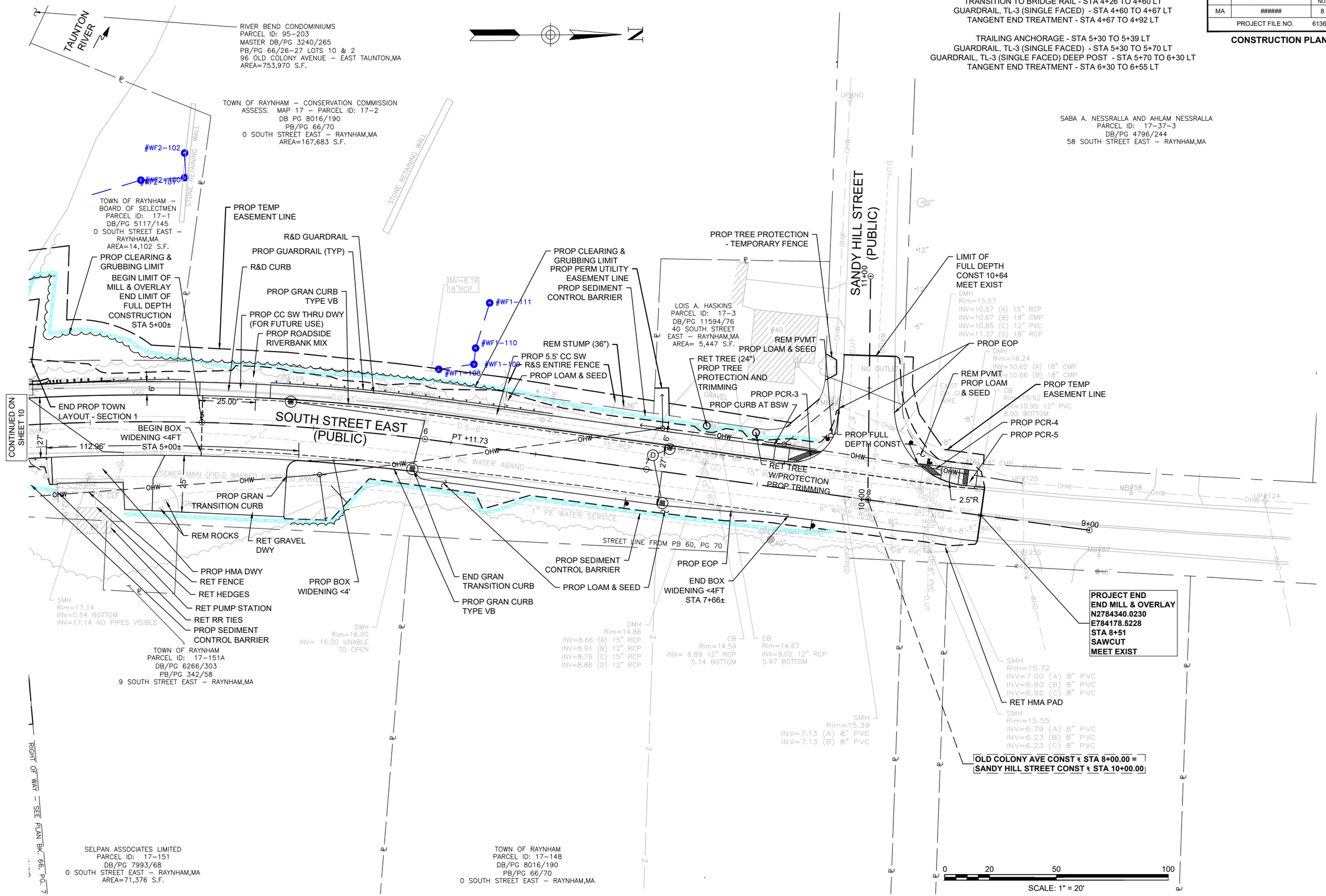
TRANSITION TO BRIDGE RAIL - STA 4+26 TO 4+60 LT
GUARDRAIL, TL-3 (SINGLE FACED) - STA 4+60 TO 4+67 LT
TANGENT END TREATMENT - STA 4+67 TO 4+92 LT

TRAILING ANCHORAGE - STA 5+30 TO 5+39 LT
GUARDRAIL, TL-3 (SINGLE FACED) - STA 5+30 TO 5+70 LT
GUARDRAIL, TL-3 (SINGLE FACED) DEEP POST - STA 5+70 TO 6+30 LT
TANGENT END TREATMENT - STA 6+30 TO 6+55 LT

SOUTH STREET E/OLD COLONY AVE.

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	######	8	10
PROJECT FILE NO.	613642		

CONSTRUCTION PLANS

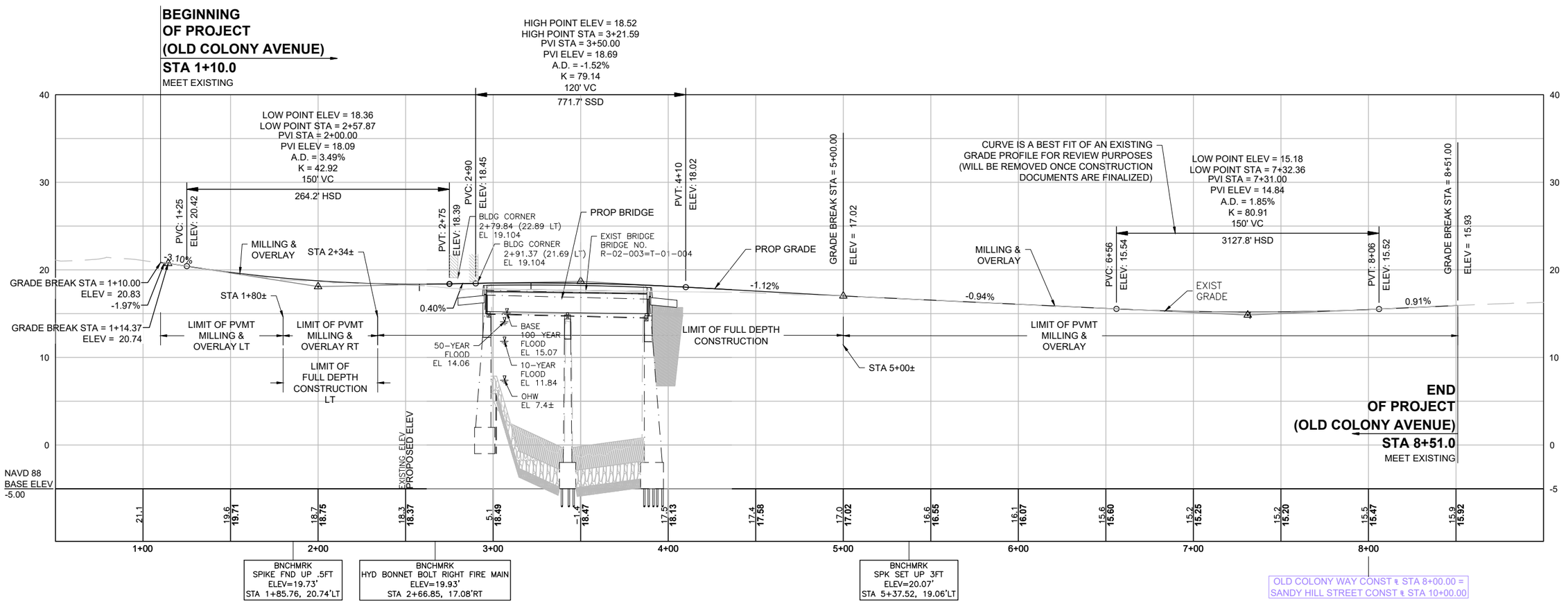


SOUTH STREET E/OLD COLONY AVE.

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	######	9	10
PROJECT FILE NO.	613642		

PROFILES

OLD COLONY AVE



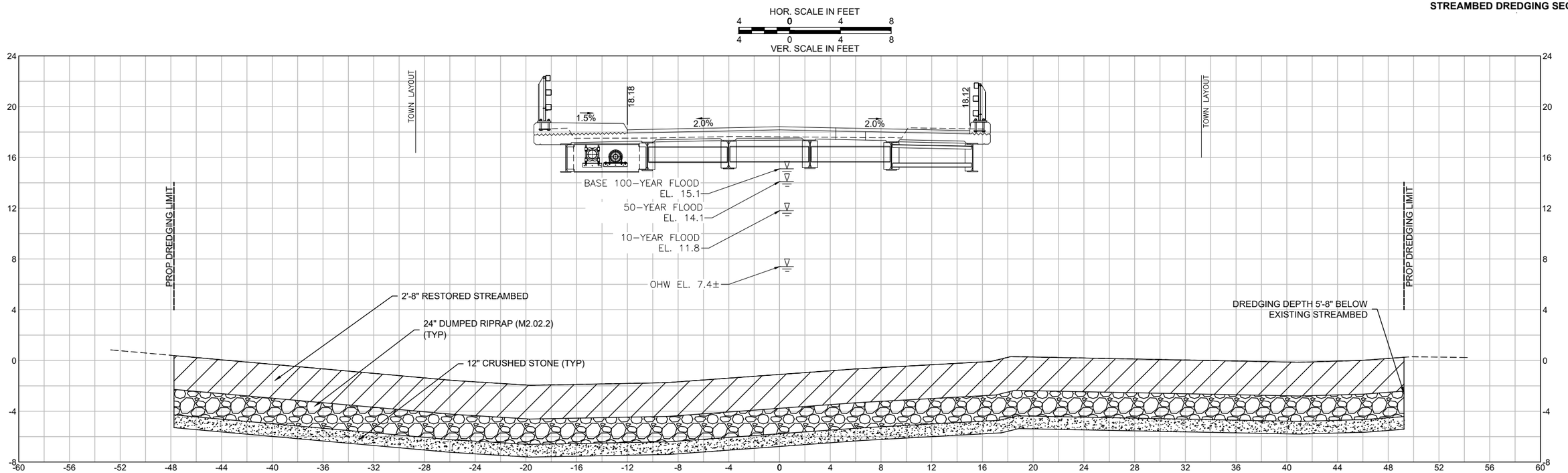
FOR CONSTRUCTION PLANS: SEE SHEETS 4 & 5

HOR. SCALE IN FEET
30 0 30 60
6 0 6 12
VER. SCALE IN FEET

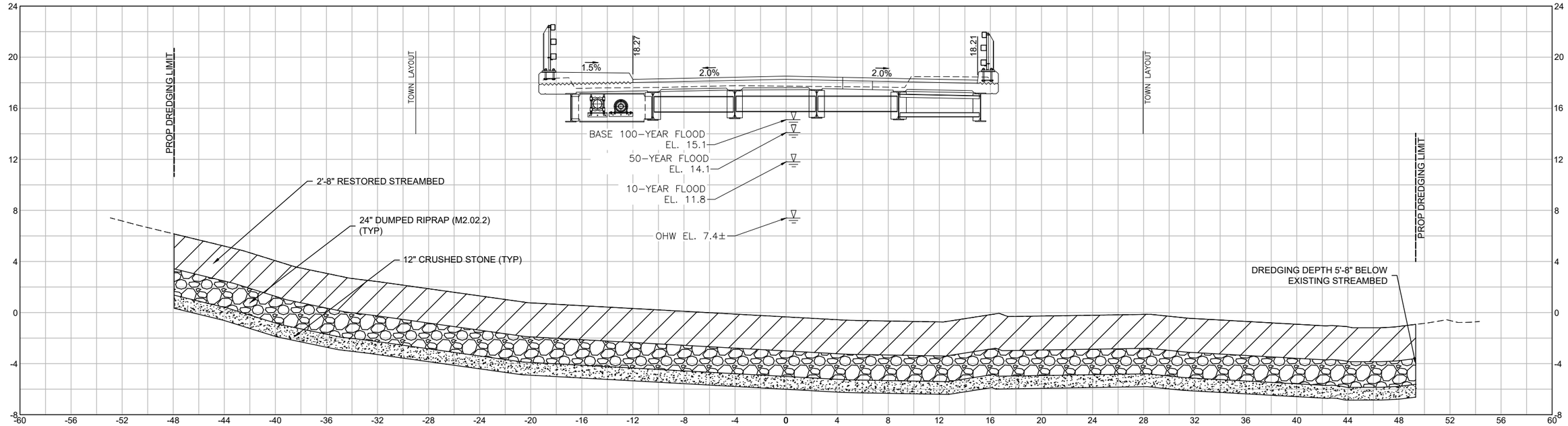
STREET NAME/ROUTE #

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	######	10	10
PROJECT FILE NO.	613642		

STREAMBED DREDGING SECTIONS



3+60



3+30

Commonwealth of Massachusetts
Executive Office of Energy and Environmental Affairs
Department of Environmental Protection
Address: 100 Cambridge Street, Suite 900, Boston MA 02114 | **Phone**: 617-292-5500

Maura T. Healey	Kim Driscoll	Rebecca Tepper	Bonnie Heiple
Governor	Lieutenant Governor	Secretary	Commissioner

April 17, 2026

BETA Group, Inc.
89 Shrewsbury Street, Suite 300
Worcester, MA 01604
ATTN: Jonathan Niro

RE: 401 WATER QUALITY CERTIFICATION
BRP WW 10, Major Fill Project
BRP WW 08, Minor Dredge
Old Colony Ave Bridge (R-02-003=T-01-004) replacement over the Taunton River
Raynham and Taunton, MA

401 WQC Filing Number: 26-WW26-0004-APP
USACE Application No. NAE-2025-02437
MassDOT File Number: 613642

Dear Mr. Niro:

The Massachusetts Department of Environmental Protection (MassDEP) has reviewed your application for a Water Quality Certification (WQC), as referenced above. The WQC application was deemed complete on March 20, 2026. In accordance with the provisions of MGL Ch. 21, §§26-53 and Section 401 of the Federal Clean Water Act as amended (33 U.S.C. §1251 et seq.), it has been determined there is reasonable assurance the proposed project will be conducted in a manner which will not violate applicable water quality standards (314 CMR 4.00) and other applicable requirements of state law.

The project proposes the replacement of the existing Old Colony Avenue Bridge (R-02-003=T-01-004) superstructure over the Taunton River, as well as scour protection installation, full depth road reconstruction, and stormwater improvements in Raynham and Taunton (the Project).

The original bridge, constructed in 1945, consists of a two-span reinforced concrete deck supported by reinforced concrete abutments and timber piles with an overall bridge span of 90 feet and width of 35 feet. This bridge carries two 10-foot travel lanes, two 2.5-foot shoulders, and a 5-foot sidewalk. The bridge rests on two concrete abutments and a single pier. The

The Commonwealth of Massachusetts
Department of Environmental Protection

Address: 100 Cambridge Street, Suite 900, Boston, MA 02114
Phone: 617-292-5500

project currently collects stormwater through two closed catch basins at the southern end of the bridge that discharge to the Taunton River through a 12-inch reinforced concrete pipe. The remainder of the site consists of country drainage.

The Project will occur within a diadromous fish run and is habitat for Atlantic Sturgeon (*Acipenser oxyrinchus*). Accordingly, in order to protect diadromous fish migration, MassDEP has conditioned this WQC to require compliance with the conditions outlined in the MA Division of Marine Fisheries (DMF) letter of February 24, 2026. This includes a prohibition of in-water work between March 1st and July 15th for the spring and September 1st to November 15th for the fall.

The Project will occur within a Federal Emergency Management Agency (FEMA) 1% annual chance of flooding zone (Zone AE) associated with the Taunton River but will not impact the Base Flood Elevation or regulatory floodway. The Taunton River is classified as a "Wild and Scenic River".

The Project will replace the bridge superstructure while retaining the existing bridge substructure. The new bridge width will have the same span and increase the width by one foot to incorporate a bicycle lane. The sidewalk will be relocated to the west side of the roadway. To avoid anticipated scour, 8,570 square feet (sf) of riprap will be installed across the river at a depth of 2 feet, and will be topped with 2 feet, 8 inches of streambed material. A wildlife shelf will be provided along the streambank via a 3-foot level riprap landing adjacent to the face of the south abutment. Approximately 790 feet of full depth roadway construction will occur, which includes the bridge and two approaches.

In total, 8,570 sf of permanent impacts and 4,699 sf of temporary impacts to Land Under Water (LUW) are required to complete the project. Permanent impacts are due to the placement of riprap scour countermeasures, and the temporary impacts are due to dewatering for access and riprap placement.

Installation of riprap scour protection will require dredging of approximately 2,075 cubic yards (cy) of material. The Project area is anticipated to have elevated levels of contamination. Sampling was conducted but did not adhere to the approved sampling plan due to hazardous water conditions at the time of sampling. The samples that were collected show low levels of contaminants, but nothing above the reportable limit. To verify these samples and also collect the number of soils samples as required by 314 CMR 9.07, additional sampling is proposed. Prior to dredge work, a Phase II Sampling and Analysis Plan shall be submitted for approval and implemented.

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Department of Environmental Protection

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Phone: 617-292-5500

An alternatives analysis was completed in accordance with 314 CMR 9.00. Four alternatives were considered, and the chosen alternative was picked to minimize impacts to the Taunton River while still implementing scour protection. The chosen alternative also minimizes the increase in impervious area. The no-build alternative is not practicable to meet the project goal of replacing the bridge superstructure.

The Project qualifies as a redevelopment project as defined at 314 CMR 9.02 and meets the Stormwater Management Standards to the maximum extent practicable. The one foot widening of the bridge to incorporate a bike path will increase impervious surface within the Project limits by 781 sf. The proposed stormwater improvements include eight new deep sump catch basins. Two existing catch basins will be replaced with deep sump catch basins on the south side of the bridge and the remaining six new deep sump catch basins will be installed at the northern and southern approach. Curbing will be added to direct flow to these new closed systems. A 45-foot-long infiltration trench will also be installed at the northwestern limit of the project. These new drainage systems will direct water to the Taunton River. Due to steep slopes and adjacent private property, no other stormwater control measures could be considered.

The Project will comply with the Stream Crossing Standards to the maximum extent practicable. All standards will be met except for Standard 3. Bankfull width of the Taunton River is 99.5 feet, requiring a span of 119.42 feet to satisfy 1.2 times bankfull width. The current span of 79 feet will not change because the existing abutments will be utilized for the proposed bridge.

Based on a review of information provided by the applicant, MassDEP finds that this project complies with the standards described under 314 CMR 9.06 and 9.07. Public notice was provided in the Taunton Daily Gazette on January 28, 2026. No comment letters were received during the public comment period.

Therefore, based on information currently in the record, MassDEP grants a WQC for this project subject to the following conditions to maintain water quality, to minimize impact on waters and wetlands, and to ensure compliance with appropriate state law. MassDEP further certifies in accordance with 314 CMR 9.00 that there is reasonable assurance the project or activity will be conducted in a manner which will not violate applicable water quality standards (314 CMR 4.00) and other applicable requirements of state law. Finally, the Department has determined that upon satisfying the conditions and mitigation requirements of this approval, the project provides a level of water quality necessary to protect existing uses and accordingly finds that the project to be implemented satisfies the Surface Water Quality Standards at 314 CMR 4.00.

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Pursuant to 314 CMR 9.09(1)(d); 314 CMR 9.06(6)(a); 310 CMR 9.06(2); 314 CMR 9.07; 314 CMR 9.07(1); 314 CMR 9.09(7)(5)(c); 314 CMR 9.11; and 314 CMR 9.09(1)(e), the following Special Conditions are necessary to ensure that construction practices and stormwater controls are implemented in such a manner as to prevent degradation to wetlands and waters; ensure that practicable steps have been taken which will avoid and minimize impacts to wetlands and waters; minimize turbidity and sediment caused by construction activities; ensure that water quality is not degraded, and that biology of the waters are not negatively impacted by potential discharges; and/or maintain a record of the dredged material for reference and to ensure accountability in its transportation.

Those Special Conditions that require direct submittals to MassDEP for either review, or review and approval, are denoted by the following notation (Submittal) at the end of the condition and are summarized in Attachment A. In addition, those conditions with the (Submittal) designation shall be included in the Special Provisions and, as applicable, reviewed at the Pre-Construction Meeting.

1. All work shall be performed in accordance with the following documents and plans:

    a. Application for Water Quality Certification. “Old Colony Avenue Bridge Reconstruction R-02-003=T-01-004” in Raynham and Taunton, MA. Prepared by BETA Group, Inc. on behalf of MassDOT, dated January 2026, with cover letter and attachments. 401 WQC Filing Number: 26-WW26-0004-APP.

    b. MassDEP Technical Review, 401 Water Quality Certification, “Old Colony Avenue Bridge Reconstruction R-02-003=T-01-004” in Raynham and Taunton, MA. Dated February 24, 2026.

    c. Responses to MassDEP Technical Review, 401 Water Quality Certification, “Old Colony Avenue Bridge Reconstruction R-02-003=T-01-004” in Raynham and Taunton, MA. Prepared and signed by Jonathan Niro of BETA Group, Inc. on behalf of MassDOT, dated March 20, 2026.

Pre-Construction

2. A qualified **Fluvial Geomorphologist** (FGM) with a minimum of five years of relevant professional experience in stream replication and restoration projects shall be employed to oversee all LUW replication and restoration activities as proposed in the WQC application and approved herein. The name, contact information, and qualifications of the FGM shall be provided to MassDEP for review and approval with a copy to the

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Raynham and Taunton Conservation Commissions prior to the Pre-Construction Meeting required in Condition 5. The FGM shall either attend the Pre-Construction Meeting or a separate virtual or onsite meeting with MassDEP, MassDOT, and the Contractor prior to any LUW replacement or restoration work. **(Submittal)**

3. One individual with at least three years of experience with construction period erosion and sedimentation controls shall be employed to be responsible for Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan (CP/PP) inspections (CP/PP Inspector). The name, contact information, and qualifications of the CP/PP Inspector shall be provided to MassDEP for review and approval with a copy to the Raynham and Taunton Conservation Commissions prior to the Pre-Construction Meeting required in Condition 5. **(Submittal)**

4. Prior to the Pre-Construction Meeting required in Condition 5, the applicant shall provide MassDEP with the name and contact information of the Resident Engineer (RE) responsible for ensuring that all work complies with the conditions of this WQC. **(Submittal)**

5. A minimum of 21 days prior to the start of ground disturbance or vegetation clearing, MassDOT shall contact MassDEP to schedule an onsite Pre-Construction Meeting to review the approved plans and terms and conditions of this WQC. The RE, the construction contractor (Contractor), the CP/PP inspector, a representative from the MassDOT Environmental Section and/or the District Environmental Engineer shall attend the Pre-Construction Meeting. **No work shall commence prior to the Pre-Construction Meeting.**

6. MassDEP shall be copied on applicable submittals to the U.S. Army Corps of Engineers (USACE). These include but are not limited to: Self-Verification Notification Form (SVNF); Pre-Construction Notification (PCN); Work-Start Notification Form; Mitigation Work-Start Notification Form; and Compliance Certification Form. The Work-Start Notification Form shall be submitted at least 14 days before the anticipated start of work and the Compliance Certification Form shall be submitted within 30 days following the completion of the authorized work. **(Submittal)**

7. A CP/PP shall be developed and implemented as required by 314 CMR 9.06(6)(a)8. A minimum of 14 days prior to the start of work, MassDOT shall submit the CP/PP for review and approval. If the U.S. Environmental Protection Agency (EPA) Construction General Permit (CGP) applies, the Stormwater Pollution Prevention Plan (SWPPP) may serve as the CP/PP, providing it includes the measures required to be in the CP/PP per

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these Special Conditions, in addition to the measures specifically required by the CGP. Any subsequent changes to the approved CP/PP (defined herein as including the construction period SWPPP if applicable) must be approved by MassDEP. **(Submittal)**

8. Training regarding erosion and sedimentation controls is required. The CP/PP Inspector and any other relevant personnel responsible for erosion and sedimentation controls shall complete the EPA CGP Inspector Training, or other training that meets the CGP requirements, as well as complete a comprehensive review of the approved CP/PP. Proof of completion of the training shall be submitted to MassDEP prior to the start of work. **(Submittal)**

9. The CP/PP shall identify, but shall not be limited to, staging and laydown areas in relation to LUW, proposed dewatering methods and locations, proposed stockpile locations and their proximity to catch basins or other drainage conveyances that discharge to wetland resource areas, and the location of construction-period erosion and sedimentation controls. Stockpiles shall be located no less than 50 feet from LUW, catch basins, or other drainage conveyances that discharge to LUW.

10. A minimum of 14 days prior to the start of work, MassDOT shall submit a Control of Water Plan for review and approval. The Plan shall include a description of proposed methods to isolate and dewater work areas within streams while maintaining stream flow, including but not limited to the method of isolation (e.g., steel sheeting or sandbag cofferdam), dewatering methods and locations and specifications for stream bypass systems as applicable. The Control of Water Plan shall include a plan depicting LUW boundaries, and the location of all relevant methods and materials which shall be located within the LUW impact areas approved herein. The plan shall meet the requirements of the CP/PP and be specific to the Project. Dewatering and stream bypasses shall be conducted under the supervision of the RE or other project staff with knowledge of these practices and comply with the applicable conditions identified herein. **(Submittal)**

11. Prior to the start of work, approved erosion and sedimentation control measures shall be installed per the approved CP/PP and as applicable, the manufacturer specifications. Erosion and sedimentation control measures may consist of, but are not limited to, silt fence, staked straw bales, silt/turbidity curtains, compost filter tubes, etc.

12. Prior to the Pre-Construction Meeting, the boundaries of LUW shall be re-flagged where they are within 50 feet of the limits of work. All boundary markers, once in place, shall

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remain in place throughout construction until all disturbed surfaces have been permanently stabilized. Boundary markers shall be fully evaluated annually and refreshed where needed. Implementation of and compliance with this requirement shall be documented by the RE. All construction personnel shall be made aware of these markers.

13. Prior to any work within the 1% annual chance of flooding zone within Project limits, including mobilization or storage of equipment and materials, a Flood Contingency Plan shall be submitted to MassDEP for review and approval that includes at a minimum the following information and provisions: **(Submittal)**

    a. The RE and/or Contractor shall monitor the National Weather Service forecast daily, and upon issuance of a flood watch or flood warning for the Project area, the Flood Contingency Plan shall be implemented.

    b. Upon implementation of the Flood Contingency Plan, all construction equipment and materials located below the Base Flood Elevation (BFE) shall be removed and placed in an upland location above the BFE and outside of LUW.

    c. Anchored stationary equipment may remain below the BFE if demonstrated to be required and upon written approval from MassDEP. In the event semi-stationary equipment cannot be feasibly removed before the arrival of the storm, they shall be adequately secured and MassDEP shall be notified prior to the storm.

    d. A requirement to inspect and maintain all erosion and sedimentation controls, and stabilize all exposed soils as needed below the BFE prior to the storm shall be included.

    e. A plan depicting at a minimum, but not limited to, LUW boundaries, the Project limits, and the BFE boundary based on ground elevations shall be included.

    f. Staff and materials must be available 24 hours per day, seven days per week to implement the Flood Contingency Plan. The name, affiliation, title, email address, and phone number of each person responsible for implementing the Flood Contingency Plan shall be included.

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g. No work shall commence until the flood watch or flood warning has ended, all areas below the BFE have been inspected, and erosion and sedimentation controls are maintained as needed.

14. The Contractor shall develop an Invasive Plant Management Strategy (IPMS) to be submitted to MassDEP for review and approval prior to the Pre-Construction Meeting. The IPMS shall be implemented as approved. **(Submittal)**

15. If needed, use of herbicides to control invasive species shall be implemented in accordance with the approved IPMS and with the following requirements:

    a. Herbicides shall only be applied by a Licensed Applicator;

    b. Only herbicides registered with the Massachusetts Pesticide Board Subcommittee shall be applied to the targeted area/species;

    c. The manufacturer's label directions must be followed, in addition to any conditions imposed by other state or local authorities;

    d. Herbicide application shall use no more than the minimum application rate to accomplish removal of the target species; and

    e. Applicants must obtain a BRP WM04 Herbicide Permit from the MassDEP Wetlands Program Dredge Unit before performing herbicide application in waterbodies (traditionally lakes and ponds).

16. A minimum of 21 days prior to the start of demolition work, a Demolition Plan shall be submitted for review and approval describing how the existing bridge will be demolished and what measures will be taken to ensure that demolition material, including but not limited to any pollutants, construction debris, toxic or hazardous substances, and airborne dust, is properly contained and does not enter the Taunton River. **(Submittal)**

17. Final Construction Plans (the plans provided to the Contractor) shall be submitted for review at least 30 days prior to the Pre-Construction Meeting. Sufficient supporting information, explanation, and documentation shall be provided to MassDEP and the Raynham and Taunton Conservation Commissions outlining any deviations from the plans approved herein, and MassDEP may at its discretion require additional supporting documentation as a condition of review. The updated set of plans shall become the

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"Final Plan of Record." The Plan shall be prepared and signed by a Professional Engineer in the Commonwealth of Massachusetts and shall incorporate all revisions and additions to the original plans that have been approved as discussed herein. **(Submittal)**

Construction Period

18. No more than **8,570 sf** of permanent impacts and **4,699 sf** of temporary impacts to LUW shall occur. No more than **2,075 cy** of dredging in LUW shall occur. All dredging activities shall avoid unapproved impacts to LUW.

19. Under the direction of the CP/PP Inspector, inspection and maintenance of erosion and sediment controls in active work areas may be performed by both the Contractor and RE or other MassDOT project staff. Maintenance is the responsibility of the Contractor; however, the permittee shall be ultimately responsible for erosion and sedimentation control failure. The RE and/or contractor shall immediately notify MassDEP and the Raynham and Taunton Conservation Commissions if any unauthorized discharges to LUW occur.

20. CP/PP inspections shall occur at least once every seven calendar days and within 24 hours of a storm event that produces 0.5 inches or more of rain within a 24-hour period, or at a more stringent frequency if the CP/PP requires.

21. Copies of CP/PP Inspection and Maintenance Log Forms shall be submitted to MassDEP within 14 days upon request.

22. Disturbed areas shall be stabilized immediately after activities have permanently ceased or will be temporarily inactive for 14 or more calendar days. The installation of stabilization measures shall be implemented as soon as practicable, but no later than 14 calendar days after disturbed areas have been inactive.

23. Work within LUW shall be conducted in low or no-flow conditions to the extent practicable. Notice shall be provided to MassDEP and the Raynham and Taunton Conservation Commissions within 24 hours prior to the commencement of dewatering. Dewatering methods and location(s) shall be approved by the RE or other project staff with knowledge of these practices prior to use to ensure consistency with the approved Control of Water Plan, and shall be documented in the CP/PP. There shall be no discharge of untreated dewatered stormwater or groundwater to LUW. Any discharges shall be visibly free of sediment.

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24. Additional erosion and sedimentation control materials shall be stored on-site at all times for emergency and routine replacement. Materials shall be kept covered, dry, and accessible at all times. The CP/PP Inspector shall be responsible for anticipating the need for and installation of additional erosion and sedimentation controls and shall have the authority to require additional erosion control measures to protect wetland resource areas beyond what is shown on the plans if field conditions or professional judgment dictate that additional protection is necessary.

25. The Contractor shall monitor the National Weather Service forecast for updates, and upon issuance of a flood watch for the 1% annual chance of flooding zone, shall implement the flood contingency plan referenced in Condition 13.

26. Any storm drains with potential to receive discharge from stockpiled materials or construction operations shall be managed to inhibit the inflow of sediment while not increasing the likelihood of roadway flooding during periods of precipitation. The CP/PP shall specify measures to implement this. Filter fabric stretched under storm drain inlet grates are not acceptable for this purpose.

27. Stockpiles shall be located no less than 50 feet from LUW, catch basins, or other drainage conveyances that discharge to LUW.

28. The contractor shall have designated washout areas for concrete equipment that will be comprised of impermeable material and sized to contain project concrete wastes and wash water. Concrete wash out areas shall be located no less than 50 feet from LUW and catch basins or other drainage conveyances that discharge directly or indirectly to LUW.

29. Refueling, washing, and cleaning of vehicles and other construction equipment shall not take place within 50 feet of LUW and any wash water shall be contained such that it does not drain toward LUW. MassDEP shall explicitly approve in writing any deviation to this condition for oversized stationary vehicles.

30. The contractor shall have spill containment kits on site. In the event of a release of fuels and/or oils, the local fire department, MassDEP Emergency Response and MassDEP Wetlands Program Highway Unit shall be immediately contacted, and in addition, the MassDEP Bureau of Waste Site Cleanup shall be notified per the requirements of the Massachusetts Contingency Plan, 310 CMR 40.0000.

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31. No in-water, silt-producing work shall occur during the Time of Year (TOY) restriction between the dates of March 1st and July 15th and September 1st to November 15th. Work may proceed behind dewatered cofferdams at any time, provided they are installed and removed outside of the TOY restriction.

32. All work shall be completed in accordance with the recommendations of DMF, which are hereby incorporated into this WQC through inclusion in the 'Responses to MassDEP Technical Review, 401 Water Quality Certification', dated March 20, 2026.

33. Construction vehicles and equipment shall not enter the LUW unless authorization is provided by way of this permit or amendment. The Contractor shall use equipment with boom reach capabilities and other measures to avoid inadvertent impacts to jurisdictional resource areas as a result of excavation, riprap placement, and/or bridge/pier demolition materials.

34. Sheet piles shall be fully removed from LUW upon stabilization of the area as required. No portion of sheet piles shall remain unless approved by MassDEP in writing prior to installation. A request to leave sheet piles shall include, but not be limited to, demonstration that full removal of the sheet piles is not feasible or practicable, and an alternatives analysis demonstrating alternative methods to isolate the work area(s) are not feasible or practicable.

35. A temporary shielding or containment system shall be in place beneath the bridge structure prior to removal to prevent debris from falling into the water below. In the event that any debris accidentally enters The Taunton River, it shall be immediately retrieved. Notice shall be provided to MassDEP if debris enters the river and that it has been removed with photo-documentation (if practicable) submitted by email.

36. Test pit information confirming Estimated Seasonal High Groundwater shall be provided to MassDEP once test pits are excavated. **(Submittal)**

Dredging

37. MassDEP shall be notified one week prior to the start of dredging so that staff may inspect the work for compliance throughout the project.

38. A Phase II Sampling and Analysis Plan (SAP II) shall be developed and submitted to MassDEP for review and approval. At a minimum, SAP II should include samples from three locations around the project dredge area. **Results of the chemical analysis shall**

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be submitted to MassDEP for review at least 10 days prior to dredging, and dredging shall not commence until MassDEP provides written approval. If sediment samples are found to be contaminated, additional conditions may be required by MassDEP as a contingency plan to protect the environmental and public health from contaminated sediments. **(Submittal)**

39. No later than 21 days prior to commencement of dredging activity, a Dredged Material Dewatering Plan shall be submitted to MassDEP for review and approval. At a minimum, the Plan shall include but not be limited to the type of containment, method of dewatering (i.e. mechanical or by gravity), method of collecting the dewatered effluent and method of disposal. **(Submittal)**

40. All handling of contaminated sediment exceeding MCP RCS-1 criteria and authorized by this WQC shall be conducted under the direction of a Licensed Site Professional (LSP). Prior to the Pre-Construction Meeting required in Condition 5, the applicant shall provide MassDEP with the name, qualifications, and contact information of the LSP. **(Submittal)**

41. An Environmental Health & Safety Plan shall be required for the protection of workers from any exposure to known/suspected contaminants present in environmental media (including sediment which has been characterized as exceeding MCP RCS-1 criteria). A copy shall be provided to MassDEP at least two weeks prior to the commencement of the dredging operation.

42. Dredged sediment shall be sampled to determine the suitability for reuse or if offsite disposal is required. Sampling data including sampling methods and laboratory QA/QC data shall be provided to MassDEP within 48 hours once available from the analytical laboratory for review. Results of the chemical analysis shall be compared to the reuse levels in Policy COMM-97-001- Reuse and Disposal of Contaminated Soil at Massachusetts Landfills for reuse as landfill daily cover and to the Massachusetts Contingency Plan (MCP) RCS-1 criteria. The approved LSP required by Condition 40 will review the data to determine if the sediment exceeds these criteria and requires disposal at an out-of-state facility within ten calendar days. The data and LSP determination shall be submitted to MassDEP prior to transportation of this material. MassDOT shall implement the determination of the LSP and of any further requirements by MassDEP regarding the disposal of all dredged sediment. **(Submittal)**

43. Best Management Practices (BMPs) shall be employed by the contractor to protect resource areas located adjacent to the proposed staging/temporary dredged material

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stockpiling and dewatering areas. Sediment stockpiles shall be constructed in accordance with the MassDEP approved project plans, stabilized, bottom-lined if not placed on paved surfaces and securely covered with wind tear resistance tarpaulin, polyethylene sheeting or similar impermeable material at all times, and properly labeled. Stockpile covers shall be securely weighed down. Stockpiles shall also be secured to restrict access by the public and shall be set back at least 10 feet from temporary construction access roads or other areas and activities which could disturb the stockpiles and associated erosion controls; if the 10-foot setback cannot be met, then a MassDEP-approved barrier shall be provided. Inspection of the sediment containment and dewatering location and associated erosion controls shall be conducted daily and within 24 hours of a storm that produces 0.5 inches or more of rain. Any observed deficiency shall be corrected or repaired in a timely manner.

44. In the event of a precipitation or storm event, the site shall be secured beforehand in such a way as to protect resource areas and waters on site and downstream of the site, including covering of stockpiles of dredged material. Sediment stockpile areas shall be inspected in line with the frequency of the CP/PP required in Condition 7. Any observed deficiency shall be corrected or repaired in a timely manner to prevent discharge from the stockpiled material. If stormwater runoff and erosion is observed from stockpiled dredged material, additional erosion and/or damage prevention controls measures shall be implemented.

45. Dredging, stockpiling of dredged material, and offsite transport of dredged material shall be sequenced and conducted in a manner to limit stockpiling time. Sediment characterized as having concentrations exceeding the RCS-1 criteria shall not be stockpiled at the site longer than 90 days from the date of generation. Extensions may be requested to accommodate unforeseen delays subject to MassDEP approval.

46. Measures shall be in place to prevent turbid waters, due to dredging, demolition, or debris removal activities, from extending past the limits of work into the Taunton River. These measures can be items such as turbidity curtains and/or sheet piles.

47. If visual turbidity escapes the controls in place, as described in Condition 42, work shall stop immediately and MassDEP shall be notified within 24 hours. Work shall not resume until the issue is corrected and to the satisfaction of MassDEP.

48. All turbidity controls shall be inspected daily by the RE or a designated MassDOT Project Staff. If any damage is observed the controls in place will be replaced or repaired immediately.

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49. If dredged sediment is disposed of off-site, MassDEP shall be notified in writing of the name and location of the upland licensed facilities accepting the dredged material for disposal or reuse for review and approval. If the licensed facility is located out of state, documentation shall be provided to MassDEP that the dredged material disposal/reuse has been approved and will be accepted by the receiving State. The dredged material shall not be transported to the facility without concurrence of MassDEP.

50. If dredged sediment is disposed of off-site, Transportation and disposal of the dredged material shall be overseen by the LSP of record. A Bill-of-Lading (BOL) or a Material Shipping Record (MSR) shall be used to track the dredged material to the licensed disposal facility and/or proposed intermediate (stockpiling /dewatering) facility. A fully executed copy of the BOL or MSR shall be provided to MassDEP within 30 days of final shipment to the reused location or facility.

51. If dredged sediment is disposed of off-site, Best Management Practices (BMPs) shall be implemented during transportation of the dredged material to the licensed receiving facility. At a minimum, when transported upon public roadways, all dredged material shall have no free liquid as determined by the Paint Filter Test or other suitably analogous methodology acceptable to MassDEP, and a tarpaulin or other means shall be used to cover the dredged material during transport.

Stream Mitigation

52. The FGM shall oversee all LUW restoration. Placement of streambed materials shall take place in no- or low-flow conditions. The Control of Water Plan required in Condition 10 shall include measures to create no-flow conditions for this work such as a pump bypass system or other dewatering method, if needed. Placement of streambed materials during greater than low-flow conditions shall require a placement plan, with a narrative describing turbidity control measures, submitted to MassDEP for review and approval.

53. A minimum of 14 days prior to installation of the streambed materials, the FGM shall meet with the contractor to determine the suitability of stockpiled streambed material for reuse and whether there is sufficient stockpiled material to complete streambed restoration.

54. Water shall be slowly introduced back into the restored and dewatered LUW work areas as to not cause erosion and sedimentation. This work shall be overseen by the FGM. The FGM shall provide final approval of the streambed restoration upon re-wetting of

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banks and removal of water controls (photographs will suffice unless otherwise determined by the FGM).

55. Upon completion of the LUW restoration, the FGM shall provide photographs and a summary of the completed work to MassDEP and the Raynham and Taunton Conservation Commissions. **(Submittal)**

56. MassDEP reserves the right to determine the success or failure of the LUW restoration areas and reserves the right to require additional measures deemed necessary to promote success.

57. The surface of the wildlife shelf at the southern abutment shall be levelled out with chinked-in stones.

Post-Construction

58. All temporary erosion and sedimentation controls shall be removed at the conclusion of work once the surrounding area has achieved final stabilization.

59. Mulch used as an erosion or sedimentation control may be spread in upland areas at a depth that will not inhibit vegetative growth and shall not be spread in LUW.

General Conditions

60. Any proposed plan changes or amendment requests, as well as any required submittals shall be sent by email for review and approval to heidi.davis@mass.gov and tyler.lewis@mass.gov. **(Submittal)**

61. This WQC remains in effect for the same duration as the Section 404 permit that requires it.

62. No Special Condition set forth herein shall be construed or operate to prohibit MassDEP from taking enforcement against MassDOT or its contractors for any failure to comply with the terms and requirements of this WQC.

63. No activity authorized by this WQC may begin prior to expiration of the 21-day appeal period, or until a final decision is issued by MassDEP in the event of an appeal.

Failure to comply with this Certification is grounds for enforcement, including civil and criminal penalties, under MGL Ch. 21 §42, MGL Ch. 21A §16, or other possible actions/penalties as authorized by the General Laws of the Commonwealth.

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This Certification does not relieve the applicant of the obligation to comply with other appropriate state or federal statutes or regulations.

NOTICE OF APPEAL RIGHTS

a.) Appeal Rights and Time Limits

Certain persons shall have a right to request an adjudicatory hearing concerning certifications by MassDEP when an application is required: (a) the applicant or property owner; (b) any person aggrieved by the decision who has submitted written comments during the public comment period; (c) any ten (10) persons of the Commonwealth pursuant to M.G.L. c.30A where a group member has submitted written comments during the public comment period; or (d) any governmental body or private organization with a mandate to protect the environment which has submitted written comments during the public comment period. Any person aggrieved, any ten (10) persons of the Commonwealth, or a governmental body or private organization with a mandate to protect the environment may appeal without having submitted written comments during the public comment period only when the claim is based on new substantive issues arising from material changes to the scope or impact of the activity and not apparent at the time of public notice. To request an adjudicatory hearing pursuant to M.G.L. c.30A, § 10, a Notice of Claim must be made in writing, provided that the request is made by certified mail or hand delivery to MassDEP, with the appropriate filing fee specified within 310 CMR 4.10 along with a DEP Fee Transmittal Form within twenty-one (21) days from the date of issuance of this Certificate, and addressed to:

Case Administrator
Department of Environmental Protection
100 Cambridge Street, 9th Floor
Boston, MA 02114

A copy of the request shall at the same time be sent by certified mail or hand delivery to the Department of Environmental Protection at:

Department of Environmental Protection
Wetlands Program, Highway Unit
100 Cambridge Street, 8th floor
Boston, MA 02114

b.) Contents of Hearing Request

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A Notice of Claim for Adjudicatory Hearing shall comply with MassDEP's Rules for Adjudicatory Proceedings, 310 CMR 1.01(6), and shall contain the following information pursuant to 314 CMR 9.10(3):

1. the 401 Certification Transmittal Number;
2. the complete name of the applicant and address of the project;
3. the complete name, address, and fax and telephone numbers of the party filing the request, and, if represented by counsel or other representative, the name, fax and telephone numbers, and address of the attorney;
4. if claiming to be a party aggrieved, the specific facts that demonstrate that the party satisfies the definition of "aggrieved person" found at 314 CMR 9.02;
5. a clear and concise statement that an adjudicatory hearing is being requested;
6. a clear and concise statement of (1) the facts which are grounds for the proceedings, (2) the objections to this Certificate, including specifically the manner in which it is alleged to be inconsistent with the MassDEP's Water Quality Regulations, 314 CMR 9.00, and (3) the relief sought through the adjudicatory hearing, including specifically the changes desired in the final written Certification; and
7. a statement that a copy of the request has been sent by certified mail or hand delivery to the applicant, the owner (if different from the applicant), the conservation commission of the city or town where the activity will occur, the Department of Conservation and Recreation (when the certificate concerns projects in Areas of Critical Environmental Concern), the public or private water supplier where the project is located (when the certificate concerns projects in Outstanding Resource Waters), and any other entity with responsibility for the resource where the project is located.

c.) Filing Fee and Address

The hearing request along with a DEP Fee Transmittal Form and a valid check or money order payable to the Commonwealth of Massachusetts in the amount of one hundred dollars ($100) must be mailed to:

Commonwealth of Massachusetts
Department of Environmental Protection
Commonwealth Master Lockbox
PO Box 4062
Boston, MA 02211

The request will be dismissed if the filing fee is not paid, unless the appellant is exempt or granted a waiver. The filing fee is not required if the appellant is a city or town (or municipal

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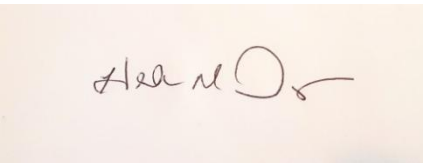
agency), county, or district of the Commonwealth of Massachusetts, or a municipal housing authority. MassDEP may waive the adjudicatory hearing filing fee pursuant to 310 CMR 4.06(2) for a person who shows that paying the fee will create an undue financial hardship. A person seeking a waiver must file an affidavit setting forth the facts believed to support the claim of undue financial hardship together with the hearing request as provided above.

Should you have any questions relative to this permit, please contact myself or at heidi.davis@mass.gov and Tyler Lewis tyler.lewis@mass.gov.

Very truly yours,



Heidi M. Davis
Highway Unit Supervisor

Ecc: DEP SERO – Maissoun Reda
USACE – Dan Vasconcelos
USACE – Kevin Newton
Raynham Conservation Commission - aengelhardt@town.raynham.ma.us
Taunton Conservation Commission – Jenna Freitas - jfreitas@taunton-ma.gov
MassDOT – Lily Collins
MassDOT – Courtney Walker
BETA Group – Hannah Davis
MA DMF – Brad Chase
MA DMF – Stephanie Berkman

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ATTACHMENT A

PRE-CONSTRUCTION SUBMITTAL CHECKLIST

Old Colony Ave Bridge replacement over the Taunton River
Raynham and Taunton, MA

THIS CHECKLIST MUST BE COMPLETED PRIOR TO THE START OF WORK. NOTE THAT SOME CONDITIONS REQUIRE THAT INFORMATION BE SUBMITTED A SPECIFIC NUMBER OF DAYS PRIOR TO THE START OF WORK OR THE PRE-CONSTRUCTION MEETING.

Pre-Construction Meeting Date: _____

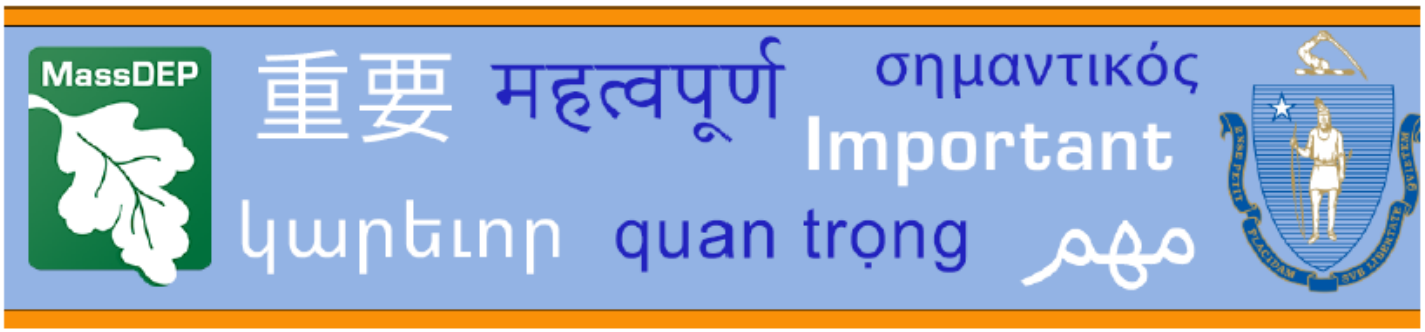
Condition	Required Submittal	Due Date	Date Submitted	Date Approved
PRE-CONSTRUCTION SUBMITTAL REQUIREMENTS				
2	Name, contact information, and qualifications of the FGM	Prior to Pre-Construction Meeting		
3	Name, contact information, and qualifications of the CP/PP inspector, including specific experience and years to meet requirement	Prior to Pre-Construction Meeting		
4	Name and contact information of the RE	Prior to Pre-Construction Meeting		
6	USACE Work-Start Notification Form	14 days prior to work start		
7&8	CP/PP and Training Verification	14 days prior to work start		
10	Control of Water Plan	14 days prior to work start		

The Commonwealth of Massachusetts
Department of Environmental Protection

Address: 100 Cambridge Street, Suite 900, Boston, MA 02114
Phone: 617-292-5500

13	Flood Contingency Plan	Prior to Work Start		
14	IPMS	Prior to Pre-Construction Meeting		
16	Final Construction Plans	30 days prior to Pre-Construction Meeting		
17	Demo Plan	21 days prior to Pre-Con Meeting		
38	SAP	Prior to Dredge		
39	Dredged Material Dewatering Plan	21 Days Prior to Dredge		
40	LSP qualifications	Prior to Pre-con Meeting		

The Commonwealth of Massachusetts
Department of Environmental Protection



Communication for Non-English-Speaking Parties

This document is important and should be translated immediately.

If you need this document translated, please contact MassDEP's Director of Environmental Justice at the telephone number listed below.

Español Spanish

Este documento es importante y debe ser traducido inmediatamente. Si necesita traducir este documento, póngase en contacto con el Director de Justicia Ambiental de MassDEP (*MassDEP's Director of Environmental Justice*) en el número de teléfono que figura más abajo.

Português Portuguese

Este documento é importante e deve ser traduzido imediatamente. Se você precisar traduzir este documento, entre em contato com o Diretor de Justiça Ambiental do MassDEP no número de telefone listado abaixo.

繁體中文 Chinese Traditional

本文檔很重要，需要即刻進行翻譯。
如需對本文檔進行翻譯，請透過如下列示電話號碼與 MassDEP 的環境司法總監聯絡。

简体中文 Chinese Simplified

这份文件非常重要，需要立即翻译。
如果您需要翻译这份文件，请通过下方电话与 MassDEP 环境司法主任联系。

Ayisyen Kreyòl Haitian Creole

Dokiman sa a enpòtan epi yo ta dwe tradui l imedyatman. Si w bezwen tradui dokiman sa a, tanpri kontakte Direktè. Jistis Anviwònmantal MassDEP a nan nimewo telefòn ki endike anba a.

Việt Vietnamese

Tài liệu này và quan trọng và phải được dịch ngay. Nếu quý vị cần bản dịch của tài liệu này, vui lòng liên hệ với Giám Đốc Phòng Công Lý Môi Trường của MassDEP theo số điện thoại được liệt kê bên dưới.

ប្រទេសកម្ពុជា Khmer/Cambodian

ឯកសារនេះមានសារៈសំខាន់
ហើយគប្បីត្រូវបានបកប្រែភ្លាមៗ។
ប្រសិនបើអ្នកត្រូវការអោយឯកសារនេះបកប្រែ
សូមទាក់ទងនាយកផ្នែកយុត្តិធម៌បរិស្ថានរបស់
MassDEPតាមរយៈលេខទូរស័ព្ទដែលបានរាយដូចខាងក្រោម។

Kriolu Kabuverdianu Cape Verdean

Es dokumentu sta important i tenki ser tradusidu immediatamenti. Se nho ta presisa ke es dokumentu sta tradisidu, por favor kontata O Diretor di Justisia di Environman di DEP ku es numero di telifoni menxionadu di baixo.

MassDEP

The Commonwealth of Massachusetts
Department of Environmental Protection

Русский Russian

Это чрезвычайно важный документ, и он должен быть немедленно переведен. Если вам нужен перевод этого документа, обратитесь к директору Департамента экологического правосудия MassDEP (MassDEP's Director of Environmental Justice) по телефону, указанному ниже.

العربية Arabic

هذه الوثيقة مهمة وتجب ترجمتها على الفور.

إذا كنت بحاجة إلى ترجمة هذه الوثيقة، فيرجى الاتصال بمدير العدالة البيئية في MassDEP على رقم الهاتف المذكور أدناه.

한국어 Korean

이 문서는 중대하므로 즉시 번역되어야 합니다.
본 문서 번역이 필요하신 경우, 매사추세츠 환경보호부의 "환경정의" 담당자 분께 문의하십시오. 전화번호는 아래와 같습니다.

հայերեն Armenian

Այս փաստաթուղթը կարևոր է, և պետք է անհապաղ թարգմանել այն:
Եթե Ձեզ անհրաժեշտ է թարգմանել այս փաստաթուղթը, դիմեք Մասաչուսեթսի շրջակա միջավայրի պահպանության նախարարության (MassDEP) Բնապահպանական հարցերով արդարադատության ղեկավարին (Director of Environmental Justice)՝ ստորև նշված հեռախոսահամարով

فارسی Farsi Persian

این نوشتار بسیار مهمی است و باید فوراً ترجمه شود.
اگر نیاز به ترجمه این نوشتار دارید لطفاً با مدیر عدالت محیط زیستی MassDEP در شماره تلفن ذکر شده زیر تماس بگیرید.

Français French

Ce document est important et doit être traduit immédiatement. Si vous avez besoin d'une traduction de ce document, veuillez contacter le directeur de la justice environnementale du MassDEP au numéro de téléphone indiqué ci-dessous.

Deutsch German

Dieses Dokument ist wichtig und muss sofort übersetzt werden. Wenn Sie eine Übersetzung dieses Dokuments benötigen, wenden Sie sich bitte an MassDEP's Director of Environmental Justice *(Direktor für Umweltgerechtigkeit in Massachusetts)* unter der unten angegebenen Telefonnummer.

Ελληνική Greek

Το έγγραφο αυτό είναι πολύ σημαντικό και πρέπει να μεταφραστεί αμέσως. Αν χρειάζεστε μετάφραση του εγγράφου αυτού, παρακαλώ επικοινωνήστε με τον Διευθυντή του Τμήματος Περιβαλλοντικής Δικαιοσύνης της Μασαχουσέτης στον αριθμό τηλεφώνου που αναγράφεται παρακάτω

Italiano Italian

Questo documento è importante e deve essere tradotto immediatamente. Se hai bisogno di tradurre questo documento, contatta il Direttore della Giustizia Ambientale di MassDEP al numero di telefono sotto indicato.

Język Polski Polish

Ten dokument jest ważny i powinien zostać niezwłocznie przetłumaczony. Jeśli potrzebne jest tłumaczenie tego dokumentu, należy skontaktować się z dyrektorem ds. sprawiedliwości środowiskowej MassDEP pod numerem telefonu podanym poniżej.

हिन्दी Hindi

यह दस्तावेज महत्वपूर्ण है और इसका अनुवाद तुरंत किया जाना चाहिए। यदि आपको इस दस्तावेज का अनुवाद कराने की जरूरत है, तो कृपया नीचे दिए गए टेलीफोन नंबर पर MassDEP के पर्यावरणीय न्याय निदेशक से संपर्क करें।

14. Linear Transportation Projects.
Activities required for crossings of waters of the United States associated with the construction, expansion, modification, or improvement of linear transportation projects (e.g., roads, highways, railways, trails, driveways, airport runways, and taxiways) in waters of the United States. For linear transportation projects in non-tidal waters, the discharge of dredged or fill material cannot cause the loss of greater than 1/2-acre of waters of the United States. For linear transportation projects in tidal waters, the discharge of dredged or fill material cannot cause the loss of greater than 1/3-acre of waters of the United States. Any stream channel modification, including bank stabilization, is limited to the minimum necessary to construct or protect the linear transportation project; such modifications must be in the immediate vicinity of the project.

This NWP also authorizes temporary structures, fills, and work, including the use of temporary mats, necessary to construct the linear transportation project. Appropriate measures must be taken to maintain normal downstream flows and minimize flooding to the maximum extent practicable, when temporary structures, work, and discharges of dredged or fill material, including cofferdams, are necessary for construction activities, access fills, or dewatering of construction sites. Temporary fills must consist of materials, and be placed in a manner, that will not be eroded by expected high flows. Temporary fills must be removed in their entirety and the affected areas returned to preconstruction elevations. The areas affected by temporary fills must be revegetated, as appropriate.

This NWP cannot be used to authorize non-linear features commonly associated with transportation projects, such as vehicle maintenance or storage buildings, parking lots, train stations, or aircraft hangars.

Notification: The permittee must submit a pre-construction notification to the district engineer prior to commencing the activity if: (1) the loss of waters of the United States exceeds 1/10-acre; or (2) there is a discharge of dredged or fill material in a special aquatic site, including wetlands. (See general condition 32.) (Authorities: Sections 10 and 404)

Note 1: For linear transportation projects crossing a single waterbody more than one time at separate and distant locations, or multiple waterbodies at separate and distant locations, each crossing is considered a single and complete project for purposes of NWP authorization. Linear transportation projects must comply with 33 CFR 330.6(d).

Note 2: Some discharges of dredged or fill material for the construction of farm roads or forest roads, or temporary roads for moving mining equipment, may qualify for an exemption under Section 404(f) of the Clean Water Act (see 33 CFR 323.4).

Note 3: For NWP 14 activities that require pre-construction notification, the PCN must include any other NWP(s), regional general permit(s), or individual permit(s) used or intended to be used to authorize any part of the proposed project or any related activity, including other separate and distant crossings that require Department of the Army

authorization but do not require pre-construction notification (see paragraph (b)(4) of general condition 32). The district engineer will evaluate the PCN in accordance with Section D, “District Engineer’s Decision.” The district engineer may require mitigation to ensure that the authorized activity results in no more than minimal individual and cumulative adverse environmental effects (see general condition 23).

2026 Nationwide Permits General Conditions

1. Navigation
a) No activity may cause more than a minimal adverse effect on navigation.

b) Any safety lights and signals prescribed by the U.S. Coast Guard, through regulations or otherwise, must be installed and maintained at the permittee's expense on authorized facilities in navigable waters of the United States.

c) The permittee understands and agrees that, if future operations by the United States require the removal, relocation, or other alteration, of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his or her authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from the Corps of Engineers, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.

NAE Note: *Compliance with this condition can be achieved by ensuring no unreasonable interference with navigation by the existence or use of any activity authorized by any Nationwide Permit (NWP), and no attempt made by a permittee to prevent the full and free use by the public of all navigable waters at or adjacent to any activity authorized by any NWP.*

2. Aquatic Life Movements
No activity may substantially disrupt the necessary life cycle movements of those species of aquatic life indigenous to the waterbody, including those species that normally migrate through the area, unless the activity's primary purpose is to impound water. All permanent and temporary crossings of waterbodies shall be suitably culverted, bridged, or otherwise designed and constructed to maintain low flows to sustain the movement of those aquatic species. If a bottomless culvert cannot be used, then the crossing should be designed and constructed to minimize adverse effects to aquatic life movements.

NAE Note: *Compliance with this condition may be achieved by ensuring that during in-stream work, the low flow channel/thalweg remains unobstructed during periods of low flow, except when it is necessary to perform the authorized work. Additionally, for work in tidal waters, in-stream controls should be installed in such a manner that do not obstruct fish passage.*

3. Spawning Areas
Activities in spawning areas during spawning seasons must be avoided to the maximum extent practicable. Activities that result in the physical destruction (*e.g.,* through excavation, fill, or downstream smothering by substantial turbidity) of an important spawning area are not authorized.

4. Migratory Bird Breeding Areas
Activities in waters of the United States that serve as breeding areas for migratory birds must be avoided to the maximum extent practicable.

5. Shellfish Beds
No activity may occur in areas of concentrated shellfish populations, unless the activity is directly related to a shellfish harvesting activity authorized by NWPs 4 and 48, or is a shellfish seeding or habitat restoration activity authorized by NWP 27.

Maine Note: *Contact the Maine Department of Marine Resource (ME DMR) for further conservation measures if a proposed activity would result in excess turbidity (i.e., dredging) and is located within 100 feet of ME DMR shellfish areas. Reference material can be found at: https://dmr-maine.opendata.arcgis.com/datasets/mainedmr-molluscan-shellfish-2010/explore?location=43.733484%2C-69.767928%2C10.43 and https://mgs-maine.opendata.arcgis.com/datasets/maine-coastal-marine-geologic-environments/explore.*

6. Suitable Material
No activity may use unsuitable material (*e.g.,* trash, debris, car bodies, asphalt, etc.). Material used for construction or discharged must be free from toxic pollutants in toxic amounts (see section 307 of the Clean Water Act).

7. Water Supply Intakes
No activity may occur in the proximity of a public water supply intake, except where the activity is for the repair or improvement of public water supply intake structures or adjacent bank stabilization.

8. Adverse Effects from Impoundments
If the activity creates an impoundment of water, adverse effects to the aquatic system due to accelerating the passage of water, and/or restricting its flow must be minimized to the maximum extent practicable.

9. Management of Water Flows
To the maximum extent practicable, the pre-construction course, condition, capacity, and location of open waters must be maintained for each activity, including stream channelization, storm water management activities, and temporary and permanent road crossings, except as provided below. The activity must be constructed to withstand expected high flows, including tidal flows. The activity must not restrict or impede the passage of normal or high flows including tidal flows, unless the primary purpose of the activity is to impound water or manage high flows. The activity may alter the pre-construction course, condition, capacity, and location of open waters if it benefits the aquatic environment (*e.g.,* stream restoration or relocation activities).

10. Fills Within 100-year Floodplains
The activity must comply with applicable FEMA-approved state or local floodplain management requirements.

Massachusetts Note: *For activities located within the Commonwealth of Massachusetts, activities may be required to comply with the Bordering Lands Subject to Flooding provisions of the Commonwealth's Wetland Protection Act. Applicants should contact Massachusetts Department of Environmental Protection to determine whether this provision applies to their proposed activity/ies.*

11. Equipment
Heavy equipment working in wetlands or mudflats must be placed on mats, or other measures must be taken to minimize soil disturbance.

If mats are used to minimize soil disturbance, the affected areas must be returned to pre-construction elevations, and revegetated as appropriate. In circumstances where the use of mats has caused significant soil compaction efforts using techniques (*e.g.,* soil reaeration techniques) to break up the compaction should be employed to return the soil to a pre-construction state prior to returning to pre-construction elevations.

NAE Notes: *(1) Compliance with this condition may be achieved through the implementation of best management practices outline in NAE's "Construction Mat Best Management Practices" document available at https://www.nae.usace.army.mil/Missions/Regulatory/State-General-Permits/Permit-Resources/.*

(2) Compliance with this condition may be achieved by ensuring that construction equipment such as barges in tidal waters always provide adequate clearance above the substrate to avoid impacts to SAS during all tides.

(3) Compliance with this condition may be achieved by ensuring that construction equipment that would cross or access streams utilizes temporary bridges, spans, construction mats, culverts, or cofferdams to minimize disturbance to the waterway.

12. Soil Erosion and Sediment Controls
Appropriate soil erosion and sediment controls must be used and maintained in effective operating condition during construction, and all exposed soil and other fills, as well as any work below the ordinary high water mark or high tide line, must be permanently stabilized at the earliest practicable date. Permittees are encouraged to perform work within waters of the United States during periods of low-flow or no-flow, or during low tides.

NAE Note: *Compliance with this condition may be achieved by ensuring that all discharge points back into waters of the U.S., including wetlands use appropriate energy dissipaters and erosion and sedimentation control BMPs. Controls that are biodegradable can be left in place, but should be removed if they are not biodegradable.*

Temporary controls should be removed upon completion of work, but not before all exposed soil and other fills and any work waterward of the OHWM are permanently stabilized. Once permanently stabilized, temporary controls should be removed as soon as possible. Sediment and debris collected by these controls should be removed and placed at an upland location and in a manner that will prevent its later erosion into a waterway or wetland.

Massachusetts Note: *In Massachusetts, compliance with this condition may be achieved by ensuring, as applicable, that all activities are compliant with the State of Massachusetts' Stormwater Management Standards at 314 CMR 9.06(6)(a)-(f) and the State of Massachusetts' Stormwater Handbook.*

13. Removal of Temporary Structures and Fills
Temporary structures must be removed to the maximum extent practicable, after their use has been discontinued. Temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The affected areas must be revegetated, as appropriate.

NAE Note: *Compliance with this general condition may be achieved by underlying temporary fills with geotextile fabric which may help to facilitate the restoration to pre-construction elevations.*

14. Proper Maintenance
Any authorized structure or fill shall be properly maintained, including maintenance to ensure public safety and compliance with applicable NWP general conditions, as well as any activity-specific conditions added by the district engineer to an NWP authorization.

NAE Note: *Compliance with this general condition may be achieved by the complete removal, cutting, and/or driving to three feet below the substrate of* d*erelict, degraded, or abandoned piles and sheet piles located in navigable waters of the U.S., except for those inside existing work footprints for piers to prevent interference with navigation. Existing creosote piles that are affected by project activities may be completely removed if practicable. In areas of fine-grained substrates, piles may be removed by the direct, vibratory or clamshell pull method to minimize sedimentation, and turbidity impacts and prevent interference with navigation from cut piles. Removed piles should be disposed of in an upland location landward of MHW or OHW and not in wetlands, tidal wetlands, their substrate, or mudflats.*

15. Single and Complete Project
The activity must be a single and complete project. The same NWP cannot be used more than once for the same single and complete project.

16. Wild and Scenic Rivers
a) No NWP activity may occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a "study river" for possible inclusion in the system while the river is in an official study status, unless the

appropriate Federal agency with direct management responsibility for such river, has determined in writing that the proposed activity will not adversely affect the Wild and Scenic River designation or study status.

b) If a proposed NWP activity will occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a “study river” for possible inclusion in the system while the river is in an official study status, the permittee must submit a pre-construction notification (see general condition 32). The district engineer will coordinate the PCN with the Federal agency with direct management responsibility for that river. Permittees shall not begin the NWP activity until notified by the district engineer that the Federal agency with direct management responsibility for that river has determined in writing that the proposed NWP activity will not adversely affect the Wild and Scenic River designation or study status.

c) Information on Wild and Scenic Rivers may be obtained from the appropriate Federal land management agency responsible for the designated Wild and Scenic River or Study River (*e.g.*, National Park Service, U.S. Forest Service, Bureau of Land Management, U.S. Fish and Wildlife Service). Information on these rivers is also available at: http://www.rivers.gov/.

NAE Note: *See also: Regional Condition C, Additional PCN Requirement (Wild and Scenic Rivers).*

17. Tribal Rights
No activity or its operation may impair reserved tribal rights, including, but not limited to, reserved water rights and treaty fishing and hunting rights.

18. Endangered Species
a) No activity is authorized under any NWP which is likely to directly or indirectly jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation, as identified under the Federal Endangered Species Act (ESA), or which will directly or indirectly destroy or adversely modify designated critical habitat or critical habitat proposed for such designation. No activity is authorized under any NWP which “may affect” a listed species or critical habitat, unless ESA section 7 consultation addressing the consequences of the proposed activity on listed species or critical habitat has been completed. See 50 CFR 402.02 for the definition of “effects of the action” for the purposes of ESA section 7 consultation.

b) Federal agencies should follow their own procedures for complying with the requirements of the ESA (see 33 CFR 330.4(f)(1)). If pre-construction notification is required for the proposed activity, the federal permittee must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements. The district engineer will verify that the appropriate documentation has been submitted. If the appropriate documentation has not been submitted, additional ESA section 7 consultation may be necessary for the activity and the respective Federal agency would be responsible for fulfilling its obligation under section 7 of the ESA.

c) Non-federal permittees must submit a pre-construction notification to the district engineer if any listed species (or species proposed for listing) or designated critical habitat (or critical habitat proposed such designation) might be affected or is in the vicinity of the activity, or if the activity is located in designated critical habitat or critical habitat proposed for such designation, and shall not begin work on the activity until notified by the district engineer that the requirements of the ESA have been satisfied and that the activity is authorized. For activities that might affect federally-listed endangered or threatened species (or species proposed for listing) or designated critical habitat (or critical habitat proposed for such designation), the pre-construction notification must include the name(s) of the endangered or threatened species (or species proposed for listing) that might be affected by the proposed activity or that utilize the designated critical habitat (or critical habitat proposed for such designation) that might be affected by the proposed activity. The district engineer will determine whether the proposed activity “may affect” or will have “no effect” to listed species and designated critical habitat and will notify the non-federal applicant of the Corps’ determination within 45 days of receipt of a complete pre-construction notification. For activities where the non-federal applicant has identified listed species (or species proposed for listing) or designated critical habitat (or critical habitat proposed for such designation) that might be affected or is in the vicinity of the activity, and has so notified the Corps, the applicant shall not begin work until the Corps has provided notification that the proposed activity will have “no effect” on listed species (or species proposed for listing or designated critical habitat (or critical habitat proposed for such designation), or until ESA section 7 consultation or conference has been completed. If the non-federal applicant has not heard back from the Corps within 45 days, the applicant must still wait for notification from the Corps.

d) As a result of formal or informal consultation or conference with the FWS or NMFS the district engineer may add species-specific permit conditions to the NWPs.

e) Authorization of an activity by an NWP does not authorize the “take” of a threatened or endangered species as defined under the ESA. In the absence of separate authorization (*e.g.*, an ESA Section 10 Permit, a Biological Opinion with “incidental take” provisions, etc.) from the FWS or the NMFS, the Endangered Species Act prohibits any person subject to the jurisdiction of the United States to take a listed species, where “take” means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. The word “harm” in the definition of “take” means an act which actually kills or injures wildlife. Such an act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering.

f) If the non-federal permittee has a valid ESA section 10(a)(1)(B) incidental take permit with an approved Habitat Conservation Plan for a project or a group of projects that includes the proposed NWP activity, the non-federal permittee should provide a copy of that ESA section 10(a)(1)(B) permit with the PCN required by paragraph (c) of this

general condition. The district engineer will coordinate with the agency that issued the ESA section 10(a)(1)(B) permit to determine whether the proposed NWP activity and the associated incidental take were considered in the internal ESA section 7 consultation conducted for the ESA section 10(a)(1)(B) permit. If that coordination results in concurrence from the agency that the proposed NWP activity and the associated incidental take were considered in the internal ESA section 7 consultation for the ESA section 10(a)(1)(B) permit, the district engineer does not need to conduct a separate ESA section 7 consultation for the proposed NWP activity. The district engineer will notify the non-federal applicant within 45 days of receipt of a complete pre-construction notification whether the ESA section 10(a)(1)(B) permit covers the proposed NWP activity or whether additional ESA section 7 consultation is required.

g) Information on the location of threatened and endangered species and their critical habitat can be obtained directly from the offices of the FWS and NMFS or their web pages at http://www.fws.gov/ or http:// www.fws.gov/ipac and http://www.nmfs.noaa.gov/pr/species/esa/ respectively.

NAE Note: *For information on how to comply with General Condition 18, please visit our website at https://www.nae.usace.army.mil/missions/regulatory/endangered-species-act/.*

Maine Note: *Federal agencies should refer to "Multiple Federal Agency & Lead Federal Agency Best Practices" when a Corps permit is required, which can be found on the Corps' webpage at: www.nae.usace.army.mil/Missions/Regulatory/State-General-Permits/Maine-General-Permit. (This is a pending document and will be published on our website when completed.)*

19. Migratory Birds and Bald and Golden Eagles

The permittee is responsible for ensuring that an action authorized by an NWP complies with the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. The permittee is responsible for contacting appropriate local office of the U.S. Fish and Wildlife Service to determine what measures, if any, are necessary or appropriate to reduce adverse effects to migratory birds or eagles, including whether "incidental take" permits are necessary and available under the Migratory Bird Treaty Act or Bald and Golden Eagle Protection Act for a particular activity.

20. Historic Properties

a) No activity is authorized under any NWP which may have the potential to cause effects to properties listed, or eligible for listing, in the National Register of Historic Places until the requirements of Section 106 of the National Historic Preservation Act (NHPA) have been satisfied.

b) Federal permittees should follow their own procedures for complying with the requirements of section 106 of the National Historic Preservation Act (see 33 CFR 330.4(g)(1)). If pre-construction notification is required for the proposed NWP activity, the federal permittee must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements. The district

engineer will verify that the appropriate documentation has been submitted. If the appropriate documentation is not submitted, then additional consultation under section 106 may be necessary. The respective Federal agency is responsible for fulfilling its obligation to comply with section 106.

c) Non-federal permittees must submit a pre-construction notification to the district engineer if the NWP activity might have the potential to cause effects to any historic properties listed on, determined to be eligible for listing on, or potentially eligible for listing on the National Register of Historic Places, including previously unidentified properties. For such activities, the pre-construction notification must state which historic properties might have the potential to be affected by the proposed NWP activity or include a vicinity map indicating the location of the historic properties or the potential for the presence of historic properties. Assistance regarding information on the location of, or potential for, the presence of historic properties can be sought from the State Historic Preservation Officer, Tribal Historic Preservation Officer, or designated tribal representative, as appropriate, and the National Register of Historic Places (see 33 CFR 330.4(g)). When reviewing pre-construction notifications, district engineers will comply with the current procedures for addressing the requirements of section 106 of the National Historic Preservation Act. The district engineer shall make a reasonable and good faith effort to carry out appropriate identification efforts commensurate with potential impacts, which may include background research, consultation, oral history interviews, sample field investigation, and/or field survey. Based on the information submitted in the PCN and these identification efforts, the district engineer shall determine whether the proposed NWP activity has the potential to cause effects on historic properties. Section 106 consultation is not required when the district engineer determines that the activity does not have the potential to cause effects on historic properties (see 36 CFR 800.3(a)). Section 106 consultation is required when the district engineer determines that the activity has the potential to cause effects on historic properties. The district engineer will conduct consultation with consulting parties identified under 36 CFR 800.2(c) when he or she makes any of the following effect determinations for the purposes of section 106 of the NHPA: no historic properties affected, no adverse effect, or adverse effect.

d) Where the non-federal applicant has identified historic properties on which the proposed NWP activity might have the potential to cause effects and so notified the Corps, the non-federal applicant shall not begin the activity until notified by the district engineer either that the activity has no potential to cause effects on historic properties or that NHPA section 106 consultation has been completed. For non-federal permittees, the district engineer will notify the prospective permittee within 45 days of receipt of a complete pre-construction notification whether NHPA section 106 consultation is required. If NHPA section 106 consultation is required, the district engineer will notify the non-federal applicant that he or she cannot begin the activity until section 106 consultation is completed. If the non-federal applicant has not heard back from the Corps within 45 days, the applicant must still wait for notification from the Corps.

e) Prospective permittees should be aware that section 110k of the NHPA (54 U.S.C. 306113) prevents the Corps from granting a permit or other assistance to an applicant who, with intent to avoid the requirements of section 106 of the NHPA, has intentionally significantly adversely affected a historic property to which the permit would relate, or having legal power to prevent it, allowed such significant adverse effect to occur, unless the Corps, after consultation with the Advisory Council on Historic Preservation (ACHP), determines that circumstances justify granting such assistance despite the adverse effect created or permitted by the applicant. If circumstances justify granting the assistance, the Corps is required to notify the ACHP and provide documentation specifying the circumstances, the degree of damage to the integrity of any historic properties affected, and proposed mitigation. This documentation must include any views obtained from the applicant, SHPO/THPO, appropriate Indian tribes if the undertaking occurs on or affects historic properties on tribal lands or affects properties of interest to those tribes, and other parties known to have a legitimate interest in the impacts to the permitted activity on historic properties.

NAE Note: *The following link to the Corps' website provides SHPO and THPO contact information and additional procedures to expedite Corps regulatory review regarding the NHPA. Please contact the appropriate SHPO and/or THPO based on the geographic location of the regulated activity: https://www.nae.usace.army.mil/Missions/Regulatory/Historic-and-Tribal-Resources/.*

21. Discovery of Previously Unknown Remains and Artifacts
Permittees that discover any previously unknown historic, cultural or archaeological remains and artifacts while accomplishing the activity authorized by an NWP, they must immediately notify the district engineer of what they have found, and to the maximum extent practicable, avoid construction activities that may affect the remains and artifacts until the required coordination has been completed. The district engineer will initiate the Federal, tribal, and state coordination required to determine if the items or remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

22. Designated Critical Resource Waters
Critical resource waters include, NOAA-managed marine sanctuaries and marine monuments, and National Estuarine Research Reserves. The district engineer may designate, after notice and opportunity for public comment, additional waters officially designated by a state as having particular environmental or ecological significance, such as outstanding national resource waters or state natural heritage sites. The district engineer may also designate additional critical resource waters after notice and opportunity for public comment.

a) Discharges of dredged or fill material into waters of the United States are not authorized by NWPs 7, 12, 14, 16, 17, 21, 29, 31, 35, 39, 40, 42, 43, 44, 49, 50, 51, 52, 57, and 58 for any activity within, or directly affecting, critical resource waters, including wetlands adjacent to such waters.

b) For NWPs 3, 8, 10, 13, 15, 18, 19, 22, 23, 25, 27, 28, 30, 33, 34, 36, 37, 38, and 54, notification is required in accordance with general condition 32, for any activity proposed by permittees in the designated critical resource waters including wetlands adjacent to those waters. The district engineer may authorize activities under these NWPs only after she or he determines that the impacts to the critical resource waters will be no more than minimal.

23. Mitigation

The district engineer will consider the following factors when determining appropriate and practicable mitigation necessary to ensure that the individual and cumulative adverse environmental effects are no more than minimal:

a) The activity must be designed and constructed to avoid and minimize adverse effects, both temporary and permanent, to waters of the United States to the maximum extent practicable at the project site (*i.e.*, on site).

b) Mitigation in all its forms (avoiding, minimizing, rectifying, reducing, or compensating for resource losses) will be required to the extent necessary to ensure that the individual and cumulative adverse environmental effects are no more than minimal.

c) Compensatory mitigation at a minimum one-for-one ratio will be required for all wetland losses that exceed 1/10-acre and require pre-construction notification, unless the district engineer determines in writing that either some other form of mitigation would be more environmentally appropriate or the adverse environmental effects of the proposed activity are no more than minimal, and provides an activity-specific waiver of this requirement. For wetland losses of 1/10-acre or less that require pre-construction notification, the district engineer may determine on a case-by-case basis that compensatory mitigation is required to ensure that the activity results in only minimal adverse environmental effects.

d) Compensatory mitigation at a minimum one-for-one ratio will be required for all losses of stream bed that exceed 3/100-acre and require pre-construction notification, unless the district engineer determines in writing that either some other form of mitigation would be more environmentally appropriate or the adverse environmental effects of the proposed activity are no more than minimal, and provides an activity-specific waiver of this requirement. This compensatory mitigation requirement may be satisfied through the restoration or enhancement of riparian areas next to streams in accordance with paragraph (e) of this general condition. For losses of stream bed of 3/100-acre or less that require pre-construction notification, the district engineer may determine on a case-by case basis that compensatory mitigation is required to ensure that the activity results in only minimal adverse environmental effects. Compensatory mitigation for losses of streams should be provided, if practicable, through stream rehabilitation, enhancement, or preservation, since streams are difficult-to-replace resources (see 33 CFR 332.3(e)(3)).

e) Compensatory mitigation plans for NWP activities in or near streams or other open waters will normally include a requirement for the restoration or enhancement, maintenance, and legal protection (*e.g.*, conservation easements) of riparian areas next to open waters. In some cases, the restoration or maintenance/protection of riparian areas may be the only compensatory mitigation required. If restoring riparian areas involves planting vegetation, only native species should be planted. The width of the required riparian area will address documented water quality or aquatic habitat loss concerns. Normally, the riparian area will be 25 to 50 feet wide on each side of the stream, but the district engineer may require slightly wider riparian areas to address documented water quality or habitat loss concerns. If it is not possible to restore or maintain/protect a riparian area on both sides of a stream, or if the waterbody is a lake or coastal waters, then restoring or maintaining/protecting a riparian area along a single bank or shoreline may be sufficient. Where both wetlands and open waters exist on the project site, the district engineer will determine the appropriate compensatory mitigation (*e.g.*, riparian areas and/or wetlands compensation) based on what is best for the aquatic environment on a watershed basis. In cases where riparian areas are determined to be the most appropriate form of minimization or compensatory mitigation, the district engineer may waive or reduce the requirement to provide wetland compensatory mitigation for wetland losses.

f) Compensatory mitigation projects provided to offset losses of aquatic resources must comply with the applicable provisions of 33 CFR part 332.

1) The prospective permittee is responsible for proposing an appropriate compensatory mitigation option if compensatory mitigation is necessary to ensure that the activity results in no more than minimal adverse environmental effects. For the NWPs, the preferred mechanism for providing compensatory mitigation is mitigation bank credits or in-lieu fee program credits (see 33 CFR 332.3(b)(2) and (3)). However, if an appropriate number and type of mitigation bank or in-lieu credits are not available at the time the PCN is submitted to the district engineer, the district engineer may approve the use of permittee-responsible mitigation.

2) The amount of compensatory mitigation required by the district engineer must be sufficient to ensure that the authorized activity results in no more than minimal individual and cumulative adverse environmental effects (see 33 CFR 330.1(e)(3)). (See also 33 CFR 332.3(f).)

3) Since the likelihood of success is greater and the impacts to potentially valuable uplands are reduced, aquatic resource restoration should be the first compensatory mitigation option considered for permittee-responsible mitigation.

4) If permittee-responsible mitigation is the proposed option, the prospective permittee is responsible for submitting a mitigation plan. A conceptual or detailed mitigation plan may be used by the district engineer to make the decision on the

NWP verification request, but a final mitigation plan that addresses the applicable requirements of 33 CFR 332.4(c)(2) through (14) must be approved by the district engineer before the permittee begins work in waters of the United States, unless the district engineer determines that prior approval of the final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation (see 33 CFR 332.3(k)(3)). If permittee-responsible mitigation is the proposed option, and the proposed compensatory mitigation site is located on land in which another Federal agency holds an easement, the district engineer will coordinate with that Federal agency to determine if proposed compensatory mitigation project is compatible with the terms of the easement.

5) If mitigation bank or in-lieu fee program credits are the proposed option, the mitigation plan needs to address only the baseline conditions at the impact site and the number of credits to be provided (see 33 CFR 332.4(c)(1)(ii)).

6) Compensatory mitigation requirements (*e.g.*, resource type and amount to be provided as compensatory mitigation, site protection, ecological performance standards, monitoring requirements) may be addressed through conditions added to the NWP authorization, instead of components of a compensatory mitigation plan (see 33 CFR 332.4(c)(1)(ii)).

g) Compensatory mitigation will not be used to increase the acreage losses allowed by the acreage limits of the NWPs. For example, if an NWP has an acreage limit of 1/2-acre, it cannot be used to authorize any NWP activity resulting in the loss of greater than 1/2-acre of waters of the United States, even if compensatory mitigation is provided that replaces or restores some of the lost waters. However, compensatory mitigation can and should be used, as necessary, to ensure that an NWP activity already meeting the established acreage limits also satisfies the no more than minimal impact requirement for the NWPs.

h) Permittees may propose the use of mitigation banks, in-lieu fee programs, or permittee-responsible mitigation. When developing a compensatory mitigation proposal, the permittee must consider appropriate and practicable options consistent with the framework at 33 CFR 332.3(b). For activities resulting in the loss of marine or estuarine resources, permittee-responsible mitigation may be environmentally preferable if there are no mitigation banks or in-lieu fee programs in the area that have marine or estuarine credits available for sale or transfer to the permittee. For permittee-responsible mitigation, the special conditions of the NWP verification must clearly indicate the party or parties responsible for the implementation and performance of the compensatory mitigation project, and, if required, its long-term management.

i) Where certain functions and services of waters of the United States are permanently adversely affected by a regulated activity, such as discharges of dredged or fill material into waters of the United States that will convert a forested or

scrub-shrub wetland to a herbaceous wetland in a permanently maintained utility line right-of-way, mitigation may be required to reduce the adverse environmental effects of the activity to the no more than minimal level.

NAE Note: *Applicants are encouraged to utilize the Regulatory In-lieu Fee and Bank Information Tracking System (RIBITS) in order to determine which in-lieu fee programs and/or mitigation banks have a sufficient amount of appropriate and available credits which they may propose to use to offset their proposed activity's unavoidable impacts to waters of the U.S., including wetlands. RIBITS is available at https://ribits.ops.usace.army.mil/ords/f?p=107:2:::::::. See also: Regional Condition I, Compensatory Mitigation.*

24. Safety of Impoundment Structures
To ensure that all impoundment structures are safely designed, the district engineer may require non-federal applicants to demonstrate that the structures comply with established state or Federal dam safety criteria or have been designed by qualified persons. The district engineer may also require documentation that the design has been independently reviewed by similarly qualified persons, and appropriate modifications made to ensure safety.

25. Water Quality
a) Where the certifying authority (state, authorized tribe, or EPA, as appropriate) has not previously certified compliance of an NWP with CWA section 401, a CWA section 401 water quality certification for the proposed activity which may result in any discharge from a point source into waters of the United States must be obtained or waived (see 33 CFR 330.4(c)). If the permittee cannot comply with all of the conditions of a water quality certification previously issued by certifying authority for the issuance of the NWP, then the permittee must obtain a water quality certification or waiver for the proposed activity which may result in any discharge from a point source into waters of the United States in order for the activity to be authorized by an NWP.

b) If the NWP activity requires pre-construction notification and the certifying authority has not previously certified compliance of an NWP with CWA section 401, the proposed activity which may result in any discharge from a point source into waters of the United States is not authorized by an NWP until water quality certification is obtained or waived. If the certifying authority issues a water quality certification for the proposed discharge into waters of the United States, the permittee must submit a copy of the certification to the district engineer. The discharge into waters of the United States is not authorized by an NWP until the district engineer has notified the permittee that the water quality certification requirement has been satisfied (*i.e.,* by the issuance of a water quality certification or a waiver and completion of the Section 401(a)(2) process).

c) The district engineer or certifying authority may require additional water quality management measures to ensure that the authorized activity does not result in more than minimal degradation of water quality.

NAE Note: *For information concerning how to apply to EPA for a Water Quality Certification for activities located within Tribal lands or within lands of exclusive Federal jurisdiction, please see: https://www.epa.gov/cwa-401/resources-when-epa-acts-certifying-authority-under-section-401 and/or contact: R1CWA401@epa.gov.*

Connecticut Note: *For information concerning how to apply to CTDEEP for a Water Quality Certification, please see: https://portal.ct.gov/deep/permits-and-licenses/factsheets-inland-water/401-water-quality-certification-fact-sheet.*

Maine Note: *For information concerning how to apply to LUPC or MEDEP for a Water Quality Certification, please see: https://www.maine.gov/dep/water/wd/wqc/.*

Massachusetts Note: *For information concerning how to apply to MassDEP for a Water Quality Certification, please see: https://www.mass.gov/lists/wetlands-permitting-forms.*

New Hampshire Note: *For information concerning how to apply to NHDES for a Water Quality Certification, please see: https://www.des.nh.gov/water/rivers-and-lakes/water-quality-certification.*

Rhode Island Note: *For information concerning how to apply to RIDEM for a Water Quality Certification, please see: https://dem.ri.gov/sites/g/files/xkgbur861/files/2025-06/wqcheck.pdf.*

Vermont Note: *For information concerning how to apply to VTDEC for a Water Quality Certification, please see: https://dec.vermont.gov/act250/watershed/business-support/water-quality-certification-section-401.*

26. Coastal Zone Management

In coastal states where an NWP has not previously received a state coastal zone management consistency concurrence, an individual state coastal zone management consistency concurrence must be obtained, or a presumption of concurrence must occur (see 33 CFR 330.4(d)). If the permittee cannot comply with all conditions of a coastal zone management consistency concurrence previously issued by the state, then the permittee must obtain an individual coastal zone management consistency concurrence in order for the activity to be authorized by an NWP. The district engineer or a state may require additional measures to ensure that the authorized activity is consistent with state coastal zone management requirements.

NAE Note: *If an individual state coastal zone management consistency concurrence is required, applicants should submit a consistency certification to the state (see 15 CFR 930.31(d)) at the same time as the PCN is submitted to the Corps, or shortly thereafter.*

Connecticut Note: *For information concerning how to apply to CTDEEP for a coastal zone management consistency certification, please see: https://portal.ct.gov/deep/coastal-resources/coastal-permitting/coastal-consistency.*

Maine Note: *For information concerning how to apply to the Maine Office of Community Affairs for a coastal zone management consistency certification, please see: https://www.maine.gov/dmr/programs/maine-coastal-program/federal-consistency-review.*

Massachusetts Note: *For information concerning how to apply to Mass CZM for a coastal zone management consistency certification, please see: https://www.mass.gov/federal-consistency-review-program.*

New Hampshire Note: *For information concerning how to apply to NHDES for a coastal zone management consistency certification, please see: https://www.des.nh.gov/water/coastal-waters/federal-consistency.*

Rhode Island Note: *For information concerning how to apply to CRMC for projects within the coastal zone, please see: https://www.crmc.ri.gov/applicationforms.html and https://www.crmc.ri.gov/regulations/fed_consistency.pdf.*

27. Regional and Case-by-Case Conditions
The activity must comply with any regional conditions that may have been added by the division engineer (see 33 CFR 330.4(e)) and with any case specific conditions added by the Corps or by the state, Indian Tribe, or U.S. EPA in its CWA section 401 Water Quality Certification, or by the state in its Coastal Zone Management Act consistency determination.

28. Use of Multiple Nationwide Permits
The use of more than one NWP for a single and complete project is authorized, subject to the following restrictions:

a) The total acreage of loss of waters of the United States for a single and complete project cannot exceed the acreage limit of the NWP with the highest specified acreage limit when multiple NWPs are used to authorize an activity.

b) If only one of the NWPs used to authorize the single and complete project has a specified acreage limit, the acreage loss of waters of the United States for that single and complete project cannot exceed that specified acreage limit. For example, if a road crossing over tidal waters is constructed under NWP 14 (which has an acreage limit of 1/3-acre in tidal waters), with associated bank stabilization authorized by NWP 13 (which does not have a specified acreage limit), the maximum acreage loss of waters of the United States for the total project cannot exceed 1/3-acre.

c) If two or more of the NWPs used to authorize the single and complete project have specified acreage limits, the acreage loss of waters of the United States authorized by each of those NWPs cannot exceed the specified acreage limits of each of those NWPs. For example, if a commercial development is constructed under NWP 39 (which has a 1/2-acre limit), and the single and complete project

includes the filling of a ditch authorized by NWP 46 (which has a 1-acre limit), the maximum acreage loss of waters of the United States for the construction of the commercial development under NWP 39 cannot exceed 1/2-acre, and the total acreage loss of waters of United States caused by the combination of the NWP 39 and 46 activities cannot exceed 1 acre.

29. Transfer of Nationwide Permit Verifications

If the permittee sells the property associated with a nationwide permit verification, the permittee may transfer the nationwide permit verification to the new owner by submitting a letter to the appropriate Corps district office to validate the transfer. A copy of the nationwide permit verification must be attached to the letter, and the letter must contain the following statement and signature:

“When the structures or work authorized by this nationwide permit are still in existence at the time the property is transferred, the terms and conditions of this nationwide permit, including any special conditions, will continue to be binding on the new owner(s) of the property. To validate the transfer of this nationwide permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below.

_____

(Transferee)

_____

(Date)

30. Compliance Certification

Each permittee who receives an NWP verification letter from the Corps must provide a signed certification documenting completion of the authorized activity and implementation of any required compensatory mitigation. The successful completion of any required permittee-responsible mitigation, including the achievement of ecological performance standards, will be addressed separately by the district engineer. The Corps will provide the permittee the certification document with the NWP verification letter. The certification document will include:

a) A statement that the authorized activity was done in accordance with the NWP authorization, including any general, regional, or activity-specific conditions;

b) A statement that the implementation of any required compensatory mitigation was completed in accordance with the permit conditions. If credits from a mitigation bank or in-lieu fee program are used to satisfy the compensatory mitigation requirements, the certification must include the documentation required by 33 CFR 332.3(l)(3) to confirm that the permittee secured the appropriate number and resource type of credits; and

c) The signature of the permittee certifying the completion of the activity and mitigation.

The completed certification document must be submitted to the district engineer within 30 days of completion of the authorized activity or the implementation of any required compensatory mitigation, whichever occurs later.

31. Activities Affecting Structures or Works Built by the United States
If an NWP activity also requires review by, or permission from, the Corps pursuant to 33 U.S.C. 408 because it will alter or temporarily or permanently occupy or use a U.S. Army Corps of Engineers (USACE) federally authorized Civil Works project (a "USACE project"), the prospective permittee must submit a pre-construction notification. See paragraph (b)(10) of general condition 32. An activity that requires section 408 permission and/or review is not authorized by an NWP until the appropriate Corps office issues the section 408 permission or completes its review to alter, occupy, or use the USACE project, and the district engineer issues a written NWP verification.

NAE Note: *Refer to the New England District's Section 408 Program webpage that can be found at: https://www.nae.usace.army.mil/Missions/Section-408/. See also: Regional Condition B, Additional PCN Requirement (Federal Projects).*

32. Pre-Construction Notification
a) Timing. Where required by the terms of the NWP, the prospective permittee must notify the district engineer by submitting a pre-construction notification (PCN) as early as possible. The district engineer must determine if the PCN is complete within 30 calendar days of the date of receipt and, if the PCN is determined to be incomplete, notify the prospective permittee within that 30 day period to request the additional information necessary to make the PCN complete. The request must specify the information needed to make the PCN complete. As a general rule, district engineers will request additional information necessary to make the PCN complete only once. However, if the prospective permittee does not provide all of the requested information, then the district engineer will notify the prospective permittee that the PCN is still incomplete and the PCN review process will not commence until all of the requested information has been received by the district engineer. The prospective permittee shall not begin the activity until either:

1) He or she is notified in writing by the district engineer that the activity may proceed under the NWP with any special conditions imposed by the district or division engineer; or

2) 45 calendar days have passed from the district engineer's receipt of the complete PCN and the prospective permittee has not received written notice from the district or division engineer. However, if the permittee was required to notify the Corps pursuant to general condition 18 that listed species (or species proposed for listing) or designated critical habitat (or critical habitat proposed for such designation) might be affected or are in the vicinity of the activity, or to notify the Corps pursuant to general condition 20 that the activity might have the potential to cause effects to historic properties, the permittee cannot begin the activity until receiving written notification from the Corps that there is "no effect" on listed species or "no potential

to cause effects" on historic properties, or that any consultation required under Section 7 of the Endangered Species Act (see 33 CFR 330.4(f)) and/or section 106 of the National Historic Preservation Act (see 33 CFR 330.4(g)) has been completed. If the proposed activity requires a written waiver to exceed specified limits of an NWP, the permittee may not begin the activity until the district engineer issues the waiver. If the district or division engineer notifies the permittee in writing that an individual permit is required within 45 calendar days of receipt of a complete PCN, the permittee cannot begin the activity until an individual permit has been obtained. Subsequently, the permittee's right to proceed under the NWP may be modified, suspended, or revoked only in accordance with the procedure set forth in 33 CFR 330.5(d)(2).

b) Contents of the Pre-Construction Notification: The PCN must be in writing and include the following information:

1) Name, address and telephone numbers of the prospective permittee;

2) Location of the proposed activity;

3) Identify the specific NWP or NWP(s) the prospective permittee wants to use to authorize the proposed activity;

4) (i) A description of the proposed activity; the activity's purpose; direct and indirect adverse environmental effects the activity would cause, including the anticipated amount of loss of wetlands, other special aquatic sites, and other waters expected to result from the NWP activity, in acres, linear feet, or other appropriate unit of measure; a description of any proposed mitigation measures intended to reduce the adverse environmental effects caused by the proposed activity; and any other NWP(s), regional general permit(s), or individual permit(s) used or intended to be used to authorize any part of the proposed project or any related activity, including other separate and distant crossings for linear projects that require Department of the Army authorization but do not require pre-construction notification. The description of the proposed activity and any proposed mitigation measures should be sufficiently detailed to allow the district engineer to determine that the adverse environmental effects of the activity will be no more than minimal and to determine the need for compensatory mitigation or other mitigation measures.

(ii) For linear projects where one or more single and complete crossings require pre-construction notification, the PCN must include the quantity of anticipated losses of wetlands, other special aquatic sites, and other waters for each single and complete crossing of those wetlands, other special aquatic sites, and other waters (including those single and complete crossings authorized by an NWP but do not require PCNs). This information will be used by the district engineer to evaluate the cumulative adverse environmental effects of the proposed linear project, and does not change those non-PCN NWP activities into NWP PCNs.

(iii) Sketches should be provided when necessary to show that the activity complies with the terms of the NWP. (Sketches usually clarify the activity and when provided results in a quicker decision. Sketches should contain sufficient detail to provide an illustrative description of the proposed activity (*e.g.,* a conceptual plan), but do not need to be detailed engineering plans);

5) The PCN must include a delineation of waters, wetlands, and other special aquatic sites on the project site. Wetland delineations must be prepared in accordance with the current method required by the Corps. The permittee may ask the Corps to delineate the special aquatic sites and other waters on the project site, but there may be a delay if the Corps does the delineation, especially if the project site is large or contains many wetlands, other special aquatic sites, and other waters. Furthermore, the 45-day period will not start until the delineation has been submitted to or completed by the Corps, as appropriate. For NWP 27 activities that require PCNs because of other general conditions or regional conditions imposed by division engineers, see Note 2 of that NWP;

NAE Note: *To comply with the above GC 32(5), the following methodologies should be utilized:*

(a) Wetlands should be delineated in accordance with the Corps Wetlands Delineation Manual and the most recent Northcentral/Northeast Regional Supplement. Wetland delineation and jurisdiction information can be found at: www.nae.usace.army.mil/missions/regulatory/jurisdiction-and-wetlands and https://www.usace.army.mil/Media/Announcements/Article/4262089/1-august-2025-us-army-corps-of-engineers-enhances-aquatic-resource-delineation/*.*

(b) Refer to the "Best Practices for Jurisdictional Determinations and Wetland Delineations," which can be found on the Corps webpage at: https://www.nae.usace.army.mil/missions/regulatory/state-general-permits/maine-general-permit/. (This is a pending document and will be published on our website when completed.)

(c) The ordinary high water mark should be delineated (on both sides) when streams, rivers, non-tidal open waters are present on the project site. Ordinary high water mark guidance can be found in RGL 05-05 (https://usace.contentdm.oclc.org/utils/getfile/collection/p16021coll9/id/1253). For complex, atypical, or problematic sites see: https://www.erdc.usace.army.mil/Media/Fact-Sheets/Fact-Sheet-Article-View/Article/486085/ordinary-high-water-mark-ohwm-research-development-and-training/.

(d) Vegetated shallows should be delineated when present on the project site. Vegetated shallow survey guidance and maps can be found on the Corps webpage at: https://www.nae.usace.army.mil/Missions/Regulatory/Jurisdiction-and-Wetlands/.

(e) All Essential Fish Habitat should be delineated when present on the project site. EFH survey guidance can be found in the current EFH programmatic, which can be found on the Corps webpage at https://www.nae.usace.army.mil/Missions/Regulatory/Essential-Fish-Habitat/.

6) If the proposed activity will result in the loss of greater than 1/10-acre of wetlands or 3/100-acre of stream bed and a PCN is required, the prospective permittee must submit a statement describing how the compensatory mitigation requirement will be satisfied, or explaining why the adverse environmental effects are no more than minimal and why compensatory mitigation should not be required. As an alternative, the prospective permittee may submit a conceptual or detailed mitigation plan.

7) For non-federal permittees, if any listed species (or species proposed for listing) or designated critical habitat (or critical habitat proposed for such designation) might be affected or is in the vicinity of the activity, or if the activity is located in designated critical habitat (or critical habitat proposed for such designation), the PCN must include the name(s) of those endangered or threatened species (or species proposed for listing) that might be affected by the proposed activity or utilize the designated critical habitat (or critical habitat proposed for such designation) that might be affected by the proposed activity. For NWP activities that require pre-construction notification, federal permittees must provide documentation demonstrating compliance with the Endangered Species Act;

8) For non-federal permittees, if the NWP activity might have the potential to cause effects to a historic property listed on, determined to be eligible for listing on, or potentially eligible for listing on, the National Register of Historic Places, the PCN must state which historic property might have the potential to be affected by the proposed activity or include a vicinity map indicating the location of the historic property. For NWP activities that require pre-construction notification, federal permittees must provide documentation demonstrating compliance with section 106 of the National Historic Preservation Act;

9) For an activity that will occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a “study river” for possible inclusion in the system while the river is in an official study status, the PCN must identify the Wild and Scenic River or the “study river” (see general condition 16); and

10) For an NWP activity that requires permission from, or review by, the Corps pursuant to 33 U.S.C. 408 because it will alter or temporarily or permanently occupy or use a U.S. Army Corps of Engineers federally authorized civil works project, the pre-construction notification must include a statement confirming that the project proponent has submitted a written request for section 408 permission from, or review by, the Corps office having jurisdiction over that USACE project.

c) Form of Pre-Construction Notification: The nationwide permit pre-construction notification form (Form ENG 6082) should be used for NWP PCNs. A letter containing the required information may also be used. Applicants may provide electronic files of PCNs and supporting materials if the district engineer has established tools and procedures for electronic submittals.

d) Agency Coordination:

(1) The district engineer will consider any comments from Federal and state agencies concerning the proposed activity's compliance with the terms and conditions of the NWPs and the need for mitigation to reduce the activity's adverse environmental effects so that they are no more than minimal.

(2) Agency coordination is required for:

(i) all NWP activities that require pre-construction notification and result in the loss of greater than 1/2-acre of waters of the United States;

(ii) NWP 13 activities in excess of 500 linear feet, fills greater than one cubic yard per running foot, or involve discharges of dredged or fill material into special aquatic sites; and

(iii) NWP 54 activities in excess of 500 linear feet, or that extend into the waterbody more than 30 feet from the mean low water line in tidal waters or the ordinary high water mark in the Great Lakes.

Maine Note: *The Corps will additionally coordinate with the State of Maine on all activities that require a waiver.*

(3) When agency coordination is required, the district engineer will immediately provide (*e.g.,* via email, facsimile transmission, overnight mail, or other expeditious manner) a copy of the complete PCN to the appropriate Federal or state offices (FWS, state natural resource or water quality agency, EPA, and, if appropriate, the NMFS). With the exception of NWP 37, these agencies will have 10 calendar days from the date the material is transmitted to notify the district engineer via telephone, facsimile transmission, or email that they intend to provide substantive, site-specific comments. The comments must explain why the agency believes the adverse environmental effects will be more than minimal. If so contacted by an agency, the district engineer will wait an additional 15 calendar days before making a decision on the pre-construction notification. The district engineer will fully consider agency comments received within the specified time frame concerning the proposed activity's compliance with the terms and conditions of the NWPs, including the need for mitigation to ensure that the net adverse environmental effects of the proposed activity are no more than minimal. The district engineer will provide no response to the resource agency, except as provided below. The district engineer will indicate in the administrative record associated with each pre-construction notification that the resource agencies' concerns were considered. For NWP 37, the emergency watershed protection and rehabilitation activity may proceed immediately in cases where there is an unacceptable hazard to life or a significant loss of property or economic hardship will occur. The district engineer will consider any comments received to decide whether the NWP 37 authorization should be modified, suspended, or revoked in accordance with the procedures at 33 CFR 330.5.

(4) In cases of where the prospective permittee is not a Federal agency, the district engineer will provide a response to NMFS within 30 calendar days of receipt of any Essential Fish Habitat conservation recommendations, as required by section 305(b)(4)(B) of the Magnuson-Stevens Fishery Conservation and Management Act.

(5) Applicants are encouraged to provide the Corps with either electronic files or multiple copies of pre-construction notifications to expedite agency coordination.

Regional Conditions

The U.S. Army Corps of Engineers (Corps) New England District Regulatory Division issues the following Regional Conditions (RCs) to ensure that activities authorized by the 2026 Nationwide Permits (NWPs) in the New England states of Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont will not cause more than minimal adverse environmental impacts, both individually and cumulatively. Before the New England District will verify an activity under one or more NWPs, the activity must be demonstrated to comply with the applicable NWP terms and all applicable NWP General Conditions (GCs) and RCs. Prior to commencement of a "non-notifying" activity (i.e., activities authorized by NWPs which do not require submission of a pre-construction notification [PCN]), the proponent (i.e., the person and/or the entity performing the work) is responsible for ensuring the activity meets all applicable:

- Terms of the NWP
- GCs
- RCs
- State Water Quality Certification, if applicable
- State Coastal Zone Consistency, if applicable

PCN Summary Table. The following activities may require a PCN regardless of the terms of the applicable NWP. Please read the applicable RCs to determine if a PCN is required.

Applicable to All New England States	
Exceedance of loss thresholds within streams, tidal/non-tidal wetlands, tidal submerged aquatic vegetation, mudflats, and intertidal areas	See RC A
Located within, or within the vicinity of a Federal Project	See RC B
Located within, or within the vicinity of a Wild and Scenic River	See RC C
Involving discharges of temporary fill material	See RC D
Involving slip lining	See RC E
Involving stream crossings	See RC F
Located within Essential Fish Habitat	See RC J
Applicable to Specific New England States	
Activities within Time-of-Year Restrictions	See RCs N, O, S, U, V, W
Located within the Saint John and Saint Croix River basins (Maine)	See RC P
Authorized by NWP 48, Commercial Shellfish Mariculture Activities and within the State of Maine > 5 acres	See RC Q
Located within Important or Rare Resources within the State of Maine	See RC R
Discharges of fill >10 cubic yards in Lake Champlain and Lake Memphremagog and/or their adjacent wetlands (Vermont)	See RC X

Regional Conditions

The following RCs apply to all applicable NWPs in **all New England States** (unless otherwise specified):

A. Additional PCN Requirement (Specific Resources): A PCN is required for any proposed activities that would result in the loss of waters of the U.S. that exceed the listed thresholds to the following aquatic resources if a PCN is not already required by the NWP.

Aquatic Resource	Threshold
Non-tidal Wetlands	4,356 square feet (1/10-acre)
Tidal and Non-Tidal Stream	200 linear feet or 3/100-acre (whichever is less)
Tidal Wetland	500 square feet
Tidal Submerged Aquatic Vegetation (SAV)	25 square feet
Mudflat	1,000 square feet
Intertidal	1,000 square feet

B. Additional PCN Requirement (Federal Projects): A PCN is required for any proposed activities that would involve the temporary or permanent occupation of, or alteration of, a federal project (including, but not limited to, a levee, dike, floodwall, channel, anchorage, breakwater, seawall, bulkhead, jetty, wharf, pier, or other work built or maintained but not necessarily owned by the United States). This includes all structures and work in, over, or under a Corps' federal navigation project (FNP) or in the FNP's buffer zone. The buffer zone is an area that extends from the horizontal limits of the FNP to a distance three times the FNP's authorized depth.

The activity may also require review and approval by the Corps pursuant to 33 USC 408 (Section 408 Permission). The applicant may reach out to the points of contact listed here: https://www.nae.usace.army.mil/Missions/Section-408/ and https://www.nan.usace.army.mil/Missions/Regulatory/Section-408/ (for activities located within the Lake Champlain watershed) and consult the National Channel Framework mapper: https://experience.arcgis.com/experience/b413139f18c046009ebcf62abea941dd/page/Map/. For activities which require a Section 408 permission, verification under an NWP will not be issued prior to the decision the Section 408 permission requires. Any structure or work constructed in an FNP, or its buffer zone shall be subject to removal at the owner's expense prior to any future Corps dredging or hydrographic surveys.

Applicants should contact the Corps Real Estate Division (https://www.nae.usace.army.mil/Missions/Real-Estate-Division/) at (978) 318-8585 for work that would occur on or would potentially affect a Corps property (or properties) and/or Corps-controlled easements. Work may not commence on Corps properties and/or Corps-controlled easements until they have received any required

Corps real estate documents demonstrating site-specific permission to perform work.

A PCN is not required if an applicant has previously obtained a Section 408 permission for their proposed activities, or a determination from the Corps that a Section 408 permission is not required for their proposed activities, and the proposed activities qualify for a non-notifying NWP.

C. Additional PCN Requirement (Wild and Scenic Rivers): A PCN is required under NWP GC 16, Wild and Scenic Rivers, and for: 1) any proposed activities that would be located in and within 1/4-mile up- or downstream of a Wild and Scenic River (WSR) segment, or in tributaries within 1/4-mile of a WSR segment; 2) any proposed activities that would be located in wetlands within 1/4-mile of a WSR segment; and 3) any proposed activities that have the potential to alter free-flowing characteristics in a WSR segment. Applicants should utilize http://www.rivers.gov/ for the most up-to-date WSR designations.

Note: Applicants may coordinate with the Federal agency that has direct management responsibility of the WSR segment or tributary their proposed activity would be within 1/4-mile of prior to submitting a PCN to the Corps. This regional condition does not require a PCN to be submitted if that Federal agency determines that the proposed activity would not adversely affect the subject WSR.

D. Additional PCN Requirement (Temporary Fills): A PCN is required for any proposed activities that would involve the discharge of temporary fill (33 CFR 323.2(e) and (f)) greater than 1/10-acre to be left in place in non-tidal wetlands for more than one growing season. The growing season is generally defined as April 1 to September 30 (See the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region* for more information about determining growing season. https://www.nae.usace.army.mil/Missions/Regulatory/Jurisdiction-and-Wetlands/Wetland-Delineation-Manual/).

Note 1: The Corps will determine on a case-by-case basis, after evaluating site-specific and activity-specific circumstances whether temporary construction mats proposed for use are considered as temporary fill.

Note 2: For linear projects, crossing a single waterbody more than one time at separate and distant locations, or multiple waterbodies at separate and distant locations, each crossing is considered a single and complete project for purposes of NWP authorization (33 CFR 330.2(i)). Therefore, each crossing of a water of the U.S., including wetlands could have up to 1/10-acre of temporary fill without requiring the submittal of a PCN. *Applicants should be aware that the definition of what constitutes a single and complete project per state regulations may differ from the Corps' definition. Applicants should consult with the state in order to determine state requirements. *

E. Additional PCN Requirement (Slip Lining): A PCN is required for any proposed activity that involves slip lining a stream crossing that is not currently meeting the stream crossing BMPs found in Regional Condition F (e.g., slip lining and invert-lining).

F. Additional PCN Requirement (Stream Crossing Standards): A PCN is required for any proposed stream crossing activities that cannot comply with the below "Stream Crossing Best Management Practices (BMPs)" unless the district engineer provides the applicant written verification removing the below requirements.

1. The width of the crossing shall be greater than or equal to 1.2 times the bank full width.
2. The crossing shall be embedded greater than or equal to 2 feet and/or at least 25 percent of the conveyance's height.
3. The crossing shall be constructed with a natural bottom substrate, as applicable.
4. The crossing shall match the gradient (i.e., slope) of the natural stream channel profile.
5. The crossing shall meet an openness ratio of greater than 0.82 feet.

Regardless of whether a proposed crossing can implement the above BMPs, the applicant should first coordinate with the appropriate state office to obtain required or recommended alternate stream crossing BMPs, prior to submitting a PCN to the Corps. If a stream crossing is designed to meet the standards required or recommended by the appropriate state agency for which the proposed activity is located within, those standards can serve in-lieu of these BMPs and submittal of a PCN is not required.

Note: Below are links to the stream crossing standards/guidelines for those New England states that have published such standards/guidelines. Applicants are highly encouraged to contact their state for additional information regarding those requirements and/or recommendations, as state requirements may be more stringent than the above listed BMPs.

Connecticut: CTDEEP Inland Fisheries Division Habitat Conservation and Enhancement Program's Stream Crossing Guidelines (https://portal.ct.gov/-/media/DEEP/fishing/restoration/StreamCrossingGuidelinespdf.pdf)

Maine: Maine Interagency Stream Crossing Guidelines: (https://www.nae.usace.army.mil/Missions/Regulatory/State-General-Permits/Maine-General-Permit/) and CoastWise (https://www.maine.gov/dmr/sites/maine.gov.dmr/files/inline-files/CoastWiseManualJuly2023_updated.pdf)

Massachusetts: Massachusetts River and Stream Crossing Standards as implemented through 314 CMR 9.06(2)(b).

(https://www.mass.gov/doc/massachusetts-river-and-stream-crossing-standards/download)

New Hampshire: New Hampshire RSA 482-A (https://www.gc.nh.gov/rsa/html/L/482-A/482-A-mrg.htm)

Rhode Island: Regardless of whether a proposed crossing can meet the above BMP's, all wetland and watercourse crossings in Rhode Island are evaluated on a site-by-site basis that account for on-site environmental characteristics by the state. For freshwater crossings, please contact them using the following link: https://dem.ri.gov/environmental-protection-bureau/customer-and-technical-assistance/pre-application-meetings. If a proposed crossing is within the coastal zone and under the jurisdiction of CRMC, please contact them using the following link: https://www.crmc.ri.gov/contact.html.

Vermont: *Vermont Stream Alteration Rule and General Permit* available at https://dec.vermont.gov/watershed/rivers/river-management#rules.

G. Aquaculture: Applicants proposing new aquaculture operations or modifications of existing aquaculture operations are required to coordinate with the appropriate U.S. Coast Guard (USCG) Sector for siting review, Navigation Risk Assessment (NRA), and navigation risk mitigation needs.

1. Coordination with the USCG can be completed by contacting via email:

   Sector Northern New England: (Maine, New Hampshire, Vermont, and Northeastern New York, Lake Champlain) D01-SMB-SecNNE-Waterways@uscg.mil

   Sector Boston: (New Hampshire border southward to Plymouth, Massachusetts) D01-SMB-SECBOSWaterways@uscg.mil

   Sector Southeastern New England: (Rhode Island and Southeastern Massachusetts, Cape Cod, and Islands) SENEWWM@uscg.mil

   Sector Long Island Sound: (New York to Connecticut border at Port Chester, Connecticut to Rhode Island border at Watch Hill) SECLISSPWMarineEvent@uscg.mil

   Sector New York: (Sandy Hook, New Jersey north through Port of New York/New Jersey, Hudson River to Whitehall, NY (south of Lake Champlain) D01-SMB-SecNY-Waterways@uscg.mil

   The applicant shall provide the following information to facilitate completion of the NRA: applicant name/company affiliation, license/lease type (commercial, research, shellfish, kelp, new or modified), nautical chart, detailed drawing with

dimensions, time of year, potential lighting/marking, types/materials of structures in water, planned anchoring, cultivation techniques (number of weekly/monthly visits, vessel tending/type), and any other significant information.

If the applicant receives a medium or high-risk assessment, they shall coordinate with the Corps and apply safety risk mitigations. The USCG will refer the project to the Corps unless the Corps makes the determination that it may proceed.

Any safety lights and signals prescribed by the USCG, through regulations or otherwise, must be installed and maintained at the permittee's expense. For required permitting, the applicant shall contact USCG First District Private Aid Program Manager through D01-SMB-D01PrivateAtoN@uscg.mil. Only actual AtoNs are permitted; floats, balls, markers, mooring balls and 'highflier flags' are not considered Aids to Navigation (AtoN). See: http://www.usharbormaster.com.

Applicants shall notify NOAA's National Ocean Service (NOS) Nautical Data Branch Office of Coast Survey to initiate chart and Coast Pilot corrections. See: https://nauticalcharts.noaa.gov/. Applicants must also notify NOAA on removal. See Note 2.

2. For marine safety information during construction or other significant periods, applicants may use the First District's Marine Safety Information form and email to: D01-SMB-LNM@uscg.mil.

Note 1: If a PCN is required, applicants shall include documentation of all required coordination with their PCN.

Note 2: For nautical chart and coast pilot updates, activities owners should use the status report form at https://nauticalcharts.noaa.gov/charts/docs/charts-updates/USACE+Permit+Status+Report.pdf. For aquaculture activities owners should use: https://nauticalcharts.noaa.gov/charts/docs/charts-updates/Artificial+Reef+Aquaculture+Status+Report.pdf to notify the Office of Coast Survey of the project completion. The form should be emailed to ocs.ndb@noaa.gov and should include a copy of as-built drawings.

H. Hydrology: Permanent wetland crossings shall be constructed in such a manner as to prevent excessive ponding or drying on either side of the authorized crossing after completion of the work. Measures shall be taken to maintain the existing hydrology. Such measures may include road cross drains such as culverts that are appropriately sized and placed at intervals to maintain the existing hydrology of the contiguous wetland.

I. Compensatory Mitigation: In addition to the requirements of NWP GC 23, Mitigation, compensatory mitigation requirements for unavoidable impacts to waters of the U.S. will be evaluated in accordance with the latest version of the *New England District Compensatory Mitigation Standard Operating Procedures* (https://www.nae.usace.army.mil/Missions/Regulatory/Mitigation/).

J. Essential Fish Habitat: Essential Fish Habitat (EFH) is defined as those waters and substrates necessary to fish for spawning, breeding, feeding or growth to maturity (16 U.S.C. 1802).

The following NWPs have been determined to result in no more than minimal adverse effects, provided the permittee complies with all terms and conditions of the NWP as applicable to the activity, including all activity thresholds and activity-specific Conservation Recommendations (CRs) identified in the current EFH and Fish and Wildlife Coordination Act (FWCA) Programmatic Consultation (https://www.nae.usace.army.mil/Missions/Regulatory/Essential-Fish-Habitat/). The National Marine Fisheries Service (NMFS) has granted General Concurrence (50 CFR 600.920(g)) for the below listed NWPs, and these activities do not require activity-specific EFH consultation.

Nationwide Permit	Authorized Activities with General Concurrence
NWPs: 1, 4, 5, 6, 9, 10, 11, 15, 16, 19, 20, 27, 28, 32, 35, & 41	All authorized activities
NWP 3	Parts (a) and (c) (i.e., non-notifying)
NWP 12	Section 404 only activities that do not result in the loss of greater than 1/10-acre and is not a new pipeline greater than 250 miles (i.e., non-notifying)
NWP 13	Activities less than 500 linear feet in length with a discharge of less than one (1) cubic yard per running foot below the ordinary high water mark or high tide line, and no discharges into special aquatic sites (i.e., non-notifying)
NWP 14	Activities less than 1/10-acre with no discharges into special aquatic sites (i.e., non-notifying)
NWP 18	Activities that discharge less than ten (10) cubic yards of fill material below the plane of the ordinary high water mark or high tide line with no discharges into special aquatic sites (i.e., non-notifying)
NWP 22	Activities associated with vessels that are not listed or eligible for listing on the National Register of Historic Places and not located within special aquatic sites (i.e., non-notifying)
NWP 23	Activities not identified as notifying within Regulatory Guidance Letter 05-07 (i.e., non-notifying)
NWP 33	Section 404 only activities (i.e., non-notifying)
NWP 36	Activities that discharge less than 50 cubic yards of fill material and are less than 20 feet wide (i.e., non-notifying)

NWP 43	Activities that do not involve the expansion or construction of a new stormwater management facility (i.e., non-notifying)
NWP 48	Activities that are not the installation of a new operation and do not directly affect greater than 1/2-acre of submerged aquatic vegetation (i.e., non-notifying)
NWPs: 51 & 60	Activities that do not result in the loss of greater than 1/10-acre (i.e., non-notifying)
NWP 54	Maintenance activities (i.e., non-notifying)
NWPs: 57 & 58	Section 404 only activities that do not result in the loss of greater than 1/10-acre (i.e., non-notifying)

For non-federal applicants whose proposed activities would be located within EFH and that do not require a PCN per the language of the NWP or per any other general or regional condition (i.e., non-notifying), the applicant shall review the current EFH and FWCA Programmatic Consultation (https://www.nae.usace.army.mil/Missions/Regulatory/Essential-Fish-Habitat/) to ensure their proposed activity complies with all applicable CRs.

1. A PCN is required for any proposed project that would exceed the activity thresholds that are included within the current EFH and FWCA Programmatic Consultation. Any proposed project that exceeds an activity threshold requires preliminary coordination/project-specific consultation.

2. For all activities that do not exceed the activity-based thresholds included within the current EFH and FWCA Programmatic Consultation, the project proponent shall implement the activity-specific applicable CRs. If the applicable CRs cannot be implemented, a PCN must be submitted to the Corps, and work may not commence until the Corps verifies the project under the applicable NWP(s).

Federal applicants should follow their own procedures for compliance with the Magnuson-Stevens Fishery Conservation and Management Act and Fish and Wildlife Coordination Act.

Note 1: For activities proposed for authorization by an NWP that requires the submittal of a PCN, applicants are encouraged to review the current EFH and FWCA Programmatic Consultation and design their proposed activities with the activity-based thresholds and incorporate applicable CRs.

Note 2: Applicants can utilize the NMFS EFH mapper to determine if their proposed activities are located within EFH: https://www.habitat.noaa.gov/apps/efhmapper/. Applicants can also utilize the current EFH and FWCA Programmatic Consultation (https://www.nae.usace.army.mil/Missions/Regulatory/Essential-Fish-Habitat/) for guidance on non-tidal waterbodies with diadromous fish.

K. Invasive Species: The introduction, spread, or the increased risk of invasion of invasive plant or animal species on the project site, into new or disturbed areas, or into areas adjacent to the project site caused by the site work shall be avoided. Native, non-invasive vegetation must be used unless otherwise authorized by the Corps, and shall not contain any species listed in Appendix K ("Invasive and Other Unacceptable Plant Species") of the current *New England District Compensatory Mitigation Standard Operating Procedures* located at: https://www.nae.usace.army.mil/Missions/Regulatory/Mitigation/. Equipment shall be thoroughly cleaned before and after project construction to prevent the spread of invasive species. This includes, but is not limited to, tire treads and construction mats. Information about how to avoid the spread of invasive species can be found at: https://www.nae.usace.army.mil/Missions/Regulatory/Invasive-Species.

L. NWP Documentation On-Site: The permittee shall ensure that a copy of their verification letter (for notifying NWPs only) and applicable NWP with all applicable GCs and RCs are at the worksite whenever work is being performed, and that all personnel performing work are fully aware of its terms and conditions.

M. Abandonment: If the permittee decides to abandon the activity authorized by an NWP, unless such abandonment is merely the transfer of property to another party, the permittee may be required to restore the area to the satisfaction of the Corps.

State-Specific Regional Conditions

The following RCs apply to all applicable NWPs in the **State of Connecticut**:

N. Regional Condition N is reserved for the state of Connecticut.

The following RCs apply to all applicable NWPs in the **State of Maine**:

O. Regional Condition O is reserved for the state of Maine.
P. Regional Condition P is reserved for the state of Maine.
Q. Regional Condition Q is reserved for the state of Maine.
R. Regional Condition R is reserved for the state of Maine.

The following RCs apply to all applicable NWPs in the **Commonwealth of Massachusetts**:

S. Additional PCN Requirement (Time-of-Year Windows and Restrictions): A PCN is required for any proposed activity located in waters of the U.S. (excluding wetlands) that does not comply with the following time-of-year (TOY) restrictions, unless the Massachusetts Division of Marine Fisheries (MA DMF) provides alternate TOY restrictions. The TOY restrictions stated in Appendix B of the MA DMF Technical Report TR-47* can apply instead if they are provided for a specific waterbody where the activity is proposed. Additionally, if MA DMF provides project-specific TOY restrictions those may also apply in lieu of the TOY restrictions listed below.

	TOY Work Restriction	TOY Work Window
Non-Tidal Waters	October 1 to June 30	July 1 to September 30
Tidal Waters and Diadromous Fish Migratory Habitat**	January 15 to November 15	November 16 to January 14

*Massachusetts Department of Marine Fisheries (MA DMF) Technical Report, TR-47, available at: https://www.nae.usace.army.mil/Missions/Regulatory/State-General-Permits/Massachusetts-General-Permit/

**Information regarding diadromous fish migratory habitat can be obtained from the following GIS website maintained by the Commonwealth of Massachusetts: https://www.mass.gov/info-details/massgis-data-diadromous-fish.

For proposed activities that require a PCN, applicants should first coordinate with the MA DMF to obtain TOY windows and/or restrictions for their activity. Applicants should include documentation of this coordination when submitting their PCN.

Any proposed activity located in waters of the U.S. (excluding wetlands) shall be completed entirely "in-the-dry" or be isolated from active flows/the water column using temporary measures (i.e., cofferdams, sandbags, flume pipes, etc.) to the maximum extent practicable. The term "in-the-dry" means work that is done under dry conditions, e.g., work behind cofferdams or when the stream or tide is waterward of the work.

T. Underwater Archaeological Resources: Under Massachusetts General Law Ch. 6, s.'s 179-180, and Ch. 91, s. 63, the Board of Underwater Archaeological Resources (BUAR) has statutory jurisdiction within state waters and is the sole trustee of the Commonwealth's underwater heritage, charged within the responsibility of encouraging the discovery and reporting, as well as the preservation and protection of underwater archaeological resources. Underwater archaeological resources located within the waters of the Commonwealth of Massachusetts are property of the Commonwealth, which holds title to these resources and retains regulatory authority over their use. Under Massachusetts General Law, no person, organization or corporation may "remove, displace, damage, or destroy" any underwater archaeological resources located within the Commonwealth's submerged lands except through consultation with the BUAR and in conformity with the permits it issues. https://www.mass.gov/orgs/board-of-underwater-archaeological-resources.

The following RCs apply to all applicable NWPs in the **State of New Hampshire**:

U. Regional Condition U is reserved for the state of New Hampshire.

The following Regional Conditions apply to all applicable NWPs in the **State of Rhode Island**:

V. Regional Condition V is reserved for the state of Rhode Island.

The following Regional Conditions apply to all applicable NWPs in the **State of Vermont**:

W. Regional Condition W is reserved for the state of Vermont.
X. Regional Condition X is reserved for the state of Vermont.

General Permit No.: NAE-2022-02649 Final Effective Date: June 2, 2023
Applicant: General Public, Commonwealth of Massachusetts Expiration Date: June 1, 2028

Department of the Army
General Permits for the Commonwealth of Massachusetts

The New England District of the U.S. Army Corps of Engineers (USACE) hereby issues twenty-five (25) regional general permits (GPs) for activities subject to USACE jurisdiction in waters of the U.S., including wetlands, navigable waters within the Commonwealth of Massachusetts and adjacent ocean waters to the seaward limit of the outer continental shelf. The Massachusetts GPs (hereafter referred to as the MA GP or GP) are issued in accordance with USACE regulations at 33 CFR 320 – 332 [see 33 CFR 325.5(c)(1)]. These GPs establish criteria and contain permit conditions to ensure that the authorized activities have no more than minimal individual and cumulative adverse impacts to the environment.

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In issuing these GPs, the Federal Government does not assume any liability for the following: (a) damages to the permitted project or uses thereof as a result of other permitted or unpermitted activities or from natural causes; (b) damages to the permitted project or uses thereof as a result of current or future activities undertaken by or on behalf of the U.S. in the public interest; (c) damages to persons, property or to other permitted or unpermitted activities or structures caused by the activity authorized by any of the GPs; (d) design or construction deficiencies associated with the permitted work; or (e) damage claims associated with any future modification, suspension or revocation of these permits.

Tammy R. Turley 02 June 2023

Tammy R. Turley Date
Chief, Regulatory Division

SECTION I. STATUTORY AUTHORITES & REGULATED ACTIVITIES

1. Work Requiring USACE Authorization

a. Section 10: Work and structures that are located in, over, under or that affect navigable waters of the United States (U.S.) (see 33 CFR 329). The USACE regulates these activities under section 10 of the Rivers and Harbors Act of 1899 (see 33 CFR 322).

b. Section 404: The discharge of dredged or fill material into waters of the U.S (see 33 CFR 328). The USACE regulates these activities under Section 404 of the Clean Water Act (CWA). The term "discharge of dredged or fill material" also includes certain discharges resulting from excavation. Applicants should contact USACE to determine if a particular excavation discharge occurring within waters of the U.S., is a regulated activity. See 33 CFR 323.4 of the CWA for exempted activities.

For additional information on the limits of USACE jurisdiction, please see: https://www.nae.usace.army.mil/Portals/74/docs/regulatory/JurisdictionalLimits/Jurisdictional_Limits_Brochure.pdf

2. Authority to Issue General Permits

a. In accordance with 33 CFR 322.2(f), 325.2(e)(2), and 325.5(c), USACE may issue regional general permits authorizing activities under Section 10 of the RHA.

b. In accordance with Section 404(e) of the CWA, 33 USC 1344(e), and 33 CFR 323.2(h), 325.2(e)(2), and 325.5(c), after notice and opportunity for public hearing, USACE may issue regional general permits for any category of activities involving discharges of dredged or fill material if the activities in such category are similar in nature, will cause only minimal adverse environmental effects when performed separately, and will only have minimal cumulative adverse effect on the environment.

3. Related Laws

33 CFR 320.3 includes a list of related laws including, but not limited to, Section 408 of the Rivers and Harbors Act of 1899, Section 401 of the Clean Water Act, Section 402 of the Clean Water Act, Section 307(c) of the Coastal Zone Management Act of 1972, Section 106 of the National Historic Preservation Act of 1966, Section 7 of the Endangered Species Act, the Fish and Wildlife Coordination Act of 1956, the Magnuson-Stevens Fishery Conservation and Management Act, the Fish and Wildlife Coordination Act, Section 302 of the Marine Protection, Research and Sanctuaries Act of 1972, Section 7(a) of the Wild and Scenic Rivers Act, the Golden Eagle Protection Act, and the Migratory Bird Treaty Act.

SECTION II. REVIEW CATEGORIES & APPLICATION PROCEDURES

To qualify under these GPs, the design, construction, and maintenance associated with each proposed activity must meet the terms and eligibility criteria listed in Section III, all applicable general conditions (GCs) in Section IV, and any specific mitigation requirements in Section V. Applicants should first review the GPs to see if a project is eligible for authorization under one or more of the GPs within this document. Any activity not specifically listed may still be eligible for authorization under these GPs; applicants are advised to contact USACE for specific eligibility determination.

Please note that these GPs allow for Self-Verification (SV) contingent upon meeting all criteria and with full adherence to all GCs. Projects that do not qualify for SV, may meet criteria for Pre-Constriction Notification (PCN). Tables are provided under each activity, which outline criteria for SV and PCN. Activities that do not meet criteria for SV or PCN may require review as an Individual Permit (IP). Activities may require a PCN or IP as noted in Sections III and/or IV of this GP. Notwithstanding compliance with the terms of these GPs, USACE retains discretionary authority to require either PCN review or IP review on a case-by-case basis for any project based on concerns for the environment or for any of the other public interest factors found in 33 CFR 320.4(a). These GPs also do not replace or change those activities identified as exempt from USACE regulation (33 CFR 323.4).

1. Pre-Application Assistance

Prospective applicants may request a pre-application meeting to address any questions they may have. USACE may also request a pre-application meeting or additional information to facilitate review of the request. Pre-application meetings and/or site visits help streamline the authorization process by alerting the prospective applicant to potentially time-consuming factors that may arise during the evaluation of their project (e.g., avoidance, minimization and compensatory mitigation requirements, historic properties, endangered species, essential fish habitat, impacts to federal projects, and/or dredging of contaminated sediments).

To schedule a pre-application meeting, present questions, or if you need further assistance, please contact USACE at:

Email: cenae-r-ma@usace.army.mil (strongly preferred) Phone: (978) 318-8338

Mail: U.S. Army Corps of Engineers
New England District
Regulatory Division, Massachusetts Section
696 Virginia Road
Concord, MA 01742

2. Submitting a Request

Please follow the procedures outlined in Sections II.2-5 when requesting an SV or applying for PCN authorization for activities covered by these GPs. The GPs are provided in Section III below. For SV-eligible projects, the Self-Verification Notification (SVN) must be submitted within 30 days of commencing work. Otherwise, a Pre-Construction Notification (PCN) must be submitted for work that is not SV-eligible. Please include appropriate drawings and attachments and submit your request using the mailbox identified in Section II.4 or II.5 below. USACE will promptly confirm receipt of your request and notify you in the event additional information is required. Guidance on

how to submit electronic correspondence is located on the NAE Regulatory website here: https://www.nae.usace.army.mil/Missions/Regulatory/Submitting-Electronic-Correspondence.

3. Local, State & Federal Approvals

Applicants are responsible for applying for and obtaining any required local, state, and federal permits or approvals. These must be obtained prior to the commencement of work in waters. Such authorizations may include a Water Quality Certification, a Coastal Zone Management Act consistency determination, and other approvals as noted below. Authorization under these GPs does not obviate the need for the permittee to obtain other Federal, State, or local permits, approvals, or authorizations required by law.

I. Water Quality Certification under Section 401 of the Federal Clean Water Act (33 USC 1341).
Applicants are responsible for determining the appropriate 401 Water quality Certification (WQC) requirements and submitting this information to the USACE at the time of their PCN application or when completing their SVN. Applicants that are unsure of whether their activity has been certified should contact MassDEP, or EPA Region 1 when the activity is located on tribal lands, for a determination. The 401 WQC requirement must be satisfied by acquiring one of the following WQCs from MassDEP (see GC 8):

General 401 WQC: The MassDEP issued a WQC on April 21, 2023 conditionally certifies all activities in GPs 1 – 24 eligible for SV and PCN so long as the activity is described in 314 CMR 9.03, and is not an activity described in 314 CMR 9.04, and so long as the activity meets all other requirements, terms and conditions of this WQC. The MassDEP WQC also conditionally certifies activities described in GP 25 so long as the activity meets all other conditions of the WQC. Emergency projects described in GP 25 must obtain an emergency certification or otherwise be authorized pursuant to 310 CMR 10.06, qualify under a Severe Weather Emergency Declaration pursuant to 310 CMR 10.06(8) issued by the MassDEP, or meet the requirements of 9.12(2) or (3) in order to be certified under the WQC

Applicants should refer to the following link to determine if their activity is eligible: *https://www.nae.usace.army.mil/Missions/Regulatory/ State-General-Permits/ Massachusetts-General-Permit/*. If eligible, you must comply with all applicable WQC conditions. Activities listed in 314 CMR 9.03 that are not exempt from the Wetland Protection Act must have a valid Final Order of Conditions (OOC) or Final Restoration Order of Conditions pursuant to 310 CMR 10.00 to be eligible under the General 401 WQC.

Individual 401 WQC: In the event the proposed activity is not covered by the general WQC, applicants shall contact MassDEP and apply for an individual 401 WQC if their activity does not qualify for a General 401 WQC as outlined above. MassDEP may issue, waive, or deny the individual 401 WQC on a case-by-case basis. All activities listed in 314 CMR 9.04 must obtain an individual 401 WQC from MassDEP to be eligible under these GPs. When an Individual 401 WQC is required for *PCN activities*, the applicant shall submit their Individual 401 WQC application concurrently to MassDEP and the USACE to comply with 40 CFR 121.

Activities Proposed on Tribal Lands: When an activity is proposed on Tribal lands, the applicant shall refer to the general 401 WQCs granted by the Environmental Protection Agency (EPA), Region 1 on May 15, 2023. These 401 WQCs are located on the USACE Regulatory website: https://www.nae.usace.army.mil/Missions/Regulatory/State-General-Permits/Massachusetts-General-Permit/.

II. Coastal Zone Management Act Federal Consistency Concurrence pursuant to Section 307 of the CZMA of 1972, as amended. Federal consistency concurrence is required for all activities located within the coastal zone, unless determined otherwise by the Massachusetts Office of Coastal Zone Management (MA CZM) (see GC 9). As applicable, this requirement must be satisfied by acquiring one of the following from the MA CZM:

General CZM Federal Consistency Concurrence (General Concurrence): MA CZM has granted General Concurrence for all SV and PCN activities for GPs 1-25 and this can be found at: https://www.nae.usace.army.mil/Missions/Regulatory/State-General-Permits/Massachusetts-General-Permit/. The applicant must obtain all applicable permits and approvals prior to the commencement of work in USACE jurisdiction (i.e., construction begins on site). For SVs, General Concurrence is automatically granted and no further action is required from the applicant. For PCNs, the USACE will coordinate with MA CZM to acquire General Concurrence as part of the PCN application review. During review of the PCN application, USACE may request additional information from the applicant to support CZM's evaluation of the activity.

Individual CZM Federal Consistency Concurrence (Individual Concurrence): In certain cases, MA CZM may elevate any GP activity 1-25 to require Individual Concurrence. The applicant must contact MA CZM and follow the procedures to obtain Individual Concurrence as determined appropriate by MA CZM.

The MA CZM program includes five regional offices that serve 78 coastal municipalities. The following map provides more information about these offices: https://www.mass.gov/service-details/czm-regions-coastal-communities-and-coastal-zone-boundary

III. Other Approvals: Approvals typically required in Massachusetts include, but are not limited to, a Chapter 91 Permit/License, Massachusetts Environmental Protection Act (MEPA) review, Wetlands Protection Act Order of Conditions, and/or Aquaculture Certification. *Applicants should also be aware that USACE may not be able to render a permit decision in the event the proposed activity is denied by another local, state and/or federal agency.*

4. Procedures for Self-Verification (SV) Eligible Projects

If the activity is eligible for an SV, the Self-Verification Notification (SVN) must be completed prior to the start of project construction and submitted to USACE within 30 days of commencing work. The purpose of the SVN is to provide applicants with a tool to assist them when determining if the activity as proposed is SV-eligible. The following GPs do not require submission of the SVN: GP 1 (SV #1), GP 3 (SV #2-3), GP 4 (SV #2), GP 11, GP 12 (note #2), GP 14 (see note), GP 15 (see note), and GP 24 (SV #3). **For the activities not listed above, the SVN must be completed prior to the start of work and be kept on site at all times during project construction.** The applicant shall not begin work for SV-eligible activities until they have completely verified the bulleted items below.

Digital submittals by email are **strongly encouraged** to facilitate the most efficient processing of the SVN submittal. Please communicate with USACE staff if you are unable to provide a digital copy. Addresses are cenae-r-ma-sv@usace.army.mil (email) or Regulatory Division, U.S. Army Corps of Engineers, New England District, 696 Virginia Road, Concord, MA 01742-2751 (mail).

Eligible SV Activities:

- Are subject to USACE jurisdiction (see GC 2); and
- Qualify for one or more of the GPs within this document (Section III); and
- Meet the GCs within this document (Section IV); and

- When required, are supported by a complete SVN (Appendix C); and
- Receive all other required local, State, and/or Federal approvals.

5. Procedures for Pre-Construction Notification (PCN) Eligible Projects

For activities that require a PCN, an application to and written authorization from USACE is required. *No work requiring a PCN may proceed until the applicant receives written authorization from USACE verifying that the activity is authorized.* The verification letter may include special conditions that the applicant must comply with. When possible, it is *highly* recommended that PCN application materials are submitted at least 90 days before the target start date to allow for USACE evaluation and any necessary agency consultations. PCN applications shall demonstrate in writing how the proposed activity complies with all GCs, as applicable to their activity.

Digital submittals by email are **strongly encouraged** to facilitate the most efficient processing of the PCN application. Please communicate with USACE staff if you are unable to provide a digital copy. Addresses are cenae-r-ma@usace.army.mil or Regulatory Division, U.S. Army Corps of Engineers, New England District, 696 Virginia Road, Concord, MA 01742-2751 (mail).

Eligible PCN Activities:

- Are subject to USACE jurisdiction (see GC 2); and
- Qualify for one or more of the GPs within this document (Section III); and
- Meet the GCs within this document (Section IV); and
- Comply with the Mitigation Standards within this document (Section V); and
- Are supported by a complete PCN document (Appendix B); and
- When required, are supported by the submittal of project information to the appropriate parties identified in Appendix A; and
- Receive all other required local, State, and/or Federal approvals.

6. Interagency Review Procedures

The USACE reserves the opportunity to coordinate PCN activities with Federal and State agencies to ensure that the proposed activity results in no more than a minimal impact to the aquatic environment. In some cases, USACE may require project modifications involving avoidance, minimization, and/or compensatory mitigation for unavoidable impacts to ensure the net effects of a project are minimal. The USACE determines, after review and coordination with the agencies and/or the applicant, if PCN applications:

a. Meet the terms and conditions of the GP as proposed;
b. Require additional information;
c. Require avoidance, minimization, compensatory mitigation, construction sequencing, project modification, or other special conditions to avoid or minimize adverse impacts to the aquatic environment;
d. Require individual permit review regardless of whether the terms and GCs of these GPs are met, based on concerns for the aquatic environment or any other factor of the public interest (see Section 9 below).

For activities requiring a PCN, the applicant must wait for written authorization from USACE before commencing activities in waters of the U.S. Beginning work for PCN required activities without a USACE written authorization is a violation of these GPs, and the terms and conditions of this document. The applicant may be subjected to an enforcement action by USACE and/or the Environmental Protection Agency (EPA).

7. Construction of Solid Fill Structures and Fills Along the Coastline or Baseline from Which the Territorial Sea is Measured.

Projects involving the construction of solid fill structures or discharge of fill that may extend beyond the coastline or the baseline from which the territorial sea is measured (i.e., mean low water) will require a PCN. The USACE will submit a description of the proposed work and a copy of the plans to the Solicitor, Department of the Interior, Washington, DC 20240, and request comments concerning the effects of the proposed work on the outer continental rights of the United States. These comments will be included in the administrative record of the application. After completion of permit review, the record will be forwarded to the Chief of Engineers. The decision on the application will be made by the Secretary of the Army after coordination with the Attorney General.

8. Emergency Activities

Per 33 CFR 325.2(e)(4), an emergency is limited to a situation that would result in an unacceptable hazard to life, a significant loss of property, or an immediate, unforeseen, and significant economic hardship if corrective action requiring a permit is not undertaken within a time period less than the normal time needed to process an application under standard procedures. Emergency work shall be limited to that which is necessary to stabilize and secure the situation. Additional work needed for final repairs shall not be completed until approval is obtained through the appropriate, non-emergency process. Emergency work is subject to the same terms and conditions of these GPs as non-emergency work, and similarly, must qualify for authorization under these GPs; otherwise, an IP is required. *See GP 25 Emergency Situations for additional information.*

9. Individual Permit

Projects that do not meet the terms and conditions of this GP may require review as an IP (33 CFR 325.5 (b)). Proposed work in this category will require a separate Federal application for an individual permit from USACE (33 CFR 325.1). In addition, USACE retains discretionary authority on a case-by-case basis to elevate GP-eligible activities to an IP based on concerns for the environment or any other factor of the public interest (33 CFR 320.4 (a)). Applicants are required to submit the appropriate application materials directly to USACE as early as possible to expedite the permit review process. General information and application forms can be obtained at our website or by contacting our office at cenae-r-ma@usace.army.mil or (978) 318-8338. Individual 401 WQC and/or CZMA Federal consistency concurrence from the appropriate MA agencies are required before USACE can issue an individual permit. Applying for an IP does not relieve the applicant from their obligation to obtain all required Federal, State and/or local approvals.

10. Compliance

Applicants shall ensure compliance with all applicable GPs in Section III, GCs in Section IV, and any special conditions included in USACE verification letters. Noncompliance with these GPs, GCs, and special conditions may subject the applicant to criminal, civil, or administrative penalties, and/or an ordered restoration, and/or the permit may be modified, suspended or revoked by USACE. The USACE will consider any activity requiring USACE authorization to be noncompliant if that activity does not comply with all GP terms and conditions at all times, including while the project is under construction and when work is completed.

SECTION III. MASSACHUSETTS GENERAL PERMITS

Applicants are encouraged to review Sections I & II prior to submitting an application to confirm that the activity as proposed complies with all terms and conditions of the 2023 MA GPs. Applicants are also encouraged to review the definitions in Section VII, Definitions & Acronyms, of this document. Several terms are frequently used throughout the GPs, and it is important for the reader to understand these terms. If seeking verification for an activity previously verified under the 2018 MA GPs, please contact the USACE to discuss permitting needs in advance of submitting an application.

General Permits

1. Aids to Navigation and Temporary Recreational Structures
2. Maintenance
3. Moorings
4. Structures in Navigable Waters of the U.S.
5. Boat Ramps and Marine Railways
6. Utility Lines, Oil or Natural Gas Pipelines, Outfall Or Intake Structures, and Appurtenant Features
7. Dredging, Disposal of Dredged Material, Beach Nourishment, Rock Removal and Rock Relocation
8. U.S. Coast Guard Approved Bridges
9. Bank and Shoreline Stabilization
10. Aquatic Habitat Restoration, Enhancement, and Establishment Activities
11. Fish and Wildlife Harvesting and Attraction Devices and Activities
12. Response Operations, Oil and Hazardous Substances
13. Cleanup of Hazardous and Toxic Waste
14. Scientific Measurement Devices
15. Survey Activities
16. Land and Water-Based Renewable Energy Generation Facilities and Hydropower Projects
17. Residential, Commercial and Institutional Developments, and Recreational Facilities
18. Aquaculture
19. Mining Activities
20. Living Shorelines
21. Agricultural Activities
22. Reshaping Existing Drainage Ditches, Construction of New Ditches, and Mosquito Management
23. Linear Transportation Projects and Wetland/Stream Crossings
24. Temporary Construction, Access, and Dewatering
25. Emergency Situations

GP 1. AIDS TO NAVIGATION AND TEMPORARY RECREATIONAL STRUCTURES (Authority: §10)	
(a) The placement of aids to navigation and regulatory markers that are approved by and installed in accordance with the requirements of the U.S. Coast Guard (USCG). See 33 CFR, Part 66; and (b) Temporary buoys, markers, and similar structures placed for recreational use during specific events such as water skiing competitions and boat races or seasonal use. See GC 16.	
Self-Verification Eligible	**Pre-Construction Notification Required**
1. Aids to navigation and regulatory markers approved by and installed in accordance with the requirements of the USCG. 2. Temporary buoys, markers and similar structures that are: (a) placed for recreational use during specific events and removed within 30 days after event; or (b) placed during winter events on ice and removed before spring thaw. These structures must be authorized by the local harbormaster, not located within an FNP or its buffer zone, and not located in saltmarsh or tidal vegetated shallows.	1. Impacts in saltmarsh or tidal vegetated shallows. 2. Activities that are not SV eligible.
Note: An SVN submittal to USACE is not required for work authorized under SV #1 above.	

GP 2. MAINTENANCE (Authorities: §10 and §404)

Repair, rehabilitation, or replacement of any previously authorized[1], currently serviceable structure, or fill, or of any currently serviceable structure or fill authorized by 33 CFR 330.3 (activities occurring before certain dates), provided that the structure or fill is not to be put to uses differing from those uses specified or contemplated for it in the original permit or the most recently authorized modification. Minor deviations in the structure's configuration or filled area, including those due to changes in materials, construction technique requirements of other regulatory agencies, or current construction codes or safety standards that are necessary to make the repair, rehabilitation, or replacement are authorized. This GP also authorizes temporary structures, fills, and work, including the use of temporary mats, necessary to conduct the activities above. Maintenance dredging and beach nourishment are not eligible under GP 2 (see GP 7). Stream crossing modifications (including sliplining), replacements or extensions are not eligible under GP 2 (see GPs 6, 17, 23). *See GP 25 Emergency Situations for expedited review of emergency activities.*

Not authorized under GP 2 (IP required): (a) Permanent impacts in >1 acre in non-tidal waters and/or wetlands; or (b) Permanent impacts >1/2 acre in tidal waters; >1000 SF in saltmarsh, mud flats, riffle and pool complexes, or non-tidal vegetated shallows; or >100 SF in tidal vegetated shallows; or (c) Temporary impacts >1 acre in tidal waters; >5000 SF in saltmarsh, mud flats, riffle and pool complexes, or non-tidal vegetated shallows; or >1000 SF in vegetated shallows; (d) New stream channelization or stream relocation projects (e.g., those in response to storm or flood events).

Self-Verification Eligible

Maintenance activities that meet all of the following terms:

1. In non-tidal waters, the combined permanent and temporary impacts extending beyond the original footprint are ≤5,000 SF[2] and not located in vegetated shallows or riffle and pool complexes.

2. In tidal waters, the combined permanent and temporary impacts extending beyond the original footprint are ≤5,000 SF, ≤1,000 SF in mudflats and/or natural rocky habitat, and not located in saltmarsh and tidal vegetated shallows.

3. Minor deviations in the repair, rehabilitation, or replacement of previously authorized, currently serviceable structures or fills.

4. Bulkhead replacement in tidal and non-tidal waters via installation of new bulkhead within 18 inches of the existing bulkhead and associated backfill.

5. Drawdown of an impoundment for dam/levee repair provided it does not exceed 18 months and one growing season (April through September).

Pre-Construction Notification Required

1. Discharges associated with removal of accumulated sediments and debris in the vicinity of existing structures, including intake and outfall structures and associated canals.

2. The removal of sediment outside the immediate vicinity of existing structures (e.g., bridges, culverted road crossings, water intake structures, etc.) that is ≥200 linear feet. This activity is limited to the minimum necessary to restore the waterway in the vicinity of the structure to the approximate dimensions existing when the structure was built.

3. Dam and flood control or levee repair, rehabilitation, or replacement involves:
   a. A change in the flood elevation or permanent water surface elevation of the impoundment; or
   b. Drawdown of impoundment for construction exceeding one growing season (see SV eligible #5);
   c. Any modification that changes the character, scope, or size of the original fill design; or
   d. Does not meet SV eligible 1-7.

4. Installation of steel piles, including steel sheet piles, that cannot be done in the dry and where NOAA-ESA listed species are mapped as present.

[1] Some maintenance activities may not be subject to regulation under Section 404 of the CWA in accordance with 33 CFR 323.4(a)(2). Per 33 CFR 330.3, Vested dates are: a) Work performed and structures installed before December 18, 1968 (Section 10); and b) Fill placed before July 25, 1975 (Section 404).
[2] This excludes dam projects that may require a temporary drawdown with impacts >5,000 SF in non-tidal waters. Instead, the drawdown shall comply with SV #5 to be eligible under Self-Verification.

6. Any stream channel modification is limited to the minimum necessary for the repair, rehabilitation, or replacement of the structure or fill; such modifications, including the removal of material from the stream channel, must be immediately adjacent to the project or within the boundaries of the structure or fill. 7. Work to previously approved tide gates not affecting upstream tidal resource areas.	5. Activities located in the Connecticut River or Merrimack River, unless they are completed in the dry or when the tide is waterward of the work area. 6. Activities on USACE properties & USACE-controlled easements. 7. Activities that do not require an IP. Activities that do not require a PCN or an IP may be SV eligible.
Notes: 1. This authorizes the repair, rehabilitation, or replacement of any previously authorized structure or fill that does not qualify for the CWA §404(f) exemption for maintenance. See 33 CFR 323.4(a)(2). Prior USACE permits may have included authorization to maintain the activity, in which case authorization under this GP is not necessary. 2. See GC 22 for information on temporary construction mats.	

GP 3. MOORINGS (Authority: §10)

New moorings and mooring fields; the relocation of previously authorized moorings; expansions, boundary reconfigurations or modifications of previously authorized mooring fields; and maintenance and replacement of moorings.

Not authorized under GP 3 (IP required): (a) Moorings or mooring fields converted to or associated with a new boating facility[1]; or (b) Moorings in a USACE Federal Navigation Anchorage or USACE Federal Navigation Channel, except municipal-operated mooring fields.

Self-Verification Eligible	Pre-Construction Notification Required
1. New or relocated moorings that meet all the following terms: a. Authorized by a local harbormaster/ municipality under MGL Chapter 91 §10A; and b. No interference with navigation; and c. Single boat, single-point and non-commercial; and d. Not associated with a boating facility, and e. Neither placed within nor impact tidal vegetated shallows (e.g., eelgrass); and f. Not located within a USACE Federal navigation project (FNP) or the FNP buffer zone. 2. Existing, authorized moorings are converted from traditional moorings to low impact mooring technology (see note below) and/or helical anchors. 3. Maintenance and replacement of moorings authorized by the USACE.	1. New mooring fields; or expansions, boundary reconfigurations or modifications of existing, authorized mooring fields. 2. Moorings located such that they, and/or vessels docked or moored at them, are within the buffer zone of the horizontal limits of a Federal Anchorage. The buffer zone is equal to 3 times the authorized depth of that channel (see GC 15). 3. New individual moorings located in saltmarsh, mudflats, natural rocky habitat, and tidal vegetated shallows. Locating moorings these areas should be avoided to the maximum extent practicable. If these areas cannot be avoided, plans should show conservation mooring or low-impact mooring systems that prevent mooring chains from resting or dragging on the bottom substrate at all tides, where practicable. USACE may require a survey in areas previously mapped as containing eelgrass or within 100 ft. of existing eelgrass beds to document presence or absence of eelgrass and to determine the appropriate type and amount of compensatory mitigation for impacts to eelgrass. 4. Replacement moorings located in tidal vegetated shallows. 5. Moorings that are not SV eligible and do not require an IP.

Notes:

1. Low impact mooring systems, including conservation moorings, are encouraged to minimize impacts of chain scouring from conventional moorings during the tidal cycle.
2. An SVN submittal to USACE is not required for work authorized under SV #2-3 above.

[1] Boating facilities are marinas, yacht clubs, boat clubs, boat yards, dockominiums, town facilities, land/homeowner's associations, etc. that provide for a fee, rent or sell mooring or docking space. Not classified as boating facilities are municipal moorings or municipal mooring fields that charge an equitable user fee based only on the actual costs incurred.

GP 4. STRUCTURES IN NAVIGABLE WATERS OF THE U.S. (Authority: §10 & §404)

New, expansions, reconfigurations or modifications of structures for navigational access in waters of the U.S. including but not limited to temporary/seasonal or permanent pile and pole-supported piers, floats, stairs, shore outhauls, and boat and float lifts.

Not authorized under GP 4 (IP required): (a) Structures associated with a new boating facility; (b) Structures in a USACE Federal anchorage or channel; or (c) Artificial reefs.

Self-Verification Eligible

1. Private, non-commercial piers, floats and lifts that meet all the following terms:

a. Piers and floats in: (i) Tidal waters total ≤600 SF combined; and (ii) Non-tidal navigable waters of the U.S. total ≤600 SF combined; and

b. Piers are ≤4 feet wide and ≥6 feet above the marsh substrate (the height is measured from the marsh substrate to the bottom of the lowest longitudinal support); and

c. Floats and lifts in tidal waters and non-tidal navigable waters of the U.S. are ≥24 inches above the substrate during all tidal cycles. Float stops are preferred when site conditions warrant them (i.e., low tide exposes substrate), and skids can only be used in areas where piles are not feasible and on sandy or hard bottom substrates; and

d. Piers, floats and lifts: (i) Are ≥25 feet from previously mapped or existing vegetated shallows, or riparian property line extensions; (ii) Extend ≤25% of the waterway width in non-tidal navigable waters of the U.S. or MHW in tidal navigable waters of the U.S.

e. Installation of ≤12-inch diameter timber piles. Installation of ≥12-inch diameter piles of any material type when installed in the dry.

2. Fenders and similar structures.

Pre-Construction Notification Required

1. Shore outhauls.
2. Expansions, modifications, or new reconfiguration zones at any authorized boating facility.
3. New, expansions, reconfigurations, reconfiguration zones, or modifications of structures that provide public, community or government recreational uses such as boating, fishing, swimming, access, etc.
4. Installation of steel piles, including steel sheet piles, that cannot be done in the dry and where NOAA-ESA listed species are mapped as present.
5. Located within the buffer zone of the horizontal limits of an FNP (GC 15).
6. Miscellaneous structures.
7. Impacts in tidal vegetated shallows.
8. Structures that are not SV eligible and do not require an IP.

Notes:

1. See GC 19 regarding pile driving and pile removal in navigable waters and
2. See GC 20 regarding time of year restrictions in tidal waters.
3. Boating facilities are facilities that provide for a fee, rent, or sell mooring space, such as marinas, yacht clubs, boat clubs, boat yards, town facilities, dockominiums, etc. Pile supported structures with no discharges of dredged or fill material are not regulated by USACE in non-navigable waters.
4. A SVN submittal to USACE is not required for SV #2 above.

GP 5. BOAT RAMPS AND MARINE RAILWAYS (Authorities: §10 and §404)

Activities required for the construction of boat ramps and marine railways, including excavation and fill.

Not authorized under GP 5 (IP required): (a) Permanent impacts that are >1 acre in non-tidal waters of the U.S., >½ acre in tidal waters; >1000 SF in saltmarsh, mud flats, riffle and pool complexes, or non-tidal vegetated shallows; or >100 SF in tidal vegetated shallows; (b) Temporary impacts in tidal waters that are >1 acre; >5000 SF in saltmarsh, mud flats, or riffle and pool complexes; or >1000 SF in vegetated shallows[1]; or (c) dredging in navigable waters of the U.S. (see GP 7).

Self-Verification Eligible	Pre-Construction Notification Required
1. In non-tidal waters, the combined permanent and temporary impacts are (a) ≤5,000 SF, and (b) not located in riffle and pool complexes and non-tidal vegetated shallows.	1. Boat ramps are located within 25 feet of property line extensions unless the properties are owned by the same owner. The USACE may require a letter of no objection from the abutter(s).
2. In tidal waters, the combined permanent and temporary impacts are (a) ≤5,000 SF, (b) ≤1,000 SF in mudflats and/or natural rocky habitat, and (c), not located in saltmarsh and tidal vegetated shallows.	2. Activities that are not eligible for SV and do not require an IP.

GP 6. UTILITY LINES, OIL OR NATURAL GAS PIPELINES, OUTFALL OR INTAKE STRUCTURES, AND APPURTENANT FEATURES (Authorities: §10 & §404)

Activities required for: (a) The construction, maintenance, repair or removal of utility lines, oil or natural gas pipelines[1], outfall or intake structures[2], and appurtenant features including the associated excavation, backfill, or bedding for these structures. (b) The construction, maintenance, or expansion of substations and other appurtenant facilities associated with a utility line, oil or natural gas pipeline, and outfall or intake structure in non-tidal waters of the U.S.; and (c) The construction and maintenance of foundations for overhead utility line towers, poles, and anchors in tidal and non-tidal waters of the U.S., provided the foundations are the minimum size necessary and separate footings for each tower leg (rather than a larger single pad) are used where feasible. This GP authorizes the construction of access roads to facilitate construction of the above activities provided the activity, in combination with all other activities included in one single and complete project, does not exceed the thresholds identified below (IP required). Access roads used solely for construction of the utility line must be removed upon completion of the work. This GP also authorizes temporary structures, fills, and work, including the use of temporary mats, necessary to conduct the activities above.[3]

Not authorized under GP 6 (IP required): (a) Permanent impacts for any single and complete project that are >1 acre in non-tidal waters of the U.S.; >½ acre in tidal waters; >1000 SF in saltmarsh, mud flats, riffle and pool complexes, or non-tidal vegetated shallows; or >100 SF in tidal vegetated shallows; (b) Temporary impacts in tidal waters that are >1 acre; >5000 SF in saltmarsh, mud flats, or riffle and pool complexes; or >1000 SF in vegetated shallows; (c) Stormwater treatment or detention systems, or subsurface sewage disposal systems in waters of the U.S.; or (d) New tide gates that do not meet SV criteria below.

Self-Verification Eligible	Pre-Construction Notification Required
1. In non-tidal waters, the combined permanent and temporary impacts are (a) ≤5,000 SF, and (b) not located in riffle and pool complexes and non-tidal vegetated shallows.	1. New outfall and/or intake structures.
2. In tidal waters, the combined permanent and temporary impacts are (a) ≤5,000 SF, (b) ≤1,000 SF in mudflats and/or natural rocky habitat, and (c), not located in saltmarsh and tidal vegetated shallows.	2. Unconfined work or silt producing activities in streams with diadromous fish.
3. Intake structures that are dry hydrants used exclusively for firefighting activities with no stream impoundments.	3. Submarine cables, conduits, or pipelines that occur in, over or under navigable waters of the U.S.
4. New tide gates on outfall structures for pipes conveying stormwater and/or industrial NPDES-permitted discharges from waters that are not waters of the U.S.	4. Stream channelization, relocation, impoundment, or loss of streambed occurs.
	5. The activity is placed within and runs parallel to or along a streambed within waters of the U.S.
	6. There is a permanent change in preconstruction contours in waters of the U.S.
	7. Installation of utility lines or gas/oil pipelines using trench excavation where material is temporarily sidecast into waters of the U.S. for >3 months. Applicants must demonstrate how the material would not be dispersed by currents or other forces.
	8. Activities that are not SV eligible and do not require an IP.

[1] See the definitions of a “utility line” and “oil or natural gas pipeline” in Section VII.
[2] Outfall structures must be in compliance with regulations issued under the National Pollutant Discharge Elimination System Program (Section 402 of the Clean Water Act).
[3] Temporary impacts shall comply with all GCs, including GC 32 Utility Line Installation and Removal.

GP 7. DREDGING (Authority: §10), DISPOSAL OF DREDGED MATERIAL (Authorities: §10, §404), BEACH NOURISHMENT (Authorities: §10 & §404), ROCK REMOVAL (Authority: §10) AND ROCK RELOCATION (Authorities: §10 & §404)

New, improvement and maintenance dredging (see notes below) including: (a) Disposal of dredged material at a confined aquatic disposal cell, beach nourishment location, near shore site, or ocean disposal site selected under Section 404 of the Clean Water Act pursuant to the 404(b)(1) Guidelines, provided the dredged material meets the requirements for such disposal; (b) Beach nourishment not associated with dredging; and (c) Rock removal and relocation for navigation.

Not authorized under GP 7 (IP required): (a) Dredging where ocean disposal is required for the disposal of dredged material (Section 103); New dredging >½ acre; ≥10,000 CY; >1000 SF permanent impacts to intertidal areas, saltmarsh, mud flats, riffle and pool complexes, or non-tidal vegetated shallows; or >100 SF permanent impacts to tidal vegetated shallows; (b) Maintenance or improvement dredging and/or disposal with >1 acre of impacts to intertidal areas, saltmarsh, mudflats, riffle and pool complexes, or non-tidal vegetated shallows; (c) New dredging where the primary purpose is sand mining for beach nourishment; (d) Beach scraping; (e) Boulder removal and relocation for navigation >½ acre; or (f) Blasting.

Self-Verification Eligible

1. Maintenance dredging of previously dredged areas, with upland disposal, that meet all of the following terms:
   a. Dredged area ≤1/2 acre; and
   b. Activities comply with GC 20, TOY Restrictions. The time-of-year restriction(s) stated in Appendix B of the MA Division of Marine Fisheries (DMF) Technical Report TR-47[1] can apply instead if the general TOY restriction if a TOY is provided for a specific waterbody and is less restrictive. This is to protect endangered species, EFH, and other species; and
   c. The dredge footprint is located >25' from salt marsh or >100' from vegetated shallows; and
   d. Combined permanent and temporary impacts that are (i) ≤1,000 SF in mudflats or natural rocky habitat, or (ii) ≤5,000 SF within intertidal habitat and areas containing shellfish (an area contains shellfish unless: it is verified that minimal shellfish are present per the local shellfish constable or a shellfish survey; or it is not mapped as a MassGIS shellfish suitability area).
   e. No return water from upland disposal areas.

2. Boulder relocation with ≤1,000 SF of impacts, relocated to a similar depth and substrate.

Pre-Construction Notification Required

1. Maintenance dredging where the primary purpose is sand mining for beach nourishment.

2. New dredging and associated disposal ≤1/2 acre or <10,000 cubic yards.

3. Improvement dredging.

4. Beach nourishment in waters of the U.S. not associated with dredging.

5. Activities that are located in saltmarsh and tidal vegetated shallows.

6. Dredging in a Federal Navigation Project or within the buffer zone (see GC 15).

7. Activities that are not eligible for SV and do not require an IP.

Notes:

1. See Section VII for definitions of improvement and maintenance dredging.
2. For PCN activities, the USACE may waive or adjust the time of year requirement on a case-by-case basis after consultation with resource agencies.
3. Disposal site of any dredged material must be identified prior to obtaining USACE authorization.
4. Contact the USACE if a ten-year authorization to maintain an area is desired.

[1] The MA DMF Technical Report TR-47: https://www.nae.usace.army.mil/Missions/Regulatory/State-General-Permits/Massachusetts-General-Permit/

GP 8. U.S. COAST GUARD APPROVED BRIDGES (Authorities: §404)

Discharges of dredged or fill material incidental to the construction and modification of bridges across navigable waters of the U.S., including cofferdams, abutments, foundation seals, piers, and temporary construction and access fills provided that the USCG authorizes the construction of the bridge structure under Section 9 of the Rivers and Harbors Act of 1899 or other applicable laws. A USCG Authorization Act Exemption or a Surface Transportation and Uniform Relocation Assistance Act (STURRA) (144h) exemption do not constitute USCG authorization.

Not authorized under GP 8 (IP Required): Causeways and approach fills (see GP 23).

Self-Verification Eligible	**Pre-Construction Notification Required**
1. Discharges of dredged or fill material that are incidental to the construction of bridges across navigable waters and meet all of the following: a. Combined permanent and temporary impacts that are ≤5,000 SF. b. Combined permanent and temporary impacts that are ≤1,000 SF in mudflats and natural rocky habitat. c. Not located in saltmarsh and tidal vegetated shallows.	1. Activities on USACE properties & USACE controlled easements.2. Installation of steel piles, including steel sheet piles, that cannot be done in the dry and where NOAA-ESA listed species are mapped as present. 3. Activities that are not eligible for SV and do not require an IP.

Notes:

1. GP 8 is not applicable to bridges over inland waters or wetlands that are not tidally influenced or regulated as navigable under Section 10.
2. See eligibility criteria for GPs 2 & 23 for projects that are not subject to USCG regulations.

GP 9. BANK AND SHORELINE STABILIZATION (Authorities: §10 & §404)

Bank stabilization activities necessary for erosion protection along the banks of lakes, ponds, streams, estuarine and ocean waters, and any other open waters. Includes bulkheads, seawalls, riprap, revetments, living seawalls, or slope protection & similar structures, specifically for the purpose of shoreline protection. This GP also authorizes temporary structures, fills, and work, including the use of temporary mats, necessary to conduct the activities above.

Activities must meet the following criteria: (a) No material is placed in excess of the minimum needed for erosion protection; (b) No material is of a type, or is placed in any location, or in any manner, that will impair surface water flow into or out of any waters of the U.S.; (c) No material is placed in a manner that will be eroded by normal or expected high flows (properly anchored native trees and treetops may be used in low energy areas); (d) Native plants appropriate for current site conditions, including salinity, must be used for bioengineering or vegetative bank stabilization; (e) The activity is not a stream channelization activity; and (f) The activity must be properly maintained, which may require repairing it after severe storms or erosion events. This GP authorizes those maintenance and repair activities if they require authorization. This GP also authorizes temporary structures, fills, and work, including the use of temporary mats, necessary to construct the bank stabilization activity. See GP 20 for living shoreline stabilization structures or fills.

Not authorized under GP 9 (IP required): (a) New bank stabilization >500 feet in total length (>1,000 linear feet in total length when necessary to protect transportation infrastructure) or permanent loss of saltmarsh >1,000 SF, unless the District Engineer waives this criterion by making a written determination concluding that the discharge of dredged or fill material will result in no more than minimal adverse environmental effects (an exception is for bulkheads – the district engineer cannot issue a waiver for a new bulkhead that is >1,000 feet in length along the bank); (b) Stream channelization or relocation activities; or (c) Breakwaters, groins or jetties.

Self-Verification Eligible

1. Activities in tidal and non-tidal waters that are:
   a. <200 feet in length.
   b. <400 feet in length when necessary to protect transportation infrastructure.
   c. ≤1 cubic yard of fill per linear foot average along the bank waterward of the plane of OHW or HTL.
   d. Not located in non-tidal wetlands, saltmarsh, vegetated shallows.

Pre-Construction Notification Required

1. Activities in tidal and non-tidal waters that are:
   a. ≥200 feet to ≤500 feet in total length. Activities >500 feet in total length must have a written waiver from USACE.
   b. ≥400 feet to ≤1,000 feet in total length when necessary to protect transportation infrastructure. Activities >1,000 feet in total length must have a written waiver from USACE.
   c. >1 cubic yard of fill per linear foot average along the bank waterward of the plane of OHW or HTL.
   d. Located in non-tidal wetlands, saltmarsh, vegetated shallows.
2. Activities with permanent loss of tidal or non-tidal waters that is (a) ≥5,000 SF or (b) ≥1,000 SF in mudflats and natural rocky habitat.
3. Activities that are (a) located in the Connecticut River or Merrimack River and/or (b) require installation of steel piles/steel sheet piles that cannot be done in the dry where NOAA ESA-listed species are mapped as present.
4. Activities on USACE properties & USACE-controlled easements.
5. Activities that require grouted riprap and/or poured/unformed concrete.
6. Activities that are not eligible for SV and do not require an IP.

Note: The applicant shall comply with GC 24. This includes utilization of bioengineering techniques in lieu of hard armoring to the maximum extent practicable as site conditions allow.

GP 10. AQUATIC HABITAT RESTORATION, ENHANCEMENT, AND ESTABLISHMENT ACTIVITIES (Authorities: §10 and §404)

Activities for the restoration, enhancement and establishment of non-tidal and tidal wetlands and riparian areas, including invasive, non-native or nuisance species control; the restoration and enhancement of non-tidal streams and other non-tidal open waters; the relocation of non-tidal waters, including non-tidal streams & associated wetlands for reestablishment of a natural stream morphology and reconnection of the floodplain; the restoration and enhancement of shellfish, finfish and wildlife; and the rehabilitation or enhancement of tidal streams, tidal wetlands and tidal open waters; provided those activities result in net increases in aquatic resource functions and services. See GP 9 for bank and shoreline stabilization. See GP 20 for living shorelines.

Not authorized under GP 10 (IP required): Stream channelization activities and artificial reefs.

Self-Verification Eligible	**Pre-Construction Notification Required**
1. In tidal and non-tidal waters excluding tidal vegetated shallows, the combined permanent and temporary impacts are ≤5,000 SF. 2. Eelgrass (vegetated shallows) planting and transplanting ≤100 SF in tidal waters.	1. In tidal and non-tidal waters excluding tidal vegetated shallows, the combined permanent and temporary impacts are >5,000 SF. 2. Eelgrass (vegetated shallows) planting and transplanting >100 SF in tidal waters. 3. Permanent water impoundments, dam removal, fish ladders, or tide gates. 4. Stream relocation, impoundment, or loss of streambed occurs. 5. Runneling projects with the purpose of restoring saltmarsh by removing excess water that ponds on the saltmarsh surface. 6. The conversion of: (a) a stream or natural wetlands to another aquatic habitat type (e.g., stream to wetland or vice versa, wetland to pond, etc.) or uplands, (b) one wetland type to another (e.g., forested wetland to an emergent wetland). 7. Activities in the Connecticut River from the Turners Falls Dam to the MA/CT border, or Merrimack River from the Essex Dam to the mouth, involving permanent or temporary impacts unless they are performed <5 feet waterward from OHW or HTL and in the dry. This is to protect endangered species. 8. Activities on USACE properties & USACE-controlled easements. 9. Activities that are not eligible for SV and do not require an IP.

Notes:

1. Changes in wetland plant communities that occur when wetland hydrology is more fully restored during wetland rehabilitation activities are not considered a conversion to another aquatic habitat type.
2. See RGL 18-01 for guidance on removal of obsolete dams and other structures from rivers and streams. https://www.usace.army.mil/missions/civil-works/regulatory-program-and-permits/guidance-letters/
3. An ecological reference site may be used for a design basis of the restoration activity. The reference site should possess characteristics of an intact aquatic habitat or riparian area that exists in the region. The reference site shall represent the target habitat type of the proposed activity. A reference site may be required at the discretion of USACE.

GP 11. FISH AND WILDLIFE HARVESTING AND ATTRACTION DEVICES AND ACTIVITIES (Authorities: §10 and §404)

Fish and wildlife harvesting and attraction devices and activities in waters of the U.S. such as pound nets, crab traps, crab and shellfish dredging, eel pots, lobster traps, duck blinds, clam and oyster digging, fish aggregating devices, and small fish attraction devices such as open-water fish concentrators (sea kites, etc.).

Not authorized under GP 11 (IP required): Artificial reefs; or new, or expansions of, impoundments and semi-impoundments of waters of the U.S. for the culture or holding of motile species such as lobster with an impounded area >½ acre.

Self-Verification Eligible	**Pre-Construction Notification Required**
1. In non-tidal waters, the combined permanent and temporary impacts are (a) ≤1/2 acre, and (b) not located in riffle and pool complexes and non-tidal vegetated shallows. 2. Fish and wildlife harvesting and attraction devices and activities that do not require a PCN or IP.	1. Pound nets, impoundments or semi-impoundments of waters of the U.S. for the culture or holding of motile species such as lobster with an impounded area ≤½ acre, fish aggregating devices, or small fish attraction devices. 2. Devices and activities that are located in tidal vegetated shallows, mud flats, or saltmarsh. 3. Devices and activities that do not require an IP.

Note: An SVN submittal to USACE is not required for work authorized under GP 11.

GP 12. RESPONSE OPERATIONS, OIL AND HAZARDOUS SUBSTANCES (Authorities: §10 & §404)

(a) Activities conducted in response to a discharge or release of oil and hazardous substances that are subject to the National Oil and Hazardous Substances Pollution Contingency Plan (40 CFR 300) including containment, cleanup, and mitigation efforts, provided that the activities are done under either: (i) The Spill Prevention, Control and Countermeasure Plan required by 40 CFR 112.3; (ii) The direction or oversight of the Federal on-scene coordinator designated by 40 CFR 300; or (iii) Any approved existing State, regional or local contingency plan provided that the Regional Response Team concurs with the proposed response efforts or does not object to the response effort; (b) Activities required for the cleanup of oil releases in waters of the U.S. from electrical equipment that are governed by EPA's polychlorinated biphenyl (PCB) spill response regulations at 40 CFR 761; (c) Booms placed in navigable waters of the U.S. for oil and hazardous substance containment, absorption and prevention; and (d) The use of structures and fills for spill response training exercises. Wetlands, vegetated shallows, mudflats, and riffle and pool complexes should be restored in place at the same elevation.

Self-Verification Eligible	**Pre-Construction Notification Required**
1. Activities are conducted in accordance with (a) or (b) above that are not planned or scheduled, but an emergency response (see Note 1). 2. Booms placed in navigable waters of the U.S. for oil and hazardous substance containment, absorption and prevention. 3. Temporary impacts for spill response training exercises ≤5000 SF in non-tidal waters and ≤1000 SF in tidal waters with no impacts to wetlands, saltmarsh, mudflats, or vegetated shallows. 4. Temporary structures in tidal waters with no impacts to wetlands, saltmarsh, mudflats, vegetated shallows, or riffle and pool complexes and in place ≤30 days.	1. Activities (a) or (b) above are planned or scheduled, not an emergency response; or 2. Activities that are not eligible for SV and do not require an IP.

Notes:

1. For emergency response activities in the Connecticut River from the Turners Falls Dam to the MA/CT border, Merrimack River from the Essex Dam to the mouth, and remaining tidal waters that are not rivers, the permittee must contact the USACE at (978) 318-8338 before or as soon as possible after the work authorized under GP 12(a) - (c) commences for the USACE to address effects under the Endangered Species Act.
2. An SVN submittal to USACE is not required for booms used for spill prevention, or properly contained and cleaned de minimus oil or hazardous substance discharges into navigable waters of the U.S.

GP 13. CLEANUP OF HAZARDOUS AND TOXIC WASTE (Authorities: §10 and §404)

Specific activities required to affect the containment, stabilization, or removal of hazardous or toxic waste materials, including court ordered remedial action plans or related settlements, which are performed, ordered or sponsored by a government agency with established legal or regulatory authority.

Not authorized under GP 13: (a) Establishment of new disposal sites; or (b) Expansion of existing sites used for the disposal of hazardous or toxic waste.

Self-Verification Eligible	Pre-Construction Notification Required
1. In non-tidal waters, the combined permanent and temporary impacts are (a) ≤5,000 SF, and (b) not located in vegetated shallows and riffle and pool complexes.	1. In non-tidal waters, the combined permanent and temporary impacts are (a) >5,000 SF, and (b) located in vegetated shallows and riffle and pool complexes. 2. Permanent and temporary impacts in tidal waters or navigable waters of the U.S. 3. Stream channelization, relocation, impoundment, or loss of streambed occurs. 4. Activities that are not eligible for SV and do not require an IP.

Notes:

1. Wetlands, vegetated shallows, mudflats, and riffle and pool complexes should be restored in place at the same elevation to the maximum extent practicable.
2. Activities undertaken entirely on a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) site by authority of CERCLA, are not required to obtain permits under Section 404 of the CWA or Section 10 of the Rivers and Harbors Act.

GP 14. SCIENTIFIC MEASUREMENT DEVICES (Authorities: §10 and §404)

Scientific measurement devices for measuring and recording scientific data, such as staff gauges, tide and current gauges, meteorological stations, water recording and biological observation devices, water quality testing and improvement devices, and similar structures. Also eligible are small weirs and flumes constructed primarily to record water elevation, flow and/or velocity. Upon completion of the use of the device to measure and record scientific data, the measuring device and any other structures or fills associated with that device (e.g., foundations, anchors, buoys, lines, etc.) must be removed to the maximum extent practicable and the site restored to preconstruction elevations.

Not authorized under GP 14 (IP required): (a) Permanent impacts that are >5,000 SF in tidal and non-tidal waters of the U.S.; >1000 SF in tidal saltmarsh, mud flats, riffle and pool complexes; or >100 SF in tidal vegetated shallows; or (b) Temporary impacts in tidal waters that are >1 acre, unless the District Engineer waives this criterion by making a written determination concluding that the discharge of dredged or fill material will result in no more than minimal adverse environmental effects; >5000 SF in saltmarsh, mud flats, or riffle and pool complexes; or >1000 SF in vegetated shallows.

Self-Verification Eligible

1. In non-tidal waters, the combined permanent and temporary impacts are (a) ≤5,000 SF, (b) not located in riffle and pool complexes and non-tidal vegetated shallows.

2. In tidal waters, the combined permanent and temporary impacts are (a) ≤5,000 SF, (b) ≤1,000 SF in mudflats and/or natural rocky habitat, (c) not located in saltmarsh and tidal vegetated shallows.

3. Temporary, non-biological sampling devices in waters that do not restrict or concentrate movement of aquatic organisms and will not adversely affect the course, condition, or capacity of a waterway for navigation.

4. Scientific measurement devices, and small weirs and flumes constructed primarily to record water quantity and velocity provided the discharge of fill is limited to 25 cubic yards. These cannot obstruct or restrict the waterway course, condition, capacity, and location.

5. Temporary measuring devices and associated structures (e.g., anchors, buoys, etc.) in tidal and non-tidal waters that do not require a PCN or IP.

Pre-Construction Notification Required

1. Biological sampling devices, weirs or flumes, or the activity restricts or concentrates movement of aquatic organisms.

2. Permanent towers located in navigable waters that record and measure scientific data.

3. Devices that are not eligible for SV and do not require an IP.

Note: An SVN submittal to USACE is not required for temporary measuring devices with a footprint of <10 SF, with a profile of <3 feet high measured from the substrate and located in water deeper than -10 feet MLW.

GP 15. SURVEY ACTIVITIES (Authorities: §10 and §404)

Survey activities such as soil borings, core sampling, seismic exploratory operations, plugging of seismic shot holes and other exploratory-type bore holes, exploratory trenching, soil surveys, sampling, sample plots or transects for wetland delineations, and historic resources surveys.

Not authorized under GP 15 (IP required): (a) Permanent impacts that are >1 acre in tidal and non-tidal waters; >1000 SF in tidal saltmarsh, mud flats, or riffle and pool complexes; or >100 SF in tidal vegetated shallows; or (b) Temporary impacts in tidal waters that are >1 acre, unless the District Engineer waives this criterion by making a written determination concluding that the discharge of dredged or fill material will result in no more than minimal adverse environmental effects; >5000 SF in saltmarsh, mud flats, or riffle and pool complexes; or >1000 SF in vegetated shallows.

Self-Verification Eligible	**Pre-Construction Notification Required**
1. In non-tidal waters, the combined permanent and temporary impacts are (a) ≤5,000 SF, (b) not located in riffle and pool complexes and non-tidal vegetated shallows. 2. In tidal waters, the combined permanent and temporary impacts are (a) ≤5,000 SF, (b) ≤1,000 SF in mudflats and/or natural rocky habitat, (c) not located in saltmarsh and tidal vegetated shallows.	1. Exploratory trenching (see Note 2) occurs in waterways (e.g., streams, tidal waters). 2. Activities associated with the recovery of historic resources, and the drilling and discharge of excavated material from test wells for oil and gas exploration. 3. Seismic exploratory operations occur in tidal waters, the Connecticut River from the Turners Falls Dam to the MA/CT border, or the Merrimack River from the Essex Dam to the mouth. This is to protect endangered species. 4. Activities that are not eligible for SV and do not require an IP.

Notes:

1. An SVN submittal is not required for wetland delineations, and core sampling conducted for preliminary evaluation of dredge project analysis.
2. For the purposes of GP 15, the term “exploratory trenching” means mechanical land or underwater clearing of the upper soil profile to expose bedrock or substrate for the purpose of mapping or sampling the exposed material.
3. The discharge of drilling mud and cuttings may require a permit under §402 of the CWA.

GP 16. LAND AND WATER-BASED RENEWABLE ENERGY GENERATION FACILITIES (Authorities: §10 and §404), AND HYDROPOWER PROJECTS (Authority: §10 and §404)

Structures and work in tidal waters and discharges of dredged or fill material into tidal and non-tidal waters for the construction, expansion, modification or removal of: (a) Land-based renewable energy production facilities (e.g., solar, wind, biomass, geothermal) and their attendant features; (b) Water-based wind or hydrokinetic renewable energy generation projects and their attendant features; and (c) Discharges of dredged or fill material associated with hydropower projects. Attendant features may include, but are not limited to, land-based collection and distribution facilities, control facilities, and parking lots. For each single and complete project in (b) above, no more than 10 generation units (e.g., wind turbines or hydrokinetic devices) are authorized in navigable waters of the U.S. Upon completion of the pilot project (see note 2), the generation units, transmission lines, and other structures or fills associated with the pilot project must be removed to the maximum extent practicable.

Not authorized under GP 16 (IP required): (a) Permanent impacts that are >1 acre in non-tidal waters, >½ acre in tidal waters; >1000 SF in saltmarsh, mud flats, riffle and pool complexes, or non-tidal vegetated shallows; or >100 SF in vegetated shallows; or (b) Temporary impacts in tidal waters that are >1 acre; >5000 SF in saltmarsh, mud flats, or riffle and pool complexes; or >1000 SF in vegetated shallows.

Self-Verification Eligible	**Pre-Construction Notification Required**
In non-tidal waters, the combined permanent and temporary impacts for land-based activities are (a) ≤5,000 SF, (b) not located in riffle and pool complexes and non-tidal vegetated shallows.	1. In non-tidal waters, the combined permanent and temporary impacts for land-based activities are (a) >5000 SF, or (b) located in vegetated shallows or riffle and pool complexes. 2. Permanent and temporary impacts in tidal waters. 3. Water-based wind or hydrokinetic renewable energy generation projects, and hydropower projects. 4. For all activities eligible for authorization under GP 16: a. The activity occurs in tidal waters or in, over or under navigable waters. b. Stream channelization, relocation, impoundment, or loss of streambed occurs. 5. Activities that are not eligible for SV and do not require an IP.

Notes:

1. Utility lines constructed to transfer the energy from the land-based renewable generation or collection facility to a distribution system, regional grid, or other facility may be authorized by GP 6.
2. For the purposes of this GP, the term “pilot project” means an experimental project where the renewable energy generation units will be monitored to collect information on their performance and environmental effects at the project site.

GP 17. RESIDENTIAL, COMMERCIAL AND INSTITUTIONAL DEVELOPMENTS AND RECREATIONAL FACILITIES (AUTHORITIES: §404)

Discharges of dredged or fill material into non-tidal waters for the construction or expansion of: (a) Residences and residential subdivisions; (b) Residential, commercial and institutional building foundations and building pads; and (c) Recreational facilities such as playgrounds, playing fields, bikeways, trails, etc. This GP also authorizes attendant features that include, but are not limited to, roads, parking lots, garages, yards, and utility lines, and stormwater management facilities. This GP authorizes attendant features if they are necessary for the use of the project purpose.

Not authorized under GP 17 (IP required): (a) Permanent impacts that result in loss of non-tidal waters >1/2 acre; >1000 SF in riffle and pool complexes or vegetated shallows; or (b) Subsurface sewerage disposal systems in non-tidal waters.

Self-Verification Eligible	**Pre-Construction Notification Required**
1. In non-tidal waters, the combined permanent and temporary impacts are (a) <5,000 SF, and (b) not located in riffle and pool complexes and non-tidal vegetated shallows.	1. In non-tidal waters, the combined permanent and temporary impacts are (a) ≥5,000 SF, or (b) located in riffle and pool complexes or non-tidal vegetated shallows.
2. Stream channelization or relocation resulting in loss of streambed that is <200 LF.	2. Stream and wetland crossings that require a PCN per GCs 20 TOY Restrictions and GC 31 Stream Work and Crossings & Wetland Crossings.
	3. Stream channelization or relocation resulting in loss of streambed that is ≥200 LF. Stream impoundment activities of any kind.
	4. Activities on USACE properties & USACE-controlled easements.
	5. Activities that are not SV eligible and do not require an IP.

Notes:

1. Stream and wetland crossings (permanent and temporary), including those built with construction mats; and modifications (including sliplining), replacements or extensions to existing crossings.
2. See GC 22 for information on temporary construction mats.
3. Subdivisions: For residential subdivisions, the aggregate total loss of waters of United States authorized by this GP cannot exceed 1/2-acre. This includes any loss of waters of the United States associated with development of individual subdivision lots.

GP 18. AQUACULTURE (Authorities: §10 and §404)

(a) The installation of buoys, floats, racks, trays, nets, lines, tubes, containers, and other structures into navigable waters of the U.S.; (b) Discharges of dredged or fill material into tidal and non-tidal waters necessary for shellfish seeding, rearing, cultivating, transplanting, and harvesting activities; and (c) Shellfish seeding or brushing the flats projects. Any fill material imported to the project from offsite (this is limited to mineral growth medium used in culture trays) shall be clean and of comparable grain size to the native substrate. Activities authorized under this GP must have (a) their MA DMF Aquaculture Certificate letter for licensed shellfish aquaculture sites, (b) documentation that the applicant has coordinated with the U.S. Coast Guard regarding USCG Private Aids to Navigation standards, (c) their MEPA Certificate (if required), and (d) documentation that the applicant has contacted their local authorities (ex. harbormaster, select board, shellfish constable) for authorization of their facility.

Not authorized under GP 18 (IP required): (a) New, or expansions of, impoundments and semi-impoundments of tidal and non-tidal waters for the culture or holding of motile species such as lobster with an impounded area >½ acre; (b) Cultivation of a nonindigenous species (see Note 1) unless that species has been previously cultivated in the waterbody; (c) Cultivation of an aquatic nuisance species (see Note 1); (d) Attendant features such as docks, piers, boat ramps (see GP 4); (e) stockpiles, staging areas, or the deposition of shell material back into tidal and non-tidal waters as waste.

Self-Verification Eligible

1. In tidal waters, a new lease site area is (a) ≤2-acre, (b) not located in salt marsh, natural rocky habitat, or tidal vegetated shallows.

2. In tidal waters, *expansions* of existing lease sites not to exceed 2 acres for the entire site (e.g. 1 acre lease site increasing to a 2 acre lease site may qualify as SV). A PCN is required for expansions in salt marsh, natural rocky habitat, and tidal vegetated shallows.

3. Cages, racks that are elevated ≥2 feet above the ocean floor with legs within a lease site with ≤4 buoys marking the corners.

4. Floating cage strings with a single connecting line, ≤2 anchors and ≤2 end marker buoys per string within a lease site with ≤4 buoys marking the corners.

5. No activities located within 25 feet of tidal vegetated shallows.

6. Culture only indigenous species.

7. Not located in FNP or within a distance of three times the authorized depth of an FNP (see GC 15).

8. Not located in or impinge upon the value of any National Lands or Federal Properties.

9. Floating upweller docks that total ≤600 SF in area.

Pre-Construction Notification Required

1. Discharges of fill material associated with aquaculture >5,000 SF.

2. Research, educational, commercial-viability or experimental aquaculture gear activities >1,000 SF.

3. Kelp or finfish aquaculture.

4. Land-based hatchery intakes >3 inches in diameter.

5. Activities in water depths >10 feet mean low lower water (MLLW).

6. Activities with in-water lines, ropes or chains that are not SV eligible (see #3-4).

7. Activities occur in the Connecticut River from the Turners Falls Dam to the MA/CT border or the Merrimack River from the Essex Dam to the mouth. This is to protect endangered species.

8. New, or expansions of, impoundments and semi-impoundments for the culture or holding of motile species such as lobster with an impounded area ≤1/2 acre.

9. Activities that do not require an IP. Activities that do not require a PCN or an IP may be SV eligible.

Note: The Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 defines: (a) nonindigenous species as “any species or other viable biological material that enters an ecosystem beyond its historic range, including any such organism transferred from one country into another”; and (b) aquatic nuisance species as “a nonindigenous species that threatens the diversity or abundance of native species or the ecological stability of infested waters, or commercial, agricultural, aquacultural, or recreational activities dependent on such waters.”

GP 19. MINING ACTIVITIES (Authorities: §10 and §404)

Discharges of dredged or fill material into non-tidal waters for mining activities, except for coal mining and metallic mineral mining activities.

Not authorized under GP 19 (IP required): (a) Permanent impacts >1 acre in non-tidal waters; or (b) Activities in tidal waters.

Self-Verification Eligible	Pre-Construction Notification Required
In non-tidal waters, the combined permanent and temporary impacts are (a) ≤5,000 SF, and (b) not located in riffle and pool complexes, non-tidal vegetated shallows, and streams.	1. In non-tidal waters, the combined permanent and temporary impacts are (a) >5,000 SF, or (b) located in riffle and pool complexes, non-tidal vegetated shallows, and streams. 2. The activity occurs in non-tidal navigable waters of the U.S. 3. Stream channelization, relocation, impoundment, loss of streambed, or discharge of tailings into streams occurs. 4. Work on USACE properties & USACE-controlled easements. 5. Activities that are not eligible for SV and do not require an IP.

GP 20. LIVING SHORELINES[1] (Authorities: §10 and §404)

Construction and maintenance of living shorelines to stabilize banks and shores in tidal waters. In non-tidal waters that are not subject to the ebb and flow of the tide, nature-based bank stabilization techniques such as bioengineering and vegetative stabilization may be authorized by GP 9. This GP authorizes those maintenance and repair activities in-kind that are necessary to address changing environmental conditions.

The following terms must be met for both SVs and PCNs as applicable: (a) Coir logs, coir mats, stone, native oyster shell, native wood debris, and other structural materials must be adequately anchored, of sufficient weight, or installed in a manner that prevents relocation in most wave action or water flow conditions, except for extremely severe storms; (b) For living shorelines consisting of tidal fringe wetlands, native plants appropriate for current site conditions, including salinity and elevation, must be used if the site is planted by the permittee; (c) Discharges of dredged or fill material into waters of the U.S., and oyster or mussel reef structures in navigable waters, must be the minimum necessary for the establishment and maintenance of the living shoreline; (d) If sills or other structural materials per PCN #4 must be constructed to protect fringe wetlands for the living shoreline, those structures must be the minimum size necessary to protect those fringe wetlands; (e) The activity must be designed, constructed, and maintained so that it has no more than minimal adverse effects on water and sediment movement between the waterbody and the shore and the movement of aquatic organisms between the waterbody and the shore; and (f) The living shoreline must be properly maintained and monitored, which may require periodic repair of sills, bioengineered components, or replacing sand fills after severe storms or erosion events. Vegetation may be replanted to maintain the living shoreline.

Not authorized under GP 20 (IP required): (a) The activity is ≥1000 feet in length along the bank (≥2000 LF both banks) unless waived by the District Engineer; or (b) The activity is >30 feet channel ward of mean low water in tidal waters; or (c) Upland reclamation activities; or (d) Stream channelization or relocation activities; or (e) Breakwaters, groins, jetties, or artificial reefs; or (f) Permanent impacts >1,000 SF in existing saltmarsh; >100 SF in existing tidal vegetated shallows.

Self-Verification Eligible	**Pre-Construction Notification Required**
1. Tidal and non-tidal living shorelines ≤100 LF for each bank (≤200 LF for both banks). 2. Combined permanent and temporary impacts ≤5,000 SF in tidal waters, excluding existing salt marsh, tidal vegetated shallows, natural rocky habitat, and mudflats.	1. Tidal and non-tidal living shorelines >100 LF to <1000 LF (>200 LF to <2000 LF for both banks). 2. Permanent and temporary impacts in existing salt marsh, tidal vegetated shallows, or mudflats. 3. Work on USACE properties & USACE-controlled easements. 4. Use of stone sills, native oyster shell, native wood debris, or other structural materials.

Notes:

1. PCNs require monitoring for a minimum of 5 years in accordance with an approved restoration plan, unless otherwise determined by the USACE. The first year of monitoring will be the first year that the site has been through a full growing period after completion of construction and planting.
2. Applicants are encouraged to obtain a MEPA certificate prior to submitting a USACE permit application.

[1] A living shoreline has a footprint that is made up mostly of native material. It incorporates vegetation or other living, natural "soft" elements alone or in combination with some type of harder shoreline structure (e.g., oyster or mussel reefs or rock sills) for added protection and stability. Living shorelines should maintain the natural continuity of the land-water interface and retain or enhance shoreline ecological processes. Living shorelines must have a substantial biological component, either tidal or lacustrine fringe wetlands or oyster or mussel reef structures.

GP 21. AGRICULTURAL ACTIVITIES (Authority: §404)

Discharges of dredged or fill material in non-tidal waters for agricultural activities, including the construction of building pads for farm buildings. Authorized activities include: (a) installation, placement, or construction of drainage tiles, ditches, or levees; mechanized land clearing; land leveling; the relocation of existing serviceable drainage ditches; and similar activities; (b) construction of farm ponds, excluding perennial streams, provided the farm pond is used solely for agricultural purposes; and (c) discharges of dredged or fill material to relocate existing serviceable drainage ditches constructed in non-tidal streams.

Not authorized under GP 21 (IP required): (a) Permanent impacts that are >1 acre in non-tidal waters; or >1000 SF in riffle and pool complexes, or non-tidal vegetated shallows; (b) Work in tidal waters; or (c) Construction of farm ponds in perennial streams.

Self-Verification Eligible	**Pre-Construction Notification Required**
In non-tidal waters, the combined permanent and temporary impacts are (a) ≤5,000 SF, and (b) not located in riffle and pool complexes and non-tidal vegetated shallows.	1. In non-tidal waters, the combined permanent and temporary impacts are (a) >5,000 SF, or (b) located in riffle and pool complexes and non-tidal vegetated shallows. 2. Activities occur in non-tidal navigable waters of the U.S. 3. Stream channelization, relocation, impoundment, loss of streambed, or farm ponds in non-perennial streams occurs. 4. Activities that are not eligible for SV and do not require an IP.

Note: Some discharges for agricultural activities may qualify for an exemption under Section 404(f) of the CWA (see 33 CFR 323.4). This GP authorizes the construction of farm ponds that do not qualify for the CWA §404(f)(1)(C) exemption because of the recapture provision at §404(f)(2).

GP 22. RESHAPING EXISTING DRAINAGE DITCHES, CONSTRUCTION OF NEW DITCHES, AND MOSQUITO MANAGEMENT (Authorities: §10 and §404)

Discharges to modify the cross-sectional configuration of currently serviceable drainage ditches constructed in tidal and non-tidal waters, for the purpose of improving water quality by regrading the drainage ditch with gentler slopes, which can reduce erosion, increase growth of vegetation, and increase uptake of nutrients and other substances by vegetation. Also authorized are mosquito reduction activities.

Not authorized under GP 22 (IP required): Stream channelization, relocation, impoundments, or loss of streambed.

Self-Verification Eligible	**Pre-Construction Notification Required**
≤500 linear feet of drainage ditch will be reshaped provided excavated material is deposited in an upland area.	1. >500 linear feet of drainage ditch will be reshaped, excavated material is deposited in a water of the U.S., or the reshaping of the ditch increases the drainage capacity beyond the original as-built capacity or expands the area drained by the ditch as originally constructed (i.e., the capacity of the ditch is not the same as originally constructed or drains additional wetlands or other waters of the U.S.). 2. Permanent and temporary impacts in tidal vegetated shallows. 3. New ditches or relocation of drainage ditches constructed in waters of the U.S. (i.e., the location of the centerline of the reshaped drainage ditch is not approximately the same as the location of the centerline of the original drainage ditch). 4. Activities that are not eligible for SV and do not require an IP.

Note: Some ditch activities are exempt under Section 404(f) of the CWA (see 33 CFR 323.4).

GP 23. LINEAR TRANSPORTATION PROJECTS AND WETLAND/STREAM CROSSINGS (Authorities: §10 & §404)

Activities[1] required for the construction, expansion, modification, or improvement of linear transportation projects (e.g., driveways, roads, highways, railways, trails, airport runways, and taxiways) and attendant features. This GP also authorizes temporary structures, fills, and work, including the use of temporary mats (see Note 1), necessary to construct the linear transportation project.

Not authorized under GP 23 (IP required): (a) Permanent impacts for any single and complete project that are >1 acre in non-tidal waters; >½ acre in tidal waters; >1000 SF in saltmarsh, mud flats, riffle and pool complexes, or non-tidal vegetated shallows; or >100 SF in tidal vegetated shallows; (b) Temporary impacts in tidal waters that are >1 acre; >5000 SF in saltmarsh, mud flats, or riffle and pool complexes; or >1000 SF in vegetated shallows; (c) Non-linear features commonly associated with transportation projects, such as vehicle maintenance or storage buildings, parking lots, train stations, or aircraft hangars (see GP 17); or (d) New tide gates.

Self-Verification Eligible

1. In non-tidal waters, the combined permanent and temporary impacts are a) ≤5,000 SF; b) not located in riffle and pool complexes and non-tidal vegetated shallows; and c) meet the Massachusetts River and Stream Crossing Standards

2. Existing crossings (e.g., culverts, elliptical or arch pipes, etc.) are not modified by (a) decreasing the diameter of the crossing or (b) changing the friction coefficient, such as through slip lining (retrofitting an existing culvert by inserting a smaller diameter pipe), culvert relining or invert lining.

3. Stream channelization or relocation resulting in loss of streambed that is <200 LF.

Pre-Construction Notification Required

1. In non-tidal waters, the combined permanent and temporary impacts are a) >5,000 SF; b) located in vegetated shallows or riffle and pool complexes; or c) do not meet the Massachusetts River and Stream Crossing Standards (see note 4).

2. The activity occurs in tidal waters, salt marsh, or in, over or under navigable waters of the U.S.

3. Stream and wetland crossings that require a PCN per GC 20 TOY Restrictions and GC 31 Stream Work and Crossings & Wetland Crossings.

4. Stream channelization or relocation resulting in loss of streambed that is ≥200 LF. Stream impoundment activities of any kind.

5. Work on USACE properties & USACE-controlled easements.

6. Activities that are not eligible for SV and do not require an IP.

Notes:

1. See GC 22 for information on temporary construction mats.
2. Discharges of dredged or fill material incidental to the construction of bridges across navigable waters of the U.S. may be authorized under GP 8.
3. Loss of streambed does not require a PCN when bridge piers or similar supports are used.
4. In their PCN application submission to the USACE, applicants must explain why they are unable to meet the Massachusetts River and Stream Crossing Standards.
5. For tidal crossings, modeling is encouraged as a method to verify the proposed crossing would not be undersized and resilient to the effects of sea level rise.

[1] Stream crossings must conform with the MA Stream Crossing Guidelines when practicable and comply with all applicable GCs of this document (Section IV).

GP 24. TEMPORARY CONSTRUCTION, ACCESS, AND DEWATERING (Authorities: §10 and §404)

Temporary structures, work, and discharges, including cofferdams, necessary for construction activities or access fills or dewatering of construction sites that are not authorized under another GP activity.

Not authorized under GP 24 (IP required): (a) Permanent structures or impacts; (b) Temporary impacts in tidal waters that are >1 acre; >5000 SF in saltmarsh, mud flats, or riffle and pool complexes; or >1000 SF in vegetated shallows; (c) Use of cofferdams to dewater wetlands or other aquatic areas to change their use; (d) Temporary stream crossings (see GPs 6, 17, 23); (e) Structures or fill left in place after construction is completed.

Self-Verification Eligible	**Pre-Construction Notification Required**
1. In non-tidal waters, temporary impacts are a) ≤5,000 SF; b) not located in riffle and pool complexes and non-tidal vegetated shallows. 2. In tidal waters, temporary impacts are a) ≤5,000 SF, b) ≤1,000 SF in mudflats and/or natural rocky habitat, and c) not located in saltmarsh and tidal vegetated shallows. 3. Structures in navigable waters of the U.S. provided impacts do not require a PCN and they are left in place ≤30 days.	1. In non-tidal waters, temporary impacts are a) >5,000 SF; b) located in riffle and pool complexes or non-tidal vegetated shallows. 2. In tidal waters, temporary impacts are a) >5,000 SF; b) >1,000 SF in mudflats and/or natural rocky habitat, or (c) located in saltmarsh and tidal vegetated shallows. 3. Activities in the Connecticut River from the Turners Falls Dam to the MA/CT border, or Merrimack River from the Essex Dam to the mouth, involving temporary impacts unless they are performed <5 feet waterward from OHW or HTL and in the dry. This is to protect endangered species; or 4. Activities not eligible for SV and do not require an IP.

Notes:

1. Turbidity or sediment resuspension is generally not considered to occur when properly using management techniques to work in dry conditions. See GC 25.
2. Total impact areas under SV Eligible 1-2 exclude use of temporary construction mats. See GC 22 for information on temporary construction mats.
3. An SVN submittal to USACE is not required for SV #3 above.

GP 25. EMERGENCY SITUATIONS (Authorities: §10 and §404)

Structures or work in or affecting navigable waters of the U.S. and the discharge of dredged or fill material into waters of the U.S., including wetlands, necessary for repair or protection measures associated with an emergency situation[1], MassDEP Emergency Declaration/Certification, or FEMA Declared Disaster. The activity shall be the minimum necessary to alleviate the immediate emergency unless that additional work would result in no more than minimal effects to aquatic environment and is necessary to reduce the potential for future failure or loss of the structure or site. Typical activities authorized under this GP include, but are not limited to, restoration of damaged areas; bank stabilization; temporary fills for staging, access, and dewatering; and, repair, replacement, or rehabilitation of existing structures and/or fills (i.e., roads, bridges, utility pipelines and flood control structures, including attendant features, and other existing structures located in waters of the U.S.).

For the restoration of areas damaged by storms floods, or other discrete events: (a) The restored area must not extend waterward of the ordinary high-water mark or high tide line that existed prior to the damage. (b) The slope of the restored area below the ordinary high-water mark or high tide line must not exceed the slope that existed prior to the damage. (c) The bottom elevation of the restored area must not exceed the bottom elevation that existed prior to the damage (i.e., the restored area must not result in a reduction in the depth of the waterbody that existed prior to the damage). (d) Except in cases of FEMA reimbursement, the activity must be initiated, under contract to commence, or funds shall be allocated for the activity within 30 days of authorization under GP 25.

Not authorized under GP 25 (IP required): (a) Permanent impacts for a single and complete project >1/2 acre in tidal waters, unless the district engineer waives this criterion by making a written determination concluding that the activity will result in no more than minimal adverse environmental effects; >1,000 SF in saltmarsh, mud flats, riffle and pool complexes, or non-tidal vegetated shallows; or >100 SF in tidal vegetated shallows; (b) Temporary impacts in tidal waters that are >5,000 SF in saltmarsh, mud flats, or riffle and pool complexes; or >1,000 SF in vegetated shallows; (c) New structures or fills that did not previously exist before the storm event or other discrete event (see other GPs).

Self-Verification Eligible	**Pre-Construction Notification Required**
1. Activities that qualify under a Severe Weather Emergency Declaration pursuant to 310 CMR 10.06(8) and/or receive an Emergency Certification pursuant to 310 CMR 10.06 and/or meet the requirements of 314 CMR 9.12(2) or (3); and 2. Activities eligible under a FEMA Declared Disaster that also comply with #1 above.	1. Activities that are eligible under a FEMA Declared Disaster and do not qualify under SV #1. 2. Minor deviations in the structure or fill area, including those to existing structures or fills are authorized due to changes in materials, construction techniques, requirements of other regulatory agencies, or current construction codes or safety standards that are necessary to alleviate the emergency. 3. Activities that are not eligible for SV and do not require an IP.

Notes:

1. Review the GCs (Section IV) to confirm if a PCN is not required elsewhere in this document.
2. If the activity is not a MassDEP Emergency Declaration/Certification, does not meet the requirements of 314 CMR 9.12(2) or (3), or is not a FEMA Declared Disaster, applicants must explain in writing why their activity qualifies as an emergency (see footnote) to be eligible under GP 25.
3. SV eligible activities qualify under the general 401 WQC MassDEP issued for the 2023 MA GPs (GC 9).

[1] An emergency, as determined by this office and 33 CFR 325.2(e)(4), is one which would result in an unacceptable hazard to life, a significant loss of property, or an immediate, unforeseen, and significant economic hardship if corrective action requiring a Department of the Army permit is not undertaken within a time period less than the normal time to process the request under standard processing procedures.

SECTION IV. GENERAL CONDITIONS:

To qualify for GP authorization, the applicant must comply with the following general conditions, as applicable, in addition to authorization-specific conditions imposed by the division or district engineer.

1. Other Permits
2. Federal Jurisdictional Boundaries
3. Single and Complete Projects
4. Use of Multiple General Permits
5. Suitable Material
6. Tribal Rights & Burial Sites
7. Avoidance, Minimization, and Compensatory Mitigation
8. Water Quality & Stormwater Management
9. Coastal Zone Management
10. Federal Threatened and Endangered Species
11. Essential Fish Habitat
12. National Lands
13. Wild and Scenic Rivers
14. Historic Properties
15. USACE Property and Federal Projects (§408)
16. Navigation
17. Permit/Authorization Letter On-Site
18. Storage of Seasonal Structures
19. Pile Driving and Pile Removal in Navigable Waters
20. Time of Year Restrictions
21. Heavy Equipment in Wetlands
22. Temporary Fill & Construction Mats
23. Restoration of Wetland Areas
24. Bank Stabilization
25. Soil Erosion and Sediment Controls
26. Aquatic Life Movements and Management of Water Flows
27. Spawning, Breeding, and Migratory Areas
28. Vernal Pools
29. Invasive Species
30. Fills Within 100-Year Floodplains
31. Stream Work and Crossings & Wetland Crossings
32. Utility Line Installation and Removal
33. Water Supply Intakes
34. Coral Reefs
35. Blasting
36. Inspections
37. Maintenance
38. Property Rights
39. Transfer of GP Verifications
40. Modification, Suspension, and Revocation
41. Special Conditions
42. False or Incomplete Information
43. Abandonment
44. Enforcement Cases
45. Previously Authorized Activities
46. Duration of Authorization

1. Other Permits. Authorization under these GPs does not obviate the need for the permittee to obtain other Federal, State, or local permits, approvals, or authorizations required by law. Permittees are responsible for obtaining all required permits, approvals, or authorizations. Activities that are not regulated by the State, but subject to USACE jurisdiction, may still be eligible for these GPs.

2. Federal Jurisdictional Boundaries.
a. Applicability of these GPs shall be evaluated with reference to Federal jurisdictional boundaries. Activities shall be evaluated with reference to "waters of the U.S." under the CWA (33 CFR 328) and "navigable waters of the U.S." under §10 of the Rivers and Harbors Act of 1899 (33 CFR 329). Permittees are responsible for ensuring that the boundaries used satisfy the Federal criteria defined at 33 CFR 328-329. These sections prescribe the policy, practice, and procedures to be used in determining the extent of the USACE jurisdiction. Note: Waters of the U.S. includes all waters pursuant to 33 CFR 328.3(a), and adjacent wetlands as the term is defined in 33 CFR 328.3(c).
b. Wetlands shall be delineated in accordance with the USACE Wetlands Delineation Manual and the most recent Northcentral/Northeast Regional Supplement. Wetland delineation and jurisdiction information is located at: www.nae.usace.army.mil/missions/regulatory/jurisdiction-and-wetlands and maps are located at www.nae.usace.army.mil/missions/regulatory/state-general-permits/massachusetts-general-permit.
c. Vegetated shallows shall be delineated when present on the project site. Vegetated shallow survey guidance and maps are located at: www.nae.usace.army.mil/missions/regulatory/state-general-permits/massachusetts-general-permit.
d. Natural rocky habitats shall be delineated when present on the project site. The definition of natural rocky habitats is in Section VII of the MA GP. Natural rocky habitat survey guidance and maps are located at: www.nae.usace.army.mil/ missions/regulatory/state-general-permits/massachusetts-general-permit.

3. Single and Complete Projects. The MA GP shall not be used for piecemeal work and shall be applied to single and complete projects. The term "single and complete project" is defined at 33 CFR 330.2(i) as the total project proposed or accomplished by one owner/developer or partnership or other association of owners/developers.
a. For non-linear projects, a single and complete project must have independent utility. Portions of a multi-phase project that depend upon other phases of the project do not have independent utility. Phases of a project that would be constructed, even if the other phases were not built, can be considered as separate single and complete projects with independent utility.
b. Unless USACE determines the activity has independent utility, all components of a single project and/or all planned phases of a multi-phased project (e.g., subdivisions should include all work such as roads, utilities, and lot development) shall be evaluated as one single and complete project.
c. For linear projects such as power lines or pipelines with multiple crossings, a "single and complete project" is all crossings of a single water of the U.S. (i.e., single waterbody) at a specific location. For linear projects crossing a single waterbody several times at separate and distant locations, each crossing is considered a single and complete project. However, individual channels in a braided stream or river, or individual arms of a large, irregularly shaped wetland or lake, etc., are not separate waterbodies, and crossings of such features cannot be considered separately. If any crossing requires a PCN review or an individual permit review, then the entire linear project shall be reviewed as one project under PCN or the individual permit procedures.

4. Use of Multiple General Permits. The use of more than one GP for a single and complete project is prohibited, except when the acreage loss of waters of the U.S. authorized by the GPs does not exceed the acreage limit of the GPs with the highest specified acreage limit. For example, if a road crossing over waters is constructed under GP 23, with an associated utility line

crossing authorized by GP 6, if the maximum acreage loss of waters of the U.S. for the total project is ≥1 acre it shall be evaluated as an IP.

5. Suitable Material & Discharge of Pollutants. No activity may use unsuitable material (e.g., trash, debris, car bodies, asphalt, etc.). All activities involving any discharge into waters of the U.S. authorized under these GPs shall be consistent with applicable water quality standards, effluent limitations, standards of performance, prohibitions, and pretreatment standards and management practices established pursuant to the CWA (33 U.S.C. 1251), and applicable state and local laws. If applicable water quality standards, limitations, etc., are revised or modified during the term of this GP, the authorized work shall be modified to conform with these standards within six months from the effective date of such revision or modification, or within a longer period of time deemed reasonable by the District Engineer in consultation with the Regional Administrator of the EPA. Unless monitoring data indicates otherwise, applicants may presume that their activity complies with state water quality standards provided they are in compliance with the Section 401 WQC (Applicable only to the Section 404 activity).

6. Tribal Rights & Burial Sites

a. For all SV and PCN applications, prospective permittees shall follow the guidance set forth in Appendix A, Guidance for NHPA Section 106 Compliance in Massachusetts.

b. No activity or its operation may impair reserved tribal rights, including, but not limited to, reserved water rights and treaty fishing and hunting rights.

c. Many tribal resources are not listed on the National Register of Historic Places (NRHP) and may require identification and evaluation in collaboration with the identifying tribe and by qualified professionals. The Tribal Historic Preservation Officer (THPO) and State Historic Preservation Officer (SHPO) may be able to assist with locating information on:

i. Previously identified tribal resources; and
ii. Areas with potential for the presence of tribal resources.

d. Discovery of Previously Unknown Remains and Artifacts: If any previously unidentified human remains, cultural deposits, or artifacts are discovered while accomplishing the activity authorized by this permit, you must immediately notify the USACE of what you have found, and to the maximum extent practicable, cease work and avoid construction activities that may affect the remains and artifacts until the required coordination has been completed. The USACE will initiate the appropriate the Federal, Tribal, and state coordination required to determine if the items or remains are eligible for listing in the NRHP and warrant a recovery effort or can be avoided.

e. Burial Sites: Burial sites, marked or unmarked, are subject to state law (Massachusetts Unmarked Burial Law). Native American burial sites on federal or tribal land are subject to the provisions of Native American Graves Protection and Repatriation Act (NAGPRA). Regulated activities may not result in disturbance or removal of human remains until disposition of the remains has been determined by the appropriate authority under these laws, and the work is authorized by the USACE. Regulated activities which result in an inadvertent discovery of human remains must stop immediately, and the USACE, as well as the appropriate state and tribal authority, must be notified. Regulated work at inadvertent discovery sites requires compliance with state law or NAGPRA, as appropriate, prior to re-starting work.

7. Avoidance, Minimization, and Compensatory Mitigation. To qualify under the MA GP, activities must comply with Section V Mitigation Standards and the following as applicable:

a. Avoid and Minimize: Activities must be designed and constructed to avoid and minimize adverse effects, both temporary and permanent, to waters of the U.S. to the maximum extent practicable at the project site. Avoidance and minimization are required to the extent necessary to ensure that the adverse effects to the aquatic environment (both area and function) are no more than minimal.

b. Compensatory mitigation for unavoidable impacts to waters of the U.S., including direct, indirect, secondary, and temporal loss, will generally be required for permanent impacts that exceed the thresholds identified in Section V, and may be required for temporary impacts, to offset unavoidable impacts which remain after all appropriate and practicable avoidance and minimization has been achieved and to ensure that the adverse effects to the aquatic environment are no more than minimal. Proactive restoration projects or temporary impact work with no secondary effects may generally be excluded from this requirement.
c. Mitigation proposals shall follow the guidelines found in the Compensatory Mitigation for Losses of Aquatic Resources; Final Rule April 10, 2008; 33 CFR 332. Prospective permittees may purchase mitigation credits in-lieu of permittee-responsible mitigation as compensation for unavoidable impacts to waters of the U.S. in the Commonwealth of Massachusetts.

8. Water Quality & Stormwater Management. The 401 WQC requirement applies to all activities listed under GPs 1-25, unless determined otherwise by MassDEP. Permittees shall also satisfy stormwater management requirements in Massachusetts.

a. General 401 WQC: MassDEP issued a WQC on April 21, 2023 which conditionally certifies all activities in GPs 1 – 24 eligible for SV and PCN so long as the activity is described in 314 CMR 9.03, and is not an activity described in 314 CMR 9.04, and so long as the activity meets all other requirements, terms and conditions of the WQC. The MassDEP WQC also conditionally certifies activities described in GP 25 so long as the activity meets all other conditions of the WQC. Emergency projects described in GP 25 must obtain an emergency certification or otherwise be authorized pursuant to 310 CMR 10.06, qualify under a Severe Weather Emergency Declaration pursuant to 310 CMR 10.06(8) issued by the MassDEP, or meet the requirements of 9.12(2) or (3) in order to be certified under the WQC. Prospective permittees may refer to the following link to determine if their activity is eligible: https://www.nae.usace.army.mil/Missions/Regulatory/State-General-Permits/ Massachusetts-General-Permit/. The General 401 WQC is located here, and it provides detailed information regarding what activities are certified and the conditions for certification. Activities listed in 314 CMR 9.03 that are not exempt from the Wetland Protection Act must have a valid Final Order of Conditions (OOC) or Final Restoration Order of Conditions pursuant to 310 CMR 10.00 to be eligible under the General 401 WQC.
b. Individual 401 WQC: Prospective permittees shall contact MassDEP and apply for an individual 401 WQC if their activity does not qualify for a General 401 WQC as outlined above. MassDEP may issue, waive, or deny the individual 401 WQC on a case-by-case basis. All activities listed in 314 CMR 9.04 must obtain an individual 401 WQC from MassDEP to be eligible under these GPs. When an Individual 401 WQC is required for *PCN activities*, the prospective permittee shall submit their Individual 401 WQC application concurrently to MassDEP and USACE to comply with 40 CFR 121.
c. The prospective permittee is responsible for determining the appropriate 401 WQC requirement and submitting this information to the USACE at the time of their PCN application or when completing their SVN. Prospective permittees that are unsure of whether their activity has been certified should contact MassDEP for a determination.
d. As applicable, all activities shall be compliant with the Massachusetts Stormwater Handbook. The Stormwater Handbook can be accessed on the NAE Regulatory website here: https://www.nae.usace.army.mil/Missions/Regulatory/State-General-Permits/Massachusetts-General-Permit/.
e. No work requiring authorization under Section 404 of the CWA may be performed unless (1) the prospective permittee qualifies for coverage under the April 21, 2023 General 401 WQC, (2) the prospective permittee receives an individual Section 401 WQC from the MassDEP, or (3) the MassDEP waives individual Section 401 WQC.

9. Coastal Zone Management. The permittee must obtain CZM consistency concurrence when an activity is located in the coastal zone in order to be eligible under the MA GP. This requirement

shall be satisfied by acquiring one of the following from the Massachusetts Office of Coastal Zone Management (MA CZM):

a. General CZM Federal Consistency Concurrence (General Concurrence): MA CZM has granted General Concurrence for all SV and PCN activities for GPs 1-25. The prospective permittee must obtain all applicable permits and approvals before construction of the authorized activity begins (e.g., before work begins on site). For SVs, General Concurrence is automatically granted and no further action is required from the prospective permittee. For PCNs, the USACE will coordinate with MA CZM to acquire General Concurrence as part of the PCN application review.
b. Individual CZM Federal Consistency Concurrence (Individual Concurrence): In certain cases, MA CZM may elevate any GP activity 1-25 and require Individual Concurrence. The prospective permittee must contact MA CZM and follow the procedures to obtain Individual Concurrence as determined appropriate by MA CZM.
c. Permittees must obtain CZM consistency concurrence as outlined above before commencing work authorized under these GPs.

10. Federal Threatened and Endangered Species

a. No activity is authorized under any GP which is likely to directly or indirectly jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation, as identified under the Federal Endangered Species Act (ESA), or which will directly or indirectly destroy or adversely modify designated critical habitat or critical habitat proposed for such designation. No activity is authorized under any GP which "may affect" a listed species or critical habitat, unless ESA section 7 consultation addressing the consequences of the proposed activity on listed species or critical habitat has been completed. See 50 CFR 402.02 for the definition of "effects of the action" for the purposes of ESA section 7 consultation, as well as 50 CFR 402.17, which provides further explanation under ESA section 7 regarding "activities that are reasonably certain to occur" and "consequences caused by the proposed action."
b. Other Federal agencies should follow their own procedures for complying with the requirements of the ESA (see 33 CFR 330.4(f)(1)). If a PCN is required for the proposed activity, the Federal permittee must provide USACE with the appropriate documentation to demonstrate compliance with those requirements. The USACE will verify that the appropriate documentation has been submitted. If the appropriate documentation has not been submitted, additional ESA section 7 consultation may be necessary for the activity and the respective federal agency would be responsible for fulfilling its obligation under section 7 of the ESA.
c. USFWS ESA-Listed Species: Non-federal applicants shall use the USFWS website, Information for Planning and Consultation (IPAC), to determine if their activity is located within the ESA-listed species range. The IPAC website can be accessed on the NAE Regulatory website: https://www. nae.usace.army.mil/Missions/Regulatory/State-General-Permits/Massachusetts-General-Permit/. Applicants shall ensure they have an updated, valid species list before construction begins. This may require applicants to update their species list in IPAC before the start of construction. Note: Applicants should refer to the NAE Regulatory Website at the link above to determine if they have been designated as a non-federal representative. Applicants shall complete Section 7 consultation according to the guidance document located on the NAE Regulatory Website. After completing the Rangewide Determination Key and reaching the outcome "may affect, not likely to adversely affect", you may be required to wait up to 15 days before that outcome is final and compliance under Section 7 of the ESA is fulfilled.

i. *Self-Verification Criteria*: The activity is SV-eligible if:
   1) The activity is not located within the ESA-listed species range;
   2) Another (lead) Federal agency has completed Section 7 consultation; or
   3) The activity is located within the ESA-listed species range ***and*** USACE has designated the applicant as a non-federal representative under 50 CFR 402.08 of the ESA for all

species within the project's action area. As the non-federal representative, the applicant shall complete consultation through IPAC and reach the outcome of "no effect" or "not likely to adversely affect".

ii. *Pre-Construction Notification Criteria*: The activity requires a PCN if:

1) The activity is located within the ESA-listed species range ***and*** USACE has NOT designated the applicant as a non-federal representative under 50 CFR 402.08 of the ESA for all species within the project's action area;

2) The activity is located in designated or proposed critical habitat; or

3) The activity is located within the ESA-listed species range and completion of the IPAC determination key has resulted in the outcome of "may affect" or "may affect, likely to adversely affect"; or

4) A PCN is required elsewhere in this document.

d. NOAA-Listed Species: Non-federal applicants shall refer to the Section 7 Mapper for federally listed species to determine if any species are mapped as present. When NOAA-listed species are present, the applicant shall generate a species report through the mapper and submit this document as part of their PCN or SVN submission. The NOAA Fisheries' Section 7 Mapper can be accessed here on the NAE Regulatory website here: https://www.nae.usace.army.mil/Missions/Regulatory/State-General-Permits/Massachusetts-General-Permit/.

e. Authorization of an activity by an GP does not authorize the "take" of a threatened or endangered species as defined under the ESA. In the absence of separate authorization (e.g., an ESA Section 10 Permit, a Biological Opinion with "incidental take" provisions, etc.) from the FWS or the NMFS, the Endangered Species Act prohibits any person subject to the jurisdiction of the United States to take a listed species, where "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. The word "harm" in the definition of "take" means an act which actually kills or injures wildlife. Such an act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering.

11. Essential Fish Habitat (EFH).

a. SV eligible activities have been determined to result in no more than minimal adverse effects, provided the permittee complies with all terms and conditions of the MA GP as appliable to the activity. NMFS has granted General Concurrence [50 CFR 600.920(g)] for all SV eligible activities. These activities do not require project specific EFH consultation.

b. For PCN required activities, the applicant is required to describe and identify potential adverse effects to EFH and should refer to NOAA Fisheries' EFH Mapper (http://www.fisheries.noaa.gov/resource/map/essential-fish-habitat-mapper) and Omnibus Essential Fish Habitat Amendment 2 Volume 2: EFH and HAPC Designation Alternatives and Environmental Impacts (https://www.habitat.noaa.gov/application/efhmapper/oa2_efh_hapc.pdf). If an activity is located within EFH, the PCN application must contain:

1. A description of the action located in EFH.
2. An analysis of the potential adverse effects of the action on EFH and the managed Species.
3. Conclusions regarding the effects of the action on EFH.
4. Proposed mitigation, if applicable (refer to the mitigation thresholds located in Section V).

c. Federal agencies shall follow their own procedures for complying with the EFH requirements of the Magnuson-Stevens Fishery Conservation and Management Act. For activities requiring a PCN, the applicant is responsible for furnishing documentation that demonstrates consultation for EFH has been completed.

d. For PCN activities, no work may commence until EFH consultation as required by the Magnuson-Stevens Act has been completed.

12. National Lands. Activities that impinge upon the value of any National Wildlife Refuge, National Forest, National Marine Sanctuary, National Historic Landmarks or any other area administered by the National Park Service, U. S. Fish and Wildlife Service (USFWS) or U.S. Forest Service (USFS) require a PCN or Individual Permit. Federal land managers seeking authorization for activities located in the above listed National Lands may proceed under SV, unless a PCN is required elsewhere in this document.

13. Wild and Scenic Rivers. The following activities in designated river or study river segments in the National Wild and Scenic River (WSR) System require a PCN unless the Federal agency with direct management responsibility for such river, in Massachusetts this is generally the National Park Service, has determined in writing to the proponent that the proposed work will not adversely affect the WSR designation or study status:

a. Activities that occur in WSR segments, in and 0.25 miles up or downstream of WSR segments, or in tributaries within 0.25 miles of WSR segments;
b. Activities that occur in wetlands within 0.25 miles of WSR segments;
c. Activities that have the potential to alter free-flowing characteristics in WSR segments.

No GP activity may occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a “study river” for possible inclusion in the system while the river is in an official study status, unless the appropriate Federal agency with direct management responsibility for such river, has determined in writing that the proposed activity will not adversely affect the Wild and Scenic River designation or study status.

As of May 10, 2023, affected rivers in Massachusetts include: the Taunton River (40 miles), Sudbury River (16.6 miles), Assabet River (4.4 miles), Concord River (8 miles), Nashua River (27 miles), Squannacook River (16.3 miles), Nissitissit River (4.7 miles), and the Westfield River, including West Branch, Middle Branch, Gendale Brook, East Branch, Drowned Land Brook, Center Brook, Windsor Jambs Brook, Shaker Mill Brook, Depot Brook, Savery Brook, Watson Brook, Center Pond Brook (78.1 miles). The most up to date list of designated and study rivers and their descriptions may be obtained from the appropriate Federal land management agency responsible for the designated Wild and Scenic River or study river (e.g., National Park Service, U.S. Forest Service, Bureau of Land Management, U.S. Fish and Wildlife Service). Information on these rivers is also available at: http://www.rivers.gov/.

14. Historic Properties

a. For all SV and PCN applications, permittees shall follow the guidance set forth in Appendix A, Guidance for NHPA Section 106 Compliance in Massachusetts.

b. No undertaking authorized by these GPs shall cause effects[1] (defined in 36 CFR Part 800 and 33 CFR Part 325, Appendix C, and its Interim Guidance) on properties listed on, determined to be eligible for listing on, or potentially eligible for listing on the National Register of Historic Places (NRHP)[2], including previously unknown historic properties within the permit area, unless the USACE or another Federal action agency has satisfied the consultation requirements of Section 106 of the National Historic Preservation Act (Section 106). If another Federal agency is determined the lead federal agency for compliance with Section 106, applicant must obtain the appropriate documentation and provide this information to the USACE to demonstrate compliance with Section 106. The applicant shall not begin the activity until the USACE notifies them in writing that the documentation provided satisfies Section 106 requirements.

[1] Effect means the alteration to the characteristics of a historic property qualifying it for inclusion in or eligibility for the National Register of Historic Properties.
[2] See the NAE Regulatory website, National Register of Historic Places link here: https://www.nae.usace.army.mil/Missions/Regulatory/State-General-Permits/Massachusetts-General-Permit/.

c. Many historic properties are not listed on the NRHP and may require identification and evaluation by qualified historic preservation and/or archaeological consultants. The State Historic Preservation Officer (SHPO), Massachusetts Board of Underwater Archaeological Resources (BUAR), local historical societies, certified local governments, general public, and NRHP may also be able to assist with locating information on:

i. Previously identified historic properties; and
ii. Areas with potential for the presence of historic properties.

d. Discovery of Previously Unknown Remains and Artifacts: If any previously unidentified human remains, cultural deposits, or artifacts are discovered while accomplishing the activity authorized by this permit, you must immediately notify the USACE of what you have found, and to the maximum extent practicable, cease work and avoid construction activities that may affect the remains and artifacts until the required coordination has been completed. The USACE will initiate the Federal, State and tribal coordination required to determine if the items or remains warrant a recovery effort and/or if the site is eligible for listing in the National Register of Historic Places.

e. Section 110k: Prospective permittees should be aware that section 110k of the NHPA (54 U.S.C. § 306113) prevents the USACE from granting a permit or other assistance to an applicant who, with intent to avoid the requirements of Section 106, has intentionally significantly adversely effected a historic property to which the permit would relate, or having legal power to prevent it, allowed such significant adverse effect to occur, unless the USACE, after consultation with the Advisory Council on Historic Preservation (ACHP), determines that circumstances justify granting such assistance despite the adverse effect created or permitted by the applicant. If circumstances justify granting the assistance, the USACE is required to notify the ACHP and provide documentation specifying the circumstances, the degree of damage to the integrity of any historic properties effected, and proposed mitigation. This documentation must include any views obtained from the applicant, SHPO/THPO, appropriate Indian tribes if the undertaking occurs on or effects historic properties on tribal lands or effects properties of interest to those tribes, and other parties known to have a legitimate interest in the impacts to the permitted activity on historic properties.

f. Underwater Archaeological Resources: Under Massachusetts General Law Ch. 6, s.'s 179-180, and Ch. 91, s. 63, the BUAR has statutory jurisdiction within state waters and is the sole trustee of the Commonwealth's underwater heritage, charged with the responsibility of encouraging the discovery and reporting, as well as the preservation and protection, of underwater archaeological resources. Underwater archaeological resources located within the waters of the Commonwealth of Massachusetts are property of the Commonwealth, which holds title to these resources and retains regulatory authority over their use. Under Massachusetts General Law, no person, organization or corporation may "remove, displace, damage, or destroy" any underwater archaeological resources located within the Commonwealth's submerged lands except through consultation with the BUAR and in conformity with the permits it issues. https://www.mass.gov/orgs/board-of-underwater-archaeological-resources.

15. USACE Property and Federal Projects. (33 USC §408)

a. USACE projects and property can be found at: https://www.nae.usace.army.mil/Missions/Civil-Works/.

b. In addition to any authorization under these GPs, prospective permittee shall contact the USACE Real Estate Division (https://www.nae.usace.army.mil/Missions/Real-Estate-Division/) at (978) 318-8585 for work occurring on or potentially affecting USACE properties and/or USACE-controlled easements. Work may not commence on USACE properties and/or USACE-controlled easements until they have received any required USACE real estate documents evidencing site-specific permission to work.

c. Any proposed temporary or permanent occupation or alteration of a Federal project (including, but not limited to, a levee, dike, floodwall, channel, anchorage, breakwater, seawall, bulkhead, jetty, wharf, pier, or other work built or maintained but not necessarily owned by the United States),

is not eligible for SV and requires a PCN. This includes all proposed structures and work in, over, or under a USACE federal navigation project (FNP) or in the FNP's buffer zone. The buffer zone is an area that extends from the horizontal limits of the FNP to a distance of three times the FNP's authorized depth. The activity also requires review and approval by the USACE pursuant to 33 USC 408 (Section 408 Permission). The prospective permittee may reach out to the POCs located here: https://www.nae.usace.army.mil/ Missions/Section-408/.
d. Any structure or work constructed in a FNP or its buffer zone shall be subject to removal at the owner's expense prior to any future USACE dredging or the performance of periodic hydrographic surveys.
e. Where a Section 408 permission is required, written verification for the PCN will not be issued prior to the decision on the Section 408 permission request.

16. Navigation
a. No activity may cause more than a minimal adverse effect on navigation.
b. Any safety lights and signals prescribed by the U.S. Coast Guard, must be installed, and maintained at the permittee's expense on authorized facilities in navigable waters of the U.S.
c. There shall be no unreasonable interference with navigation by the existence or use of the activity authorized herein, and no attempt shall be made by the permittee to prevent the full and free use by the public of all navigable waters at or adjacent to the activity authorized herein.
d. The permittee understands and agrees that if future U.S. operations require the removal, relocation, or other alteration of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from USACE, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the U.S. No claim shall be made against the U.S. on account of any such removal or alteration.

17. Permit/Authorization Letter On-Site. For PCNs, the permittee shall ensure that a copy of these GPs and the accompanying authorization letter are at the work site (and the project office) whenever work is being performed, and that all personnel with operational control of the site ensure that all appropriate personnel performing work are fully aware of its terms and conditions. The entire permit authorization shall be made a part of any and all contracts and sub-contracts for work that affects areas of USACE jurisdiction at the site of the work authorized by these GPs. This shall be achieved by including the entire permit authorization in the specifications for work. The term "entire permit authorization" means these GPs, including GCs and the authorization letter (including its drawings, plans, appendices, special conditions, and other attachments), and any permit modifications. If the authorization letter is issued after the construction specifications, but before receipt of bids or quotes, the entire permit authorization shall be included as an addendum to the specifications. If the authorization letter is issued after receipt of bids or quotes, the entire permit authorization shall be included in the contract or sub-contract as a change order. Although the permittee may assign various aspects of the work to different contractors or sub-contractors, all contractors and sub-contractors shall be obligated by contract to comply with all environmental protection provisions contained within the entire authorization letter, and no contract or sub-contract shall require or allow unauthorized work in areas of USACE jurisdiction. For SVs, the permittee shall ensure that a complete and signed copy of the SVN is present on site during construction and is made available for review at any time by USACE and other Federal, State, & Local regulatory agencies. A complete and signed copy of the SVN must be submitted to USACE Regulatory within 30 days of initiating construction of the authorized activity, unless stated otherwise in the applicable GP.

18. Storage of Seasonal Structures. Coastal structures such as pier sections, floats, etc., that

are removed from the waterway for a portion of the year (often referred to as seasonal structures) shall be stored in an upland location, located above MHW and not in tidal wetlands. These seasonal structures may be stored on the fixed, pile-supported portion of the structure that is seaward of MHW. This is intended to prevent structures from being stored on the marsh substrate and the substrate seaward of MHW.

19. Pile Driving and Pile Removal in Navigable Waters.
a. Derelict, degraded or abandoned piles and sheet piles in navigable waters of the U.S., except for those inside existing work footprints for piers, must be completely removed, cut and/or driven to 3 feet below the substrate to prevent interference with navigation, and existing creosote piles that are affected by project activities shall be completely removed if practicable. In areas of fine-grained substrates, piles must be removed by the direct, vibratory or clamshell pull method[1] to minimize sedimentation and turbidity impacts and prevent interference with navigation from cut piles. Removed piles shall be disposed of in an upland location landward of MHW or OHW and not in wetlands, tidal wetlands or mudflats.
b. A PCN is required for the installation or removal of structures with jetting techniques.
c. A PCN is required for the installation of >12 inch-diameter piles of any material type or steel piles of any size in tidal waters, unless they are installed in the dry. If piles are not installed in the dry:
i. Impact pile driving shall commence with an initial set of three strikes by the hammer at 40% energy, followed by a one-minute wait period, then two subsequent 3-strike sets at 40% energy, with one minute waiting periods, before initiating continuous impact driving.
ii. Vibratory pile driving shall be initiated for 15 seconds at reduced energy followed by a one-minute waiting period. This sequence of 15 seconds of reduced energy driving, one-minute waiting period shall be repeated two more times, followed immediately by pile-driving at full rate and energy.
iii. In addition to using a soft start at the beginning of the workday for pile driving as described in 19c(i-ii), a soft start must also be used at any time following a cessation of pile driving for a period of 30 minutes or longer.
d. Bubble curtains may be used to reduce sound pressure levels during vibratory or impact hammer pile driving.

20. Time-of-Year (TOY) Restrictions. Activities that include in-water work must comply with the TOY Restrictions below to be SV eligible, otherwise a PCN is required. PCN submittals shall contain written justification for deviation from the TOY Restrictions. The term “in-water work” does not include conditions where the work site is “in-the-dry” (e.g., intertidal areas exposed at low tide). The term “in-the-dry” includes work contained within a cofferdam so long as the cofferdam is installed and subsequently removed outside the TOY Restriction. The TOY restrictions stated in Appendix B of the MA DMF Technical Report TR-47[2] can apply instead for activities in tidal waters if (1) TOYs are provided for a specific waterbody where the activity is proposed and (2) the TOYs are less restrictive than below. The activity must also not require a PCN elsewhere in this document to be SV eligible.

[1] Direct Pull: Each piling is wrapped with a choker cable or chain that is attached at the top to a crane. The crane then pulls the piling directly upward, removing the piling from the sediment. Vibratory Pull: The vibratory hammer is a large mechanical device (5-16 tons) that is suspended from a crane by a cable. The vibrating hammer loosens the piling while the crane pulls up. Clamshell Pull: This can remove intact, broken or damaged pilings. The clamshell bucket is a hinged steel apparatus that operates like a set of steel jaws. The bucket is lowered from a crane and the jaws grasp the piling stub as the crane pulls up. The size of the clamshell bucket is minimized to reduce turbidity during piling removal.
[2] The MA DMF Technical Report TR-47: https://www.nae.usace.army.mil/Missions/Regulatory/State-General-Permits/Massachusetts-General-Permit/

	TOY Restriction (No work)
Non-tidal Waters	Defer to TR-47
Tidal Waters	January 15 – November 15

Alternate work windows proposed under a PCN will generally be coordinated with the USFWS and NMFS. Resulting written verifications may include species-specific work allowed windows.

21. Heavy Equipment in Wetlands. Operating heavy equipment (drill rigs, fixed cranes, etc.) within wetlands shall be minimized, and such equipment shall not be stored, maintained, or repaired in wetlands, to the maximum extent practicable. Where construction requires heavy equipment operation in wetlands, the equipment shall:

i. Have low ground pressure (typically ≤3 psi);

ii. Be placed on swamp/construction/timber mats (herein referred to as "construction mats" or "mats") that are adequate to support the equipment in such a way as to minimize disturbance of wetland soil and vegetation. See GC 22 for information on the placement of construction mats; or

iii. Be operated on adequately dry or frozen wetlands such that shear pressure does not cause subsidence of the wetlands immediately beneath the equipment and upheaval of adjacent wetlands. Construction mats are to be placed in the wetland from the upland or from equipment positioned on mats if working within a wetland. Dragging construction mats into position is prohibited. Other support structures that are capable of safely supporting equipment may be used with written USACE authorization.

22. Temporary Fill, Work & Construction Mats.

a. *Construction mats in non-tidal waters*: Temporary construction mats shall be in place ≤1 year *and* for one growing season or less to be SV eligible. A PCN is required if construction mats are in place >1 year *or* for more than one growing season. Construction mats can be placed in an area of any size in non-tidal waters. The activity may occur in segments to ensure the requirements for SV above are met, otherwise a PCN is required.

b. *Construction mats in tidal waters*: Temporary construction mats placed in an area <5,000 SF in tidal waters are SV eligible, provided those mats are in place ≤6 months. Temporary construction mats placed in an area ≥5,000 SF or in place >6 months in tidal waters require a PCN.

c. *Management of construction mats:* At a minimum, construction mats shall be managed in accordance with the following construction mat best management practices (BMPs):

1. Mats shall be in good condition to ensure proper installation, use, and removal.
2. As feasible, mats shall be placed in a location that will minimize the amount of mats needed for the wetland crossing(s).
3. Inspect mats prior to their re-use and remove any plant debris. Mats are to be thoroughly cleaned before re-use to prevent the spread of invasive plant species.
4. Impacts to wetland areas shall be minimized during installation, use, and removal of the mats.
5. Adequate erosion & sediment controls shall be installed at approaches to mats to promote a smooth transition to, and minimize sediment tracking onto, the mats.
6. In most cases, mats should be placed along the travel area so that the individual boards are resting perpendicular to the direction of traffic. No gaps should exist between mats. Place mats far enough on either side of the resource area to rest on firm ground.

d. A PCN is required for temporary fills in place >2 years. All temporary fills and disturbed soils shall be stabilized to prevent the material from eroding into waters of the U.S. where it is not authorized. Work shall include phased or staged development to ensure only areas under active development are exposed and to allow for stabilization practices as soon as practicable. Temporary fill must be placed in a manner that will prevent it from being eroded by expected high flows.

e. Activities that require unconfined temporary fill and are authorized for discharge into waters of the U.S. shall consist of material that minimizes effects to water quality.
f. Appropriate measures must be taken to maintain normal downstream flows and minimize flooding to the maximum extent practicable when temporary structures, work, and discharges of dredged or fill material, including cofferdams, are necessary for construction activities, access fills, or dewatering of construction sites. Materials shall be placed in a location and manner that does not adversely impact surface or subsurface water flow into or out of the wetland. Temporary fill authorized for discharge into wetlands shall be placed on geotextile fabric or other appropriate material laid on the pre-construction wetland grade where practicable to minimize impacts and to facilitate restoration to the original grade. Construction mats are excluded from this requirement.
g. Construction debris and deteriorated materials shall not be located in waters of the U.S.
h. Temporary fills, construction mats, and corduroy roads shall be entirely removed as soon as they are no longer needed to construct the authorized activity and the disturbed areas be restored to pre-construction contours and conditions.
i. Construction equipment, such as temporary barges in tidal waters, shall provide clearance above the substrate to avoid grounding onto the substrate during all tides.

23. Restoration of Wetland Areas.
a. Upon completion of construction, all disturbed wetland areas shall be stabilized with a wetland seed mix or plant plugs containing only plant species native to New England, and be appropriate for site conditions, including salinity and frequency of inundation, and shall not contain any species listed in the “Invasive and Other Unacceptable Plant Species” Appendix K of the New England District “Compensatory Mitigation Standard Operating Procedures” found at https://www.nae.usace.army.mil/Missions/Regulatory/Mitigation.aspx.
b. The introduction or spread of invasive plant species in disturbed areas shall be prevented and controlled. Equipment shall be thoroughly cleaned before and after project construction to prevent the spread of invasive species. This includes, but is not limited to, tire treads and construction mats.
c. In areas of authorized temporary disturbance, if trees are cut in USACE jurisdiction, they shall be cut at or above ground level and not uprooted in order to prevent disruption of any kind to the wetland soil structure and to allow stump sprouts to revegetate the work area, unless otherwise authorized.
d. Wetland areas where permanent disturbance is not authorized shall be restored to their original condition and elevation, which under no circumstances shall be higher than the pre-construction elevation. Original condition means careful protection and/or removal of existing soil and vegetation, and replacement back to the original location such that the original soil layering and vegetation schemes are approximately the same, unless otherwise authorized.

24. Bank Stabilization.
a. Projects involving construction or reconstruction/maintenance of bank stabilization within USACE jurisdiction shall be designed to minimize environmental effects, effects to neighboring properties, scour, conversion of natural shoreline to hard armoring, etc. to the maximum extent practicable.
b. Projects involving the construction of new bank stabilization within USACE jurisdiction shall use bioengineering techniques and natural materials in the project design to the maximum extent practicable. Use of hard structures shall be eliminated or minimized unless the prospective permittee can demonstrate that use of bioengineering techniques is not practicable due to site conditions.
c. Where possible, bank stabilization projects shall optimize the natural function of the shoreline, including self-sustaining stability to attenuate flood flows, fishery, wildlife habitat and water quality protection, while protecting upland infrastructure from storm events that can cause erosion as well as impacts to public and private property.
d. No material shall be placed in excess of the minimum needed for erosion protection.
e. No material shall be placed in a manner that will be eroded by normal or expected high flows (properly anchored native trees and treetops may be used in low energy areas).

f. Native plants appropriate for current site conditions, including salinity, must be used for bioengineering or vegetative bank stabilization.
g. The activity must be properly maintained, which may require repairing it after severe storms or erosion events.

25. Soil Erosion and Sediment Controls.
a. Appropriate soil erosion and sediment controls[1] (hereinafter referred to as "controls") must installed prior to earth disturbance and maintained in effective operating condition during construction. Biodegradable wildlife friendly erosion controls should be used whenever practicable to minimize effects to water quality.
b. Activities in streams (rivers, streams, brooks, etc.) and tidal waters that are capable of producing sedimentation or turbidity should be done during periods of low-flow or no-flow, when the stream or tide is waterward of the work area. Controls may also be used to obtain dry work conditions (e.g., coffer dam, turbidity curtain). The prospective permittee must demonstrate in the project plans where the controls are proposed and how these controls would avoid and/or minimize turbidity or sedimentation.
c. A PCN is required for controls that encroach: i) >25% of the stream width measured from OHW in non-tidal diadromous streams from March 15 to June 30; or ii) >25% of the waterway width measured from MHW in tidal waters from Feb. 1 to June 30, or >50% of the waterway width measured from MHW in tidal waters from July 1 to Jan. 14. This is to protect upstream fish passage. Proponents must also maintain downstream fish passage throughout the project.
d. No dewatering shall occur with direct discharge to waters or wetlands. Excess water in isolated work areas shall be pumped or directed to a sedimentation basin, tank or other dewatering structures in an upland area adequately separated from waters or wetlands. Suspended solids shall be removed prior to discharge back into waters or wetlands from these dewatering structures. All discharge points back into waters and wetlands shall use appropriate energy dissipaters and erosion and sedimentation control BMPs.
e. Temporary controls shall be removed upon completion of work, but not until all exposed soil and other fills, as well as any work waterward of OHW or the HTL, are permanently stabilized at the earliest practicable date. Sediment and debris collected by these devices shall be removed and placed at an upland location in a manner that will prevent its later erosion into a waterway or wetland. Controls may be left in place if they are biodegradable and flows and aquatic life movements are not disrupted.

26. Aquatic Life Movements and Management of Water Flows.
a. No activity may substantially disrupt the necessary life cycle movements of those species of aquatic life indigenous to the waterbody, including those species that normally migrate through the area, unless the activity's primary purpose is to impound water. All permanent and temporary crossings of waterbodies and wetlands shall be:
   i. Suitably spanned, bridged, culverted, or otherwise designed and constructed to maintain low flows to sustain the movement of those aquatic species; and
   ii. Properly aligned and constructed to prevent bank erosion or streambed scour both adjacent to and inside the crossing.

[1] Appropriate soil erosion, sediment and turbidity controls include cofferdams, bypass pumping around barriers immediately up and downstream of the work footprint (i.e., dam and pump), installation of sediment control barriers (i.e., silt fence, vegetated filter strips, geotextile silt fences, filter tubes, erosion control mixes, hay bales or other devices) downhill of all exposed areas, stream fords, retention of existing vegetated buffers, application of temporary mulching during construction, phased construction, and permanent seeding and stabilization, etc.

b. To avoid adverse impacts on aquatic organisms, the low flow channel/thalweg shall remain unobstructed during periods of low flow, except when necessary to perform the authorized work.
c. For work in tidal waters, in-stream controls (e.g., cofferdams) should be installed in such a way as to not obstruct fish passage.
d. Riprap and other stream bed materials shall be installed in a manner that avoids organism entrapment in rock voids or water displaced to subterranean flow with crushed stone and riprap.
e. To the maximum extent practicable, the preconstruction course, condition, capacity, and location of open waters must be maintained for each activity, including stream channelization, storm water management activities, and temporary and permanent road crossings, except as provided below. The activity must be constructed to withstand expected high flows. The activity shall not restrict or impede the passage of normal or high flows unless the primary purpose of the activity is to impound water or manage high flows. The activity may alter the pre-construction course, condition, capacity, and location of open waters if it benefits the aquatic environment (e.g., stream restoration or relocation activities).

27. Spawning, Breeding, and Migratory Areas.
a. Activities in spawning areas during spawning seasons must be avoided to the maximum extent practicable. Activities that result in the physical destruction (e.g., through excavation, fill, or downstream smothering by substantial turbidity) of an important spawning area are not authorized under these GPs.
b. Activities in waters of the U.S. that serve as breeding areas for migratory birds must be avoided to the maximum extent practicable.
c. The applicant is responsible for obtaining any "take" permits required under the USFWS's regulations governing compliance with the Migratory Bird Treaty Act or the Bald and Golden Eagle Protection Act. The applicant should contact the appropriate local office of the USFWS to determine if such "take" permits are required for a particular activity.
d. Information on spawning habitat for species managed under the Magnuson-Stevens Fishery Conservation and Management Act (i.e., EFH for spawning adults) can be obtained from NAE Regulatory website, Essential Fish Habitat section, at: https://www.nae.usace.army.mil/Missions/Regulatory/State-General-Permits/Massachusetts-General-Permit/.
e. Information regarding diadromous fish habitat can be obtained from the following DMF website at: https://www.mass.gov/info-details/massgis-data-diadromous-fish.

28. Vernal Pools.
a. A PCN is required if a discharge of dredged or fill material is proposed within a vernal pool depression that is also a water of the U.S.
b. Vernal pools must be identified on the plans that show aquatic resource delineations.
c. Adverse impacts to vernal pools shall be avoided & minimized to the maximum extent practicable.

29. Invasive Species.
a. The introduction, spread or the increased risk of invasion of invasive plant or animal species on the project site, into new or disturbed areas, or areas adjacent to the project site caused by the site work shall be avoided. Construction mats shall be thoroughly cleaned before reuse to avoid spread of invasive species.
b. Unless otherwise directed by USACE, all applications for PCN non-tidal projects proposing fill in USACE jurisdiction shall include an Invasive Species Control Plan. Additional information can be found at: https://www.nae.usace.army.mil/Missions/Regulatory/Invasive-Species/, https://www.nae.usace.army.mil/Missions/Regulatory/Mitigation/.

30. Fills Within 100-Year Floodplains. The activity shall comply with applicable Federal Emergency Management Agency (FEMA) approved, Massachusetts Emergency Management

Agency (MEMA) approved and/or local floodplain management requirements. Applicants should contact FEMA and/or MEMA regarding floodplain management requirements.

31. Stream Work and Crossings & Wetland Crossings.
a. When feasible, all temporary and permanent crossings of waterbodies and wetlands (hereinafter referred to as "crossings") shall conform to the "Massachusetts River and Stream Crossing Standards" located at: https://www.mass.gov/doc/massachusetts-river-and-stream-crossing-standards/download or https://www.nae.usace.army.mil/Missions/Regulatory/State-General-Permits/Massachusetts-General-Permit/. Projects that do not conform to these guidelines shall be reviewed under PCN or IP procedures.
b. Crossings shall be suitably culverted, bridged, or otherwise designed to withstand and to prevent the restriction of high flows, to maintain existing low flows, maintain water quality, and not obstruct the movement of aquatic life indigenous to the waterbody beyond the duration of construction.
c. Crossings shall be installed in such a manner as to preserve hydraulic capacity and flow, sediment transport, and organism passage at its present level, between the wetlands on either side of the road. The applicant shall take necessary measures to correct any wetland damage resulting from deficiencies in hydraulic capacity, sediment transport and organism passage.
d. Stream crossings shall utilize a natural mixed grain-size streambed material composition that matches upstream and downstream substrates to create a stable streambed. Substrate should function appropriately during normal and high flows without washing out. If natural streambed material is not utilized, a PCN is required.
e. Activities involving open trench excavation in flowing waters require a PCN. Work should not occur in flowing waters (requires using management techniques such as temporary flume pipes, culverts, cofferdams, etc.). Normal flows should be maintained within the stream boundary's confines when practicable. Projects utilizing these management techniques must meet all applicable terms and conditions of the GP, including the GCs in Section IV.

32. Utility Line Installation and Removal
a. Subsurface utility lines must be installed at a sufficient depth to avoid damage from anchors, dredging, etc., and to prevent exposure from erosion and stream adjustment.
b. When utility lines are installed via horizontal directional drilling, a frac-out contingency plan shall be present on site for the duration of construction. As necessary, the applicant shall immediately contain, control, recover, and remove drilling fluids released into the environment.
c. Abandoned or inactive utility lines must be removed and faulty lines (e.g., leaking hazardous substances, petroleum products, etc.) must be removed or repaired. A written verification from the USACE is required if they are to remain in place, e.g., to protect sensitive areas or ensure safety.
d. Utility lines shall not adversely alter existing hydrology, and trenches cannot be constructed or backfilled in such a manner as to drain waters of the U.S. (e.g., backfilling with extensive gravel layers, creating a French drain effect). In wetland areas, structures such as ditch plugs, cut-off walls, clay blocks, bentonite, or other suitable material shall be used within utility trenches to ensure that the trench through which the utility line is installed does not drain waters of the U.S. including wetlands.
e. Stockpiling of tree debris, to the extent where it has the effect of fill material, shall not occur in waters of the U.S. Tree debris shall be removed from waters of the U.S. and placed in uplands without causing additional disturbance to aquatic resources. Failure to meet this condition could change the bottom elevation of the wetland and be considered a discharge of fill material, and depending on the area of alteration, may require a PCN or IP.

33. Water Supply Intakes. No activity may occur in the proximity of a public water supply intake, except where the activity is for the repair or improvement of public water supply intake structures or adjacent bank stabilization.

34. Coral Reefs. Impacts to coral reefs are not authorized under these GPs. Coral reefs consist of the skeletal deposit, usually of calcareous or silicaceous materials, produced by the vital activities of anthozoan polyps or other invertebrate organisms present in growing portions of the reef.

35. Blasting. Blasting in waters of the U.S. associated with work such as dredging, trenching, pile installation, etc. is not authorized under these GPs.

36. Inspections. The permittee shall allow USACE to make periodic inspections at any time deemed necessary to ensure that the work is being or has been performed in accordance with the terms and conditions of this permit. To facilitate these inspections, for activities requiring a PCN, the permittee shall complete and return the Certificate of Compliance when it is provided with a PCN verification letter. For SV-eligible activities, the permittee shall complete and submit the SVN to USACE within 30 days of initiating project construction, at which point, USACE may opt to inspect the activity to verify compliance with the terms and conditions of the GP. Post-construction engineering drawings may be required by USACE for completed work. This includes post-dredging survey drawings for any dredging work.

37. Maintenance. The permittee shall maintain the activity authorized by these GPs in good condition and in conformance with the terms and conditions of this permit. Some maintenance activities may not be subject to federal regulation under Section 404 in accordance with 33 CFR 323.4(a)(2). This condition is not applicable to maintenance of dredging projects. Prospective permittees should contact USACE to inquire about maintenance of dredging projects, and its eligibility under these GPs. Maintenance dredging is subject to the review thresholds in GP #7 as well as any conditions included in a written USACE authorization. Maintenance dredging includes only those areas and depths previously authorized and dredged.

38. Property Rights. Per 33 CFR 320.4(g)(6), these GPs do not convey any property rights, either in real estate or material, or any exclusive privileges, nor do they authorize any injury to property or invasion of rights or any infringement of Federal, State, or local laws or regulations.

39. Transfer of GP Verifications. When the work authorized by these GPs is still in existence at the time the property is transferred, the terms and conditions of these GPs, including any special conditions, will continue to be binding on the entity or individual who received the GP authorizations, as well as the new owner(s) of the property. If the permittee sells the property associated with a GP authorization, the applicant may transfer the GP authorization to the new owner by submitting a letter to USACE to validate the transfer. A copy of the GP authorization letter must be attached to the letter, and the letter must include the following statement: “The terms and conditions of these general permits, including any special conditions, will continue to be binding on the new owner(s) of the property.” This letter shall be signed by both the seller and new property owner(s).

40. Modification, Suspension, and Revocation. These GPs and any individual authorization issued thereof may be either modified, suspended, or revoked in whole or in part pursuant to the policies and procedures of 33 CFR 325.7; and any such action shall not be the basis for any claim for damages against the U.S.

41. Special Conditions. The USACE may impose other special conditions on a project authorized pursuant to these GPs that are determined necessary to minimize adverse navigational and/or environmental effects or based on any other factor of the public interest. Failure to comply with all conditions of the authorization, including special conditions, constitutes a permit violation and may subject the applicant to criminal, civil, or administrative penalties or restoration.

42. False or Incomplete Information. If USACE makes a determination regarding the eligibility of a project under these GPs, and subsequently discovers that it has relied on false, incomplete, or inaccurate information provided by the applicant, the authorization will not be valid, and the U.S. Government may institute appropriate legal proceedings.

43. Abandonment. If the permittee decides to abandon the activity authorized under these GPs, unless such abandonment is merely the transfer of property to a third party, he/she/they may be required to restore the area to the satisfaction of USACE.

44. Enforcement cases. These GPs do not apply to any existing or proposed activity in USACE jurisdiction associated with an on-going USACE or EPA enforcement action, until such time as the enforcement action is resolved or USACE or EPA determines that the activity may proceed independently without compromising the enforcement action.

45. Previously Authorized Activities.
a. Completed projects that received prior authorization from USACE (SV or PCN), shall remain authorized in accordance with the original terms and conditions of those authorizations, including their terms, GCs, and any special conditions provided in a written verification.
b. Activities authorized pursuant to 33 CFR 330.3 (activities occurring before certain dates) are not affected by these GPs.

46. Duration of Authorization.
These GPs expire on June 1, 2028. Activities authorized under these GPs will remain authorized until the GPs expire, unless discretionary authority has been exercised on a case-by-case basis to modify, suspend, or revoke the authorization in accordance with 33 CFR 325.2(e)(2). Activities authorized under GPs 1-25 that have either commenced (i.e., are under construction) or are under contract to commence in reliance upon this authorization will have until June 1, 2029 to complete the work. If requested by USACE, the permittee shall furnish documentation that demonstrates the project was under construction or under contract to commence by June 1, 2028. If work is not completed before June 1, 2029, the permittee must contact USACE. The USACE may issue a new authorization provided the project meets the terms and conditions of the MA GPs in effect at the time. Activities completed under the SV or PCN authorizations of these GPs will continue to be authorized after their expiration date.

SECTION V: MITIGATION STANDARDS

1. Mitigation Types

For all activities, applicants must (a) demonstrate how the project has been designed to avoid or minimize impacts to aquatic resources; and (b) describe measures taken to avoid or minimize impacts to aquatic resources through construction techniques and/or site access. Please see https://www.nae.usace.army.mil/Missions/Regulatory/Mitigation/ for assistance with preparing mitigation in accordance with the 2008 Compensatory Mitigation for Losses of Aquatic Resources; Final Rule (33 CFR 332.3), hereafter referred to as "2008 Mitigation Rule."

Avoidance - Avoidance of impacts (direct and indirect) to aquatic resources means that project activities would not result in the placement of fill material or installation of a structure that could impact the resource area. Avoidance can include, but is not limited to, designing the project to avoid impacts to all or a portion of the aquatic resource areas.

Minimization - Minimization of impacts (direct and indirect) to aquatic resources means that measures are taken to ensure the amount and duration of impacts are limited to the maximum extent practicable. There are many minimization measures that could be implemented, prior to, during, or after the proposed activity, to ensure impacts are minimized. Examples include, but are not limited to:

- Permanent preservation of avoided aquatic features and buffer zone, in perpetuity. In these cases, the preserved area would be under a conservation easement and managed by conservation oriented third-party manager.
- Utilization of best management practices (BMPs) to ensure impacts are limited, and do not result in adverse impacts to the integrity and long-term functions of preserved/avoided features.

Compensatory Mitigation - Compensatory mitigation is generally required for PCN activities in which the impacts to the aquatic resources have been avoided and minimized to the maximum extent practicable but would still result in unavoidable adverse effects to the environment that are considered more than minimal or are contrary to the public interest. *Whatever the case may be, compensatory mitigation is no substitute for avoidance and minimization.*

2. Thresholds for Compensatory Mitigation

The basic objective of compensatory mitigation in the USACE Regulatory Program is to offset environmental losses resulting from unavoidable impacts to waters of the U.S. authorized by Department of the Army permits. **The following compensatory mitigation thresholds apply to all PCN activities that result in loss[1] of the resource area types listed below. Activities[2] in waters of the U.S. associated with the restoration, enhancement, and establishment of tidal and non-tidal aquatic resources are not considered loss and are not subject to the thresholds below.** Thresholds for different resource areas may not be combined to exceed 5,000 SF of total loss of all waters. The USACE will continue to evaluate projects on a case-by-case basis, and may in some cases require compensatory mitigation below these thresholds (e.g. minor impacts that add to a cumulative loss).

[1] See definition of loss in Section VII.
[2] These activities must result in net increases in aquatic resource functions and services to be exempted from the thresholds above.

Compensatory Mitigation Thresholds in Massachusetts		
Resource Area	**Non-Tidal Threshold**	**Tidal Threshold**
Stream	200 LF	200 LF
Bank Stabilization	500 LF	500 LF
Open Water	Project Dependent	Project Dependent
Wetland	5,000 SF	500 SF
Vernal Pool	All	N/A
SAV	Project dependent	25 SF
Mudflat	N/A	1,000 SF
Intertidal	N/A	1,000 SF

These thresholds can be utilized to determine at what point compensatory mitigation is required but are not used to determine how much mitigation may be needed to offset impacts to resources. Per the 2008 Mitigation Rule (33 CFR 332.3(f)(1)) "the amount of required compensatory mitigation must be, to the extent practicable, sufficient to replace lost aquatic resource functions. In cases where appropriate functional or condition assessment methods or other suitable metrics are available, these methods should be used where practicable to determine how much compensatory mitigation is required. If a functional or condition assessment or other suitable metric is not used, a minimum one-to-one acreage or linear foot compensation ratios must be used."

3. Compensatory Mitigation Hierarchy

Compensatory mitigation should follow the hierarchy as outlined in 33 CFR 332.3(b)(2-6) or current regulation. This hierarchy in order of preference includes: (1) Mitigation Bank credits, (2) In-Lieu Fee program credits, (3) permittee-responsible mitigation under a watershed approach, (4) permittee-responsible mitigation through on-site and in-kind mitigation, and (5) permittee-responsible mitigation through off-site and/or out-of-kind mitigation. If the proposed mitigation deviates from this mitigation hierarchy, the applicant **must** justify in writing why the proposed mitigation is environmentally preferable to the preferred method of compensatory mitigation (See 2008 Mitigation Rule). **In order for your application to be considered complete, you must provide a statement that discusses how your project will compensate for the loss or impact to aquatic resources.** If you are proposing permittee responsible mitigation, the 12 components of a mitigation plan (33 CFR 332.4(c)(2-14) must be addressed for your application to be considered complete. Prospective applicants are encouraged to contact USACE with questions at any time. Addressing the 12 components of a mitigation plan is commensurate with the amount of compensatory mitigation required, and USACE can assist prospective applicants with the level of information needed to satisfy each component.

For activities resulting in the loss of marine or estuarine resources, permittee-responsible mitigation may be environmentally preferable if there are no mitigation banks or in-lieu fee programs in the area that have marine or estuarine credits available for sale or transfer to the permittee.

4. In-Lieu Fee (ILF)

The purchase of credits from the Massachusetts In-Lieu Fee Program (MA ILFP) is the ***preferred*** method of compensatory mitigation in Massachusetts since, as of the issuance date of this GP, there are no mitigation banks available in Massachusetts. The applicant shall develop a mitigation plan that addresses the baseline conditions at the impact site and the number of credits to be provided (see 33 CFR 332.4(c)(1)(ii)).

The MA ILFP is administered by the Massachusetts Department of Fish & Game (DFG) in accordance with the 2008 Mitigation Rule at 33 CFR 332. The Mitigation Rule governs in-lieu fee compensatory mitigation associated with USACE permits under §404 of the Clean Water Act and/or §9 or §10 of the Rivers and Harbors Act of 1899.

MA ILFP Website: https://www.mass.gov/in-lieu-fee-program

Acceptance of an ILF payment into the ILFP established by the 2014 MA ILFP Instrument (link below) is an acknowledgement by DFG that it assumes all legal responsibility for satisfying the mitigation requirements of the USACE (i.e., the implementation, performance, and long-term management and monitoring of the compensatory mitigation project(s) approved under this Instrument and subsequent Compensatory Mitigation Plans). This transfer of legal responsibility is established by: 1) the approval of this In-Lieu Fee Instrument; 2) receipt by the district engineer of a Notice of Credit Sale and Transfer of Legal Responsibility to DFG that is signed by the DFG and the permittee and dated; and 3) the transfer of fees from the permittee to DFG.

MA ILFP Fact Sheet: https://www.mass.gov/files/documents/2017/01/sj/ilfp-fact-sheet-ma-ilfp-fees.pdf

MA ILFP Instrument: https://www.mass.gov/files/documents/2016/08/nd/ilfp-final-instrument-dfg.pdf

5. Permittee-Responsible

The USACE may determine that the proposed permittee-responsible compensatory mitigation is appropriate on a case-by-case basis. As described in the Compensatory Mitigation Hierarchy section above, applicants must justify in writing why the proposed mitigation is environmentally preferable to the purchase of ILF credits. Applicants are encouraged to contact the USACE prior to submission of a permit application to seek further guidance regarding USACE mitigation requirements.

Applicants will demonstrate their proposed compensatory mitigation in writing by addressing the 12 components of a mitigation plan (33 CFR 332.4(c)(2-14). *Please note that all elements must be addressed, or the permit application will be deemed incomplete.* In certain circumstances, the district engineer may determine that prior approval of the final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation (see 33 CFR 332.3(k)(3)). Guidance on how to address these components can be found on the New England District Mitigation webpage: https://www.nae.usace.army.mil/Missions/Regulatory/Mitigation/

Performance standards will be used to measure the successfulness of the mitigation project. A successful mitigation project is one that is self-sustaining. For a mitigation project that will restore, enhance, or create wetlands, proper performance standards must address hydrology, hydric soils, and hydrophytic vegetation. The mitigation proposal must include an explanation of quantitative methods used to measure the success of performance standards (i.e., percent cover may be measured using vegetation plots, hydrology may be measured using data loggers, soil cores may be taken and evaluated for hydric soil indicators).

Monitoring methods should include quantitative sampling methods following established, scientific protocols. Sampling documentation, as part of monitoring reports, should include maps and coordinates (also shapefiles, if available) showing locations of sampling points, transects, quadrats, etc. In addition, permanent photo stations should be established coincident with sampling locations.

SECTION VI: FEDERAL & STATE AGENCY CONTACT INFORMATION & ORGANIZATIONAL WEBSITES

Federal Agencies

U.S. Army Corps of Engineers
Regulatory Division
696 Virginia Road
Concord, Massachusetts 01742-2751
(978) 318-8338 (phone); (978) 318-8303 (fax)
www.nae.usace.army.mil/missions/regulatory

U.S. Army Corps of Engineers
Navigation Division – Section 408
696 Virginia Road
Concord, Massachusetts 01742-2751
See link below for contact information:
https://www.nae.usace.army.mil/Missions/Section-408/

National Marine Fisheries Service
55 Great Republic Drive
Gloucester, Massachusetts 01930
(978) 281-9300 (phone)
(*Federal endangered species & EFH)*

U.S. Fish & Wildlife Service
70 Commercial Street, Suite 300
Concord, New Hampshire 03301
(603) 223-2541 (phone)
(Federal endangered species)

National Park Service
15 State Street
Boston, Massachusetts 02109
(617) 223-5191 (phone)
(*Wild and Scenic Rivers*)

Bureau of Ocean and Energy Management
1849 C Street, NW
Washington D.C. 20240
202-208-6474 (phone)
(*Offshore Wind Facilities)*

Chief, Risk Analysis Branch
FEMA Region 1
99 High Street, 6th Floor
U.S. Department of Homeland Security
Boston, Massachusetts 02110
(617) 956-7576 (phone)

Commander (dpb)
First Coast Guard District
Battery Building
One South Street
New York, New York 10004-1466
(212) 514-4331 (phone); (212) 514-4337 (fax)
(*Bridge permits*)

U.S. Environmental Protection Agency
5 Post Office Square
Suite 100 (OEP06–3)
Boston, Massachusetts 02109-3912
(617) 918-1692 (phone)

State Agencies in Massachusetts

Massachusetts Department of Environmental Protection (MassDEP)	
DEP Division of Wetlands & Waterways	100 Cambridge Street, Suite 900 Boston, Massachusetts 02114 (617) 292-5695
Northeast Region	150 Presidential Way, Suite 300 Woburn, Massachusetts 01801 (978) 694-3200
Southeast Region	20 Riverside Drive, Route 105 Lakeville, Massachusetts 02347 (508) 946-2800
Central Region	8 New Bond Street Worcester, Massachusetts 01606 (508) 792-7650
Western Region	436 Dwight Street Springfield, Massachusetts 01103 (413) 784-1100

Massachusetts Office of Coastal Zone Management (CZM) Emails may be sent to: czm@mass.gov	
MA Office of Coastal Zone Management	100 Cambridge Street, Suite 900 Boston, Massachusetts 02114 (617) 626-1200
North Shore Region	2 State Fish Pier Gloucester, Massachusetts 01930 (978) 281-3972
South Shore Region	175 Edward Foster Road Scituate, Massachusetts 02066
Cape Cod and Islands Region	3195 Main Street, P.O. Box 220 Barnstable, MA 02630
South Coastal Region	81-B County Road, Suite E Mattapoisett, MA 02739

Massachusetts Historical Commission (MHC)	
Office Location:	220 Morrisey Boulevard Boston, Massachusetts 02125 (617) 727-8470

Massachusetts Board of Underwater Archaeological Resources (BUAR) Emails may be sent to: david.s.robinson@mass.gov	
Office Location:	100 Cambridge Street, Suite 900 Boston, Massachusetts 02114 (617) 626-1014

SECTION VII: Definitions & Acronyms

Artificial or Living Reef: A structure which is constructed or placed in waters for the purpose of enhancing fishery resources and commercial and recreational fishing opportunities.
Attendant Features: Occurring with or as a result of; accompanying.
Biodegradable: A material that decomposes into elements found in nature within a reasonably short period of time and will not leave a residue of plastic or a petroleum derivative in the environment after degradation. In contrast, degradable plastics break down into plastic fragments that remain in the environment after degradation. Examples of biodegradable materials include jute, sisal, cotton, straw, burlap, coconut husk fiber (coir) or excelsior. In contrast, degradable plastics break down into plastic fragments that remain in the environment after degradation. Photodegradable, UV degradable or Oxo-(bio)degradable plastics are not considered biodegradable under this GP.
Boating facilities: These provide, rent or sell mooring space, such as marinas, yacht clubs, boat yards, dockominiums, municipal facilities, land/home owners, etc. Not classified as boating facilities are piers shared between two abutting properties or municipal mooring fields that charge an equitable user fee based on the actual costs incurred.
Compensatory mitigation: The restoration (re-establishment or rehabilitation), establishment (creation), enhancement, and/or in certain circumstances preservation of aquatic resources for the purposes of offsetting unavoidable adverse impacts which remain after all appropriate and practicable avoidance and minimization has been achieved. Must comply with the applicable provisions of 33 CFR 332. See also the New England District Compensatory Mitigation Guidance at http://www.nae.usace.army.mil/Missions/Regulatory/Mitigation.aspx.
Construction mats: Constructions, swamp and timber mats (herein referred to as “construction mats”) are generic terms used to describe structures that distribute equipment weight to prevent wetland damage while facilitating passage and providing work platforms for workers and equipment. They are comprised of sheets or mats made from a variety of materials in various sizes. A timber mat consists of large timbers bolted or cabled together. Corduroy roads, which are not considered to be construction mats, are cut trees and/or saplings with the crowns and branches removed, and the trunks lined up next to one another. Corduroy roads are typically installed as permanent structures. Like construction mats, they are considered as fill whether they are installed temporarily or permanently.
Cumulative Impacts: The impact on the environment, which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR 1508.1). Although the impact of a particular discharge may constitute a minor change in itself, the cumulative effect of numerous such piecemeal changes can result in a major impairment of the water resources and interfere with the productivity and water quality of existing aquatic ecosystems. See 40 CFR 230.11(g).
Currently serviceable: Useable as is or with some maintenance, but not so degraded as to essentially require reconstruction.
Dredging:
Improvement Dredging: For the purposes of these GPs, this is dredging deeper than previously authorized by the USACE and dredged under that authorization.
Maintenance Dredging: For the purposes of these GPs, this is dredging from an area previously authorized by the USACE and dredged under that authorization. The USACE may require proof of authorization and dredging. Maintenance dredging typically refers to the routine removal of accumulated sediment to maintain the design depths of serviceable navigation channels, harbors, marinas, boat launches and port facilities. Maintenance dredging is conducted for navigational purposes and does not include any expansion of the previously dredged area. The USACE may

review a maintenance dredging activity as new dredging if sufficient time has elapsed to allow for the colonization of SAS, shellfish, etc.
New Dredging: For the purposes of these GPs, this is a) first time the USACE authorizes dredging of a particular location or b) dredging has not occurred for an extended period of time, and this has allowed for aquatic resources (i.e., eelgrass, shellfish, etc.) to redevelop in the area.
Dredged material & discharge of dredged material: These are defined at 33 CFR 323.2(c) and (d). The term dredged material means material that is excavated or dredged from waters of the U.S.
Enhancement: The manipulation of the physical, chemical, or biological characteristics of an aquatic resource to heighten, intensify, or improve a specific aquatic resource function(s). Enhancement results in the gain of selected aquatic resource function(s) but may also lead to a decline in other aquatic resource function(s). Enhancement does not result in a gain in aquatic resource area.
Ephemeral stream: A stream with flowing water only during, and for a short duration, after precipitation events in a typical year. Ephemeral stream beds are located above the water table year-round. Groundwater is not a source of water for the stream. Runoff from rainfall is the primary source of water for stream flow.
Erosion Controls: Appropriate soil erosion, sediment and turbidity controls include cofferdams, bypass pumping around barriers immediately up and downstream of the work footprint (i.e., dam and pump), installation of sediment control barriers (i.e., silt fence, vegetated filter strips, geotextile silt fences, filter tubes, erosion control mixes, hay bales or other devices) downhill of all exposed areas, stream fords, retention of existing vegetated buffers, application of temporary mulching during construction, phased construction, and permanent seeding and stabilization, etc.
Establishment (creation): The manipulation of the physical, chemical, or biological characteristics present to develop an aquatic resource that did not previously exist at an upland site. Establishment results in a gain in aquatic resource area (33 CFR 332.2).
Expansions: Work that increases the footprint of fill, structures, depth of basin or drainage features, or floats, or slip capacity.
Essential Fish Habitat (EFH): The Federal Magnuson-Stevens Fishery Management and Conservation Act broadly defines EFH to include those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. See www.greateratlantic.fisheries.noaa.gov/habitat for more information.
Fill material & discharge of fill material: Material placed in waters of the U.S. where the material has the effect of either replacing any portion of a water of the U.S. with dry land or changing the bottom elevation of any portion of a water of the U.S. Fill material does not include any pollutant discharged into the water primarily to dispose of waste. These are defined at 33 CFR 323.2 (e) & (f).
Federal navigation projects (FNPs): These areas are maintained by the USACE; authorized, constructed and maintained on the premise that they will be accessible and available to all on equal terms; and comprised of USACE Federal anchorages, Federal channels and Federal turning basins. The buffer zone is equal to three times the authorized depth of a FNP. The following are FNPs in MA and more information, including the limits, is provided at www.nae.usace.army.mil/missions/navigation >> Navigation Projects:

- Andrews River, Harwich, MA
- Aunt Lydia's Cove
- Beverly Harbor
- Boston Harbor
- Buttermilk Bay Channel
- Canapitsit Channel
- Cape Cod Canal
- Chatham Harbor
- Cohasset Harbor
- Cross Rip Shoals, Nantucket Sound
- Cuttyhunk Harbor
- Dorchester Bay and Neponset River
- Duxbury Harbor
- Edgartown Harbor
- Essex River
- Fall River Harbor
- Falmouth Harbor
- Gloucester Harbor and Annisquam River
- Green Harbor
- Hingham Harbor
- Hyannis Harbor
- Ipswich River
- Island End River (Chelsea, MA)
- Kingston Harbor
- Lagoon Pond
- Little Harbor Woods Hole

Lynn Harbor
Malden River
Menemsha Creek
Merrimack River
Mystic River
Nantucket Harbor of Refuge
New Bedford and Fairhaven Harbor
Newburyport Harbor
Oak Bluffs Harbor
Pigeon Cove Harbor
Plymouth Harbor
Pollock Rip Shoals, Nantucket Sound
Provincetown Harbor
Red Brook Harbor
Rockport Harbor
Salem Harbor
Sandy Bay Harbor of Refuge
Saugus River
Scituate Harbor
Sesuit Harbor
Taunton River
Vineyard Haven Harbor
Wareham Harbor
Wellfleet Harbor
Westport River and Harbor
Weymouth Back River
Weymouth Fore and Town Rivers
Winthrop Harbor
Woods Hole Channel

Flume: An open artificial water channel, in the form of a gravity chute, which leads water from a diversion dam or weir alongside a natural flow. A flume can be used to measure the rate of flow.
FNP buffer zone: The buffer zone of a USACE Federal Navigation Project (FNP) is equal to three times the authorized depth of the FNP.
Frac out: During horizontal directional drilling (HDD) operations, drilling fluid travels up the borehole into a pit. When the borehole becomes obstructed or the pressure becomes too great inside the borehole, the ground fractures and fluid escapes to the surface and may affect surface waters.
Ground disturbance: Any activity that compacts, relocates, overturns, removes, mixes, or otherwise disturbs the ground, including under water. Ground disturbance can be caused by the use of hand tools (shovels, pick axe, posthole digger, etc.), heavy equipment (excavators, backhoes, bulldozers, dredgers, trenching and earthmoving equipment, etc.), and heavy trucks (large four wheel drive trucks, dump trucks and tractor trailers, etc.). Trenching, bulldozing, dredging, excavating, scraping, and plowing are typical examples of ground disturbance activities.
Height:width ratio: The height of structures shall at all points be equal to or exceed the width of the deck. For the purpose of this definition, height shall be measured from the marsh substrate to the bottom of the longitudinal support beam.
High Tide Line (HTL): The line of intersection of the land with the water's surface at the maximum height reached by a rising tide. The high tide line may be determined, in the absence of actual data, by a line of oil or scum along shore objects, a more or less continuous deposit of fine shell or debris on the foreshore or berm, other physical markings or characteristics, vegetation lines, tidal gages, or other suitable means that delineate the general height reached by a rising tide. The line encompasses spring high tides and other high tides 58 that occur with periodic frequency but does not include storm surges in which there is a departure from the normal or predicted reach of the tide due to the piling up of water against a coast by strong winds. (33 CFR 328). Refer to the highest predicted tide for the current year at the nearest NOAA tide gage. https://tidesandcurrents.noaa.gov/map/index.html
Historic Property: Any prehistoric or historic site (including archaeological sites), district, building, structure, or other object included in, or eligible for inclusion in, the National Register of Historic Places maintained by the Secretary of the Interior. This term includes artifacts, records, and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization and that meet the National Register criteria (36 CFR part 60).
Impacts:
Direct Impacts: Effects that are caused by the activity and occur at the same time and place (40 CFR 1508.7).
Indirect impacts: Effects that are caused by the activity and are later in time or farther removed in distance, but are still reasonably foreseeable.
Secondary impacts: Effects on an aquatic ecosystem that are associated with a discharge of dredged or fill materials, but do not result from the actual placement of the dredged or fill material.

Information about secondary effects on aquatic ecosystems shall be considered prior to the time final section 404 action is taken by permitting authorities. Some examples of secondary effects on an aquatic ecosystem are: aquatic areas drained, flooded, fragmented; fluctuating water levels in an impoundment and downstream associated with the operation of a dam; septic tank leaching and surface runoff from residential or commercial developments on fill; and leachate and runoff from a sanitary landfill located in waters of the U.S. See 40 CFR 230.11(h).

Incidental Fallback: Incidental fallback is the redeposit of small volumes of dredged material that is incidental to excavation activity in waters of the U.S. when such material falls back to substantially the same place as the initial removal (33 CFR 323.2(d)(2)(iii)).

In the dry: Work that is done under dry conditions, e.g., work behind cofferdams or when the stream or tide is waterward of the work.

Independent utility: A test to determine what constitutes a single and complete non-linear project in the USACE Regulatory Program. A project is considered to have independent utility if it would be constructed absent the construction of other projects in the project area. Portions of a multi-phase project that depend upon other phases of the project do not have independent utility. Phases of a project that would be constructed even if the other phases were not built can be considered as separate single and complete projects with independent utility.

Individual permit: A Department of the Army authorization that is issued following a case-by-case evaluation of a specific structure or work in accordance with the procedures of 33 CFR 322, or a specific project involving the proposed discharge(s) in accordance with the procedures of 33 CFR 323, and in accordance with the procedures of 33 CFR 325 and a determination that the proposed discharge is in the public interest pursuant to 33 CFR 320.

Intermittent stream: An intermittent stream has flowing water during certain times of the year, when groundwater provides water for stream flow. During dry periods, intermittent streams may not have flowing water. Runoff from rainfall is a supplemental source of water for stream flow.

Intertidal: The area in between mean low water and the high tide line.

Living reef: See the definition of “artificial or living reef.”

Living shoreline: A term used to describe a low-impact approach with a substantial biological component to shoreline protection and restoration along coastal shores, riparian zones, lacustrine fringe wetlands, or oyster or mussel reef structures. This approach integrates natural features to restore, enhance, maintain, or create habitat, functions, and processes while also functioning to mitigate flooding or shoreline erosion. Living shorelines may stabilize banks and shores with small fetch and gentle slopes that are subject to low-to mid-energy waves. A living shoreline has a footprint that is made up mostly of native material. It incorporates vegetation or other living, natural “soft” elements alone or in combination with some type of harder shoreline structure (e.g., oyster or mussel reefs or rock sills) for added protection and stability. Living shorelines should maintain the natural continuity of the land-water interface and retain or enhance shoreline ecological processes.

Loss of waters of the United States: Waters of the U.S. that are permanently adversely affected by filling, flooding, excavation, or drainage because of the regulated activity. The loss of stream bed includes the acres of stream bed that are permanently adversely affected by filling or excavation because of the regulated activity. Permanent adverse effects include permanent discharges of dredged or fill material that change an aquatic area to dry land, increase the bottom elevation of a waterbody, or change the use of a waterbody. The acreage of loss of waters of the U.S. is a threshold measurement of the impact to jurisdictional waters or wetlands for determining whether a project may qualify for a GP; it is not a net threshold that is calculated after considering compensatory mitigation that maybe used to offset losses of aquatic functions and services. Waters of the U.S. temporarily filled, flooded, excavated, or drained, but restored to pre-construction contours and elevations after construction, are not included in the measurement of loss of waters of the U.S. Impacts resulting from activities that do not require Department of the Army authorization, such as activities eligible for exemptions under section 404(f) of the Clean Water Act, are not considered when calculating the loss of waters of the U.S.

Maintenance: The repair, rehabilitation, or in-kind replacement of any previously authorized, currently serviceable structure or fill, or of any currently serviceable structure or fill authorized by 33 CFR 330.3 – "Activities occurring before certain dates," provided that the structure or fill is not to be put to uses differing from those uses specified or contemplated for it in the original permit or the most recently authorized modification. Maintenance includes minor deviations in the structure's configuration or filled area, including those due to changes in materials, construction techniques, or current construction codes or safety standards that are necessary to make repair, rehabilitation, or replacement are authorized. Currently serviceable means useable as is or with some maintenance, but not so degraded as to essentially require reconstruction.
Maintenance Exemption: In accordance with 33 CFR 323.4(a)(2), any discharge of dredged or fill material that may result from any of the following activities is not prohibited by or otherwise subject to regulation under Section 404 of the CWA: "Maintenance, including emergency reconstruction of recently damaged parts, of currently serviceable structures such as dikes, dams, levees, groins, riprap, breakwaters, causeways, bridge abutments or approaches, and transportation structures. Maintenance does not include any modification that changes the character, scope, or size of the original fill design."
Mean high water: Line on the shore reached by the plane of the average high water. Where precise determination of the actual location of the line becomes necessary, it must be established by survey with reference to the available tidal datum, preferably averaged over a period of 18.6 years. Less precise methods, such as observation of the "apparent shoreline" which is determined by reference to physical markings, lines of vegetation, or changes in type of vegetation, may be used only where an estimate is needed of the line reached by the mean high water.
Mechanized land clearing: Land clearing activities using mechanized equipment such as backhoes or bulldozers with sheer blades, rakes or discs constitute point source discharges and are subject to section 404 jurisdiction when they take place in wetlands or waters of the U.S (Regulatory Guidance Letter 90-05).
Metallic mineral: Any ore or material to be excavated from the natural deposits on or in the earth for its metallic mineral content to be used for commercial or industrial purposes. "Metallic mineral" does not include thorium or uranium.
Minor deviations: Deviations in the structure's configuration or filled area, including those due to changes in materials, construction techniques, or current construction codes or safety standards, which are necessary to make repair, rehabilitation, or replacement are permitted, provided the adverse environmental effects resulting from such repair, rehabilitation, or replacement are minimal.
Natural Rocky Habitats: Intertidal and subtidal substrates of pebble-gravel, cobble, boulder, or rock ledge and outcrops. Manufactured stone (e.g., cur or engineered riprap) is not considered a natural rocky habitat. Natural rocky habitats are either found as pavement (consolidated pebble-gravel, cobble, or boulder areas) or as a mixture with fines (i.e., clay and sand) and other substrates. Rocky habitats as EFH are defined as follows: (1) All pebble-gravel, cobble, or boulder pavements; (2) Pebble-gravel mixed with fines: mixed substrate of pebble-gravel and fines where pebble-gravel is an evident component of the substrate (either through visual observation or within sediment samples). Sediment samples with a content of 10% or more of pebble-gravel in the top layer (6-12 inches) should be delineated; (3) Scattered cobble, scattered boulder, scattered cobble/boulder: mixed substate of cobble and/or boulder and other substrates. The aerial extent of cobbles and/or boulders should be delineated; and (4) All rock ledge outcrops: area should be delineated along the edge of the ledge/outcrop (as defined by NMFS Habitat and Ecosystems Services Branch, Gloucester, MA).
Navigable waters or Navigable waters of the U.S.: These waters are subject to section 10 of the Rivers and Harbors Act of 1899 and are defined as those waters that are subject to the ebb and flow of the tide and/or are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce (33 CFR Part 329). Work or structures in navigable

waters require permits pursuant to §9 and §10 of the Rivers and Harbors Act of 1899. Also see the definition of “waters of the U.S.” below.
Note: Currently the following non-tidal waters have been determined to be navigable waters of the U.S. subject to permit jurisdiction in Massachusetts: Merrimack River, Connecticut River, and Charles River to the Watertown Dam.
Nearshore disposal: This is defined in the USACE Coastal Engineering Manual as “(1) In beach terminology an indefinite zone extending seaward from the shoreline well beyond the breaker zone. (2) The zone which extends from the swash zone to the position marking the start of the offshore zone, typically at water depths of the order of 20m.” A nearshore berm is an artificial berm built in shallow water using dredged material. Often, the berm is intended to renourish the adjacent and downdrift shore over time under the influence of waves and currents.
Non-regulated activity: Only structures or fills that were previously authorized and are in compliance with the terms and condition of the original authorization can be maintained as a non-regulated activity under 33 CFR 323.4(a)(2). Minor deviations from the previously authorized footprint do not qualify as a non-regulated activity and require new authorization from the USACE. The state’s maintenance provisions may differ from the USACE and a project may require reporting and written authorization from the state.
Non-tidal wetlands: A non-tidal wetland is a wetland that is not subject to the ebb and flow of tidal waters. Non-tidal wetlands contiguous to tidal waters are located landward of the HTL (*i.e.,* spring HTL). Also see the definition of “Waters of the U.S.” below.
Oil or natural gas pipeline: Any pipe or pipeline for the transportation of any form of oil or natural gas, including products derived from oil or natural gas, such as gasoline, jet fuel, diesel fuel. heating oil, petrochemical feedstocks, waxes, lubricating oils, and asphalt.
Ordinary High Water Mark (OHWM): A line on the shore established by the fluctuations of water and indicated by physical characteristics, or by other appropriate means that consider the characteristics of the surrounding areas. See 33 CFR 328.3(e).
Overall project: The overall project, for purposes of these GPs, includes all regulated activities that are reasonably related and necessary to accomplish the project purpose. Also see the definition of “single and complete linear project.”
Perennial stream: A perennial stream has flowing water year-round during a typical year. The water table is located above the stream bed for most of the year. Groundwater is the primary source of water for stream flow. Runoff from rainfall is a supplemental source of water for stream flow.
Practicable: Available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes.
Permanent impacts: Permanent impacts means waters of the U.S. that are permanently affected by filling, flooding, excavation, or drainage because of the regulated activity. Permanent impacts include permanent discharges of dredged or fill material that change an aquatic area to dry land, increase the bottom elevation of a waterbody, or change the use of a waterbody.
Preconstruction notification (PCN): A request submitted by the applicant to the USACE for confirmation that a particular activity is authorized by these GPs. The request may be a permit application, letter, or similar document that includes information about the proposed work and its anticipated environmental effects. Preconstruction notification may be required by the terms and conditions of these GPs. A PCN may be voluntarily submitted in cases where PCN is not required and the applicant wants confirmation that the activity is authorized under these GPs.
Preservation: The removal of a threat to, or preventing the decline of, aquatic resources by an action in or near those aquatic resources. This term includes activities commonly associated with the protection and maintenance of aquatic resources through the implementation of appropriate legal and physical mechanisms. Preservation does not result in a gain of aquatic resource area or functions (33 CFR 332.2).
Real estate subdivision: Includes circumstances where a landowner or developer divides a tract of land into smaller parcels for the purpose of selling, conveying, transferring, leasing, or

developing said parcels. This would include the entire area of a residential, commercial or other real estate subdivision, including all parcels and parts thereof

Reconfiguration zone: A USACE authorized area in which permittees may rearrange pile-supported structures and floats without additional authorizations. A reconfiguration zone does not grant exclusive privileges to an area or an increase in structure or float area.

Re-establishment: The manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/ historic functions to a former aquatic resource. Re-establishment results in rebuilding a former aquatic resource and results in again in aquatic resource area and functions (33 CFR 332.2).

Reference Site: Reference sites - Compensatory restoration, rehabilitation, and creation mitigation projects should seek to duplicate the features of reference aquatic resources or enhance connectivity with adjacent natural upland and aquatic resource landscape elements. Performance standards related to reference sites are encouraged. Mitigation project sites must be selected based on their ability to be, and continue to be, resistant to disturbance from the surrounding landscape, by locating them adjacent to refuges, buffers, green spaces, and other preserved natural elements of the landscape. In general, aquatic resource mitigation projects must be designed to be self-sustaining, natural systems within the landscape and climate in which they are located, with little or no ongoing maintenance and/or hydrologic manipulation.

Rehabilitation: The manipulation of the physical, chemical, or biological characteristics of a site with the goal of repairing natural/historic functions to a degraded aquatic resource. Rehabilitation results in a gain in aquatic resource function, but does not result in a gain in aquatic resource area (33 CFR 332.2).

Restoration: The manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former or degraded aquatic resource. For the purpose of tracking net gains in aquatic resource area, restoration is divided into two categories: re-establishment and rehabilitation (33 CFR 332.2).

Riffle and pool complex: Riffle and pool complexes are special aquatic sites under the 404(b)(1) Guidelines. Riffle and pool complexes sometimes characterize steep gradient sections of streams. Such stream sections are recognizable by their hydraulic characteristics. The rapid movement of water over a course substrate in riffles results in a rough flow, a turbulent surface, and high dissolved oxygen levels in the water. Pools are deeper areas associated with riffles. A slower stream velocity, a streaming flow, a smooth surface, and a finer substrate characterize pools.

Sedimentation: Sedimentation is defined as the process of deposition of a solid material from a state of suspension. Deposited sediments may accumulate and have temporal impacts to aquatic resource areas. See secondary effects definition above. For the purposes of this document, “greater than minimal sedimentation” is generally not considered to occur when using proper erosion controls (GC 25) or when sedimentation is considered “de minimis” 33 CFR 323.2(d)(5).

Single and complete linear project: A linear project is a project constructed for the purpose of getting people, goods, or services from a point of origin to a terminal point, which often involves multiple crossings of one or more waterbodies at separate and distant locations. The term “single and complete project” is defined as that portion of the total linear project proposed or accomplished by one owner/ developer or partnership or other association of owners/developers that includes all crossings of a single water of the U.S. (i.e., a single waterbody) at a specific location. For linear projects crossing a single or multiple waterbodies several times at separate and distant locations, each crossing is considered a single and complete project for the purposes of these GPs. However, individual channels in a braided stream or river, or individual arms of a large, irregularly shaped wetland or lake, etc., are not separate waterbodies, and crossings of such features cannot be considered separately.

Single and complete non-linear project: For non-linear projects, the term “single and complete project” is defined at 33 CFR 330.2(i) as the total project proposed or accomplished by one owner/developer or partnership or other association of owners/developers. A single and complete

non-linear project must have independent utility (see the definition of “independent utility”). Single and complete non-linear projects may not be “piecemealed” to avoid the limits in a GP authorization.
Special aquatic sites (SAS): These include inland and saltmarsh wetlands, mud flats, vegetated shallows, sanctuaries and refuges, coral reefs, and riffle and pool complexes. These are defined at 40 CFR 230.3 and listed in 40 CFR 230 Subpart E.
Streambed: The stream substrate between the OHW marks on each side. The substrate may be bedrock or inorganic particles that range in size from clay to boulders. Wetlands contiguous to the streambed, but outside of the OHW marks, are not considered part of the streambed.
Stream channelization: The manipulation of a stream’s course, condition, capacity, or location that causes more than minimal interruption of normal stream processes. A channelized stream remains a water of the U.S.
Structure: An object that is arranged in a definite pattern of organization. Examples of structures include, without limitation, any pier, boat dock, boat ramp, wharf, dolphin, weir, boom, breakwater, bulkhead, revetment, riprap, jetty, artificial island, artificial reef, permanent mooring structure, power transmission line, permanently moored floating vessel, piling, aid to navigation, or any other manmade obstacle or obstruction.
Temporal loss: The time lag between the loss of aquatic resource functions caused by the permitted impacts and the replacement of aquatic resource functions at the compensatory mitigation site(s) (33 CFR 332.2).
Temporary impacts: Temporary impacts include, but are not limited to, jurisdictional waters that are temporarily filled, flooded, excavated, or drained because of the regulated activity. Impacts are considered temporary when they are removed immediately upon completion of the activity. Note: An impact is considered temporary when the aquatic resource is restored to pre-project conditions, but effects to archaeological and/or cultural resources may be permanent in duration.
Tidal wetlands: A wetland that is subject to the ebb and flow of the tide. See the definition of “Waters of the U.S.” below.
Tide gates: Structures such as duckbills, flap gates, manual and self-regulating tide gates, etc. that regulate or prevent upstream tidal flows.
Turbidity: A measure of the level of particles such as sediment, plankton, or organic by-products, in a body of water. As the turbidity of water increases, it becomes denser and less clear due to a higher concentration of these light-blocking particles. Suspended solids are more likely to carry toxic chemicals, and can also negatively affect aquatic organisms, water temperature, and dissolved oxygen levels.
Utility line: Any pipe or pipeline for the transportation of any gaseous, liquid, liquescent, or slurry substance, for any purpose that is not oil, natural gas, or petrochemicals. A utility line also includes any cable, line, or wire for the transmission for any purpose of electrical energy, telephone, and telegraph messages, and radio and television communication. The term ‘utility line’ does not include activities that drain a water of the U.S., such as drainage tile or French drains, but it does apply to pipes conveying drainage from another area.
Vegetated shallows: Permanently inundated areas that under normal circumstances support communities of rooted aquatic vegetation, such as eelgrass *(Zostera marina)* and widgeon grass (*Rupia maritima*) in marine systems (does not include salt marsh) as well as a number of freshwater species in rivers and lakes. These are a type of SAS defined at 40 CFR 230.43. Vegetated shallows are commonly referred to as submerged aquatic vegetation or SAV. Vegetated shallow survey guidance is located at www.nae.usace.army.mil/missions/regulatory /jurisdiction-and-wetlands. Maps of vegetated shallows in Massachusetts are located at www.nae.usace.army.mil/missions/regulatory/state-general-permits/massachusetts-general-permit.
Vernal pools: For the purposes of these GPs, vernal pools are depressional wetland basins that typically dry up in most years and may contain inlets or outlets, typically of intermittent flow. Vernal pools range in both size and depth depending upon landscape position and parent material(s). In

most years, vernal pools support one or more of the following obligate indicator species: wood frog, spotted salamander, blue-spotted salamander, marbled salamander, Jefferson's salamander and fairy shrimp. However, they should preclude sustainable populations of predatory fish.

Water diversions: Water diversions are activities such as bypass pumping (e.g., "dam and pump") or water withdrawals. Temporary flume pipes, culverts or cofferdams where normal flows are maintained within the stream boundary's confines aren't water diversions. "Normal flows" are defined as no change in flow from pre-project conditions.

Waters of the United States (U.S.) These waterbodies are the waters where permits are required for the discharge of dredged or fill material pursuant to §404 of the CWA. These waters include but are not limited to navigable waters of the U.S. and tidal wetlands and include many non-tidal wetlands and other waterbodies. See definitions for navigable waters of the U.S., tidal wetlands, waterbody, and non-tidal wetlands. (33 CFR 328)

Waterbody: Examples of "waterbodies" include oceans, coastal waters, rivers, streams, ditches, lakes, ponds, and wetlands. If a wetland is adjacent to a waterbody determined to be a water of the U.S., that waterbody and any adjacent wetlands are considered together as a single aquatic unit (see 33 CFR 328.4(c)(2)).

Weir: A barrier across a river designed to alter the flow characteristics. In most cases, weirs take the form of a barrier, smaller than most conventional dams, across a river that causes water to pool behind the structure and allows water to flow over the top. Weirs are commonly used to alter the flow regime of a river, prevent flooding, measure discharge and help render a river navigable.

Wetland: Wetlands are areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas. The Corps of Engineers Wetlands Delineation Manual in conjunction with the associated regional supplement should be used to determine if a wetland is present and delineate wetland boundaries.

Acronyms

BMPs	Best Management Practices
BUAR	Massachusetts Board of Underwater Archaeological Resources
CWA	Clean Water Act
CZM	Coastal Zone Management
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
EFH	Essential Fish Habitat
FNP	Federal Navigation Project
GC	General Condition
GP	General Permit
HTL	High Tide Line
IP	Individual Permit
LID	Low impact development
MassDEP	Massachusetts Department of Environmental Protection
MA DMF	Massachusetts Division of Marine Fisheries
MHC	Massachusetts Historical Commission
MHW	Mean High Water
MLLW	Mean Lower Low Water
MLW	Mean Low Water
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
OHW	Ordinary High Water Mark
PCN	Preconstruction Notification
SAS	Special Aquatic Sites
SF	Square Feet
SV	Self-Verification
SHPO	State Historic Preservation Officer
THPO	Tribal Historic Preservation Officer
USFWS	U.S. Fish and Wildlife Service
USCG	U.S. Coast Guard
USFS	U.S. Forest Service
USGS	U.S. Geological Service
WQC	Water Quality Certification

Appendix A: Guidance for NHPA Section 106 Compliance in Massachusetts

1. Purpose & Applicability

Section 106 of the National Historic Preservation Act of 1966, as amended (NHPA) (54 U.S.C § 306108), requires Federal agencies to take into account the effects of their undertakings on Historic Properties and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment on such undertakings. Therefore, in order for an activity to be eligible for authorization under the 2023 Massachusetts General Permit, the USACE must consider the effect the activity may have on historic properties. Historic properties may include, but are not limited to, historic districts, archaeological districts, sites, buildings, structures, objects, sacred sites, traditional cultural places, and traditional cultural landscapes that are included in, or eligible for inclusion in, the National Register of Historic Places (NRHP).

This guidance applies to projects that require authorization under Section 404 of the Clean Water Act (33 U.S.C. § 1344) and/or Section 10 of the Rivers and Harbors Act (33 U.S.C. §403) and will assist applicants when evaluating and documenting the presence of historic properties within or near their project site(s). The prospective applicant will evaluate their proposed project using the criteria below to determine if their project has the potential to affect historic properties and if so, whether or not historic properties are present or are likely to be present. All activities authorized under these GPs shall follow the terms outlined in General Condition 14: Historic Properties and General Condition 6: Tribal Rights & Burial Sites. Prospective applicants shall complete their due diligence according to the procedures below for their application to be deemed complete.

2. No Potential to Affect Historic Properties

Certain activities do not have the potential to cause effects on historic properties, assuming such historic properties were present, based on the nature of the activity and site-specific conditions. Therefore, these activities **do not** require historic property identification efforts or notification of the SHPO, THPOs, and/or BUAR under Section 106. The USACE has determined the following activities within the stated parameters have no potential to affect historic properties:

General Permit	Activity Parameters
1	Temporary buoys, markers and similar structures that are placed during winter events on ice and removed before spring thaw.
2	Repair or rehabilitation of structures that are less than 45 years in age. Any temporary structures or fills or work necessary to complete repairs or rehabilitation must not result in any ground disturbance.
3	Maintenance and replacement of moorings that are less than 45 years in age.
6	Maintenance, repair, replacement, or removal of utility lines, oil or natural gas pipelines, outfall or intake structures, and/or appurtenant features that are less than 45 years in age when all access, staging, and ground disturbance is strictly limited to previously disturbed areas (including any previous ground disturbance). Replacement must be in kind or smaller in size. Installation of tide gates on outfall structures that are less than 45 years in age.
7	Maintenance dredging of previously dredged areas where dredging does not extend beyond the original bottom elevations.

	Disposal of dredged material at an existing established and USACE-approved confined aquatic disposal cell. Beach nourishment in ongoing existing nourishment areas.
11	Fish and wildlife harvesting and attraction devices and activities.
13	Cleanup of hazardous and toxic waste materials, including contaminated sediments, that are less than 45 years in age.
16	Removal of land-based and water-based renewable energy generation facilities and hydropower projects that are less than 45 years in age.
18	Installation of buoys, floats, racks, trays, nets, lines, tubes, containers, and other structures for previously authorized by the USACE and ongoing aquaculture activities. Discharges of dredged or fill material into tidal or non-tidal waters necessary for shellfish seeding, rearing, cultivating, transplanting, and harvesting activities for previously authorized and ongoing aquaculture activities.
20	Maintenance activities for existing living shorelines excluding maintenance activities that require new ground disturbance such as excavation or re-sloping of the bank/shoreline.
22	Reshaping or maintenance of existing drainage ditches less than 45 years in age excluding ditch enlargement.
23	Placement of temporary and removable linear transportation and wetland/stream crossings that have no ground disturbance prior to placement, during placement, and during removal (i.e., placed on the surface and subsequently removed within one year of placement).
24	Placement of temporary and removable crossings and cofferdams that have no ground disturbance prior to placement, during placement, and during removal (i.e., placed on the surface and subsequently removed within one year of placement).
25	Emergency repair of existing structures and/or fills less than 45 years in age.

3. Historic Property Identification

If the activity does not fit under the criteria above, the following historic property identification efforts must be completed to demonstrate compliance with Section 106 of the NHPA. This includes documenting previously identified and unidentified historic properties in the project area.

a. Previously Identified Historic Properties: The prospective applicant shall document if previously identified historic properties are present on or adjacent to the project site by notifying the Massachusetts Historical Commission (MHC) and the Massachusetts Board of Underwater Archaeological Resources (BUAR), as appropriate, of the proposed project. The MHC and BUAR will check their records for the presence of any previously identified historic properties. The following outlines how prospective applicants should notify the MHC and BUAR.

i. The prospective applicant will notify the SHPO and BUAR to identify any previously recorded cultural resources. Applicants shall mail a completed Project Notification Form[18], project narrative, location (coordinates), plans, soil maps, and information on known cultural resources to the MHC. The MHC does not accept submissions via email. Applicants shall email or mail this information to the BUAR when the activity is located in lakes, ponds, rivers, and/or navigable waters in MA. Emailed file attachments should be <10MB. Any files >10MB shall be delivered via a file exchange system or the hard copy documents shall be mailed. Preferred contact information is listed below.

ii. **When sending this information, applicants must also document proof of receipt OR proof the information was delivered.** Proof of receipt constitutes a certified mail receipt, read email receipt, or other mail/email/online tracking services that document the information has reached the intended recipient(s). Proof the information was delivered constitutes a certificate of mailing, email delivery receipt, or other mail/email/online services that document the information was sent at a particular time. When using proof of delivery such (e.g., certificate of mailing), applicants should add 5 days to the 30-day notification period so the mail has time to reach its intended recipient. When using proof of receipt, the applicant may begin the 30-day notification period from the date received by the intended recipient.

iii. When mailing or emailing the application materials, applicants should include the following statement: “Please send responses to this notification directly to the USACE via email: cenae-r-ma@usace.army.mil or address regular mail responses to: Regulatory Division, U.S. Army Corps of Engineers, New England District, 696 Virginia Road, Concord, Massachusetts 01742-2751.” Email responses to the USACE are strongly preferred. The SHPO and BUAR will contact the USACE and cc the applicant(s) within 30 days of receiving the notification if their records indicate that historic properties are located in the project vicinity, and if additional review and/or surveys are recommended to ensure NHPA compliance. If the SHPO and/or BUAR do not respond within 30 days of receiving the notification, is it presumed that no known historic properties are present.

b. Previously Unidentified Historic Properties: The prospective applicant shall evaluate the project site and determine the sensitivity for the presence of historic properties if the project site has not been previously surveyed for cultural resources within the last 10 years. If the sensitivity is determined to be moderate to high, an intensive archaeological and/or architectural survey is required to investigate the potential presence of historic properties. The individual conducting this survey must meet the Secretary of the Interior’s Standards for Professional Qualifications (48 FR 44738-44739) in the discipline relevant to a particular resource type. For example, archeologists should not document and evaluate buildings or structures and architectural historians should not document and evaluate archaeological sites. The identification and qualifications for those participating in any survey and evaluation of resources should be included with the survey results. The criteria listed below are indicators of low sensitivity for the presence of historic properties for consideration when determining if an archaeological or architectural survey is needed.

Low sensitivity indicators:

- Previous archaeological and/or architectural survey within the last 10 years with negative results.
- In a location created in modern times (i.e., built on fill placed within the last 45 years or within an area excavated within the last 45 years).
- USACE has reviewed the project description and determined that a survey is not warranted based on the proposed activity and its location.

State survey guidance and standards are provided in the September 1995 Historic Properties Survey Manual Guidelines for the Identification of Historical and Archaeological Resources in Massachusetts available. State survey guidance and standards for underwater surveys are provided

[18] https://www.sec.state.ma.us/mhc/mhcform/formidx.htm

in the Board of Underwater Archaeological Resources' 2022 Policy Guidance on Archaeological Investigations and Related Survey Standards for the Discovery of Underwater Archaeological Resources. This guidance is available on the NAE Regulatory website: https://www.nae.usace.army.mil/Missions/Regulatory/State-General-Permits/Massachusetts-General-Permit/.

Please note, a negative result from MHC and/or BUAR does not necessarily mean no historic properties are present. Often proposed project sites have not been previously subject to a survey, so historic properties which may be present have not been previously recorded.

4. Tribal Coordination

Prospective applicants shall mail the Project Notification Form, project narrative, location (coordinates), plans with locus map, soil maps, and information on cultural resources to the Wampanoag Tribe of Gay Head (Aquinnah), Mashpee Wampanoag Tribe, Narragansett Indian Tribe, and/or Stockbridge-Munsee Community Band of Mohican Indians with interests in the project location. Preferred tribal contact information, including their respective areas of interest, can be found below. Applicants shall follow the same procedures as identified in Section 3(a)i-iii above when notifying Tribes of the proposed activity. Applicants shall provide the USACE with any responses received from the tribe(s) with their PCN application. If a tribe does not respond within 30 days of receiving the notification, the applicant shall provide USACE with all documentation of tribal outreach with their SV or PCN submission (e.g., emails, letters, phone call log, etc.). If the tribe indicates the presence of a previously unrecorded cultural resource, including a traditional cultural property (TCP) or traditional cultural landscape (TCL), a PCN is required.

5. Effect Determination

The project may have the potential to affect historic properties and/or tribal resources if 1) notification recipients respond within 30 calendar days of notification with concerns, 2) historic properties eligible for listing, or potentially eligible for listing in the NRHP, are present or 3) tribal resources are known to be present. The USACE may need to further review the project to confirm potential effects to historic properties and/or tribal resources. A PCN is required for any activity that may affect a historic property.

The USACE may determine the project will have 'no effect' on historic properties (i.e., no historic properties affected) when procedures outlined in Section 3 above are followed and no cultural resources are identified. Similarly, if historic properties are identified and will be completely avoided, the USACE may determine 'no effect.'

6. Contact Information:

Massachusetts Historical Commission

The Massachusetts Archives Building
220 Morrissey Boulevard
Boston, Massachusetts 02125

No email. Applicants or their representatives must send project information via certified mail and submit the certified mail receipt to the USACE or send via regular mail and submit proof of delivery.

Area of concern: All of Massachusetts.

Massachusetts Board of Underwater Archaeological Resources (BUAR)

100 Cambridge Street, Suite 900
Boston, Massachusetts 02114
Email: david.s.robinson@mass.gov

Applicants or their representatives must send project information via email (***strongly preferred***) or regular mail and provide proof of receipt or proof of delivery.

Area of concern: All waterbodies in Massachusetts.

Wampanoag Tribe of Gay Head (Aquinnah)

Bettina Washington
Tribal Historic Preservation Officer (THPO)
20 Black Brook Road
Aquinnah, Massachusetts 02535
Email: thpo@wampanoagtribe-nsn.gov

Applicants or their representative must send project information via email (***preferred***) or regular mail and provide proof of receipt or proof of delivery.

Area of concern: All of Massachusetts.

Mashpee Wampanoag Tribe

ATTN: David Weeden
Tribal Historic Preservation Officer (THPO)
483 Great Neck Road South
Mashpee, Massachusetts 02649
Email: 106review@mwtribe-nsn.gov
Cc: David.weeden@mwtribe-nsn.gov

Applicants or their representative must send project information via email (***preferred***) or regular mail and provide proof of receipt or proof of delivery.

Area of concern: All of Massachusetts.

Narragansett Indian Tribe

ATTN: John Brown
Tribal Historic Preservation Officer (THPO)
Narragansett Indian Longhouse
4425 South County Trail
Charlestown, Rhode Island 02813
Email: tashtesook@aol.com

Applicants or their representative must send project information via email (***preferred***) or regular mail and provide proof of receipt or proof of delivery.

Area of concern: Massachusetts east of the Connecticut River.

Stockbridge-Munsee Community Band of Mohican Indians

ATTN: Jeff Bendremer
Tribal Historic Preservation Manager
Stockbridge-Munsee Community
Tribal Historic Preservation Extension office
86 Spring Street
Williamstown, Massachusetts 01267
Email: thpo@mohican-nsn.gov

Applicants or their representative must send project information via email (***preferred***) or regular mail and provide proof of receipt or proof of delivery.

Area of concern: West of the Connecticut River and Northfield, Montague, Miller's Falls, Turner's Falls, Sunderland, Amherst, Hadley, South Hadley, Chicopee, Springfield and Longmeadow.

APPENDIX B PRE-CONSTRUCTION NOTIFICATION

U.S. Army Corps of Engineers (USACE), New England District (NAE)

PRE-CONSTRUCTION NOTIFICATION (PCN)

DATA REQUIRED BY THE PRIVACY ACT OF 1974

Authority Rivers and Harbors Act, Section 10, 33 USC 403; Clean Water Act, Section 404, 33 USC 1344; Regulatory Programs of the Corps of Engineers; Final Rule 33 CFR 320-332.

Principal Purpose The information provided will be used in evaluating activities under Pre-Construction Notification procedures within New England.

Routine Uses This information may be shared with other federal, state, and local government agencies during the application review process. Submission

Disclosure of requested information is voluntary. However, if information is not provided the PCN application cannot be fully evaluated nor can USACE render a permit decision.

Instructions The applicant must complete ALL required sections of this document before their submission to USACE. The PCN submission to USACE shall include one set of drawings which show the location and character of the proposed activity, statements that address each required field below, and documentation that supports each field (e.g., emails, letters, description/narrative, phone calls, surveys, reports, etc.). Electronic submissions to the following address are strongly preferred: cenae-r-ma@usace.army.mil. The email subject line shall contain the following: General Permit #, PCN, City/Town, and date submitted. An application that is not completed in full will be returned.

(ITEMS 1 THRU 4 TO BE FILLED BY USACE)

1. APPLICATION NO.	2. FIELD OFFICE CODE	3. DATE RECEIVED	4. DATE APPLICATION COMPLETE

(ITEMS BELOW TO BE FILLED BY APPLICANT)

5. APPLICANT'S NAME	8. AUTHORIZED AGENT'S NAME AND TITLE (*agent is not required*)
First - Middle - Last -	First - Middle - Last -
Company -	Company -
E-mail Address -	E-mail Address -
6. APPLICANT'S ADDRESS:	9. AGENT'S ADDRESS:
Address-	Address-
City - State - Zip - Country -	City - State - Zip - Country -
7. APPLICANT'S PHONE NOs. with AREA CODE	10. AGENT'S PHONE NOs. with AREA CODE
a. Residence b. Business c. Fax d. Mobile	a. Residence b. Business c. Fax d. Mobile

STATEMENT OF AUTHORIZATION

11. I hereby authorize, _____ to act on my behalf as my agent in the processing of this general permit PCN application and to furnish, upon request, supplemental information in support of this general permit PCN application.

_____ _____

SIGNATURE OF APPLICANT DATE

NAME, LOCATION, AND DESCRIPTION OF PROJECT OR ACTIVITY

12. PROJECT NAME or TITLE (*see instructions*)

13. NAME OF WATERBODY, IF KNOWN (*if applicable*)	14. PROPOSED ACTIVITY STREET ADDRESS (*if applicable*)
15. LOCATION OF PROPOSED ACTIVITY (*see instructions*)	City: State: Zip:
Latitude: °N Longitude: °W	

16. OTHER LOCATION DESCRIPTIONS, IF KNOWN (*see instructions*)

State Tax Parcel ID: Municipality:

Section: Township: Range:

17. DIRECTIONS TO THE SITE.

18. IDENTIFY THE SPECIFIC GENERAL PERMIT(S) YOU PROPOSE TO USE:

19. DESCRIPTION OF PROPOSED GENERAL PERMIT ACTIVITY (*see instructions*)

20. DESCRIPTION OF PROPOSED MITIGATION MEASURES (*see instructions*)

21. PURPOSE OF GENERAL PERMIT ACTIVITY (*Describe the reason or purpose of the project, see instructions*)

22. Quantity of Wetlands, Streams, or Other Types of Waters Directly Affected by Proposed General Permit Activity (*see instructions*)

Area (square feet)	Length (linear feet)	Volume (cubic yards)	Duration	Purpose

Each PCN must include a delineation of wetlands, other special aquatic sites, and other waters, such as lakes and ponds, and perennial, intermittent, and ephemeral streams, on the project site.

23. List any other GP(s), regional general permit(s), or individual permit(s) used or intended to be used to authorize any part of the proposed project on any related activity (*see instructions*)

24. If the proposed activity will result in the loss of aquatic resources that exceed those identified in the New England District Compensatory Mitigation Thresholds, explain how the compensatory mitigation requirement will be satisfied. (*see instructions*)

25. Is Any Portion of the General Permit Activity Already Complete? ☐ Yes ☐ No If Yes, describe the completed work:

26. List the name(s) of any species listed as endangered or threatened under the Endangered Species Act that might be affected by the proposed GP activity or utilize the designated critical habitat that might be affected by the proposed GP activity. (*see instructions*)

27. List any historic properties that have the potential to be affected by the proposed GP activity or include a vicinity map indicating the location of the historic property or properties. Attach relevant project information, along with any responses received from project notifications to this submittal. (*see instructions*)

28. For a proposed GP activity that will occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a "study river" for possible inclusion in the system while the river is in an official study status, identify the Wild and Scenic River or the "study river":

29. If the proposed GP activity also requires permission from the USACE pursuant to 33 U.S.C. 408 because it will alter or temporarily or permanently occupy or use a U.S. Army Corps of Engineers federally authorized civil works project, have you submitted a written request for section 408 permission from the USACE district having jurisdiction over that project? ☐ Yes ☐ No

If "yes", please provide the date your request was submitted to the USACE District:

30. Does the activity require a 401 Water Quality Certification (WQC)? If so, specify the type of 401 WQC that is required (general or individual). In cases where an individual 401 WQC is required, provide the date the 401 WQC certification request was submitted to the certifying authority and their contact information.

31. If the terms of the GP(s) you want to use require additional information to be included in the PCN (i.e. sampling and analysis plan), please include that information in this space or provide it on an additional sheet of paper marked Block 30. (*see instructions*)

32. I certify that the information in this pre-construction notification is complete and accurate. I further certify that I possess the authority to undertake the work described herein or am acting as the duly authorized agent of the applicant.

SIGNATURE OF APPLICANT	DATE	SIGNATURE OF AGENT	DATE

The Pre-Construction Notification must be signed by the person who desires to undertake the proposed activity (applicant) and, if the statement in block 11 has been filled out and signed, the authorized agent.

18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals, or covers up any trick, scheme, or disguises a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statements or entry, shall be fined not more than $10,000 or imprisoned not more than five years or both.

Instructions for Preparing a

Department of the Army

General Permit (GP) Pre-Construction Notification (PCN)

Blocks 1 through 4. To be completed by the U.S. Army Corps of Engineers.

Block 5. Applicant' Name. Enter the name and the e-mail address of the responsible party or parties. If the responsible party is an agency, company, corporation, or other organization, indicate the name of the organization and responsible officer and title. If more than one party is associated with the PCN, please attach a sheet of paper with the necessary information marked Block 5.

Block 6. Address of Applicant. Please provide the full address of the party or parties responsible for the PCN. If more space is needed, attach an extra sheet of paper marked Block 6.

Block 7. Applicant Telephone Number(s). Please provide the telephone number where you can usually be reached during normal business hours.

Blocks 8 through 11. To be completed, if you choose to have an agent.

Block 8. Authorized Agent's Name and Title. Indicate name of individual or agency, designated by you, to represent you in this process. An agent can be an attorney, builder, contractor, engineer, consultant, or any other person or organization. Note: An agent is not required.

Blocks 9 and 10. Agent's Address and Telephone Number. Please provide the complete mailing address of the agent, along with the telephone number where they can be reached during normal business hours.

Block 11. Statement of Authorization. To be completed by the applicant, if an agent is to be employed.

Block 12. Proposed General Permit Activity Name or Title. Please provide a name identifying the proposed GP activity, e.g., Windward Marina, Rolling Hills Subdivision, or Smith Commercial Center.

Block 13. Name of Waterbody. Please provide the name (if it has a name) of any stream, lake, marsh, or other waterway to be directly impacted by the GP activity. If it is a minor (no name) stream, identify the waterbody the minor stream enters.

Block 14. Proposed Activity Street Address. If the proposed GP activity is located at a site having a street address (not a box number), enter it in Block 14.

Block 15. Location of Proposed Activity. Enter the latitude and longitude of where the proposed GP activity is located. Indicate whether the project location provided is the center of the project or whether the project location is provided as the latitude and longitude for each of the "corners" of the project area requiring evaluation. If there are multiple sites, please list the latitude and longitude of each site (center or corners) on a separate sheet of paper and mark as Block 15.

Block 16. Other Location Descriptions. If available, provide the Tax Parcel Identification number of the site, Section, Township, and Range of the site (if known), and / or local Municipality where the site is located.

Block 17. Directions to the Site. Provide directions to the site from a known location or landmark. Include highway and street numbers as well as names. Also provide distances from known locations and any other information that would assist in locating the site. You may also provide a description of the location of the proposed GP activity, such as lot numbers, tract numbers, or you may choose to locate the proposed GP activity site from a known point (such as the right descending bank of Smith Creek, one mile downstream from the Highway 14 bridge). If a large river or stream, include the river mile of the proposed GP activity site if known. If there are multiple locations, please indicate directions to each location on a separate sheet of paper and mark as Block 17.

Block 18. Identify the Specific General Permit(s) You Propose to Use. List the number(s) of the General Permit(s) you want to use to authorize the proposed activity (e.g., GP 4).

Block 19. Description of the Proposed General Permit Activity. Describe the proposed GP activity, including the direct and indirect adverse environmental effects of the proposed activity. The description of the proposed activity should be sufficiently detailed for USACE to determine that the adverse environmental effects of the activity will be no more than minimal. Identify the materials to be used in construction, as well as the methods by which the work is to be done.

Provide drawings to show that the proposed GP activity complies with the terms of the applicable GP(s). Drawings should contain sufficient detail to provide an illustrative description of the proposed GP activity, but do not need to be detailed engineering plans. The written descriptions and illustrations are an important part of the application. Please describe, in detail, what you wish to do. If more space is needed, attach an extra sheet of paper marked Block 19.

Block 20: Description of Proposed Mitigation Measures. Describe any proposed mitigation measures intended to reduce the adverse environmental effects caused by the proposed GP activity. The description of any proposed mitigation measures should be sufficiently detailed for USACE to determine how the measures would avoid and minimize adverse environmental effects. If adverse effects exceed the New England District compensatory mitigation thresholds, you must document how compensatory mitigation would be satisfied in Block 24.

Block 21. Purpose of General Permit Activity. Describe the purpose and need for the proposed GP activity. What will it be used for and why? Also include a brief description of any related activities associated with the proposed project. Provide the approximate dates you plan to begin and complete all work.

Block 22. Quantity of Wetlands, Streams, or Other Types of Waters Directly Affected by the Proposed General Permit Activity. For discharges of dredged or fill material into Waters of the U.S., provide the amount of wetlands, streams, or other types of waters filled, flooded, excavated, or drained by the proposed GP activity. For structures or work in Navigable Waters of the U.S. subject to Section 10 of the Rivers and Harbors Act of 1899, provide the amount of navigable waters filled, dredged, occupied by one or more structures (e.g., aids to navigation, mooring buoys) by the proposed GP activity. The area of impact includes the structures or fills with direct or indirect effects to waters of the U.S. The length of impact includes the length of a stream, including is banks, that are directly affected by the structures or fills. The duration of impact should be identified as temporary (xx days) or permanent. The impact purpose should briefly describe what structure or fill is responsible for the impact.

Block 23. Identify Any Other General Permit(s), Regional General Permit(s), or Individual Permit(s) Used to Authorize Any Part of Proposed Activity or Any Related Activity. List any other GP(s) or individual permit(s) used or intended to be used to authorize any part of the proposed project or any related activity. For linear projects, list other separate and distant crossings of waters and wetlands authorized by these GPs that do not require PCNs. If more space is needed, attach an extra sheet of paper marked Block 23.

Block 24. Compensatory Mitigation Statement for Losses Greater Than the New England District Compensatory Mitigation Thresholds. New England District requires compensatory mitigation at a minimum one for one replacement ratio or greater for all aquatic resource losses that require a PCN and exceed the New England District Compensatory Mitigation Thresholds, unless USACE determines in writing that either some other form of mitigation is more environmentally appropriate or the adverse environmental effects of the proposed GP activity are no more than minimal without compensatory mitigation, and provides an activity specific waiver of this requirement. Describe the proposed compensatory mitigation for wetland losses greater than the New England District Compensatory Mitigation Thresholds or provide an explanation of why USACE should not require wetland compensatory mitigation for the proposed GP activity. If more space is needed, attach an extra sheet of paper marked Block 24.

Block 25. Is Any Portion of the General Permit Activity Already Complete? Describe any work that has already been completed for the GP activity.

Block 26. List the Name(s) of Any Species Listed As Endangered or Threatened under the Endangered Species Act that Might be Affected by the General Permit Activity. If you are not a federal agency, and if any listed species or designated critical habitat might be affected or is in the vicinity of the proposed GP activity, or if the proposed GP activity is located in designated critical habitat, list the name(s) of those endangered or threatened species that might be affected by the proposed GP activity or utilize the designated critical habitat that might be affected by the proposed GP activity. If you are a Federal agency, and the proposed GP activity requires a PCN, you must provide documentation demonstrating compliance with Section 7 of the Endangered Species Act.

Block 27. List Any Historic Properties that Have the Potential to be Affected by the General Permit Activity. If you are not a federal agency, and if any historic properties have the potential to be affected by the proposed GP activity, list the name(s) of those historic properties that have the potential to be affected by the proposed GP activity. Provide all relevant documentation about these historic properties in the PCN submittal. If you are a Federal agency, and the proposed GP activity requires a PCN, you must provide documentation demonstrating compliance with Section 106 of the National Historic Preservation Act.

Block 28. List the Wild and Scenic River or Congressionally Designated Study River if the General Permit Activity Would Occur in such a River. If the proposed GP activity will occur in a river in the National Wild and Scenic River System or in a river officially designated by Congress as a “study river” under the Wild and Scenic Rivers Act, provide the name of the river. For a list of Wild and Scenic Rivers and study rivers, please visit http://www.rivers.gov/

Block 29. General Permit Activities that also Require Permission from the USACE Under 33 U.S.C. 408. If the proposed GP activity also requires permission from the USACE under 33 U.S.C. 408 because it will temporarily or permanently alter, occupy, or use a USACE federal authorized civil works project, indicate whether you have submitted a written request for section 408 permission from the USACE district having jurisdiction over that project.

Block 30. 401 Water Quality Certification. As described above, specify if the activity requires a 401 WQC from the certifying authority.

Block 31. Other Information Required For General Permit Pre Construction Notifications. The terms of some of the General Permits include additional information requirements for preconstruction notifications:

* Maintenance – information regarding the original design capacities and configurations of the outfalls, intakes, small impoundments, and canals.
* Temporary Construction, Access, and Dewatering – a restoration plan showing how all temporary fills and structures will be removed and the area restored to pre-project conditions.
* Repair of Uplands Damaged by Discrete Events – documentation, such as a recent topographic survey or photographs, to justify the extent of the proposed restoration.
* Commercial Shellfish Aquaculture Activities – (1) a map showing the boundaries of the project area, with latitude and longitude coordinates for each corner of the project area; (2) the name(s) of the species that will be cultivated during the period this GP is in effect; (3) whether canopy predator nets will be used; (4) whether suspended cultivation techniques will be used; and (5) general water depths in the project area (a detailed survey is not required).Dredging – (1) a proposed sampling and analysis plan shall be provided to USACE for approval prior to its execution. Pre-application meetings are encouraged.
* Beach Nourishment – sediment grain size should be determined for the length of the beach where nourishment is proposed. The frequency and locations of sediment sampling shall be sufficient to identify the sediment composition of the beach profile. This data shall be consolidated to generate a sediment gradation curve for each sampled transect. Each sampled transect should also be identified on the project plans (drawings).

If more space is needed, attach an extra sheet of paper marked Box 31.

Block 32. Signature of Applicant or Agent. The PCN must be signed by the person proposing to undertake the GP activity, and if applicable, the authorized party (agent) that prepared the PCN. The signature of the person proposing to undertake the GP activity shall be an affirmation that the party submitting the PCN possesses the requisite property rights to undertake the GP activity (including compliance with special conditions, mitigation, etc.).

DELINEATION OF WETLANDS, OTHER SPECIAL AQUATIC SITES, AND OTHER WATERS

Each PCN must include a delineation of wetlands, other special aquatic sites, and other waters, such as lakes and ponds, and perennial, intermittent, and ephemeral streams, on the project site. Wetland delineations must be prepared in accordance with the current wetland delineation manual and regional supplement published by the USACE. The permittee may ask the USACE to delineate the special aquatic sites and other waters on the project site, but there may be a delay if the USACE does the delineation, especially if the project site is large or contains many wetlands, other special aquatic sites, and other waters. The 60-day PCN review period will not start until a delineation has been completed.

DRAWINGS AND ILLUSTRATIONS

General Information.

Three types of illustrations are needed to properly depict the work to be undertaken. These illustrations or drawings are identified as a Vicinity Map, a Plan View or a Typical Cross Section Map. Identify each illustration with a figure or attachment number. For linear projects (e.g. roads, subsurface utility lines, etc.) gradient drawings should also be included. Please submit one copy of all drawings on 8½ x 11 inch plain white paper (electronic submissions preferred). Use the fewest number of sheets necessary for your drawings or illustrations. Each illustration should identify the project, the applicant, and the type of illustration (vicinity map, plan view, or cross section). While illustrations need not be professional (many small, private project illustrations are prepared by hand), they should be clear, accurate, and contain all necessary information.

ADDITIONAL INFORMATION AND REQUIREMENTS

For proposed GP activities that involve discharges into waters of the United States, water quality certification from the State, Tribe, or EPA must be obtained or waived. Some States, Tribes, or EPA have issued water quality certification for one or more GPs. Please check the New England District website to see if water quality certification has already been issued for the GP(s) you wish to use. For proposed GP activities in coastal states, state Coastal Zone Management Act consistency concurrence must be obtained, or a presumption of concurrence must occur. Some States have issued Coastal Zone Management Act consistency concurrences for one or more GPs. Please check the New England District website to see if Coastal Zone Management Act consistency concurrence has already been issued for the GP(s) you wish to use.

APPENDIX C SELF-VERIFICATION NOTIFICATION

U.S. Army Corps of Engineers (USACE)

SELF-VERIFICATION NOTIFICATION (SVN)

DATA REQUIRED BY THE PRIVACY ACT OF 1974

Authority Rivers and Harbors Act, Section 10, 33 USC 403; Clean Water Act, Section 404, 33 USC 1344; Regulatory Programs of the Corps of Engineers; Final Rule 33 CFR 320-332.

Principal Purpose This information will be used in evaluating activities under Self-Verification procedures within Massachusetts.

Routine Uses Routine uses will include: (1) Documenting compliance with the terms and conditions of the General Permit (GP) for activities that may require authorization pursuant to one or more of USACE's Regulatory authorities. (2) Records may be referred to other Federal, State, and local agencies for evaluation and enforcement purposes.

Disclosure Failure to fully comply and abide by the GP terms and conditions prior to commencing work and after completion project may result in formal enforcement action, up to and including monetary penalties and/or legal action, pursuant to 33 CFR Part 326.

Instructions The permittee must complete ALL required sections of this document before commencing USACE-regulated activities. A copy of this completed SVN must be kept on site during construction and be made available for review by USACE and other Federal, State, & Local regulatory authorities at any time. Within 30 days of initiating project construction, the permittee shall submit the completed SVN to USACE. The SVN shall be submitted to USACE as **ONE signed document** that includes project plans and documentation that supports each field (e.g., emails, letters, description, phone calls, surveys). Electronic submissions to the following address are strongly preferred: cenae-r-ma-sv@usace.army.mil. The email subject line shall contain the following: GP #, SVN, City/Town, and date submitted.

(ITEMS 1 THRU 3 TO BE FILLED BY USACE)

1. APPLICATION NO.	2. FIELD OFFICE CODE	3. DATE RECEIVED

APPLICANT AND AGENT INFORMATION

4. APPLICANT'S NAME	7. AGENT'S ADDRESS:
First - Middle - Last -	First - Middle - Last -
Company -	Company -
E-mail Address -	E-mail Address -
5. APPLICANT'S ADDRESS:	8. AGENT'S ADDRESS:
Address-	Address-
City - State - Zip - Country -	City - State - Zip - Country -
6. APPLICANT'S PHONE NOs. w/AREA CODE	9. AGENTS PHONE NOs. w/AREA CODE
a. Residence b. Business c. Fax	a. Residence b. Business c. Fax

NAME, LOCATION, AND DESCRIPTION OF PROJECT SITE

10. PROJECT NAME OR TITLE

11. FILE NUMBER(S) OF PREVIOUS USACE ACTIONS ON THE SITE (if applicable)	12. NAME OF WATERBODY
13. PROJECT COORDINATES (in decimal degrees)	14. PROJECT STREET ADDRESS (if applicable)
Latitude: ◦N Longitude: ◦W	Address
	City - State - Zip -

ACTIVITY TYPE, PROJECT IMPACTS, AVOIDANCE & MINIMIZATION

15. GENERAL PERMIT ACTIVITIES (CHECK ALL THAT APPLY)

1 ☐	6 ☐	11 ☐	16 ☐	21 ☐
2 ☐	7 ☐	12 ☐	17 ☐	22 ☐
3 ☐	8 ☐	13 ☐	18 ☐	23 ☐
4 ☐	9 ☐	14 ☐	19 ☐	24 ☐
5 ☐	10 ☐	15 ☐	20 ☐	25 ☐

16. SUMMARY OF PROJECT IMPACTS (*see instructions*)

Area (square feet)	Length (linear feet)	Volume (cubic yards)	Duration

17. PROJECT PLANS (BY CHECKING THE BOXES BELOW, YOU CERTIFY THESE ITEMS ARE COMPLETE) (*see instructions*)

- ☐ a. Plans shall at least contain the following: Vicinity Map, Plan View, and Typical Cross Section View of the proposed activity.
- ☐ b. All direct, indirect and secondary impacts from USACE regulated activities are shown on the project plans.
- ☐ c. The size of the impact area for each activity (acre, square feet, linear feet) are shown on the project plans.
- ☐ d. For discharges of fill material (§404), the volume of fill material is identified on the project plans.
- ☐ e. The duration of each impact, permanent or temporary (X days), is identified on the project plans.
- ☐ f. Do activities with permanent impacts result in the loss of waters? If so, this is identified on the project plans.
- ☐ g. All aquatic resources in the vicinity of the USACE regulated activities are delineated on the project plans.

18. AVOIDANCE & MINIMIZATION (BY CHECKING THE BOXES BELOW, YOU CERTIFY THESE CRITERIA ARE MET) (*see instructions*)

- ☐ a. The project has been designed to avoid and minimize impacts to aquatic resources.
- ☐ b. The footprint of activities in waters of the U.S. has been reduced to only what is necessary to achieve the overall project purpose.
- ☐ c. All practicable measures have been taken to avoid and minimize impacts to aquatic resources through construction techniques and site access (e.g., Best Management Practices, Time of Year Restrictions).
- ☐ d. All temporary impacts from USACE regulated activities will be restored upon completion of construction and the project area will be returned to pre-construction contours and conditions.

COMPLIANCE WITH FEDERAL REGULATIONS & SUPPLEMENTAL INFORMATION

19. DUE DILIGENCE (*see instructions*)

Complete the entries below to document compliance with the following Federal requirements. Construction may NOT begin if a PCN is/may be required, and you must contact USACE to determine permitting requirements. Documentation that demonstrates how the activity complies with each field below shall be submitted to the USACE as noted in the instructions block. See each General Condition (GC) in the GP for how to comply with each requirement.

a. State Historic Preservation Officer	Select Option
b. Massachusetts BUAR	Select Option
c. Tribal Historic Preservation Officers	Select Option
d. Endangered Species Act - NOAA	Select Option
e. Endangered Species Act - USFWS	Select Option
f. Northern Long Eared Bat (ESA)	Select Option
g. Essential Fish Habitat	Select Option
h. Wild & Scenic Rivers	Select Option
i. 401 Water Quality Certification 401	Select Option
	401 WQC/OOC File Number: OOC issued: 401 issued:
j. Section 408 Permission	Select Option
k. Coastal Zone	Select Option
l. Construction Mats	Select Option
m.Time of Year Restrictions	Select Option
n. Vernal Pools	Select Option
o. Sediment & Erosion Controls	Select Option
p. Stream/Wetland Crossings	Select Option

20. AQUACULTURE ACTIVITIES - GP 18 (*see instructions*)

- ☐ a. If required, an Aquaculture Certification from the Massachusetts Division of Marine Fisheries was obtained prior to commencing work.
- ☐ b. Coordination with the U.S. Coast Guard pursuant to Private Aids to Navigation has occurred prior to commencing work.
- ☐ c. If required, a MEPA Certificate was obtained from the Massachusetts Environmental Protection Agency prior to commencing work. Select Option
- ☐ d. The prospective permittee contacted local authorities (e.g. harbormaster, select board, shellfish constable) for authorization of their facility prior to commencing work.

21. ADDITIONAL INFORMATION/ATTACHMENTS (*see instructions*)

- ☐ a. The project plans are enclosed in this SVN submittal (see block 17).
- ☐ b. The activity Select Option funded through the Bipartisan Infrastructure Bill (also known as the Infrastructure Investment and Jobs Act).
- ☐ c. All required state, local and federal approvals were acquired prior to starting construction in USACE jurisdiction.
- ☐ d. After construction of the activity is completed, a complete Certificate of Compliance will be submitted to USACE.

22. IS THERE ANOTHER LEAD FEDERAL AGENCY:

☐ YES ☐ NO

23. STATEMENT OF AUTHORIZATION *(see instructions)*

I certify that I possess the authority to undertake the work described herein or am acting as the duly authorized agent of the applicant.

SIGNATURE OF APPLICANT	DATE	SIGNATURE OF AGENT	DATE

24. SIGNATURES *(see instructions)*

I hereby certify that the information in this Self-Verification Notification is complete and accurate. As the applicant or their duly authorized agent, I certify the activity was completed in accordance with the terms and conditions of the GP. This includes all applicable terms, general conditions, and activity-specific GP criteria. I agree to allow the duly authorized representatives of the Corps of Engineers Regulatory Program and other regulatory or advisory agencies to enter upon the premises of the project site at reasonable times to evaluate inspect and photograph site conditions. This consent to enter the property is superior to, takes precedence over, and waives any communication to the contrary. For example, if the property is posted as “no trespassing” this consent specifically supersedes and waives that prohibition and grants permission to enter the property despite such posting.

SIGNATURE OF APPLICANT	DATE	SIGNATURE OF AGENT	DATE

18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals, or covers up any trick, scheme, or disguises a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statements or entry, shall be fined not more than $10,000 or imprisoned not more than five years or both.

Instructions for Preparing a
Department of the Army
General Permit (GP) Self-Verification

Blocks 1 through 3. To be completed by the Corps of Engineers.

Block 4. Applicant' Name. Enter the name and the e-mail address of the responsible party or parties. If the responsible party is an agency, company, corporation, or other organization, indicate the name of the organization and responsible officer and title. If more than one party is associated with the self-verification, please attach a sheet of paper with the necessary information marked Block 4.

Block 5. Address of Applicant. Please provide the full address of the party or parties responsible for the self-verification. If more space is needed, attach an extra sheet of paper marked Block 5.

Block 6. Applicant Telephone Number(s). Please provide the telephone number where you can usually be reached during normal business hours.

Blocks 7 through 9. To be completed, if you choose to have an agent.

Block 7. Authorized Agent's Name and Title. Indicate name of individual or agency, designated by you, to represent you in this process. An agent can be an attorney, builder, contractor, engineer, consultant, or any other person or organization. Note: An agent is not required.

Blocks 8 and 9. Agent's Address and Telephone Number. Please provide the complete mailing address of the agent, along with the telephone number where they can be reached during normal business hours.

Block 10. Proposed General Permit Activity Name or Title. Please provide a name identifying the proposed GP activity, e.g., Windward Marina, Rolling Hills Subdivision, or Smith Commercial Center.

Block 11. File Number(s) of Previous USACE Actions on the Site Please provide any known USACE file number. If the activity does not have a known USACE file number, you may state N/A.

Block 12. Name of Waterbody. Please provide the name (if it has a name) of any stream, lake, marsh, or other waterway to be directly impacted by the GP activity. If it is a minor (no name) stream, identify the waterbody the minor stream enters.

Block 13. Proposed Activity Coordinates. Please enter the latitude and longitude of where the proposed GP activity is located. Indicate whether the project location provided is the center of the project or whether the project location is provided as the latitude and longitude for each of the "corners" of the project area. If there are multiple sites, please list the latitude and longitude of each site (center or corners) on a separate sheet of paper and mark as Block 13.

Block 14. Proposed Activity Street Address. If the proposed activity is located at a site having a street address (not a box number), enter it in Block 14.

Block 15. General Permit Activity Type. Please select all GP activity types that apply to the proposed activity. A list of GP activity types can be found in Section III of the GP.

Block 16. Summary of Project Impacts. Please provide ALL proposed impacts, both temporary and permanent in duration, that are located in Waters of the United States. The area of impact shall be provided in square feet (SF). When applicable, impacts that result in conversion of stream bank or shoreline must also be identified in linear feet (LF). Dredging or the discharge of dredged or fill material shall also include the volume, cubic yards (CY), of material removed from or placed into Waters of the U.S. If more entries are required, please attach a table matching the desired format in Block 16.

Block 17. Project Plans. Please verify that items a-g are included in the project plans. Three types of illustrations are necessary to properly depict the proposed work. These illustrations or drawings are identified as a Vicinity Map, a Plan View (Aerial view) and a Cross Section Map. For linear projects (e.g. roads, subsurface utility lines, etc.) gradient drawings (longitudinal profile) should also be included. Plans must accurately depict the existing conditions and all aspects of the proposed activity located in waters of the U.S. Please submit one copy of all drawings formatted to print on 8½ x 11 inch or 11 x 17 inch plain white paper. Use the fewest number of sheets necessary for your drawings or illustrations. Each illustration should identify the project, the applicant, and the type of illustration (vicinity map, plan view, or cross section). While illustrations need not be certified engineering sheets; they should be clear, accurate, contain all necessary information, and depict all proposed work. Each submission must also include a delineation of wetlands, other special aquatic sites, and other waters, such as lakes and ponds, and perennial, intermittent, and ephemeral streams, on the project site. Wetland delineations must be prepared in accordance with the current wetland delineation manual and regional supplement published by USACE.

Block 18. Avoidance & Minimization. Please verify that items a-d have been implemented for the proposed activity.

Block 19. Due Diligence. Please complete all the fields and submit documentation to USACE to demonstrate compliance with the above requirements. This Documentation may include emails, letters, meeting notes, phone call log, project narrative, project plans, a species list from the NOAA Section 7 Mapper, a completed copy of the IPAC determination keys, etc. Documentation should be limited to what is necessary to demonstrate how the proposed activity meets each requirement. Refer to the MA GP, Appendix A, for specific guidance on the identification of previously identified historic properties and previously unidentified historic properties. Endangered Species: *The applicant must be designated as the non-federal representative for the purposes of Section 7 consultation to select the Rangewide D-Key options. Otherwise, the applicant shall select the following option when IPAC indicates the NLEB is present: "The activity IS located within the NLEB Species Range (PCN Required)."

Block 20. Aquaculture Activities. Please verify that items a-d have been obtained or completed prior to commencing work in waters of the U.S.

Block 21. Additional Information/Attachments. Please verify that items a-d have been completed prior to commencing work in waters of the U.S.

Block 22. Lead Federal Agency. Please identify if there is another lead federal agency involved with the proposed activity. Enter the lead federal agency name (e.g., the Federal Emergency Management Agency, FEMA) and the agency's designated person of contact for the activity.

Block 23. Statement of Authorization. The applicant shall sign this section for all activities. If an agent is to be employed, the agent shall sign this section.

Block 24. Signatures. The SVN must be signed by the person proposing to undertake the GP activity, and if applicable, the authorized party (agent) that prepared the SVN. The signature of the person proposing to undertake the GP activity shall be an affirmation that the party submitting the SVN possesses the requisite property rights to undertake the GP activity.

US Army Corps of Engineers®
New England District

APPENDIX D: PCN APPLICATION CHECKLIST

The following information shall be submitted for all PCNs for USACE to properly evaluate your application. Some applications may require more information and this checklist is offered as a tool to assist applicants with submitting a complete application.

SECTION 1: GENERAL APPLICATION INFORMATION

1. ☐ Complete the Pre-Construction Notification document (Appendix B).
2. ☐ Specify which local/state/federal authorizations are required for the project and if any have been obtained or applied for at the time of USACE application submittal.
3. ☐ Identify all funding sources the project will receive or has received to date. Provide any relevant information in the application submission.
4. ☐ Is this part of a larger project that is being implemented in phases? If so, describe the project schedule and how each phase will be implemented.
5. ☐ Describe the existing conditions on the site and the general land use in the vicinity of the project at the time application submittal.
6. ☐ Provide any historic information available that you may have of project area, e.g., existing USACE permit numbers, the names under which the permits were obtained if the permit numbers are unknown, construction dates and proof of prior existence (aerials, photos, town hall records, affidavits, state or local permits, etc.) to verify that the project predates regulation and is "vested".[19]
7. ☐ The anticipated start and end dates for construction.

SECTION 2: WETLAND DELINEATION

8. ☐ Data used to support aquatic resource boundary determinations (delineation forms, delineation map(s) that show the locations of each aquatic resource in the project area, aerial and ground photographs, LIDAR imagery, national wetland inventory maps, soil maps, national hydrography dataset maps, floodplain maps, historical imagery, etc.).
9. ☐ Photographs of the wetland(s) and/or waterway(s) where impacts are proposed. Photos at low tide are preferred for work in tidal waters.
10. ☐ Indicate the relationship of the project area to waters of the U.S., i.e., adjacent wetlands, tidal influence or hydraulic connectivity through culverts, or other conveyances, etc.
11. ☐ At minimum the delineation map/figure should include the following:
    a. Contour lines showing topography.
    b. North arrow.
    c. Bar and text scale.
    d. Legend.
    e. Drawn project boundary.
    f. High tide line, mean high water, mean low water, ordinary high water mark, and/or wetland boundaries.
    g. Captions with a unique name for each aquatic resource and the area or length of the aquatic resource within the project area.

[19] Vested is exempt (someone or something) from a new law or regulation.

h. Appropriate landmarks and features (e.g., culverts, special aquatic sites, etc.).
i. Points showing the paired upland and wetland delineation locations for tidal and non-tidal wetlands only.

SECTION 3: AVOIDANCE & MINIMIZATION

12. ☐ Describe specific measures taken to avoid impacts to aquatic resources or describe why aquatic resources could not be avoided while achieving the project purpose and need.
13. ☐ For impacts to aquatic resources that could not be avoided, describe specific considerations/ measures taken to minimize the area of proposed impacts to aquatic resources in designing the project.
14. ☐ Describe specific measures taken to avoid and minimize the proposed direct, indirect, and secondary impacts to aquatic resources and their functions through construction techniques and timing.
15. ☐ If applicable, provide a restoration plan that describes how all temporary fills and structures will be removed and the area restored to pre-impact conditions (see GC 22).
16. ☐ If applicable, provide an Invasive Species Control Plan (see GC 29). For sample control plans, see www.nae.usace.army.mil/missions/regulatory/invasive-species.
17. ☐ If applicable, describe how the proposed wetland/waterbody crossing is compliant with GC 31, Stream Work and Crossings, and Wetland Crossings.

SECTION 4A: PROJECT IMPACTS

18. ☐ Describe the overall project and the activities located in Waters of the U.S. (WOTUS) that you are seeking authorization for.
19. ☐ Identify the following for project impacts in WOTUS:
    a. ☐ Direct, indirect, secondary impacts[20] within WOTUS.
    b. ☐ The size of each impact (square feet or acres, or linear feet).
    c. ☐ For discharges of fill material (§404), specify the volume of fill material to be discharged (cubic yards).
    d. ☐ The impact duration from each activity, permanent or temporary (X days).

SECTION 4B: PROJECT PLANS

20. ☐ Submit project plans that depict all impacts in WOTUS. On the project plans, applicants shall provide:

    General Information

    a. ☐ Plan view and typical cross-section view sheets that show the existing and proposed conditions. These illustrations should each be identified with a figure number, date of the map, the project title, the name of the applicant and the type of illustration (vicinity map, plan view, or cross section).
    b. ☐ Drawings, sketches, or plans that are legible, reproducible (color is encouraged, but features must be distinguishable in black and white), drawn to scale, and no larger than 11”x17” and 10 MB when submitted in digital format. Numeric and graphic/bar scales must agree, and plan details must be measurable using a standard engineer’s scale on printed plans. Reduced plans are not acceptable.
    c. ☐ The north arrow and remove miscellaneous non-wetland or water project related features such as conduits, utility poles, guardrails, etc.

[20] See definitions section for the definitions of direct, indirect, secondary impacts.

d. ☐ Clearly draw the overall limits of work, staging areas, disposal sites, access routes, and any permittee responsible mitigation sites. These areas may include both aquatic resources and upland areas.
e. ☐ Names or numbers of all roads in the site's vicinity and ownership and numbers of abutting parcels.
f. ☐ Datum in plan and elevation views. The horizontal datum shall be in the NAD 83 Massachusetts State Plane Coordinate System (INSERT) in U.S. survey feet. The vertical data in coastal projects shall be referenced to either MLLW or the North American Vertical Datum of 1988 (NAVD 88). Both the distance and depth units shall be U.S. survey feet and specified on the project plans.

Aquatic Resources & Project Impacts

g. ☐ Delineation of all aquatic resource types on site including salt marsh; other special aquatic sites (vegetated shallows, mudflats, riffles and pools, coral reefs, and sanctuaries and refuges); other waters, such as lakes, ponds, vernal pools, natural rocky habitat (tidal only), and perennial, intermittent, and ephemeral streams.
h. ☐ Identify the substrate type (cobble/gravel, organic detritus, sand/shell, silt, mud) and the approximate percentage of each substrate type on site. Grain sizes shall be based on Wentworth grain size classification scale for granules, pebbles, cobbles, and boulders. Sediment samples with a content of 10% or more of pebble-gravel-cobble and/or boulder in the top layer (6-12 inches) should be delineated and material with epifauna/macroalgae should be differentiated from bare pebble-gravel-cobble and boulder.
i. ☐ The direction of ebb and flood in tidal waters and direction of flow in non-tidal waters.
j. ☐ In tidal waters, the project boundary distance from special aquatic sites identified in 20g above if within 25 feet from that resource.
k. ☐ USACE jurisdictional boundaries including ordinary high-water mark (OHWM), high tide line (HTL), mean high water (MHW). Other boundaries include mean low water (MLW), mean lower low water (MLLW), as applicable.
   - Non-tidal: OHWM and/or wetland boundaries.
   - Tidal (structures/work only): MHW, MLW.
   - Tidal (Fill and Structures/work): HTL, MHW, MLW.
   - Tidal (Dredging/Beach Nourishment): HTL, MHW, MLW, MLLW.
l. ☐ Identification of each aquatic resource with a unique name (ex. Wetland 1, Wetland 2, Tributary 1, Beaver Brook, Atlantic Ocean) and the size of each aquatic resource within the project area (square feet or acres).
m. ☐ Impacts to each aquatic resource with captions denoting the size of each impact (square feet, acres, or linear feet) and the duration of the impact (ex. Permanent, Temporary (X days).

SECTION 4C: PROJECT PLANS - SPECIFIC PROJECT INFORMATION

21. ☐ For projects involving Navigation, Structures, Dredging, and/or Beach Nourishment, the applicant shall also address the following:

Navigation

a. ☐ Identify the locations of adjacent Federal navigation project (FNP) and/or state/local navigation projects on the project plans.
b. ☐ Specify the distance between the FNP and proposed project boundary, the authorized depths of the FNP, and state plane coordinates of seaward end(s) of project structures near an FNP.

Structures

a. ☐ Identification of the piling type (steel, timber, concrete) and diameter to be removed and/or installed.
b. ☐ Specify the minimal height of the structures' frame over saltmarsh. To meet the SV threshold, piers must be ≤4 feet in width and this minimal height must achieve a 1.5:1 ratio (i.e., a 4-foot-wide pier is 6 feet above a saltmarsh).
c. ☐ For floats, the methods of securing them (piles, bottom anchors) and for keeping them off substrate (skids, stops) at low water. To meet the SV threshold, a minimum depth of 18-inches of water should be maintained below a floating dock/structure at lower tide levels.

Dredging

a. ☐ The area (SF, acre) and volume (CY) of material to be dredged waterward of MHW for each dredge location.
b. ☐ Dredge boundaries.
c. ☐ Bathymetry for existing, proposed, and historical (include dates and USACE permits) dredge depths.
d. ☐ The likely final angle of repose of the side cuts based on the physical characterization of the material to be dredged and based upon the high/ medium/low, wave or current energy of the location.
e. ☐ Label area whether the dredging is new, maintenance, improvement, or a combination.
f. ☐ Location of the disposal site (include location sheet). NOTE: For projects proposing open water, nearshore disposal, or beach nourishment, contact USACE as early as possible for sampling and testing protocols. Sediment testing, including physical (e.g., grain-size analysis), chemical and biological testing may be required. Sampling/testing of sediments without such contact should not occur and if done, will be at the applicant's risk.
g. ☐ The methods and areas used to retain or prevent dredged material from running back into the wetland or waterway. Provide the capacity of the storage area and points of runback, including the overflow route, into the aquatic system.
h. ☐ For open-water disposal, explain why inland or beneficial reuse sites are not practicable.
i. ☐ Show the finished top elevation of the disposal site.

Beach Nourishment

a. ☐ For beach nourishment, identify the disposal footprint, existing and proposed nourishment profiles (multiple profiles are appropriate if the site is more than 150 feet long or non-contiguous), total fill area (SF) and volume (CY), fill area and volume waterward of the HTL, and delineation of dunes, banks, existing beach vegetation, and contours.
b. ☐ For beach nourishment identify the substrate type (fine sand, sand, cobble, boulder) and/or grain-size of existing material.

SECTION 5: STRUCTURES

22. ☐ For projects with the removal of existing pilings identify the number, type (steel, timber, concrete) and diameter of pilings to be removed and the methodology for removal (cut off at mud line, pulling, vibratory, etc.).
23. ☐ For projects with the installation of new pilings identify the number, type (steel, timber, concrete) and diameter of pilings to be installed and the methodology for installation (vibratory hammer, impact hammer etc.).
24. ☐ Identify any existing structures and moorings in waters adjacent to the proposed activity, their dimensions, and the distance to the limits and coordinates of any proposed mooring field or reconfiguration zone. For reconfiguration zone and mooring fields, provide the coordinates for all

corners based on the Massachusetts State Plane Coordinate System. Specify the maximum number of slips and/or moorings within proposed reconfiguration zones or anchorage areas.

25. ☐ The dimensions of the structure or work and extent of encroachment waterward of MHW and from affixed point on the shoreline or upland.
26. ☐ Shoreline of adjacent properties and property boundary offset for structures. In narrow waterbodies, the distance to opposite shoreline, waterway width, and structures across from proposed work.
27. ☐ For new commercial boating facilities, anchorage areas or reconfiguration zones, provide a description of the type of vessels that would use the facility, and any plans for sewage pump-out facilities, fueling facilities and contingency plans for oil spills.
28. ☐ See Sections 4A-C above.

SECTION 6: AQUACULTURE

29. ☐ Identify the coordinates for lease area corners and gear configuration area on the project plans.
30. ☐ Identify the proposed aquaculture gear type (buoys, floats, racks, trays, nets, lines, tubes, cages, containers, and other structures). Provide the impacts for each aquaculture gear type (see Section 4A 19a-d).
31. ☐ For a GP 18 to be valid, applicants must have (a) their MA DMF Aquaculture Certification letter for licensed shellfish aquaculture sites, (b) documentation that the applicant has coordinated with the U.S. Coast Guard regarding USCG Private Aids to Navigation standards, (c) their MEPA Certificate (if required), and (d) documentation that the applicant has contacted their local authorities (ex. harbormaster, select board, shellfish constable) for authorization of their facility.
32. Provide information on site the operation, maintenance, and access. Will the site be accessed via boat, kayak, etc.? Will cages be removed in the winter? How often will gear be checked on? Is there an operations plan for the proposed aquaculture area?
33. ☐ See Sections 4A-C above.

SECTION 7: DREDGING

34. ☐ Sampling plan requests for new, improvement or maintenance dredging must submit completed **Dredged Material Evaluation checklist found at Dredged Material Evaluation Checklist, Sampling and Analysis Plan Requirements from Applicant (army.mil)** and identify the method of handling/transporting the dredged material.
35. ☐ Identify grain-size of material to be dredged (e.g., silty sand) and provide any existing sediment grain size and bulk sediment chemistry data from the proposed project or nearby projects. Include information on any recent spills of oil and/or other hazardous materials and/or nearby outfalls. Document the information source, e.g., EPA database, the harbormaster or fire chief. If there are none, state “none”.
36. ☐ See Section 4A, 4B and 4C, Dredging 21(a-i) above.

SECTION 8: WETLAND/WATERBODY CROSSINGS

37. ☐ For the stream crossing, identify the crossing methodology on the project plan (e.g., dam and pump, dry, wet, etc.). Submit a waterway crossing sequencing plan with the application.
38. ☐ If the project includes a permanent crossing of a tidal waterway, your project design should be modified to match the velocity, depth, cross-sectional area, and substrate of the existing waterbody adjacent to the crossing and provide documentation (hydraulic analysis including low lying property analysis) that the size of the crossing will not restrict tidal flow over the full natural tide range and will not adversely affect abutting infrastructure.

39. ☐ If the work includes a permanent crossing of a non-tidal stream, your project design should be modified to match the culvert gradient of the existing stream channel profile, provide clearance for ≥1.2 times bank full width and conveyance should be embedded ≥1-2 feet for box culverts and pipe arches or ≥1-2 feet and at least 25 percent for rounded pipes/culverts in accordance with the Massachusetts Stream Crossing Standards. Provide the basis for any variation to this requirement.
40. ☐ If the work includes a permanent crossing of a non-tidal stream, the structure should be designed to include a natural bottom substrate within the conveyance that matches the characteristics of the substrate in the natural stream channel and the character of the banks (mobility, slope, stability, confinement, grain and rock size). The conveyance should be designed with a minimum openness ratio ≥0.82-feet (0.25-meters). For how to calculate openness ratio and stream simulation ecological approach for road and stream crossings, see https://www.nae.usace.army.mil/Missions/Regulatory/Stream-and-River-Continuity/.

SECTION 9: COMPENSATORY MITIGATION

41. ☐ Does the project require Compensatory Mitigation[21] for impacts to Waters of the U.S.? (See Section V in the 2023 Massachusetts General Permit)
42. ☐ If the project requires mitigation, does the selected compensatory mitigation option (i.e., In-Lieu Fee, permittee-responsible mitigation) deviate from the order of the options presented in §332.3(b)(2)-(6)? If so, please explain why. https://www.ecfr.gov/current/title-33/chapter-II/part-332/section-332.3
43. ☐ For any compensatory mitigation that involves preservation, the applicant must use a site protection instrument to preserve the parcel in perpetuity. (Conservation Easement, Deed Restriction, etc.) https://www.mass.gov/service-details/conservation-restriction-review-program.

SECTION 10: HISTORIC PROPERTIES & NOTIFICATIONS TO SHPO, THPOs, BUAR

44. ☐ Notify the SHPO, Massachusetts Historical Commission, of the Project via Certified Mail and include proof of delivery or receipt in the application package (See Appendix A).
45. ☐ As applicable, notify the THPOs, Narragansett Indian Tribe, Wampanoag Tribe of Gay Head (Aquinnah), and Mashpee Wampanoag Tribe, of the Project via email OR mail and include proof of delivery or receipt in the application package (See Appendix A).
46. ☐ As applicable, notify the BUAR via email (*strongly preferred*) OR mail and include proof of delivery or receipt in the application package (See Appendix A).
47. ☐ Include responses to this notification in the permit application.
48. ☐ As applicable, information on historic properties (Tribal and Archaeological) within the project area should be provided in the permit application.

SECTION 11: ENDANGERED SPECIES & ESSENTIAL FISH HABITAT

49. ☐ Provide a USFWS Information for Planning and Consultation (IPaC) Official Species List from https://ecos.fws.gov/ipac and the email of the individual who generated the list (see GC 10 of the 2023 Massachusetts General Permit for more information).
50. ☐ Provide a species list from the NMFS Section 7 Endangered Species Act mapper at https://noaa.maps.arcgis.com/apps/webappviewer/index.html.
51. ☐ Provide a species list from the NMFS Essential Fish Habitat Mapper at https://www.habitat.noaa.gov/apps/efhmapper/?page=page_3.

[21] Your mitigation proposal must be consistent with the December 29, 2020 Compensatory Mitigation Standard Operating Procedures at https://www.nae.usace.army.mil/Portals/74/docs/regulatory/Mitigation/Compensatory-Mitigation-SOP-2020.pdf and 2008 Mitigation Rule.

52. ☐ If the project will generate turbidity, describe the extent of turbidity and if erosion controls will be used to contain turbidity. If turbidity controls are not operationally feasible, explain the basis for your conclusion and identify any other measures that you will implement to minimize resuspension of sediment.
53. ☐ Identify the substrate type and any aquatic resources that will be affected by the proposed action. (SAV, salt marsh, sand, silt/clay, rocky/hard bottom)
54. ☐ For projects which will include the installation of pilings/sheet-piles, identify the substrate at the project site (sand, cobble, silt/mud/clay), the installation method (vibratory hammer, impact hammer, combination) and indicate whether the following “soft start” procedures at beginning of the workday and after a 30-minute period of rest will be deployed:
    a. ☐ Vibratory Pile Installation: pile driving will be initiated for 15 seconds at reduced energy followed by a one-minute waiting period. This sequence of 15 seconds of reduced energy driving, one-minute waiting period will be repeated two additional times, followed immediately by pile-driving at full rate and energy.
    b. ☐ Impact Pile Installation: pile driving will commence with an initial set of three strikes by the hammer at 40% energy, followed by a one-minute wait period, then two subsequent 3-strike sets at 40% energy, with one-minute waiting periods, before initiating continuous impact driving.
55. ☐ If the project involves dredging, describe any dredge history, number of dredge events to be covered by the permit, erosion/sediment controls, dredge type, intake structures (mesh screen size), dredged material disposal site.
56. ☐ For project activities associated with structures, identify the number, type (drill barge, work boat, tugboat, etc.), and size of any temporary vessels that will be used. Specify measures that will be implemented to ensure vessels are not berthed in shallow water or will “ground out” at low tide.
57. ☐ For aquaculture projects identify whether any component of the gear is seasonal (will be removed annually) or will be in place year-round. If gear will be present year-round and will be variably managed (e.g., floating in summer, bottom in winter) identify month/date for such configurations.
58. ☐ For aquaculture projects identify whether the project will involve use of an existing vessel or new vessel. Identify the length for all work vessels and identify the distance round trip from vessel berthing location and aquaculture area.
59. ☐ For project activities associated with docking structures (either commercial, industrial, or recreational) identify the number, type (motorized/non-motorized, jet-ski, sailboat, kayak, canoe, other that will be berthed there and the sizes of each.
60. ☐ Information required for Section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act:
    a. Results of an eelgrass survey completed per the INSERT.
    b. Essential Fish Habitat Assessment to determine project-related impacts to essential fish habitat, using guidance developed by the National Marine Fisheries Service.
61. ☐ A document containing the following information (requirements of 50 CFR §600.920(e)(3)):
    a. Description of proposed action.
    b. Analysis of potential adverse effects on essential fish habitat.
    c. Conclusions regarding the effects of the action on essential fish habitat.
    d. If applicable, proposed mitigation.
    e. Analysis of alternatives to the proposed action.
    f. Other:

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DOCUMENT A00840

PRE-CONSTRUCTION NOTIFICATION

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IMPROVING COMMUNITIES TOGETHER

January 30, 2026

Dan Vasconcelos, PWS
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742

Subject: Pre-Construction Notification
Old Colony Avenue Bridge Reconstruction Project
Taunton and Raynham, Massachusetts
MassDOT Project #613642

Dear Mr. Vasconcelos:

The City of Taunton in conjunction with the Massachusetts Department of Transportation – Highway Division (MassDOT) is submitting this combined Pre-Construction Notification / Water Quality Certification application for the proposed Bridge Reconstruction of bridge R-02-003=T-01-004 (the Project) at Old Colony Avenue over the Taunton River in Taunton and Raynham, Massachusetts (the Site). The Project requires authorization under Massachusetts General Permit 23: Linear Transportation Projects, and 24: Temporary Construction, Access, and Dewatering. A Combined License/Permit for Waterways & Water Quality Certification (BRP WW26), which combines a Major Fill/Excavation Project Certification (BRP WW 10) and a Minor Dredge Project Certification (BRP WW 08), is also required due to proposed impacts to Land Under Water (LUW) exceeding 5,000 square feet in area and proposed dredging exceeding 100 cubic yards in volume. Portions of the Project within the City of Taunton and Town of Raynham are being filed under the MassDOT bridge exemption as specified in the 2014 Transportation Bond Bill. The bridge replacement design is substantially the functional equivalent of and in similar alignment to, the existing bridge. Therefore, permitting with the local Conservation Commissions will be limited to that which is required under the local wetlands bylaw / ordinance.

The Project is necessary to improve safety and transportation infrastructure in Taunton and Raynham along the Taunton River. The existing bridge was constructed in 1945, and following a recent rating it was recommended the bridge be closed to vehicular traffic due to poor conditions along the bridge abutments. The Project will require demolition of the existing bridge superstructure, construction of the new bridge deck and associated structural appurtenances; installation of scour protection within the Taunton River; full depth pavement reconstruction; and grading. The Project proposes to retain the existing bridge substructure while replacing the superstructure with a deck that is one foot wider to allow for the addition of a bicycle lane. Ancillary Project facets including guardrails and a relocated sidewalk have also been incorporated into the design, and the Project will also address the addition of scour protection within the river during construction.

As a result of the proposed work the following impacts to resource areas are expected:

- 164 linear feet of temporary and 72 linear feet (lf) of permanent impact to Streambank; and
- 4,699 square feet (sf) of temporary and 8,570 sf of permanent impact to Streambed associated with a dredge volume of 2,055 cubic yards (cy).

Due to the nature of the work, impacts to Waters of the U.S. are unavoidable; however, impacts will be minimized and mitigated through the use of dewatering and water control best management practices to

BETA GROUP, INC.
89 Shrewsbury Street, Suite 300, Worcester, MA 01604
P: 508.756.1600 | W: www.BETA-Inc.com

support good water quality during construction, the use of perimeter erosion and sedimentation controls to prevent unintentional impacts to Waters of the U.S. downgradient from the proposed work, and restoring the streambed with simulated streambed material that is compatible with the existing streambed placed over the riprap scour protection.

A pre-filing meeting with U.S. Army Corps of Engineers and MassDEP took place on November 20, 2025.

MassDOT hereby certifies that all information contained herein is true, accurate, and complete to the best of my knowledge and belief. If you have any questions regarding this application, please do not hesitate to contact Jonathan Niro at 844-800-2382 x7141 or JNiro@BETA-Inc.com. The Project proponent hereby requests that the certifying authority review and take action on this CWA 401 certification request within the applicable reasonable period of time.

Sincerely,

Hannah Davis
Staff Scientist

Jonathan Niro, PWS
Project Manager

cc: Heidi Davis, MassDEP
Ryan Hale, MassDEP
Tyler Lewis, MassDEP
Herrio Lamothe, MassDOT Project Manager
Courtney Walker, MassDOT
Lily Collins, MassDOT
Christopher Jones, PE, BETA Group, Inc.
Laura Krause, BETA Group, Inc.
Taunton Conservation Commission
Raynham Conservation Commission

Enclosures: Combined PCN / 401 WQC Application, plans

IMPROVING COMMUNITIES TOGETHER

January 30, 2026

Heidi Davis, Highway Unit Supervisor
MassDEP Wetlands Program
100 Cambridge Street, Suite 900
Boston, MA 02114

Subject: 401 WQC Application
Old Colony Avenue Bridge Reconstruction Project
Taunton and Raynham, Massachusetts
MassDOT Project #613642

Dear Ms. Davis:

The City of Taunton in conjunction with the Massachusetts Department of Transportation – Highway Division (MassDOT) is submitting this combined Pre-Construction Notification / Water Quality Certification application for the proposed Bridge Reconstruction of bridge R-02-003=T-01-004 (the Project) at Old Colony Avenue over the Taunton River in Taunton and Raynham, Massachusetts (the Site). The Project requires authorization under Massachusetts General Permit 23: Linear Transportation Projects, and 24: Temporary Construction, Access, and Dewatering. A Combined License/Permit for Waterways & Water Quality Certification (BRP WW26), which combines a Major Fill/Excavation Project Certification (BRP WW 10) and a Minor Dredge Project Certification (BRP WW 08), is also required due to proposed impacts to Land Under Water (LUW) exceeding 5,000 square feet in area and proposed dredging exceeding 100 cubic yards in volume. Portions of the Project within the City of Taunton and Town of Raynham are being filed under the MassDOT bridge exemption as specified in the 2014 Transportation Bond Bill. The bridge replacement design is substantially the functional equivalent of and in similar alignment to, the existing bridge. Therefore, permitting with the local Conservation Commissions will be limited to that which is required under the local wetlands bylaw / ordinance.

The Project is necessary to improve safety and transportation infrastructure in Taunton and Raynham along the Taunton River. The existing bridge was constructed in 1945, and following a recent rating it was recommended the bridge be closed to vehicular traffic due to poor conditions along the bridge abutments. The Project will require demolition of the existing bridge superstructure, construction of the new bridge deck and associated structural appurtenances; installation of scour protection within the Taunton River; full depth pavement reconstruction; and grading. The Project proposes to retain the existing bridge substructure while replacing the superstructure with a deck that is one foot wider to allow for the addition of a bicycle lane. Ancillary Project facets including guardrails and a relocated sidewalk have also been incorporated into the design, and the Project will also address the addition of scour protection within the river during construction.

As a result of the proposed work the following impacts to resource areas are expected:

- 164 linear feet of temporary and 72 linear feet (lf) of permanent impact to Streambank; and
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Due to the nature of the work, impacts to Waters of the Commonwealth are unavoidable; however, impacts will be minimized and mitigated through the use of dewatering and water control best

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management practices to support good water quality during construction, the use of perimeter erosion and sedimentation controls to prevent unintentional impacts to Waters of the Commonwealth downgradient from the proposed work, and restoring the streambed with simulated streambed material that is compatible with the existing streambed placed over the riprap scour protection.

A pre-filing meeting with U.S. Army Corps of Engineers and MassDEP took place on November 20, 2025.

MassDOT hereby certifies that all information contained herein is true, accurate, and complete to the best of my knowledge and belief. If you have any questions regarding this application, please do not hesitate to contact Jonathan Niro at 844-800-2382 x7141 or JNiro@BETA-Inc.com. The Project proponent hereby requests that the certifying authority review and take action on this CWA 401 certification request within the applicable reasonable period of time.

Sincerely,

Hannah Davis
Staff Scientist

Jonathan Niro, PWS
Project Manager

Cc: Dan Vasconcelos, PWS, USACE
Herrio Lamothe, MassDOT Project Manager
Courtney Walker, MassDOT
Lily Collins, MassDOT
Christopher Jones, PE, BETA Group, Inc.
Laura Krause, BETA Group, Inc.
Taunton Conservation Commission
Raynham Conservation Commission

Enclosures: Combined PCN /401 WQC Application, plans

Taunton and Raynham, MA

Old Colony Avenue Bridge Reconstruction R-02-003=T-01-004

MassDOT Project Number 613642

January 2026

COMBINED PRE-CONSTRUCTION NOTIFICATION AND SECTION 401 WATER QUALITY CERTIFICATION

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www.BETA-Inc.com

Old Colony Avenue Bridge Reconstruction
R-02-003=T-01-004

Taunton and Raynham, MA

COMBINED PRE-CONSTRUCTION NOTIFICATION AND SECTION 401 WATER QUALITY CERTIFICATION

Prepared by: BETA GROUP, INC.
Prepared for: City of Taunton and MassDOT – Highway Division

January 2026

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APPENDIX N – TEMPORARY CONSTRUCTION HYDRAULIC ANALYSIS MEMO

APPENDIX O – PUBLIC NOTICE & EEA EPLACE SUBMISSION

APPENDIX P – COAST GUARD COORDINATION

U.S. Army Corps of Engineers (USACE), New England District (NAE)

PRE-CONSTRUCTION NOTIFICATION (PCN)

DATA REQUIRED BY THE PRIVACY ACT OF 1974

Authority Rivers and Harbors Act, Section 10, 33 USC 403; Clean Water Act, Section 404, 33 USC 1344; Regulatory Programs of the Corps of Engineers; Final Rule 33 CFR 320-332.

Principal Purpose The information provided will be used in evaluating activities under Pre-Construction Notification procedures within New England.

Routine Uses This information may be shared with other federal, state, and local government agencies during the application review process. Submission

Disclosure of requested information is voluntary. However, if information is not provided the PCN application cannot be fully evaluated nor can USACE render a permit decision.

Instructions The applicant must complete ALL required sections of this document before their submission to USACE. The PCN submission to USACE shall include one set of drawings which show the location and character of the proposed activity, statements that address each required field below, and documentation that supports each field (e.g., emails, letters, description/narrative, phone calls, surveys, reports, etc.). Electronic submissions to the following address are strongly preferred: cenae-r-ma@usace.army.mil. The email subject line shall contain the following: General Permit #, PCN, City/Town, and date submitted. An application that is not completed in full will be returned.

(ITEMS 1 THRU 4 TO BE FILLED BY USACE)

1. APPLICATION NO.	2. FIELD OFFICE CODE	3. DATE RECEIVED	4. DATE APPLICATION COMPLETE

(ITEMS BELOW TO BE FILLED BY APPLICANT)

5. APPLICANT'S NAME	8. AUTHORIZED AGENT'S NAME AND TITLE (*agent is not required*)
First - Middle - Last -	First - Middle - Last -
Company -	Company -
E-mail Address -	E-mail Address -
6. APPLICANT'S ADDRESS:	9. AGENT'S ADDRESS:
Address-	Address-
City - State - Zip - Country -	City - State - Zip - Country -
7. APPLICANT'S PHONE NOs. with AREA CODE	10. AGENT'S PHONE NOs. with AREA CODE
a. Residence b. Business c. Fax d. Mobile	a. Residence b. Business c. Fax d. Mobile
	844-800-2382 x7141

STATEMENT OF AUTHORIZATION

11. I hereby authorize, _____ to act on my behalf as my agent in the processing of this general permit PCN application and to furnish, upon request, supplemental information in support of this general permit PCN application.

_____ _____

SIGNATURE OF APPLICANT DATE

NAME, LOCATION, AND DESCRIPTION OF PROJECT OR ACTIVITY

12. PROJECT NAME or TITLE (*see instructions*)

13. NAME OF WATERBODY, IF KNOWN (*if applicable*)	14. PROPOSED ACTIVITY STREET ADDRESS (*if applicable*)
15. LOCATION OF PROPOSED ACTIVITY (*see instructions*)	City: State: Zip:
Latitude: °N Longitude: °W	

16. OTHER LOCATION DESCRIPTIONS, IF KNOWN (*see instructions*)

State Tax Parcel ID: Municipality:

Section: Township: Range:

17. DIRECTIONS TO THE SITE.

18. IDENTIFY THE SPECIFIC GENERAL PERMIT(S) YOU PROPOSE TO USE:

19. DESCRIPTION OF PROPOSED GENERAL PERMIT ACTIVITY (*see instructions*)

20. DESCRIPTION OF PROPOSED MITIGATION MEASURES (*see instructions*)

21. PURPOSE OF GENERAL PERMIT ACTIVITY (*Describe the reason or purpose of the project, see instructions*)

22. Quantity of Wetlands, Streams, or Other Types of Waters Directly Affected by Proposed General Permit Activity (*see instructions*)

Area (square feet)	Length (linear feet)	Volume (cubic yards)	Duration	Purpose

Each PCN must include a delineation of wetlands, other special aquatic sites, and other waters, such as lakes and ponds, and perennial, intermittent, and ephemeral streams, on the project site.

23. List any other GP(s), regional general permit(s), or individual permit(s) used or intended to be used to authorize any part of the proposed project on any related activity (*see instructions*)

24. If the proposed activity will result in the loss of aquatic resources that exceed those identified in the New England District Compensatory Mitigation Thresholds, explain how the compensatory mitigation requirement will be satisfied. (*see instructions*)

25. Is Any Portion of the General Permit Activity Already Complete? ☐ Yes ☐ No If Yes, describe the completed work:

26. List the name(s) of any species listed as endangered or threatened under the Endangered Species Act that might be affected by the proposed GP activity or utilize the designated critical habitat that might be affected by the proposed GP activity. (*see instructions*)

27. List any historic properties that have the potential to be affected by the proposed GP activity or include a vicinity map indicating the location of the historic property or properties. Attach relevant project information, along with any responses received from project notifications to this submittal. (*see instructions*)

28. For a proposed GP activity that will occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a "study river" for possible inclusion in the system while the river is in an official study status, identify the Wild and Scenic River or the "study river":

29. If the proposed GP activity also requires permission from the USACE pursuant to 33 U.S.C. 408 because it will alter or temporarily or permanently occupy or use a U.S. Army Corps of Engineers federally authorized civil works project, have you submitted a written request for section 408 permission from the USACE district having jurisdiction over that project? ☐ Yes ☐ No

If "yes", please provide the date your request was submitted to the USACE District:

30. Does the activity require a 401 Water Quality Certification (WQC)? If so, specify the type of 401 WQC that is required (general or individual). In cases where an individual 401 WQC is required, provide the date the 401 WQC certification request was submitted to the certifying authority and their contact information.

31. If the terms of the GP(s) you want to use require additional information to be included in the PCN (i.e. sampling and analysis plan), please include that information in this space or provide it on an additional sheet of paper marked Block 30. (*see instructions*)

32. I certify that the information in this pre-construction notification is complete and accurate. I further certify that I possess the authority to undertake the work described herein or am acting as the duly authorized agent of the applicant.

SIGNATURE OF APPLICANT	DATE	SIGNATURE OF AGENT	DATE

The Pre-Construction Notification must be signed by the person who desires to undertake the proposed activity (applicant) and, if the statement in block 11 has been filled out and signed, the authorized agent.

18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals, or covers up any trick, scheme, or disguises a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statements or entry, shall be fined not more than $10,000 or imprisoned not more than five years or both.

APPENDIX A

- **Project Narrative**

1.0 INTRODUCTION

On behalf of the City of Taunton (the Applicant) and the Massachusetts Department of Transportation (MassDOT – Highway Division), BETA Group, Inc. (BETA) is submitting this combined Pre-Construction Notification (PCN) / 401 Water Quality Certification (WQC) for the proposed reconstruction of the Old Colony Avenue Bridge (the Project). The overall project limits extend 250' north of the intersection of Old Colony Avenue and Battle Row in Taunton, MA; along the Old Colony Avenue Bridge; and 370' to the intersection of South Street East and Sandy Hill Road, in Raynham, MA (the Site). The total length of the Project is approximately 790' along the Old Colony Avenue and South Street East.

The bridge is a two-span reinforced concrete deck supported by reinforced concrete abutments and timber piles. The structure was recently rated, and it was recommended that bridge be closed to vehicular traffic due to the poor conditions of the ends of beams 1, 2, 5, and 7 at the South Abutment, and beam 2 at the North Abutment. Emergency Certification requests were made to the Taunton and Raynham Conservation Commissions on July 31, 2025 and August 28, 2025, respectively, to allow the Applicant to make masonry repairs that would facilitate the reopening of the bridge. This Project is proposed to address the aging and deteriorated superstructure and improve public safety.

The Project will consist of several activities including:

- Bridge deck replacement;
- Full depth pavement construction in the vicinity of the bridge;
- Pavement milling and overlay to the north and south of the bridge;
- Modifications to roadway geometry;
- Construction of a new sidewalk;
- New granite curbing;
- Striping of two travel lanes and a bike lane;
- Installation of Americans With Disabilities Act (ADA)-Compliant Ramps;
- Replacement of Guardrails;
- Modifications to water, sewer, gas, electric and drainage utilities;
- Installation of a perforated High-Density Polyethylene (HDPE) infiltration trench;
- Placement of riprap scour protection within the Taunton River; and
- Tree clearing and trimming.

It is anticipated that this Project will address the existing safety concerns while also improving non-vehicular transportation accommodations. These accommodations associated with the Project have been designed to meet standards set forth by the ADA.

Given the nature of the bridge reconstruction work, there are no feasible alternatives that avoid the impacts to Waters of the United States (U.S.) described herein. The Project has been designed to minimize impacts and restore altered areas following construction. During construction, erosion and sedimentation controls and in-water controls including compost filter tubes and siltation fencing will be installed and maintained to prevent migration of sediment into the stream. Post-construction restoration activities include regrading and stabilizing Streambanks with a native seed mix and placing suitable Streambed material over the proposed scour protection measures within the Taunton River.

The Project only proposes the replacement of the superstructure and will maintain the existing substructure (i.e., piers and abutments). Accordingly, it is anticipated that the Project will meet the Massachusetts Stream Crossing Standards to the maximum extent practicable. Work associated with the Project will result in temporary and permanent impacts to federally jurisdictional Waters of the U.S. including the land below Ordinary High Water (Streambank and Streambed) associated with the Taunton River. The Project will result in a total of 13,269 square feet (sf) and 236 linear feet (lf) of impacts to Waters of the U.S., further broken down as follows:

- 164 linear feet of temporary and 72 linear feet (lf) of permanent impact to Streambank; and
- 4,699 square feet (sf) of temporary and 8,570 sf of permanent[1] impact to Streambed associated with a dredge volume of 2,055 cubic yards (cy).

As a bridge project qualifies for the 2014 Massachusetts Transportation Bond Bill, this work is exempt from the requirements of the Massachusetts Wetlands Protection Act (WPA) in the City of Taunton and Town of Raynham. Due to the WPA exemption and the proposed fill/dredging within Waters of the U.S., the Project requires a 401 Water Quality Certification. This Combined PCN/401 WQC Application serves to fulfill the application requirements for the following:

- A 401 Water Quality Certification (WQC) from MassDEP for impacts to Waters of the US that exceed 5,000 sf of loss and 100 cy of dredging; and
- Coverage under the U.S. Army Corps of Engineers (USACE) Section 404 Massachusetts General Permit.

The Project is seeking coverage under the U.S. Army Corps of Engineers (USACE) Massachusetts General Permits 23: Linear Transportation Projects and Wetland/Stream Crossings and 24: Temporary Construction, Access, and Dewatering. Other permits and regulatory review processes associated with the Project include:

- Order of Conditions under the Taunton Wetlands Protection Ordinance and Raynham Wetlands Protection Bylaw;
- Coverage under the National Pollutant Discharge Elimination Systems (NPDES) Construction General Permit (CGP);
- Compliance with the National Historic Preservation Act of 1966 Section 106 review;
- Compliance of NOAA Section 7 review;
- Coordination with the National Parks Service due to the status of the Taunton River as a Wild and Scenic River; and
- Completion of National Environmental Policy Act (NEPA) review through preparation of a programmatic Categorical Exclusion.

2.0 Existing Conditions

2.1 Project Locus

The Site is located along Old Colony Avenue approximately 250 linear feet north of its intersection with Battle Row (Figure 1 – Site Locus). The Taunton River flows east/northeast through the Site towards its

[1] Permanent impacts denote areas which are subject to the placement of scour protection and covered with up to two feet of compatible sediment for restoration.

confluence with Mount Hope Bay in Fall River, Massachusetts. The centerline of the Taunton River is the common boundary between Taunton and Raynham; therefore, the Site includes land in both municipalities.

The majority of the work is located within the Taunton River or within the roadway boundaries of Old Colony Avenue and South Street East. However, work is also located on private property adjacent to the bridge. A list of private property ownership information is included below in Table 1.

Table 1: Private Property Ownership

Address	Assessor ID	Owner	Legal Reference
103 Old Colony Avenue, Taunton, MA, 02718	96-1-0	Colony LLC	Book 25006, Page 40
96 Old Colony Avenue, Taunton, MA, 02718	95-203-0	River Bend Condominiums	Book 3240, Page 265
0 South Street East, Raynham, MA, 02767	17-151-0	Selpan Associated Limited	Book 7993, Page 68

South Street East is a two-lane road oriented in a north to south direction adjacent to the Taunton River through undeveloped forest and residential properties (Figure 1 – Site Locus). The roadway is under the jurisdiction of the Town of Raynham and is classified as an Urban Collector. Old Colony Ave is a two-lane road oriented in a north to south direction adjacent to the Taunton River through multi-family and industrial properties (Figure 1 – Site Locus). The roadway is under the jurisdiction of the City of Taunton and is classified as an Urban Collector.

The existing structure is an approximately 90’ two-span bridge with equal spans of approximately 45’ 3.5”, constructed in 1945. The structure consists of eight (8) steel beams supporting a 7” concrete deck and 2-1/4” of bituminous paving. The bridge is supported by unreinforced concrete gravity abutments and wingwalls and a reinforced concrete pier. The south abutment is founded on spread footings and the north abutment and pier are founded on timber piles. The bridge is 35’-0” wide, which includes a 26’-0” roadway, a 2’-6” safety walk and 5’-0” sidewalk with metal railing. The bridge has a skew angle of 23.6° and was designed for H20 loading. Stormwater infrastructure in the vicinity of the bridge includes two closed catch basins at the southern end of the bridge that discharge to the Taunton River through a 12-inch reinforced concrete pipe (RCP) within the southeastern wingwall. The remainder of the Site, particularly the portion in Raynham, consists of “country drainage”. A 4” Cast-Iron (CI) and an 8” Asbestos Cement (AC) sewer pipe is located within the bridge superstructure. Additionally, a 6” gas main suspected to be Ductile Iron (DI) is located within the bridge superstructure.

According to the USDA Natural Resources Conservation Service – Soil Survey and the field delineation performed by BETA Group, Inc (BETA) in March 2023, the soils on the Site and in the vicinity of the Site are classified as Birdsall Silt Loam, Urban Land, and Smoothed Udorthents.

Temporary and permanent easements are required for work within and along the Taunton River on both municipal and private properties. A total of 12 easements are required in Taunton (6 temporary, 6 permanent) and a total of 9 easements are required in Raynham (3 permanent, 6 temporary).

2.2 JURISDICTIONAL WATERS OF THE U.S. / WATERS OF THE COMMONWEALTH

A Site inspection was conducted by BETA Wetland Scientists on March 31st 2023, to review the previously delineated boundaries of existing Resource Areas within and in the immediate vicinity of the Site. Waters of the U.S./ Land Under Water boundaries were identified and delineated in accordance with the methods developed by the *U.S. Army Corps of Engineers Wetland Delineation Manual; Northeast Region* (2009). Resource Areas identified on the Site include Inland Bank, Vegetated Wetlands (VW), Waters of the U.S. / Streambed, and FEMA Floodplain associated with the Taunton River. The wetlands and streams along the Site are also "Waters of the United States" and are therefore subject to the federal Clean Water Act, 33 U.S.C §1251 et seq (1972). A delineation report describing BETA's field findings related to onsite Waters of the U.S. is included in Appendix C. Non-tidal Waters of the U.S. identified within or immediately adjacent to the limit of work include Vegetated Wetlands and land below the Ordinary High Water Mark (OHWM) (i.e., Streambank and Streambed). The portion of the Taunton River at the Site is non-tidal.

According to the July 16, 2015 FEMA Flood Insurance Rate Map (FIRM) Number 25005C0169G, the Site is within a National Flood Insurance Program (NFIP) Special Flood Hazard) Zone AE. Zone AE areas are considered to be within the 100-year floodplain. The base flood elevation onsite is 14.8' on the upstream side of the Old Colony Ave Bridge and 14.4' on the downstream side of the bridge. The Taunton River has a designated Regulatory Floodway at the Site.

The Taunton River is designated as a Wild and Scenic River by the United States Congress. Within the Site, the Taunton River is classified as a "Scenic River Area." Under Sec 2. [16 U.S.C 1273].b.(2) of the Wild and Scenic Rivers Act, Scenic River Areas is defined as "Those River or sections of rivers that are free of impoundments, with shorelines or watershed still largely primitive and shorelines undeveloped, but accessible in places by roads".

Jurisdictional Waters of the U.S. are present throughout the Site, including:

- Streambank – Streambank at the Site is associated with one (1) perennial stream (the Taunton River) and one (1) unnamed intermittent stream.
- Vegetated Wetlands (VW) – Two (2) areas of VW are present at the Site. The WF1 Series wetland is a scrub shrub wetland that borders on the B3/B4 Series intermittent stream. The WF2 Series wetland is a scrub shrub wetland located along the northern bank of the perennial stream (the Taunton River).
- Waters of the U.S. / Streambed – Streambed exists between the Streambank boundaries below the mean annual low water level (MLW) of the streams located at the Site and generally consist of muck and gravel. The boundary of Streambed is the MLW, which was not field delineated by BETA.
- FEMA Floodplain – FEMA Floodplain at the Site exists in the Zone AE Flood Hazard associated with the Taunton River.

2.2.1 STREAMBANK

Streambanks were delineated by BETA in the field in March 2023 as described in Table 2: Streambank Boundary Description and the Resource Area Boundary Delineation Report included in Appendix C.

Table 2: Streambank Boundary Description

Flag Series	Location	Description / Notes
B1 Series *Flags* *B1-99 to 95, and B1-100 to 106* *B2 Series* *Flags* *B2-91 to 99, and B2-100 to 105*	Taunton River, located east, under and west of the Old Colony Ave Bridge	The northern (*B1 Series*) and southern (*B2 Series*) Banks associated with the Taunton River, a perennial stream, that generally flows west were delineated in two (2) segments along the first observable break in slope consistent with the mean annual flood level. The Bank north of the Taunton River was delineated west (*B1-99 to B1-95*) and east (*B1-100 to B1-106*) of the Old Colony Avenue Bridge in Raynham. Banks west of the bridge were generally well defined and consisted of eroded soils. Banks east of the bridge were observed to be undercut and also consisted of eroded soils. Where vegetated, both Banks consist primarily of woody vegetation including bush honeysuckle (*Diervilla lonicera*), silky dogwood (*Cornus amomum*) and Norway maple (*Acer platanoides*). Populations of poison ivy (*Toxicodendron radicans*) were also observed. The Bank south of the Taunton River was delineated west (*B2-91 to 99*) and east (*B2-100 to 105*) of the Old Colony Avenue Bridge in Taunton. Banks west of the bridge were generally poorly defined and consisted of rocks and stones of various sizes. Banks east of the bridge were generally well defined and generally consisted of eroded soils. Where vegetated, both Banks consist primarily of woody vegetation including slippery elm (*Ulmus rubra*), Norway maple, and silky dogwood. Populations of poison ivy were also observed. The channel width downstream of the Old Colony Avenue bridge is between 95 to 110 feet wide with a mucky, gravel substrate. The channel width upstream is 90 to 100 feet wide with a mixed cobble, gravel, and mucky substrate. Water depths within the Taunton River could not be determined in the field. The Taunton River is mapped as perennial on USGS topographic maps; therefore, it meets the definition of a perennial stream (River) per 310 CMR 10.58(2).
B3/B4 Series *Flags* *B3-96 to 107, and B4-96 to 107*	Northwest of Old Colony Avenue Bridge at 0 South East Street	The interior (*B4 Series*) and exterior (*B3 Series*) Banks associated with a shallow, braided intermittent stream west of South Street East were delineated along the first observable break in slope (consistent with the mean annual flood level). The *B3/B4 Series* stream flows west out of a drainage outfall associated with the closed drainage system under South Street East in Raynham, where flow becomes braided prior to reaching a confluence west of the Site. The *B3/ B4 Series* Banks were primarily vegetated with silky dogwood. The channel is approximately 3 to 5 feet wide and 2 to 6 inches deep with a substrate of sand and muck.

Flag Series	Location	Description / Notes
		This stream is not depicted on current USGS topographic maps or on the StreamStats program; therefore, it is presumed to be intermittent.

2.2.2 Vegetated Wetland (VW)

VWs were delineated by BETA in the field in March 2023 as described in Table 3: VW Boundary Description and the Resource Area Boundary Delineation Report included in Appendix C.

Table 3: VW Boundary Description

Flag Series	Location	Description / Notes
WF1 Series Flags WF1-108 to 111	Northwest of Old Colony Avenue Bridge at 0 South East Street	The *WF1 Series* VW is a scrub shrub wetland bordering on the *B3/B4 Series* intermittent stream. The attached U.S. Army Corps of Engineers Field Data Sheets describe evidence of hydrophytic vegetation, hydric soils, and indicators of hydrology at a specific data plot.
WF2 Series Flags WF2-100 to 102	Along the northern Bank of the Taunton River	The *WF2 Series* VW is a scrub shrub wetland located along the northern bank of the Taunton River, west of the *B1 Series* Bank. Dominant hydrophytic vegetation observed within the area includes silky dogwood. Evidence of hydrology observed in the field includes sediment deposition and stressed vegetation (buttressed roots), and hydric soils indicators including sandy soils with prominent redox concentrations. A formal data plot was not performed at this location.

2.2.3 Waters of the U.S. / Streambed

Streambed exists between the Bank boundaries below the mean annual low water levels of the streams delineated at the Site. The boundary of Streambed is the mean annual low water level. This boundary was not field delineated by BETA and is described in the Resource Area Boundary Delineation Report included in Appendix C.

2.2.4 FEMA Floodplain

According to the Federal Emergency Management Agency (FEMA) FIRM Number 25005C0169G, dated July 16, 2015, a Zone AE Flood Hazard associated with the Taunton River exists at the Site with Base Flood Elevations (BFE) ranging from 14.4 feet (NAVD88) downstream of the bridge and 14.8 feet (NAVD88) upstream of the bridge. The Site is also located within the Regulatory Floodway of the Taunton River.

Determination of the MAHW boundary was included in the delineation. Descriptions of the MAHW boundaries associated with the Taunton River are provided below in Table 4: MAHW Boundary Description and the Resource Area Boundary Delineation Report included in Appendix C.

Table 4: MAHW Boundary Description

Flag Series	Waterbody	Description / Notes
B1 Series Flags B1-99 to 95, and B1-100 to 106 *B2 Series Flags B2-91 to 99, and B2-100 to 105*	Taunton River	The northern (*B1 Series*) Banks were delineated at the mean annual flood level (coincident with the mean annual high-water mark – MAHW) approximately ten (10) feet upgradient of Bank. MAHW was determined based on observations of sediment accumulation and scour. The southern (*B2 Series*) Banks were delineated approximately ten (10) feet upgradient of Bank. MAHW was determined based on observations of sediment accumulation, scour and the presence of debris.

3.0 PROPOSED CONDITIONS

The Project consists of replacing the bridge superstructure while retaining the existing bridge substructure. The Project proposes to widen the bridge by 1' for curb-to-curb width of 27', which will allow a bicycle lane to be added to the roadway. The proposed sidewalk will be relocated from the east side to the west side of the roadways to connect the existing sidewalk at the condominium building south of the bridge and to Sandy Hill Street in Raynham. While the substructure will be retained, it is anticipated that in-water work will be required for placement of scour protection. Dredging will be required to install the scour protection and cofferdams will be installed within the River for control of water. Scour protection will consist of a 2'-8" layer of streambed material over 2'-0" layer of dumped riprap, which will all be over 1' of crushed stone for a total depth of 5'-8". Water controls and a dewatering system will be installed to install the scour protection in dry conditions. Additional details on anticipated dewatering and water controls are provided in Section 7.3 below.

Specific activities associated with the Project include:

- Implementation of traffic controls and installation of erosion and sedimentation controls.
- Bridge Replacement:
    - Removal of existing Bridge superstructure.
    - Replace superstructure with the following:
        - S3-MTL4 Bridge Barrier
        - 3" Wearing surface at the roadway over an 8" cast-in-place reinforced concrete deck support by (6) W27 steel stringers;
        - Proposed superstructure will utilize the existing substructure that will remain in place;
        - Proposed low chord will match the existing low chord elevation of 14.35' and the hydraulic opening will remain unchanged;
        - Removal of debris that has accumulated at the pier.
- Full depth pavement reconstruction in the vicinity of the bridge.
- Pavement mill and overlay to the north and the south of the bridge.

  - Establishment of two 13.5’ wide travel lanes with no shoulders south of the Bridge along Old Colony Avenue.
  - Establishment of two 11’ to 11.5’ wide travel lanes with 1.5’ to 2’ shoulders north of the Bridge along South Street East.
- Construction of a 6’-wide concrete sidewalk along the east side of Old Colony Avenue.
- Construction of a 5.5’-wide concrete sidewalk along the eastern side of the Old Colony Avenue Bridge.
- Construction a 5.5’-wide concrete sidewalk along the eastern side of South Street East.
- Installation of granite curbing.
- Striping for two (2) 10’ wide travel lanes and one (1) 2’ wide bicycle lane.
- Installation of ADA Compliant Ramps.
- Installation of guardrails.
- Modifications to water, sewer, gas, electric and drainage utilities.
- Installation of a 45’ 8” perforated High-Density Polyethylene (HDPE) infiltration trench.
- Dredging of 13,269 sf of Streambed and subsequent Streambed/Streambank restoration:
  - Installation of 1’ crushed stone scour protection.
  - Installation of 2’-0” of riprap over 1’ crushed stone scour protection.
  - Installation of 2’-8” of streambed material over 2’-0” of riprap.
  - Placement of modified rockfill over permanently impacted segments of Streambank.
- Clearing, grubbing, and grading.
- Stabilization of disturbed areas.

In order to complete the work outlined above, the bridge will be closed, and a detour will be implemented during construction. The 6.5-mile detour is proposed via New State Highway (Route 44) to Church Street/ Precinct Street to Middleboro Avenue. Erosion and sedimentation control measures will be implemented as discussed in Section 6.0 – Erosion and Sediment Controls to protect adjacent Resource Areas. Material stockpiles and staging areas will be located as far from the onsite resource areas as possible and will be placed on poly fabric and surrounded with erosion and sedimentation control measures. Stockpiling and equipment storage will occur on the adjacent paved surfaces of Old Colony Avenue and South Street East.

Cofferdams will be installed in two phases associated with dewatering and scour protection installation. Phase I covers the southern cell, diverting flow through the northern cell throughout construction. Phase II will cover the southern cell. A Time of Year (TOY) restriction will be observed within the Taunton River from March 15th to June 30th and from September 1st to November 15th per TR-47 (pending confirmation from NOAA) in order to achieve a “Not Likely To Adversely Affect” determination via the IPaC NLEB Determination Key and to protect rare species. Water controls will be installed and removed outside of this time period. Given the layout of the municipal boundary in relation to the River, water control efforts will span across both municipalities.

Water control specifications (Item 991.1) have been included in Appendix M. A Water Control Plan designed by a Mass. Registered PE is required to be submitted prior to starting work on the bridge replacement. The Water Control Plan will include a Sedimentation and Erosion Control Plan, as well as a Water Flow Diversion and Containment Plan. Work within Waters of the U.S., including placement of fill, will only occur within dewatered areas. Final streambed restoration will be overseen by a Fluvial Geomorphologist.

4.0 Impacts & Restoration – Waters of the US

The Project will result in a total of 13,269 square feet (sf) and 236 linear feet (lf) of impacts to Waters of the U.S., further broken down as follows:

- 164 linear feet of temporary and 72 linear feet (lf) of permanent impact to Streambank; and
- 4,699 square feet (sf) of temporary and 8,570 sf of permanent[2] impact to Streambed associated with a dredge volume of 2,055 cubic yards (cy).

The Project will dredge an area of 2,331 square feet and remove 2,055 cubic yards of sediment from the Site.

4.1 Stream Crossing Standards

The Project only proposes the replacement of the superstructure and will make no changes to the existing bridge substructure. While the existing conditions do not fully meet all Massachusetts Stream Crossing Standards, the proposed Project conditions meet the Standards to the maximum extent practicable. The compliance of the existing bridge with the Standards will not change given the nature of the work being applicable only to the superstructure. Proposing improvements to the bridge to meet the Standards would require a full bridge substructure replacement which is outside the scope of the Project.

The existing structure is an approximately 90'-6" two-span bridge with equal spans of approximately 45'-3.5". The hydraulic opening of the existing bridge is 82' 8" with a sharp nose pier that varies in width from 3'-0" to 2'-9". The bankfull width of the Taunton River is estimated to be approximately 99'-6". Bankfull width was calculated in AutoCAD by measuring the width between flags of the B1/B2 Series, taking the average of three (3) bankfull widths upstream of the bridge and three (3) bankfull widths downstream of the bridge. Table 2: Stream Crossing Standards Compliance demonstrates the Project's ability to comply with the Massachusetts Stream Crossing Standards as follows:

Table 2: Stream Crossing Standards Compliance

Stream Information and Standards	Existing/Proposed Project
Standard 1 **Crossing Type**	Bridge – **Met** (**Optimal Standard Met)**
Standard 2 **Embedment > 2 feet**	Crossing type is a bridge. **Not Applicable**
Standard 3 **Crossing Span >1.2*BFW**	BFW = 99.5' 1.2*99.5' = 119.4' Span = 79.0' 79.0' < 119.4' **Not Met**

[2] Permanent impacts denote areas which are subject to the placement of scour protection and covered with up to two feet of compatible sediment for restoration.

Standard 4 **Substrate Type**	Simulated natural substrate will be used to restore Streambed – **Met**
Standard 5 **Water Depth and Velocity**	The Project will result in water depths and velocities equivalent to existing conditions during 25/50/100-year storm events at the location of the Bridge. **Met – proposed water depths and velocity are comparable to existing conditions upstream and downstream of the bridge. See Appendix H – Hydraulic Analysis and Scour Report.**
Standard 6 **Openness Ratio > 0.82**	$\frac{15.6' \; x \; 79.0'}{37.7'}$ = 32.69 Openness Ratio: 32.69 > 1.64 (Optimal) > 0.82 Height: 15.6' > 6' (Optimal) **Met (Optimal Standard Met)**

4.2 WATERS OF THE U.S. (STREAMBANK)

The Project includes permanent and temporary impacts to the Streambanks of the Taunton River. Permanent impacts are associated with dredging and the installation of scour protection and temporary water controls. The proposed Streambank impacts are summarized in Table 3: Streambank Impacts Summary.

Table 3. Streambank Impacts Summary

LOCATION	STREAMBANK SERIES	IMPACT TYPE*	LENGTH (LF)
West of Station 4+00, along flags B1-98 to B1-97	BF1	Erosion control installation *	19
West of Station 4+00, along flags B1-98 to B1-99	BF1	Riprap scour construction	25
East of Station 4+00, along flags B1-100 to B1-102	BF1	Riprap scour construction	26
East of Station 4+00, along flags B1-102 to B1-104	BF1	Erosion control installation *	47
East of Station 3+00, along flags B2-102 to B2-103	BF2	Erosion control installation *	47
East of Station 3+00, along flags B2-102 to B2-100	BF2	Riprap scour construction	21
West of Station 3+00, along flags B2-	BF2	Erosion control installation *	51

99 to B2-96			
		TOTAL PERMANENT STREAMBANK IMPACTS:	72
		TOTAL TEMPORARY STREAMBANK IMPACTS:	164

Denotes a temporary impact that will be restored in-place per Project Specifications.

The majority of permanent impacts to Streambank result from dredging and construction of the riprap scour protection, where the riprap will extend upgradient over the Bank. Temporary impacts result from water control through cofferdam installation and dewatering and will be restored in place as described in Section 5.0.

4.3 WATERS OF THE U.S. (STREAMBED)

The Project will require permanent and temporary impacts to the Streambed of the Taunton River. The proposed Streambed impacts are summarized in Table 4: Streambed Impacts Summary.

Table 4: Streambed Impacts Summary

LOCATION	IMPACT TYPE*	AREA (SF)
Western side of the bridge between B2-97 and B2-96 and B1-97 and B1-98	Dredging for access, cofferdam installation and dewatering *	1,571
Western side of the bridge to the Eastern side of the bridge between B2-97 and B2-102 and B1-98 and B1-102	Dredging and installation of riprap scour protection	8,570
Eastern side of the bridge between B2-102 and B2-103 and B1-102 and B1-104	Dredging for access, cofferdam installation and dewatering *	3,128
	TOTAL PERMANENT STREAMBED IMPACTS:	8,570
	TOTAL TEMPORARY STREAMBED IMPACTS:	4,699

Denotes a temporary impact that will be restored in-place per Project Specifications.

Permanent impacts to Waters of the U.S./Streambed result from dredging and the installation of riprap scour protection. Although a suitable streambed material will be placed on these impacts areas, the presence of new riprap scour protection has resulted in these impacts being qualified as permanent with in-kind restoration. Riprap scour protection is necessary to protect the bridge from erosion as further explained in Section 12. Temporary impacts result from the temporary control of water through the use of a cofferdam during construction that will be restored after work is completed. Dredging to access the area of scour protection installation will be restored and results in temporary impacts.

4.4 FLOODPLAIN & REGULATORY FLOODWAY

While not considered a Water of the U.S., Project impacts to FEMA-mapped Regulatory Floodways must be assessed in accordance with Condition 30 of the USACE Massachusetts Section 404 General Permit. The Project will require temporary occupancy of the Regulatory Floodway for water control and dewatering practices to support dry conditions during construction. However, no permanent fill is proposed within the Regulatory Floodway, as the finished grade of the Streambed following placement of scour protection will be comparable to existing conditions.

5.0 Impact Avoidance, Minimization, and Mitigation

The Project was designed to avoid, minimize, and mitigate impacts to Waters of the U.S., wildlife habitat, and other sensitive areas. Due to the nature of the Project being a bridge replacement within a linear corridor, avoidance of impacts is infeasible; however, they have been minimized to the extent possible. Impacts will be mitigated with Streambed / Streambank restoration as described below.

5.1.1 Streambed Restoration

To address the proposed permanent Streambed impacts, the Project will restore the Streambed conditions in place through the addition of native streambed material over installed scour protections. To restore the Streambed, 2'-8" layer of streambed material will be placed over a 2'-0" layer of dumped Class III riprap, which will all be over 1' of crushed stone for a total depth of 5'-8". The riprap will extend the length of the channel from each abutment and will extend 25' upstream and downstream of the embankment. All 4,699 sf of temporary impacts and 8,570 sf of permanent impacts to Streambed will be restored in place.

5.1.2 Streambank Restoration

To address the proposed temporary Streambank impacts caused by the installation of erosion controls, all 164 lf of temporary Streambank impacts will be restored through the application of a native roadside part-shade seed mix. Four inches (4") of loam and seed will be applied over pavement milling mulch.

Erosion and sedimentation controls will be 100% biodegradable and left in place at the conclusion of the Project. Compost filter tubes will be overlapped by a minimum of 3' for a continuous barrier and secured using hardwood stakes. Erosion and sedimentation controls will be used to reduce flow onto work and to prevent flow off-site by placing the controls as close to the area of disturbance as possible. Compost filter tube berms will be used for slopes 2:1 or steeper and will be staked every 5' to secure the tube or per the manufacturer's instructions. Any non-biodegradable material, if used, will be removed and disposed of off-site at the Contractor's expense. Filter tube compost will be spread or raked around to eliminate berm.

BMPs will be employed by the Contractor to prevent further propagation of invasive plant species at the Site. These BMPs include proper disposal of any excavated invasive species, prevention of migration of rhizome fragments and seed pods, and cleaning vehicles of soil before and after accessing the Site. Any application of herbicides will be done in accordance with the practices set forth by the Massachusetts Department of Agricultural Resources. Further details regarding invasive species control can be found in Appendix G – Project Plans.

6.0 Erosion and Sedimentation Controls

Best Management Practices (BMPs) for erosion and sedimentation controls will be adhered to for all phases of construction to minimize erosion, sedimentation, and impacts on Resource Areas.

Due to the clearing of vegetation, removal of dredged sediment and installation of stone, dust management will be necessary. Water will likely be used by contractors to minimize airborne particulate matter during construction.

Prior to final completion of construction, areas of exposed soils will be present at the Site and will require temporary stabilization. Temporary stabilization methods may include temporary seeding, application of straw mulch, and use of erosion control blankets. Erosion and sedimentation controls will be installed

before any land disturbance begins and will remain in place for the duration of the Project. These control measures will be used throughout construction to prevent impacts to downgradient Resource Areas and may include compost filter tubes and siltation fencing or similar controls at the Contractor's specification. Compost filter tubes will be placed as close to the limit of soil disturbance as possible, along contours, and perpendicular to flow. Silt sacks will be used in all existing catch basins within and near the limit of work.

Erosion and sedimentation control measures will be implemented along the limit of work downgradient of the disturbed areas during construction to minimize further resource area impacts and act as a visual limit of work. Erosion and sedimentation barriers will be installed to reduce the chance of soil or sediment migration beyond the limits of work. Temporarily impacted areas will be restored to existing conditions upon completion of the Project. Erosion and sedimentation controls will remain in place and in proper working order until the Site is completely stabilized. A stockpile of approved erosion and sedimentation control materials will be kept on-site for emergency and routine replacement.

The Contractor will be responsible for obtaining coverage under the Construction General Permit (CGP) pursuant to the Environmental Protection Agency (EPA) National Pollutant Discharge Elimination Systems (NPDES). A Stormwater Pollution Prevention Plan (SWPPP) will be developed prior to any land disturbance. Per the SWPPP, the Contractor will monitor and assess conditions and identify problems in the field during and after construction activities.

7.0 WATER CONTROLS AND DEWATERING

The dredging of the Streambed and installation of riprap scour protection will require the implementation and maintenance of temporary water controls within the Taunton River so that the work can be completed in dry conditions. While the exact means and methods for water control will be determined by the contractor, it is anticipated that water controls will consist of cofferdams in the form of portadams or sandbags.

Water control specifications (Item 991.1) have been included in Appendix M. A Water Control Plan designed by a Massachusetts Registered Professional Engineer is required to be submitted prior to starting in-water work. The Water Control Plan will include a Sedimentation and Erosion Control Plan and a Water Flow Diversion and Containment plan. Work within Waters of the U.S., including placement of fill, will only occur within dewatered areas. Final Streambed restoration will be overseen by a Fluvial Geomorphologist.

According to preliminary hydraulic studies performed for the Project, temporary closure of each half of the Taunton River will result in water levels remaining below bankfull conditions. Flow is expected to remain within the channel with no overbank flooding in response to a 2-year flood.

Cofferdams will be installed in two phases consistent with the phasing of the dredging work. Phase I addresses the southern half of the River and will divert flow through the northern cell, while Phase II addresses the northern half of the River and will divert flow through the southern cell. A Time of Year (TOY) restriction will be observed within the Taunton River from March 15th to June 30th and from September 1st to November 15th per TR-47 (pending confirmation from NOAA) to protect rare species habitat. Water controls will be installed and removed outside this period.

Dewatering of the work area will be completed to avoid an increase in turbidity over the baseline conditions. It is anticipated that the work area will be dewatered via pumping to a settling tank or dewatering system that filters the water prior to discharge back to the stream. The means and methods for dewatering will be determined by the Contractor at the time of construction based on Site-specific

conditions and will be included in the prepared SWPPP which will be completed by the Contractor prior to the start of work.

8.0 Invasive Species Control

Invasive species observed at the Site by BETA include, Norway Maple *Acer platanoides,* Garlic Mustard *Alliera petiolata,* and Multiflora Rose *Rosa multiflora.*

During or after construction, the contractor will employ BMPs designed to prevent further propagation of invasive plant species at the Site. These BMPs include proper disposal of any excavated invasive species, prevention of migration of rhizome fragments and seed pods, and cleaning vehicles of soil before and after accessing the Site. Any application of herbicides will be done in accordance with the practices set forth by the Massachusetts Department of Agricultural Resources.

9.0 Stormwater Management

9.1.1 Existing Stormwater Management

Stormwater runoff from the Site is described as Drainage Areas Ex-1E, Ex-2E, and Ex-3E in the Stormwater Report (Appendix E). Existing closed drainage systems are present along the roadway which convey stormwater runoff to two outfalls, one of which discharges to the Taunton River and one of which discharges to a nearby intermittent stream. No edge treatment is provided on the southern side of South Street East in Raynham, and stormwater runoff from this portion of the Site flows overland into a forested area.

9.1.2 Proposed Stormwater Management

Stormwater management is proposed via modifications to the existing closed drainage system. Existing inlets will be replaced with deep-sump catch basins, and additional deep-sump catch basins will be installed throughout the corridor to provide more effective stormwater collection and treatment. New curbing is proposed to better direct stormwater runoff to catch basins. The majority of existing trunklines will be retained. The Project will retain existing drainage runoff patterns to the maximum extent practicable.

The Project will retain the existing outfall from the closed drainage system within the Town of Raynham and will replace the existing outfall associated with the closed drainage system within the City of Taunton. The new outfall will be increased in size from 12” to 18” and the existing headwall will be rebuilt at the same location.

The Project proposes a new 45’ 8” HDPE infiltration trench within the Town of Raynham near the northeastern limit of work. Stormwater runoff will be directed to this SCM through a new deep sump catch basin which will overflow into the existing closed drainage system.

Additionally, country drainage/pavement disconnection will be implemented for several portions of South Street East by excluding curbing to allow treatment in the grass/woodland area adjacent to the roadway. Of this, approximately 100’ of South Street East, on the eastern side of the roadway, drains to an area that meets the definition of qualifying pervious area and is comprised of approximately 1,500 sf of impervious area.

9.2 COMPLIANCE WITH STORMWATER STANDARDS

The Project complies with the MassDEP Stormwater Management Standards (the Standards).

The proposed work within the roadway, such as replacing the existing catch basins with deep sump catch basins, constitutes Redevelopment work because the work will substantially occur within an existing paved area. Redevelopment work is required to meet Standards 1 and 7 through 10 fully, and Standards 2 through 6 only to the maximum extent practicable.

This section details the regulatory framework for stormwater management, the existing impervious cover and stormwater system, an assessment of impacts, and the project's regulatory compliance with the Massachusetts Stormwater Standards.

9.2.1 REGULATORY FRAMEWORK

The Project consists of redevelopment of an existing / paved bridge and roadway, widening of roadway and installation of a bicycle pathway, relocation of an existing sidewalk from the eastern side of the bridge to the west, associate drainage infrastructure improvements, and installation of scour protection within the Taunton River. The Project complies with the MassDEP Stormwater management Standards that meets all standards to the maximum extent practicable.

The Project is a Redevelopment project and is only required to meet Standards 1 and 7 through 10 fully, and Standards 2 through 6 only to the maximum extent practicable. The Stormwater design for these Standards is described in the following sections.

9.2.2 REGULATORY COMPLIANCE

The Project will result in vegetative clearing, grading, and construction of 781 square feet of new impervious area. Accordingly, stormwater SCMs that comply with the Stormwater Management Standards are required.

The Project qualifies as Limited Redevelopment Project under the Stormwater Management Standards. This section provides a list of the Stormwater Management Standards and a brief description of the Project's compliance with the Standards to the maximum extent practicable.

LID Measures

Low Impact Development (LID) techniques utilized along portions of the Project include:

- Preservation of existing vegetation;
- Use of country drainage for portions of the Site; and
- Preservation of existing drainage patterns.

Standard 1: No New Untreated Discharges

No new stormwater conveyances (e.g. outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.

The Project has been designed to comply with Standard 1. The Project proposes to replace the existing outfall from the City of Taunton closed drainage system. This work will include replacing the existing 12" MTL and 12" CMP outfalls with a new 18" DI outfall at the same location, replacing the existing headwall, and providing stone for pipe ends as stabilization to prevent erosion to the Taunton River. The Project proposes to retain the existing outfall from the Town of Raynham closed drainage system.

The Stormwater Management Report (Appendix E) provides supporting calculations for the outlet protection design.

Stormwater runoff will be treated by deep sump catch basins, the infiltration trench, or country drainage before discharging off-site.

See Standard 4 for the water quality treatment provided by the Project.

Standard 2: Peak Rate Attenuation

Stormwater management systems shall be designed so that the post-development peak discharge rates do not exceed pre-development peak discharge rates.

The Project has been designed to comply with Standard 2 only to the maximum extent practicable as a Redevelopment / Limited Project. This Project reduces post development peak runoff rates to below pre-development peak runoff rates for DP 3 during the 2-year and 100-year 24-hour design storm events based on NOAA Atlas 14 precipitation data as shown in Table 5. Otherwise, a net increase in peak runoff rates is anticipated for all design points and design storm events.

Table 5: Rainfall Depths (in)

DESIGN STORM EVENTS	RAINFALL DEPTH (in)
2-Year	3.42
10-Year	5.08
100-Year	7.71

Table 6 provides a summary of peak rates for each design point under existing and proposed conditions. The Stormwater Management Report (Appendix E) provides computations and supporting information regarding the hydraulic and hydrologic modeling.

Table 6: Peak Discharge Rates (cfs)

DESIGN POINT	EXISTING RATE (cfs)			PROPOSED RATE (cfs)		
	2-Year	10-Year	100-Year	2-Year	10-Year	100-Year
DP 1	1.14	2.08	3.61	1.23	2.22	3.81
DP 2	0.74	1.39	2.44	0.67	1.28	2.20
DP 3	0.52	1.11	2.14	0.39	0.90	1.81
TOTAL	2.40	4.58	8.19	2.29	4.41	7.82

The Project is unable to fully meet this standard due to constraints including right-of-way, grades, and existing developed properties. This Project includes a net increase of 781± square feet of impervious surface, which will result in minor increases to the volume and rate of stormwater runoff from the Project area. This increase in impervious area is necessary to provide sidewalks where none currently exist. Despite Project constraints and an increase in peak flow rates, the proposed deep-sump catch basins and infiltration trench will improve existing conditions throughout the Project corridor. Refer to HydroCAD calculations provided in the Stormwater Management Report (Appendix B) for additional information.

Standard 3: Recharge

Loss of annual recharge to groundwater shall be eliminated or minimized through the use of infiltration measures, including environmentally sensitive site design, low impact development techniques, stormwater best management practices, and good operation and maintenance. At a minimum, the annual recharge from the post-development site shall approximate the annual recharge from pre-development conditions based on soil type. This Standard is met when the stormwater management system is designed to infiltrate the required recharge volume as determined in accordance with the Massachusetts Stormwater Handbook.

The Project has been designed to meet this standard on a Project-wide basis, as the Project is a Redevelopment / Limited Project. The Project has significant right-of-way constraints, which restrict opportunities for recharge on the southern portions of the Site. Despite constraints, the proposed infiltration trench has been designed to provide the sitewide required recharge volume for new and a portion of the existing impervious area. However, the required recharge volume will not be achieved for design points DP 1 and DP 2.

Table 7 provides the required recharge volume for the Project, and Table 8 provides the recharge volumes proposed for each design point.

Table 7: Required Recharge Volume for Project

	HSG A	HSG B	HSG C	HSG D	Total
Existing Impervious (sq. ft)	26,829		1,964	2,417	31,210
Proposed Impervious (sq. ft)	27,280		2,213	2,498	31,991
Net Impervious Area (sq. ft)	451		249	81	781
Target depth, F (in)	0.6	0.35	0.25	0.10	
Required Recharge Volume, ReV (cf)	22.55		5.19	0.68	28.41

Table 8: Provided Recharge Volumes at Each Design Point

	HSG A	HSG B	HSG C	HSG D	Total
DP-1					
Net Impervious Area (sq. ft)	461		5	705	9,844
Required Recharge Volume, ReV (cf)	23.05		0.10	5.88	29.03
Provided Recharge Volume (cf)	0		0		0.00
DP-2					

Net Impervious Area (sq. ft)	1,583		0	-195	1,388
Required Recharge Volume, ReV (cf)	79.15		0.00	-1.63	77.53
Provided Recharge Volume (cf)	81.42		0		81.42
DP-3					
Net Impervious Area (sq. ft)	-1593		244	-429	-1,778
Required Recharge Volume, ReV (cf)	-79.65		5.08	-3.58	-78.14
Provided Recharge Volume (cf)	0.00		0		0.00

The infiltration SCMs are designed to drain completely within 72 hours.

Standard 4: Water Quality Treatment

Stormwater management systems shall be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS)

The Project has been designed to comply with Standard 4 only to the maximum extent practicable as a Redevelopment / Limited Project. Proposed drainage system improvements, including the installation of deep sump catch basins and an infiltration trench, will provide treatment of stormwater runoff that does not currently exist and will improve existing conditions. The proposed Project will provide an average TSS removal rate of 20% for 31,991± sq. ft. of impervious surfaces.

The Project is located in an area with a rapid infiltration rate (>2.4 in/hr) and the required water quality volume has been calculated based on the 1.0" water quality depth.

Table 9 shows the WQV to be treated for both new and existing impervious area within each drainage area, organized by design point.

Table 9: WQV at Each Design Point

DESIGN POINT	WQV FOR NEW IA (cf)	WQV FOR EXISTING IA (cf)	TOTAL WQV (cf)
DP-1			
10P	*97.58*	*722.75*	*820.33*
Total	97.58	722.75	820.33
DP-2			
20P	*44.75*	*1,028.50*	*1,073.25*
21P	*70.92*	*0.00*	*70.92*
Total	115.67	1,028.50	1,144.17

DP-3			
30P	*-148.17*	*849.58*	*701.42*
Total	-148.17	849.58	701.42
Project Total	**65.08**	**2,600.83**	**2,665.92**

Table 10 shows the WQV provided by the SCMs at each design point.

Table 10: WQV by the SCMs at Each Design Point

DESIGN POINT	PRETREATMENT (Y/N)	*WQV PROVIDED (cf)*	*MEETS TOTAL WQV (cf)*	*MEETS REQUIRED WQV for NEW IA*
DP-1		0	No	No
DP-2			No	Yes
Linear Infiltration Practice	Y	81.42	No	Yes
Total	Y	81.42		
DP-3		0		
Project Total			***No***	***Yes***

Opportunities to install treatment and recharge SCMs are limited due to the aforementioned constraints. Despite Project constraints, the proposed deep sump catch basins and linear infiltration practice will improve existing conditions throughout the Project corridor. Refer to Appendix A in the Stormwater Management Report for calculations relating to TSS Removal. Refer to Illicit Discharge Compliance Statement under Standard 10.

Appendix B includes the Long Term Pollution Prevention Plan for this Project.

Standard 5: Land Uses with Higher Potential Pollutant Loads (LUHPPLs)

Land use with high potential pollutant loads must have source control and pollution prevention measures implemented in accordance with the Massachusetts Stormwater Handbook.

Standard 5 does not apply to the Project. There are no Land Uses with Higher Potential Pollutant Loads proposed as part of the Project.

Standard 6: Critical Areas

Stormwater discharges within the Zone II or Interim Wellhead Protection Area of a public water supply and stormwater discharges near or to any other critical area require the use of specific source control, pollution prevention measures.

Standard 6 does not apply to the Project. There are no Critical Areas near the Project area.

Standard 7: Redevelopment

A redevelopment project is required to meet certain Stormwater Management Standards only to the maximum extent practicable.

The Project is a Redevelopment Project under the first definition: "Maintenance and improvement of existing roadways, including widening less than a single lane, adding shoulders, correcting substandard intersections, improving existing drainage systems and repaving." Proposed deep sump catch basins and infiltration trench will provide treatment to the maximum extent practicable and represent an improvement to the existing conditions. Standards 1, 8, 9, and 10 are met, Standards 3 and 4 are met on a Project-wide basis, and Standard 2 is met to the maximum extent practicable. Standards 5 and 6 are not applicable to this Project.

Standard 8: Construction Period Pollution Prevention and Erosion and Sediment Control

A plan to control construction related impacts, including erosion, sedimentation, and other pollutant sources during construction and land disturbance activities shall be developed and implemented.

The implementation of erosion and sedimentation (E&S) controls during construction is considered a standard practice for all City projects. E&S controls will be installed before any land disturbance begins for the Project and will remain in place for the duration of the Project. The E&S controls for the Project are shown on the Project plans and include perimeter sediment control barrier, tree protection, temporary cofferdam for water control, and dewatering.

The Project as currently design disturbs one or more acres of land; therefore, the Project contractor will request coverage under the NPDES Construction General Permit (CGP) and develop a Stormwater Pollution Prevention Plan (SWPPP). The SWPPP follows the requirements of this standard and complies with the NPDES CGP.

Standard 9: Long Term Operation and Maintenance Plan

A Long-Term Operation and Maintenance Plan shall be developed and implemented to ensure that stormwater management systems function as designed.

The roadway and bridge included in this Project are located in both the City of Taunton and the Town of Raynham. Ownership is divided between the City of Taunton and the Town of Raynham. The activities included in the O&M Plan will be implemented by the municipality. Appendix E of the Stormwater Management Report (Appendix E) includes the O&M Plan for this Project.

Standard 10: Prohibition of Illicit Discharges

All illicit discharges to the stormwater management system are prohibited.

The Project's stormwater management system, as shown on the plans submitted with this report, has been designed in full compliance with Standard 10. The Project area does not have any known illicit connections. Any illicit connections to the stormwater management system found in the Project limit of work during construction will be removed and/or resolved through the City's Illicit Discharge Detention and Elimination (IDDE) Program. The Long-Term Pollution Prevention Plan, provided in Appendix E of the Stormwater Report (Appendix E), includes measures to prevent illicit discharges.

For additional details see Stormwater Report in Appendix E– Stormwater Management Report details the stormwater management improvements proposed by the Project and describes the Project's relation to the Stormwater Management Standards.

The Contractor will be responsible for obtaining a National Pollutant Discharge Elimination Systems (NPDES) Dewatering and Remediation General Permit (DRGP). A Stormwater Pollution Prevention Plan (SWPPP) will be prepared prior to any land disturbance and will be submitted to the Conservation Commission for review and approval. Per the SWPPP, the Contractor will monitor and assess conditions and identify problems in the field during and after construction activities.

10.0 Fisheries and Wildlife / NHESP / Vernal Pools

The Site is not located within Natural Heritage and Endangered Species Program (NHESP)-mapped Priority Habitat of Rare Species or Estimated Habitat of Rare Wildlife. No Certified or Potential Vernal Pools are present at the Site. In addition, according to the U.S. Fish and Wildlife Service (USFWS)'s Information for Planning and Consultation (IPaC) tool, the Site is located within the range of the northern long-eared bat (*Myotis septentrionalis*), and the Plymouth redbelly turtle/cooter (*Pseudemys rubriventris bangsi*), both endangered species under the federal Endangered Species Act (ESA). The Site is also within the range of the tricolored bat (*Perimyotis subflavus*), a proposed endangered species, and the monarch butterfly (*Danaus plexippus*), a proposed threatened species. The Site is not within the vicinity of any mapped Critical Habitats for the northern long-eared bat (*Myotis septentrionalis*) or the tricolored bat (*Perimyotis subflavus*). There is final critical habitat for the Plymouth redbelly turtle/cooter, but the Project is not within this habitat.

In addition, the Taunton River is a diadromous fish run and is habitat for the Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*), an endangered species. The Project is in mapped habitat of federally listed endangered species and therefore Endangered Species Act (ESA) Section 7 consultation with NOAA commenced. Consultation with USFWS to achieve a "Not Likely to Adversely Affect" verification for the northern long-eared bat also took place (Appendix F).

A Time of Year (TOY) restriction will be observed within the Taunton River from March 15th to June 30th and from September 1st to November 15th per TR-47 (pending confirmation from NOAA) to protect Atlantic Sturgeon habitat. Water controls will be installed and removed outside of this time period. Section 7 consultation has commenced with NOAA to confirm these TOY restrictions.

The Taunton River is designated as a Wild and Scenic River with the River Classification of being a "Scenic River Area" Under Sec 2. [16 U.S.C 1273].b.(2) of the Wild and Scenic Rivers Act, Scenic River Areas is defined as "Those River or sections of rivers that are free of impoundments, with shorelines or watershed still largely primitive and shorelines undeveloped, but accessible in places by roads". Coordination with the National Park Service through the interagency review process is anticipated.

There are no Natural Heritage and Endangered Species Program (NESP) Priority Habitats for Rare Species or NHESP Estimated Habitats of Rare Wildlife, Areas of Critical Environmental Concern (ACEC), Surface Water Protection Areas (Zones A, B, C), Wellhead Protection Areas (Zone I, II or IWPA) or Outstanding Resource Waters (ORWs) present on the Site. The Taunton River at the Site is mapped as a FEMA Regulated Floodway, and the Taunton River is not considered a coldwater fishery by MassDEP. No NHESP Certified Vernal Pools (CVPs) exist at the Site. A Potential Vernal Pool is located 380 ft northwest of the bridge. The Site is located within a FEMA-100 year floodplain.

11.0 HISTORIC COORDINATION

According to the Massachusetts Cultural Resources Information System (MACRIS) online database, no mapped Historic Resources are located within the Project.

However, there are mapped historic resources adjacent to the Site. These historic Sites included:

- Old Colony Iron Works - Shovel Shop (TAU.28) - 103 Old Colony Avenue
  - TAU.28 is adjacent to the Site along the southern border of the Taunton River and the eastern border of Old Colony Avenue.
- Old Colony Mills - Office (TAU.630) - 96 Old Colony Avenue
  - TAU.630 is adjacent to the Site along the southern border of the Taunton River and the western border of Old Colony Avenue.
- Old Colony Iron Works - Rolling Mill Nemasket Mills (TAU.629) - 96 Old Colony Avenue
  - TAU.630 is adjacent to the Site along the southern border of the Taunton River and the western border of Old Colony Avenue.

A finding of "No Adverse Effect" was issued by the Massachusetts Historical Commission (MHC) under Section 106 of the National Historic Preservation Act (NHPA) (Appendix K).

12.0 ALTERNATIVES ANALYSIS

The purpose of this Project is to reconstruct a structurally deficient bridge, protect the bridge from scour, and improve safety for vehicles, cyclists, and pedestrians. As described in further detail within the Alternatives Analysis prepared for the Project (Appendix J), several factors were considered when determining the scope and approach of the Project design, including cost, construction constraints, and environmental concerns.

The intent of this analysis is to demonstrate that there is no alternative to the Project with less impacts on the environment that meets the Project purpose. Accordingly, this Alternatives Analysis focuses on the considerations made during the preparation of the Bridge Reconstruction R-02-003=T-01-004. This Alternatives Analysis assesses the following alternatives:

- No-Build Alternative;
- 10' travel Lanes and 4' Shoulder on Safety Curb Side (Alternative #1 – Preferred);
- 12' Travel Lanes and 2' Shoulders on Either Side (Alternative #2);
- No Scour Protection (Alternative #3); and
- Embedment Below Scour Depths (Alternative #4).

12.1 PROJECT CONSTRUCTION ALTERNATIVES

12.1.1 NO-BUILD ALTERNATIVE

The No-Build Alternative was assessed as a potential Project alternative. Under the No-Build Alternative, no aspect of the Project purpose as defined above is realized. While the No-Build Alternative would not result in a loss of Streambank, Streambed, or Waters of the U.S., the Old Colony Avenue Bridge would remain deteriorating and insufficient for safe public transportation. Pursuing the Non-Build Alternative is

not consistent with the Project purpose and would not serve the needs of the City of Taunton or the Town of Raynham, therefore, this alternative was not selected.

12.1.2 Alternative #1: 10-Foot Travel Lanes and 4-Foot Shoulder on Safety Curb Side (Preferred)

Alternative #1 features a cross-section with two 10'-wide travel lanes in each direction, accompanied by one 2' -wide shoulder on the sidewalk side and one 4'-wide shoulder on the safety curb side. Sidewalk is proposed on the west side of the roadway. The sidewalk is 6' wide from the condominium driveway to over the bridge. North of the bridge the sidewalk tapers down to 5.5' wide and terminates at Sandy Hill Street with reciprocal ramps. Vertical granite curb is proposed along the front of the sidewalk. Vertical granite curb is proposed at the back of sidewalk at Station 5+70 +/- to 6+32 +/- (LT) to avoid impacts to the wetlands. Alternative #1 will require a design justification for pedestrian accomodations because only one sidewalk is being proposed. The design does not allow for sidewalks on both sides of the road due to the width constraint of the existing bridge substructure. A design justification is also needed for the bicycle accomodations. Neither a shared use path or seperated bike lanes were able to fit within the existing bridge structure. Therefore, a 4' shoulder was provided on the east side, which is the minimum width for bicycle accomodation. A 2' shoulder was provided on the west side against the sidewalk for drainage, errant vehicles, and encroachment and off-tracking of wide vehicles. Sharrows can be added in the northbound lane.

Alternative #1 results in impacts to Streambed totaling 13,269 square feet (8,570 square feet permanent and 4,699 square feet temporary); and impacts to Streambank totaling 236 linear feet (72 feet permanent and 164 linear feet temporary). Alternative #1 and Alternative #2 result in the same impacts to Waters of the U.S.

Alternative #1 allows for bicycle accommodation southbound with a 4' shoulder, while still maintaining the minimum lane width for a collector of 10'. Old Colony Avenue and South Street East is a bus route on the Greater Attleboro Taunton Regional Transit Authority. Bus lanes are permitted on 10' travel lanes. The narrower 10' roadway will help reduce speeds. Alternative #1 presents an improvement upon existing bridge conditions and achieves the Project's purpose and need with no increase in Waters of the U.S. impacts compared to Alternative #2. Therefore, Alternative #1 is the preferred alternative.

12.1.3 Alternative #2: 12-Foot Travel Lanes and 2-Foot Shoulders on Either Side

Alternative #2 features a cross-section with two 11'-wide travel lanes in each direction, accompanied by two 2'-wide shoulders. Vertical granite curbing lines both sides of the roadway. Sidewalk proposed on the west side of the roadway. The sidewalk is 6' wide from the condominium driveway to over the bridge. North of the bridge the sidewalk tapers down to 5.5' wide and terminates at Sandy Hill Street with reciprocal ramps. Vertical granite curb is proposed along the front of the sidewalk. Vertical granite curb is proposed at the back of sidewalk at Station 5+70 +/- to 6+32 +/- (LT) to avoid impacts to the wetlands. Alternative #2 will require a design justification for pedestrian accomodations because only one sidewalk is being proposed. The design does not allow for sidewalks on both sides of the road due to the width constraint of the existing bridge substructure. A design justification is also needed for the bicycle accomodations. Neither a shared use path or seperated bike lanes were able to fit within the existing bridge structure. Therefore, 2' shoulders were provided on both sides of the roadway. Sharrows can be added to both travel lanes.

Alternative #2 results in impacts to Streambed totaling 13,269 square feet (8,570 square feet permanent and 4,699 square feet temporary); and impacts to Streambank totaling 236 linear feet (72 feet permanent

and 164 linear feet temporary). Alternative #1 and Alternative #2 result in the same impacts to Waters of the U.S.

Alternative #2 presents the same conditions as existing conditions, where the lane widths are 11' wide and the shoulders are 2' wide. Alternative #2 does not propose any pedestrian or bicycle improvements in addition to addressing unsafe bridge conditions, while providing no decrease in impacts to Waters of the U.S. Therefore, Alternative #2 was not selected.

12.1.4 Alternative #3: No Scour Protection

Alternative #3 includes the design provisions of the preferred Alternative #1 without the addition of scour protection. In Alternative #1, scour protection consists of a 2'-8" layer of streambed material over 2'-0" layer of dumped riprap, which will all be over 1' of crushed stone for a total depth of 5'-8". Constructing the Project without scour protection eliminates the need for dredging and dewatering, reducing impacts to Waters of the U.S. Although Alternative #3 results in less impacts to Waters of the U.S., scour protection has been determined as necessary to protect the Taunton River and bridge from scour and eventual compromising of the substructure. Therefore, Alternative #3 was not selected.

12.1.5 Alternative #4: Embedment Below Scour Depths

Alternative #4 proposes to lower the bridge footings below predicted scour depths. This alternative would require the substructure to be replaced in order to embed it below the level where scour would occur.

Hydraulic analysis confirms that scour countermeasures are required around the bridge to prevent erosion. Under proposed conditions, the scour analysis predicts contraction scour of approximately 2.6' to 2.7' and worst local abutment scour of approximately 13' during the 25-year and 50-year storm events. Total predicted scour exceeds 5'. These scour depths indicate that the existing bridge is vulnerable to scour without protection. Accordingly, riprap countermeasures are required to protect the substructure and reduce erosion risk during flood events. Dredging is only proposed to install scour countermeasures. An alternative to installing scour protection would be to replace the substructure and embed it to a depth below the level where scour would occur. However, this alternative would still result in significant impacts to Streambed and Streambank associated with water controls and pier removal/installation and would be cost-prohibitive to the City of Taunton based on current funding. Installation of scour protection is significantly less costly than substructure replacement and the proposed 2' of native streambed material proposed over the scour protection will provide appropriate restoration in the final condition.

Alternative #1 was selected because the installation of riprap countermeasures is necessary to protect the area around the bridge from scour and results in less disturbance than Alternative #4. The proposed riprap countermeasures are consistent with the MassDOT Bridge Manual - Hundredth Anniversary Edition.

13.0 Sediment Quality and Disposal

A Sampling and Analysis Plan (SAP) was prepared pursuant to 314 CMR 9.07(1)C because it was initially anticipated that the Project would require the removal and disposal of up to 2,000 cubic yards (cy) of dredged material. The SAP was approved by MassDEP on October 29, 2025; however, the dredge volume has since exceeded 2,000 CY. Since three composite samples are proposed to be collected in the field, the SAP remains valid for dredging up to 3,000 cy.

The approved SAP has been attached to this application along with the results of laboratory analysis in Appendix L; however, only upstream samples are being included at this time. When sampling was being

conducted in the field, the contractor encountered extremely difficult conditions due to the strong current and the presence of significant stones within the substrate. Several attempts were made to collect the remainder of the samples, but the watercraft was consistently swept downstream by the current. While use of a barge is a potential approach, creating access to place a barge in the Taunton River would require significant clear cutting and grading and has been determined to be infeasible. Therefore, the Applicant requests that MassDEP permit the completion of the SAP during construction when the work area is dewatered and flow is bypassed around the locations where sampling would take place. A condition could be included in the 401 WQC allowing this approach with the requirement that sampling results be submitted to MassDEP once received, at which point a disposal location can be determined.

13.1 Sediment Testing

Due to on-site constraints, sediment sampling will be conducted during construction. Grab samples will be collected from upstream of the bridge, downstream of the bridge, downstream of the bridge, and at the outfall. Sampling will take place once work commences, but upstream samples were collected on and analyzed on December 1, 2025 for the following:

- Semi-Volatile Organic Compounds
- MADEP-EPH Extractable Petroleum Hydrocarbons
- Copper and MCP 14 Metals (including arsenic, cadmium, chromium, lead, mercury, nickel, and zinc as required by 314 CMR 9.07)
- Volatile Organics Low Level
- Organochlorine Pesticides (by EPA method 8081B) and herbicides (by EPA method 8151MCP) to meet Aggregate reporting limits
- PCBs (polychlorinated biphenyls by EPA Method 8082 and NOAA analysis for congeners)
- Conductivity

Most of the tested contaminants were found in non-detectable or insignificant quantities. The only materials that exceed the Beneficial Use Determination (BUD) Method 1 S-1/GW-1 Standards include chromium, lead, nickel, and zinc. Summary tables of sediment testing results are included at the beginning of Appendix L.

14.0 Regulatory Compliance

The Project has been designed to fully comply with the General Conditions of the USACE Massachusetts Section 404 General Permit and the provisions of 314 CMR 9.00. Below is a list of all federal, interstate, tribal, state, territorial, or local agency authorizations and reviews required for the proposed Project:

- An Order of Conditions from the Taunton Conservation Commission pursuant to the local ordinance only;
- An Order of Conditions from the Raynham Conservation Commission pursuant to the local bylaw only;
- Completion of National Environmental Policy Act (NEPA) Review through preparation of a programmatic Categorical Exclusion.
- Completion of the National Historic Preservation Act of 1966 Section 106 review;
- Completion of U.S. Fish and Wildlife Service Section 7 review;
- Completion of NOAA Section 7 review;

- Coverage under the National Pollutant Discharge Elimination Systems (NPDES) Construction General Permit from the U.S. Environmental Protection Agency (EPA);
- Coordination with the National Parks Service due to the status of the Taunton River as a Wild and Scenic River;
- Coverage under the 404 Clean Water Act General Permit from the U.S. Army Corps of Engineers (USACE); and
- Coverage under a 401 Water Quality Certification (WQC) from MassDEP.

In addition, the following USACE MA general permits (GPs) are applicable to the Project:

- GP 23 Linear Transportation Projects and Wetland/Stream Crossings; and
- GP 24 Temporary Construction, Access, and Dewatering.

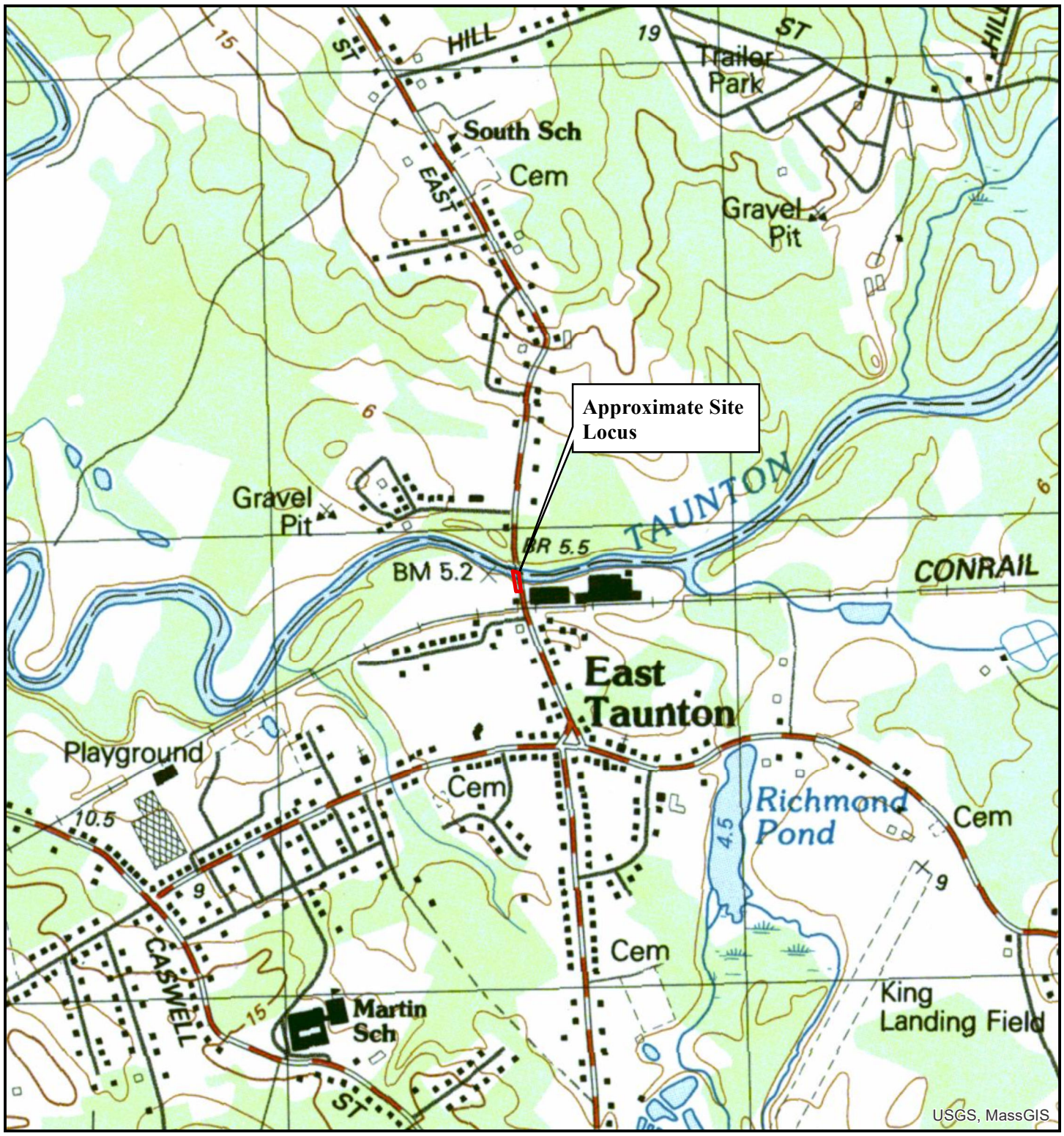
15.0 SUMMARY

The proposed Project is anticipated to provide a critical bridge replacement to support motorist, cyclist, and pedestrian safety along Old Colony Avenue and South Street East. Construction of the Project will result in permanent and temporary impacts to Waters of the U.S., which have been minimized to the maximum extent possible and will be mitigated through in-kind restoration. The Project has been designed to meet all local, state, and federal standards and comply with the regulations set forth in Section 401 of the federal Clean Water Act and the General Conditions of the USACE Massachusetts Section 404 General Permit.

The City of Taunton and MassDOT respectfully request that MassDEP and USACE find these measures adequately protective of the interests of Section 401 and Section 404 of the Clean Water Act, approving the work as described in this application and accompanying plans

APPENDIX B

- **Figure 1a: USGS Site Locus Map**
- **Figure 1b: Aerial Site Locus Map**
- **Figure 2: Environment Resources Map**
- **Figure 3: FEMA Flood Map**
- **Figure 4: Historic Resources Map**
- **Figure 5: Open Space Resources Map**
- **Figure 6: Soil Survey Map**



IMPROVING COMMUNITIES TOGETHER

N
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0 1,000 2,000 Feet

1 inch = 1,000 feet

Figure 1a
USGS Site Locus
Old Colony Avenue Bridge
Taunton and Raynham, MA

Data Source: MassGIS USGS Topographic Quadrangle Images (2001)

BETA
IMPROVING COMMUNITIES TOGETHER

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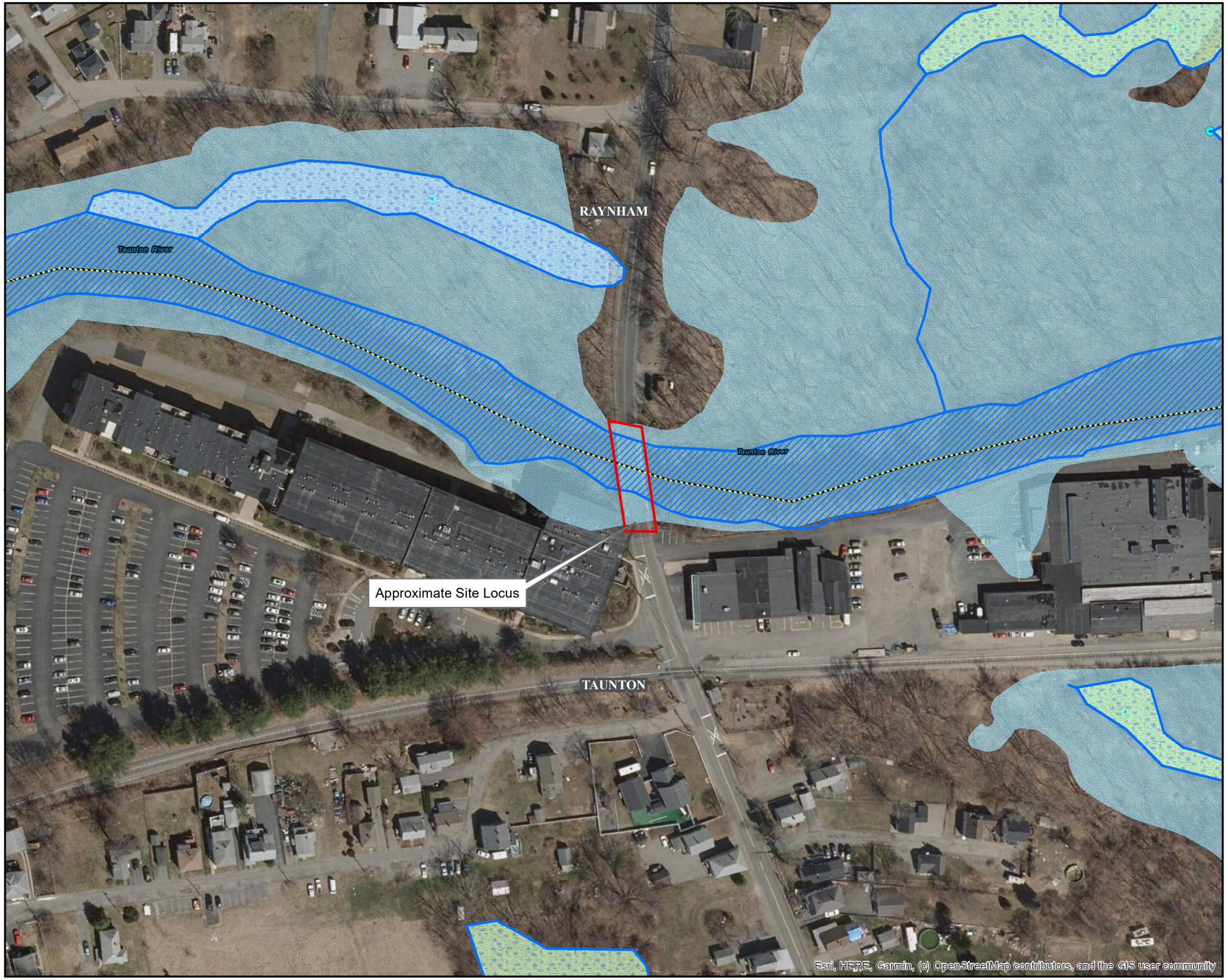
0 1,000 2,000 Feet

1 inch = 1,000 feet

Figure 1b
Aerial Site Locus
Old Colony Avenue Bridge
Taunton and Raynham, MA

Data Source: MassGIS USGS Topographic Quadrangle Images (2001)

Figure 2
Environmental Resources Figure
Old Colony Avenue Bridge
Taunton and Raynham, MA



Environmental Resources Legend

- MassDEP Hydrologic Feature
- Marsh/Bog
- Wooded marsh
- Open Water
- NFHL 100 Year Flood Zone
- NHESP Potential Vernal Pool
- NHESP Certified Vernal Pool
- NHESP Priority Habitat of Rare Species
- NHESP Estimated Habitats of Rare Wildlife
- Zone A
- Zone B
- ZONE C
- MassDEP Zone I
- MassDEP Zone II
- MassDEP IWPA
- Outstanding Resource Water
- Area of Critical Environmental Concern (ACEC)
- Town Boundary

N
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0 125 250 Feet

1 inch = 125 feet

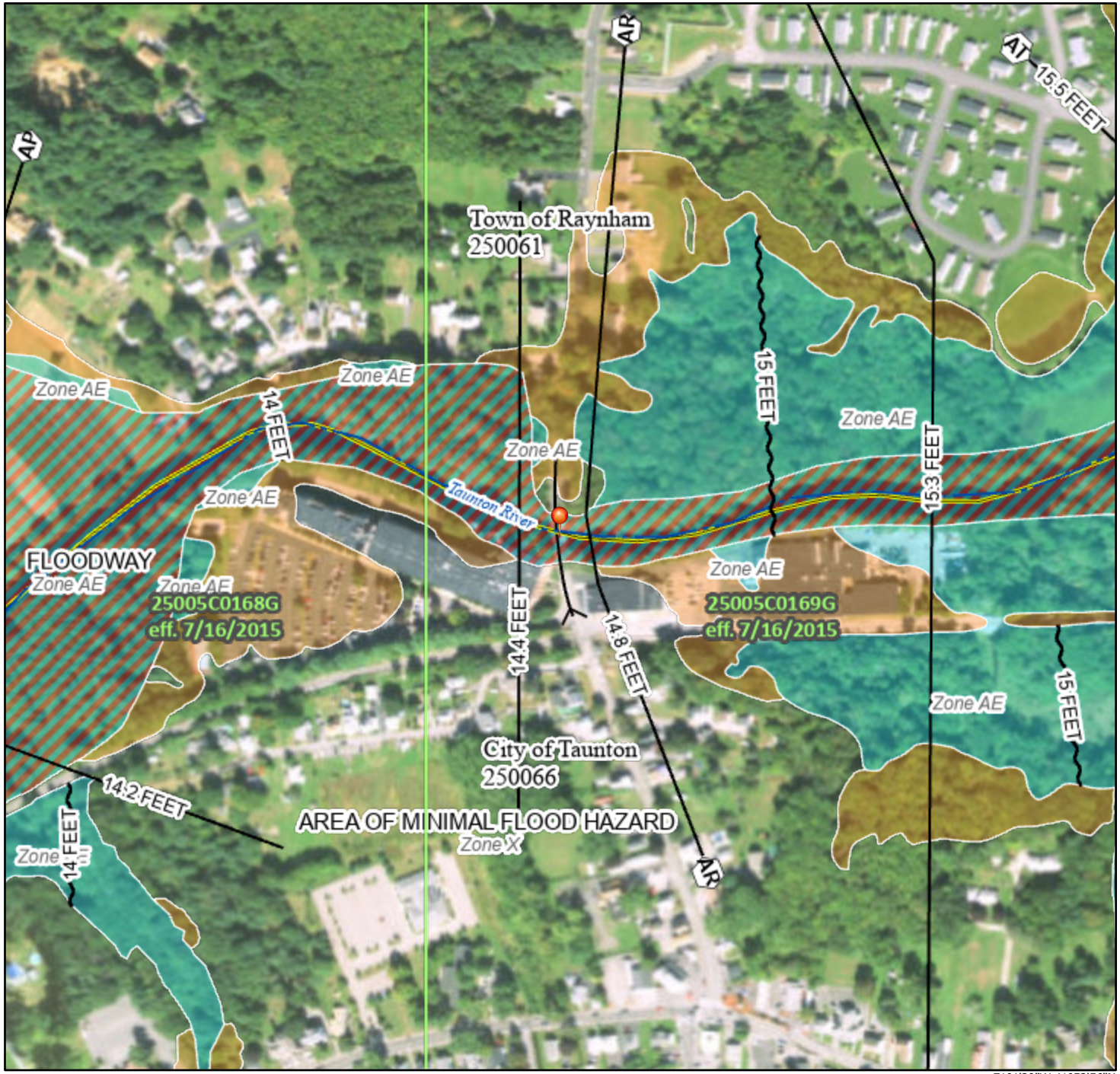
Data Source: MassGIS USGS Color Ortho Imagery (2014), MassDEP Wetlands (1:12000) (2009), NHESP Potential Vernal Pools (2000), NHESP Certified Vernal Pools, NHESP Priority Habitats of Rare Species (2008), NHESP Estimated Habitats of Rare Species (2008), Areas of Critical Environmental Concern (2009), FEMA National Flood Hazard Layer (2014),

BETA
IMPROVING COMMUNITIES TOGETHER

National Flood Hazard Layer FIRMette

FEMA

71°2'7"W 41°53'23"N



71°1'29"W 41°52'56"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

A00840 - 45

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 3/28/2023 at 3:27 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

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Figure 4
Historic Resources Map
Old Colony Avenue Bridge
Taunton and Raynham, MA

Legend

MassHistoric Commission Inventory (Points)
- Inventoried Property
- LHD
- MA/HL
- NRHP
- NRHP and LHD
- PR

MassHistoric Commission Inventory (Areas)
- Inventoried Property
- LHD
- MA/HL
- NRHP
- NRHP and LHD
- PR

N
W E
S

0 200 400
Feet
1 inch = 200 feet

Data Source: MassGIS USGS Color Ortho Imagery (2023), MHC Historic Inventory (2024)

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Figure 5
OpenSpace Resources Map
Old Colony Avenue Bridge
Taunton and Raynham, MA

Legend

ARTICLE97

- Yes
- No
- Unknown

N
W E
S

0 200 400 Feet

1 inch = 200 feet

Data Source: MassGIS USGS Color Ortho Imagery (2023), Protected and Recreational OpenSpace (2024). Land Use (2009).

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Figure 6
Soil Survey Map
Old Colony Avenue Bridge
Taunton and Raynham, MA

Legend

- Site Locus
- MassDEP Soils

N
W E
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0 200 400
Feet
1 inch = 200 feet

Data Source: MassGIS USGS Color Ortho Imagery (2023), MassDEP Wetlands (2017), NHESP Potential Vernal Pools (2013), NHESP Certified Vernal Pools, NHESP Priority Habitats of Rare Species (2021), NHESP Estimated Habitats of Rare Species (2021), Areas of Critical Environmental Concern (2009), FEMA National Flood Hazard Layer (2014),

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APPENDIX C

- **Resource Area Boundary Delineation Report**

IMPROVING COMMUNITIES TOGETHER

Resource Area Boundary Delineation
Old Colony Avenue Bridge
Taunton and Raynham, Massachusetts

July 01, 2024

On March 31, 2023, BETA Group, Inc. (BETA) Wetland Scientists performed Wetland Resource Area delineations near the bridge over the Taunton River along Old Colony Avenue in Taunton and South Street East in Raynham, Massachusetts (the Site). This report describes Wetland Resource Areas Subject to Protection under the Massachusetts Wetlands Protection Act (M.G.L. Chapter 131 Section 40 - the Act), the City of Taunton Wetlands Protection Ordinance (City of Taunton Code (2010) §§ 16-30 to 16-38 – the Ordinance), the Raynham Wetland Protection Bylaw (the Bylaw), the federal Clean Water Act (33 U.S.C. §1251 et seq (1972)), and the Massachusetts Clean Waters Act (MGL Chapter 21 Section 26-53) that exist on or within 100 feet of the Site as well as the methodologies used to delineate their boundaries.

Site Description

The Site consists of a two-lane bituminous concrete roadway and underlying bridge that spans the Taunton River at the municipal boundary between the City of Taunton and the Town of Raynham (Figure 1 – Site Locus). The bridge is a two-span reinforced concrete deck supported on reinforced concrete abutments and timber piles. The Site is bounded by undeveloped forest and residential housing to the north, multi-family residential and industrial properties to the south, and the Taunton River to the east and west (Figure 2 – Environmental Resources).

According to the USDA Natural Resources Conservation Service – Soil Survey, mapped soils on and within proximity to the Site are generally classified as Urban Land, Birdsall silt loam and Udorthents, smoothed. Field observations generally confirmed the soil types at the Site. The *Custom Soil Resource Report for Bristol County, Massachusetts, Northern Part* is attached.

State jurisdictional Resource Areas identified within 100 feet of the Site include Inland Bank (to perennial and intermittent streams), Bordering Vegetated Wetlands (BVW), Land Under Water (LUW), Bordering Land Subject to Flooding (BLSF), and Riverfront Area (RA). The MassGIS database was used as the initial step in identifying critical areas on or within proximity to the Site. The table below describes selected environmentally critical categories as determined through MassGIS.

Table 1. Selected MassGIS Environmental Data Layers

Mapped Resource On or Within Proximity to Site	Yes	No
Area of Critical Environmental Concern		✓
NHESP Certified Vernal Pool		✓
NHESP Potential Vernal Pool		✓
NHESP Estimated Habitat of Rare Wildlife		✓
NHESP Priority Habitat of Rare Species		✓
Outstanding Resource Waters		✓
FEMA Flood Zones	✓	
Surface Water Protection Area (Zones A and B)		✓
Interim Wellhead Protection Area		✓
Zone I Wellhead Protection Area		✓
Zone II Wellhead Protection Area		✓
Wild and Scenic River	✓	

BETA GROUP, INC.
89 Shrewsbury Street, Suite 300, Worcester, MA 01604
P: 508.756.1600 | W: www.BETA-Inc.com

Mapped Resource On or Within Proximity to Site	Yes	No
DCR Dams		✓
Coldwater Fisheries Resource		✓

Source: MassGIS

Jurisdictional Wetland Resource Areas – Massachusetts Wetlands Protection Act

A Site visit was conducted by BETA Wetland Scientists on March 31, 2023 to identify and delineate the boundaries of Wetland Resource Areas at and in the immediate vicinity to the Site. Resource Area boundaries were identified and delineated in accordance with methods developed by the Massachusetts Department of Environmental Protection's *Delineating Bordering Vegetated Wetlands Under the Massachusetts Wetlands Protection Act: Second Edition*, dated September 2022, as well as definitions set forth in the Wetland Regulations, 310 CMR 10.00. Several areas subject to Protection under the Act exist along the Site and are described below.

Inland Bank (to perennial and intermittent streams) – 310 CMR 10.54

According to 310 CMR 10.54(2), the definition of a Bank is the portion of the land surface which normally abuts and confines a water body, occurring between a water body and a vegetated bordering wetland and adjacent floodplain, or, in the absence of these, it occurs between a water body and an upland. The upper boundary of a Bank is the first observable break in the slope or the mean annual flood level, whichever is lower.

BETA identified the resource Bank to one (1) perennial stream (the Taunton River) and one (1) unnamed intermittent stream within and near the Site. Banks were delineated in the field with blue flagging as described in Table 2.

Table 2: Bank Boundary Description

Flag Series	Location	Description / Notes
B1 Series *Flags* *B1-99 to 95, and B1-100 to 106* *B2 Series* *Flags* *B2-91 to 99, and 100 to 105*	Taunton River, located east, under and west of the Old Colony Ave Bridge	The northern (*B1 Series*) and southern (*B2 Series*) Banks associated with the Taunton River, a perennial stream, that generally flows west were delineated in two (2) segments along the first observable break in slope consistent with the mean annual flood level. The Bank north of the Taunton River was delineated west (*B1-99 to B1-95*) and east (*B1-100 to B1-106*) of the Old Colony Avenue Bridge in Raynham. Banks west of the bridge were generally well defined and consisted of eroded soils. Banks east of the bridge were observed to be undercut and also consisted of eroded soils. Where vegetated, both Banks consist primarily of woody vegetation including bush honeysuckle (*Diervilla lonicera*), silky dogwood (*Cornus amomum*) and Norway maple (*Acer platanoides*). Populations of poison ivy (*Toxicodendron radicans*) were also observed. The Bank south of the Taunton River was delineated west (*B2-91 to 99*) and east (*B2-100 to 105*) of the Old Colony Avenue Bridge in Taunton. Banks west of the bridge were generally poorly defined and consisted of rocks and stones of various sizes. Banks east of the bridge were generally well defined and generally consisted of eroded soils. Where vegetated, both Banks consist primarily of woody vegetation including slippery elm (*Ulmus rubra*),

Flag Series	Location	Description / Notes
		Norway maple, and silky dogwood. Populations of poison ivy were also observed. The channel width downstream of the Old Colony Avenue bridge is between 95 to 110 feet wide with a mucky, gravel substrate. The channel width upstream is 90 to 100 feet wide with a mixed cobble, gravel, and mucky substrate. Water depths within the Taunton River could not be determined in the field. The Taunton River is mapped as perennial on USGS topographic maps; therefore, it meets the definition of a perennial stream (River) per 310 CMR 10.58(2).
B3/B4 Series *Flags* *B3-96 to 107* *and* *B4-96 to 107*	Northwest of Old Colony Avenue Bridge at 0 South East Street	The interior (*B4 Series*) and exterior (*B3 Series*) Banks associated with a shallow, braided intermittent stream west of South Street East were delineated along the first observable break in slope (consistent with the mean annual flood level). The *B3/B4 Series* stream flows west out of a drainage outfall associated with the closed drainage system under South Street East in Raynham, where flow becomes braided prior to reaching a confluence west of the Site. The *B3/ B4 Series* Banks were primarily vegetated with silky dogwood. The channel is approximately 3 to 5 feet wide and 2 to 6 inches deep with a substrate of sand and muck. This stream is not depicted on current USGS topographic maps or on the StreamStats program; therefore, it is presumed to be intermittent.

Bordering Vegetated Wetlands – 310 CMR 10.55

According to 310 CMR 10.55(2), the definition of BVW are freshwater wetlands which border on creeks, Rivers, streams, ponds and lakes and are areas where the soils are saturated and/or inundated such that they support a predominance of wetland indicator plants. The boundary of BVW is the line within which 50% or more of the vegetation community consists of wetland indicator plants and saturated or inundated conditions exist.

BETA identified two (2) areas of BVW within and adjacent to the Site. US Army Corps of Engineers' *Vegetated Wetland Boundary Delineation Field Data Sheets* documenting BETA's observed evidence of hydrology, soils, and hydrophytic vegetation at specific data plots are attached.

Table 3: BVW Boundary Description

Flag Series	Location	Description / Notes
WF1 Series *Flags* *WF1-108 to 111*	Northwest of Old Colony Avenue Bridge at 0 South East Street	The *WF1 Series* BVW is a scrub shrub wetland bordering on the *B3/B4 Series* intermittent stream. The attached U.S. Army Corps of Engineers Field Data Sheets describe evidence of hydrophytic vegetation, hydric soils, and indicators of hydrology at a specific data plot.

Flag Series	Location	Description / Notes
WF2 Series *Flags* *WF2-100 to 102*	Along the northern Bank of the Taunton River	The *WF2 Series* BVW is a scrub shrub wetland located along the northern bank of the Taunton River, west of the *B1 Series* Bank. Dominant hydrophytic vegetation observed within the area includes silky dogwood. Evidence of hydrology observed in the field includes sediment deposition and stressed vegetation (buttressed roots), and hydric soils indicators including sandy soils with prominent redox concentrations. A formal data plot was not performed at this location.

Land Under Water – 310 CMR 10.56

According to 310 CMR 10.56(2), the definition of LUW is the land beneath any creek, river, stream, pond or lake and may be composed of organic muck or peat, fine sediments, rocks or bedrock. LUW exists between the Bank boundaries below the mean annual low water levels of the streams delineated at the Site (Table 2). The boundary of LUW is the mean annual low water level. This boundary was not delineated in the field.

Bordering Land Subject to Flooding – 310 CMR 10.57

According to the Federal Emergency Management Agency (FEMA) FIRM Number 25005C0169G, dated July 16, 2015, a Zone AE Flood Hazard associated with the Taunton River exists at the Site with Base Flood Elevations (BFE) ranging from 14.4 feet (NAVD88) downstream of the bridge and 14.8 feet (NAVD88) upstream of the bridge. The Site is also located within the Regulatory Floodway of the Taunton River. Any work performed within BLSF (i.e. areas with a 0.1% yearly chance of flooding) is Subject to Jurisdiction under the Act.

Riverfront Area – 310 CMR 10.58

According to 310 CMR 10.58(2), RA is defined as the area of land between a river's MAHW line and a parallel line measured 200' away horizontally. A River is any natural flowing body of water that empties to any ocean, lake, pond, or other River flowing throughout the year and is shown as perennial on the current United States Geological Survey or more recent map provided by the Department, or has a watershed size of at least 0.50 square miles and a predicted flow rate greater than or equal to 0.01 cubic feet per second at the 99% flow duration using the USGS Stream Stats Method.

As noted in Table 2 above, the B1/B2 Series stream qualifies as a perennial stream (River) and is therefore afforded a 200-foot RA. The RA at the Site would be measured 200 feet horizontally from the MAHW flags. Descriptions of the MAHW boundaries associated with the Taunton River are provided below in Table 4.

Table 4: MAHW Boundary Description

Flag Series	Waterbody	Description / Notes
B1 Series *Flags* *B1-99 to 95, and B1-100 to 106* *B2 Series* *Flags* *B2-91 to 99, and 100 to 105*	Taunton River	The northern (*B1 Series*) Banks were delineated at the mean annual flood level (coincident with the mean annual high-water mark – MAHW) approximately ten (10) feet upgradient of Bank. MAHW was determined based on observations of sediment accumulation and scour. The southern (*B2 Series*) Banks were delineated approximately ten (10) feet upgradient of Bank. MAHW was determined based on observations of sediment accumulation, scour and the presence of debris.

Jurisdictional Wetland Resource Areas – City of Taunton

The City of Taunton protects resource areas under the City of Taunton Wetlands Protection Ordinance and Conservation Ordinance Regulations. In some instances, these regulations provide additional jurisdiction and protection beyond what is set forth in the Wetlands Regulations at 310 CMR 10.00.

Freshwater Wetland

The Ordinance and Regulations defines a freshwater wetland per the definition presented in the Act, or if it meets two of three total criteria including vegetation within the community consisting of at least 50% wetland plant species, hydric soils are present, or hydrology or field indicators of hydrology are present. BVWs delineated at the Site (Table 3) meet the Ordinance definition of a freshwater wetland.

Vernal Pool

The Ordinance and Regulations consider vernal pools to be *"any confined basin depression that has been certified as such by the Natural Heritage and Endangered Species Program or has been demonstrated by credible proof to contain obligate vernal pool breeding species".* A potential vernal pool (PVP) is mapped interior to the *WF1 Series* BVW approximately 350 feet from the Site; however, it has not been certified, nor was the area reviewed for the presence of vernal pool breeding species.

Wetland Protection Zone (WPZ)

The WPZ as defined in the Ordinance and Regulations is *"an area of no less than 25 feet and no more than 100 feet from the border of BVWs, vernal pools, lakes, ponds and ILSFs larger than a quarter acre-foot in size".* The WPZ is measured from the boundary of Bank and BVW at the Site and allows for limitations and prohibitions on activities that may negatively impact a Resource Area.

Wildlife Corridors

The Ordinance defines Wildlife Corridors as: "*contiguous areas of land within a Wetlands Protection Zone, which provide feeding areas, breeding areas, and normal home range movement for wildlife. An area will be deemed a wildlife corridor upon presentation of credible evidence of the corridors and wildlife value. Wildlife corridors may be both narrow and vulnerable. Wildlife corridors can also contain core vegetative life, which make them sensitive and important for plant diversity*." A narrow strip of contiguous area is located along the southern (B2 Series) Bank to the Taunton River, located within the City of Taunton. This area is primarily developed however it supports vegetation that may provide habitat for wildlife therefore this area may be considered a Wildlife Corridor under the Ordinance.

Jurisdictional Wetland Resource Areas – Town of Raynham

The Town of Raynham protects resource areas under the Town of Raynham Conservation Bylaw. In some instances, these regulations provide additional jurisdiction and protection beyond what is set forth in the Wetlands Regulations at 310 CMR 10.00.

Land Subject to Flooding

The Town of Raynham provides a 100 foot buffer zone to any land subject to flooding or inundation by groundwater or surface water, where a buffer zone to these resource areas is not present under the Act. The area of BLSF associated with the Taunton River has a 100-foot buffer zone under the Bylaw.

25-foot No Activity Buffer

The Bylaw provides a 25-foot "No Activity Buffer" around bordering vegetated wetlands for all construction activities. This No Activity Buffer extends 25-feet upgradient of the delineated boundaries of the WF1 and WF2 Series BVW's.

Jurisdictional Wetland Resource Areas – Federal Clean Water Act (Section 404)

The wetlands and waterways located at the Site are "Waters of the United States," and are therefore subject to the federal Clean Water Act, 33 U.S.C. §1251 et seq (1972). The boundary to "Waters of the United States" is the vegetated wetlands boundary, or, in the absence of vegetated wetlands, is the Ordinary High Water Mark (OHWM) for non-tidal rivers and streams, as specified at 33 CFR §328.4.

According to 33 CFR §328.3(c)(4), vegetated wetlands are defined as "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions." The wetland boundary previously described in this report was delineated in accordance with this definition. US Army Corps vegetated wetland boundary delineation field data sheets are attached documenting BETA's observations of evidence of hydrology, soils, and hydrophytic vegetation at specific data plots.

Work conducted below the boundary of Vegetated Wetlands or the OHWM is Subject to Jurisdiction under Section 404 of the Clean Water Act. Where present, Vegetated Wetland boundaries (Table 3) are the extent of federal Jurisdiction. Where streams are present and upgradient Vegetated Wetlands are absent, the OHWM coincides with the delineated boundaries of the B1/B2 Series Banks. The OHWM for the unnamed intermittent stream coincides with the delineated boundaries of the B3/B4 Series Banks.

Jurisdictional Wetland Resource Areas – Massachusetts Clean Waters Act (Section 401)

The limit of jurisdiction under the Massachusetts Clean Waters Act (Section 401), as specified in 314 CMR 9.00, is the limit of Section 404 jurisdiction under the federal Clean Water Act. Exceedances of the jurisdictional threshold under 314 CMR 9.00 require filing for a Water Quality Certification under Section 401.

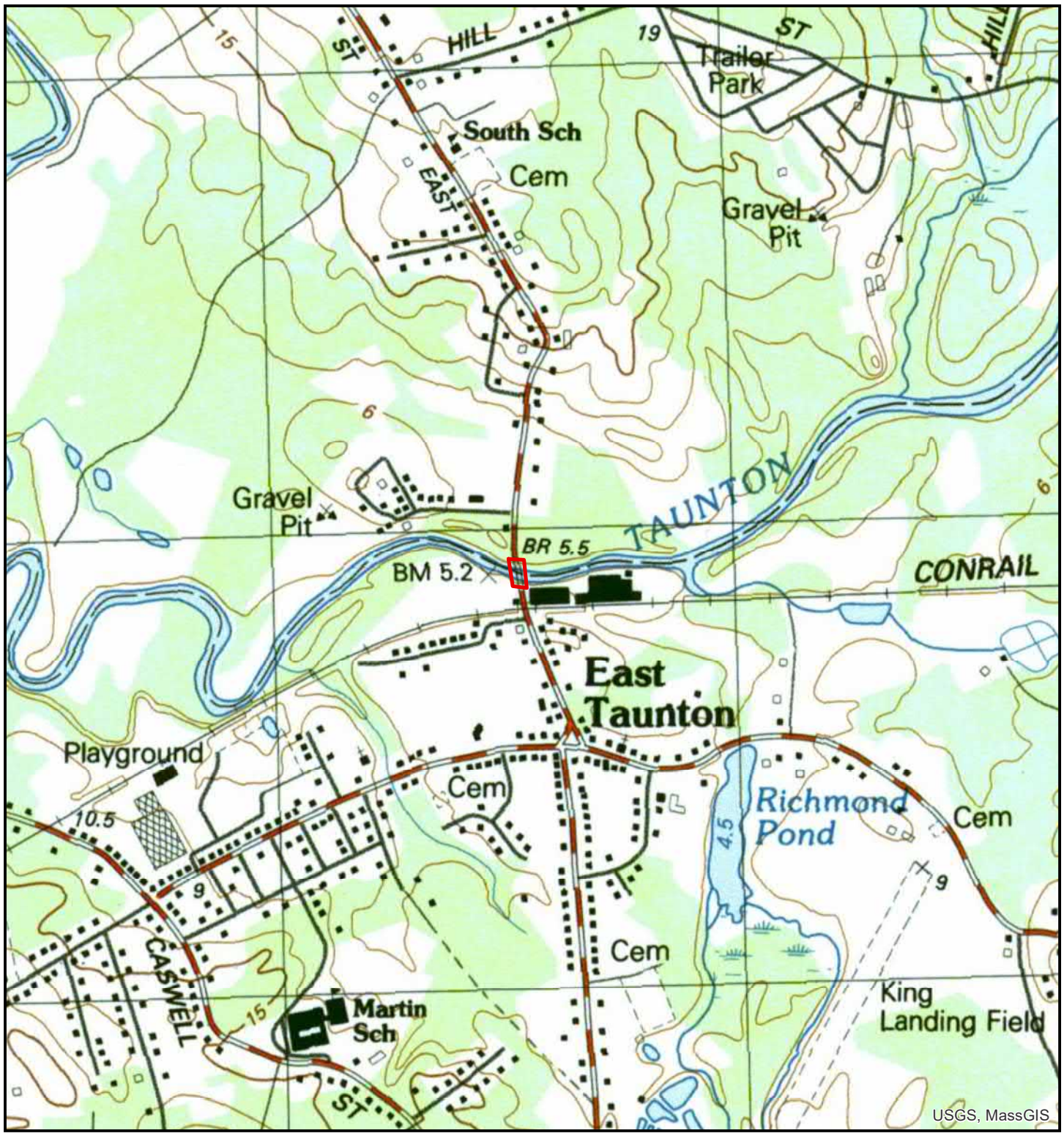
Findings and Recommendations

BETA has identified areas Subject to Protection and/or Jurisdiction under the Massachusetts Wetlands Protection Act, the Taunton Conservation Ordinance, the Town of Raynham Wetland Protection Bylaw, the federal Clean Water Act, and the Massachusetts Clean Waters Act located on or within 100 feet of the Site, and has delineated the boundaries of Bank, BVW, and MAHW that exist along the Site. In order to definitively determine the extent of Conservation Commission jurisdiction, Army Corps jurisdiction, and

MassDEP jurisdiction, the boundary flags would need to be located and depicted on a to-scale plan of the Site.

Attachments: Figure 1 – Site Locus
Figure 2 – Environmental Resources Map
Figure 3 – FEMA FIRMette
Photographic Documentation
US Army Corps of Engineers' *Vegetated Wetland Boundary Delineation Field Data Sheets*
Custom Soil Report for Bristol County, Massachusetts, Northern Part

Job No: 22.10887.00



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N
W E
S

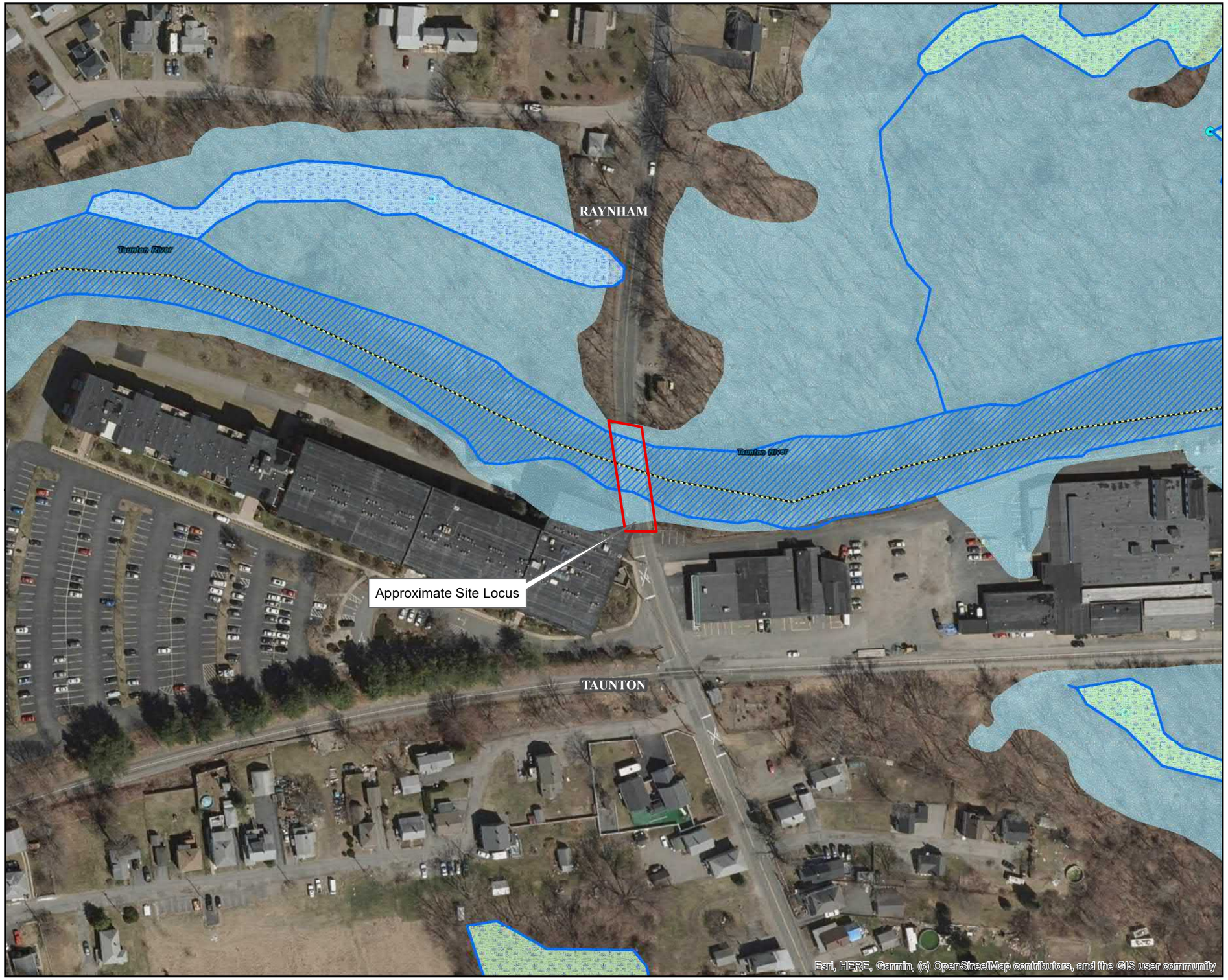
0 1,000 2,000 Feet

1 inch = 1,000 feet

Figure 1
Site Locus
Old Colony Avenue Bridge
Taunton and Raynham, MA

Data Source: MassGIS USGS Topographic Quadrangle Images (2001)

Figure 2
Environmental Resources Figure
Old Colony Avenue Bridge
Taunton and Raynham, MA



Environmental Resources Legend

- MassDEP Hydrologic Feature
- Marsh/Bog
- Wooded marsh
- Open Water
- NFHL 100 Year Flood Zone
- NHESP Potential Vernal Pool
- NHESP Certified Vernal Pool
- NHESP Priority Habitat of Rare Species
- NHESP Estimated Habitats of Rare Wildlife
- Zone A
- Zone B
- ZONE C
- MassDEP Zone I
- MassDEP Zone II
- MassDEP IWPA
- Outstanding Resource Water
- Area of Critical Environmental Concern (ACEC)
- Town Boundary

N
W E
S

0 125 250 Feet

1 inch = 125 feet

Data Source: MassGIS USGS Color Ortho Imagery (2014), MassDEP Wetlands (1:12000) (2009), NHESP Potential Vernal Pools (2000), NHESP Certified Vernal Pools, NHESP Priority Habitats of Rare Species (2008), NHESP Estimated Habitats of Rare Species (2008), Areas of Critical Environmental Concern (2009), FEMA National Flood Hazard Layer (2014),

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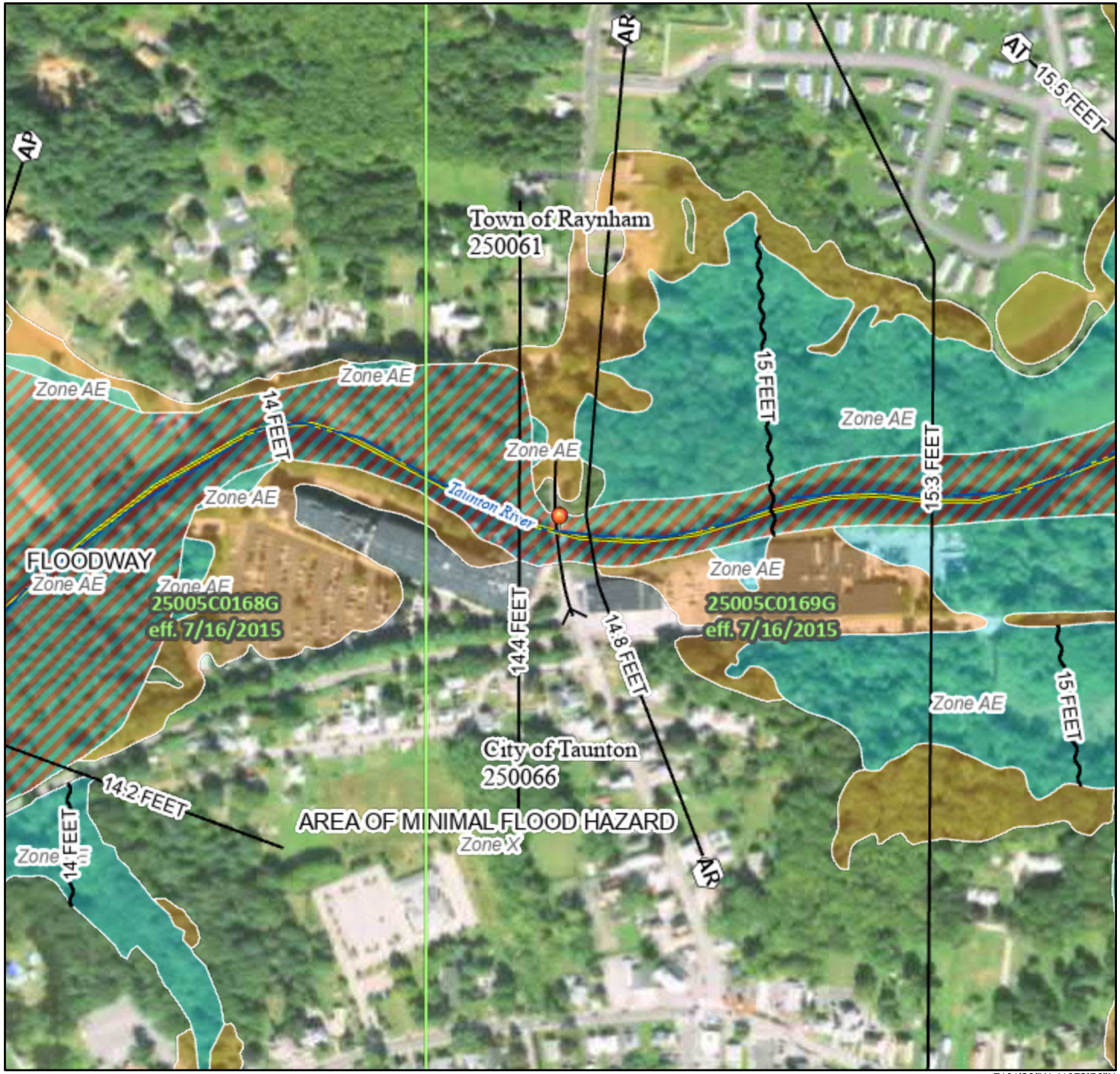
National Flood Hazard Layer FIRMette

FEMA

71°2'7"W 41°53'23"N



71°1'29"W 41°52'56"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

A00840 - 59

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
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- With BFE or Depth *Zone AE, AO, AH, VE, AR*
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OTHER AREAS OF FLOOD HAZARD
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- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
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- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

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Photo 1

View of the B1-100 Series Bank along the Taunton River—Facing west

Photo 2

View of the B1-99 Series Bank along the Taunton River—Facing east

PHOTOGRAPHIC DOCUMENTATION

Old Colony Avenue Bridge over the Taunton River

Taunton and Raynham, Massachusetts

Photographs Documented 3.31.2023

Photo 3

View of the B2-100 Series Bank along the Taunton River—Facing east

Photo 4

View of the B2-99 Series Bank along the Taunton River—Facing west

PHOTOGRAPHIC DOCUMENTATION

Old Colony Avenue Bridge over the Taunton River

Taunton and Raynham, Massachusetts

Photographs Documented 3.31.2023

Photo 5

View of the B3/B4 Series Intermittent Streams—facing west

Photo 6

View of the B3/B4 Series Intermittent Streams and headwall—facing south

PHOTOGRAPHIC DOCUMENTATION
Old Colony Avenue Bridge over the Taunton River
Taunton and Raynham, Massachusetts
Photographs Documented 3.31.2023

Photo 7

View of the WF1 Series BVW—facing west

Photo 8

View of the WF2 Series BVW—facing west

PHOTOGRAPHIC DOCUMENTATION

Old Colony Avenue Bridge over the Taunton River

Taunton and Raynham, Massachusetts

Photographs Documented 3.31.2023

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Old Colony Avenue Bridge City/County: Taunton and Raynham Sampling Date: 3/31/23

Applicant/Owner: MassDOT State: MA Sampling Point: WF1-109 UP

Investigator(s): Tyler Drew, Jonathan Niro Section, Township, Range: Bristol County

Landform (hillside, terrace, etc.): Hillside Local relief (concave, convex, none): Convex Slope %: 10

Subregion (LRR or MLRA): LRR R, MLRA 144A Lat: 41.88676 Long: -71.03012 Datum: WGS84

Soil Map Unit Name: Udorthents, smoothed NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	**Is the Sampled Area**
Hydric Soil Present?	Yes ____	No X	**within a Wetland?** **Yes** ____ **No** X
Wetland Hydrology Present?	Yes ____	No X	If yes, optional Wetland Site ID: ____

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____
Water Table Present?	Yes ____	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ____	No X	Depth (inches): ____

Wetland Hydrology Present? **Yes** ____ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: WF1-109 UP

Tree Stratum (Plot size: 30' radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer platanoides*	50	Yes	UPL
2. *Ulmus rubra*	5	No	FAC
3.			
4.			
5.			
6.			
7.			
	55	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15' radius)			
1. *Rosa multiflora*	10	Yes	FACU
2.			
3.			
4.			
5.			
6.			
7.			
	10	=Total Cover	
Herb Stratum (Plot size: 5' radius)			
1. *Alliaria petiolata*	30	Yes	FACU
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	30	=Total Cover	
Woody Vine Stratum (Plot size: N/A)			
1.			
2.			
3.			
4.			
		=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	5	x 3 =	15
FACU species	40	x 4 =	160
UPL species	50	x 5 =	250
Column Totals:	95 (A)		425 (B)

Prevalence Index = B/A = 4.47

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ___ **No** X

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WF1-109 UP

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 2/1	100						Loamy Sand

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ High Chroma Sands (S11) (**LRR K, L)**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: Stoney Refusal (3 attempts)

Depth (inches): 4

Hydric Soil Present? **Yes** ___ **No** X

Remarks:

This data form is revised from Northcentral and Northeast Regional Supplement Version 2.0 to include the NRCS Field Indicators of Hydric Soils, Version 7.0, 2015 Errata. (http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_051293.docx)

Refusal at 4 inches. 3 Attempts.

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Old Colony Avenue Bridge City/County: Taunton and Raynham Sampling Date: 3/31/23

Applicant/Owner: MassDOT State: MA Sampling Point: WF1-109 WET

Investigator(s): Tyler Drew, Jonathan Niro Section, Township, Range: Bristol County

Landform (hillside, terrace, etc.): Toe of Slope Local relief (concave, convex, none): Concave Slope %: 0-5

Subregion (LRR or MLRA): LRR R, MLRA 144A Lat: 41.88676 Long: -71.03012 Datum: WGS84

Soil Map Unit Name: Udorthents, smoothed NWI classification: PEM1Fh

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area**
Hydric Soil Present?	Yes X	No ____	**within a Wetland?** **Yes** X **No** ____
Wetland Hydrology Present?	Yes X	No ____	If yes, optional Wetland Site ID: WF1

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- X Inundation Visible on Aerial Imagery (B7)
- X Sparsely Vegetated Concave Surface (B8)
- X Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- X Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____
Water Table Present?	Yes ____	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes X	No ____	Depth (inches): 1

Wetland Hydrology Present? **Yes** X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: WF1-109 WET

Tree Stratum (Plot size: N/A)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	=Total Cover		
Sapling/Shrub Stratum (Plot size: 15' radius)			
1. *Cornus amomum*	40	Yes	FACW
2. *Rosa multiflora*	10	Yes	FACU
3.			
4.			
5.			
6.			
7.			
	50 =Total Cover		
Herb Stratum (Plot size: N/A)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	=Total Cover		
Woody Vine Stratum (Plot size: N/A)			
1.			
2.			
3.			
4.			
	=Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	40	x 2 =	80
FAC species	0	x 3 =	0
FACU species	10	x 4 =	40
UPL species	0	x 5 =	0
Column Totals:	50 (A)		120 (B)

Prevalence Index = B/A = 2.40

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WF1-109 WET

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 2/2	100						Sandy Silt Loam
8-16	5Y 5/1	40	2.5Y 5/4	30	C	M		Loamy Sand
			5YR 4/6	30	C	M		

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- X Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ High Chroma Sands (S11) (**LRR K, L)**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** ___

Remarks:

This data form is revised from Northcentral and Northeast Regional Supplement Version 2.0 to include the NRCS Field Indicators of Hydric Soils, Version 7.0, 2015 Errata. (http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_051293.docx)

Refusal at 4 inches. 3 Attempts.

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Bristol County, Massachusetts, Northern Part

January 10, 2024

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

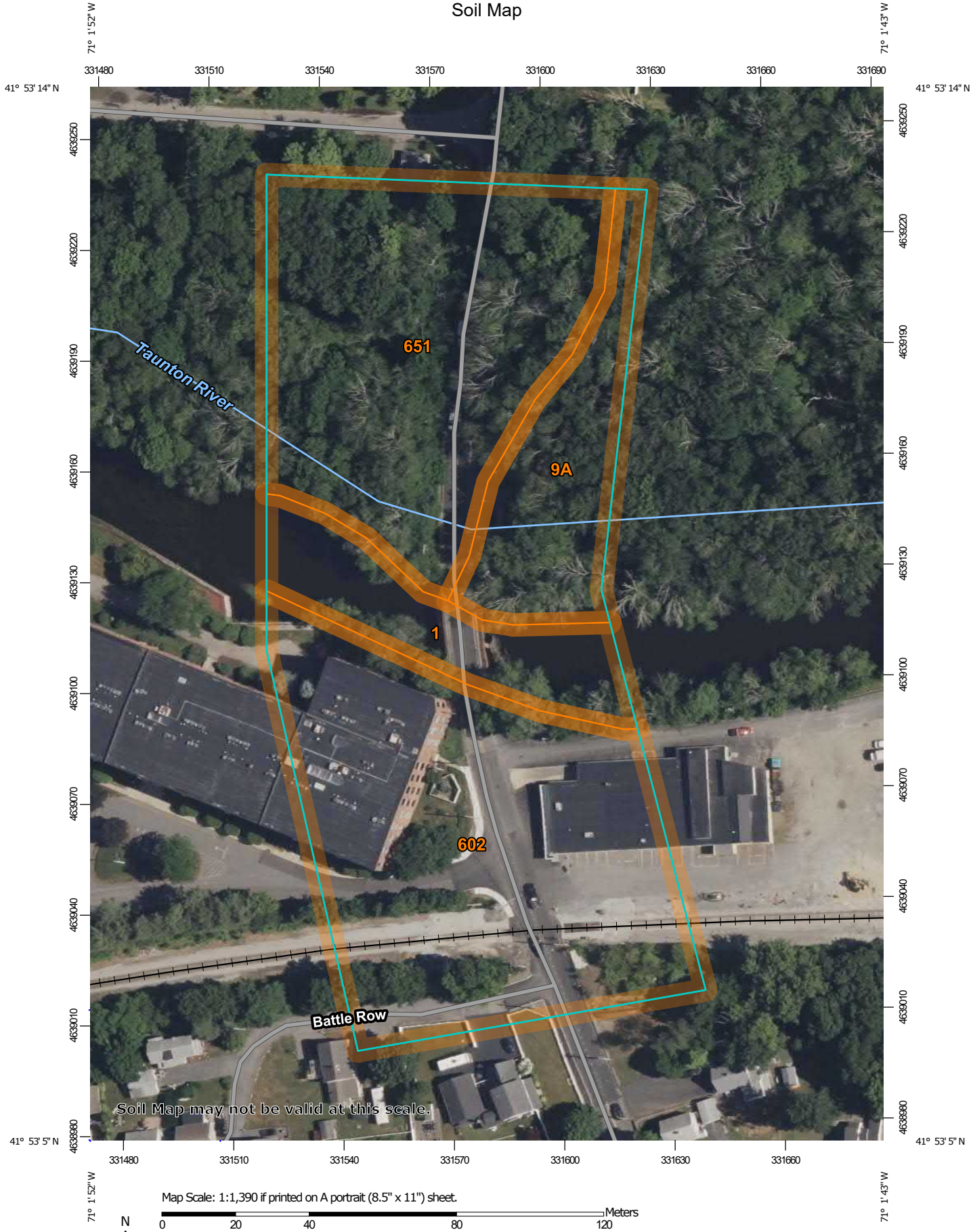
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:1,390 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 20 40 80 120

Feet
0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Bristol County, Massachusetts, Northern Part
Survey Area Data: Version 16, Sep 10, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 14, 2022—Jul 1, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
1	Water	0.6	10.7%
9A	Birdsall silt loam, 0 to 3 percent slopes	0.7	12.5%
602	Urban land	2.3	41.8%
651	Udorthents, smoothed	1.9	35.0%
Totals for Area of Interest		**5.5**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The

delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Bristol County, Massachusetts, Northern Part

1—Water

Map Unit Setting

National map unit symbol: 997q
Frost-free period: 120 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

9A—Birdsall silt loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 997p
Elevation: 0 to 150 feet
Mean annual precipitation: 45 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 145 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Birdsall and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Birdsall

Setting

Landform: Depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Soft coarse-silty lacustrine deposits over hard coarse-silty lacustrine deposits

Typical profile

H1 - 0 to 7 inches: silt loam
H2 - 7 to 21 inches: silt loam
H3 - 21 to 60 inches: very fine sandy loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None

Frequency of ponding: Frequent
Available water supply, 0 to 60 inches: Very high (about 12.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: C/D
Ecological site: F144AY031MA - Very Wet Outwash
Hydric soil rating: Yes

Minor Components

Raynham

Percent of map unit: 10 percent
Landform: Depressions
Hydric soil rating: Yes

Swansea

Percent of map unit: 10 percent
Landform: Bogs
Hydric soil rating: Yes

602—Urban land

Map Unit Setting

National map unit symbol: 9999
Frost-free period: 120 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

651—Udorthents, smoothed

Map Unit Setting

National map unit symbol: v4w7
Elevation: 0 to 3,000 feet
Mean annual precipitation: 45 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 145 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Udorthents and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Udorthents

Setting

Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Excavated and filled land over loose sandy and gravelly glaciofluvial deposits and/or firm loamy basal till

Typical profile

H1 - 0 to 6 inches: variable
H2 - 6 to 60 inches: variable

Properties and qualities

Slope: 0 to 15 percent
Depth to restrictive feature: More than 80 inches
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to very high (0.06 to 20.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A
Hydric soil rating: Unranked

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

APPENDIX D

- **Photographic Documentation**

Photo 1

View of the B1-100 Series Bank along the Taunton River—Facing west

Photo 2

View of the B1-99 Series Bank along the Taunton River—Facing east

PHOTOGRAPHIC DOCUMENTATION

Old Colony Avenue Bridge over the Taunton River

Taunton and Raynham, Massachusetts

Photographs Documented 3.31.2023

Photo 3

View of the B2-100 Series Bank along the Taunton River—Facing east

Photo 4

View of the B2-99 Series Bank along the Taunton River—Facing west

PHOTOGRAPHIC DOCUMENTATION

Old Colony Avenue Bridge over the Taunton River

Taunton and Raynham, Massachusetts

Photographs Documented 3.31.2023

Photo 5

View of the B3/B4 Series Intermittent Streams—facing west

Photo 6

View of the B3/B4 Series Intermittent Streams and headwall—facing south

PHOTOGRAPHIC DOCUMENTATION

Old Colony Avenue Bridge over the Taunton River

Taunton and Raynham, Massachusetts

Photographs Documented 3.31.2023

Photo 7

View of the WF1 Series BVW—facing west

Photo 8

View of the WF2 Series BVW—facing west

PHOTOGRAPHIC DOCUMENTATION

Old Colony Avenue Bridge over the Taunton River

Taunton and Raynham, Massachusetts

Photographs Documented 3.31.2023

APPENDIX E

- **Stormwater Management Report**

Raynham / Taunton, Massachusetts

South Street East / Old Colony Avenue

MassDOT Highway Division
Project File # 613642
January 2026

STORMWATER MANAGEMENT REPORT

PREPARED FOR

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Department of Public Works
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1

Introduction

This Stormwater Management Report has been prepared to demonstrate compliance with the Massachusetts Stormwater Management Standards (the Standards) in accordance with the Massachusetts Wetlands Protection Act Regulations (310 CMR 10.00) and Water Quality Certification Regulations (314 CMR 9.00). Appendix A includes a completed Massachusetts Department of Environmental Protection (MassDEP) Checklist for Stormwater Report, stamped by a Massachusetts registered professional engineer.

The Project follows the guidance presented in the MassDOT Stormwater Design Guide (SDG), and stormwater management systems are designed in accordance with the Standards.

2

Project Summary

The Applicant, the City of Taunton, is proposing Project 613642 for the replacement of the Old Colony Avenue Bridge (Bridge #R-02-00=T-01-004) over the Taunton River, including work along adjacent roadways (the Project) located in Raynham, MA and Taunton, MA.

As proposed, the Project generally consists of bridge replacement, roadway paving, and new sidewalk, as more fully described in Section 4. The purpose of this project is to replace a structurally deficient bridge as well as improving safety for vehicles, cyclists, and pedestrians.

The project area is an approximately 0.14-mile-long section of a roadway which is identified as Old Colony Ave within the City of Taunton and South Street East within the Town of Raynham. Old Colony Ave crosses over the Taunton River and the work includes temporary and permanent work within the river's footprint. The project also includes portions of Sandy Hill Road, an intersecting side street, and the Riverbend Condominiums driveway.

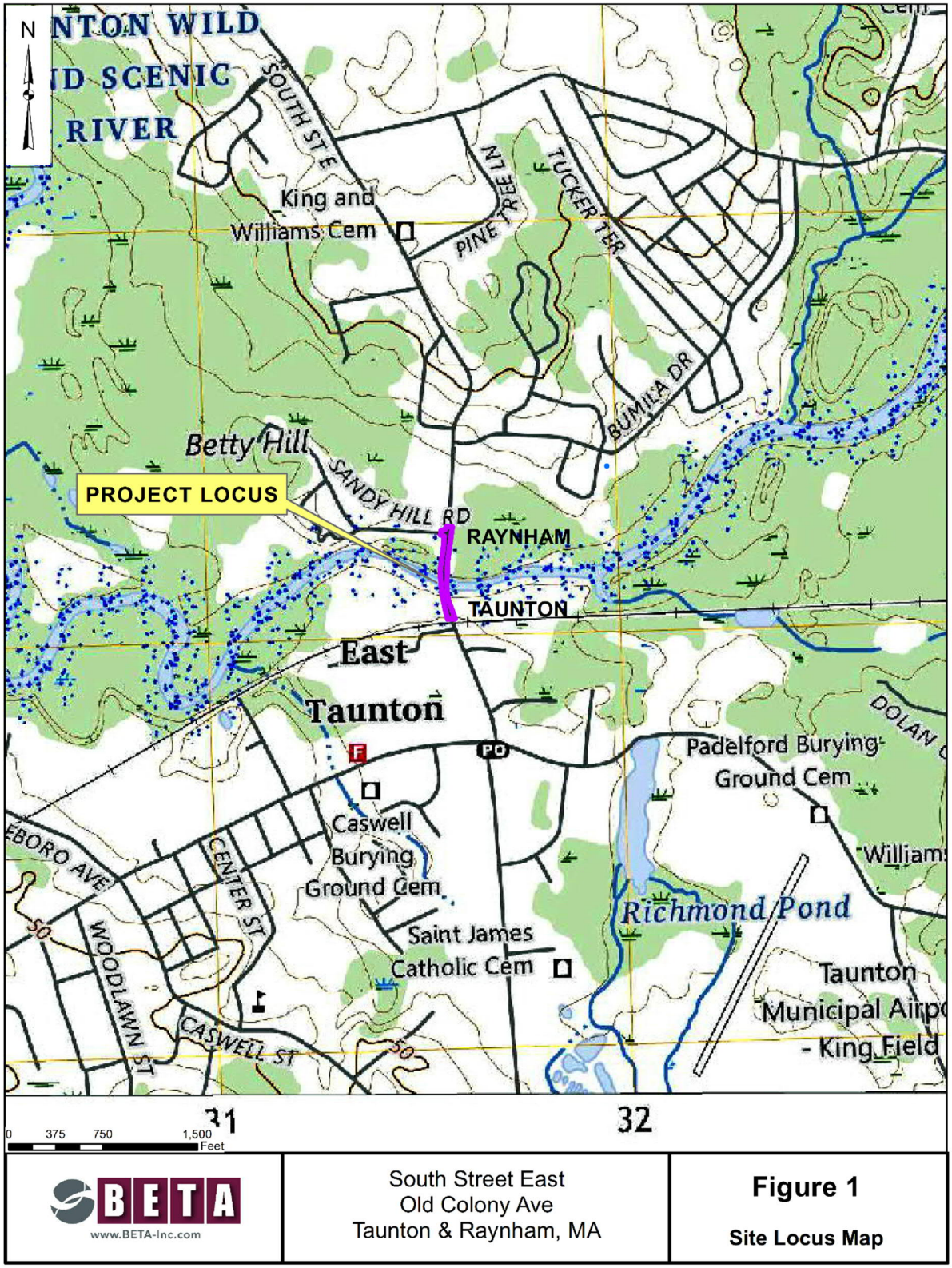
Land use on surrounding lots includes the River Bend Condominiums, several commercial properties, a pump station, a single family residence, and woodlands.

Wetland resource areas are located in proximity to the project area, notably including the Taunton River. Refer to Notice of Intent narrative for a summary of project compliance. The project is not considered a Land Use with Higher Potential Pollutant Loads (LUHPPL) and the project is not located within or near to a Zone II or Interim Wellhead Protection Area, any other critical areas, or a NHESP-mapped habitat.

This stormwater analysis has been prepared to support a bridge replacement and roadway reconstruction project and associated stormwater management measures, as more fully described in Section 3.0. A total disturbance of approximately 1.05± Acres is anticipated as a result of the proposed work.

See Figure 1 for the Project Locus Map.

Figure 1 Locus Figure



3

Existing Conditions

The project includes Old Colony Ave / South Street East, a two-lane, two-way Urban Collector roadway. A bridge carries Old Colony Avenue over the Taunton River. Within the project area, the width of the roadway generally varies from 27 to 35 feet, with one lane in each direction. A short sidewalk segment is provided on the north side of the road near Riverbend Condominiums and along the south side of the bridge. Otherwise, the roadway is bordered by grass or driveways. Granite curb is provided along the north side of the roadway and along the bridge; otherwise, no edge treatment is provided.

The project corridor generally consists of an impervious roadway and pervious grass/woodland side areas or impervious driveways. Topography is generally directed away from the roadway and towards the Taunton River, and the roadway is crowned throughout the entire project limits.

Resource Areas of Interest

Wetland resource areas are located (within or in proximity to) the project area. Refer to Notice of Intent narrative for a thorough description of these areas and a summary of project compliance. Notably, the project crosses over the Taunton River, which flows east to west. A stream is located in the northwestern portion of the project.

The project is located In the IWP Priority #2: Taunton Watershed. Waterbodies located immediately downgradient of the Site include the Taunton River, a Category 5 water, which is impaired for Dissolved Oxygen, Enterococcus, and E. Coli. The Taunton River eventually discharges to Mt. Hope Bay. Refer to Section 5 for discussion of impairments and TMDLs.

Existing Stormwater Characteristics

Topography in areas adjacent to the roadway is generally directed away from the roadway. Existing closed drainage systems are present along the roadway which convey stormwater runoff to two outfalls, one of which discharges to the Taunton River and one of which discharges to a stream. As no formal edge treatment is provided on the southern side of South Street East, stormwater runoff from this portion of the Site can flow overland into an area of woodlands.

Refer to the watershed plans in Appendix F for detailed delineation of pre-development flow patterns and watershed boundaries. Refer to Appendix D for hydrologic calculations relating to existing conditions.

Table 1 presents the existing drainage areas and their characteristics. See Figure 2 for existing drainages areas and existing SCMs by design point.

Table 1 Existing Drainage Areas

Drainage Area	Design Point	Area (acres)	Curve Number
Ex-1E	DP-1L	0.576	82
Ex-2E	DP-2L	0.395	81
Ex-3E	DP-3L	0.400	74

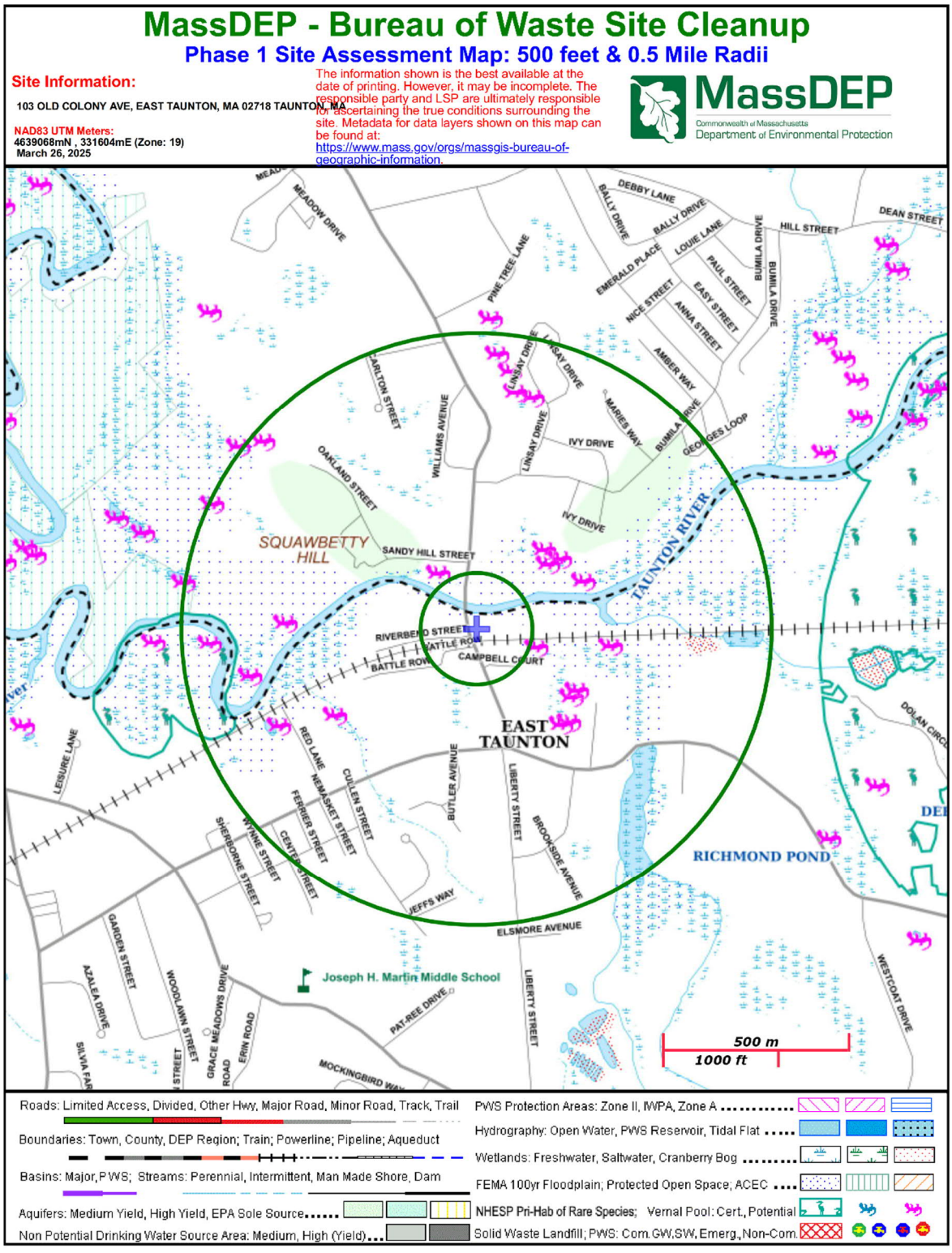
Key features in and around the project area include the Taunton River and associated riverfront area, a stream, and vegetated wetlands, as shown on Figure 2.

The Project is partially located within the 100-year floodplain as shown on FEMA map panel 25005C0169G eff. 7/16/2015. A FEMA flood map is included in Appendix B. 100-year flood areas included a Zone AE Floodway coincident with the Taunton River (Elev. 15 ft.) and a Zone AE (Elev. 15 ft.). Refer to the Notice of Intent for an evaluation of impact to flood zones.

Review of the NRCS Soil Survey map of the project area identified three major soil groups. South Street East is mapped as Unit 651: Udorthents with Hydrologic Soil Group Rating (HSGR) A and Unit 9A: Birdsall silt loam with HSGR C/D. Old Colony Ave is mapped as 602: Urban Land with no assigned HSGR. Additionally, the footprint of the Taunton River is mapped as Unit 1: Water with no assigned HSGR. NRCS soils information is shown on the plans in Appendix F and included in Appendix B.

Figure 2 Existing Key Features and Wetland Resource Areas

MassDEP Phase 1 Site Assessment Map https://maps.massgis.digital.mass.gov/images/dep/mcp/mcp.htm



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4

Proposed Conditions

Scope of Work

The scope of work generally consists of bridge replacement, full depth pavement construction in the vicinity of the bridge, pavement milling and overlay to the north and south of the bridge, modifications to roadway geometry (less than a single lane), construction of a sidewalk, new granite curbing, striping of two travel lanes and a bike lane, new ADA compliant ramps, replacement of guardrail, modifications to water, sewer, gas, electric, and drainage utilities, and restoration of disturbed areas.

Table 2 provides a breakdown of the impervious area for the Project.

Table 2 Impervious Area

Condition	Impervious Area (sq. ft)
Existing	31210
Proposed	31991
Net	781

Proposed Stormwater Management

Stormwater Management will be accomplished through modifications to the existing closed drainage systems. Existing inlets will be replaced, where necessary, with deep-sump catch basins, and additional deep-sump catch basins will be installed to provide more effective stormwater collection and treatment. New curbing is proposed to better direct stormwater runoff to catch basins. The majority of existing trunklines will be retained. The project will retain existing drainage grading patterns to the maximum extent practicable.

The project will retain the existing outfall from the closed drainage system within the Town of Raynham. The project will replace the existing outfall associated with the closed drainage system within the Town of Taunton. The new outfall will be increased in size from 12” to 18” and the existing headwall will be rebuilt at the same location.

The project proposes new stormwater control measures (SCM) including a new infiltration trench. This new practice is proposed within the Town of Raynham near the northeastern limit of work. Stormwater runoff will be directed to this SCM through a new deep sump catch basin which will overflow into the existing closed drainage system.

Additionally, country drainage/pavement disconnection will be implemented for several portions of South Street East by excluding curbing to allow treatment in the grass/woodland area adjacent to the roadway. Of this, approximately 100 ft. of South Street East, on the eastern side of the roadway, drains to an area that meets the definition of qualifying pervious area and is comprised of 1,500 ± sq. ft. of impervious area.

Table 3 presents the proposed drainage areas and their characteristics under proposed conditions. Refer to Appendix F for proposed drainage patterns and drainage area delineations by design point.

Table 3 Proposed Drainage Areas

Drainage Area	Design Point	Area (acres)	Curve Numbers
Pr-10P	DP-1L	0.598	83
Pr-20P/21P	DP-2L	0.410	83
Pr-30P	DP-3L	0.363	71

Project Constraints

The project is constrained by the presence of the Taunton River, presence of wetland resource areas, presence of private commercial and residential features within the Town of Taunton, and conflicts with existing utilities which restrict the opportunity to install substantial Stormwater Control Measures (SCMs). The project is also constrained by minimum required setbacks outlined in the MassDOT Stormwater Design Guide, namely the 10 foot setback to property lines, the 50 foot setback to surface waters, and the 50 foot setback to any slope greater than 15% for infiltration basins. The project area was evaluated for potential locations of SCMs and is summarized on the SCM Analysis Plan located in Appendix G. Despite constraints, the proposed stormwater management systems will provide an improvement to the existing conditions by installing deep sump catch basins and a new infiltration trench. Note the project is considered a redevelopment, as discussed in Section 7.0.

Table 4 lists the proposed SCMs and provides a description of each.

Table 4 Proposed SCMs

SCM	Description
Infiltration Trench	One infiltration trench consisting of a perforated pipe surrounded by crushed stone, located from STA 6+00 RT to STA 6+45 RT. A deep-sump catch basin is provided at STA 5+96 for pretreatment and conveyance to the infiltration trench as well to convey overflow.

LID measures incorporated at the project include the preservation of existing vegetation and maintaining pre-development drainage patterns. The use of country drainage/pavement disconnection is proposed for stormwater runoff from portions of the roadway by directing portions of South Street East to areas of pervious grass/woodlands. The reduction of impervious cover was considered; however, the introduction of new impervious area is required to replace the bridge and extend sidewalks to areas where none currently exist.

5

Impaired Waters and TMDLs

As described under the previous sections, the Project will discharge to the Taunton River, which is impaired based on the MassDEP Year 2023 Integrated List of Waters, also known as the 303(d) list.

Table 5 lists the receiving water bodies that are impaired and if the water body has a TMDL.

Table 5 Impaired Waters and TMDL Information

Water Body	303(d) Category	303(d) Impairments	TMDL	TMDL Pollutant	TMDL Report Name
Taunton River (MA62-01)	5 – Waters Requiring a TMDL	Dissolved Oxygen, Enterococcus, E. Coli	Yes	Pathogens (Fecal coliform, E. Coli, Enterococcus)	Final Pathogen TMDL for the Taunton River Watershed

Note that this segment of the Taunton River is not included in the TMDL. However, the downstream portions of the river are.

As stated in the Final Pathogen TMDL for the Taunton River Watershed, leading sources of bacterial surface water pollution include failing septic systems, combined sewer overflows (CSOs), sanitary sewer overflows (SSOs), sewer pipes connecting to storm drains, certain recreational activities, wildlife, and direct overland stormwater runoff.

The project includes relocation of a portion of the existing sanitary sewer force main. This work will not include any sanitary sewer discharges to the Taunton River. Any sanitary sewer pipes connecting to the storm drain will be eliminated, if identified. See Illicit Discharge Compliance Statement under Standard 10 in Section 6 below. All stormwater runoff discharged from the Site will receive additional treatment via deep sump catch basins, the new infiltration trench, or through country drainage. As a transportation facility, pathogen loads from the roadway surfaces are anticipated to be minimal.

The proposed infiltration trench has been selected for their capability to treat phosphorus, nitrogen, and total suspended solids. A load reduction of 0.03 lb/yr of phosphorus, 0.21 lb/yr of nitrogen, and 29 lb/yr of total suspended solids is anticipated for this SCM, as calculated based on EPA Water Quality Curves in the MassDOT Water Quality Date Form.

See Standard 4 in Section 6 below for more water quality calculations and discussion.

6

Stormwater Management Standards

As demonstrated below, the proposed Project complies with the MassDEP Stormwater Management Standards (the Standards).

The Project is classified as a limited, redevelopment under the first definition “Maintenance and improvement of existing roadways, including widening less than a single lane, adding shoulders, correcting substandard intersections, improving existing drainage systems and repaving.” Work related to the maintenance, repair, and improvement of the bridge is considered a Limited Project.

Standard 1: No New Untreated Discharges

No new stormwater conveyances may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.

The Project has been designed to comply with Standard 1. The project proposes to replace the existing outfall from the City of Taunton closed drainage system. This work will include replacing the existing 12” MTL and 12” CMP outfalls with a new 18” DI outfall at the same location, replacing the existing headwall, and providing stone for pipe ends as stabilization to prevent erosion to the Taunton River. The project proposes to retain the existing outfall from the Town of Raynham closed drainage system.

Appendix C provides supporting calculations for the outlet protection design.

Stormwater runoff will be treated by deep sump catch basins, the infiltration trench, or country drainage before discharging off-site.

See Standard 4 for the water quality treatment provided by the Project.

Standard 2: Peak Rate Attenuation

Stormwater management systems shall be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates. This Standard may be waived for discharges to land subject to coastal storm flowage as defined in 310 CMR 10.04.

The Project has been designed to comply with Standard 2 only to the maximum extent practicable as the project is a limited, redevelopment project. This project reduces post-development peak runoff rates to below pre-development peak runoff rates for DP-2 and DP-3, as well as on a site-wide basis, during the 1-year, 2-year, 10-year, and 100-year 24-hour

design storm events based on NOAA Atlas 14 precipitation data. Minor increases in peak runoff rates are anticipated for DP-1.

Table 6 Rainfall Depths (in)

Design Storm Event	Rainfall Depth (in)
2-year	3.42
10-year	5.08
100-year	7.71

Table 7 provides a summary of peak rates for each design point under existing and proposed conditions. Appendix D provides computations and supporting information regarding the hydrologic modeling.

Table 7 Peak Discharge Rates (cfs)

Design Point	Existing			Proposed		
	2-year	10-year	100-year	2-year	10-year	100-year
DP 1	1.14	2.08	3.61	1.23	2.22	3.81
DP 2	0.74	1.39	2.44	0.67	1.28	2.20
DP 3	0.52	1.11	2.14	0.39	0.90	1.81
Total	2.40	4.58	8.19	2.29	4.41	7.82

The project is unable to fully meet this standard due to constraints at the project site as described previously. This project includes a net increase of 781± sq. ft. of impervious surface, which will result in minor increases to the volume and rate of stormwater runoff from the project area. This increase in impervious area is necessary to provide sidewalks where none currently exist. Despite project constraints and an increase in peak flow rates, the proposed deep-sump catch basins and infiltration trench will improve existing conditions throughout the project corridor. Refer to HydroCAD calculations provided in Appendix D for additional information.

Standard 3: Recharge

Loss of annual recharge to groundwater shall be eliminated or minimized through the use of infiltration measures, including environmentally sensitive site design, low impact development techniques, stormwater best management practices, and good operation and maintenance. At a minimum, the annual recharge from the post-development site shall approximate the annual recharge from pre-development conditions based on soil type. This Standard is met when the stormwater management system is designed to infiltrate the required recharge volume as determined in accordance with the Massachusetts Stormwater Handbook.

The project has been designed to meet this standard on a project-wide basis. The project has significant right-of-way constraints as described previously, which restrict opportunities for recharge on the southern portions of the Site. Despite constraints, the proposed infiltration trench has been designed to provide the sitewide required recharge volume for new and a portion of the existing impervious area.

Table 8 provides the required recharge volume for the Project, and Table 9 provides the recharge volumes proposed for each design point.

Table 8 Required Recharge Volume for Project

	HSG A	HSG B	HSG C	HSG D	Total
Existing Impervious (sq. ft.)	26829		1964	2417	31210
Proposed Impervious (sq. ft.)	27280		2213	2498	31991
Net Impervious Area (sq. ft.)	451		249	81	781
Target depth, F (in)	0.6	0.35	0.25	0.1	-
Required Recharge Volume, ReV (cf)	22.55		5.19	0.68	28.41

Table 9 Provided Recharge Volumes at Each Design Point

	HSG A	HSG B	HSG C	HSG D	Total
DP-1					
Net Impervious Area (sf)	461		5	705	9844
Required Recharge Volume, ReV (cf)	23.05		0.10	5.88	29.03
Provided Recharge Volume (cf)	0		0		0.00
DP-2					
Net Impervious Area (sf)	1583		0	-195	1388
Required Recharge Volume, ReV (cf)	79.15		0.00	-1.63	77.53
Provided Recharge Volume (cf)	81.42		0		81.42
DP-3					
Net Impervious Area (sf)	-1593		244	-429	-1778
Required Recharge Volume, ReV (cf)	-79.65		5.08	-3.58	-78.14
Provided Recharge Volume (cf)	0.00		0		0.00

The infiltration SCM has been designed to drain completely within 72 hours.

Appendix B provides soil evaluation information (including the geotechnical report if applicable), and Appendix C provides computations, drawdown calculations, and supporting information regarding recharge.

Standard 4: Water Quality Treatment

Stormwater management systems shall be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS). This Standard is met when:

- Suitable practices for source control and pollution prevention are identified in a long-term pollution prevention plan, and thereafter are implemented and maintained.
- Structural stormwater best management practices are sized to capture the required water quality volume determined in accordance with the Massachusetts Stormwater Handbook.

› Pretreatment is provided in accordance with the Massachusetts Stormwater Handbook.

The Project has been designed to comply with Standard 4 on a project wide basis. Proposed drainage system improvements, including the installation of deep sump catch basins and an infiltration trench will provide treatment of stormwater runoff that does not currently exist and will improve existing conditions. The proposed project will provide an average TSS removal rate of 20% for 31,991± sq. ft. of impervious surfaces.

Note that the project is located in an area with a rapid infiltration rate (>2.4 in/hr) and the required water quality volume has been calculated based on the 1.0-inch water quality depth.

Table 10 shows the WQV to be treated for both new and existing impervious area within each drainage area, organized by design point.

Table 10 WQV at Each Design Point

Design Point	WQV for New IA (cf)	WQV for Existing IA (cf)	Total WQV (cf)
DP-1			
10P	97.58	722.75	820.33
Total	97.58	722.75	820.33
DP-2			
20P	44.75	1028.50	1073.25
21P	70.92	0.00	70.92
Total	115.67	1028.50	1144.17
DP-3			
30P	-148.17	849.58	701.42
Total	-148.17	849.58	701.42
Project Total	65.08	2600.83	2665.92

Table 11 shows the WQV provided by the SCMs at each design point.

Table 11 WQV Provided by the SCMs at Each Design Point

Design Point	Pretreatment (y/n)	WQV Provided (cf)	Meets Total WQV	Meets Required WQV for New IA
DP-1		0	No	No
DP-2			No	Yes
Linear Infiltration Practice	Y	81.42		
Total	Y	81.42		
DP-3		0	No	No
Project Total			No	Yes

As previously noted, the project is a limited, redevelopment project; therefore, the project is required to meet this standard only to the maximum extent practicable. Opportunities to install treatment and recharge SCMs are limited due to the constraints described previously. Despite project constraints, the proposed deep sump catch basins will improve existing

conditions throughout the project corridor and groundwater recharge will be provided via the new infiltration trench. Refer to Appendix C for calculations relating to TSS Removal. Refer to Illicit Discharge Compliance Statement under Standard 10.

Appendix E includes the Long Term Pollution Prevention Plan for this project.

Standard 5: Land Uses with Higher Potential Pollutant Loads

For Land Uses with Higher Potential Pollutant Loads (LUHPPLs), source control and pollution prevention shall be implemented in accordance with the Massachusetts Stormwater Handbook to eliminate or reduce the discharge of stormwater runoff from such land uses to the maximum extent practicable. If through source control and/or pollution prevention all LHPPLs cannot be completely protected from exposure to rain, snow, snow melt, and stormwater runoff, the proponent shall use the specific structural stormwater BMPs determined by the Department to be suitable for such uses as provided in the Massachusetts Stormwater Handbook. Stormwater discharges from LUHPPLs shall also comply with the requirements of the Massachusetts Clean Waters Act, M.G.L. c. 21, §§ 26-53 and the regulations promulgated thereunder at 314 CMR 3.00, 314 CMR 4.00 and 314 CMR 5.00.

Standard 5 does not apply to the Project. There are no Land Uses with Higher Potential Pollutant Loads within the project area.

Standard 6: Critical Areas

Stormwater discharges within the Zone II or Interim Wellhead Protection Area of a public water supply and stormwater discharges near or to any other critical area require the use of the specific source control and pollution prevention measures and the specific structural stormwater best management practices determined by the Department to be suitable for managing discharges to such areas as provided in the Massachusetts Stormwater Handbook. A discharge is near a critical area if there is a strong likelihood of a significant impact occurring to said area, taking into account site-specific factors. Stormwater discharges to Outstanding Resource Waters and Special Resource Waters shall be removed and set back from the receiving water or wetland and receive the highest and best practical method of treatment. A “stormwater discharge” as defined in 314 CMR 3.04(2)(a)1 or (b), to an Outstanding Resource Water or Special Resource Water shall comply with 314 CMR 3.00 and 314 CMR 4.00. Stormwater discharges to a Zone I or Zone A are prohibited unless essential to the operation of a public water supply.

Standard 6 does not apply to the Project. There are no Critical Areas near the project area.

Standard 7: Redevelopment

A redevelopment project is required to meet the following Stormwater Management Standards only to the maximum extent practicable: Standard 2, Standard 3, and the pretreatment and structural best management practice requirements of Standards 4, 5, and 6. Existing stormwater discharges shall comply with Standard 1 only to the maximum extent practicable. A redevelopment project shall also comply with all other requirements of the Stormwater Management Standards and improve existing conditions.

The Project is a limited, redevelopment project under the first definition: “Maintenance and improvement of existing roadways, including widening less than a single lane, adding shoulders, correcting substandard intersections, improving existing drainage systems and repaving.” Proposed deep sump catch basins and infiltration trench will provide treatment to the maximum extent practicable and represent an improvement to the existing conditions. Standards 1, 8, 9, and 10 are met, Standards 3 and 4 are met on a project wide basis, and Standard 2 is met to the maximum extent practicable. Standards 5 and 6 are not applicable to this project.

Standard 8: Erosion and Sediment Control

A plan to control construction related impacts, including erosion, sedimentation and other pollutant sources during construction and land disturbance activities (construction period erosion, sedimentation, and pollution prevention plan) shall be developed and implemented.

The implementation of erosion and sediment (E&S) controls during construction is considered a standard practice for all projects. E&S controls will be installed before any land disturbance begins for the Project and will remain in place for the duration of the Project. The E&S controls for the Project are shown on the project plans and include perimeter sediment control barrier, inlet protection, tree protection, temporary cofferdam for water control, and dewatering.

The Project disturbs one or more acres of land; therefore, the project contractor will request coverage under the NPDES Construction General Permit (CGP) and develop a Stormwater Pollution Prevention Plan (SWPPP). The SWPPP follows the requirements of this standard and complies with the NPDES CGP.

Standard 9: Operation and Maintenance Plan

A long-term operation and maintenance plan shall be developed and implemented to ensure that stormwater management systems function as designed.

The roadway and bridge included in this project are located in both the City of Taunton and the Toad of Raynham. Ownership is divided between the Town of Taunton and the Town of Raynham. The activities included in the O&M Plan will be implemented by the municipality. Appendix E includes the O&M Plan for this project.

Standard 10: Prohibition of Illicit Discharges

All illicit discharges to the stormwater management system are prohibited.

Illicit Discharge Statement

The project’s stormwater management system, as shown on the plans submitted with this report, have been designed in full compliance with Standard 10. The project area does not have any known illicit connections. Any illicit connections to the stormwater management system found in the project limit of work during construction will be removed and/or resolved through the City of Taunton’s or Town of Raynham’s Illicit Discharge Detention and Elimination (IDDE) Programs. The Long-Term Pollution Prevention Plan, provided in Appendix E, includes measures to prevent illicit discharges.

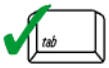
Appendix A: MassDEP Checklist for Stormwater Report

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

A. Introduction

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the Massachusetts Stormwater Handbook. The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.[1] This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8[2]
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

[1] The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

[2] For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.

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Checklist for Stormwater Report

B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature

01/30/26

Signature and Date

Checklist

Project Type: Is the application for new development, redevelopment, or a mix of new and redevelopment?

- ☐ New development
- ☒ Redevelopment
- ☐ Mix of New Development and Redevelopment

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

Checklist (continued)

LID Measures: Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

- ☐ No disturbance to any Wetland Resource Areas
- ☐ Site Design Practices (e.g. clustered development, reduced frontage setbacks)
- ☐ Reduced Impervious Area (Redevelopment Only)
- ☒ Minimizing disturbance to existing trees and shrubs
- ☐ LID Site Design Credit Requested:
  - ☐ Credit 1
  - ☐ Credit 2
  - ☐ Credit 3
- ☒ Use of “country drainage” versus curb and gutter conveyance and pipe
- ☐ Bioretention Cells (includes Rain Gardens)
- ☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)
- ☐ Treebox Filter
- ☐ Water Quality Swale
- ☐ Grass Channel
- ☐ Green Roof
- ☐ Other (describe): _____

Standard 1: No New Untreated Discharges

- ☒ No new untreated discharges
- ☒ Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth
- ☐ Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.

☐ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.

☐ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

☐ Soil Analysis provided.

☒ Required Recharge Volume calculation provided.

☐ Required Recharge volume reduced through use of the LID site Design Credits.

☒ Sizing the infiltration, BMPs is based on the following method: Check the method used.

☒ Static ☐ Simple Dynamic ☐ Dynamic Field[1]

☐ Runoff from all impervious areas at the site discharging to the infiltration BMP.

☐ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.

☒ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.

☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:

- ☐ Site is comprised solely of C and D soils and/or bedrock at the land surface
- ☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
- ☐ Solid Waste Landfill pursuant to 310 CMR 19.000
- ☒ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.

☒ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.

☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

[1] 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

☐ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.

☐ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:

- Good housekeeping practices;
- Provisions for storing materials and waste products inside or under cover;
- Vehicle washing controls;
- Requirements for routine inspections and maintenance of stormwater BMPs;
- Spill prevention and response plans;
- Provisions for maintenance of lawns, gardens, and other landscaped areas;
- Requirements for storage and use of fertilizers, herbicides, and pesticides;
- Pet waste management provisions;
- Provisions for operation and management of septic systems;
- Provisions for solid waste management;
- Snow disposal and plowing plans relative to Wetland Resource Areas;
- Winter Road Salt and/or Sand Use and Storage restrictions;
- Street sweeping schedules;
- Provisions for prevention of illicit discharges to the stormwater management system;
- Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
- Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
- List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.

☒ A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.

☒ Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:

- ☐ is within the Zone II or Interim Wellhead Protection Area
- ☐ is near or to other critical areas
- ☒ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
- ☐ involves runoff from land uses with higher potential pollutant loads.

☐ The Required Water Quality Volume is reduced through use of the LID site Design Credits.

☒ Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

☒ The BMP is sized (and calculations provided) based on:

- ☒ The ½" or 1" Water Quality Volume or
- ☐ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.

☐ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.

☐ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)

☐ The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.

☐ The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted ***prior to*** the discharge of stormwater to the post-construction stormwater BMPs.

☐ The NPDES Multi-Sector General Permit does ***not*** cover the land use.

☐ LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.

☐ All exposure has been eliminated.

☐ All exposure has ***not*** been eliminated and all BMPs selected are on MassDEP LUHPPL list.

☐ The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

☐ The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.

☐ Critical areas and BMPs are identified in the Stormwater Report.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

Checklist (continued)

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

☒ The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:

- ☒ Limited Project
- ☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
- ☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
- ☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
- ☐ Bike Path and/or Foot Path
- ☒ Redevelopment Project
- ☐ Redevelopment portion of mix of new and redevelopment.

☒ Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.

☐ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
- Construction Period Operation and Maintenance Plan;
- Names of Persons or Entity Responsible for Plan Compliance;
- Construction Period Pollution Prevention Measures;
- Erosion and Sedimentation Control Plan Drawings;
- Detail drawings and specifications for erosion control BMPs, including sizing calculations;
- Vegetation Planning;
- Site Development Plan;
- Construction Sequencing Plan;
- Sequencing of Erosion and Sedimentation Controls;
- Operation and Maintenance of Erosion and Sedimentation Controls;
- Inspection Schedule;
- Maintenance Schedule;
- Inspection and Maintenance Log Form.

☐ A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

Checklist (continued)

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

☐ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has ***not*** been included in the Stormwater Report but will be submitted ***before*** land disturbance begins.

☐ The project is ***not*** covered by a NPDES Construction General Permit.

☐ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.

☒ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

☒ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:

- ☒ Name of the stormwater management system owners;
- ☒ Party responsible for operation and maintenance;
- ☒ Schedule for implementation of routine and non-routine maintenance tasks;
- ☒ Plan showing the location of all stormwater BMPs maintenance access areas;
- ☒ Description and delineation of public safety features;
- ☒ Estimated operation and maintenance budget; and
- ☒ Operation and Maintenance Log Form.

☐ The responsible party is ***not*** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:

- ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
- ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

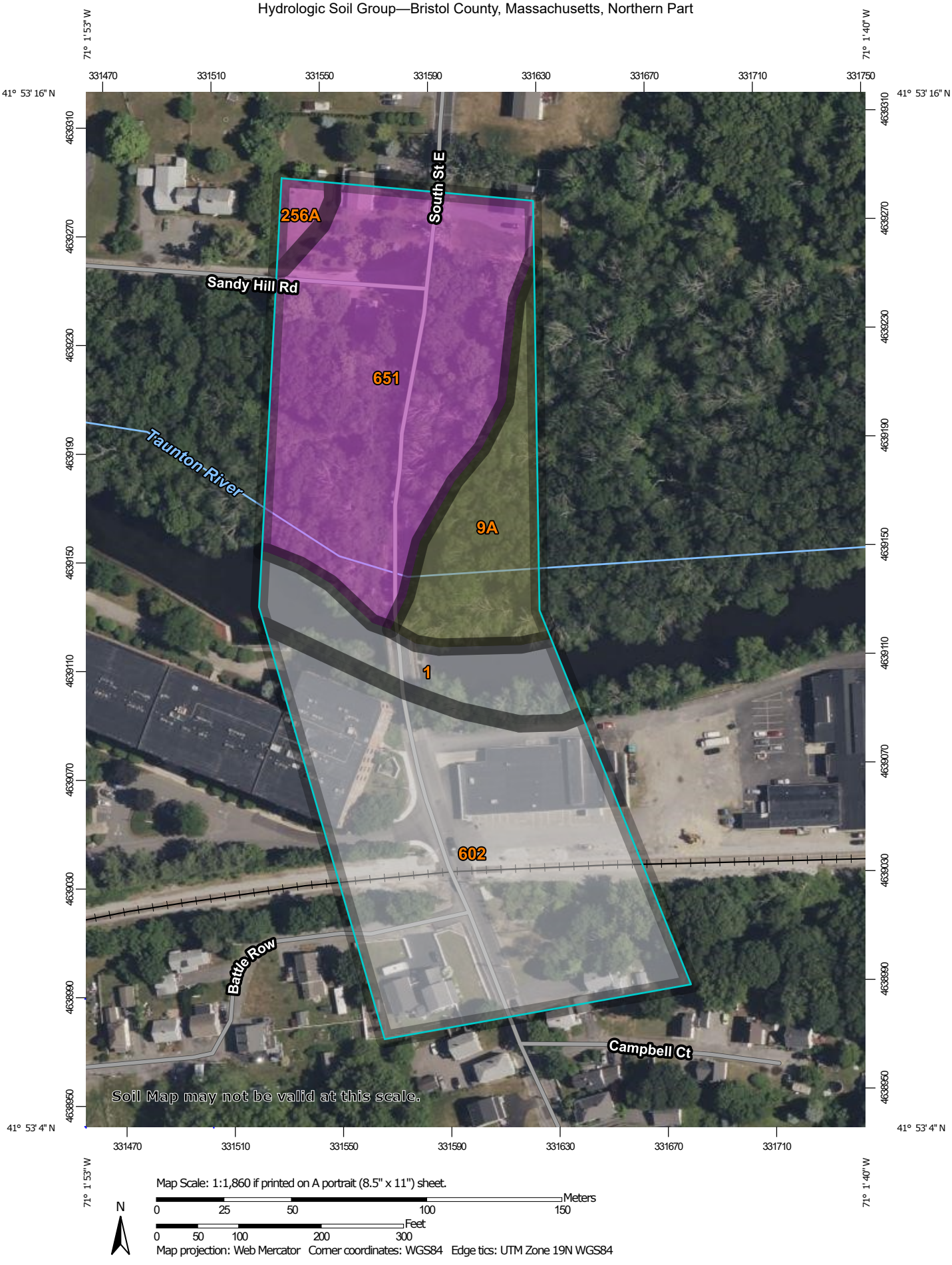
☒ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;

☒ An Illicit Discharge Compliance Statement is attached;

☐ NO Illicit Discharge Compliance Statement is attached but will be submitted ***prior to*** the discharge of any stormwater to post-construction BMPs.

Appendix B: Soils and FEMA Information

Hydrologic Soil Group—Bristol County, Massachusetts, Northern Part



Hydrologic Soil Group—Bristol County, Massachusetts, Northern Part

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Bristol County, Massachusetts, Northern Part
Survey Area Data: Version 17, Aug 27, 2024

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 14, 2022—Jul 1, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
1	Water		0.7	9.0%
9A	Birdsall silt loam, 0 to 3 percent slopes	C/D	0.9	11.6%
256A	Deerfield loamy fine sand, 0 to 3 percent slopes	A	0.1	1.4%
602	Urban land		3.3	42.2%
651	Udorthents, smoothed	A	2.8	35.8%
Totals for Area of Interest			**7.9**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

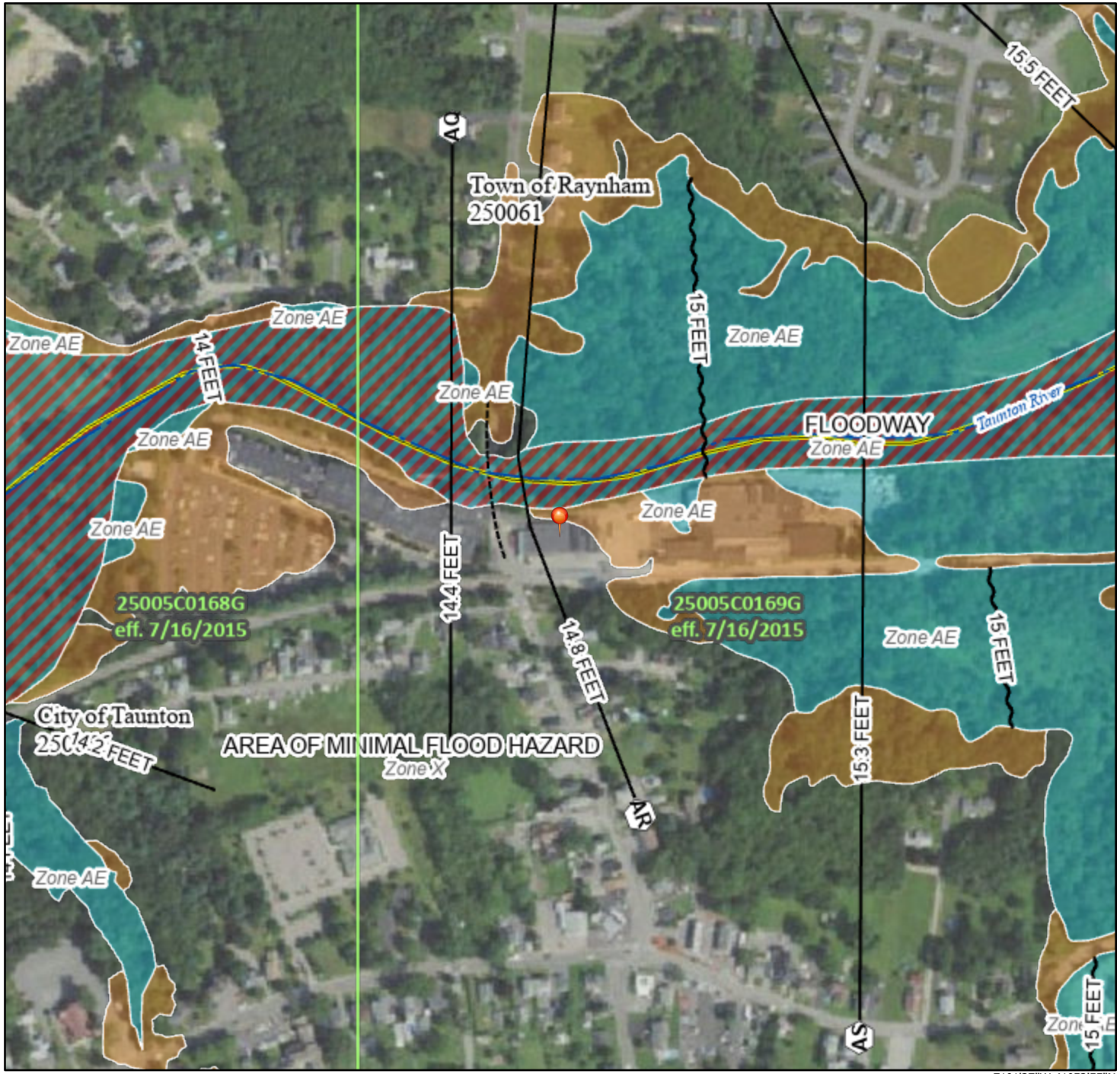
Tie-break Rule: Higher

Proposal No. 613642 - 136413

National Flood Hazard Layer FIRMette

FEMA

71°2'4"W 41°53'22"N



71°1'27"W 41°52'55"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

A00840 - 125

Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 3/26/2025 at 11:50 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Appendix C: Supporting Calculations

PROJECT NAME:	**South Street East / Old Colony Ave**	PROJ NO.	**10887**
DESCRIPTION:	**Standards 3 & 4 Worksheet**	DATE	**01/30/26**
CALCULATED BY:	**SLB**	SHEET	**1**

Recharge Volume (Rv) and Water Quality Volume (WQv)
Provided Volumes Worksheet

Calculation of Required Recharge Volume

	Soil Group	Impervious Area (Sq. Ft.)	Runoff Depth (In.)	Recharge Volume (Cu. Ft.)
Pre-Development	Total	**31210**		
	HSG A	26829		
	HSG C	1964		
	HSG D	2417		
Post-Development	Total	**31991**		**1430.92**
	HSG A	27280	0.60	1364.00
	HSG C	2213	0.25	46.10
	HSG D	2498	0.10	20.82
Net Change	Total	**781**		**28.41**
	HSG A	451	0.60	22.55
	HSG C	249	0.25	5.19
	HSG D	81	0.10	0.68

Recharge Volume (R_V) Required = Impervious Area x Runoff Depth (from HSG)

Total Recharge Volume Required: **28 CF**

Total Recharge Volume Provided: **81 CF**

Calculation of Required Water Quality Volume

	Impervious Area (Sq. Ft.)	Runoff Depth (In.)	Water Quality Volume (Cu. Ft.)
Total Impervious Area	31991	1.0	2666
Net New Impervious Area Only	781	1.0	**65**

Water Quality Volume (WQ_V) Required = Impervious Area x Runoff Depth (0.5" or 1.0" Depth)

Total Water Quality Volume Provided: **81 CF**

PROJECT NAME:	**South Street East / Old Colony Ave**	PROJ NO.	**10887**
DESCRIPTION:	**Standards 3 & 4 Worksheet**	DATE	**01/30/26**
CALCULATED BY:	**SLB**	SHEET	**2**

Total Suspended Solids (TSS)
Provided Treatment Worksheet

Treatment Train	A: Total Removal Rate (%)	B: Total Treatment Area (Sq. Ft.)	C: A x B (Sq. Ft.)
No Treatment (30P)	0%	8417	0
Deep Sump Catch Basins (10P, 20P)	25%	22723	5681
Treatment Train - Infiltration Trench (21P)	80%	851	681
Totals:		31,991 SF	6,362 SF

Total Sitewide TSS Removal (C / B) 20%
Total of Column C divided by Total of Column B

Equivalent Area for 80% TSS Removal **7,952 SF**
Total of Column B x total TSS Rate divided by 80%

Proposed New Impervious Area: **781 SF**

PROJECT NAME:	**South Street East / Old Colony Ave**	PROJ NO.	**10887**
DESCRIPTION:	**Standards 3 & 4 Worksheet**	DATE	**01/30/26**
CALCULATED BY:	**SLB**	SHEET	**3**

Infiltration Trench
Provided Volumes & TSS Worksheet

Total Storage

Storage Within Basins	Length (Ft.)	Width (Ft.)	Depth (Ft.)	Volume - Perforated Pipe (Cu. Ft.)	Volume Stone (40% Voids) (Cu. Ft.)	Total Volume Provided (Cu. Ft.)
Infiltration Trench	45	2	2.00	15.7	65.7	81

Total Storage Volume Provided: **81 CF**

TSS Removal

Best Management Practice (BMP)	SCM Removal Rate (%)	Remaining TSS (%)	Cumulative Removal Rate (%)
Sediment Forebay (Pretreatment)	25%	75%	25%
Total Pretreatment Provided:			**25%**
Infiltration Trench	80%	20%	**80%**

Drawdown Calculations

BMP: **Infiltration Trench**

Rv (cu. ft.) =	81	Drawdown (hrs) =	**10.6**
K (in/hr) =	1.02		
Bottom Area (sq. ft.)	90	Less than 72 hrs?	**PASS**

**The hydraulic conductivity rate is based on Rawls Rate for Sandy Loam

PROJECT NAME: **South Street East / Old Colony Ave** PROJ NO. 10887
DESCRIPTION: **Standards 3 & 4 Worksheet** DATE 01/28/26
CALCULATED BY: **SLB** SHEET 1

Riprap Stone Size

$D_{50} = 0.2D(Q/(g)^{1/2}(D)^{2.5})^{4/3}(D/TW)$

D_{50} = riprap size (ft)
Q = design discharge (cfs) (10-year)
D = pipe diameter (ft)
TW = tailwater (ft) if unknown use 0.4D
g = acceleration due to gravity (32.2 ft/s^2)

Outfall No.	Q (cfs)	D (ft)	TW (ft)	$D^{2.5}$	D/TW	$g^{1/2}$	D_{50} (ft)
HW-1	16.14	1.5	0.6	2.76	2.5	5.67	**0.31**

*Flow rate is based on pipe flowing full

Riprap Parameters

Apply 1.5 Safety Factor to D50
Depth = 3.3*D50
Length = 4*D
Width (at pipe) = 3 * D
Width (Apron End) = 3 * D + 2/3 * Length

Outfall No.	1.5*D_{50} (in)	Approx. Weight (lb)	Minimum Dimensions			
			Depth (in)	Length (ft)	Width 1 (ft)	Width 2 (ft)
HW-1	5.57	37.73	18.39	6.00	4.50	8.50

Calculation Equations taken from:
HEC14 - Hydraulic Design for Energy Dissipators for Culverts and Channels
Equation 10.4

Proposal No. 613642 - 136413

NOAA Atlas 14, Volume 10, Version 3
Location name: East Taunton, Massachusetts, USA*
Latitude: 41.8856°, Longitude: -71.0294°
Elevation: 19 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.299** (0.240-0.369)	**0.372** (0.299-0.460)	**0.492** (0.394-0.610)	**0.592** (0.470-0.736)	**0.729** (0.559-0.945)	**0.831** (0.623-1.10)	**0.940** (0.685-1.29)	**1.07** (0.726-1.48)	**1.27** (0.824-1.80)	**1.44** (0.909-2.07)
10-min	**0.423** (0.340-0.522)	**0.527** (0.423-0.651)	**0.697** (0.558-0.864)	**0.839** (0.666-1.04)	**1.03** (0.792-1.34)	**1.18** (0.883-1.56)	**1.33** (0.970-1.82)	**1.52** (1.03-2.09)	**1.80** (1.17-2.55)	**2.03** (1.29-2.93)
15-min	**0.498** (0.400-0.614)	**0.620** (0.498-0.766)	**0.820** (0.656-1.02)	**0.986** (0.784-1.23)	**1.22** (0.932-1.58)	**1.38** (1.04-1.83)	**1.57** (1.14-2.15)	**1.78** (1.21-2.46)	**2.11** (1.37-3.00)	**2.39** (1.52-3.45)
30-min	**0.703** (0.565-0.868)	**0.876** (0.704-1.08)	**1.16** (0.928-1.44)	**1.39** (1.11-1.74)	**1.72** (1.32-2.23)	**1.96** (1.47-2.59)	**2.22** (1.61-3.04)	**2.53** (1.71-3.48)	**2.99** (1.94-4.24)	**3.38** (2.14-4.88)
60-min	**0.908** (0.730-1.12)	**1.13** (0.909-1.40)	**1.50** (1.20-1.86)	**1.80** (1.43-2.24)	**2.22** (1.70-2.88)	**2.53** (1.90-3.35)	**2.87** (2.09-3.92)	**3.26** (2.22-4.50)	**3.87** (2.51-5.48)	**4.38** (2.77-6.30)
2-hr	**1.16** (0.944-1.43)	**1.47** (1.19-1.80)	**1.98** (1.60-2.43)	**2.40** (1.92-2.96)	**2.97** (2.30-3.83)	**3.40** (2.58-4.46)	**3.86** (2.84-5.26)	**4.42** (3.03-6.03)	**5.28** (3.47-7.41)	**6.02** (3.86-8.58)
3-hr	**1.36** (1.10-1.65)	**1.71** (1.39-2.09)	**2.30** (1.86-2.81)	**2.78** (2.24-3.42)	**3.45** (2.69-4.43)	**3.95** (3.01-5.16)	**4.48** (3.32-6.08)	**5.14** (3.54-6.97)	**6.14** (4.06-8.56)	**7.00** (4.51-9.91)
6-hr	**1.78** (1.46-2.16)	**2.22** (1.82-2.68)	**2.92** (2.38-3.54)	**3.51** (2.84-4.27)	**4.31** (3.38-5.47)	**4.91** (3.77-6.34)	**5.55** (4.14-7.42)	**6.32** (4.40-8.48)	**7.48** (5.00-10.3)	**8.46** (5.52-11.8)
12-hr	**2.34** (1.94-2.81)	**2.83** (2.34-3.40)	**3.62** (2.98-4.36)	**4.28** (3.50-5.17)	**5.18** (4.09-6.49)	**5.86** (4.53-7.46)	**6.57** (4.92-8.63)	**7.39** (5.21-9.81)	**8.59** (5.81-11.7)	**9.58** (6.32-13.3)
24-hr	**2.86** (2.39-3.41)	**3.42** (2.85-4.07)	**4.33** (3.59-5.17)	**5.08** (4.19-6.09)	**6.12** (4.87-7.58)	**6.90** (5.37-8.68)	**7.71** (5.82-9.99)	**8.63** (6.16-11.3)	**9.94** (6.81-13.4)	**11.0** (7.35-15.1)
2-day	**3.25** (2.73-3.84)	**3.91** (3.28-4.62)	**4.99** (4.18-5.91)	**5.89** (4.90-7.00)	**7.12** (5.73-8.76)	**8.05** (6.33-10.1)	**9.02** (6.89-11.6)	**10.1** (7.31-13.2)	**11.8** (8.14-15.7)	**13.1** (8.85-17.7)
3-day	**3.54** (2.99-4.16)	**4.24** (3.58-4.99)	**5.39** (4.53-6.35)	**6.34** (5.30-7.51)	**7.65** (6.19-9.36)	**8.64** (6.84-10.7)	**9.68** (7.44-12.4)	**10.9** (7.88-14.0)	**12.6** (8.77-16.7)	**14.0** (9.53-18.8)
4-day	**3.80** (3.22-4.46)	**4.53** (3.83-5.31)	**5.71** (4.81-6.70)	**6.69** (5.61-7.89)	**8.04** (6.52-9.79)	**9.05** (7.19-11.2)	**10.1** (7.80-12.9)	**11.3** (8.25-14.6)	**13.1** (9.15-17.2)	**14.5** (9.91-19.4)
7-day	**4.53** (3.86-5.27)	**5.28** (4.50-6.16)	**6.52** (5.53-7.61)	**7.55** (6.37-8.84)	**8.96** (7.31-10.8)	**10.0** (8.01-12.3)	**11.1** (8.62-14.0)	**12.3** (9.08-15.7)	**14.1** (9.94-18.3)	**15.4** (10.6-20.4)
10-day	**5.23** (4.48-6.06)	**6.01** (5.14-6.96)	**7.28** (6.20-8.46)	**8.34** (7.07-9.72)	**9.79** (8.02-11.7)	**10.9** (8.74-13.2)	**12.0** (9.34-14.9)	**13.2** (9.80-16.8)	**14.9** (10.6-19.3)	**16.2** (11.2-21.3)
20-day	**7.33** (6.33-8.43)	**8.18** (7.05-9.41)	**9.56** (8.22-11.0)	**10.7** (9.15-12.4)	**12.3** (10.1-14.5)	**13.5** (10.9-16.2)	**14.7** (11.5-17.9)	**15.9** (11.9-19.9)	**17.4** (12.6-22.3)	**18.5** (13.0-24.0)
30-day	**9.08** (7.88-10.4)	**9.98** (8.65-11.4)	**11.5** (9.90-13.1)	**12.7** (10.9-14.6)	**14.4** (11.9-16.9)	**15.7** (12.7-18.6)	**17.0** (13.3-20.5)	**18.1** (13.7-22.5)	**19.6** (14.2-24.9)	**20.5** (14.6-26.5)
45-day	**11.2** (9.80-12.8)	**12.2** (10.6-13.9)	**13.8** (12.0-15.8)	**15.1** (13.1-17.3)	**17.0** (14.2-19.8)	**18.4** (15.0-21.7)	**19.8** (15.5-23.6)	**21.0** (16.0-25.9)	**22.4** (16.4-28.2)	**23.2** (16.6-29.8)
60-day	**13.0** (11.4-14.8)	**14.1** (12.3-16.0)	**15.8** (13.8-18.0)	**17.2** (14.9-19.6)	**19.2** (16.0-22.2)	**20.7** (16.9-24.3)	**22.2** (17.4-26.3)	**23.4** (17.9-28.7)	**24.8** (18.2-31.1)	**25.6** (18.4-32.6)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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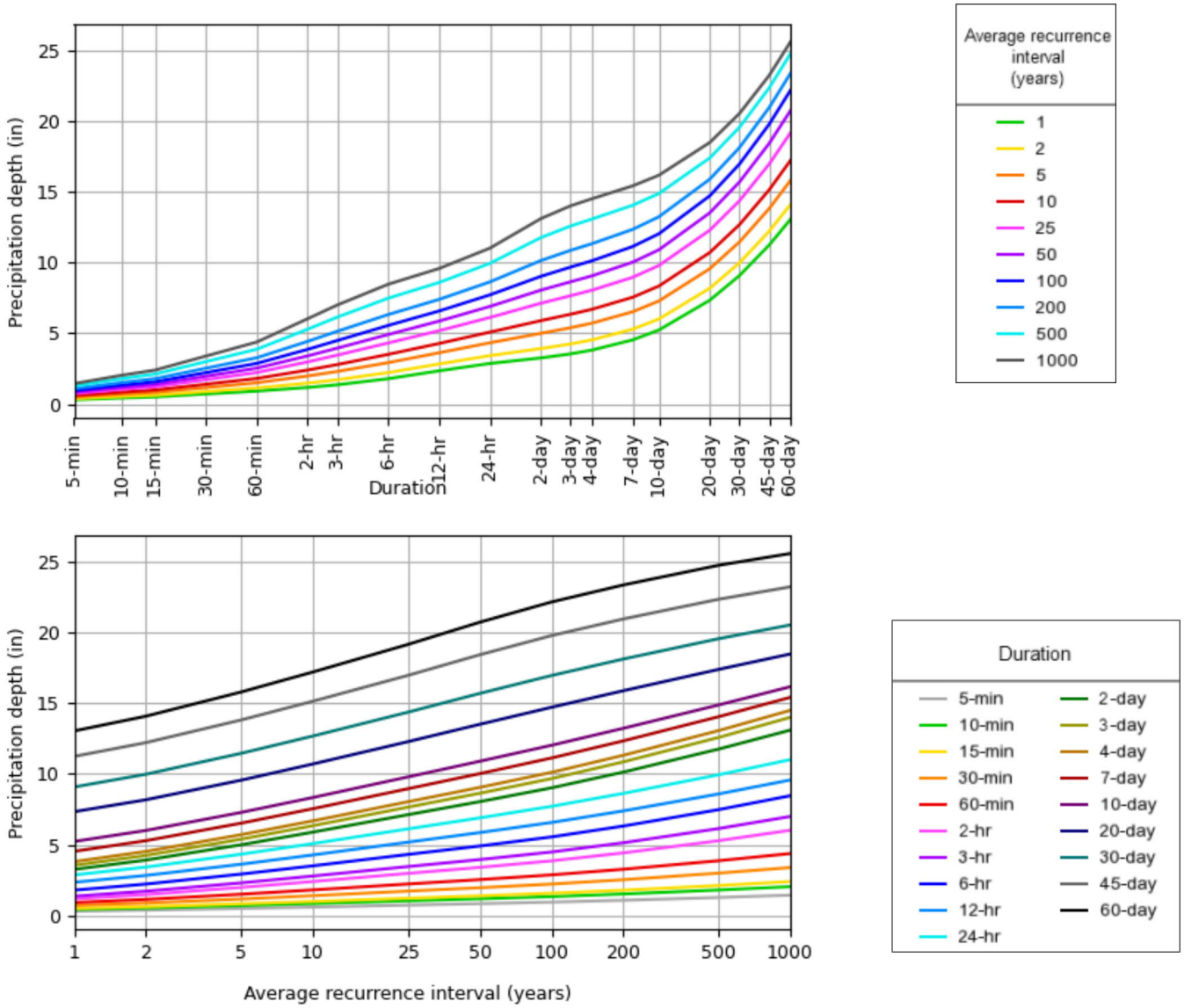
PF graphical

PDS-based depth-duration-frequency (DDF) curves
Latitude: 41.8856°, Longitude: -71.0294°



NOAA Atlas 14, Volume 10, Version 3

Created (GMT): Tue Aug 19 17:43:51 2025

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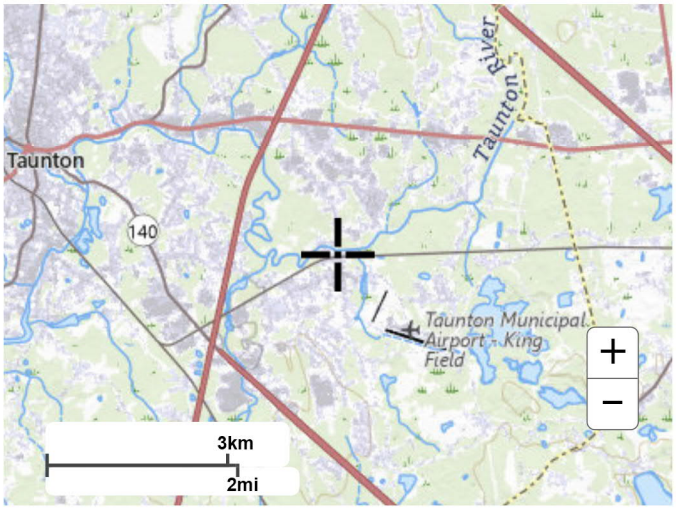
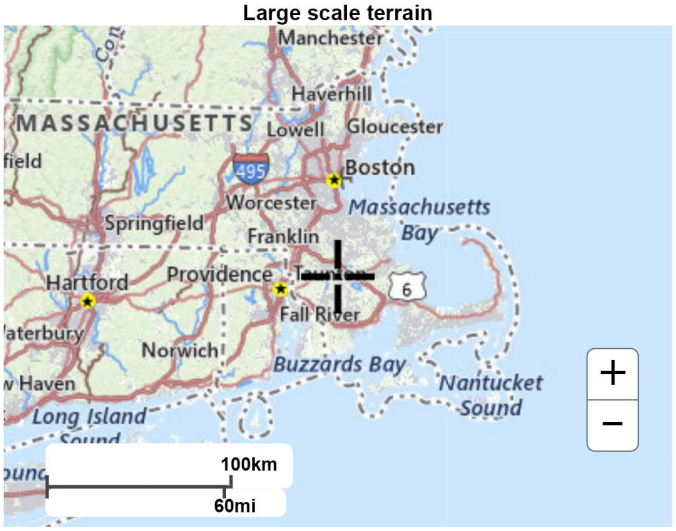
Maps & aerials

Small scale terrain

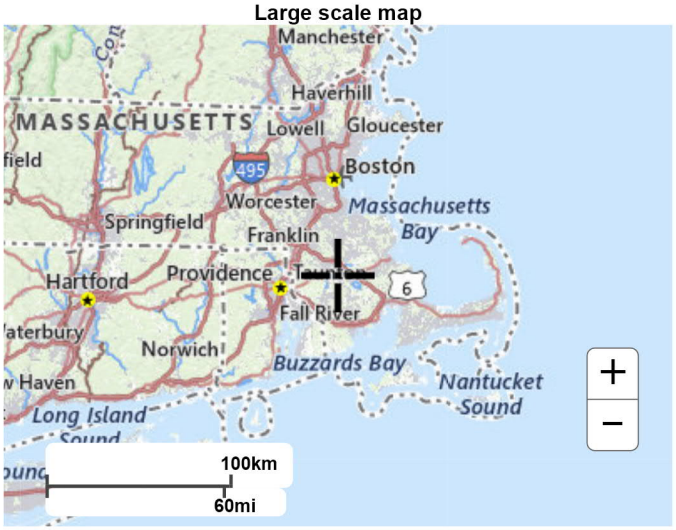
Proposal No. 613642 - 136413



Large scale terrain



Large scale map



Large scale aerial

Proposal No. 613642 - 136413

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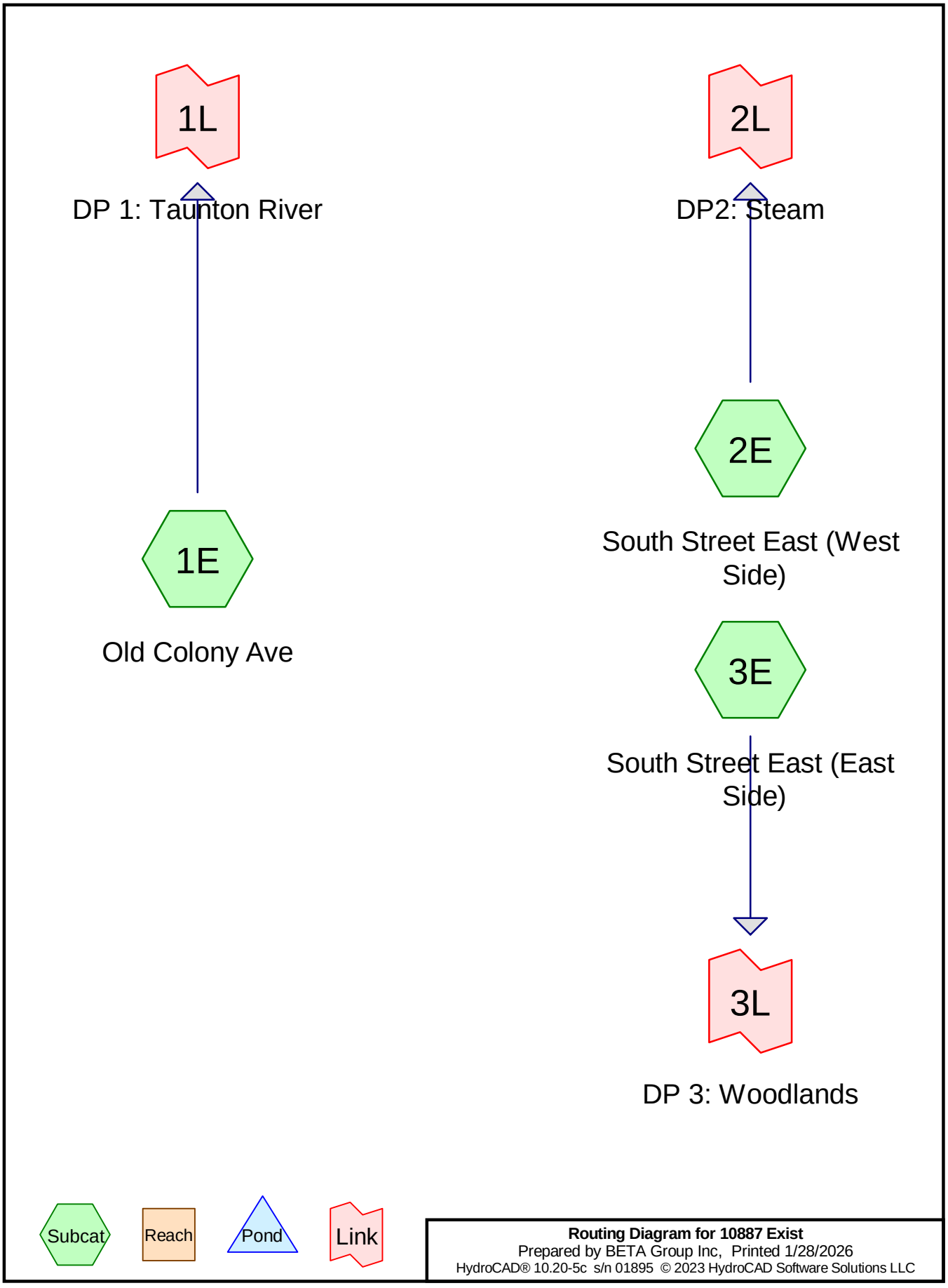
US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

Appendix D: Hydrologic Data


1L
DP 1: Taunton River
2L
DP2: Steam
2E
South Street East (West Side)
1E
Old Colony Ave
3E
South Street East (East Side)
3L
DP 3: Woodlands
Subcat
Reach
Pond
Link
Routing Diagram for 10887 Exist
Prepared by BETA Group Inc, Printed 1/28/2026
HydroCAD® 10.20-5c s/n 01895 © 2023 HydroCAD Software Solutions LLC

Summary for Subcatchment 1E: Old Colony Ave

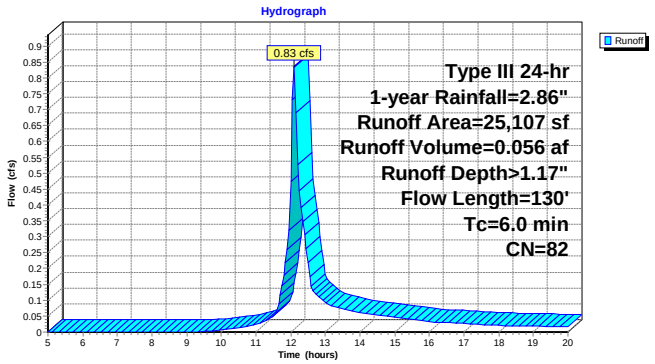
Runoff = 0.83 cfs @ 12.10 hrs, Volume= 0.056 af, Depth> 1.17"
Routed to Link 1L : DP 1: Taunton River

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-year Rainfall=2.86"

Area (sf)	CN	Description
3,592	39	>75% Grass cover, Good, HSG A
788	74	>75% Grass cover, Good, HSG C
145	80	>75% Grass cover, Good, HSG D
8,643	98	Paved roads w/curbs & sewers, HSG A
26	98	Paved roads w/curbs & sewers, HSG C
4	98	Paved roads w/curbs & sewers, HSG D
1,602	98	Water Surface, HSG A
915	98	Water Surface, HSG C
6,901	98	Water Surface, HSG D
2,491	30	Woods, Good, HSG A
25,107	82	Weighted Average
7,016		27.95% Pervious Area
18,091		72.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0340	1.53		**Sheet Flow, Sheet Flow** Smooth surfaces n= 0.011 P2= 3.42"
0.6	80	0.0130	2.31		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
1.1	130	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 1E: Old Colony Ave



Summary for Subcatchment 2E: South Street East (West Side)

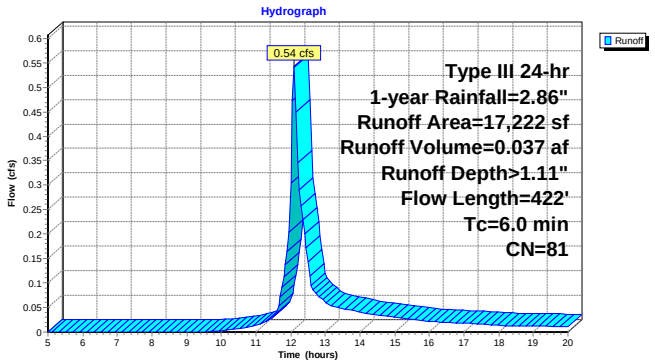
Runoff = 0.54 cfs @ 12.10 hrs, Volume= 0.037 af, Depth> 1.11"
Routed to Link 2L : DP2: Steam

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-year Rainfall=2.86"

Area (sf)	CN	Description
4,102	39	>75% Grass cover, Good, HSG A
0	80	>75% Grass cover, Good, HSG D
530	96	Gravel surface, HSG A
10,287	98	Paved roads w/curbs & sewers, HSG A
165	98	Paved roads w/curbs & sewers, HSG C
1,280	98	Paved roads w/curbs & sewers, HSG D
0	98	Water Surface, HSG A
1	98	Water Surface, HSG D
857	30	Woods, Good, HSG A
17,222	81	Weighted Average
5,489		31.87% Pervious Area
11,733		68.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	50	0.0070	0.81		**Sheet Flow, SF1** Smooth surfaces n= 0.011 P2= 3.42"
3.2	372	0.0090	1.93		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
4.2	422	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2E: South Street East (West Side)



Summary for Subcatchment 3E: South Street East (East Side)

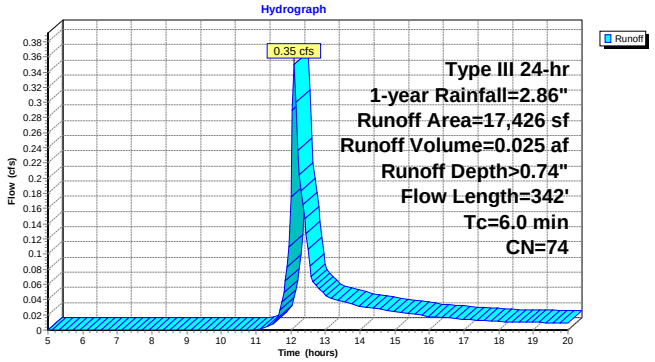
Runoff = 0.35 cfs @ 12.10 hrs, Volume= 0.025 af, Depth> 0.74"
Routed to Link 3L : DP 3: Woodlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-year Rainfall=2.86"

Area (sf)	CN	Description
3,738	39	>75% Grass cover, Good, HSG A
1,102	74	>75% Grass cover, Good, HSG C
0	80	>75% Grass cover, Good, HSG D
2,356	96	Gravel surface, HSG A
387	96	Gravel surface, HSG C
4,933	98	Paved roads w/curbs & sewers, HSG A
1,386	98	Paved roads w/curbs & sewers, HSG C
1,133	98	Paved roads w/curbs & sewers, HSG D
1	98	Water Surface, HSG A
3	98	Water Surface, HSG D
2,387	30	Woods, Good, HSG A
17,426	74	Weighted Average
9,970		57.21% Pervious Area
7,456		42.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	50	0.0070	0.81		**Sheet Flow, SF1** Smooth surfaces n= 0.011 P2= 3.42"
2.5	292	0.0090	1.93		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
3.5	342	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 3E: South Street East (East Side)

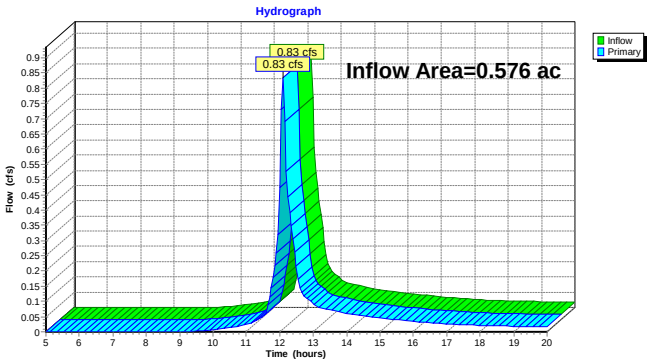


Summary for Link 1L: DP 1: Taunton River

Inflow Area = 0.576 ac, 72.05% Impervious, Inflow Depth > 1.17" for 1-year event
Inflow = 0.83 cfs @ 12.10 hrs, Volume= 0.056 af
Primary = 0.83 cfs @ 12.10 hrs, Volume= 0.056 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 1L: DP 1: Taunton River

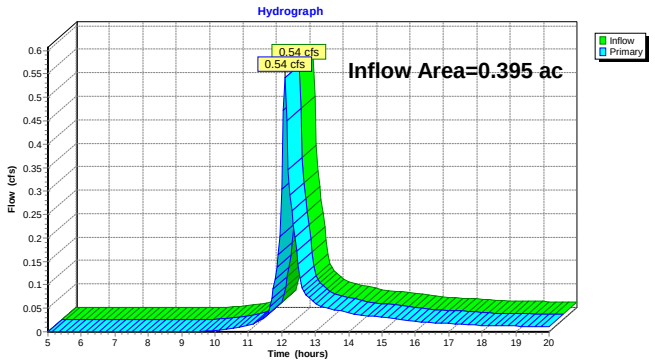


Summary for Link 2L: DP2: Steam

Inflow Area = 0.395 ac, 68.13% Impervious, Inflow Depth > 1.11" for 1-year event
Inflow = 0.54 cfs @ 12.10 hrs, Volume= 0.037 af
Primary = 0.54 cfs @ 12.10 hrs, Volume= 0.037 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 2L: DP2: Steam

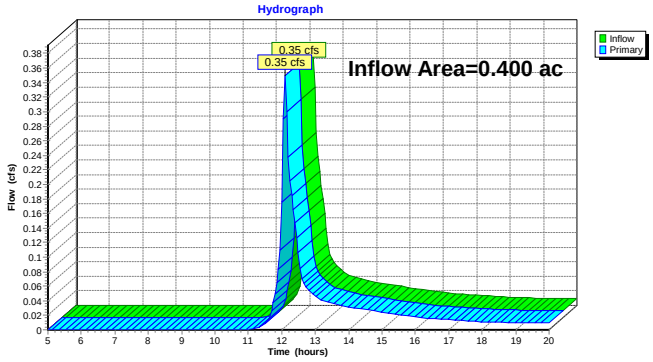


Summary for Link 3L: DP 3: Woodlands

Inflow Area = 0.400 ac, 42.79% Impervious, Inflow Depth > 0.74" for 1-year event
Inflow = 0.35 cfs @ 12.10 hrs, Volume= 0.025 af
Primary = 0.35 cfs @ 12.10 hrs, Volume= 0.025 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 3L: DP 3: Woodlands



Summary for Subcatchment 1E: Old Colony Ave

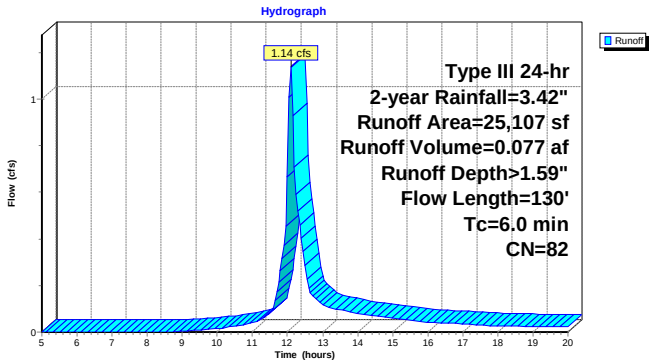
Runoff = 1.14 cfs @ 12.09 hrs, Volume= 0.077 af, Depth> 1.59"
Routed to Link 1L : DP 1: Taunton River

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.42"

Area (sf)	CN	Description
3,592	39	>75% Grass cover, Good, HSG A
788	74	>75% Grass cover, Good, HSG C
145	80	>75% Grass cover, Good, HSG D
8,643	98	Paved roads w/curbs & sewers, HSG A
26	98	Paved roads w/curbs & sewers, HSG C
4	98	Paved roads w/curbs & sewers, HSG D
1,602	98	Water Surface, HSG A
915	98	Water Surface, HSG C
6,901	98	Water Surface, HSG D
2,491	30	Woods, Good, HSG A
25,107	82	Weighted Average
7,016		27.95% Pervious Area
18,091		72.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0340	1.53		**Sheet Flow, Sheet Flow** Smooth surfaces n= 0.011 P2= 3.42"
0.6	80	0.0130	2.31		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
1.1	130	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 1E: Old Colony Ave



Summary for Subcatchment 2E: South Street East (West Side)

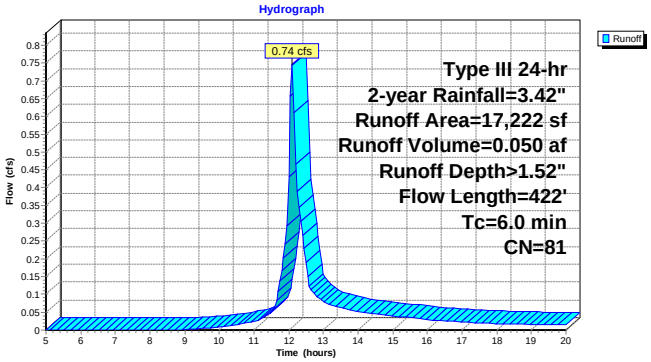
Runoff = 0.74 cfs @ 12.09 hrs, Volume= 0.050 af, Depth> 1.52"
Routed to Link 2L : DP2: Steam

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.42"

Area (sf)	CN	Description
4,102	39	>75% Grass cover, Good, HSG A
0	80	>75% Grass cover, Good, HSG D
530	96	Gravel surface, HSG A
10,287	98	Paved roads w/curbs & sewers, HSG A
165	98	Paved roads w/curbs & sewers, HSG C
1,280	98	Paved roads w/curbs & sewers, HSG D
0	98	Water Surface, HSG A
1	98	Water Surface, HSG D
857	30	Woods, Good, HSG A
17,222	81	Weighted Average
5,489		31.87% Pervious Area
11,733		68.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	50	0.0070	0.81		**Sheet Flow, SF1** Smooth surfaces n= 0.011 P2= 3.42"
3.2	372	0.0090	1.93		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
4.2	422	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2E: South Street East (West Side)



Summary for Subcatchment 3E: South Street East (East Side)

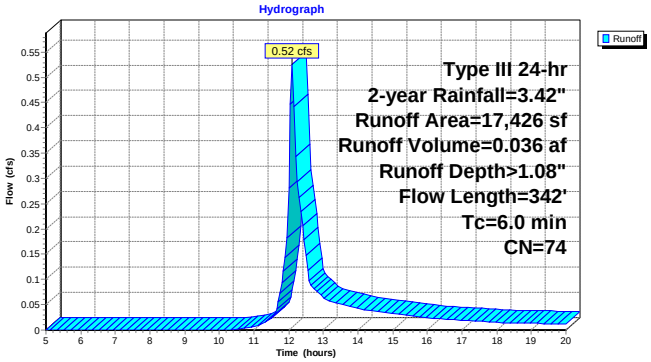
Runoff = 0.52 cfs @ 12.10 hrs, Volume= 0.036 af, Depth> 1.08"
Routed to Link 3L : DP 3: Woodlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.42"

Area (sf)	CN	Description
3,738	39	>75% Grass cover, Good, HSG A
1,102	74	>75% Grass cover, Good, HSG C
0	80	>75% Grass cover, Good, HSG D
2,356	96	Gravel surface, HSG A
387	96	Gravel surface, HSG C
4,933	98	Paved roads w/curbs & sewers, HSG A
1,386	98	Paved roads w/curbs & sewers, HSG C
1,133	98	Paved roads w/curbs & sewers, HSG D
1	98	Water Surface, HSG A
3	98	Water Surface, HSG D
2,387	30	Woods, Good, HSG A
17,426	74	Weighted Average
9,970		57.21% Pervious Area
7,456		42.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	50	0.0070	0.81		**Sheet Flow, SF1** Smooth surfaces n= 0.011 P2= 3.42"
2.5	292	0.0090	1.93		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
3.5	342	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 3E: South Street East (East Side)

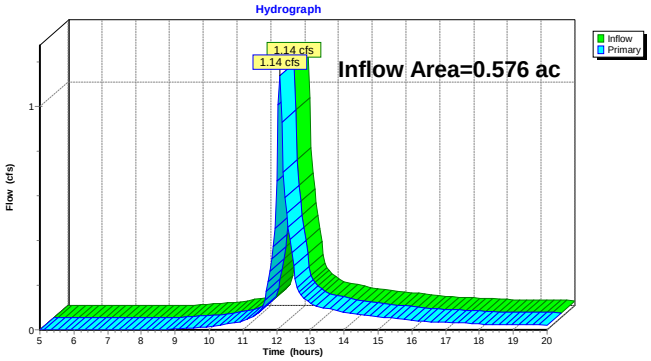


Summary for Link 1L: DP 1: Taunton River

Inflow Area = 0.576 ac, 72.05% Impervious, Inflow Depth > 1.59" for 2-year event
Inflow = 1.14 cfs @ 12.09 hrs, Volume= 0.077 af
Primary = 1.14 cfs @ 12.09 hrs, Volume= 0.077 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 1L: DP 1: Taunton River

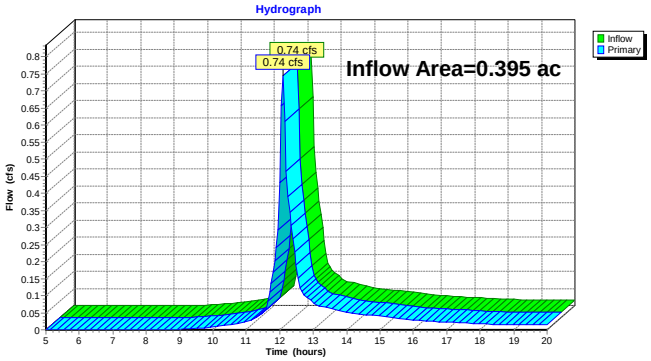


Summary for Link 2L: DP2: Steam

Inflow Area = 0.395 ac, 68.13% Impervious, Inflow Depth > 1.52" for 2-year event
Inflow = 0.74 cfs @ 12.09 hrs, Volume= 0.050 af
Primary = 0.74 cfs @ 12.09 hrs, Volume= 0.050 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 2L: DP2: Steam

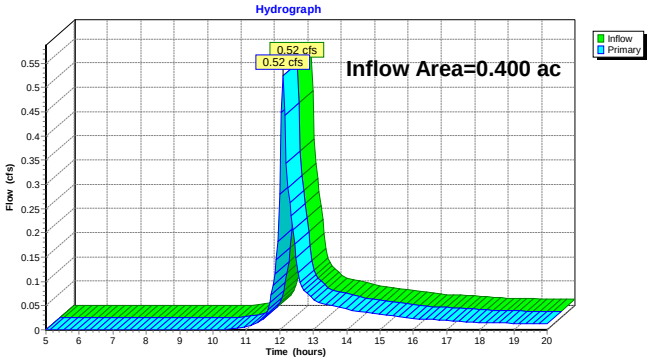


Summary for Link 3L: DP 3: Woodlands

Inflow Area = 0.400 ac, 42.79% Impervious, Inflow Depth > 1.08" for 2-year event
Inflow = 0.52 cfs @ 12.10 hrs, Volume= 0.036 af
Primary = 0.52 cfs @ 12.10 hrs, Volume= 0.036 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 3L: DP 3: Woodlands



Summary for Subcatchment 1E: Old Colony Ave

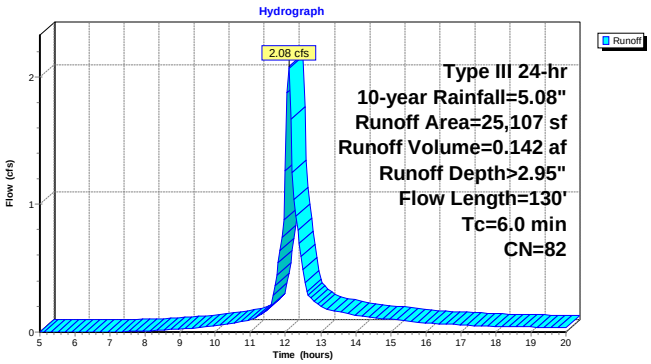
Runoff = 2.08 cfs @ 12.09 hrs, Volume= 0.142 af, Depth> 2.95"
Routed to Link 1L : DP 1: Taunton River

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=5.08"

Area (sf)	CN	Description
3,592	39	>75% Grass cover, Good, HSG A
788	74	>75% Grass cover, Good, HSG C
145	80	>75% Grass cover, Good, HSG D
8,643	98	Paved roads w/curbs & sewers, HSG A
26	98	Paved roads w/curbs & sewers, HSG C
4	98	Paved roads w/curbs & sewers, HSG D
1,602	98	Water Surface, HSG A
915	98	Water Surface, HSG C
6,901	98	Water Surface, HSG D
2,491	30	Woods, Good, HSG A
25,107	82	Weighted Average
7,016		27.95% Pervious Area
18,091		72.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0340	1.53		**Sheet Flow, Sheet Flow** Smooth surfaces n= 0.011 P2= 3.42"
0.6	80	0.0130	2.31		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
1.1	130	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 1E: Old Colony Ave



Summary for Subcatchment 2E: South Street East (West Side)

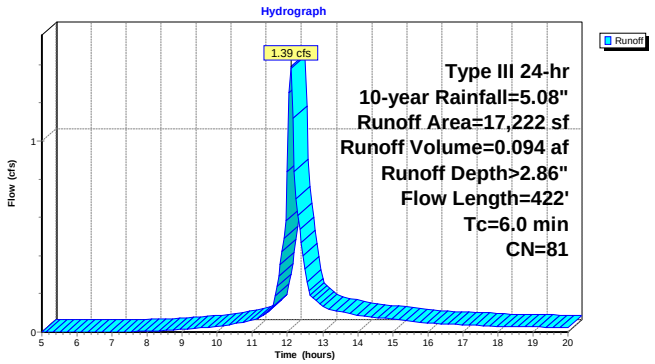
Runoff = 1.39 cfs @ 12.09 hrs, Volume= 0.094 af, Depth> 2.86"
Routed to Link 2L : DP2: Steam

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=5.08"

Area (sf)	CN	Description
4,102	39	>75% Grass cover, Good, HSG A
0	80	>75% Grass cover, Good, HSG D
530	96	Gravel surface, HSG A
10,287	98	Paved roads w/curbs & sewers, HSG A
165	98	Paved roads w/curbs & sewers, HSG C
1,280	98	Paved roads w/curbs & sewers, HSG D
0	98	Water Surface, HSG A
1	98	Water Surface, HSG D
857	30	Woods, Good, HSG A
17,222	81	Weighted Average
5,489		31.87% Pervious Area
11,733		68.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	50	0.0070	0.81		**Sheet Flow, SF1** Smooth surfaces n= 0.011 P2= 3.42"
3.2	372	0.0090	1.93		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
4.2	422	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2E: South Street East (West Side)



Summary for Subcatchment 3E: South Street East (East Side)

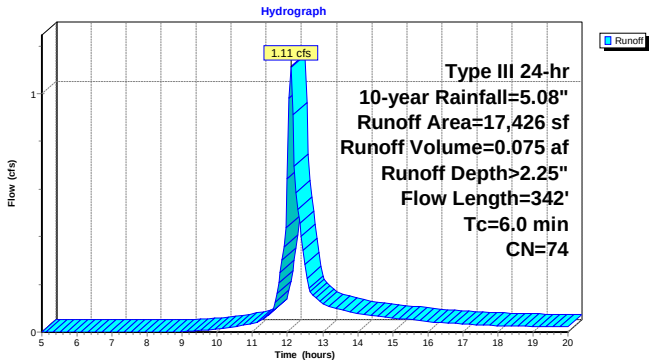
Runoff = 1.11 cfs @ 12.09 hrs, Volume= 0.075 af, Depth> 2.25"
Routed to Link 3L : DP 3: Woodlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=5.08"

Area (sf)	CN	Description
3,738	39	>75% Grass cover, Good, HSG A
1,102	74	>75% Grass cover, Good, HSG C
0	80	>75% Grass cover, Good, HSG D
2,356	96	Gravel surface, HSG A
387	96	Gravel surface, HSG C
4,933	98	Paved roads w/curbs & sewers, HSG A
1,386	98	Paved roads w/curbs & sewers, HSG C
1,133	98	Paved roads w/curbs & sewers, HSG D
1	98	Water Surface, HSG A
3	98	Water Surface, HSG D
2,387	30	Woods, Good, HSG A
17,426	74	Weighted Average
9,970		57.21% Pervious Area
7,456		42.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	50	0.0070	0.81		**Sheet Flow, SF1** Smooth surfaces n= 0.011 P2= 3.42"
2.5	292	0.0090	1.93		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
3.5	342	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 3E: South Street East (East Side)

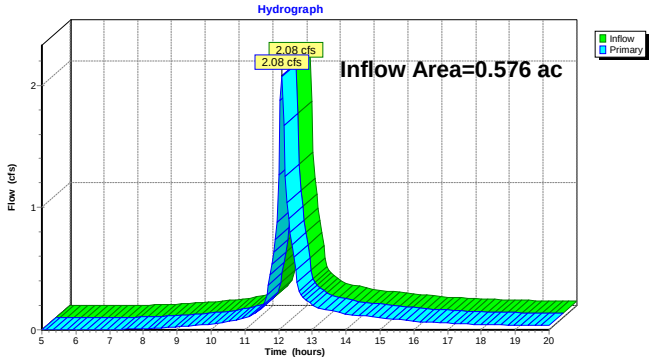


Summary for Link 1L: DP 1: Taunton River

Inflow Area = 0.576 ac, 72.05% Impervious, Inflow Depth > 2.95" for 10-year event
Inflow = 2.08 cfs @ 12.09 hrs, Volume= 0.142 af
Primary = 2.08 cfs @ 12.09 hrs, Volume= 0.142 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 1L: DP 1: Taunton River

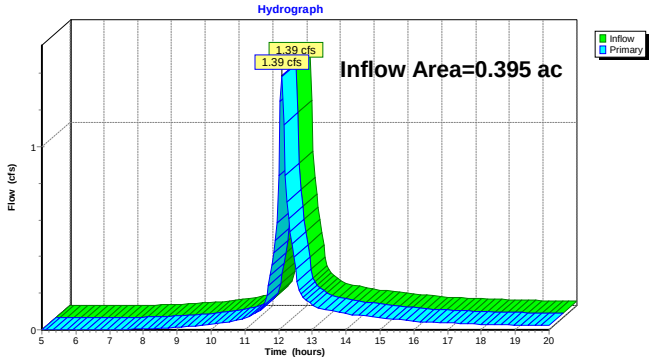


Summary for Link 2L: DP2: Steam

Inflow Area = 0.395 ac, 68.13% Impervious, Inflow Depth > 2.86" for 10-year event
Inflow = 1.39 cfs @ 12.09 hrs, Volume= 0.094 af
Primary = 1.39 cfs @ 12.09 hrs, Volume= 0.094 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 2L: DP2: Steam

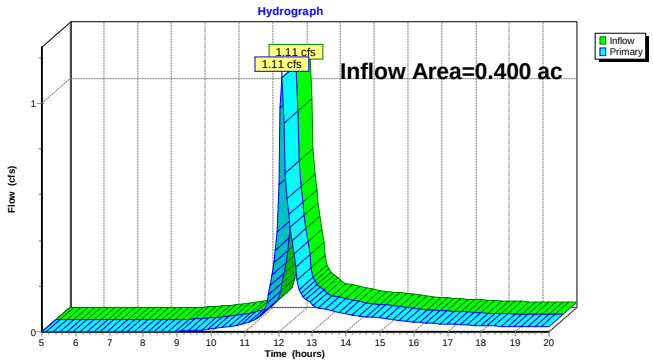


Summary for Link 3L: DP 3: Woodlands

Inflow Area = 0.400 ac, 42.79% Impervious, Inflow Depth > 2.25" for 10-year event
Inflow = 1.11 cfs @ 12.09 hrs, Volume= 0.075 af
Primary = 1.11 cfs @ 12.09 hrs, Volume= 0.075 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 3L: DP 3: Woodlands



Summary for Subcatchment 1E: Old Colony Ave

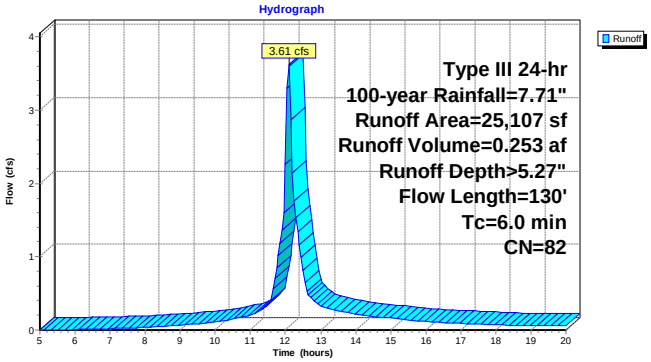
Runoff = 3.61 cfs @ 12.09 hrs, Volume= 0.253 af, Depth> 5.27"
Routed to Link 1L : DP 1: Taunton River

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=7.71"

Area (sf)	CN	Description
3,592	39	>75% Grass cover, Good, HSG A
788	74	>75% Grass cover, Good, HSG C
145	80	>75% Grass cover, Good, HSG D
8,643	98	Paved roads w/curbs & sewers, HSG A
26	98	Paved roads w/curbs & sewers, HSG C
4	98	Paved roads w/curbs & sewers, HSG D
1,602	98	Water Surface, HSG A
915	98	Water Surface, HSG C
6,901	98	Water Surface, HSG D
2,491	30	Woods, Good, HSG A
25,107	82	Weighted Average
7,016		27.95% Pervious Area
18,091		72.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0340	1.53		**Sheet Flow, Sheet Flow** Smooth surfaces n= 0.011 P2= 3.42"
0.6	80	0.0130	2.31		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
1.1	130	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 1E: Old Colony Ave



Summary for Subcatchment 2E: South Street East (West Side)

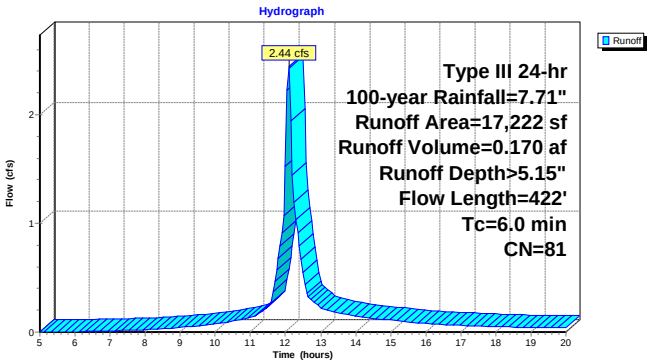
Runoff = 2.44 cfs @ 12.09 hrs, Volume= 0.170 af, Depth> 5.15"
Routed to Link 2L : DP2: Steam

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=7.71"

Area (sf)	CN	Description
4,102	39	>75% Grass cover, Good, HSG A
0	80	>75% Grass cover, Good, HSG D
530	96	Gravel surface, HSG A
10,287	98	Paved roads w/curbs & sewers, HSG A
165	98	Paved roads w/curbs & sewers, HSG C
1,280	98	Paved roads w/curbs & sewers, HSG D
0	98	Water Surface, HSG A
1	98	Water Surface, HSG D
857	30	Woods, Good, HSG A
17,222	81	Weighted Average
5,489		31.87% Pervious Area
11,733		68.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	50	0.0070	0.81		**Sheet Flow, SF1** Smooth surfaces n= 0.011 P2= 3.42"
3.2	372	0.0090	1.93		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
4.2	422	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2E: South Street East (West Side)



Summary for Subcatchment 3E: South Street East (East Side)

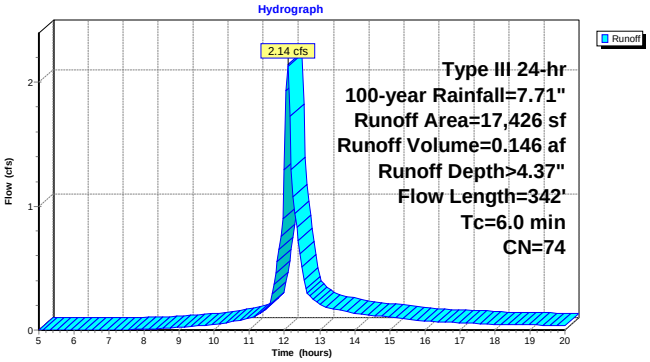
Runoff = 2.14 cfs @ 12.09 hrs, Volume= 0.146 af, Depth> 4.37"
Routed to Link 3L : DP 3: Woodlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=7.71"

Area (sf)	CN	Description
3,738	39	>75% Grass cover, Good, HSG A
1,102	74	>75% Grass cover, Good, HSG C
0	80	>75% Grass cover, Good, HSG D
2,356	96	Gravel surface, HSG A
387	96	Gravel surface, HSG C
4,933	98	Paved roads w/curbs & sewers, HSG A
1,386	98	Paved roads w/curbs & sewers, HSG C
1,133	98	Paved roads w/curbs & sewers, HSG D
1	98	Water Surface, HSG A
3	98	Water Surface, HSG D
2,387	30	Woods, Good, HSG A
17,426	74	Weighted Average
9,970		57.21% Pervious Area
7,456		42.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	50	0.0070	0.81		**Sheet Flow, SF1** Smooth surfaces n= 0.011 P2= 3.42"
2.5	292	0.0090	1.93		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
3.5	342	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 3E: South Street East (East Side)

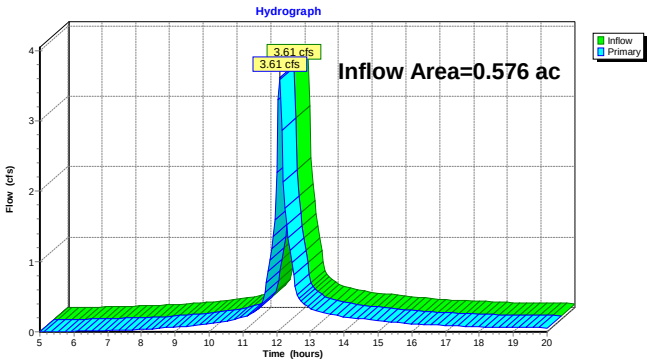


Summary for Link 1L: DP 1: Taunton River

Inflow Area = 0.576 ac, 72.05% Impervious, Inflow Depth > 5.27" for 100-year event
Inflow = 3.61 cfs @ 12.09 hrs, Volume= 0.253 af
Primary = 3.61 cfs @ 12.09 hrs, Volume= 0.253 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 1L: DP 1: Taunton River

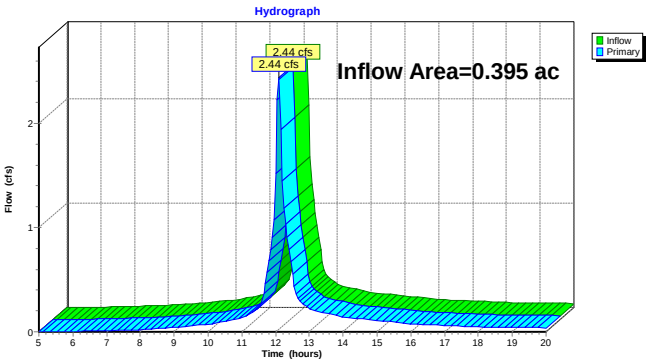


Summary for Link 2L: DP2: Steam

Inflow Area = 0.395 ac, 68.13% Impervious, Inflow Depth > 5.15" for 100-year event
Inflow = 2.44 cfs @ 12.09 hrs, Volume= 0.170 af
Primary = 2.44 cfs @ 12.09 hrs, Volume= 0.170 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 2L: DP2: Steam

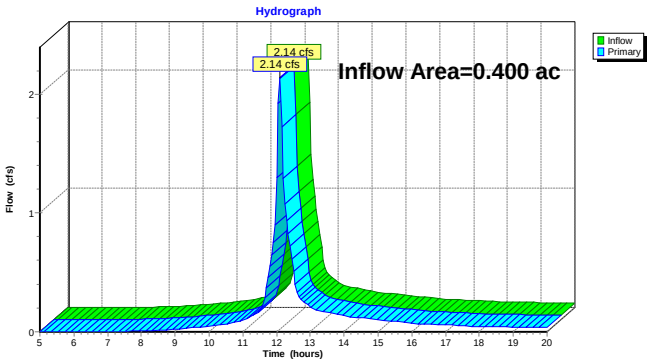


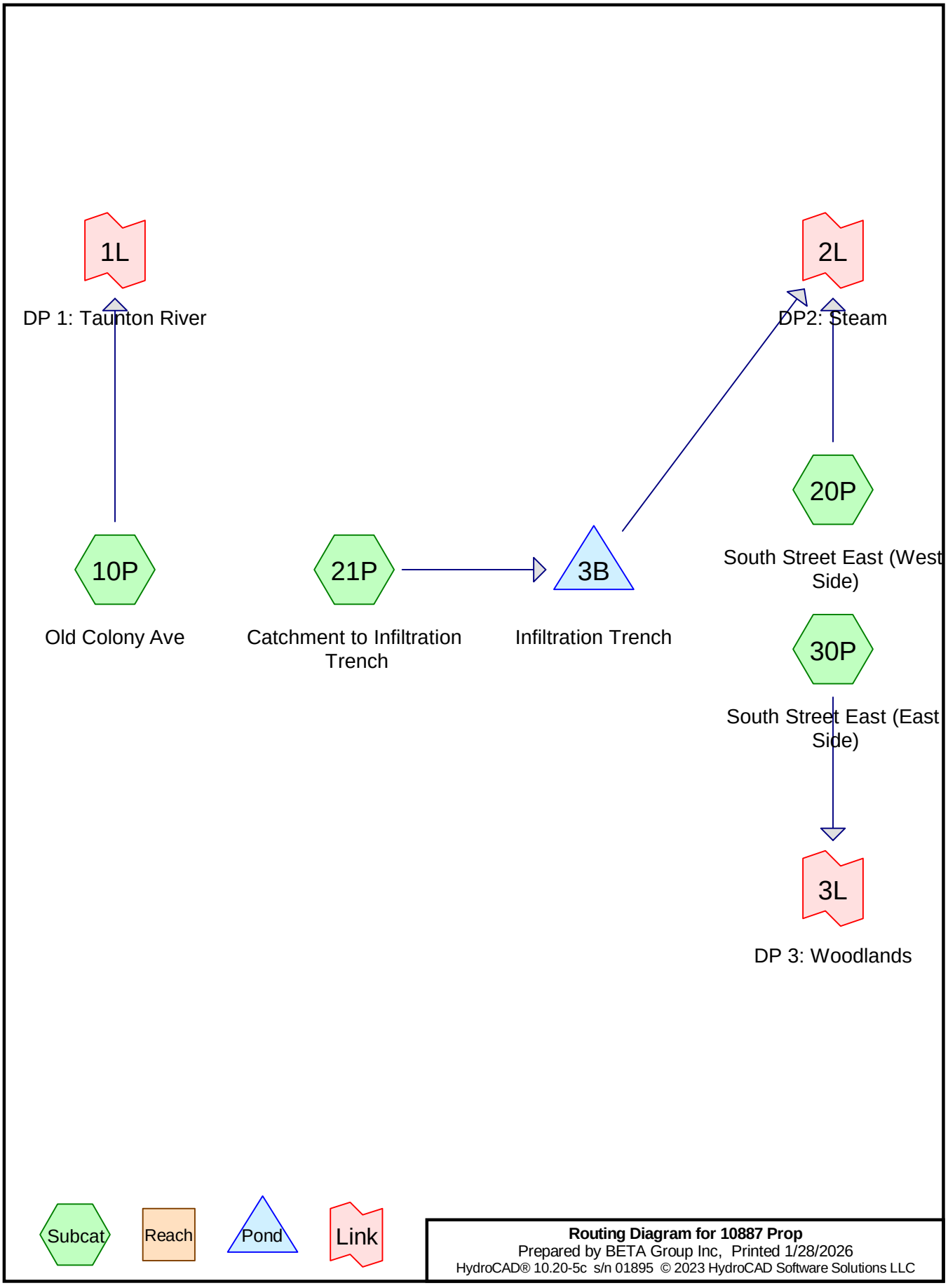
Summary for Link 3L: DP 3: Woodlands

Inflow Area = 0.400 ac, 42.79% Impervious, Inflow Depth > 4.37" for 100-year event
Inflow = 2.14 cfs @ 12.09 hrs, Volume= 0.146 af
Primary = 2.14 cfs @ 12.09 hrs, Volume= 0.146 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 3L: DP 3: Woodlands




1L
DP 1: Taunton River
2L
DP2: Steam
20P
South Street East (West Side)
10P
Old Colony Ave
21P
Catchment to Infiltration Trench
3B
Infiltration Trench
30P
South Street East (East Side)
3L
DP 3: Woodlands
Subcat
Reach
Pond
Link
Routing Diagram for 10887 Prop
Prepared by BETA Group Inc, Printed 1/28/2026
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Summary for Subcatchment 10P: Old Colony Ave

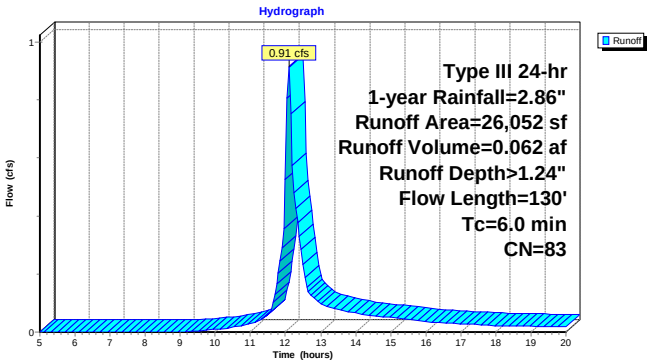
Runoff = 0.91 cfs @ 12.09 hrs, Volume= 0.062 af, Depth> 1.24"
Routed to Link 1L : DP 1: Taunton River

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-year Rainfall=2.86"

Area (sf)	CN	Description
4,934	39	>75% Grass cover, Good, HSG A
776	74	>75% Grass cover, Good, HSG C
135	80	>75% Grass cover, Good, HSG D
9,104	98	Paved roads w/curbs & sewers, HSG A
31	98	Paved roads w/curbs & sewers, HSG C
709	98	Paved roads w/curbs & sewers, HSG D
1,590	98	Water Surface, HSG A
906	98	Water Surface, HSG C
6,827	98	Water Surface, HSG D
1,039	30	Woods, Good, HSG A
26,052	83	Weighted Average
6,884		26.43% Pervious Area
19,168		73.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0340	1.53		**Sheet Flow, Sheet Flow** Smooth surfaces n= 0.011 P2= 3.42"
0.6	80	0.0130	2.31		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
1.1	130	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 10P: Old Colony Ave



Summary for Subcatchment 20P: South Street East (West Side)

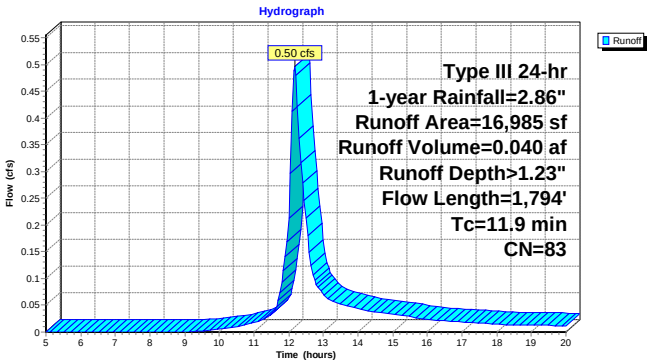
Runoff = 0.50 cfs @ 12.17 hrs, Volume= 0.040 af, Depth> 1.23"
Routed to Link 2L : DP2: Steam

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-year Rainfall=2.86"

Area (sf)	CN	Description
3,571	39	>75% Grass cover, Good, HSG A
366	96	Gravel surface, HSG A
11,263	98	Paved roads w/curbs & sewers, HSG A
165	98	Paved roads w/curbs & sewers, HSG C
1,085	98	Paved roads w/curbs & sewers, HSG D
0	98	Water Surface, HSG D
535	30	Woods, Good, HSG A
16,985	83	Weighted Average
4,472		26.33% Pervious Area
12,513		73.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0200	1.24		**Sheet Flow, SF1** Smooth surfaces n= 0.011 P2= 3.42"
3.2	372	0.0090	1.93		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
8.0	1,372	0.0200	2.87		**Shallow Concentrated Flow, SC2** Paved Kv= 20.3 fps
11.9	1,794	Total			

Subcatchment 20P: South Street East (West Side)



Summary for Subcatchment 21P: Catchment to Infiltration Trench

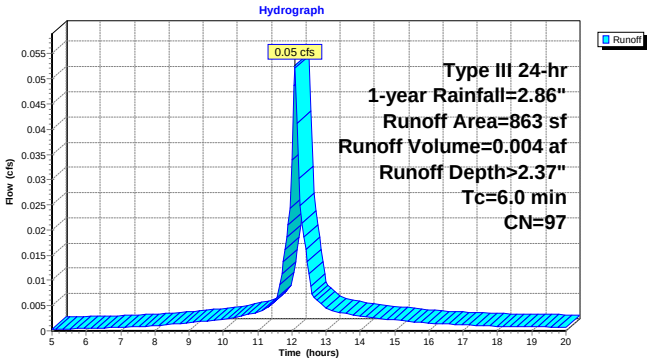
Runoff = 0.05 cfs @ 12.09 hrs, Volume= 0.004 af, Depth> 2.37"
Routed to Pond 3B : Infiltration Trench

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-year Rainfall=2.86"

Area (sf)	CN	Description
12	39	>75% Grass cover, Good, HSG A
851	98	Paved roads w/curbs & sewers, HSG A
863	97	Weighted Average
12		1.37% Pervious Area
851		98.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Assume Min. TC**

Subcatchment 21P: Catchment to Infiltration Trench



Summary for Subcatchment 30P: South Street East (East Side)

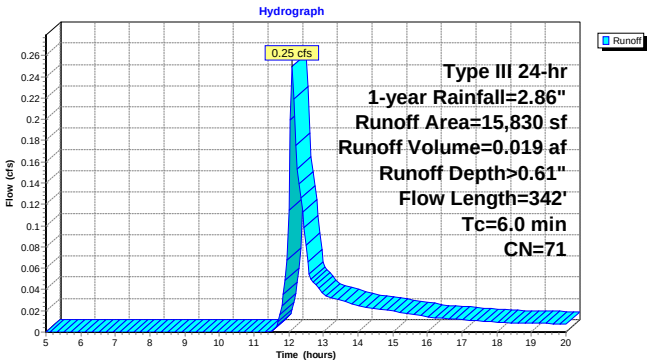
Runoff = 0.25 cfs @ 12.11 hrs, Volume= 0.019 af, Depth> 0.61"
Routed to Link 3L : DP 3: Woodlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-year Rainfall=2.86"

Area (sf)	CN	Description
4,195	39	>75% Grass cover, Good, HSG A
870	74	>75% Grass cover, Good, HSG C
1,421	96	Gravel surface, HSG A
387	96	Gravel surface, HSG C
4,275	98	Paved roads w/curbs & sewers, HSG A
1,630	98	Paved roads w/curbs & sewers, HSG C
704	98	Paved roads w/curbs & sewers, HSG D
4	98	Water Surface, HSG C
2	98	Water Surface, HSG D
2,343	30	Woods, Good, HSG A
15,830	71	Weighted Average
9,215		58.21% Pervious Area
6,615		41.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	50	0.0070	0.81		**Sheet Flow, SF1** Smooth surfaces n= 0.011 P2= 3.42"
2.5	292	0.0090	1.93		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
3.5	342	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 30P: South Street East (East Side)



Summary for Pond 3B: Infiltration Trench

Inflow Area = 0.020 ac, 98.63% Impervious, Inflow Depth > 2.37" for 1-year event
Inflow = 0.05 cfs @ 12.09 hrs, Volume= 0.004 af
Outflow = 0.00 cfs @ 13.62 hrs, Volume= 0.003 af, Atten= 94%, Lag= 91.8 min
Discarded = 0.00 cfs @ 13.62 hrs, Volume= 0.003 af
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af
Routed to Link 2L : DP2: Steam

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 11.80' @ 13.62 hrs Surf.Area= 90 sf Storage= 84 cf

Plug-Flow detention time= 175.7 min calculated for 0.003 af (73% of inflow)
Center-of-Mass det. time= 113.4 min (858.8 - 745.3)

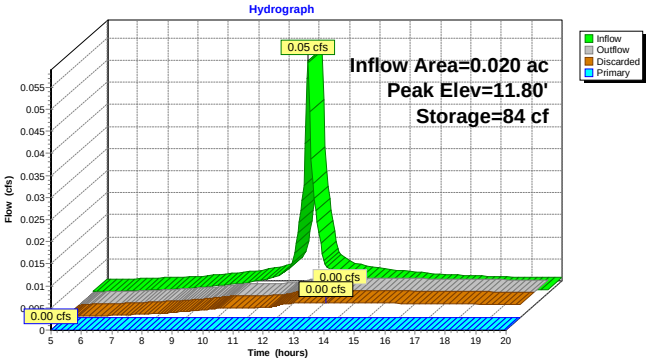
Volume	Invert	Avail.Storage	Storage Description
#1	10.00'	72 cf	**2.00'W x 45.00'L x 2.17'H Crushed Stone Trench** 195 cf Overall - 16 cf Embedded = 180 cf x 40.0% Voids
#2	11.00'	16 cf	**8.0" Round 8" Perforated Pipe** Inside #1 L= 45.0'
#3	11.00'	70 cf	**4.00'D x 5.57'H CB-6** -Impervious
		158 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	10.00'	**1.020 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 7.00'
#2	Primary	12.00'	**12.0" Vert. CB-6 Outlet** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.00 cfs @ 13.62 hrs HW=11.80' (Free Discharge)
↑**1=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=10.00' (Free Discharge)
↑**2=CB-6 Outlet** (Controls 0.00 cfs)

Pond 3B: Infiltration Trench

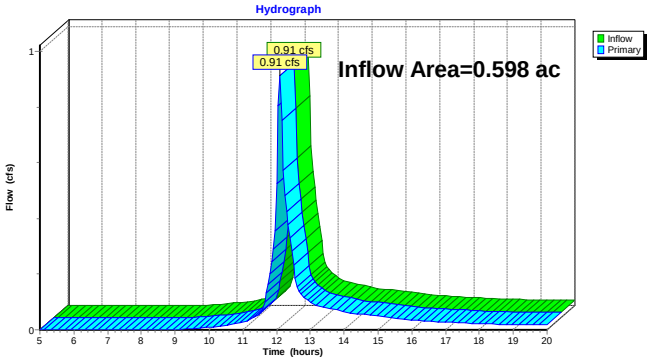


Summary for Link 1L: DP 1: Taunton River

Inflow Area = 0.598 ac, 73.57% Impervious, Inflow Depth > 1.24" for 1-year event
Inflow = 0.91 cfs @ 12.09 hrs, Volume= 0.062 af
Primary = 0.91 cfs @ 12.09 hrs, Volume= 0.062 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 1L: DP 1: Taunton River

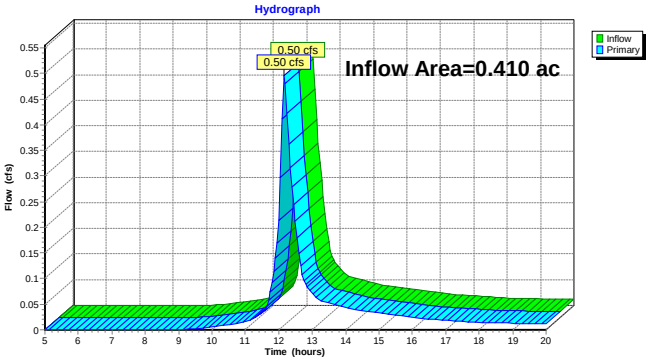


Summary for Link 2L: DP2: Steam

Inflow Area = 0.410 ac, 74.88% Impervious, Inflow Depth > 1.17" for 1-year event
Inflow = 0.50 cfs @ 12.17 hrs, Volume= 0.040 af
Primary = 0.50 cfs @ 12.17 hrs, Volume= 0.040 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 2L: DP2: Steam

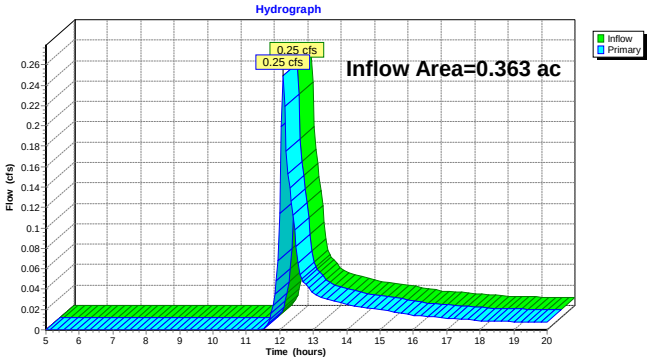


Summary for Link 3L: DP 3: Woodlands

Inflow Area = 0.363 ac, 41.79% Impervious, Inflow Depth > 0.61" for 1-year event
Inflow = 0.25 cfs @ 12.11 hrs, Volume= 0.019 af
Primary = 0.25 cfs @ 12.11 hrs, Volume= 0.019 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 3L: DP 3: Woodlands



Summary for Subcatchment 10P: Old Colony Ave

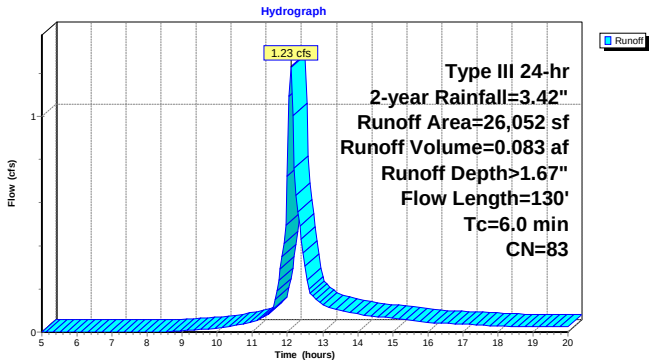
Runoff = 1.23 cfs @ 12.09 hrs, Volume= 0.083 af, Depth> 1.67"
Routed to Link 1L : DP 1: Taunton River

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.42"

Area (sf)	CN	Description
4,934	39	>75% Grass cover, Good, HSG A
776	74	>75% Grass cover, Good, HSG C
135	80	>75% Grass cover, Good, HSG D
9,104	98	Paved roads w/curbs & sewers, HSG A
31	98	Paved roads w/curbs & sewers, HSG C
709	98	Paved roads w/curbs & sewers, HSG D
1,590	98	Water Surface, HSG A
906	98	Water Surface, HSG C
6,827	98	Water Surface, HSG D
1,039	30	Woods, Good, HSG A
26,052	83	Weighted Average
6,884		26.43% Pervious Area
19,168		73.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0340	1.53		**Sheet Flow, Sheet Flow** Smooth surfaces n= 0.011 P2= 3.42"
0.6	80	0.0130	2.31		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
1.1	130	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 10P: Old Colony Ave



Summary for Subcatchment 20P: South Street East (West Side)

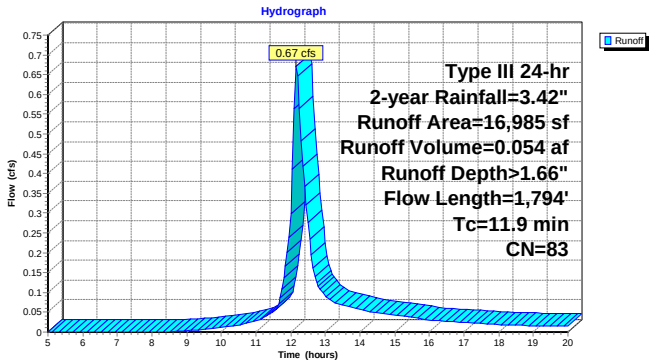
Runoff = 0.67 cfs @ 12.17 hrs, Volume= 0.054 af, Depth> 1.66"
Routed to Link 2L : DP2: Steam

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.42"

Area (sf)	CN	Description
3,571	39	>75% Grass cover, Good, HSG A
366	96	Gravel surface, HSG A
11,263	98	Paved roads w/curbs & sewers, HSG A
165	98	Paved roads w/curbs & sewers, HSG C
1,085	98	Paved roads w/curbs & sewers, HSG D
0	98	Water Surface, HSG D
535	30	Woods, Good, HSG A
16,985	83	Weighted Average
4,472		26.33% Pervious Area
12,513		73.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0200	1.24		**Sheet Flow, SF1** Smooth surfaces n= 0.011 P2= 3.42"
3.2	372	0.0090	1.93		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
8.0	1,372	0.0200	2.87		**Shallow Concentrated Flow, SC2** Paved Kv= 20.3 fps
11.9	1,794	Total			

Subcatchment 20P: South Street East (West Side)



Summary for Subcatchment 21P: Catchment to Infiltration Trench

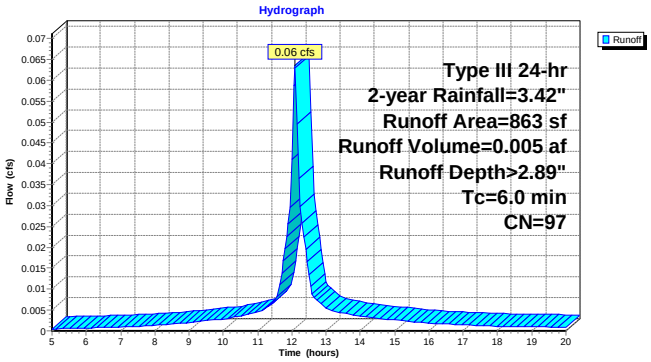
Runoff = 0.06 cfs @ 12.09 hrs, Volume= 0.005 af, Depth> 2.89"
Routed to Pond 3B : Infiltration Trench

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.42"

Area (sf)	CN	Description
12	39	>75% Grass cover, Good, HSG A
851	98	Paved roads w/curbs & sewers, HSG A
863	97	Weighted Average
12		1.37% Pervious Area
851		98.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Assume Min. TC**

Subcatchment 21P: Catchment to Infiltration Trench



Summary for Subcatchment 30P: South Street East (East Side)

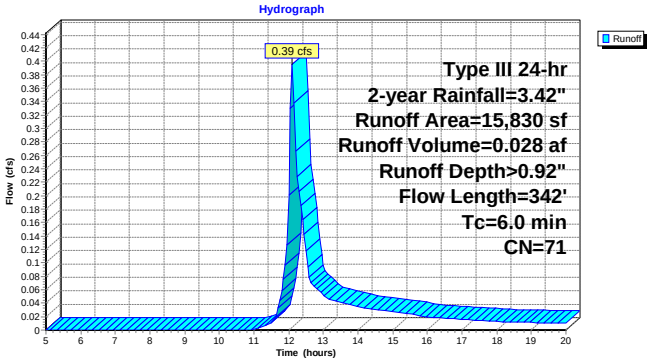
Runoff = 0.39 cfs @ 12.10 hrs, Volume= 0.028 af, Depth> 0.92"
Routed to Link 3L : DP 3: Woodlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.42"

Area (sf)	CN	Description
4,195	39	>75% Grass cover, Good, HSG A
870	74	>75% Grass cover, Good, HSG C
1,421	96	Gravel surface, HSG A
387	96	Gravel surface, HSG C
4,275	98	Paved roads w/curbs & sewers, HSG A
1,630	98	Paved roads w/curbs & sewers, HSG C
704	98	Paved roads w/curbs & sewers, HSG D
4	98	Water Surface, HSG C
2	98	Water Surface, HSG D
2,343	30	Woods, Good, HSG A
15,830	71	Weighted Average
9,215		58.21% Pervious Area
6,615		41.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	50	0.0070	0.81		**Sheet Flow, SF1** Smooth surfaces n= 0.011 P2= 3.42"
2.5	292	0.0090	1.93		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
3.5	342	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 30P: South Street East (East Side)



Summary for Pond 3B: Infiltration Trench

Inflow Area = 0.020 ac, 98.63% Impervious, Inflow Depth > 2.89" for 2-year event
Inflow = 0.06 cfs @ 12.09 hrs, Volume= 0.005 af
Outflow = 0.01 cfs @ 12.51 hrs, Volume= 0.003 af, Atten= 78%, Lag= 25.1 min
Discarded = 0.00 cfs @ 12.51 hrs, Volume= 0.003 af
Primary = 0.01 cfs @ 12.51 hrs, Volume= 0.000 af
Routed to Link 2L : DP2: Steam

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 12.04' @ 12.51 hrs Surf.Area= 90 sf Storage= 96 cf

Plug-Flow detention time= 162.7 min calculated for 0.003 af (72% of inflow)
Center-of-Mass det. time= 98.4 min (841.0 - 742.7)

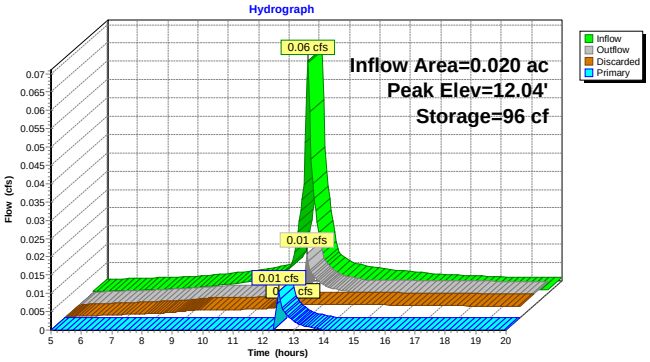
Volume	Invert	Avail.Storage	Storage Description
#1	10.00'	72 cf	**2.00'W x 45.00'L x 2.17'H Crushed Stone Trench** 195 cf Overall - 16 cf Embedded = 180 cf x 40.0% Voids
#2	11.00'	16 cf	**8.0" Round 8" Perforated Pipe** Inside #1 L= 45.0'
#3	11.00'	70 cf	**4.00'D x 5.57'H CB-6** -Impervious
		158 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	10.00'	**1.020 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 7.00'
#2	Primary	12.00'	**12.0" Vert. CB-6 Outlet** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.00 cfs @ 12.51 hrs HW=12.04' (Free Discharge)
↑**1=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=0.01 cfs @ 12.51 hrs HW=12.04' (Free Discharge)
↑**2=CB-6 Outlet** (Orifice Controls 0.01 cfs @ 0.71 fps)

Pond 3B: Infiltration Trench

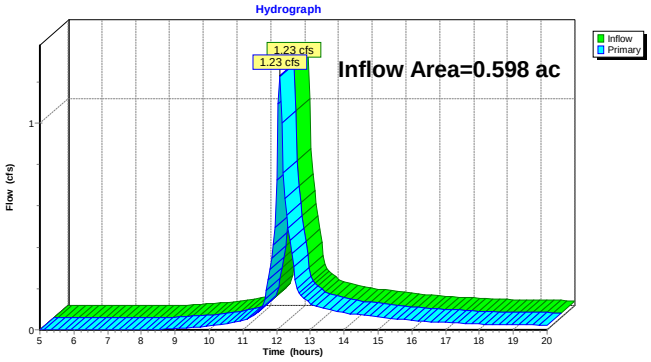


Summary for Link 1L: DP 1: Taunton River

Inflow Area = 0.598 ac, 73.57% Impervious, Inflow Depth > 1.67" for 2-year event
Inflow = 1.23 cfs @ 12.09 hrs, Volume= 0.083 af
Primary = 1.23 cfs @ 12.09 hrs, Volume= 0.083 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 1L: DP 1: Taunton River

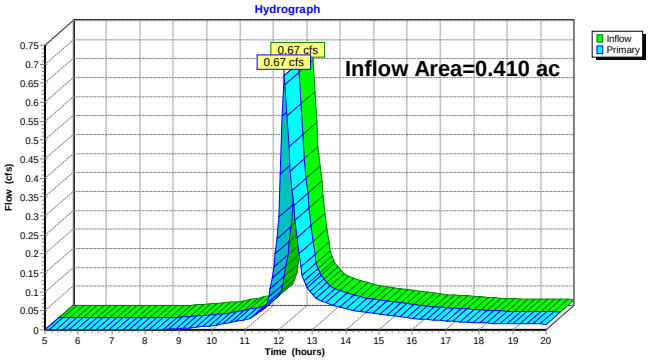


Summary for Link 2L: DP2: Steam

Inflow Area = 0.410 ac, 74.88% Impervious, Inflow Depth > 1.59" for 2-year event
Inflow = 0.67 cfs @ 12.17 hrs, Volume= 0.054 af
Primary = 0.67 cfs @ 12.17 hrs, Volume= 0.054 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 2L: DP2: Steam

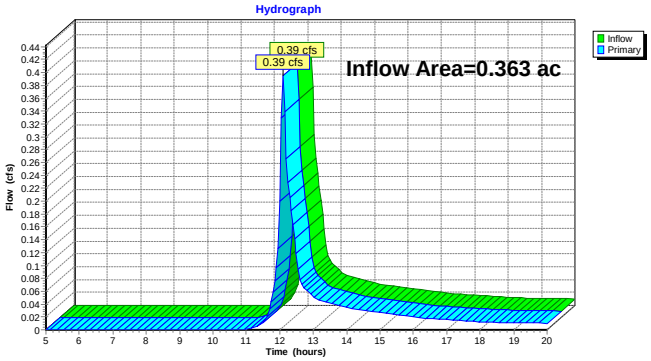


Summary for Link 3L: DP 3: Woodlands

Inflow Area = 0.363 ac, 41.79% Impervious, Inflow Depth > 0.92" for 2-year event
Inflow = 0.39 cfs @ 12.10 hrs, Volume= 0.028 af
Primary = 0.39 cfs @ 12.10 hrs, Volume= 0.028 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 3L: DP 3: Woodlands



Summary for Subcatchment 10P: Old Colony Ave

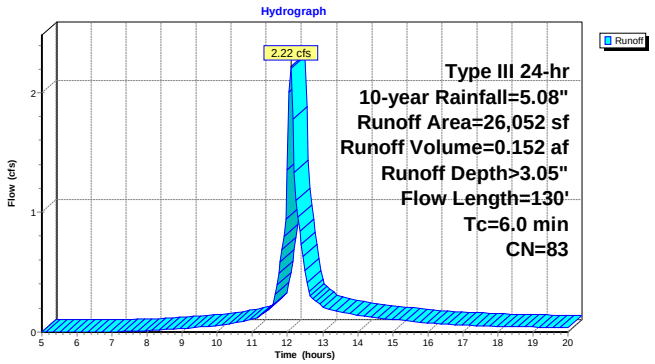
Runoff = 2.22 cfs @ 12.09 hrs, Volume= 0.152 af, Depth> 3.05"
Routed to Link 1L : DP 1: Taunton River

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=5.08"

Area (sf)	CN	Description
4,934	39	>75% Grass cover, Good, HSG A
776	74	>75% Grass cover, Good, HSG C
135	80	>75% Grass cover, Good, HSG D
9,104	98	Paved roads w/curbs & sewers, HSG A
31	98	Paved roads w/curbs & sewers, HSG C
709	98	Paved roads w/curbs & sewers, HSG D
1,590	98	Water Surface, HSG A
906	98	Water Surface, HSG C
6,827	98	Water Surface, HSG D
1,039	30	Woods, Good, HSG A
26,052	83	Weighted Average
6,884		26.43% Pervious Area
19,168		73.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0340	1.53		**Sheet Flow, Sheet Flow** Smooth surfaces n= 0.011 P2= 3.42"
0.6	80	0.0130	2.31		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
1.1	130	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 10P: Old Colony Ave



Summary for Subcatchment 20P: South Street East (West Side)

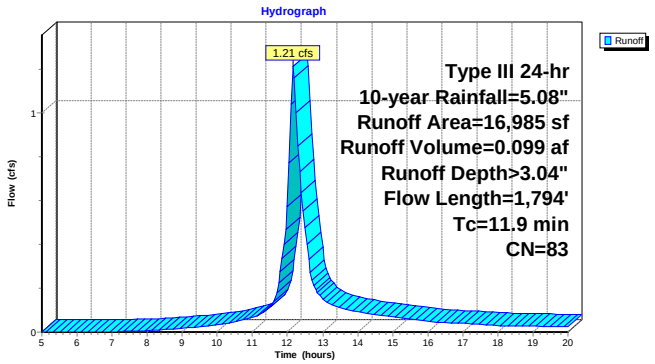
Runoff = 1.21 cfs @ 12.16 hrs, Volume= 0.099 af, Depth> 3.04"
Routed to Link 2L : DP2: Steam

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=5.08"

Area (sf)	CN	Description
3,571	39	>75% Grass cover, Good, HSG A
366	96	Gravel surface, HSG A
11,263	98	Paved roads w/curbs & sewers, HSG A
165	98	Paved roads w/curbs & sewers, HSG C
1,085	98	Paved roads w/curbs & sewers, HSG D
0	98	Water Surface, HSG D
535	30	Woods, Good, HSG A
16,985	83	Weighted Average
4,472		26.33% Pervious Area
12,513		73.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0200	1.24		**Sheet Flow, SF1** Smooth surfaces n= 0.011 P2= 3.42"
3.2	372	0.0090	1.93		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
8.0	1,372	0.0200	2.87		**Shallow Concentrated Flow, SC2** Paved Kv= 20.3 fps
11.9	1,794	Total			

Subcatchment 20P: South Street East (West Side)



Summary for Subcatchment 21P: Catchment to Infiltration Trench

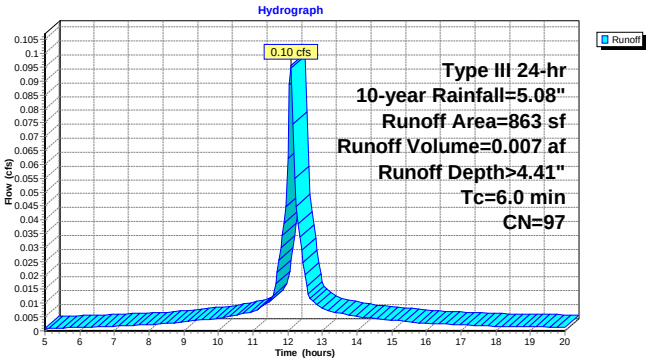
Runoff = 0.10 cfs @ 12.09 hrs, Volume= 0.007 af, Depth> 4.41"
Routed to Pond 3B : Infiltration Trench

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=5.08"

Area (sf)	CN	Description
12	39	>75% Grass cover, Good, HSG A
851	98	Paved roads w/curbs & sewers, HSG A
863	97	Weighted Average
12		1.37% Pervious Area
851		98.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Assume Min. TC**

Subcatchment 21P: Catchment to Infiltration Trench



Summary for Subcatchment 30P: South Street East (East Side)

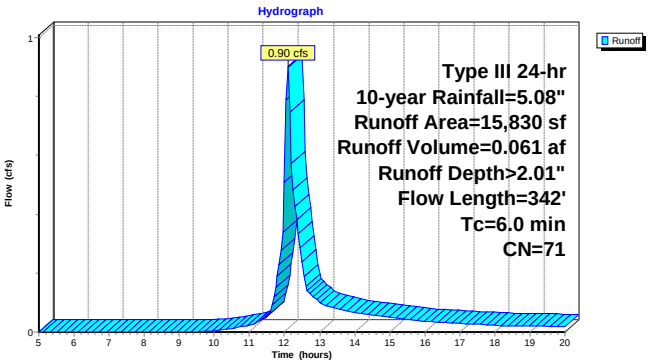
Runoff = 0.90 cfs @ 12.10 hrs, Volume= 0.061 af, Depth> 2.01"
Routed to Link 3L : DP 3: Woodlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=5.08"

Area (sf)	CN	Description
4,195	39	>75% Grass cover, Good, HSG A
870	74	>75% Grass cover, Good, HSG C
1,421	96	Gravel surface, HSG A
387	96	Gravel surface, HSG C
4,275	98	Paved roads w/curbs & sewers, HSG A
1,630	98	Paved roads w/curbs & sewers, HSG C
704	98	Paved roads w/curbs & sewers, HSG D
4	98	Water Surface, HSG C
2	98	Water Surface, HSG D
2,343	30	Woods, Good, HSG A
15,830	71	Weighted Average
9,215		58.21% Pervious Area
6,615		41.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	50	0.0070	0.81		**Sheet Flow, SF1** Smooth surfaces n= 0.011 P2= 3.42"
2.5	292	0.0090	1.93		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
3.5	342	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 30P: South Street East (East Side)



Summary for Pond 3B: Infiltration Trench

Inflow Area = 0.020 ac, 98.63% Impervious, Inflow Depth > 4.41" for 10-year event
Inflow = 0.10 cfs @ 12.09 hrs, Volume= 0.007 af
Outflow = 0.09 cfs @ 12.12 hrs, Volume= 0.006 af, Atten= 5%, Lag= 2.2 min
Discarded = 0.00 cfs @ 12.10 hrs, Volume= 0.003 af
Primary = 0.09 cfs @ 12.12 hrs, Volume= 0.002 af
Routed to Link 2L : DP2: Steam

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 12.13' @ 12.10 hrs Surf.Area= 90 sf Storage= 100 cf

Plug-Flow detention time= 114.1 min calculated for 0.006 af (78% of inflow)
Center-of-Mass det. time= 57.0 min (795.1 - 738.1)

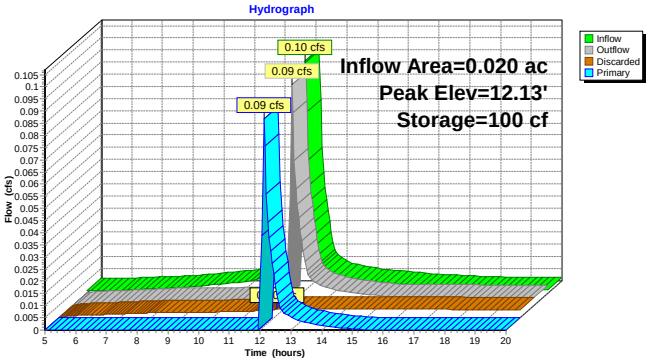
Volume	Invert	Avail.Storage	Storage Description
#1	10.00'	72 cf	**2.00'W x 45.00'L x 2.17'H Crushed Stone Trench** 195 cf Overall - 16 cf Embedded = 180 cf x 40.0% Voids
#2	11.00'	16 cf	**8.0" Round 8" Perforated Pipe** Inside #1 L= 45.0'
#3	11.00'	70 cf	**4.00'D x 5.57'H CB-6** -Impervious
		158 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	10.00'	**1.020 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 7.00'
#2	Primary	12.00'	**12.0" Vert. CB-6 Outlet** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.00 cfs @ 12.10 hrs HW=12.13' (Free Discharge)
↑**1=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=0.07 cfs @ 12.12 hrs HW=12.13' (Free Discharge)
↑**2=CB-6 Outlet** (Orifice Controls 0.07 cfs @ 1.22 fps)

Pond 3B: Infiltration Trench

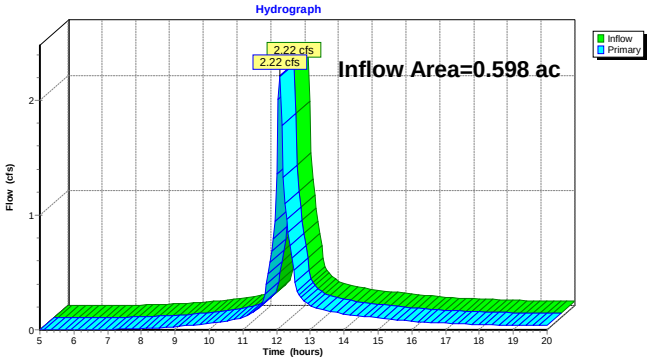


Summary for Link 1L: DP 1: Taunton River

Inflow Area = 0.598 ac, 73.57% Impervious, Inflow Depth > 3.05" for 10-year event
Inflow = 2.22 cfs @ 12.09 hrs, Volume= 0.152 af
Primary = 2.22 cfs @ 12.09 hrs, Volume= 0.152 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 1L: DP 1: Taunton River

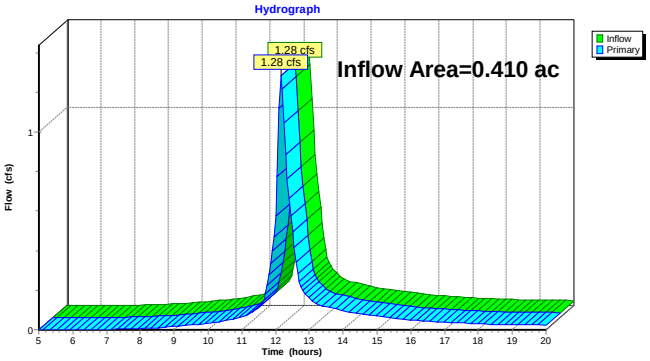


Summary for Link 2L: DP2: Steam

Inflow Area = 0.410 ac, 74.88% Impervious, Inflow Depth > 2.96" for 10-year event
Inflow = 1.28 cfs @ 12.16 hrs, Volume= 0.101 af
Primary = 1.28 cfs @ 12.16 hrs, Volume= 0.101 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 2L: DP2: Steam

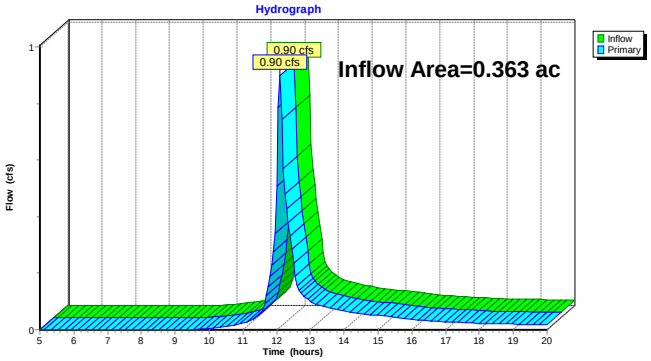


Summary for Link 3L: DP 3: Woodlands

Inflow Area = 0.363 ac, 41.79% Impervious, Inflow Depth > 2.01" for 10-year event
Inflow = 0.90 cfs @ 12.10 hrs, Volume= 0.061 af
Primary = 0.90 cfs @ 12.10 hrs, Volume= 0.061 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 3L: DP 3: Woodlands



Summary for Subcatchment 10P: Old Colony Ave

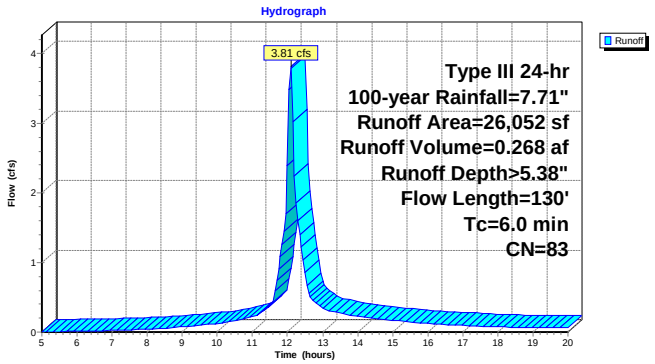
Runoff = 3.81 cfs @ 12.09 hrs, Volume= 0.268 af, Depth> 5.38"
Routed to Link 1L : DP 1: Taunton River

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=7.71"

Area (sf)	CN	Description
4,934	39	>75% Grass cover, Good, HSG A
776	74	>75% Grass cover, Good, HSG C
135	80	>75% Grass cover, Good, HSG D
9,104	98	Paved roads w/curbs & sewers, HSG A
31	98	Paved roads w/curbs & sewers, HSG C
709	98	Paved roads w/curbs & sewers, HSG D
1,590	98	Water Surface, HSG A
906	98	Water Surface, HSG C
6,827	98	Water Surface, HSG D
1,039	30	Woods, Good, HSG A
26,052	83	Weighted Average
6,884		26.43% Pervious Area
19,168		73.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0340	1.53		**Sheet Flow, Sheet Flow** Smooth surfaces n= 0.011 P2= 3.42"
0.6	80	0.0130	2.31		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
1.1	130	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 10P: Old Colony Ave



Summary for Subcatchment 20P: South Street East (West Side)

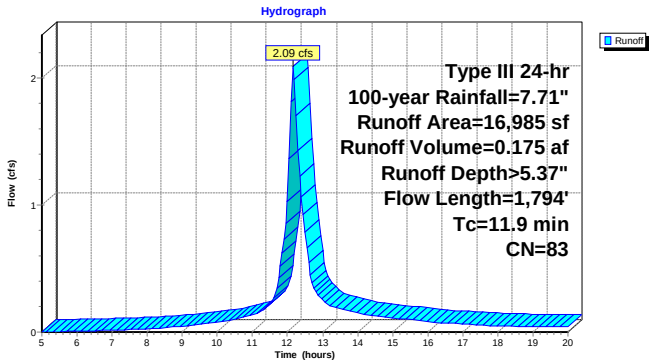
Runoff = 2.09 cfs @ 12.16 hrs, Volume= 0.175 af, Depth> 5.37"
Routed to Link 2L : DP2: Steam

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=7.71"

Area (sf)	CN	Description
3,571	39	>75% Grass cover, Good, HSG A
366	96	Gravel surface, HSG A
11,263	98	Paved roads w/curbs & sewers, HSG A
165	98	Paved roads w/curbs & sewers, HSG C
1,085	98	Paved roads w/curbs & sewers, HSG D
0	98	Water Surface, HSG D
535	30	Woods, Good, HSG A
16,985	83	Weighted Average
4,472		26.33% Pervious Area
12,513		73.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0200	1.24		**Sheet Flow, SF1** Smooth surfaces n= 0.011 P2= 3.42"
3.2	372	0.0090	1.93		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
8.0	1,372	0.0200	2.87		**Shallow Concentrated Flow, SC2** Paved Kv= 20.3 fps
11.9	1,794	Total			

Subcatchment 20P: South Street East (West Side)



Summary for Subcatchment 21P: Catchment to Infiltration Trench

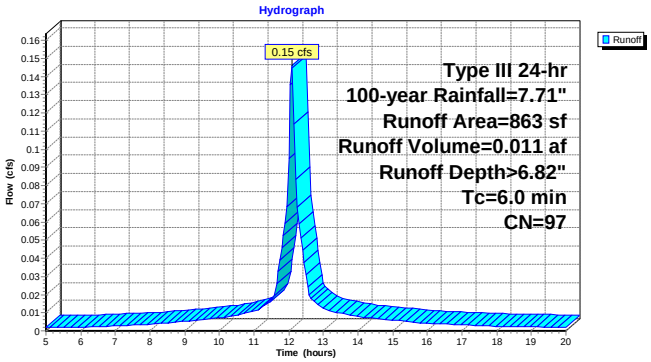
Runoff = 0.15 cfs @ 12.09 hrs, Volume= 0.011 af, Depth> 6.82"
Routed to Pond 3B : Infiltration Trench

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=7.71"

Area (sf)	CN	Description
12	39	>75% Grass cover, Good, HSG A
851	98	Paved roads w/curbs & sewers, HSG A
863	97	Weighted Average
12		1.37% Pervious Area
851		98.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Assume Min. TC**

Subcatchment 21P: Catchment to Infiltration Trench



Summary for Subcatchment 30P: South Street East (East Side)

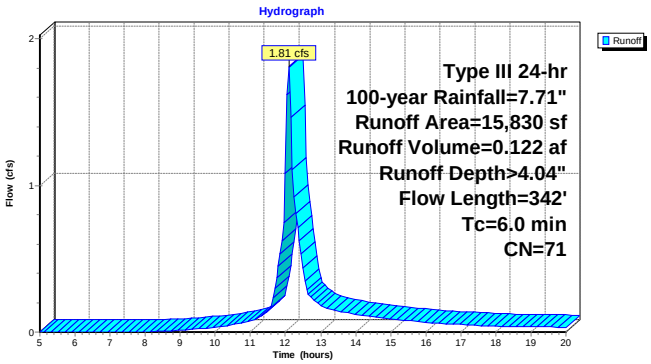
Runoff = 1.81 cfs @ 12.09 hrs, Volume= 0.122 af, Depth> 4.04"
Routed to Link 3L : DP 3: Woodlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=7.71"

Area (sf)	CN	Description
4,195	39	>75% Grass cover, Good, HSG A
870	74	>75% Grass cover, Good, HSG C
1,421	96	Gravel surface, HSG A
387	96	Gravel surface, HSG C
4,275	98	Paved roads w/curbs & sewers, HSG A
1,630	98	Paved roads w/curbs & sewers, HSG C
704	98	Paved roads w/curbs & sewers, HSG D
4	98	Water Surface, HSG C
2	98	Water Surface, HSG D
2,343	30	Woods, Good, HSG A
15,830	71	Weighted Average
9,215		58.21% Pervious Area
6,615		41.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	50	0.0070	0.81		**Sheet Flow, SF1** Smooth surfaces n= 0.011 P2= 3.42"
2.5	292	0.0090	1.93		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
3.5	342	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 30P: South Street East (East Side)



Summary for Pond 3B: Infiltration Trench

Inflow Area = 0.020 ac, 98.63% Impervious, Inflow Depth > 6.82" for 100-year event
Inflow = 0.15 cfs @ 12.09 hrs, Volume= 0.011 af
Outflow = 0.15 cfs @ 12.10 hrs, Volume= 0.009 af, Atten= 0%, Lag= 0.6 min
Discarded = 0.00 cfs @ 12.10 hrs, Volume= 0.004 af
Primary = 0.14 cfs @ 12.10 hrs, Volume= 0.006 af
Routed to Link 2L : DP2: Steam

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 12.18' @ 12.10 hrs Surf.Area= 90 sf Storage= 102 cf

Plug-Flow detention time= 86.6 min calculated for 0.009 af (83% of inflow)
Center-of-Mass det. time= 37.2 min (772.2 - 735.0)

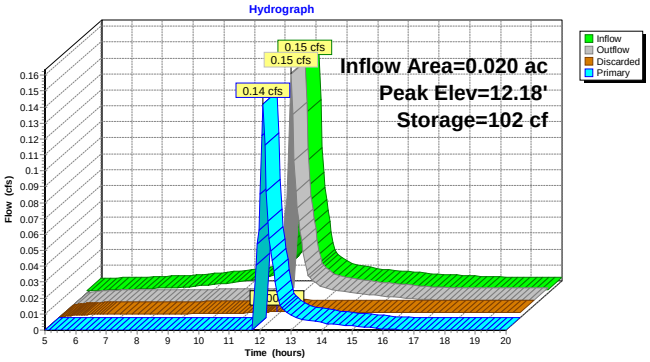
Volume	Invert	Avail.Storage	Storage Description
#1	10.00'	72 cf	**2.00'W x 45.00'L x 2.17'H Crushed Stone Trench** 195 cf Overall - 16 cf Embedded = 180 cf x 40.0% Voids
#2	11.00'	16 cf	**8.0" Round 8" Perforated Pipe** Inside #1 L= 45.0'
#3	11.00'	70 cf	**4.00'D x 5.57'H CB-6** -Impervious
		158 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	10.00'	**1.020 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 7.00'
#2	Primary	12.00'	**12.0" Vert. CB-6 Outlet** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.00 cfs @ 12.10 hrs HW=12.18' (Free Discharge)
↑**1=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=0.14 cfs @ 12.10 hrs HW=12.18' (Free Discharge)
↑**2=CB-6 Outlet** (Orifice Controls 0.14 cfs @ 1.44 fps)

Pond 3B: Infiltration Trench

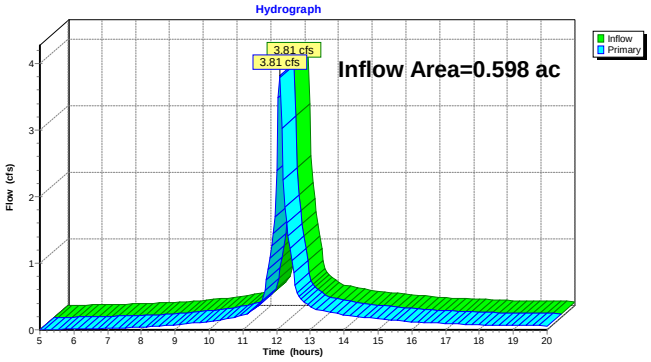


Summary for Link 1L: DP 1: Taunton River

Inflow Area = 0.598 ac, 73.57% Impervious, Inflow Depth > 5.38" for 100-year event
Inflow = 3.81 cfs @ 12.09 hrs, Volume= 0.268 af
Primary = 3.81 cfs @ 12.09 hrs, Volume= 0.268 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 1L: DP 1: Taunton River

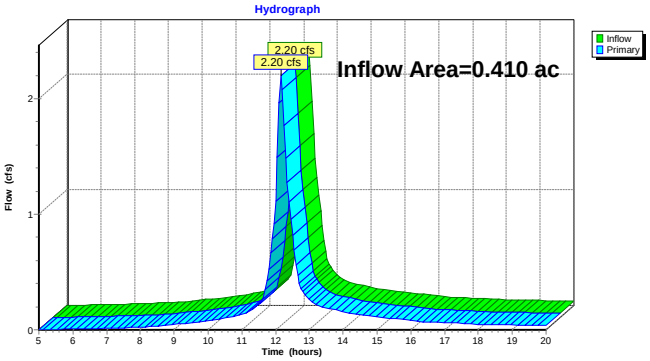


Summary for Link 2L: DP2: Steam

Inflow Area = 0.410 ac, 74.88% Impervious, Inflow Depth > 5.28" for 100-year event
Inflow = 2.20 cfs @ 12.16 hrs, Volume= 0.180 af
Primary = 2.20 cfs @ 12.16 hrs, Volume= 0.180 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 2L: DP2: Steam

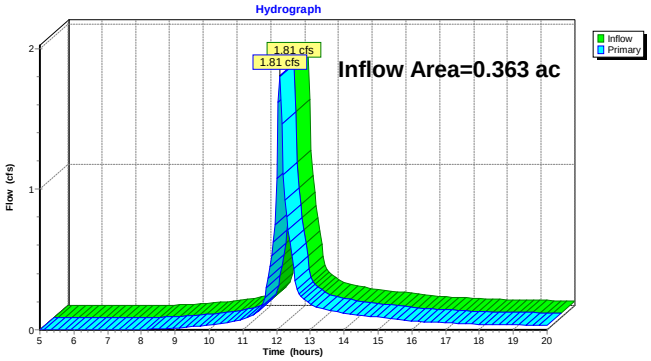


Summary for Link 3L: DP 3: Woodlands

Inflow Area = 0.363 ac, 41.79% Impervious, Inflow Depth > 4.04" for 100-year event
Inflow = 1.81 cfs @ 12.09 hrs, Volume= 0.122 af
Primary = 1.81 cfs @ 12.09 hrs, Volume= 0.122 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 3L: DP 3: Woodlands



Appendix E: O&M Plan and LTPPP

1

Stormwater Management System Operation and Maintenance (O&M) Plan

This Stormwater Management System Operation and Maintenance (O&M) Plan describes the approach for inspection and maintenance of drainage infrastructure and structural stormwater control measures (SCMs) to minimize contaminant loading for South Street East / Old Colony Ave in the Town of Raynham and City of Taunton, MA. In general, inspection and maintenance activities will be conducted consistent with the National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater Discharges from Small Municipal Separate Storm Sewer System (MS4).

This document has been prepared per the requirements of Massachusetts Department of Environmental Protection (MassDEP) Regulations 310 CMR 10.05 (6)(k)(9) and satisfies the requirements of Massachusetts Stormwater Standard 9.

1.1 Responsible Party

The Town of Raynham and City of Taunton will be responsible for the operation and maintenance of all stormwater management systems under their respective ownership within the project limits. Questions or concerns regarding activities associated with this O&M Plan should be addressed to the Raynham Highway Department located at 1555 King Phillip Street, Raynham, MA 02767, phone (508) 824-2718 and/or the Taunton Public Works Department located at 90 Ingell Street, Taunton, MA 02780, phone (508) 821-1431.

It shall be the responsibility of the Owner to provide a revised plan to the Conservation Commission indicating any change of ownership or responsible party. The responsible party shall also be responsible for financing maintenance and emergency repairs at the Site.

Project information is summarized in the following table:

Project Name:	South Street East / Old Colony Avenue
Project Type:	Transportation
Address:	Old Colony Ave, Taunton, MA, from approximately 75 feet north of Battle Row to the Taunton/Raynham Town Line South Street East , Raynham, MA, from the Taunton/Raynham Town Line to the north side of Sandy Hill Road.
SWMS Owner (Taunton):	Taunton Department of Public Works 90 Ingell Street, Taunton, MA
SWMS Owner (Raynham):	Raynham Highway Department 1555 King Phillip Street, Raynham, MA 02767
Responsible Party (Taunton):	Taunton Department of Public Works 90 Ingell Street, Taunton, MA
Responsible Party (Raynham):	Raynham Highway Department 1555 King Phillip Street, Raynham, MA 02767
Contact (Taunton):	Fred Cornaglia, Commissioner of Public Works (508) 821-1431
Contact (Raynham):	Norman Sturtevent, Superintendent (508) 824-2718

1.2 Inspection and Maintenance Measures and Record-Keeping

See Appendix F of the Stormwater Management Report for the proposed stormwater system within the project limits. The stormwater management system covered by this O&M Plan consists of the following measures:

- Deep Sump Catch Basins
- Infiltration Trench

The Town of Raynham and City of Taunton shall use a performance-based inspection and maintenance program for SCMs and catch basins. For SCMs, the overall approach is to inspect SCMs, and based on the results of the inspections, perform maintenance to preserve functionality. For catch basins, the overall approach is to perform maintenance at an interval that maintains the functionality of the catch basin (e.g., sump is less than 50% full of sediment). Catch basin inspections, including documentation of sediment accumulation, and maintenance will generally occur simultaneously.

The following table summarizes inspection requirements for each asset type.

Inspection Form	Applicable Stormwater Assets	Inspection Requirements
Inlets	› Catch basins	› Sediment accumulation › Trash/Debris accumulation › Signs of contamination › Frame and grate condition › Overall structure condition
SCMs	› Infiltration SCMs › Other SCMs	› SCM accessibility › Presence of standing water › Level of erosion › Sediment accumulation › Trash/Debris accumulation › Vegetation condition › Overall SCM condition
Storm Discharge Points	› Outlets to SCMs	› Presence of flow › Signs of contaminated flow › Sediment accumulation › Level of erosion › Pipe condition › Scour protection condition › Overall structure condition

Inspection and maintenance records can be made available by contacting the Town of Raynham Highway Department or the City of Taunton Department of Public Works. Representatives of each Town's Conservation Commission, MassDEP, and US EPA may obtain access to these records, upon request.

Maintenance actions will not occur at any set frequency, but rather will be based on condition and impact to functionality. Maintenance to be performed on the stormwater system includes:

Stormwater Feature	Potential Maintenance Actions	
Surface SCMs	• Remove and properly dispose of accumulated material (e.g., sediment, trash, leaf litter, debris) • Mow vegetated areas and remove and dispose of grass clippings • Regrade areas that show signs of unwanted ponding and channelization • Stabilize or reconstruct eroded areas and reseed • Replace stones/soil and/or replant vegetation	• Remove woody growth • Treat invasive plants • Address issues of standing water • Drain and reconstruct SCM • If rehabilitation is not possible, then retrofit to be a wet SCM while considering safety implications
Underground SCMs	• Remove and properly dispose of trash, sediment, debris, and root intrusions • Clean out sumps at an interval to maintain functionality (less than 50% full of sediment) • Jet and repair pipes	• Rehabilitate filtering and infiltration materials (e.g., geotextile fabric, crushed stone) • Stabilize and replace deteriorated structures • Perform evaluations (e.g., test pits) to evaluate subsurface conditions
Inlets and Outlets to SCMs	• Clear inlet and remove and properly dispose of sediment, trash, leaf litter, debris, and vegetation • Regrade areas that show signs of ponding and channelization • Repair or replace structural components • Repair damaged or eroded areas	• Provide or rehabilitate erosion control at the outlet • Regrade and replace the channel materials • Remove woody growth • Stabilize or reconstruct eroded areas • Treat invasive plants.

Based on the results of the inspection, repairs will be made in accordance with Town/City standard practices. Maintenance will be prioritized given the urgency of the required maintenance and availability of staff, contracts, etc. Maintenance may require contracting if existing maintenance personel are unavailable to perform the work. More intensive remedial activities may require permitting and/or an engineering solution.

Inspection, maintenance, and record keeping on will be performed in conjunction with the Town of Raynham / Taunton MS4 compliance requirements.

1.3 Erosion and Sediment Control Measures during Maintenance Activities

For maintenance activities that could result in discharges of sediments or other contaminants into wetlands, waterways, or other resource areas regulated under 310 CMR 10.00, the responsible maintenance personnel will employ measures to prevent migration of these sediments/contaminants. Such temporary measures may include, but are not necessarily limited to, the use of siltation barriers, catch basin silt sacks/filter bags, pipe plugs, cofferdams deployed within the stormwater structure, turbidity curtains, or other practices designed to prevent such discharges.

Where maintenance occurs in areas that are confined, with no risk of discharge to adjacent water bodies, no special measures may be needed. Examples include, but are not limited to: (1) cleaning of a forebay under dry conditions when the work can be completed and exposed surfaces stabilized prior to placing it back into service; and (2) catch basin cleaning where the activity is limited to removing material from a sump below the elevation of the outlet pipe.

1.4 O&M Budget

The Town of Raynham and City of Taunton perform maintenance for stormwater management systems as part of their routine operation and maintenance budget for roadways and bridges.

2

Long-Term Pollution Prevention Plan

This Long-Term Pollution Prevention Plan (LTPPP) describes the approach for pollution prevention and related maintenance activities for South Street East / Old Colony Ave in the Town of Raynham and City of Taunton, MA. In general, long-term pollution prevention and related maintenance activities will be conducted consistent with:

- The National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater Discharges from Small Municipal Separate Storm Sewer System (MS4),
- Measures outlined in the Town of Raynham's and City of Taunton's Stormwater Management Plans (SWMP).

This LTPPP satisfies the requirements related to pollution prevention under Massachusetts Stormwater Standards 4, 5, 6, and 10.

2.1 Practices for Long-Term Pollution Prevention

For the facilities covered, long-term pollution prevention includes the following measures.

2.1.1 Litter Pick-up

The municipalities will conduct litter pick-up from the stormwater management facilities in conjunction with routine road maintenance activities.

2.1.2 Material Storage and Handling

The following storage and handling practices shall be implemented at the Site:

- Avoid stockpiling of soil or materials within 100 feet of wetland resources and wellhead protection areas. If necessary, provide sufficient erosion controls to prevent migration of sediments.
- All materials shall be stored or disposed in accordance with all local, state, and federal regulations.
- All sand piles shall be contained and stabilized to prevent the discharge of sand to wetlands or water bodies and, where feasible, covered.
- Minimize hazardous materials stored on site. All materials stored on site shall be stored in original containers and sealed.
- All solid waste, if encountered, shall be handled and disposed of in accordance with all local, state, and federal regulations.
- No snow shall be stored within waterbodies, resource areas, wellhead protection areas, or associated buffer zones.

2.1.3 Inspection and Maintenance of Stormwater Assets

The municipalities will conduct inspection and maintenance of drainage infrastructure and the stormwater control measures (SCMs) in accordance with the O&M Plan, as described in Section 1.

2.1.4 Maintenance of Landscaped Areas

Routine mowing will be conducted according to standard Town practices. SCM basin bottoms and embankments designed to impound water should be mowed as required to prevent establishment of woody vegetation.

2.1.5 Snow and Ice Management

Snow and Ice Management will be conducted consistent with Town/City Snow and Ice Policy and Procedures.

2.1.6 Street Sweeping

Operations on Town-owned roadways with be conducted in accordance with Town Standard Operating Procedures.

2.1.7 Prohibition of Illicit Discharges

The MassDEP Stormwater Management Standard 10 prohibits illicit discharges to the stormwater management system. Illicit discharges are discharges that do not consist entirely of stormwater, except for certain specified non-stormwater discharges.

In accordance with the existing MS4 permit, examples of discharges from the following sources are not considered illicit discharges:

- Firefighting activities*
- Foundation drains
- Water line flushing
- Footing drains
- Landscape irrigation
- Individual residential car washing
- Uncontaminated groundwater
- Rising groundwater
- Diverted stream flows
- Flows from riparian habitats/wetlands
- Potable water sources
- Dechlorinated swimming pool water
- Street wash waters
- Wash water from residential buildings (no detergents)
- Condensation from air conditioning units
- Run-on from private driveways caused by precipitation
- Lawn watering
- Water from crawl space pumps

*Water from firefighting activities is allowed and need only be addressed where they are identified as significant sources of pollutants to waters of the United States.

Based on plan review and existing survey, there are no known or proposed illicit connections associated with the project. Should an interconnection to the stormwater management system be identified, the Town/City will determine if the connections are authorized. For unauthorized

connections, the Town/City will investigate the connections and if they are determined to be illicit, the connections will be managed through Town's/City's Illicit Discharge Detection and Elimination (IDDE) program.

2.1.8 Spill Prevention and Response

The following spill prevention and response measures shall be implemented at the Site:

- Refuel construction equipment off-site.
- Any spills of hazardous materials shall be reported, contained, and removed in accordance with local, State, and Federal regulations.
- Review on-site equipment and activities to ensure no illicit discharges are created.

3

Construction Period Pollution Prevention and Erosion and Sediment Control Plan

3.1.1 Introduction

The project is anticipated to disturb greater than one acre; therefore, filing a Notice of Intent with EPA and developing of a Stormwater Pollution Prevention Plan (SWPPP) is required. The SWPPP will be provided as part of the construction documents and will be submitted to the Town of Raynham and the City of Taunton Conservation Commission prior to commencement of construction. The following plan provides general guidance for the prevention of pollution and erosion and sedimentation during construction.

Potential Erosion and Sedimentation

Portions of the project involve soil disturbance in areas upgradient of stormwater collection systems and wetland resources. Site preparation, scheduling, and construction practices need to be carefully planned to prevent construction debris and erosion caused by stormwater runoff over exposed soils from causing degradation of downstream wetland resources. Although it is not always possible to avoid impacts from storm events, the following guidelines shall be followed:

- Minimize land disturbance area and soil exposure to stormwater and wind erosion.
- Minimize time that area is disturbed.
- Avoid routing stormwater runoff or dewatering flows through disturbed areas.
- Inspect and maintain erosion controls until all soils are stabilized.
- Maintain good housekeeping practices.
- Stabilize disturbed soils as soon as possible to limit exposure.

Erosion and Sedimentation Plan

This Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan has been prepared in accordance with the Department of Environmental Protection's Massachusetts Erosion and Sedimentation Guidelines for Urban and Suburban Areas.

Extent of Disturbance

The total area of disturbance is approximately 1.05± acres. The project has been designed to minimize disturbance to existing woodlands and the majority of proposed work is within an existing roadway and its associated right-of-way. The existing Site will be impacted by tree clearing/trimming, grading, roadway widening, sidewalk and shared use path construction, utility installation, and other associated activities. Off-site areas are not proposed to be

directly altered but may be impacted by erosion and sedimentation if the controls described in this plan are not followed. No off-site land disturbance is proposed.

Refer to construction drawings for locations of all proposed erosion and sedimentation controls and the proposed area of disturbance.

Pre-Construction and Site Preparation

- Install all erosion control barrier in accordance with the construction documents prior to commencing any land disturbance activity.
- Inspect and maintain erosion controls until all soils are stabilized.
- Monitor weather reports daily and stabilize/prepare site if storm event in excess of the 2-year storm is expected.
- Maintain an inspection logbook on-site at all times. The specific location of the logbook shall be conveyed to the Town.

3.1.2 Planned Erosion and Sedimentation Control Practices

Catch Basin Inlet Protection

Inlet protection is proposed at all existing and proposed drain inlets within the project area. Inlet protection shall also be provided at off-site drain inlets located immediately downgradient of the area of disturbance, pending coordination with the Town and/or abutting property owners.

The purpose of inlet protection is to intercept and capture sediment that would otherwise enter the drainage system. Inlet protection shall consist of manufactured polyproplylene fabric consistent with the construction details.

Inspection and maintenance shall consist of checking for sediment accumulation and removing sediment when the protection device is at least one-half full.

Sediment Control Barrier

Sediment control barrier is proposed along the downgradient limit of work, as depicted on the construction plans. Additional erosion control barrier may be required at other locations as needed.

The purpose of erosion control barrier is to intercept and capture sediment that would otherwise migrate off-site. Erosion control barrier shall consist of compost filter tubes, straw wattles, and silt fence.

Inspection and maintenance:

- Check for sedimentation accumulation and removing sediments when they reach excessive volumes (approximately 1/3 the height of the barrier).
- Remove sediments when runoff ponds for 24 or more hours to prevent potential mosquito breeding habitat. Restake/replace controls as necessary to maintain their effectiveness.

Control of Water

Control of water is proposed along the Taunton River upstream and downstream of the proposed bridge rehabilitation.

The purpose of control of water is redirect flows around the work area to prevent sedimentation transport downstream. The means and methods of the controls shall be the responsibility of contractor and will be based on their construction operations and the conditions at the site. Methods are anticipated to include temporary cofferdams and dewatering.

Inspection and maintenance, as applicable:

- Check for sediment accumulation, plant growth, or debris behind the control.
- Check for stability at anchoring points and identify any breaks in the control.
- Identify any areas where turbid water is passing through the control.
- Repair as necessary to maintain effectiveness.

Tree Protection

Tree protection is proposed at existing trees to remain near to the area of disturbance, as noted on the construction plans.

The purpose of tree protection is to minimize risk of damage to trees designated to remain. Tree protection shall consist of armoring, pruning, and/or fencing consistent with the construction details.

Temporary Seeding

Temporary seeding is proposed for disturbed areas which have remained exposed for more than 14 days.

The purpose of temporary seeding is to provide vegetative stabilization of loose soil to mitigate risk of erosion.

Inspection and maintenance:

- Confirm that vegetation has been established
- Provide additional seeding as needed

3.1.3 Additional Control Measures

Good Housekeeping

- Minimize hazardous materials stored on site. All materials stored on site shall be stored in original containers and sealed.
- Refuel construction equipment off-site.
- Any spills of hazardous materials shall be reported, contained, and removed in accordance with local, State, and Federal regulations.

Material Stockpiling

All construction materials shall be stored in designated stockpile areas. Stockpiles shall be surrounded with silt fence, straw wattles, and/or compost filter tubes to mitigate erosion potential. All waste materials shall be removed from the Site or placed in approved receptacles at the conclusion of each workday. Disposal of waste materials shall be in accordance with relevant local, state, and federal regulations.

Protection of Infiltration Areas

To protect the infiltrative capacity of proposed infiltration areas, SCMs shall be excavated as late as practicable in the construction sequence.

Potential Construction Site Pollutants

Pollutant-Generating Activity	Pollutants or Pollutant Constituents	Location on Site
Equipment Re-fueling	Diesel Fuel, Gasoline	Laydown Area
Leaking or Broken Hydraulic Lines	Hydraulic Oil	Building Work Areas and Laydown Area
Minor Equipment Maintenance	Diesel Fuel, Gasoline, Hydraulic Oil, Motor Oil, Anti-Freeze	Laydown Area
Applying Fertilizer	Nitrogen, Phosphorous	Newly Seeded Areas
Portable Sanitary Toilets	Bacteria, Parasites and Viruses	Laydown Area
Vehicle Accident	Diesel Fuel, Gasoline	Entire Site
Trash Containers/Dumpsters	Paper, Plastic, and Food Waste	Laydown Area

Refer to Long-Term Pollution Prevention Plan, included as Section 2, for measures to be implemented to minimize pollutant discharges.

Proposal No. 613642 - 136413

RAYNHAM / TAUNTON
SOUTH STREET EAST / OLD COLONY AVE

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA		1	1
PROJECT FILE NO.	613642		

OPERATION AND MAINTENANCE MAP

NAD 83

N

TAUNTON RIVER

SANDY HILL STREET

SOUTH STREET EAST

OLD COLONY AVE

0+00

9+00

CATCH BASIN OR GUTTER INLET (TYP.)

EXISTING OUTFALL

RECONSTRUCTED OUTFALL

PROP INFILTRATION TRENCH

TAUNTON RIVER

TAUNTON RAYNHAM

1 2 4 5 6 7 8

0 60 150

SCALE: 1" = 60'

10887_WATERSHED_O&M.DWG Plotted on 29-Jan-2026 10:36 AM

A00840 - 172

Appendix F: Watershed Plans

RAYNHAM / TAUNTON
SOUTH STREET EAST / OLD COLONY AVE

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA		1	2
PROJECT FILE NO.	613642		

WATERSHED PLAN - PRE DEVELOPMENT

NAD 83

N

TAUNTON RIVER

DP 1:
TAUNTON RIVER

APPROX. WATERSHED
BOUNDARY (TYP.)

SUBCATCHMENT 1E
OLD COLONY AVE
INCUDING AREAS
ALONG TAUNTON RIVER

1L

2L

DP 2:
STREAM

651
UDORTHENTS,
SMOOTHED
HSG A

SUBCATCHMENT 2E
SOUTH STREET EAST
(WEST SIDE)

SANDY HILL STREET

1E

2E

3E

3L

1

2

3

4

5

6

7

8

0+00

9+00

OLD COLONY AVE

SOUTH STREET EAST

APPROX.
FLOWPATH (TYP.)

602
URBAN LAND
ASSUME HSG A

DP 3:
WOODLANDS

SUBCATCHMENT 3E
SOUTH STREET EAST
(EAST SIDE)

TAUNTON RIVER

TAUNTON
RAYNHAM

SOIL GROUP
BOUNDARY (TYP.)

9A
BIRDSAIL SILT
LOAM
HSG C/D

1
WATER
USE HSG D

LEGEND

APPROX. WATERSHED BOUNDARY

SOIL GROUP BOUNDARY

APPROX. FLOWPATH

0 60 150

SCALE: 1" = 60'

10887_WATERSHED_EXIST.DWG Plotted on 29-Jan-2026 8:57 AM

RAYNHAM / TAUNTON
SOUTH STREET EAST / OLD COLONY AVE

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA		2	2
PROJECT FILE NO.	613642		

WATERSHED PLAN - POST DEVELOPMENT

Plotted on 29-Jan-2026 8:57 AM
10887_WATERSHED_PROP.DWG

NAD 83
N

TAUNTON RIVER

DP 1:
TAUNTON RIVER

1L

APPROX. WATERSHED
BOUNDARY (TYP.)

SUBCATCHMENT 10P
OLD COLONY AVE
INCUDING AREAS ALONG
TAUNTON RIVER

2L

DP 2:
STREAM

651
UDORTHENTS,
SMOOTHED
HSG A

SUBCATCHMENT 20P
SOUTH STREET EAST
(WEST SIDE)

SANDY HILL STREET

10P

20P

21P

30P

3L

1

2

4

5

6

7

8

9+00

0+00

OLD COLONY AVE

SOUTH STREET EAST

APPROX.
FLOWPATH (TYP.)

602
URBAN LAND
ASSUME HSG A

SUBCATCHMENT 21P
CATCHMENT TO
INFILTRATION TRENCH

PROP PAVEMENT
DISCONNECTION

DP 3:
WOODLANDS

SUBCATCHMENT 30P
SOUTH STREET EAST
(EAST SIDE)

TAUNTON RIVER

TAUNTON
RAYNHAM

SOIL GROUP
BOUNDARY (TYP.)

9A
BIRDSAIL SILT
LOAM
HSG C/D

1
WATER
USE HSG D

LEGEND

- APPROX. WATERSHED BOUNDARY
- SOIL GROUP BOUNDARY
- APPROX. FLOWPATH

0 60 150
SCALE: 1" = 60'

Appendix G: SCM Analysis Plan

RAYNHAM/TAUNTON
SOUTH STREET E./OLD COLONY AVE.

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	######	1	2
PROJECT FILE NO.	613642		

STORMWATER CONTROL MEASURE ANALYSIS PLAN

Plotted on 29-Jan-2026 10:44 AM

613642_HDI(10887 STORMWATER CONTROL MEASURE ANALYSIS).DWG

N

RIVER BEND CONDOMINIUMS
PARCEL ID: 95-203
MASTER DB/PG 3240/265
PB/PG 66/26-27 LOTS 10 & 2
96 OLD COLONY AVENUE – EAST TAUNTON,MA
AREA=753,970 S.F.

CITY OF TAUNTON BOARD OF SEWER COMMISSIONERS
EASEMENT – PLAN BOOK 99, PAGE 47
DEED BOOK 1467, PAGE 383 (1965)

COMMONWEALTH OF MASSACHUSETTS
(MASSACHUSETTS BAY TRANSPORTATION AUTHORITY)
PARCEL ID: 96-193
DB/PG 2264/52
0 RR – TAUNTON,MA

JAMES THOMAS & LISA B. DIFFLEY
PARCEL ID: 96-15
DB/PG 25685/348
88 OLD COLONY AVENUE – EAST TAUNTON,MA

MBTA PERMANENT EASEMENT
ORDER OF TAKING NO. 737
MS-31-PE
DB/PG 25571/41

BATTLE ROW
(PRIVATE)

RIVER BEND CONDOMINIUMS DWY (PRIVATE)

OLD COLONY AVE
(PUBLIC)

BUILDING SET-BACK LINE – SEE PB. 14, PG. 72

PROJECT BEGIN
N2783608.4781
E784198.0476
STA 1+10

MBTA PERMANENT EASEMENT
ORDER OF TAKING NO. 753 MS-29-PE
DB/PG 25786/251

MBTA
ORDER OF TAKING NO. 753 – MS-29
DB/PG 25786/251

RR
PARCEL ID: 96-194
DB/PG 0/0
0 RR – TAUNTON,MA

TMLP
PARCEL ID: 96-34
DB/PG 1606/1047
91 OLD COLONY AVENUE – TAUNTON,MA

103 COLONY LLC
PARCEL ID: 96-1
DB/PG 25006/40
103 OLD COLONY AVENUE – TAUNTON,MA
AREA=68,014 S.F.

CITY OF TAUNTON – BOARD OF SEWER COMMISSIONERS
EASEMENT – PLAN BOOK 99, PAGE 48
DEED BOOK 1467, PAGE 383 (1965)

DEED CALLS BOUNDING ON THE RIVER.
PLAN BOOK 70, PAGE 67
SHOWS TO WATER EDGE

TAUNTON RIVER

OWNER UNKNOWN

OWNER UNKNOWN

RIGHT OF WAY – SEE PLAN BK. 66, PG. 70
NO GRANT FOUND
BENEFICIARY UNKNOWN

LINE AS SHOWN ON PLAN BK. 66, PG. 70
NORTHERLY BANK OF TAUNTON RIVER (DEED)

FEMA FLOOD ZONE
= 14.40'

TAUNTON RIVER

OF RIVER PER PLAN BK. 66, PG. 26

TOWN OF RAYNHAM – CONSERVATION COMMISSION
ASSESS. MAP 17 – PARCEL ID: 17-2
DB PG 8016/190
PB/PG 66/70
0 SOUTH STREET EAST – RAYNHAM,MA
AREA=167,683 S.F.

TOWN OF RAYNHAM –
BOARD OF SELECTMEN
PARCEL ID: 17-1
DB/PG 5117/145
0 SOUTH STREET EAST –
RAYNHAM,MA
AREA=14,102 S.F.

APPROXIMATE BOUNDARY OF TOPOGRAPHY PROHIBITIVE TO INSTALLATION OF SCMS (TYP).

AREAS SOUTH OF BRIDGE EXCLUDED FROM SCM CONSIDERATION DUE TO LIMITED RIGHT-OF-WAY, PRESENCE OF UTILITIES, AND PROXIMITY OF PRIVATE FEATURES.

AREA CONSIDERED FOR SUBSURFACE LEACHING SYSTEM. EXCLUDED DUE TO SETTLEMENT CONCERNS WITHIN LIMIT OF SIDEWALK AND GREATER SUITABILITY PROVIDED WHERE SCMS ARE CURRENTLY PROPOSED.

SOUTH STREET EAST
(PUBLIC)

CONTINUED ON SHEET 2

AREAS CONSIDERED FOR SUBSURFACE LEACHING BASINS BUT EXCLUDED DO TO PROXIMITY TO EXISTING SEWER MAIN.

SMH
Rim=17.14
INV=0.54 BOTTOM
INV=17.14 NO PIPES VISIBLE

DMH
Rim=16.00
INV= 16.00 UNABLE TO OPEN

TOWN OF RAYNHAM
PARCEL ID: 17-151A
DB/PG 6266/303
PB/PG 342/58
9 SOUTH STREET EAST – RAYNHAM,MA

AREA CONSIDERED FOR SUBSURFACE LEACHING SYSTEM. EXCLUDED DUE TO LIMITED IMPERVIOUS CATCHMENT, INABILITY TO ADEQUATELY PROVIDE OUTLET, AND GREATER SUITABILITY WHERE SCMS ARE CURRENTLY PROPOSED.

APPROXIMATE BOUNDARY OF TOPOGRAPHY PROHIBITIVE TO INSTALLATION OF SCMS (TYP).

NOT TO SCALE

SELPAN ASSOCIATES LIMITED
PARCEL ID: 17-151
DB/PG 7993/68
0 SOUTH STREET EAST – RAYNHAM,MA
AREA=71,376 S.F.

TOWN OF RAYNHAM
PARCEL ID: 17-148
DB/PG 8016/190
PB/PG 66/70
0 SOUTH STREET EAST – RAYNHAM,MA

SMH
Rim=21.05
INV=6.40 (A) 12" VC
INV=6.45 (B) 12" VC

SMH
Rim=18.43
INV=6.48 (A) 8" AC
INV=6.48 (B) 12" VC
INV=6.43 (C) 12" VC

SMH
Rim=20.34
INV=6.34 (A) 12" VC
INV=6.39 (B) 12" VC
INV=6.39 (C) 12" VC

SMH
Rim=18.56
INV=6.66 (A) 12" VC
INV= 6.66 (B) 12" VC

SMH Rim=17.70
INV = 9.30 (A) 8" AC (ABAND)
INV= 17.70 (B) NOT VISIBLE

CB
Rim=17.73
INV=13.03 12" RCP
11.83 BOTTOM

CB
Rim=17.56
INV=12.66 (A) 12" RCP
13.26 (B) 12" RCP
13.36 (C) 12" CMP
13.01 (D) 15" RCP

RAYNHAM/TAUNTON
SOUTH STREET E./OLD COLONY AVE.

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	######	2	2
PROJECT FILE NO.	613642		

STORMWATER CONTROL MEASURE ANALYSIS PLAN

Plotted on 29-Jan-2026 10:44 AM

613642_HDI10887 STORMWATER CONTROL MEASURE ANALYSIS).DWG

RIVER BEND CONDOMINIUMS
PARCEL ID: 95-203
MASTER DB/PG 3240/265
PB/PG 66/26-27 LOTS 10 & 2
96 OLD COLONY AVENUE – EAST TAUNTON,MA
AREA=753,970 S.F.

TAUNTON RIVER

TOWN OF RAYNHAM – CONSERVATION COMMISSION
ASSESS. MAP 17 – PARCEL ID: 17-2
DB PG 8016/190
PB/PG 66/70
0 SOUTH STREET EAST – RAYNHAM,MA
AREA=167,683 S.F.

TOWN OF RAYNHAM –
BOARD OF SELECTMEN
PARCEL ID: 17-1
DB/PG 5117/145
0 SOUTH STREET EAST –
RAYNHAM,MA
AREA=14,102 S.F.

AREA CONSIDERED FOR SUBSURFACE LEACHING SYSTEM. EXCLUDED DUE TO SETTLEMENT CONCERNS WITHIN LIMIT OF SIDEWALK AND GREATER SUITABILITY PROVIDED WHERE SCMS ARE CURRENTLY PROPOSED.

APPROXIMATE BOUNDARY OF TOPOGRAPHY PROHIBITIVE TO INSTALLATION OF SCMS (TYP).

AREA EXCLUDED FROM SCM CONSIDERATION DUE TO POTENTIAL CLASSIFICATION OF ARTICLE 97 LAND.

SABA A. NESSRALLA AND AHLAM NESSRALLA
PARCEL ID: 17-37-3
DB/PG 4796/244
58 SOUTH STREET EAST – RAYNHAM,MA

LOIS A. HASKINS
PARCEL ID: 17-3
DB/PG 11594/76
40 SOUTH STREET
EAST – RAYNHAM,MA
AREA= 5,447 S.F.

SOUTH STREET EAST
(PUBLIC)

SANDY HILL STREET
(PUBLIC)

CONTINUED ON SHEET 1

AREAS CONSIDERED FOR SUBSURFACE LEACHING BASINS BUT EXCLUDED DO TO PROXIMITY TO EXISTING SEWER MAIN.

AREA CONSIDERED FOR LINEAR INFILTRATION BASIN AND EXCLUDED DUE TO PROXIMITY TO ROADWAY, UNDERGROUND UTILITY CONFLICTS, AND MAINTENANCE/FAILURE CONCERNS FROM PLOWING OPERATIONS. AREA IS CURRENTLY PROPOSED TO SERVE AS LID COUNTRY DRAINAGE AREA.

STREET LINE FROM PB 60, PG 70

PROJECT END
N2784340.0230
E784178.5228
STA 8+51

TOWN OF RAYNHAM
PARCEL ID: 17-151A
DB/PG 6266/303
PB/PG 342/58
9 SOUTH STREET EAST – RAYNHAM,MA

AREA CONSIDERED FOR SUBSURFACE LEACHING SYSTEM. EXCLUDED DUE TO LIMITED IMPERVIOUS CATCHMENT, INABILITY TO ADEQUATELY PROVIDE OUTLET, AND GREATER SUITABILITY WHERE SCMS ARE CURRENTLY PROPOSED.

APPROXIMATE BOUNDARY OF TOPOGRAPHY PROHIBITIVE TO INSTALLATION OF SCMS (TYP).

SELPAN ASSOCIATES LIMITED
PARCEL ID: 17-151
DB/PG 7993/68
0 SOUTH STREET EAST – RAYNHAM,MA
AREA=71,376 S.F.

TOWN OF RAYNHAM
PARCEL ID: 17-148
DB/PG 8016/190
PB/PG 66/70
0 SOUTH STREET EAST – RAYNHAM,MA

RIGHT OF WAY – SEE PLAN BK. 66, PG. 70

NOT TO SCALE

BETA
www.BETA-Inc.com

APPENDIX F

- **USFW Section 7 Documentation**
- **EFH Documentation**

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New England Ecological Services Field Office
70 Commercial Street, Suite 300
Concord, NH 3301-5094
Phone: (603) 223-2541 Fax: (603) 223-0104

In Reply Refer To: 12/18/2025 17:10:42 UTC
Project code: 2026-0024808
Project Name: 613642- RAYNHAM- TAUNTON- BRIDGE REPLACEMENT, R-02-003, SOUTH STREET EAST OVER THE TAUNTON RIVER

Subject: Not Likely to Adversely Affect Concurrence verification letter for the '613642- RAYNHAM- TAUNTON- BRIDGE REPLACEMENT, R-02-003, SOUTH STREET EAST OVER THE TAUNTON RIVER' project under the December 13, 2024, FHWA, FRA, FTA Programmatic Biological Opinion for Transportation Projects within the Range of the Indiana Bat, Northern Long-eared Bat, and Tricolored Bat.

To whom it may concern:

This letter records the determination of effects to federally listed (or proposed) bat species anticipated to result from the 613642- RAYNHAM- TAUNTON- BRIDGE REPLACEMENT, R-02-003, SOUTH STREET EAST OVER THE TAUNTON RIVER (the Project). This determination is based upon information you entered into the assisted determination key (Dkey) associated with the above referenced Programmatic Biological Opinion/Conference Opinion (PBO/PCO) in the U.S. Fish and Wildlife Service's (Service) Information for Planning and Consultation (IPaC) system on the date listed above to verify that the Project may rely on the concurrence provided in the PBO/PCO to satisfy requirements under section 7(a)(2) of the Endangered Species Act of 1973 (ESA) (16 USC 1536), as amended.

Ensuring Accurate Determinations When Using IPaC:

The Service developed the IPaC system and this Dkey in accordance with the ESA and based on the PBO/PCO. All information submitted by the project proponent into IPaC must accurately represent the full scope and details of the Project.

Failure to accurately represent or implement the Project as detailed in the Dkey invalidates this letter. Answers to certain questions in the Dkey commit the project proponent to implementation of conservation measures that must be followed for the ESA determinations to remain valid. Carefully review this letter, your ESA requirements are <u>NOT</u> yet complete.

Determinations:

Based on the information you provided (Project Description shown below), you have determined that the Project is within the scope and adheres to the criteria of the PBO/PCO, including the adoption of applicable avoidance and minimization measures. Based on your IPaC submission and the PBO/PCO, the Project is consistent with the following effect determinations:

Species	Listing Status	Determination
Northern Long-eared Bat (*Myotis septentrionalis*)	Endangered	NLAA
Tricolored Bat (*Perimyotis subflavus*)	Proposed Endangered	NLAA

The tricolored bat is proposed for listing as endangered under the ESA, but not yet listed. For actions that may affect a proposed species, agencies cannot consult, but they can confer under the authority of section 7(a)(4) of the ESA. Such conferences can follow the procedures for a consultation and be adopted as such if the proposed species is listed. Should the tricolored bat be listed, agencies must review projects that are not yet complete, or projects with ongoing effects within the tricolored bat range that previously received a no effect or not likely to adversely affect (NLAA) determination from the key to confirm that the determination is still accurate.

The Service has 14 calendar days to notify the lead Federal action agency or designated non-federal representative if we determine that the Project does not meet the criteria for a NLAA determination under the PBO/PCO. **If the Service does <u>not</u> notify the lead Federal action agency or designated non-federal representative within that timeframe, you may proceed with the Project under the terms of the NLAA concurrence provided in the PBO/PCO**. This verification period allows Service Field Offices to apply local knowledge to implementation of the PBO, as we may identify a small subset of actions having impacts that were unanticipated. In such instances, Service Field Offices may request additional information that is necessary to verify inclusion of the proposed action under the PBO/PCO.

If the Project is modified, or new information reveals that it may affect the Indiana bat, northern long-eared bat, or tricolored bat in a manner or to an extent not considered in the PBO/PCO, further review to conclude the requirements of ESA section 7(a)(2) may be required.

For Proposed Actions that include bridge/culvert or structure removal, replacement, and/or maintenance activities:

If your initial bridge, culvert, or structure assessment failed to detect Indiana bat, northern long-eared bat, or tricolored bat use or occupancy, yet bats are later detected prior to, or during construction, promptly notify the local Service Field Office within 2 working days of the discovery. In addition, please document whether incidental take occurred, and if so, the type (i.e. kill or harm) and amount (i.e. number of individuals) and submit documentation to the local Service Field Office within 5 working days from the completion of the bridge, culvert, or structure construction (use Appendix E - Post Assessment Discovery of Bats at Bridge/Culvert or Structure Form in the User's Guide). In these instances, potential incidental take of Indiana bats, northern long-eared bats, or tricolored bats may be exempted provided that the take is reported to

the Service. In these instances, potential incidental take of Indiana bats, northern long-eared bats, or tricolored bats may be exempted provided that the take is reported to the Service.

If the Project may affect any other federally listed or proposed species and/or designated critical habitat, additional consultation between the lead Federal action agency and this Service Field Office is required for those species/designated critical habitat. If the Project has the potential to take bald or golden eagles, additional coordination with the Service under the Bald and Golden Eagle Protection Act may also be required. In either of these circumstances, please advise the lead Federal action agency to contact this Service Field Office

The following species may occur in your project area and **are not** covered by this determination:

- Monarch Butterfly *Danaus plexippus* Proposed Threatened
- Plymouth Redbelly Turtle = Plymouth Redbelly Cooter *Pseudemys rubriventris bangsi* Endangered

PROJECT DESCRIPTION

The following project name and description was collected in IPaC as part of the endangered species review process.

NAME

613642- RAYNHAM- TAUNTON- BRIDGE REPLACEMENT, R-02-003, SOUTH STREET EAST OVER THE TAUNTON RIVER

DESCRIPTION

RAYNHAM- TAUNTON- BRIDGE REPLACEMENT, R-02-003=T-01-004 (3M4), SOUTH STREET EAST OVER THE TAUNTON RIVER

The proposed project consists of replacing the bridge deck, increasing safety, and improving operations of the roadway. The proposed design relocates the existing bridge sidewalk from the east to the west side of the bridge to connect to an existing sidewalk on the southwest approach. A 5-foot shoulder for a bike lane in the northbound direction improves safety by providing dedicated space for cyclists, separating them from vehicular traffic. This separation reduces the risk of conflicts between cyclists and vehicles.

Monarch Butterfly: Proposed Threatened Species only. The project action will not jeopardize the continued existence of the proposed species.

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@41.88630155,-71.03005054127355,14z

DETERMINATION KEY RESULT

Based on your answers provided, this project(s) may affect, but is not likely to adversely affect the Indiana bat, northern long-eared bat or tricolored bat, therefore, consultation with the U.S. Fish and Wildlife Service pursuant to Section 7(a)(2) of the Endangered Species Act of 1973 (ESA) (87 Stat. 884, as amended 16 U.S.C. 1531 et seq.) is required. However, also based on your answers provided, this project may rely on the concurrence provided in the Programmatic Biological Opinion/Conference Opinion for Transportation Projects in the Range of the Indiana bat, northern long-eared bat, and tricolored bat, dated December 13, 2024.

QUALIFICATION INTERVIEW

1. Which Federal Agency is the lead federal agency the action?

   A) Federal Highway Administration (FHWA)

2. Does the Action Area intersect the species list area of the Northern long-eared bat?

   Automatically answered
   Yes

3. Does the Action Area intersect the species list area of the tricolored Bat (TCB)?

   Automatically answered
   Yes

4. [Semantic] Is any portion of the action area within a 0.5 mile radius of an entrance/opening to any known NLEB or TCB hibernacula?

   Note: The map queried for this question contains proprietary information and cannot be displayed. If you need additional information, please contact the Field Office listed in the letterhead of this letter.

   Automatically answered
   No

5. Does your project's activities include raising the road profile above the tree canopy in documented habitat for the Indiana bat, NLEB, or TCB?

   Note: For the definition of documented habitat, refer to Appendix A: https://www.fws.gov/media/users-guide-range-wide-programmatic-consultation-indiana-bat-and-northern-long-eared-bat

   No

6. Is your project located within a karst area?

   No

7. Will the project include bridge, culvert, or structure removal, replacement, and/or alteration activities?

   Note: For definitions of bridge, culvert, and structure, refer to Appendix A: https://www.fws.gov/media/users-guide-range-wide-programmatic-consultation-indiana-bat-and-northern-long-eared-bat.

   Yes

8. Do your project's activities involve tree removal/trimming, temporary lighting, new/additional permanent lighting, ground disturbance, percussives that involves noise/vibration above existing background levels, vibrations, or slash pile burning?

   Yes

9. Is there suitable summer habitat for the Indiana bat, NLEB, or TCB within the project action area?

   Note: See the Service's summer survey guidance for current definitions of suitable habitat [https://www.fws.gov/midwest/endangered/mammals/inba/inbasummersurveyguidance.html].

   Yes

10. Have P/A surveys for the Indiana bat, NLEB, or TCB been conducted within the suitable summer habitat located within your project action area? This refers to mist-netting or acoustic surveys, not bridge assessments.

    Note: See the Service's survey guidance https://www.fws.gov/midwest/endangered/mammals/inba/inbasummersurveyguidance.html

    Yes

    SUBMITTED DOCUMENTS

    - *Raynham_613642_memo_20251027.pdf https://ipac.ecosphere.fws.gov/project/A3767GZ2FBHULEJFUCBVE3PERE/projectDocuments/173932326*

11. Did the P/A surveys detect Indiana bats, NLEBs, or TCBs?

    Note: If Indiana bats, NLEBs, or TCBs are detected, the action area is considered **documented habitat.**

    No

12. Did the local Service Field Office verify that this P/A survey can be used to determine Indiana bat, NLEB, and TCB are **not likely to be present** within the suitable summer habitat located within your project area?

    Yes

13. Will the project include **bridge** removal, replacement, and/or alteration activities?

    Yes

14. Has a Bridge Bat Assessment been conducted **within the last 24 months** to determine if the bridge is being used by the Indiana bat, NLEB, or TCB? If yes, upload assessment.

    Note: Refer to the Service's current survey guidance for acceptable assessment practices and validity timeframe of bridge/culvert and structure bat assessments: https://www.fws.gov/library/collections/range-wide-indiana-bat-and-northern-long-eared-bat-survey-guidelines.

    Yes

    SUBMITTED DOCUMENTS

    - *Raynham_613642_memo_20251027.pdf https://ipac.ecosphere.fws.gov/project/A3767GZ2FBHULEJFUCBVE3PERE/projectDocuments/173932326*

15. Please select one of the following results of the Bridge Bat Assessment:

    c) *Indicates the* ***absence*** *of Indiana bats, NLEBs, or TCBs roosting in/under the bridge (no bats, guano, etc.)?*

16. Does the project include **culvert** removal, replacement, and/or alteration activities?

    No

17. Does the project include **structure** removal, replacement, and/or alteration activities?

    No

18. Does the Action Area intersect the species list area of the tricolored Bat (TCB)?

    Automatically answered
    Yes

19. Does the Action Area intersect the species list area of the northern long-eared bat (NLEB)?

    Automatically answered
    Yes

PROJECT QUESTIONNAIRE

1. Have you made a No Effect determinations for all other species included on the FWS IPaC generated species list?

   Yes

2. Have you made a May Affect determination for any other species on the FWS IPaC generated list?

   No

3. Please enter the date of the bridge assessment.

   6/2/2025

AVOIDANCE AND MINIMIZATION MEASURES (AMMS)

This determination key result includes the commitment to implement the following Avoidance and Minimization Measures (AMMs):

GAMM1

Ensure all operators, employees, and contractors working in areas of Indiana bat, NLEB, or TCB suitable habitat are aware of all Transportation Agency environmental commitments, including all applicable AMMs.

DETERMINATION KEY DESCRIPTION: FHWA, FRA, FTA PROGRAMMATIC CONSULTATION FOR TRANSPORTATION PROJECTS AFFECTING IBAT, NLEB, OR TCB

This key was last updated in IPaC on September 11, 2025. Keys are subject to periodic revision.

This decision key is intended for projects/activities funded or authorized by the Federal Highway Administration (FHWA), Federal Railroad Administration (FRA), and/or Federal Transit Administration (FTA), which may require consultation with the U.S. Fish and Wildlife Service (Service) under Section 7 of the Endangered Species Act (ESA) and may affect the federally listed endangered Indiana bat (*Myotis sodalis*), northern long-eared bat (*Myotis septentrionalis*), and/or federally proposed endangered tricolored bat (*Perimyotis subflavus*).

This decision key should only be used to verify project applicability with the Service's Programmatic Biological Opinion/Conference Opinion for Transportation Projects in the Range of the Indiana bat, northern long-eared bat, and tricolored bat, dated December 13, 2024. The programmatic consultation limited transportation activities that may affect the covered bat species and addresses situations that are both likely and not likely to adversely affect the covered bat species. This decision key will assist in identifying the effect of a specific project/activity and the applicability of the programmatic consultation. The programmatic consultation is not intended to cover all types of transportation actions. Activities outside the scope of the programmatic consultation, or that may affect ESA-listed species other than the Indiana bat, northern long-eared bat, or tricolored bat, or their designated critical habitat, may require additional ESA Section 7 consultation.

IPAC USER CONTACT INFORMATION

Agency: Massachusetts Department of Transportation
Name: Stephanie Barton
Address: 10 Park Plaza
City: Boston
State: MA
Zip: 02116
Email stephanie.g.barton@dot.state.ma.us
Phone: 8572623378

Appendix A. Verification Form (updated January 2025)

Federal Highway Administration (FHWA) or the applicable state Department of Transportation (DOT) shall submit a signed version of this completed form, together with any project plans, maps, supporting analyses, etc., to NOAA's National Marine Fisheries Service (NMFS), Greater Atlantic Regional Fisheries Office, Protected Resources Division (GARFO PRD) at nmfs.gar.esa.section7@noaa.gov with "FHWA GARFO NLAA Program: [Project Title or Number]" in the subject line. **Note:** project design contractors and/or consultants may assist in preparing the form, but only FHWA/DOT staff shall sign off on it on the final page.

Project Activity Type (check all that apply to the entire action):

- [x] 1. Bridge repair, demolition, or replacement project
- [ ] 2. Culvert repair or replacement project
- [ ] 3. Dock, pier, or waterway access project (includes construction, demolition, and repairs)
- [ ] 4. Slope stabilization project

Transportation Project Information

Name of Project:	613642 RAYNHAM- TAUNTON- BRIDGE REPLACEMENT, R-02-003=T-01-004		
Reinitiation (Yes/No):	No		
State DOT/Program:	MassDOT		
DOT ID Code:	613642		
Contact Person:	Dave Paulson		
Phone:	+ 1 857 262 3378	Email:	david.j.paulson@dot.state.ma.
Project Latitude (e.g., 42.625884):		41.886006	
Project Longitude (e.g., -70.646114):		-71.030015	
Maximum Water Depth (m)		2.3	
Anticipated Project Start Date:	Decemeber 2026	Anticipated Project End Date:	October 2028
City/Town:	Taunton/ Raynham MA	Water body:	Taunton River
Project/Action Description and Purpose:	The Massachusetts Department of Transportation (MassDOT – Highway Division) Is proposing a reconstruction of the Old Colony Avenue Bridge over the Taunton River. The overall project limits extend 250' north of the intersection of Old Colony Avenue and Battle Row in Taunton, MA; along the Old Colony Avenue Bridge; and 370' to the intersection of South Street East and Sandy Hill Road, in Raynham, MA . The total length of the Project is approximately 790' along Old Colony Avenue and South Street East. The Project will consist of several activities including: Bridge deck replacement; Full depth pavement construction in the vicinity of the bridge; Pavement milling and overlay to the north and south of the bridge; Modifications to roadway geometry; Construction of a new sidewalk; New granite curbing; Striping of two travel lanes and a bike lane; Installation of Americans With Disabilities Act (ADA)-Compliant Ramps; Replacement of Guardrails; Paving of an existing town-owned gravel area associated with the pump station; Modifications to water, sewer, gas, electric and drainage utilities; Installation of a sediment forebay and leaching basins; Placement of riprap scour protection within the Taunton River; and Tree clearing and trimming. The Project only proposes the replacement of the superstructure and will maintain the existing substructure (i.e., piers and abutments). The project will result in temporary and permanent impacts to federally jurisdictional Waters of the U.S. including the land below Ordinary High Water (Streambank and Streambed) associated with the Taunton River. The Project will result in a total of 13,270		

ESA-listed species and/or critical habitats in the action area (Check all that apply)

☑	Atlantic sturgeon (all DPSs)	☐	Kemp's ridley sea turtle
☐	Atlantic sturgeon critical habitat Indicate which DPS (GOM, NYB, Chesapeake Bay DPSs): Select DPS	☐	Loggerhead sea turtle (Northwest Atlantic DPS)
☐	Shortnose sturgeon	☐	Leatherback sea turtle
☐	Atlantic salmon (GOM DPS)	☐	North Atlantic right whale
☐	Atlantic salmon critical habitat (GOM DPS)	☐	North Atlantic right whale critical habitat
☐	Green sea turtle (North Atlantic DPS)	☐	Fin whale

* Please consult GARFO PRD's ESA Section 7 Mapper for ESA-listed species and critical habitat information for your action area at: https://www.fisheries.noaa.gov/new-england-mid-atlantic/consultations/section-7-species-critical-habitat-information-maps-greater.

The following stressors are applicable to the action:

- ☐ Underwater Noise
- ■ Impingement/Entrainment and Entanglement
- ■ Water Quality/Turbidity
- ■ Habitat Alteration
- ☐ Vessel Traffic

Impacts Table

Habitat Alteration		
	Permanent (acres)	Temporary (acres)
Sand (saline)		
Silt/Mud/Clay (saline)		
Hard bottom (saline)		
Submerged Aquatic Vegetation (SAV) (saline)		
Sand (freshwater)		
Silt/Mud/Clay (freshwater)	0.19	0.10
Hard bottom (freshwater)		
Submerged Aquatic Vegetation (SAV) (freshwater)		
Total amount of habitat alteration	0.19	0.10

In-water Construction Impacts	
	Amount in meters
Width of water body in action area (m)	27.0
Stressor category that extends furthest distance into water body (e.g.; underwater noise, turbidity plume)	Turbidity
Maximum extent of stressor into the water body (m)	92.0

Project Design Criteria (PDC) Checklist
FHWA/DOT shall incorporate all general PDCs and all applicable PDCs in the appropriate stressor categories. For any PDCs that are not incorporated, additional justification is required for a project to be eligible for the NLAA Program. FHWA/DOT shall check the corresponding box for each PDC that is, or will be, incorporated into the project or indicate if not applicable.

GENERAL PDCs			
Yes	N/A	PDC #	PDC Description
☑	☐	1.	Ensure all operators, employees, and contractors are aware of all FHWA environmental commitments, including these PDC, when working in areas where ESA-listed species may be present or in critical habitat.
☑		2.	No portion of the proposed action will individually or cumulatively have an adverse effect on ESA-listed species or critical habitat.
☐	☑	3.	No portion of the proposed action that may affect the GOM DPS of Atlantic salmon will occur in the tidally influenced portion of rivers/streams where their presence is possible from April 10 through November 7. The range of the GOM DPS only occurs in Maine. **Note**: If the project will occur within the geographic range of the GOM DPS Atlantic salmon but their presence is not expected following the best available commercial scientific data, the work window does not need to be applied. Please attach best available information (i.e. local fisheries biologist correspondence).
☐	☑	4.	No portion of the proposed action that may affect shortnose or Atlantic sturgeon will occur in areas identified as spawning grounds as follows: i. Gulf of Maine: Apr 1-Aug 31 ii. Southern New England/New York Bight: Mar 15-Aug 31 iii. Chesapeake Bay: Mar 15-Jul 1 and Sep 15-Nov 1 **Note**: If river specific information exists that provides better or more refined time of year information, those dates may be substituted with NMFS approval.
☐	☑	5.	No portion of the proposed action that may affect shortnose or Atlantic sturgeon will occur in areas identified as overwintering grounds where dense aggregations are known to occur as follows: i. Gulf of Maine: Oct 15-Apr 30 ii. Southern New England/New York Bight: Nov 1-Mar 15 iii. Chesapeake Bay: Nov 1-Mar 15 **Note**: If river specific information exists that provides better or more refined time of year information, those dates may be substituted with NMFS approval.
☐	☑	6.	Within designated critical habitat for Atlantic sturgeon, no work will affect hard bottom substrate (e.g., rock, cobble, gravel, limestone, boulder, etc.) in low salinity waters (i.e., 0.0-0.5 parts per thousand) (PBF 1).
☑		7.	Work will result in no or only temporary/short-term changes in water temperature, water flow, salinity, or dissolved oxygen levels.

Yes	N/A	PDC #	PDC Description
☑		8.	If ESA-listed species are (a) likely to pass through the action area at the time of year when project activities occur; and/or (b) the project will create an obstruction to passage when in-water work is completed, then a zone of passage (~50% of water body) with appropriate habitat for ESA-listed species (e.g., depth, water velocity, etc.) must be maintained (i.e., physical or biological stressors such as turbidity and sound pressure must not create barrier to passage).
☑		9.	The project will not adversely impact any submerged aquatic vegetation (SAV) or oyster reefs.
☑		10.	No blasting or use of explosives will occur.
☑		11.	No in-water work on large dams or tide gates (small dam and tide gate repairs may be permitted with prior review and approval from NMFS).

UNDERWATER NOISE PDCs			
Yes	N/A	PDC #	PDC Description
☐	☑	12.	If pile driving is occurring during a time of year when ESA-listed species may be present, and the anticipated noise is above the behavioral noise threshold, a "soft start" is required to allow animals an opportunity to leave the project vicinity before sound pressure levels increase. *In addition to using a soft start at the beginning of the work day for pile driving, one must also be used at any time following cessation of pile driving for a period of 30 minutes or longer.* <u>For impact pile driving</u>: pile driving will commence with an initial set of three strikes by the hammer at 40% energy, followed by a one minute wait period, then two subsequent three-strike sets at 40% energy, with one-minute waiting periods, before initiating continuous impact driving. <u>For vibratory pile installation</u>: pile driving will be initiated for 15 seconds at reduced energy followed by a one-minute waiting period. This sequence of 15 seconds of reduced energy driving, one-minute waiting period will be repeated two additional times, followed immediately by pile-driving at full rate and energy.

Yes	N/A	PDC #	PDC Description
☐	☑	13.	All underwater noise is below the injury thresholds of ESA-listed species in the action area. Attach your calculations to this verification form supporting this.
☐	☑	14.	Any new pile-supported structure must involve the installation of no more than 50 piles (below MHW).

Information for Pile Driving:
If your project includes **pile driving of any kind**, please attach your calculation to this verification form to verify that it fits within the scope of the behavioral/injury threshold analysis for ESA-listed species in the action area. The NMFS Office of Protected Resources Acoustic Calculator is available as one source, should you not have other information:
https://www.fisheries.noaa.gov/new-england-mid-atlantic/consultations/section-7-effects-analysis-acoustics-greater-atlantic-region

Pile material (e.g., steel pipe, concrete)	Pile diameter/ width (in)	Number of piles	Installation method (e.g., impact hammer, vibratory start and then impact hammer to depth, drilling)

IMPINGEMENT/ENTRAINMENT AND ENTANGLEMENT PDCs			
Yes	N/A	PDC #	PDC Description
☑	☐	15.	If excavating or dredging, only mechanical buckets, hydraulic cutterheads, or low volume hopper dredges (e.g., CURRITUCK, ≤300 cubic yard maximum bin capacity) may be used. **Note**: We consider excavating a smaller scale form of mechanical dredging.
☑	☐	16.	No new excavation or dredging in Atlantic sturgeon or salmon critical habitat (excavation in a prior construction footprint or maintenance dredging is permitted, but still must meet all other PDCs). New excavation or dredging outside Atlantic sturgeon or salmon critical habitat is limited to one-time events (e.g., burying a cable or utility line) and minor (≤2 acres) expansions of areas already subject to prior excavation or maintenance dredging. Locating a replacement bridge within 250 feet (centerline to centerline) of an existing bridge and excavation of sediment around bridge piers are considered work in a previous construction footprint. **Note**: We consider excavating a smaller scale form of mechanical dredging.

Yes	N/A	PDC #	PDC Description
☑	☐	17.	Temporary intakes related to construction are prohibited in sturgeon and salmon spawning, rearing, or overwintering habitat during the time of year windows identified in General PDCs 3-5. If utilized outside those areas and times of year and in an area with anticipated sturgeon and salmon presence, temporary intakes must be equipped with 2-millimeter wedge wire mesh screening and must not have greater than 0.5 feet per second intake velocities, to prevent impingement or entrainment of juvenile and early life stages of these species.
☑	☐	18.	Work behind cofferdams, turbidity curtains, or other instruments that prevent access of animals to the project area is required when ESA-listed species are likely to be present (if presence is limited to rare, transient individuals, access control measures are not necessary). Once constructed, work inside a cofferdam at any time of year may be permitted with NMFS approval, provided the cofferdam is installed/removed outside the time-restricted period.
☑	☐	19.	No new permanent surface water withdrawal, water intakes, or water diversions.
☑	☐	20.	Turbidity control measures, including cofferdams, must be designed to not entangle or entrap ESA-listed species.
☐	☑	21.	Any in-water lines, ropes, or chains must be made of materials and installed in a manner to minimize or avoid the risk of entanglement by using thick, heavy, and taut lines that do not loop or entangle. Lines can be enclosed in a rigid sleeve.

WATER QUALITY/TURBIDITY PDCs			
Yes	N/A	PDC #	PDC Description
☐	☑	22.	In-water offshore disposal may only occur at designated disposal sites that have already been the subject of ESA section 7 consultation with NMFS and where a valid consultation is in place.
☐	☑	23.	Any temporary discharges must meet state water quality standards (e.g., no discharges of substances in concentrations that may cause acute or chronic adverse reactions, as defined by EPA water quality standards criteria).
☑	☐	24.	Only repair, upgrades, relocations, and improvements of existing discharge pipes or replacement in-kind are allowed; no new construction of untreated discharges.
☑	☐	25.	Work behind cofferdams, turbidity curtains, or other instruments to control turbidity is required when operationally feasible and ESA-listed species are likely to be present (if presence is limited to rare, transient individuals, turbidity control methods are not necessary).

HABITAT ALTERATION PDCs			
Yes	N/A	PDC #	PDC Description
☑	☐	26.	Minimize all new waterward encroachment and permanent fill.
☐	☑	27.	In Atlantic salmon critical habitat, stream simulation design with a minimum span of 1.2 bankfull width will be used in areas with minimal tidal influence. In tidal areas, a design that allows for unimpeded flow will be used (no delay in water entering or exiting the area upstream of the crossing).
☐	☑	28.	In Atlantic salmon critical habitat, no culvert end extensions, invert line culvert rehabilitation, or slipline culvert rehabilitation may occur.

VESSEL TRAFFIC PDCs			
Yes	N/A	PDC #	PDC Description
☐	☑	29.	Maintain project (i.e., construction) vessels operating within the action area to speed limits below 10 knots and dredge vessels to speeds of 4 knots maximum, while dredging.
☐	☑	30.	Maintain a 1,500-foot buffer between project (i.e., construction) vessels and ESA-listed whales and a 300-foot buffer between project vessels and sea turtles. This also applies to dredge vessels.
☐	☑	31.	The number of project (construction) vessels must be limited to the greatest extent possible, as appropriate to size and scale of project.
☐	☑	32.	The project must not result in the permanent net increase of commercial vessels.

Justification for NLAA Determination if not Incorporating All PDC
If the project is not in compliance with all of the general and stressor-based PDCs, but you can provide justification and/or special conditions to demonstrate why the project still meets the NLAA determination and is consistent with the aggregate effects considered in the programmatic consultation, you may still certify your project through the NLAA program using this verification form. Please identify which PDCs your project does not meet (e.g., PDC 9, PDC 15, PDC 22, etc.) and provide your rationale and justification for why the project is still eligible for the verification form. Project modifications must not result in different effects not already considered.

To demonstrate that the project is still NLAA, you must explain why the effects on ESA-listed species or critical habitat are **insignificant** (i.e., too small to be meaningfully measured or detected) or **discountable** (i.e., extremely unlikely to occur). **Please use this language in your justification.**

PDC#	Justification

FHWA/DOT Verification of Determination (To be filled out by FHWA/DOT staff only)
By submitting this Verification Form, FHWA, or the state DOT as FHWA's designated non-federal representative, indicates that they determined that the proposed activity described above is not likely to adversely affect (NLAA) ESA-listed species or designated critical habitat under NMFS jurisdiction in accordance with the Program, and all effects (direct, indirect, interrelated, and interdependent) are either insignificant (so small they cannot meaningfully be measured, detected, or evaluated) or discountable (extremely unlikely to occur).

☑	In accordance with the FHWA GARFO NLAA Program, we have determined that the action complies with all applicable PDCs and is not likely to adversely affect listed species.
☐	In accordance with the FHWA GARFO NLAA Program, we have determined that the action is not likely to adversely affect listed species per the justifications and/or special conditions provided above.

FHWA/DOT Signature:	Date:
	01/09/2026

By providing your determination and signature, you are certifying that to the best of your knowledge the information provided in this form is accurate and based upon the best available scientific information. This form must be filled out and signed by FHWA or state DOT staff, as an officially designated non-federal representative.

GARFO PRD Concurrence (To be filled out by GARFO PRD)
After receiving the Verification Form, GARFO PRD will contact FHWA/DOT with any concerns and indicate whether GARFO PRD concurs with FHWA/DOT's determination.

☑	In accordance with the FHWA GARFO NLAA Program, GARFO PRD concurs with FHWA/DOT's determination that the action complies with all applicable PDCs and is not likely to adversely affect listed species or critical habitat.
☐	In accordance with the FHWA GARFO NLAA Program, GARFO PRD concurs with FHWA/DOT's determination that the action is not likely to adversely affect listed species or critical habitat per the justifications and/or special conditions provided above.
☐	GARFO PRD does not concur with FHWA/DOT's determination that the action complies with the applicable PDCs (with or without justifications), and recommends an individual Section 7 consultation to be completed independent from the FHWA GARFO NLAA Program.

GARFO PRD Signature:	Date:
	01/12/2026

Appendix B. Verification Form

This form demonstrates compliance with the FHWA/NMFS GARFO EFH Programmatic Consultation dated 1/16/24. The applicable state Department of Transportation (state DOT) will complete this form and enter the project details into the ESA/EFH webtool (https://www.environment.fhwa.dot.gov/esawebtool/) to apply the programmatic consultation to a transportation project. FHWA will receive and review the completed forms before a final NEPA decision as part of the overall environmental review process. FHWA with the assistance of VOLPE will compile the information provided by all covered state DOTs on the completed Verification Forms and ESA/EFH webtool for the purposes of tracking and annual monitoring. FHWA/state DOT must include the completed Verification Form as part of a permit application with any other federal agency, such as U.S. Army Corps of Engineers or U.S. Coast Guard, to confirm that EFH consultation is complete.

Projects that are unable to meet the mandatory conservation recommendations in **bold** the state DOT will work with their FHWA Division Office to complete individual EFH consultation with NMFS.

Project Activity Type

1. ☒ Bridge repair, demolition, and replacement
2. ☐ Culvert repair and replacement
3. ☐ Docks, piers, and waterway access projects
4. ☐ Slope stabilization

Transportation Project Information

Project Name:	RAYNHAM- TAUNTON- BI	Project Number:	613642
Project Sponsor:	MassDOT	Contact Person:	Dave Paulson
Email:	david.j.paulson@dot.state.	Phone:	+ 1 857 262 3378
Latitude (e.g., 42.625884):		41.886005903543975	
Longitude (e.g., -70.646114):		71.0300152141668	
City/Town, State:	Taunton/ Raynham MA	Waterway:	Taunton River
Project Description and Purpose:	The Massachusetts Department of Transportation (MassDOT – Highway Division) Is proposing a reconstruction of the Old Colony Avenue Bridge over the Taunton River. The overall project limits extend 250' north of the intersection of Old Colony Avenue and Battle Row in Taunton, MA; along the Old Colony Avenue Bridge; and 370' to the intersection of South Street East and Sandy Hill Road, in Raynham, MA. The total length of the Project		
Anticipated Project Start Date:	Dec 2026	Anticipated Project End Date:	October 2028
Total area of impact to EFH (in acres): Include locus map with area of impact.		0.29	
Area of impacts to sensitive habitats (in square feet):		No impacts to submerged aquatic vegetation (SAV) or oyster reefs allowed.	
Natural rocky habitat (e.g., bedrock, boulders, cobble, and/or gravel):		0	
Salt marsh:		0	
Areas containing shellfish (excluding oyster reefs):		0	
Intertidal mudflats:		0	
Area of impact to diadromous fish habitat:		0.29	

Potential Stressors Caused by the Activity (Check all that apply based on activity type)

☐ Underwater Noise
☒ Impingement/Entrainment and Entanglement
☒ Water Quality/Turbidity
☒ Habitat Alteration
☐ Vessel Traffic

EFH Conservation Recommendation Checklist

FHWA/state DOT will indicate how the project addresses each of the programmatic EFH conservation recommendations, by selecting the appropriate check box and providing a brief explanation where necessary. **Bolded CRs are required.** If the project is not in compliance with any additional programmatic EFH conservation recommendation and FHWA/state DOT has still determined that the effects of a project on EFH are not substantial and the project is otherwise consistent with the FHWA programmatic EFH consultation, provide justification below under the conservation recommendations that are not included.

Underwater Noise

☒ Check here if the EFH conservation recommendations in this section are not applicable because the project will not create underwater noise as a stressor. Proceed to the next stressor.

1. Use a vibratory hammer to the maximum extent practicable.

☐ Not met:

☐ Not applicable, provide reasoning:

☐ Project is unable to accommodate, provide justification:

☐ Met:

☐ Shown on project plans
☐ Included in description, other terms and conditions

2. For impact driving, an initial set of three strikes would be made by the hammer at 40 percent energy, followed by a 1-minute wait period, then two subsequent 3-strike sets at 40 percent energy, with 1-minute waiting periods, before initiating continuous impact driving. In addition to a soft start at the beginning of the day for impact pile driving, a soft start must also be used at any time following cessation of impact pile driving for a period of thirty minutes or longer and if any increase in pile installation or removal intensity is required. Build up power slowly from a low energy start-up over a 20-minute period to warn fish to leave the vicinity. This buildup shall occur in uniform stages to provide a constant increase in output. This should be done in accordance with the methods outlined in the NMFS GARFO/FHWA Best Management Practices (BMP) Manual.

☐ Not met:

☐ Not applicable, provide reasoning:

☐ Project is unable to accommodate, provide justification:

☐ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

3. Avoid the use of hollow steel pipe piles when possible.

☐ Not met:
- ☐ Not applicable, provide reasoning:
- ☐ Project is unable to accommodate, provide justification:

☐ Met:
- ☐ Shown on project plans
- ☐ Included in description, other terms and conditions

4. Do not undertake noise-generating work in diadromous streams within the spring diadromous fish TOY restriction listed in Appendix C unless it is isolated behind sealed, dewatered cofferdams, to avoid impeding fish migration.

☐ Not met:
- ☐ Not applicable, provide reasoning:
- ☐ Project is unable to accommodate, provide justification:

☐ Met:
- ☐ Shown on project plans
- ☐ Included in description, other terms and condition

Impingement/Entrainment and Entanglement

☐ Check here if the EFH conservation recommendations in this section are not applicable because the project will not lead to impingement/entrainment and entanglement as a stressor. Proceed to the next stressor.

5. **Turbidity control measures must be properly installed, secured and regularly monitored to ensure aquatic species are not entangled or trapped in the project area.**

☐ Not met: Project requires individual consultation with NMFS

☒ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

6. **No new permanent surface water withdrawal, water intakes, or water diversions. (Permanent surface water intakes do not include dry hydrants.)**

☐ Not met: Project requires individual consultation with NMFS

☒ Met
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

7. Install and operate temporary intakes related to construction in accordance with the NMFS GARFO/FHWA Best Management Practices (BMP) Manual and equip intakes with mesh size screening and approach velocity appropriate for the species and life stage anticipated to be present during construction. Temporary pumping/intakes related to construction water handling will be based on the resource present and be in accordance with state fisheries consultation (with documentation provided) where such consultation is available. In addition,
   a) Per the NMFS Anadromous Salmonid Passage Facility Design manual, screen openings must not exceed 3/32 inch and screen approach velocity must be less than 0.25 feet per second (ft. /sec) in waters supporting anadromous salmonids.
   b) The use of 2 millimeter (mm) wedge wire screens must be used with a maximum intake velocity of 0.5 feet per second (ft. /sec).
   c) In Virginia, a 1 mm wedge wire screen with a maximum intake velocity of 0.25 ft. /sec) is required.

☐ Not met:
- ☐ Not applicable, provide reasoning:
- ☐ Project is unable to accommodate, provide justification:

☒ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

Water Quality/Turbidity

☐ Check here if the EFH conservation recommendations in this section are not applicable because the project will not negatively affect water quality or create turbidity. Proceed to the next stressor.

8. **Install soil erosion, sediment, and turbidity controls and maintain them in effective operating condition during construction. Remove controls upon completion of work, after all exposed soil and other fills, as well as any work waterward of ordinary high water or the high tide line, are permanently stabilized.**

☐ Not met: Project requires individual consultation with NMFS

☒ Met:
- ☒ Shown on project plans
- ☒ Included in description, other terms and conditions

9. **Prevent construction debris and sediment from entering aquatic areas and remove all construction debris and excess/deteriorated materials and dispose of in an appropriate upland area.**

☐ Not met: Project requires individual consultation with NMFS

☒ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

10. **Dredged and/or excavated materials, including any fine-grained materials removed from inside culverts, shall either be moved to an upland location and stabilized to prevent reentry into the waterway or disposed of at a previously approved disposal site.**

☐ Not met: Project requires individual consultation with NMFS

☒ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

11. **Completely remove and do not reuse existing creosote piles that are affected by project activities and do not install new creosote piles. Piles that break or cannot be removed due to site conditions must be cut off at the mudline.**

☐ Not met: Project requires individual consultation with NMFS

☒ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

12. **Ensure that raw concrete does not contact the water; wet pours of concrete must be confined within sealed forms until the concrete is set or pre-cast members installed. Ensure grout bags are watertight.**

☐ Not met: Project requires individual consultation with NMFS

☒ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

13. Install and remove any in-water soil erosion, sediment, and turbidity controls outside of the TOY restrictions listed in Appendix C.

☐ Not met:

☐ Not applicable, provide reasoning:

☐ Project is unable to accommodate, provide justification:

☒ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

14. Conduct in-water work that produces turbidity or sedimentation in diadromous streams or EFH outside of the TOY restriction(s) in Appendix C.

☐ Not met:
- ☐ Not applicable, provide reasoning:
- ☐ Project is unable to accommodate, provide justification:

☒ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

15. Do not use any creosote, coal tar epoxy, or other hydrocarbon-based coatings on any in-water structures or overwater structures. Dispose of any demolished structures treated with creosote, coal tar epoxy, or other hydrocarbon-based coatings in an approved upland disposal site.

☒ Not met:
- ☒ Not applicable, provide reasoning:
  Project does not propose any hydrocarbon-based coatings
- ☐ Project is unable to accommodate, provide justification:

☐ Met:
- ☐ Shown on project plans
- ☐ Included in description, other terms and conditions

16. In NJ only, in areas mapped as shellfish beds pursuant to N.J.A.C 7:7-9.2
    - All structures should be constructed with alternative materials, such as plastic, natural cedar or other untreated wood, or pressure-treated wood, coated offsite with an impact resistant, biologically inert substance to minimize leachate into shellfish areas.

- Coat any chemically or pressure treated piles (CCA, ACQ, etc.) with an impact-resistant, biologically inert substance. Coating should be applied during the manufacturing process, not post-manufacturing by a third party or contractor.

☒ Not met:

☒ Not applicable, provide reasoning:

Project action area is not in New Jersey

☐ Project is unable to accommodate, provide justification:

☐ Met:

☐ Shown on project plans

☐ Included in description, other terms and conditions

Habitat Alteration

☐ Check here if the EFH conservation recommendations in this section are not applicable because the project will not cause habitat alteration. Proceed to the next stressor.

17. **Remove temporary and/or obsolete structures and fills in their entirety. Use geotextile barriers prior to placement of temporary fill material to ensure complete removal.**

☐ Not met: Project requires individual consultation with NMFS

☒ Met:

☐ Shown on project plans

☒ Included in description, other terms and conditions

18. **Return areas impacted by temporary activities, fills, or structures to pre-construction or better condition, including elevations and substrate, and replant with native species.**

☐ Not met: Project requires individual consultation with NMFS

☒ Met:

☐ Shown on project plans

☒ Included in description, other terms and conditions

19. **Temporary monitoring devices, if used in-water as part of an activity, shall be removed and the substrate restored to pre-construction elevations no later than 24 months from initial installation, or upon completion of data acquisition.**

☐ Not met: Project requires individual consultation with NMFS

☒ Met:

☐ Shown on project plans

☒ Included in description, other terms and conditions

20. **Pipelines and cables that cross a waterway must not rest on the substrate. They may be**

attached to an overwater structure or be buried to allow an area to return to preexisting conditions.

☐ Not met: Project requires individual consultation with NMFS

☒ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

21. **Any fill, including planting media and placement of any seed shellfish, spatted-shell, or cultch must be free of all non-native or invasive species and/or contaminants. An invasive species control plan must be part of the project if the transportation agency cannot guarantee this.**

☐ Not met: Project requires individual consultation with NMFS

☒ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

22. **Prevent dislodging of coir logs, mats, or native oyster shell.**

☐ Not met: Project requires individual consultation with NMFS

☒ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

23. **Lowermost section of floating docks and vessels must be ≥18 inches above the substrate at all times.**

☐ Not met: Project requires individual consultation with NMFS

☒ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

24. **Avoid propeller scour and grounding of all project vessels and floating docks.**

☐ Not met: Project requires individual consultation with NMFS

☒ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

25. Provide compensatory mitigation for all permanent impacts to aquatic habitats and for temporary impacts in place over 12 months to address the temporal loss of aquatic habitat functions. This could include a contribution to an existing in-lieu fee program. Because compensatory mitigation is intended to offset adverse effects of an action, it

cannot be viewed separately from an action causing the effect.

When impacts are unavoidable:

a) Conduct a pre-biological survey to map the coverage of the sensitive habitats;
b) Develop a compensatory mitigation plan for biological resource losses, including success criteria, monitoring and adaptive management plans, and long-term maintenance plan. Use the 2008 Final Rule, Compensatory Mitigation for Losses of Aquatic Resources under Clean Water Act Section 404 (33 CFR Parts 325 and 332, 40 CFR Part 230) and NOAA's Mitigation Policy as guides for the development of the compensatory mitigation plan.
c) Undertake compensatory mitigation prior to or concurrent with any impacts to sensitive habitat.

☒ Not met:

◉ Not applicable, provide reasoning:

The project does not propose any loss of aquatic resources

☐ Project is unable to accommodate, provide justification:

☐ Met:

☐ Shown on project plans
☐ Included in description, other terms and conditions

26. Prior to construction, identify and mark in the field any SAV and wetlands at the project site. An SAV survey is required for activities adjacent to mapped or known SAV if a survey has not been conducted in the previous three years.

☐ Not met:

☐ Not applicable, provide reasoning:

☐ Project is unable to accommodate, provide justification:

☒ Met:

☐ Shown on project plans
☒ Included in description, other terms and conditions

27. Locate temporary structures, anchors, spud barges, and construction, access, and dewatering activities outside of special aquatic sites.

☐ Not met:

☐ Not applicable, provide reasoning:

☐ Project is unable to accommodate, provide justification:

☒ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

28. All in-water work, including dredging or discharge of fill material will be undertaken at, or approximating, low tide and using low ground pressure equipment to prevent compaction. Low ground pressure is defined as < 3 psi. Where construction requires heavy equipment operation in or across wetlands or mudflats, the equipment shall be placed on construction timber mats that are adequate to support the equipment; be operated on dry or frozen wetlands such that shear pressure does not cause subsidence of the wetlands immediately beneath equipment and upheaval of adjacent wetlands. Construction mats must not be dragged into position.

☐ Not met:
- ☐ Not applicable, provide reasoning:
- ☐ Project is unable to accommodate, provide justification:

☒ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

29. Remove temporary and/or obsolete structures and fills in their entirety, unless the structure or fill is to be left in place in order to comply with conditions imposed by other state or federal permits. Obsolete structures do not include any structures that are repurposed or preserved to prevent habitat degradation (e.g., abutments or sheet piling that remain in place for habitat or scour protection).

☐ Not met:
- ☐ Not applicable, provide reasoning:
- ☐ Project is unable to accommodate, provide justification:

☒ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

30. If rock relocation is necessary, move them to an area of equivalent depth and substrate.

☐ Not met:

☐ Not applicable, provide reasoning:

☐ Project is unable to accommodate, provide justification:

☒ Met:

☐ Shown on project plans

☒ Included in description, other terms and conditions

31. The height of docks and piers must be at least four feet above salt marsh substrate and must be greater than or equal to the width of the deck to minimize shading impacts. The height must be measured from the marsh substrate to the bottom of the longitudinal support beam.

☐ Not met:

☐ Not applicable, provide reasoning:

☐ Project is unable to accommodate, provide justification:

☐ Met:

☐ Shown on project plans

☐ Included in description, other terms and conditions

32. The lowermost part of floating docks must be greater than or equal to 18 inches above the substrate at all times to avoid grounding and propeller scour and to provide adequate circulation and flushing.

☒ Not met:

☒ Not applicable, provide reasoning:

Floating docks not proposed

☐ Project is unable to accommodate, provide justification:

☐ Met:

☐ Shown on project plans

☐ Included in description, other terms and conditions

33. Habitat restoration or mitigation projects must not result in a permanent conversion or loss of sensitive habitats such as SAV, natural rocky habitats, areas containing shellfish, mudflats, and riffle and pool complexes.

☒ Not met:

☒ Not applicable, provide reasoning:

No SAS in action area

☐ Project is unable to accommodate, provide justification:

☐ Met:

☐ Shown on project plans

☐ Included in description, other terms and conditions

34. Grain size of any sediment used as part of habitat restoration must be the same size or larger than the native material at the site. Material must be free from toxic chemicals (in excess of ERM values in NOAA SQuiRT tables), asphalt, and other trash or anthropogenic debris.

☐ Not met:

☐ Not applicable, provide reasoning:

☐ Project is unable to accommodate, provide justification:

☒ Met:

☐ Shown on project plans

☒ Included in description, other terms and conditions

35. The following buffers apply between the following habitats and the top of slope of the area to be dredged/excavated.:

a) In New England, setbacks of 100 ft. from tidal SAV or 25 ft. from natural rocky habitats, Special Aquatic Sites (wetlands, mudflats, riffle/pool complexes) and areas containing shellfish.
b) In NY, NJ, DE and PA, dredging shall not occur within 25 ft. from the edge of vegetated wetlands.
c) In NY and NJ, dredging shall not occur within 500 ft. of SAV in sediments greater than or equal to 90% sand and 250 ft. of SAV if sediments are less than 90% sand during the growing season (April 15-October 15) to minimize impacts to SAV due to turbidity.
d) In Virginia and Maryland, dredging shall not occur in areas within the distance from wetlands equal to four times the depth of the dredging.
e) In Maryland, dredging shall not occur within 500 yds. of a natural oyster beds between December 16 to March 14 and June 1 to September 30.

☐ Not met:
☐ Not applicable, provide reasoning:

☐ Project is unable to accommodate, provide justification:

☒ Met:
☐ Shown on project plans
☒ Included in description, other terms and conditions

36. Do not discharge new or proposed outlets directly into sensitive habitats and redirect upgrades to existing outlets away from sensitive habitats.

☐ Not met:
☐ Not applicable, provide reasoning:

☐ Project is unable to accommodate, provide justification:

☒ Met:
☐ Shown on project plans
☒ Included in description, other terms and conditions

Fish Passage/Migration Habitat

37. Design replacement crossings to provide anadromous and resident fish and aquatic organism passage to the maximum extent possible. Use the Federal Interagency Nature-like Fishway Passage Design Guidelines for Atlantic Coast Diadromous Fishes and Culvert Design For Aquatic Organism Passage FHWA-HIF-11-008) for design guidance. In addition, structures must:
    - provide sufficient water depth and maintain suitable water velocities during migration periods; and
    - maintain or replicate natural stream channel and flow conditions.

☐ Not met:
☐ Not applicable, provide reasoning:

☐ Project is unable to accommodate, provide justification:

☒ Met:

☒ Shown on project plans
☒ Included in description, other terms and conditions

38. Replaced or upgraded crossings must be a similar or improved structure type and must be designed to provide diadromous and resident fish organism passage by providing sufficient water depth, maintaining suitable water velocities during migration periods, and maintaining or replicating natural stream channel and flow conditions. Upgraded crossings must be designed in accordance with the order of preference set out in NMFS' Anadromous Salmonid Passage Facility Design, unless such design is otherwise approved by the State Fisheries Agency.

☐ Not met:
☐ Not applicable, provide reasoning:

☐ Project is unable to accommodate, provide justification:

☒ Met:
☒ Shown on project plans
☒ Included in description, other terms and conditions

39. For activities that require soil erosion, sediment, and turbidity controls, prevent impeding the run by incorporating the following:
    a) in non-tidal streams containing diadromous fish
        i. the activities must not encroach >25% of the stream width measured from ordinary high water during the anadromous TOY restriction unless such encroachment is otherwise approved by State Fisheries; and
        ii. In waterways supporting diadromous fish, the activities must maintain safe, timely, and effective downstream fish passage throughout the project.
    b) in tidal waters:
        i. The activities must not encroach >50% of a tidal stream's width as measured from mean high water unless such encroachment is otherwise approved by the State Fisheries Agency.

☐ Not met:
☐ Not applicable, provide reasoning:

☐ Project is unable to accommodate, provide justification:

☒ Met:

☐ Shown on project plans
☒ Included in description, other terms and conditions

40. Incorporate climate change and sea level rise projections into the project design as appropriate to address changing hydrologic conditions (increased precipitation and stream flow, altered tidal regimes, etc.). Guidance can be found in NOAA Fisheries' national Procedure for Addressing Climate Change in NMFS Essential Fish Habitat Consultations and GARFO's Guidance for Integrating Climate Change Information in Greater Atlantic Region Habitat Conservation Division Consultation Processes, including the recommendation to use relevant local or regional climate prediction models where available as well as emission and climate projection scenarios on a global scale from the Intergovernmental Panel on Climate Change (IPCC). The use of a "high" (e.g., RCP/SSP8.5) and an "intermediate" (e.g., RCP/SSP 4.5 or RCP 6.0) scenario (IPCC 2021) is suggested. For SLR projections, at a minimum the 1.0 m mean global scenario is recommended with the relevant downscaled projections for the closest tide gauge location identified in Sweet et al. (2022).

☒ Not met:
☒ Not applicable, provide reasoning:

Climate change analysis was not done due to the project keeping existing abutments.

☐ Project is unable to accommodate, provide justification:

☐ Met:
☐ Shown on project plans
☐ Included in description, other terms and conditions

Vessel Interactions

☒ Check here if the EFH conservation recommendations in this section are not applicable because the project will not use vessels.

41. Project vessels shall be operated in adequate water depths in the action area to avoid propeller scour and grounding at all tides. Shallow draft vessels will be used in shallow areas to maximize the navigational clearance between the vessel and the bottom substrate. Spuds may be used to elevate the vessel.

☐ Not met:
☐ Not applicable, provide reasoning:
☐ Project is unable to accommodate, provide justification:

☐ Met:
- ☐ Shown on project plans
- ☐ Included in description, other terms and conditions

42. Project vessels shall not be moored in or use spuds in SAV or be located in such a way that the vessel could shade SAV.

☐ Not met:
- ☐ Not applicable, provide reasoning:
- ☐ Project is unable to accommodate, provide justification:

☐ Met:
- ☐ Shown on project plans
- ☐ Included in description, other terms and conditions

43. Vessels transit through SAV shall be done at high tide.

☐ Not met:
- ☐ Not applicable, provide reasoning:
- ☐ Project is unable to accommodate, provide justification:

☐ Met:
- ☐ Shown on project plans
- ☐ Included in description, other terms and conditions

Activities that Require Individual Consultation

1. Any work (including anchoring) that results in temporary or permanent impacts to:
    a) Existing or historically mapped submerged aquatic vegetation (SAV) beds or areas within 100 feet of existing or historically mapped SAV beds unless otherwise confirmed to be absent by survey.
    b) ≥ 1,000 SF of tidal SAS (except tidal SAV, see 1 above), natural rocky habitats, or freshwater SAV.
2. Stream channelization.
3. Any temporary structures, construction access, and dewatering activities proposed to be in place for ≥ two years
4. Slip-lining or invert lining existing culverts in tidal waters or non-tidal waters that support diadromous fishes. Resources to assist in the identification of these waters can be found in Appendix H and from State fishery agencies.
5. Structures (docks, piers, walkways) or temporary structures: Less than 1:1 height/width ratio or wider than 4 ft. over salt marsh waterward of MHW. The height should be measured from the substrate to the bottom of the longitudinal support beam lowermost portion of the deck structure.
6. Construction of new or expansion of existing boating facilities. For the purposes of this programmatic EFH consultation, a boating facility is boat docking or mooring space for more than two non-commercial vessels.
7. Excavation for the purpose of establishing new or improved navigation channels (e.g. dredging), exceeding the thresholds listed under number 1 above.
8. Any nearshore disposal or beach nourishment activities.
9. New fill or stabilization structures placed below mean low water in excess of 200 linear feet (lf).
10. Replacement of:
    a) slope stabilization structures > 200 lf. *and* waterward of the existing toe, or
    b) vertical structures > 18 inches waterward of the existing face *and* > 200 lf.
11. in layer deposition as a part of wetland restoration.
12. Placement of any seed shellfish, spatted-shell, or cultch in the following sensitive habitats: fish and wildlife sanctuaries and refuges, mudflats, SAV beds, riffle/pool complexes, natural rocky habitats, intertidal areas, and areas containing shellfish.
13. In-water utility lines ≥100 linear feet (LF) installed by trench excavation; or where installed by jet-plow, fluidization or other direct burial methods:
    a) installed in mud, clay, or silt substrates; or
    b) ≥200 LF when installed in sandy substrates (e.g. >/= 90% coarse grained sand habitats (Wentworth <35 ASTM No. US Standard)). Direct burial methods do not include jacking or directional drilling/boring.
14. Airgun seismic activities.
15. Any new permanent surface water withdrawal, water intakes, or water diversions.
16. All work to tide gates without a USACE-approved operation and maintenance plan or alterations to tide gates that will affect the hydraulic regime. This does not include work on tide gates (e.g., duckbills, flap gates, etc.) that solely convey stormwater and/or NPDES-permitted discharges. See The Effects of Tide Gates on New England Wetlands and Other Tidal Resources. Greater Atlantic Region Policy Series [23-01] for additional information on tide gates and associated BMPs.
17. In-water blasting that affects EFH or diadromous species habitat, or out-of-water blasting with the discharge of blasted material in water.

18. Construction of new bridges or culverts, where no crossing existed previously.
19. Any new or replacement causeways (raised roadways across waters or wetlands). Temporary causeways do not require project specific consultation (i.e., they are covered under the programmatic consultation), provided they do not exceed the above listed threshold or include other excluded activities.
20. Dam and flood control or levee repairs that will alter water levels or flood elevations during the diadromous time of year (TOY) restriction provided in App C.
21. Living shoreline >500 linear feet in length located below OHW or the HTL and/or includes beach nourishment/ land reclamation activities.
22. Living shorelines with structure and/or fill area that extends into the waterbody more than 30 FT from the MLW line, including sand fills, sills, breakwaters, or reefs, or any living shoreline that proposes to impact SAV.
23. Excavated materials, stored, deposited, and retained anywhere but an upland area that prevents sediments from reentering aquatic habitats, except as authorized/required by the terms of a USACE or USCG approval.

DOT Determination of Effects to Essential Fish Habitat and Signature
After reviewing the programmatic EFH conservation recommendations in Section 6.0 and Appendix B, state DOT will select the appropriate determination:

☒ The activity is in compliance with all programmatic EFH conservation recommendations in the FHWA programmatic EFH consultation and adverse effects to EFH will not be substantial.

☐ The activity is not in compliance with all of the programmatic EFH conservation recommendations in the FHWA programmatic EFH consultation and individual consultation with NMFS is needed.

Use the electronic fillable fields to include the name and signature of the state DOT preparing this Verification Form, along with the date.

State DOT Name Massachusetts Department of Transportation

Signature David Paulson

Digitally signed by David Paulson
Date: 2025.12.19 10:03:33 -05'00'

Date 12/19/2025

By providing your determination and signature, you are certifying that to the best of your knowledge the information provided in this form is accurate and based upon the best available scientific information. This form must be filled out and signed state DOT staff, as an officially designated non-federal representative. Email this Verification Form to your FHWA Division Office.

FHWA Review
After receiving the Verification Form, the FHWA Division Office will contact the state DOT with any concerns. FHWA will review this form before a final NEPA decision. FHWA will email the signed form back to the state DOT for record keeping.

☐ FHWA concurs with state DOT's determination that the proposed project is consistent with the programmatic EFH consultation (without the need for justification).

☒ FHWA concurs with state DOT's determination that the proposed project is consistent with the programmatic EFH consultation, with justification described above.

☐ FHWA does not concur with state DOT's determination that the project is consistent with the programmatic EFH consultation. FHWA/state DOT must conduct additional coordination with GARFO HCD and a separate individual EFH consultation may be required.

FHWA Reviewer

Name Signature

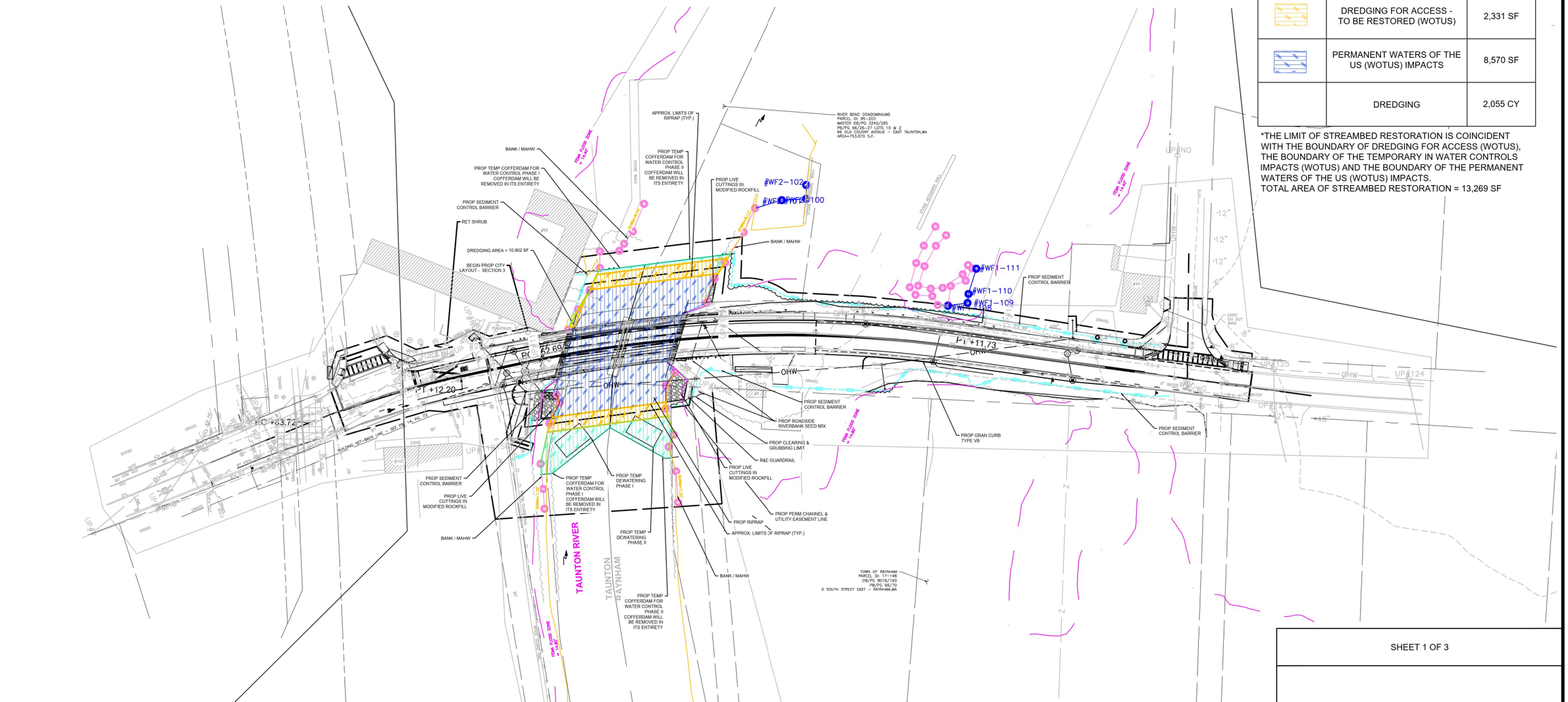
Date of Review

APPENDIX G

- **Project Plans**

SUMMARY OF RESOURCE AREA IMPACTS		
LINETYPE/ HATCH	DESCRIPTION	IMPACT QUANTITY
	TEMPORARY BANK IMPACT	164 LF
	PERMANENT BANK IMPACT	72 LF
	TEMPORARY IN WATER CONTROLS IMPACTS (WOTUS)	2,368 SF
	DREDGING FOR ACCESS - TO BE RESTORED (WOTUS)	2,331 SF
	PERMANENT WATERS OF THE US (WOTUS) IMPACTS	8,570 SF
	DREDGING	2,055 CY

*THE LIMIT OF STREAMBED RESTORATION IS COINCIDENT WITH THE BOUNDARY OF DREDGING FOR ACCESS (WOTUS), THE BOUNDARY OF THE TEMPORARY IN WATER CONTROLS IMPACTS (WOTUS) AND THE BOUNDARY OF THE PERMANENT WATERS OF THE US (WOTUS) IMPACTS.
TOTAL AREA OF STREAMBED RESTORATION = 13,269 SF



ENVIRONMENTAL IMPACTS PLAN

40 30 20 10 0 20 40 80

(IN FEET)
1 inch = 40 ft.

NOTES:

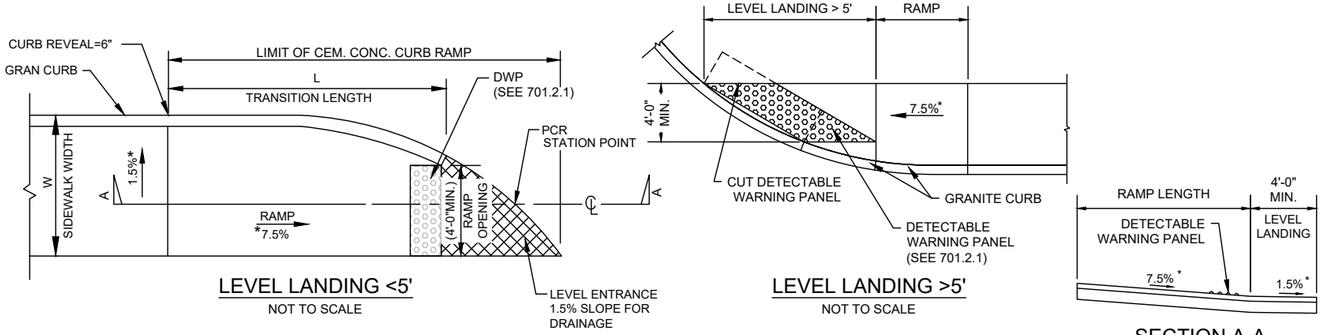
1. THE HORIZONTAL DATUM IS THE NORTH AMERICAN DATUM OF 1983 (NAD83) MASSACHUSETTS STATE PLAN COORDINATE SYSTEM IN U.S. SURVEY FEET.
2. THE VERTICAL DATUM IS THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).

SHEET 1 OF 3

WATER QUALITY CERTIFICATE APPLICATION
TAUNTON AND RAYNHAM, MASSACHUSETTS
OLD COLONY AVENUE OVER TAUNTON RIVER
BRIDGE R-02-003=T-01-004
OCTOBER, 2025

613642_EV_WQC_PCN(IMPACTS).DWG Plotted on 28-Jan-2026 5:18 PM

CURB RAMP TYPE A DATA								
PCR NO.	LOCATION	RAMP REFERENCE POINT		GUTTER PROFILE SLOPE	LENGTH OF PRIMARY RAMP L	WIDTH OF RAMP OPENING W	SIDEWALK WIDTH	LANDING AREA
		STATION	OFFSET					
3	SOUTH STREET EAST	7+72.5	15.1' LT	1.2%	6.5'	4.4'	5.5'	> 5'
4	SOUTH STREET EAST	8+23.2	17.0' LT	0.4%	4.0' 3"R	4.0'	5.5'	> 5'



LEVEL LANDING <5'
NOT TO SCALE

LEVEL LANDING >5'
NOT TO SCALE

SECTION A-A
NOT TO SCALE

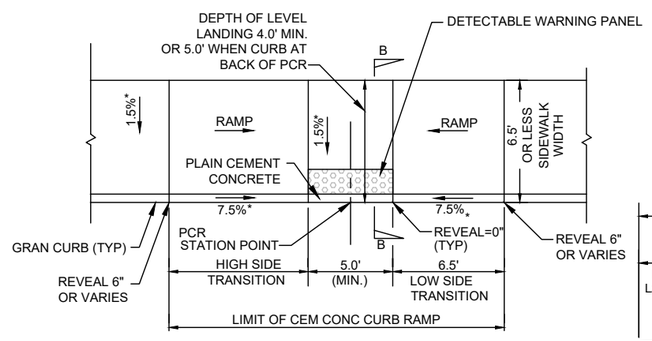
CURB RAMP TYPE "A"
SEE MASSDOT S.D. E107.6.0
NOT TO SCALE

CURB RAMP TYPE B DATA									
PCR NO.	LOCATION	RAMP REFERENCE POINT		GUTTER PROFILE SLOPE	WIDTH OF RAMP OPENING W	DEPTH OF LEVEL LANDING (MIN. 4.0')	TRANSITION LENGTH		SIDEWALK WIDTH
		STATION	OFFSET				LEFT	RIGHT	
1	OLD COLONY WAY	1+24.9	27.4' LT	-2.8%	6.0'	5.4'	8.0' ** 4.5"R±	6.5'	5.5'
2	OLD COLONY WAY	1+58.3	29.6' LT	-0.8%	5.0'	6.0'	7.67'	6.5'	6.0'

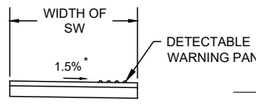
** MATCH EXISTING REVEAL

NOTES:

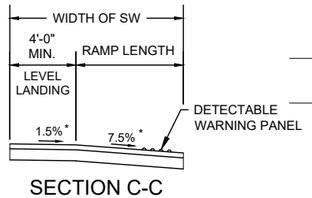
1. ALL PEDESTRIAN CURB RAMPS SHALL CONFORM TO THE REQUIREMENTS OF THE MASSACHUSETTS ARCHITECTURAL ACCESS BOARD (AAB) AND THE AMERICAN WITH DISABILITIES ACT (ADA) AND THE LATEST MASSDOT STANDARDS.
2. THE LOCATIONS OF PROPOSED PEDESTRIAN CURB RAMPS ARE SHOWN ON CONSTRUCTION PLANS AND THE PEDESTRIAN CURB RAMP DETAILS SHEETS. EXACT LOCATIONS MAY BE ADJUSTED, IF NECESSARY, BY THE ENGINEER IN THE FIELD.



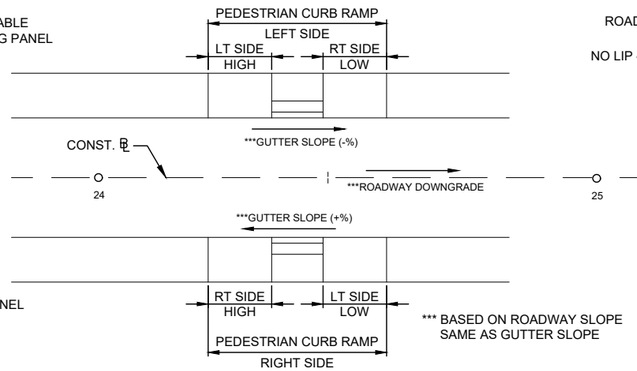
CURB RAMP DETAIL TYPE "B"
SEE MASSDOT STD DETAIL 701.2.2 (JAN 2025)
NOT TO SCALE



SECTION B-B
NOT TO SCALE



SECTION C-C
NOT TO SCALE

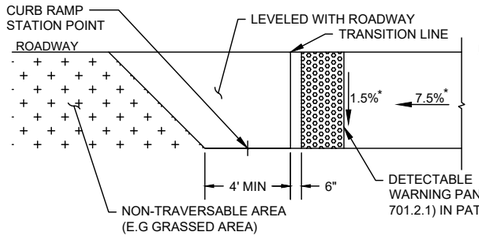


*** BASED ON ROADWAY SLOPE
SAME AS GUTTER SLOPE

GUTTER SLOPE DIAGRAM
NOT TO SCALE

TABLE I	
ROADWAY PROFILE GRADE	* HIGH SIDE TRANSITION LENGTH
%	ENGLISH UNITS
=0%	6'-6"
>0% TO 1%	7'-8"
>1% TO 2%	9'-0"
>2% TO 3%	11'-0"
>3% TO 4%	14'-0"
>4% TO 5%	15'-0" MAX.

CURB TRANSITION LENGTH
FOR CURB RAMPS
MASSDOT CONST. STD DETAIL 701.2.8 (JAN 2025)



PEDESTRIAN TRANSITION RAMP TO SHOULDER NOTES:

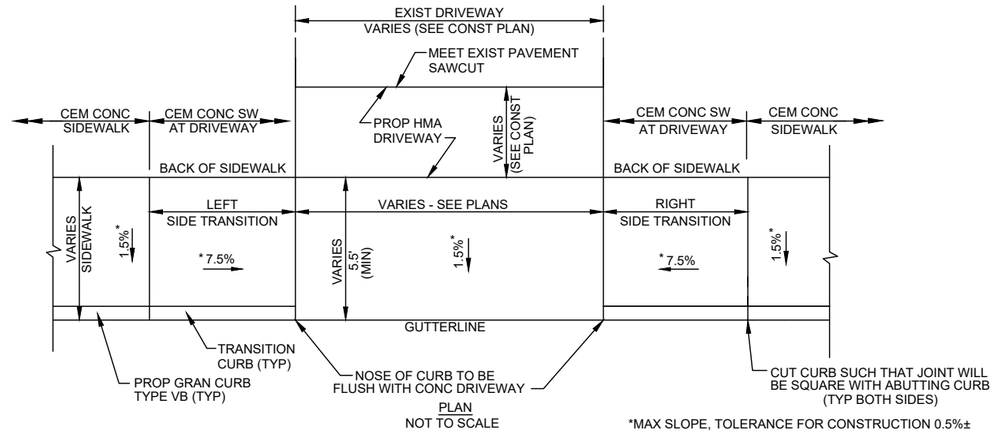
1. DETECTABLE WARMING PANEL TO BE ALIGNED TO THE DIRECTION OF TRAVEL.
2. PEDESTRIAN PATH OF TRAVEL SHALL BE NO LESS THAN 4'-0" WIDE AND FREE OF VERTICAL OBSTRUCTIONS (FOR ALL CONSTRAINED CONDITIONS).
3. ALL SLOPE VALUES LISTED HERE ARE MAXIMUM VALUES WITH CONSTRUCTION TOLERANCE OF ±0.5%.
4. THE DETECTABLE WARNING PANEL IS 2 FEET DEEP MINIMUM AT ALL LOCATIONS IN THE PEDESTRIAN PATH OF TRAVEL

CURB RAMP TYPE "C"
NOT TO SCALE

CURB RAMP TYPE C DATA								
PCR NO.	LOCATION	RAMP REFERENCE POINT		GUTTER PROFILE SLOPE	WIDTH OF RAMP OPENING W	DEPTH OF LEVEL LANDING (MIN. 4.0')	TRANSITION LENGTH	SIDEWALK WIDTH
		STATION	OFFSET					

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	######	5	30
PROJECT FILE NO.	613642		

CONSTRUCTION DETAILS

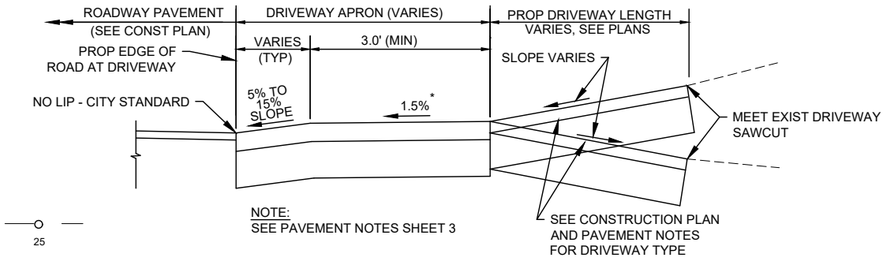


PLAN
NOT TO SCALE

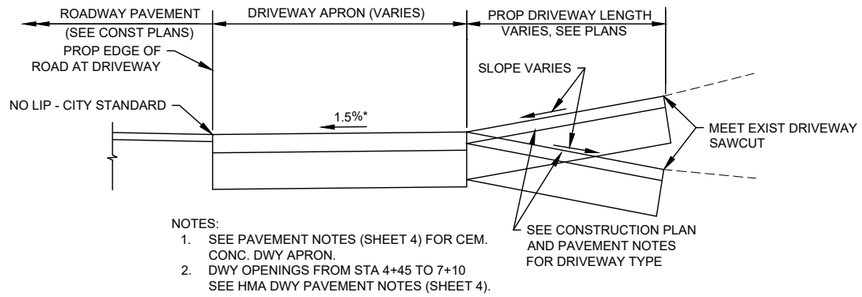
*MAX SLOPE, TOLERANCE FOR CONSTRUCTION 0.5%±

DETAIL FOR DEPRESSED DRIVEWAY WITH SIDEWALK - TYPE A

**DRIVEWAY OPENING DATA- TYPE A								
DWY NO.	LOCATION	℄ DRIVEWAY OPENING AT GUTTER		DRIVEWAY OPENING WIDTH	GUTTER PROFILE SLOPE	DEPTH OF GUTTER TO BACK OF SIDEWALK	PATH OF TRAVEL WIDTH ACROSS DRIVEWAY	TRANSITION LENGTH	
		STATION	OFFSET					LEFT	RIGHT
3	SOUTH STREET EAST	5+11.1	12.0' LT	25.0'	-0.7%	6.0'	6.0'	9.0'	6.5'



SECTION FOR TYPICAL DRIVEWAY WITH SIDEWALK - TYPE A
NOT TO SCALE



NOTES:

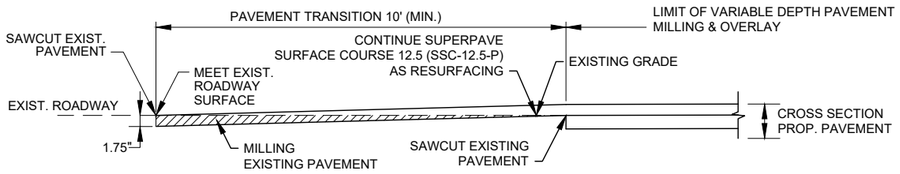
1. SEE PAVEMENT NOTES (SHEET 4) FOR CEM. CONC. DWY APRON.
2. DWY OPENINGS FROM STA 4+45 TO 7+10 SEE HMA DWY PAVEMENT NOTES (SHEET 4).

SECTION FOR DEPRESSED DRIVEWAY WITH SIDEWALK - TYPE B
NOT TO SCALE

SOUTH STREET E/OLD COLONY AVE.

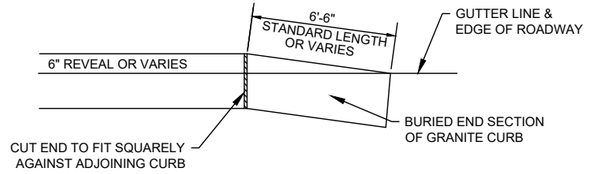
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	######	6	30
PROJECT FILE NO.	613642		

CONSTRUCTION DETAILS



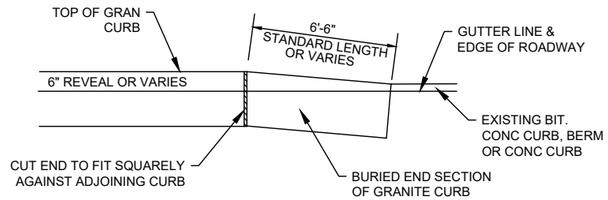
DETAIL FOR PAVEMENT TRANSITION AT LIMIT OF WORK

NOT TO SCALE



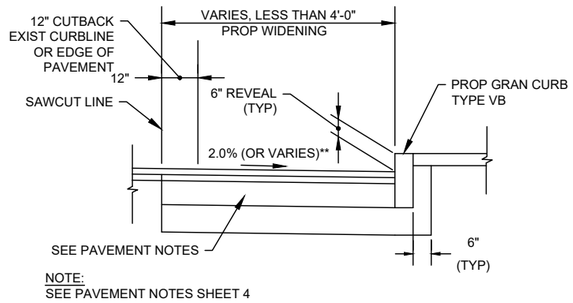
DETAIL FOR TRANSITION CURB
PROP CURB TO EXISTING EDGE OF TRAVEL WAY

NOT TO SCALE



DETAIL FOR TRANSITION CURB
TRANSITION CURB - PROP CURB TO EXISTING CURB

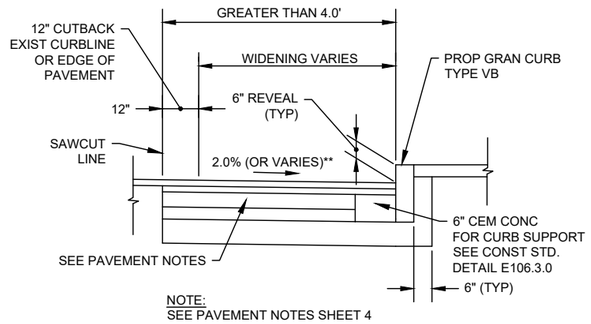
NOT TO SCALE



NOTE:
SEE PAVEMENT NOTES SHEET 4

DETAIL FOR BOX WIDENING 4.0' OR LESS

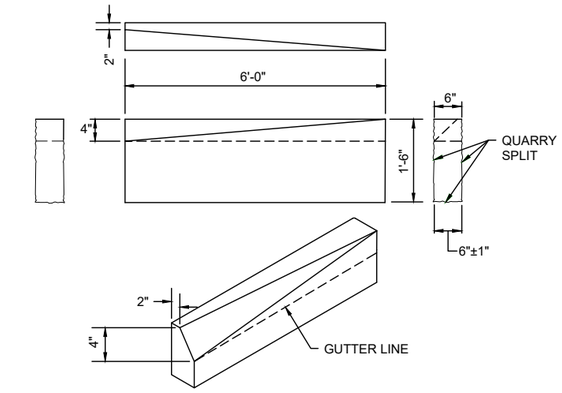
NOT TO SCALE



NOTE:
SEE PAVEMENT NOTES SHEET 4

DETAIL FOR BOX WIDENING GREATER THAN 4.0'

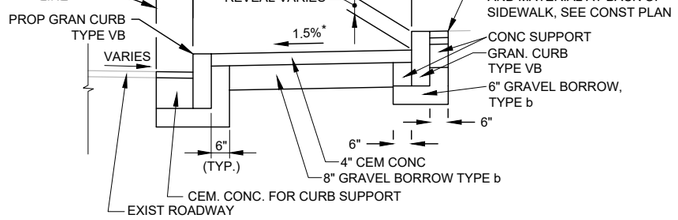
NOT TO SCALE



NOTES:
1. TOP SURFACE AND SLOPED SURFACE TO BE DRESSED BY SAW. REMAINDER TO BE QUARRY SPLIT.
2. DRAWING SHOWS TRANSITION CURB FOR ONE DIRECTION. FOR OTHER DIRECTION USE OPPOSITE HAND.

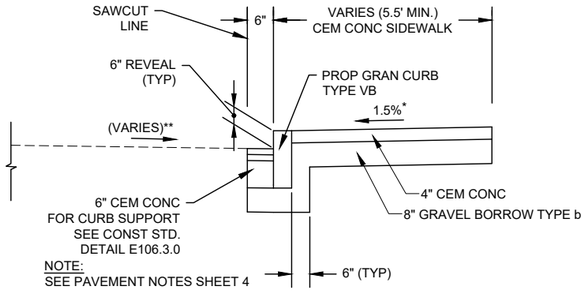
GRANITE CURB TYPE VA4-SPLAYED END
(ITEM 504.2)

NOT TO SCALE



DETAIL FOR GRANITE CURB AT BACK OF SIDEWALK

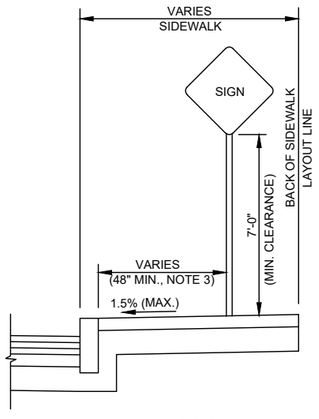
NOT TO SCALE



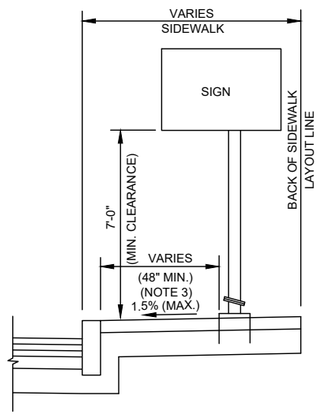
NOTE:
SEE PAVEMENT NOTES SHEET 4

DETAIL FOR SIDEWALK W/ GRANITE CURB - NO ROADWAY WORK

NOT TO SCALE



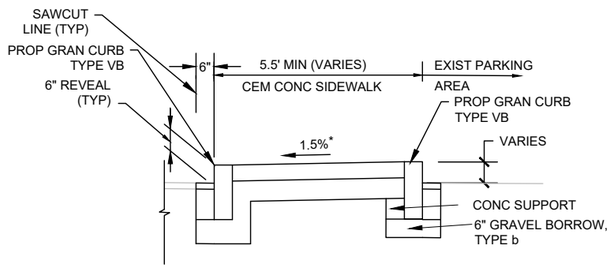
TRAFFIC SIGN



D6/D8 SIGN SUPPORT

NOTES:
1. MINIMUM CLEAR PATH ON ALL SIDEWALKS SHALL BE 48 INCHES, EXCLUDING THE CURB.
2. CONTRACTOR TO ATTAIN 60" CLEAR

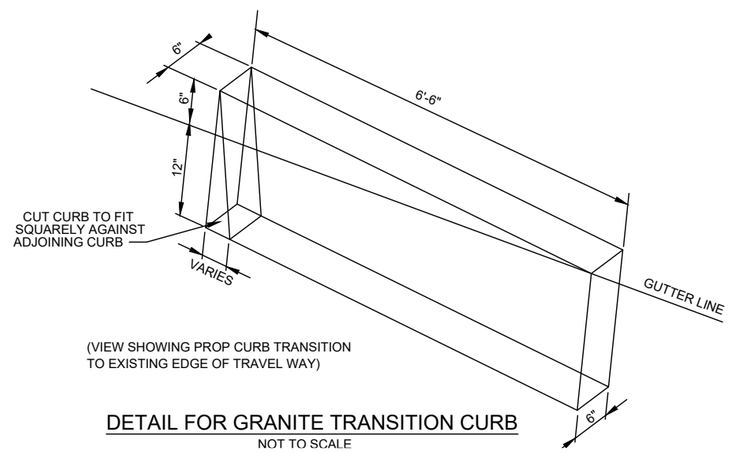
DETAIL FOR MINIMUM OFFSET DISTANCES



CURB AT BACK OF SIDEWALK
NEAR PARKING LOT AREAS

STA 50+45 TO 54+36±

NOT TO SCALE

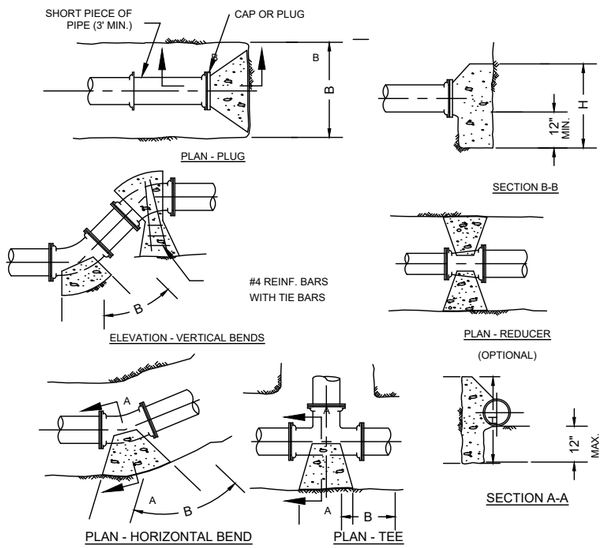


(VIEW SHOWING PROP CURB TRANSITION TO EXISTING EDGE OF TRAVEL WAY)

DETAIL FOR GRANITE TRANSITION CURB

NOT TO SCALE

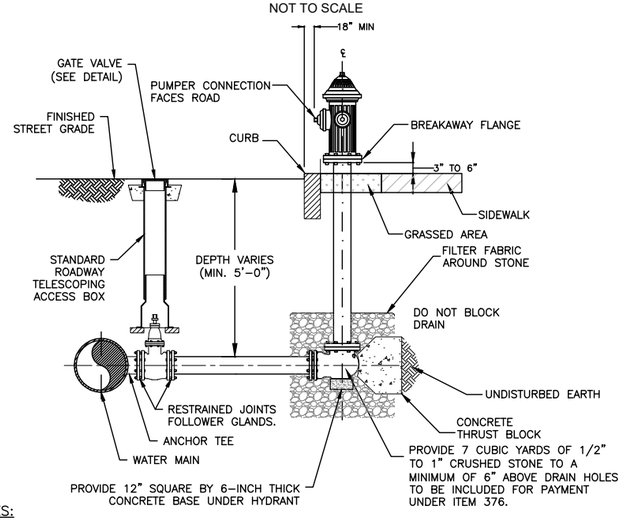
FITTING	MIN. BEARING AREA (H X B)
6" - 1/8 BEND	32" x 32"
8" - 1/8 BEND	24" x 24"
8" x 6" TEE	20" x 20"
12" - 1/8 BEND	32" x 32"
12" x 12" TEE	24" x 24"
12" x 6" TEE	24" x 24"
12" x 8" TEE	32" x 32"
16' x 12" TEE	24" x 24"
HYDRANT	24" x 24"
8" PLUG	32" x 32"
150 mm PLUG	24" x 24"
8" x 6" REDUCER	24" x 24"
8" - 1/16 BEND	20" x 20"
12' x 8" REDUCER	24" x 24"



NOTE:
ALL CONCRETE TO BE PLACED AGAINST UNDISTURBED EARTH

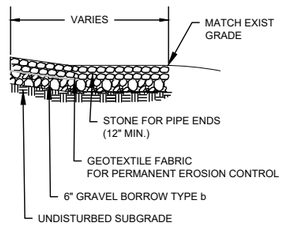
CONCRETE ANCHORAGE DETAILS

NOT TO SCALE



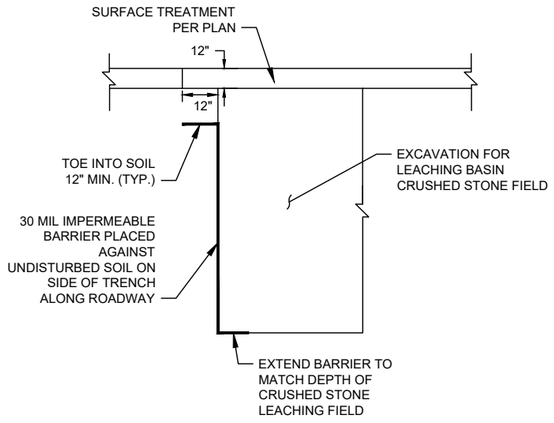
NOTES:

1. HYDRANTS SHALL BE OFFSET 1' FROM THE BACK OF SIDEWALK.
2. HYDRANTS SHALL BE PROVIDED BY THE CITY OF TAUNTON.
3. PROVIDE HYDRANT AND VALVE JOINTS WITH RESTRAINED MECHANICAL JOINTS.
4. ALL JOINTS BETWEEN ANCHOR TEE AND HYDRANT SHALL BE RESTRAINED.
5. SUPPORT BLOCKS TO BE CONCRETE MASONRY BLOCK.
6. SEE HYDRANT TABLE ON THRUST BLOCK BEARING AREAS FOR THE AREA OF CONCRETE REQUIRED.
7. ALL HYDRANTS OUT OF SERVICE MUST BE BAGGED.



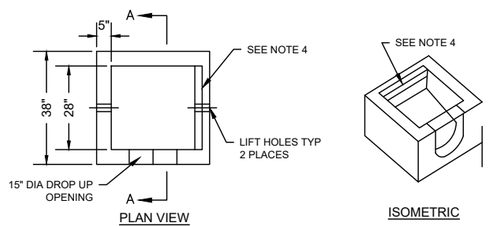
STONE FOR PIPE ENDS

NOT TO SCALE



DETAIL FOR IMPERMEABLE BARRIER INSTALLATION IN EXCAVATION WALL

NOT TO SCALE



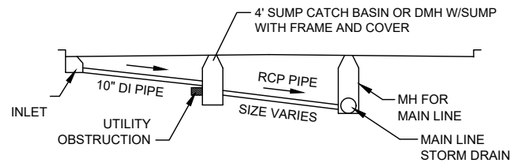
NOTES:

1. DESIGNED FOR AASHTO HS25-44 LOADING
2. CONCRETE STRENGTH fc=4000 PSI
3. REINFORCING STEEL: ASTM A185 (wwf) fy=60,000 PSI
4. CURB INLETS ARE REQUIRED WHEN GUTTER INLETS ARE INSTALLED AGAINST CURBING. PROVIDE 3"X6" OPENING WHERE CURB INLETS ARE PROPOSED.

SPECIAL GUTTER INLET (ITEM 204)

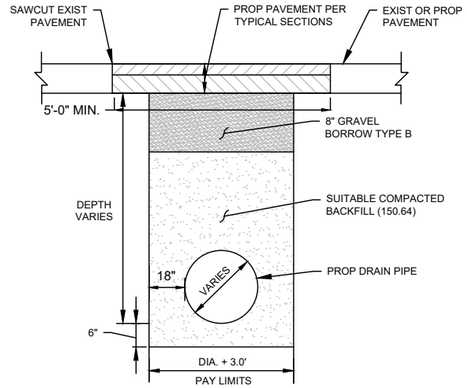
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	######	7	30
PROJECT FILE NO.	613642		

CONSTRUCTION DETAILS



CONTINGENCY DETAIL FOR STORM DRAIN LATERAL LINES

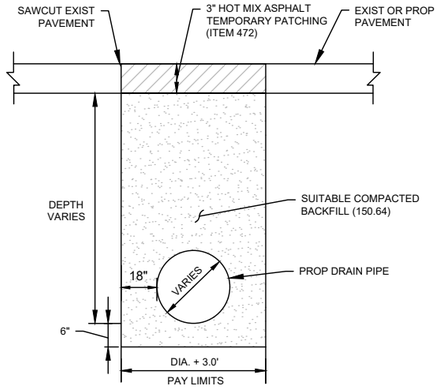
(USE ONLY IF OBSTRUCTION IS ENCOUNTERED)
NOT TO SCALE



NOTES:
1. ANY EXCAVATED MATERIALS DETERMINED BY THE ENGINEER TO BE UNSUITABLE FOR BACKFILL SHALL BE REPLACED WITH GRAVEL BORROW FOR BACKFILLING STRUCTURES AND PIPES AND PAID FOR UNDER ITEM 151.2.

PERMANENT DRAINAGE TRENCH IN MILL AND OVERLAY AREAS

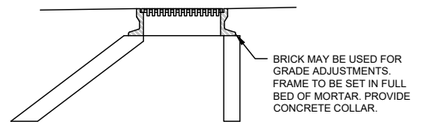
NOT TO SCALE



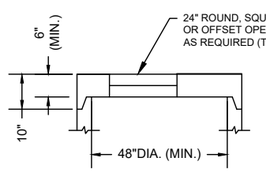
NOTES:
1. ANY EXCAVATED MATERIALS DETERMINED BY THE ENGINEER TO BE UNSUITABLE FOR BACKFILL SHALL BE REPLACED WITH GRAVEL BORROW FOR BACKFILLING STRUCTURES AND PIPES AND PAID FOR UNDER ITEM 151.2.

TEMPORARY DRAINAGE TRENCH IN FULL DEPTH AREAS

NOT TO SCALE



ALTERNATE ECCENTRIC CONE SECTION



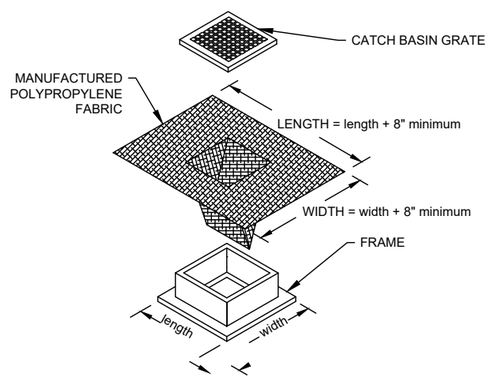
ALTERNATE FLAT TOP SLAB

NOTES:

1. BASED ON ACTUAL FIELD CONDITIONS; THE CONTRACTOR SHALL DETERMINE WHICH STYLE OF TOP SECTION SHOULD BE USED.

ALTERNATE DRAINAGE STRUCTURE TOP CONFIGURATIONS

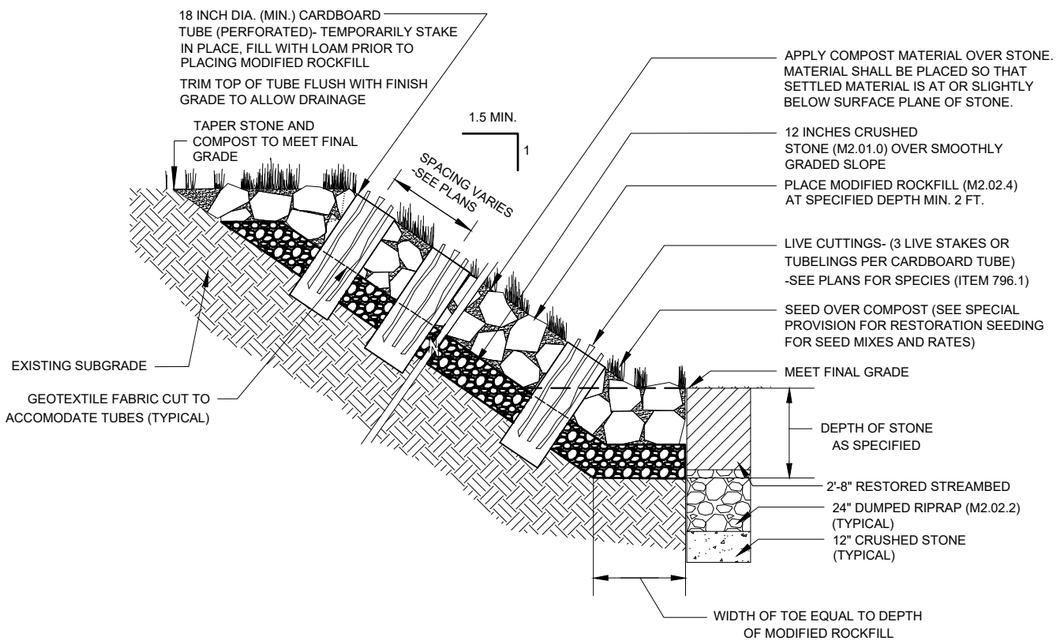
NOT TO SCALE



NOTES
1. LENGTH AND WIDTH OF POLYPROPYLENE FABRIC MUST EXCEED EXISTING CATCH BASIN FRAME DIMENSIONS BY A MINIMUM OF 8".
2. REMOVE CATCH BASIN GRATE AND INSTALL POLYPROPYLENE FABRIC OVER CATCH BASIN FRAME. REPLACE CATCH BASIN GRATE TO SECURE POLYPROPYLENE FABRIC IN PLACE.
3. PROVIDE EROSION CONTROL PROTECTION AT ALL EXISTING AND PROPOSED CATCH BASINS WITHIN THE PROJECT LIMITS.

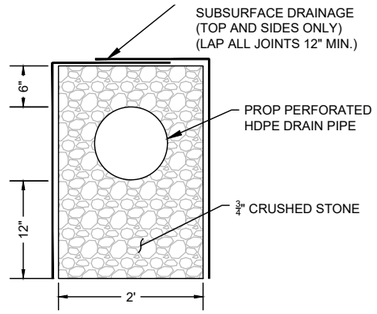
CATCH BASIN EROSION CONTROL PROTECTION (TYP)

NOT TO SCALE



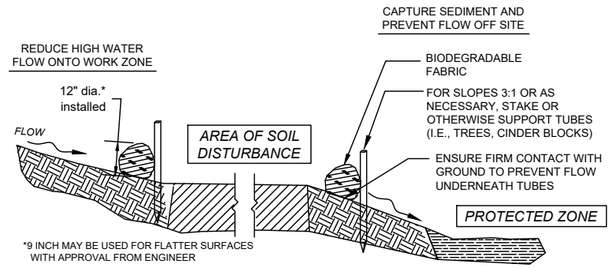
LIVE CUTTINGS IN MODIFIED ROCKFILL

NOT TO SCALE



PERFORATED HDPE INFILTRATION TRENCH

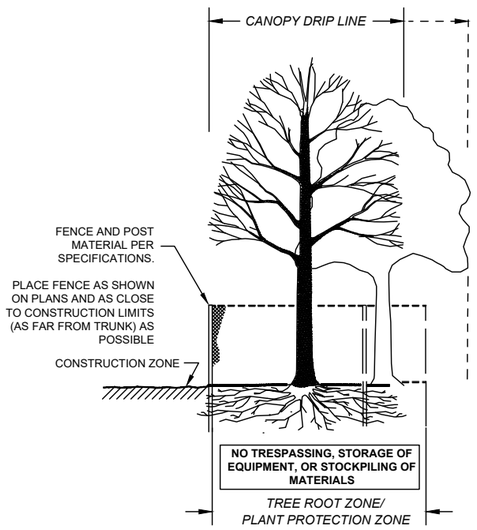
NOT TO SCALE



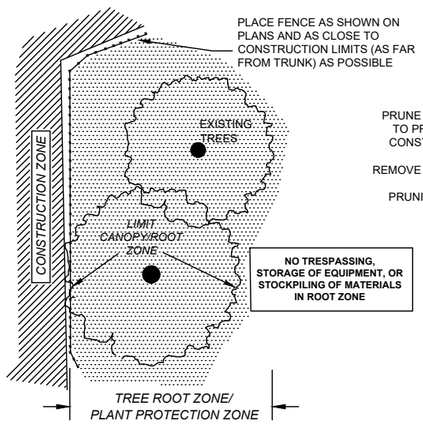
SECTION

SEDIMENT BARRIER - COMPOST FILTER TUBE

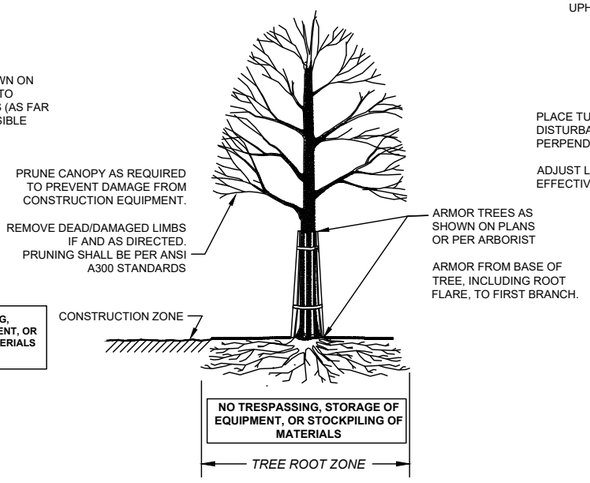
NOT TO SCALE



SECTION - FENCE PROTECTION OF ROOT ZONE

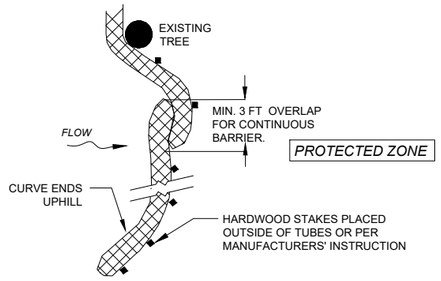


PLAN VIEW - FENCE PROTECTION OF ROOT ZONE



SECTION - TRUNK ARMORING & PRUNING

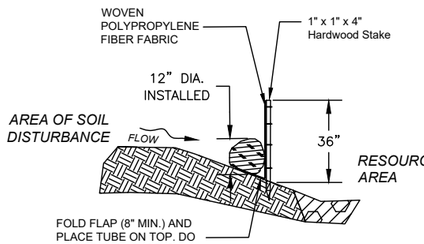
TREE PROTECTION DETAILS



PLACE TUBE AS CLOSE TO LIMIT OF SOIL DISTURBANCE AS POSSIBLE, ALONG CONTOURS, AND PERPENDICULAR TO FLOW.

ADJUST LOCATION AS REQUIRED FOR OPTIMUM EFFECTIVENESS. DO NOT INSTALL IN WATERWAYS.

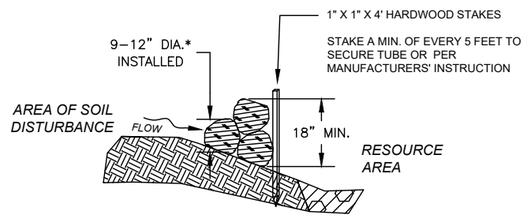
PLAN VIEW



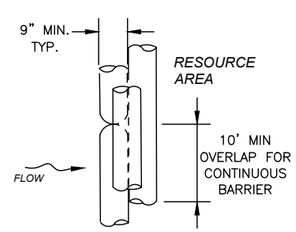
SECTION

COMPOST FILTER TUBE & SILT FENCE

NOT TO SCALE



SECTION



PLAN VIEW

COMPOST FILTER TUBE BERM (SLOPES 2:1 OR STEEPER)

NOT TO SCALE

SOUTH STREET E/OLD COLONY AVE.

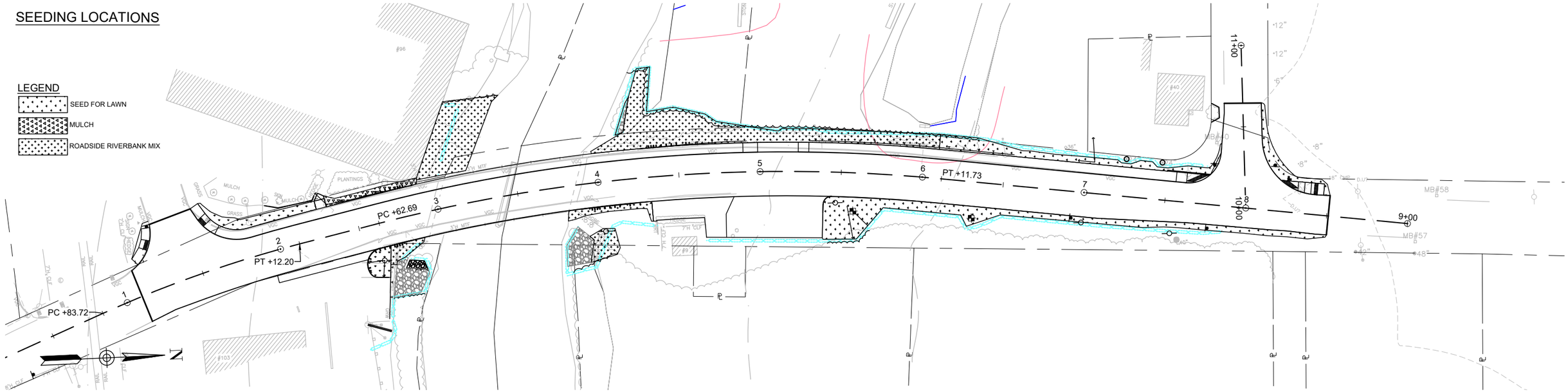
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	######	9	30
PROJECT FILE NO.	613642		

CONSTRUCTION DETAILS

SEEDING LOCATIONS

LEGEND

- SEED FOR LAWN
- MULCH
- ROADSIDE RIVERBANK MIX



SCALE: 1" = 30'

HIGHWAY GUARD DETAILS

TRAILING ANCHORAGE - STA 2+41 TO 2+50 LT
GUARDRAIL, TL-3 (SINGLE FACED) - STA 2+50 TO 2+54 LT
TRANSITION TO BRIDGE RAIL - STA 2+54 TO 2+88 LT

TERMINAL END TREAMENT - STA 2+50 RT
CURVED TRANSITION TO BRIDGE RAIL - STA 2+50 TO 2+80 RT

TERMINAL END TREATMENT - STA 2+54 RT (ALONG PARKING)
GUARDRAIL, TL-3 (SINGLE FACED) - STA 2+54 TO 2+64 RT
TERMINAL END TREATMENT - STA 2+64 RT

TRANSITION TO BRIDGE RAIL - STA 3+88 TO 4+22 RT
TRAILING ANCHORAGE - STA 4+22 TO 4+32 RT

TRANSITION TO BRIDGE RAIL - STA 4+26 TO 4+60 LT
GUARDRAIL, TL-3 (SINGLE FACED) - STA 4+60 TO 4+67 LT
TANGENT END TREATMENT - STA 4+67 TO 4+92 LT

TRAILING ANCHORAGE - STA 5+30 TO 5+39 LT
GUARDRAIL, TL-3 (SINGLE FACED) - STA 5+30 TO 5+70 LT
GUARDRAIL, TL-3 (SINGLE FACED) DEEP POST - STA 5+70 TO 6+30 LT
TANGENT END TREATMENT - STA 6+30 TO 6+55 LT

N

CURB TIE AND GRADING PLAN

SEE SHEET 13

DRAINAGE AND UTILITY PLAN

SEE SHEET 15

SIGN & PAVEMENT MARKING PLAN

SEE SHEET 17

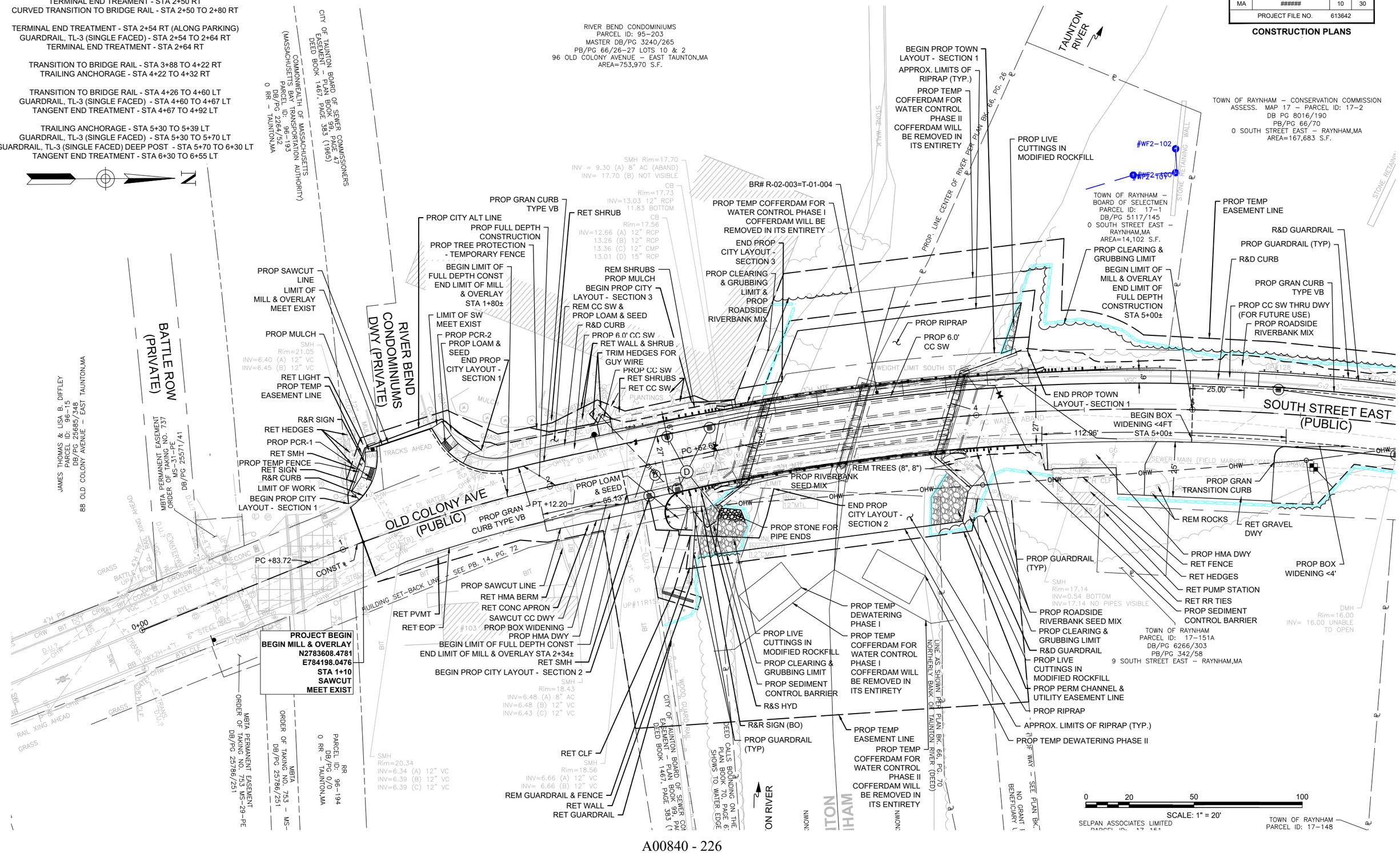
WATER SUPPLY PLAN

SEE BELOW

RAYNHAM/TAUNTON
SOUTH STREET E./OLD COLONY AVE.

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	######	10	30
PROJECT FILE NO.	613642		

CONSTRUCTION PLANS



SEE SHEET 14 | SEE SHEET 16 | SEE SHEET 18 | SEE BELOW

TRAILING ANCHORAGE - STA 4+22 TO 4+32 RT

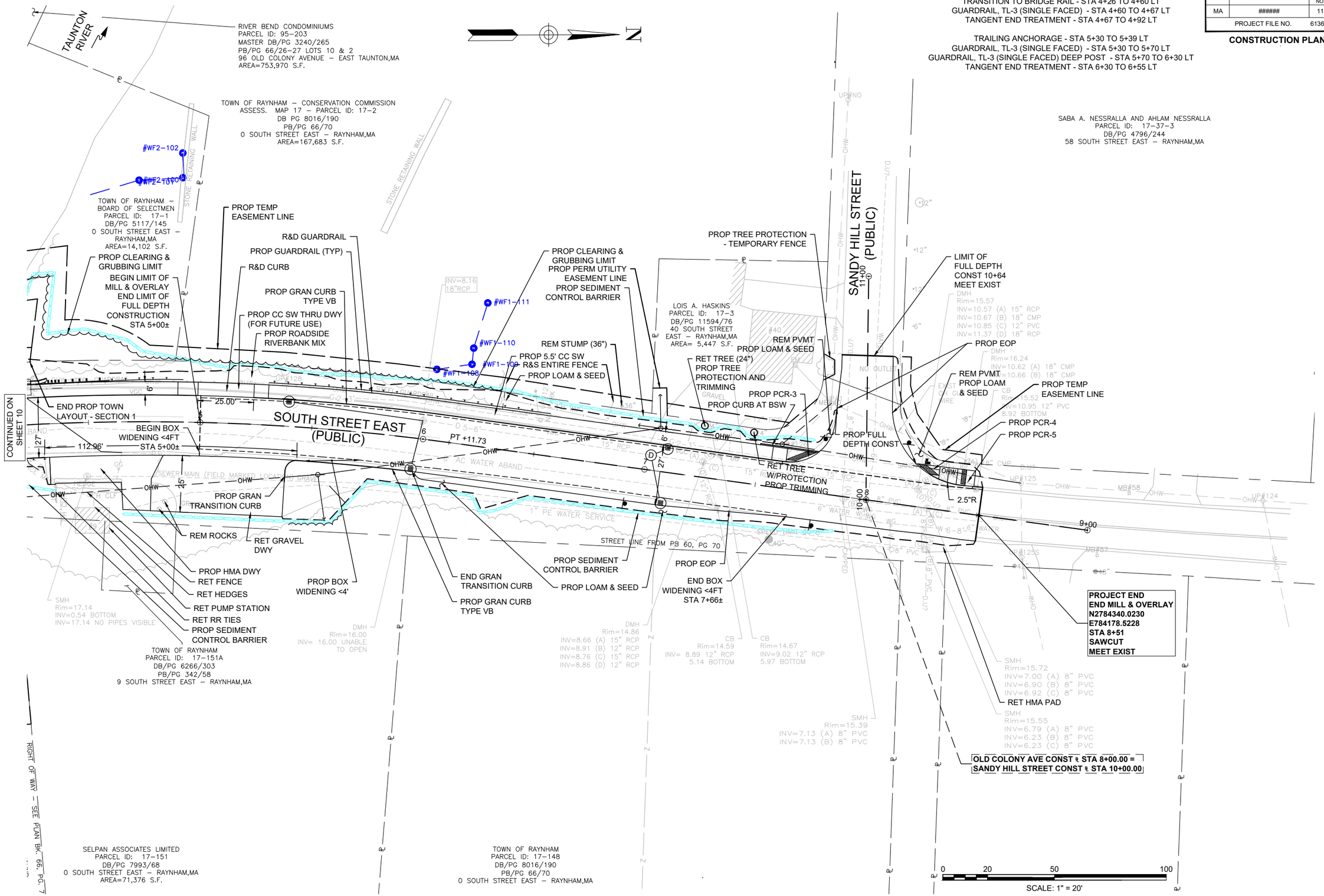
TRANSITION TO BRIDGE RAIL - STA 4+26 TO 4+60 LT
GUARDRAIL, TL-3 (SINGLE FACED) - STA 4+60 TO 4+67 LT
TANGENT END TREATMENT - STA 4+67 TO 4+92 LT

TRAILING ANCHORAGE - STA 5+30 TO 5+39 LT
GUARDRAIL, TL-3 (SINGLE FACED) - STA 5+30 TO 5+70 LT
GUARDRAIL, TL-3 (SINGLE FACED) DEEP POST - STA 5+70 TO 6+30 LT
TANGENT END TREATMENT - STA 6+30 TO 6+55 LT

SOUTH STREET E/OLD COLONY AVE.

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	######	11	30
PROJECT FILE NO.	613642		

CONSTRUCTION PLANS

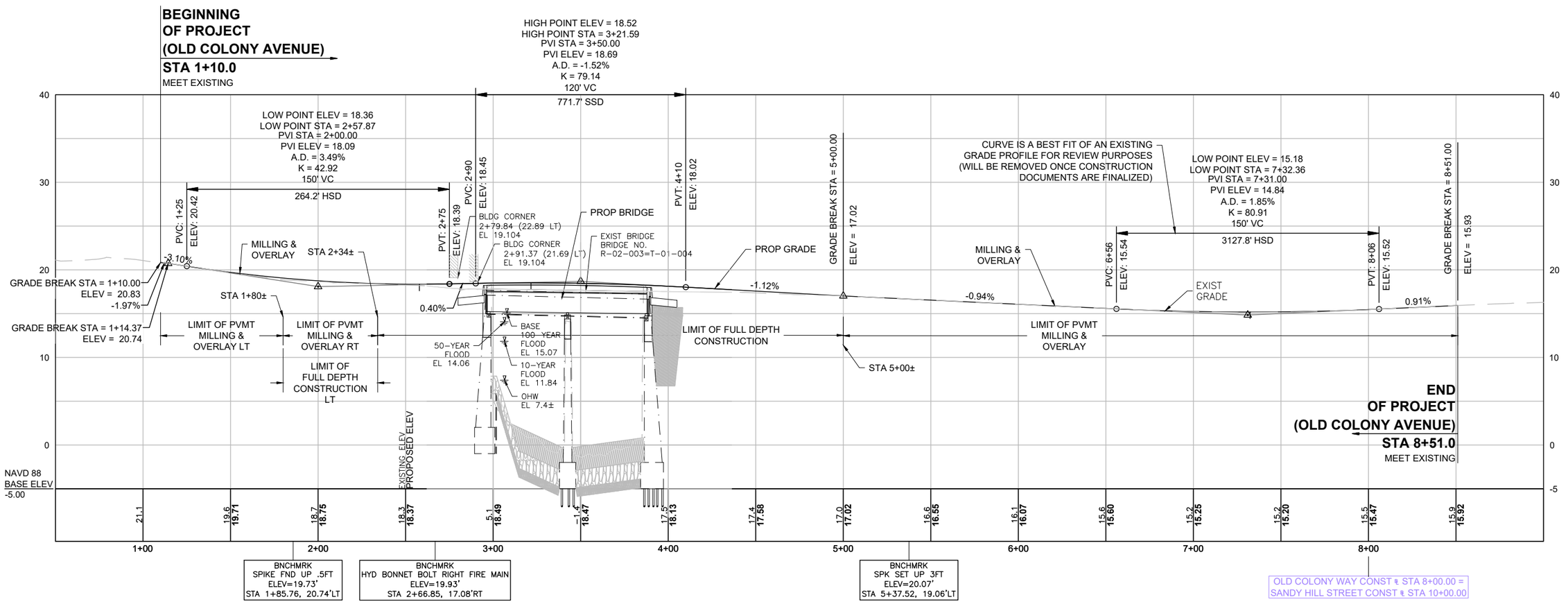


SOUTH STREET E/OLD COLONY AVE.

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	######	12	30
PROJECT FILE NO.	613642		

PROFILES

OLD COLONY AVE



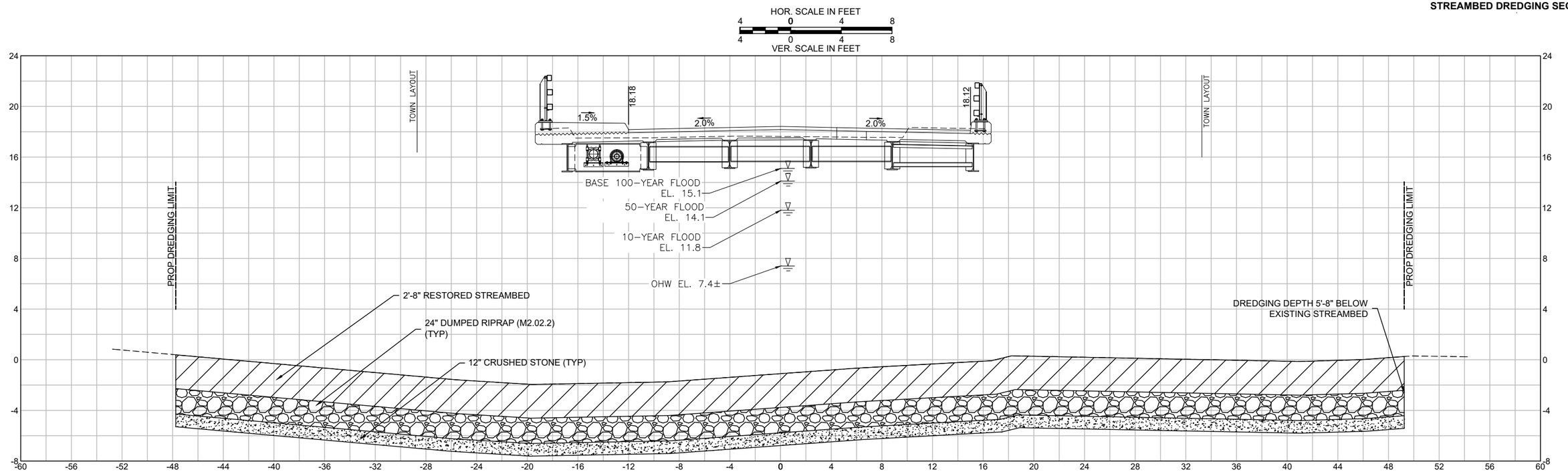
FOR CONSTRUCTION PLANS: SEE SHEETS 4 & 5

HOR. SCALE IN FEET
30 0 30 60
6 0 6 12
VER. SCALE IN FEET

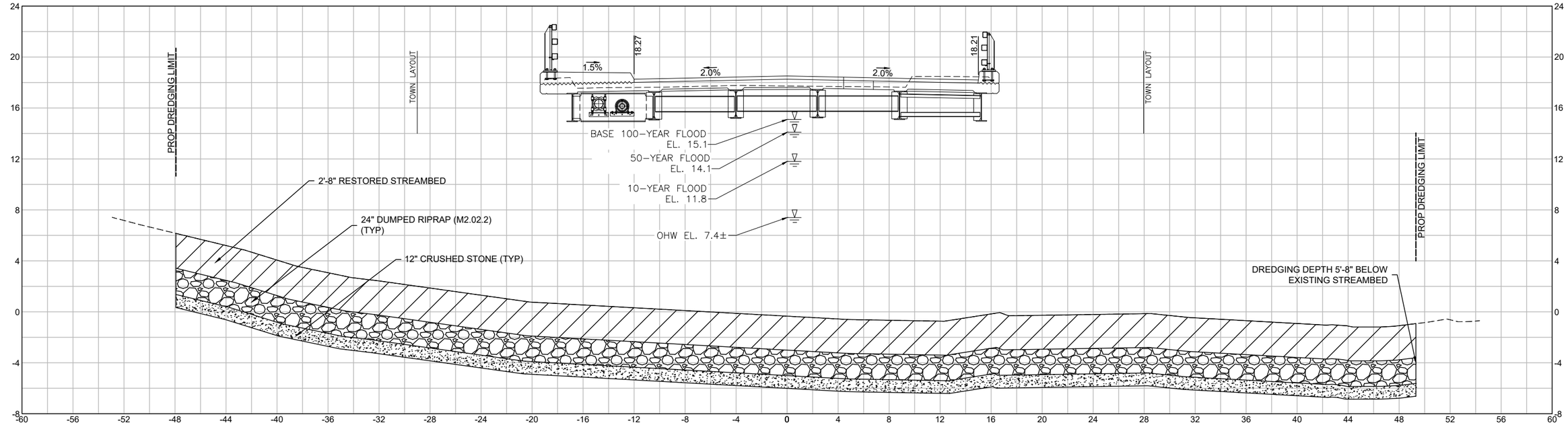
STREET NAME/ROUTE #

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	######	11A	15
PROJECT FILE NO.	613642		

STREAMBED DREDGING SECTIONS



3+60



3+30

APPENDIX H

- **Hydraulic and Scour Analysis Report**

  To be provided when received from MassDOT.

APPENDIX F

SITE PHOTOS

South abutment (Photo taken facing east)

Stone dam at south abutment (Photo taken facing west)

Downstream face of bridge (Photo taken facing east).

Downstream face of bridge (Photo taken facing west).

APPENDIX I

- **Emergency Certification Request**

IMPROVING COMMUNITIES TOGETHER

July 31, 2025

City of Taunton
Taunton Conservation Commission
141 Oak Street
Taunton, MA 02780

Attn: Steven Turner, Chair

Re: Request for Emergency Certification for South St E / Taunton River Bridge Closure and Repairs
Raynham: South St E / Taunton River
Bridge No: R-02-003 = T-01-004
BIN No: 3M4
Structure No: R02003-3M4-MUN-NBI

Dear Mr. Steven Turner:

This letter serves to notify the Taunton Conservation Commission of proposed emergency repairs to the Old Colony Avenue Bridge (identified as South Street in Raynham) necessitated by unsafe structural conditions that pose immediate risk to public safety and access.

The Massachusetts Department of Transportation (MassDOT) – Highway Division has undertaken the inventory, inspection, and rating of locally owned bridges to assist the City of Taunton in complying with State and Federal Legislation. In accordance with the provisions of **M.G.L.C. 85, sub-section 35**, the MassDOT – Highway Division determined the maximum load which the subject bridge may safely carry. The structure was recently rated and it is recommended that the bridge be closed to vehicular traffic due to the poor condition of the ends of beams 1, 2, 5, and 7 at the South Abutment, and beam 2 at the North Abutment.

Pursuant to **310 CMR 10.06(1) and (2)** of the Massachusetts Wetlands Protection Act, this work qualifies as an emergency exempt from prior permitting requirements for the protection of the safety of the citizens of the Commonwealth. The poor condition of the bridge requires prompt action to prevent collapse, injury, and loss of access.

Proposed emergency work includes:

- Concrete repairs along beams 1, 2, 5, and 7 at the South Abutment;
- Concrete repairs along beam 2 at the North Abutment; and
- Temporary scaffolding / staging that will be partially located within Land Under Water (LUW) but will not require permanent alterations.

Work on the bridge will need to be performed in and around the Taunton River, within NFHL 100 Year Flood Zone AE (i.e., Bordering Land Subject to Flooding), and within the 100-foot Buffer Zone to two (2) Bordering Vegetated Wetlands. All reasonable measures will be taken to minimize impacts to resource areas. Emergency repair work shall not exceed thirty (30) days. Only work necessary to abate the emergency will be performed on the subject bridge. Following the completion of emergency repairs, documentation will be submitted as required, and coordination with the Commission will continue to ensure full compliance.

BETA GROUP, INC.
89 Shrewsbury Street, Suite 300, Worcester, MA 01604
P: 508.756.1600 | W: www.BETA-Inc.com

The City of Taunton Department of Public Works requests an Emergency Certification to complete the work described above in the interest of public safety and in accordance with 310 CMR 10.06. If we can be of any further assistance regarding this matter, please contact us at our office.

Very truly yours,
BETA Group, Inc.

Jonathan Niro, PWS
Project Manager

Christopher Jones, P.E.
Vice President

cc: Fred Cornaglia, Commissioner of Public Works

Attachments:
MassDOT Letter
Site Locus Figure

Job No: [23.10887.00]

Maura Healey, Governor
Kimberley Driscoll, Lieutenant Governor
Monica Tibbits-Nutt, Secretary & CEO
Jonathan L. Gulliver, Highway Administrator

MassDOT
Massachusetts Department of Transportation
Highway Division

July 18, 2025

City of Taunton
Mayor of Taunton
90 Ingell St.
Taunton, MA 02780

Attn: Fred Cornaglia, Commissioner of Public Works

SUBJECT: NATIONAL BRIDGE INSPECTION STANDARDS (NBIS)
BRIDGE CLOSURE

Raynham: SOUTH ST E / TAUNTON RIVER
Bridge No: R-02-003 = T-01-004
BIN No: 3M4
Structure No: R02003-3M4-MUN-NBI

Dear Select Board:

The Massachusetts Department of Transportation (MassDOT) - Highway Division has undertaken the inventory, inspection, and rating of locally owned bridges to assist the cities and towns in complying with State and Federal Legislation. In accordance with the provisions of **M.G.L.C 85, sub-section 35**, the MassDOT - Highway Division has determined the maximum load which the subject bridge may safely carry.

The above structure was recently rated, and it is recommended that the bridge be **CLOSED** to vehicular traffic.

The reason for this recommendation is due to the poor condition of the ends of beams 1, 2, 5 and 7 at the South Abutment, and beam 2 at the North Abutment.

Your immediate action is requested. Please coordinate with the District Bridge Engineer, Shane Sousa, at (781)853-7065 on your action taken so the Bridge Inspection Unit can document the closure.

A copy of the Rating Report regarding this recommendation is on file at our District office. Mary-Joe Perry, the District Highway Director, will be pleased to review the report with you and advise you of any programs available regarding this bridge.

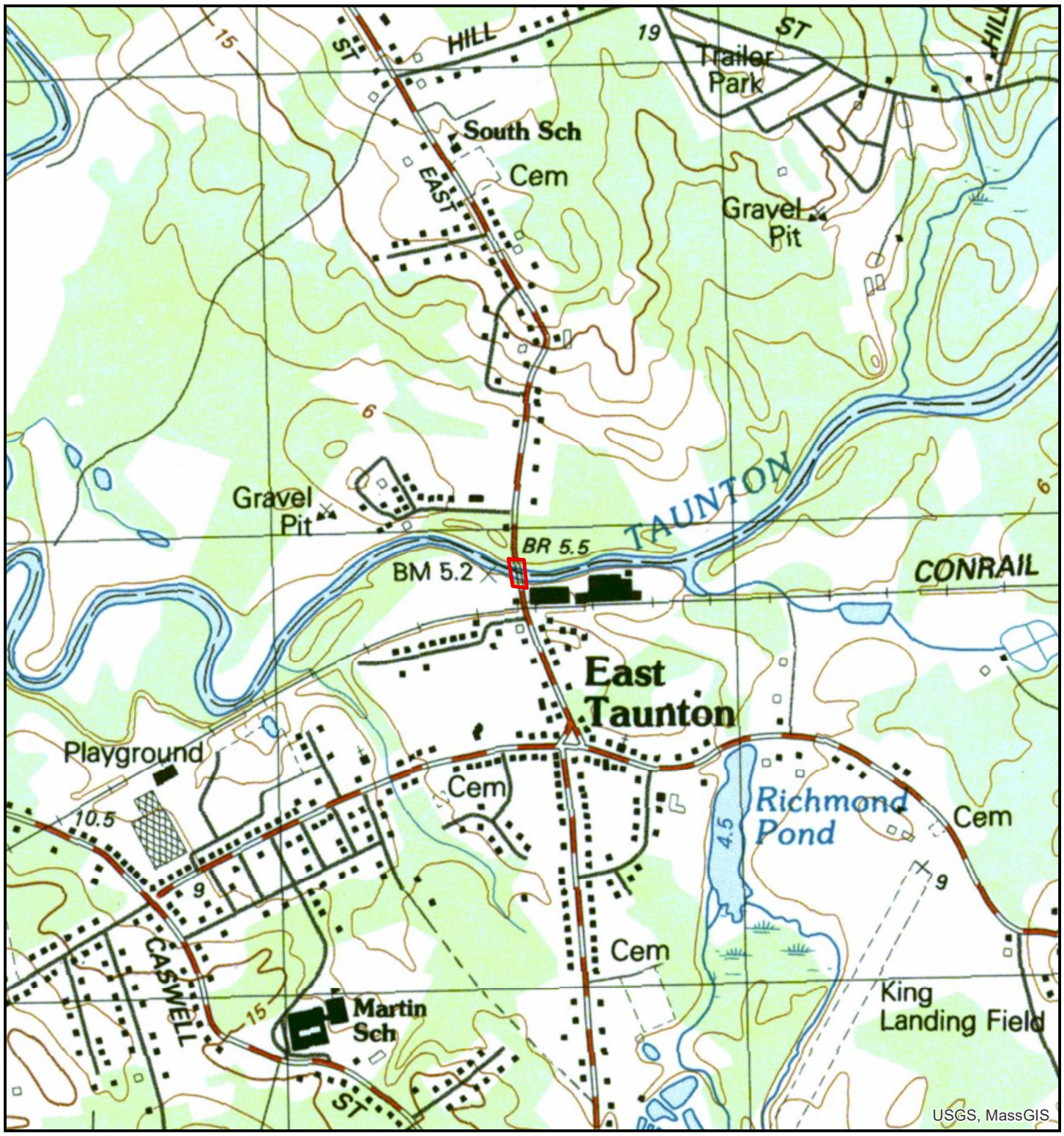
Thank you for your cooperation.

Sincerely,

Alexander K. Bardow, P.E.
State Bridge Engineer

SS/ss
cc: DHD, D-5 & DBIE, D-5, BIE

Ten Park Plaza, Suite 4160, Boston, MA 02116
Tel: 857-368-4636, TYY: 857-368-0655
www.mass.gov/massdot



BETA
IMPROVING COMMUNITIES TOGETHER

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0 1,000 2,000 Feet

1 inch = 1,000 feet

Figure 1
Site Locus
Old Colony Avenue Bridge
Taunton and Raynham, MA

Data Source: MassGIS USGS Topographic Quadrangle Images (2001)

IMPROVING COMMUNITIES TOGETHER

August 28, 2025

City of Raynham
Raynham Conservation Commission
Veterans Memorial Town Hall
558 South Main Street
Raynham, MA 02767

Attn: David McRae, Chair

Re: Request for Emergency Certification for South St E / Taunton River Bridge Closure and Repairs
Raynham: South St E / Taunton River
Bridge No: R-02-003 = T-01-004
BIN No: 3M4
Structure No: R02003-3M4-MUN-NBI

Dear Mr. David McRae:

This letter serves to notify the Raynham Conservation Commission of proposed emergency repairs to the Old Colony Avenue Bridge (identified as South Street in Raynham) necessitated by unsafe structural conditions that pose immediate risk to public safety and access.

The Massachusetts Department of Transportation (MassDOT) – Highway Division has undertaken the inventory, inspection, and rating of locally owned bridges to assist the Town of Raynham in complying with State and Federal Legislation. In accordance with the provisions of **M.G.L.C. 85, sub-section 35**, the MassDOT – Highway Division determined the maximum load which the subject bridge may safely carry. The structure was recently rated and it is recommended that the bridge be closed to vehicular traffic due to the poor condition of the ends of beams 1, 2, 5, and 7 at the South Abutment, and beam 2 at the North Abutment.

Pursuant to **310 CMR 10.06(1) and (2)** of the Massachusetts Wetlands Protection Act, this work qualifies as an emergency exempt from prior permitting requirements for the protection of the safety of the citizens of the Commonwealth. The poor condition of the bridge requires prompt action to prevent collapse, injury, and loss of access.

Proposed emergency work includes:

- Concrete repairs along beams 1, 2, 5, and 7 at the South Abutment;
- Concrete repairs along beam 2 at the North Abutment; and
- Temporary scaffolding / staging that will be partially located within Land Under Water (LUW) but will not require permanent alterations.

Work on the bridge will need to be performed in and around the Taunton River, within NFHL 100 Year Flood Zone AE (i.e., Bordering Land Subject to Flooding), and within the 100-foot Buffer Zone to two (2) Bordering Vegetated Wetlands. All reasonable measures will be taken to minimize impacts to resource areas. Emergency repair work shall not exceed thirty (30) days. Only work necessary to abate the emergency will be performed on the subject bridge. Following the completion of emergency repairs,

BETA GROUP, INC.
89 Shrewsbury Street, Suite 300, Worcester, MA 01604
P: 508.756.1600 | W: www.BETA-Inc.com

documentation will be submitted as required, and coordination with the Commission will continue to ensure full compliance.

If we can be of any further assistance regarding this matter, please contact us at our office.

Very truly yours,
BETA Group, Inc.

Jonathan Niro, PWS
Project Manager

Christopher Jones, P.E.
Vice President

cc: Lori Anderson, Public Works Specialist
Maissoun Reda, Chief of Wetlands Program - MassDEP Southeast Regional Office

Attachments:
MassDOT Letter
Site Locus Figure

Job No: [23.10887.00]

Maura Healey, Governor
Kimberley Driscoll, Lieutenant Governor
Monica Tibbits-Nutt, Secretary & CEO
Jonathan L. Gulliver, Highway Administrator

MassDOT
Massachusetts Department of Transportation
Highway Division

July 18, 2025

Town of Raynham
Board of Selectmen
558 South Main St.
Raynham, MA 02767

Attn: Norm Sturtevant, Highway Superintendent

SUBJECT: NATIONAL BRIDGE INSPECTION STANDARDS (NBIS)
BRIDGE CLOSURE

Raynham: SOUTH ST E / TAUNTON RIVER
Bridge No: R-02-003 = T-01-004
BIN No: 3M4
Structure No: R02003-3M4-MUN-NBI

Dear Select Board:

The Massachusetts Department of Transportation (MassDOT) - Highway Division has undertaken the inventory, inspection, and rating of locally owned bridges to assist the cities and towns in complying with State and Federal Legislation. In accordance with the provisions of **M.G.L.C 85, sub-section 35**, the MassDOT - Highway Division has determined the maximum load which the subject bridge may safely carry.

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The reason for this recommendation is due to the poor condition of the ends of beams 1, 2, 5 and 7 at the South Abutment, and beam 2 at the North Abutment.

Your immediate action is requested. Please coordinate with the District Bridge Engineer, Shane Sousa, at (781)853-7065 on your action taken so the Bridge Inspection Unit can document the closure.

A copy of the Rating Report regarding this recommendation is on file at our District office. Mary-Joe Perry, the District Highway Director, will be pleased to review the report with you and advise you of any programs available regarding this bridge.

Thank you for your cooperation.

Sincerely,

Alexander K. Bardow, P.E.
State Bridge Engineer

SS/ss
cc: DHD, D-5 & DBIE, D-5, BIE

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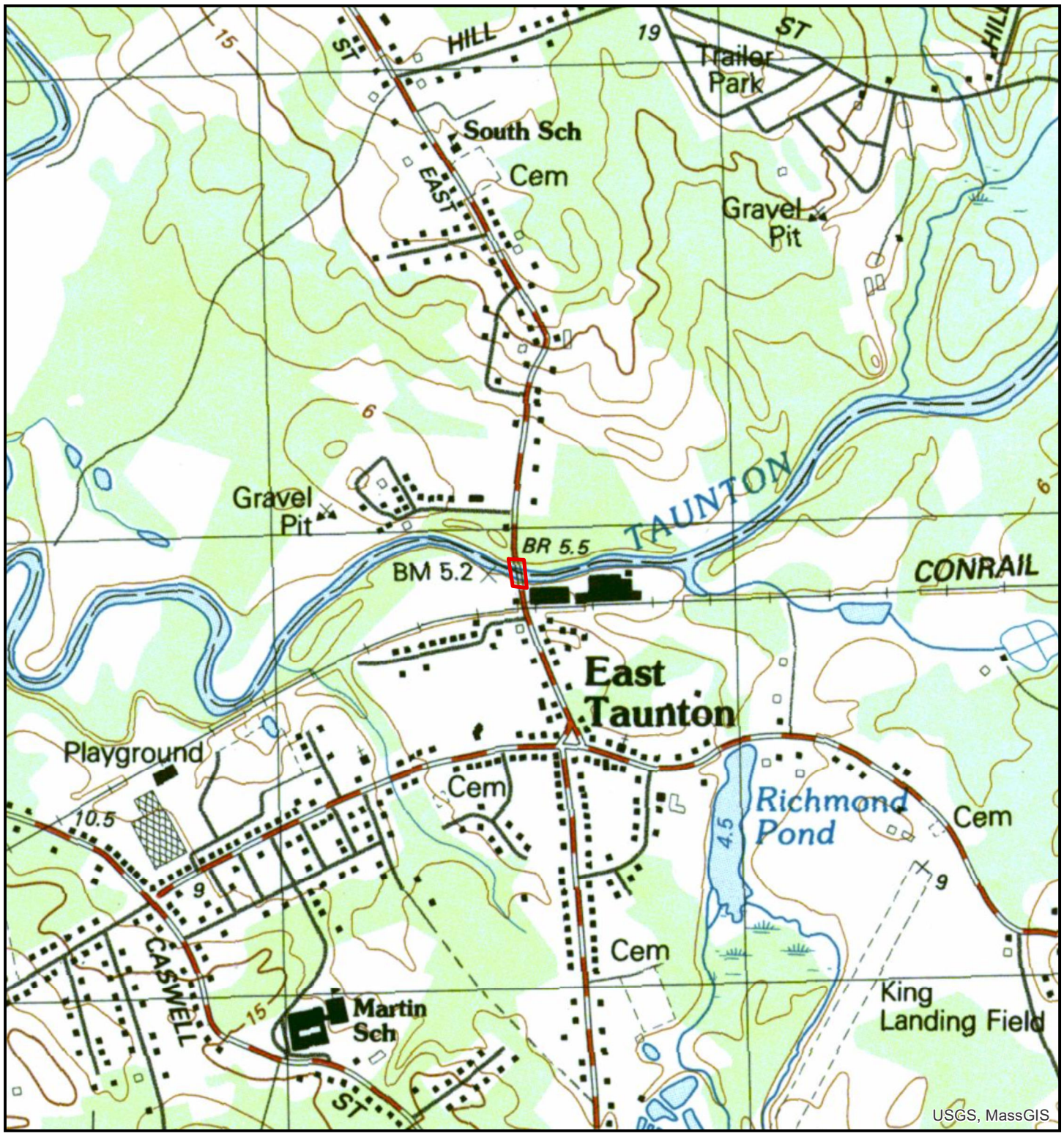

BETA
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Figure 1
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Old Colony Avenue Bridge
Taunton and Raynham, MA

Data Source: MassGIS USGS Topographic Quadrangle Images (2001)

APPENDIX J

- **Alternatives Analysis**

Raynham/Taunton

Bridge Reconstruction R-02-003=T-01-004

MassDOT Project File # 613642

July 2024

ALTERNATIVES ANALYSIS

315 Norwood Park South
2nd Floor
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781.255.1982
www.BETA-Inc.com

Bridge Reconstruction R-02-003=T-01-004

Raynham/Taunton

MassDOT Project File # 613642

ALTERNATIVES ANALYSIS

Prepared by: BETA GROUP, INC.
Prepared for: MassDOT Highway Division

July 2024

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1.0 EXISTING CONDITIONS

1.1 STUDY AREA

The project is located at the bridge carrying South Street East / Old Colony Ave over the Taunton River in Raynham Taunton. The project limits are from the intersection with Sandy Hill Road approximately 380 feet north of the bridge to the railroad grade crossing approximately 200 feet south of the bridge.

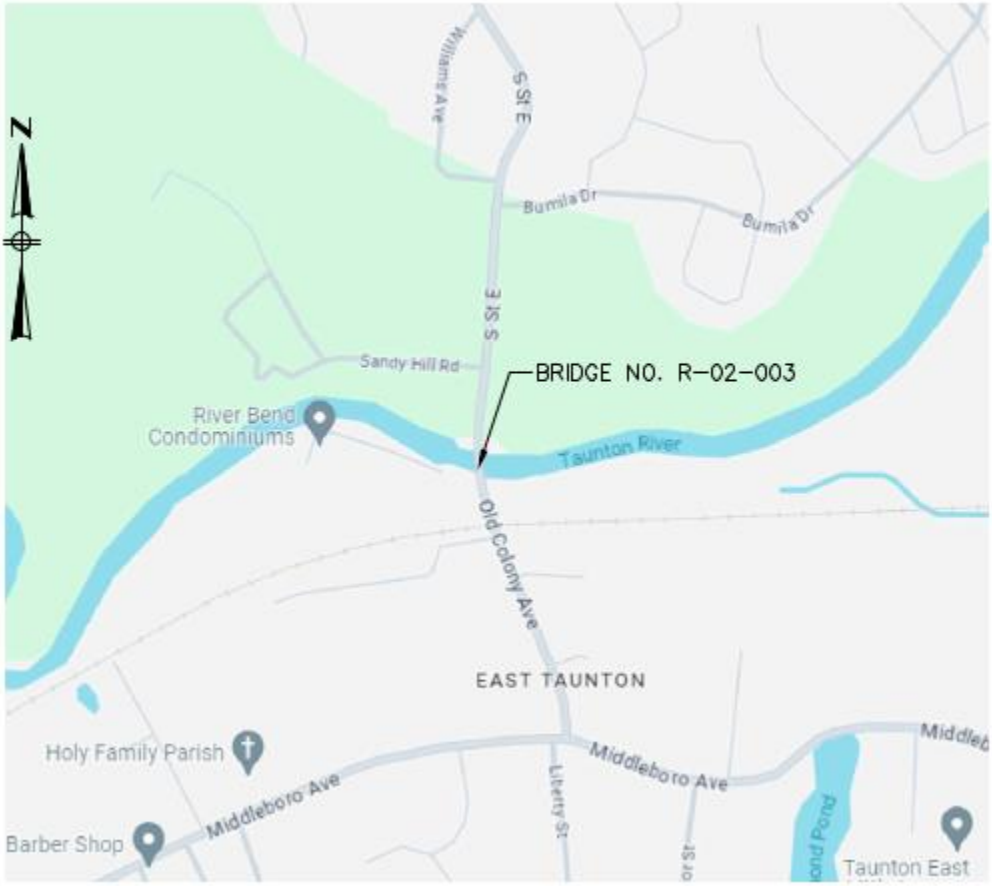

Figure 1 Location Map

1.2 BRIDGE

The existing structure is an approximately 89'-6" two span bridge with equal spans of approximately 44'-9", constructed in 1945. The structure consists of eight (8) 27 WF steel beams spaced at 4'-6 ½" on center supporting a 7" concrete deck and 2-1/4" of bituminous paving. The bridge is supported by unreinforced concrete gravity abutments and wingwalls and a reinforced concrete pier. The south abutment is founded on spread footings and the north abutment and pier are founded on timber piles. The bridge is 35'-0" wide, which includes a 26'-0" roadway, a 2'-6" safety walk and 5'-0" sidewalk with metal railing. The bridge has a skew angle of 23.6° and was designed for H20 loading.

1.3 ROADWAY

Old Colony Ave is a 0.3-mile-long (0.5 km) road in Taunton, Massachusetts, that runs north-south adjacent to the Taunton River. The roadway is under the jurisdiction of the City of Taunton. Old Colony Ave is classified as an Urban Collector.

Old Colony Ave within the study area consists of approximately (2) 13.5-foot-wide travel lanes with no shoulders on the approach to the bridge and over the bridge (2) 11.5-foot-wide travel lanes with 1 to 2-ft shoulders. Directional flow along the roadway is separated by a double yellow line and there are no bicycle accommodations within the project area. The legal speed regulation along the roadway in the study area is 30 miles per hour (mph).

South Street East is a 1.5-mile-long (2.4 km) road in Raynham, Massachusetts, that runs north-south adjacent to the Taunton River. The roadway is under the jurisdiction of the Town of Raynham. South Street East is classified as an Urban Collector.

South Street East within the study area consists of approximately (2) 11- to 11.5-foot-wide travel lanes with 1.5- to 2-ft shoulders. Guardrail exists on the southbound side of the roadway leading up to the bridge. Directional flow along the roadway is separated by a double yellow line and there are no bicycle accommodations within the project area. The legal speed regulation along the roadway in the study area is 30 miles per hour (mph).

1.4 SAFETY ANALYSIS

Crash data for the major intersections included within the detour limits was obtained for the five most recent years available, January 2019 through December 2023, from the MassDOT IMPACT Crash Portal. Refer to Section 3.0 of this report for further discussion of the four intersections used for the detour.

A review of the MassDOT crash data revealed that there were 49 crashes that occurred at the intersection of New State Hwy (Route 44) and Orchard St, 33 crashes at the intersection of New State Hwy (Route 44) and Church St, 31 crashes at the intersection of Middleboro Ave and Old Colony Ave/Liberty St and 6 crashes at the intersection of Middleboro Ave and Precinct St/South Precinct St. No fatalities were reported within the analysis limits. Most crashes within the intersections (95 out of 119) were either angle crashes or rear-end crashes. Furthermore, most crashes within the study area occurred during clear/dry weather. **Table 1** provides a summary of the roadway crash history.

Table 1: Roadway Crash Summary

	ROADWAY	New State Hwy (Route 44)@ Orchard St	New State Hwy (Route 44)@ Church St	Middleboro Ave @ Old Colony Ave/Liberty St	Middleboro Ave @ Precinct St/South Precinct St	TOTAL
Number of Crashes	Total	49	33	31	6	119
	Average Per Year	*9.8*	*6.6*	*6.2*	*1.2*	*23.8*
Severity	Fatal Injury	0	0	0	0	0
	Non-Fatal Injury	8	10	4	2	24
	Property Damage	41	23	27	4	95
Weather Condition	Clear/ Dry	39	25	26	6	96
	Cloudy/Rain/Snow	10	8	5	0	23
Crash Type	Angle	21	8	15	5	49
	Rear-End/Front to Rear	19	18	9	0	46
	Sideswipe	7	4	3	0	14
	Single Vehicle Crash	2	1	4	0	7
	Head On	0	2	0	1	3

2.0 ENVIRONMENTAL

2.1 ENVIRONMENTAL PERMITTING ASSESSMENT

The following Table is a list of applicable permits and reviews for the Project:

Table 2 Regulatory Permits and Reviews

Permit or Review	Yes	No	Notes:
Bridge Exempt	✓		The Project is considered "bridge exempt" and therefore does not require permitting under the Massachusetts Wetlands Protection Act, the Massachusetts Public Waterfront Act, or the Massachusetts Environmental Policy Act.
Wetlands Protection Act (WPA)		✓	
Chapter 91		✓	
Environmental Justice Community		✓	None mapped within 1 mile of the Site.
Massachusetts Environmental Policy Act (MEPA)		✓	

National Environmental Policy Act (NEPA)	✓		Categorical Exclusion (CE) required.
Section 401 Water Quality Certification (WQC)		✓	Should any wetland or waterway impacts be necessary based on Project scope revisions, a 401 WQC will be required if the "bridge exemption" is claimed for Massachusetts Wetlands Protection Act permitting. Otherwise, the Order of Conditions would serve as the 401 WQC.
Section 404 Army Corps General Permit		✓	
U.S. Coast Guard Bridge Permit		✓	
Coastal Zone Management (CZM) Federal Consistency Review		✓	
Essential Fish Habitat		✓	
Section 7 Endangered Species Act	✓		Consultation required.
Natural Heritage and Endangered Species Program (NHESP) Estimated or Priority Habitat		✓	
Section 106	✓		Project Notification Form required.
Adjacent Parkland or Wildlife Refuges for Section 4(f)	✓		Land to the north of the site is publicly owned and may be considered subject to Section 4(f); however, it does not appear to be protected open space based on cursory online research.
Wild and Scenic River	✓		Coordination with the National Parks Service will be required during design.
Adjacent Section 6(f) Properties		✓	
Article 97		✓	
Other		✓	

The differences in proposed work under the Alternatives presented in this report are related to striping and lane width; under either Alternative, the bridge superstructure will be replaced. Therefore, it is not anticipated that the selection of an Alternative will result in changes to the permitting requirements for the Project. The Project will not result in direct Resource Area impacts (e.g., fill and/or alteration). As summarized in Table 1 above, the following environmental permits/reviews are anticipated to be required under either Alternative:

Categorical Exclusion (MassDOT / FHWA)

The Project will be funded by a federal Community Project Funding Grant routed through the Federal Highway Administration (FHWA); therefore, documentation of compliance with the National Environmental Policy Act (NEPA) will be required. It is anticipated that the Project will require the

submission of a Categorical Exclusion (CE) pursuant to the FHWA's list of CE-eligible activities and that no Environmental Assessment or Environmental Impact Study will be required.

Section 7 – Endangered Species Act (USFWS)

As part of Project's environmental review process, coordination with the U.S. Fish and Wildlife Service (USFWS) under Section 7 of the federal Endangered Species Act will be undertaken. At a minimum, it is anticipated that the Project will require securing a "Not Likely to Adversely Affect" determination due to the Project Area being within the range of the Northern long-eared bat (*Myotis septentrionalis*), the Plymouth redbelly turtle (*Pseudemys rubriventris bangsi*), and the Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*).

Project Notification Form (State Historic Preservation Officer / Bureau of Underwater Archaeological Resources / Relevant Tribes)

Due to the use of federal funding, the Project will require the submission of a Project Notification Form (PNF) to the State Historic Preservation Officer (SHPO), Bureau of Underwater Archaeological Resources (BUAR), and all relevant Tribes to demonstrate compliance with Section 106 of the National Historic Preservation Act.

The Project will be constructed within/adjacent to the Old Colony Iron Works – Nemasket Mill Complex National Register Historic District (TAU.AA). Based on mapping reviewed via the Massachusetts Cultural Resources Information System (MACRIS), only roadway approach work within Taunton will be located within this Historic District. Both MACRIS mapping and the Massachusetts Historical Commission Inventory Form do not indicate that the bridge itself is a historic or cultural resource. Nearby historic and cultural resources associated with this Historic District include TAU.630 and TAU.628.

2.2 HAZMAT

The selection of a specific alternative will not affect the hazardous materials due diligence required for the Project.

2.2.1 HISTORIC AND CURRENT LAND USE

Historic and current land uses near the Project Area consist of residential and industrial properties to the south (within Taunton) and undeveloped woodlands and residential properties to the north (within Raynham).

2.2.2 ADJACENT RELEASE SITES AND CONTAMINATION SOURCES

According to the Massachusetts Underground Storage Tank (UST) Facility Search there is one (1) UST facilities within 0.25-miles of the Project Corridor, the Amaros Market Inc. (Facility ID #3854) located at 508 Middleboro Ave in Taunton.

According to MassDEP's Searchable Sites Database, the following releases have been reported within the vicinity of the Project Area:

RTN 4-0000160 – 103 Old Colony Avenue, Taunton

In July of 1992, a Phase I Environmental Site Assessment (ESA) was completed at the former Bacon Felt Facility located at 103 Old Colony Avenue in Taunton due to soil and groundwater contamination associated with a former leaching tank. Contaminants noted in the Phase 1 ESA included elevated levels of toluene and Volatile Organic Compounds (VOCs). Due to the limited vertical and horizontal spread of the contaminants per monitoring well data and surface water sampling, the property was assigned a Tier II classification.

Given the scope of the Project, there is currently no anticipated excavation of soils; therefore, management of contaminated media is unlikely.

2.2.3 Known or suspected Contamination Sites

A search for known oil and hazardous material releases in proximity of Project limits was conducted using online resources as noted above. No superfund sites are present within the Project Area.

2.2.4 Active Use Limitations (AUL)

There are no AUL Deed Restrictions within or adjacent to the Project limits that may be impacted by construction.

2.2.5 Excavation Work

The Project does not propose excavation into soils; only full-depth pavement construction will be conducted.

2.2.6 Excess Soil Generation

The Project does not propose activity that will generate excess soil.

2.2.7 Rail trail Projects

The Project is not a rail trail project.

2.2.8 Dewatering Contaminated groundwater

The Project does not propose any dewatering of polluted groundwater.

2.2.9 Hazardous Building Materials

Due to the age of the bridge, there is the potential for asbestos within concrete, joint caulking materials, gunite patches on the concrete, or the asphalt road surface. There is also potential for the presence of Polychlorinated biphenyls (PCBs) in paint and/or joint caulking materials. Lead paint may also be present on bridge surfaces.

3.0 Temporary Traffic Management

3.1 Detour Route

The construction staging alternative under consideration for the bridge and roadway construction involves a full bridge closure with traffic detours. Based on traffic counts conducted in May of 2024, the Old Colony Ave Bridge experiences a heavy vehicle percentage of approximately 0.8% in the northbound direction and 0.7% in the southbound direction.

The proposed detour would be via New State Highway (US Route 44), Church Street/Precinct Street and Middleboro Ave. Vehicles typically utilizing the Pleasant Street Bridge northbound approach would follow the detour route on Middleboro Ave and turn left onto Precinct Street, continue onto Church Street and turn left onto New State Highway. Vehicles destined in the southbound direction over the bridge would use the same route in the opposite direction. The two intersections on Middleboro Ave are stop controlled. The two study intersections on New State Highway (US Route 44) are signalized.

3.2 OPERATIONS ANALYSIS

Traffic Operations Analysis

Capacity analyses were conducted to assess the quality of traffic flow at four study intersections. This analysis was performed for existing Year 2024 volume conditions and Year 2024 detour volume conditions during the weekday AM and PM peak hours.

Capacity analysis was performed using Trafficware's Synchro software package (Version 12.0). The Synchro software analysis utilizes methodologies contained in the *Highway Capacity Manual, 7th Edition (HCM7)* published by the Transportation Research Board.

Six levels of service (LOS), "A"-"F", have been established with "A" representing very good operation and "F" representing very poor operation. For signalized and unsignalized intersections, level of service is defined in terms of total delay and is computed for individual intersection turning movements. Delay is a measure of driver discomfort, frustration, fuel consumption, and lost travel time. The relationship between LOS and delay for signalized intersections are summarized in Error! Reference source not found.**3**. The relationship between LOS and delay for unsignalized intersections are summarized in Error! Reference source not found.4. In addition to delay and level of service, the analysis examined the volume to capacity ratio (v/c) and 95th percentile queues for each lane group. Capacity analysis worksheets are provided in **Appendix C.**

Table 3: Signalized Intersection Level of Service Criteria

LOS	**Signalized Intersection Criteria Average Total Delay** (Seconds per Vehicle)	General Description
A	< 10.0	Free Flow
B	10.1 to 20.0	Stable flow (slight delays)
C	20.1 to 35.0	Stable flow (acceptable delays)
D	35.1 to 55.0	Approaching unstable flow (tolerable delay)
E	55.1 to 80.0	Unstable flow (intolerable delay)
F	> 80.0	Forced flow (jammed)

Table 4: Unsignalized Intersection Level of Service Criteria

LOS	Unsignalized Intersection Criteria Average Total Delay (Seconds per Vehicle)	General Description
A	< 10.0	Free Flow
B	10.1 to 15.0	Stable flow (slight delays)
C	15.1 to 25.0	Stable flow (acceptable delays)
D	25.1 to 35.0	Approaching unstable flow (tolerable delay)
E	35.1 to 50.0	Unstable flow (intolerable delay)
F	> 50.0	Forced flow (jammed)

Traffic Capacity Analysis Results

Intersection capacity and Level of Service (LOS) analysis was conducted for the Existing and Detour conditions for the AM and PM weekday commuting peak hours. Summaries of this analysis are provided in **Tables 5 and 6**.

Table 5: Level of Service Summary – Signalized Intersections

INTERSECTION	Existing				Detour			
	LOS	DEL[a]	v/c[b]	95%[c]	LOS	DEL[a]	v/c[b]	95%[c]
Route 44 at Orchard Street – Signalized Intersection								
OVERALL AM	**D**	**40.1**			**D**	**36.5**		
Route 44 – EBL - AM	F	216.5	1.17	89	E	66.8	0.52	64
Route 44 – EBT - AM	C	31.2	0.72	480	C	34.3	0.81	622
Route 44 – EBR - AM	A	1.4	0.19	24	A	1.1	0.07	11
Route 44 – WBL - AM	E	78.1	0.50	51	E	58.0	0.22	37
Route 44 – WBTR - AM	C	24.4	0.44	207	C	29.3	0.65	340
Orchard – NBL - AM	E	58.3	0.72	182	E	57.8	0.69	165
Orchard – NBTR - AM	F	104.6	0.96	204	E	63.5	0.72	154
Orchard – SBL - AM	E	55.6	0.57	184	E	60.8	0.69	242
Orchard – SBT - AM	D	53.3	0.33	87	D	45.5	0.09	40
Orchard – SBR - AM	B	12.4	0.50	54	B	11.2	0.44	55
OVERALL PM	**D**	**35.0**			**C**	**31.7**		
Route 44 – EBL - PM	F	81.6	0.71	123	E	76.7	0.67	113
Route 44 – EBT - PM	C	29.1	0.67	415	C	28.3	0.66	403
Route 44 – EBR - PM	A	3.6	0.35	55	A	2.3	0.35	28
Route 44 – WBL - PM	E	58.1	0.29	58	E	57.2	0.28	59
Route 44 – WBTR - PM	C	29.3	0.72	426	C	31.9	0.81	502
Orchard – NBL - PM	D	54.9	0.62	128	E	64.1	0.38	40
Orchard – NBTR - PM	E	64.1	0.71	183	D	40.6	0.16	44
Orchard – SBL - PM	E	65.3	0.70	191	E	70.6	0.75	202
Orchard – SBT - PM	F	89.1	0.89	261	D	49.7	0.52	186
Orchard – SBR - PM	B	11.5	0.46	31	A	7.9	0.35	28
Route 44 at Church Street – Signalized Intersection								
OVERALL AM	**C**	**24.5**			**F**	178.3		
Route 44 – EBLTR - AM	B	10.6	0.63	263	F	164.6	1.29	754
Route 44 – WBLTR - AM	B	13.5	0.74	350	F	145.4	1.24	671
Church – NBLTR - AM	E	74.1	0.97	98	F	271.2	1.53	301
Church – SBLTR - AM	D	45.6	0.77	182	B	13.3	0.37	96
OVERALL PM	**C**	**28.4**			**F**	**125.7**		
Route 44 – EBLTR - PM	C	21.0	0.87	624	F	106.6	1.16	772
Route 44 – WBLTR - PM	C	27.3	0.92	646	F	126.8	1.21	764
Church – NBLTR - PM	E	56.5	0.86	168	F	205.1	1.36	440
Church – SBLTR - PM	D	38.9	0.73	122	B	17.5	0.42	94

a. Delay measured in seconds per vehicle

b. v/c represents Volume to Capacity Ratio

c. 95th Percentile Queue measured in feet.

Table 6: Level of Service Summary – Unsignalized Intersections

INTERSECTION	Existing				Detour			
	LOS	DEL[a]	v/c[b]	95%[c]	LOS	DEL[a]	v/c[b]	95%[c]
Middleboro Ave at Old Colony Ave/Liberty Street – Unsignalized Intersection								
Liberty – NB - AM	F	176.8	1.18	11	C	21.4	0.52	3
Middleboro – EBL -AM	A	8.6	0.23	< 1	A	8.3	0.03	< 1
Middleboro – WBL - AM	A	8.9	0	< 1	B	10.2	0.01	< 1
Old Colony – SB - AM	F	273.5	1.43	15	B	14.8	0.09	1
Liberty – NB - PM	F	128.9	1.02	9	C	17.3	0.42	2
Middleboro – EBL - PM	A	8.8	0.17	< 1	A	8.0	0.01	< 1
Middleboro – WBL - PM	A	7.9	0.03	< 1	A	8.3	0.04	< 1
Old Colony – SB - PM	F	>300.0	>2.00	53	C	16.7	0.16	1
Middleboro Ave at Precinct Street/S Precinct Street – Unsignalized Intersection								
S Precinct – NB - AM	C	19.3	0.44	3	F	>300.0	>2.00	21
Middleboro – EBL -AM	A	7.8	0.04	< 1	A	9.5	0.41	2
Middleboro – WBL - AM	A	7.6	0.02	< 1	A	7.6	0.02	< 1
Precinct – SB - AM	B	13.4	0.14	< 1	F	90.9	1.02	12
S Precinct – NB - PM	D	33.1	0.50	3	F	>300.0	>2.00	17
Middleboro – EBL -PM	A	8.0	0.03	< 1	A	8.8	0.22	< 1
Middleboro – WBL -PM	A	7.9	0.06	< 1	A	7.9	0.06	< 1
Precinct – SB - PM	D	28.2	0.57	4	F	253.2	1.37	14

a. Delay measured in seconds per vehicle
b. v/c represents Volume to Capacity Ratio
c. 95th Percentile Queue measured in vehicles

Route 44 at Orchard Street

At the Route 44 signalized intersection with Orchard Street, the traffic operations with the proposed detour in place is projected to operate at a slightly improved level of service over existing conditions for the overall intersection. A few of the individual lane movements are projected to experience a slight increase in delay, but all will operate at LOS E or better.

Route 44 at Church Street

At the Route 44 signalized intersection with Church Street, the traffic operations with the proposed detour in place is projected to operate at a worse level of service over existing conditions for the overall intersection due to the additional traffic volume that will need to be processed by the traffic signal. The overall intersection and the EB, WB, and NB approaches are projected to operate at LOS F, have a volume to capacity ratio over 1.0 and have longer queues when compared with existing conditions. A potential mitigation measure is for a traffic control officer to be present to monitor peak time periods. An additional mitigation strategy is to adjust the traffic signal timing while the detour is in place.

Middleboro Ave at Old Colony Ave/Liberty Street

At the Middleboro Ave unsignalized intersection with Old Colony Ave/Liberty Street, the traffic operations with the proposed detour in place is projected to operate at significantly improved level of service over existing conditions for the overall intersection due to the full closure of the Old Colony Ave bridge over the Taunton River just north of this intersection. A few of the individual lane movements are projected to experience a slight increase in delay, but all will operate at LOS C or better.

Middleboro Ave at Precinct Street/S Precinct Street

At the Middleboro Ave unsignalized intersection with Precinct Street/ S Precinct Street, the traffic operations with the proposed detour in place is projected to operate at a worse level of service over existing conditions due to the additional traffic volume that will need to be processed through the intersection. The NB and SB stop-controlled approaches are projected to operate at LOS F, have a volume to capacity ratio well over 1.0 and have longer queues when compared with existing conditions. A potential mitigation measure is for a traffic control officer be present during peak time periods to mitigate the anticipated side street delay.

4.0 Utilities

Underground utilities within the project area include water, sewer, and gas. Gas and sewer are carried on the bridge superstructure and will be relocated from the east sidewalk to the west sidewalk so that service can be maintained during construction. An additional utility bay will be added to the bridge for a future water main.

Overhead utility poles will be permanently relocated from the west side of the roadway to the east side for bridge construction and for sidewalk clearance within project limits.

5.0 Right of Way

The existing Right of Way is municipal owned and varies in width starting from approximately 38’ at the beginning of the project and widening to up to 58’ over the bridge on the Taunton Side. On the Raynham side the Right of Way also varies in width. The Right of Way goes from 73’ by the sewer pump station. to 45’ wide by Sandy Hill Street.

Both alternatives presented below will have the same Right of Way impacts. A permanent easement will be required for proposed pedestrian curb ramp at #96 Old Colony Avenue. Permanent utility easements will be required for overhead wires that are being relocated from the west to the east side of the roadway. Temporary easements will be required for slope work, driveway work, sediment control barriers, and construction access.

6.0 Alternatives

6.1 General

There are two alternatives under consideration. Both alternatives were chosen based on the constraint that the existing bridge substructure be retained and only the superstructure be replaced. This restricts the cross-section of the roadway to approximately 26 ft curb to curb with a 6 ft sidewalk on one side of

the roadway. Both alternatives are proposing relocating the sidewalk from the east side to the west side of the roadway so that the sidewalk connects to the existing sidewalk at the condominium on the south side of the bridge. The sidewalk will be extended to Sandy Hill Street in Raynham.

The difference in the two alternatives are the lane and shoulder widths. Alternative 1 offers a narrower lane width with larger shoulder on the bridge curb side. Alternative 2 offers a more typical lane width with narrow shoulders on both sides of the roadway. Both alternatives will require design justifications for pedestrian and bicycle accommodation.

6.2 ALTERNATIVE 1

Alternative 1 features a cross-section with two 10-foot-wide travel lanes in each direction, accompanied by one 2-foot-wide shoulder on the sidewalk side and one 4-foot-wide shoulder on the safety curb side. Sidewalk is proposed on the west side of the roadway. The sidewalk is 6 feet wide from the condominium driveway to over the bridge. North of the bridge the sidewalk tapers down to 5.5 feet wide and terminates at Sandy Hill Street with reciprocal ramps. Vertical granite curb is proposed along the front of the sidewalk. Vertical granite curb is proposed at the back of sidewalk at Station 5+70 +/- to 6+32 +/- (LT) to avoid impacts to the wetlands. Alternative 1 will require a design justification for pedestrian accomodations because only one sidewalk is being proposed. The design does not allow for sidewalks on both sides of the road due to the width constraint of the existing bridge substructure. A design justification is also needed for the bicycle accomodations. Neither a shared use path or seperated bike lanes were able to fit within the existing bridge structure. Therefore, a 4-foot shoulder was provided on the east side, which is the minimum width for bicycle accomodation. A 2-foot shoulder was provided on the west side against the sidewalk for drainage, errant vehicles, and encroachment and off-tracking of wide vehicles. Sharrows can be added in the northbound lane.

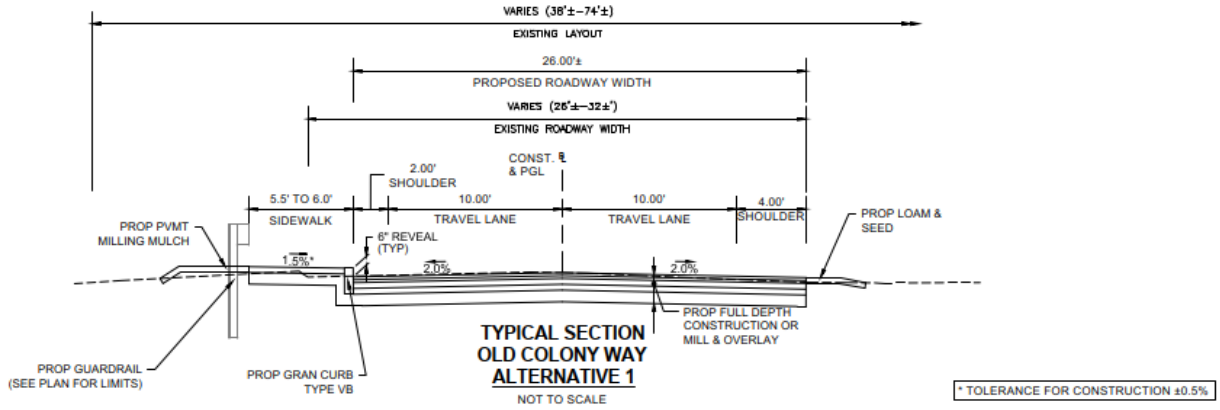

Figure 2 Typical Section Alternative 1

6.3 ALTERNATIVE 2

Alternative 2 features a cross-section with two 11-foot-wide travel lanes in each direction, accompanied by two 2-foot-wide shoulders. Vertical granite curbing lines both sides of the roadway. Sidewalk proposed on the west side of the roadway. The sidewalk is 6 feet wide from the condominium driveway to over the bridge. North of the bridge the sidewalk tapers down to 5.5 feet wide and terminates at Sandy Hill Street with reciprocal ramps. Vertical granite curb is proposed along the front of the sidewalk. Vertical granite curb is proposed at the back of sidewalk at Station 5+70 +/- to 6+32 +/- (LT) to avoid impacts to the wetlands. Alternative 2 will require a design justification for pedestrian

accomodations because only one sidewalk is being proposed. The design does not allow for sidewalks on both sides of the road due to the width constraint of the existing bridge substructure. A design justification is also needed for the bicycle accomodations. Neither a shared use path or seperated bike lanes were able to fit within the existing bridge structure. Therefore, 2- foot shoulders were provided on both sides of the roadway. Sharrows can be added to both travel lanes.

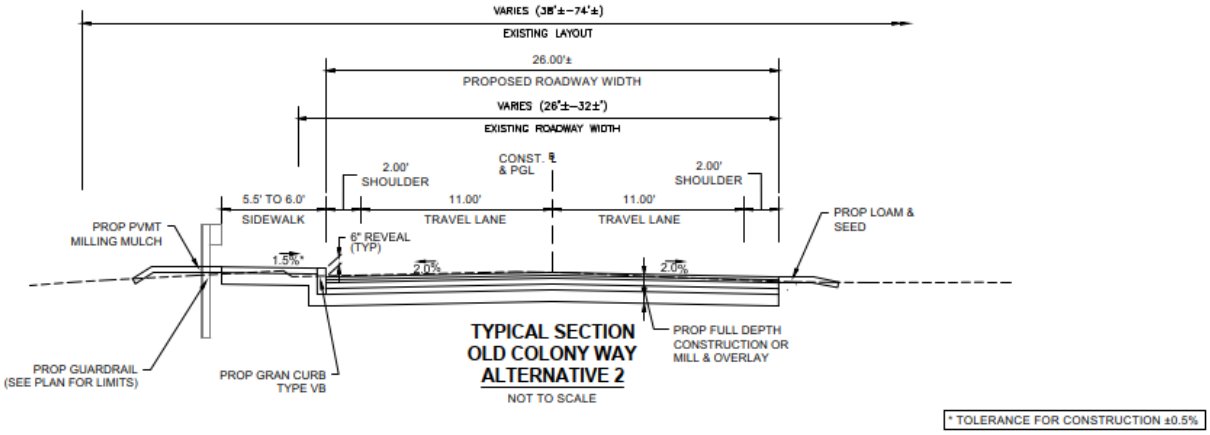

Figure 3 Typical Section Alternative 2

7.0 Opinion of Cost

The cost in both alternatives is the same because the cross-sectional width of the roadway, bridge, sidewalk and project limits are not different. The total estimated construction cost is $6,510,000.

8.0 Conclusion

Both alternatives require design justification for pedestrian and bicycle accommodation. Both have the same cost and impacts to utilities and properties. The only difference between the two are lane and shoulder configuration. Alternative 1 allows for bicycle accommodation southbound with a 4’ shoulder, while still maintaining the minimum lane width for a collector of 10-foot. Old Colony Avenue and South Street East is a bus route on the Greater Attleboro Taunton Regional Transit Authority. Bus lanes are permitted on 10’ travel lanes. The narrower 10’ roadway will help reduce speeds. Alternative 2 is like existing conditions where the lane widths are close to 11-feet and the shoulders are close 2-feet. Sharrows can be added to both lanes to signify that vehicles will be sharing the roadway with bicyclists.

APPENDIX K

- **SHPO, BUAR, THPO Correspondence and PNF**

  To be provided when received from MassDOT.

MassDOT - Cultural Resources Unit (Project #613642)

Section 106 Notification Checklist for USACOE Section 404 Permit - Project Notification Forms (PNF)

1. State Historic Preservation Office (SHPO)

- ☐ PNF submitted by certified mail (receipt attached)
- ☐ SHPO stamped PNF received (attached)
- ☐ No comments received within 30-day review period
- ☐ No PNF submitted in accordance with 2013 letter from USACOE, MassDOT in-house Section 106 clearance attached
- ☒ Section 106 No Adverse Effect or Adverse Effect documentation attached

2. Board of Underwater Archaeological Resources (BUAR)

- ☒ PNF submitted by e-mail with delivery receipt (attached)
- ☐ Comments received within 30-day review period (attached)
- ☒ No comments received within 30-day review period

3. Mashpee Wampanoag Tribe (MTHPO)

- ☒ PNF submitted by e-mail with delivery receipt (attached)
- ☐ Comments received within 30-day review period (attached)
- ☒ No comments received within 30-day review period

4. Wampanoag Tribe of Gay Head Aquinnah (ATHPO)

- ☒ PNF submitted by e-mail with delivery receipt (attached)
- ☐ Comments received within 30-day review period (attached)
- ☒ No comments received within 30-day review period

5. Stockbridge-Munsee Community (SMTHPO)

- ☐ PNF submitted by e-mail with delivery receipt (attached)
- ☐ Comments received within 30-day review period (attached)
- ☐ No comments received within 30-day review period
- ☒ N/A (Project not within tribe's area of interest)

6. Narragansett Indian Tribe (NTHPO)

- ☒ PNF submitted by e-mail with delivery receipt (attached)
- ☐ Comments received within 30-day review period (attached)
- ☒ No comments received within 30-day review period

RECEIVED
MAR 19 2025
MASS. HIST. COMM

Maura Healey, Governor
Kimberley Driscoll, Lieutenant Governor
Monica Tibbits-Nutt, Secretary & CEO
Jonathan L. Gulliver, Highway Administrator

massDOT Massachusetts Department of Transportation Highway Division

March 14, 2025 RC.76514

Ms. Brona Simon
State Historic Preservation Officer
Massachusetts Historical Commission
220 Morrissey Boulevard
Boston, MA 02125

CONCURRENCE: Brona Simon 4/17/25
BRONA SIMON
STATE HISTORIC
PRESERVATION OFFICER
MASSACHUSETTS
HISTORICAL COMMISSION

RE: RAYNHAM-TAUNTON: Bridge R-02-003=T-01-004 Replacement
South Street East over the Taunton River (MassDOT Project #613642)
Section 106 Review: No Adverse Effect
Section 4(f) Evaluation: Permanent Easements - *de minimis*
Section 4(f) Evaluation: Temporary Occupancies – No 4(f) Use

Dear Ms. Simon,

The Massachusetts Department of Transportation (MassDOT) proposes to replace Bridge R-02-003=T-01-004 which carries Old Colony Avenue over the Taunton River in Taunton and Raynham. The bridge was constructed in 1945. The project will replace the superstructure and retain the existing substructure. The proposed superstructure will be wider by 1' to accommodate a bicycle lane. The sidewalk will be relocated to the west side of the bridge structure to connect to the existing sidewalk at the condominium building south of the bridge. While the substructure will be retained, it is anticipated that in-water work will be required for scour protection.

The project's area of potential effect (APE) is within the National Register-listed **Old Colony Iron Works / Nemasket Mills Complex Historic District (TAU.AA).** MassDOT has reviewed the project under the Massachusetts Statewide Programmatic Agreement for Section 106 of the National Historic Preservation Act of 1966, as amended [36 CFR 800], and has determined that the proposed work will have **No Adverse Effect** on properties that are listed or eligible for listing in the National Register of Historic Places (NR).

Old Colony Iron Works / Nemasket Mills Complex Historic District
A review of the NR-form in MACRIS revealed that two contributing properties associated with the Old Colony Iron Works / Nemasket Mills Complex Historic District are located within the project's APE: Old Colony Iron Works - Office (TAU.630) at 96 Old Colony Avenue and Old Colony Iron Works – Shovel Shop (TAU.628) at 103 Old Colony Avenue. The period of significance for the former mill complex is 1824 – 1920. The former mill complex was converted into residential condominiums in the 1980s, currently known as River Bend Condominiums.

The 1945 bridge plans show a small, 2-story brick office building located adjacent to the Old Colony Avenue driveway for the former mill office (west of APE) (enclosed). A review of historic aerial photos indicates the small office building was demolished when the mill complex was converted to condominiums. The 1945 bridge plans also show four buildings located on the property at 103 Old Colony Avenue (east of APE): a 4-story building, a 1-story brick building, a 1½-story wooden factory, and a 2½-story brick office building. The 1-story brick building is all that remains as it appears the other three buildings were demolished by the turn of the 21st century.

The project work within the historic district includes: pavement milling and overlay, full depth pavement reconstruction, pavement markings, signage, ADA-sidewalk, curbing, and ramp construction, landscaping, placing loam and seed, utility and drainage adjustments, and installing guardrail.

Ten Park Plaza, Suite 4160, Boston, MA 02116
Tel: 857-368-4636, TTY: 857-368-0655
mass.gov/massdot

The project's APE within the boundaries of the Old Colony Iron Works / Nemasket Mills Complex Historic District is confined to disturbed areas within and immediately adjacent to the roadway layout. Proposed work within the district requires permanent easements and temporary occupancies from contributing properties (see Section 4(f) discussion below).

Bridge R-02-003=T-01-004

Bridge R-02-003=T-01-004, constructed in 1945, is a two-span structure consisting of eight (8) steel beams supporting a 7" concrete deck and 2-1/4" of bituminous paving. The bridge is supported by unreinforced concrete gravity abutments and wingwalls and a reinforced concrete pier. The south abutment is founded on spread footings and the north abutment and pier are founded on timber piles. The bridge is a typical mid-20th century example of the most common structural type in MassDOT's bridge inventory. It lacks any architectural or engineering features that would confer individual eligibility for the National Register.

Archaeological Assessment

A review of the MHC's archaeological maps in MACRIS revealed one recorded site north of the bridge crossing: RAY.HA.5 (Ferry Landing Site). Archaeological surveys were conducted near the current project's APE between 2009 and 2019 as part of the SouthCoast Rail project. It is the opinion of the MassDOT Archaeologist that low sensitivity can be ascribed to the current project's direct APE based on the results of previous surveys, impacts of past roadway, bridge, sidewalk, drainage, and utility construction, and roadside development. All proposed roadway work will be confined to disturbed areas within or immediately adjacent to the existing roadway layout. The 1945 bridge plans highlight how the current project's APE was significantly altered by the earlier construction activities. The road alignment north of the bridge was shifted to the west and a temporary foot bridge was constructed east of the bridge. The river channel was also excavated as part of the 1945 bridge construction. Soil borings taken as part of the 2024 geotechnical survey indicate the bridge approaches were constructed on approximately 20' of fill.

Section 4(f) Evaluation – Permanent Easements – *de minimis* impact

This project requires four permanent easements from two contributing properties within the Old Colony Iron Works / Nemasket Mills Complex Historic District: Office (TAU.630) and Shovel Shop (TAU.628). Any taking or easement that results in the permanent incorporation of land from a public or private historic site into a transportation facility is regarded as a transportation use and must be evaluated and approved under Section 4(f) of the National Transportation Act of 1966, as amended [23 CFR Part 774].

The permanent easements from the Old Colony Iron Works – Office property, located at 96 Old Colony Avenue, include: Parcel X-E-1, Parcel X-W-1, and Parcel X-C-2. The permanent easements from the Old Colony Iron Works – Shovel Shop property, located at 103 Old Colony Avenue, include: Parcel X-D-GR-PUE-W-1 and Parcel X-C-1. The permanent easements are necessary to facilitate the placement of rip rap, sidewalk and curbing construction, masonry pipework, guardrail installation, utility work, and wingwall construction. The permanent easements are highlighted in orange on the enclosed ROW plans.

It is MassDOT's expectation that the Federal Highway Administration (FHWA) will determine that the proposed permanent easements meet the criteria for a Section 4(f) *de minimis* finding, pursuant to 23 CFR 774.3(b). This project, therefore, does not require an individual Section 4(f) evaluation. This letter is intended to inform the State Historic Preservation Officer (SHPO) that this project is expected to qualify for a *de minimis* finding under Section 4(f) based on the concurrence of your office with this Section 106 finding of No Adverse Effect, pursuant to 23 CFR 774.5(b)(1)(ii).

Section 4(f) Evaluation – Temporary Occupancies – No 4(f) use

This project requires temporary occupancies, also known as temporary construction easements, on parcels occupied by contributing properties to the NR-listed Old Colony Iron Works / Nemasket Mills Complex Historic District. These minor temporary easements are necessary for sidewalk construction, grading, landscaping, erosion controls, and driveway apron reconstruction. The parcels highlighted in yellow on the enclosed ROW plans show the proposed temporary occupancies.

It is MassDOT's opinion that the temporary occupancies on the above mentioned will satisfy the five conditions required for a temporary occupancy not to constitute a "use" within the meaning of Section 4(f), pursuant to 23 CFR 774.13(d):

(1) Duration must be temporary, i.e., less than the time needed for construction of the project, and there should be no change in ownership of the land;
(2) Scope of the work must be minor, i.e., both the nature and the magnitude of the changes to the Section 4(f) property are minimal;
(3) There are no anticipated permanent adverse physical impacts, nor will there be interference with the protected activities, features, or attributes of the property, on either a temporary or permanent basis;
(4) The land being used must be fully restored, i.e., the property must be returned to a condition which is at least as good as that which existed prior to the project; and
(5) There must be documented agreement of the official(s) with jurisdiction over the Section 4(f) resource regarding the above conditions.

The SHPO is the official with jurisdiction over a historic site for the purposes of Section 4(f), pursuant to 23 CFR 774.17. Your concurrence with this No Adverse Effect finding will signify that your office agrees with MassDOT's assessment that the proposed temporary occupancy does not constitute a "use" of the historic districts under Section 4(f) and that the conditions listed above have been satisfied, pursuant to Condition 5.

Section 106 Consultation and No Adverse Effect Finding

Early coordination letters were submitted to the Raynham Historical Commission and the Taunton Historical Commission on February 7, 2025 (enclosed). To date, no comments from either commission have been received.

In the opinion of MassDOT, the proposed project will result in No Adverse Effect on the NR-listed Old Colony Iron Works / Nemasket Mills Complex Historic District. The project work within the district will be confined to disturbed areas within and immediately adjacent to the roadway layout. MassDOT solicits your concurrence with our finding of **No Adverse Effect** for this project under Section 106 of the National Historic Preservation Act of 1966, as amended. If you have any questions about this project, please contact me at jameson.harwood@dot.state.ma.us.

Sincerely,

Jameson Harwood

Jameson Harwood
Cultural Resources Supervisor
Environmental Services

encl: Locus Map and Aerials
Right of Way Plans - marked
Project Plans and 1945 bridge plans
Photographs
LHC correspondence

FOR FHWA USE

MassDOT Request for Federal Highway Administration (FHWA) Approval

MassDOT Highway Division requests final approval from FHWA that the proposed "use" of the above described Section 4(f) resources meets the criteria of a *de minimis* impact, as specified under 23 CFR 774.17.

_____ _____

Joi Singh, (or designee) Date
Division Administrator
Federal Highway Administration
Massachusetts Division

Harwood, Jameson (DOT)

From: Microsoft Outlook
To: Bettina Washington
Sent: Thursday, March 27, 2025 9:28 AM
Subject: Relayed: MassDOT Project #613642 - Raynham-Taunton Bridge R-02-003 (Project Notification)

Delivery to these recipients or groups is complete, but no delivery notification was sent by the destination server:

Bettina Washington (thpo@wampanoagtribe-nsn.gov)

Subject: MassDOT Project #613642 - Raynham-Taunton Bridge R-02-003 (Project Notification)

Harwood, Jameson (DOT)

From: Harwood, Jameson (DOT)
Sent: Thursday, March 27, 2025 9:28 AM
To: Bettina Washington
Subject: MassDOT Project #613642 - Raynham-Taunton Bridge R-02-003 (Project Notification)
Attachments: Raynham-Taunton, R-02-003 (613642) PNF.pdf; Raynham-Taunton, R-02-003 (613642) Plans.pdf

Ms. Washington,

MassDOT is submitting information for the above-referenced project to the THPO to meet the Section 106 consultation requirements of FHWA (lead federal agency) and US Army Corps of Engineers. Please submit any written comments or concerns regarding historic or archaeological properties that may be affected by this project to Carrie Lavallee, P.E., Chief Engineer, Massachusetts Department of Transportation, 10 Park Plaza, Boston, MA 02116-3973, Attn: Jameson Harwood.

You also may send comments, questions, or requests for more information by email to Jameson.Harwood@dot.state.ma.us

Thank you,
Jamie

Jameson M. Harwood, Cultural Resources Supervisor
Environmental Services Section
***MassDOT* – Highway Division**
10 Park Plaza
Boston, MA 02116

Harwood, Jameson (DOT)

From: Microsoft Outlook
To: Robinson, David S (EEA)
Sent: Thursday, March 27, 2025 9:26 AM
Subject: Delivered: MassDOT Project #613642 - Raynham-Taunton Bridge R-02-003 (Project Notification)

Your message has been delivered to the following recipients:

Robinson, David S (EEA) (David.S.Robinson@mass.gov)

Subject: MassDOT Project #613642 - Raynham-Taunton Bridge R-02-003 (Project Notification)

Harwood, Jameson (DOT)

From: Harwood, Jameson (DOT)
Sent: Thursday, March 27, 2025 9:26 AM
To: Robinson, David S (EEA)
Subject: MassDOT Project #613642 - Raynham-Taunton Bridge R-02-003 (Project Notification)
Attachments: Raynham-Taunton, R-02-003 (613642) Plans.pdf; Raynham-Taunton, R-02-003 (613642) PNF.pdf

Tracking:

Recipient	Delivery
Robinson, David S (EEA)	Delivered: 3/27/2025 9:26 AM

David,

MassDOT is submitting information for the above-referenced project to the BUAR to meet the Section 106 consultation requirements of FHWA (lead federal agency) and US Army Corps of Engineers. Please submit any written comments or concerns regarding historic or archaeological properties that may be affected by this project to Carrie Lavallee, P.E., Chief Engineer, Massachusetts Department of Transportation, 10 Park Plaza, Boston, MA 02116-3973, Attn: Jameson Harwood.

You also may send comments, questions, or requests for more information by email to Jameson.Harwood@dot.state.ma.us

Thank you,
Jamie

Jameson M. Harwood, Cultural Resources Supervisor
Environmental Services Section
***MassDOT* – Highway Division**
10 Park Plaza
Boston, MA 02116

Harwood, Jameson (DOT)

From: Microsoft Outlook
To: David Weeden (David.Weeden@mwtribe-nsn.gov); 106Review
Sent: Thursday, March 27, 2025 9:27 AM
Subject: Relayed: MassDOT Project #613642 - Raynham-Taunton Bridge R-02-003 (Project Notification)

Delivery to these recipients or groups is complete, but no delivery notification was sent by the destination server:

David Weeden (David.Weeden@mwtribe-nsn.gov) (David.Weeden@mwtribe-nsn.gov)

106Review (106Review@mwtribe-nsn.gov)

Subject: MassDOT Project #613642 - Raynham-Taunton Bridge R-02-003 (Project Notification)

Harwood, Jameson (DOT)

From: Harwood, Jameson (DOT)
Sent: Thursday, March 27, 2025 9:27 AM
To: David Weeden (David.Weeden@mwtribe-nsn.gov); 106Review
Subject: MassDOT Project #613642 - Raynham-Taunton Bridge R-02-003 (Project Notification)
Attachments: Raynham-Taunton, R-02-003 (613642) PNF.pdf; Raynham-Taunton, R-02-003 (613642) Plans.pdf

David,

MassDOT is submitting information for the above-referenced project to the THPO to meet the Section 106 consultation requirements of FHWA (lead federal agency) and US Army Corps of Engineers. Please submit any written comments or concerns regarding historic or archaeological properties that may be affected by this project to Carrie Lavallee, P.E., Chief Engineer, Massachusetts Department of Transportation, 10 Park Plaza, Boston, MA 02116-3973, Attn: Jameson Harwood.

You also may send comments, questions, or requests for more information by email to Jameson.Harwood@dot.state.ma.us

Thank you,
Jamie

Jameson M. Harwood, Cultural Resources Supervisor
Environmental Services Section
***MassDOT* – Highway Division**
10 Park Plaza
Boston, MA 02116

Harwood, Jameson (DOT)

From: Microsoft Outlook
To: Tashtesook@aol.com; markandrews0563@outlook.com
Sent: Thursday, March 27, 2025 9:28 AM
Subject: Relayed: MassDOT Project #613642 - Raynham-Taunton Bridge R-02-003 (Project Notification)

Delivery to these recipients or groups is complete, but no delivery notification was sent by the destination server:

Tashtesook@aol.com (Tashtesook@aol.com)

markandrews0563@outlook.com (markandrews0563@outlook.com)

Subject: MassDOT Project #613642 - Raynham-Taunton Bridge R-02-003 (Project Notification)

Harwood, Jameson (DOT)

From: Harwood, Jameson (DOT)
Sent: Thursday, March 27, 2025 9:28 AM
To: Tashtesook@aol.com
Cc: markandrews0563@outlook.com
Subject: MassDOT Project #613642 - Raynham-Taunton Bridge R-02-003 (Project Notification)
Attachments: Raynham-Taunton, R-02-003 (613642) PNF.pdf; Raynham-Taunton, R-02-003 (613642) Plans.pdf

Mr. Brown,

MassDOT is submitting information for the above-referenced project to the THPO to meet the Section 106 consultation requirements of FHWA (lead federal agency) and US Army Corps of Engineers. Please submit any written comments or concerns regarding historic or archaeological properties that may be affected by this project to Carrie Lavallee, P.E., Chief Engineer, Massachusetts Department of Transportation, 10 Park Plaza, Boston, MA 02116-3973, Attn: Jameson Harwood.

You also may send comments, questions, or requests for more information by email to Jameson.Harwood@dot.state.ma.us

Thank you,
Jamie

Jameson M. Harwood, Cultural Resources Supervisor
Environmental Services Section
***MassDOT* – Highway Division**
10 Park Plaza
Boston, MA 02116

IMPROVING COMMUNITIES TOGETHER

February 7, 2025

Jeff Kelleher, Chairman
Historical Commission
Veterans Memorial Town Hall
558 South Main Street
Raynham, MA 02767

Re: Old Colony Avenue Bridge Superstructure Replacement Project
MassDOT Project #613642

Dear Mr. Kelleher and Historical Commission:

The Massachusetts Department of Transportation (MassDOT) Highway Division proposes replacement of the two-lane bridge at Old Colony Avenue over the Taunton River in Taunton and Raynham, MA (the Project). The Project proposes to replace the superstructure and perform substructure repairs to address deteriorating conditions and improve pedestrian accommodations. The Project description below is included for the City Council's review.

The existing structure is an approximately 89'-6" two-span bridge constructed in 1945. The structure consists of eight (8) steel beams supporting a 7" concrete deck and 2-1/4" of bituminous paving. The bridge is supported by unreinforced concrete gravity abutments and wingwalls and a reinforced concrete pier. The south abutment is founded on spread footings and the north abutment and pier are founded on timber piles. The bridge is 35'-0" wide, which includes a 26'-0" roadway, a 2'-6" safety walk and 5'-0" sidewalk with metal railing. The bridge has a skew angle of 23.6° and was designed for H20 loading. Stormwater infrastructure in the vicinity of the bridge includes two closed catch basins at the southern end of the bridge that discharge to the Taunton River through a 12-inch reinforced concrete pipe (RCP) within the southeastern wingwall. The remainder of the Site, particularly the portion in Raynham, consists of "country drainage".

The Project proposes to retain the existing bridge substructure, while replacing the superstructure. This will require the replacement bridge superstructure to have the approximately the same dimensions as the existing structure. However, the project proposes to widen the bridge by 1 foot for curb-to-curb width of 27', which will allow a bicycle lane to be added to the roadway. The proposed sidewalk will be relocated from the east side to the west side of the roadway to connect to the existing sidewalk at the condominium building south of the bridge, and to Sandy Hill Street in Raynham. While the substructure will be retained, it is anticipated that in-water work will be required for scour protection.

In order to complete repairs, the bridge will be closed, and a detour will be implemented during construction. The 6.5-mile detour is proposed via New State Highway (Route 44) to Church Street/ Precinct Street to Middleboro Avenue.

MassDOT Highway Division requests that the Historical Commission reviews the enclosed materials at their earliest convenience and provides any comments that the Historical Commission wishes to make regarding this project. Written comments should be submitted, preferably within 30 days, to: Carrie Lavallee, P.E., Chief Engineer, MassDOT Highway Division, 10 Park Plaza, Boston, MA 02116, Attn: Herrio Lamothe at herrio.lamothe@state.ma.us. Please also copy the BETA Group, Inc. Attn: Chris Jones at cjones@beta-inc.com or the address below.

BETA GROUP, INC.
315 Norwood Park South, 2nd Floor, Norwood, MA 02062
P: 781.255.1982 | F: 781.255.1974 | W: www.BETA-Inc.com

If we can be of any further assistance regarding this matter, please contact us at our office.

Very truly yours,
BETA Group, Inc.

Christopher W. Jones, P.E.
Senior Associate

Atts: Figure 1 – Location Map
Figure 2 – Proposed Detour Route
Figure 3 – General Plan

cc: H. Lamothe, MassDOT (w/o att)

IMPROVING COMMUNITIES TOGETHER

February 7, 2025

Joseph Norte, Chair
Historic District Commission
15 Summer Street
Taunton, MA 02780

Re: Old Colony Avenue Bridge Superstructure Replacement Project
MassDOT Project #613642

Dear Mr. Norte and Historic District Commission:

The Massachusetts Department of Transportation (MassDOT) Highway Division proposes replacement of the two-lane bridge at Old Colony Avenue over the Taunton River in Taunton and Raynham, MA (the Project). The Project proposes to replace the superstructure and perform substructure repairs to address deteriorating conditions and improve pedestrian accommodations. The Project description below is included for the City Council's review.

The existing structure is an approximately 89'-6" two-span bridge constructed in 1945. The structure consists of eight (8) steel beams supporting a 7" concrete deck and 2-1/4" of bituminous paving. The bridge is supported by unreinforced concrete gravity abutments and wingwalls and a reinforced concrete pier. The south abutment is founded on spread footings and the north abutment and pier are founded on timber piles. The bridge is 35'-0" wide, which includes a 26'-0" roadway, a 2'-6" safety walk and 5'-0" sidewalk with metal railing. The bridge has a skew angle of 23.6° and was designed for H20 loading. Stormwater infrastructure in the vicinity of the bridge includes two closed catch basins at the southern end of the bridge that discharge to the Taunton River through a 12-inch reinforced concrete pipe (RCP) within the southeastern wingwall. The remainder of the Site, particularly the portion in Raynham, consists of "country drainage".

The Project proposes to retain the existing bridge substructure, while replacing the superstructure. This will require the replacement bridge superstructure to have the approximately the same dimensions as the existing structure. However, the project proposes to widen the bridge by 1 foot for curb-to-curb width of 27', which will allow a bicycle lane to be added to the roadway. The proposed sidewalk will be relocated from the east side to the west side of the roadway to connect to the existing sidewalk at the condominium building south of the bridge, and to Sandy Hill Street in Raynham. While the substructure will be retained, it is anticipated that in-water work will be required for scour protection.

In order to complete repairs, the bridge will be closed, and a detour will be implemented during construction. The 6.5-mile detour is proposed via New State Highway (Route 44) to Church Street/ Precinct Street to Middleboro Avenue.

MassDOT Highway Division requests that the Historic District Commission reviews the enclosed materials at their earliest convenience and provides any comments that the Historic District Commission wishes to make regarding this project. Written comments should be submitted, preferably within 30 days, to: Carrie Lavallee, P.E., Chief Engineer, MassDOT Highway Division, 10 Park Plaza, Boston, MA 02116, Attn: Herrio Lamothe at herrio.lamothe@state.ma.us. Please also copy the BETA Group, Inc. Attn: Chris Jones at cjones@beta-inc.com or the address below.

If we can be of any further assistance regarding this matter, please contact us at our office.

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Very truly yours,
BETA Group, Inc.

Christopher W. Jones, P.E.
Senior Associate

Atts: Figure 1 – Location Map
Figure 2 – Proposed Detour Route
Figure 3 – General Plan

cc: H. Lamothe, MassDOT (w/o att)

APPENDIX L

- **Upstream Sampling Results Summary Tables**
- **Upstream Sampling Results**
- **Sampling and Analysis Plan**

Table 1: Classical Chemistry Analysis Old Colony Avenue Bridge Upstream Sediment Sampling December 1, 2025 Event

Oil of Hazardous Material	MCP Reportable Concentration	BUD Reuse Standards			COMM-97		Sample Identification
POLYCYCLIC AROMATIC HYDROCARBONS	RCS-1	BUD S-1/GW-1	BUD S-1/GW-2	BUD S-2/GW-2	Lined Landfill	Unlined Landfill	CS1 12/1/2025
	(mg/kg)	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	
Conductivity (umhos/cm)	NS	NS	NS	NS	8000	4000	52
Flashpoint (°F)	NS	NS	NS	NS	NS	NS	> 200
Percent Moisture (%)	NS	NS	NS	NS	NS	NS	10
Reactive Cyanide (mg/kg)	NS	NS	NS	NS	NS	NS	ND
Reactive Sulfide (mg/kg)	NS	NS	NS	NS	NS	NS	ND
Total Organic Carbon (Average) (mg/kg)	NS	NS	NS	NS	NS	NS	12500
Total Volatile Solids (%)	NS	NS	NS	NS	NS	NS	3

Notes:

1. Values in bold exceed BUD Method 1 S-1/GW-1 Standard

2. Values highlighted exceed MCP RCS-1 Standards

3. Values highlighted exceed COMM-97 Paramaters

4. "NS" designates a compound with no given standard for the specified criteria

5. "ND" Designates a concentration below minimum laboratory detectable limits

6. "NT" Designates a compound not tested

7. "RL" is reporting limit

8. BUD Method 1 Standards based on document titled "March 2004 Draft Interim Guidance Document for Beneficial Use Regulations"

Table 2: PCB Analysis Old Colony Avenue Bridge Upstream Sediment Sampling December 1, 2025 Event

Oil of Hazardous Material	MCP Reportable Concentration	BUD Method 1 Standards			COMM-97		Sample Identification	
POLYCHLORINATED BIPHENYLS (PCBs)	RCS-1	BUD S-1/GW-1	BUD S-1/GW-2	BUD S-2/GW-2	Lined Landfill	Unlined Landfill	CS1 12/1/2025	
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	mg/kg	RL
Polychlorinated Biphenyls (PCBs)	1	0.044	0.044	1.6	2	2	NT	---
Aroclor-1016	1	0.044	0.044	1.6	NS	NS	NT	---
Aroclor-1221	2	0.044	0.044	1.6	NS	NS	NT	---
Aroclor-1232	2	0.044	0.044	1.6	NS	NS	NT	---
Aroclor-1242	2	0.044	0.044	1.6	NS	NS	NT	---
Aroclor-1248	2	0.044	0.044	1.6	NS	NS	NT	---
Aroclor-1254	2	0.044	0.044	1.6	NS	NS	NT	---
Aroclor-1260	2	0.044	0.044	1.6	NS	NS	NT	---
Aroclor-1262	NS	0.044	0.044	1.6	NS	NS	NT	---
Aroclor-1268	NS	0.044	0.044	1.6	NS	NS	NT	---
NOA Congeners								
BZ#8	1	0.044	0.044	1.6	NS	NS	ND	(0.00035)
BZ#18	1	0.044	0.044	1.6	NS	NS	ND	(0.00176)
BZ#28	1	0.044	0.044	1.6	NS	NS	ND	(0.00035)
BZ#44	1	0.044	0.044	1.6	NS	NS	ND	(0.00176)
BZ#49	1	0.044	0.044	1.6	NS	NS	NT	---
BZ#52	1	0.044	0.044	1.6	NS	NS	ND	(0.00176)
BZ#66	1	0.044	0.044	1.6	NS	NS	ND	(0.00176)
BZ#87	1	0.044	0.044	1.6	NS	NS	NT	---
BZ#101	1	0.044	0.044	1.6	NS	NS	ND	(0.00176)
BZ#105	1	0.044	0.044	1.6	NS	NS	ND	(0.00035)
BZ#118	1	0.044	0.044	1.6	NS	NS	ND	(0.00176)
BZ#128	1	0.044	0.044	1.6	NS	NS	ND	(0.00035)
BZ#138	1	0.044	0.044	1.6	NS	NS	ND	(0.00176)
BZ#153 [2C]	1	0.044	0.044	1.6	NS	NS	ND	(0.00035)
BZ#170	1	0.044	0.044	1.6	NS	NS	ND	(0.00035)
BZ#180	1	0.044	0.044	1.6	NS	NS	ND	(0.00035)
BZ#183	1	0.044	0.044	1.6	NS	NS	NT	---
BZ#184	1	0.044	0.044	1.6	NS	NS	NT	---
BZ#187	1	0.044	0.044	1.6	NS	NS	ND	(0.00035)
BZ#195	1	0.044	0.044	1.6	NS	NS	ND	(0.00035)
BZ#206	1	0.044	0.044	1.6	NS	NS	ND	(0.00035)
BZ#209	1	0.044	0.044	1.6	NS	NS	ND	(0.00035)
Total Congener	1	0.044	0.044	1.6	NS	NS	0	---

Notes:

1. Values in bold exceed BUD Method 1 S-1/GW-1 Standard

2. Values highlighted exceed MCP RCS-1 Standards

3. Values highlighted exceed COMM-97 Parameters

4. "NS" designates a compound with no given standard for the specified criteria

5. "ND" Designates a concentration below minimum laboratory detectable limits

6. "NT" Designates a compound not tested

7. "RL" is reporting limit

8. BUD Method 1 Standards based on document titled "March 2004 Draft Interim Guidance Document for Beneficial Use Regulations"

Table 3: Pesticide/Herbicide Analysis Old Colony Avenue Bridge Upstream Sediment Sampling December 1, 2025 Event

Oil of Hazardous Material	MCP Reportable Concentration	BUD Reuse Standards			COMM-97		Sample Identification	
PESTICIDES/HERBICIDES	RCS-1	BUD S-1/GW-1	BUD S-1/GW-2	BUD S-2/GW-2	Lined Landfill	Unlined Landfill	CS1 12/1/2025	
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	mg/kg	RL
Dichlorodiphenyl Dichloroethane, P,P'- (DDD)	8	1.8	1.8	14	NS	NS	ND	(0.0033)
Dichlorodiphenyl Dichloroethylene, P,P'- (DDE)	6	1.3	1.3	10	NS	NS	ND	(0.0033)
Dichlorodiphenyl Trichloroethane, P,P'- (DDT)	6	1.3	1.3	10	NS	NS	ND	(0.0033)
Aldrin	0.08	0.022	0.022	0.19	NS	NS	ND	(0.0033)
alpha-BHC	50	NS	NS	NS	NS	NS	ND	(0.0033)
alpha-Chlordane	0.7	-	-	-	NS	NS	ND	(0.0033)
beta-BHC	10	NS	NS	NS	NS	NS	ND	(0.0033)
Chlordane (Total)*	0.7	0.7	0.7	13	NS	NS	ND	(0.0267)
delta-BHC	1000	NS	NS	NS	NS	NS	ND	(0.0033)
Dieldrin	0.08	0.023	0.023	0.21	NS	NS	ND	(0.0033)
Endosulfan I	NS	NS	NS	NS	NS	NS	ND	(0.0033)
Endosulfan II	NS	NS	NS	NS	NS	NS	ND	(0.0033)
Endosulfan Sulfate	NS	NS	NS	NS	NS	NS	ND	(0.0033)
Endrin	10	3.9	3.9	7	NS	NS	ND	(0.0033)
Endrin Ketone	NS	NS	NS	NS	NS	NS	ND	(0.0033)
gamma-BHC (Lindane)	0.003	NS	NS	NS	NS	NS	ND	(0.0020)
gamma-Chlordane	-	-	-	-	NS	NS	ND	(0.0020)
Heptachlor	0.3	0.096	0.096	0.78	NS	NS	ND	(0.0033)
Heptachlor Epoxide	0.1	0.056	0.056	0.35	NS	NS	ND	(0.0033)
Hexachlorobenzene	0.7	0.66	0.66	2.4	NS	NS	ND	(0.0033)
Methoxychlor	200	76	76	140	NS	NS	ND	(0.0033)
D, 2,4-	100	NS	NS	NS	NS	NS	NT	(0.059)
Dalapon	NS	NS	NS	NS	NS	NS	NT	(0.077)
DB, 2,4-	100	NS	NS	NS	NS	NS	NT	(0.060)
Dicamba	500	NS	NS	NS	NS	NS	NT	(0.012)
Dichloroprop	NS	NS	NS	NS	NS	NS	NT	(0.059)
Dinoseb	NS	NS	NS	NS	NS	NS	NT	(0.060)
MCPA	100	NS	NS	NS	NS	NS	NT	(2.92)
MCPP	NS	NS	NS	NS	NS	NS	NT	(2.95)
T,2,4,5-	NS	NS	NS	NS	NS	NS	NT	(0.012)
TP,2,4,5-(Silvex)	100	NS	NS	NS	NS	NS	NT	(0.012)

Notes:

1. Values in bold exceed BUD Method 1 S-1/GW-1 Standard

2. Values highlighted exceed MCP RCS-1 Standards

3. Values highlighted exceed COMM-97 Parameters

4. "NS" designates a compound with no given standard for the specified criteria

5. "ND" Designates a concentration below minimum laboratory detectable limits

6. "NT" Designates a compound not tested

7. "RL" is reporting limit

8. BUD Method 1 Standards based on document titled "March 2004 Draft Interim Guidance Document for Beneficial Use Regulations"

*Chlordane MCP issues

Table 4: VOC Analysis Old Colony Avenue Bridge Upstream Sediment Sampling December 1, 2025 Event

Oil of Hazardous Material	MCP Reportable Concentration	BUD Reuse Standards			COMM-97		Sample Identification	
VOLATILE ORGANIC COMPOUNDS (VOCs)	RCS-1	BUD S-1/GW-1	BUD S-1/GW-2	BUD S-2/GW-2	Lined Landfill	Unlined Landfill	GS4 12/1/2026	
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	mg/kg	RL
1,1,1,2-Tetrachloroethane	0.1	0.025	0.025	0.025	NS	NS	ND	(0.0050)
1,1,1-Trichloroethane	30	19	320	320	NS	NS	ND	(0.0050)
1,1,2,2-Tetrachloroethane	0.005	0.005	0.0094	0.0094	NS	NS	ND	(0.0050)
1,1,2-Trichloroethane	0.1	0.005	0.53	0.53	NS	NS	ND	(0.0050)
1,1-Dichloroethane	0.4	0.2	2.7	2.7	NS	NS	ND	(0.0050)
1,1-Dichloroethene	3	NS	NS	NS	NS	NS	ND	(0.0050)
1,1-Dichloropropene	NS	NS	NS	NS	NS	NS	ND	(0.0050)
1,2,3-Trichlorobenzene	NS	NS	NS	NS	NS	NS	ND	(0.0050)
1,2,3-Trichloropropane	100	NS	NS	NS	NS	NS	ND	(0.0050)
1,2,4-Trichlorobenzene	2	0.66	33	33	NS	NS	ND	(0.0050)
1,2,4-Trimethylbenzene	1000	NS	NS	NS	NS	NS	ND	(0.0050)
1,2-Dibromo-3-Chloropropane	10	NS	NS	NS	NS	NS	ND	(0.0050)
1,2-Dibromoethane	NS	NS	NS	NS	NS	NS	ND	(0.0050)
1,2-Dichlorobenzene	9	0.66	15	15	NS	NS	ND	(0.0050)
1,2-Dichloroethane	0.1	0.005	0.0055	0.0055	NS	NS	ND	(0.0050)
1,2-Dichloropropane	0.1	0.005	0.005	0.005	NS	NS	ND	(0.0050)
1,3,5-Trimethylbenzene	10	NS	NS	NS	NS	NS	ND	(0.0050)
1,3-Dichlorobenzene	3	0.66	21	21	NS	NS	ND	(0.0050)
1,3-Dichloropropane	500	NS	NS	NS	NS	NS	ND	(0.0050)
1,4-Dichlorobenzene	0.7	0.66	1.2	1.2	NS	NS	ND	(0.0050)
1,4-Dioxane	0.2	0.014	2.7	2.7	NS	NS	ND	(0.0798)
2,2-Dichloropropane	NS	NS	NS	NS	NS	NS	ND	(0.0050)
2-Butanone	4	-	-	-	NS	NS	ND	(0.0050)
2-Chlorotoluene	100	NS	NS	NS	NS	NS	ND	(0.0050)
2-Hexanone	100	NS	NS	NS	NS	NS	ND	(0.0499)
4-Chlorotoluene	NS	NS	NS	NS	NS	NS	ND	(0.0050)
4-Isopropyltoluene	NS	NS	NS	NS	NS	NS	ND	(0.0050)
4-Methyl-2-Pentanone	0.4	0.11	50	50	NS	NS	ND	(0.0050)
Acetone	6	0.33	50	50	NS	NS	ND	(0.0499)
Benzene	2	0.15	13	76	NS	NS	ND	(0.0050)
Bromobenzene	100	NS	NS	NS	NS	NS	ND	(0.0050)
Bromochloromethane	NS	NS	NS	NS	NS	NS	ND	(0.0050)
Bromodichloromethane	0.1	0.005	0.0079	0.0079	NS	NS	ND	(0.0050)
Bromoform	0.1	0.007	0.7	0.7	NS	NS	ND	(0.0050)
Bromomethane	0.5	0.5	0.5	0.5	NS	NS	NT	---
Carbon Disulfide	100	NS	NS	NS	NS	NS	ND	(0.0050)
Carbon Tetrachloride	5	3.9	4.5	4.5	NS	NS	ND	(0.0050)
Chlorobenzene	1	0.028	0.49	0.49	NS	NS	ND	(0.0050)
Chloroethane	100	NS	NS	NS	NS	NS	ND	(0.0100)
Chloroform	0.2	0.005	0.038	0.038	NS	NS	ND	(0.0050)
Chloromethane	100	NS	NS	NS	NS	NS	ND	(0.0100)
cis-1,2-Dichloroethene	NS	NS	NS	NS	NS	NS	ND	(0.0050)
cis-1,3-Dichloropropene	0.01	-	-	-	NS	NS	ND	(0.0050)
Dibromochloromethane	0.005	0.005	0.017	0.017	NS	NS	ND	(0.0050)
Dibromomethane	500	NS	NS	NS	NS	NS	ND	(0.0050)
Dichlorodifluoromethane	NS	NS	NS	NS	NS	NS	ND	(0.0100)
Diethyl Ether	100	NS	NS	NS	NS	NS	ND	(0.0050)
Di-isopropyl Ether	100	NS	NS	NS	NS	NS	ND	(0.0050)
Ethyl tertiary-butyl ether	NS	NS	NS	NS	NS	NS	ND	(0.0050)
Ethylbenzene	40	1.9	230	230	NS	NS	ND	(0.0050)
Hexachlorobutadiene	30	3	3	45	NS	NS	ND	(0.0050)
Isopropylbenzene	1000	NS	NS	NS	NS	NS	ND	(0.0050)
Methyl tert-Butyl Ether	0.1	0.14	100	100	NS	NS	ND	(0.0050)
Methylene Chloride	0.1	NS	NS	NS	NS	NS	ND	(0.0249)
Naphthalene	4	0.66	14	14	NS	NS	ND	(0.0050)
n-Butylbenzene	NS	NS	NS	NS	NS	NS	ND	(0.0050)
n-Propylbenzene	100	NS	NS	NS	NS	NS	ND	(0.0050)
sec-Butylbenzene	NS	NS	NS	NS	NS	NS	ND	(0.0050)
Styrene	3	0.015	1.8	1.8	NS	NS	ND	(0.0050)
tert-Butylbenzene	NS	NS	NS	NS	NS	NS	ND	(0.0050)
Tertiary-amyl methyl ether	NS	NS	NS	NS	NS	NS	ND	(0.0050)
Tetrachloroethene	1	NS	NS	NS	NS	NS	ND	(0.0050)
Tetrahydrofuran	NS	NS	NS	NS	NS	NS	ND	(0.0050)
Toluene	30	1.3	130	130	NS	NS	ND	(0.0050)
trans-1,2-Dichloroethene	1	NS	NS	NS	NS	NS	ND	(0.0050)
trans-1,3-Dichloropropene	0.01	0.019	0.042	0.042	NS	NS	ND	(0.0050)
Trichloroethene	0.3	NS	NS	NS	NS	NS	ND	(0.0050)
Trichlorofluoromethane	1000	NS	NS	NS	NS	NS	ND	(0.0050)
Vinyl Chloride	0.7	0.28	0.28	0.66	NS	NS	ND	(0.0100)
Xylene O	100	0.42	290	290	NS	NS	ND	(0.0100)
Xylene P,M	100	0.42	290	290	NS	NS	ND	(0.0100)
Xylenes (Total)	100	0.42	290	290	NS	NS	ND	(0.0100)
Total VOCs	---	---	---	---	10	4	ND	---

Notes:

1. Values in bold exceed BUD Method 1 S-1/GW-1 Standard

2. Values highlighted exceed MCP RCS-1 Standards

3. Values highlighted exceed COMM-97 Parameters

4. "NS" designates a compound with no given standard for the specified criteria

5. "ND" Designates a concentration below minimum laboratory detectable limits

6. "NT" Designates a compound not tested

7. "RL" is reporting limit

8. BUD Method 1 Standards based on document titled "March 2004 Draft Interim Guidance Document for Beneficial Use Regulations"

***Acceptable Criteria: <10% of RCS-1 or 0.1 mg/kg**

Table 5: EPH Analysis Old Colony Avenue Bridge Upstream Sediment Sampling December 1, 2025 Event

Oil of Hazardous Material	MCP Reportable Concentration	BUD Reuse Standards			COMM-97		Sample Identification	
EPH (Petroleum Hydrocarbons)	RCS-1	BUD S-1/GW-1	BUD S-1/GW-2	BUD S-2/GW-2	Lined Landfill	Unlined Landfill	CS1 12/1/2025	
	(mg/kg)	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	mg/kg	RL
C9-C18 Aliphatics1	1000	1000	1000	1000	NS	NS	ND	(31.1)
C19-C36 Aliphatics1	3000	3000	3000	3000	NS	NS	23.3	(31.1)
C11-C22 Unadjusted Aromatics1	1000	1000	1000	1000	NS	NS	ND	(31.1)
C11-C22 Aromatics1,2	1000	1000	1000	1000	NS	NS	ND	(31.9)
2-Methylnaphthalene	0.7	0.66	12	12	NS	NS	0.02	(0.017)
Acenaphthene	4	3.9	1000	3000	NS	NS	0.096	(0.017)
Naphthalene	4	0.66	14	14	NS	NS	0.05	(0.017)
Phenanthrene	10	10	500	1000	NS	NS	0.775	(0.166)
Acenaphthylene	1	1.1	110	110	NS	NS	ND	(0.017)
Anthracene	1000	1000	1000	3000	NS	NS	0.218	(0.017)
Benzo(a)anthracene	7	3.7	3.7	21	NS	NS	0.337	(0.017)
Benzo(a)pyrene	2	0.66	0.66	2.1	NS	NS	0.347	(0.017)
Benzo(b)fluoranthene	7	3.7	3.7	21	NS	NS	0.39	(0.017)
Benzo(g,h,i)perylene	1000	1000	1000	3000	NS	NS	0.23	(0.017)
Benzo(k)fluoranthene	70	37	37	210	NS	NS	0.165	(0.166)
Chrysene	70	370	370	2100	NS	NS	0.327	(0.017)
Dibenzo(a,h)Anthracene	0.7	0.66	0.66	2.1	NS	NS	0.081	(0.017)
Fluoranthene	1000	1000	1000	3000	NS	NS	0.944	(0.166)
Fluorene	1000	1000	1000	3000	NS	NS	0.119	(0.017)
Indeno(1,2,3-cd)Pyrene	7	3.7	3.7	21	NS	NS	0.184	(0.017)
Pyrene	1000	1000	1000	3000	NS	NS	0.736	(0.166)

Notes:

1. Values in bold exceed BUD Method 1 S-1/GW-1 Standard

2. Values highlighted exceed MCP RCS-1 Standards

3. Values highlighted exceed COMM-97 Parameters

4. "NS" designates a compound with no given standard for the specified criteria

5. "ND" Designates a concentration below minimum laboratory detectable limits

6. "NT" Designates a compound not tested

7. "RL" is reporting limit

8. BUD Method 1 Standards based on document titled "March 2004 Draft Interim Guidance Document for Beneficial Use Regulations"

*Chlordane MCP issues

Table 6: Metals Analysis Old Colony Avenue Bridge Upstream Sediment Sampling December 1, 2025 Event

Oil of Hazardous Material	MCP Reportable Concentration	BUD Reuse Standards			COMM-97		Sample Identification	
METALS	RCS-1	BUD S-1/GW-1	BUD S-1/GW-2	BUD S-2/GW-2	Lined Landfill	Unlined Landfill	CS1 - OVEN DRIED 12/1/2025	
	(mg/kg)	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	mg/kg	RL
Arsenic	20	11	11	11	40	40	1.01	(0.97)
Cadmium	70	0.8	0.8	16	80	30	0.19	(0.10)
Chromium	100	11	11	570	1000	1000	**11.7**	(0.78)
Copper	1000	NS	NS	NS	NS	NS	16.6	(0.97)
Lead	200	19	19	110	2000	1000	**19.9**	(3.90)
Mercury	20	8.7	8.7	16	10	10	0.012	(0.009)
Nickel	600	7.2	7.2	350	NS	NS	**7.24**	(0.97)
Zinc	1000	28	28	3000	NS	NS	**62.5**	(0.97)

Notes:

1. Values in bold exceed BUD Method 1 S-1/GW-1 Standard

2. Values highlighted exceed MCP RCS-1 Standards

3. Values highlighted exceed COMM-97 Paramaters

4. "NS" designates a compound with no given standard for the specified criteria

5. "ND" Designates a concentration below minimum laboratory detectable limits

6. "NT" Designates a compound not tested

7. "RL" is reporting limit

8. BUD Method 1 Standards based on document titled "March 2004 Draft Interim Guidance Document for Beneficial Use Regulations"

Table 7: TPH Analysis Old Colony Avenue Bridge Upstream Sediment Sampling December 1, 2025 Event

Oil of Hazardous Material	MCP Reportable Concentration	BUD Reuse Standards			COMM-97		Sample Identification	
Total Petroleum Hydrocarbons (TPH)	RCS-1	BUD S-1/GW-1	BUD S-1/GW-2	BUD S-2/GW-2	Lined Landfill	Unlined Landfill	CS1	
							12/1/2025	
	(mg/kg)	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	RL	
Total Petroleum Hydrocarbons (C9-C36)	1000	NS	NS	NS	5000	2500	44.9	(13.3)

Notes:
1. Values in bold exceed BUD Method 1 S-1/GW-1 Standard
2. Values highlighted exceed MCP RCS-1 Standards
3. Values highlighted exceed COMM-97 Paramaters
4. "NS" designates a compound with no given standard for the specified criteria
5. "ND" Designates a concentration below minimum laboratory detectable limits
6. "NT" Designates a compound not tested
7. "RL" is reporting limit
8. BUD Method 1 Standards based on document titled "March 2004 Draft Interim Guidance Document for Beneficial Use Regulations"

Table 8: SVOCs Analysis Old Colony Avenue Bridge Upstream Sediment Sampling December 1, 2025 Event

Oil of Hazardous Material	MCP Reportable Concentration	BUD Reuse Standards			COMM-97		Sample Identification	
SVOCs/ POLYCYCLIC AROMATIC HYDROCARBONS	RCS-1	BUD S-1/GW-1	BUD S-1/GW-2	BUD S-2/GW-2	Lined Landfill	Unlined Landfill	CS1 12/1/2025	
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	mg/kg	RL
1,1-Biphenyl	0.05	0.05	6	1000	NS	NS	ND	(0.033)
1,2,4-Trichlorobenzene	2	2	6	3000	NS	NS	ND	(0.333)
1,2-Dichlorobenzene	9	9	100	1000	NS	NS	ND	(0.333)
1,3-Dichlorobenzene	3	3	100	1000	NS	NS	ND	(0.333)
1,4-Dichlorobenzene	0.7	0.7	1	1.2	NS	NS	ND	(0.333)
2,4,5-Trichlorophenol	4	4	1000	1.6	NS	NS	ND	(0.333)
2,4,6-Trichlorophenol	0.7	0.7	20	0.66	NS	NS	ND	(0.333)
2,4-Dichlorophenol	0.7	0.7	60	0.005	NS	NS	ND	(0.333)
2,4-Dimethylphenol	0.7	0.7	100	64	NS	NS	ND	(0.333)
2,4-Dinitrophenol	3	3	50	45	NS	NS	ND	(1.33)
2,4-Dinitrotoluene	0.7	0.7	2	5.7	NS	NS	ND	(0.333)
2,6-Dinitrotoluene	100	NS	NS	NS	NS	NS	ND	(0.333)
2-Chloronaphthalene	1000	NS	NS	NS	NS	NS	ND	(0.333)
2-Chlorophenol	0.7	0.7	100	2.3	NS	NS	ND	(0.333)
2-Methylnaphthalene	0.7	0.7	80	12	NS	NS	ND	(0.333)
2-Methylphenol	500	NS	NS	NS	NS	NS	ND	(0.333)
2-Nitrophenol	100	NS	NS	NS	NS	NS	ND	(0.665)
3,3'-Dichlorobenzidine	3	3	3	5.4	NS	NS	ND	(0.333)
3+4-Methylphenol	500	NS	NS	NS	NS	NS	ND	(0.333)
4-Bromophenyl-phenylether	100	NS	NS	NS	NS	NS	ND	(0.333)
4-Chloroaniline	1	1	7	NS	NS	NS	ND	(0.333)
4-Nitrophenol	100	NS	NS	NS	NS	NS	ND	(1.33)
Acenaphthene	4	4	1000	3000	NS	NS	ND	(0.333)
Acenaphthylene	1	1	600	110	NS	NS	ND	(0.333)
Acetophenone	1000	NS	NS	NS	NS	NS	ND	(0.333)
Aniline	1000	NS	NS	NS	NS	NS	ND	(0.333)
Anthracene	1000	1000	1000	3000	NS	NS	ND	(0.333)
Azobenzene	50	NS	NS	NS	NS	NS	ND	(0.333)
Benzo(a)anthracene	7	7	7	21	NS	NS	ND	(0.333)
Benzo(a)pyrene	2	2	2	2.1	NS	NS	ND	(0.333)
Benzo(b)fluoranthene	7	7	7	21	NS	NS	ND	(0.333)
Benzo(g,h,i)perylene	1000	1000	1000	3000	NS	NS	ND	(0.333)
Benzo(k)fluoranthene	70	70	70	210	NS	NS	ND	(0.333)
bis(2-Chloroethoxy)methane	500	NS	NS	NS	NS	NS	ND	(0.333)
bis(2-Chloroethyl)ether	0.7	0.7	0.7	0.66	NS	NS	ND	(0.333)
bis(2-chloroisopropyl)Ether	0.7	0.7	0.7	0.81	NS	NS	ND	(0.333)
bis(2-Ethylhexyl)phthalate	90	90	90	230	NS	NS	ND	(0.333)
Butylbenzylphthalate	100	NS	NS	NS	NS	NS	ND	(0.333)
Chrysene	70	70	70	2100	NS	NS	ND	(0.333)
Dibenzo(a,h)Anthracene	0.7	0.7	0.7	2.1	NS	NS	ND	(0.333)
Dibenzofuran	100	NS	NS	NS	NS	NS	ND	(0.333)
Diethylphthalate	10	10	200	200	NS	NS	ND	(0.333)
Dimethylphthalate	0.7	0.7	50	50	NS	NS	ND	(0.333)
Di-n-butylphthalate	50	NS	NS	NS	NS	NS	ND	(0.333)
Di-n-octylphthalate	1000	NS	NS	NS	NS	NS	ND	(0.665)
Fluoranthene	1000	1000	1000	3000	NS	NS	0.423	(0.333)
Fluorene	1000	1000	1000	3000	NS	NS	ND	(0.333)
Hexachlorobenzene	0.7	0.7	0.7	2.4	NS	NS	ND	(0.333)
Hexachlorobutadiene	30	30	30	45	NS	NS	ND	(0.333)
Hexachloroethane	0.7	0.7	3	1.7	NS	NS	ND	(0.333)
Indeno(1,2,3-cd)Pyrene	7	7	7	21	NS	NS	ND	(0.333)
Isophorone	100	NS	NS	NS	NS	NS	ND	(0.333)
Naphthalene	4	4	20	14	NS	NS	ND	(0.333)
Nitrobenzene	500	NS	NS	NS	NS	NS	ND	(0.333)
N-Nitrosodimethylamine	50	NS	NS	0.18	NS	NS	ND	(0.333)
Pentachlorophenol	3	3	3	33	NS	NS	ND	(1.33)
Phenanthrene	10	10	500	1000	NS	NS	ND	(0.333)
Pyrene	1000	1000	1000	3000	NS	NS	ND	(0.333)

Notes:

1. Values in bold exceed BUD Method 1 S-1/GW-1 Standard

2. Values highlighted exceed MCP RCS-1 Standards

3. Vaues highlighted exceed COMM-97 Parameters

4. "NS" designates a compound with no given standard for the specified criteria

5. "ND" Designates a concentration below minimum laboratory detectable limits

6. "NT" Designates a compound not tested

7. "RL" is reporting limit

8. BUD Method 1 Standards based on document titled "March 2004 Draft Interim Guidance Document for Beneficial Use Regulations"

***Acceptable Criteria: RL <10% RCS-1 or 0.05 mg/kg**

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CERTIFICATE OF ANALYSIS

Jonathan Niro
Beta Engineering
315 Norwood Park South
Norwood, MA 02062

REVIEWED
By ESS Laboratory at 5:08 pm, Dec 19, 2025

RE: Bridge Reconstruction Over Taunton River (10887)
ESS Laboratory Work Order Number: 25L0055

This signed Certificate of Analysis is our approved release of your analytical results. These results are only representative of sample aliquots received at the laboratory. ESS Laboratory expects its clients to follow all regulatory sampling guidelines. Beginning with this page, the entire report has been paginated. This report should not be copied except in full without the approval of the laboratory. Samples will be disposed of thirty days after the final report has been delivered. If you have any questions or concerns, please feel free to call our Customer Service Department.

Laurel Stoddard
Laboratory Director

Analytical Summary

The project as described above has been analyzed in accordance with the ESS Quality Assurance Plan. This plan utilizes the following methodologies: US EPA SW-846, US EPA Methods for Chemical Analysis of Water and Wastes per 40 CFR Part 136, APHA Standard Methods for the Examination of Water and Wastewater, American Society for Testing and Materials (ASTM), and other recognized methodologies. The analyses with these noted observations are in conformance to the Quality Assurance Plan. In chromatographic analysis, manual integration is frequently used instead of automated integration because it produces more accurate results.

The test results present in this report are in compliance with TNI and relative state standards, and/or client Quality Assurance Project Plans (QAPP). The laboratory has reviewed the following: Sample Preservations, Hold Times, Initial Calibrations, Continuing Calibrations, Method Blanks, Blank Spikes, Blank Spike Duplicates, Duplicates, Matrix Spikes, Matrix Spike Duplicates, Surrogates and Internal Standards. Any results which were found to be outside of the recommended ranges stated in our SOPs will be noted in the Project Narrative.

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CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Bridge Reconstruction Over Taunton River ESS Laboratory Work Order: 25L0055

Sample Receipt

The following samples were received on December 01, 2025 for the analyses specified on the enclosed Chain of Custody Record.

Samples 25L0055-01 and 25L0055-02 for Metals were oven dried at 60 degrees Celsius prior to digestion and relogged in as samples 25L0055-04 and 25L0055-05. This was done to increase the dry weight of the sample digested which decreases variability of results and lowers the detection limits for samples with high water content.

Lab Number	Sample Name	Matrix	Analysis
25L0055-01	CS1	Soil	1010A, 2540 G, 2540G, 7.3.3.2, 7.3.4.1, 8081B, 8082A Cong, 8100M, 8151A, 8270E, 9050A, EPH8270, EPH8270SIM, LK, MADEP-EPH
25L0055-02	GS4	Soil	8260D Low, EPH8270, EPH8270SIM, MADEP-EPH
25L0055-03	GS1	Soil	8260D Low
25L0055-04	CS1 - OVEN DRIED	Soil	6010D, 7471B
25L0055-05	GS4 - OVEN DRIED	Soil	6010D, 7471B

Subcontracted Analyses

Eurofins New England - North Kingstown, RI (M-PA009) Herbicides

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CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Bridge Reconstruction Over Taunton River ESS Laboratory Work Order: 25L0055

Project Narrative

MADEP-EPH Extractable Petroleum Hydrocarbons

25L0055-01 **Elevated Method Reporting Limits due to sample matrix (EL).**

25L0055-02 **Elevated Method Reporting Limits due to sample matrix (EL).**

25L0055-02 **Present in Method Blank (B).**
Naphthalene

DL51501-BSD2 **Relative percent difference for duplicate is outside of criteria (D+).**
C11-C22 Unadjusted Aromatics1 (30% @ 25%)

DL51501-BSD4 **Relative percent difference for duplicate is outside of criteria (D+).**
2-Methylnaphthalene (32% @ 30%)

Semi-Volatile Organic Compounds

D5L0088-CCV1 **Calibration required quadratic regression (Q).**
2,4-Dinitrophenol (97% @ 40-160%)

D5L0088-CCV1 **Continuing Calibration %Diff/Drift is above control limit (CD+).**
2,4,6-Tribromophenol (24% @ 20%), Hexachlorobutadiene (30% @ 20%)

D5L0088-CCV1 **Continuing Calibration %Diff/Drift is below control limit (CD-).**
2-Fluorophenol (23% @ 20%), Azobenzene (29% @ 20%), bis(2-Ethylhexyl)phthalate (23% @ 20%), Butylbenzylphthalate (22% @ 20%), Di-n-octylphthalate (28% @ 20%), N-Nitrosodimethylamine (31% @ 20%), Phenol-d6 (22% @ 20%)

D5L0116-CCV1 **Calibration required quadratic regression (Q).**
2,4-Dinitrophenol (97% @ 40-160%)

D5L0116-CCV1 **Continuing Calibration %Diff/Drift is above control limit (CD+).**
2,4,6-Tribromophenol (25% @ 20%), Hexachlorobutadiene (37% @ 20%)

D5L0116-CCV1 **Continuing Calibration %Diff/Drift is below control limit (CD-).**
2-Fluorophenol (23% @ 20%), Azobenzene (32% @ 20%), bis(2-Ethylhexyl)phthalate (23% @ 20%), Butylbenzylphthalate (23% @ 20%), Di-n-octylphthalate (28% @ 20%), N-Nitrosodimethylamine (40% @ 20%), Phenol-d6 (23% @ 20%)

DL50244-BSD1 **Blank Spike recovery is below lower control limit (B-).**
Aniline (38% @ 40-140%)

Total Metals

25L0055-04 **RSD of replicate analysis > 20%. Reanalysis produced similar results.**
Arsenic

Volatile Organics Low Level

D5L0058-CCV1 **Continuing Calibration %Diff/Drift is below control limit (CD-).**
1,2-Dibromo-3-Chloropropane (21% @ 20%), Tetrahydrofuran (30% @ 20%)

DL50212-BS1 **Blank Spike recovery is below lower control limit (B-).**
Tetrahydrofuran (64% @ 70-130%)

DL50212-BSD1 **Relative percent difference for duplicate is outside of criteria (D+).**
2-Butanone (24% @ 20%), 2-Hexanone (24% @ 20%), Acetone (65% @ 20%)

No other observations noted.

End of Project Narrative.

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CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Bridge Reconstruction Over Taunton River ESS Laboratory Work Order: 25L0055

Current SW-846 Methodology Versions

Analytical Methods

1010A - Flashpoint
6010D - ICP
6020B - ICP MS
7010 - Graphite Furnace
7196A - Hexavalent Chromium
7470A - Aqueous Mercury
7471B - Solid Mercury
8011 - EDB/DBCP/TCP
8015C - GRO/DRO
8081B - Pesticides
8082A - PCB
8100M - TPH
8151A - Herbicides
8260D - VOA
8270E - SVOA
8270E SIM - SVOA Low Level
9014 - Cyanide
9038 - Sulfate
9040C - Aqueous pH
9045D - Solid pH (Corrosivity)
9050A - Specific Conductance
9056A - Anions (IC)
9060A - TOC
9095B - Paint Filter
MADEP 19-2.1 - EPH
MADEP 18-2.1 - VPH

Prep Methods

3005A - Aqueous ICP Digestion
3020A - Aqueous Graphite Furnace / ICP MS Digestion
3050B - Solid ICP / Graphite Furnace / ICP MS Digestion
3060A - Solid Hexavalent Chromium Digestion
3510C - Separatory Funnel Extraction
3520C - Liquid / Liquid Extraction
3540C - Manual Soxhlet Extraction
3546 - Microwave Extraction
3580A - Waste Dilution
5030B - Aqueous Purge and Trap
5030C - Aqueous Purge and Trap
5035A - Solid Purge and Trap

SW846 Reactivity Methods 7.3.3.2 (Reactive Cyanide) and 7.3.4.1 (Reactive Sulfide) have been withdrawn by EPA. These methods are reported per client request and are not NELAP accredited.

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CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Bridge Reconstruction Over Taunton River
Client Sample ID: CS1
Date Sampled: 12/01/25 03:46
Percent Solids: 90
Initial Volume: 20.5g
Final Volume: 1ml
Extraction Method: 3546

ESS Laboratory Work Order: 25L0055
ESS Laboratory Sample ID: 25L0055-01
Sample Matrix: Soil
Units: mg/kg dry
Analyst: TJ
Prepared: 12/3/25 19:03

Semi-Volatile Organic Compounds

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	Sequence	Batch
1,1-Biphenyl	ND (0.027)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
1,2,4-Trichlorobenzene	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
1,2-Dichlorobenzene	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
1,3-Dichlorobenzene	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
1,4-Dichlorobenzene	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
2,4,5-Trichlorophenol	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
2,4,6-Trichlorophenol	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
2,4-Dichlorophenol	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
2,4-Dimethylphenol	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
2,4-Dinitrophenol	ND (1.09)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
2,4-Dinitrotoluene	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
2,6-Dinitrotoluene	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
2-Chloronaphthalene	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
2-Chlorophenol	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
2-Methylnaphthalene	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
2-Methylphenol	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
2-Nitrophenol	ND (0.545)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
3,3′-Dichlorobenzidine	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
3+4-Methylphenol	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
4-Bromophenyl-phenylether	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
4-Chloroaniline	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
4-Nitrophenol	ND (1.09)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
Acenaphthene	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
Acenaphthylene	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
Acetophenone	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
Aniline	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
Anthracene	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
Azobenzene	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
Benzo(a)anthracene	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244

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CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Bridge Reconstruction Over Taunton River
Client Sample ID: CS1
Date Sampled: 12/01/25 03:46
Percent Solids: 90
Initial Volume: 20.5g
Final Volume: 1ml
Extraction Method: 3546

ESS Laboratory Work Order: 25L0055
ESS Laboratory Sample ID: 25L0055-01
Sample Matrix: Soil
Units: mg/kg dry
Analyst: TJ
Prepared: 12/3/25 19:03

Semi-Volatile Organic Compounds

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	Sequence	Batch
Benzo(a)pyrene	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
Benzo(b)fluoranthene	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
Benzo(g,h,i)perylene	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
Benzo(k)fluoranthene	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
bis(2-Chloroethoxy)methane	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
bis(2-Chloroethyl)ether	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
bis(2-chloroisopropyl)Ether	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
bis(2-Ethylhexyl)phthalate	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
Butylbenzylphthalate	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
Chrysene	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
Dibenzo(a,h)Anthracene	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
Dibenzofuran	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
Diethylphthalate	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
Dimethylphthalate	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
Di-n-butylphthalate	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
Di-n-octylphthalate	ND (0.545)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
Fluoranthene	**0.423** (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
Fluorene	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
Hexachlorobenzene	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
Hexachlorobutadiene	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
Hexachloroethane	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
Indeno(1,2,3-cd)Pyrene	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
Isophorone	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
Naphthalene	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
Nitrobenzene	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
N-Nitrosodimethylamine	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
Pentachlorophenol	ND (1.09)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
Phenanthrene	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
Phenol	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244

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CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Bridge Reconstruction Over Taunton River
Client Sample ID: CS1
Date Sampled: 12/01/25 03:46
Percent Solids: 90
Initial Volume: 20.5g
Final Volume: 1ml
Extraction Method: 3546

ESS Laboratory Work Order: 25L0055
ESS Laboratory Sample ID: 25L0055-01
Sample Matrix: Soil
Units: mg/kg dry
Analyst: TJ
Prepared: 12/3/25 19:03

Semi-Volatile Organic Compounds

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	Sequence	Batch
Pyrene	**0.329** (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244

	%Recovery	Qualifier	Limits
Surrogate: 1,2-Dichlorobenzene-d4	*72 %*		*30-130*
Surrogate: 2,4,6-Tribromophenol	*108 %*		*30-130*
Surrogate: 2-Chlorophenol-d4	*67 %*		*30-130*
Surrogate: 2-Fluorobiphenyl	*78 %*		*30-130*
Surrogate: 2-Fluorophenol	*59 %*		*30-130*
Surrogate: Nitrobenzene-d5	*62 %*		*30-130*
Surrogate: Phenol-d6	*59 %*		*30-130*
Surrogate: p-Terphenyl-d14	*76 %*		*30-130*

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CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Bridge Reconstruction Over Taunton River
Client Sample ID: CS1
Date Sampled: 12/01/25 03:46
Percent Solids: 90
Initial Volume: 15g
Final Volume: 1ml
Extraction Method: 3546

ESS Laboratory Work Order: 25L0055
ESS Laboratory Sample ID: 25L0055-01
Sample Matrix: Soil
Units: mg/kg dry

Prepared: 12/3/25 14:35

MADEP-EPH Extractable Petroleum Hydrocarbons

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	Sequence	Batch
C9-C18 Aliphatics1	ND (18.6)	---	MADEP-EPH	---	1	JDN	12/11/25 15:56	D5L0231	DL50324
C19-C36 Aliphatics1	**23.3** (18.6)	---	MADEP-EPH	---	1	JDN	12/11/25 15:56	D5L0231	DL50324
C11-C22 Unadjusted Aromatics1	ND (18.6)	---	EPH8270	---	1	JEL	12/11/25 20:36	D5L0242	DL50324
C11-C22 Aromatics1,2	ND (18.9)	---	EPH8270	---		TJ	12/12/25 0:36	---	[CALC]
2-Methylnaphthalene	**0.020** (0.015)	---	EPH8270SIM	---	1	TJ	12/12/25 0:36	D5L0252	DL50324
Acenaphthene	**0.096** (0.015)	---	EPH8270SIM	---	1	TJ	12/12/25 0:36	D5L0252	DL50324
Naphthalene	**0.050** (0.015)	---	EPH8270SIM	---	1	TJ	12/12/25 0:36	D5L0252	DL50324
Phenanthrene	**0.775** (0.015)	---	EPH8270SIM	---	1	TJ	12/12/25 0:36	D5L0252	DL50324
Acenaphthylene	ND (0.015)	---	EPH8270SIM	---	1	TJ	12/12/25 0:36	D5L0252	DL50324
Anthracene	**0.218** (0.015)	---	EPH8270SIM	---	1	TJ	12/12/25 0:36	D5L0252	DL50324
Benzo(a)anthracene	**0.337** (0.015)	---	EPH8270SIM	---	1	TJ	12/12/25 0:36	D5L0252	DL50324
Benzo(a)pyrene	**0.347** (0.015)	---	EPH8270SIM	---	1	TJ	12/12/25 0:36	D5L0252	DL50324
Benzo(b)fluoranthene	**0.390** (0.015)	---	EPH8270SIM	---	1	TJ	12/12/25 0:36	D5L0252	DL50324
Benzo(g,h,i)perylene	**0.230** (0.015)	---	EPH8270SIM	---	1	TJ	12/12/25 0:36	D5L0252	DL50324
Benzo(k)fluoranthene	**0.165** (0.015)	---	EPH8270SIM	---	1	TJ	12/12/25 0:36	D5L0252	DL50324
Chrysene	**0.327** (0.015)	---	EPH8270SIM	---	1	TJ	12/12/25 0:36	D5L0252	DL50324
Dibenzo(a,h)Anthracene	**0.081** (0.015)	---	EPH8270SIM	---	1	TJ	12/12/25 0:36	D5L0252	DL50324
Fluoranthene	**0.944** (0.015)	---	EPH8270SIM	---	1	TJ	12/12/25 0:36	D5L0252	DL50324
Fluorene	**0.119** (0.015)	---	EPH8270SIM	---	1	TJ	12/12/25 0:36	D5L0252	DL50324
Indeno(1,2,3-cd)Pyrene	**0.184** (0.015)	---	EPH8270SIM	---	1	TJ	12/12/25 0:36	D5L0252	DL50324
Pyrene	**0.736** (0.015)	---	EPH8270SIM	---	1	TJ	12/12/25 0:36	D5L0252	DL50324

	%Recovery	Qualifier	Limits
Surrogate: 1-Chlorooctadecane	*51 %*		*40-140*
Surrogate: 2-Bromonaphthalene	*86 %*		*40-140*
Surrogate: 2-Fluorobiphenyl	*85 %*		*40-140*
Surrogate: O-Terphenyl	*78 %*		*40-140*

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CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Bridge Reconstruction Over Taunton River
Client Sample ID: CS1
Date Sampled: 12/01/25 03:46
Percent Solids: 90
Initial Volume: 19.9g
Final Volume: 5ml
Extraction Method: 3546

ESS Laboratory Work Order: 25L0055
ESS Laboratory Sample ID: 25L0055-01
Sample Matrix: Soil
Units: mg/kg dry
Analyst: DMC
Prepared: 12/4/25 12:50

8081B Organochlorine Pesticides

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
4,4′-DDD	ND (0.0028)	---	8081B	---	1	12/04/25 16:09	D5L0097	DL50310
4,4′-DDE	ND (0.0028)	---	8081B	---	1	12/04/25 16:09	D5L0097	DL50310
4,4′-DDT	ND (0.0028)	---	8081B	---	1	12/04/25 16:09	D5L0097	DL50310
Aldrin	ND (0.0028)	---	8081B	---	1	12/04/25 16:09	D5L0097	DL50310
alpha-BHC	ND (0.0028)	---	8081B	---	1	12/04/25 16:09	D5L0097	DL50310
alpha-Chlordane	ND (0.0028)	---	8081B	---	1	12/04/25 16:09	D5L0097	DL50310
beta-BHC	ND (0.0028)	---	8081B	---	1	12/04/25 16:09	D5L0097	DL50310
Chlordane (Total)	ND (0.0224)	---	8081B	---	1	12/04/25 16:09	D5L0097	DL50310
delta-BHC	ND (0.0028)	---	8081B	---	1	12/04/25 16:09	D5L0097	DL50310
Dieldrin	ND (0.0028)	---	8081B	---	1	12/04/25 16:09	D5L0097	DL50310
Endosulfan I	ND (0.0028)	---	8081B	---	1	12/04/25 16:09	D5L0097	DL50310
Endosulfan II	ND (0.0028)	---	8081B	---	1	12/04/25 16:09	D5L0097	DL50310
Endosulfan Sulfate	ND (0.0028)	---	8081B	---	1	12/04/25 16:09	D5L0097	DL50310
Endrin	ND (0.0028)	---	8081B	---	1	12/04/25 16:09	D5L0097	DL50310
Endrin Ketone	ND (0.0028)	---	8081B	---	1	12/04/25 16:09	D5L0097	DL50310
gamma-BHC (Lindane)	ND (0.0017)	---	8081B	---	1	12/04/25 16:09	D5L0097	DL50310
gamma-Chlordane	ND (0.0028)	---	8081B	---	1	12/04/25 16:09	D5L0097	DL50310
Heptachlor	ND (0.0028)	---	8081B	---	1	12/04/25 16:09	D5L0097	DL50310
Heptachlor Epoxide	ND (0.0028)	---	8081B	---	1	12/04/25 16:09	D5L0097	DL50310
Hexachlorobenzene	ND (0.0028)	---	8081B	---	1	12/04/25 16:09	D5L0097	DL50310
Methoxychlor	ND (0.0028)	---	8081B	---	1	12/04/25 16:09	D5L0097	DL50310

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*55 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*61 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*53 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*53 %*		*30-150*

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CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Bridge Reconstruction Over Taunton River
Client Sample ID: CS1
Date Sampled: 12/01/25 03:46
Percent Solids: 90
Initial Volume: 20.2g
Final Volume: 1ml
Extraction Method: 3546

ESS Laboratory Work Order: 25L0055
ESS Laboratory Sample ID: 25L0055-01
Sample Matrix: Soil
Units: mg/kg dry
Analyst: JDN
Prepared: 12/3/25 9:52

8100M Total Petroleum Hydrocarbons

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Total Petroleum Hydrocarbons (C9-C36)	**44.9** (11.1)	---	8100M	---	1	12/03/25 23:13	---	DL50204

	%Recovery	Qualifier	Limits
Surrogate: O-Terphenyl	*72 %*		*40-140*

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CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Bridge Reconstruction Over Taunton River
Client Sample ID: CS1
Date Sampled: 12/01/25 03:46
Percent Solids: 90

ESS Laboratory Work Order: 25L0055
ESS Laboratory Sample ID: 25L0055-01
Sample Matrix: Soil

Classical Chemistry

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	Units	Batch
Conductivity	**WL 52** (5)	---	9050A	---	1	CCP	12/01/25 21:30	umhos/cm	DL50142
Flashpoint	**> 200** (N/A)	---	1010A	---	1	EAM	12/03/25 15:10	°F	DL50333
Percent Moisture	**10** (1)	---	2540G	---	1	EAM	12/03/25 16:02	%	DL50315
Reactive Cyanide	ND (2.0)	---	7.3.3.2	---	1	EAM	12/03/25 14:58	mg/kg	DL50222
Reactive Sulfide	ND (2.0)	---	7.3.4.1	---	1	EAM	12/03/25 14:58	mg/kg	DL50222
Total Organic Carbon (Average)	**12500** (500)	---	LK	---	1	CCP	12/10/25 14:54	mg/kg	[CALC]
Total Volatile Solids	**3** (1)	---	2540 G	---	1	EEM	12/03/25 16:02	%	DL50424

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CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Bridge Reconstruction Over Taunton River
Client Sample ID: CS1
Date Sampled: 12/01/25 03:46
Percent Solids: 90
Initial Volume: 30.4g
Final Volume: 2ml
Extraction Method: 3540C

ESS Laboratory Work Order: 25L0055
ESS Laboratory Sample ID: 25L0055-01
Sample Matrix: Soil
Units: mg/kg dry
Analyst: DMC
Prepared: 12/5/25 13:01

8082 Polychlorinated Biphenyls (PCB) / Congeners

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
BZ#8	ND (0.00030)	---	8082A Cong	---	1	12/08/25 14:05	D5L0163	DL50503
BZ#18	ND (0.00030)	---	8082A Cong	---	1	12/08/25 14:05	D5L0163	DL50503
BZ#28	ND (0.00030)	---	8082A Cong	---	1	12/08/25 14:05	D5L0163	DL50503
BZ#44	ND (0.00030)	---	8082A Cong	---	1	12/08/25 14:05	D5L0163	DL50503
BZ#52	ND (0.00030)	---	8082A Cong	---	1	12/08/25 14:05	D5L0163	DL50503
BZ#66	ND (0.00030)	---	8082A Cong	---	1	12/08/25 14:05	D5L0163	DL50503
BZ#101	ND (0.00030)	---	8082A Cong	---	1	12/08/25 14:05	D5L0163	DL50503
BZ#105	ND (0.00030)	---	8082A Cong	---	1	12/08/25 14:05	D5L0163	DL50503
BZ#118	ND (0.00030)	---	8082A Cong	---	1	12/08/25 14:05	D5L0163	DL50503
BZ#128	ND (0.00030)	---	8082A Cong	---	1	12/08/25 14:05	D5L0163	DL50503
BZ#138	ND (0.00030)	---	8082A Cong	---	1	12/08/25 14:05	D5L0163	DL50503
BZ#153 [2C]	ND (0.00030)	---	8082A Cong	---	1	12/08/25 14:05	D5L0163	DL50503
BZ#170	ND (0.00030)	---	8082A Cong	---	1	12/08/25 14:05	D5L0163	DL50503
BZ#180	ND (0.00030)	---	8082A Cong	---	1	12/08/25 14:05	D5L0163	DL50503
BZ#187	ND (0.00030)	---	8082A Cong	---	1	12/08/25 14:05	D5L0163	DL50503
BZ#195	ND (0.00030)	---	8082A Cong	---	1	12/08/25 14:05	D5L0163	DL50503
BZ#206	ND (0.00030)	---	8082A Cong	---	1	12/08/25 14:05	D5L0163	DL50503
BZ#209	ND (0.00030)	---	8082A Cong	---	1	12/08/25 14:05	D5L0163	DL50503

	%Recovery	Qualifier	Limits
Surrogate: Tetrachloro-m-xylene	*86 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*92 %*		*30-150*

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CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Bridge Reconstruction Over Taunton River
Client Sample ID: CS1
Date Sampled: 12/01/25 03:46
Percent Solids: 83
Initial Volume:
Final Volume:
Extraction Method: 8151A SP

ESS Laboratory Work Order: 25L0055
ESS Laboratory Sample ID: 25L0055-01
Sample Matrix: Soil
Units: mg/Kg dry
Analyst: OXG
Prepared: 12/10/25 19:15

8151MCP Herbicides (GC)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Dicamba	ND (0.040)	0.0059	8151A	---	1	12/11/25 9:57		1079332
2,4-D	ND (0.040)	0.015	8151A	---	1	12/11/25 9:57		1079332
Dalapon	ND (0.040)	0.013	8151A	---	1	12/11/25 9:57		1079332
Dinoseb	ND (0.040)	0.016	8151A	---	1	12/11/25 9:57		1079332
2,4,5-T	ND (0.040)	0.0085	8151A	---	1	12/11/25 9:57		1079332
Silvex (2,4,5-TP)	ND (0.040)	0.0042	8151A	---	1	12/11/25 9:57		1079332
2,4-DB	ND (0.040)	0.015	8151A	---	1	12/11/25 9:57		1079332
Dichlorprop	ND (0.040)	0.012	8151A	---	1	12/11/25 9:57		1079332
MCPA	ND (4.0)	2.0	8151A	---	1	12/11/25 9:57		1079332
MCPP	ND (7.2)	6.4	8151A	---	1	12/11/25 9:57		1079332

	%Recovery	Qualifier	Limits
Surrogate: 2,4-Dichlorophenylacetic acid	117 %		30-150

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CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Bridge Reconstruction Over Taunton River
Client Sample ID: GS4
Date Sampled: 12/01/25 12:14
Percent Solids: 86
Initial Volume: 5.1g
Final Volume: 10ml
Extraction Method: 5035

ESS Laboratory Work Order: 25L0055
ESS Laboratory Sample ID: 25L0055-02
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK
Prepared: 12/2/25 8:00

Volatile Organics Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	Sequence	Batch
1,1,1,2-Tetrachloroethane	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
1,1,1-Trichloroethane	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
1,1,2,2-Tetrachloroethane	ND (0.0023)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
1,1,2-Trichloroethane	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
1,1-Dichloroethane	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
1,1-Dichloroethene	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
1,1-Dichloropropene	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
1,2,3-Trichlorobenzene	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
1,2,3-Trichloropropane	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
1,2,4-Trichlorobenzene	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
1,2,4-Trimethylbenzene	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
1,2-Dibromo-3-Chloropropane	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
1,2-Dibromoethane	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
1,2-Dichlorobenzene	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
1,2-Dichloroethane	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
1,2-Dichloropropane	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
1,3,5-Trimethylbenzene	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
1,3-Dichlorobenzene	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
1,3-Dichloropropane	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
1,4-Dichlorobenzene	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
1,4-Dioxane	ND (0.114)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
2,2-Dichloropropane	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
2-Butanone	ND (0.0571)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
2-Chlorotoluene	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
2-Hexanone	ND (0.0571)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
4-Chlorotoluene	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
4-Isopropyltoluene	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
4-Methyl-2-Pentanone	ND (0.0571)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Acetone	ND (0.0571)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212

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CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Bridge Reconstruction Over Taunton River
Client Sample ID: GS4
Date Sampled: 12/01/25 12:14
Percent Solids: 86
Initial Volume: 5.1g
Final Volume: 10ml
Extraction Method: 5035

ESS Laboratory Work Order: 25L0055
ESS Laboratory Sample ID: 25L0055-02
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK
Prepared: 12/2/25 8:00

Volatile Organics Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	Sequence	Batch
Benzene	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Bromobenzene	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Bromochloromethane	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Bromodichloromethane	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Bromoform	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Bromomethane	ND (0.0114)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Carbon Disulfide	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Carbon Tetrachloride	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Chlorobenzene	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Chloroethane	ND (0.0114)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Chloroform	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Chloromethane	ND (0.0114)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
cis-1,2-Dichloroethene	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
cis-1,3-Dichloropropene	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Dibromochloromethane	ND (0.0023)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Dibromomethane	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Dichlorodifluoromethane	ND (0.0114)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Diethyl Ether	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Di-isopropyl ether	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Ethyl tertiary-butyl ether	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Ethylbenzene	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Hexachlorobutadiene	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Isopropylbenzene	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Methyl tert-Butyl Ether	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Methylene Chloride	ND (0.0286)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Naphthalene	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
n-Butylbenzene	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
n-Propylbenzene	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
sec-Butylbenzene	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212

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CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Bridge Reconstruction Over Taunton River
Client Sample ID: GS4
Date Sampled: 12/01/25 12:14
Percent Solids: 86
Initial Volume: 5.1g
Final Volume: 10ml
Extraction Method: 5035

ESS Laboratory Work Order: 25L0055
ESS Laboratory Sample ID: 25L0055-02
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK
Prepared: 12/2/25 8:00

Volatile Organics Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	Sequence	Batch
Styrene	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
tert-Butylbenzene	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Tertiary-amyl methyl ether	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Tetrachloroethene	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Tetrahydrofuran	ND (0.0228)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Toluene	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
trans-1,2-Dichloroethene	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
trans-1,3-Dichloropropene	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Trichloroethene	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Trichlorofluoromethane	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Vinyl Chloride	ND (0.0114)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Xylene O	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Xylene P,M	ND (0.0114)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Xylenes (Total)	ND (0.0114)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212

	%Recovery	Qualifier	Limits
Surrogate: 1,2-Dichloroethane-d4	*104 %*		*70-130*
Surrogate: 4-Bromofluorobenzene	*96 %*		*70-130*
Surrogate: Dibromofluoromethane	*103 %*		*70-130*
Surrogate: Toluene-d8	*95 %*		*70-130*

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CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Bridge Reconstruction Over Taunton River
Client Sample ID: GS4
Date Sampled: 12/01/25 12:14
Percent Solids: 86
Initial Volume: 15g
Final Volume: 1ml
Extraction Method: 3546

ESS Laboratory Work Order: 25L0055
ESS Laboratory Sample ID: 25L0055-02
Sample Matrix: Soil
Units: mg/kg dry

Prepared: 12/15/25 13:16

MADEP-EPH Extractable Petroleum Hydrocarbons

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	Sequence	Batch
C9-C18 Aliphatics1	ND (19.4)	---	MADEP-EPH	---	1	JDN	12/17/25 1:07	D5L0279	DL51501
C19-C36 Aliphatics1	**98.3** (19.4)	---	MADEP-EPH	---	1	JDN	12/17/25 1:07	D5L0279	DL51501
C11-C22 Unadjusted Aromatics1	**49.6** (19.4)	---	EPH8270	---	1	JEL	12/16/25 22:20	D5L0319	DL51501
C11-C22 Aromatics1,2	**44.5** (19.7)	---	EPH8270	---		TJ	12/17/25 22:06	---	[CALC]
2-Methylnaphthalene	ND (0.016)	---	EPH8270SIM	---	1	TJ	12/17/25 22:06	D5L0340	DL51501
Acenaphthene	ND (0.016)	---	EPH8270SIM	---	1	TJ	12/17/25 22:06	D5L0340	DL51501
Naphthalene	**B 0.026** (0.016)	---	EPH8270SIM	---	1	TJ	12/17/25 22:06	D5L0340	DL51501
Phenanthrene	**0.357** (0.016)	---	EPH8270SIM	---	1	TJ	12/17/25 22:06	D5L0340	DL51501
Acenaphthylene	ND (0.016)	---	EPH8270SIM	---	1	TJ	12/17/25 22:06	D5L0340	DL51501
Anthracene	**0.087** (0.016)	---	EPH8270SIM	---	1	TJ	12/17/25 22:06	D5L0340	DL51501
Benzo(a)anthracene	**0.336** (0.016)	---	EPH8270SIM	---	1	TJ	12/17/25 22:06	D5L0340	DL51501
Benzo(a)pyrene	**0.437** (0.016)	---	EPH8270SIM	---	1	TJ	12/17/25 22:06	D5L0340	DL51501
Benzo(b)fluoranthene	**0.614** (0.016)	---	EPH8270SIM	---	1	TJ	12/17/25 22:06	D5L0340	DL51501
Benzo(g,h,i)perylene	**0.330** (0.016)	---	EPH8270SIM	---	1	TJ	12/17/25 22:06	D5L0340	DL51501
Benzo(k)fluoranthene	**0.249** (0.016)	---	EPH8270SIM	---	1	TJ	12/17/25 22:06	D5L0340	DL51501
Chrysene	**0.461** (0.016)	---	EPH8270SIM	---	1	TJ	12/17/25 22:06	D5L0340	DL51501
Dibenzo(a,h)Anthracene	**0.112** (0.016)	---	EPH8270SIM	---	1	TJ	12/17/25 22:06	D5L0340	DL51501
Fluoranthene	**1.04** (0.016)	---	EPH8270SIM	---	1	TJ	12/17/25 22:06	D5L0340	DL51501
Fluorene	**0.016** (0.016)	---	EPH8270SIM	---	1	TJ	12/17/25 22:06	D5L0340	DL51501
Indeno(1,2,3-cd)Pyrene	**0.267** (0.016)	---	EPH8270SIM	---	1	TJ	12/17/25 22:06	D5L0340	DL51501
Pyrene	**0.756** (0.016)	---	EPH8270SIM	---	1	TJ	12/17/25 22:06	D5L0340	DL51501

	%Recovery	Qualifier	Limits
Surrogate: 1-Chlorooctadecane	*54 %*		*40-140*
Surrogate: 2-Bromonaphthalene	*92 %*		*40-140*
Surrogate: 2-Fluorobiphenyl	*92 %*		*40-140*
Surrogate: O-Terphenyl	*81 %*		*40-140*

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CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Bridge Reconstruction Over Taunton River
Client Sample ID: GS1
Date Sampled: 12/01/25 12:14
Percent Solids: 86
Initial Volume: 6.5g
Final Volume: 10ml
Extraction Method: 5035

ESS Laboratory Work Order: 25L0055
ESS Laboratory Sample ID: 25L0055-03
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK
Prepared: 12/2/25 8:00

Volatile Organics Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	Sequence	Batch
1,1,1,2-Tetrachloroethane	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
1,1,1-Trichloroethane	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
1,1,2,2-Tetrachloroethane	ND (0.0018)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
1,1,2-Trichloroethane	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
1,1-Dichloroethane	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
1,1-Dichloroethene	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
1,1-Dichloropropene	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
1,2,3-Trichlorobenzene	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
1,2,3-Trichloropropane	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
1,2,4-Trichlorobenzene	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
1,2,4-Trimethylbenzene	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
1,2-Dibromo-3-Chloropropane	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
1,2-Dibromoethane	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
1,2-Dichlorobenzene	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
1,2-Dichloroethane	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
1,2-Dichloropropane	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
1,3,5-Trimethylbenzene	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
1,3-Dichlorobenzene	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
1,3-Dichloropropane	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
1,4-Dichlorobenzene	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
1,4-Dioxane	ND (0.0896)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
2,2-Dichloropropane	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
2-Butanone	ND (0.0448)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
2-Chlorotoluene	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
2-Hexanone	ND (0.0448)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
4-Chlorotoluene	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
4-Isopropyltoluene	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
4-Methyl-2-Pentanone	ND (0.0448)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Acetone	ND (0.0448)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212

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CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Bridge Reconstruction Over Taunton River
Client Sample ID: GS1
Date Sampled: 12/01/25 12:14
Percent Solids: 86
Initial Volume: 6.5g
Final Volume: 10ml
Extraction Method: 5035

ESS Laboratory Work Order: 25L0055
ESS Laboratory Sample ID: 25L0055-03
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK
Prepared: 12/2/25 8:00

Volatile Organics Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	Sequence	Batch
Benzene	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Bromobenzene	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Bromochloromethane	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Bromodichloromethane	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Bromoform	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Bromomethane	ND (0.0090)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Carbon Disulfide	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Carbon Tetrachloride	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Chlorobenzene	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Chloroethane	ND (0.0090)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Chloroform	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Chloromethane	ND (0.0090)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
cis-1,2-Dichloroethene	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
cis-1,3-Dichloropropene	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Dibromochloromethane	ND (0.0018)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Dibromomethane	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Dichlorodifluoromethane	ND (0.0090)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Diethyl Ether	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Di-isopropyl ether	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Ethyl tertiary-butyl ether	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Ethylbenzene	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Hexachlorobutadiene	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Isopropylbenzene	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Methyl tert-Butyl Ether	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Methylene Chloride	ND (0.0224)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Naphthalene	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
n-Butylbenzene	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
n-Propylbenzene	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
sec-Butylbenzene	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212

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CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Bridge Reconstruction Over Taunton River
Client Sample ID: GS1
Date Sampled: 12/01/25 12:14
Percent Solids: 86
Initial Volume: 6.5g
Final Volume: 10ml
Extraction Method: 5035

ESS Laboratory Work Order: 25L0055
ESS Laboratory Sample ID: 25L0055-03
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK
Prepared: 12/2/25 8:00

Volatile Organics Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	Sequence	Batch
Styrene	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
tert-Butylbenzene	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Tertiary-amyl methyl ether	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Tetrachloroethene	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Tetrahydrofuran	ND (0.0179)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Toluene	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
trans-1,2-Dichloroethene	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
trans-1,3-Dichloropropene	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Trichloroethene	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Trichlorofluoromethane	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Vinyl Chloride	ND (0.0090)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Xylene O	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Xylene P,M	ND (0.0090)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Xylenes (Total)	ND (0.0090)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212

	%Recovery	Qualifier	Limits
Surrogate: 1,2-Dichloroethane-d4	*104 %*		*70-130*
Surrogate: 4-Bromofluorobenzene	*97 %*		*70-130*
Surrogate: Dibromofluoromethane	*101 %*		*70-130*
Surrogate: Toluene-d8	*95 %*		*70-130*

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CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Bridge Reconstruction Over Taunton River
Client Sample ID: CS1 - OVEN DRIED
Date Sampled: 12/01/25 03:46
Percent Solids: 100

ESS Laboratory Work Order: 25L0055
ESS Laboratory Sample ID: 25L0055-04
Sample Matrix: Soil
Units: mg/kg dry

Extraction Method: 3050B

Total Metals

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	IV / FV	Batch
Arsenic	**X* 1.01** (0.35)	---	6010D	---	1	CEV	12/10/25 14:02	5.67 100	DL50454
Cadmium	**0.19** (0.18)	---	6010D	---	1	CEV	12/08/25 19:05	5.67 100	DL50454
Chromium	**11.7** (0.35)	---	6010D	---	1	CEV	12/08/25 19:05	5.67 100	DL50454
Copper	**16.6** (0.88)	---	6010D	---	1	CEV	12/08/25 19:05	5.67 100	DL50454
Lead	**19.9** (1.76)	---	6010D	---	1	CEV	12/08/25 19:05	5.67 100	DL50454
Mercury	**0.012** (0.012)	---	7471B	---	1	RAP	12/08/25 17:00	1.68 40	DL50525
Nickel	**7.24** (0.88)	---	6010D	---	1	CEV	12/08/25 19:05	5.67 100	DL50454
Zinc	**62.5** (1.76)	---	6010D	---	1	CEV	12/08/25 19:05	5.67 100	DL50454

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CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Bridge Reconstruction Over Taunton River
Client Sample ID: GS4 - OVEN DRIED
Date Sampled: 12/01/25 12:14
Percent Solids: 100

ESS Laboratory Work Order: 25L0055
ESS Laboratory Sample ID: 25L0055-05
Sample Matrix: Soil
Units: mg/kg dry

Extraction Method: 3050B

Total Metals

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	IV / FV	Batch
Arsenic	**1.94** (0.40)	---	6010D	---	1	CEV	12/10/25 14:07	5.06 100	DL50454
Cadmium	**0.27** (0.20)	---	6010D	---	1	CEV	12/08/25 19:07	5.06 100	DL50454
Chromium	**17.0** (0.40)	---	6010D	---	1	CEV	12/08/25 19:07	5.06 100	DL50454
Copper	**33.3** (0.99)	---	6010D	---	1	CEV	12/08/25 19:07	5.06 100	DL50454
Lead	**36.4** (1.98)	---	6010D	---	1	CEV	12/08/25 19:07	5.06 100	DL50454
Mercury	ND (0.013)	---	7471B	---	1	RAP	12/08/25 17:02	1.55 40	DL50525
Nickel	**7.06** (0.99)	---	6010D	---	1	CEV	12/08/25 19:07	5.06 100	DL50454
Zinc	**100** (1.98)	---	6010D	---	1	CEV	12/08/25 19:07	5.06 100	DL50454

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CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Bridge Reconstruction Over Taunton River ESS Laboratory Work Order: 25L0055

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Total Metals										
Batch DL50454 - 3050B										
Blank										
Arsenic	ND	0.85	mg/kg wet							
Cadmium	ND	0.43	mg/kg wet							
Chromium	ND	0.85	mg/kg wet							
Copper	ND	2.13	mg/kg wet							
Lead	ND	4.26	mg/kg wet							
Nickel	ND	2.13	mg/kg wet							
Zinc	ND	4.26	mg/kg wet							
LCS										
Arsenic	53.4	3.33	mg/kg wet	63.55		84	63-137			
Cadmium	171	1.67	mg/kg wet	180.0		95	80-120			
Chromium	58.8	3.33	mg/kg wet	59.83		98	80-120			
Copper	60.0	8.33	mg/kg wet	63.17		95	80-120			
Lead	170	16.7	mg/kg wet	208.0		82	64-136			
Nickel	117	8.33	mg/kg wet	124.9		93	80-120			
Zinc	490	16.7	mg/kg wet	516.0		95	80-120			
LCS Dup										
Arsenic	47.0	3.12	mg/kg wet	63.55		74	63-137	13	30	
Cadmium	148	1.56	mg/kg wet	180.0		82	80-120	14	30	
Chromium	50.8	3.12	mg/kg wet	59.83		85	80-120	15	30	
Copper	52.1	7.81	mg/kg wet	63.17		83	80-120	14	30	
Lead	151	15.6	mg/kg wet	208.0		72	64-136	12	30	
Nickel	101	7.81	mg/kg wet	124.9		81	80-120	14	30	
Zinc	424	15.6	mg/kg wet	516.0		82	80-120	14	30	
Batch DL50525 - 7471B										
Blank										
Mercury	ND	0.028	mg/kg wet							
LCS										
Mercury	14.8	3.25	mg/kg wet	15.90		93	80-120			
LCS Dup										
Mercury	15.7	3.00	mg/kg wet	15.90		98	80-120	5	30	
Volatile Organics Low Level										
Batch DL50212 - 5035										
Blank										
1,1,1,2-Tetrachloroethane	ND	0.0050	mg/kg wet							
1,1,1-Trichloroethane	ND	0.0050	mg/kg wet							
1,1,2,2-Tetrachloroethane	ND	0.0020	mg/kg wet							
1,1,2-Trichloroethane	ND	0.0050	mg/kg wet							
1,1-Dichloroethane	ND	0.0050	mg/kg wet							
1,1-Dichloroethene	ND	0.0050	mg/kg wet							
1,1-Dichloropropene	ND	0.0050	mg/kg wet							
1,2,3-Trichlorobenzene	ND	0.0050	mg/kg wet							
1,2,3-Trichloropropane	ND	0.0050	mg/kg wet							

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CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Bridge Reconstruction Over Taunton River ESS Laboratory Work Order: 25L0055

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Volatile Organics Low Level										
Batch DL50212 - 5035										
1,2,4-Trichlorobenzene	ND	0.0050	mg/kg wet							
1,2,4-Trimethylbenzene	ND	0.0050	mg/kg wet							
1,2-Dibromo-3-Chloropropane	ND	0.0050	mg/kg wet							
1,2-Dibromoethane	ND	0.0050	mg/kg wet							
1,2-Dichlorobenzene	ND	0.0050	mg/kg wet							
1,2-Dichloroethane	ND	0.0050	mg/kg wet							
1,2-Dichloropropane	ND	0.0050	mg/kg wet							
1,3,5-Trimethylbenzene	ND	0.0050	mg/kg wet							
1,3-Dichlorobenzene	ND	0.0050	mg/kg wet							
1,3-Dichloropropane	ND	0.0050	mg/kg wet							
1,4-Dichlorobenzene	ND	0.0050	mg/kg wet							
1,4-Dioxane	ND	0.100	mg/kg wet							
2,2-Dichloropropane	ND	0.0050	mg/kg wet							
2-Butanone	ND	0.0500	mg/kg wet							
2-Chlorotoluene	ND	0.0050	mg/kg wet							
2-Hexanone	ND	0.0500	mg/kg wet							
4-Chlorotoluene	ND	0.0050	mg/kg wet							
4-Isopropyltoluene	ND	0.0050	mg/kg wet							
4-Methyl-2-Pentanone	ND	0.0500	mg/kg wet							
Acetone	ND	0.0500	mg/kg wet							
Benzene	ND	0.0050	mg/kg wet							
Bromobenzene	ND	0.0050	mg/kg wet							
Bromochloromethane	ND	0.0050	mg/kg wet							
Bromodichloromethane	ND	0.0050	mg/kg wet							
Bromoform	ND	0.0050	mg/kg wet							
Bromomethane	ND	0.0100	mg/kg wet							
Carbon Disulfide	ND	0.0050	mg/kg wet							
Carbon Tetrachloride	ND	0.0050	mg/kg wet							
Chlorobenzene	ND	0.0050	mg/kg wet							
Chloroethane	ND	0.0100	mg/kg wet							
Chloroform	ND	0.0050	mg/kg wet							
Chloromethane	ND	0.0100	mg/kg wet							
cis-1,2-Dichloroethene	ND	0.0050	mg/kg wet							
cis-1,3-Dichloropropene	ND	0.0050	mg/kg wet							
Dibromochloromethane	ND	0.0020	mg/kg wet							
Dibromomethane	ND	0.0050	mg/kg wet							
Dichlorodifluoromethane	ND	0.0100	mg/kg wet							
Diethyl Ether	ND	0.0050	mg/kg wet							
Di-isopropyl ether	ND	0.0050	mg/kg wet							
Ethyl tertiary-butyl ether	ND	0.0050	mg/kg wet							
Ethylbenzene	ND	0.0050	mg/kg wet							
Hexachlorobutadiene	ND	0.0050	mg/kg wet							
Isopropylbenzene	ND	0.0050	mg/kg wet							
Methyl tert-Butyl Ether	ND	0.0050	mg/kg wet							
Methylene Chloride	ND	0.0250	mg/kg wet							
Naphthalene	ND	0.0050	mg/kg wet							

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CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Bridge Reconstruction Over Taunton River ESS Laboratory Work Order: 25L0055

Quality Control Data

Volatile Organics Low Level

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch DL50212 - 5035										
n-Butylbenzene	ND	0.0050	mg/kg wet							
n-Propylbenzene	ND	0.0050	mg/kg wet							
sec-Butylbenzene	ND	0.0050	mg/kg wet							
Styrene	ND	0.0050	mg/kg wet							
tert-Butylbenzene	ND	0.0050	mg/kg wet							
Tertiary-amyl methyl ether	ND	0.0050	mg/kg wet							
Tetrachloroethene	ND	0.0050	mg/kg wet							
Tetrahydrofuran	ND	0.0200	mg/kg wet							
Toluene	ND	0.0050	mg/kg wet							
trans-1,2-Dichloroethene	ND	0.0050	mg/kg wet							
trans-1,3-Dichloropropene	ND	0.0050	mg/kg wet							
Trichloroethene	ND	0.0050	mg/kg wet							
Trichlorofluoromethane	ND	0.0050	mg/kg wet							
Vinyl Chloride	ND	0.0100	mg/kg wet							
Xylene O	ND	0.0050	mg/kg wet							
Xylene P,M	ND	0.0100	mg/kg wet							
Surrogate: 1,2-Dichloroethane-d4	*0.0503*		mg/kg wet	*0.05000*		*101*	*70-130*			
Surrogate: 4-Bromofluorobenzene	*0.0478*		mg/kg wet	*0.05000*		*96*	*70-130*			
Surrogate: Dibromofluoromethane	*0.0491*		mg/kg wet	*0.05000*		*98*	*70-130*			
Surrogate: Toluene-d8	*0.0479*		mg/kg wet	*0.05000*		*96*	*70-130*			
LCS										
1,1,1,2-Tetrachloroethane	0.0453	0.0050	mg/kg wet	0.05000		91	70-130			
1,1,1-Trichloroethane	0.0446	0.0050	mg/kg wet	0.05000		89	70-130			
1,1,2,2-Tetrachloroethane	0.0382	0.0020	mg/kg wet	0.05000		76	40-160			
1,1,2-Trichloroethane	0.0438	0.0050	mg/kg wet	0.05000		88	70-130			
1,1-Dichloroethane	0.0412	0.0050	mg/kg wet	0.05000		82	70-130			
1,1-Dichloroethene	0.0446	0.0050	mg/kg wet	0.05000		89	70-130			
1,1-Dichloropropene	0.0449	0.0050	mg/kg wet	0.05000		90	70-130			
1,2,3-Trichlorobenzene	0.0479	0.0050	mg/kg wet	0.05000		96	70-130			
1,2,3-Trichloropropane	0.0348	0.0050	mg/kg wet	0.05000		70	70-130			
1,2,4-Trichlorobenzene	0.0471	0.0050	mg/kg wet	0.05000		94	70-130			
1,2,4-Trimethylbenzene	0.0423	0.0050	mg/kg wet	0.05000		85	70-130			
1,2-Dibromo-3-Chloropropane	0.0365	0.0050	mg/kg wet	0.05000		73	70-130			
1,2-Dibromoethane	0.0444	0.0050	mg/kg wet	0.05000		89	70-130			
1,2-Dichlorobenzene	0.0434	0.0050	mg/kg wet	0.05000		87	70-130			
1,2-Dichloroethane	0.0450	0.0050	mg/kg wet	0.05000		90	70-130			
1,2-Dichloropropane	0.0399	0.0050	mg/kg wet	0.05000		80	70-130			
1,3,5-Trimethylbenzene	0.0427	0.0050	mg/kg wet	0.05000		85	70-130			
1,3-Dichlorobenzene	0.0436	0.0050	mg/kg wet	0.05000		87	70-130			
1,3-Dichloropropane	0.0426	0.0050	mg/kg wet	0.05000		85	70-130			
1,4-Dichlorobenzene	0.0440	0.0050	mg/kg wet	0.05000		88	70-130			
1,4-Dioxane	0.859	0.100	mg/kg wet	1.000		86	70-130			
2,2-Dichloropropane	0.0381	0.0050	mg/kg wet	0.05000		76	70-130			
2-Butanone	0.165	0.0500	mg/kg wet	0.2500		66	40-160			
2-Chlorotoluene	0.0409	0.0050	mg/kg wet	0.05000		82	70-130			

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CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Bridge Reconstruction Over Taunton River ESS Laboratory Work Order: 25L0055

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Volatile Organics Low Level										
Batch DL50212 - 5035										
2-Hexanone	0.135	0.0500	mg/kg wet	0.2500		54	40-160			
4-Chlorotoluene	0.0405	0.0050	mg/kg wet	0.05000		81	70-130			
4-Isopropyltoluene	0.0420	0.0050	mg/kg wet	0.05000		84	70-130			
4-Methyl-2-Pentanone	0.145	0.0500	mg/kg wet	0.2500		58	40-160			
Acetone	0.136	0.0500	mg/kg wet	0.2500		55	40-160			
Benzene	0.0422	0.0050	mg/kg wet	0.05000		84	70-130			
Bromobenzene	0.0431	0.0050	mg/kg wet	0.05000		86	70-130			
Bromochloromethane	0.0455	0.0050	mg/kg wet	0.05000		91	70-130			
Bromodichloromethane	0.0448	0.0050	mg/kg wet	0.05000		90	70-130			
Bromoform	0.0408	0.0050	mg/kg wet	0.05000		82	40-160			
Bromomethane	0.0428	0.0100	mg/kg wet	0.05000		86	40-160			
Carbon Disulfide	0.0424	0.0050	mg/kg wet	0.05000		85	70-130			
Carbon Tetrachloride	0.0459	0.0050	mg/kg wet	0.05000		92	70-130			
Chlorobenzene	0.0438	0.0050	mg/kg wet	0.05000		88	70-130			
Chloroethane	0.0439	0.0100	mg/kg wet	0.05000		88	40-160			
Chloroform	0.0446	0.0050	mg/kg wet	0.05000		89	70-130			
Chloromethane	0.0405	0.0100	mg/kg wet	0.05000		81	40-160			
cis-1,2-Dichloroethene	0.0456	0.0050	mg/kg wet	0.05000		91	70-130			
cis-1,3-Dichloropropene	0.0404	0.0050	mg/kg wet	0.05000		81	40-160			
Dibromochloromethane	0.0435	0.0020	mg/kg wet	0.05000		87	40-160			
Dibromomethane	0.0438	0.0050	mg/kg wet	0.05000		88	70-130			
Dichlorodifluoromethane	0.0520	0.0100	mg/kg wet	0.05000		104	40-160			
Diethyl Ether	0.0384	0.0050	mg/kg wet	0.05000		77	70-130			
Di-isopropyl ether	0.0365	0.0050	mg/kg wet	0.05000		73	70-130			
Ethyl tertiary-butyl ether	0.0378	0.0050	mg/kg wet	0.05000		76	70-130			
Ethylbenzene	0.0425	0.0050	mg/kg wet	0.05000		85	70-130			
Hexachlorobutadiene	0.0490	0.0050	mg/kg wet	0.05000		98	40-160			
Isopropylbenzene	0.0414	0.0050	mg/kg wet	0.05000		83	70-130			
Methyl tert-Butyl Ether	0.0386	0.0050	mg/kg wet	0.05000		77	70-130			
Methylene Chloride	0.0425	0.0250	mg/kg wet	0.05000		85	70-130			
Naphthalene	0.0452	0.0050	mg/kg wet	0.05000		90	40-160			
n-Butylbenzene	0.0431	0.0050	mg/kg wet	0.05000		86	70-130			
n-Propylbenzene	0.0410	0.0050	mg/kg wet	0.05000		82	70-130			
sec-Butylbenzene	0.0381	0.0050	mg/kg wet	0.05000		76	70-130			
Styrene	0.0425	0.0050	mg/kg wet	0.05000		85	40-160			
tert-Butylbenzene	0.0424	0.0050	mg/kg wet	0.05000		85	70-130			
Tertiary-amyl methyl ether	0.0378	0.0050	mg/kg wet	0.05000		76	70-130			
Tetrachloroethene	0.0386	0.0050	mg/kg wet	0.05000		77	70-130			
Tetrahydrofuran	0.0321	0.0200	mg/kg wet	0.05000		64	70-130			B-
Toluene	0.0434	0.0050	mg/kg wet	0.05000		87	70-130			
trans-1,2-Dichloroethene	0.0439	0.0050	mg/kg wet	0.05000		88	70-130			
trans-1,3-Dichloropropene	0.0398	0.0050	mg/kg wet	0.05000		80	70-130			
Trichloroethene	0.0457	0.0050	mg/kg wet	0.05000		91	70-130			
Trichlorofluoromethane	0.0496	0.0050	mg/kg wet	0.05000		99	40-160			
Vinyl Chloride	0.0459	0.0100	mg/kg wet	0.05000		92	70-130			
Xylene O	0.0427	0.0050	mg/kg wet	0.05000		85	70-130			

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CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Bridge Reconstruction Over Taunton River ESS Laboratory Work Order: 25L0055

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Volatile Organics Low Level										
Batch DL50212 - 5035										
Xylene P,M	0.0874	0.0100	mg/kg wet	0.1000		87	70-130			
Surrogate: 1,2-Dichloroethane-d4	*0.0490*		mg/kg wet	*0.05000*		*98*	*70-130*			
Surrogate: 4-Bromofluorobenzene	*0.0480*		mg/kg wet	*0.05000*		*96*	*70-130*			
Surrogate: Dibromofluoromethane	*0.0510*		mg/kg wet	*0.05000*		*102*	*70-130*			
Surrogate: Toluene-d8	*0.0473*		mg/kg wet	*0.05000*		*95*	*70-130*			
LCS Dup										
1,1,1,2-Tetrachloroethane	0.0496	0.0050	mg/kg wet	0.05000		99	70-130	9	20	
1,1,1-Trichloroethane	0.0485	0.0050	mg/kg wet	0.05000		97	70-130	8	20	
1,1,2,2-Tetrachloroethane	0.0414	0.0020	mg/kg wet	0.05000		83	40-160	8	20	
1,1,2-Trichloroethane	0.0473	0.0050	mg/kg wet	0.05000		95	70-130	8	20	
1,1-Dichloroethane	0.0449	0.0050	mg/kg wet	0.05000		90	70-130	8	20	
1,1-Dichloroethene	0.0492	0.0050	mg/kg wet	0.05000		98	70-130	10	20	
1,1-Dichloropropene	0.0489	0.0050	mg/kg wet	0.05000		98	70-130	9	20	
1,2,3-Trichlorobenzene	0.0520	0.0050	mg/kg wet	0.05000		104	70-130	8	20	
1,2,3-Trichloropropane	0.0379	0.0050	mg/kg wet	0.05000		76	70-130	8	20	
1,2,4-Trichlorobenzene	0.0512	0.0050	mg/kg wet	0.05000		102	70-130	8	20	
1,2,4-Trimethylbenzene	0.0466	0.0050	mg/kg wet	0.05000		93	70-130	10	20	
1,2-Dibromo-3-Chloropropane	0.0394	0.0050	mg/kg wet	0.05000		79	70-130	8	20	
1,2-Dibromoethane	0.0484	0.0050	mg/kg wet	0.05000		97	70-130	9	20	
1,2-Dichlorobenzene	0.0475	0.0050	mg/kg wet	0.05000		95	70-130	9	20	
1,2-Dichloroethane	0.0485	0.0050	mg/kg wet	0.05000		97	70-130	7	20	
1,2-Dichloropropane	0.0438	0.0050	mg/kg wet	0.05000		88	70-130	9	20	
1,3,5-Trimethylbenzene	0.0470	0.0050	mg/kg wet	0.05000		94	70-130	9	20	
1,3-Dichlorobenzene	0.0475	0.0050	mg/kg wet	0.05000		95	70-130	9	20	
1,3-Dichloropropane	0.0471	0.0050	mg/kg wet	0.05000		94	70-130	10	20	
1,4-Dichlorobenzene	0.0486	0.0050	mg/kg wet	0.05000		97	70-130	10	20	
1,4-Dioxane	0.905	0.100	mg/kg wet	1.000		91	70-130	5	20	
2,2-Dichloropropane	0.0415	0.0050	mg/kg wet	0.05000		83	70-130	8	20	
2-Butanone	0.211	0.0500	mg/kg wet	0.2500		84	40-160	24	20	D+
2-Chlorotoluene	0.0450	0.0050	mg/kg wet	0.05000		90	70-130	10	20	
2-Hexanone	0.171	0.0500	mg/kg wet	0.2500		68	40-160	24	20	D+
4-Chlorotoluene	0.0447	0.0050	mg/kg wet	0.05000		89	70-130	10	20	
4-Isopropyltoluene	0.0458	0.0050	mg/kg wet	0.05000		92	70-130	9	20	
4-Methyl-2-Pentanone	0.156	0.0500	mg/kg wet	0.2500		63	40-160	8	20	
Acetone	0.266	0.0500	mg/kg wet	0.2500		107	40-160	65	20	D+
Benzene	0.0461	0.0050	mg/kg wet	0.05000		92	70-130	9	20	
Bromobenzene	0.0481	0.0050	mg/kg wet	0.05000		96	70-130	11	20	
Bromochloromethane	0.0499	0.0050	mg/kg wet	0.05000		100	70-130	9	20	
Bromodichloromethane	0.0487	0.0050	mg/kg wet	0.05000		97	70-130	8	20	
Bromoform	0.0450	0.0050	mg/kg wet	0.05000		90	40-160	10	20	
Bromomethane	0.0464	0.0100	mg/kg wet	0.05000		93	40-160	8	20	
Carbon Disulfide	0.0465	0.0050	mg/kg wet	0.05000		93	70-130	9	20	
Carbon Tetrachloride	0.0501	0.0050	mg/kg wet	0.05000		100	70-130	9	20	
Chlorobenzene	0.0478	0.0050	mg/kg wet	0.05000		96	70-130	9	20	
Chloroethane	0.0480	0.0100	mg/kg wet	0.05000		96	40-160	9	20	

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CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Bridge Reconstruction Over Taunton River ESS Laboratory Work Order: 25L0055

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Volatile Organics Low Level										
Batch DL50212 - 5035										
Chloroform	0.0484	0.0050	mg/kg wet	0.05000		97	70-130	8	20	
Chloromethane	0.0443	0.0100	mg/kg wet	0.05000		89	40-160	9	20	
cis-1,2-Dichloroethene	0.0498	0.0050	mg/kg wet	0.05000		100	70-130	9	20	
cis-1,3-Dichloropropene	0.0438	0.0050	mg/kg wet	0.05000		88	40-160	8	20	
Dibromochloromethane	0.0475	0.0020	mg/kg wet	0.05000		95	40-160	9	20	
Dibromomethane	0.0471	0.0050	mg/kg wet	0.05000		94	70-130	7	20	
Dichlorodifluoromethane	0.0558	0.0100	mg/kg wet	0.05000		112	40-160	7	20	
Diethyl Ether	0.0418	0.0050	mg/kg wet	0.05000		84	70-130	8	20	
Di-isopropyl ether	0.0401	0.0050	mg/kg wet	0.05000		80	70-130	9	20	
Ethyl tertiary-butyl ether	0.0411	0.0050	mg/kg wet	0.05000		82	70-130	8	20	
Ethylbenzene	0.0464	0.0050	mg/kg wet	0.05000		93	70-130	9	20	
Hexachlorobutadiene	0.0531	0.0050	mg/kg wet	0.05000		106	40-160	8	20	
Isopropylbenzene	0.0454	0.0050	mg/kg wet	0.05000		91	70-130	9	20	
Methyl tert-Butyl Ether	0.0418	0.0050	mg/kg wet	0.05000		84	70-130	8	20	
Methylene Chloride	0.0463	0.0250	mg/kg wet	0.05000		93	70-130	8	20	
Naphthalene	0.0487	0.0050	mg/kg wet	0.05000		97	40-160	8	20	
n-Butylbenzene	0.0472	0.0050	mg/kg wet	0.05000		94	70-130	9	20	
n-Propylbenzene	0.0453	0.0050	mg/kg wet	0.05000		91	70-130	10	20	
sec-Butylbenzene	0.0419	0.0050	mg/kg wet	0.05000		84	70-130	10	20	
Styrene	0.0466	0.0050	mg/kg wet	0.05000		93	40-160	9	20	
tert-Butylbenzene	0.0467	0.0050	mg/kg wet	0.05000		93	70-130	10	20	
Tertiary-amyl methyl ether	0.0412	0.0050	mg/kg wet	0.05000		82	70-130	9	20	
Tetrachloroethene	0.0444	0.0050	mg/kg wet	0.05000		89	70-130	14	20	
Tetrahydrofuran	0.0351	0.0200	mg/kg wet	0.05000		70	70-130	9	20	
Toluene	0.0475	0.0050	mg/kg wet	0.05000		95	70-130	9	20	
trans-1,2-Dichloroethene	0.0484	0.0050	mg/kg wet	0.05000		97	70-130	10	20	
trans-1,3-Dichloropropene	0.0432	0.0050	mg/kg wet	0.05000		86	70-130	8	20	
Trichloroethene	0.0501	0.0050	mg/kg wet	0.05000		100	70-130	9	20	
Trichlorofluoromethane	0.0541	0.0050	mg/kg wet	0.05000		108	40-160	9	20	
Vinyl Chloride	0.0428	0.0100	mg/kg wet	0.05000		86	70-130	7	20	
Xylene O	0.0471	0.0050	mg/kg wet	0.05000		94	70-130	10	20	
Xylene P,M	0.0956	0.0100	mg/kg wet	0.1000		96	70-130	9	20	
Surrogate: 1,2-Dichloroethane-d4	*0.0474*		mg/kg wet	*0.05000*		*95*	*70-130*			
Surrogate: 4-Bromofluorobenzene	*0.0476*		mg/kg wet	*0.05000*		*95*	*70-130*			
Surrogate: Dibromofluoromethane	*0.0503*		mg/kg wet	*0.05000*		*101*	*70-130*			
Surrogate: Toluene-d8	*0.0472*		mg/kg wet	*0.05000*		*94*	*70-130*			
Semi-Volatile Organic Compounds										
Batch DL50244 - 3546										
Blank										
1,1-Biphenyl	ND	0.025	mg/kg wet							
1,2,4-Trichlorobenzene	ND	0.250	mg/kg wet							
1,2-Dichlorobenzene	ND	0.250	mg/kg wet							
1,3-Dichlorobenzene	ND	0.250	mg/kg wet							

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Client Name: Beta Engineering
Client Project ID: Bridge Reconstruction Over Taunton River ESS Laboratory Work Order: 25L0055

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Semi-Volatile Organic Compounds										
Batch DL50244 - 3546										
1,4-Dichlorobenzene	ND	0.250	mg/kg wet							
2,4,5-Trichlorophenol	ND	0.250	mg/kg wet							
2,4,6-Trichlorophenol	ND	0.250	mg/kg wet							
2,4-Dichlorophenol	ND	0.250	mg/kg wet							
2,4-Dimethylphenol	ND	0.250	mg/kg wet							
2,4-Dinitrophenol	ND	1.00	mg/kg wet							
2,4-Dinitrotoluene	ND	0.250	mg/kg wet							
2,6-Dinitrotoluene	ND	0.250	mg/kg wet							
2-Chloronaphthalene	ND	0.250	mg/kg wet							
2-Chlorophenol	ND	0.250	mg/kg wet							
2-Methylnaphthalene	ND	0.250	mg/kg wet							
2-Methylphenol	ND	0.250	mg/kg wet							
2-Nitrophenol	ND	0.500	mg/kg wet							
3,3´-Dichlorobenzidine	ND	0.250	mg/kg wet							
3+4-Methylphenol	ND	0.250	mg/kg wet							
4-Bromophenyl-phenylether	ND	0.250	mg/kg wet							
4-Chloroaniline	ND	0.250	mg/kg wet							
4-Nitrophenol	ND	1.00	mg/kg wet							
Acenaphthene	ND	0.250	mg/kg wet							
Acenaphthylene	ND	0.250	mg/kg wet							
Acetophenone	ND	0.250	mg/kg wet							
Aniline	ND	0.250	mg/kg wet							
Anthracene	ND	0.250	mg/kg wet							
Azobenzene	ND	0.250	mg/kg wet							
Benzo(a)anthracene	ND	0.250	mg/kg wet							
Benzo(a)pyrene	ND	0.250	mg/kg wet							
Benzo(b)fluoranthene	ND	0.250	mg/kg wet							
Benzo(g,h,i)perylene	ND	0.250	mg/kg wet							
Benzo(k)fluoranthene	ND	0.250	mg/kg wet							
bis(2-Chloroethoxy)methane	ND	0.250	mg/kg wet							
bis(2-Chloroethyl)ether	ND	0.250	mg/kg wet							
bis(2-chloroisopropyl)Ether	ND	0.250	mg/kg wet							
bis(2-Ethylhexyl)phthalate	ND	0.250	mg/kg wet							
Butylbenzylphthalate	ND	0.250	mg/kg wet							
Chrysene	ND	0.250	mg/kg wet							
Dibenzo(a,h)Anthracene	ND	0.250	mg/kg wet							
Dibenzofuran	ND	0.250	mg/kg wet							
Diethylphthalate	ND	0.250	mg/kg wet							
Dimethylphthalate	ND	0.250	mg/kg wet							
Di-n-butylphthalate	ND	0.250	mg/kg wet							
Di-n-octylphthalate	ND	0.500	mg/kg wet							
Fluoranthene	ND	0.250	mg/kg wet							
Fluorene	ND	0.250	mg/kg wet							
Hexachlorobenzene	ND	0.250	mg/kg wet							
Hexachlorobutadiene	ND	0.250	mg/kg wet							
Hexachloroethane	ND	0.250	mg/kg wet							

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Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Semi-Volatile Organic Compounds										
Batch DL50244 - 3546										
Indeno(1,2,3-cd)Pyrene	ND	0.250	mg/kg wet							
Isophorone	ND	0.250	mg/kg wet							
Naphthalene	ND	0.250	mg/kg wet							
Nitrobenzene	ND	0.250	mg/kg wet							
N-Nitrosodimethylamine	ND	0.250	mg/kg wet							
Pentachlorophenol	ND	1.00	mg/kg wet							
Phenanthrene	ND	0.250	mg/kg wet							
Phenol	ND	0.250	mg/kg wet							
Pyrene	ND	0.250	mg/kg wet							
Pyridine	ND	0.250	mg/kg wet							
Surrogate: 1,2-Dichlorobenzene-d4	*1.75*		mg/kg wet	*2.500*		*70*	*30-130*			
Surrogate: 2,4,6-Tribromophenol	*3.85*		mg/kg wet	*3.750*		*103*	*30-130*			
Surrogate: 2-Chlorophenol-d4	*2.33*		mg/kg wet	*3.750*		*62*	*30-130*			
Surrogate: 2-Fluorobiphenyl	*1.70*		mg/kg wet	*2.500*		*68*	*30-130*			
Surrogate: 2-Fluorophenol	*2.19*		mg/kg wet	*3.750*		*58*	*30-130*			
Surrogate: Nitrobenzene-d5	*1.48*		mg/kg wet	*2.500*		*59*	*30-130*			
Surrogate: Phenol-d6	*2.19*		mg/kg wet	*3.750*		*58*	*30-130*			
Surrogate: p-Terphenyl-d14	*1.68*		mg/kg wet	*2.500*		*67*	*30-130*			
LCS										
1,1-Biphenyl	1.88	0.025	mg/kg wet	2.500		75	40-140			
1,2,4-Trichlorobenzene	2.13	0.250	mg/kg wet	2.500		85	40-140			
1,2-Dichlorobenzene	1.96	0.250	mg/kg wet	2.500		78	40-140			
1,3-Dichlorobenzene	1.94	0.250	mg/kg wet	2.500		78	40-140			
1,4-Dichlorobenzene	1.98	0.250	mg/kg wet	2.500		79	40-140			
2,4,5-Trichlorophenol	2.37	0.250	mg/kg wet	2.500		95	30-130			
2,4,6-Trichlorophenol	2.32	0.250	mg/kg wet	2.500		93	30-130			
2,4-Dichlorophenol	2.10	0.250	mg/kg wet	2.500		84	30-130			
2,4-Dimethylphenol	1.58	0.250	mg/kg wet	2.500		63	30-130			
2,4-Dinitrophenol	2.10	1.00	mg/kg wet	2.500		84	15-140			
2,4-Dinitrotoluene	2.12	0.250	mg/kg wet	2.500		85	40-140			
2,6-Dinitrotoluene	2.15	0.250	mg/kg wet	2.500		86	40-140			
2-Chloronaphthalene	1.90	0.250	mg/kg wet	2.500		76	40-140			
2-Chlorophenol	1.88	0.250	mg/kg wet	2.500		75	30-130			
2-Methylnaphthalene	1.98	0.250	mg/kg wet	2.500		79	40-140			
2-Methylphenol	1.73	0.250	mg/kg wet	2.500		69	15-140			
2-Nitrophenol	1.99	0.500	mg/kg wet	2.500		80	30-130			
3,3´-Dichlorobenzidine	1.92	0.250	mg/kg wet	2.500		77	40-140			
3+4-Methylphenol	3.71	0.250	mg/kg wet	5.000		74	15-140			
4-Bromophenyl-phenylether	2.24	0.250	mg/kg wet	2.500		90	40-140			
4-Chloroaniline	1.33	0.250	mg/kg wet	2.500		53	15-140			
4-Nitrophenol	1.53	1.00	mg/kg wet	2.500		61	15-140			
Acenaphthene	1.86	0.250	mg/kg wet	2.500		75	40-140			
Acenaphthylene	1.76	0.250	mg/kg wet	2.500		70	40-140			
Acetophenone	1.76	0.250	mg/kg wet	2.500		70	40-140			
Aniline	1.23	0.250	mg/kg wet	2.500		49	40-140			

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Client Name: Beta Engineering
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Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Semi-Volatile Organic Compounds										
Batch DL50244 - 3546										
Anthracene	1.85	0.250	mg/kg wet	2.500		74	40-140			
Azobenzene	1.28	0.250	mg/kg wet	2.500		51	40-140			
Benzo(a)anthracene	1.89	0.250	mg/kg wet	2.500		76	40-140			
Benzo(a)pyrene	1.91	0.250	mg/kg wet	2.500		77	40-140			
Benzo(b)fluoranthene	1.70	0.250	mg/kg wet	2.500		68	40-140			
Benzo(g,h,i)perylene	1.92	0.250	mg/kg wet	2.500		77	40-140			
Benzo(k)fluoranthene	1.84	0.250	mg/kg wet	2.500		74	40-140			
bis(2-Chloroethoxy)methane	1.54	0.250	mg/kg wet	2.500		61	40-140			
bis(2-Chloroethyl)ether	1.53	0.250	mg/kg wet	2.500		61	40-140			
bis(2-chloroisopropyl)Ether	1.87	0.250	mg/kg wet	2.500		75	40-140			
bis(2-Ethylhexyl)phthalate	1.63	0.250	mg/kg wet	2.500		65	40-140			
Butylbenzylphthalate	1.62	0.250	mg/kg wet	2.500		65	40-140			
Chrysene	1.96	0.250	mg/kg wet	2.500		78	40-140			
Dibenzo(a,h)Anthracene	1.77	0.250	mg/kg wet	2.500		71	40-140			
Dibenzofuran	1.91	0.250	mg/kg wet	2.500		77	40-140			
Diethylphthalate	1.79	0.250	mg/kg wet	2.500		72	40-140			
Dimethylphthalate	1.83	0.250	mg/kg wet	2.500		73	15-140			
Di-n-butylphthalate	1.69	0.250	mg/kg wet	2.500		67	40-140			
Di-n-octylphthalate	1.50	0.500	mg/kg wet	2.500		60	40-140			
Fluoranthene	1.99	0.250	mg/kg wet	2.500		80	40-140			
Fluorene	1.87	0.250	mg/kg wet	2.500		75	40-140			
Hexachlorobenzene	2.22	0.250	mg/kg wet	2.500		89	40-140			
Hexachlorobutadiene	2.37	0.250	mg/kg wet	2.500		95	40-140			
Hexachloroethane	1.69	0.250	mg/kg wet	2.500		68	40-140			
Indeno(1,2,3-cd)Pyrene	1.92	0.250	mg/kg wet	2.500		77	40-140			
Isophorone	1.37	0.250	mg/kg wet	2.500		55	40-140			
Naphthalene	1.76	0.250	mg/kg wet	2.500		71	40-140			
Nitrobenzene	1.49	0.250	mg/kg wet	2.500		60	40-140			
N-Nitrosodimethylamine	1.25	0.250	mg/kg wet	2.500		50	40-140			
Pentachlorophenol	2.05	1.00	mg/kg wet	2.500		82	15-140			
Phenanthrene	1.81	0.250	mg/kg wet	2.500		72	40-140			
Phenol	1.66	0.250	mg/kg wet	2.500		66	15-140			
Pyrene	1.92	0.250	mg/kg wet	2.500		77	40-140			
Pyridine	1.33	0.250	mg/kg wet	2.500		53	40-140			
Surrogate: 1,2-Dichlorobenzene-d4	*2.03*		mg/kg wet	*2.500*		*81*	*30-130*			
Surrogate: 2,4,6-Tribromophenol	*3.86*		mg/kg wet	*3.750*		*103*	*30-130*			
Surrogate: 2-Chlorophenol-d4	*2.64*		mg/kg wet	*3.750*		*70*	*30-130*			
Surrogate: 2-Fluorobiphenyl	*1.94*		mg/kg wet	*2.500*		*78*	*30-130*			
Surrogate: 2-Fluorophenol	*2.46*		mg/kg wet	*3.750*		*66*	*30-130*			
Surrogate: Nitrobenzene-d5	*1.52*		mg/kg wet	*2.500*		*61*	*30-130*			
Surrogate: Phenol-d6	*2.45*		mg/kg wet	*3.750*		*65*	*30-130*			
Surrogate: p-Terphenyl-d14	*1.90*		mg/kg wet	*2.500*		*76*	*30-130*			
LCS Dup										
1,1-Biphenyl	1.71	0.025	mg/kg wet	2.500		68	40-140	9	30	
1,2,4-Trichlorobenzene	1.85	0.250	mg/kg wet	2.500		74	40-140	14	30	

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Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Semi-Volatile Organic Compounds										
Batch DL50244 - 3546										
1,2-Dichlorobenzene	1.59	0.250	mg/kg wet	2.500		64	40-140	20	30	
1,3-Dichlorobenzene	1.63	0.250	mg/kg wet	2.500		65	40-140	17	30	
1,4-Dichlorobenzene	1.67	0.250	mg/kg wet	2.500		67	40-140	17	30	
2,4,5-Trichlorophenol	2.15	0.250	mg/kg wet	2.500		86	30-130	9	30	
2,4,6-Trichlorophenol	2.09	0.250	mg/kg wet	2.500		84	30-130	10	30	
2,4-Dichlorophenol	1.86	0.250	mg/kg wet	2.500		75	30-130	12	30	
2,4-Dimethylphenol	1.47	0.250	mg/kg wet	2.500		59	30-130	8	30	
2,4-Dinitrophenol	1.68	1.00	mg/kg wet	2.500		67	15-140	22	30	
2,4-Dinitrotoluene	2.08	0.250	mg/kg wet	2.500		83	40-140	2	30	
2,6-Dinitrotoluene	2.00	0.250	mg/kg wet	2.500		80	40-140	7	30	
2-Chloronaphthalene	1.68	0.250	mg/kg wet	2.500		67	40-140	12	30	
2-Chlorophenol	1.64	0.250	mg/kg wet	2.500		65	30-130	14	30	
2-Methylnaphthalene	1.76	0.250	mg/kg wet	2.500		71	40-140	12	30	
2-Methylphenol	1.49	0.250	mg/kg wet	2.500		59	15-140	15	30	
2-Nitrophenol	1.85	0.500	mg/kg wet	2.500		74	30-130	7	30	
3,3´-Dichlorobenzidine	1.58	0.250	mg/kg wet	2.500		63	40-140	19	30	
3+4-Methylphenol	3.27	0.250	mg/kg wet	5.000		65	15-140	12	30	
4-Bromophenyl-phenylether	2.00	0.250	mg/kg wet	2.500		80	40-140	11	30	
4-Chloroaniline	1.21	0.250	mg/kg wet	2.500		48	15-140	9	30	
4-Nitrophenol	1.45	1.00	mg/kg wet	2.500		58	15-140	5	30	
Acenaphthene	1.75	0.250	mg/kg wet	2.500		70	40-140	6	30	
Acenaphthylene	1.65	0.250	mg/kg wet	2.500		66	40-140	6	30	
Acetophenone	1.51	0.250	mg/kg wet	2.500		61	40-140	15	30	
Aniline	0.945	0.250	mg/kg wet	2.500		38	40-140	26	30	B-
Anthracene	1.72	0.250	mg/kg wet	2.500		69	40-140	7	30	
Azobenzene	1.18	0.250	mg/kg wet	2.500		47	40-140	9	30	
Benzo(a)anthracene	1.73	0.250	mg/kg wet	2.500		69	40-140	9	30	
Benzo(a)pyrene	1.73	0.250	mg/kg wet	2.500		69	40-140	10	30	
Benzo(b)fluoranthene	1.53	0.250	mg/kg wet	2.500		61	40-140	11	30	
Benzo(g,h,i)perylene	1.73	0.250	mg/kg wet	2.500		69	40-140	10	30	
Benzo(k)fluoranthene	1.68	0.250	mg/kg wet	2.500		67	40-140	9	30	
bis(2-Chloroethoxy)methane	1.40	0.250	mg/kg wet	2.500		56	40-140	9	30	
bis(2-Chloroethyl)ether	1.26	0.250	mg/kg wet	2.500		50	40-140	19	30	
bis(2-chloroisopropyl)Ether	1.58	0.250	mg/kg wet	2.500		63	40-140	17	30	
bis(2-Ethylhexyl)phthalate	1.48	0.250	mg/kg wet	2.500		59	40-140	10	30	
Butylbenzylphthalate	1.58	0.250	mg/kg wet	2.500		63	40-140	3	30	
Chrysene	1.77	0.250	mg/kg wet	2.500		71	40-140	10	30	
Dibenzo(a,h)Anthracene	1.62	0.250	mg/kg wet	2.500		65	40-140	9	30	
Dibenzofuran	1.79	0.250	mg/kg wet	2.500		72	40-140	7	30	
Diethylphthalate	1.75	0.250	mg/kg wet	2.500		70	40-140	2	30	
Dimethylphthalate	1.71	0.250	mg/kg wet	2.500		68	15-140	7	30	
Di-n-butylphthalate	1.52	0.250	mg/kg wet	2.500		61	40-140	10	30	
Di-n-octylphthalate	1.33	0.500	mg/kg wet	2.500		53	40-140	12	30	
Fluoranthene	1.87	0.250	mg/kg wet	2.500		75	40-140	6	30	
Fluorene	1.75	0.250	mg/kg wet	2.500		70	40-140	7	30	
Hexachlorobenzene	2.02	0.250	mg/kg wet	2.500		81	40-140	10	30	

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Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Semi-Volatile Organic Compounds										
Batch DL50244 - 3546										
Hexachlorobutadiene	2.04	0.250	mg/kg wet	2.500		82	40-140	15	30	
Hexachloroethane	1.50	0.250	mg/kg wet	2.500		60	40-140	12	30	
Indeno(1,2,3-cd)Pyrene	1.75	0.250	mg/kg wet	2.500		70	40-140	9	30	
Isophorone	1.22	0.250	mg/kg wet	2.500		49	40-140	11	30	
Naphthalene	1.59	0.250	mg/kg wet	2.500		63	40-140	11	30	
Nitrobenzene	1.25	0.250	mg/kg wet	2.500		50	40-140	18	30	
N-Nitrosodimethylamine	1.09	0.250	mg/kg wet	2.500		43	40-140	14	30	
Pentachlorophenol	1.84	1.00	mg/kg wet	2.500		74	15-140	11	30	
Phenanthrene	1.63	0.250	mg/kg wet	2.500		65	40-140	10	30	
Phenol	1.45	0.250	mg/kg wet	2.500		58	15-140	13	30	
Pyrene	1.68	0.250	mg/kg wet	2.500		67	40-140	13	30	
Pyridine	1.09	0.250	mg/kg wet	2.500		44	40-140	20	30	
Surrogate: 1,2-Dichlorobenzene-d4	*1.65*		mg/kg wet	*2.500*		*66*	*30-130*			
Surrogate: 2,4,6-Tribromophenol	*3.40*		mg/kg wet	*3.750*		*91*	*30-130*			
Surrogate: 2-Chlorophenol-d4	*2.24*		mg/kg wet	*3.750*		*60*	*30-130*			
Surrogate: 2-Fluorobiphenyl	*1.79*		mg/kg wet	*2.500*		*72*	*30-130*			
Surrogate: 2-Fluorophenol	*2.02*		mg/kg wet	*3.750*		*54*	*30-130*			
Surrogate: Nitrobenzene-d5	*1.32*		mg/kg wet	*2.500*		*53*	*30-130*			
Surrogate: Phenol-d6	*2.01*		mg/kg wet	*3.750*		*54*	*30-130*			
Surrogate: p-Terphenyl-d14	*1.66*		mg/kg wet	*2.500*		*66*	*30-130*			
MADEP-EPH Extractable Petroleum Hydrocarbons										
Batch DL50324 - 3546										
Blank										
C19-C36 Aliphatics1	ND	10.0	mg/kg wet							
C9-C18 Aliphatics1	ND	10.0	mg/kg wet							
Surrogate: 1-Chlorooctadecane	*1.05*		mg/kg wet	*2.000*		*52*	*40-140*			
Blank										
C11-C22 Unadjusted Aromatics1	ND	10.0	mg/kg wet							
Surrogate: 2-Bromonaphthalene	*1.57*		mg/kg wet	*2.000*		*78*	*40-140*			
Surrogate: 2-Fluorobiphenyl	*1.56*		mg/kg wet	*2.000*		*78*	*40-140*			
Surrogate: O-Terphenyl	*1.35*		mg/kg wet	*2.000*		*68*	*40-140*			
Blank										
2-Methylnaphthalene	ND	0.008	mg/kg wet							
Acenaphthene	ND	0.008	mg/kg wet							
Acenaphthylene	ND	0.008	mg/kg wet							
Anthracene	ND	0.008	mg/kg wet							
Benzo(a)anthracene	ND	0.008	mg/kg wet							
Benzo(a)pyrene	ND	0.008	mg/kg wet							
Benzo(b)fluoranthene	ND	0.008	mg/kg wet							
Benzo(g,h,i)perylene	ND	0.008	mg/kg wet							
Benzo(k)fluoranthene	ND	0.008	mg/kg wet							
Chrysene	ND	0.008	mg/kg wet							

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Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
MADEP-EPH Extractable Petroleum Hydrocarbons										
Batch DL50324 - 3546										
Dibenzo(a,h)Anthracene	ND	0.008	mg/kg wet							
Fluoranthene	ND	0.008	mg/kg wet							
Fluorene	ND	0.008	mg/kg wet							
Indeno(1,2,3-cd)Pyrene	ND	0.008	mg/kg wet							
Naphthalene	ND	0.008	mg/kg wet							
Phenanthrene	ND	0.008	mg/kg wet							
Pyrene	ND	0.008	mg/kg wet							
LCS										
C19-C36 Aliphatics1	12.8	10.0	mg/kg wet	16.00		80	40-140			
C9-C18 Aliphatics1	6.4	10.0	mg/kg wet	12.00		53	40-140			
Surrogate: 1-Chlorooctadecane	*1.17*		mg/kg wet	*2.000*		*59*	*40-140*			
LCS										
C11-C22 Unadjusted Aromatics1	25.3	10.0	mg/kg wet	34.00		74	40-140			
Surrogate: 2-Bromonaphthalene	*1.81*		mg/kg wet	*2.000*		*90*	*40-140*			
Surrogate: 2-Fluorobiphenyl	*1.78*		mg/kg wet	*2.000*		*89*	*40-140*			
Surrogate: O-Terphenyl	*1.54*		mg/kg wet	*2.000*		*77*	*40-140*			
LCS										
2-Methylnaphthalene Breakthrough	0.0		%				0-5			
Naphthalene Breakthrough	0.0		%				0-5			
LCS										
2-Methylnaphthalene	1.21	0.040	mg/kg wet	2.000		60	40-140			
Acenaphthene	1.23	0.040	mg/kg wet	2.000		61	40-140			
Acenaphthylene	1.29	0.040	mg/kg wet	2.000		64	40-140			
Anthracene	1.43	0.040	mg/kg wet	2.000		71	40-140			
Benzo(a)anthracene	1.35	0.040	mg/kg wet	2.000		68	40-140			
Benzo(a)pyrene	1.52	0.040	mg/kg wet	2.000		76	40-140			
Benzo(b)fluoranthene	1.38	0.040	mg/kg wet	2.000		69	40-140			
Benzo(g,h,i)perylene	1.43	0.040	mg/kg wet	2.000		72	40-140			
Benzo(k)fluoranthene	1.48	0.040	mg/kg wet	2.000		74	40-140			
Chrysene	1.41	0.040	mg/kg wet	2.000		71	40-140			
Dibenzo(a,h)Anthracene	1.48	0.040	mg/kg wet	2.000		74	40-140			
Fluoranthene	1.54	0.040	mg/kg wet	2.000		77	40-140			
Fluorene	1.32	0.040	mg/kg wet	2.000		66	40-140			
Indeno(1,2,3-cd)Pyrene	1.49	0.040	mg/kg wet	2.000		75	40-140			
Naphthalene	1.04	0.040	mg/kg wet	2.000		52	40-140			
Phenanthrene	1.31	0.040	mg/kg wet	2.000		66	40-140			
Pyrene	1.51	0.040	mg/kg wet	2.000		76	40-140			
LCS Dup										
C19-C36 Aliphatics1	12.2	10.0	mg/kg wet	16.00		76	40-140	5	25	
C9-C18 Aliphatics1	6.2	10.0	mg/kg wet	12.00		52	40-140	3	25	
Surrogate: 1-Chlorooctadecane	*1.08*		mg/kg wet	*2.000*		*54*	*40-140*			
LCS Dup										

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MADEP-EPH Extractable Petroleum Hydrocarbons										
Batch DL50324 - 3546										
C11-C22 Unadjusted Aromatics1	25.0	10.0	mg/kg wet	34.00		74	40-140	1	25	
Surrogate: 2-Bromonaphthalene	*1.64*		mg/kg wet	*2.000*		*82*	*40-140*			
Surrogate: 2-Fluorobiphenyl	*1.61*		mg/kg wet	*2.000*		*80*	*40-140*			
Surrogate: O-Terphenyl	*1.42*		mg/kg wet	*2.000*		*71*	*40-140*			
LCS Dup										
2-Methylnaphthalene Breakthrough	0.0		%				0-5		200	
Naphthalene Breakthrough	0.0		%				0-5		200	
LCS Dup										
2-Methylnaphthalene	1.23	0.040	mg/kg wet	2.000		62	40-140	2	30	
Acenaphthene	1.25	0.040	mg/kg wet	2.000		62	40-140	2	30	
Acenaphthylene	1.32	0.040	mg/kg wet	2.000		66	40-140	2	30	
Anthracene	1.44	0.040	mg/kg wet	2.000		72	40-140	1	30	
Benzo(a)anthracene	1.35	0.040	mg/kg wet	2.000		67	40-140	0.2	30	
Benzo(a)pyrene	1.52	0.040	mg/kg wet	2.000		76	40-140	0.2	30	
Benzo(b)fluoranthene	1.38	0.040	mg/kg wet	2.000		69	40-140	0.1	30	
Benzo(g,h,i)perylene	1.45	0.040	mg/kg wet	2.000		73	40-140	2	30	
Benzo(k)fluoranthene	1.48	0.040	mg/kg wet	2.000		74	40-140	0.4	30	
Chrysene	1.43	0.040	mg/kg wet	2.000		72	40-140	1	30	
Dibenzo(a,h)Anthracene	1.49	0.040	mg/kg wet	2.000		75	40-140	1	30	
Fluoranthene	1.55	0.040	mg/kg wet	2.000		78	40-140	1	30	
Fluorene	1.33	0.040	mg/kg wet	2.000		66	40-140	0.4	30	
Indeno(1,2,3-cd)Pyrene	1.51	0.040	mg/kg wet	2.000		75	40-140	0.9	30	
Naphthalene	1.07	0.040	mg/kg wet	2.000		53	40-140	3	30	
Phenanthrene	1.33	0.040	mg/kg wet	2.000		66	40-140	1	30	
Pyrene	1.53	0.040	mg/kg wet	2.000		76	40-140	0.9	30	
Batch DL51501 - 3546										
Blank										
C19-C36 Aliphatics1	ND	10.0	mg/kg wet							
C9-C18 Aliphatics1	ND	10.0	mg/kg wet							
Surrogate: 1-Chlorooctadecane	*0.869*		mg/kg wet	*2.000*		*43*	*40-140*			
Blank										
C11-C22 Unadjusted Aromatics1	ND	10.0	mg/kg wet							
Surrogate: 2-Bromonaphthalene	*1.74*		mg/kg wet	*2.000*		*87*	*40-140*			
Surrogate: 2-Fluorobiphenyl	*1.59*		mg/kg wet	*2.000*		*80*	*40-140*			
Surrogate: O-Terphenyl	*1.24*		mg/kg wet	*2.000*		*62*	*40-140*			
Blank										
2-Methylnaphthalene	ND	0.008	mg/kg wet							
Acenaphthene	ND	0.008	mg/kg wet							
Acenaphthylene	ND	0.008	mg/kg wet							
Anthracene	ND	0.008	mg/kg wet							
Benzo(a)anthracene	ND	0.008	mg/kg wet							
Benzo(a)pyrene	ND	0.008	mg/kg wet							

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Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
MADEP-EPH Extractable Petroleum Hydrocarbons										
Batch DL51501 - 3546										
Benzo(b)fluoranthene	ND	0.008	mg/kg wet							
Benzo(g,h,i)perylene	ND	0.008	mg/kg wet							
Benzo(k)fluoranthene	ND	0.008	mg/kg wet							
Chrysene	ND	0.008	mg/kg wet							
Dibenzo(a,h)Anthracene	ND	0.008	mg/kg wet							
Fluoranthene	ND	0.008	mg/kg wet							
Fluorene	ND	0.008	mg/kg wet							
Indeno(1,2,3-cd)Pyrene	ND	0.008	mg/kg wet							
Naphthalene	0.011	0.008	mg/kg wet							
Phenanthrene	ND	0.008	mg/kg wet							
Pyrene	ND	0.008	mg/kg wet							
LCS										
C19-C36 Aliphatics1	12.3	10.0	mg/kg wet	16.00		77	40-140			
C9-C18 Aliphatics1	7.1	10.0	mg/kg wet	12.00		59	40-140			
Surrogate: 1-Chlorooctadecane	*1.13*		mg/kg wet	*2.000*		*57*	*40-140*			
LCS										
C11-C22 Unadjusted Aromatics1	25.6	10.0	mg/kg wet	34.00		75	40-140			
Surrogate: 2-Bromonaphthalene	*1.64*		mg/kg wet	*2.000*		*82*	*40-140*			
Surrogate: 2-Fluorobiphenyl	*1.45*		mg/kg wet	*2.000*		*73*	*40-140*			
Surrogate: O-Terphenyl	*1.55*		mg/kg wet	*2.000*		*77*	*40-140*			
LCS										
2-Methylnaphthalene Breakthrough	0.0		%				0-5			
Naphthalene Breakthrough	0.0		%				0-5			
LCS										
2-Methylnaphthalene	1.46	0.040	mg/kg wet	2.000		73	40-140			
Acenaphthene	1.47	0.040	mg/kg wet	2.000		74	40-140			
Acenaphthylene	1.61	0.040	mg/kg wet	2.000		81	40-140			
Anthracene	1.70	0.040	mg/kg wet	2.000		85	40-140			
Benzo(a)anthracene	1.57	0.040	mg/kg wet	2.000		78	40-140			
Benzo(a)pyrene	1.78	0.040	mg/kg wet	2.000		89	40-140			
Benzo(b)fluoranthene	1.62	0.040	mg/kg wet	2.000		81	40-140			
Benzo(g,h,i)perylene	1.66	0.040	mg/kg wet	2.000		83	40-140			
Benzo(k)fluoranthene	1.82	0.040	mg/kg wet	2.000		91	40-140			
Chrysene	1.68	0.040	mg/kg wet	2.000		84	40-140			
Dibenzo(a,h)Anthracene	1.67	0.040	mg/kg wet	2.000		84	40-140			
Fluoranthene	1.78	0.040	mg/kg wet	2.000		89	40-140			
Fluorene	1.56	0.040	mg/kg wet	2.000		78	40-140			
Indeno(1,2,3-cd)Pyrene	1.71	0.040	mg/kg wet	2.000		86	40-140			
Naphthalene	1.33	0.040	mg/kg wet	2.000		66	40-140			
Phenanthrene	1.49	0.040	mg/kg wet	2.000		74	40-140			
Pyrene	1.78	0.040	mg/kg wet	2.000		89	40-140			
LCS Dup										
C19-C36 Aliphatics1	10.8	10.0	mg/kg wet	16.00		67	40-140	14	25	

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MADEP-EPH Extractable Petroleum Hydrocarbons										
Batch DL51501 - 3546										
C9-C18 Aliphatics1	6.5	10.0	mg/kg wet	12.00		54	40-140	9	25	
Surrogate: 1-Chlorooctadecane	*0.909*		mg/kg wet	*2.000*		*45*	*40-140*			
LCS Dup										
C11-C22 Unadjusted Aromatics1	18.9	10.0	mg/kg wet	34.00		55	40-140	30	25	D+
Surrogate: 2-Bromonaphthalene	*1.83*		mg/kg wet	*2.000*		*92*	*40-140*			
Surrogate: 2-Fluorobiphenyl	*1.68*		mg/kg wet	*2.000*		*84*	*40-140*			
Surrogate: O-Terphenyl	*1.16*		mg/kg wet	*2.000*		*58*	*40-140*			
LCS Dup										
2-Methylnaphthalene Breakthrough	0.0		%				0-5		200	
Naphthalene Breakthrough	0.0		%				0-5		200	
LCS Dup										
2-Methylnaphthalene	1.06	0.040	mg/kg wet	2.000		53	40-140	32	30	D+
Acenaphthene	1.07	0.040	mg/kg wet	2.000		54	40-140	32	30	
Acenaphthylene	1.17	0.040	mg/kg wet	2.000		58	40-140	32	30	
Anthracene	1.23	0.040	mg/kg wet	2.000		61	40-140	32	30	
Benzo(a)anthracene	1.10	0.040	mg/kg wet	2.000		55	40-140	35	30	
Benzo(a)pyrene	1.25	0.040	mg/kg wet	2.000		63	40-140	35	30	
Benzo(b)fluoranthene	1.12	0.040	mg/kg wet	2.000		56	40-140	36	30	
Benzo(g,h,i)perylene	1.16	0.040	mg/kg wet	2.000		58	40-140	35	30	
Benzo(k)fluoranthene	1.35	0.040	mg/kg wet	2.000		67	40-140	30	30	
Chrysene	1.23	0.040	mg/kg wet	2.000		61	40-140	31	30	
Dibenzo(a,h)Anthracene	1.15	0.040	mg/kg wet	2.000		58	40-140	37	30	
Fluoranthene	1.27	0.040	mg/kg wet	2.000		64	40-140	33	30	
Fluorene	1.12	0.040	mg/kg wet	2.000		56	40-140	32	30	
Indeno(1,2,3-cd)Pyrene	1.19	0.040	mg/kg wet	2.000		59	40-140	36	30	
Naphthalene	0.974	0.040	mg/kg wet	2.000		49	40-140	31	30	
Phenanthrene	1.07	0.040	mg/kg wet	2.000		53	40-140	33	30	
Pyrene	1.29	0.040	mg/kg wet	2.000		65	40-140	32	30	
8081B Organochlorine Pesticides										
Batch DL50310 - 3546										
Blank										
4,4´-DDD	ND	0.0025	mg/kg wet							
4,4´-DDD [2C]	ND	0.0025	mg/kg wet							
4,4´-DDE	ND	0.0025	mg/kg wet							
4,4´-DDE [2C]	ND	0.0025	mg/kg wet							
4,4´-DDT	ND	0.0025	mg/kg wet							
4,4´-DDT [2C]	ND	0.0025	mg/kg wet							
Aldrin	ND	0.0012	mg/kg wet							
Aldrin [2C]	ND	0.0012	mg/kg wet							
alpha-BHC	ND	0.0025	mg/kg wet							
alpha-BHC [2C]	ND	0.0025	mg/kg wet							
alpha-Chlordane	ND	0.0025	mg/kg wet							

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Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
8081B Organochlorine Pesticides										
Batch DL50310 - 3546										
alpha-Chlordane [2C]	ND	0.0025	mg/kg wet							
beta-BHC	ND	0.0025	mg/kg wet							
beta-BHC [2C]	ND	0.0025	mg/kg wet							
Chlordane (Total)	ND	0.0200	mg/kg wet							
Chlordane (Total) [2C]	ND	0.0200	mg/kg wet							
delta-BHC	ND	0.0025	mg/kg wet							
delta-BHC [2C]	ND	0.0025	mg/kg wet							
Dieldrin	ND	0.0012	mg/kg wet							
Dieldrin [2C]	ND	0.0012	mg/kg wet							
Endosulfan I	ND	0.0025	mg/kg wet							
Endosulfan I [2C]	ND	0.0025	mg/kg wet							
Endosulfan II	ND	0.0025	mg/kg wet							
Endosulfan II [2C]	ND	0.0025	mg/kg wet							
Endosulfan Sulfate	ND	0.0025	mg/kg wet							
Endosulfan Sulfate [2C]	ND	0.0025	mg/kg wet							
Endrin	ND	0.0025	mg/kg wet							
Endrin [2C]	ND	0.0025	mg/kg wet							
Endrin Ketone	ND	0.0025	mg/kg wet							
Endrin Ketone [2C]	ND	0.0025	mg/kg wet							
gamma-BHC (Lindane)	ND	0.0015	mg/kg wet							
gamma-BHC (Lindane) [2C]	ND	0.0015	mg/kg wet							
gamma-Chlordane	ND	0.0025	mg/kg wet							
gamma-Chlordane [2C]	ND	0.0025	mg/kg wet							
Heptachlor	ND	0.0025	mg/kg wet							
Heptachlor [2C]	ND	0.0025	mg/kg wet							
Heptachlor Epoxide	ND	0.0025	mg/kg wet							
Heptachlor Epoxide [2C]	ND	0.0025	mg/kg wet							
Hexachlorobenzene	ND	0.0025	mg/kg wet							
Hexachlorobenzene [2C]	ND	0.0025	mg/kg wet							
Methoxychlor	ND	0.0025	mg/kg wet							
Methoxychlor [2C]	ND	0.0025	mg/kg wet							
Toxaphene	ND	0.125	mg/kg wet							
Toxaphene [2C]	ND	0.125	mg/kg wet							
Surrogate: Decachlorobiphenyl	*0.00910*		mg/kg wet	*0.01250*		*73*	*30-150*			
Surrogate: Decachlorobiphenyl [2C]	*0.00978*		mg/kg wet	*0.01250*		*78*	*30-150*			
Surrogate: Tetrachloro-m-xylene	*0.00897*		mg/kg wet	*0.01250*		*72*	*30-150*			
Surrogate: Tetrachloro-m-xylene [2C]	*0.00932*		mg/kg wet	*0.01250*		*75*	*30-150*			
LCS										
4,4´-DDD	0.0092	0.0025	mg/kg wet	0.01250		74	40-140			
4,4´-DDD [2C]	0.0099	0.0025	mg/kg wet	0.01250		79	40-140			
4,4´-DDE	0.0090	0.0025	mg/kg wet	0.01250		72	40-140			
4,4´-DDE [2C]	0.0097	0.0025	mg/kg wet	0.01250		77	40-140			
4,4´-DDT	0.0099	0.0025	mg/kg wet	0.01250		79	40-140			
4,4´-DDT [2C]	0.0106	0.0025	mg/kg wet	0.01250		85	40-140			
Aldrin	0.0086	0.0012	mg/kg wet	0.01250		69	40-140			

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Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
8081B Organochlorine Pesticides										
Batch DL50310 - 3546										
Aldrin [2C]	0.0088	0.0012	mg/kg wet	0.01250		71	40-140			
alpha-BHC	0.0081	0.0025	mg/kg wet	0.01250		65	40-140			
alpha-BHC [2C]	0.0089	0.0025	mg/kg wet	0.01250		71	40-140			
alpha-Chlordane	0.0080	0.0025	mg/kg wet	0.01250		64	40-140			
alpha-Chlordane [2C]	0.0093	0.0025	mg/kg wet	0.01250		74	40-140			
beta-BHC	0.0077	0.0025	mg/kg wet	0.01250		62	40-140			
beta-BHC [2C]	0.0075	0.0025	mg/kg wet	0.01250		60	40-140			
delta-BHC	0.0100	0.0025	mg/kg wet	0.01250		80	40-140			
delta-BHC [2C]	0.0091	0.0025	mg/kg wet	0.01250		72	40-140			
Dieldrin	0.0092	0.0012	mg/kg wet	0.01250		73	40-140			
Dieldrin [2C]	0.0097	0.0012	mg/kg wet	0.01250		78	40-140			
Endosulfan I	0.0081	0.0025	mg/kg wet	0.01250		65	40-140			
Endosulfan I [2C]	0.0085	0.0025	mg/kg wet	0.01250		68	40-140			
Endosulfan II	0.0093	0.0025	mg/kg wet	0.01250		75	40-140			
Endosulfan II [2C]	0.0098	0.0025	mg/kg wet	0.01250		79	40-140			
Endosulfan Sulfate	0.0093	0.0025	mg/kg wet	0.01250		74	40-140			
Endosulfan Sulfate [2C]	0.0100	0.0025	mg/kg wet	0.01250		80	40-140			
Endrin	0.0095	0.0025	mg/kg wet	0.01250		76	40-140			
Endrin [2C]	0.0105	0.0025	mg/kg wet	0.01250		84	40-140			
Endrin Ketone	0.0089	0.0025	mg/kg wet	0.01250		71	40-140			
Endrin Ketone [2C]	0.0096	0.0025	mg/kg wet	0.01250		77	40-140			
gamma-BHC (Lindane)	0.0084	0.0015	mg/kg wet	0.01250		67	40-140			
gamma-BHC (Lindane) [2C]	0.0090	0.0015	mg/kg wet	0.01250		72	40-140			
gamma-Chlordane	0.0086	0.0025	mg/kg wet	0.01250		69	40-140			
gamma-Chlordane [2C]	0.0090	0.0025	mg/kg wet	0.01250		72	40-140			
Heptachlor	0.0085	0.0025	mg/kg wet	0.01250		68	40-140			
Heptachlor [2C]	0.0094	0.0025	mg/kg wet	0.01250		75	40-140			
Heptachlor Epoxide	0.0090	0.0025	mg/kg wet	0.01250		72	40-140			
Heptachlor Epoxide [2C]	0.0095	0.0025	mg/kg wet	0.01250		76	40-140			
Hexachlorobenzene	0.0077	0.0025	mg/kg wet	0.01250		61	40-140			
Hexachlorobenzene [2C]	0.0082	0.0025	mg/kg wet	0.01250		65	40-140			
Methoxychlor	0.0102	0.0025	mg/kg wet	0.01250		82	40-140			
Methoxychlor [2C]	0.0109	0.0025	mg/kg wet	0.01250		87	40-140			
Surrogate: Decachlorobiphenyl	*0.00904*		mg/kg wet	*0.01250*		*72*	*30-150*			
Surrogate: Decachlorobiphenyl [2C]	*0.00973*		mg/kg wet	*0.01250*		*78*	*30-150*			
Surrogate: Tetrachloro-m-xylene	*0.00763*		mg/kg wet	*0.01250*		*61*	*30-150*			
Surrogate: Tetrachloro-m-xylene [2C]	*0.00815*		mg/kg wet	*0.01250*		*65*	*30-150*			
LCS Dup										
4,4´-DDD	0.0096	0.0025	mg/kg wet	0.01250		77	40-140	4	30	
4,4´-DDD [2C]	0.0101	0.0025	mg/kg wet	0.01250		81	40-140	2	30	
4,4´-DDE	0.0093	0.0025	mg/kg wet	0.01250		75	40-140	3	30	
4,4´-DDE [2C]	0.0092	0.0025	mg/kg wet	0.01250		74	40-140	5	30	
4,4´-DDT	0.0100	0.0025	mg/kg wet	0.01250		80	40-140	0.7	30	
4,4´-DDT [2C]	0.0108	0.0025	mg/kg wet	0.01250		86	40-140	2	30	
Aldrin	0.0086	0.0012	mg/kg wet	0.01250		69	40-140	0.3	30	

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Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
8081B Organochlorine Pesticides										
Batch DL50310 - 3546										
Aldrin [2C]	0.0089	0.0012	mg/kg wet	0.01250		71	40-140	0.9	30	
alpha-BHC	0.0083	0.0025	mg/kg wet	0.01250		66	40-140	2	30	
alpha-BHC [2C]	0.0090	0.0025	mg/kg wet	0.01250		72	40-140	1	30	
alpha-Chlordane	0.0081	0.0025	mg/kg wet	0.01250		65	40-140	2	30	
alpha-Chlordane [2C]	0.0093	0.0025	mg/kg wet	0.01250		75	40-140	0.8	30	
beta-BHC	0.0082	0.0025	mg/kg wet	0.01250		65	40-140	6	30	
beta-BHC [2C]	0.0077	0.0025	mg/kg wet	0.01250		62	40-140	4	30	
delta-BHC	0.0105	0.0025	mg/kg wet	0.01250		84	40-140	5	30	
delta-BHC [2C]	0.0094	0.0025	mg/kg wet	0.01250		76	40-140	4	30	
Dieldrin	0.0093	0.0012	mg/kg wet	0.01250		74	40-140	1	30	
Dieldrin [2C]	0.0087	0.0012	mg/kg wet	0.01250		70	40-140	11	30	
Endosulfan I	0.0084	0.0025	mg/kg wet	0.01250		67	40-140	3	30	
Endosulfan I [2C]	0.0085	0.0025	mg/kg wet	0.01250		68	40-140	0.4	30	
Endosulfan II	0.0095	0.0025	mg/kg wet	0.01250		76	40-140	2	30	
Endosulfan II [2C]	0.0101	0.0025	mg/kg wet	0.01250		80	40-140	2	30	
Endosulfan Sulfate	0.0092	0.0025	mg/kg wet	0.01250		74	40-140	0.7	30	
Endosulfan Sulfate [2C]	0.0101	0.0025	mg/kg wet	0.01250		81	40-140	2	30	
Endrin	0.0095	0.0025	mg/kg wet	0.01250		76	40-140	0.06	30	
Endrin [2C]	0.0105	0.0025	mg/kg wet	0.01250		84	40-140	0.5	30	
Endrin Ketone	0.0091	0.0025	mg/kg wet	0.01250		73	40-140	2	30	
Endrin Ketone [2C]	0.0099	0.0025	mg/kg wet	0.01250		79	40-140	3	30	
gamma-BHC (Lindane)	0.0085	0.0015	mg/kg wet	0.01250		68	40-140	0.9	30	
gamma-BHC (Lindane) [2C]	0.0092	0.0015	mg/kg wet	0.01250		74	40-140	3	30	
gamma-Chlordane	0.0088	0.0025	mg/kg wet	0.01250		70	40-140	2	30	
gamma-Chlordane [2C]	0.0090	0.0025	mg/kg wet	0.01250		72	40-140	0.2	30	
Heptachlor	0.0089	0.0025	mg/kg wet	0.01250		71	40-140	4	30	
Heptachlor [2C]	0.0094	0.0025	mg/kg wet	0.01250		75	40-140	0.01	30	
Heptachlor Epoxide	0.0090	0.0025	mg/kg wet	0.01250		72	40-140	0.6	30	
Heptachlor Epoxide [2C]	0.0096	0.0025	mg/kg wet	0.01250		77	40-140	1	30	
Hexachlorobenzene	0.0080	0.0025	mg/kg wet	0.01250		64	40-140	4	30	
Hexachlorobenzene [2C]	0.0087	0.0025	mg/kg wet	0.01250		70	40-140	6	30	
Methoxychlor	0.0105	0.0025	mg/kg wet	0.01250		84	40-140	3	30	
Methoxychlor [2C]	0.0114	0.0025	mg/kg wet	0.01250		91	40-140	5	30	
Surrogate: Decachlorobiphenyl	*0.00947*		mg/kg wet	*0.01250*		*76*	*30-150*			
Surrogate: Decachlorobiphenyl [2C]	*0.0102*		mg/kg wet	*0.01250*		*82*	*30-150*			
Surrogate: Tetrachloro-m-xylene	*0.00825*		mg/kg wet	*0.01250*		*66*	*30-150*			
Surrogate: Tetrachloro-m-xylene [2C]	*0.00838*		mg/kg wet	*0.01250*		*67*	*30-150*			
8100M Total Petroleum Hydrocarbons										
Batch DL50204 - 3546										
Blank										
Decane (C10)	ND	0.2	mg/kg wet							
Docosane (C22)	ND	0.2	mg/kg wet							
Dodecane (C12)	ND	0.2	mg/kg wet							

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Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
8100M Total Petroleum Hydrocarbons										
Batch DL50204 - 3546										
Eicosane (C20)	ND	0.2	mg/kg wet							
Hexacosane (C26)	ND	0.2	mg/kg wet							
Hexadecane (C16)	ND	0.2	mg/kg wet							
Hexatriacontane (C36)	ND	0.2	mg/kg wet							
Nonadecane (C19)	ND	0.2	mg/kg wet							
Nonane (C9)	ND	0.2	mg/kg wet							
Octacosane (C28)	ND	0.2	mg/kg wet							
Octadecane (C18)	ND	0.2	mg/kg wet							
Tetracosane (C24)	ND	0.2	mg/kg wet							
Tetradecane (C14)	ND	0.2	mg/kg wet							
Total Petroleum Hydrocarbons (C9-C36)	ND	10.0	mg/kg wet							
Triacontane (C30)	ND	0.2	mg/kg wet							
Surrogate: O-Terphenyl	*3.69*		mg/kg wet	*5.000*		*74*	*40-140*			
LCS										
Decane (C10)	1.3	0.2	mg/kg wet	2.500		52	40-140			
Docosane (C22)	1.5	0.2	mg/kg wet	2.500		59	40-140			
Dodecane (C12)	1.4	0.2	mg/kg wet	2.500		54	40-140			
Eicosane (C20)	1.4	0.2	mg/kg wet	2.500		58	40-140			
Hexacosane (C26)	1.4	0.2	mg/kg wet	2.500		57	40-140			
Hexadecane (C16)	1.5	0.2	mg/kg wet	2.500		58	40-140			
Hexatriacontane (C36)	1.5	0.2	mg/kg wet	2.500		58	40-140			
Nonadecane (C19)	1.4	0.2	mg/kg wet	2.500		58	40-140			
Nonane (C9)	1.2	0.2	mg/kg wet	2.500		46	30-140			
Octacosane (C28)	1.4	0.2	mg/kg wet	2.500		58	40-140			
Octadecane (C18)	1.4	0.2	mg/kg wet	2.500		57	40-140			
Tetracosane (C24)	1.4	0.2	mg/kg wet	2.500		58	40-140			
Tetradecane (C14)	1.4	0.2	mg/kg wet	2.500		56	40-140			
Total Petroleum Hydrocarbons (C9-C36)	19.7	10.0	mg/kg wet	35.00		56	40-140			
Triacontane (C30)	1.4	0.2	mg/kg wet	2.500		58	40-140			
Surrogate: O-Terphenyl	*3.08*		mg/kg wet	*5.000*		*62*	*40-140*			
LCS Dup										
Decane (C10)	1.5	0.2	mg/kg wet	2.500		58	40-140	11	25	
Docosane (C22)	1.7	0.2	mg/kg wet	2.500		66	40-140	12	25	
Dodecane (C12)	1.5	0.2	mg/kg wet	2.500		61	40-140	12	25	
Eicosane (C20)	1.6	0.2	mg/kg wet	2.500		65	40-140	12	25	
Hexacosane (C26)	1.6	0.2	mg/kg wet	2.500		65	40-140	12	25	
Hexadecane (C16)	1.6	0.2	mg/kg wet	2.500		65	40-140	12	25	
Hexatriacontane (C36)	1.7	0.2	mg/kg wet	2.500		66	40-140	13	25	
Nonadecane (C19)	1.6	0.2	mg/kg wet	2.500		65	40-140	12	25	
Nonane (C9)	1.3	0.2	mg/kg wet	2.500		51	30-140	10	25	
Octacosane (C28)	1.6	0.2	mg/kg wet	2.500		66	40-140	13	25	
Octadecane (C18)	1.6	0.2	mg/kg wet	2.500		64	40-140	12	25	
Tetracosane (C24)	1.6	0.2	mg/kg wet	2.500		65	40-140	12	25	
Tetradecane (C14)	1.6	0.2	mg/kg wet	2.500		64	40-140	12	25	

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Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
8100M Total Petroleum Hydrocarbons										
Batch DL50204 - 3546										
Total Petroleum Hydrocarbons (C9-C36)	22.4	10.0	mg/kg wet	35.00		64	40-140	13	25	
Triacontane (C30)	1.6	0.2	mg/kg wet	2.500		65	40-140	13	25	
Surrogate: O-Terphenyl	*3.40*		mg/kg wet	*5.000*		*68*	*40-140*			
Classical Chemistry										
Batch DL50142 - General Preparation										
Blank										
Conductivity	ND	5	umhos/cm							
LCS										
Conductivity	1350		umhos/cm	1411		96	90-110			
Batch DL50222 - General Preparation										
Blank										
Reactive Cyanide	ND	2.0	mg/kg							
Reactive Sulfide	ND	2.0	mg/kg							
LCS										
Reactive Cyanide	4.1	2.0	mg/kg	100.3		4	0.68-5.41			
Reactive Sulfide	2.2	2.0	mg/kg	10.00		22	0-44			
Batch DL50333 - General Preparation										
Reference										
Flashpoint	81		°F	81.00		100	97.9-102.1			
Batch DL50424 - General Preparation										
Blank										
Total Volatile Solids	ND	1	%							
Batch DL50941 - General Preparation										
Blank										
Total Organic Carbon (1)	ND	500	mg/kg							
Total Organic Carbon (2)	ND	500	mg/kg							
LCS										
Total Organic Carbon (1)	10300	500	mg/kg	10010		103	80-120			
Total Organic Carbon (2)	10200	500	mg/kg	10010		101	80-120			
LCS Dup										
Total Organic Carbon (1)	11100	500	mg/kg	10010		111	80-120	8	25	
Total Organic Carbon (2)	10300	500	mg/kg	10010		103	80-120	2	25	
8082 Polychlorinated Biphenyls (PCB) / Congeners										
Batch DL50503 - 3540C										
Blank										
BZ#101	ND	0.00027	mg/kg wet							
BZ#101 [2C]	ND	0.00027	mg/kg wet							
BZ#105	ND	0.00027	mg/kg wet							
BZ#105 [2C]	ND	0.00027	mg/kg wet							

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Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
8082 Polychlorinated Biphenyls (PCB) / Congeners										
Batch DL50503 - 3540C										
BZ#118	ND	0.00027	mg/kg wet							
BZ#118 [2C]	ND	0.00027	mg/kg wet							
BZ#128	ND	0.00027	mg/kg wet							
BZ#128 [2C]	ND	0.00027	mg/kg wet							
BZ#138	ND	0.00027	mg/kg wet							
BZ#138 [2C]	ND	0.00027	mg/kg wet							
BZ#153	ND	0.00027	mg/kg wet							
BZ#153 [2C]	ND	0.00027	mg/kg wet							
BZ#170	ND	0.00027	mg/kg wet							
BZ#170 [2C]	ND	0.00027	mg/kg wet							
BZ#18	ND	0.00027	mg/kg wet							
BZ#18 [2C]	ND	0.00027	mg/kg wet							
BZ#180	ND	0.00027	mg/kg wet							
BZ#180 [2C]	ND	0.00027	mg/kg wet							
BZ#187	ND	0.00027	mg/kg wet							
BZ#187 [2C]	ND	0.00027	mg/kg wet							
BZ#195	ND	0.00027	mg/kg wet							
BZ#195 [2C]	ND	0.00027	mg/kg wet							
BZ#206	ND	0.00027	mg/kg wet							
BZ#206 [2C]	ND	0.00027	mg/kg wet							
BZ#209	ND	0.00027	mg/kg wet							
BZ#209 [2C]	ND	0.00027	mg/kg wet							
BZ#28	ND	0.00027	mg/kg wet							
BZ#28 [2C]	ND	0.00027	mg/kg wet							
BZ#44	ND	0.00027	mg/kg wet							
BZ#44 [2C]	ND	0.00027	mg/kg wet							
BZ#52	ND	0.00027	mg/kg wet							
BZ#52 [2C]	ND	0.00027	mg/kg wet							
BZ#66	ND	0.00027	mg/kg wet							
BZ#66 [2C]	ND	0.00027	mg/kg wet							
BZ#8	ND	0.00027	mg/kg wet							
BZ#8 [2C]	ND	0.00027	mg/kg wet							
Surrogate: Tetrachloro-m-xylene	*0.00245*		mg/kg wet	*0.003333*		*74*	*30-150*			
Surrogate: Tetrachloro-m-xylene [2C]	*0.00267*		mg/kg wet	*0.003333*		*80*	*30-150*			
LCS										
BZ#101	0.00269	0.00027	mg/kg wet	0.003333		81	40-140			
BZ#101 [2C]	0.00258	0.00027	mg/kg wet	0.003333		77	40-140			
BZ#105	0.00282	0.00027	mg/kg wet	0.003333		85	40-140			
BZ#105 [2C]	0.00301	0.00027	mg/kg wet	0.003333		90	40-140			
BZ#118	0.00267	0.00027	mg/kg wet	0.003333		80	40-140			
BZ#118 [2C]	0.00275	0.00027	mg/kg wet	0.003333		82	40-140			
BZ#128	0.00241	0.00027	mg/kg wet	0.003333		72	40-140			
BZ#128 [2C]	0.00263	0.00027	mg/kg wet	0.003333		79	40-140			
BZ#138	0.00265	0.00027	mg/kg wet	0.003333		80	40-140			
BZ#138 [2C]	0.00279	0.00027	mg/kg wet	0.003333		84	40-140			

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Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
8082 Polychlorinated Biphenyls (PCB) / Congeners										
Batch DL50503 - 3540C										
BZ#153	0.00260	0.00027	mg/kg wet	0.003333		78	40-140			
BZ#153 [2C]	0.00275	0.00027	mg/kg wet	0.003333		82	40-140			
BZ#170	0.00258	0.00027	mg/kg wet	0.003333		77	40-140			
BZ#170 [2C]	0.00269	0.00027	mg/kg wet	0.003333		81	40-140			
BZ#18	0.00273	0.00027	mg/kg wet	0.003333		82	40-140			
BZ#18 [2C]	0.00262	0.00027	mg/kg wet	0.003333		79	40-140			
BZ#180	0.00261	0.00027	mg/kg wet	0.003333		78	40-140			
BZ#180 [2C]	0.00287	0.00027	mg/kg wet	0.003333		86	40-140			
BZ#187	0.00256	0.00027	mg/kg wet	0.003333		77	40-140			
BZ#187 [2C]	0.00274	0.00027	mg/kg wet	0.003333		82	40-140			
BZ#195	0.00248	0.00027	mg/kg wet	0.003333		74	40-140			
BZ#195 [2C]	0.00271	0.00027	mg/kg wet	0.003333		81	40-140			
BZ#206	0.00243	0.00027	mg/kg wet	0.003333		73	40-140			
BZ#206 [2C]	0.00264	0.00027	mg/kg wet	0.003333		79	40-140			
BZ#209	0.00237	0.00027	mg/kg wet	0.003333		71	40-140			
BZ#209 [2C]	0.00255	0.00027	mg/kg wet	0.003333		77	40-140			
BZ#28	0.00257	0.00027	mg/kg wet	0.003333		77	40-140			
BZ#28 [2C]	0.00285	0.00027	mg/kg wet	0.003333		85	40-140			
BZ#44	0.00272	0.00027	mg/kg wet	0.003333		81	40-140			
BZ#44 [2C]	0.00263	0.00027	mg/kg wet	0.003333		79	40-140			
BZ#52	0.00260	0.00027	mg/kg wet	0.003333		78	40-140			
BZ#52 [2C]	0.00263	0.00027	mg/kg wet	0.003333		79	40-140			
BZ#66	0.00270	0.00027	mg/kg wet	0.003333		81	40-140			
BZ#66 [2C]	0.00274	0.00027	mg/kg wet	0.003333		82	40-140			
BZ#8	0.00316	0.00027	mg/kg wet	0.003333		95	40-140			
BZ#8 [2C]	0.00281	0.00027	mg/kg wet	0.003333		84	40-140			
Surrogate: Tetrachloro-m-xylene	*0.00267*		mg/kg wet	*0.003333*		*80*	*30-150*			
Surrogate: Tetrachloro-m-xylene [2C]	*0.00282*		mg/kg wet	*0.003333*		*85*	*30-150*			
LCS Dup										
BZ#101	0.00254	0.00027	mg/kg wet	0.003333		76	40-140	5	30	
BZ#101 [2C]	0.00244	0.00027	mg/kg wet	0.003333		73	40-140	6	30	
BZ#105	0.00248	0.00027	mg/kg wet	0.003333		74	40-140	13	30	
BZ#105 [2C]	0.00266	0.00027	mg/kg wet	0.003333		80	40-140	12	30	
BZ#118	0.00236	0.00027	mg/kg wet	0.003333		71	40-140	12	30	
BZ#118 [2C]	0.00248	0.00027	mg/kg wet	0.003333		75	40-140	10	30	
BZ#128	0.00239	0.00027	mg/kg wet	0.003333		72	40-140	0.5	30	
BZ#128 [2C]	0.00256	0.00027	mg/kg wet	0.003333		77	40-140	3	30	
BZ#138	0.00240	0.00027	mg/kg wet	0.003333		72	40-140	10	30	
BZ#138 [2C]	0.00252	0.00027	mg/kg wet	0.003333		76	40-140	10	30	
BZ#153	0.00239	0.00027	mg/kg wet	0.003333		72	40-140	9	30	
BZ#153 [2C]	0.00253	0.00027	mg/kg wet	0.003333		76	40-140	8	30	
BZ#170	0.00230	0.00027	mg/kg wet	0.003333		69	40-140	11	30	
BZ#170 [2C]	0.00241	0.00027	mg/kg wet	0.003333		72	40-140	11	30	
BZ#18	0.00249	0.00027	mg/kg wet	0.003333		75	40-140	9	30	
BZ#18 [2C]	0.00252	0.00027	mg/kg wet	0.003333		76	40-140	4	30	

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CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Bridge Reconstruction Over Taunton River ESS Laboratory Work Order: 25L0055

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
8082 Polychlorinated Biphenyls (PCB) / Congeners										
Batch DL50503 - 3540C										
BZ#180	0.00234	0.00027	mg/kg wet	0.003333		70	40-140	11	30	
BZ#180 [2C]	0.00259	0.00027	mg/kg wet	0.003333		78	40-140	10	30	
BZ#187	0.00239	0.00027	mg/kg wet	0.003333		72	40-140	7	30	
BZ#187 [2C]	0.00255	0.00027	mg/kg wet	0.003333		76	40-140	7	30	
BZ#195	0.00228	0.00027	mg/kg wet	0.003333		68	40-140	8	30	
BZ#195 [2C]	0.00249	0.00027	mg/kg wet	0.003333		75	40-140	9	30	
BZ#206	0.00223	0.00027	mg/kg wet	0.003333		67	40-140	9	30	
BZ#206 [2C]	0.00242	0.00027	mg/kg wet	0.003333		72	40-140	9	30	
BZ#209	0.00222	0.00027	mg/kg wet	0.003333		67	40-140	6	30	
BZ#209 [2C]	0.00237	0.00027	mg/kg wet	0.003333		71	40-140	7	30	
BZ#28	0.00227	0.00027	mg/kg wet	0.003333		68	40-140	12	30	
BZ#28 [2C]	0.00265	0.00027	mg/kg wet	0.003333		80	40-140	7	30	
BZ#44	0.00258	0.00027	mg/kg wet	0.003333		77	40-140	5	30	
BZ#44 [2C]	0.00249	0.00027	mg/kg wet	0.003333		75	40-140	5	30	
BZ#52	0.00246	0.00027	mg/kg wet	0.003333		74	40-140	5	30	
BZ#52 [2C]	0.00250	0.00027	mg/kg wet	0.003333		75	40-140	5	30	
BZ#66	0.00245	0.00027	mg/kg wet	0.003333		73	40-140	10	30	
BZ#66 [2C]	0.00251	0.00027	mg/kg wet	0.003333		75	40-140	9	30	
BZ#8	0.00264	0.00027	mg/kg wet	0.003333		79	40-140	18	30	
BZ#8 [2C]	0.00242	0.00027	mg/kg wet	0.003333		73	40-140	15	30	
Surrogate: Tetrachloro-m-xylene	*0.00252*		mg/kg wet	*0.003333*		*76*	*30-150*			
Surrogate: Tetrachloro-m-xylene [2C]	*0.00262*		mg/kg wet	*0.003333*		*79*	*30-150*			

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
8151MCP Herbicides (GC)										
Batch 1079332 - 8151A_SP										
LCS										
2,4,5-T	0.0410	0.033	mg/Kg	0.0417		98	40-140			
2,4-D	0.145	0.033	mg/Kg	0.167		87	40-140			
2,4-DB	0.121	0.033	mg/Kg	0.167		73	40-140			
Dalapon	0.100	0.033	mg/Kg	0.167		60	40-140			
Dicamba	0.0845	0.033	mg/Kg	0.0833		101	40-140			
Dichlorprop	0.147	0.033	mg/Kg	0.167		88	40-140			
Dinoseb	0.131	0.033	mg/Kg	0.167		79	42-140			
MCPA	14.7	3.3	mg/Kg	16.7		88	40-140			
MCPP	18.1	6.0	mg/Kg	16.7		108	40-140			
Silvex (2,4,5-TP)	0.0424	0.033	mg/Kg	0.0417		102	40-140			
Surrogate: 2,4-Dichlorophenylacetic acid	*0.191*		mg/Kg	*0.167*		*115*	*30-150*			
LCS Dup										
2,4,5-T	0.0334	0.033	mg/Kg	0.0417		80	40-140	20	30	

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ESS Laboratory

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Bridge Reconstruction Over Taunton River ESS Laboratory Work Order: 25L0055

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
				8151MCP Herbicides (GC)						
Batch 1079332 - 8151A_SP										
2,4-D	0.111	0.033	mg/Kg	0.167		67	40-140	24	30	
2,4-DB	0.0726	0.033	mg/Kg	0.167		44	40-140	28	30	
Dalapon	0.0831	0.033	mg/Kg	0.167		50	40-140	19	30	
Dicamba	0.0638	0.033	mg/Kg	0.0833		77	40-140	22	30	
Dichlorprop	0.118	0.033	mg/Kg	0.167		71	40-140	22	30	
Dinoseb	0.116	0.033	mg/Kg	0.167		70	42-140	22	30	
MCPA	11.7	3.3	mg/Kg	16.7		70	40-140	23	30	
MCPP	14.8	6.0	mg/Kg	16.7		89	40-140	20	30	
Silvex (2,4,5-TP)	0.0370	0.033	mg/Kg	0.0417		89	40-140	19	30	
Surrogate: 2,4-Dichlorophenylacetic acid	*0.185*		mg/Kg	*0.167*		*111*	*30-150*			
Blank										
2,4,5-T	ND	0.033	mg/Kg			0	-			
2,4-D	ND	0.033	mg/Kg			0	-			
2,4-DB	ND	0.033	mg/Kg			0	-			
Dalapon	ND	0.033	mg/Kg			0	-			
Dicamba	ND	0.033	mg/Kg			0	-			
Dichlorprop	ND	0.033	mg/Kg			0	-			
Dinoseb	ND	0.033	mg/Kg			0	-			
MCPA	ND	3.3	mg/Kg			0	-			
MCPP	ND	6.0	mg/Kg			0	-			
Silvex (2,4,5-TP)	ND	0.033	mg/Kg			0	-			
Surrogate: 2,4-Dichlorophenylacetic acid	*0.202*		mg/Kg	*0.167*		*121*	*30-150*			

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ESS Laboratory

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Bridge Reconstruction Over Taunton River ESS Laboratory Work Order: 25L0055

Notes and Definitions

X*	RSD of replicate analysis > 20%. Reanalysis produced similar results.
WL	Results obtained from a deionized water leach of the sample.
U	Analyte included in the analysis, but not detected
Q	Calibration required quadratic regression (Q).
EL	Elevated Method Reporting Limits due to sample matrix (EL).
D+	Relative percent difference for duplicate is outside of criteria (D+).
D	Diluted.
CD+	Continuing Calibration %Diff/Drift is above control limit (CD+).
CD-	Continuing Calibration %Diff/Drift is below control limit (CD-).
B-	Blank Spike recovery is below lower control limit (B-).
B	Present in Method Blank (B).
>	Greater than.
ND	Analyte NOT DETECTED at or above the MRL (LOQ), LOD for DoD Reports, MDL for J-Flagged Analytes
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
MDL	Method Detection Limit
MRL	Method Reporting Limit
LOD	Limit of Detection
LOQ	Limit of Quantitation
DL	Detection Limit
I/V	Initial Volume
F/V	Final Volume
§	Subcontracted analysis; see attached report
1	Range result excludes concentrations of surrogates and/or internal standards eluting in that range.
2	Range result excludes concentrations of target analytes eluting in that range.
3	Range result excludes the concentration of the C9-C10 aromatic range.
Avg	Results reported as a mathematical average.
NR	No Recovery
[CALC]	Calculated Analyte
SUB	Subcontracted analysis; see attached report
RL	Reporting Limit
EDL	Estimated Detection Limit
MF	Membrane Filtration
MPN	Most Probable Number
TNTC	Too numerous to Count
CFU	Colony Forming Units

eurofins | Environment Testing ESS Laboratory

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Bridge Reconstruction Over Taunton River

ESS Laboratory Work Order: 25L0055

ESS Laboratory Certifications and Accreditations

Environmental

Rhode Island Potable and Non Potable Water: LAI00179
http://www.health.ri.gov/find/labs/analytical/ESS.pdf

Connecticut Potable and Non Potable Water, Solid and Hazardous Waste: PH-0750
http://www.ct.gov/dph/lib/dph/environmental_health/environmental_laboratories/pdf/OutofStateCommercialLaboratories.pdf

Maine Potable and Non Potable Water, and Solid and Hazardous Waste: RI00002
http://www.maine.gov/dhhs/mecdc/environmental-health/dwp/partners/labCert.shtml

Massachusetts Potable and Non Potable Water: M-RI002
http://public.dep.state.ma.us/Labcert/Labcert.aspx

New Hampshire (NELAP accredited) Potable and Non Potable Water, Solid and Hazardous Waste: 2424
http://des.nh.gov/organization/divisions/water/dwgb/nhelap/index.htm

New York (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: 11313
http://www.wadsworth.org/labcert/elap/comm.html

New Jersey (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: RI006
http://datamine2.state.nj.us/DEP_OPRA/OpraMain/pi_main?mode=pi_by_site&sort_order=PI_NAMEA&Select+a+Site:=58715

Pennsylvania: 68-01752
http://www.dep.pa.gov/Business/OtherPrograms/Labs/Pages/Laboratory-Accreditation-Program.aspx

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ANALYTICAL REPORT

PREPARED FOR

Attn: Marc Levesque
Eurofins Environment Testing Northeast LLC
185 Frances Avenue
Cranston, Rhode Island 02910

Generated 12/15/2025 9:11:18 AM

JOB DESCRIPTION

25L0055

JOB NUMBER

620-31612-1

Eurofins Rhode Island
646 Camp Ave
North Kingstown RI 02852

See page two for job notes and contact information.

my EOL

Eurofins Rhode Island

Job Notes

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The test results in this report relate only to the samples as received by the laboratory and will meet all requirements of the methodology, with any exceptions noted. This report shall not be reproduced except in full, without the express written approval of the laboratory. All questions should be directed to the Eurofins Environment Testing Northeast, LLC Project Manager.

Authorization

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Authorized for release by
Michael Chang, Project Manager II
Michael.Chang@et.eurofinsus.com
(774)562-0566

Client: Eurofins Environment Testing Northeast LLC
Project/Site: 25L0055

Laboratory Job ID: 620-31612-1

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Definitions/Glossary

Client: Eurofins Environment Testing Northeast LLC
Project/Site: 25L0055

Job ID: 620-31612-1

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
☼	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

MassDEP Analytical Protocol Certfication Form

Laboratory Name: Eurofins Rhode Island | Project #: 620-31612-1

Project Location: 25L0055 | RTN:

This Form provides certifications for the following data set: list Laboratory Sample ID Number(s):
620-31612-1

Matrices: ☐ Groundwater/Surface Water ☑ Soil/Sediment ☐ Drinking Water ☐ Air ☐ Other:

CAM Protocol (check all that apply below:)

8260 VOC CAM II A ☐	7470/7471 Hg CAM III B ☐	MassDEP VPH (GC/PID/FID) CAM IV A ☐	8082 PCB CAM V A ☐	9014 Total Cyanide/PAC CAM VI A ☐	6860 Perchlorate CAM VIII B ☐
8270 SVOC CAM II B ☐	7010 Metals CAM III C ☐	MassDEP VPH (GC/MS) CAM IV C ☐	8081 Pesticides CAM V B ☐	7196 Hex Cr CAM VI B ☐	MassDEP APH CAM IX A ☐
6010 Metals CAM III A ☐	6020 Metals CAM III D ☐	MassDEP EPH CAM IV B ☐	8151 Herbicides CAM V C ☑	8330 Explosives CAM VIII A ☐	TO-15 VOC CAM IX B ☐

Affirmative Responses to Questions A through F are required for "Presumptive Certainty" status

A	Were all samples received in a condition consistent with those described on the Chain-of-Custody, properly preserved (including temperature) in the field or laboratory, and prepared/analyzed within method holding times?	☑ Yes ☐ No
B	Were the analytical method(s) and all associated QC requirements specified in the selected CAM protocol(s) followed?	☑ Yes ☐ No
C	Were all required corrective actions and analytical response actions specified in the selected CAM protocol(s) implemented for all identified performance standard non-conformances?	☑ Yes ☐ No
D	Does the laboratory report comply with all the reporting requirements specified in CAM VII A, "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data"?	☑ Yes ☐ No
E	VPH, EPH, APH, and TO-15 only a. VPH, EPH, and APH Methods only: Was each method conducted without significant modification(s)? (Refer to the individual method(s) for a list of significant modifications). b. APH and TO-15 Methods only: Was the complete analyte list reported for each method?	☐ Yes ☐ No ☐ Yes ☐ No
F	Were all applicable CAM protocol QC and performance standard non-conformances identified and evaluated in a laboratory narrative (including all "No" responses to Questions A through E)?	☑ Yes ☐ No

Responses to Questions G, H and I below are required for "Presumptive Certainty" status

G	Were the reporting limits at or below all CAM reporting limits specified in the selected CAM protocol(s)?	☑ Yes ☐ No[1]

Data User Note: Data that achieve "Presumptive Certainty" status may not necessarily meet the data usability and representativeness requirements described in 310 CMR 40. 1056 (2)(k) and WSC-07-350.

H	Were **all** QC performance standards specified in the CAM protocol(s) achieved?	☐ Yes ☑ No[1]
I	Were results reported for the complete analyte list specified in the selected CAM protocol(s)?	☑ Yes ☐ No[1]

1 All negative responses must be addressed in an attached laboratory narrative.

I, the undersigned, attest under the pains and penalties of perjury that, based upon my personal inquiry of those responsible for obtaining the information, the material contained in this analytical report is, to the best of my knowledge and belief, is accurate and complete.

Signature: Michael Chang | **Position:** Project Manager II

Printed Name: Michael Chang | **Date:** 12/15/2025

Case Narrative

Client: Eurofins Environment Testing Northeast LLC
Project: 25L0055

Job ID: 620-31612-1

Job ID: 620-31612-1 — Eurofins Rhode Island

Job Narrative
620-31612-1

The analytical test results presented in this report meet all requirements of the associated regulatory program listed on the Accreditation/Certification Summary Page, unless otherwise noted. Data qualifiers and/or narrative comments are included to explain any exceptions, if applicable. Regulated compliance samples (e.g. SDWA, NPDES) must comply with associated agency requirements/permits.

- Matrix-specific batch QC (e.g., MS, MSD, SD) may not be reported when insufficient sample volume is available or when site-specific QC samples are not submitted. In such cases, a Laboratory Control Sample Duplicate (LCSD) may be analyzed to provide precision data for the batch.
- For samples analyzed using surrogate and/or isotope dilution analytes, any recoveries falling outside of established acceptance criteria are re-prepared and/or re-analyzed to confirm results, unless the deviation is due to sample dilution or otherwise explained in the case narrative.

Receipt
The sample was received on 12/5/2025 9:30 AM. Unless otherwise noted below, the sample arrived in good condition, and, where required, properly preserved and on ice. The temperature of the cooler at receipt time was 4.0°C.

Herbicides
Method 8151MCP: The continuing calibration verification (CCV) associated with batch 460-1079381 recovered outside acceptance criteria, low biased, for Dalapon. A reporting limit (RL) standard was analyzed, and the target analytes are detected. Since the associated samples were non-detect for the analyte, the data are reported.

Method 8151MCP: The continuing calibration verification (CCV) associated with batch 460-1079381 recovered above the upper control limit for Dinoseb and Dalapon. The samples associated with this CCV were non-detects for the affected analytes; therefore, the data have been reported. The associated sample is:(CCV 460-1079381/25).

Method 8151MCP: The continuing calibration verification (CCV) associated with batch 460-1079381 recovered above the upper control limit for 2,4,5-T. The samples associated with this CCV were non-detects for the affected analytes; therefore, the data have been reported. The associated sample is:(CCV 460-1079381/35).

Method 8151MCP: The continuing calibration verification (CCV) associated with batch 460-1079381 recovered above the upper control limit for Dalapon, Dicamba, Dichlorprop and Dinoseb. The samples associated with this CCV were non-detects for the affected analytes; therefore, the data have been reported. The associated sample is:(CCV 460-1079381/35).

Method 8151MCP: The continuing calibration verification (CCV) associated with batch 460-1079656 recovered outside acceptance criteria, low biased, for Dalapon. A reporting limit (RL) standard was analyzed, and the target analytes are detected. Since the associated samples were non-detect for the analyte(s), the data are reported.

Method 8151MCP: The continuing calibration verification (CCV) associated with batch 460-1079656 recovered above the upper control limit for MCPP. The samples associated with this CCV were non-detects for the affected analytes; therefore, the data have been reported. The associated sample is:(CCVRT 460-1079656/2).

Method 8151MCP: The continuing calibration verification (CCV) for Dalapon recovered outside the lower control limit on the primary column but within control limits on the secondary column. The samples associated with this CCV were non-detects for the affected analytes; therefore, the data have been reported for Dalapon on the secondary column. (CCV 460-1079656/18)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

General Chemistry
No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Detection Summary

Client: Eurofins Environment Testing Northeast LLC
Project/Site: 25L0055

Job ID: 620-31612-1

Client Sample ID: 25L0055-01

Lab Sample ID: 620-31612-1

No Detections.

This Detection Summary does not include radiochemical test results.

Client Sample Results

Client: Eurofins Environment Testing Northeast LLC
Project/Site: 25L0055

Job ID: 620-31612-1

Client Sample ID: 25L0055-01

Date Collected: 12/01/25 03:46
Date Received: 12/05/25 09:30

Lab Sample ID: 620-31612-1

Matrix: Solid
Percent Solids: 83.3

Method: SW846 8151A - Herbicides (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dicamba	ND		0.040	0.0059	mg/Kg	☼	12/10/25 19:15	12/11/25 09:57	1
2,4-D	ND		0.040	0.015	mg/Kg	☼	12/10/25 19:15	12/11/25 09:57	1
Dalapon	ND		0.040	0.013	mg/Kg	☼	12/10/25 19:15	12/11/25 09:57	1
Dinoseb	ND		0.040	0.016	mg/Kg	☼	12/10/25 19:15	12/11/25 09:57	1
2,4,5-T	ND		0.040	0.0085	mg/Kg	☼	12/10/25 19:15	12/11/25 09:57	1
Silvex (2,4,5-TP)	ND		0.040	0.0042	mg/Kg	☼	12/10/25 19:15	12/11/25 09:57	1
2,4-DB	ND		0.040	0.015	mg/Kg	☼	12/10/25 19:15	12/11/25 09:57	1
Dichlorprop	ND		0.040	0.012	mg/Kg	☼	12/10/25 19:15	12/11/25 09:57	1
MCPA	ND		4.0	2.0	mg/Kg	☼	12/10/25 19:15	12/11/25 09:57	1
MCPP	ND		7.2	6.4	mg/Kg	☼	12/10/25 19:15	12/11/25 09:57	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2,4-Dichlorophenylacetic acid	*117*		*30 - 150*	*12/10/25 19:15*	*12/11/25 09:57*	*1*

Surrogate Summary

Client: Eurofins Environment Testing Northeast LLC
Project/Site: 25L0055

Job ID: 620-31612-1

Method: 8151A - Herbicides (GC)

Matrix: Solid

Prep Type: Total/NA

		Percent Surrogate Recovery (Acceptance Limits)
Lab Sample ID	**Client Sample ID**	**DCPAA2 (30-150)**
620-31612-1	25L0055-01	117
LCS 460-1079332/2-A	Lab Control Sample	115

Surrogate Legend

DCPAA = 2,4-Dichlorophenylacetic acid

Method: 8151A - Herbicides (GC)

Matrix: Solid

Prep Type: Total/NA

		Percent Surrogate Recovery (Acceptance Limits)
Lab Sample ID	**Client Sample ID**	**DCPAA1 (30-150)**
LCSD 460-1079332/3-A	Lab Control Sample Dup	111
MB 460-1079332/1-A	Method Blank	121

Surrogate Legend

DCPAA = 2,4-Dichlorophenylacetic acid

QC Sample Results

Client: Eurofins Environment Testing Northeast LLC
Project/Site: 25L0055

Job ID: 620-31612-1

Method: 8151A - Herbicides (GC)

Lab Sample ID: MB 460-1079332/1-A
Matrix: Solid
Analysis Batch: 1079381

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 1079332

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dicamba	ND		0.033	0.0049	mg/Kg		12/09/25 19:36	12/10/25 15:31	1
2,4-D	ND		0.033	0.012	mg/Kg		12/09/25 19:36	12/10/25 15:31	1
Dalapon	ND		0.033	0.011	mg/Kg		12/09/25 19:36	12/10/25 15:31	1
Dinoseb	ND		0.033	0.014	mg/Kg		12/09/25 19:36	12/10/25 15:31	1
2,4,5-T	ND		0.033	0.0071	mg/Kg		12/09/25 19:36	12/10/25 15:31	1
Silvex (2,4,5-TP)	ND		0.033	0.0035	mg/Kg		12/09/25 19:36	12/10/25 15:31	1
2,4-DB	ND		0.033	0.012	mg/Kg		12/09/25 19:36	12/10/25 15:31	1
Dichlorprop	ND		0.033	0.0098	mg/Kg		12/09/25 19:36	12/10/25 15:31	1
MCPA	ND		3.3	1.6	mg/Kg		12/09/25 19:36	12/10/25 15:31	1
MCPP	ND		6.0	5.3	mg/Kg		12/09/25 19:36	12/10/25 15:31	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2,4-Dichlorophenylacetic acid	*121*		*30 - 150*	*12/09/25 19:36*	*12/10/25 15:31*	*1*

Lab Sample ID: LCS 460-1079332/2-A
Matrix: Solid
Analysis Batch: 1079381

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 1079332

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Dicamba	0.0833	0.0798		mg/Kg		96	40 - 140
2,4-D	0.167	0.142		mg/Kg		85	40 - 140
Dalapon	0.167	0.100		mg/Kg		60	40 - 140
Dinoseb	0.167	0.131		mg/Kg		79	42 - 140
2,4,5-T	0.0417	0.0418		mg/Kg		100	40 - 140
Silvex (2,4,5-TP)	0.0417	0.0424		mg/Kg		102	40 - 140
2,4-DB	0.167	0.121		mg/Kg		73	40 - 140
Dichlorprop	0.167	0.147		mg/Kg		88	40 - 140
MCPA	16.7	14.7		mg/Kg		88	40 - 140
MCPP	16.7	14.8		mg/Kg		89	40 - 140

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
2,4-Dichlorophenylacetic acid	*115*		*30 - 150*

Lab Sample ID: LCSD 460-1079332/3-A
Matrix: Solid
Analysis Batch: 1079381

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 1079332

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Dicamba	0.0833	0.0638		mg/Kg		77	40 - 140	22	30
2,4-D	0.167	0.111		mg/Kg		67	40 - 140	24	30
Dalapon	0.167	0.0831		mg/Kg		50	40 - 140	19	30
Dinoseb	0.167	0.106		mg/Kg		64	42 - 140	21	30
2,4,5-T	0.0417	0.0330		mg/Kg		79	40 - 140	23	30
Silvex (2,4,5-TP)	0.0417	0.0340		mg/Kg		82	40 - 140	22	30
2,4-DB	0.167	0.0921		mg/Kg		55	40 - 140	27	30
Dichlorprop	0.167	0.118		mg/Kg		71	40 - 140	22	30
MCPA	16.7	11.7		mg/Kg		70	40 - 140	23	30
MCPP	16.7	12.0		mg/Kg		72	40 - 140	21	30

QC Sample Results

Client: Eurofins Environment Testing Northeast LLC
Project/Site: 25L0055

Job ID: 620-31612-1

Method: 8151A - Herbicides (GC) (Continued)

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
2,4-Dichlorophenylacetic acid	111		30 - 150

QC Association Summary

Client: Eurofins Environment Testing Northeast LLC
Job ID: 620-31612-1
Project/Site: 25L0055

GC Semi VOA

Prep Batch: 1079332

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
620-31612-1	25L0055-01	Total/NA	Solid	8151A	
MB 460-1079332/1-A	Method Blank	Total/NA	Solid	8151A	
LCS 460-1079332/2-A	Lab Control Sample	Total/NA	Solid	8151A	
LCSD 460-1079332/3-A	Lab Control Sample Dup	Total/NA	Solid	8151A	

Analysis Batch: 1079381

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 460-1079332/1-A	Method Blank	Total/NA	Solid	8151A	1079332
LCS 460-1079332/2-A	Lab Control Sample	Total/NA	Solid	8151A	1079332
LCSD 460-1079332/3-A	Lab Control Sample Dup	Total/NA	Solid	8151A	1079332

Analysis Batch: 1079656

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
620-31612-1	25L0055-01	Total/NA	Solid	8151A	1079332

General Chemistry

Analysis Batch: 1079536

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
620-31612-1	25L0055-01	Total/NA	Solid	Moisture	
620-31612-1 DU	25L0055-01	Total/NA	Solid	Moisture	

Lab Chronicle

Client: Eurofins Environment Testing Northeast LLC
Project/Site: 25L0055

Job ID: 620-31612-1

Client Sample ID: 25L0055-01
Date Collected: 12/01/25 03:46
Date Received: 12/05/25 09:30

Lab Sample ID: 620-31612-1
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	Moisture		1	1079536	CJC	EET EDI	12/10/25 16:15

Client Sample ID: 25L0055-01
Date Collected: 12/01/25 03:46
Date Received: 12/05/25 09:30

Lab Sample ID: 620-31612-1
Matrix: Solid
Percent Solids: 83.3

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	8151A			1079332	JMS	EET EDI	12/10/25 19:15
Total/NA	Analysis	8151A		1	1079656	OXG	EET EDI	12/11/25 09:57

Laboratory References:

EET EDI = Eurofins Edison, 777 New Durham Road, Edison, NJ 08817, TEL (732)549-3900

Accreditation/Certification Summary

Client: Eurofins Environment Testing Northeast LLC
Job ID: 620-31612-1
Project/Site: 25L0055

Laboratory: Eurofins Edison

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Connecticut	State	PH-0818	09-30-26
DE Haz. Subst. Cleanup Act (HSCA)	State	N/A	01-03-26
Georgia	State	12028 (NJ)	06-30-26
Illinois	NELAP	2000942025-2	04-30-26
Massachusetts	State	M-NJ312	06-30-26
New Jersey	NELAP	12028	06-30-26
New York	NELAP	11452	04-01-26
Pennsylvania	NELAP	68-00522	02-28-26
Rhode Island	State	LAO00376	12-23-25
USDA	US Federal Programs	525-24-149-77606	05-21-27

Method Summary

Client: Eurofins Environment Testing Northeast LLC
Project/Site: 25L0055

Job ID: 620-31612-1

Method	Method Description	Protocol	Laboratory
8151A	Herbicides (GC)	SW846	EET EDI
Moisture	Percent Moisture	EPA	EET EDI
8151A	Extraction (Herbicides)	SW846	EET EDI

Protocol References:

EPA = US Environmental Protection Agency

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

EET EDI = Eurofins Edison, 777 New Durham Road, Edison, NJ 08817, TEL (732)549-3900

Sample Summary

Client: Eurofins Environment Testing Northeast LLC
Project/Site: 25L0055

Job ID: 620-31612-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Sample Origin
620-31612-1	25L0055-01	Solid	12/01/25 03:46	12/05/25 09:30	Rhode Island

eurofins

31612

Subcontract Order

25L0055

Sending Laboratory

Eurofins Providence
185 Frances Avenue
Cranston, RI 02910
Phone. (401) 461-7181

Receiving Laboratory

Eurofins New England
646 Camp Avenue
North Kingstown, RI 02852
Phone: (413) 789-9018

☐ **These samples require MCL exceedance reporting**

Project Notes

Project Name: 25L0055
Project Location: MA
Project PO Number: 10887
Due Date: Standard
Send Report To: smorrell@thielsch.com; MDean@thielsch.com; ESSProjectManagement@thielsch com

MA REM - 401WQ 20x on Metals Report to MDL & MyLG

Sample ID: 25L0055-01
Sample Matrix: Soil
Sampled: 12/01/25 03:46
Sample Type: Composite
Sampled By: Client

Container - Preservation: 1 x Other
Analysis Herbicides
Analysis Comments: N/A
Hold Time Expires 12/15/2025

-1

620-31612 COC

Released By	Date	Received By	Date
M	12/5/25 0824		8:30
	12/5/25 8:26		12/5/25 0930

3.8 +0.2 4.0 #6

Eurofins Rhode Island
646 Camp Ave
North Kingstown, RI 02852
Phone: 413-789-9018 Fax: 413-506-3830

Chain of Custody Record

eurofins | Environment Testing

Client Information (Sub Contract Lab)	Sampler: N/A	Lab PM: Chang, Michael T	Carrier Tracking No(s): N/A	COC No: 620-26495.1
Client Contact: Shipping/Receiving	Phone: N/A	E-Mail: Michael.Chang@et.eurofinsus.com	State of Origin: Rhode Island	Page: Page 1 of 1
Company: Eurofins Environment Testing Northeast L		Accreditations Required (See note): State Massachusetts		Job #: 620-31612-1
Address: 777 New Durham Road,	Due Date Requested: 12/11/2025			
City: Edison	TAT Requested (days): N/A			
State, Zip: NJ 08817				
Phone: 732-549-3900(Tel) 732-549-3679(Fax)	PO #: N/A			
Email: N/A	WO #: N/A			
Project Name: 25L0055	Project #: 62002228			
Site: N/A	SSOW#: N/A			

Analysis Requested

Preservation Codes:

Other: N/A

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	8151MCP/8151A_SP	Moisture	Total Number of containers	Special Instructions/Note:
			Preservation Code:							
25L0055-01 (620-31612-1)	12/1/25	03:46 Eastern	G	Solid			X	X	1	

Note: Since laboratory accreditations are subject to change, Eurofins Environment Testing Northeast, LLC places the ownership of method, analyte & accreditation compliance upon our subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/tests/matrix being analyzed, the samples must be shipped back to the Eurofins Environment Testing Northeast, LLC laboratory or other instructions will be provided. Any changes to accreditation status should be brought to Eurofins Environment Testing Northeast, LLC attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said compliance to Eurofins Environment Testing Northeast, LLC.

Possible Hazard Identification	*Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)*
Unconfirmed	☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For* _____ *Months*
Deliverable Requested: I II III, IV Other (specify) Primary Deliverable Rank: 2	Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
1					12/5/25 2330	ETA
2		12/5/25 2330	ETA			
3						

Custody Seals Intact: △ Yes △ No	Custody Seal No.	Cooler Temperature(s) °C and Other Remarks: 18/13

Ver 10/10/2024

Login Sample Receipt Checklist

Client: Eurofins Environment Testing Northeast LLC

Job Number: 620-31612-1

Login Number: 31612
List Number: 1
Creator: Scott, Krishnan F

List Source: Eurofins Rhode Island

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Login Sample Receipt Checklist

Client: Eurofins Environment Testing Northeast LLC

Job Number: 620-31612-1

Login Number: 31612
List Number: 2
Creator: Armbruster, Chris

List Source: Eurofins Edison
List Creation: 12/10/25 12:55 PM

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	1.8/1.3°C IR9
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Proposal No. 613642 - 136413

ESS Laboratory Sample and Cooler Receipt Checklist

Client: Beta Engineering - ML/TB

Shipped/Delivered Via: Client

ESS Project ID: 25L0055
Date Received: 12/1/2025
Project Due Date: 12/8/2025
Days for Project: 5 Day

1. Air bill manifest present? No
   Air No.: NA
2. Were custody seals present? No
3. Is radiation count <100 CPM? Yes
4. Is a Cooler Present? Yes
   Temp (°C): 10 Iced with: Ice
5. Was COC signed and dated by client? Yes
6. Does COC match bottles? Yes
7. Is COC complete and correct? Yes
8. Were samples received intact? Yes
9. **Were labs informed about short holds & rushes?** (Yes) / No / NA
10. Were any analyses received outside of hold time? Yes / (No)

11. Any Subcontracting needed? (Yes) / No
    ESS Sample IDs: (illegible)
    Analysis: (illegible)
    TAT: STD
12. Were VOAs received? (Yes) / No
    a. Air bubbles in aqueous VOAs? Yes / (No)
    b. Does methanol cover soil completely? (Yes) / No / NA
13. Are the samples properly preserved? (Yes) / No
    a. If metals preserved upon receipt: Date: _____ Time: _____ By/Acid Lot#: _____
    b. If dissolved metals are requested, are they: Field Filtered / To Be Lab Filtered
    c. Low Level VOA vials frozen: Date: 12/1/25 Time: 1848 By: AD

Sample Receiving Notes:

14. Was there a need to contact Project Manager? Yes / (No)
    a. Was there a need to contact the client? Yes / No
    Who was contacted? _____ Date: _____ Time: _____ By: _____

Resolution:

Sample Number	Container ID	Proper Container	Air Bubbles Present	Sufficient Volume	Container Type	Preservative	Record pH (Cyanide and 608 Pesticides)
1	732065	Yes	N/A	Yes	4 oz. Jar	NP	
1	732066	Yes	N/A	Yes	4 oz. Jar	NP	
1	732067	Yes	N/A	Yes	4 oz. Jar	NP	
1	732068	Yes	N/A	Yes	4 oz. Jar	NP	
1	732069	Yes	N/A	Yes	4 oz. Jar	NP	
1	732070	Yes	N/A	Yes	4 oz. Jar	NP	
1	732071	Yes	N/A	Yes	4 oz. Jar	NP	
1	732072	Yes	N/A	Yes	4 oz. Jar	NP	
1	732073	Yes	N/A	Yes	4 oz. Jar	NP	
2	732074	Yes	N/A	Yes	4 oz. Jar	NP	
2	732075	Yes	N/A	Yes	4 oz. Jar	NP	
2	732076	Yes	N/A	Yes	VOA Vial	MeOH	
2	732078	Yes	N/A	Yes	VOA Vial	DI Water	
2	732079	Yes	N/A	Yes	VOA Vial	DI Water	
3	732077	Yes	N/A	Yes	VOA Vial	MeOH	
3	732080	Yes	N/A	Yes	VOA Vial	DI Water	
3	732081	Yes	N/A	Yes	VOA Vial	DI Water	

2nd Review
Were all containers scanned into storage/lab? Initials _____

Control #: 10.0035_Rev0

ESS Laboratory Sample and Cooler Receipt Checklist

Client: Beta Engineering - ML/TB

ESS Project ID: 25L0055

Date Received: 12/1/2025

Are barcode labels on correct containers?	Yes / No
Are all Flashpoint stickers attached/container ID # circled?	Yes / No / NA
Are all Hex Chrome stickers attached?	Yes / No / NA
Are all QC stickers attached?	Yes / No / NA
Are VOA stickers attached if bubbles noted?	Yes / No / NA

Completed By: _____ Date & Time: 12/1/25 17:46

Reviewed By: AO Date & Time: 12/1/25 18:48

ESS Laboratory
Analytical Balance BAL Laboratory
185 Frances Avenue, Cranston, RI 02910
Phone: 401-461-7181
www.esslaboratory.com

Work Order # 2510055 Page 1 of 1

Turn Time (Days): ☑ Standard ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐ SameDay
Regulatory State: MA Criteria: 401 WQC
PROJECT TYPE: ☐ CT RCP ☐ MA MCP ☐ RGP ☐ Permit ☑ 401 WQ ☐ Drinking Water

PAYMENT: Amount $ ____ Check # ____ V MC D AmEx Cash

ELECTRONIC DELIVERABLES (Final Reports are PDF): ☐ EQuIS ☐ State Upload ☐ Enviro Data ☐ CLP-Like Package ☐ Other (Specify) →

CLIENT INFORMATION

Client: BETA Group
Address: 701 George Washington Highway, Lincoln, RI, 02865
Phone: 207-513-9917
Persons Authorized to Receive Data: Mlambert@BETA-Inc.com; JNiro@BETA-Inc.com

PROJECT INFORMATION

Project Name: Bridge Reconstruction Over Taunton River
Project Location: Old Colony Avenue, Taunton, MA
Project Number: 10887
Project Manager: Jonathan Niro
Bill to: BETA
PO#:
Quote#:

Client acknowledges that sampling is compliant with all EPA / State regulatory programs.

REQUESTED ANALYSES

Laboratory ID	Collection Date	Collection Time	Sample Type	Sample Matrix	Sample ID	VOC (Low level)	Total metals	PAH	PCB (NoDA)	EPH	Total SVOC (SIM)	TPH	Direct entry solids	Direct entry liquid	Cyanide, reactive	Cyanide, total	Ignitability	Corrosivity	Reactivity (sulfide)	Hexavalent Chromium	Total Number of Bottles
1	12/1/25	3:46	Composite	Sed/soil	CS1		+	+	+	+	+	+	+	+	+	+	+	+	+	+	
2	12/1/25	12:14	Grab	Sed/soil	GS4	X	X			X											
3	12/1/25	12:46	Grab	Sed/soil	GS1	X				X											
						X															
Container Type: AC-Air Cassette AG-Amber Glass B-BOD Bottle C-Cubitainer J-Jar O-Other P-Poly S-Sterile V-Vial						V	J	J	J	J	J	J	J	J	J	J	J	J	J	J	
Container Volume: 1-100 mL 2-2.5 gal 3-250 mL 4-300 mL 5-500 mL 6-1L 7-VOA 8-2 oz 9-4 oz 10-8 oz 11-Other*						11	6	6	4	4	4	4	9	9	9	9	9	9	4	4	
Preservation Code: 1-Non Preserved 2-HCl 3-H2SO4 4-HNO3 5-NaOH 6-Methanol 7-Na2S2O3 8-ZnAce, NaOH 9-NH4Cl 10-DI H2O 11-Other*						10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Number of Bottles per Sample:						3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	

Shipping Conditions (circle one)

Ice Iced Ambient
Cooler Temperature (°C): 10.0 IR1
Client approval required for temperature >6°C
☐ Approved by Client (initials/date →)

Sampled by :

Comments: * Please specify "Other" preservative and containers types in this space

Total ~~metals~~ metals (~~As~~ Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Nickel and Zinc) Run TCLP Analysis if metals exceed 20 times rule.

Chain needs to be filled out neatly and completely for on time delivery.

All samples submitted are subject to ESS Laboratory's payment terms and conditions.

Dissolved Filtration: ☐ Laboratory Filter ☐ Field Filter

Relinquished by (Signature)	Date	Time	Received By (Signature)	Relinquished by (Signature)	Date	Time	Received by (Signature)
[signature]	12/1/25	5:07	[signature] 12/1/25				
Relinquished by (Signature)	Date	Time	Received By (Signature)	Relinquished by (Signature)	Date	Time	Received by (Signature)

* General chemistry in this case refers to Corrosivity, Ignitability, Reactive sulfide/cyanide, Pesticides,

Taunton and Raynham, Massachusetts

Bridge Reconstruction R-02-003=T-01-004 over Taunton River

MassDOT Project File 613642

October 2025

SAMPLING AND ANALYSIS PLAN

BETA
315 Norwood Park South
2nd Floor
Norwood, Massachusetts 02062
781.255.1982
www.BETA-Inc.com

Bridge Reconstruction R-02-003=T-01-004 over Taunton River

Taunton and Raynham, Massachusetts

MassDOT Project File 613642

SAMPLING AND ANALYSIS PLAN

Prepared by: BETA GROUP, INC.
Prepared for: City of Taunton and Massachusetts Department of Transportation (MassDOT)

October 2025

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FIGURES

Figure 1 – Site Locus
Figure 2 – Environmental Resources Map
Figure 3 - Hazardous Materials Figure
Figure 4 - Sampling Plan

1.0 INTRODUCTION AND PURPOSE

This Sampling and Analysis Plan (SAP) was prepared in support of the Taunton & Raynham – Superstructure Replacement Project, South Street East Over the Taunton River (the Project) (MassDOT Project #613642), which proposes to replace the superstructure and perform substructure repairs of the bridge carrying South Street East/ Old Colony Avenue over the Taunton River in Raynham and Taunton, Massachusetts (Figure 1). As outlined in 314 CMR 9.07(1)C, the Project anticipates removing and disposing of up to **2,000 cubic yards (cy)** of dredged material and is subsequently required to conduct sediment sample collection and analysis to ensure the protection of human health, public safety, public welfare, and the environment.

In total, three (3) composite samples and four (4) grab samples will be collected for analysis. The samples will be collected by TG&B Marine Services, Inc. and overseen by a BETA scientist. Each sample will be advanced to the proposed dredging depth within the river (6 feet) using geoprobe hand tools and a sediment samplers. Sampling locations are identified on the Sediment Sampling Plan (Figure 4) and will be GPS located at time of sampling. Following collection, the samples will be sent to ESS Laboratory **|** A division of the RISE Group in Cranston, RI.

The composite samples will be tested for the following:

- Conductivity
- MCP 14 Metals (includes arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc as required by 314 CMR 9.07))
- Ignitability
- Reactive Sulfide/cyanides
- Pesticides/herbicides to meet Aggregate reporting limits
- VOCs (volatile organic compounds) (Grab sample based upon highest PID)
- PCBs (polychlorinated biphenyls by EPA Method 8082 and NOAA analysis for congeners) **
- Total SVOCs (semi-volatile organic compounds)
    - (PAH (polynuclear aromatic hydrocarbons) results will be a subset of the total SVOC results; Total SVOC results to conform with MassDEP Policy # Comm-97-001)
- Extractable Petroleum Hydrocarbons (EPH)
- TPH (total petroleum hydrocarbons)
- Total Organic Carbon
- volatile solids (percent)
- water (percent)
- TCLP, as applicable

** PCB analysis will be conducted using EPA Method 8270C Modified (EPA Method 680); results will include the “NOAA” list of 22 congeners.

Additionally, each composite sediment sample will be analyzed for cyanide.

The grab samples will be tested for:

- VOCs
- EPH with PAHs

The Sediment Sampling Figure showing the sampling locations and a description of any compositing or subsampling conducted will be submitted along with the analytical results. In addition, a copy of the report

of sample analysis from the performing laboratory will be provided including quality assurance/quality control information and methods of analysis used.

1.1 Sampling Equipment & Additional Materials Required

The sampling will be conducted using the following equipment:

- Geoprobe hand tools;
- Sediment Sampler;
- Chest waders or equivalent wet weather gear;
- Small watercraft;
- Disposable Nitrile Gloves;
- GPS Unit
- Plastic Zip-lock bags or glass jars depending on lab requirements.

1.2 Site Contacts

The consultant Project Manager (PM) from BETA Group Inc will be Chistopher Jones, PE. They can be contacted at the phone number and email listed below:

Phone Number: 781.255.1982 x. 7017

Email: cjones@beta-inc.com

In the event of “suspect” contamination or previously unknown condition, contact the Project Manager.

1.3 Health and Safety

Field personnel assigned to conduct or inspect drilling and sampling operations shall be appropriately trained for the subject investigation and shall have successfully completed health and safety training in accordance with the "HAZWOPER" Standard promulgated by the Occupational Safety and Health Administration (OSHA) as 29 CFR Part 1910.120(e). Documentation shall include the initial 40-hour training and 8-hour annual refresher training demonstrating compliance within the current work period.

2.0 Sediment Sampling Oversight

2.1 Sediment Sampling Scope

The total volume of sediment to be dredged from below the Mean High-Water elevation of the Taunton River is estimated to be approximately 2,000 cubic yards. BETA is proposing sampling for parameters outlined in the Water Quality Certification regulation and COMM-97 disposal parameters to evaluate likely off-site disposal alternatives for the generated sediment.

The samples submitted for analysis will be a combination of composite and grab samples, based upon the sample location. Based upon the dredging depth within the stream and in order to provide sufficient information to evaluate sediment volume and off-site management options, BETA has proposed collection of 9 sediment cores to a depth of 6 feet (three from upstream of the bridge, three from the area underneath the bridge, and three from downstream of the bridge) which will be composited to create three composite samples. One grab sample will also be collected in an area underneath the CMP drainage outfall, and three additional grab samples will be collected (one from upstream of the bridge, one from the area underneath the bridge, and one from downstream of the bridge). The location of all sediment sampling locations is available in the attached Sediment Sampling Plan (Figure 4).

The sediment samples will be analyzed based on the requirements for the 401 Water Quality Certification (WQC), as well as COMM-97 standards to evaluate potential off-site management alternatives as described in Section III below.

Each sample will be advanced to a depth representative of the sediment depth within the River using geoprobe hand tools and a sediment sampler. Sampling locations will be GPS located at time of sampling.

3.0 SAMPLING PLAN

The application for a 401 Water Quality Certification (WQC) for Dredging requires the physical and chemical analysis of sediment samples. Samples will be collected to adequately represent the sediment to be dredged and evaluate off-site management alternatives. The locations of the cores from which WQC samples will be collected are shown on Figure 4.

One (1) grab sample from each of the 3 sample areas (upstream, underneath the bridge and downstream) shown in Figure 4 will be collected, 1 grab sample from the area below the drainage outfall, and 3 composite samples made up of 3 core samples collected from each sample area, as depicted on Figure 4 will be collected and submitted for laboratory analysis, as described below.

If a 0–6-foot depth is infeasible at any of the identified sampling sites, the field personnel responsible for taking the sample will find a representative site as close as possible to the identified site. The Field personnel is responsible for noting the change in sampling location, the impetuous for that change, and the distance of the new location from the previously identified one.

Sample Collection and Analysis will be performed in accordance with MassDEP standard operating procedures. The analytical laboratory will be instructed that the testing must meet the reporting limits indicated in the table above and can also be found under Section 9.07(2)(b)6 of the 401 Water Quality Certification Regulations [314 CMR 9.07(2)(b)6].

A plan showing the sampling locations and a description of any compositing or subsampling conducted will be submitted along with the analytical results. In addition, a copy of the report of sample analysis from the performing laboratory will be provided including quality assurance/quality control information and methods of analysis used.

3.1 GRAB SAMPLES

Grab Samples will be collected in compliance with WQC and COMM-97 standards. Four (4) grab samples will be collected including:

- One sample upstream of the bridge (GS1);
- One sample underneath the bridge (GS2);
- One sample downstream of the bridge (GS3); and,
- One outfall sample (GS 4).

According to 314 CMR 9.07(2) - Sampling and Analysis Requirements, samples collected for analysis of volatile organic compounds are obtained from an individual core and not composited from multiple cores. In areas adjacent to the , the core selected for VOC analysis will be selected based upon the highest field PID reading of the two cores collected from each sample area. If all PID readings are 0, VOC samples will be selected to be spatially representative of the future dredging area.

3.2 COMPOSITE SAMPLES

Composite samples will be collected in accordance with 314 CMR 9.07(b)(4), which states:

> "*For projects up to 10,000 cubic yards, one core for every 1000 cubic yards of dredged material shall be collected. Up to three cores may be composited to create a single sample, provided:*
>
> *a. The grain-size distribution and likelihood of contamination are similar based on depositional characteristics, spill history, and location of point source discharges;*
> *b. Cores are composited from the same reach; and*
> *c. Samples collected for analysis of volatile compounds are obtained from an individual core and not composited from multiple cores.*
>
> *For all projects, a minimum of two representative samples shall be characterized physically and chemically.*"

The limits of dredging have been subdivided into 3 distinct composite areas that correlate with the downstream, upstream, and below-bridge reaches. Within each composite area, the streambed has consistent grain size distribution, likelihood of contamination, and location of point source discharges. All samples submitted for volatile compounds are to be obtained from an individual core sample and will not be composited from multiple cores.

In total, 3 composite samples will be submitted for WQC parameters and reporting limits in accordance with 314 CMR 9.07. These composite samples will be collected downstream of the bridge (CS1), in the area underneath the bridge (CS2) and upstream (CS3) of the bridge. Each composite sample will consist of 3 core samples located within their respective composite area as designated on the included Sampling and Analysis Plan.

Composite samples will be composed of the following core samples:

- Composite Sample 1 (CS1);
  - Core Sample 1 (S1)
  - Core Sample 2 (S2)
  - Core Sample 3 (S3)
- Composite Sample 2 (CS2);
  - Core Sample 4 (S4)
  - Core Sample 5 (S5)
  - Core Sample 6 (S6)
- Composite Sample 3 (CS3);
  - Core Sample 7 (S7)
  - Core Sample 8 (S8)
  - Core Sample 9 (S9)

In total, 9 core samples will be collected in their respective locations. Each set of three cores, (S1-S3, S4-S6, and S7-S9) will be combined to create the three composite samples (CS1, CS2, and CS3) respectively. Under no circumstances are the three composite samples (CS1, CS2, and CS3) to be combined. All 3 shall be submitted separately for chemical analysis.

The composite sediment samples will also be analyzed for chemical constituents required by Section D of the WQC Application, and COMM-97 parameters. The COMM-97 parameters is one sample per 500 CY of material so three samples composited from each of the 9 core samples should be sufficient for evaluating disposal options.

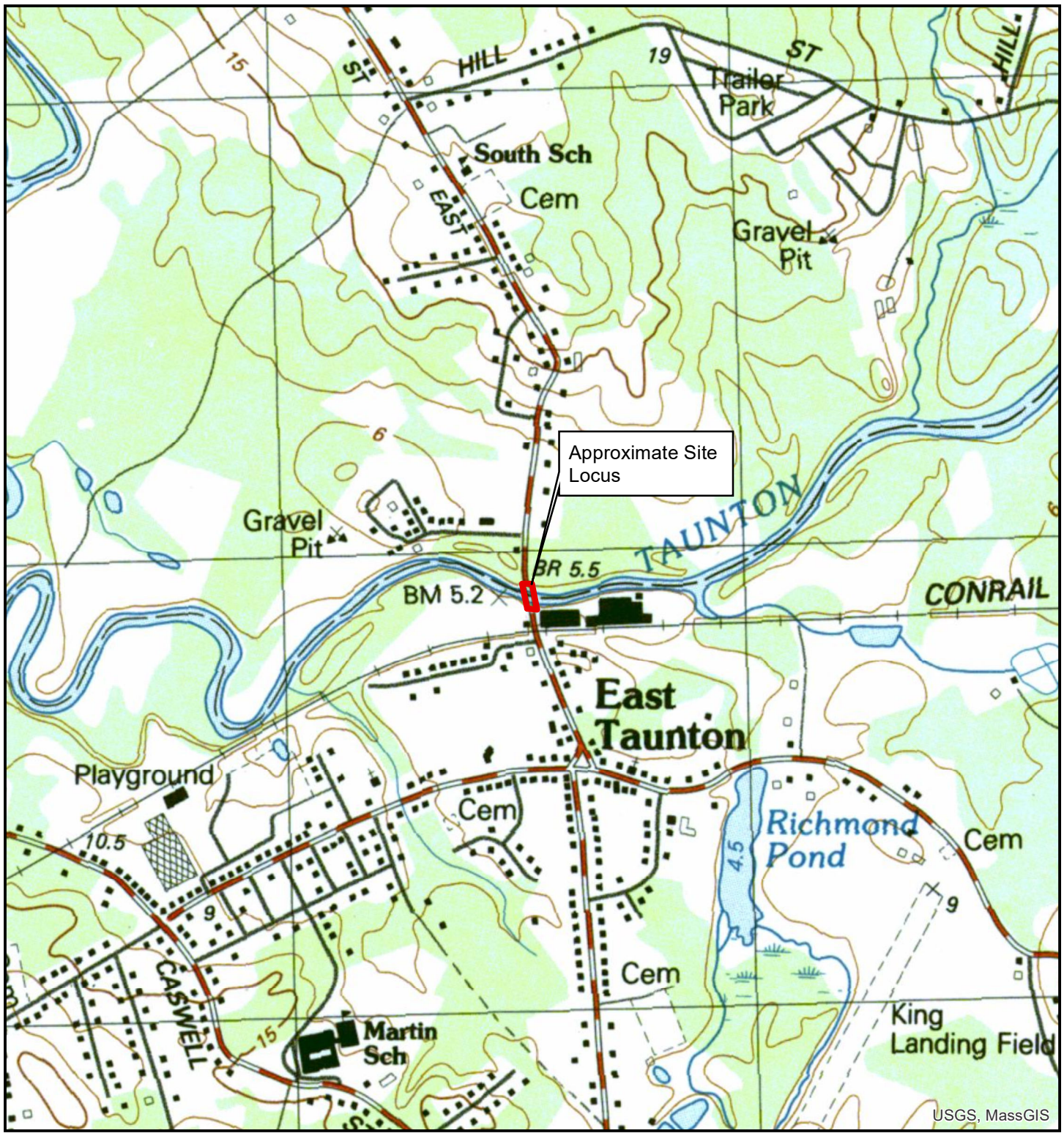
3.3 SEDIMENT SAMPLING PARAMETERS

The results of analysis will be reported in units of mg/kg (ppm) dry weight. The table below is a list following of the constituents that all sediment samples will be analyzed for:

Sample Locations	Parameter	Reporting Limit mg/kg (dry weight)	Method
GS4, CS1, CS2, CS3	Arsenic	0.5	6010B
GS4, CS1, CS2, CS3	Cadmium	0.1	6010B
GS4, CS1, CS2, CS3	Chromium	1.0	6010B
GS4, CS1, CS2, CS3	Copper	1.0	6010B
GS4, CS1, CS2, CS3	Lead	1.0	6010B
GS4, CS1, CS2, CS3	Mercury	0.02	6010B
GS4, CS1, CS2, CS3	Nickel	1.0	6010B
GS4, CS1, CS2, CS3	Zinc	1.0	6010B
CS1, CS2, CS3	Polycyclic Aromatic Hydrocarbons (PAHs)	0.02	8270
CS1, CS2, CS3	Polychlorinated Biphenyls (PCBs) – by NOAA Summation of Congeners	0.01	NOAA
GS4, CS1, CS2, CS3	Extractable Petroleum Hydrocarbons	25	MassDEP EPH
CS1, CS2, CS3	Total Semi-Volatile Organic compounds (SVOCs)		8270
CS1, CS2, CS3	Total Petroleum Hydrocarbons (TPH)		8100
CS1, CS2, CS3	Percent Volatile Solids		
GS1, GS2, GS3, GS4	Volatile Organic Compounds (VOCs)	0.1	8260
CS1, CS2, CS3	Total Organic Carbon	0.1%	
CS1, CS2, CS3	Percent Water	1.0%	
CS1, CS2, CS3	Toxicity Characteristic Leaching Procedure	As applicable	
CS1, CS2, CS3	Conductivity		General Chemistry
CS1, CS2, CS3	Ignitability		General Chemistry
CS1, CS2, CS3	Reactive Sulfide/Cyanides		
CS1, CS2, CS3	Pesticides/Herbicides		

CS1	Particle Size Analysis		ASTM D6913

Figures



IMPROVING COMMUNITIES TOGETHER

N
W E
S

0 1,000 2,000 Feet

1 inch = 1,000 feet

Figure 1
Site Locus
Old Colony Avenue Bridge
Taunton and Raynham, MA

Data Source: MassGIS USGS Topographic Quadrangle Images (2001)

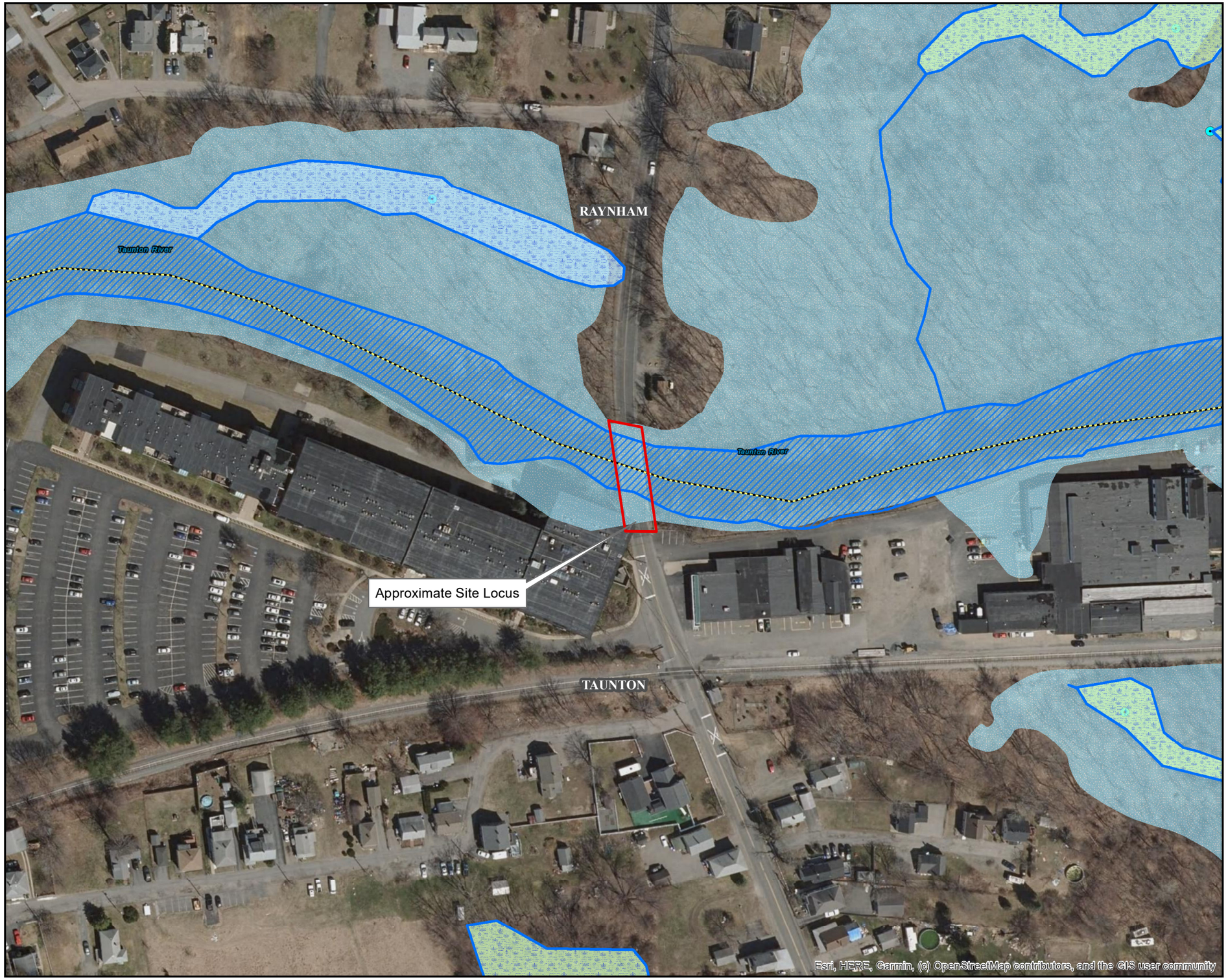


Figure 2
Environmental Resources Figure
Old Colony Avenue Bridge
Taunton and Raynham, MA

Environmental Resources Legend

- MassDEP Hydrologic Feature
- Marsh/Bog
- Wooded marsh
- Open Water
- NFHL 100 Year Flood Zone
- NHESP Potential Vernal Pool
- NHESP Certified Vernal Pool
- NHESP Priority Habitat of Rare Species
- NHESP Estimated Habitats of Rare Wildlife
- Zone A
- Zone B
- ZONE C
- MassDEP Zone I
- MassDEP Zone II
- MassDEP IWPA
- Outstanding Resource Water
- Area of Critical Environmental Concern (ACEC)
- Town Boundary

N
W E
S

0 125 250 Feet

1 inch = 125 feet

Data Source: MassGIS USGS Color Ortho Imagery (2014), MassDEP Wetlands (1:12000) (2009), NHESP Potential Vernal Pools (2000), NHESP Certified Vernal Pools, NHESP Priority Habitats of Rare Species (2008), NHESP Estimated Habitats of Rare Species (2008), Areas of Critical Environmental Concern (2009), FEMA National Flood Hazard Layer (2014),

BETA
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Hazardous Materials Map
Old Colony Avenue Bridge
Taunton and Raynham, MA

Legend

Chapter 21E Tier Classified Sites - Currently Active

Regulated Status

- TIER I
- TIER II
- TIER1D

N
W E
S

0 200 400 Feet

1 inch = 200 feet

Data Source: MassGIS Orthophoto (2013/2014); MassGIS Data: MHC Historic Inventory

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1. THE "LIMITS OF DREDGING" DEPICTED ON THIS PLAN IS FOR INFORMATIONAL PURPOSES ONLY AND WILL BE PERMITTED SEPARATELY.
2. HORIZONTAL DATUM IS BASED UPON THE MASSACHUSETTS MAINLAND STATE PLANE COORDINATE SYSTEM, NAD83 IN US SURVEY FEET.
3. VERTICAL DATUM IS BASED UPON NAVD88 IN US SURVEY FEET.
4. CONTOURS AND ELEVATIONS REFERENCED FROM BATHYMETRIC SURVEY DATA OBTAINED BY GM2 ASSOCIATES, CONDUCTED BETWEEN MAY 2023 AND JUNE 2024.
5. SITE IS LOCATED IN FEMA FLOOD ZONE AE AS SHOWN ON FIRM 25005C0169G, EFFECTIVE 7/16/2015 BASE FLOOD ELEVATION RANGE = 14.4'-14.8'

LEGEND

- CONTOUR-MAJOR
- CONTOUR-MINOR
- EDGE OF WATER
- GRAB SAMPLE LOCATION
- SAMPLE LOCATION
- COMPOSITE SEDIMENT SAMPLE LOCATION

NUMBER	DATE	MADE BY	CHECKED BY	REVISIONS

DRAWN BY: ML
DESIGNED BY:
CHECKED BY:

REGISTERED PROFESSIONAL
For Review Only

PREPARED BY
BETA
www.BETA-Inc.com

SUBCONSULTANT

SCALE
HOR. SCALE IN FEET: 1"=20'
20 0 20 40
VER. SCALE IN FEET: 1"=4'
4 0 4 8
UNLESS OTHERWISE NOTED OR CHANGED BY REPRODUCTION

TITLE
OLD COLONY AVE BRIDGE
TAUNTON, MA 02718

SEDIMENT SAMPLING PLAN

BETA JOB NO. 10887
ISSUE DATE 9/15/2025 12:25 PM
SHEET NO. 1

APPENDIX M

- **Special Provisions**

Town/City, State

Bridge No. R-02-003=T-01-004
South St East/Old Colony Ave over Taunton River

MassDOT Project File # 613642

October 2025

SPECIAL PROVISIONS

315 Norwood Park South
2nd Floor
Norwood, Massachusetts 02062
781.255.1982
www.BETA-Inc.com

DOCUMENT A00801

RAYNHAM/TAUNTON
Federal Aid Project No. CMQ/STP-XXXX
Superstructure Replacement Bridge No. R-02-003=T-01-004 (3M4)
South Street East/Old Colony Avenue over Taunton River

Labor participation goals for this Project shall be 15.3% for minorities and 6.9% for women for each job category. The goals are applicable to both Contractor's and Subcontractor's on-site construction workforce. Refer to Document 00820 for details.

SCOPE OF WORK

All work under this Contract shall be done in conformance with the *2025 Standard Specifications for Highways and Bridges, the Supplemental Specifications* contained in this book, the *Construction Standard Details* in effect as of June, 2025, the *1990 Standard Drawings for Signs and Supports*, the 2015 *Overhead Signal Structure and Foundation Standard Drawings*, the *2009 Manual on Uniform Traffic Control Devices (MUTCD) with Revisions 1, 2, and 3 and the November 2022 Massachusetts Amendments to the MUTCD, the 1968 Standard Drawings for Traffic Signals and Highway Lighting*, the latest edition of The *American Standard for Nursery Stock*, the Plans and these Special Provisions.

The work under this Contract includes the superstructure replacement of Bridge No. R-02-003=T-01-004 South Street East/Old Colony Avenue over Taunton River. The work includes removing and disposing of the existing bridge superstructure; removing and disposing of portions of the existing bridge abutments, wingwalls, and piers; installing abutment, pier, and wall caps; installing continuous steel beam and reinforced concrete deck superstructure; installing approach slabs, highway guardrail transitions, and metal bridge rail. The work also includes temporary water control, excavation, riprap channel protection, sidewalks, full depth roadway construction, milling and overlay, pavement markings, utility relocations, the provisions of safety controls and signing for construction operations, and other incidental work included in the contract documents.

SUBSECTION 7.05 INSURANCE REQUIREMENTS

The insurance requirements set forth in this subsection are in addition to the requirements of the Standard Specifications.

7.05.B: Public Liability Insurance 1. and
7.05.B: Public Liability Insurance 2.

The Massachusetts Department of Transportation and applicable railroads shall be named as additional insureds.

7.05.B: Public Liability Insurance 4.

Asbestos Liability Insurance shall be obtained for this project. The Contractor and the Massachusetts Department of Transportation shall be named as additional insureds.

CONTRACTOR QUESTIONS AND ADDENDUM ACKNOWLEDGEMENTS

Prospective bidders are required to submit all questions to the Construction Contracts Engineer by 3:00 P.M. on the Tuesday of the previous week before the scheduled bid opening date. Any questions received after this time will not be considered for review by the Department.

Contractors should email questions and addendum acknowledgements to the following email address massdotspecifications@dot.state.ma.us The MassDOT project file number and municipality is to be placed in the subject line.

BIDDERS LIST

Pursuant to the provisions of 49 CFR Part 26.11 all official bidders will be required to report the names, addresses and telephone numbers of all firms that submitted bids or quotes in connection with this project. Failure to comply with a written request for this information within 15 business days may result in a recommendation to the Prequalification Committee that prequalification status be suspended until the information is received.

The Department will survey all firms that have submitted bids or quotes during the previous year prior to setting the annual goal and shall request that each firm report its age and gross receipts for the year.

BUILD AMERICA BUY AMERICA PREFERENCE

On Federally-aid projects the Buy America (23.CFR § 635.410) and Build America, Buy America Act. requires the following,

(1) all iron and steel used in the project are produced in the United States--this means all manufacturing processes, from the initial melting stage through the application of coatings, must occur in the United States. Foreign steel and iron can be used if the cost of the materials does not exceed 0.1% of the total Contract cost or $2,500, whichever is greater. The action of applying a coating to a covered material (i.e., steel and iron) is deemed a manufacturing process subject to Buy America. Coating includes epoxy coating, galvanizing, painting and any other coating that protects or enhances the value of a material subject to requirements of Build America, Buy America. Steel used for temporary support of excavation, including H piles, soldier piles, and sheeting when the steel is required to be left in place is subject to requirements of Build America, Buy America. Temporary steel, shall remain in place when it falls within the influence zone of the soil supporting any structure or railroad tracks.

(2) all manufactured products used in the project are produced in the United States—this means the manufactured product was manufactured in the United States and

(3) all construction materials are manufactured in the United States—this means that all manufacturing processes for the construction material occurred in the United States. "Construction materials" includes an article, material, or supply—other than an item of primarily iron or steel; a manufactured product; cement and cementitious materials; aggregates such as stone, sand, or gravel; or aggregate binding agents or additives—that is or consists primarily of:
- non-ferrous metals,
- plastic and polymer-based products (including polyvinylchloride, composite building materials, and polymers used in fiber optic cables),
- glass (including optic glass),
- lumber; or
- drywall.

The Buy America preference only applies to articles, materials, and supplies that are consumed in, incorporated into, or affixed to an infrastructure project. As such, it does not apply to tools, equipment, and supplies, such as temporary scaffolding, brought to the construction site and removed at or before the completion of the infrastructure project. Nor does a Buy America preference apply to equipment and furnishings, such as movable chairs, desks, and portable computer equipment, that are used at or within the finished infrastructure project but are not an integral part of the structure or permanently affixed to the infrastructure project.

All articles, materials, and supplies should be classified as an iron or steel product, a manufactured product, or another product as specified by law or in 2 CFR part 184 (such other products specified by law or in 2 CFR part 184 include "excluded materials" and "construction materials"); an article, material, or supply must not be considered to fall into multiple categories.

NOTE: The requirements for manufactured products indicated in paragraph (2) above are not in effect for this contract.

HOLIDAY WORK RESTRICTIONS

(Supplementing Subsection 7.09)

The District Highway Director (DHD) may authorize work to continue during these specified time periods if it is determined by the District that the work will not negatively impact the traveling public. DHD may allow work in those areas on a case by case basis and where work is behind barrier and will not impact traffic

Below are the holiday work restrictions:

New Years Day (Federal Holiday)
No work on major arterial roadways from 5:00 AM on the day before until the normal start of business on the next subsequent business day. No work on local roadways on the holiday without permission by the DHD and the local police chief.

HOLIDAY WORK RESTRICTIONS (Continued)

Martin Luther King's Birthday (Federal Holiday)
No work restrictions due to traffic concerns, however work on local roadways requires permission by the DHD and local police chief.

President's Day (Federal Holiday)
No work restrictions due to traffic concerns, however work on local roadways requires permission by the DHD and local police chief.

Evacuation Day (Suffolk County State Holiday)
No work restrictions due to traffic concerns.

Patriot's Day (State Holiday)
Work restrictions will be in place for Districts 3 and 6 along the entire Boston Marathon route and any other locations that the DHD in those districts determine are warranted so as to not to impact the marathon. All other districts work restrictions will be as per DHD.

Mother's Day
No work on Western Turnpike and Metropolitan Highway System from 5:00 AM on the Friday before, until the normal start of business on the following day.

Memorial Day (Federal Holiday)
No work on major arterial roadways from 5:00 AM on the Friday before, until the normal start of business on the following day.

Bunker Hill Day (Suffolk County State Holiday)
No work restrictions due to traffic concerns.

Juneteenth
No work restrictions due to traffic concerns, however work on local roadways requires permission by the DHD and local police chief.

Independence Day (Federal Holiday)
No work on major arterial roadways from 5:00 AM on the day before until the normal start of business on the next subsequent business day. No work on local roadways on the holiday without permission by the DHD and the local police chief.

Labor Day (Federal Holiday)
No work on major arterial roadways from 5:00 AM on the Friday before, until the normal start of business on the following day.

Columbus Day (Federal Holiday)
No work on major arterials from 5:00 AM on the Friday before, until the normal start of business on the following day

Veterans' Day (Federal Holiday)
No work restrictions due to traffic concerns.

HOLIDAY WORK RESTRICTIONS (Continued)

Thanksgiving Day (Federal Holiday)
No work on major arterials from 5:00 AM two days before until the normal start of business on the following Monday.

Christmas Day (Federal Holiday)
No work on major arterial roadways from 5:00 AM on the day before until the normal start of business on the next subsequent business day.

SOIL STOCKPILING DIRECTIVE P-22-001

Any stockpiling of soil must be performed in compliance with Policy Directive P-22-001, Off-Site Stockpiling of Soil from MassDOT Construction Projects. This directive limits the allowable locations for off-site stockpiling of soil generated during MassDOT projects and includes various requirements that must be satisfied by the contractor prior to off-site stockpiling. The Contractor is responsible for identifying a suitable stockpile location.

SUBSECTION 8.02 SCHEDULE OF OPERATIONS
Replace this subsection with the following:

An integrated cost and schedule controls program shall be implemented by the Contractor to track and document the progress of the Work from Notice to Proceed (NTP) through the Contractor Field Completion (CFC) Milestone. The Contractor's schedules will be used by the Engineer to monitor project progress, plan the level-of-effort required by the Department's work force and consultants and as a critical decision-making tool. Accordingly, the Contractor shall ensure that it complies fully with the requirements specified herein and that its schedules are both accurate and updated as required by the specification throughout the life of the project. Detailed requirements are provided in Division II, Section 722 Construction Scheduling.

Work on this project is restricted to (1) 8-hour shift per day, 5 days a week, Monday through Friday, between the hours of 7:00 AM and 3:30 PM, with the Prime Contractor and all Subcontractors working on the same shift

TRUCK SAFETY DEVICES
(Supplementing Subsection 7.04: Motor Vehicles)

All motor vehicles subject to Section 7 of Chapter 90 to be operated under this Contract shall be equipped with safety devices as provided therein and in 540 CMR 4.00.

By December 31, 2025, the Contractor shall certify to the Registry of Motor Vehicles, in a manner prescribed by the Registrar, that all applicable vehicles are equipped with Lateral Protective Devices, Convex Mirrors, Cross Over Mirror(s) and Back Up Cameras in accordance with the requirements of 540 CMR 4.00.

The Contractor shall provide evidence satisfactory to the Department to demonstrate compliance with the above certification requirement for all applicable vehicles operated under this Contract by the Contractor and its subcontractors and vendors in a manner set forth by the Department. Thereafter, the Contractor shall have an affirmative obligation to continue to provide such evidence of compliance on an ongoing basis and no later than 7 days after certification with the Registry of Motor Vehicles of any additional vehicles operated under this Contract by the Contractor and its subcontractors and vendors.

Non-compliance with respect to a vehicle that is subject to 540 CMR 4.00 may subject the Contractor to statutory fines as established in M.G.L. c. 90, § 7 and/or contractual remedies up to and including termination of the Contract.

SUBSECTION 8.14 UTILITY COORDINATION, DOCUMENTATION, AND MONITORING RESPONSIBILITIES

A. GENERAL

In accordance with the provisions of Section 8.00 Prosecution and Progress, utility coordination is a critical aspect to this Contract. This section defines the responsibility of the Contractor and MassDOT, with regard to the initial utility relocation plan and changes that occur as the prosecution of the Work progresses. The Engineer, with assistance from the Contractor shall coordinate with Utility companies that are impacted by the Contractor's operations. To support this effort, the Contractor shall provide routine and accurate schedule updates, provide notification of delays, and provide documentation of the steps taken to resolve any conflicts for the temporary and/or permanent relocations of the impacted utilities. The Contractor shall provide copies to the Engineer of the Contractor communication with the Utility companies, including but not limited to:

- Providing advanced notice, for all utility-related meetings initiated by the Contractor.
- Providing meeting minutes for all utility-related meetings that the Contractor attends.
- Providing all test pit records.
- Request for Early Utility work requirements of this section (see below).
- Notification letters for any proposed changes to Utility start dates and/or sequencing.
- Written notification to the Engineer of all apparent utility delays within seven (7) Calendar Days after a recognized delay to actual work in the field – either caused by a Utility or the Contractor.
- Any communication, initiated by the Contractor, associated with additional Right-of-Way needs in support of utility work.
- Submission of completed Utility Completion Forms.

B. PROJECT UTILITY COORDINATION (PUC) FORM

The utility schedule and sequence information provided in the Project Utility Coordination Form (if applicable) is the best available information at the time of the bid and has been considered in setting the contract duration. The Contractor shall use all of this information in developing the bid price and the Baseline Schedule Submission, inclusive of the individual utility durations sequencing requirements, and any work that has been noted as potentially concurrent utility installations.

C. INITIATION OF UTILITY WORK

The Engineer will issue all initial notice-to-proceed dates to each Utility company based on either the:

1) Contractor's accepted Baseline Schedule
2) An approved Early Utility Request in the form of an Early Utility sub-net schedule (in accordance with the requirements of this Subsection)
3) An approved Proposal Schedule

C.1 - BASELINE SCHEDULE – UTILITY BASIS

The Contractor shall provide a Baseline Schedule submission in accordance with the requirements of Subsection 8.02 and inclusive of all of the information provided in the PUC Form that has been issued in the Contract documents. This is to include the utility durations, sequencing of work, allowable concurrent work, and all applicable considerations that have been depicted on the PUC Form.

SUBSECTION 8.14 (Continued)

C.2 – EARLY UTILITY REQUEST – (aka SUBNET SCHEDULE) PRIOR TO THE BASELINE
All early utility work is defined as any anticipated/required utility relocations that need to occur prior to the Baseline Schedule acceptance. In all cases of proposed early utility relocation, the Contractor shall present all known information at the pre-construction conference in the form of a 'sub-net' schedule showing when each early utility activity needs to be issued a notice-to-proceed. The Contractor shall provide advance notification of this intent to request early utility work in writing at or prior to the Pre-Construction meeting. Prior to officially requesting approval for early utility work, the Contractor shall also coordinate with MassDOT and all utility companies (private, state or municipal) which may be impacted by the Contract. If this request is acceptable to the Utilities and to MassDOT, the Engineer will issue a notice-to-proceed to the affected Utilities, based on these accepted dates.

C.3 – PROPOSAL SCHEDULE - CHANGES TO THE PUC FORM
If the Contractor intends to submit a schedule (in accordance with MassDOT Standard Specifications, Division I, Subsection 8.02) that contains durations or sequencing that vary from those provided in the Project Utility Coordination (PUC) Form, the Contactor must submit this as an intended change, in the form of a Proposal Schedule and in accordance with MassDOT Standard Specifications, Division I, Subsection 8.02. These proposed changes are subject to the approval of the Engineer and the impacted utilities, in the form of this Proposal Schedule and a proposed revision to the PUC form. The Contractor shall not proceed with any changes of this type without written authorization from the Engineer, that references the approved Proposal Schedule and PUC form changes. The submission of the Baseline Schedule should not include any of these types of proposed utility changes and should not delay the submission of the Baseline Schedule. As a prerequisite to the Proposal Schedule submission, and in advance of the utility notification(s) period, the Contractor shall coordinate the proposed utility changes with the Engineer and the utility companies, to develop a mutually agreed upon schedule, prior to the start of construction.

D. UTILITY DELAYS
The Contractor shall notify the Engineer upon becoming aware that a Utility owner is not advancing the work in accordance with the approved utility schedule. Such notice shall be provided to the Engineer no later than seven (7) calendar days after the occurrence of the event that the Contractor believes to be a utility delay. After such notice, the Engineer and the Contractor shall continue to diligently seek the Utility Owner's cooperation in performing their scope of Work.

In order to demonstrate that a critical path delay has been caused by a third-party Utility, the Contractor must demonstrate, through the requirements of the monthly Progress Schedule submissions and the supporting contract records associated with Subsection 8.02, 8.10 and 8.14, that the delays were beyond the control of the Contractor.

SUBSECTION 8.14 (Continued)

All documentation provided in this section is subject to the review and verification of the Engineer and, if required, the Utility Owner. In accordance with MassDOT Specifications, Division I, Subsection 8.10, a Time Extension will be granted for a delay caused by a Utility, only if the actual duration of the utility work is in excess of that shown on the Project Utility Coordination Form, and only if;

1) proper Notification of Delay was provided to MassDOT in accordance with the time requirements that are specified in this Section
2) the utility delay is a critical path impact to the Baseline Schedule (or most recently approved Progress Schedule)

E. LOCATION OF UTILITIES

The locations of existing utilities are shown on the Contract drawings as an approximation only. The Contractor shall perform a pre-construction utility survey, including any required test pits, to determine the location of all known utilities no later than thirty (30) calendar days before commencing physical site work in the affected area.

F. POST UTILITY SURVEY – NOTIFICATION

Following completion of a utility survey of existing locations, the Contractor will be responsible to notify the Engineer of any known conflicts associated with the actual location of utilities prior to the start of the work. The Engineer and the Contractor will coordinate with any utility whose assets are to be affected by the Work of this Contract. A partial list of utility contact information is provided in the Project Utility Coordination Form.

G. MEETINGS AND COOPERATION WITH UTILITY OWNERS

The Contractor shall notify the Engineer in advance of any meeting they initiate with a Utility Owner's representative to allow MassDOT to participate in the meeting if needed.

Prior to the Pre-Construction Meeting, the Contractor should meet with all Utility Owners who will be required to perform utility relocations within the first 6 months of the project, to update the affected utilities of the Project Utility Coordination Form and all other applicable Contract requirements that impact the Utilities. The Contractor shall copy the Engineer on any correspondence between the Utility Owner and the Contractor.

H. FORCE ACCOUNT / UTILITY MONITORING REQUIREMENTS

The Engineer will be responsible for recording daily Utility work force reports. The start, suspension, re-start, and completion dates of each of the Utilities, within each phase of the utility relocation work, will be monitored and agreed to by the Engineer and the Contractor as the work progresses.

I. ACCESS AND INSPECTION

The Contractor shall be responsible for allowing Utility owners access to their own utilities to perform the relocations and/or inspections. The Contractor shall schedule their work accordingly so as not to delay or prevent each utility from maintaining their relocation schedule.

COMPLIANCE WITH THE NATIONAL DEFENSE AUTHORIZATION ACT

(Supplementing Subsection 7.01)

On all projects, the "Prohibition on Certain Telecommunications and Video Surveillance Services or Equipment" Regulation (2 CFR 200.216) prohibits the Contractor from using or furnishing the following telecommunications equipment or services:

- Telecommunications equipment produced by Huawei Technologies Company or ZTE Corporation (or any subsidiary or affiliate of such entities).
- For the purpose of public safety, security of government facilities, physical security surveillance of critical infrastructure, and other national security purposes, video surveillance and telecommunications equipment produced by Hytera Communications Corporation, Hangzhou Hikvision Digital Technology Company, or Dahua Technology Company (or any subsidiary or affiliate of such entities).
- Telecommunications or video surveillance services provided by such entities or using such equipment.
- Telecommunications or video surveillance equipment or services produced or provided by an entity that the Secretary of Defense, in consultation with the Director of the National Intelligence or the Director of the Federal Bureau of Investigation, reasonably believes to be an entity owned or controlled by, or otherwise connected to, the government of a covered foreign country.

This prohibition applies to all products manufactured by the aforementioned companies, including any individual components or parts.

By submitting a bid on a project, the Contractor certifies that all work will be in compliance with the terms of 2 CFR 200.216. The Contractor shall submit a COC indicating compliance with the above provisions for all telecommunications equipment or services included in the Contract.

Payment for the item in which the materials are incorporated may be withheld until these COCs are received. Any cost involved in furnishing the certificate(s) shall be borne by the Contractor.

2026 FIFA WORLD CUP – BOSTON, MASSACHUSETTS

The 2026 FIFA World Cup will be held at Gillette Stadium in Foxborough, related events, and significant tourist events such as Sail Boston and the 250th Anniversary of the United States will be held throughout the region. Matches and Fan Fest and other possible 250th Celebration activities are scheduled through June, July and August 2026. The District will be imposing work and/or traffic restrictions as necessary to minimize impacts during these periods when, as determined by MassDOT, the Contractor's operations could impact vehicular traffic, particularly on interstate highways and major arterials throughout the region and local roads near event sites. No additional compensation will be allowed for work restrictions except as determined under Subsection 8.10. nor will the Contractor have any claim for related costs, direct or indirect. The Contract time determinations have accounted for potential work restriction during this period and Contractor's should plan accordingly. Any necessary or emergency work required during this time will require District approval.

EMERALD ASH BORER ADVISORY

To the extent possible, all trees and brush shall be disposed on site, typically chipped and spread in place. When trees or brush must be removed, such as in urban, or otherwise populated areas, Contractor shall identify proposed location for disposal, and provide written notification to the Engineer for approval. Disposal shall be in city or town of project, or at minimum, within county, of construction operations.

ENVIRONMENTAL PERMITTING

The proposed work occurs in jurisdictional wetland resources subject to section 401 and section 404 of the Clean Water Act; therefore, a Water Quality Certification from the Massachusetts Department of Environmental Protection and MA General Permit authorization from the US Army Corps of Engineers have been obtained. The Contractor is advised that all terms and conditions within said permits shall be strictly adhered to. The proposed work qualifies for the bridge exemption authorized in the Transportation Bond Bill and is therefore not subject to the Massachusetts Wetlands Protection Act, the Massachusetts Public Waterfront Act (Chapter 91), or the Massachusetts Environmental Policy Act. The proposed work, however, is subject to the Raynham and Taunton wetlands bylaws. An Order of Conditions has been obtained from each municipality for this work.

If Contractor erection, demolition, storage, or other procedures not originally allowed by existing environmental permits require work to occur in or otherwise impact water or wetland resource areas, the Contractor is advised that no associated work can occur until all required environmental permits have been either amended or obtained allowing such work. The Contractor must notify the MassDOT Highway Division District 5 Highway Director and Resident Engineer in writing at least 60 days prior to commencement of the proposed activity. All environmental submittals, including any contact with Local, State, or Federal environmental agencies, must be coordinated through the MassDOT Highway Division District 5 Environmental Engineer. The Contractor is expected to fully cooperate with requests for information and provide same in a timely manner. The Contractor is further advised that the Department will not entertain a delay claim due to the time required to modify or obtain the environmental permits.

Army Corps of Engineers – Section 404 General Permit Coverage

Work under this project is subject to Section 404 of the Federal Clean Water Act, 33 U.S.C. 1251 et seq and is authorized under the Department of the Army General Permits for Massachusetts (GPs), dated June 2, 2023, which are issued by the New England District of the U.S. Army Corps of Engineers (Corps). Activities are eligible for coverage under the GPs provided that 1) the activity meets the terms and conditions of applicable GPs and General Conditions (GCs), and 2) either a Self-Verification Form (SVF) or a Pre-Construction Notification (PCN) is submitted to the Corps. A PCN listing the applicable GPs (23 & 24) for the work proposed under this project was submitted to the Corps. The GPs are to be considered part of this contract and a copy of the entire GPs document, PCN authorization and all associated plans/attachments shall be maintained on-site while activities regulated by the GPs are being performed.

The Contractor is hereby notified that he/she will be responsible and held accountable for performing any/all work necessary to satisfy and comply with the entire GPs document. The Contractor is advised that no additional compensation will be allowed for work required to establish, achieve, and maintain compliance with the GPs, as payment for the work shall be included in the various bid items, unless specified elsewhere. This work may include, but is not limited to, the following: the hiring and paying for the services of a Professional Biologist, Botanist, Wetland Scientist, Engineer, Landscape Architect, etc.; preparation and submission of as-built plans; wetland flagging; wetland replication monitoring reports, etc.

MassDEP – Section 401 Water Quality Certification

This project is subject to Section 401 of the Federal Clean Water Act and has been issued a Water Quality Certification ("WQC") by the Department of Environmental Protection. The WQC and Application are to be considered part of this contract and a copy of the WQC and all plans/attachments shall be on-site while activities regulated by the WQC are being performed. The Contractor's attention is directed to the fact that special conditions and other requirements are associated with this WQC and Application. It is the Contractor's responsibility to be aware of and comply with these conditions and requirements and plan his/her work and schedule accordingly. **The Contractor is hereby notified that he/she will be responsible and held accountable for performing any/all work necessary to satisfy and comply with the entire WQC and Application**. Arrangements to view the WQC and/or Application can be made by calling Amer Raza at (857) 368-1035. If the Contractor wishes to obtain copies, s/he shall do so at his own expense. The Contractor is advised that no additional compensation will be allowed for work required to establish, achieve, and maintain compliance with the WQC and Application, as payment for the work shall be included in the various bid items, unless otherwise specified. This work may include, but is not limited to, the following: preparation and submission of as-built plans; wetland flagging; wetland replication monitoring reports; preparation of the construction period erosion, sedimentation, and pollution prevention plan (CP/PP); etc.

Orders of Conditions

Orders of Conditions have been obtained from the Raynham and Taunton Conservation Commissions for work in and around the onsite resource areas. Payment for work required by the Orders of Conditions and any Special Conditions, unless otherwise provided for, shall be considered incidental to other items, and no additional payment shall be made for this work.

GENERAL REQUIREMENTS FOR DEMOLITION AND WORK INVOLVING PAINTED STEEL

(02/06/2020)

Demolition and work involving painted steel shall conform to the requirements of Subsection 961 of the Standard Specifications.

Work Involving Painted Steel

Hazardous materials shall be removed in the immediate area of any intended welding, heating, saw cutting or burning of steel. Hazardous material removal is required to allow the demolition of structural steel, railings, drainage systems, utility supports, steel lamp posts, etc.

The contractor shall assume that the coatings on the steel contain lead (Pb), unless otherwise determined by testing. The contractor shall certify in writing to the Engineer the results of all testing, and shall also certify that any lead (Pb) coated steel removed from the project was not reused or buried, but was sent to a scrap metal recycling facility.

Implement and maintain programs and procedures, which comply with the requirements of this specification and all applicable standards and regulations. Comply with all applicable regulations even if the regulation is not specifically referenced herein. If a state or local regulation is more restrictive than the regulation of this specification, follow the more restrictive requirements.

This requirement is intended only for the demolition and preparation prior to repair and does not include provisions for recoating of steel.

Environmental

All applicable portions of Subsections 961.65 “Worker Protection” and 961.66 “Environmental Protection and Monitoring” shall be followed when performing this work.

During chemical stripping a hand washing facility may be used in lieu of a decontamination/changing facility.

Hazardous material shall be collected during the disassembly and disposed of as outlined in Subsection 961.68 “Handling of Hazardous Waste and Reporting Release Programs”.

The applicable submittals shall be according to Subsection 961.69 “Submittals”.

GENERAL REQUIREMENTS FOR DEMOLITION AND WORK INVOLVING PAINTED STEEL (Continued)

Cleaning/Removal

Cutting Or Burning Of Steel

All surfaces to be welded, heated, saw cut or burned shall be cleaned so as to remove all contaminants and/or hazardous materials, which could be discharged to the environment as a function of the subsequent operations.

Lead paint shall be removed in its entirety in an area prescribed by a 6 inch (15 cm) minimum offset from the required work. The paint removal operation may be dry abrasive blasting, wet abrasive blasting or chemical stripping.

Proper level of containment shall be used when performing this work in accordance with Subsection 961.67 "Containment". Full containment is not required during chemical stripping operation however; the Contractor shall install proper shielding and/or tarpaulins under the chemical stripping operations in order to catch all debris generated during this procedure. A cleaned area must be inspected and approved before the demolition operations are started.

During cleaning operations the Contractor shall be required to furnish and erect temporary floodlights illuminating the steel surface at a minimum of 30-foot candles. This lighting shall be used in areas where there is insufficient lighting for proper cleaning operations and inspection. The Contractor shall supply electrical power.

The Contractor shall provide support for interim and final inspection of the bridge during cleaning operations. This support shall include the necessary traffic controls and safe access to the work.

Mechanical Disassembly Of Steel

All surfaces to be mechanically disassembled by shear cutting or removing bolts or rivets shall not require deleading. When shear cutting or removing bolts or rivets, the Contractor shall not use any method that will cause dust and/or particles to be emitted and/or dispersed into the environment to an extent that would expose the workers above the Action Levels of 30µg/m3.

For purposes of limiting the lead (Pb) dust, the Contractor will be required to dampen the lead paint work areas.

The contractor shall install a proper shielding and/or tarpaulins under all lead-paint-coated surfaces to be shear cut or bolts or rivets ordered removed in order to catch any loose lead paint chips, dust or particles.

PIGEON WASTE

The Contractor shall remove and dispose of the pigeon waste and any other debris accumulated on the steel members and bridge seats in areas where work is being performed. Pigeon waste and debris material contaminants will require special handling and disposal in accordance with all Federal, state, and local requirements. No separate payment will be made for removal and disposal of pigeon waste. Cost shall be incidental to the contract pay items.

CONTAMINATED SOIL

Soil to be removed from the project area shall not be assumed to be uncontaminated and must be evaluated prior to off-site management for potential contamination with hazardous materials. **No soil may be disposed of off-site without proper assessment by the contractor and approval from the Resident Engineer (RE), District Environmental Engineer (DEE), or the project designee.**

NOTIFICATION OF FUNDING SOURCES FOR WORK TO BE PAID BY OTHERS

This contract has an agreement with the City of Taunton; whereas when the construction costs for the contract scope exceed the total participating contract bid price by more than ten percent (10%), the City of Taunton shall be responsible for the amount over 110% of the total participating contract bid price.

ASBESTOS CONDUIT

Utility conduits are considered suspect materials for asbestos. Please determine whether asbestos is present in existing drainage pipe and utility conduits to be removed throughout the project corridor. **Item 182.1 – Inspection and Testing for Asbestos** (if needed) and **Item 182.2 – Removal and Disposal of Asbestos** is included in the contract.

NOTICE TO OWNERS OF UTILITIES

(Supplementing Subsection 7.13)

Written notice shall be given by the Contractor to all public service corporations or municipal and State officials owning or having charge of publicly or privately owned utilities of his intention to commence operations affecting such utilities at least one (1) week in advance of the commencement of such operations. The Contractor shall, at the same time, file a copy of such notice with the Engineer. The Contractor shall ensure that all affected utilities / agencies are notified.

The following website lists the names and addresses of the utilities may be affected, but the completeness of the list is not guaranteed:

https://www.mass.gov/info-details/utility-contacts-by-district-and-municipality

Select District 5
Select the Raynham Town and Taunton City, and then locate the utility

Town officials are shown at website http://www.mass.gov

Print "Cities and Towns" in the Search box, then Select Massachusetts **Cities and Towns** link, then select alphabetically the required Town.

The following is the name and addresses of the agency which may be affected and must be notified. Completeness is not guaranteed by the Department. The Contractor shall assure that all affected agencies are notified.

RAYNHAM - Pole Data

Municipality	Pole Set Responsibility	Updated
RAYNHAM	Taunton Municipal Light/Verizon	1/11/2018

District Utility/Constructability Engineer

County	District	Contact	Phone	Email
Bristol	5	Christopher Lockett	857-368-5073	Christopher.lockett@state.ma.us

Utility Data

Electric

Company	Address	City	State	Zip	Updated
Taunton Municipal Lighting Plant	P.O. Box 870	Taunton	MA	02780	7/8/2009

Contact	Office	Extension	Email	
Joe Fernandes	508-824-5844	3179	josephfernandes@tmlp.com	9/4/2012

Gas

Company	Address	City	State	Zip	Updated
Eversource Gas	995 Belmont St.	Brockton	MA	02301	1/8/2021

Contact	Office	Extension	Email	
Brendan Pitts	508-895-4818		brendan.pitts@Eversource.com	12/4/2023

Telephone

Company	Address	City	State	Zip	Updated
Verizon	385 Myles Standish Blvd.	Taunton	MA	02780	11/8/2013

Contact	Office	Extension	Email	
Evan McSorley	774-409-3184		evan.mcsorley@verizon.com	9/29/2025

Water

Company	Address	City	State	Zip	Updated
Raynham Center Water District	P.O. Box 160	Raynham	MA	02767	

Contact	Office	Extension	Email	
William Ward	508-824-0020			4/24/2013

Company	Address	City	State	Zip	Updated
North Raynham Water District	P.O. Box 1	Raynham	MA	02767	6/19/2008

Contact	Office	Extension	Email	
Arthur Bendinelli	508-824-0520			4/24/2013

Sewer

Company	Address	City	State	Zip	Updated
Raynham Sewer Dept.	416 Titicut Rd.	Raynham	MA	02767	

Contact	Office	Extension	Email	
Rob Carey	508-824-2749		rcarey@raynhamsewer.com	10/23/2018

Railroad

Company	Address	City	State	Zip	Updated
MBTA Archives & Digital Asset Preservation	10 Park Plaza	Boston	MA	02116	8/1/2024

Contact	Office	Extension	Email

Sylvia Welsh				archives@mbta.com	8/1/2024

Company	Address	City	State	Zip	Updated
Mass Coastal Railroad	12 Harding Street, Unit 202	Lakeville	MA	02347	6/18/2019

Contact	Office	Extension	Email	
Chris Podgurski	508-291-2116		cpodgurski@capetrain.com	3/11/2015

Cable

Company	Address	City	State	Zip	Updated
Comcast Cable Corporation	PO Box 6505, 5 Omni Way	Chelmsford	MA	01824	8/8/2018

Contact	Office	Extension	Email	
Wendy Brown	978-848-5163		Wendy_Brown@comcast.com	4/22/2024

Fire Alarm

Company	Address	City	State	Zip	Updated
No Fire Alarm			MA		

Contact	Office	Extension	Email	
No Contact				12/20/2011

DPW

Company	Address	City	State	Zip	Updated
Raynham Hwy. Dept.	1555 King Phillip Street	Raynham	MA	02767	

Contact	Office	Extension	Email	
Norm Sturtevant	508-824-2718		nsturtevant@town.raynham.ma.us	5/6/2025

Other

Company	Address	City	State	Zip	Updated
Verizon Wireless Small Cell	20 Alexander Drive	WallingfordCT		06492	10/27/2022

Contact	Office	Extension	Email	
Elizabeth Glidden			elizabeth.glidden@vzw.com	3/25/2025

TAUNTON - Pole Data

Municipality	Pole Set Responsibility	Updated
TAUNTON	Taunton Municipal Light/Verizon	1/11/2018

District Utility/Constructability Engineer

County	District	Contact	Phone	Email
Bristol	5	Christopher Lockett	857-368-5073	Christopher.lockett@state.ma.us

Utility Data

Electric

Company	Address	City	State	Zip	Updated
Taunton Municipal Lighting Plant	P.O. Box 870	Taunton	MA	02780	7/8/2009

Contact	Office	Extension	Email	
Joe Fernandes	508-824-5844	3179	josephfernan	9/17/2014

Gas

Company	Address	City	State	Zip	Updated
Enbridge	8 Wilson Way	Westwood	MA	02090	3/2/2018

Contact	Office	Extension	Email	
Kathy M. Aruda	508-938-7728		kathleen.aruda@enbridge.com	3/2/2018

Company	Address	City	State	Zip	Updated
Eversource Gas	995 Belmont St.	Brockton	MA	02301	1/8/2021

Contact	Office	Extension	Email	
Brendan Pitts	508-895-4818		brendan.pitts@Eversource.com	12/4/2023

Telephone

Company	Address	City	State	Zip	Updated
Verizon	385 Myles Standish Blvd.	Taunton	MA	02780	11/8/2013

Contact	Office	Extension	Email	
Evan McSorley	774-409-3184		evan.mcsorley@verizon.com	9/29/2025

Water

Company	Address	City	State	Zip	Updated
Taunton DPW-Water Division	90 Ingell Street	Taunton	MA	02780	7/28/2010

Contact	Office	Extension	Email	
Mike Arruda	508-823-3582		marruda@taunton-ma.gov	4/5/2022

Sewer

Company	Address	City	State	Zip	Updated
Veolia Water (Municipal)	825 West Water St	Taunton	MA	02780	3/24/2010

Contact	Office	Extension	Email

Mike Arruda	508-823-3582	marruda@taunton-ma.gov	4/5/2022

Railroad

Company	Address	City	State	Zip	Updated
MBTA Archives & Digital Asset Preservation	10 Park Plaza	Boston	MA	02116	8/1/2024

Contact	Office	Extension	Email	
Sylvia Welsh			archives@mbta.com	8/1/2024

Company	Address	City	State	Zip	Updated
Mass Coastal Railroad	12 Harding Street, Unit 202	Lakeville	MA	02347	6/18/2019

Contact	Office	Extension	Email	
Chris Podgurski	508-291-2116		cpodgurski@capetrain.com	3/11/2015

Company	Address	City	State	Zip	Updated
CSX Transportation	2000 West Cabot Blvd - Suite 130	Langhorne	PA	19047	2/13/2023

Contact	Office	Extension	Email	
Michael Sliper	518-767-6081		Michael_Sliper@csx.com	4/28/2025

Cable

Company	Address	City	State	Zip	Updated
Comcast Cable Corporation	PO Box 6505, 5 Omni Way	Chelmsford	MA	01824	8/8/2018

Contact	Office	Extension	Email	
Wendy Brown	978-848-5163		Wendy_Brown@comcast.com	4/22/2024

Company	Address	City	State	Zip	Updated

AT&T / Teleport Communications America, c/o Siena Engineering Group	50 Mall Road - Suite 203	Burlington	MA	01803	4/15/2014

Contact	Office	Extension	Email	
Erica Hudson	781-221-8400	7041	erica.hudson@sienaengineeringgroup.com	7/18/2023

Company	Address	City	State	Zip	Updated
Crown Castle	80 Central Street	Boxborough	MA	01719	1/18/2018

Contact	Office	Extension	Email	
Mark Bonanno	508 616 7818		mark.bonanno@crowncastle.com	7/17/2018

Fire Alarm

Company	Address	City	State	Zip	Updated
Radio Boxes					

Contact	Office	Extension	Email

DPW

Company	Address	City	State	Zip	Updated
Taunton City Engineer	90 Ingell Street	Taunton	MA	02780	4/18/2012

Contact	Office	Extension	Email	
Michael Patneaude	508-821-1027		mpatneaude@taunton-ma.gov	4/5/2022

Other

Company	Address	City	State	Zip	Updated
Verizon Wireless Small Cell	20 Alexander Drive	Wallingford	CT	06492	10/27/2022

Contact	Office	Extension	Email
Elizabeth Glidden			elizabeth.glidden@vzw.com3/25/2025

The Contractor shall coordinate his/her work with the work required to be performed by any private utility owner for this project. No additional compensation or time extensions shall be allowed for delays as a result of work required to be performed by a private utility owner.

If a pole needs to be held by the utility in order to sustain them securely in place during placement of (drainage structures, pipe, etc.), the Contractor will be solely responsible for all costs charged by the utility owner for this service. All costs in connection shall be included in the unit prices for the various items.

EVERSOURCE EMERGENCY TELEPHONE NUMBERS

GAS:
Outage/ Emergency: 800-592-2000
New Service: 866-678-2744
Customer Support: 800-592-2000

MBTA FLAGGING

The Contractor shall provide a minimum two week notice for flagging support for MBTA bridges and railroads. This applies only to bridges and railroads operated by Keolis Commuter Services (KCS). This two week notice does not apply to emergency work, only to routine or scheduled work activities. The contact person for advance request for flagging services is Rich Arnold, MBTA Railroad Operations Department, Phone number (617)-222-3635, email address: rarnold@mbta.com.

MBTA COMMUTER RAIL

Keolis Commuter Service (KCS) operates the commuter rail for the MBTA. All references to MBCR in the provisions will mean Keolis Commuter Service (KCS).

MBTA RAILROAD COORDINATION / ACCESS TO MBTA PROPERTY

The Contractor shall be required to coordinate the work of this Contract with the MBTA and Keolis Commuter Services Co. ("KCS") through the MassDOT Resident Engineer and MassDOT designated Field Staff. A majority of the prerequisites for the Contractor to perform work on or adjacent to MBTA transit lines may be found in the "MBTA Special Instructions" provided herein. The Contractor shall be required to comply with the all applicable requirements of the latest edition of the MBTA Special Instructions available at the time of Contract Award.

The Contractor will have to perform construction related activities on, over, under, within or adjacent to railroad property owned or controlled by the MBTA. Any work that will affect Commuter Rail operations, involve work on, over, under, within or adjacent to the commuter rail right of way must be coordinated with MBTA Railroad Operations and KCS and shall comply with the latest version of the MBTA Railroad Operations Directorate.

An owner or Contractor who wishes permission to enter upon or perform work over, on, under or adjacent to MBTA property shall submit to the offices of the MBTA's designated representative, a request in writing, a minimum of forty-two (42) days prior to the owner or the Contractor's planned commencement of any of the above stated activities.

MBTA COORDINATION – SUBSTITUTE BUSING

Substitute bus transportation will be required for weekend MBTA Commuter Rail shutdowns. The Contractor must coordinate with MBTA Operations Department for provision of bus service. The Contractor shall contact MBTA Operations Dept. a minimum of 6 weeks prior to any planned rail shutdown. The MBTA will be responsible for planning, procuring, and administering the necessary substitute bus transportation services and operations based on the Contractor's approved work schedule.

Prime Contact:
Eric Ciborowski
32 Cobble Hill Road
Somerville, MA 02143
617-634-2567
ECIBOROWSKI@MBTA.com

Secondary Contact:
Delrico Gomes
32 Cobble Hill Road
Somerville, MA 02143
857-366-0404
DGOMES@MBTA.COM

The Contractor shall be required to attend the MBTA Weekly Track Outage Schedule Coordination Meetings held Wednesdays at 10:00 am at 32 Cobble Hill Road in the small classroom located in the training area at the rear of the building.

VALUE ENGINEERING CHANGE PROPOSAL

This Subsection defines the conditions and requirements which apply to Value Engineering Change Proposals ("VECPs"). The purpose of this provision is to encourage the Contractor to propose changes in certain project requirements that will maintain the project's functional requirements at a savings in contract time, contract price, or both. The net savings obtained by using a VECP that meets the conditions and requirements set forth here will be shared by the Contractor and MassDOT.

VECP's under this provison are to be initiated, developed and submitted to MassDOT by the Contractor. The VECP must show the contemplated changes to the Drawings, Specifications and other requirements in the Contract. When a VECP submitted pursuant to this section is fully accepted by MassDOT, the VECP will be implemented by the Contractor and paid using the current cost and resource loaded schedule. Contractor shall demonstrate that the VECP is equal to, or better than, the original design or material; that there is an interest in public safety within the VECP; that there is a life-cycle cost benefit; and/or that end users will benefit from the shortened schedule. VECPs shall be consistent with the MassHighway/MassDOT Standard Specifications for Highways and Bridges and other applicable reference documents and directives. Any proposed deviation from these documents will need to be clearly identified in the VECP Proposal Documents, and must be approved by MassDOT's Chief Engineer before accepting this VECP.

A. In order to be considered for MassDOT review each VECP shall:
   1. Be clearly labeled pursuant to this Subsection;

   2. Yield a net savings at least two hundred and fifty thousand (250,000.00) Dollars and/or a net saving of contract completion duration of at least three (3) months;

   3. The proposed changes to contract items must:

      a. maintain the specified items' required functions (service life, reliability);

      b. meet applicable safety regulations and codes;

      c. material substitutions must be in accordance with DOT prequalified/preapproved products and must be tested in accordance with standard material specs/testing methods (and considering all relevant environmental, load, and other relevant factors);

      d. show economy of operation, ease of maintenance, ease of construction, and necessary standardized features and appearance; and

   4. Shall not require an extension of Contract Time or Contract Milestones, with the exception of cases when there are anticipated significant cost saving.

VALUE ENGINEERING CHANGE PROPOSAL (Continued)

The thresholds above are considered to be a general guideline. MassDOT will consider VECPs outside of these thresholds if a significant benefit is demonstrated. Additionally, notwithstanding this VECP process, MassDOT will consider minor revisions in the form of a Contract Modification.

Further, any VECP submitted shall be in sufficient detail to clearly define the proposed change. The Contractor's failure to provide information of the type, detail and in a format to facilitate the MassDOT's review, may be grounds for rejection of the VECP. Additionally, the Contractor will not be entitled to any equitable adjustment or increased Time, due to any aspect of any of the proposed VECP including permitting, right of way, utility coordination or delayed responses by MassDOT. If, after the progression of the work associated with the executed Contract Modification for the VECP, any additional costs are realized by the Contractor or any of the sub- consultants, sub-contractors, or suppliers, the Contractor shall be obligated to pay for any and all costs.

B. The following initial items shall be provided by the Contractor for MassDOT's review. *Items 1-6 need to be submitted prior to the start of MassDOT's review of the VECP and item 7 is an important consideration for the pricing of the VECP and the timeline of the proposed VECP schedule.*

1. ***VECP Description***: A description of the difference between the existing and the proposed Contract requirements, and the comparative advantages and disadvantages of each;

2. ***VECP Change Listing***: A listing of the Contract requirements that will need to be changed, modified, or reviewed as well as the proposed Contract document changes in the Instructions to Bidders, Contract, Standard Specifications, General Requirements and Special Provisions required by the VECP.

3. ***Construction Schedule Update*:** Any changes in the Contract Time(s) or Contract Milestone(s), that will result from acceptance of the VECP, shall be accompanied by a contemporaneous schedule analysis *(i.e, the Contractor's baseline schedule submission, all past/required monthly schedule updates, a detailed assessment of all past delays, and a resource loaded Crticial Path Method schedule as specified in Section 8.0 / Subsection 8.02 of this Contract)* of the projected Work that remains including the proposed VECP related schedule changes *(inclusive of the timeline to review accept the VECP and the timeline for implementing the design changes)* in the remaining work. This shall be submitted in the form of a Proposal Schedule until the VECP has been formally accepted. Note: All of this information is to be updated, recertified, and formally accepted by MassDOT before final acceptance of this this VECP is issued.

VALUE ENGINEERING CHANGE PROPOSAL (Continued)

4. ***Date for MassDOT's Acceptance***: A statement that clearly justifies the date by which the VECP must be accepted to obtain the maximum price reduction, noting any effect upon the Contract Time(s) and/or Contract Milestone(s). This statement must include a narrative that demonstrates the most recent construction schedule has been utilized to justify that proposed acceptance date *(e.g. "in order to start to fabricate critical materials, authorization must be provided to work on the shop drawings by no later than [date]").* The Contractor should allow for at least sixty (60) to ninety (90) days for acceptance by MassDOT once all of the VECP documentation has been provided. Acceptance shall mean that MassDOT has received a finalized and executed contract modification. However, this is a proposed Contract change.

   The Contractor is fully obligated to progress the Work of the original Contract and MassDOT is not liable for any delays or costs that may occur in the review phase of any VECP proposal.

5. ***Cost and Savings Estimates***: A detailed estimate of the anticipated net savings, calculated as follows:

   a. ***Original Scope:*** Isolate the cost of performing the original contract construction activities, in accordance with the original Contract Documents, as originally bid by the Contractor, that are anticipated to be superseded by the VECP. *This cost is to include any original contract scope that is anticipated to be altered or eliminated by the VECP such as, shop drawing preparation, inspection work, testing, maintenance of traffic, or any other original contract costs, that have yet to have been performed at the time of this VECP submission.*

   b. ***New VECP Scope:*** Calculate the cost of performing the comparable construction activities associated with the VECP.

   c. ***Contractor's Engineer & Inspection***: Calculate the cost of engineering, inspection, and design work by the Contractor's Engineer/Designer. This should be a realistic estimate of the costs of any required engineering, design and review work by the Contractor's Engineer.

   d. ***MassDOT's Costs:*** MassDOT's estimate of costs to perform engineering/design reviews, cost estimate reviews, schedule reviews, and any other administrative costs to review and recommend implementation of the proposed VECP. *(including all anticipated increased costs to MassDOT on other Contracts and all anticipated follow-on increased costs to MassDOT, if any)* as provided by MassDOT. MassDOT's estimated costs must be included the VECP calculation and will be provided by MassDOT in support of the VECP evaluation process.

   e. ***Other Costs:*** Estimated costs associated with any revisions to other project related costs, such as Environmental Permits or Right of Way acquisitions, including other agency or municipality costs, as provided by MassDOT.

VALUE ENGINEERING CHANGE PROPOSAL (Continued)

Net Savings:
The net savings to be split between MassDOT and the Contractor shall be calculated using the items above as follows: a - (b+c+d+e) = net savings

6. *The Contractor shall also provide:*

   a. A proposed Change Order, which explains and justifies any required Equitable Adjustment in the Contract Price.

   b. The Contractor's actual costs expended for developing the VECP as of the date of the VECP submission;

7. ***Design Changes and Drawings*****:** The costs that are outlined above should be inclusive of the following design and engineering responsibilities.

   a. Design changes shall be prepared and stamped by the Contractor's professional designer and/or engineer. In addition, in the development of the VECP; the Contractor is responsible for anticipating and managing all aspects associated with any VECP design work that must be performed by a licensed Engineer.

   b. The Contractor's engineer must analyze and stamp all components of any aspect of the project that has been redesigned, changed, or altered as a result of this VECP.

   c. The Contractor's engineer shall provide all calculations and supporting design/engineering documentation that was utilized to develop the changes and stamped drawings. These will be used by MassDOT's Designer-of-Record to review the VECP changes. The Contractor is limited to selecting only those engineer's that have been pre-qualified by MassDOT's A&E Board.

   d. MassDOT's Designer-of-Record will review and respond to all completed design submissions related to this VECP within thirty (30) calendar days, unless determined to be a non-critical path item.

   e. MassDOT will be responsible for estimating and managing MassDOT's Designer-of-Record during the VECP review and implementation. Should any significant conflicts arise, between the Contractor's Engineer and MassDOT's Designer-of-Record, the DOT and the Contractor will work expeditiously to resolve the conflict. Should this type of conflict continue for greater than five (5) days, the Contractor is to bear all financial and time related impacts of such delay and must seek to resolve the design conflict, in an acceptable manner to MassDOT. The resolution of this conflict will be funded at the Contractor's expense – exclusive of the net saving that was agreed to at the execution of the contract modification for this VECP.

   f. The Contractor's Engineer may also be required to inspect the construction work. The Contractor is to include such anticipated inspection costs in the initial VECP.

VALUE ENGINEERING CHANGE PROPOSAL (Continued)

g. MassDOT's Designer of Record will remain the Designer-of-Record for the entire Project. Any costs incurred in the use of MassDOT's Designer-of-Record by MassDOT or Contractor associated with the review of a VECP are to be included in the calculated net savings.

C. Approval of the VECP shall not occur until a Contract Modification, incorporating the VECP, is issued by MassDOT and properly executed by the Contractor. MassDOT may accept or reject part or all of any VECP at any time prior to an executed Contract Modification for the applicable VECP. The decision of MassDOT, concerning acceptance or rejection of any VECP, shall be final and shall not be subject to dispute resolution.

It is expected that several weeks may go by before the final VECP documentation has been executed with a Contract Modification. Therefore, MassDOT intends to make certain that the initial cost estimate information has not changed before entering into a Contract Modification. As the VECP evaluation process is finalized, and prior to the signed Contract Modification for the VECP, the Contractor and MassDOT must re-certify the current status of the originally proposed cost and/or schedule savings.

Until a contract modification is issued and schedule and cost/savings re-certification is complete and accepted by MassDOT, the Contractor shall remain obligated to perform the Work in accordance with the terms and conditions of the original Contract Documents.

Upon completion of the work associated with the VECP, MassDOT may require verification that the VECP savings has been achieved.

D. VECPs will be processed (distributed, reviewed, commented upon, accepted or rejected) expeditiously (pursuant to M.G.L. c. 30, § 39R); however, as this is an elective modification to the contract, MassDOT shall not be liable for any delay or cost in the review and acceptance of the VECP. During the review of the VECP, the Contractor remains obligated to progress the original Contract scope, and schedule, as planned; until a Contract Modification, accepting the Contractor re-certified VECP, has been executed by MassDOT.

The Contractor has the right to withdraw part, or all of any VECP, prior to acceptance by MassDOT. Such withdrawal shall be made in writing to the Engineer. The Contractor shall state the period of time, from the date of the initial VECP submittal, that the VECP shall remain valid and feasible. Revision of this validity and feasibility period shall be allowed only by mutual agreement of the Contractor and the Engineer in writing.

If the Contractor desires to withdraw the proposal prior to the expiration of this period for non-technical reason, MassDOT reserves the right to recover all actual costs that have been incurred to MassDOT.

VALUE ENGINEERING CHANGE PROPOSAL (Continued)

If the Contractor withdraws the VEC Proposal, MassDOT reserves the right to proceed with the VECP or any portion of the VECP as a normal change and the Contractor waives any right it may have had to share in net savings thereunder.

For purposes of this provision, expiration of the time established by the Contractor for approval shall be considered as withdrawal by the Contractor if MassDOT requests an extension of that time and the Contractor does not provide a written extension.

E. With regard to unknown conditions or sub-surface work, in general, the expectation is that the Contractor and MassDOT will strive to gain enough knowledge about the risks in order to provide a forward-priced Change Proposal. Therefore, any costs to fully evaluate the proposal, such as additional borings and/or test pits, must be considered in the cost evaluation of whether the VECP is worth pursuing. However, if it is impractical to gather conclusive exploratory information, before the VECP is executed, MassDOT may consider provisions in the VECP that clearly identifies the risk sharing (cost and time) related specifically to the unknown/sub-surface conditions. If these VECP provisions are acceptable to MassDOT they are to include supplemental language to provide a determination of the final savings/cost, and time impacts, no later than 45 days after the sub-surface work is completed. All other aspects of the VECP, unrelated to these Provisions, will be binding upon execution of the VECP.

EQUIVALENT SINGLE AXLE LOADS (ESALS)

The estimated traffic level to be used for SUPERPAVE HMA mixture designs for this contract, expressed in Equivalent Single Axle Loads (ESALs) for the design travel lane over a 20-year period, is 0.3-10.0 Million 18-kip (80-kn) ESALs.

SECTION 722
CONSTRUCTION SCHEDULING
DESCRIPTION

722.20 General

The Contractor's approach to prosecution of the Work shall be disclosed to the Department by submission of a Critical Path Method (CPM) schedule and a cost/resource loaded Construction Schedule as defined by the schedule type set forth below. These requirements are in addition to any requirements imposed in other sections.

This section establishes the requirement for scheduling submissions. There are four schedule types identified as types A, B, C and D.

All schedules shall be prepared and submitted in accordance with this specification and the instructions contained in the Construction Schedule Toolkit located on the MassDOT-Highway Division website at https://www.mass.gov/info-details/massdot-highway-contractors-schedule-toolkit.

Type A –

- Schedule Planning Session
- Baseline CPM Schedule
- Monthly Update CPM Schedule
- Short-term Construction Schedule
- Contract Schedule Update Meeting
- Cost-loaded & Resource Loaded CPM
- Resources Graphic Reporting
- Cash Flow Projections from the CPM
- Cash Flow Charts
- Monthly Projected Spending Report (PSR)
- Contractor-furnished CPM software and computer

Type B –

- Schedule Planning Session
- Baseline CPM Schedule
- Monthly Update CPM Schedule
- Short-term Construction Schedule
- Contract Schedule Update Meeting
- Cost-loaded & Resource Loaded CPM
- Monthly Projected Spending Report (PSR)
- Contractor-furnished CPM software and computer

Type C –

- Schedule Planning Session
- Baseline CPM Schedule
- Monthly Update CPM Schedule
- Short-term Construction Schedule
- Contract Schedule Update Meeting
- Monthly Projected Spending Report (PSR)
- Contractor-furnished CPM software and computer

SECTION 722 (Continued)

Type D -

- Bar chart schedule updated monthly or at the request of the Engineer
- Short-term Construction Schedule
- Monthly Projected Spending Report (PSR)

EQUIPMENT, PERSONNEL

722.40 General

A. **Software Requirements**

The Contractor shall use Primavera P6 computer scheduling software.

In addition to the requirements of Section 740 – Engineer's Field Office and Equipment, the Contractor shall provide to the Department one (1) copy of the scheduling software, one (1) software license and one (1) computer capable of running the scheduling software for the duration of the Contract. This computer and software shall be installed in the Engineer's Field Office. The computer and software shall be maintained and serviced at no additional cost to the Department.

B. Scheduler Requirements

The Scheduler shall be approved by the Engineer.

For Type A, B and C Schedules the name of the Contractor's Project Scheduler together with his/her qualifications shall be submitted to the Department for approval by the Engineer within seven (7) Calendar Days after NTP. The Project Scheduler shall have a minimum of five (5) years of project CPM scheduling experience, three (3) years of which shall be on projects of similar scope and value as the project for which the Project Scheduler is being proposed. References shall be provided from past projects that can attest to the capabilities of the Project Scheduler.

SCHEDULING METHODS

722.60 General

A. **Schedule Planning Session**

The Contractor shall conduct a schedule planning session prior to submission of the Baseline Schedule. This session will be attended by the Department and its consultants. During this session, the Contractor shall present its planned approach to the project including, but not limited to:

1. the Work to be performed by the Contractor and its subcontractors;
2. the planned construction sequence and phasing; planned crew sizes;
3. summary of equipment types, sizes, and numbers to be used for each work activity;
4. all early work related to third party utilities;
5. identification of the most critical submittals and projected submission timelines;
6. estimated durations of major work activities;
7. the anticipated Critical Path of the project and a summary of the activities on that Critical Path;
8. a summary of the most difficult schedule challenges the Contractor is anticipating and how it plans to manage and control those challenges;

SECTION 722 (Continued)

9. a summary of the anticipated quarterly cash flow over the life of the project.

This will be an interactive session and the Contractor shall answer all questions that the Department and its consultants may have. The Contractor shall provide a written summary of the information presented and discussed during the session to the Engineer. The Contractor's Baseline Schedule and accompanying Schedule Narrative shall incorporate the information discussed at this Schedule Planning Session.

B. **Schedule Reviews by the Department**

1. Baseline Schedule Reviews
   The Engineer will respond to the Baseline Schedule Submission within thirty (30) Calendar Days of receipt providing comments, questions and/or disposition that either accepts the schedule or requires revision and resubmittal. Rejected Baseline Schedules shall be resubmitted within fifteen (15) Calendar Days after receipt of the Engineer's comments.
2. Contract Progress Schedule / Monthly Update Reviews / Recovery Schedules
   The Engineer will respond to each submittal within twenty-one (21) Calendar Days. Rejected schedules shall be resubmitted by the Contractor within five (5) Calendar Days after receipt of the Engineer's comments.

The Engineer's review comments shall not be construed as direction to change the Contractor's means and methods. The review and acceptance of the CPM schedule does not relieve the Contractor of the responsibility for accomplishing the work within the contract required completion dates. Omissions and errors in the accepted CPM schedule shall not excuse performance less than that required by the Contract.

722.61 Schedule Content and Preparation Requirements

All schedules shall be prepared and submitted in accordance with the instructions contained in the Construction Schedule Toolkit located on the MassDOT-Highway Division website at:
https://www.mass.gov/info-details/massdot-highway-contractors-schedule-toolkit
and the following:

A. **LOGIC**

The schedules shall divide the Work into activities with appropriate logic ties to show:

1. conformance with the requirements of this Section and Division I, Subsection 8.02 - Schedule of Operations
2. the Contractor's overall approach to the planning, scheduling, and execution of the Work
3. conformance with any additional sequences of Work required by the Contract Documents, including, but not limited to, Subsection 8.03 - Prosecution of Work and Subsection 8.06 – Limitations of Operations.

SECTION 722 (Continued)

B. **ACTIVITIES**

The schedule shall clearly define the progression of the Work from the Notice to Proceed (NTP) to Contractor Field Completion (CFC) by using separate activities, or including attributes within appropriate activities, to address each of the following:

1. Notice to Proceed
2. Work Breakdown Structure
3. The Critical Path is clearly defined and organized.
4. Float shall be clearly identified.
5. Detailed activities to satisfy permit requirements.
6. Subcontractor approvals at fifteen (15) Calendar Days from submittal to response
7. The preparation and submission of shop drawings, procedures, and other required submittals, with a planned duration that is to be demonstrated to the Engineer as reasonable.
8. The review and return of shop drawings, procedures, and other required submittals, approved or with comments, the duration of which shall be thirty (30) Calendar Days, unless otherwise specified or as approved by the Engineer.
9. Procurement of fabricated materials and equipment with long lead times, including time for review and approval of submittals required before procuring and fabricating.
10. Each component of the Work defined by specific activities.
11. Right-of-Way (ROW) takings that have been identified in the Contract.
12. Early Utility Relocation (by others) that has been identified in the Contract.
13. Interfaces with adjacent work, utility companies, other public agencies, sensitive abutters, and/or any other third-party work affecting the Contract.
14. Utility work to be performed in accordance with the Project Utility Coordination (PUC) Form as provided in Section 8.14 - Utilities Coordination, Documentation and Monitoring Responsibilities
15. Access Restraints – restrictions on access to areas of the Work that are defined by the Department in the bid package, in Subsection 8.06 – Limitations of Operations or elsewhere in the Contract
16. Limitations of Work – time of year restrictions and any other limitations identified in the contract
17. Traffic work zone set-up and removal, night work and phasing
18. Material Certifications
19. Milestones listed in Subsection 8.03 - Prosecution of Work or elsewhere in the Contract Documents
20. For Type A and B Contracts only: All items to be paid for, including all Unit Price and Lump Sum pay items, shall be identified by activity. This shall include all non-construction activities such as engineering work; purchase of permanent materials and equipment, purchase of structural steel stock, equipment procurement, equipment delivery to the site or storage location and the representative amount of overhead/indirect costs that was included in the Contractor's Bid Prices.

SECTION 722 (Continued)

21. Contractor's request for validation of FBU (ready to open to traffic)
22. Full Beneficial Use (FBU) Contract Milestone per the following requirements: The majority of contract Work has been completed and the asset(s) has been opened for full multi-modal transportation use, except for limited contract work items that do not materially impair or hinder the intended public use of the transportation facility. All anticipated lane takings have been completed, except for minor, short term work items and as defined in Subsection 8.03 - Prosecution of Work
23. The Department's confirmation of completed work to allow for FBU.
24. Contractor's request for validation of Substantial Completion
25. Department generated punch list of twenty-one (21) Calendar Days
26. Substantial Completion Contract Milestone as defined in the standard specifications.
27. Punch list Completion Period of at least thirty (30) Calendar Days per the requirements of Subsections 5.11 - Final Acceptance, 7.15 - Claims Against Contractors for Payment of Labor, Materials and Other Purposes
28. Contractor confirmation that all punchlist work and documentation has been completed.
29. Physical Completion of the Work Contract Milestone per the requirements of Subsections 5.11 - Final Acceptance and 8.03 - Prosecution of Work
30. Documentation Completion per the requirements of Subsections 5.11 - Final Acceptance and 8.03 - Prosecution of Work
31. Contractor Field Completion Contract Milestone (which can also be considered the completion date) per the following requirements: All physical contract Work is complete including punchlist. The Contractor has fully de-mobilized from field operations and as defined in Subsection 5.11

C. **EARLY AND LATE DATES**

Early Dates shall be based on proceeding with the Work or a designated part of the Work exactly on the date when the corresponding Contract Time commences. Late Dates shall be based on completing the Work or a designated part of the Work exactly on the corresponding Contract Time, even if the Contractor anticipates early completion.

D. **DURATIONS**

Activity durations shall be in Work Days. Planned Original Durations shall be established with consideration of resources and production rates that correspond to the Contractor's Bid Price. Within all of the Department-required schedules, the Contractor shall plan the Work using durations for all physical construction activities of no less than one (1) Work Day and no greater than fourteen (14) Work Days, unless approved by the Engineer as part of the Baseline Schedule Review.

SECTION 722 (Continued)

Should there be an activity with a duration that is determined by the Engineer to be unreasonable, the Contractor will be asked to provide a basis of the duration using bid documents, historic production rates for similar work, or other form of validation that is acceptable to the Engineer. Should the Contractor and the Engineer be unable to agree on reasonable activity durations, the Engineer will, at a minimum, note the disagreement in the Baseline Schedule Review along with a duration the Engineer considers reasonable and the basis for that duration. A schedule that contains a substantial number of activities with durations that are deemed unreasonable by the Engineer will not be accepted.

E. MATERIALS ON HAND

The Contractor shall identify in the Baseline Schedule all items of permanent materials (Materials On Hand) for which the Contractor intends to request payment prior to the incorporation of such items into the Work.

F. ACTIVITY DESCRIPTIONS

The Contractor shall use activity descriptions in all schedules that clearly describe the work to be performed using a combination of words, structure numbers, station numbers, bid item numbers, work breakdown structure (WBS) and/or elevations in a concise and compact label.

G. ACTIVITY IDENTIFICATION NUMBERS

The Contractor shall use the activity identification numbering system specified in the MassDOT Highway Division Contractor Construction Schedule Toolkit.

H. ACTIVITY CODES

The Contractor shall use the activity codes specified in the MassDOT Highway Division Contractor Construction Schedule Toolkit.

I. CALENDARS

Different calendars may be created and assigned to all activities or to individual activities. Calendars define the available hours of work in each Calendar Day, holidays and general or project-specific non-Work Days such as Fish Migration Periods, time-of-year (TOY) restrictions and/or area roadway restrictions. All calendars shall extend two years beyond the current project completion date.

Project Special Provisions identify specific calendar restrictions some examples of special calendars include, but are not limited to:

- Winter Shutdown Period, specific work is required by separate special provision to be performed during the winter. See Special Provision 8.03 (if applicable)
- Peak traffic hours on heavily traveled roadways. This shall be from 6:30 am to 9:30 am and from 3:30 pm to 7:00 pm, unless specified differently elsewhere in the Contract.
- Special requirements by sensitive abutters, railroads, utilities and/or other state agencies as defined in the Contract.
- Planting seasons for trees, shrubs and grasses and wetlands mitigation work.

SECTION 722 (Continued)

- Cape Cod and the Islands Summer Roadway Work Restrictions: A general restriction against highway and bridge construction is enforced between Memorial Day and Labor Day, unless otherwise directed by the Engineer. Cape Ann Summer Roadway Work Restrictions: While there are no general restrictions for Cape Ann as there are for Cape Cod and the Islands, project-specific restrictions may be enforced.
- Turtle and/or Fish Migration Periods and/or other in-water work restrictions: Refer to the Project Special Provisions for specific restrictions.
- Working over Waterways Restricted Periods.
- Night-time paving and striping operations, traffic, and temperature restrictions.
- Utility Restrictions shall be as specified within the Contract.

J. **FLOAT**

For the calculation of float in the CPM schedule, the setting for *Retained Logic* is required for all schedule submissions, starting with the Baseline Schedule Submission. Should the Contractor have a reason to propose that an alternative calculation setting such as *Progress Override* be used, the Contractor shall obtain the Engineer's approval prior to modifying to this setting.

K. **COST AND RESOURCE LOADING (Types A and B only)**

For all Type A and B Schedules, the Contractor shall provide a cost and resource-loaded schedule with an accurate allocation of the costs and resources necessary to complete the Work. The costs and resources shall be assigned to all schedule activities in order to enable the Contractor to efficiently execute the Contract requirements and the Engineer to validate the original plan, monitor progress, provide cash flow projections, and analyze delays.

1. Each schedule activity shall have an assigned cost that accurately represents the value of the Work. Each schedule activity shall have its resources assigned to it by craft and the anticipated hours to accomplish the work. Each schedule activity's equipment resources shall be assigned to it by equipment type and hours operated. Front-loading or other unbalancing of the cost distribution will not be permitted.
2. The sum of the cost of all schedule activities shall be equal to the Contractor's Bid Price.
3. Indicating the labor hours per individual, per day, by craft and equipment hours/day will be acceptable.
4. The Engineer reserves the right to use the cost-loading as a means to resolve changes, disputes, time entitlement evaluations, increases or decreases in the scope of Work, unit price renegotiations and/or claims.
5. For all Type A and B Schedules, all subnets, fragnets, Proposal Schedules, and Recovery Schedules shall be cost and resource- loaded to help to quickly validate and monitor the duration of the Work to be performed.
6. For Type A Schedules, cost-loading of the schedule will also be used for cash flow projection purposes.
7. The cost-loading of each activity shall indicate the portion of the cost for that activity that is applicable to a specific bid item (cost account.) The total cost for each cost account must equal the bid item price.

SECTION 722 (Continued)

L. **NOT TO BE USED IN THE CONTRACTOR'S CPM SCHEDULE**

1. Milestones or constraint dates not specified in the Contract.
2. Scheduled work not required for the accomplishment of a Contract Milestone
3. Use of activity durations, logic ties and/or sequences deemed unreasonable by the Engineer.
4. Delayed starts of follow-on trades.
5. Float suppression techniques.
6. Leads such as leads, lags, SS, SF, & FF relationships without the expressed permission of the Department.

722.62 Submittal Requirements

All schedules shall be prepared and submitted in accordance with the requirements listed below.

Each monthly Contract Progress Schedule submittal shall be uniquely identified.

Each Submission shall, at a minimum, include the following:

a. Narrative
b. Schedule submittals shall be signed by the Scheduler
c. Schedule Printout - All Activities
d. Schedule Printout - Critical Path Layout
e. Schedule Printout - Remaining Work
f. Schedule Printout - Top 3 Float Path
g. Work Breakdown Structure (WBS) Summary
h. Project Spending Report (PSR) in Portable Document Format (.PDF)
i. Project Spending Report (PSR) in Microsoft Excel spreadsheet (.XLS)
j. Oracle Primavera P6 Schedule File (.XER)

All digital file submittals will be labeled with the following information.

- Contract Number
- Project Number
- Project locations (i.e., town(s))
- Brief description
- Submittal description (i.e., UP07)
- Data Date (MM-DD-YY)
- File Description (i.e., Critical Path)

Example: C110464 (P606309) - Orange Route 2 over 202 – UP23 (07-15-22) - Critical Path

A. **Narratives**

A written narrative shall be submitted with every schedule submittal. The narrative shall:

1. itemize and describe the flow of work for all activities on the Critical Path in a format that includes any changes made to the schedule since the previous Contract Progress Schedule / Monthly Update or the Baseline Schedule, whichever is most recent.
2. provide a description of any specification requirements that are not being followed. Identify those that are improvements and those that are not considered to be meeting the requirements.

SECTION 722 (Continued)

3. provide all references to any Notice of Delay that has been issued, within the time period of the Contract Progress Schedule Update, by letter to the Engineer. Note that any Notice of Delay that is not issued by letter will not be recognized by the Engineer. See Subsection 722.64.A – Notice of Delay.
4. provide a description of each third-party utility's planned vs. actual progress and note any that are trending late or are late per the durations and commitments as provided in the PUC Form; provide a description of the five (5) most important responses needed from the Department and the need date for the responses in order to maintain the current Schedule of Record.
5. provide a description of all critical issues that are not within the control of the Contractor or the Department (third party) and any impact they had or may have on the Critical Path.
6. provide a description of any possible considerations to improve the probability of completing the project early or on time.
7. compare Early and Late Dates for activities on the Critical Path and describe reasons for changes in the top three (3) most critical paths.
8. describe the Contractor's plan, approach, methodologies, and resources to be employed for completing the various operations and elements of the Work for the top three (3) most critical paths. For update schedules, describe and propose changes to those plans and verify that a Proposal Schedule is not required.
9. describe, in general, the need for shifts that are not 5 days/week, 8 hours/day, the holidays that are inserted into each calendar and a tabulation of each calendar that has been used in the schedule.
10. describe any out-of-sequence logic and provide an explanation of why each out-of-sequence activity does not require a correction, if one has not been provided, and an adequate demonstration that these changes represent the basis of how these activities will be built, including considerations for resources, dependencies, and previously approved production rates.
11. identify any possible duration increases resulting from actual or anticipated unit price item quantity overruns as compared to the baseline duration, with a corresponding suggestion to mitigate any possible delays to the Critical Path. If the delay is anticipated to impact the Critical Path, refer to Subsections 4.06 – Increased or Decreased Contract Quantities and 8.10 – Determination and Extension of Contract Time for Completion and submit a letter to the Engineer notifying of a potential delay.
12. include a schedule log consisting of the name of the schedule, the data date and the date submitted.
13. include and describe any notifications, communications and coordination meetings with third-parties such as utility companies that occurred from the last update including personnel names, job titles and contact information, date of meeting(s)/correspondence(s), topics discussed, and reasons the third party provided for deviations from the PUC form.

SECTION 722 (Continued)

B. **CPM Bar Charts**

One (1) timescaled bar chart containing all activities shall be prepared and submitted using a scale that yields readable plots and that meets the requirements of Subsection 722.61 – Schedule Content and Preparation Requirements Activities shall be linked by logic ties and shown on their Early Dates. Critical Paths shall be highlighted, and Total Float shall be shown for all activities.

A second timescaled bar chart shall also be prepared containing only the Critical Path or, if the Critical Path is not the longest path, the Longest Path using a scale that yields readable plots and that meets the requirements of Subsection 722.61 – Schedule Content and Preparation Requirements. Activities shall be linked by logic ties and shown on their Early Dates. Total Float shall be shown for all activities.

C. Detailed Activity Schedule Comparisons

A Detailed Activity Schedule Comparison (DASC) is a simple reporting tool in the format of a graphical report that will provide Resident Engineers with immediate, timely and up-to-date information. The DASC consists of an updated bar chart that overlays the current time period's bar chart onto the previous time period's bar chart for an easily read comparison of progress during the present and previous reporting periods.

D. Activity Cost Report and Monthly Cash Flow Projections (Type A only)

With each Contractor Quantity Estimate (CQE), the Contractor shall submit an Activity Cost Report and Cash Flow Projection that includes all activities grouped by Contract Bid Item.

The Activity Cost Report shall be generated from the Schedule of Record and shall be the basis of the Monthly Cash Flow Projection. Within each contract Bid Item, activities shall be sequenced by ascending activity identification number and shall show:

1. activity ID and description,
2. forecast start and finish dates for each activity and,
3. when submitted as a revised schedule, actual start, and finish dates for each completed activity.
4. any variance to the estimated contract quantity shall be shown.

E. Resource Graphs (Type A only)

Monthly and cumulative resource graphs for the remaining Contract period using the Early Dates and Late Dates in the Contract Progress Schedule shall be included as part of each schedule submittal.

SECTION 722 (Continued)

F. Projected Spending Reports

A Projected Spending Report (PSR) shall be prepared and submitted monthly. The PSR shall indicate the monthly spending (cash flow) projection for each month from NTP to Contractor Field Completion (CFC). Each month's actual spending shall be calculated using all CQEs paid during that month. The Projected Spending Report (PSR) shall be depicted in a tabular format and provided in both an .XLS and .PDF.

722.63. Progress Schedule Requirements

A. Baseline Schedule

The Baseline Schedule shall be due thirty (30) Calendar Days after Notice to Proceed (NTP). The Baseline Schedule shall only reflect the Work awarded to the Contractor and shall not include any additional work involving Extra Work Orders or any other type of alleged delay. The Baseline Schedule shall be prepared and submitted in accordance with Subsections 722.61 - Schedule Content and Preparation Requirements and 722.62 - Submittal Requirements. Once the Baseline Schedule has been accepted by the Engineer, with or without comments, it shall represent the as-planned schedule for the Work and become the Contract Progress Schedule of Record until such time as the schedule is updated or revised under Subsections 722.63.C - Contract Progress Schedules / Monthly Updates, 722.64.C - Recovery Schedules and 722.64.D - Proposal Schedules.

The Cost and Resource-Loading information (Types A and B only) shall be provided by the Contractor within forty-five (45) Calendar Days after NTP.

The Engineer's review comments on the Baseline Schedule and the Contractor's responses to them will be maintained for the duration of the Contract and will be used by the Engineer to monitor the Contractor's work progress by comparing it to the Contract Progress Schedule / Monthly Update.

B. Interim Progress-Only Schedule Submissions

The first monthly update of the Contract Progress Schedule/Monthly Update is due within seventy (70) Calendar Days after Notice to Proceed (NTP.) The Baseline Schedule review period ends at sixty (60) Calendar Days after NTP, see Subsection 722.60.B - Schedule Reviews by the Department. If the Baseline Schedule has not been accepted within sixty (60) Calendar Days after NTP, an Interim Progress-Only Schedule shall be due within seventy (70) Calendar Days after NTP. The purpose of the Interim Progress-Only Schedule is to document the actual progress of all activities, including non-construction activities, from NTP until the Baseline Schedule is accepted.

SECTION 722 (Continued)

C. Contract Progress Schedules / Monthly Updates

The first Contract Progress Schedule shall be submitted by the Contractor no later than seventy (70) Calendar Days after NTP. The data date for this first Progress Schedule shall be two months (approximately sixty (60) Calendar Days) after NTP. Subsequent Progress Schedules shall be submitted monthly.

Each Contract Progress Schedule shall reflect progress up to the data date. Updated progress shall be limited to asbuilt sequencing and asbuilt dates for completed and inprogress activities. Asbuilt data shall include actual start dates, remaining Work Days and actual finish dates for each activity, but shall not change any activity descriptions, the Original Durations, or the Original Resources (as planned at the time of bid), without the acceptance of the Engineer. If any activities have been completed out-of-sequence, the Contractor shall propose new logic ties for affected in-progress and future activities that accurately reflect the previously approved sequencing. Alternatively, the Contractor may submit to the Engineer for approval an explanation of why an out-of-sequence activity does not require a correction and an adequate demonstration that the changes accurately represent how the activities will be built, including considerations for resources, dependencies, and previously approved production rates. Once approved by the Engineer, the Contractor may incorporate the changes in the next Contract Progress Schedule/Monthly Update with the affected activities clearly identified and explained in the Schedule Narrative.

No revisions to logic ties, sequence, description, or duration of future activities; or planned resource costs shall be made without prior approval by the Engineer.

Any proposed logic changes for in-progress or future activities shall be submitted to the Engineer for approval before being incorporated into a Contract Progress Schedule. The logic changes must be submitted using a Proposal Schedule or a schedule fragnet submission. Once approved by the Engineer, the Contractor may incorporate the logic in the next Contract Progress Schedule/Monthly Update with the affected activities clearly identified and explained in the Schedule Narrative.

For any proposed changes to the original sequence, description or duration of future activities, the Contractor shall submit to the Engineer for approval an explanation of how the proposed description or duration change reflects how the activity will be progressed, including considerations for resources and previously approved production rates. Any description or duration change that does not accurately reflect how the activity will be progressed will not be approved by the Engineer. Once approved by the Engineer, the Contractor may incorporate the changes in the next Contract Progress Schedule/Monthly Update with the affected activities clearly identified and explained in the Schedule Narrative.

Contract Progress Schedules that extend performance beyond the Contract Time or beyond any Contract Milestone shall not be approved by the Engineer. The Contractor shall submit a Recovery Schedule, or a Time Entitlement Analysis, if any Contract Progress Schedule/Monthly Update indicates a failure to meet the Contract Dates.

SECTION 722 (Continued)

D. Short-Term Construction Schedule

The Contractor shall provide a Short-Term Construction Schedule that details daily work activities, including any multiple shift work that the Contractor intends to conduct, in a spreadsheet format. The daily activities shall directly correspond to the Contract Progress Schedule activities, with a matching reference to the activity identification number in the Contract Progress Schedule and may be at a greater level of detail. The Short-Term Construction Schedule shall be submitted every two weeks. It shall display all work for a thirty-five (35) Calendar Day period consisting of completed work for the two (2) week period prior and all planned work for the following three (3) week period. The initial submission shall be provided no later than thirty (30) Calendar Days after NTP or as required by the Engineer.

The Contractor shall be prepared to discuss the Short-Term Construction Schedule, in detail, with the Engineer in order to coordinate field inspection staff requirements, the schedule of work affecting abutters and any corresponding work with affected utilities. Short-Term Construction Schedules shall be prepared and submitted in accordance with Subsections 722.61 - Schedule Content and Preparation Requirements and 722.62 - Submittal Requirements.

722.64 Impacted Schedule Requirements

A. Notice of Delay

The Contractor shall notify the Engineer in writing, with copies to the District and State Construction Engineers, within fifteen (15) of the start of any delays to the Critical Path that are caused by actions or inactions that were not within the control of the Contractor. Delay notifications that are not provided in a letter to the Engineer, such as a delay notification in the schedule narrative, will not be recognized as contractual notice in the determination of any Time Extension related to the impacts to the work associated with this specific alleged delay. Should such a delay continue for more than one (1) week, the Contractor shall note it in the Schedule Narrative until the delay is no longer impacting the Critical Path for the completion of the Contract Milestones. The Engineer will evaluate the alleged delay and its impact and will respond to the Contractor within ten (10) Calendar Days after receipt of a notice of delay.

B. Time Entitlement Analysis

A Time Entitlement Analysis (TEA) shall consist of a descriptive narrative, prepared in accordance with Subsection 722.62.A - Narratives, and an as-built CPM schedule, which may be in the form of a schedule fragnet that has been developed from the project's Contract Progress Schedule of Record, and illustrates the impact of a delay to the Critical Path, Contract Milestones and/or Contract Completion Date as required in Subsection 8.10 - Determination and Extension of Contract Time for Completion. TEAs shall also be used to determine the schedule impact of proposed Extra Work Orders (EWO) as also required in Subsection 8.10.

TEAs shall be prepared and submitted in accordance with the requirements of Subsections 722.61 - Schedule Content and Preparation Requirements and 722.62 - Submittal Requirements and shall be based on the Contract Progress Schedule of Record applicable at the start of the delay or impact from an EWO. A TEA fragnet must start with a specific new activity describing the work contained in either a Notice of Delay previously submitted to the Department per Subsection 722.64.A - Notice of Delay or an EWO.

SECTION 722 (Continued)

TEAs shall be submitted:

1. as part of any Extra Work Order that may impact Contract Time,
2. with a request for a Time Extension,
3. within fifteen (15) Calendar Days after a request for a TEA by the Engineer for any other reason.

A TEA shall be submitted to the Engineer before any Time Extension is granted to the Contractor. Time Extensions will not be granted unless the TEA accurately reflects an evaluation of all past delays and the actual events that occurred that impacted the Critical Path. The TEA must also demonstrate a plan for the efficient completion of all of the remaining work through an optimized CPM Schedule. The analysis shall include all delays, including Contractor-caused delays, and shall be subdivided into timeframes and causes of delays.

TEAs shall incorporate any proposed activities, logic ties, resource considerations, and activity costs required to demonstrate the schedule impacts most efficiently in addition to detailing all impacts to existing activities, logic ties, the Critical Path, Contract Milestones, and the Contract Completion Date. In addition, TEAs shall accurately reflect any changes made to activities, logic ties, restraints, and activity costs, necessitated by an Extra Work Order or other schedule impact, for the completion of the remaining work. The Contractor shall provide TEAs that demonstrate that all delays have been mitigated to the fullest extent possible without requiring an Equitable Adjustment to the original bid basis.

All TEAs shall clearly indicate any overtime hours, additional shifts and the resources that are proposed to be incorporated in the schedule. The Engineer shall have final discretion over the use of overtime hours and additional shifts. The Engineer shall have the right to require that overtime hours and/or additional shifts be used to minimize the duration of Time Extensions if it is determined to be in the best interest of the Department to do so.

When accepted, the changes included in a TEA shall be incorporated into the next Contract Progress Schedule per the requirements of Subsection 722.63.C - Contract Progress Schedules / Monthly Updates. During the review of any TEA, all Contract Progress Schedules shall continue to be submitted as required.

The Engineer may request that the Contractor prepare a Proposal Schedule or a Recovery Schedule to further mitigate any delays that are shown in the accepted TEA or Contract Progress Schedule.

C. Recovery Schedules

The Contractor shall promptly report to the Engineer all schedule delays during the prosecution of the Work. Contract Progress Schedules that predict performance extended beyond the Contract Time or beyond any Contract Milestone shall not be approved as the schedule of record. This requirement is critical to the Department's ability to make informed decisions regarding Contract Time and costs.

The Contractor shall submit a Recovery Schedule within fifteen (15) Calendar Days of a Contract Progress Schedule submission that shows failure to meet the Contract Dates unless a recovery schedule is waived by the Department. Waiving the recovery schedule does not relieve the contractor of the responsibility for the delay. The Department may revoke the waiver of a Recovery Schedule, at which time a Recovery Schedule shall be submitted within fifteen (15) Calendar Days of the Contractor being notified.

Changes represented in accepted Recovery Schedules shall be incorporated into the next Contract Progress Schedule.

SECTION 722 (Continued)

D. Proposal Schedules

A Proposal Schedule is an alternative schedule used to evaluate proposed changes to the Contract scope or significant alternatives to previously approved approaches to complete the Work, which may include changes to activity durations, logic, and sequence. For Types A and B Schedules, the Proposal Schedule shall be cost and resource loaded.

A Proposal Schedule may be requested by the Department at any time or may be offered by the Contractor. The Engineer may request that the Contractor prepare a Proposal Schedule to further mitigate any delays that are shown in an accepted TEA or Contract Progress Schedule.

The Contractor shall submit the Proposal Schedule within thirty (30) Calendar Days of a request from the Department.

The Proposal Schedule shall not be considered a Schedule of Record until the logic, durations, narrative, and basis of the Proposal Schedule have been accepted by the Engineer. If the Proposal Schedule took the form of a fragnet, it must be incorporated into the Contract Progress Schedule of Record showing the current progress of all other activities and the impacts/results of the changes made by the Proposal Schedule before the Proposal Schedule is accepted by the Department.

Proposal Schedules shall clearly indicate any proposed acceleration including overtime hours, additional shifts, and the resources that are proposed to be incorporated in the schedule. The Engineer shall have final discretion over the use of overtime hours and additional shifts. Proposal Schedules that contain a cost element shall be submitted with a separate Cost Proposal.

Changes represented in the accepted Proposal Schedules shall be incorporated into the next Contract Progress Schedule. During the review of any Proposal Schedule, all Contract Progress Schedules shall continue to be required every month.

E. Disputes

All schedules shall be submitted, reviewed, dispositioned, and accepted in the timely manner specified herein so as to provide the greatest possible benefit to the execution of this Contract.

The Contractor may dispute a decision by the Engineer by filing a claim notice within seven (7) days after the Contractor's request for additional time has been denied or if the Contractor does not accept the number of days granted in a time extension. The Contractor's claim notice shall include a revised time entitlement analysis that sufficiently explains the basis of the time-related claim. Failure to submit the required time entitlement analysis with the claim notice shall result in denial of the Contractor's claim. A determination on the Contractor’s claim shall be in accordance with Subsection 7.16 Claims of Contractor for Compensation. Pending resolution of any dispute, the last schedule accepted by the Engineer will remain the Contract Schedule of Record.

SECTION 722 (Continued)

722.65 Schedule Type D Requirements

This section is to detail the requirements for Type D Schedules and is separate from the requirements listed above. These schedules are intended for a project in which a more formal schedule would not be practical.

Schedules for Type D projects shall be submitted for each work assignment. The Schedule Type D shall be submitted electronically in .XLS and .PDF format and meet the following requirements.

The schedule requirements for work assignments that are anticipated to last three weeks or less shall conform to the requirements for Short-term Construction Schedules below.

Work assignments that are anticipated to last longer than three weeks shall submit a bar chart baseline and provided update schedules upon request of the engineer as required under Bar Chart Schedule below in addition to meeting the Short-term Construction schedule requirements.

A. **Bar Chart Schedule**

A Bar Chart that shall include the following:

- Work Assignment start date.
- Activities to identify.
  - Major work operations broken down to be no longer than 14 days.
  - Procurement of fabricated materials and equipment with long lead times, including time for review and approval of submittals required before procuring and fabricating.
  - The preparation and submission of shop drawings, procedures, and other required submittals, with a planned duration that is to be demonstrated to the Engineer as reasonable.
  - The review and return of shop drawings, procedures, and other required submittals, approved or with comments, the duration of which shall be shown as thirty (30) Calendar Days,
  - Detailed activities to satisfy permit requirements.
  - Subcontractor approvals at fifteen (15) Calendar Days from submittal to response
  - Project Close out activities including a 21-calendar day creation of a punchlist activity and 30 calendar day minimum completion of punchlist activity.
- Interfaces with adjacent work, utility companies, other public agencies, sensitive abutters, and/or any other third-party work affecting the Contract.
- Access Restraints – restrictions on access to areas of the Work
- Traffic work zone set-up and removal, night work and phasing
- Contract Milestones including Full beneficial Use, Substantial Completion and Contractor Field Completion

The Bar Char Schedule shall be provided at the beginning of the project and updated with each work order created for the project.

SECTION 722 (Continued)

B. **Short-Term Construction Schedule**

The Contractor shall provide a Short-Term Construction Schedule that details daily work activities, including any multiple shift work that the Contractor intends to conduct, in a spreadsheet format. The daily activities shall directly correspond to the Contract Progress Schedule activities, with a matching reference to the activity identification number in the Contract Progress Schedule and may be at a greater level of detail. See schedule toolkit for suggested format.

The Short-Term Construction Schedule shall be submitted every two weeks. It shall display all work for a thirty-five (35) Calendar Day period consisting of completed work on the assignment for the two week period prior and all planned work for the following three week period. The initial submission shall be provided no later than thirty (30) Calendar Days after NTP or as required by the Engineer.

The Contractor shall be prepared to discuss the Short-Term Construction Schedule, in detail, with the Engineer in order to coordinate field inspection staff requirements, the schedule of work affecting abutters and any corresponding work with affected utilities.

C. **Project Spending Report (PSR)**

A Projected Spending Report (PSR) shall be prepared and submitted monthly. The PSR shall be for all active work assignments, broken down by work assignment. The PSR shall indicate the monthly spending (cash flow) projection for each month from NTP to Contractor Field Completion (CFC). Each month's actual spending shall be calculated using all CQEs paid during that month. The Projected Spending Report (PSR) shall be depicted in a tabular format and provided in both an .XLS and .PDF

SECTION 722 (Continued)

COMPENSATION

722.80 Method of Measurement

Schedule of Operations (Type A, B and C)

The project bid documents specify the fixed-price amounts to be paid to the Contractor for the Project Schedule requirements contained herein. Each bidder shall include this fixed price bid item amounts in their bid. Failure to do so may be grounds for the rejection of the bid.

This fixed price amount is for payment purposes only and is separate from what the Department considers to be the Contractor's General Condition costs. If the Contractor deems it necessary to include additional costs to provide all of the requirements of this section, these additional costs shall be included in the Contractor's overall bid price.

All required schedule-related work, including, but not limited to computers, computer software, the planning and coordination with utilities, training, schedule preparation and schedule submittals will be paid for under the fixed price amount.

Twenty percent (20%) of this pay item will be paid upon the Engineer's acceptance of the Contractor's Baseline Schedule, prepared and submitted in accordance with Subsection 722.63.A.

The remaining eighty percent (80%) of this pay item will be paid in equal monthly installments distributed across the Contract Duration from Notice to Proceed (NTP) to Contractor Field Completion (CFC), less the 2 months required for the submittal and review of the Baseline Schedule in accordance with the following formula:

$$\text{Monthly Payment} = \frac{\text{Remaining Fixed Price amount (80\% of the Item Cost.)}}{\text{Contract Duration in whole months} - 2 \text{ months}}$$

The Schedule of Operations pay item will be adjusted to pay for only the actual quantity of schedules that have been submitted in accordance with this section.

Should there be a Time Extension granted to the Contractor, the Engineer may provide an Equitable Adjustment for additional Contract Progress Schedule Updates at intervals directed by the Engineer. The monthly payment will be the basis for this Equitable Adjustment.

Schedule of Operations (Type D)

For projects assigned with Type D schedule requirements, all scheduling work shall be considered incidental to the project with no separate payment under this section.

SECTION 722 (Continued)

722.81 Basis of Payment

The timely and accurate submission of the Baseline Schedule is critical to the Contract and the Department's ability to make informed decisions. Only payments under Item 740 - Engineer's Field Office and Item 748 – Mobilization will be made until the Baseline Schedule is accepted by the Engineer.

All required schedule-related work, including, but not limited to computers, computer software, the planning and coordination with utilities, training, schedule preparation and schedule submittals (including monthly progress schedules, short-term schedules, project spending reports, TEAs, recovery schedules or impacted schedules) shall be included in this work.

No payment for any other pay item will be processed beyond seventy-five (75) Calendar Days from Notice to Proceed (NTP) until the Baseline Schedule is accepted by the Engineer. Until the Engineer's acceptance of the Baseline Schedule, the combined total of all payments made to the Contractor will be limited to an amount no greater than the total price for Item 748 - Mobilization or 3% of the contract price, whichever is less.

All Contract Progress Schedule Updates submitted later than ten (10) Calendar Days after the CQE (Contract Quantity Estimate) completion date, or greater than forty (40) Calendar Days from the Data Date of the previous submission, will be deemed to be no longer useful and will not qualify for payment. The late submission of Impacted schedules, including TEAs, recovery schedules and proposal schedules will result in the forfeiture of the monthly payment for the month in which they were due and subsequent months until the submission is made. Late submission of missed submittals will not result in recovery of the previously forfeited portion of the Schedule of Operations Fixed Price Payment Item.

Failure to submit schedules as and when required may result in the forfeiture of that portion of the Schedule of Operations Fixed Price Payment and/or the withholding of the full or partial CQE payments by the Engineer.

Failure to submit schedules that are acceptable to the Engineer may result in the forfeiture of that portion of the Schedule of Operations Fixed Price Payment and/or the withholding of the full or partial CQE payments by the Engineer.

The Schedule of Operations pay item will be adjusted to pay for only the actual quantity of schedules that have been submitted in accordance with this section.

The Contractor's failure or refusal to comply with the requirements of this Section shall be reasonable evidence that the Contractor is not prosecuting the Work with due diligence and may result in the Engineer withholding of full or partial payments of all work performed.

722.82 Payment Items

722.2 SCHEDULE OF OPERATIONS (TYPE B) - FIXED PRICE $43,500 LUMP SUM

ITEM 102.2 TREE TRIMMING LUMP SUM

Tree trimming shall conform to the relevant provisions of Sections 8.08 and 101 of the Standard Specifications.

Work shall consist of removing all living, dead, dying, broken and certain other limbs and branches in areas adjacent to proposed overhead wire relocations, highway lighting, traffic signals, traffic signage, and other areas as described on the plans, as required by the Engineer.

Tree trimming shall be done as directed by the Engineer. Any tree trimming for overhead wire relocations shall meet the current requirements of each Utility. Prior to commencing work the Contractor shall verify each location with the Utility Companies.

All pruning and tree work shall be in conformance with the most current version of the American National Standards Institute (ANSI) Standard Z-133.1 and A300 Standard Practices for Tree, Shrub, and Other Woody Plant Maintenance.

All tree trimming work within 10 feet of energized power lines and equipment shall be in conformance with the most current version of the United States Department of Labor (DOL) OSHA Standard 1910.269(r) along with subsections (1) through (8).

All work under this Item will be performed or supervised by a Massachusetts Certified Arborist.

Contractor shall be required to provide a crew, consisting of a bucket truck with operator and grounds man for pruning and removal. The minimum crew shall consist of the following: a supervisor and three tree-trimmers/laborers. The crew shall be equipped with all necessary equipment needed to complete the work including, but not limited to, pickup trucks, chippers, gas powered chain saws, hand saws, loppers, shears, pruners, branch trimmers, ladders, tree- climbing equipment, etc. Fuel for equipment shall also be considered incidental to this Item. The crew shall be OSHA certified as line-clearance tree trimmers to work within 10 feet of energized power lines and equipment.

SUBMITTALS

Prior to start of work, the Contractor shall submit to the Engineer the name, certification number and resume of the Massachusetts Certified Arborist referenced herein. Cost for Certified Arborist for all activities pertaining to this Item shall be incidental to this Item.

Incidental to this Item, the Contractor shall provide to the Engineer one (1) copy of the most current version of the American National Standards Institute (ANSI) Standard Z-133.1 and A300 Standard Practices for Tree, Shrub, and Other Woody Plant Maintenance, Part 1: Pruning. These references shall be kept by the Engineer at his/her office for the length of the Contract.

Prior to start of work, the Contractor shall coordinate with the MassDOT Landscape Design Section, the Electric Utility Company, and the Utility Company with pole set in the field to confirm number, location, and extent of selective tree trimming.

DESCRIPTION OF WORK

Line-clearance Tree Trimming: Shall be defined as the pruning, trimming, repairing, maintaining, removing, or clearing of trees or the cutting of brush that is near (within 10 feet of) energized power lines.

TREE: Shall be defined as having a diameter of 4 inches or over, measured at a point 3 feet above the average ground.

LIMBS AND BRANCHES: Shall be defined as wood having a diameter of ½ inch or over and wood that has a diameter of less than ½ inch shall be considered a TWIG.

A DYING LIMB OR BRANCH: May have live growth at some point but shall be removed if found to be in an unhealthy condition.

While it is not the intent that every dead, dying and/or broken twig be removed from trees requiring trimming, the tree worker will be required to remove all such twigs accessible in the areas of the tree in which he/she is working.

If required by the Engineer, specific trees or parts thereof which are so located that damage may result from dropping shall be reduced by rope or cable lowering.

Tree shaping may be required on trees, where up-branching done under this contract has distorted the natural symmetry of the tree. Tree shaping shall consist of the removal of limbs and branches from other locations of the tree where removal is desirable to restore natural symmetry.

All sucker growth on all tree trunks within the limits of the contract shall be removed from the ground level to the beginning of the main branch system.

Any and all trees, branches, or brush conflicting with utility poles, equipment, overhead wires, and service connections, shall be removed and/or cut back using best practices to satisfy the requirements of all Utilities with an attachment to the pole line.

Any and all branches extending directly below a street luminaire as to limit the light reaching the street or path/sidewalk surfaces shall be removed and all branches shall be cut back to afford a minimum of 5-foot clearance on all sides of the luminaire. The path/sidewalk surface shall be considered as the area from the edge of the roadway surface to the edge of the path/sidewalk surface farthest from the roadway.

By cutting NEARLY, but not quite, flush with the trunk, limb or branch, the "collar" is left at the top of the wound (in the crotch of the union). This will permit the callus growth to cover the wound in a shorter period of time.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

This work will be measured and paid for at the Lump Sum Bid Price and is considered full compensation for all labor, certifications, materials, equipment, apparatus, tools and incidentals necessary for the satisfactory completion of the work.

ITEM 102.3 HERBICIDE TREATMENT OF INVASIVE PLANTS HOUR

CONTRACTS:

- INCLUDE HERBICIDE REPORT FORM IN THE BOOK – SEE PROPOSAL DOCS FOLDER DOCUMENT A00810

REV. 2025.03.01 *(REV. DATE TO BE REMOVED BY CONTRACTS)*

This work must be performed by persons who meet the qualifications below and are approved by the Landscape Design Section.

Work under this item consists of herbicide treatment of invasive plants currently existing within the project limits and as directed. An Invasive Plant Management Strategy (IPMS) shall be submitted to the Engineer for review and approval and the IPMS shall be implemented on-site. The IPMS shall be written and submitted per Item 102.33 Invasive Plant Management Strategy and shall be measured and paid for under that Item.

Work under this item shall be coordinated with work and schedule for Selective Clearing, Clearing and Grubbing, Mowing, Tree Removal, Planting, and Wetland Mitigation items.

Payment is per hour on-site and shall be compensation for a minimum crew of 2 licensed applicators, 2 back-pack sprayers and mist-blowers, a properly equipped spray truck with spray hoses, and a tank with sufficient capacity for a full day of work. If there is only one applicator, hourly payment shall be adjusted to 50 percent of the unit price.

Date and time stamped photos indicating start and stop time of work must be submitted if requested.

This item is not intended for manual removal of plants.

Management of plants determined to have been introduced to the site via imported loam, compost, mulch, plants, equipment, or other construction activities will be the Contractor's responsibility and at the Contractor's expense.

Herbicide shall be applied during daytime hours only.

Measures to prevent the introduction of invasive plant species to the site and to address introduction due to construction-related activities shall be covered under the Standard Specifications, Division I - Subsections 7.01(D) Plant Pest Control and 7.13 Protection and Restoration of Property as amended in these Special Provisions.

Plant species targeted for management under this item shall be as determined in the field per the site walk and as specified in the IPMS.

The definition of invasive plant species shall be as described by Massachusetts Invasive Plant Advisory Group (MIPAG): "non-native species that have spread into native or minimally managed plant systems in Massachusetts, causing economic or environmental harm by developing self-sustaining populations and becoming dominant and/or disruptive to those systems."

Control of invasive plants shall begin immediately with the initiation of construction activities and prior to any clearing or site disturbance. Treatment areas shall include stockpile locations and may, upon approval of the Engineer, extend outside the project limit. Treatment shall be done each consecutive year for the duration of the contract unless specified otherwise in the IMPS or unless directed otherwise by the MassDOT invasive species contact. Work shall be done during the growing season from May – October unless otherwise specified in the IPMS.

Areas identified for vegetation control measures shall be as shown on the plans and as determined in the field by the Engineer and a MassDOT Landscape Architect. Contact at MassDOT Landscape Design Section may be contacted at: Andrew.Schlenker@dot.state.ma.us. (DESIGNER: CJones@BETA-inc.com.)

QUALIFICATIONS

The applicators shall submit and meet the qualifications outlined below. A list of contractors specializing in invasive management and approved by MassDOT Landscape Design Section is available on the following website: https://www.mass.gov/lists/landscape-design-and-roadside-maintenance under Invasive Plant Management.

Requirements

1. Company must provide proof of qualifications by providing the following:
   a. Narrative describing company, its expertise and experience with invasive plant control.
   b. Demonstrate experience with herbicide treatment as part of restorations and in sensitive areas.
   c. Describe company's technical qualifications and past performance.

2. Company must meet licensing requirements:
   a. All crew applicators must have a Massachusetts Commercial Applicator License (CORE).
   b. At least one or more applicator must have a ROW certification, if required for work.
   c. Company must provide name(s) of applicator(s) and Applicator License/Certification number for all contractor crew leaders working on the project.
   d. Company must provide documentation of any warnings, penalties or fines received in the last three (3) years.

3. Company must provide proof of experience with invasive plant control and include following:
   a. At least five (5) references from prior invasive plant control work completed in last five (5) years. Provide contact information including address, phone number and email.
   b. Provide a summary of each of these projects including nature of the problem, specific invasive vegetation treated, dates and period of treatment, methodologies used, and summary of success or not in terms of meeting performance objectives. Include summary of equipment used.
   c. Photo documentation of these projects.
   d. GPS coordinates of project locations, if available.

4. Crew leader must have expertise with invasive plant control and provide the following:
   a. Have held Core license for at least five (5) years.

b. Resume listing five (5) or more years of experience applying pesticides with the company or with another company specializing in vegetation management.

SUBMITTALS

No work shall begin without approval of the submittals.

Submittals include the following items:

Invasive Plant Management Strategy (IPMS)

At least thirty (30) days prior to proposed treatment the IPMS shall be submitted for approval by the Engineer and MassDOT Landscape Architect. All chemicals, methods and work done under this item shall be consistent with the IPMS. The IPMS shall be as described under Item 102.33.

Herbicide Use Report

Within two (2) weeks after each application, the Contractor shall provide to the Engineer and the MassDOT Landscape Architect a completed and signed MassDOT Herbicide Use Report.

Photo Documentation

Digital photos with date and time of herbicide application work, showing start time and completion time, are required and must be submitted for measurement of payment upon request.

MATERIALS

All proposed herbicides shall be as approved in the IPMS. Herbicides shall be labeled for the method of treatment and shall meet all federal, state and local regulation requirements. Application rates will depend on herbicide proposed and shall be per the manufacturer's label for specific application.

METHODS

All methods used shall be as approved in the IPMS which shall be determined during the Initial Site Walk as described under Item 102.33 Invasive Plant Management Strategy.

The Contractor shall be responsible for marking delineated areas and plants to be preserved, removed, or otherwise treated. Fencing or other materials needed for marking and delineating protected areas shall be incidental to this item.

The Contractor shall notify the Engineer a minimum of 3 days prior to date of expected herbicide application. Applicators shall notify the Engineer upon arriving on-site and upon leaving the site.

Herbicide Applications

All herbicide application shall conform to Massachusetts Pesticide Laws and Regulations per the Massachusetts Department of Agricultural Resources (MDAR) Pesticide Bureau.

Mixing, applying and/or disposing of herbicides shall always be in accordance with instructions on their labels and all applicable federal, state, and local regulations. Mixing shall not occur within sensitive areas, wetlands, or buffer zones.

Contractor shall not spray 2 hours prior to precipitation, during rain, or during windy conditions. The Contractor shall be responsible for monitoring weather conditions and adjusting the work schedule as appropriate for the herbicide and application method to be used.

Targeted vegetation shall be identified and marked prior to treatment. Plants treated by foliar spray, injection or glove application or other methods that leave standing vegetation, as opposed to cut-stump application, shall remain clearly marked for identification through the contract period.

Desirable vegetation shall be protected from both spray and other physical damage.

Contractor is responsible for any damage to vegetation not designated for removal or treatment. Vegetation damaged shall be restored. Cost of replacement plants and/or restoration shall be borne by the Contractor.

Contractor shall ensure that the public does not enter a work area while herbicide application or spraying is underway.

Disposal Of Invasive Plant Material

All material to be cleared shall become the property of the Contractor. The satisfactory disposal of all cleared plant material (seeds, roots, woody vegetation, associated soils, etc.) shall be the Contractor's responsibility.

The Contractor shall take measures to prevent viable plant material from leading to further infestations (seeds, roots, woody material, etc.) while stockpiled, in transit, or at final disposal locations. All precautions shall be taken to avoid contamination of natural landscapes with invasive plants or invasive plant material.

Chipping, shredding, or on-site burning of plant material must be approved by the Engineer and included in the IMPS.

For plant material taken to an incinerating facility per the IPMS, a receipt from that facility shall be submitted to the Engineer as proof of disposal.

Where feasible, it is preferable to dispose of plants on-site or to bury them on-site with on-going monitoring for re-sprouting. Disposal locations and methods must be approved and included in the IPMS. Site work such as grading and seeding to stabilize and restore disposal area shall be incidental to this item.

The Contractor shall be responsible for treating or otherwise managing areas of re-growth due to improper disposal. Treatment shall be at the Contractor's expense.

Follow-Up Treatment

Plants and areas shall be re-treated as necessary and as appropriate to the time of year. Treatment shall be for the duration of the contract and per the IPMS.

MEASURE OF SUCCESS

The expectation is a minimum of 85-95 percent control achieved after the first treatment, depending on plants targeted and extent of population, and based on the expectations laid out in the IPMS. The expectation for the contract duration is 95-100% eradication by the end of the treatment period, unless otherwise specified in the IPMS.

METHOD OF MEASUREMENT

Item 102.3 will be measured for payment by the Hour of verified crew time spent on the project doing herbicide application as and where specified herein and in the IPMS. A crew shall be defined as a minimum of two licensed applicators each equipped with (at minimum) back-pack sprayer and mist blower. The crew shall also have a properly equipped spray truck with hoses and a tank with sufficient capacity for a full day of work.

BASIS OF PAYMENT

Item 102.3 will be paid at the contract unit price per Hour, which price shall include all labor, materials, equipment, tools, and all incidentals required to complete the work.

Payment will be based upon verified time spent on the project doing herbicide application as and where specified in the IPMS and upon receipt and approval of submittals. Payment will not include travel time to and from the Contractor's place of business and nor time for investigative field trips.

If there is only one applicator, hourly payment shall be adjusted to 50 percent of the unit price.

The Invasive Plant Management Strategy will be paid for under Item 102.33.

ITEM 102.33 INVASIVE PLANT MANAGEMENT STRATEGY HOUR

REV. 2025.03.01 *(REV. DATE TO BE REMOVED BY CONTRACTS)*

This item consists of providing an Invasive Plant Management Strategy (IPMS) for the control of invasive plants currently existing on the project site and/or as directed and shall be coordinated with Item 102.3 Herbicide Treatment of Invasive Plants. Unless otherwise approved, the IPMS shall be submitted in the form of the MassDOT Invasive Plant Management Strategy Report Form.

The IPMS shall be submitted for review and approval by the MassDOT Landscape Design Section or their representative, and the IPMS shall be implemented on-site.

The Invasive Plant Management Strategy Report Form is available online at https://www.mass.gov/lists/landscape-design-and-roadside-maintenance under Invasive Plant Management.

Herbicide treatment for invasive plants shall be as described under Item 102.3 Herbicide Treatment of Invasive Plants and shall be compensated per that Item.

Work under this item shall be coordinated with work and schedule for Selective Clearing, Clearing and Grubbing, Mowing, Tree Removal, Planting, and Wetland Mitigation as relevant to the project.

Individual attending the site walk and determining the Invasive Plant Management Strategy must demonstrate expertise with vegetation management and invasive plant control and submit qualifications as described below.

QUALIFICATIONS

Individual shall be from the same company as that providing services for Item 102.3 Herbicide Treatment of Invasive Plants and shall submit the following, if not submitted under Item 102.3:

- Submit copy of current Core license.
- Submit a resume listing five (5) or more years of experience managing invasive plants with a company specializing in vegetation management.
- References shall be submitted if requested.

SUBMITTALS

Task Summary & Reports

For measurement of payment, the contractor shall submit the total sum and a breakdown of hours for the tasks performed. At a minimum, the tasks shall include the Initial Site Walk, submittal of an approved IPMS, and if requested to accommodate project or site changes, a Follow-up Site Inspection and accompanying IPMS Amendment.

Interim Site Monitoring Reports and/or a Final Report shall be submitted if requested by the MassDOT Landscape Design contact. The MassDOT Landscape Design contact must be notified to attend the site inspection walk when an Interim or Final Report has been requested.

Invasive Plant Management Strategy (IPMS)

At least thirty (30) days prior to construction activities and/or any proposed treatment, the contractor shall submit the IPMS for approval by the Engineer and MassDOT Landscape Architect. All chemicals and methods proposed shall be consistent with applicable Massachusetts Wetlands Protection Act Order of Conditions.

The IPMS shall be completed in coordination with the Prime Contractor and the Engineer and shall include the following as appropriate and applicable to the project and to the IPMS Report Form questions and Guidance:

I. Project Information
- a. Company writing the IPMS and performing the herbicide application.
- b. Date of site walk
- c. Attendees at site walk
- d. Expected end date of contract and expected last treatment (month/season)

II. Brief Description of Conditions
- a. Provide a free-hand sketch on construction plans or aerial image showing species, location, and as relevant, show or note extent of population as relevant to Strategy (i.e., population extends off ROW preventing eradication, small population and eradication deemed feasible within contract schedule, etc.).

III. Coordination with Roadway Contractor regarding other work
- a. Tree Work: Note coordination to be implemented with tree removal, clearing, and clearing and grubbing as applicable to the project.
- b. Wetland Mitigation - Include management proposed for wetland mitigation areas in the IPMS, if and as required.
- c. Planting: If there will be planting in areas proposed for treatment, propose treatment and schedule to avoid herbicide damage to plants.
- d. Mowing: If coordination is required with state mowers, note need in IPMS.

IV. Soil Management
- a. Provide specifics on how soil with invasive plant roots (in particular) or seeds will be handled (i.e., separate stockpiles, plant material will be buried on-site, re-used on-site, disposed off-site and if so, where?).
- b. Show stockpile locations on plan and include treatment schedule.
- c. Note measures that will be implemented to avoid spread through equipment, including how and where equipment will be cleaned.

V. Invasive Plant Treatment & Management
- a. Proposed chemical and methods of treatment for each species or area.
- b. Time of treatment based on target plant species.
- c. Submit product label including application methods and rates (entire MSDS information need not be submitted if available online).
- d. Proposed performance metrics or measure of treatment success if different from that specified under Item 102.3.

e. Method for disposing invasive plant material. This includes material that may result in spread (i.e., seeds, roots) and material that has been treated and/or is not viable (foliage, dead wood, etc.). Methods may include grinding in place, stockpiling and treating, and incinerating offsite.
f. Expected follow-up treatment for duration of contract.

VI. Monitoring Schedule if requested by MassDOT.

Note: The IPMS is critical for identifying pre-construction conditions as well as strategies for minimizing import or spread of invasive plants. Failure to provide an approved IPMS may jeopardize this item, in which case, the contractor will be responsible for management of invasive plants found on-site at no cost to the contract.

Photo Documentation

Digital photos of site conditions, typical species, and extent of infestation must be provided with the IPMS and with any follow-up monitoring or reporting. Photos of follow-up monitoring and reporting must be date and time stamped for acceptance.

METHODS

Initial Site Walk

Prior to any construction activities and soil disturbance, the Contractor shall walk the site with the Engineer and the MassDOT Landscape Architect to determine the IPMS. During the site walk the Contractor shall identify limits of work and, as necessary, mark locations of areas designated for treatment and individual plants targeted for treatment or removal. The Contractor shall be responsible for marking delineated areas and plants to be preserved, removed, or otherwise treated. Fencing or other materials needed for marking and delineating protected areas shall be incidental to this item.

IPMS Follow-up Amendment

The IPMS may be amended to address additional concerns or adjust to conditions if required by the MassDOT Landscape Architect. The amended IPMS shall be submitted to the Engineer and MassDOT Landscape Architect for approval at least fourteen (14) days prior to any proposed treatment.

Interim Site Monitoring Inspection Reports

If required by the MassDOT Landscape Architect and Engineer, Interim Site Monitoring and an accompanying report shall be conducted. Interim Reports must include time and date stamped photos showing treated locations and species.

Final Inspection

A final inspection and report documenting the status of the invasive control may be required for regulatory purposes or for instances where control will be continued by others. The report shall

include photo documentation of pre-construction (existing) and post-treatment conditions, notations on a plan or aerial image of area treated, summary of treatment performed, and control achieved. Final reports submittal must include time and date stamped photos.

METHOD OF MEASUREMENT

Item 102.33 will be measured for payment by the Hour. The basis for measurement shall be per the completion of tasks as approved under the Task Summary submittal and acceptance of submittals and photos described above.

BASIS OF PAYMENT

Item 102.33 will be paid at the contract unit price per Hour, which price shall include all labor, materials, equipment, tools, and all incidentals required to complete the work. Payment shall not include travel time to and from the Contractor's place of business.

ITEM 102.511 TREE PROTECTION – ARMORING AND PRUNING EACH

The work under this item shall conform to the relevant provisions of Sections 771 and shall be for furnishing and installing temporary tree trunk protection and for minor limb pruning or removal of lower tree limbs to prevent injury to the tree from construction equipment and activities.

Trunk armoring is for instances where construction activity (the use of heavy equipment) comes close enough to potentially damage the tree trunk or limbs. It is to be used where shown on the plans and as directed by the Engineer.

REFERENCES

If requested, the Contractor shall provide to the Engineer one copy of the latest edition of the American National Standards Institute (ANSI) A300 Standard Practices for Tree, Shrub, and Other Woody Plant Maintenance: Part 1-Pruning and Part 5-Construction Management Standard. Provision of reference shall be incidental to this item.

MATERIALS

Trunk armoring shall be such that it prevents damage to the trunk from construction equipment. Selected material shall be such that installation and removal will not damage the trunk.

Acceptable materials include 2x4 wood cladding with wire or metal strapping, or, for instances when duration of construction activities is less than three months, corrugated plastic pipe mounted with duct tape. Height of cladding shall be from base of tree (including root flare) to the bottom of the first branch, eight feet above the ground, or as required by the Engineer. Material and methods shall be approved by the Engineer.

Other materials or methods may be acceptable if approved by MassDOT Landscape Design or by an Arborist (if included in the contract).

METHODS OF WORK

Prior to construction activities, the Engineer, the Contractor, the Town Tree Warden, and the Arborist (if item is included in the contract), shall review trees noted on the plans to be protected. Final decision as to trees armored and/or pruned shall be per the Engineer.

Care shall be taken to avoid damage to the bark during installation and removal of armoring. Trunk armoring shall be replaced and maintained such that it is effective for as long as required and shall be removed immediately upon completion of work activities adjacent to trees.

Pruning of limbs shall conform to the techniques and standards of the most recent ANSI A300 standards.

DAMAGES & PENALTIES

In the event that trees designated for protection under this item are damaged, including root damage from unapproved trespassing onto the root zone, the Contractor shall, at his own expense obtain an Arborist. The Arborist shall be approved by MassDOT.
If, based on the recommendations of the Arborist, the Engineer determines that damages can be remedied by corrective measures, such as repairing trunk or limb injury, soil compaction remediation, pruning, and/or watering, the damage will be repaired as soon as possible within the appropriate season for such work and according to industry standards.

If the Engineer determines that damages are irreparable, the Contractor shall pay for the damages in the amount of $500.00 per diameter inch at breast height (DBH) per tree.

Additionally, if the Engineer determines that the damages are such that the tree is sufficiently compromised as to pose a future safety hazard, the tree shall be removed. Tree removal will include clean up of all wood parts, grinding of the stump to a depth sufficient to plant a replacement tree or plant, removal of all chips from the stump site, and filling the resulting hole with topsoil.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 102.511 will be measured and paid at the contract unit price per each. This will include full compensation for all labor, equipment, materials, and incidentals for the satisfactory completion of the work and the subsequent removal and satisfactory disposal of the protective materials upon completion of the contract.

In the event of tree damage, cost of Arborist services, of remediation measures, and/or tree removal will be borne by the Contractor.

Payment under this item will be scheduled throughout the length of contract:

- 40% of value shall be paid upon installation of trunk armoring and completion of pruning work, if required.
- 60% shall be paid at the end of construction operations that would damage the tree and after protection materials have been removed and properly disposed of by the Contractor. In the event of repairable damages, payment shall be made after the completion of remediation measures.

In the event of irreparable damage due to lack of proper protective measures being take there will be no compensation in addition to the $500.00 per diameter inch penalty.

ITEM 102.521 TREE AND PLANT PROTECTION FENCE FOOT

The work under this Item shall conform to the relevant provisions of Sections 644 and 771 of the Standard Specifications and the following:

Work under this item consists of furnishing, installing, removing and resetting, maintaining fence in a vertical and effective position at all times, and final removal of temporary fence.

The purpose of the fence is to prevent damage to tree roots, tree trunks, soil, and all other vegetation within a delineated Tree and Plant Protection Zone (TPPZ) as shown on the plans, as directed by the Engineer, and as described herein.

Protection shall be for the duration of the construction activities unless otherwise directed.

MATERIALS

Temporary Fence shall be such that it provides a minimum 48-inch tall barrier that remains vertical and effective (not sagging) for the duration of period required. Fence shall be plastic orange safety fence (recommended where high visibility is necessary), wooden snow fencing, or other approved material.

Per the Engineer, additional posts, deeper post depths, and/or additional attachments will be used if the fabric or fence sags, leans or otherwise shows signs of failing to create a sufficient barrier to access.

REFERENCES

If requested, the Contractor shall provide to the Engineer one copy of the American National Standards Institute (ANSI) A300 Standard Practices for Tree, Shrub, and Other Woody Plant Maintenance Part 1, Pruning and Part 5, Construction Management Standard. Provision of reference shall be incidental to this item.

ESTABLISHMENT OF TPPZ

Fencing shall be used for construction areas, staging areas, and stockpile areas as shown on the plans and as directed by the Engineer to establish the Tree and Plant Protection Zone (TPPZ).

Fence shall be located as close to the work zone limit and as far from the trunk as possible to maximize the area to be protected. Fence shall run parallel and adjacent to construction activity to create a barrier between the work zone and the root zone or designated limit of plants and soils to be protected.

When construction activities surround (or have the potential to surround) trees or plants to be protected, a circular enclosure shall be used. In these instances, the TPPZ limit shall be the Drip Line of each tree or as close as possible to the Drip Line, and as shown on the plans and details. The Drip Line is defined as the limit of tree canopy.

The Contractor shall not engage in any construction activity within the TPPZ without the approval of the Engineer, including: operating, moving or storing equipment; storing supplies or materials; locating temporary facilities including trailers or portable toilets; and shall not permit employees to traverse the area to access adjacent areas of the project or use the area for lunch or any other work breaks.

METHOD OF WORK

Fence shall be installed prior to any construction work or staging activities and shall be installed and maintained in a vertical and effective position at all times.

Fence shall be repositioned where and as necessary for optimum effectiveness. Repositioning shall be incidental to this item. Fence shall not be moved without prior approval by the Engineer.

The TPPZ shall be protected at all times from compaction of the soil; damage of any kind to trunks, bark, branches, leaves, and roots of all plants; and contamination of the soil with construction materials, debris, silt, fuels, oils, and any chemicals substance.
After construction activities are completed, or when directed by the Engineer, fence, stakes, and other materials shall be removed and disposed off-site by the Contractor.

REQUIRED WORK WITHIN THE TPPZ

In the event that grading, trenching, utility work, or storage is unavoidable within the TPPZ, the Engineer shall be notified. Measures may be required for tree protection and preservations, including air spading, the use of six-inch depth of wood chips or approved matting for root protection, pruning of branches, and/or trunk protection. These protection measures will be paid under applicable items.

Landscaping work specified within the TPPZ shall be accomplished by hand tools. Where hand work is not feasible, with permission of the Engineer, work shall be conducted with the smallest mechanized equipment necessary.

TREE AND PLANT DAMAGES OR LOSS

If the TPPZ is intruded upon, at the discretion of the Engineer, the Contractor will be required to provide a more durable barrier (e.g., Jersey Barriers) to secure the area. Cost of furnishing and installing additional or more durable barrier shall be borne by the Contractor.

If the Contractor intrudes into a TPPZ without approval, soil will be considered compacted and tree root damage will be assumed. Action will be taken as specified below.

In the event that trees designated for protection under this item are damaged, including root damage from unapproved trespassing onto the root zone, the Contractor shall, at his own expense obtain an Arborist. The Arborist shall be approved by MassDOT.

In the event of spills, compaction or damage, the Contractor shall take corrective action immediately using methods approved by the Engineer in coordination with the Arborist.

If, based on the recommendations of the Arborist, the Engineer determines that damages can be remedied by corrective measures, such as repairing trunk or limb injury, soil compaction remediation, pruning, and/or watering, the damage will be repaired as soon as possible within the appropriate season for such work and according to industry standards.

If the Engineer determines that damages are irreparable, the Contractor shall pay for the damages in the amount of $500.00 per diameter inch at breast height (DBH) per tree.

Additionally, if the Engineer determines that the damages are such that the tree is sufficiently compromised as to pose a future safety hazard, the tree shall be removed. Tree removal will include cleanup of all wood parts, grinding of the stump to a depth sufficient to plant a replacement tree or plant, removal of all chips from the stump site, and filling the resulting hole with topsoil.

Shrubs will be replaced with a plant of similar species and equal size or the largest size plants reasonably available. The Engineer will approve the size and quality of the replacement plant. Replacement will include a minimum of one year of watering and care.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 102.521 will be measured and paid for payment by the foot of Tree and Plant Protection Fence, complete in place. This includes all labor, materials, equipment, maintenance, final removal and disposal of the protective materials, damages repair, and all incidental cost required to complete the work.

Payment of 40 percent of value will be made upon installation of Fence. The remaining 60 percent will be made when protection materials have been removed and disposed off-site.

No separate payment will be made for costs of remedial actions, including addition of more durable barriers, or arborist services, but all costs in connection therewith shall be included in the Contract unit price bid.

In the event of irreparable damage due to lack of proper protective measures being take there will be no compensation in addition to the $500.00 per diameter inch penalty.

ITEM 106.29 GRAFFITI REMOVAL BY APPLICATION OF COATING SQUARE FOOT

The work under this Item shall conform to the relevant Provisions of Subsection 961.60 of the Standard Specifications and the following:

This work shall consist of the removal of graffiti from the surfaces of concrete substructures to the satisfaction of the Engineer.

The work shall be executed by application of coating to the area affected by graffiti. The removal limits shall be as directed by the Engineer.

Graffiti removal by application of coating means concealing graffiti completely out of sight by making use of approved coating application on a given structure.

MATERIALS

For graffiti removal conducted by application of coating, the proposed paint system shall be a two-coat system consisting of a primer coat and a topcoat. The primer shall be a quality primer with good hiding power and formulated specifically for the purpose of covering graffiti; It shall be compatible with the surface it is used on as per the manufacturer's data sheet.

The top coat shall be compatible with the primer and the existing substrate. Its color shall match the color of the adjacent surface to the satisfaction of the Engineer. The Contractor shall submit the graffiti removing coating products for the approval of the Engineer. Different coating products may be required for surfaces of different materials.

Any product approved by the Engineer shall be non-toxic, non-corrosive, biodegradable substance and comply with the volatile organic compound (VOC) requirements of the Massachusetts Department of Environmental Protection (MassDEP) regulation 310 CMR 7.25(11), Architectural and Industrial Maintenance (AIM) Coatings. The application of the product selected for graffiti removal shall be consistent with the recommendations of the coating manufacturer.

CONSTRUCTION DETAILS

The graffiti removal coating material shall be applied as per manufacturer's specification. The contractor shall provide product data and manufacturer’s recommendations for use by the Engineer for approval at least two weeks prior to starting of work.

The thoroughness of the graffiti removal from the graffitied surface is subject to the approval of the Engineer. If the Engineer establishes the work requires additional application, the Contractor shall remedy and remove any sign of the graffiti at no additional cost to the State. The Contractor shall also take appropriate precautions to prevent any solvent or coating chemical from falling into the river.

The substrate surfaces shall be thoroughly cleaned before applying coating. All dust, dirt, oil, grease, and other substances which might prevent the adhesion of the paint to the substrate shall be removed.

The surface preparation and application procedure shall be consistent with the recommendations of the graffiti removal coating manufacturer.

Cleaned surfaces shall bear no evidence of graffiti paint layers. If after cleaning is completed, the cleaned surface becomes soiled because of the Contractor's operations, it shall be re-cleaned, at the expense of the Contractor.

METHOD OF MEASUREMENT

Item 226.52 will be measured for payment by the Square Foot of surface area where the graffiti was actually removed. Measurement shall be taken as a flat plane. No allowance will be made for depths of joints, overhangs, stone faces or concrete patterns.

BASIS OF PAYMENT

Item 226.52 will be paid for at the respective Contract unit prices per Square Foot, which prices shall include all labor, materials, equipment and all incidental costs required to complete the work.

ITEM 107.855 PRESSURE INJECTION OF CRACKS FOOT

The work to be done under this Item consists of repairing cracks in sound concrete of the existing substructures. Existing cracks to be repaired by pressure injection shall be bonded by penetration with an epoxy adhesive in accordance with the epoxy manufacturer's recommendations and the following:

The epoxy adhesive shall be listed on MassDOT's Qualified Construction Materials List, and the Contractor shall submit manufacturer's literature completely describing the products to be used. The materials shall be delivered clearly marked with legible and intact labels containing the manufacturer's name, brand name, and identifications of the temperatures that conform to the manufacturer's recommendations and instructions.

The Contractor shall comply with all manufacturers' instructions and recommendations regarding safety. The surrounding work, vehicles, and vegetation shall be protected from damage by epoxy injection materials and operation.

Not included under this Item are the repairs to cracks that pass through areas of unsound concrete to be removed under Item 127.12. The Engineer will designate these areas.

The Contractor will perform his own investigations and will "evaluate" and mark out the cracks to be repaired. Before any repairs are made, the Contractor will provide the Engineer clear access to the areas designated for repair. During this time, the Engineer will perform an inspection of the areas and will approve and/or designate the areas where repair will be required. It shall be the responsibility of the Contractor to inform the Engineer, in writing, of the date that a structure(s) will be available for inspection operations. Notification shall be given to the Engineer at least seven (7) days prior to the date that the area in question will be in a condition acceptable to the Engineer.

The Contractor will not be allowed to do any repair work until all necessary inspection operations have been performed, unless given permission by the Engineer. The Contractor will include any costs related to this inspection in the general cost of the work.

As crack repair operations commence, the Contractor shall provide at least one 4″ diameter core at a location designated by the Engineer. The Engineer reserves the right to order additional cores at locations he/she designates. The core shall penetrate the full crack depth of the area being restored. The cores shall be submitted to the Engineer for testing by the MassDOT Highway Division Research and Materials Section.

Further crack repairs may not continue until the test results confirm that the methods and materials being utilized by the Contractor are deemed acceptable by the Engineer. The test will be considered acceptable if upon visual examination the injection has achieved more than 90 percent penetration of the crack, and the bond strength has conformed to the following: concrete failure before adhesive failure, or 6500 psi with no failure of either concrete or adhesive. If a core fails a test, an evaluation of the methods and materials used must be made before the area represented by the failed test is re-injected and re-tested. The Contractor will not be permitted to continue to inject cracks until the cause of failure is determined and the Engineer is satisfied that corrective measures have been taken to prevent additional failures. The Contractor shall make additional cores as necessary until the work is considered acceptable.

The Contractor shall furnish to the Engineer samples of materials proposed for use at least six weeks prior to scheduled use.

The Contractor shall arrange with the materials manufacturer or distributor to have the services of a competent field representative at the work site prior to any mixing of components to instruct the work crews in the proper mixing and application procedures. The field representative shall remain at the job site after work commences and continue to instruct until the Engineer is satisfied that the crew has mastered the technique of installing the system successfully. The representative shall make periodic visits to the project as the work progresses and shall confer on each visit with the Contractor and the Engineer.

The manufacturer's field representative must be fully qualified to perform the work and shall be subject to the approval by the Engineer. The Contractor shall be completely responsible for the expense of the services of the required field representative.

MEASUREMENT AND PAYMENT

Pressure Injection of Cracks, when completed as such, will be measured by the FOOT of crack repaired as directed by the Engineer. Payment for work done under this Item will be made at the Contract unit price per foot of crack repaired. The unit bid price shall include the costs of the manufacturer's field representative and the costs for taking test cores and repairing all test core locations.

ITEM 127.1 REINFORCED CONCRETE EXCAVATION CUBIC YARD

The work under this Item shall conform to the relevant provisions of Section 112 and shall include the excavation, removal and proper disposal of portions of the existing bridge substructure, including but not limited to, abutment stems, backwalls, pier stem, and wingwall stems, to the limits indicated on the Plans and/or as directed by the Engineer, unless specifically approved by the Engineer in writing.

The work shall include removal of steel reinforcement, where necessary, and all saw cutting of the existing concrete where indicated on the Plans and/or as directed by the Engineer. Exposed rebar to remain shall be cleaned by abrasion blasting and shall be free of all oil, grease, rust and other foreign material. The Contractor will not be paid for the removal of any concrete beyond the limits described under this Item or shown on the Plans.

METHOD OF CONSTRUCTION

All materials resulting from the concrete demolition shall become the property of the Contractor who shall properly dispose of all such materials at approved locations. Debris from construction must be carefully contained within the work zones by the use of temporary shielding or other appropriate methods and prevented from falling into the water, or surface, below. Contractor shall be responsible for dust control as a result of the demolition operations.

The Contractor shall utilize two types of jackhammers. The first type of jackhammer shall not exceed a weight of forty (40) pounds. This equipment shall be used to remove the concrete to the full depth of the excavation as indicated on the Plans or as directed by the Engineer. The second type of jackhammer shall be a chipping hammer and shall not exceed a weight of fifteen (15) pounds. This equipment shall be used to dress the excavated area by removing loose, cracked, unsound or hollow areas between the unexcavated area and the excavated area.

The Contractor may propose the use of other demolition equipment, the use of which will be subject to the review and approval of the Engineer. The Engineer may reject the use of any equipment or demolition methods that, in his opinion, cause excessive vibration of the structure, or threaten to damage the bridge or any part thereof, or cause discomfort to the users of the bridge, or present a hazard of any kind to the structure, workers, or the public.

Any reinforcing steel which is to remain and has been loosened or dislodged, shall be realigned and retied by the Contractor. This shall be considered incidental to this Item of work. If during the course of this operation, the Contractor damages the existing reinforcing steel or structural steel that is not designated to be replaced, he shall submit to the Engineer for approval his method of repair. The approved repair shall be completed by the Contractor at no additional cost to the Department.

The Contractor shall prepare a neat line between the unexcavated area and the excavated area. This shall be accomplished with a masonry saw which shall penetrate a minimum of 1 inch below the surface. The Contractor shall take extreme care so as to not damage any steel reinforcing or embedded structural steel.

ITEM 127.1 (Continued)

Areas to be capped must be clean, sound, and free of contaminants. All loose and deteriorated concrete shall be removed by mechanical means. Mechanically prepare the concrete substrate to obtain a surface profile of ±0.25 inch with a new exposed aggregate surface. After removals and edge conditioning are complete, remove bond inhibiting materials (dirt, grease, loosely bonded aggregate) by abrasion blasting or high pressure washing with water. Check the concrete surfaces after cleaning to ensure that surface is free from additional loose aggregate or additional delaminations.

Measurement and Payment

Reinforced Concrete Excavation will be measured for payment by the number of cubic yards of material excavated, as determined by field measurements conducted by the Contractor and verified by the Engineer.

Reinforced Concrete Excavation shall be paid for at the contract bid price per cubic yard. Said price shall constitute full payment for excavation, saw cutting, abrasion blasting, removal, and satisfactory off-site disposal of all excavated materials. Said price shall also include the furnishing of all tools, labor, equipment and transportation and all incidental work required to properly execute the work in accordance with these specifications including any temporary shielding or other methods required to contain the debris within the work zone.

ITEM 127.122 REINFORCED CONCRETE EXCAVATION FOR REPAIRS CUBIC FOOT

The work under this Item includes the removal of deteriorated and/or spalled concrete in the bridge substructures, as may be required, for repairs as directed by the Engineer. Plans of the existing bridge, as well as the latest Inspection Report are available at the MassDOT Highway Division, Plans and Records Room, 10 Park Plaza, Boston, MA 02116.

GENERAL

Existing deteriorated concrete within the existing substructures shall be removed to the limits of sound concrete as directed by the Engineer. The Contractor shall not damage any existing reinforcing steel in areas where deteriorated or spalled concrete is being removed. The Contractor will not be paid for the removal of any concrete beyond the limits described under this Item and approved by the Engineer.

CONSTRUCTION METHODS

A. Inspection of the Concrete Surfaces: The Contractor will perform their own investigations and will "evaluate" and mark out the surfaces of the concrete to determine the areas for repairs. Methods for evaluation shall include nondestructive methods such as visual observations and acoustic impact method using a hammer or chain drag (for horizontal surfaces only). The Contractor is referenced to ACI Report 201.1R-08 "Guide for Making a Condition Survey of Concrete in Service" and ACI Report 364.1R-07 "Guide for Evaluation of Concrete Structures Before Rehabilitation" in regards to evaluation methods. Before any existing concrete is removed, the Contractor will provide the Engineer clear access to the areas designated for repair. During this time, the Engineer will perform an inspection of the areas and will approve and/or designate the areas where concrete removal and repair will be required.

   It shall be the responsibility of the Contractor to inform the Engineer, in writing, of the date that a structure will be available for inspection operations. Notification shall be given to the Engineer at least seven (7) days prior to the date that the area in question will be in a condition acceptable to the Engineer.

   The Contractor will not be allowed to do any further repair work until all necessary inspection operations have been performed, unless given permission by the Engineer.
   The Contractor will include any costs related to this inspection in the general cost of the work.

B. Removal of Deteriorated Concrete: All deteriorated concrete designated for removal under this Item shall be removed within the limits approved by the Engineer. The lateral limits of each area to be repaired will be delineated by the Contractor and suitably marked and subsequently approved by the Engineer. Where several areas are to be repaired are very close together, the Engineer may combine these individual repairs into a larger area. The outlines of each such area shall first be cut to a depth of ½ inch with an approved power-saw capable of making straight cuts. In the event that reinforcing steel is encountered within the outer ½ inch depth during sawing operations, the depth of sawcut shall immediately be adjusted to a shallower depth so as not to damage the steel bars. If so directed by the Engineer, sawcutting shall again be carried down to the ½ inch depth at

other locations of repair provided reinforcing steel is not again encountered. Where over-breakage occurs resulting in a featheredge, the featheredge shall be squared up to a vertical edge in an approved manner. Where sawing is impractical, the area shall be outlined by chisel or other approved means.

The removal of deteriorated concrete shall be accomplished by pneumatic or power hammers approved by the Engineer. For concrete removal, the weight of pneumatic or power hammers shall not exceed 30 pounds. Fillets at inside corners of intersecting limit lines shall be carefully removed. After completion of concrete removal, the sides of the patch shall be vertical down to the bottom of the patch.

The minimum depth of concrete removal shall not be less than the specified minimum thickness of repair material.

No debris, tools or incidental equipment of any kind will be permitted to fall into the river below. The Contractor shall provide any necessary shielding or other means to prevent debris from falling into the river below. Any material that accidentally falls into the river shall be removed immediately at his/her own expense. All debris shall be promptly removed and satisfactorily disposed of by the Contractor.

If removal of deteriorated concrete results in full or partial exposure of reinforcing steel, but less than 1 inch clearance exists between the sound concrete and the inside surface of exposed reinforcing steel, enough sound concrete as is necessary to achieve this 1 inch minimum clearance shall be removed. The removal of this sound concrete shall also be included for payment under Item 127.12.

Where the existing reinforcing steel is damaged or deteriorated it shall be supplemented with new reinforcing steel of the same size. Pneumatic tools shall not be placed in direct contact with reinforcing steel. Any sound reinforcing steel damaged during the concrete removal operations shall be repaired or replaced by the Contractor at his expense as directed by the Engineer. New steel shall be attached beside existing steel with a minimum splice length as indicated on the Plans, or as directed by the Engineer. The concrete shall be removed to a minimum depth of 1 inch below the new steel.

C. Surface Preparation: Areas to be repaired must be clean, sound, and free of contaminants. All loose and deteriorated concrete shall be removed by mechanical means. Mechanically prepare the concrete substrate to obtain a surface profile of +/- 0.25 inches with an exposed aggregate surface. Area to be patched shall not be less than the minimum depth specified by manufacturer of the rapid setting cement.

If reinforcing steel is exposed, then clean by mechanical cleaning and then high pressure washing with water that does not contain detergents or any bond inhibiting chemicals. Where active corrosion has occurred that would inhibit bonding, abrasion blast steel to white metal finish.

After removals and edge conditioning are complete, remove bond inhibiting materials (dirt, grease, loosely bonded aggregate) by abrasion blasting or high pressure water blasting with water that does not contain detergents or any bond inhibiting chemicals. Check the concrete surfaces after

cleaning to ensure that surface is free from additional loose aggregate or that additional delaminations are not present.

Measurement and Payment

Reinforced Concrete Excavation for Repairs will be measured for payment by the number of cubic feet of material excavated, as determined by field measurements conducted by the Contractor and verified by the Engineer.

Reinforced Concrete Excavation for Repairs shall be paid for at the contract bid price per CUBIC FOOT and shall constitute full payment for excavation, saw cutting, abrasion blasting, removal, and satisfactory off-site disposal of all excavated materials, and the furnishing of all tools, labor, equipment transportation and all incidental work required to properly execute the work in accordance with these specifications and to the complete satisfaction of the Engineer. Payment for new steel reinforcing required to supplement any existing steel that is found to be damaged or deteriorated shall be paid under Item 910.1.

ITEM 141.1 TEST PIT FOR EXPLORATION CUBIC YARD

The work to be done under this Item shall conform to the relevant provisions of Section 140 supplemented by the following:

The Contractor shall exercise extreme caution when performing the work of this section, and specialized techniques such as vacuum excavation or handwork as directed by the Engineer and shall be considered part of the work of this section. Test pits shall be no greater than 5'x3'x5' deep unless otherwise directed by the Engineer.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

This item shall be measured and paid at the contract unit price per Cubic Yard, which price shall be full compensation for labor, materials, equipment, tools, saw-cutting, excavation, including any special techniques such as hand or vacuum methods, survey or other measurement, backfilling, compacting, coordinating with others and all incidentals necessary to satisfactorily complete the work. Test pits made without the prior approval of the Engineer shall not be compensated for. Payment for temporary HMA patch shall be paid under Item 472.

ITEM 151.9 STREAMBED RESTORATION CUBIC YARD

This work shall consist of stockpiling and replacing river bed material in the proposed bridge replacement and the upstream and downstream approaches in the limits of work. The streambed restoration shall replicate the existing natural channel bed outside the work area in terms of material, roughness, shape, profile, and appearance. The ultimate product will, to the extent possible, replicate the function and appearance of the natural stream channel, as illustrated by photo-documentation herein (Figures A).

The Contractor shall coordinate with his/her sub-contractors to ensure all required equipment is available on-site to complete the work in this manner. The streambed restoration is required to comply with environmental permits issued for the project. MassDOT Environmental Services will provide a Fluvial Geomorphologist (Geomorphologist) to provide a pre-construction meeting, on-site oversight during construction, and assistance during streambed restoration construction to ensure the restoration is constructed as shown on the Plans, as required by these Special Provisions and in accordance with permit requirements.

At least 30 days prior to the commencement of construction, the Contractor shall coordinate with David Paulson (MassDOT Wetlands & Wildlife Unit Supervisor, (508) 389-6366 / david.j.paulson@state.ma.us) to set up an initial (virtual or in person) meeting with MassDOT's Geomorphologist, Contractor, and Engineer. At this meeting, the Geomorphologist will provide an overview of the restoration work. The Contractor should be prepared to discuss the anticipated means, methods, and schedule.

Process Approval:

In lieu of a mockup, the Contractor shall schedule an onsite meeting to discuss the streambed restoration with the Geomorphologist and respective parties from MassDOT. The Geomorphologist shall be onsite during initial streambed restoration. The Contractor shall provide the Geomorphologist adequate access to observe, direct, and inspect the channel restoration work throughout the duration of the removal, stockpile, and reinstallation of the existing streambed material. If material is being brought to the site for streambed restoration, the Contractor shall provide the Geomorphologist with photographs to see the material.

MATERIAL

The top 2'-8" of streambed material excavated from the existing streambed shall be removed and stockpiled to facilitate reinstallation and replication of the natural streambed. The excavated streambed material below the top 2'-8" feet shall be stockpiled and reused to fill the voids in the proposed riprap placed below the top streambed restoration layer.

In the event that the excavated material is not suitable or there is not enough available suitable material, additional streambed restoration material shall be locally sourced that matches the composition of the existing native river bed. The following gradation shall be used as a guide. The channel is a cobble and gravel riffle-pool channel. The median grain size (D50) is approximately 1.9 mm (medium sand).

ITEM 151.9 (Continued)

Stream Bed Material Gradation

Particle	Percent (%) Composition
Boulder	0
Cobble	0
Gravel	48
Sand	52

The streambed material shall be approved by the Engineer and Geomorphologist prior to use.

CONSTRUCTION

Channel

The streambed material shall be reinstalled over dumped riprap, as depicted on the plans, to an average thickness of 2'-8" feet, with variations in thickness as necessary to create the channel shape as shown on the plans. The initial placement of streambed material shall fill / choke the voids in the underlying riprap. Fill voids by shaking stone with the teeth of an excavator bucket, hand tamping with metal tamping rods, and by spraying water to settle fines between large stones. Plate compactors shall not be used. The purpose of filling the voids is to prevent subsurface flow where surface water disappears into large voids between the stone fill below the channel bed surface during low flow conditions. The final streambed shape and appearance shall be finalized in the field as directed by the Geomorphologist.

Reinstallation of the stockpiled streambed material shall be placed on top of the riprap to restore streambed habitat and fish passage. The streambed materials shall be installed during normal low water conditions behind cofferdams in accordance with the environmental permits.

Completion

Once all material has been placed in the stream channel and approved by the Geomorphologist and Engineer, the Contractor shall remove the cofferdams in such a way as to slowly wet the stream to minimize the initial sediment pulse. Every attempt shall be made to minimize the downstream movement of sediment.

The final streambed shall maintain the general configuration of the existing streambed bedform and there shall be minimal subsurface flow upon final inspection by the Engineer and Geomorphologist. The project must be passable by fish and other aquatic organisms following construction.

ITEM 151.9 (Continued)
METHOD OF MEASUREMENT

Item 151.9 will be measured in place for the complete and accepted work for restoration of the streambed within the limits shown on the Plans as approved by the Engineer and Geomorphologist.

BASIS OF PAYMENT

Item 151.9 will be paid for at the contract unit price per cubic yar. Payment will be full compensation for stockpiling, transporting, and placing the material specified and for furnishing all labor, tools, equipment, testing, and incidentals necessary to complete the work.

The Geomorphologist will be provided by MassDOT at no cost to the Contractor.

Excavation of the existing streambed material will be paid for under Item 143.

ITEM 180.01 ENVIRONMENTAL HEALTH AND SAFETY PROGRAM LUMP SUM

The work shall consist of ensuring the health and safety of the Contractor's employees and subcontracting personnel, the Engineer, their representatives, the environment, and public welfare from any on-site chemical contamination present in air, soil, water and sediment.

The Contractor shall prepare and implement a site-specific Environmental Health and Safety Plan (EHASP) which has been approved and stamped by a Certified Industrial Hygienist (CIH) and includes the preparer's name and work experience. The EHASP shall include appropriate components required by OSHA Standard 29 CFR 1910.120(b) and the Massachusetts Contingency plan (MCP) 310 CMR 40.0018 and must comply with all applicable state and federal laws, regulations, standards and guidelines, and provide a degree of protection and training appropriate for implementation on the project. The EHASP shall be a dynamic document with provision for change to reflect new information, new practices or procedures, changing site environmental conditions or other situations which may affect site workers and the public. The EHASP shall be developed and implemented independently from the standard construction HASP required to work on all MassDOT construction projects.

Health and safety procedures provided by the Contractor shall comply with all the appropriate regulations that address employee working conditions, including but not limited to standards established by OSHA and National Institute for Occupational Safety and Health (NIOSH). Equipment used for the purpose of health and safety shall be approved by and meet pertinent standards and specifications of the appropriate regulatory agencies.

A copy of the most up-to-date version of the EHASP shall be maintained on-site at all times by the Contractor. The on-site copy shall contain the signature of the Engineer and each on-site employee of the MassDOT, Contractor, and Subcontractors involved with on-site activities. The employee's signature on the EHASP shall be deemed prima facie evidence that the employee has read and understands the plan. Updated copies of signature sheets shall be submitted to the Engineer.

The EHASP shall specify a Contractor Site Safety and Health Officer responsible for implementation of the EHASP and to oversee all construction activities, including handling, storage, sampling and transport, which require contact with or exposure to potentially hazardous materials.

The level of protection, required to ensure the health and safety of on-site personnel will be stipulated in the EHASP. The Site Safety and Health Officer shall implement the EHASP based on changing site and weather conditions, type of operation or activity, chemical compounds identified on-site, concentration of the chemicals, air monitoring data, physical state of the hazardous materials, potential duration of exposure to hazardous materials, dexterity required to perform work, decontamination procedures, necessary personnel and type of equipment to be utilized.

During implementation of the EHASP, a daily log shall be kept by the Site Safety and Health Officer and a copy shall be provided weekly to the Engineer. This log shall be used to record a description of the weather conditions, levels of personal protection being employed, screening data and any other information relevant to on-site environmental safety conditions. The Site Safety and Health Officer shall sign and date the daily log.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Preparation and implementation of the Environmental Health and Safety Program, including the monitoring, protection and storage of all contaminated materials, as well as subsequent modifications to the EHASP, will be measured and paid for at the Lump Sum Bid Price.

Payment of 50% of the Environmental Health and Safety Program contract price will be made upon the initial acceptance of the EHASP by the Engineer. Payment of the remaining 50% of the Environmental Health and Safety Program contract price will be made upon completion of the work. The bid price shall include preparation and implementation of the EHASP as well as the cost for its enforcement by the Site Safety and Health Officer along with any necessary revisions and updates. The work of implementing the Environmental Health and Safety Program includes work involving, but not limited to, the monitoring, protection, and storage of all contaminated materials.

ITEM 180.02 PERSONAL PROTECTION LEVEL C UPGRADE HOUR

The work shall consist of providing appropriate personal protective equipment (PPE) for all personnel in an area either containing or suspected of containing a hazardous environment.

Contingencies for upgrading the level of protection for on-site workers will be identified in the EHASP and the Contractor shall have the capability to implement the personal protection upgrade in a timely manner. The protective equipment and its use shall be in compliance with the EHASP and all appropriate regulations and/or standards for employee working conditions.

Personal Protection Level C Upgrade will be measured and paid only upon upgrade to Level C and will be at the contract unit price, per hour, per worker, required in Level C personal protection. No payment will be made to the Contractor to provide Level D PPE.

ITEM 180.03 LICENSED SITE PROFESSIONAL SERVICES HOUR

Within limited areas of the project site, soils, sediments and/or groundwater may be contaminated. A Licensed Site Professional (LSP) shall be required to provide the services necessary to comply with the requirements of the MCP. These services may include sampling, analysis and characterization of potentially contaminated media, preparation of Immediate Response Action (IRA) Plans, Utility-Related Abatement Measure (URAM) and Release Abatement Measure (RAM) Plans, Imminent Hazard Evaluations, status reports, transmittal forms, release notification forms, risk assessments, completion statements, and related documents required pursuant to the Massachusetts Contingency Plan (MCP). LSP hours related to the characterization and disposal of contaminated soil and/or sediment are incidental to the disposal items. An estimate of LSP services to be provided shall be submitted to the Engineer for approval before any LSP activity begins.

The name and qualifications of the LSP and all environmental technicians to be assigned to the project shall be submitted to the Engineer for approval at least four weeks prior to initial site activities. The LSP shall have a current, valid license issued by the Massachusetts Board of Registration of Hazardous Waste Site Cleanup Professionals. The LSP shall have significant experience in the oversight of MCP activities at active construction sites. Qualification packages for the LSP and each technician shall include a resume, all recent work assignments with responsibilities identified (previous 5 years), and applicable training and certifications. A list of all Notices of Noncompliance, Notice of Audit Findings and Enforcement Orders issued by the DEP shall be submitted for all work assignments listed for the LSP and environmental technicians.

The LSP shall evaluate soil and/or sediment with discoloration, odor, and presence of petroleum liquid or sheening on the groundwater surface, or any abnormal gas or materials in the ground which are known or suspected to be oil or hazardous materials. Excavated soil and sediment which is suspected of petroleum contamination shall be field screened using the jar headspace procedures according to established DEP Guidance. All field screening equipment must be pre-approved by the Engineer. The LSP shall ensure proper on site calibration of all field screening instrumentation.

The Engineer shall be contacted immediately when observations or any field screening results verify contamination requiring further analysis, and/or enhanced management of suspect soil and/or sediment. Any enhanced management of contaminated soil to ensure proper stockpiling and storage is incidental to the LSP Services item. The LSP shall adequately characterize subsurface conditions prior to backfill in areas where contaminated material has been excavated. The Engineer shall approve the locations of the testing sites prior to the sampling.

Contaminated soil, sediment and/or groundwater shall be handled in accordance with all applicable state and federal statutes, regulations and policies. The LSP shall adequately characterize contaminated media for comparison to the requirements of the MCP. The Contractor and the LSP shall be aware of the reporting requirements for releases of oil and/or other hazardous material (OHM) as set forth in federal and state laws and regulations, and shall both be held responsible for performing the work in accordance with all applicable Federal and State laws and regulations. The LSP shall maintain written records in a clear and concise format which tracks the excavation, stockpiling, analysis and reuse/disposal of all suspect contaminated soils, sediments and groundwater. These records shall be up-to-date and available to the Engineer on a bi-weekly basis. The LSP shall review and summarize the laboratory data from any analyses performed on

contaminated media. A report shall be delivered to the Engineer outlining the material sampling methods, laboratory analysis results and proposed course of action. The laboratory report together with Chain of Custody forms for all analytical results shall be submitted to the Engineer within 14 days after completion of such analyses.

The LSP and Contractor shall be held responsible for the submission of all MCP-related documents to the Engineer at least 14 days in advance of any timeframe specified in the MCP and for the timely submission of data and tracking information as noted within this Item. All documents prepared under this Item must be reviewed and signed by the approved LSP. The Contractor and LSP shall be responsible for all fines, penalties and enforcement requirements imposed by applicable regulatory agencies for failure to meet regulatory and contract timeframes. No compensation will be provided for such fines, penalties and enforcement actions.

The Contractor and the LSP shall be aware of the reporting requirements for releases of oil and/or other hazardous material (OHM) as set forth in federal and state laws and regulations, and shall both be held responsible for performing the work in accordance with all applicable Federal and State laws and regulations.

If the Contractor causes a release of OHM, the Contractor shall be responsible for assessing and remediating the release in accordance with all pertinent State and Federal regulations, including securing the services of a LSP, at his own expense.

The LSP shall coordinate all activities involving both MassDOT and the DEP through the Engineer. Any notification of release shall be approved by the Department before submittal to the DEP, except if an imminent hazard condition exists as defined in 309 CMR 4.03(4)(b).

LABORATORY TESTING IN SUPPORT OF LSP SERVICES

Laboratory testing provides for analytical testing in support of LSP services related to maintaining MCP compliance, such as delineating the extent and type of contamination present. Sampling and testing for disposal purposes are not included.

In order to maintain compliance with the MCP or other regulatory requirements, the LSP shall request approval from the Engineer to obtain samples from various locations and depths within the project area and to perform laboratory analyses on those samples. The samples shall be delivered to a DEP-certified laboratory using proper chain-of-custody documentation for analyses which, depending upon site conditions and suspected and/or identified contaminants of concern, may include, but are not limited to, metals, polychlorinated biphenyls (PCBs), volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides, polycyclic aromatic hydrocarbons (PAHs), extractable petroleum hydrocarbons (EPHs) and volatile petroleum hydrocarbons (VPHs). Subsequent testing, depending upon initial results, may be required for Toxicity Characteristic Leaching Procedure (TCLP) analyses (EPA Method 1311) for metals.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

LSP Services for work under this item will be measured per person, per hour of service provided by LSP, Environmental Technicians and other approved personnel. Travel time shall not be included in the billable hours. LSP hours related to soil/sediment disposal (disposal

characterization, landfill acceptance, disposal package preparation, etc.) shall be incidental to disposal items.

The quantity and type of laboratory tests must be approved by the Engineer beforehand. The contractor will be reimbursed upon satisfactory written evidence of payment. The contractor may be required to obtain cost estimates from three DEP certified laboratories for the Engineer to choose the service provider. Laboratory testing related to soil/sediment disposal (disposal characterization, landfill acceptance, disposal package preparation, etc.) shall be incidental to disposal items.

LSP Services will be paid at the Contractor bid price for each hour, or fraction thereof, spent to perform the work as described above. The bid price shall be a blended rate that includes the cost of the LSP, environmental technicians and other personnel, the performance of all work tasks and field screening, including required equipment, materials and instrumentation, and production of all documentation described above. All requests for payment must be accompanied by the following information: the names of the personnel associated with the work charged under LSP Services, dates and hours worked, work conducted, including, where appropriate, locations as identified on the construction plans, and a copy of the field diary for the dates submitted.

Laboratory Testing will be reimbursed upon receipt of paid invoices for testing approved by the Engineer.

ITEM 181.11	**DISPOSAL OF UNREGULATED SOIL**	**TON**
ITEM 181.12	**DISPOSAL OF REGULATED SOIL - IN-STATE FACILITY**	**TON**
ITEM 181.13	**DISPOSAL OF REGULATED SOIL - OUT-OF-STATE FACILITY**	**TON**
ITEM 181.14	**DISPOSAL OF HAZARDOUS WASTE**	**TON**

The work under these Items shall include the transportation and disposal of contaminated material excavated, or excavated and stockpiled. It shall also include the cost of any additional laboratory analyses required by a particular disposal facility beyond the standard disposal test set.

Excavation of existing subsurface materials may include the excavation of contaminated soils. The Contractor shall be responsible for the proper coordination of characterization, transport and disposal, recycling or reuse of contaminated soils. Disposal, recycling or reuse will be referred to as "disposal" for the purposes of this specification. However, regardless of the use of the term herein, there will be no compensation under these items for reuse within the project limits. The Contractor will be responsible for coordinating the activities necessary for characterization, transport and disposal of contaminated soils. Such coordination will include the Engineer and his/her designee overseeing management of contaminated materials. Contaminated soils must be disposed of in a manner appropriate for the soil classification as described below and in accordance with the applicable laws of local, state and federal authorities. The Contractor shall be responsible for identifying disposal facility (ies) licensed to accept the class of contaminated soils to be managed and assure that the facility can accept the anticipated volume of soil contemplated by the project. The Contractor shall be responsible for hiring a Licensed Site Professional (LSP) and all ancillary professional services including laboratories as needed for this work. The Contractor will be responsible for obtaining all permits, approvals, manifests, waste profiles, Bills of Lading, etc. subject to the approval of the Engineer prior to the removal of the contaminated soil from the site. The Contractor and LSP shall prepare and submit to the Engineer for approval all documents required under the Massachusetts Contingency Plan (MCP) and related laws and environmental regulations to conduct characterization, transport, and disposal of contaminated materials.

CLASSES OF CONTAMINATED SOILS

The Contractor and its LSP shall determine if soil excavated or soil to be excavated is unregulated soil or contaminated soil as defined in this section. Such materials shall be given a designation for purposes of reuse or disposal based on the criteria of the MCP. Soils and sediments which are not suitable for reuse will be given a designation for purposes of off-site disposal based on the characterization data and disposal facility license requirements. The Classes of Contaminated Soils are defined as follows:

UNREGULATED SOIL consists of soil, fill and dredged material with measured levels of oil and hazardous material (OHM) contamination at concentrations below the applicable Reportable Concentrations (RCs) presented in the MCP. Unregulated soil consists of material which may be reused (or otherwise disposed) as fill within the Commonwealth of Massachusetts subject to the non-degradation criteria of the MCP (310 CMR 40.0032(3), in a restricted manner, such that they are sent to a location with equal or higher concentrations of similar contaminants. Disposal areas include licensed disposal facilities, approved industrial settings in areas which will be capped or covered with pavement or loamed and seeded, and for purposes of this project should be reused as fill within the project site construction corridor whenever possible. The material cannot be placed

in residential and/or environmentally sensitive (e.g. wetlands) areas. Under no circumstances shall contaminated soils be placed in an uncontaminated or less contaminated area (including the area above the groundwater table if this area shows no sign of contamination).

The Contractor shall submit to MassDOT the proposed disposal location for unregulated soils for approval. If such a disposal location is not a licensed disposal facility, the Contractor shall submit to the Engineer analytical data to characterize the disposal area sufficiently to verify that the unregulated material generated within the MassDOT construction project limits is equal to or less than the contaminant levels at the disposal site and meets the non-degradation requirements of the MCP. In addition, the Contractor shall provide written confirmation from the owner of the proposed disposal location that they have been provided with the analytical data for both the materials to be disposed as well as the disposal site characterization and that s/he agrees to accept this material. A Material Shipping Record or Bill of Lading, as appropriate, shall be used to track the off-site disposal of unregulated soil and a copy, signed by the disposal facility or property owner, shall be provided to the Engineer in order to document legal disposal of the unregulated material.

The cost of on-site disposal of unregulated soil within the project area will be considered incidental to the item of work to which it pertains.

REGULATED SOIL consists of materials containing measurable levels of OHM that are equal to or exceed the applicable Reportable Concentrations for the site as defined by the MCP, 310 CMR 40.0000. Regulated soil which meets the MCP reuse criteria of the applicable soil/groundwater category for this project area may be reused on site provided that it meets the appropriate geotechnical criteria established by the Engineer. Regulated Soil may be reused (as daily or intermediate cover or pre-cap contouring material) or disposed (as buried waste) at lined landfills within the Commonwealth of Massachusetts or at an unlined landfill that is approved by the Massachusetts Department of Environmental Protection (DEP) for accepting such material, in accordance with DEP Policy #COMM-97-001, or at a similar out-of-state facility. It should be noted that soils which exceed the levels and criteria for disposal at in-state landfills, as outlined in COMM-97-001, may be shipped to an in-state landfill, but require approval from the DEP Division of Solid Waste Management and receiving facility. An additional management alternative for this material is recycling into asphalt. Regulated Soils may also be recycled at a DEP approved recycling facility possessing a Class A recycling permit subject to acceptance by the facility and compliance with DEP Policy #BWSC-94-400. Regulated Soil removed from the site for disposal or treatment must be removed via an LSP approved Bill of Lading, Manifest or applicable material tracking form. This type of facility shall be approved/permitted by the State in which it operates to accept the class of contaminated soil in accordance with all applicable local, state and federal regulations.

HAZARDOUS WASTE consists of materials which must be disposed of at a facility permitted and operated in full compliance with Federal Regulation 40 CFR 260-265, Massachusetts Regulation 310 CMR 30.000, Toxic Substances Control Act (TSCA) regulations, or the equivalent regulations of other states, and all other applicable local, state, and federal regulations. All excavated materials classified as hazardous waste shall be disposed of at an out-of-state permitted facility. This facility shall be a RCRA hazardous waste or TSCA facility, or RCRA hazardous waste incinerator. This type of facility shall be approved/permitted by the State in which it operates to accept hazardous waste in accordance with all applicable local, state and federal

regulations and shall be permitted to accept all contamination which may be present in the soil excavate. The Contractor shall ensure that, when needed, the facility can accept TSCA waste materials i.e. polychlorinated biphenyls (PCBs). Hazardous waste must be removed from the site for disposal or treatment via an LSP approved Manifest.

MONITORING/SAMPLING/TESTING REQUIREMENTS

The Contractor shall be responsible for monitoring, sampling and testing during and following excavation of contaminated soils to determine the specific class of contaminated material. Monitoring, sampling and testing frequency and techniques should be performed in accordance with Item 180.03 – LSP Services. Additional sampling and analysis may be necessary to meet the requirements of the disposal facility license. The cost of such additional sampling and analysis shall be included in monitthe bid cost for the applicable disposal items. The Contractor shall obtain sufficient information to demonstrate that the contaminated soil meets the disposal criteria set by the receiving facility that will accept the material.

No excavated material will be permanently placed on-site or removed for off-site disposal until the results of chemical analyses have been received and the materials have been properly classified. The Contractor shall submit to the Engineer results of field and laboratory chemical analyses tests within seven days after their completion, accompanied by the classification of the material determined by the Contractor, and the intended disposition of the material. The Contractor shall submit to the Engineer for review all plans and documents relevant to LSP services, including but not limited to, all documents that must be submitted to the DEP.

WASTE TRACKING:

Copies of the fully executed Weight Slips/Bills of Lading/ Manifests/Material Shipping Records or other material tracking form received by the Contractor from each disposal facility and for each load disposed of at that facility, shall be submitted to Engineer and the Contractor's LSP within three days of receipt by the Contractor. The Contractor is responsible for preparing and submitting such documents for review and signature by the LSP or other appropriate person with signatory authority, three days in advance of transporting soil off-site. The Contractor shall furnish a form attached to each manifest or other material tracking form for all material removed off-site, certifying that the material was delivered to the site approved for the class of material. If the proposed disposition of the material is for reuse within the project construction corridor, the Contractor shall cooperate with MassDOT to obtain a suitable representative sample(s) of the material to establish its structural characteristics in order to meet the applicable structural requirements as fill for the project.

All material transported off-site shall be loaded by the Contractor into properly licensed and permitted vehicles and transported directly to the selected disposal or recycling facility and be accompanied by the applicable shipping paper. At a minimum, truck bodies must be structurally sound with sealed tail gates, and trucks shall be lined and loads covered with a liner, which shall be placed to form a continuous waterproof tarpaulin to protect the load from wind and rain.

DECONTAMINATION OF EQUIPMENT

Tools and equipment which are to be taken from and reused off site shall be decontaminated in accordance with applicable local, state and federal regulations. This requirement shall include, but not be limited to, all tools, heavy machinery and excavating and hauling equipment used during excavation, stockpiling and handling of contaminated material. Decontamination of equipment is considered incidental to the applicable excavation item.

REGULATORY REQUIREMENTS

The Contractor shall be responsible for adhering to regulations, specifications and recognized standard practices related to contaminated material handling during excavation and disposal activities. MassDOT shall not be responsible at any time for the Contractor's violation of pertinent State or Federal regulations or endangerment of laborers and others. The Contractor shall comply with all rules, regulations, laws, permits and ordinances of all authorities having jurisdiction including, but not limited to, Massachusetts DEP, the U.S. Environmental Protection Agency (EPA), Federal Department of Transportation (DOT), Massachusetts Water Resources Authority (MWRA), the Commonwealth of Massachusetts and other applicable local, state and federal agencies governing the disposal of contaminated soils.

All labor, materials, equipment and services necessary to make the work comply with such regulations shall be provided by the Contractor without additional cost to MassDOT. Whenever there is a conflict or overlap within the regulations, the most stringent provisions shall apply. The Contractor shall reimburse MassDOT for all costs it incurs, including penalties and/or for fines, as a result of the Contractor's failure to adhere to the regulations, specifications, recognized standard practices, etc., that relate to contaminated material handling, transportation and disposal.

SUBMITTALS

I. Summary of Sampling Results, Classification of Material and Proposed Disposal Option.

The following information, presented in tabular format, must be submitted to the Engineer for review and approval prior to any reuse on-site or disposal off-site. This requirement is on-going throughout the project duration. At least two weeks prior to the start of any excavation activity, the Contractor shall submit a tracking template to be used to present the information as stipulated below. Excavation will not begin until the format is acceptable to MassDOT.

Characterization Reports will be submitted for all soil, sediment, debris and groundwater characterized through the sampling and analysis program. Each report will include a site plan which identifies the sampling locations represented in the Report. The Construction Plan sheets may be used as a baseplan to record this information.

The Sampling Results will be presented in tabular format. Each sample will be identified by appropriate identification matching the sample identification shown on the Chain of Custody Record. The sample must also be identified by location (e.g. grid number or stockpile number). For each sample, the following information must be listed: the classification (unregulated,

regulated, etc.), proposed disposal option for the stockpile or unit of material represented, and, all analytical results.

Each Characterization Report will include the laboratory analytical report and Chain of Custody Record for the samples included in the Report.

II. Stockpiling, Transport, and Disposal.

At least two weeks prior to the start of any excavation activity, the Contractor shall submit, in writing, the following for review and shall not begin excavation activity until the entire submittal is acceptable to MassDOT.

Excavation and Stockpiling Protocol:
Provide a written description of the management protocols for performing excavation and stockpiling and/or direct loading for transport, referencing the locations and methods of excavating and stockpiling excavated material.

Disposal and Recycling Facilities:

1. Provide the name, address, applicable licenses and approved waste profile for disposal and/or recycling location(s) where contaminated soil will be disposed. Present information substantiating the suitability of proposed sites to receive classifications of materials intended to be disposed there, including the ability of the facility to accept anticipated volumes of material.

2. Provide a summary of the history of compliance actions for each disposal/recycling facility proposed to be used by the Contractor. The compliance history shall include a comprehensive list of any state or federal citations, notices of non-compliance, consent decrees or violations relative to the management of waste (including remediation waste) at the facility. Material should not be sent to facilities which are actively considered by the DEP, USEPA or other responsible agency to be in violation of federal, state or local hazardous waste or hazardous material regulations. MassDOT reserves the right to reject any facility on the basis of poor compliance history.

Transportation:
The name, address, applicable license and insurance certificates of the licensed hauler(s) and equipment and handling methods to be used in excavation, segregation, transport, disposal or recycling.

III. Material Tracking and Analytical Documentation for Reuse/Disposal.

The following documents are required for all excavation, reuse and disposal operations and shall be in the format described. At least two weeks prior to the start of any excavation or demolition activity, the Contractor shall submit the tracking templates required to present the information as stipulated below. Excavation or demolition will not begin until the format is acceptable to MassDOT.

All soils, sediments and demolition debris must be tracked from the point of excavation to stockpiling to onsite treatment/processing operations to off-site disposal or onsite reuse as applicable.

Demolition Debris:
Demolition debris must be tracked if the debris is stockpiled at a location other than the point of origin or if treatment or material processing is conducted. Identification of locations will be based on the station-offset of the location. The tracking table will identify date and point of generation, any field screening such as PID or dust monitoring, visual observations/comments, quantity, and stockpile ID/processing operation location. For each unit of material tracked, the table will also track reuse of the material on-site, providing reuse date, location of reuse as defined by start and end station, width of reuse location by offset, the fill elevation range, quantity, and finish grade for said location. For demolition debris which is not reused on site, the table will also track disposal of the material as defined by disposal date, quantity and disposal facility. The table must provide a reference to any analytical data generated for the material.

Soil/Sediment:
Soil excavation will be identified based on the station-offset of the excavation location limits. The tracking table will identify date and point of generation, any field screening such as PID or dust monitoring, visual observations, quantity, and stockpile number/location. For each unit of material tracked, the table will also track reuse of the material on-site and disposal of the material off-site using the same categories identified for demolition debris above.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Disposal of contaminated soil shall be measured for payment by the Ton of actual and verified weight of contaminated materials removed and disposed of. The quantities will be determined only by weight slips issued by and signed by the disposal facility. The most cost-effective, legal disposal method shall be used. The work of the LSP for disposal under all of these items shall be incidental to the work with no additional compensation.

ITEM 181.11 Measurement for Disposal of Unregulated Soil shall be under the Contract Unit Price by the weight, in tons, of contaminated materials removed from the site and transported to and disposed of at an approved location or licensed facility, and includes any and all costs for approvals, permits, fees and taxes, additional testing/characterization required by the facility beyond the standard disposal test set, decontamination procedures, transportation and disposal.

ITEM 181.12 Measurement for Disposal of Regulated Soil – In-State Facility shall be under the Contract Unit Price by the weight in tons of contaminated materials removed from the site and transported to and disposed of at an approved in-state facility, and includes any and all costs for approvals, permits, fees and taxes, testing/characterization required by the facility beyond the standard disposal test set, decontamination procedures, transportation and disposal.

ITEM 181.13 Measurement for Disposal of Regulated Soil - Out-of-State Facility shall be under the Contract Unit Price by the weight in tons of contaminated materials removed from the site and transported to and disposed of at an approved out-of-state facility, and includes any and all costs for approvals, permits, fees and taxes, testing/characterization required by the facility beyond the standard disposal test set, decontamination procedures, transportation and disposal.

ITEM 181.14 Measurement for Disposal of Hazardous Waste shall be under the Contract Unit Price by the weight in tons of hazardous waste removed from the site and transported to and disposed of at the licensed hazardous waste facility, and includes any and all costs for approvals, permits, fees and taxes, testing/characterization required by the facility beyond the standard disposal test set, decontamination procedures, transportation and disposal.

ITEM 182.1 INSPECTION AND TESTING FOR ASBESTOS LUMP SUM

The work shall include the inspecting and testing of all materials suspected of containing asbestos. When any demolition is required to enable the inspection and testing of the suspected material it will be considered incidental to this Item and the Contractor must perform all asbestos handling and testing in accordance with the regulations stated below.

Dust suppression in the form of light water sprays, foams, dust suppressants and calcium chloride will be implemented as required to control dusting during any disturbance of asbestos suspected material. Alternatively, intrusive activities may be reduced or curtailed under high wind or heavy rain conditions, which in the opinion of the Health And Safety Plan (HASP) may pose a safety hazard to the workers.

The Contractor shall employ the services of a Massachusetts licensed "Asbestos Inspector" to inspect the material to determine whether or not "ITEM 182.2 REMOVAL OF ASBESTOS" is required. Should the asbestos inspector determine laboratory testing is required, a state certified laboratory shall be used to perform all necessary tests.

REGULATIONS

U.S. Department of Labor, Occupational Safety and Health Administration, (OSHA) including but not limited to:

29 CFR 1910 Section 1001 and 29 CFR 1926 Section 58 Occupational exposure to Asbestos, Tremolite, Anthophyllite and Actinolite, Final Rule
29 CFR 1910 Section 134 Respiration Protection
29 CFR 1926 Construction Industry
29 CFR 1910 Section 2 Access to Employee Exposure and Medical Records
29 CFR 1910 Section 1200 Hazard Communication
29 CFR 1910 Section 145 Specifications for Accident Prevention Signs and Tags

U.S. Environmental Protection Agency, (EPA) including but not limited to:

40 CFR 762, CPTS 62044, FRL 2843-9, Federal Register Vol. 50 no.134, July 12, 1985 p.28530 - 28540 Asbestos Abatement Projects Rule
40 CFR 61 Subpart A Regulation for Asbestos
40 CFR 61 Subpart M (Revised Subpart B) National Emission Standard for Asbestos

U.S. Department of Transportation 49 CFR 172 and 173

Massachusetts Department of Labor and Industries Regulations, (DLI) including but not limited to:

453 CMR 6.00 Removal, Containment and Encapsulation of Asbestos

Massachusetts Department of Environmental Protection (DEP) including but not limited to (supplementing subsection 7.01):

310 CMR 7.00, Section 7.09 Odor and Dust, Section 7.10 Noise, Section 7.15 Air Pollution Control Regulations

310 CMR 18.00 and 19.00 Solid Waste Regulations

Massachusetts Division of Industrial Safety 45 CMR 10.00

Local Requirements including but not limited to those of Health Departments, Fire Departments and Inspection Services Departments

Wherever there is a conflict or overlap of the above references, the most stringent provision shall apply.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT:

Measurement and payment will be at the contract unit price per Lump Sum for ITEM 182.1 INSPECTION AND TESTING FOR ASBESTOS as specified above including all materials, tools, equipment and labor to complete the inspecting and testing of the asbestos suspected material.

All costs in the connection with the protection of general public, private property, and all costs associated with the proper inspecting and testing of the material shall be included in the price and no additional compensation will be allowed.

ITEM 182.2 REMOVAL OF ASBESTOS FOOT

The work shall include the removal and satisfactory disposal of existing asbestos. The Contractor's attention is directed to the fact that existing asbestos shall be inspected and tested prior to removal, to determine if special removal and disposal is required. The Contractor shall follow all the rules and regulations stated in "ITEM 182.1 INSPECTION AND TESTING FOR ASBESTOS". If asbestos is present, the Contractor shall follow all the rules and regulations stated in the section "REMOVAL AND DISPOSAL OF ASBESTOS CONTAINING MATERIALS", under this item. The Contractor should notify and coordinate his/her efforts with the proper utility accordingly.

REMOVAL AND DISPOSAL OF ASBESTOS CONTAINING MATERIALS

This section specifies the requirements for the handling and removal of asbestos containing material. The Contractor must perform all asbestos handling and removal work in accordance with these specifications and the following additional requirements.

U.S. Department of Labor, Occupational Safety and Health Administration, (OSHA) including but not limited to:

29 CFR 1910 Section 1001 and 29 CFR 1926 Section 58Occupational exposure to Asbestos, Tremolite, Anthophyllite and Actinolite, Final Rule
29 CFR 1910 Section 134 Respiration Protection
29 CFR 1926 Construction Industry
29 CFR 1910 Section 2 Access to Employee Exposure and Medical Records
29 CFR 1910 Section 1200 Hazard Communication
29 CFR 1910 Section 145 Specifications for Accident Prevention Signs and Tags

U.S. Environmental Protection Agency, (EPA) including but not limited to:

40 CFR 762, CPTS 62044, FRL 2843-9, Federal Register Vol. 50 no.134, July 12, 1985 p.28530 - 28540 Asbestos Abatement Projects Rule
40 CFR 61 Subpart A Regulation for Asbestos
40 CFR 61 Subpart M (Revised Subpart B) National Emission Standard for Asbestos

U.S. Department of Transportation 49 CFR 172 and 173

Massachusetts Department of Labor and Industries Regulations, (DLI) including but not limited to:

453 CMR 6.00 Removal, Containment and Encapsulation of Asbestos

Massachusetts Department of Environmental Protection (DEP) including but not limited to (supplementing subsection 7.01):

310 CMR 7.00, Section 7.09 Odor and Dust, Section 7.10 Noise, Section 7.15 Air Pollution Control Regulations

310 CMR 18.00 and 19.00 Solid Waste Regulations

Massachusetts Division of Industrial Safety 45 CMR 10.00

Local Requirements including but not limited to those of Health Departments, Fire Departments and Inspection Services Departments

Wherever there is a conflict or overlap of the above references, the most stringent provision shall apply.

All asbestos material shall be removed and properly disposed of by a contractor or subcontractor with a current Massachusetts Abatement Contractors License issued by the Department of Labor and Industries. Work shall be supervised by a competent person as required by OSHA in 29 CFR 1926 to ensure regulatory compliance. This person must have completed a course at an EPA Training Center or equivalent course in asbestos abatement procedures, have had a minimum of four years on-the-job training and meet any additional requirements set forth in 29 CFR 1926 for a Competent Person. This person must also be certified by the Commonwealth as an Asbestos Abatement Supervisor and Asbestos Abatement Project Designer as required by 453 CMR 6.00.

Asbestos removal work shall be coordinated with all other work under the contract and shall be completed prior to performing any activities which could disturb the asbestos material or produce airborne asbestos fibers.

Dust suppression in the form of light water sprays, foams, dust suppressants and calcium chloride will be implemented as required to control dusting during trenching and excavation. Alternatively, intrusive activities may be reduced or curtailed under high wind or heavy rain conditions, which in the opinion of the Health and Safety Plan (HASP) may pose a safety hazard to the workers.

NOTIFICATION AND PERMITS

The Contractor shall prepare a formal pre-notification form at least ten (10) days prior to the start of asbestos removal work. This form must be submitted to the appropriate Regional Office of the Massachusetts Department of Environmental Protection and to the U.S. Environmental Protection Agency Region I Air and Hazardous Material Division. A copy of the submitted forms must be provided to the Engineer and kept at the work site.

Prior to starting any work, the Contractor shall also obtain any required asbestos removal permit(s) from the city/town. A copy of the permit(s) must be provided to the Engineer and posted at the work site.

The Contractor shall also obtain and pay all other applicable asbestos waste transportation and disposal permits, licenses and fees.

STANDARD OPERATING PROCEDURES

The standard operating procedure shall ensure the following:

1. Proper site security including posting of warning signs and restricting access to

prevent unauthorized entry into the work spaces.

2. Proper protective clothing and respiratory protection prior to entering the work spaces.

3. Safe work practices including provisions for communications; exclusion of eating, drinking, smoking, or use of procedures or equipment that would in any way reduce the effectiveness of respiratory protection or other engineering controls.

4. Proper exit practices from the work space though the showering and decontamination facilities.

5. Removing asbestos containing material in ways that minimize release of fibers.

6. Packing, labeling, loading, transporting and disposing of contaminated material in a way that minimizes or prevents exposure and contamination.

7. Emergency evacuation of personnel, for medical or safety (fire and smoke) so that exposure will be minimized.

8. Safety from accidents in the work space, especially from electrical shocks, slippery surfaces and entanglements in loose hoses and equipment.

9. Provisions for effective supervision and OSHA - specified personnel air monitoring for exposure during work.

REQUIRED SUBMITTALS

The Contractor shall submit to the Engineer the following listed items at least ten (10) calendar days prior to the start of asbestos work. No asbestos removal work activities shall commence until these items are reviewed by the Engineer, unless otherwise waived. Submittals shall be clearly labeled and in sufficient detail to enable the Engineer to form an opinion as to its conformity to the specifications.

1. Name, experience and DLI certification of proposed Supervisors and Foreman responsible for asbestos work.

2. Summary of workforce by disciplines and a notarized statement documenting that all proposed workers, by name, have received all required medical exams and have been properly trained and certified for asbestos removal work, respirator use and appropriate Massachusetts DLI, EPA and OSHA standards.

3. Notarized statement that workers are physically fit and able to wear and use the type of respiratory protection proposed for the project. Notarized certification signed by an officer of the abatement contracting firm that exposure measurements, medical surveillance and worker training records are being kept in conformance with 29 CFR 1926.

4. Written plan of action and standard operating procedures (HASP) to include: location and layout of decontamination areas; sequencing of asbestos work; detailed schedule of work activities by date and interface with other project activities which affect work performance; methods used to assure safety and security; worker protection and exposure monitoring; contingency and emergency evacuation procedures; detailed description of methods to be employed to control pollution; waste handling procedures.

5. Written respiratory protection program specifying level of protection intended for each operation required by the project and details of daily inspection and maintenance elements.

6. Copies of the U.S. EPA, State and local asbestos removal pre-notification forms. If applicable, lists and copies of all permits, licenses, or manifests which will be applied for and used.

7. Name, location and applicable approval certificates for primary and secondary landfill for disposal of asbestos-containing or asbestos contaminated waste. Name, address and licenses number(s) of hauler permitted to transport waste. (Submit copies of completed manifests upon disposal).

The Contractor must provide copies of daily inspection and record logs upon request of the Engineer, at any time during project. This information will include but is not limited to work area entry data, respirator inspections and maintenance, HEPA-exhaust inspections and maintenance and other work applicable activities or reports of accidents or unusual events.

METHOD OF MEASUREMENT

ITEM 182.2 will be measured by the FOOT for the complete removal and disposal of the asbestos containing material.

BASIS OF PAYMENT

Payment will be at the contract unit price per FOOT for ITEM 182.2 REMOVAL OF ASBESTOS, as specified above including all materials, tools, equipment and labor necessary to complete the work specified above.

All costs in connection with the protection of the general public, private property and all costs associated with the proper disposal of the material removed shall be included in the price and no additional compensation will be allowed.

ITEM 184.1 DISPOSAL OF TREATED WOOD PRODUCTS TON

The work under this item shall include the transportation and disposal of all treated existing wood product as directed by the Engineer.

Timber guardrail at Parking Lot may be treated wood. This item shall include all costs for sampling, laboratory testing, loading, transportation and disposal of the treated wood. The Contractor is required to submit disposal manifests to the Engineer prior to the completion of the project. All aspects of this Item are to be completed in accordance with state and federal regulations.

COMPENSATION

Measurement and payment will be by the weight, in Tons, of treated timber transported and accepted at a licensed facility. The work shall be considered full compensation for all labor, tools, equipment, materials, testing, loading, transportation, approvals, and permits necessary for the completion of the work.

ITEM 201.	**CATCH BASIN**	**EACH**
ITEM 202.	**MANHOLE**	**EACH**
ITEM 202.15	**MANHOLE - 5 FOOT DIAMETER**	**EACH**
ITEM 204.11	**GUTTER INLET – SPECIAL**	**EACH**
ITEM 205.1	**LEACHING BASIN**	**EACH**

The work to be done under these Items shall conform to the relevant provisions of Subsection 200 of the Standard Specifications, and the following:

Item 201. shall be constructed as shown in MassDOT Standard Drawing E 201.0.2 with 4 foot sump (deep sump), unless otherwise noted on the plans with the exception that catch basins with frame and covers shall have round openings.

Item 202.15 shall be constructed as shown in MassDOT Standard Drawing E 202.0.2 with the exception that the inside diameter shall be five feet.

Item 204.11 shall be constructed as shown on the detail provided in the construction drawings and in accordance with applicable Sub-sections of Subsection 201 of the Standard Specifications.

Item 205.1 shall be a precast concrete structure constructed as shown on the detail provided in the construction drawings and in accordance with applicable Sub-sections of Subsection 201 of the Standard Specifications.

Alternate flat top slabs shall be substituted for conical sections in areas of low cover. It shall be the responsibility of the Contractor to determine the appropriate type of top and alternate flat top slab thickness for each location. Alternate flat top slabs shall have a minimum 28-day compressive strength of 4000 psi, reinforced for AASHTO H-20 loading with ASTM A 615 Grade 60 steel. Shop drawings and design calculations shall be stamped by a Massachusetts Structural Engineer, where required. No additional payment will be made for alternate flat top slabs.

Alternate eccentric cone sections or alternate flat top sections with offset openings shall be used in areas where drainage structures are in close proximity to existing underground utilities, as shown on the plans or as directed by the Engineer. Alternate eccentric cone sections or alternate flat top sections with offset openings shall also be used where drainage manholes are proposed in travel or bike lanes and shall be oriented to locate covers outside wheel paths to the extent practical. No additional payment will be made for eccentric cones or alternate flat top structures with offset openings.

Frames shall be set using clay brick (3 courses allowed for) in a full mortar bed. Clay brick manufacturer shall be listed on MassDOT's Qualified Construction Materials List. Cement brick will not be allowed.

Concrete collars for new structures shall be High Early Strength cement concrete. The Contractor shall submit a mix design for High Early Strength concrete to the Engineer for approval. The dimensions of the concrete collars shall be as shown on MassDOT Construction Standard Drawing 223.0.1. Concrete collars shall be incidental to the item of work to which they pertain.

The concrete collars shall be placed up to a height that allows for the placement of a minimum of 3 inches of Hot Mix Asphalt above the collar.

Catch basins, manholes, and gutter inlets shall be placed on 6" crushed stone (M2.01.4) foundation as directed by the Engineer.

Leaching basins shall be provided with crushed stone (M2.01.4) used for the percolation bed below and around the structure and geotextile fabric for subsurface drainage (M9.50.0) shall be provided on all sides as shown on detail.

Connections to existing pipe shall be included in the cost of the catch basins or manholes. If existing pipe is to be abandoned, end of existing pipe shall be plugged as specified in Section 200.

Excavation support and excavation techniques such as vacuum excavation may be required for installation of structures due to the proximity of existing utilities. All work to install drainage structures complete in place shall be considered part of work of this section.

METHOD OF MEASUREMENT

Item 201., Item 202., Item 202.15, Item 204.11, and Item 205.1 will be measured for payment by the Each unit installed, complete in place.

BASIS OF PAYMENT

Item 201., Item 202., Item 202.15, Item 204.11, and Item 205.1 will be paid for at the respective Contract unit price per Each, which price shall be full compensation for labor, materials, equipment, tools, sawcut, excavation, and other incidentals necessary to satisfactorily complete the work.

If necessary to obtain a satisfactory foundation for the drainage structure, excavation shall be deeper than normally required for crushed stone bedding and will be measured for payment under Item 142, Class B Trench Excavation.

The crushed stone for percolation bed and foundation shall be paid for under Item 156.

Masonry plugs shall be paid for under Item 227.4.

Geotextile shall be paid for under item 698.2

BASIS OF PAYMENT

Item 221.1 will be paid for at the Contract unit price EACH Frame and Cover – Secured and shall include furnishing and installation of the Frame and Cover.

ITEM 210.02 SANITARY SEWER MANHOLE REMOVED EACH

DESCRIPTION

The work under this Item shall conform to the relevant provisions of section 140 and 201 of the Standard Specifications and the following:

The work under this Item shall consist of the removing Sanitary Sewer Manholes as shown on the Plans, and/or as directed by the Engineer.

METHOD OF MEASUREMENT

Measurement for Sanitary Sewer Manholes shall be per manhole removed regardless of depth on a per each basis.

BASIS OF PAYMENT

Sanitary Sewer Manholes will be paid for at the contract unit price each, including excavation, disposal of solid waste and debris, backfill, discarding of manhole frame and cover, brick leveling course, and precast sections. Manhole and connecting pipes may have concrete fill if previously abandoned.

ITEM 222.3 FRAME AND GRATE (OR COVER) MUNICIPAL STANDARD EACH

The work under this Item shall conform to the relevant provisions of Sections 201, 220 of the Standards Specifications and the following:

Catch basin and gutter inlet frames and grates shall be as manufactured by EJ, No. 5548, in accordance with City of Taunton and Town of Raynham Standards. Frames shall be 8 inches in height unless otherwise noted on the contract drawings and have 4 flanges with the exception of grates at curb inlet stone locations which shall have 3 flanges.

Drainage manhole covers and frames shall be as shown on the 2025 MassDOT Construction Standards No. 221.0.3 and 221.0.3 and shall have the letters "DRAIN" inscribed on the cover.

Frame and Grate (or Cover) shall be listed on MassDOT's Qualified Construction Materials List.

METHOD OF MEASUREMENT

Item 222.3 will be measured for payment by the EACH Frame and Grate (or Cover) – Municipal Standard furnished and delivered to the site.

BASIS OF PAYMENT

Item 222.3 will be paid for at the Contract unit price per EACH Frame and Grate furnished and delivered to the site, which price shall include all labor, materials, equipment and incidental costs related to the work.

Frame and Grate (or Cover) shall be considered as a one unit.

ITEM 271.1 DRAINAGE PIPE REMOVED AND DISCARDED FOOT

This work under this Item shall conform to the relevant provisions of Subsection 270 of the Standard Specifications and the following.

The work to be done under this item shall include all labor, materials and equipment necessary to remove and discard the existing pipes. The work shall consist of the removal of existing drain pipe (regardless of size) where noted on the plans, and as directed by the Engineer. Where existing pipe is located within the same trench as new pipe or drainage structures, the removal and discarding of the existing pipe shall be considered incidental to the installation of the new pipe or structure. The work includes all excavation, shoring, and bracing. A trench shall be excavated and the pipe cut and removed. The remaining open pipe ends shall be plugged watertight. All materials excavated from the trench, when deemed suitable for reuse by the Engineer, shall be placed in 6 inch loose lift depths and compacted to not less than 95 percent of the maximum dry density of the material. If additional material is needed to backfill the trench it shall meet the requirements for Gravel Borrow. All unused and unsuitable material shall be disposed of off-site.

METHOD OF MEASUREMENT

Pipe removed and discarded, except for pipe located in the same trench as new pipe, will be measured in place by the foot of pipe removed and discarded off the project.

BASIS OF PAYMENT

Item 271.1 Drainage Pipe Removed and Discarded, will be paid at the contract unit price per Foot, which price shall be full compensation for all labor, materials, equipment, excavation, saw cutting, removal of pipes, disposal of unsuitable material, and incidentals required to complete the work.

If in situ material is unsatisfactory for backfill, as determined by the Engineer, payment will be made separately for backfill under Item 151. Gravel Borrow.

Masonry plug will be paid under Item 227.4

ITEM 302.041 4 INCH DUCTILE IRON SEWER PIPE (RUBBER GASKET) FOOT

The work under this Item shall conform to the relevant provisions of Section 301 of the Standard Specifications, Town of Raynham Water Division Regulations, the details shown on the plans and the following:

Town of Raynham Water Division Regulations can be found at the following link:
http://raynhamcenterwater.com/randr.pdf

The work under these Items includes all materials, labor and equipment to furnish, lay, joint, and test ductile iron pressure pipe, fittings (including special castings), and appurtenant materials and equipment indicated on the Drawings and specified in this Section.

Testing of new sewer force main shall conform to all applicable sections of AWWA Standards and Town of Raynham's Water Division Regulations.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Items 302.041 will be measured and paid at the Contract unit price per Foot, which price shall include all labor, tools, equipment, materials and incidental costs required to complete the work and shall also include the cost for excavation regardless of depth, backfill regardless of depth, dense graded crushed stone for backfilling, pressure and leak testing, and providing as-built drawings. Ductile Iron Fittings for Sewer Pipe shall be paid for under Item 309. Sewer gate valves and boxes shall be paid for under Item 349.04, as needed.

ITEM 309. DUCTILE IRON FITTINGS FOR WATER PIPE POUND

The work under this item shall conform to the relevant provisions of Section 301 of the Standard Specifications, Town of Raynham Water Division Regulations, and the following:

Town of Raynham Water Division Regulations can be found at the following link:
http://raynhamcenterwater.com/randr.pdf

Fittings under this item include elbows, bends, reducers, caps, tees, couplings, mechanical joint restraints and all other fittings not measured and paid for elsewhere. All edges of excavation shall be sawcut. Fittings shall be used for proposed sewer force main and for tee and fittings needed to connect proposed hydrant to water main.

All pipe shutdowns shall be approved by Town of Raynham's DPW and the Fire Department prior to performing any work. The work shall be coordinated in a manner to minimize the number and duration of shutdowns.

ITEM 336.1 1 INCH PLASTIC WATER PIPE FOOT

The work under this item shall conform to the relevant provisions of Section 301 of the Standard Specifications, Town of Raynham Water Division Regulations, and the following:

Town of Raynham Water Division Regulations can be found at the following link:

http://raynhamcenterwater.com/randr.pdf

Testing of new plastic water pipe shall conform to all applicable sections of AWWA Standards and Town of Raynham's Water Division Regulations.

Plastic water pipe shall be relocated where it conflicts with proposed leaching basins, paved water way, and sediment forebay as shown on the plans. If existing water service line is not plastic, Contractor shall inform Raynham Water Department. Existing water service pipe in conflict shall be removed and discarded and new 1 inch water plastic pipe shall be installed and connected to existing.

Work shall be coordinated in a manner to minimize the number and duration of shutdowns.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 336.1 will be measured and paid at the contract unit price per Foot, which price shall include all testing, flushing, chlorination, disinfection, tools, labor, equipment, materials, fittings, couplings, and incidental costs required to connect to existing and complete the work. Work shall also include removal of existing water service that is in conflict with proposed.

ITEM 372.02 2 INCH SEWER PIPE INSULATION FEET

The work under this item shall conform to the relevant provisions of Section 301 of the Standard Specifications, Town of Raynham Water Division Regulations, and the following:

Town of Raynham Water Division Regulations can be found at the following link:
http://raynhamcenterwater.com/randr.pdf

2-inch insulation shall be installed on proposed sewer force main over the bridge and for a distance of 10' off the bridge on either side of the bridge.

MATERIALS

Insulation shall be Urethane material or other approved material. Material must be approved by the Engineer.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

This item will be measured and paid at the Contract unit price per Foot. The unit price for pipe insulation shall be equal to the linear feet of pipe with insulation installed. The unit price shall include full compensation for furnishing and installing insulation complete in place.

ITEM 376. HYDRANT EACH

The work under this Item shall conform to the relevant provisions of Subsection 301 of the Standard Specifications, Town standard specifications, the Town Fire Department standards, and the following:

New hydrants shall be as specified in the Town Water and Sewer Division standards and shall be installed according to the Town's Water and Sewer Division Standard Details. All edges of excavation shall be sawcut.

At the completion of installation, all hydrants shall be cleaned and disinfected per the Town Water and Sewer Division standards and the Town Fire Department standards. The cost of any testing, chlorination and disinfection shall be considered incidental to the work in this item.

All new hydrants adjusted hydrants shall be inspected by the Town Fire Department. The Contractor shall coordinate inspections with the Town Fire Department.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

This Item shall be measured and paid at the contract unit bid price per Each, which price shall be considered full compensation for all labor, equipment and materials including saw cutting, excavation, furnishing and installing new hydrant, crushed stone, testing, disinfection, removal of any conflicting pipe, backfill, compaction, coordination with the Town Water and Sewer Division and the Town Fire Department for water main shutdowns.

Payment for pipe, fittings, valves and thrust blocks shall be measured and paid for under their respective contract items. Payment for Class B Trench Excavation, Class B Rock excavation shall be at the contract unit price for their respective contract items.

ITEM 376.3 HYDRANT - REMOVED AND STACKED EACH

The work under this item shall conform to the relevant provisions of Section 301 of the Standard Specifications and the following:

The unit price shall include removal and stacking of existing hydrant as directed by the Engineer and delivered to the City of Taunton. Unit price bid shall also included necessary excavation, gravel backfill, restoration of surfaces over trenches and all other necessary and incidental work not paid for under other items for complete removal, stacking, and delivery. Nonsalvageable hydrant as determined by the Engineer shall become the property of the Contractor and shall be properly disposed of off the site with no additional payment made.

BASIS OF PAYMENT

ITEM 376.3, HYDRANT-REMOVED AND STACKED will be paid for at the Contract unit price per EACH; which price shall be full compensation for the removal and stacking of existing hydrant as directed by the Engineer and delivered to the DPW Water Dept Yard at 90 Ingell Street, Taunton, MA.

ITEM 390.01 IRRIGATION SYSTEM REMOVED AND RESET FOOT

All work shall be done in accordance with the relevant Subsections of the MassDOT Highway Division Standard Specifications.

Where a sprinkler system is encountered during the construction, the piping system and sprinkler heads shall be removed and reset at new locations or modified as directed by the Engineer. The exact locations will be determined by the Engineer in the field to the satisfaction of the owner.

Existing sprinkler system impacted due to the construction as identified on the plan or encountered during construction operations shall be carefully removed and reset on the property as directed by the Engineer. The work also includes disconnecting existing system with coordination with owner.

All sprinkler heads and pipes etc. shall be removed carefully. The Contractor will be held responsible for any damage done during the removal and resetting of these items and shall replace or repair the damaged item as directed by the Engineer at his own expense.

Sprinkler heads and the pipes shall be relocated to new locations or eliminated as determined by the Engineer. All necessary piping shall be provided and installed by the Contractor.

The irrigation system to be R&R may not be out of service for more than two weeks (except October thru April). Any temporary work required to keep system in service shall be considered incidental to this pay item.

The operation of the sprinkler system shall be guaranteed by the Contractor for a period of one month from the date of completion of work.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 390.01 will be measured in place by the Foot of irrigation tubing removed and reset in its final position.

Item 390.01 will be paid at the contract unit bid price per Foot, which Contract unit price shall include all work necessary or incidental for complete in place relocated sprinkler irrigation tubing, sprinkler heads, testing and incidentals required to complete the work.

ITEM 620.13 GUARDRAIL, TL-3 (SINGLE FACED) FEET
ITEM 628.24 TRANSITION TO BRIDGE RAIL EACH

Work under this item shall conform to the relevant provisions of Section 600 of the Standard Specifications and the following:

Transition to bridge rail shall include curved sections in the guardrail as shown on the southeast corner of the bridge with radius 10 feet. No separate pay item shall be required for this curved section within the Transition to Bridge Rail.

Terminal end section shall follow the end unit detail shown in std detail drawing number 627.1.1 and be incidental to the respective Item that it is connected to either Item 620.13 Guardrail, TL-3 (Single Faced) or Item 628.24 Transition to Bridge Rail.

ITEM 657. TEMPORARY FENCE FOOT

The work under this Item shall conform to the relevant provisions of Section 644 of the Standard Specifications and supplemented by the following:

Work under this item shall include furnishing, installing, removing and resetting and, subsequently, removing a chain link fence located around the work area, river, staging area and/or field office as necessary for safety and security. The Contractor will be responsible for providing an acceptable method for the installation of the fence that will provide for the safety and security for which it is intended.

Fence gates for access/egress shall be furnished, installed and maintained by the Contractor, and shall be included in the unit cost. All posts including end, gate, corner and intermediate brace posts shall be included in the unit cost. The fencing height shall be 6 feet minimum from ground level. Material need not be new, but shall not be deteriorated, nor in any way jeopardize the security purposes intended. All fencing shall meet the approval of the Engineer.

The Contractor shall be responsible for maintenance of the temporary fence, and shall be responsible and cognizant that it remains secure, and that the area is sealed off at all times to the general public. It may be necessary to remove and reset sections of temporary fence at times to conform to current stage construction.

Fence fabric shall be placed on the face of the post away from the work area. A top tension wire, rather than a pipe top rail, shall be used. The top edge of the fabric shall be finished with a "Knuckled" selvage. The fence shall not be removed until the bridge work is complete and safe pedestrian passage is provided. No additional compensation will be paid for resetting and removing the temporary fence.

Measurement and Payment

Measurement and Payment for Item 657., Temporary Fence will be paid at the Contract unit per FOOT, which price shall include all equipment, material, labor and tools necessary for a complete installation including foundations, if required, removing and resetting for each construction stage, and final removal of fence, all components of fence and foundations as described above and/or as directed by the Engineer. No payment shall be made for the replacement and/or restoration of fence damaged due to construction accidents, vandalism and/or any other manner, but shall be provided by the Contractor without additional compensation.

ITEM 697.1 SILT SACK EACH

Work under this item shall conform to the relevant provisions of Subsections 227 and 670 of the Standard Specifications and the following:

The work under this item includes the furnishing, installation, maintenance and removal of a reusable fabric sack to be installed in drainage structures for the protection of wetlands and other resource areas and the prevention of silt and sediment from the construction site from entering the storm water collection system. Devices shall be ACF Environmental (800)-448-3636; Reed & Graham, Inc. Geosynthetics (888)-381-0800; The BMP Store (800)-644-9223; or approved equal.

CONSTRUCTION

Silt sacks shall be installed in retained existing and proposed catch basins and gutter inlets within the project limits and as directed by the Engineer.

The silt sack shall be as manufactured to fit the opening of the drainage structure under regular flow conditions, and shall be mounted under the grate. The insert shall be secured from the surface such that the grate can be removed without the insert discharging into the structure. The filter material shall be installed and maintained in accordance with the manufacturer's written literature and as directed by the Engineer.

Silt sacks shall remain in place until the placement of the pavement overlay or top course and the graded areas have become permanently stabilized by vegetative growth. All materials used for the filter fabric will become the property of the Contractor and shall be removed from the site.

The Contractor shall inspect the condition of silt sacks after each rainstorm and during major rain events. Silt sacks shall be cleaned periodically to remove and dispose of accumulated debris as required at no additional cost. Silt sacks, which become damaged during construction operations, shall be repaired or replaced immediately at no additional cost to the Department.

When emptying the silt sack, the contractor shall take all due care to prevent sediment from entering the structure. Any silt or other debris found in the drainage system at the end of construction shall be removed at the Contractor's expense.

All curb openings shall be blocked to prevent stormwater from bypassing the device.

All silt, sediment, and debris accumulated in silt sacks shall be handled and disposed of as specified in Section 227 of the Standard Specifications. Under no condition shall silt and sediment from the insert be deposited on site and used in construction.

COMPENSATION

Silt sacks will be measured and paid at the Contract unit price per each, complete in place, which price shall include all labor, materials, equipment and incidental costs required to complete the work. No separate payment will be made for removal and disposal of the sediment from the insert, but all costs in connection therewith shall be included in the Contract unit price bid.

ITEM 698.2 GEOTEXTILE FABRIC FOR SUBSURFACE DRAINAGE SQUARE YARD

ITEM 698.4 GEOTEXTILE FABRIC FOR PERMANENT EROSION CONTROL SQUARE YARD

All work shall be done in conformance with the applicable sections of the Standard Specifications.

Geotextile Fabric for Subsurface Drainage and Geotextile Fabric and Geotextile for Permanent Erosion Control shall conform to the requirements of AASHTO M 288, shall be listed on MassDOT's Qualified Construction Materials List, and shall be approved by the Engineer. Geotextile for Subsurface Drainage shall be used to wrap crushed stone surrounding leaching basins as shown on the detail provided in the construction drawings. Geotextile for Permanent Erosion Control shall be used under stone for pipe ends and modified rockfill including two feet of overlapping width. If geotextile requires anchor pins, they shall be included under these items.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Items 698.2 and 698.4 will be paid for at the contract unit price bid per Square Yard and shall include the fabric, all labor, tools, materials, and any necessary incidental items to provide complete in place installation. Overlaps between sheets are considered incidental to the unit price per square yard and shall not be measured separately for payment. Geotextile which becomes damaged during construction operations shall be repaired or replaced immediately at no additional cost to the Department.

ITEM 699. 30-MIL IMPERMEABLE LINER SQUARE YARD

All work shall be done in conformance with the applicable sections of the Standard Specifications and the following:

30-Mil Impermeable barrier shall be used at locations shown on the plans where leaching basins are proposed in proximity to the roadway. 30-Mil Impermeable liner shall be polyvinyl chloride (PVC) and shall conform to ASTM 7176-06 (2018). 30-Mil Impermeable barrier shall be installed vertically from a single, continuous roll without holes or gaps and shall be placed against the undisturbed excavation wall closest to the roadway in accordance with the Detail for Impermeable Barrier Installation in Excavation Wall.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 699. will be paid for at the contract unit price bid per Square Yard and shall include impermeable barrier, excavation, shoring and bracing, backfilling, all labor, tools, materials, and any necessary incidental items to provide complete in place installation. Impermeable barrier which become damaged during construction operations shall be repaired or replaced immediately at no additional cost to the Department.

ITEM 740. ENGINEERS FIELD OFFICE AND EQUIPMENT (TYPE A) MONTH

The work under this Item shall conform to the relevant provisions of Subsection 740 of the Standard Specifications and the following:

Two computer systems and printer system meeting minimum requirements set forth below including installation, maintenance, power, paper, disks, and other supplies shall be provided at the Resident Engineer's Office:

All equipment shall be UL approved and Energy Star compliant.

The Computer System shall meet the following minimum criteria or better:

Processor:	Intel, 3.5 GHz
System Memory (RAM):	12 GB
Hard Drive:	500 GB
Optical Drive:	DVD-RW/DVD+RW/CD-RW/CD+RW
Graphics Card:	8 GB
Network Adapter:	10/100 Mbit/s
USB Ports:	6 USB 3.0 ports
Keyboard:	Generic
Mouse:	Optical mouse with scroll, MS-Mouse compliant
Video/Audio	the computer system shall be capable of allow video calling and recording:
Video camera	shall be High Definition 1080p widescreen capable video calling and recording with built in microphone. The microphone system shall capture natural audio while filtering out background noise.
Audio	shall be stereo multimedia speaker system delivering premium sound.
OS:	Latest Windows Professional with all security updates
Web Browser:	Latest Internet Explorer with all security updates
Applications:	Latest MS Office Professional with all security updates Latest Adobe Acrobat Professional with all security updates Latest Autodesk AutoCAD LT Antivirus software with all current security updates maintained through the life of the contract.
Monitors:	Two 27" LED with Full HD resolution. Max. resolution 1920 x 1080
Flash drives:	2 (two) - 128GB USB 3.0
Internet access:	High Speed (min. 24 mbps) internet access with wireless router.

The Multifunction Printer System shall meet the following minimum criteria or better:

Color laser printer, fax, scanner, email and copier all in one with the following minimum capabilities:

- Estimated volume 8,000 pages per month
- LCD touch panel display
- 50 page reversing automatic document feeder (RADF)
- Reduction/enlargement capability
- Ability to copy and print 11" x 17" paper size
- email and network pc connectivity
- Microsoft and Apple compatibility
- ability to overwrite latent images on hard drive
- 600 x 600 dpi capability
- 30 pages per minute print speed (color),
- 4 Paper Trays Standard (not including the bypass tray)
- Automatic duplexing
- Finisher with staple functions
- Standard Ethernet. Print Controller
- Scan documents to PDF, PC and USB
- ability to print with authenticated access protection

The Contractor shall supply a maintenance contract for next day service, and all supplies (toner, staples, paper) necessary to meet estimated monthly usage.

The Engineer's Field Office and the equipment included herein including the computer system, and printer shall remain the property of the Contractor at the completion of the project. Disks, flash drives, and card readers with cards shall become the property of the Department.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Compensation for this work will be made at the contract unit price per month which price includes full compensation for all services and equipment, and incidentals necessary to provide equipment, maintenance, insurance as specified and as directed by the Engineer.

ITEM 751.765 COMPOST AND SEED OVER MODIFIED ROCK CUBIC YARD

REV. 2024.01.01 (REV. DATE TO BE REMOVED BY CONTRACTS).

DESIGNER: This item is generally not recommended for large expanses of rock slope where conditions may be too hot and dry for seed germination. Areas with partial shade or where there is moisture from waterways have been observed to be the most successful.

GENERAL

The work under this Item shall conform to the relevant provisions of Subsection 751, 767, and 765 of the Standard Specifications and the following.

Work shall consist of furnishing and pneumatically applying compost in conjunction with the specified native seed on designated areas of modified rock and achieving satisfactory establishment of seeded species as specified herein.

QUALIFICATIONS

Compost application and seeding shall be done by a company having a minimum of five years of experience with native seed establishment. Prior to beginning work, the seeding Contractor shall furnish proof of qualifications to the Engineer for approval. Proof of qualifications shall include providing documentation (photos and contacts) to demonstrate knowledge and expertise with native seeding and establishment and proof of having completed successful native seeding projects.

MATERIAL AND SUBMITTALS

Compost

Compost shall meet the relevant provisions for Type 2 Compost, found in Section M1.06 of the Supplemental Standard Specifications.

The Engineer shall approve the Contractor's equipment for application.

Seed Mix

Seed Mixes and Submittals shall be per the item(s) for the permanent seed mix. Mix shall be:

ITEM 765.442 ROADSIDE RIVERBANK MIX POUND

SEEDING SEASON

The season for seeding native mixes is April 1 - May 15 and October 1 - December 1 for dormant seeding. Written approval must be obtained for seeding outside the seeding season and, if approved, the permanent seed rate shall be increased by 50%

CONSTRUCTION METHODS

Method of application and equipment to be used shall be reviewed and approved by the Engineer prior to placement of material.

Placement of Compost

Compost shall be placed as shown on the Plans and in the Detail and as required by the Engineer. Material shall be placed so that settled material is at or slightly below the surface plane of the stone. The Contractor shall ensure that there will be adequate quantity, including adjustment for settlement.

For purposes of estimation, required compost quantities should be 300 cubic yards per acre to achieve the target depth.

Seeding

For areas smaller than half an acre, unless otherwise approved by the Engineer, seeding shall be done by broadcast method. Seeding shall be done in conjunction with or immediately following Compost application. Alternative seeding methods must be submitted and approved by the Engineer 14 days in advance of compost and seed application.

Hydroseeding

Hydroseeding may be used for sites over half an acre in size or when the rock slope does not permit safe application via a broadcasting method. Hydroseed shall be per the manufacturer's directions and as follows.

Tank and hoses shall be cleaned from all previous hydroseeding and hydromulching projects. Seed shall be mixed into the slurry immediately before application and slurry applied within 30 minutes after seeds have been placed in the tank. Once seed has been placed in the tank, tank shall be agitated only enough to mix the seeds and keep slurry from separating.

When Seeding Occurs after Application of Compost or after December 1

When seeding is done more than 3 days after Compost application or when Compost is applied after December 1, seeding rate shall be increased by 50%.

Over-Seeding

Large extents of bare area (greater than 5-6 feet and depending on modified rock slope conditions) shall be over-seeded with the specified mix during the appropriate season for seeding. Rates, methods, and submittals shall be as specified under the relevant Seed Mix Item and Materials above.

Over-seeding, mulch, watering, and all work for over-seeding shall be incidental.

Determining Satisfactory Establishment

A reasonably well-established stand of the specified seeded species as determined by the Engineer and the MassDOT Landscape Architect or designated Specialist will be required for Final Acceptance. The expectation is that an acceptable number and variety of the desired permanent seeded species will be visible. For seeding with compost over modified rock this shall generally be:

- A minimum of 50% coverage by the specified permanent seeded species after one growing season (considered June-September 15). Of that percentage, generally, depending on the mix species:
    - At least 2 types of permanent seeded grass species shall be visible.
    - At least 2 species of wildflowers shall be visible.
- There will be no more than 25% coverage by weed species.
- There will be no invasive or aggressive species within the stand at the time of acceptance.
- There shall be no evidence of seed from non-native mixes (ex., clover) due to using an incorrect or modified mix or due to failure to clean the hydroseeding tank if a hydroseeder is used.

Invasive and aggressive weeds (such as mugwort, vetch, knapweed, and chicory) must be cut, pulled with roots removed, or treated with herbicide by a licensed and approved applicator prior to going to seed for Interim Acceptance. Weed removal shall be coordinated with MassDOT Landscape Architect. No herbicides shall be used without approval and coordination with MassDOT Landscape Design Section.

Acceptance of Seeding and Establishment Work

Conditional Acceptance shall be based on approval of seed mix submittals and proper application of seed as specified herein.

Final Acceptance of Seed Establishment shall be given upon satisfactory Establishment as described above. If the seeded area fails to meet the requirements of Establishment by the end of the growing season, contractor shall propose and implement remediations and site shall be inspected during the following growing season after July 1st. Otherwise, Contractor shall forego the payment for Final Acceptance. All remediation shall be at the contractor's expense.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Compost and Seed for Modified Rock will be measured and paid for at the Contract unit price per Cubic Yard which price shall include all labor, materials, equipment, site preparation, and all incidental costs required to complete the work.

Native Seed Mix shall be compensated at the bid price per the specified seed mix item by pound.

Schedule of payment shall be as follows:

60% upon approval of Compost application and Conditional Acceptance of seeding as specified above

40% upon Final Acceptance of Seed Establishment

ITEM 756. NPDES STORM WATER POLLUTION PREVENTION PLAN LUMP SUM

This Item addresses the preparation and implementation of a Storm Water Pollution Prevention Plan required by the National Pollutant Discharge Elimination System (NPDES) and applicable Construction General Permit (CGP) issued by the U.S. Environmental Protection Agency (EPA).

Pursuant to the Federal Clean Water Act, construction activities which disturb one acre or more are required to apply to the EPA for coverage under the NPDES General Permit for Storm Water Discharges from Construction Activities. The Contractor shall be fully responsible for compliance with the most recently issued CGP and any subsequent revisions. Should a fine or damages be assessed against it, or MassDOT, as a result of a local, state, or federal enforcement action due to non-compliance with the CGP, the Contractor shall take full responsibility.

The NPDES CGP requires the submission of a Notice of Intent (NOI) to the EPA prior to the start of construction (defined as any activity which disturbs land, including clearing and grubbing). There is a fourteen (14) day review period commencing from the date on which EPA enters the Notice into their database. Based on the review of the NOI, EPA may require additional information, including but not limited to, the submission of the Storm Water Pollution Prevention Plan (SWPPP) for review. Work may not commence on the project until final authorization has been granted by EPA. Any additional time required by EPA for review of submittals will not constitute a basis for claim of delay.

In addition, if the project discharges to an Outstanding Resource Water, vernal pool, or is within a coastal ACEC as identified by the Massachusetts Department of Environmental Protection (DEP), a separate notification to DEP is required. DEP may also require submission of the Storm Water Pollution Prevention Plan for review and approval. Filing fees associated with the notification to DEP and, if required, the SWPPP filing to DEP shall be paid by the Contractor.

The CGP also requires the preparation and implementation of a SWPPP in accordance with the afore-mentioned statutes and regulations. The Plan will include the CGP conditions and detailed descriptions of controls of erosion and sedimentation to be implemented during construction. The contractor shall prepare the SWPPP and update it as necessary. The Contractor shall submit the Plan to the Engineer for approval at least four (4) weeks prior to any site activities. It is the responsibility of the Contractor to comply with the CGP conditions and the conditions of any state Wetlands Protection Act Order, Water Quality Certification, Corps of Engineers Section 404 Permit and other environmental permits applicable to the project and to include in the SWPPP the methods and means necessary to comply with applicable conditions of said permits.

It is the responsibility of the Contractor to complete the SWPPP in accordance with the EPA CGP, provide all information required, and obtain any and all certifications as required by the CGP. Any amendments to the SWPPP required by site conditions, schedule changes, revised work, regulations, construction methodologies, and the like are the responsibility of the Contractor. Amendments will require the approval of the Engineer prior to implementation.

In addition to the CGP requirements for inspections, MassDOT requires inspection of all erosion controls and site conditions on a weekly basis. Inspections are also required at portions of sites that discharge to sediment or nutrient impaired or high quality waters per the CGP when each incidence of rainfall exceeding 0.25 inches in twenty-four hours or after snowmelt discharge from

a storm event that produces 3.25 inches or more of snow within twenty-four hours occurs. The CGP requires that inspections be performed by a qualified individual as outlined in the CGP. MassDOT requires proof of completion of a 4 hour minimum sedimentation and erosion control training class current to the latest CGP. This individual can be, but not limited to, someone that is either a certified inspector, certified professional, or certified storm water inspector. The documentation shall be included as an appendix in the SWPPP. The inspector's qualifications shall be submitted to the Engineer for approval prior to beginning any work. This individual shall be on-site during construction to perform these inspections. In addition, if the Engineer determines at any time that the inspector's performance is inadequate, the Contractor shall provide an alternate inspector. Written weekly inspection forms, storm event inspection forms, and Monthly Summary Reports must be completed and provided to the Engineer. Monthly Summary Reports must include a summary of construction activities undertaken during the reporting period, general site conditions, erosion control maintenance and corrective actions taken, the anticipated schedule of construction activities for the next reporting period, any SWPPP amendments, and representative photographs.

The Contractor is responsible for preparation of the Plan, all SWPPP certifications, inspections, reports and any and all corrective actions necessary to comply with the provisions of the CGP. The Standard Specifications require adequate erosion control for the duration of the Contract. All control measures must be properly selected, installed, and maintained in accordance with manufacturer specifications and good engineering practices. If periodic inspections or other information indicates a control has been used inappropriately or is no longer adequate, it is the responsibility of the Contractor to replace or modify the control for site conditions at no additional cost to the Department. Contractor must maintain all control measures and other protective measures in effective operating conditions and shall consider replacement of erosion controls for each construction season.

The work under this item shall also include the preparation, submission and implementation of a Flood Contingency Plan. The plan shall address the potential need for the temporary relocation of construction and auxiliary equipment situated within the 1% annual chance of flooding zone to designated upland locations above the Base Flood Elevation during flood events. The Flood Contingency Plan shall address any additional MassDEP-required information requirements, as applicable. The Flood Contingency Plan shall be submitted to the Engineer for review and approval at the same time as the SWPPP.

This Item addresses acceptable completion of the SWPPP, any revisions/amendments required during construction, preparation of monthly reports and Flood Contingency Plan. In addition, any erosion controls beyond those specified in bid items which are selected by the Contractor to facilitate and/or address the Contractor's schedule, methods and prosecution of the work shall be considered incidental to this item.

The CGP provides specific requirements for temporary and final stabilization. This shall be incorporated into the project schedule. The permit defines specific deadline requirements for Initial Stabilization ("immediately", i.e., no later than the end of the next work day following the day when earth-disturbing activities have temporarily or permanently ceased) and for Complete Stabilization Activities (no later than 14 calendar days after the initiation of stabilization). Stabilization criteria for vegetative and non-vegetative measures are provided in the CGP.

The CGP requires the submission of a Notice of Termination (NOT) from all operators when final stabilization has been achieved, as well as removal and proper disposal of all construction materials, waste and waste handling devices, removal of all equipment and construction vehicles, removal of all temporary stormwater controls, etc. Approval of final stabilization by the Engineer and confirmation of submission of the NOT will be required prior to submission of the Resident Engineer's Final Estimate. The permittee shall use EPA's website to prepare and submit the NOT.

BASIS OF PAYMENT

Item 756 will be paid for at the Contract unit price Lump Sum, which price shall include all labor, materials, equipment, SWPPP & Flood Contingency Plan preparation, revisions/addenda during construction, monthly reports, filing fees, and all incidental costs required to complete the work.

Payment of 50% of the Lump Sum price of this item will be made upon acceptance of the NPDES Stormwater Pollution Prevention Plan & Flood Contingency Plan.

Payment of 40% of the Lump Sum price of this item will be paid in equal monthly installments distributed across the time remaining in the accepted baseline schedule until substantial completion.

The remaining 10% of the Lump Sum price of this Item will be paid following accepted submission of a Notice of Termination (NOT) when final stabilization has been achieved.

ITEM 765.412 SHORT GRASSLAND MIX - SANDY SOIL POUND
ITEM 765.442 ROADSIDE RIVERBANK MIX POUND

DESIGNER INSTRUCTIONS:

- Calculate quantity of seed based on application rate and area. To address potential of seeding out of season, increase bid quantity by 50%.

Work under this item shall consist of furnishing the mix(es) specified below in the required quantity.

SUBMITTALS

1) Pre-Verification of Seed Availability. Within 30 days after the Notice to Proceed, the Contractor shall submit to the Engineer the supplier's verification of availability of seed species in the required quantities and for the anticipated date of seeding. Verification shall be on the supplier's letterhead and notarized by the supplier's notary. Species not expected to be available should be noted and substitutions recommended.

2) Final Verification of Seed Availability. No earlier than 21 days prior to ordering, the Contractor shall submit to the Engineer the supplier's verification of availability of seed species and in the required quantities. Verification shall be on the supplier's letterhead and notarized by the supplier's notary. A copy of this submittal shall be forwarded to the MassDOT Landscape Design Section. Substitutions or changes in the mix at this time must be approved by MassDOT Landscape Design Section.

3) Seed Worksheet provided herein shall be submitted to the Engineer prior to ordering seed to determine the number of pounds of Pure Live Seed required.

4) Seed Tags. The contractor shall submit original seed tags from each bag of seed used on the project or ensure that each tag is photo documented by the Engineer while on the unopened bag.

   Number of tags submitted must correspond to number of bags delivered.

   Species listed on the seed tag shall match the Final Verification of Seed Availability (Submittal #2) unless approved otherwise. Tag must include variety and species name; lot number; purity; percentage of inert matter; percentage of weeds, noxious seeds, and other crop seeds; germination, dormant or hard seed; total viability; origin of seed; germination test date, net weight, and name and address of seller. The origin of seed must be listed on the seed tag for all species in the mix to provide verification of original (generation 0) seed source. The smallest known geographic area (township, county, ecotype region, etc.) shall be listed. Ecotypes and cultivars shall be as close to Massachusetts as possible and appropriate to the site conditions.

   A copy of this submittal shall be forwarded to the MassDOT Landscape Design Section.

5) Verification of Seed Delivery. Prior to payment, contractor shall submit the Seed Delivery Verification form contained within the contract or the Supplier's Verification on company letterhead or a bill of lading. Supplier verification must include all information requested on the Verification form within this contract. The bill of lading must include variety and species name,

lot number, net weight shipped, date of sale, invoice, project or seeding location, and name and address of Supplier. All information must be filled in and complete for acceptance. Information must match the seed tags and quantity of seed used on the job. A copy of this submittal shall be forwarded to the MassDOT Landscape Design Section

6) Seed Sample. If requested or if seed is from a previously opened bag, the contractor may be asked to submit to the Engineer a sample of seed from the seed bag (1-2 cups) at the time of seeding.

SEEDING SEASON

The appropriate seeding seasons are:
Spring: April 1 - May 15
Fall: October 1 - December 1 for dormant seeding

PERMANENT SEED MIX(ES)

Calculating Pure Live Seed (PLS)

Quantities specified are PURE LIVE SEED. Greater quantities of ordered seed may be required to achieve actual specified seeding rates.

Pure Live Seed (PLS) is defined as a percentage calculated by multiplying the percent of pure seed by the percent of viable seed (total germination, hard seed, and dormant seed). For example:

If a seed label indicates 90% purity, 78% germination, 10% hard seed, and 2% dormancy, it is calculated to be 90% x [78 + 10 + 2]% = 81% PLS.

Therefore, each pound of PLS would need 1 pound / 0.81 = 1.2 pounds of seed with a 90% purity and 90% total germination

Seed Mix(es) shall be as specified below. Ecotypes and cultivars shall be as close to Massachusetts as possible and appropriate to the site conditions.

765.412 Short Grassland Mix-Sandy Soil

Botanical Name	**Common Name**	**% Mix by Weight (PLS)**
Grass		
Festuca ovina	Sheep Fescue	44.0%
Schizachyrium scoparium	Little Blue Stem	34.5%
Elymus canadensis	Canada Wild Rye	13.0%
Eragrostis spectabilis 'RI Ecotype'	Purple Lovegrass 'RI Ecotype'	2.0%
Agrostis perennans	Upland Bentgrass	1.0%
		94.5%
Herb/Forb		
Chamaecrista fasciculata	Partridge Pea	2.0%
Rudbeckia hirta-VT ecotype	Black-eyed Susan-VT ecotype	0.8%

Pycnanthemum tenuifolium	Slender Mountain Mint	0.4%
Achillea millefolium	Common Yarrow	0.4%
Asclepias tuberosa	Butterfly Milkweed	0.4%
Aster laevis NY Ecotype	Smooth Aster NY Ecotype	0.3%
Aster pilosus	Heath Aster	0.3%
Eurybia spectabilis	Eastern Showy Aster	0.3%
Lespedeza capitata	Roundhead Bush Clover	0.2%
Solidago odora	Licorice Scented Goldenrod	0.2%
Solidago nemoralis	Grey Goldenrod	0.2%
		5.5%
		100.0%

765.442 Roadside Riverbank Mix

Botanical Name	**Common Name**	**% Mix by Weight (PLS)**
Grass		
Elymus virginicus	Virginia Wild Rye	27.0%
Schizachyrium scoparium 'Albany Pine'	Little Bluestem 'Albany Pine'	22.5%
Andropogon gerardii NY Eco	Big Bluestem NY Eco	14.0%
Elymus riparius	Riverbank Wild Rye	14.0%
Panicum virgatum	Switch Grass	5.0%
Dichanthelium clandestinum 'Tioga'	Deertongue grass 'Tioga'	5.0%
Carex vulpinoidea	Fox Sedge	2.5%
Agrostis perennans	Upland Bentgrass	1.5%
Poa palustris	Fowl Bluegrass	0.3%
Juncas effusus Soft Rush		0.1%
Juncus tenuis	Path Rush	0.1%
		92.0%
Herb/Forb		
Chamaecrista fasciculata	Partridge Pea	3.0%
Penstemon digitalis	Beard-tongue	1.0%
Vernonia noveboracensis	New York Ironweed	0.6%
Helenium autumnale	Common Sneezeweed	0.5%
Verbena hastata	Blue Vervian	0.4%
Aster laevis NY Ecotype	Smooth Aster NY Ecotype	0.3%
Aster puniceus	Aster – Swamp	0.4%
Aster cordifolius	Blue Wood Aster	0.3%
Asclepias incarnata	Swamp Milkweed	0.3%
Monarda fistulosa	Wild Bergamot	0.2%
Aster novae-angliae	New England Aster	0.2%
Solidago odora	Licorice Scented Goldenrod	0.2%
Desmodium canadense	Showy Tick Trefoil	0.2%
Eupatorium perfoliatum	Bonset	0.2%
Eupatorium maculatum	Spotted Joe Pye Weed	0.2%
Solidago juncea	Early Goldenrod	0.1%

Euthamia graminifolia	Grass-leaved Goldenrod	0.1%
Lobelia cardinalis	Cardinal Flower	0.1%
		8.0%
		100.0%

Application Rate

Short Grassland Mix – Sandy Soil: 30 lbs/acre PLS. Option1: In addition, apply 30 pounds of cover crop (grain oats or grain rye) as appropriate to the season.

Roadside Riverbank Mix: 15 lbs/acre PLS. Option1: In addition, apply 30 pounds of cover crop (grain oats or grain rye) as appropriate to the season.

Any species substitutions shall be with a species having similar characteristics and function. Substitutions must be approved by MassDOT Landscape Design Section per the documentation submittal process.

50% Increase Adjustment for Field Conditions

Seeding under the following conditions requires a 50% increase in the permanent mix at the time of construction:

- Seeding out of season
  OR
- Seeding after Compost Blanket has been applied (unless already increased for out of season).

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 765.412 Short Grassland Mix – Sandy Soil and Item 765.442 Roadside Riverbank Mix will be measured for payment by the pound of Pure Live Seed delivered and complete in place.

Item 765.412 Short Grassland Mix – Sandy Soil and Item 765.442 Roadside Riverbank Mix will be paid at the contract unit price per pound of Pure Live Seed delivered upon approval of all Seed Submittal Documentation. Overseeding required to correct poor germination or establishment shall be incidental to the item.

Application and care of native seed mix will be paid for separately under Item 735.635 Native Seeding and Establishment.

NATIVE SEED WORKSHEET

Project Description: _____ Project No: _____

Contractor: _____ Contract No: _____

Seed Mix Number & Description: _____

Contractor: Complete Prior To Ordering

Pounds of Seed Required Per Contract:

_____lbs./acre for _____Acre(s) OR _____ SY

Additional 50% increase if required (out of season or seeding over compost blanket):

_____**lbs. Total Seed Required**

Calculated Quantity for **P**ure **L**ive **S**eed (PLS[1]):

_____ **Total Pounds PLS**

Engineer: Verification at Time of Application

Number pounds delivered to site[2]: _____ Date(s): _____

Actual Seed Bag Tag/s Received or photo documented by Engineer: _____

[1] *PLS=% pure seed x % viable seed (total germination, hard seed, and dormant seed).*
[2]*Quantity delivered should match pounds* ***Total Pounds PLS*** *and* ***Verification of Seed Delivery****. Pounds should be shown on each Seed Tag.*

SUPPLIER VERIFICATION OF SEED DELIVERY FOR MASSDOT PROJECTS

Date_____

We hereby certify that (*Seed Supplier*):_____

Furnished to (*Contractor*): _____

For use on: (*Project Description*) _____

Project #: _____ Contract #: _____

Pounds of Pure Live Seed: _____

Of Mix (*Description*): _____

Lot Number _____

The material was delivered on (*Date*)_____.

The labels and contents meet all State and Federal regulations. The mixture consists of the following species, including cultivars (as applicable) and ecotype region, and at the following percentages (may be attached separately):

Name (print): _____ Title: _____

Supplier: _____

Signature and Seal: _____

ITEM 765.635 NATIVE SEEDING AND ESTABLISHMENT SQUARE YARD

Work shall conform to the relevant provisions of Subsections 765 and 767 of the Standard Specifications and the following:

The work under this item shall consist of seeding, mowing, and other care to establish a stand of grass in the areas shown on the plans or as required by the Engineer. For the purposes of these specifications, the term "grass" shall apply to all the forbs, grasses, sedges, and rushes included in the materials.

QUALIFICATIONS

Seeding shall be done by a company having a minimum of five years of experience with native seed establishment. Prior to beginning work, the seeding Contractor shall furnish proof of qualifications to the Engineer for approval. Proof of qualifications shall include providing documentation (photos and contacts) to demonstrate knowledge and expertise with native seeding and establishment and proof of having completed successful native seeding projects.

SEEDING SEASON

Seeding seasons for native mixes is April 1 - May 15 and October 1 - December 1 for dormant seeding. Written approval must be obtained for seeding outside the seeding season and, if approved, the permanent seed rate shall be increased by 50%.

Seeding season for cover crops shall be grain oats January 1 – July 31 and grain rye August 1 – December 1.

MATERIAL AND SUBMITTALS

Seed Mixes and Submittals shall be per the item(s) for permanent and annual (cover crop) seed mixes.

Compost Blanket, if used, shall meet the material and submittal requirements for that item.

Hydromulch shall be wood fiber or straw applied per the Standard Specifications and at the rates specified below and per the manufacturer.

A certified statement shall be furnished, prior to start of work, to the Engineer by the Contractor as to the number of pounds of hydromulch, tackifier, and seed, per 100 gallons of water and as applicable to products used. This statement should also specify the number of square yards of seeding that can be covered with the solution specified above.

Fertilizer

No fertilizers shall be applied.

Water

Water, including hose and all other watering equipment required for the work, shall be furnished by the Contractor to the site at no additional cost. Water shall be suitable for irrigation and free from ingredients harmful to plant life. All plants injured or work damaged due to the lack of water or the use of too much water shall be the Contractor's responsibility to correct.

SEEDING

Hand broadcast method shall be used for all areas smaller than half an acre and when specified on the plans for areas over half an acre.

Seeding shall occur within 72 hours of placement of loam and final grading or the Contractor shall propose a reasonable, alternative schedule that shall be approved by the Engineer.

Surface Preparation

No seeding or soil preparation shall be done if soils are muddy or dry and compacted. Bare soils shall be raked to remove large stiff clods, lumps, brush, roots, stumps, litter and other foreign matter. Ruts and depressions shall be filled with additional loam or compost and the soil shall be re-graded to a relatively smooth finish corresponding to the required grades.

When seeding over existing or compacted soil or soil that has sat bare for more than 30 days, surface will be prepared by tilling or raking to a minimum depth of 2 inches prior to seeding and prior to Compost Blanket application (when applied).

Surface preparation shall be compensated for under for loam placement or topsoil rehandled and spread as appropriate to the project.

Jute or coir mesh, when specified in the contract, shall be placed after seeding and per the Standard Specifications and the manufacturer’s instruction.

Surface preparation shall be approved by the Engineer prior to seeding.

Seeding over Various Substrates

Loam: Seeding shall occur within 72 hours of loam placement to prevent loss of topsoil. Seed shall be manually broadcast for areas less than half an acre (each area, not cumulative area) and when specified on the plans. Broadcasting shall be immediately followed by hydromulching as specified below. When not specified on the plans, larger areas may be hydroseeded as specified below.

Compost Blanket: Compost Blanket shall be applied as specified under that item. Seed should be hand broadcast at the same time as compost application to ensure a thin cover of compost over seed.

When seeding is done after application of Compost Blanket the rate shall be increased by 50%. If the Compost Blanket is applied after December 1, seed shall be broadcast or hydroseeding over the compost in the Spring and the rate increased by 50% specified under Seed Application.

Compost Mulch over Modified Rock: Compost Mulch and seed shall be applied as specified under that item. No hydromulch is required.

Cover Crop

Cover crop shall be used when seeding out of season, when specified with the permanent native seed mix under that item, and as required to prevent erosion until the permanent seed establishes. A cover crop should not be used with a steep slope mix or other permanent mix which already contains either cereal rye or oats in the composition of the mix. A cover crop is not necessary for wetland seeding and is not typically necessary for soil stabilization when seeding in conjunction with a compost blanket application.

Seed Application

All seed shall be mulched as specified herein.

Seed application shall be by broadcast seeding or by hydroseeding as described below.

Broadcast Seeding

Seed shall be broadcast spread using a cyclone or whirlwind seeder or hand broadcast. Small or light-seeded species such as bluestem may be mixed with approved filler to achieve an even distribution. Seed shall not be broadcast when wind velocities are greater than 15 mph.

Broadcast seeding shall be undertaken in two separate passes at ninety degrees to each other. One-half the seeding rate shall be applied in each direction (horizontally and vertically). To ensure seed to soil contact with broadcasting of seed, seeding shall be followed by rolling or tracking with equipment approved by the Engineer.

Broadcast seed shall be mulched with weed-free straw mulch unless seeding is done as part of Compost Blanket in which case it shall be as specified above under seeding with Compost Blanket application. Hydromulching shall be as specified under Hydromulching.

Hydroseeding and Hydromulching

Hydroseed and mulching shall be per the manufacturer's directions and as follows.

Hydroseeding shall only be used for sites over half an acre in size or with permission of the Engineer.

Tank and hoses shall be cleaned from all previous hydroseeding and hydromulching projects. Seed shall be mixed into the slurry immediately before application and slurry applied within 30 minutes after seeds have been placed in the tank. Once seed has been placed in the tank, tank shall be agitated only enough to mix the seeds and keep slurry from separating.

A 2-step process shall be used for seeding in conjunction with hydromulch. Seed shall be applied with 500 lbs/acre of hydromulch in the first pass. A second pass with 1,000 lbs/ acre of hydromulch shall be applied in a second pass. Each pass shall be applied in a different direction.

Once the seed has been added to the tank mixture a one-hour time limit is set for spreading the mixture on the soil. Once the one hour has passed the excess mixture must be discarded.

For broadcast seeding, hydromulch shall be applied immediately following seeding at a rate of 1,000 lbs/acre. Tank shall be cleaned from any previous hydroseeding.

CARE DURING GERMINATION AND ESTABLISHMENT

Contractor shall care for seeded areas as necessary for successful germination. Care will include watering and weed control as necessary to achieve establishment of the specified seeded species after one growing season as specified below.

The contractor shall maintain the stand of grasses to ensure healthy growth of the seeded species. Work shall include mowing or weed-whacking for weed control, watering if necessary, and removal of invasive plants.

Watering shall be sufficient to achieve soil moisture to a depth of 2 inches or more and such moisture is uniform. Method of watering shall not erode or damage soil or grassed surfaces.

General Weed Control: Unless otherwise directed, mowing shall be as specified under Mowing for Weed Control for seed establishment. Weeds shall be mowed prior to weeds setting seed (by the end of July unless otherwise approved).

Control of Invasive and Aggressive Weeds: Invasive and aggressive weeds, including but not limited to mugwort, ragweed, knapweed, foxtail, crabgrass, and chicory must be cut or treated prior to going to seed. Herbicide treatment must be coordinated with MassDOT. Undesired species (such as chicory) introduced due to use of incorrect seed mix shall be removed at the Contractor's expense.

MOWING FOR WEED CONTROL

Mowing for weed control shall be completed after weeds have sprouted and show leaf and bud growth, but prior to setting seed, generally between July 7th and August 1st, unless directed otherwise by the MassDOT Landscape Architect and the Engineer.

Mowing height shall be as needed for weed control, generally to a height of 8 inches and not below 4 inches, unless directed otherwise. Mowing shall be with a brush hog mower or string trimmer other approved equipment. Conventional lawn mowers which cannot achieve the appropriate cut shall not be used.

Contractor shall give 48-hour notice prior to mowing work. Mowing shall only occur in dry sunny weather. Litter pickup should occur prior to mowing in all areas. If required, cut grass

shall be raked and removed. Litter pickup and raking and removal of grass shall be incidental to the work.

Mowing equipment shall be approved by the Engineer prior to work.

OVER-SEEDING

Areas of bare ground greater than 2-3 feet in diameter shall be over-seeded with the specified mix during the appropriate season for seeding. Where required for overseeding mowing shall be as close to the soil as possible. Soil that is compacted shall be raked or otherwise roughened prior to over-seeding.

Over-seeding rates and methods shall those specified above under Materials and Methods. Following over-seeding, soil shall be lightly tamped to ensure seed to soil contact and areas shall be mulched with straw mulch and watered with a fine mist to moisten soil to a depth of at least 2 inches.

Over-seeding, mulch, watering, and all work for over-seeding shall be incidental.

DETERMINING SATISFACTORY GRASS ESTABLISHMENT

A well-established stand of the specified seeded species as determined by the Engineer and the MassDOT Landscape Architect will be required for Final Acceptance. The expectation is that an acceptable number and variety of the desired permanent seeded species (not the cover crop) will be visible. Generally:

- A minimum of 75% coverage by the specified permanent seeded species after one growing season. Of that percentage, generally, depending on the mix species:
    - At least 3 types of the permanent seeded grass species shall be visible.
    - At least 3 species of wildflowers shall be visible.
- There will be no significant gaps or bare soil (generally 2-3 feet in diameter or greater).
- There will be no more than 25% coverage by weed species.
- All soil shall be stabilized and there shall be no channeling or erosion.
- There will be no invasive or aggressive species within the stand at the time of acceptance.
- There shall be no evidence of seed from non-native mixes (i.e., clover) due to failure to clean the hydroseeding tank or using incorrect mix.

Invasive and aggressive weeds (such as mugwort, ragweed, knapweed, and chicory) must be cut or treated prior to going to seed for Interim Acceptance. Herbicide treatment must be coordinated with MassDOT.

A warm-season grass mix with perennials will not have uniform growth. A uniform stand of grass may indicate use of an incorrect mix.

ACCEPTANCE OF SEEDING AND ESTABLISHMENT WORK

Conditional Acceptance shall be based on proper application of seed as specified herein.

Interim Acceptance of Care. Seeding will be inspected by mid-July to assess germination and Establishment conditions as described above. When necessary for Interim Acceptance, areas shall be mowed prior to weed species producing seed and as specified above under Weed Control. ***Areas requiring weed control that are not mowed prior to weed seed dispersal will not be approved for Interim Acceptance.*** Seeding that shows good germination and is determined by the Engineer and Landscape Architect to not require weed control at time of inspection shall be accepted for Interim Acceptance payment.

Final Acceptance of Establishment shall be given upon satisfactory Establishment as described above.

If the seeded area fails to meet the requirements of Establishment by the end of the growing season, contractor shall propose and implement remediations and site shall be inspected during the following growing season after July 1st. All remediation shall be at the contractor's expense.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Native Seeding and Establishment will be measured for payment by the square yard, complete in place.

Native Seeding and Establishment will be paid at the Contract unit price by the square yard upon Conditional, Interim, and Final Acceptances as described above. This price shall include all submittals, seeding, rolling to ensure seed-to-soil contact, weed control other than mowing, water, over-seeding, labor, materials, equipment, and all incidental costs required to complete the work of establishing a satisfactory stand of grass.

Native seed and cover crop mixes shall be compensated under the respective items.

Site preparation, including raking, tilling, removal of debris and stones, and other work to the prepare site for seeding shall be compensated under loam placement or topsoil rehandled and spread as relevant to the project. If used, Compost Blanket shall be compensated under the respective item.

Mowing for weed control will be incidental to this item.

Schedule of payment shall be as follows:

30% upon Conditional Acceptance
20% upon Interim Acceptance of Care, except this amount will be reduced to zero and final payment will be reduced accordingly when areas requiring weed control are not mowed as specified in the Interim Acceptance criteria.
50% upon Final Acceptance of Establishment

ITEM 767.121 SEDIMENT CONTROL BARRIER FOOT

The work under this item shall conform to the relevant provisions of Subsections 670, 751 and 767 of the Standard Specifications and shall include the furnishing and placement of a sediment control barrier. Sediment control barrier shall be installed prior to disturbing upslope soil.

The purpose of the sediment control barrier is to slow runoff velocity and filter suspended sediments from storm water flow. Sediment barrier may be used to contain stockpile sediments, to break slope length, and to slow or prevent upgradient water or water off road surfaces from flowing into a work zone. Contractor shall be responsible for ensuring that barriers fulfill the intent of adequately controlling siltation and runoff.

Twelve-inch diameter (after installation) compost filter tubes with biodegradable natural fabric (i.e., cotton, jute, burlap) are intended to be the primary sedimentation control barrier.

For small areas of disturbance with minimal slope and slope length, the Engineer may approve the following sediment control methods:

- 9-inch compost filter tubes
- Straw bales which shall be trenched

No straw wattles may be used. Additional compost filter tubes (adding depth or height) shall be used at specific locations of concentrated flow such as at gully points, steep slopes, or identified failure points in the sediment capture line.

When required by permits, additional sediment barrier shall be stored on-site for emergency use and replacement for the duration of the contract.

Where shown on the plans or when required by permits, silt fence shall be used in addition to compost filter tubes and straw bales and shall be incidental to the item.

Sediment control barriers shall be installed in the approximate location as shown on the plans and as required so that no excavated or disturbed soil can enter mitigation areas or adjacent wetlands or waterways. Barriers shall be in place prior to excavation work. No work shall take place outside the barriers.

MATERIALS AND CONSTRUCTION

Prior to initial placement of barriers, the Contractor and the Engineer shall review locations specified on the plans and adjust placement to ensure that the placement will provide maximum effectiveness.

Barriers shall be staked, trenched, and/or wedged as specified herein and according to the Manufacturer’s instructions. Barriers shall be securely in contact with existing soil such that there is no flow beneath the barrier.

Compost Filter Tube

Compost material inside the filter tube shall meet M1.06.0, except for the following: no peat, manure or bio-solids shall be used; no kiln-dried wood or construction debris shall be allowed; material shall pass through a 2-inch sieve; and the C:N ratio shall be disregarded.

Outer tube fabric shall be made of 100% biodegradable materials (i.e., cotton, hemp or jute) and shall have a knitted mesh with openings that allow for sufficient water flow and effective sediment capture.

Tubes shall be tamped, but not trenched, to ensure good contact with soil. When reinforcement is necessary, tubes shall be stacked as shown on the detail plans.

Straw Bales

Straw bales shall be used if shown on the plans or when specified by Orders of Condition or other permit requirements.

Bales should be placed in a single row, lengthwise on the contour, with ends of adjacent bales tightly abutting one another. All bales should be either wire-bound or string-tied. Straw bales should be installed so that bindings are oriented around the sides (rather than along the tops and bottoms) of the bales in order to prevent deterioration of the bindings.

The barrier should be entrenched and backfilled. A trench should be excavated the width of a bale and the length of the proposed barrier to a minimum depth of 4 inches. The trench must be deep enough to remove all grass and other material which might allow underflow. After the bales are staked and chinked (filled by wedging), the excavated soil should be backfilled against the barrier. Backfill soil should conform to the ground level on the downhill side and should be built up to 4 inches against the uphill side of the barrier.

Each bale should be securely anchored by at least 2 stakes or re-bars driven through the bale. The first stake in each bale should be driven toward the previously laid bale to force the bales together. Stakes or re-bars should be driven deep enough into the ground to securely anchor the bales. For safety reasons, stakes should not extend above the bales but should be driven in flush with the top of the bale.

The gaps between the bales should be chinked (filled by wedging) with straw to prevent water from escaping between the bales. Loose straw scattered over the area immediately uphill from a straw bale barrier tends to increase barrier efficiency. Wedging must be done carefully in order not to separate the bales.

When used in a swale, the barrier should be extended to such a length that the bottoms of the end bales are higher in elevation than the top of the lowest middle bale to assure that sediment-laden runoff will flow either through or over the barrier but not around it.

Silt Fence

Materials and Installation shall be per Section 670.40 and 670.60 of the Standard Specifications and the following:

Silt fence shall only be used if shown on the plans or when specified by Orders of Condition or other permit requirements.

When used with compost filter tubes, the tube shall be placed on a minimum of 8 inches of folded fabric on the upslope side of the fence. Fabric does not need to be trenched.

When used with straw bales, an 8-inch deep and 4-inch wide trench or V-trench shall be dug on the upslope side of the fence line. One foot of fabric shall be placed in the bottom of the trench followed by backfilling with compacted earth or gravel. Stakes shall be on the down slope side of the trench and shall be spaced such that the fence remains vertical and effective.

Width of fabric shall be sufficient to provide a 36-inch high barrier after fabric is folded or trenched. Sagging fabric will require additional staking or other anchoring.

MAINTENANCE

Maintenance of the sediment control barrier shall be per Section 670.60 of the Standard Specifications or per the Stormwater Pollution Prevention Plan (SWPPP), whichever is more restrictive.

The contractor shall inspect the sediment barrier in accordance with relevant permits. At a minimum, barriers shall be inspected at least once every 7 calendar days and after a rain event resulting in 0.25 inches or more of rainfall. Contractor shall be responsible for ensuring that an effective barrier is in place and working effectively for all phases of the Contract.

Barriers that decompose such that they no longer provide the function required shall be repaired or replaced as directed. If the resulting berm of compost within the fabric tube is sufficiently intact and continues to provide effective water and sediment control, barrier does not necessarily require replacement.

DISMANTLING & REMOVING

Barriers shall be dismantled and/or removed, as required, when construction work is complete and upslope areas have been permanently stabilized and after receiving permission to do so from the Engineer.

Regardless of site context, nonbiodegradable material and components of the sediment barriers, including photo-biodegradable fabric, plastic netting, nylon twine, and silt fence, shall be removed and disposed off-site by the Contractor.

For naturalized areas, biodegradable, natural fabric and material may be left in place to decompose on-site. In urban, residential, or other locations where aesthetics is a concern, the following shall apply:

- Compost filter tube fabric shall be cut and removed, and compost shall be raked to blend evenly (as would be done with a soil amendment or mulch). No more than a 2-inch depth shall be left on soil substrate.
- Straw bales shall be removed and disposed off-site by the Contractor. Areas of trenching shall be raked smooth and disturbed soils stabilized with a seed mix matching adjacent seeding or existing grasses (i.e., lawn or native grass mix).
- Silt fence, stakes, and other debris shall be removed and disposed off-site. Site shall be restored to a neat and clean condition.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 767.121 will be measured and paid for at the contract unit price per foot of sediment control barrier which price shall include all labor, equipment, materials, maintenance, dismantling, removal, restoration of soil, and all incidental costs required to complete the work.

Silt fence, when used in conjunction with compost filter tubes or straw bales, will be incidental to this item.

Additional barrier, such as double or triple stacking of compost filter tubes, will be paid for per foot of tube installed.

Barriers that have been driven over or otherwise damage by construction activities shall be repaired or replaced as directed by the Engineer at the Contractors expense.

ITEM 859. REFLECTORIZED DRUM DAY

The work under this Item shall conform the relevant provisions of Section 850 of the Standard Specifications and the following:

Reflectorized drums placed in advanced of the work zone, along the gutter line to delineate intersection geometric curb alignment changes shown on the plans, and as required by the Engineer shall be equipped with Type A flashing warning lights. Flashing units shall be maintained in operation from dusk to dawn.

ITEM 874.45 MISCELLANEOUS SIGNS REMOVED AND RESET EACH

The work under this item shall conform to the relevant provision of Subsections 828 and 840 of the Standard Specifications and the following:

The work shall include removing and resetting existing informational, guide, and directional sign panels on new ground-mounted supports at the current or new locations as indicated on the plans. The work will also include the restoration to original condition, of any natural features disturbed in any way or manner by the operation, and the proper disposal of the existing sign supports.

MATERIALS

Materials for signs removed and reset shall be the existing signs and supports. If in the opinion of the Engineer, the existing sign panel is unsuitable for reuse, a new sign panel of a size and composition equal to the existing sign panel shall be furnished, as directed by the Engineer.

The hardware used to attach the sign panel to the new sign support shall be the existing bolts, brackets or clamps, or new and equal quality equipment furnished by the Contractor, as directed by the Engineer.

CONSTRUCTION METHODS

Sign panels to be removed and reset shall be cleaned before being remounted on new sign supports.

Work shall include the dismantling, removal, transporting, storing and resetting of existing traffic signs on new supports at the locations shown on the plans. The Contractor shall completely remove the sign and post and reset said sign at the new location. If existing signs are not suitable for reuse as determined by the Engineer, the contractor shall provide new signs under item 832. New supports shall be provided under item 847.1. New attachment hardware shall be furnished as necessary to replace any missing or unusable existing hardware.

Existing sign damaged or lost by the Contractor’s operations shall be replaced in-kind by the Contractor at no additional compensation

The Contractor shall backfill with compacted gravel all holes resulting from the removal of the existing signs and their foundations and restore the area to match existing conditions of adjacent areas.

METHOD OF MEASUREMENT

Miscellaneous signs removed and reset will be measured for payment by the unit each sign reset in its final position on a new post, complete in place.

BASIS OF PAYMENT

Miscellaneous signs removed and reset will be paid for at the Contract unit price per each, which price shall include all labor, materials, equipment and incidental costs required to complete the

work, including dismantling, excavating and removing, loading, transporting, and resetting of the signs on new supports; gravel backfill; and concrete foundations where required.

Replacement of sign panels that have been determined to be unsuitable for reuse shall be paid for under the appropriate contract bid items. No payment shall be made for any sign panels that have been damaged by the Contractor's operation.

ITEM 874.51 MISCELLANEOUS SIGNS REMOVED AND DISCARDED EACH

Work under this item includes the dismantling, removal, transportation and discarding of the existing roadside signs shown on the plans and removal and disposal of the sign supports and their foundations.

The existing signs shall not be removed until the new signs and structures replacing them are ready for traffic or until the Engineer shall permit.

If signs are attached to existing light poles, utility poles or traffic poles, only the sign and attached hardware shall be removed and discarded.

BASIS OF PAYMENT

Item 874.51 will be paid at the Contract unit price per each, which price shall include all labor, materials, equipment and all incidental costs required for dismantling, loading, transporting, and discarding of the signs as designated above, the excavating and disposal of the existing foundation and supports of the sign, and the supplying and placing of compacted gravel backfill where foundations and posts are removed and restoration of surface.

ITEM 874.7 MISCELLANEOUS SIGNS REMOVED AND STACKED EACH

The work under this item shall conform to the relevant provision of Section 800 of the Standard Specifications and the following:

Work to be completed under this item shall include the dismantling, removal, transporting, resetting, stacking, and disposal of existing roadside traffic signs as indicated on the plans or as directed by the Engineer, including the removal and disposal of existing sign supports and foundations.

The Contractor shall exercise particular care in the dismantling, removal, transporting, and resetting of the existing signs designated on the plans to be reset or stacked. Any sign panel damaged through carelessness or lack of protection by the Contractor shall be replaced at the Contractor's expense.

The existing signs shall not be removed until the new signs and structures replacing them are ready for installation or until the Engineer shall permit.

Existing foundations shall be excavated (including Class "B" Rock) to a depth of at least six inches below grade and the resulting hole shall be backfilled with compacted gravel and the surface restored to match existing conditions of adjacent areas. Existing foundations within the proposed roadway areas shall be excavated (including Class "B" Rock) to a depth of at least three feet below grade and the resulting hole shall be backfilled with compacted gravel and the surface restored to match existing conditions of adjacent areas.

Signs to be removed and stacked shall be stacked on site and the Contractor shall coordinate with the property owner for stacked location.

COMPENSATION

Payment for removing and stacking signs shall be at the contract price per each under Item 874.7 for all signs removed and stacked within the project, which price shall provide full compensation for dismantling, loading, transporting and stacking of signs; the excavating and disposal of the existing supports and foundations, of the same; the supplying and placing of compacted gravel backfill where foundations and posts are removed; and surface restoration.

No separate payments will be made for any excavation, including Class "B" Rock Excavation, gravel backfill, compaction, and surface restoration. All costs for excavation, backfill, compaction, restoration, and any incidental work shall be included in the bid price for Item 874.7.

ITEM 905.2 5000 PSI, 3/8 INCH, 710 HP CEMENT CONCRETE CUBIC YARD

All work shall conform to the relevant provisions of Section 901 of the Standard Specifications and the following:

a) The work to be done under this Item shall consist of replacing concrete removed in deteriorated or spalled areas for substructure repairs greater than 1½" deep.

b) The work under this item consists of furnishing and placing 5,000 PSI, 3/8 IN., 710 HP Cement Concrete Masonry to repair substructures, as directed.

c) The Contractor shall have the approval of the Engineer certifying that the existing concrete has been removed to the required limits and that adequate surface preparation has been achieved before any concrete is placed.

d) Bonding Agent: Immediately prior to all concrete pours, the Contractor will apply an bonding agent from the MassDOT Qualified Construction Materials List to the excavated surfaces of the concrete. The bonding agent will be worked into the surfaces with stiff brushes or brooms. Bonding Agent will be considered incidental to this Item. Products to be used for this item shall be approved by the Engineer before the Contractor begins his operations. If the bonding compound prematurely hardens, additional bonding compound shall be applied, if allowed by the bonding compound manufacturer or the hardened bonding compound shall be addressed as per the bonding compound manufacturer's recommendations.

Any steel that is unsuitable for further use through no fault of the Contractor shall be replaced under Item 910.1 Steel Reinforcement for Structures - Epoxy Coated. All reinforcing steel that is loose shall be tied tightly together using wire ties.

Concrete removal and satisfactory disposal of the deteriorated and spalled concrete of the substructure will be paid for under Item 127.122 Reinforced Concrete Excavation for Repairs.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

The work under Item 905.2 shall be measured and paid for at the Contract unit price per cubic yard which payment shall be considered full compensation for all labor, materials, equipment, and incidentals necessary to satisfactorily complete the work.

ITEM 909.2 CEMENTITIOUS MORTAR FOR PATCHING SQUARE FOOT

All work shall conform to the relevant Provisions of Section 901 of the Standard Specification and the following:

The work under this Item consists of furnishing and placing a polymer-modified, cementitious, 2-component, fast-setting, trowel grade patching mortar to patch vertical, horizontal and overhead surfaces on the existing structure in areas of spalled concrete, in concrete beams and where beam ends repair are being done, and as directed by the Engineer.

This Item does not include the repair of any horizontal or vertical spalls which exceed 1½ inches in depth. The repairs to those areas shall be made with 5000 PSI, 3/8 IN., 710 HP Cement Concrete under Item 905.2.

MATERIAL

The polymer modified cementitious patching mortar shall be selected from the MassDOT Qualified Construction Materials List.

The Contractor shall furnish notarized certification that all materials conform to the above requirements. Only those products previously approved for the purpose intended herein and listed on the Qualified Construction Materials List maintained by the MassDOT Research and Materials Section may be used.

No Materials will be ordered or used before the approval of the Engineer.

SURFACE PREPARATION

Concrete at the edges of all areas to be patched using Cementitious Mortar for Patching shall be removed to a minimum depth of half (1/2) inch prior to the application of the mortar.

Areas to be patched must be clean and sound. All loose and disintegrated concrete shall be removed by means of abrasive blasting, or an equivalent method, to a depth where sound concrete is exposed. The Contractor shall remove all deteriorated and spalled areas as designated by the Engineer. All costs to remove the deteriorated and spalled concrete shall be compensated for under Item 127.122.

The Contractor shall have the approval of the Engineer certifying that all spalled and deteriorated concrete has been removed prior to patching deteriorated areas.

MIXING

Mix manually or mechanically. The mortar shall be prepared in accordance with the Manufacturer's instructions.

APPLICATION METHODS

At the time of application, surfaces should be damp (saturated surface dry) with no glistening water. Mortar must be worked into the substrate filling all pores and voids. Force the material against the edge of the repair, working towards the center. After filling, consolidate, then screed.

The maximum thickness of application in one pass shall be 1". If the depth of patch exceeds 1", the mortar shall be placed in two passes of approximate equal thickness. Before the first pass has achieved an initial set, the surface shall be prepared for the second pass by scratching with a trowel to form a grid of deformation on the surface.

Prime and work the mix into the substrate, filling all pores and voids. Avoid puddling of the primer on horizontal substrates.

CURING

Use of fine mist spray of water, wet burlap, or non-solvent approved curing compound if ambient conditions might cause premature surface drying, i.e., high temperature, low humidity, strong winds. If necessary, protect newly applied mortar from rain. To prevent freezing, the Contractor shall cover the application area with insulating material, to the satisfaction of the Engineer.

MANUFACTURER'S FIELD REPRESENTATIVE

The Contractor shall arrange with the materials manufacturer or distributor to have the services of a competent field representative at the work site prior to any mixing of components to instruct the work crews in the proper mixing and application procedures. The field representative shall remain at the job site after work commences and continue to instruct until the representative and the Contractor, Inspector and/or Engineer are satisfied that the crew has mastered the technique of installing the system successfully. The representative shall make periodic visits to the project as the work progresses and shall confer on each visit with the Contractor, Inspector and/or Engineer.

The Manufacturer's field representative must be fully qualified to perform the work and shall be subject to the approval of the Engineer.

The Contractor shall be completely responsible for the expense of the services of the required field representative and the bid contract price shall be full compensation for all costs in connection therewith.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

The measurement payment for Item 909.2 will be per square foot of patch area, complete in place and accepted by the Engineer. Item 909.2 Cementitious Mortar for Patching will be paid for at the Contract Unit Price per square foot of cementitious mortar installed, which price shall include full compensation for all labor, materials, equipment, and all other incidentals necessary to perform the work as described above to the satisfaction of the Engineer.

ITEM 912. DRILLING AND GROUTING DOWELS EACH
ITEM 912.01 DRILLING AND ADHESIVE ANCHORING DOWELS EACH

The work under these Items shall consist of drilling and grouting (i.e. non-shrink cementitious mortar) or applying anchoring adhesive in holes in the existing substructure for steel reinforcing dowels as shown on the Plans, or as directed by the Engineer.

MATERIALS

Grout for dowels shall be a non-shrink cementitious mortar. Grouting material, which has been tested, is approved, and is listed on the Qualified Construction Materials List is acceptable for use.

Adhesive for dowels shall be an epoxy, vinyl, or polyester resin adhesive. The resin adhesive shall be a moisture-insensitive, high-modulus, high-strength resin. If the resin adhesive is an epoxy it shall conform to ASTM C 881, Type IV, Grade 3, Classes B and C. Adhesive material that has been tested, approved, and listed on the Qualified Construction Materials List is acceptable for use.

The steel dowels shall meet the requirements of AASHTO M31 (ASTM A615) Grade 60 for reinforcement. All steel reinforcement dowels shall be epoxy coated. Steel dowels shall be incidental to the work under this Item.

CONSTRUCTION METHODS

Dowel hole diameter shall be per the grout or adhesive manufacturer's recommendations for each size dowel.

That Contractor shall install two test dowel bars of each dowel size in the existing concrete and test them for pullout. The pullout force shall correspond to 90% of the yield strength of the bar. If any of the tested bars pull out or if the surrounding concrete shows signs of cracking, the Contractor must adjust the hole diameter, embedment length, and/or grouting material to meet this test requirement.

All testing of the drilled and grouted dowels shall be performed by the Contractor and is incidental to the work under this heading. The method of applying the tension test load to the dowels shall conform to ASTM E488. The details of the testing equipment used and the locations and details of the test dowels shall be submitted to the Engineer for approval. The Contractor shall perform this test as soon as possible in order to eliminate delays in construction due to the approval process. Dowels shall not be ordered until the embedment lengths have been approved by the Engineer.

All dowel holes shall be air drilled provided that the minimum edge distance of 6 inches is observed. Should, in the Engineer's opinion, air drilling be inappropriate due to questionable strength of the existing concrete or insufficient edge distance, the dowel holes shall be diamond core drilled. The inner surfaces of diamond core drilled dowel holes shall be scored to develop sufficient keying action. The method of scoring of the dowel hole's inner surfaces shall be subject to the approval of the Engineer. The depth of the drilled dowel holes shall be as shown on the Plans, except that the depth of drilled hole shall be modified by the Contractor as required to comply with the minimum depth of hole specified in the product literature of the cementitious mortar to develop 125% of the yield strength of the reinforcing bars. The diameter of the dowel holes shall be as specified in the product literature of the cementitious mortar to develop 125% of

the yield strength of the reinforcing bars. The holes shall be blown clear of any debris and shall have the approval of the Engineer prior to the placement of any grout material.

The drilling operation shall be performed without damage to any existing reinforcing or portion of the structure that is to remain in place. Any damage to any existing portion of the structure that is to remain in place shall be repaired to a condition equal to or better than existing condition prior to the beginning of the Contractor's operations and shall be repaired at the Contractor's expense.

The Contractor shall strictly follow the recommendations of the manufacturer for mixing and placing the grout material prior to the placement of the dowels. The Contractor shall, at a minimum, adhere to the ACI code requirements regarding minimum and maximum temperatures while placing the grout. Any excessive grout around the hole after placement of the dowel shall be struck off smooth while the grout is still fresh.

SUBMITTALS

The Contractor shall submit the grout manufacturer’s literature completely describing the products to be utilized. The materials shall be delivered clearly marked with legible and intact labels containing the manufacturer’s name, brand name, and identification of the areas where temperatures conform to manufacturer’s instructions and recommendations.

MEASUREMENT AND PAYMENT

Measurement of these Items shall be made per unit EACH of drilled and grouted hole or drilled and adhesive anchored hole, regardless of depth, complete in place with the dowel, and accepted by the Engineer regardless of length or size of the actual rebar dowels.

Payment under these Items shall be made at the contract unit price per EACH drilled/cored and grouted dowel or adhesive anchored dowel installed, which price shall include full compensation for all labor, materials, tools, equipment, and other incidentals necessary to perform the work described above. The Contractor shall have no claim for any variations in the diameter of the hole, the method of drilling the hole, or the type of grout or adhesive used in anchoring the proposed dowels. The supply, testing, and installation of reinforcing steel dowels shall be considered incidental to the work performed under this Item.

ITEM 950.1 TEMPORARY SHORING LUMP SUM

The work under this Item shall conform to the relevant provisions of Subsection 950. of the Standard Specifications and includes the designing, furnishing, installing and subsequent removal of all temporary shoring to facilitate the Contractor's demolition and construction operations.

MATERIALS

The temporary shoring shall include all necessary shoring, sheeting, soldier piles and lagging or other means and methods of providing temporary excavation support. References to temporary shoring or earth support under this Item or on the Plans are to be considered a generic term for temporary earth support system(s). It is the responsibility of the Contractor to determine the appropriate means, methods, and materials to provide the appropriate temporary excavation support for each of his/her operations and/or work tasks.

SUBMITTALS

The Contractor shall prepare and submit working drawings and associated design calculations to the Engineer,for review and approval. Complete working drawings shall be submitted for the temporary shoring in which are shown all materials, member sizes, connections, methods and sequence of installation, location, and depths of system components; and the complete description of equipment and instrumentation to be used with installation, operation, and maintenance procedures. The working drawings, and associated calculations, shall be stamped by a Professional Engineer registered in Massachusetts. Approval of the working drawing does not relieve the Contractor of the responsibility of providing for the safety of the work and its successful completion, and the protection of adjacent structures from damage caused by the construction.

The temporary shoring shall be designed in accordance with the American Association of State Highway and Transportation Officials Standard Specifications for Highway Bridges, 17th Edition. Changes in the temporary shoring subsequent to approval from the Engineer, shall be re-submitted to the Engineer for additional review prior to installation.

CONSTRUCTION METHODS

Temporary shoring shall be installed without causing damage or misalignment of existing adjacent structures, utilities, and pavements. To mitigate vibration impacts, vibratory hammers used to install sheet piling shall be a variable moment hammer with a minimum operating frequency of 30 Hz. Solider piles shall be installed either in holes pre-drilled to their full embedment depth and filled with concrete, or driven with a vibratory variable moment hammer with a minimum operating frequency of 30 Hz.

Any damage to existing adjacent facilities as a result of the temporary shoring operations shall be promptly repaired or replaced in kind at no additional cost.

The Contractor, in order to ensure the integrity and stability of the temporary shoring, shall be solely responsible for monitoring the support systems to identify and correct bulges, breakage or other evidence of movement.

ITEM 950.1 (Continued)

All temporary shoring shall be installed in strict accordance with the design and recommendations of the design engineer employed by the Contractor, and in accordance with any review requirements of the Engineer.

Any part of the temporary shoring that protrudes into the supporting soil below the bridge structure shall not be removed, but shall be cut off and left in place with no additional payment. Supporting soil shall be defined as all soil directly below the footing contained within a series of planes that originate at the perimeter of the bottom of the footing and project down and away from the footing at an angle of 45° from the horizontal.

BASIS OF PAYMENT

Temporary Shoring will be paid for at the Contract Lump Sum bid price, which price shall include all labor, materials, equipment, design, furnishing, installing, maintenance, and subsequent removal or cutting off and disposal of all temporary shoring, and incidental costs required to complete the work regardless of the actual system utilized.

ITEM 991.1 **CONTROL OF WATER – STRUCTURE NO. R-02-003 = T-01-004** **LUMP SUM**

Work under this Item shall conform to the relevant provisions of Sections 7.02 and 140 of the Standard Specifications, all applicable environmental regulations and permits, and the following:

The work to be performed under this Item shall include all work necessary for the control of water within the excavations and cofferdam to construct the project in the dry. The work shall include designing, furnishing, installing, maintaining, operating, and removing temporary dewatering systems as required, to lower and control water levels. Work also includes properly disposing of pumped water, constructing, maintaining, observing, and removing of equipment and instrumentation for control of the system. Water shall be discharged as specified in the environmental permits obtained for this project. No direct discharge shall be allowed into the Taunton River during the dewatering operations.

It is the responsibility of the Contractor to determine the need and extent of dewatering required, sedimentation and dewatering techniques and controls and submit method and materials he/she proposes to use for approval by the Engineer.

The Contractor is cautioned that flow rates in the river can increase substantially during and after storm events. The flow diversion operations shall include contingencies for accommodating the increased flow during such events. At a minimum, the flow diversion operations shall be designed to accommodate a 2-year storm event with a flow rate of 1900 cubic feet per second and a water surface elevation of EL 7.4. In the event of a storm exceeding this capacity, the contractor shall be responsible for stabilizing the work zone and allowing the excess flow to overflow the diversion/bypass mechanisms and flow through the work zone.

Plans and calculations for the water control measures shall be developed by the Contractor for this Item. These plans and calculations shall be prepared and stamped by a Professional Engineer registered in the Commonwealth of Massachusetts and shall be submitted for review and approval prior to the start of construction.

The Contractor shall use such equipment and shall perform the operations in such a manner that boiling or other disturbances of the soil in the foundation area will be prevented. The Contractor shall keep the excavated area dry by such means that the water will be prevented from entering the excavations and adversely affecting the stability of the foundation material or supporting soils.

The pumping discharge shall not be allowed to enter directly into the water from the work areas, rather it shall be pumped to a temporary stilling basin or other appropriate treatment or containment device. The criteria that shall be implemented for the control of water must meet the following:

1. The enclosure shall be adequately sized and designed to achieve adequate water quality treatment/sedimentation trapping and prevent overtopping from dewatering and to provide the required filtering or containment.
2. The outlet from the containment structure shall not cause erosion of the surrounding area. An approved method of controlling erosion, such as an erosion control blanket, stone, etc. shall be used at the outlet.

3. Impacts from dewatering will be minimized by designing support walls for minimal leakage, covering trucks, barges and stockpiles during rain events and land contouring to limit surface runoff from leaving the dewatering site.
4. Dewatered excavated material will be transported to the disposal site in accordance with local, state, and federal regulations.
5. The control of water containment structure shall be maintained as follows:
   a. Inspect at least twice daily during dewatering operations.
   b. Repair any damage immediately.
   c. Clean containment structure daily. Remove any debris immediately.
   d. Remove sediments when accumulated deposits reach a depth of 6 inches

The Contractor shall inspect the outlet daily and maintain the erosion controls at the outfall.

Placement of the dewatering stilling structure will be specified in the dewatering plan and will be submitted for approval by the Engineer. Pumping shall be conducted in a manner which will not adversely affect the freshly placed concrete within the excavation.

The Contractor shall provide and maintain pumps, pipes and other devices to promptly and continually remove and dispose of water from the excavation areas. The size and configuration of pumps and pipes shall be selected by the Contractor.

The Contractor is advised that the effectiveness of the water control method used will vary based on the field conditions and the time at which the actual excavation work is being performed. The Engineer shall to order the Contractor to stop all excavation operations when in his judgment the Contractor's water control operations are failing to produce adequate results or are posing a threat to the environment.

BASIS OF PAYMENT

Payment for work under this Item shall be paid at the contract unit bid price lump sum. Payment for all water control work, including design for the dewatering and treatment operations, used to maintain a water free excavation for construction of the proposed work shall include all labor, tools and equipment materials and installation, piping, pumping, maintenance, subsequent removal of all related materials and equipment all as outlined above; and restoration of site shall be included in the lump sum contract price bid under this Item. This work will include preparation of the Construction Dewatering Plan.

ITEM 994.01 TEMPORARY PROTECTIVE SHIELDING LUMP SUM
BRIDGE NO. R-02-003 = T-01-004

The work under this Item shall consist of designing, furnishing, fabricating, erecting, maintaining, and subsequent removal of temporary side and deck underside protective shielding to provide for the safety beneath the bridge from falling debris during the removal of the existing bridge.

CONSTRUCTION METHODS

The Contractor is responsible for preventing any debris resulting from demolition, excavation or construction from falling into the water below. All precautions and costs to install netting, scaffolding, shielding, etc., necessary to assure this shall be considered incidental to this Item. Any debris that falls into the water below shall be immediately removed by the Contractor at his/her expense, as directed by the Engineer.

The temporary shielding shall be placed in a manner as to prevent it from being blown out by the wind. If, in the opinion of the Engineer, the shielding is not secure, then the Contractor shall remove it and install it to the satisfaction of the Engineer at no additional cost.

The shielding shall at a minimum conform to the following:

1. Shielding shall be in place prior to the start of any demolition.

2. Shielding shall extend the full length of the bridge and a sufficient distance above and beyond the deck overhang at the fascias (2 feet minimum) and vertically adjacent to the bridge fascias (4 feet minimum).

3. Shielding shall have all spaces along the perimeter and at the seams sealed to prevent dust and debris from escaping and falling below the bridge.

4. Shielding shall be designed to safely withstand all loads that it will be subjected to. The allowable design stresses shall be in accordance with AASHTO Standard Specifications for Highway Bridges. The design shall also include a complete description of the equipment and construction methods proposed for the deck removal and also indicate the maximum size of deck area being excavated. The shielding shall also be designed to withstand the maximum size of excavated area should it fall during excavation or removal.

5. Shielding shall be installed or removed only upon approval of the Engineer.

6. Shielding design, calculations and sketches shall be stamped by a Professional Engineer registered in Massachusetts.

All materials used in the shielding system shall become the property of the Contractor and shall be removed from the site at the completion of the project.

ITEM 994.01 (Continued)

SUBMITTALS

The Contractor shall submit shop drawings, working drawings, and associated design calculations, stamped by a Professional Engineer registered in Massachusetts, of all proposed shielding to the Engineer for approval prior to installation. The drawings shall include all details of all connections, brackets, and fasteners. The protective shielding shall be designed to support all construction and dead loads safely; and to be sealed tightly at all joints.

BASIS OF PAYMENT

Item 994.01 will be paid for at the Contract Lump Sum bid price, which price shall include all labor materials, equipment, tools, and incidental costs required to complete the work.

The first payment of 70 percent of the lump sum bid price of this Item will be made upon completion of the installation of the shielding system to the satisfaction and approval of the Engineer. The second payment of 30 percent of the lump sum bid prices of this Item will be made upon the complete construction of the proposed bridge and proper disposal of the shielding from the project site.

ITEM 995.01 BRIDGE STRUCTURE, BRIDGE NO. R-02-003 = T-01-004 LUMP SUM

The work under this Item shall conform to the relevant provisions of Subsection 995. of the Standard Specifications and the specific requirements stipulated below for the component parts of this item. For those components where no specific requirement is stipulated, the Standard Specification shall apply, except for payment.

The work under this item includes all material, equipment and labor needed to construct the following: sawing and sealing joints in asphalt pavement at bridges, cast-in-place reinforced concrete abutment caps, wingwalls, wingwall caps, pier cap, and approach slabs; steel superstructure with cast-in-place reinforced concrete deck, sidewalk and safety curb; bridge railings; precast concrete highway guardrail transitions; bearings; controlled low-strength material (>300 PSI) around the precast highway guardrail transitions; and all other items not specifically provided for in the contract.

The work does not include any items listed separately in the proposal. Payment for materials shown on the Plans as being part of this bridge structure or which may be incidental to its construction and are not specifically included for payment under another item shall be considered incidental to the work performed under this Item and shall be included in the unit price of the component of which they are a part.

SAWING & SEALING JOINTS IN ASPHALT PAVEMENT AT BRIDGES

The work to be done under this Item consists of making a sealed kerf across the full width of the finished asphalt pavement at bridge abutments where called for on the Plans. The shape, width, and depth of the kerf shall be as shown on the Plans.

Prior to the start of the asphalt pavement operation, the Contractor shall place a mark on each curb or barrier on either side of the paved roadway. These marks shall be aligned with the actual end of the bridge deck and shall be placed so that they will not be covered or otherwise obscured by the asphalt pavement.

After the completion of the paving operation, the Contractor shall snap a straight chalk line on the pavement between these two marks. The Contractor shall then saw cut the pavement along this line to the depth, width and shape as shown on the Plans. The equipment shall be approved by the Engineer prior to commencing work.

After completing the saw cutting, the Contractor shall clean the saw groove of any dust and debris with an oil free air blast. If the groove was wet sawn, the groove shall be cleaned with a water blast to remove any remaining slurry and debris, vacuumed with a Wet-or-Dry vacuum to remove any standing water, and then dried with an air blast from a Hot-Air-Lance.

Once the groove is clean and dry, the Contractor shall fill it completely with a Hot Applied Crack Sealer meeting the requirements of M3.05.2 in accordance with the manufacturer's application instructions and restrictions regarding ambient and material temperatures. The crack sealer shall be thoroughly cured prior to opening the road to traffic. To reduce tackiness, only boiler slag

aggregate (black beauty) shall be scattered over the sealer when required by the Engineer. Conventional sand shall not be used for this purpose.

HOT DIP GALVANIZED COATING FOR NEW STRUCTURAL STEEL

A. GENERAL

Fabricated steel shall be galvanized as indicated on the plans. All fabrication shall be completed prior to surface preparation and the application of any coating.

The faying surfaces of all field bolted connections shall be coated based on the design of the connection. Class B connections shall be masked prior to galvanizing to allow for application of an approved class B slip coefficient primer. After galvanizing the masked surface will be cleaned in accordance with SSPC-SP11 and coated with the approved zinc rich primer. A galvanized connection will result in a faying surface meeting a class C slip coefficient.

When grinding, drilling or any other operation produces steel turnings, filings, shavings, etc. the contractor shall completely clean all areas of all accumulation prior to the end of the work shift.

Locations of field applied studs shall require masking or removal of galvanizing and paint prior to welding.

The Engineer shall provisionally accept the shop coated items before shipment to the jobsite but final acceptance of the coating system will occur after erection of the coated items, and after all required repairs and coating application has been completed.

The contractor shall be responsible for failure and damage of all applied coating. Failures include but are not limited to, visible corrosion, blistering, checking, cracking, or delamination (peeling) and loss of gloss and color of the coating system. Damage includes but is not limited to damage from installation or from external agents, such as scraping, vandalism, debris impacts, and collisions. The extent and method of repair must be approved by the Engineer.

B. GALVANIZING

The following shall be hot dipped galvanized in accordance with Section M7 of these Specifications:

1. Members identified on the contract documents.
2. Diaphragms, cross frames, utility supports and bottom lateral bracing elements that are composed of non-weathering steels or weathering steels designated to be coated.
3. All sole plates and masonry plates (except sole plates for sliding elastomeric bearings).

Galvanized members requiring shop fabrication and assembly shall be cut, welded, and/or drilled prior to galvanizing. Bearing members to be milled shall be galvanized prior to milling. A thin layer of a rust inhibitor shall be applied to the milled surface. Material to be painted shall not be quenched after galvanizing.

Where material is required to be welded after galvanizing, the steel shall be masked 3 inches on each side of the weld center line. Prior to field welding the masked surface shall be cleaned in accordance with SSPC-SP11. After welding the area shall be repaired in accordance with ASTM

A780 "Repair of Hot Dip Galvanizing" section 4.2.2, "Paints Containing Zinc Dust" and Annex 2. Repair paint shall meet M7.04.11 and application shall be in accordance with the manufacturer's recommendations.

Damaged galvanized surfaces shall be repaired in accordance with ASTM A780 "Repair of Hot Dip Galvanizing" section 4.2.2 Paints Containing Zinc Dust "High Zinc Dust Content". The paint shall be applied to achieve a minimum dry film thickness of 3 mils and not more than 5 mils. Repair paint shall meet M7.04.11 and application shall be in accordance with the manufacturer's recommendations.

The contractor shall provide protection of the adjacent coating in areas that will be field welded. After welding, the weld areas shall be prepared in accordance with SSPC-SP-11.

THERMAL SPRAYED COATING (METALIZING) SHOP APPLIED

PURPOSE

This section provides the requirements for shop performed surface preparation; the application of a thermal spray coating (TSC/metalizing); the application of a coating system; and includes field application of coatings and repairs and touch up of all coatings after site erection of the coated structure.

GENERAL INFORMATION

1. All fabrication shall be completed prior to the application of a thermal sprayed coating. (TSC)
2. All surfaces to be coated shall be cleaned in accordance with SSPC SP-5.
3. All TSC shall be sealed with an approved sealer, except for faying surfaces.
4. After site erection of the structure, perform field touch-up of any damaged coating.
5. All fasteners shall be galvanized and coated with the intermediate and topcoat if applicable.
6. The products of only one thermal spray wire manufacturer and one coating manufacturer shall be used on the entire project.
7. All field painting shall be in accordance with applicable sections of Item 961 of the MassDOT Standards and Specifications.

MATERIALS

Abrasives

Provide abrasives that are clean, dry, and sized properly to provide the specified surface profile. The profile shall be dense, uniform and of sufficient angularity to be acceptable for the application of TSC.
Abrasives shall conform to the following as applicable:

- SSPC-AB 1 for mineral slag abrasives
- SSPC-AB 2 for recycles ferrous metal abrasives
- SSPC-AB 3 for new steel abrasives

Thermal Spray Feedstock

The contractor shall provide material certificates from the supplier that includes the chemical composition and lot number of the wire. MassDOT will perform random sampling of wire from lots provided. Wire shall conform to ASTM A833. See table below for application and selection of wire type, thickness, and coating system.

Environmental Zone **2** shall be used for this project.

ENVIRONMENTAL ZONE*	WIRE TYPE	THICKNESS (mils)**	COATING SYSTEM***
1	Zinc-Aluminum	6-9	Three Coat
	Zinc-Aluminum	6-9	Sealer Only
2	Zinc- Aluminum	8-11	Three Coat
	Zinc-Aluminum	9-12	Sealer Only
3	Zinc Aluminum	9-12	Three Coat
	Zinc Aluminum	12-15	Sealer Only

***Zone 1** – Bridges in rural environments, not over waterways, and not over high speed state or interstate highways with potential for salt spray and heavy salt use and de-icing chemical use.

***Zone 2** – Bridges in urban environments, near industrial and manufacturing plants, power plants, or warehouses, over heavy road traffic, or over waterways.

***Zone 3** – Bridges in marine environments, over or close to saltwater waterways, or over high speed state or interstate highways with potential for salt spray and heavy salt use and de-icing chemical use.

** Mil thickness on faying surfaces shall meet the requirements of the slip certificate.

*** Coating systems shall consist of a three coat paint system applied over the metalized surface or a clear sealer applied over the metalized surface.

SUBMITTALS

Submit the following information to the MassDOT - Highway for approval a minimum of thirty days prior to beginning any coating operations:

A. Manufacturer's recommendation and field history for the coating system proposed. Include data sheets for all selected coatings to be applied.
B. Procedures for shop surface preparation, the application of the TSC and application of coatings.
C. Procedures for coating of field connections.
D. Procedures for field touch-up surface preparation, application of TSC and application of coating.
E. Proposed abrasive for use in the shop.
F. Proposed thermal spray wire to be used and product data sheets. Provide certification of Class B slip coefficient.
G. A copy of SSPC-QP3/AISC (SPE) certification. This certification must be in effect at the time of bid and must remain in effect throughout the duration of the project.

H. Quality Systems Manual
I. Work schedule. Contractor must notify the Engineer a minimum of seven days prior to starting work.

QUALITY CONTROL

A. The shop performing the application of TSC and coating shall be certified by the American Institute of Steel Construction (AISC) Sophisticated Paint Endorsement (SPE) quality program, or under the Society for Protective Coatings (SSPC) QP3 program, "Standard Procedure for Evaluating Qualification of Shop Painting Applicators" and shall maintain certification throughout the project.
   1. The coating applicator shall have completed a minimum of three structural steel TSC projects that utilized the same coating system as that being specified on this project. Provide project locations, TSC/painting; name, e-mail address, and the telephone number of the owner or owner's representative.
B. Provide an on-site Quality Control Specialist (QCS) who shall function as a TSC inspector with a minimum of five years of each TSC and coating application experience; and possess SSPC BCI Level 1 or NACE Certified Level 3 or other related certification as accepted by the MassDOT - Highway. The QCS shall not be a foreman or a member of the Contractor's production staff. The QCS's sole purpose shall be quality control testing, inspection and reporting.

PRE-APPLICATION MEETING

A pre-application meeting will be held prior to any steel fabrication that includes the application of thermal spray applied coatings. This meeting is separate from the pre-construction meeting for the entire project.

The following parties are required to attend this meeting: TSC/applicator, QCS, and MassDOT – Highway Representatives. Other project personnel should attend as may be needed.

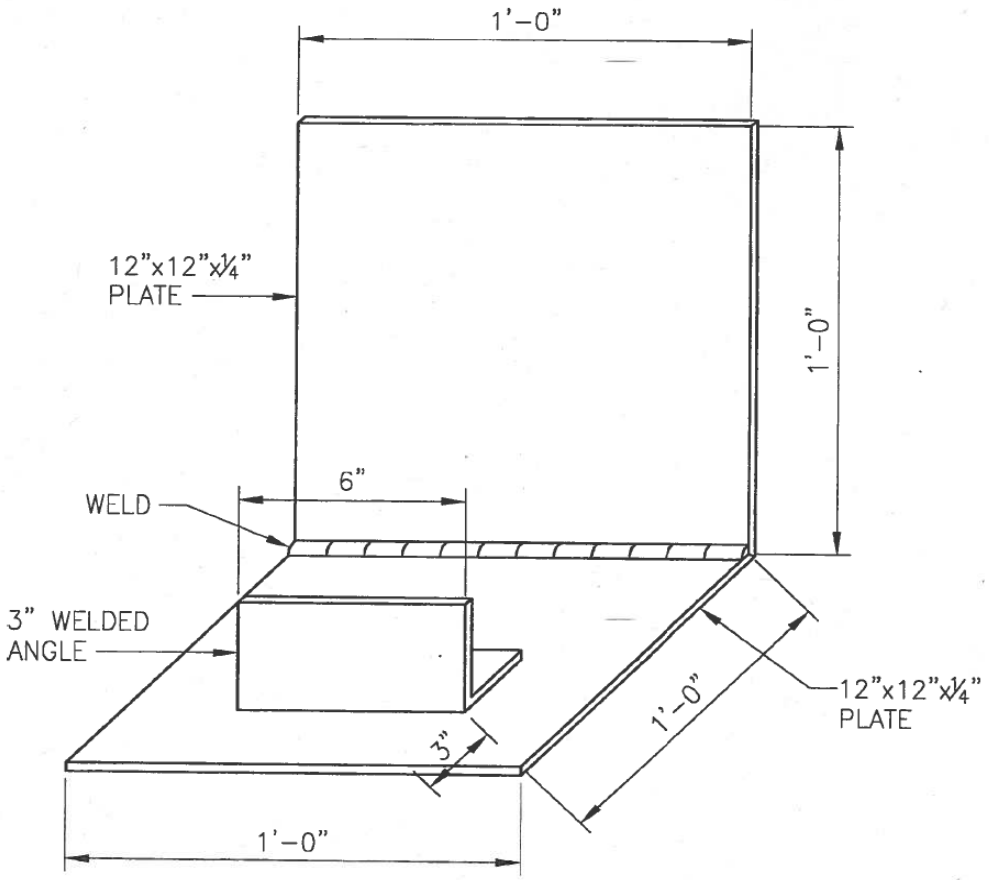
PERSONNEL QUALIFICATION

The applicators of the thermally applied material shall be individually qualified to apply the TSC as follows:

1. Each applicator must complete a practical test designed to demonstrate the ability to set up and operate the equipment to apply the material to the specified thicknesses to a minimum of 10 square feet of representative steel surfaces, and to successfully pass the surface preparation, bend, and cut tests specified herein. Administer the qualification testing, document the results in writing, and retain the bend test coupons for the duration of the project.
2. At the discretion of MassDOT - Highway, requalify the applicators at any time during the project to reconfirm the proficiency and the quality of the workmanship being provided. This may be required at any time due to unacceptable or failing results of the bend test, cut test, or poor workmanship.

SHOP QUALIFICATIONS

Prior to proceeding with the production blast cleaning operations prepare a minimum of five Job Reference Standards (JRS) test plates. Blast clean all surfaces of each test plate using the same equipment and abrasive that will be used for the production work. After acceptance of the surface cleanliness and profile, apply the TSC to all surfaces of each test plate. After acceptance of the TSC apply the sealer to be used with the three coat system to three test plates excluding the bottom surface of all test plates. After curing apply a coat of epoxy to two of the three test plates excluding the bottom surface. After curing apply a coat of the polyurethane topcoat to one test plates on all surfaces excluding the bottom surface. Apply the clear sealer to the last remaining TSC plate. Bottom surfaces of the prepared plates shall be used for cut testing as specified. Surface preparation and application shall be witnessed by a MassDOT representative. *See drawing below for dimensions and construction*



Configuration of JRS Test Plates

SURFACE PREPARATION

For cleaning that utilizes compressed air, utilize only clean, dry air. Conduct blotter test(s) in accordance with ASTM D4285 a minimum of one time each shift for each compressor system in use to verify that the air supply is free of moisture and oil contamination. Conduct the tests in the presence of the MassDOT – Highway Representative.

Weld Spatter, Sharp Edges, Flame-Cut Steel, Holes, Fins, and Silvers
Remove slag, flux deposits, fins, slivers, burrs, and weld spatter from the steel. Grind any sharp edges around holes. Break all flame-cut and sheared edges. If blast profile is degraded by grinding restore profile by abrasive blasting.

Solvent Cleaning
Where oil and grease are present on the bare steel, remove by solvent cleaning to SSPC-SP 1 prior to blast cleaning. If contamination remains after blast cleaning, reclean with solvent prior to application of the TSC.

Cleaning of galvanized bolts prior to the application of paint to bolted connections in the shop or in the field all galvanized fasteners shall be cleaned of all lubricating wax. Cleaning shall be in accordance with SSPC-SP-1, Solvent Cleaning, method 4.1.1. The contractor is responsible to identify the solvent and method needed to remove all lubricant. Cleanliness will be determined by the use of a white cloth wipe test. The test will be performed by the engineer using a clean white cloth and the same solvent used by the Contractor for cleaning. The cloth shall be wetted and rung to a damp condition, placed on selected fasteners and rubbed with a twisting motion around the entire exposed surface of the previously waxed surfaces of the fastener. A minimum of 3 alternating rotations shall be done. Acceptance of cleanliness is with no color transfer to the cloth. A minimum of 10% of the bolts at each bolted connection shall be tested for cleanliness.

Abrasive Blasting
Blast clean all steel to, SSPC-SP5 “White Metal Surface Cleanliness.” Determine the SP5 condition by use of SSPC-Vis 1. In the event of a conflict between the pictorial standard and the written definition the written definition shall prevail. Abrasive blast cleaned surfaces shall have a dense, uniform pattern of sharp, angular depressions and ridges, between 3.5-5.0 mils.

Surface preparation is defined as complete when all remedial repairs have been performed and the piece is accepted by both QC and MassDOT QA.

Verification of the profile height will be performed in accordance with ASTM D 4417 Method C.

Manual Blasting shall have a minimum of one profile depth measurement every 10 to 20 ft^2, of blasted surface.

Automated Blasting shall have a minimum of two profile depth measurements every 100 ft^2. When acceptable results are obtained on three consecutive days in which testing is conducted, the test frequency may be reduced to two spot readings for every 1,000 ft^2 providing the preparation method remains unchanged. If unacceptable results are encountered during testing or

the preparation method has changed in any way, testing will revert back to a frequency of two tests per every 100 ft², until acceptable results are once again achieved over a three day period.

Profile replica tape shall be filed with the project inspection records. The Engineer with the use of a surface profile comparator will randomly inspect angularity of the profile.

The use of steel shot is not permitted.

TSC AND COATING APPLICATION

Storage, Testing and Sampling

The Contractor shall provide protection from the elements and insure that the paint is not subjected to temperatures outside the manufacturer's recommended extremes.

Before the Contractor will be permitted to use any paint, the material provided for application shall have been sampled, tested and approved in accordance with Section M7. MassDOT's Research and Materials Laboratory needs a minimum of fourteen days after the receipt of samples to test and approve.

Mixing and Thinning

Before the paint is applied, each component shall be mechanically mixed to ensure the pigment is completely dispersed. Mixing of components shall be accomplished by mechanical mixing, boxing or hand mixing of components will not be allowed. Any special precautions or requirements for mixing by the manufacturer shall be followed. Paint shall be kept thoroughly mixed in spray pots or containers during application. The pot life shall not be exceeded or attempts made to extend pot life with the addition of solvent.

If it is necessary for any reason to thin paint it will be done in the presence of the Engineer, in accordance with the manufacturer's recommendations. Thinning must be performed using a measuring cup marked in ounces or milliliters. Other methods, such as eyeballing, are not acceptable. Thinner shall be supplied from and recommended by the same manufacturer as the paint system.

For multi component paints, the mixing of half or partial kits is not allowed. If the need for small quantities of paint is anticipated, the contractor should order materials accordingly.

Application

Prior to the application of any coating material, the Engineer's approval must be obtained. All surfaces painted prior to the Engineer's approval, shall require the complete removal of the coating applied.

Thermal Sprayed Coating

Apply the TSC within six hours after the final abrasive blast cleaning is performed. If the steel is blast cleaned and remains unmetalized for longer than six hours, or if cleaned steel exhibits evidence of rustback, blast clean it again prior to metalizing. Remove abrasive residue and dust from the surface. Apply the metalizing only after the MassDOT – Highway Representative has accepted the prepared surface.

Bend Testing for Evaluation of the TSC

Conduct bend tests of applied TSC each day prior to production application. Unless otherwise directed by the MassDOT - Highway, each day that TSC will be applied, conduct bend testing before beginning the production work. For each TSC applicator, blast clean five carbon steel coupons measuring 0.05 inches in thickness, 2 inches width, and between 5 and 8 inches in length. Use the same equipment and abrasive used for the production work. Have each applicator apply the TSC to five coupons in accordance with the requirements of this Section to dry film thickness between 8 and 15 mils. Conduct 180º bend testing on all five coupons using the appropriate mandrel in accordance with the requirements and acceptance criteria of SSPC-CS 23. Minor cracks that cannot be lifted from the substrate with a knife blade are acceptable. If lifting on any of the coupons is possible, modify the surface preparation/TSC process until acceptable results are achieved before proceeding with the production work.

Apply the TSC in accordance with the requirements of the material supplier, this specification, approved procedures and SSPC-CS 23.

The completion of TSC is defined as after the spraying of TSC is complete and all remedial repairs have been performed and the piece is accepted by both QC and MassDOT QA.

Touch-up of bare steel and/or TSC damage shall be done with organic zinc rich primer. The total area subject to repair shall be no more than .50 % of the total square foot of the piece requiring repair. The dry film thickness of the applied coating shall be a minimum of 5 mils. Surface preparation for all repair areas shall be as specified in, “Surface Preparation and Abrasives” paragraph 3. The maximum individual repair shall be limited to 1 square foot. Areas larger than 1 square foot shall be re-blasted and the TSC applied in accordance with this document.

Sealer Coat

Apply the seal coat to the TSC after the MassDOT – Highway Representative has accepted the TSC. The seal coat shall be thin enough when applied to penetrate into the body of the TSC and seal the porosity. Added thickness to porous TSC should not be measurable. Typically the seal coat is applied at a spreading rate resulting in a theoretical 1.5 mils dry film thickness. Apply the seal coat in accordance with the manufacturer’s instructions as soon as possible after the application of the TSC but in no case greater than 6 hours. Verify that the TSC surface is clean and dry prior to the application of the sealer. If grease, oil, or similar contaminants become deposited on the TSC, remove them in accordance with SSPC-SP 1 prior to the application of the seal coat.

Paint

Applied coatings shall not exhibit, runs, sags, holidays, wrinkling, pinholes, nap hair, topcoat gloss or color variations, or other film discontinuities.

Repair of unacceptable areas that involve removal of the coating system or part of it, shall require surface preparation and coating equal to that specified. Repair procedures used for any unacceptable coating shall be those supplied by the contractor and approved by the Engineer.

Application of full coats of paint shall be accomplished by spray equipment. Spray equipment shall meet the requirements of the coating manufacturer and be in proper working order.

Application by brush and roller will be allowed for limited access areas. Brushes and roller covers recommended by the coating manufacturer shall be used. Areas brushed and rolled will have a uniform thickness and be free of defects and excessive coating thickness.

All coating shall be applied according to the latest manufacturer's data sheet or approved recommendations. The maximum recoat times of the primer, intermediate and finish coats shall not be exceeded.

Application of coatings shall not be done when the relative humidity is above 85% or when the surface temperature of the steel is less than 5°F above the Dew Point. Paint shall not be applied when the surface temperature is below 50°F or when the surface temperature is above 110°F.

If requested by the Engineer the Contractor shall provide written instructions from the coating manufacturer indicating the length of time that each coat must be protected from cold or inclement weather (e.g., exposure to rain) during its curing or drying period.

Paint shall not be applied when, in the Engineer's judgment, conditions are or will become unsatisfactory for application and proper cure. All changes as to the application parameters other than specified must be the manufacturer's and presented in writing and approved by the Engineer. Ambient conditions should be closely monitored so that proper cure/drying is achieved prior to recoat. In no case shall a succeeding coat of paint be applied before the previous coat has cured/dried sufficiently for recoat as per manufactured data sheet.

If required, contaminated surfaces shall be cleaned in accordance with SSPC- SP 1 Solvent Cleaning method 4.1.1.

Measurement of the ambient conditions shall be done in accordance with ASTM, E 337 Test Method for "Measuring Humidity with a Psychrometer" (the Measurement of Wet and Dry bulb Temperatures).

When the primer has cured sufficiently for recoat, all bridge components to be painted shall receive a full intermediate coat.

When the intermediate coat has cured sufficiently for recoat, all bridge components to be painted shall receive the finish coat.

Coating Thickness

Apply the shop and field coats to the dry film thicknesses as specified.

1. Determine the cumulative dry film thickness of each coat using a magnetic dry film thickness gage in accordance with SSPC-CS 23 and SSPC-PA 2 with the following exceptions:
    a. Take readings on each 100 square-foot increment of the surface.
    b. The minimum specified thickness of the TSC must be achieved at each individual spot measurement location (i.e., the 20 percent under run allowed by SSPC-PA 2 is not permitted for the metalizing).
2. If the thickness of any coat (TSC, seal coat, intermediate coat or top coat) is less than specified, apply additional material in accordance with the manufacturer's instructions and

this Section before applying the next coat. Before applying additional TSC, visually confirm that there is no evidence of oxidation or contamination on the surface.

3. Thickness of applied TSC greater than the contract specified shall be reported to the MassDOT-Highway QA inspector in writing prior to the end of the shift. The thickness of the applied TSC shall not be more than 120% of the specified range for the zone specified.

4. Application of TSC to faying surfaces that require a slip rating shall not be more than the maximum thickness specified in the environmental zone chart for each zone included in the materials section of this specification.

5. The minimum adhesion value of the unsealed TSC shall be the average of 3 spot reading resulting in an average of 700psi for each 500 sq/ft.

Access for MassDOT - Highway Inspection
Provide safe access and sufficient time for MassDOT - Highway inspections for any and all phases of the work, including but not limited to surface preparation, the application of each coat (including field coat), and for an inspection of the completed system.

Quality Control Documentation
Copies of Quality Control daily inspection and testing documents will be provided to the MassDOT – Highway Representative within 24 hours.

PRECAST HIGHWAY GUARDRAIL TRANSITIONS

General.

The work under this Heading consists of fabricating, transporting and installing Precast Highway Guardrail Transitions and includes all necessary labor, materials, and equipment to complete the work as shown on the Plans. The Precast Concrete Bridge Elements shall meet the requirements of Section M4: Cement Concrete and Related Materials.

MATERIALS

Materials.

Materials shall conform to M4.09.1 and the following:

Non-Shrink Grout Products	M4.04.5
Controlled Low-Strength Material – Structural Non-Excavatable	M4.08.0
Welded Steel Wire Fabric	M8.01.2
Mechanical Reinforcing Bar Splicer	M8.01.9
Lifting Devices	PCI MNL-116
Corrugated Metal Pipe	AASHTO M 36

1. **Vertical Adjustment Assembly.**

Vertical Adjustment Assembly details and material requirements shall be as shown on the plans. Alternate devices may be used provided that they are adjustable and can support the anticipated loads. The design of the leveling devices, with necessary calculations, shall be submitted to the Engineer of Record for approval.

2. **Threaded Inserts.**

Threaded inserts are permissible to facilitate forming the keyway pours. Threaded inserts shall be hot dip galvanized or made of stainless steel. The number of threaded inserts shall be minimized, and the inserts shall not come in contact with the reinforcing steel.

3. **Corrugated Metal Pipe.**

Corrugated Metal Pipe to be used for forming voids as specified on the plans shall be fabricated from steel and shall have a protective metallic coating of zinc (galvanizing).

CONSTRUCTION METHODS – PLANT FABRICATION

Pre-Production Meeting.

The Contractor shall notify the MassDOT Research and Materials Section to determine if a pre-production meeting will be required to review the specification, shop drawings, curing plan, schedule, and discuss any specific requirements. The meeting shall be held prior to scheduling a MassDOT Inspector (refer to M4.09.4 *Department Acceptance*), and at least seven (7) days prior to the scheduled casting of any Precast Concrete Bridge Element or control section. The Contractor shall schedule the meeting, which shall include representatives of the Fabricator and MassDOT.

Reinforcement.

The reinforcing bars shall be installed in accordance with Subsection 901.35, including tolerances for cover and horizontal spacing of bars. Components of mechanical reinforcing bar splicers shall be set with

the tolerances shown on the plans. The reinforcing bars and mechanical reinforcing bar splicers shall be assembled into a rigid cage that will maintain its shape in the form and which will not allow individual reinforcing bars to move during the placement of concrete. This cage shall be secured in the form so that the clearances to all faces of the concrete, as shown on the plans, shall be maintained.

Where reinforcing bars are to protrude from one Precast Concrete Bridge Element in order to mate with reinforcing bar splicers in a second precast concrete element, the fabricator shall set the reinforcing bars and the reinforcing bar splicers with a template in order to ensure proper fit up within the tolerances specified on the plans.

Tolerances.

Fabrication shall comply with tolerances specified on the plans. Tolerances for steel reinforcement placement shall be in accordance with Subsection 901.35. In the absence of specifications on the plans, tolerances shall comply with the latest version of the PCI MNL 135, Precast Tolerance Manual.

Forms.

Concrete shall be cast in rigidly constructed forms, which will maintain the Precast Concrete Bridge Elements within specified tolerances to the shapes, lines and dimensions shown on the approved fabrication drawings. Forms shall be constructed from flat, smooth, non-absorbent material and shall be sufficiently tight to prevent the leakage of the plastic concrete. When wood forms are used, all faces in contact with the concrete shall be laminated or coated with a non-absorbent material. All worn or damaged forms, which cause irregularities on the concrete surface or damage to the concrete during form removal, shall be repaired or replaced before being reused. If threaded inserts are cast into the elements for support of formwork, the inserts shall be recessed a minimum of 1 inch and shall be plugged after use with a grout of the same color as that of the precast cement concrete.

CONSTRUCTION METHODS – FIELD CONSTRUCTION

General.

All of the Contractor's field personnel involved in the erection and assembly of the Precast Concrete Bridge Elements shall have knowledge of and follow the approved Erection Procedure.

Prior to installation, the following documentation shall be reviewed and confirmed by the MassDOT Resident Engineer or designee:

(a) QC Compressive Strength Test Report Forms attaining Design Strength, f'c for the Precast Concrete Bridge Element's representative sublot.
(b) Certificate of Compliance generated by the Fabricator as described under the Fabricator Quality Control section.
(c) QC Inspection Reports signed by the Quality Control Manager.

Field construction staff shall verify that the Resident Engineer has accepted all Precast Concrete Bridge Elements prior to installation.

Erection Procedure.

Prior to the erection, the Contractor shall submit an Erection Procedure for approval by the Engineer. This submittal shall include computations and drawings for the transport, hoisting, erection and handling of the Precast Concrete Bridge Elements. The Erection Procedure shall be prepared and stamped by a Professional Engineer registered in the Commonwealth of Massachusetts with working knowledge of the

Contractor's equipment, approved shop drawings, and materials to build the bridge. The Erection Procedure shall, at a minimum, include the following:

1. **Erection Procedure**

The Erection Procedure shall be prepared to conform to the requirements of 960.61, Design, Fabrication and Erection and the applicable sections in Chapter 8 of the PCI Design Handbook (eighth edition) for handling, erection, and bracing requirements. At a minimum, the Erection Procedure shall provide:

(a) Minimum concrete compressive strength for handling the Precast Concrete Bridge Elements.
(b) Concrete stresses during handling, transport, and erection.
(c) Crane capacities, pick radii, sling geometry, and lifting hardware.
(d) Verification that the equipment can handle all pick loads and weights with the required factor of safety.
(e) Evaluation of construction sequence and evaluation of any geometric conflicts in the lifting of the Precast Concrete Bridge Elements and setting them as shown on the plans.
(f) Design of crane supports including verification of subgrade for support.
(g) Location and design of all temporary bracing that will be required during erection.

Non-shrink grout and concrete materials, approved by the Engineer, shall be placed as shown on the plans. Fill joints, keyways, and voids, in strict accordance with the specifications and manufacturer's recommendations and instructions.

For footings, approach slabs and highway guardrail transitions, once these Precast Concrete Bridge Elements have been set to the correct horizontal and vertical alignment, the void between them and the supporting soil shall be filled with Controlled Low-Strength Material – Structural Non-Excavatable to the limits as shown on the plans. Add additional grout ports in the footings to facilitate the bedding process if required.

Except in approach slabs, joints shall be filled flush to the top with non-shrink grout, and any vertical misalignment between adjacent elements shall be feathered out on a slope of 1 to 12.

Curing of grout or concrete shall be performed in strict accordance with the specifications and manufacturer's recommendations. Filling shall not be completed in cold weather when either the ambient temperature or the precast member's temperature is below the manufacturer's recommendation. No localized heating of either the precast members or of the air surrounding the element will be permitted in an attempt to reach application temperatures.

If the joints or voids are not filled within five days after the Precast Bridge Elements are erected, the Contractor shall cover and protect the openings from weather and debris until they are filled.

Survey and Layout.

Working points, working lines, and benchmark elevations shall be established prior to placement of all elements. The Contractor is responsible for field survey as necessary to complete the work. MassDOT reserves the right to perform additional independent survey. If discrepancies are found, the Contractor may be required to verify previous survey data.

Preparation of Closure Pours and Grouted Keyways.

Immediately prior to erecting the Precast Concrete Bridge Elements, the closure pours and grouted keyways shall be cleaned at the job site of all dust, dirt, carbonation, laitance, and other potentially detrimental materials which may interfere with the bonding of the closure pour concrete or grout and precast concrete using a high-pressure water blast. Any exposed reinforcing steel in the precast concrete

shall be protected from damage during the cleaning of the keyways. Damaged epoxy coating of steel reinforcement shall be repaired, and the reinforcing steel shall be cleaned as directed by the Engineer. The surfaces of the closure pours and grouted keyways shall be wetted so that the surfaces shall have a Saturated Surface Dry (SSD) condition for at least 24 hours prior to the placement of the closure pour concrete.

Erection.

The elements shall be placed in the sequence and according to the methods outlined in the Erection Procedure. As the erection proceeds, the Contractor shall constantly monitor the assembly to ensure that the precast concrete bridge element is within proper horizontal and vertical location and tolerances prior to releasing it from the crane and setting the next unit. The Contractor may use shims to maintain proper setting tolerances.

The concrete elements shall be lifted only by the lifting devices, and the utmost care shall be taken to prevent distortion of the elements during handling, transportation or storage.

This approval will be contingent on the Contractor demonstrating by calculations, prepared by a Professional Engineer registered in Massachusetts, that the elements will not be damaged by the non-vertical lifting force and by documentation that the capacity of the lifting devices is adequate for the non-vertical lifting force.

After all Precast Concrete Bridge Elements have been placed, the actual overall dimensions of the structure both horizontal and vertical, as laid out shall not deviate from the nominal dimensions shown on the plans beyond a tolerance of +0 inches and -1 inches. Once the layout of Precast Concrete Bridge Elements has been accepted by the Engineer, the Contractor shall cut all lifting devices off below the surfaces of the elements.

Filling of Blockouts for Lifting Devices and Threaded inserts.

If the blockouts in the Precast Concrete Bridge Elements where the lifting devices were located will be exposed and visible after assembly is complete, the Contractor shall fill these blockouts with Mortar (M4.04.5).

After the formwork has been removed, all threaded inserts that have been cast into the precast concrete bridge deck for support of the formwork shall be filled with a grout of the same color as that of the precast concrete.

BASIS OF PAYMENT

Item 995.01 will be paid for at the Contract unit price per Lump Sum, which price shall include all labor, materials, equipment, and all incidental costs required to complete the work.

SCHEDULE OF BASIS FOR PARTIAL PAYMENT

Within ten (10) days after the Notice to Proceed, the Contractor shall submit on his/her proposal form a schedule of unit prices for the major component Sub-Items that make up Item 995.01 as well as his/her total bridge structure Lump Sum cost for Bridge Structure No. R-02-003=T-01-004 (3M4). The bridge structure Lump Sum breakdown quantities provided in the proposal form are estimated and not guaranteed. The total of all partial payments to the Contractor shall equal the Lump Sum contract price regardless of the accuracy of the quantities furnished by the Engineer for the individual bridge components. The cost of labor and materials for any Item not listed but

required to complete the work shall be considered incidental to Item 995.01 and no further compensation will be allowed.

Sub-Item	Description	Quantity	Unit	Unit Price	Total
482.31	Sawing & Sealing Joints In Asphalt Pavement At Bridges	60	FT		
904.3	5000 psi, 3/4 in., 685 HP Cement Concrete	280	CY		
910.1	Steel Reinforcement For Structures - Epoxy Coated	56,000	LB		
922.	Laminated Elastomeric Bearing Pad without Anchor Bolts	12	EA		
923.	Laminated Sliding Elastomeric Bearing Pad with Anchor Bolts	6	EA		
930.64	Precast Concrete Highway Guardrail Transition	4	EA		
960.1	Structural Steel – Coated Steel	69,600	LB		
965.	Membrane Waterproofing For Bridge Decks	3140	SF		
970	Damp-Proofing	1100	SF		
975.1	Metal Bridge Railing (3 Rail), Steel (Type S3-TL4)	260	FT		

Total Lump Sum Price for Item 995.01 =

The above schedule applies only to Bridge No. R-02-003=T-01-004 (3M4). Payment for similar materials and construction at locations other than at this bridge structure shall not be included under this Item. Sub-Item numbering is presented for information only in accordance with MassDOT Standard Nomenclature.

ITEM 997. EXPANDED POLYSTYRENE (EPS) GEOFOAM CUBIC YARD

GENERAL

This Item specifies the furnishing and installation of block-molded Expanded Polystyrene for use as lightweight fill in bridge approaches and highway embankments constructed on soft ground referred to herein after as "EPS-Block Fill Structures / Highway Embankment," as indicated on the Contract Drawings. Provide all labor, materials and equipment necessary to complete the work of this section.

DEFINITIONS

EPS-Block Fill Structure / Highway Embankment:
An assemblage of EPS blocks forming a single transition structure, highway fill or bridge embankment designated to carry highway traffic which constitutes part of this Project.

EPS Block Grade:
Refers to one of NCHRP material designation types indicated in table 1 of this Specification.

Molder:
Is the company actually manufacturing the EPS blocks used for the proposed EPS-Block fill structures on this Project. In the event several EPS molders are supplying EPS blocks to this Project, one Molder shall be designated as the Primary Molder and assume the responsibility for all EPS block material supplied to this contract and its compliance with the requirements of this specification. All references herein after to the "Molder" shall be taken to mean the Primary Molder if there are multiple molders.

Supplier:
Is the company having the contractual relationship with the Contractor for the supply of the EPS blocks. This may be the Molder (or Primary Molder in case of multiple molders) directly or an intermediary company (typically a distributor of construction and / or geosynthetic products manufactured by others). Where appropriate, the Supplier may delegate certain tasks of this Specification to the Molder or Primary Molder.

Inter-Block Connectors:
Galvanized steel mechanical connectors provided for the purpose of enhancing the frictional force between two EPS blocks at their interfacing surfaces. Such connectors are typically fabricated of thin galvanized steel plates with barbs protruding in two opposite directions to allow anchoring of the connector into the adjoining surfaces of two successive or adjacent EPS
blocks.

Rebar / Shear Connectors:
Reinforcing steel rebars provided for the purpose of enhancing the frictional force between the load distribution slab and the underlying EPS blocks in resisting lateral loads. These inverted L-shape rebars are typically embedded into the load distribution slab at one end and into the top most layer of EPS blocks at another.

REFERENCES

Comply with the provisions of the following codes, specifications and standards except as otherwise indicated:

A. ASTM C 203 – Standard Test Method for Breaking Load and Flexural Properties of Block-type Thermal Insulation.
B. ASTM C 303 – Standard Test Method for Dimensions and Density of Board and Block-Type Thermal Insulation.
C. ASTM C 578 – Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.
D. ASTM C 165 – Standard Test Method for Compressive Properties of Thermal Insulations.
E. ASTM D 1621 – Standard Test Method for Compressive Properties of Rigid Cellular Plastics.

SUBMITTALS

Product Data

Molder's production and product data, installation instructions, use limitations and recommendations for each material specified herein shall all be submitted for review and approval by the Engineer. Certifications shall be provided stating that equipment and materials comply with requirements of this Specification.

Shipping Plan

As part of Phase I Manufacturing Acceptance Supplier Pre-Certification requirements described in this Special Provision, Contractor shall submit their proposed EPS block shipping procedure to the Engineer for review. Such procedure shall include method proposed for transporting the blocks, protective measures during shipping to avoid any damage to the blocks including crushing to the edges, sides and corners of blocks. If flat bed trucks are being proposed, timber cribbing with straps, tarp attached to the truck or other effective means may be proposed to secure the blocks to the transporting vehicle. Alternatively, closed container trucks may be used to transport the blocks to the Project construction site.

Shop Drawings

The Contractor shall submit full-size shop drawings to scale for each EPS-Block fill structure / highway embankment constructed on this Project. The shop drawings shall indicate the proposed location and layout of all EPS blocks, inter-block connectors, rebar / shear connectors and all accessory items to be used. The submitted drawings shall include, but are not limited to, plans, elevations, cross-sections showing profiles and cross-slopes, location of connectors between EPS blocks, connections, and accessory items as necessary.

Contractor shall include on the shop drawings any specific control geometry, survey or control points or other information necessary for adequate placement of the blocks to conform to the design, geometry and all other requirements of this Specification.

Contractor shall include on the submitted shop drawings a step-by-step description of the installation and construction procedure proposed for the EPS-Block fill structure / highway

embankment constructed on this Project. Installation and construction sequence, supplemented by drawings as necessary, of the EPS blocks, pavement system and utilities shall all be included. EPS block sizes and laying pattern as well as methods of temporarily ballasting and stabilizing the EPS blocks to prevent movement during construction prior to placement of the load distribution slab (LDS) shall all be identified.

Shop drawings, working drawings, installation and construction procedures and supporting calculations shall all be stamped by a Professional Engineer registered in the Commonwealth of Massachusetts. The Professional Engineer stamping this submission shall be experienced in EPS design and construction, with a minimum of three (3) EPS roadway fill projects of similar complexity and size.

All details different than those depicted on the contract drawings, or required in support of the construction procedures shall be engineered by the Contractor. All Contractor engineered items shall be stamped by a Professional Engineer registered in the Commonwealth of Massachusetts. All such details shall be reviewed and approved by the Engineer prior to construction.

Review of the shop drawings and construction procedures shall be the primary responsibility of the Engineer. The Engineer, however, may select to conduct parallel secondary reviews of shop drawings and construction procedures during the early phases of submittal reviews or for any part of the EPS-Block fill structure / highway embankment of this project as appropriate. Contractor shall be notified of such reviews through Standard MassDOT procedures.

The layout of all EPS blocks and other members of the EPS-Block fill structure / highway embankment shall be in conformance with the design requirements and details shown on the contract documents.

Risk Management Plan

Contractor shall submit a risk management plan to ensure safe and adequate EPS construction. This plan shall outline risks and measures proposed to mitigate such risks during EPS construction.

Installer Qualifications

Contractor shall submit a detailed resume of the EPS/Geomembrane/Geotextile Installer, which must be a firm with a minimum of six (6) years of EPS block construction experience and with at least one supervisor experienced in the handling and installation of EPS in the same capacity, with a minimum of three (3) EPS roadway fill projects of similar complexity and size. The EPS/Geomembrane/Geotextile Installer shall furnish the Engineer a certified report after installation confirming that the EPS fill system and all appurtenances have been installed in compliance with all project requirements.

Manufacturing Quality Control (MQC) Submittals

Contractor shall submit the following in accordance with MassDOT requirements:

A. Test Compliance:

1. The Contractor shall supply for review and approval by the Engineer a summary of testing compliance with the specified performance characteristics and physical properties for the EPS Block material supplied and the Inter-Block Connectors.

B. Certificates:

1. The Contractor shall supply, for review and approval by the Engineer, hard copy product Certificates showing compliance with the block manufacturing requirements and material properties stated in this Specification. Product Certificates shall be signed by the Supplier to certify material compliance with the specified performance characteristics, criteria and physical requirements outlined in this Specification.

2. The Contractor shall indicate in writing to the Engineer whether or not the Supplier has a Third Party Certification. If Third Party Certification is offered, this notification shall be accompanied by documentation that indicates the business entity providing the Third Party Certification and describes in detail the steps to be taken by this agency to verify the Molder's compliance with the specific requirements of this specification. Acceptance of the Molder's Third Party Certification by the Engineer will not waive the need for pre-construction product submittal and testing as specified in this Specification.

3. The Contractor shall submit, for MassDOT's acceptance, Supplier's Standard Warranty document or certificate executed by an authorized company official. Supplier's Warranty is in addition to, and not a limitation of, other rights MassDOT may have under Contract Documents.

MANUFACTURING ACCEPTANCE

General Requirements

Manufacturing Acceptance of the EPS-Block product will be conducted to verify the Molder's Quality Control (MQC) procedures. The Engineer will have primary responsibility for all Manufacturing Acceptance activities unless MassDOT notifies the Contractor otherwise. The Engineer will communicate directly only with the Contractor in matters and questions of Manufacturing Acceptance unless all parties agree otherwise. The Engineer may designate an Engineer's Representative to assume all or part of the Engineer's responsibilities for Manufacturing Acceptance activities.

Manufacturing Acceptance of the EPS-Block will consist of two phases:

- Phase I Manufacturing Acceptance – Supplier Pre-Certification, which shall be conducted prior to shipment of any EPS blocks to the Project construction site.

- Phase II Manufacturing Acceptance – Block Verification, which shall be conducted prior to assembling of any EPS blocks on the structure / highway embankment of the Project.

Regulatory Requirements: Installation of all items including EPS blocks must comply with the requirements of all applicable local, state and national jurisdictions.

Phase I Manufacturing Acceptance – Supplier Pre-Certification

No EPS blocks shall be shipped to the Project construction site until all activities required by Phase I Manufacturing Acceptance – Supplier Pre-Certification, as specified in this section, have been completed and reviewed successfully by the Engineer as demonstrated by the approved submittals. Supplier Pre-Certification shall proceed in the order listed below:

The Shipping Plan proposed by the Contractor in compliance with this Specification has been submitted and approved by the Engineer. Contractor's Shipping Plan shall also include Contractor's confirmation for compliance with all Product Delivery, Storage and Handling requirements described in this Specification.

The Contractor shall supply a scale with sufficient capacity and precision for weighing of the EPS blocks. This scale shall be delivered to the Project construction site or to an alternate location specified by the Engineer. This scale shall be recently calibrated and certification of such calibration shall be made available to the Engineer.

At least five (5) working days prior to the scheduled shipment of any blocks to the Project construction site, the Contractor shall deliver to a location specified by the Engineer a minimum of three full-size EPS blocks of the AASHTO EPS block grade material to be used on this Project. These blocks shall be the same in all respects as the blocks to be supplied for construction, including required seasoning as described in this Specification.

The Engineer will weigh and measure each of the three blocks for the grade of material supplied. The Engineer will sample and test at least one of the three blocks, selected randomly, to evaluate the ability of the supplier to deliver EPS blocks of the quality and properties specified herein. The sampling and testing protocol will be the same as for Phase II Manufacturing Acceptance . Any EPS blocks not used for testing may be utilized for construction provided they satisfy all the requirements outlined in this Specification.

The Contractor shall submit shop drawings as required by this Specification, and such drawings have been reviewed and approved for construction in conformance with Project Standards.

Prior to shipment of any EPS blocks to the Project construction site, a meeting shall be held at a minimum between the Engineer and Contractor to review the results of Phase I Manufacturing Acceptance and discuss plans and any matters related to Phase II Manufacturing Acceptance . The meeting may also address other aspects of construction to ensure that all parties are familiar with the requirements of this Specification. The Supplier and/or Molder of the EPS blocks may also attend the meeting at the Contractor's discretion to facilitate answering any questions that may arise first hand.

At the satisfactory conclusion of this meeting, the Contractor shall be allowed to begin shipment of the blocks including on-site delivery, receipt, and storage (if desired) of the EPS blocks in accordance with this Specification. Assembly or construction of the EPS blocks on any segment

of the EPS Block-fill structure / highway embankment shall not be allowed until the requirements of Phase II Manufacturing Acceptance have been satisfied.

Product Delivery, Storage and Handling

Prior to shipment of the EPS block to the Project construction site, the Contractor shall review, plan and implement, with the assistance of the Supplier, a material handling procedure that shall include and satisfy the following as a minimum:

Care should be exercised during shipping to prevent any damage to the EPS blocks. Particular attention should be paid to avoid crushing to the edges, sides and corners of the blocks during shipping from the Molder to the Project construction site. All shipment shall conform to shipping plan as indicated in this Specification.

The Contractor shall prevent any damage to the EPS blocks during delivery, handling and storage. EPS blocks with cracks of any size are considered not acceptable and shall be rejected and replaced by the Contractor with undamaged equal EPS blocks at no additional charge in cost or schedule to MassDOT. Holes shall not be created in the blocks at any stage of manufacturing or construction to facilitate shipping or handling or placement of the blocks during construction.

C. Each EPS block shall be labeled to include the following information:

1. Name of the Molder (if there is more than one for any segment of the EPS-Block fill structure / highway embankment.
2. Production Lot Identification which shall include as a minimum the date the block was molded.
3. Mass of the entire block in pounds as measured after a satisfactory period of seasoning as specified in this Specification.
4. Dimensions of the block in inches and the actual dry unit weight in pounds per cubic foot.
5. Additional identification markings such as North arrow, and other alphanumeric characters and/or symbols, applied as necessary by the Supplier, to clearly identify the location, orientation and position of each block relative to the shop drawing shall also be provided. Any paint or other markings used to mark EPS blocks shall be chemically compatible with EPS and not cause any dissolution of the EPS during application of the paint or other marking material.

If the EPS blocks are to be stockpiled at the construction site until placement, a secure storage area shall be identified and designated by the Contractor for this purpose. Contractor shall notify the Engineer of their selection for a storage area. The storage area shall be safe, provide access only to construction personnel, adequate to protect the stored blocks from the weather elements and ultraviolet (UV) rays, and shall be away from any heat source or construction activity that may produce heat or flame or would expose the blocks to hydrocarbon fuels (diesel, kerosene, gasoline). In addition, personal tobacco smoking shall not be allowed in the storage area. While in temporary on-site storage, EPS blocks shall be secured with sandbags and similar "soft" weights to prevent their being dislodged by wind which may possibly pose a safety hazard. The blocks shall not be covered in any manner that might allow the build up of heat beneath the cover. The blocks shall not be trafficked by any vehicle or equipment or unauthorized individuals. In addition, foot traffic by authorized personnel shall be kept to a minimum.

Unless authorized otherwise by the Engineer, the maximum amount of time during which EPS blocks can be stored at the Project construction site prior to their placement on the structure shall be limited to a maximum of 30 calendar days.

EPS is not an inherently dangerous or toxic material so there are no particular safety issues to be observed other than normal construction safety and protection against heat and flame and hydrocarbon fuels (diesel, kerosene, gasoline) which can cause EPS to melt. However, extra caution is required during wet or cold weather since surfaces of the EPS blocks tend to be more slippery wet than dry. In addition, when air temperatures approach or go below freezing, a thin layer of hoarfrost (ice) can readily develop on the exposed surfaces of EPS blocks if the dew-point is sufficiently high. Thus, the surfaces of the EPS blocks can pose particular slip hazards in this condition.

Phase II Manufacturing Acceptance – Block Verification

The Engineer or designated representative shall assume the primary responsibility for conducting this phase of the work with the exception of the testing described below. Contractor shall cooperate with and assist the Engineer in implementing Phase II Manufacturing Acceptance – Block Verification.

No EPS blocks shall be placed on any segment of the EPS Block-fill structure / highway embankment of this Project until all activities required by Phase II Manufacturing Acceptance – Block Verification, as specified in this section, have been completed and successfully reviewed by the Engineer as demonstrated by the approved submittals. Block Verification shall proceed in the order listed below:

Each EPS block delivered on any truck to the construction site shall be inspected on-site visually to check for damage as well as for verification of the labeled information provided on each block. Any blocks with damage, or without proper labels as specified in this Specification, or not meeting the requirements of these Specifications shall be rejected on the spot. Damaged blocks shall be replaced by the Contractor with undamaged equal EPS blocks at no additional charge in cost or schedule to MassDOT.

B. At least one block of the EPS delivered on every truck to the construction site shall be checked to verify its compliance with the requirements of the specifications for the minimum block dry unit weight as well as all the physical tolerances. Weighing of blocks shall be conducted onsite using a scale with sufficient capacity and precision for weighing of EPS blocks to be supplied by the Contractor in conformance with this Specification.

Should verification of the parameters of item B above indicate lack of compliance, at least three additional blocks of the same grade EPS delivered from the same truck-load will be individually checked. The entire shipment of the grade of EPS in question shall be rejected should any one of the three additional blocks fail to meet the requirements of the specifications for minimum block dry unit weight and physical tolerances outlined above.

D. At least one EPS block delivered on the first truck to the construction site for use on the EPS-Block fill structure / highway embankment, shall be selected for sampling and testing. Additional

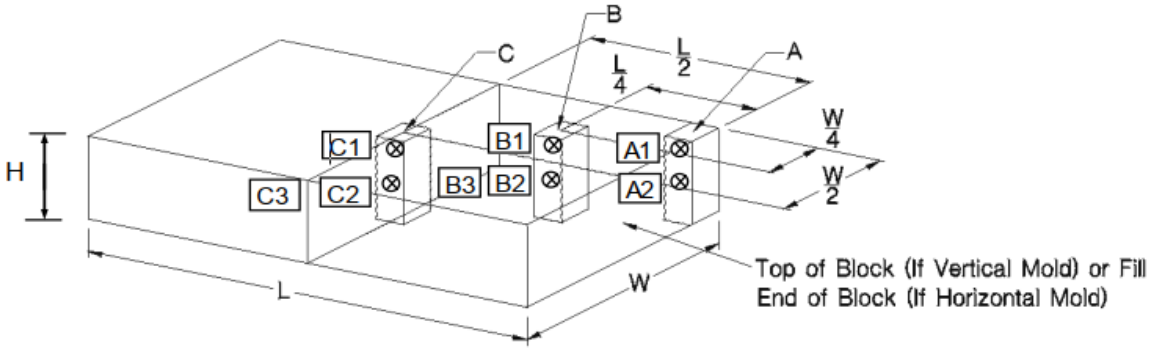
EPS blocks shall be selected by the Engineer, as deemed necessary, for sampling and testing during the course of construction at a rate of sampling to be determined by the Engineer. As a general guidance, the rate of sampling shall be approximately one block for every 500 cubic yards of EPS delivered.

Sampling will be at locations A, B and C shown in Figure 1. The samples should be approximately square in cross-section and of sufficient width to enable preparing the test specimen required by this specification. The Contractor shall employ an accredited independent lab qualified to perform this testing. The lab shall perform the sampling and testing and provide certified results prior to installation of the EPS blocks.

Laboratory tests will check for compliance with the material properties shown on table 2 of this specification and will be reviewed by the Engineer.

Portions of sampled blocks that are used for testing are not acceptable for construction. Portions of sampled blocks that are otherwise acceptable can be used as desired by the Contractor provided that they comply with all other requirements of this specification.

G. The Contractor shall allow for early delivery of the EPS blocks to the construction site to allow for conducting laboratory testing of the blocks by the independent lab. For those truckloads and production lots where EPS blocks will be selected for sampling and testing, a minimum of 3 business days are required prior to their scheduled installation to allow for samples to be taken and laboratory testing conducted. Any shipment or production lot of EPS blocks, for which the representative samples fail to meet the material property or other parameters outlined in this specification, are considered defective and shall be replaced by the Contractor with non-defective EPS block at no additional charge in cost or schedule to MassDOT.



Sampling locations A1, B1 and C1 are at or near the top or bottom (contact) surface of the block.
Sampling locations A2, B2, B3, C2 and C3 are at or near the center (or mid-height) of the block.
L = Length of block; W = Width of Block; H = Height of block

Figure 1. Locations of required EPS block sampling

H. Pre-installation Meeting: Prior to installing the blocks at the Project site, a pre-installation meeting shall be held to verify results of Phase II Manufacturing Acceptance , Project requirements, substrate conditions, and details relative to the manufacturing, shipping, storage and placement of the EPS blocks. The meeting shall involve the Contractor, Engineer, Design Engineer and the EPS Supplier. At the satisfactory conclusion of this meeting, the Contractor shall be

allowed to begin construction and installation of the blocks in accordance with the approved shop drawings. Assembly or construction of the EPS blocks on the EPS Block-fill structure / highway embankment shall not be allowed until the requirements of Phase II Manufacturing Acceptance have been satisfied.

MANUFACTURING QUALITY CONTROL (MQC)

General Requirements

MQC of the EPS blocks product is the primary responsibility of the Molder. The purpose of this section is to define the parameters for use by a Molder in developing an MQC plan. These parameters will also be those measured as part of the Manufacturing Acceptance to be conducted by the Engineer. Manufacturing Acceptance requirements are detailed elsewhere in this Specification.

Manufacturing Requirements

All EPS blocks produced for this Project shall be manufactured through the use of vacuum assisted molding equipment. No other type of block manufacturing mold is acceptable or could be substituted for a vacuum mold.

Material Requirements

All EPS blocks shall consist entirely of expanded polystyrene. All EPS blocks shall consist of virgin raw material (expandable polystyrene bead or resin). No regrind material is allowed under any condition for manufacturing EPS blocks on any segment of the EPS-Block fill structure / highway embankment on this Project. Previously used EPS blocks are not allowed in part or in full on any segment of the EPS-Block fill structure / highway embankment on this Project.

All EPS blocks shall be adequately seasoned prior to shipment to the Project construction site. For the purposes of this specification, seasoning is defined as storage in an area suitable for the intended purpose as subsequently defined herein for a minimum of 72 hours after an EPS block is released from the mold. Seasoning shall be done within a building or other structure that protects the EPS blocks from moisture as well as UV radiation. The area in which EPS blocks are stored for seasoning shall also be such that adequate space is allowed between blocks and positive air circulation and venting of the structure provided so as to foster the out-gassing of blowing agent and trapped condensate from within the blocks. The Engineer shall be allowed to inspect the structure to be used for seasoning upon request and during normal business days and hours. The supplier may request a shortened seasoning period if the EPS blocks are seasoned within an appropriate heated storage space and the Molder demonstrates to the satisfaction of the Engineer that the alternative seasoning treatment produces blocks that equal or exceed the quality of blocks subjected to the normal 72-hour seasoning period.

All EPS blocks shall satisfy the product flammability requirements specified in ASTM C 578.

All EPS blocks shall satisfy the Material Property requirements outlined in this specification.

All inter-block connectors shall be fabricated of galvanized steel and shall satisfy the requirements outlined in this Specification.

PROJECT CONDITIONS

Provide inserts and anchorages which must be built into other work at the time they are needed.

MATERIALS

EXPANDED POLYSTYRENE BLOCKS

A. Only National Cooperative Highway Research Program (NCHRP) Material type designations shall be used on all drawings, correspondence and communication related to this Project. Table 1 indicates the NCHRP material type designation and the corresponding unit weight for EPS blocks that are covered by this Specification. For a given material type, the dry unit weight of each EPS block (as measured for the overall block as a whole) after the period of seasoning as defined in this Specification shall meet or exceed that shown in Table 1. The dry unit weight shall be determined by measuring the mass of the entire block by weighing on a scale and dividing the mass by the volume of the block.

Table 1. Dry unit weights of EPS blocks

NCHRP Material Designation	**Minimum Allowable Dry Unit Weight of Entire EPS Block Lbs/ft^3**
EPS100	2.00

Table 2 gives the minimum allowable values for the Material Properties corresponding to the NCHRP Material type shown in table 1. These material properties shall be obtained by testing specimens prepared from samples taken from actual EPS blocks produced for the Project in compliance with this Specification and which has satisfied both MQC requirements by the Molder and Manufacturing Acceptance by the Engineer as described in this specification. Testing for material properties shall comply with the following requirements:

- All test specimens shall be seasoned as specified in ASTM C 578.
- Dry density, compressive strength and flexural strength shall all be measured as specified in ASTM C 578.
- The specimens used for compressive strength testing shall be cubic in shape with a two (2) inch side length.
- A strain rate of 10% per minute shall be used for the compressive strength tests.
- Both the elastic-limit stress and initial tangent Young's modulus shall be determined in the same test used to measure compressive strength.
- The elastic-limit stress is defined as the measured compressive normal stress at a compressive normal strain of 1%. The initial tangent Young's modulus is defined as the

average slope of the compressive stress versus compressive strain curve between 0% and 1% strain.

Table 2. Minimum allowable values of MQC/ Manufacturing Acceptance material properties for individual test specimens

NCHRP Material Designation	Dry Density Pcf	Compressive Strength Psi	Flexural Strength Psi	Elastic Limit Stress Psi	Initial Tangent Young's Modulus Psi
EPS100	1.80	25	50	14.5	1450

Each EPS block shall meet dimensional tolerances as determined in three distinct areas:

- Variations in linear dimensions as defined in Item D of this section.
- Deviation from perpendicularity of block faces as defined in Item E of this section.
- Overall warp of block faces as defined in Item F of this section.

The thickness, width and length dimensions of an EPS block are defined herein as the minimum, intermediate and maximum overall dimensions of the block, respectively, as measured along a block face. These dimensions of each block shall not deviate from the theoretical dimensions by more than ± 0.5%.

The corner or edge formed by any two faces of an EPS block shall be perpendicular, i.e. form an angle of 90°. The deviation of any face of the block from a theoretical perpendicular plane shall not exceed one eighth (1/8) inch over a distance of twenty (20) inches

Any one face of a block shall not deviate from planarity by more than one quarter (1/4) inch when measured using a straightedge with a length of ten (10) feet.

The EPS shall contain a flame retardant additive and shall have UL Certification of Classification as to External Fire Exposure and Surface Burning Characteristics so as to comply with the Oxygen Index requirements of ASTM C 578.

INTER-BLOCK CONNECTORS

Inter-block connectors shall be used to restrain EPS blocks from moving laterally in layer over layer applications. Contractor shall supply samples and test data for the proposed inter-block connectors to comply with this Specification for review and approval by the Engineer prior to construction.

Inter-block connectors shall be made of 20 gauge (minimum) galvanized steel with two-sided multi-barbed design, or approved equal, capable of piercing the EPS up to three quarters (3/4) inch. Each plate shall be capable of a lateral holding strength of at least 60 lbs.. Refer to Contract Drawings for suggested layout and number of inter-block connectors required.

Should the size of supplied EPS blocks be different than that shown on the Contract Drawings, Contractor shall propose a revised layout for the inter-block connectors satisfying the design

requirements for review and approval by the Engineer prior to the start of Construction. The revised layout shall be incorporated on the shop drawings in conformance with this Specification.

CONSTRUCTION METHODS

CONSTRUCTION QUALITY CONTROL (CQC)

The Contractor shall be directly responsible for all Construction Quality Control (CQC). Items covered by CQC include, but are not limited to, all earthwork and all construction activities associated with the construction of EPS-Block fill structures / highway embankments in addition to manufacturing and shipment of the EPS blocks.

The Contractor shall prevent any damage to the EPS blocks during handling, placement and construction. Any EPS blocks with cracks of any size or other damage incurred during shipping, handling or in storage prior to their placement are considered not acceptable and shall be rejected and replaced by the Contractor with undamaged equal EPS blocks at no additional charge in cost or schedule to MassDOT. Holes shall not be created in the blocks at any stage of construction or block assembly to facilitate placement or hauling of the blocks during construction.

The Engineer will be responsible for providing Construction Quality Acceptance (CQA) of the contractor's construction activities.

The Contractor shall engage the services of an expert familiar with EPS design and construction. This expert shall review the construction documents and advise the Contractor on the adequate EPS construction practices.

SITE PREPARATION

The natural soil subgrade shall be cleared of vegetation, any large or sharp-edged soil particles, any kind of debris and shall be reasonably planar prior to placing a geotextile and a leveling or bedding layer. Reasonably planar is defined as ± one (1) inch over ten (10) feet .

Unless identified otherwise on the Contract Drawings, the bedding layer shall consist of Expanded Shale Lightweight Fill or other adequate material as approved by the Engineer conforming to the applicable Specification. The required smoothness of the bedding layer prior to placement of the first layer of EPS blocks shall be no more than ± three-eighth (3/8) of one inch over any ten (10) foot distance.

At locations where the subgrade is stepped under the lowermost layers of blocks, as required by design, every effort shall be made by the Contractor to adequately compact the soil subgrade at such locations to prevent any possible undermining of the subgrade under the first layer of blocks.

There shall be no debris of any kind on the bedding surface at the time EPS blocks are placed.

E. Unless directed otherwise by the Engineer, there shall be no standing water or accumulated snow or ice on the bedding layer within the area where EPS blocks are placed at the time of block placement.

EPS blocks shall not be placed on a frozen subgrade nor shall de-icing salts be used except as directed by the Engineer.

EPS BLOCK PLACEMENT

EPS blocks shall be placed at the locations and elevations shown on the approved shop drawings submitted by the Contractor.

There shall be no debris of any kind between adjacent surfaces of EPS blocks at the time adjacent EPS blocks are placed.

C. There shall be no standing water or accumulated snow or ice on the previously placed EPS block layer within the area where subsequent EPS blocks are to be placed at the time of block placement.

EPS blocks shall be placed so that all vertical and horizontal joints between blocks are tight.

In addition to surveys performed throughout the course of construction, following placement of the first layer of EPS blocks, Contractor shall conduct a survey of the placed blocks to determine and verify the as-built elevations and geometry controls such as width, length, elevations, slopes, etc. against those called for on the approved shop drawings. Contractor shall report to the Engineer any resulting discrepancies and their proposed measures for correction. Contractor shall not proceed to resume placement of blocks on successive layers until such corrective measures have been reviewed and approved by the Engineer.

While placing successive layers of EPS blocks, Contractor should exercise care to guarantee that all placed blocks are supported over their entire bearing area. In the event the top constructed surface of an assembly of blocks becomes uneven or where rocking of the blocks is observed, Contractor shall notify the Engineer and propose a remedial procedure for corrective action. Such procedure shall be submitted for review and approval by the Engineer prior to resuming construction.

When placing successive layers of EPS blocks, Contractor shall conduct necessary surveys for each constructed layer to confirm that the as-built conditions agree with the geometry indicated on the approved shop drawings. Contractor shall report to the Engineer any resulting discrepancies and their proposed measures for correction. Contractor shall not proceed with any repairs or resume block placement until such corrective measures have been reviewed and approved by the Engineer.

Blocks shall be placed such that the resulting exterior surfaces on the sides of the EPS blocks are vertical and planar within a tolerance of ± one-quarter (1/4) inch between blocks.

The inter-block connectors shall be placed at the locations shown on the shop drawings and shall be set into the EPS block such that the inter-block connectors do not cause a gap to exist between adjacent layers of EPS blocks.

The final surface of the EPS blocks shall be covered as shown on the Contract Drawings. Care shall be exercised during placement of the cover material so as not to cause any damage to the EPS blocks.

FIELD QUALITY REQUIREMENTS

Field cutting of EPS blocks shall be permitted, but limited to the use only of hot wire cutters.

With the exception of sand bags or similar "soft" weights used to temporarily restrain EPS blocks against wind and buoyancy forces, no construction material other than that shown on the contract drawings shall be placed or stockpiled on the EPS blocks.

In the temporary condition prior to the installation and construction of the pavement system, all EPS blocks installed-in-place shall be secured at the end of each work day with an adequate number of sandbags or similar "soft" weights to prevent their being dislodged by wind or buoyancy forces. At all times, the Contractor shall maintain a minimum of two (2) redundant pumping systems; each capable of preventing water accumulation in the vicinity of the placed EPS blocks. These pumping systems shall be intended solely for the purpose of safeguarding the placed EPS blocks against extreme water events / buoyancy conditions during construction. An autodialer shall be installed by the Contractor to alert them of a buoyancy condition or other extreme weather events during construction.

At no time shall heat, open flame or motor vehicle fuels be used in proximity to the EPS blocks so as to cause combustion or melting of the EPS.

The final top surface of the EPS blocks shall be covered with a cast-in-place (CIP) reinforced concrete load distribution slab (LDS) as shown on the Contract Drawings. Care shall be exercised during placement of the cover material so as not to cause any damage to the EPS blocks.

The surfaces of the EPS blocks shall not be directly traversed by any vehicle or construction equipment during or after placement of the blocks.

PAVEMENT CONSTRUCTION
The pavement system is defined for the purposes of this specification as all material placed above the EPS blocks, including the LDS, within the limits of the roadway, including any shoulders.

The pavement system shall be constructed above the EPS blocks as shown on the contract drawings. Specifications covering construction of the pavement system are given elsewhere in the contract documents.

Concrete and reinforcement steel for the LDS shall be installed over the EPS blocks using appropriate labor and equipment that will not damage the EPS blocks. Construction of the LDS shall be in conformance with all the requirements of the applicable Reinforced Concrete Structures Specification.

PROTECTION

Protect partial installation and installed product and finish surfaces from damage during construction in accordance with this Specification.

EPS DISPOSAL

Contractor shall assume total responsibility for disposal of EPS block material or portions of unused blocks resulting from testing or construction by returning it to the Supplier/Molder for recycling. Such process shall be conducted on a regular basis or as instructed by the Engineer.

METHOD OF MEASUREMENT

Item 997. "Expanded Polystyrene (EPS) Geofoam" shall be measured by the Cubic Yard, complete in-place.

BASIS OF PAYMENT

Item 997. "Expanded Polystyrene (EPS) Geofoam" will be paid for at the Contract unit price per Cubic Yard, which price shall include all labor, materials, equipment and incidental costs required to complete the work. The cost of laboratory tests as required in this Specification shall be incidental to the cost of this Item.

ITEM 997.1 GASOLINE RESISTANT GEOMEMBRANE FOR EPS SQUARE FOOT

This Item specifies the furnishing and installation of Gasoline Resistant Geomembrane for EPS over "EPS-Block Fill Structures / Highway Embankment," as indicated on the Contract Drawings.

The Geomembrane shall consist of textured-surface materials, made of high-density polyethylene (HDPE), tri-polymer membrane manufactured from polyvinyl chloride (PVC), ethylene interpolymer alloy (EIA), or a comparable polymer combination. The geomembrane shall be suitable for the containment of spilled liquid hydrocarbons, including gasoline, diesel fuel, kerosene, hydraulic fluid, methanol, ethanol, mineral spirits, and naphtha.

The geomembrane shall be sufficiently flexible to cover and closely conform to 90-degree edges and corners of EPS blocks, and subgrade material, at ambient temperatures as low as 45°F without application of heat. The Geomembrane thickness shall be 30 mils minimum and factory produced seams bonded width shall be 1.25 inch minimum.

Physical Property	**ASTM Designation**	**Acceptance Value**
Unleaded Gasoline Permeability (VTR)	D 814	0.4 oz/ft^2 Maximum per 24 hours
Grab Tensile Strength (1" grip, 4"x8" sample)	D 751	550 lbs Minimum in each direction
Elongation at Break	D 751	20% Minimum
Bursting/Puncture Resistance (ball tip)	D 751	750 lb Minimum
Factory Produced Seams, Shear Strength	D 751 Procedure A	550 lb Minimum
Field Produced Seams, Vapor Tight Seal	D 5641	Pass

The Contractor shall submit, to MassDOT's representative, samples and properties of the Geomembrane in accordance with the relevant materials specifications for Geomembranes (GM) per the Geosynthetic Research Institute (GRI):

GM1 Seam Evaluation by Ultrasonic Shadow Method.
GM4 Three Dimensional Geomembrane Tension Test (see ASTM D5617).
GM5(a) Notched Constant Tensile Load (NCTL) Test for Polyolefin Geomembranes (ASTM D5397).
GM6 Pressurized Air Channel Test for Dual Seamed Geomembranes.
GM10 The Stress Crack Resistance of HDPE Geomembrane Sheet.
GM12 Asperity Measurement of Textured Geomembranes using a Depth Gage (ASTM D7466).
GM13 Test Methods, Properties and Testing Frequency for High Density Polyethylene (HDPE) Smooth and Textured Geomembranes.
GM15 Determination of Ply Adhesion of Reinforced Geomembranes (see ASTM D6636).
GM19 Seam Strength and Related Properties of Thermally Bonded Polyolefin Geomembranes.

Submittals

Certificate of Compliances for the Gasoline Resistant Geomembrane (GRG) to the Engineer for review and approval.

Shipping and on-site storage plan of the Gasoline Resistant Geomembrane to the construction site, for the Engineer's review. This plan shall include protective measures during shipping and on-site storage to avoid any damage to the Geomembrane.

Certified Test Reports for each of the materials to be used.

Construction Methods

Geomembrane (gasoline resistant) shall be placed directly on the surface of the EPS blocks, which shall be clean and free of sharp objects. Encase the top of EPS blocks with the Geomembrane within the limits shown on the Plans. Field seams shall be bonded with an electrically-heated hot-wedge device or other method as recommended by the manufacturer. The temperature of the bonded geomembrane shall not exceed 165°F immediately before contacting the EPS blocks.

Before installation of geomembrane, the Contractor shall demonstrate to the Engineer that the equipment, techniques, and personnel proposed for the bonding of field seams can produce vapor-tight seams under similar weather and work conditions near the job site. The Contractor shall provide a typical "test panel" as a basis for testing acceptance.

Field seams shall be inspected by the Installer and, when ordered by the Engineer, shall be tested by the Installer and shall pass the Vacuum Chamber test.

Construction equipment shall not be operated directly on the geomembrane. Any material damaged by the Contractor's equipment or operations shall be replaced or repaired to the satisfaction of the Engineer.

METHOD OF MEASUREMENT

Item 997.1 "Gasoline Resistant Geomembrane for EPS" shall be measured by the Square Foot, complete in-place.

BASIS OF PAYMENT

Item 997.1 "Gasoline Resistant Geomembrane for EPS" will be paid for at the Contract unit price per Square Foot, which price shall include all labor, materials, equipment and incidental costs required to complete the work. Overlaps and fold-overs are considered incidental to the unit price and shall be not be measured separately for cost.

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APPENDIX N

- **Temporary Construction Hydraulic Analysis**

IMPROVING COMMUNITIES TOGETHER

TECHNICAL MEMORANDUM

Date: December 11, 2025 Job No.: 10887

To: City of Taunton, Massachusetts

From: BETA Group, Inc.

Subject: Taunton, MA – Old Colony Ave Bridge – Temporary Construction Hydraulics

The purpose of this memorandum is to summarize the hydrologic and hydraulic analysis completed for the temporary construction water control measures at Old Colony Ave Bridge.

PROJECT LOCATION

The Old Colony Ave Bridge is in East Taunton, Massachusetts at Latitude 41.885989° N, Longitude 71.030044° W. The bridge spans the Taunton River, which runs from east to west under the structure.

Figure 1: Project Location Map

OBJECTIVE

The objective of this analysis is to determine the hydraulic characteristics of the Taunton River under the Old Colony Ave Bridge while temporary construction water control measures are in place. These measures consist of blocking flow between the existing pier and the existing river right embankment, only allowing flow down the river left side of the channel while work is done on the first span. Once the span is complete, flow will subsequently be blocked between the existing pier and the existing river left embankment, only

allowing flow down the river right side of the channel while work is done on the other span. See the following sections for more details regarding the hydrologic and hydraulic analyses.

HYDROLOGIC ANALYSIS

To analyze the hydraulic characteristics of the Taunton River while temporary water control measures are in place, it was necessary to determine the 50% AEP (2-year) flow in the river. The USGS StreamStats Application Version 4.29.4 was used to determine the peak discharge for the 2-year return interval at the crossing.

Table 1: Temporary Construction Hydrology

Target Flow Event	Peak Discharge (CFS)
2-year (50% AEP)	2150

HYDRAULIC ANALYSIS

The 2-year peak discharge for the Taunton River was analyzed in GeoHECRAS Version 5.1.0.2113, which uses the U.S. Army Corps of Engineers (USACE) HEC-RAS Version 6.4.1 as the analysis engine.

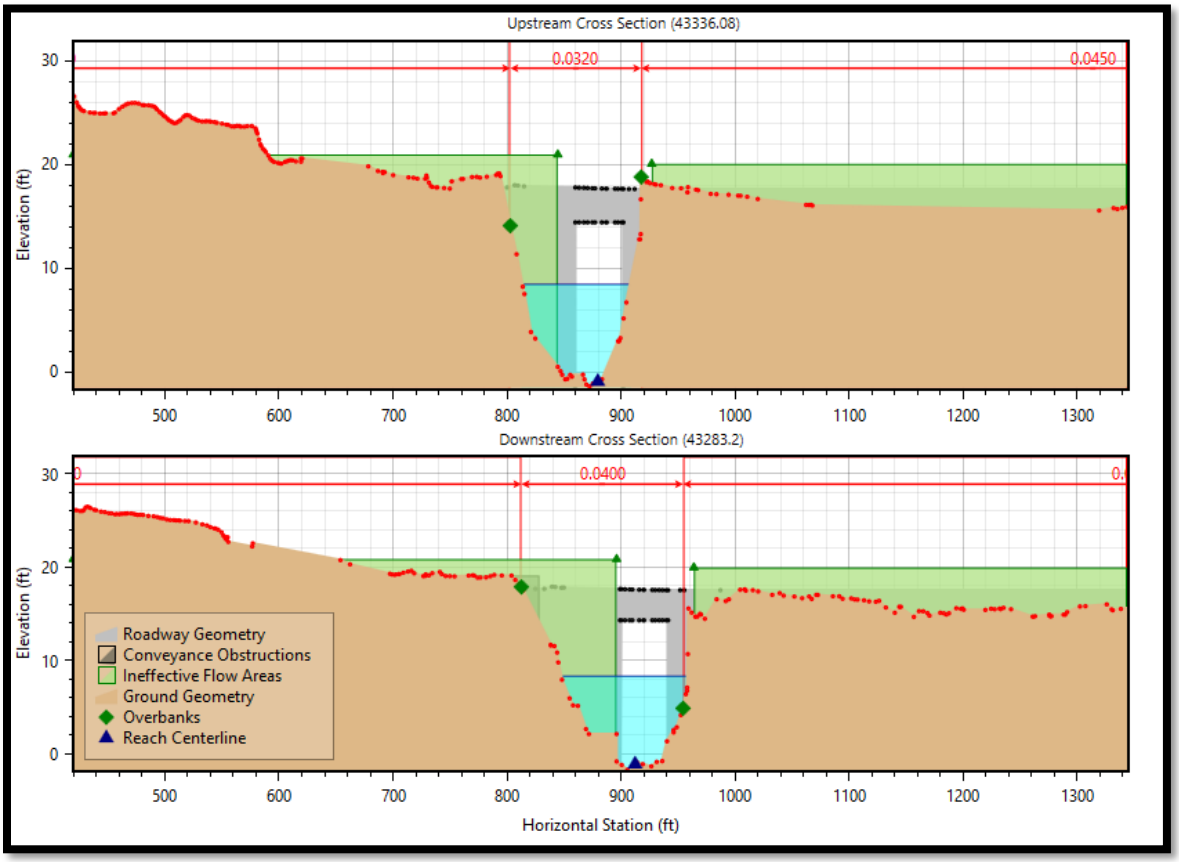

Figure 2: Bridge Cross Sections – River Left Blocked (Looking Downstream)

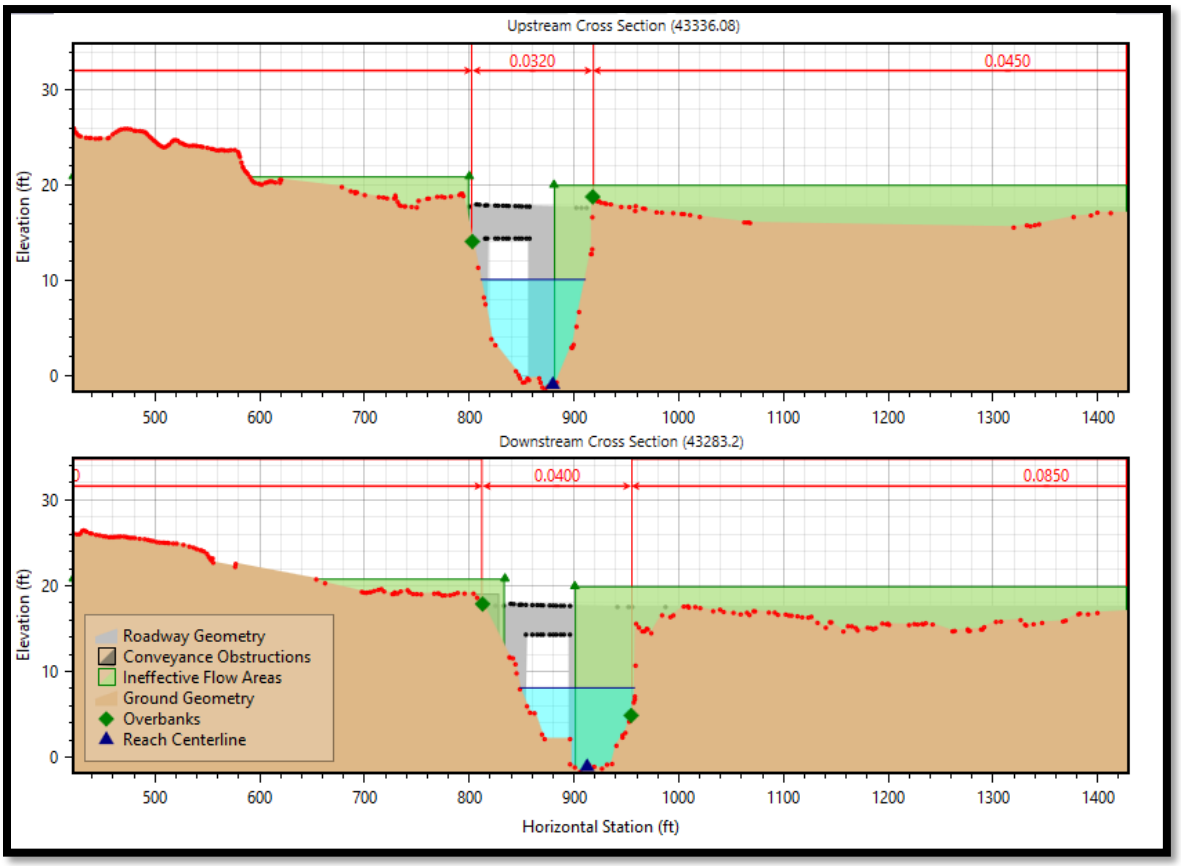

Figure 3: Bridge Cross Sections – River Right Blocked (Looking Downstream)

The figures above show the upstream and downstream bridge cross sections when the 2-year flow is analyzed for the two scenarios listed above (river left blocked, river right blocked). To simulate the blockage, the bridge geometry was altered to represent the flow obstruction, and ineffective areas were adjusted accordingly to simulate the contraction and expansion of flow as it moves through the opening. The results of the hydraulic analysis are summarized in Table 2 below:

Table 2: Hydraulic Analysis Results

	River Left Blocked		River Right Blocked	
	Upstream XS	**Downstream XS**	**Upstream XS**	**Downstream XS**
Flow (CFS)	2150	2150	2150	2150
WSEL (FT)	8.37	8.35	10.05	8.15
Velocity (FPS)	6.28	5.47	6.15	10.08

APPENDIX O

- **Public Notice**
- **EEA ePlace Submission**

Public Notice

Massachusetts Department of Environmental Protection
Division of Wetlands and Waterways
MassDEP Boston Office
100 Cambridge Street, Suite 900
Boston, MA02114

Pursuant to 33 U.S.C. 1341 and M.G.L. c. 21 §§ 26-53 and 33 U.S.C. 1341 and M.G.L. c. 21 §43, notice is given of a 401 Water Quality Certification application for work in Waters of the US associated with the proposed bridge replacement in the Towns of Raynham and Taunton, MA, by the Town of Taunton, 15 Summer Street, Taunton MA, in connection with the Massachusetts Department of Transportation - Highway Division, Ten Park Plaza, Room 7360, Boston, MA 02116. This project will replace the Old Colony Ave bridge over the Taunton River (Bridge #R-02-003) (the Project) with a wider superstructure while retaining the existing substructure. The bridge deck will also be slightly widened to accommodate a bicycle lane. Additional information may be obtained from the Massachusetts Department of Transportation - Highway Division at the above address, Attention Courtney Walker or by emailing Courtney.L.Walker@dot.state.ma.us. Written comments should be sent to MassDEP Wetlands Program, Attention Heidi Davis, 100 Cambridge Street, Suite 900, Boston, MA 02114 or heidi.davis@mass.gov within 21 days of this notice.

Any group of ten persons, any aggrieved person, or any governmental body or private organization with a mandate to protect the environment who submits written comments may appeal the Department's Certification. Failure to submit written comments before the end of the public comment period may result in the waiver of any right to an adjudicatory hearing.

Mass.Gov State Offices & Courts State Topics State Website Accessibility FAQs

An Official website of the Commonwealth of Massachusetts

EEA ePLACE Portal

Need Help? For technical assistance in using this web application, please call the ePLACE Help Desk Team at (844) 733-7522 or (844) 73-ePLAC between the hours of 7:30 AM-5:00 PM Monday-Friday, with the exception of all Commonwealth and Federally observed holidays. If you prefer, you can also e-mail us at ePLACE_helpdesk@mass.gov. For assistance with non-technical questions, please contact the issuing Agency directly using the links below.

Contact:
Energy and Environmental Affairs, MASSDEP
Energy and Environmental Affairs, MDAR
Energy and Environmental Affairs, DCR

Convenience Fee: Please note there will be a convenience fee for all online credit card transactions. There is also a nominal fee for online payment by check.

Home

DEP Applications

WW26 - Combined Licenses/Permits for Waterways and Water Quality Certification Application

1	2	3	4 401 Dredge Information	5 401 Fill Information	6 Documents and Special Fees	7 Review	8 Application Submitted

Step 7: Review

Continue Application » Save and resume later

Please review the information below prior to submission. After the application has been submitted, you will not be able to make changes. To make changes after submittal you must contact the Department directly.

Review and Certification

Edit Application

Pre-Consultation Information

Have you consulted with MassDEP about the combined application process?:	Yes
Date you consulted with MassDEP:	10/29/2025

Application Information

Please select the Chapter 91 Water-Dependent Application (if applicable):	
Please select the 401 Water Quality Certification for Dredging Application (if applicable):	WW08 - 401 Minor Dredging - Minor < 5000 cubic yards
Please select the 401 Water Quality Certification for Fill/Excavation Application (if applicable):	WW10 - 401 Major Fill and Excavation - Major >= 5000 square feet

Primary Project Location

Taunton River | 0 N/A Taunton MA 02718

Other Primary Location Info

Parcel ID:	N/A - ROW
Municipality :	TAUNTON

Project Location Info

Will the project occur in multiple municipalities?: Yes

Additional Project Sites

Additional Project Sites

Municipality	Description
RAYNHAM	The project occurs in Raynham and Taunton. Within Raynham, jurisdiction extends to the Taunton-Raynham municipal boundary, which includes South Street East and Old Colony Avenue Bridge over the Taunton River within Raynham.

Permittee

Individual
Katherine Nunes
90 Ingell Street
Taunton, MA, 02780
United States

Use Login Information: No

Telephone #:508-821-1431
E-mail:knunes@taunton-ma.gov
PINnull

Application Contacts

Showing 1-1 of 1

Contact Type	Name	Organization Name	Contact Person	Action
Additional Permittee		BETA Group, Inc.	Jonathan Niro	Edit/View

Application Prepared By

Showing 1-1 of 1

Contact Type	Name	Organization Name	Contact Person	Action
Application Prepared By	HANNAH ELIZABETH DAVIS			Edit/View

Pre-Application Information

Has the DEP Agency specified that you are exempt from this process?: No

Has the project's Sampling Analysis Plan been approved by the DEP Agency? If yes, please attach a document 'DEP Sampling Analysis Plan' in the document section.: Yes

Project Information

Project Name: Old Colony Avenue Bridge Reconstruction

Have you completed the Public Notice as per 314 CMR 9.00? If yes, please attach a completed 'Proof of Public Notice' document in the document section.: No

Will the proposed project occur in any wetlands or waters designated as 'Outstanding Resource Waters'?: No

Identify the loss, or alteration, in square feet for Land under water: 8570

Identify the loss, or alteration, in square feet for Other Resources: 0

Material to be Dredged

Briefly describe in general the proposed project or activity, including the ... The Project is the proposed reconstruction of the Old ...

Briefly describe in general the proposed project or activity, including the purpose and intended use of the project, and the duration of the work within any waterbody:	The Project is the proposed reconstruction of the Old Colony Avenue Bridge in Taunton, MA and Raynham, MA. The Project is proposed to address the aging and deteriorated bridge superstructure and to improve public safety. Work within the Taunton River is required to place riprap scour protection within the river to prevent erosion at the bridge. Dredging will require the implementation and maintenance of temporary water controls within the Taunton River so that the work can be completed in dry conditions. While the exact means and methods for water control will be determined by the contractor, it is anticipated that water controls will consist of cofferdams in the form of portadams or sandbags. Dredging and work within the Taunton River will occur for the duration of the project, abiding by Time-of-Year restrictions.
Proposed Start Date:	12/01/2026
What is the expected frequency of maintenance dredging of this project?:	1
Length of the proposed project (If applicable, please include the maximum and minimum):	790
Width of the proposed project (If applicable, please include the maximum and minimum):	26 to 35
Depth of the proposed project (If applicable, please include the maximum and minimum):	5.67
Volume of the proposed project(Cubic yards):	2055
Type of proposed project:	Improvement dredging
Briefly describe the physical dredging operation (such as., dredging methods), the method of release of the dredged material into the disposal site, and the name of the contractor if other than the applicant. (Please attach a detailed document - "Dredging and Disposal Operation" in the document section of the application):	The dredging of the Taunton River will require the implementation and maintenance of temporary water controls within the Taunton River so that the work can be completed in dry conditions. While the exact means and methods for water control will be determined by the contractor, it is anticipated that water controls will consist of cofferdams in the form of portadams or sandbags. Work within Waters of the U.S. will only occur within dewatered areas. Cofferdams will be installed in two phases consistent with the phasing of dredging work. Phase I addresses the southern half of the Taunton River and will divert flow through the northern cell, while Phase II addresses the northern half of the river and will divert flow through the southern cell. Time-of-Year restrictions will be observed within the Taunton River to protect endangered species habitat. Water controls will be installed outside this period. Dewatering of the work area will be completed to avoid an increase in turbidity over the baseline conditions. It is anticipated that the work area will be dewatered via pumping to a settling tank or dewatering system that filters the water prior to discharge back to the river. The means and methods for dewatering will be determined by the contractor at the time of construction based on site-specific conditions.
Briefly describe all measures designed to avoid and minimize adverse impacts of the project on aquatic life and the aquatic ecosystem. Where impacts cannot be avoided or minimized, what mitigation measures are proposed? (If necessary, please attach a document - "Performance Standard to avoid and minimize and mitigate impact" in the document section of the application):	The Project was designed to avoid, minimize, and mitigate impacts to Waters of the U.S., wildlife habitat, and other sensitive areas. Due to the nature of the project being a bridge replacement within a linear corridor, avoidance of impacts is infeasible; however, they have been minimized to the extent possible. To address the proposed permanent streambed impacts, the project will restore the streambed conditions in place through the addition of native streambed material over installed scour protections. To restore the streambed, 2.67 ft layer of streambed material will be placed over a 2 ft layer of dumped Clas III riprap, which will all be over 1 ft of crushed stone for a total depth of 5.67 ft. The riprap will extend the length of the channel from each abutment and will extend 25 ft upstream and downstream of the embankment. All temporary impacts and permanent impacts to the streambed will be restored in place. Final streambed restoration will be overseen by a Fluvial Geomorphologist. To address the proposed temporary streambank impacts caused by the installation of erosion controls, all temporary streambank impacts will be restored through the application of native roadside part-shade seed mix. Four inches of loam and seed will be applied over pavement milling mulch. Erosion and sedimentation controls will be 100% biodegradable and left in place at the conclusion of the project. Compost filter tubes will be overlapped by a minimum of 3 ft for a continuous barrier and secured using hardwood stakes. Compost filter tubes may be used to reduce flow onto work and to prevent flow off-site by placing the controls as close to the area of disturbance as possible. Other controls including siltation fencing or similar controls may be used at the contractor's specification. Work within Waters of the U.S. will only occur within dewatered areas. Best Management Practices will be employed by the contractor
Does the proposed project have any past history of chemical or oil spills of	No

discharge?:	
Does the proposed project have any past history of Upstream or on-site industrial or municipal discharge within 1,000 feet of the proposed project?:	No
Does the proposed project have any past history of chronic pollutant loading from port or harbor use and/or other sources of pollutants? (eg. CSO or POTW discharges):	No

Proposed Ocean Site

Location of proposed disposal site and its physical boundaries:	No ocean disposal is proposed.
Has the site been designated by the State or E.P.A. as a dredge disposal site?:	No
If no, give a brief description of the characteristics of the proposed disposal site and an explanation as to why no currently designated site is feasible for this project. :	No ocean disposal is proposed.
Is the anticipated disposal site located within a designated ocean sanctuary as established by federal law or G.L.c. 132A, sec. 13?:	No

Disposal/Dewatering Land Site

Location of proposed disposal and dewatering sites and physical boundaries:	Disposal will occur off-site.
Indicate drainage characteristics of dewatering and disposal sites from the results of test pits, borings, and percolation tests as applicable:	Disposal will occur off-site.
How long are the dewatering and disposal sites estimated to be in use from this project?:	For the duration of the Project.

Proposed Barge Site

Are you proposing dewatering of dredged sediment on a barge? If yes, please attach a document 'Plans for adequate containment' in the document section.:	No

Grain Size Analysis

Grain Size Analysis

Number of Sieve	Percentage of total by weight passing
200	28.86

Chemical Analysis of Sediment

Chemical Analysis Of Sediment

Chemical	Average Concentration (In ppm)
Arsenic	1.01
Cadmium	0.19
Chromium	11.7
Copper	16.6
Lead	19.9
Mercury	0.012
Nickel	7.24
Zinc	62.5
Volatile Solids (percent)	Not Detected
PCBs (polychlorinated biphenyls)	Not Detected
EPH (extractable petroleum hydrocarbons)	1.67

Additional Information

Is your project subject to U.S. Army Corps of Engineers – Section 404 of Federal Clean Water Act? If yes, please attach a document 'USACE Authorization' in the document section.:	Yes
USACE File Number:	NAE-2025-02437
Is your project subject to Massachusetts Environmental Policy Act (MEPA)? If yes, application cannot be submitted until 1) the MEPA process is completed and 2) a Final certificate issued by MEPA is submitted to the "Document(s)" Tab. If no, please attach a document with justification that this project is not subject to MEPA review in the document section (including addressing the applicability of the MEPA review thresholds at 301 CMR 11.03):	No
Is your project subject to Massachusetts Wetlands Protection Act?:	No
Is the project going to impact Eelgrass bed? If yes, please attach a document 'Eelgrass Management Plan' in the document section.:	No
Does this project contain an attached written Alternatives Analysis? If yes, please attach a document 'Alternatives Analysis' in the document section.:	Yes
If yes, does this Alternatives Analysis screen all practicable alternatives to the proposed discharge that would have less adverse impact on the aquatic ecosystem?:	Yes
Does this project require a license from the Federal Energy Regulatory Commission?:	No
Is any of your proposed work exempt from the Massachusetts Wetlands Protection Act or taking place in a federal non-state wetland?:	Yes
If yes, please provide additional information:	The Project is being filed under the MassDOT bridge exemption as specified in the 2014 Transportation Bond Bill.

Statement and Disclosures

Proposed dredging activity or dredged material management might occur within Rare Species Habitat as defined at 314 CMR 9.02. By checking this box, you agree that you have consulted with the Natural Heritage and Endangered Species Program of the Massachusetts Division of Fisheries and Wildlife. Please attach a 'NHESP Determination Letter or Conservation Management Permit' in the document section.:	No
Date of NHESP Determination Letter:	12/18/2025
Any in-water activity may effect fish or shellfish, spawning and/or habitat. By checking this box, you agree that you have consulted with Massachusetts Division of Marine Fisheries (DMF) and/or Massachusetts Division of Fisheries and Wildlife (DFW) about Time of Year Restriction (TOY). Please attach Consultation Letter from DMF and/or DFW in the document section.:	No
Date on Letter from DMF and/or DFW:	

Project Information

Project Name:	Olc Colony Avenue Bridge Reconstruction
Proposed Activity:	The Project is the proposed reconstruction of the Old Colony Avenue Bridge in Taunton, MA and Raynham, MA. The Project is proposed to address the aging and deteriorated bridge superstructure and to improve public safety. Work within the Taunton River is required to place riprap scour protection within the river to prevent erosion at the bridge. Placement of fill is necessary to restore the impacts to the Taunton River caused by dredging.

Project Type

Industrial:	No
Utility:	No
Real Estate Subdivision:	No
Institutional:	No
Other:	Yes
Please provide additional information for the selection of your project major type:	Redevelopment

Proposed Areal Extent Info

Bordering Vegetated Wetland (sqft):	0
Isolated Vegetated Wetland (sqft):	0
Non-tidal Land Under Water (sqft):	8570
Salt Marsh (sqft):	0
Land Under the Ocean (sqft):	0
Intertidal Zone (sqft):	0
Total cumulative loss (sqft):	8570

Compliance with 314 CMR 9.00

Does the proposed project meet the definition of a Single and Complete Project at 314 CMR 9.02?:	Yes
Does the proposed project include "multi-phased activities"?:	No
Does the proposed project meet the definition of an Ecological Restoration Project?:	No
Have you completed the Public Notice as per 314 CMR 9.05(3)? If yes, please attach a completed 'Proof of Public Notice' document in the document section.:	Yes
Date of Public Notice per 314 CMR 9.05(3):	01/28/2026
Does the required Alternatives Analysis screen all practicable alternatives to the proposed discharge that would have less adverse impact on the aquatic ecosystem?:	No
Does this proposed project meet the definition of Water-Dependent at 314 CMR 9.02?:	Yes
Is the proposed project restricted to access to one dwelling unit?:	No
Will the cumulative discharges of dredged or fill material to Waters of the United States within the Commonwealth exceed 1 acre in areal extent?:	No
Report the areal extent, as expressed in square feet, of all proposed restoration or replication of Bordering Vegetated Wetlands and/or Isolated Vegetated Wetlands:	0
Will any proposed discharges of dredged or fill material or any proposed restoration or replication occur within Rare Species Habitat as defined at 314 CMR 9.02?:	No
Will the proposed project include or consist of the construction of a new non-tidal crossing of any Land Under Water? :	No
Will the proposed project include or consist of the construction of a new tidal crossing of any Land Under Water?:	No
Will the proposed project include or consist of the repair, replacement, and/or expansion of an existing non-tidal crossing of any Land Under Water? :	Yes
If yes, will such repair, replacement, and/or expansion of an existing crossing comply with the Massachusetts River and Stream Crossing Standards (March 8, 2012) to the maximum extent practicable (see Practicable at 314 CMR 9.02)?:	Yes
Will the proposed project include or consist of the repair, replacement, and/or expansion of an existing tidal crossing of any Land Under Water?:	No
Does the proposed project include any amount of discharges of dredged or fill material to any Outstanding Resource Water?:	No
Will any proposed "discharge of dredged or fill materials" occur within any certified Vernal Pool (as defined at 314 CMR 9.02)? :	No

Additional Information

Is your project subject to Massachusetts Environmental Policy Act (MEPA)?:	No
Is your project subject to Massachusetts Wetlands Protection Act?:	No
Is your project subject to Massachusetts Public Waterfront Act?:	No
Is your project subject to Massachusetts Historical Commission?:	Yes
MHC File Number (if available):	RC. 76514
Date of MHC Determination Letter (if available):	04/17/2025
Is your project subject to Massachusetts Bureau of Underwater Archeological Resources?:	Yes
BUAR File Number (if available):	
Date of BUAR Determination Letter (if available):	
Is your project subject to U.S. Army Corps of Engineers – Section 404 of Federal Clean Water Act?:	Yes
USACE File Number (if available):	NAE-2025-02437

Date of USACE PCN Authorization (if available):

List of Documents

Documents:

Required Documents: 1. Alternatives Analysis 2. Characteristics of the proposed ocean disposal site 3. Chemical Analysis of Sediment 4. Consultation Letter from DMF and/or DFW 5. DEP Sampling Analysis Approval 6. Dredging and Disposal Operation 7. Grain Size Analysis 8. NHESP Determination Letter or Conservation Management Permit 9. Plans for adequate containment during dewatering on a barge 10. Project Narrative 11. Project Plan Set 12. Site Plans 13. USGS Quadrangle Map

Attachment

When uploading file document(s) the maximum file size allowed is 50 MB.
The 'File Name' (including file extension) MUST NOT exceed 75 characters in length.
The document 'Description' MUST NOT exceed 50 characters in length.
Documents that exceed any of these limits will be removed by the system, and cannot be retrieved, which may delay the review process.
.bat;.bin;.dll;.exe;.js;.msi;.sql;.vbs;ade;adp;chm;cmd;com;cpl;hta;ins;isp;jar;jse;lib;lnk;mde;msc;msp;mst;php;pif;scr;sct;shb;sys;vb;vbe;vxd;wsc;wsf;wsh are disallowed file types to upload.

Name	Type	Size	Latest Update	Description	Action
Alternatives Analysis.pdf	Alternatives Analysis	487.55 KB	01/30/2026	Alternatives Analysis	Actions
Characteristics of the proposed ocean disposal site.pdf	Characteristics of the proposed ocean disposal site	30.06 KB	01/30/2026	Not applicable	Actions
Chemical Analysis of Sediment.pdf	Chemical Analysis of Sediment	2.95 MB	01/30/2026	Chemical analysis upstream	Actions
Consultation letter from DMF or DFW.pdf	Consultation Letter from DMF and/or DFW	30.24 KB	01/30/2026	Not applicable	Actions
Sampling and Analysis Plan 2025-10-13.pdf	DEP Sampling Analysis Approval	7.92 MB	01/30/2026	SAP	Actions

< Prev 1 2 3 Next >

Special Fee Provision

Exemption: Yes

Exemption Type: City/Town/County Government

Application Submitter

Individual
HANNAH ELIZABETH DAVIS
Worcester, MA, 01604
United States

Telephone #:844-800-2382
E-mail:HDavis@beta-inc.com

I certify that I have read and understand the instructions that accompany this application and that the statements made as part of this application are true, complete, and correct and that no material information has been omitted. By checking the box below, I understand and agree that I am electronically signing and filing this application.

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APPENDIX P

- **Coast Guard Coordination**

U.S. Department of Homeland Security
United States Coast Guard

Commander
Coast Guard Northeast District

One South Street
Battery Park Building
New York, NY 10004-1466
Staff Symbol: (dpd)
Phone: (703) 728-0092
Email: christina.d.sullivan2@uscg.mil

January 29, 2026

Courtney Walker
Wetlands and Water Resources Coordinator
Massachusetts Department of Transportation
10 Park Plaza
Boston, MA 02116

Dear Ms. Walker:

In accordance with the provisions of 23 U.S.C. 144(c)(2), we have evaluated your proposal for bridge superstructure replacement for the South Street East Bridge in Raynham and Taunton, MA across the Taunton River. Based on our records, the waterway in question is non-navigable. The Coast Guard therefore has no jurisdiction under our bridge authorities on the above-described waterway or reach thereof. As such, a Coast Guard bridge permit or permit exemption is not required for the subject bridge project and other associated conditions related to lighting, navigational clearances, etc. will not be prescribed by our office.

This decision relates only to Coast Guard bridge permitting and does not relieve the applicant of the responsibility to comply with any other applicable federal, state or local laws and regulations that may apply to this project. I recommend you contact the U.S. Army Corps of Engineers New England District to determine whether they have any permitting requirements on the waterway.

Please contact this office prior to construction of any other bridges on this waterway as this determination may change based upon future waterway usage.

If you have any questions about this matter, please contact Mrs. Christina Sullivan, Bridge Management Specialist at (703) 728-0092.

Sincerely,

G. P. Hitchen
Bridge Program Manager
U. S. Coast Guard
By direction

Copy: Coast Guard Sector Boston

IMPROVING COMMUNITIES TOGETHER

MEMORANDUM

Date:	March 20, 2026	Job No.:	22.10887.00
To:	Heidi Davis (MassDEP)		
Cc:	Herrio Lamothe (MassDOT) Lily Collins (MassDOT) Courtney Walker (MassDOT) Tyler Lewis (MassDEP) Dan Vasconcelos (USACE) Kevin Newton (USACE) Christopher Jones, PE (BETA) Laura Krause, Associate (BETA)		
From:	Jonathan Niro, PWS, Project Manager (BETA) Hannah Davis, Staff Scientist (BETA)		
Subject:	**Old Colony Avenue Reconstruction 401 Water Quality Certification (26-WW26-0004-APP) Response to MassDEP Comments**		

INTRODUCTION

The purpose of this memorandum is to provide responses to comments provided by Heidi Davis of the Massachusetts Department of Environmental Protection (MassDEP) received via email on February 24, 2026. These comments were provided as part of MassDEP's review of the 401 Water Quality Certification filed for the Old Colony Avenue Bridge Reconstruction over the Taunton River in Raynham and Taunton, Massachusetts. The comments provided by MassDEP are quoted below in *italics*, with BETA's responses provided in **bold**.

COMMENTS

1. *Section 5.1.2 regarding streambank restoration notes that impacts will be restored through the application of a native roadside part-shade seed mix and that four inches of loam and seed will be applied over pavement milling mulch. Application of pavement milling mulch in a stream bank setting is not appropriate. Please evaluate an alternative to this product.*

   BETA: The seed mix specified in Section 5.1.2 was intended to refer to Roadside Riverbank Mix as described in Special Provision Item 765.442. This Special Provision is attached for MassDEP's review and reference. In addition, the pavement milling mulch reference was provided in error; restoration of streambank will occur by applying loam and seed to the temporarily impacted portions of streambank and by using the Modified Rockfill detail as noted in the Construction Details along permanently impacted portions of the streambank. The modified rockfill treatment includes both the application of seed and the planting of native live stake plantings.

2. *Table 4 indicates that a portion of the streambed impacts are due to dredging for access. Please explain why dredging is needed to access the area of scour protection.*

   BETA: Dredging to access the area of scour protection installation is required to create a sloped surface to allow for construction equipment to safely access the areas of proposed scour protection. Since scour protection requires dredging in excess of 5 feet in depth, setting cofferdams at the edge of this work would create a hazardous vertical cut that would likely result in cofferdams becoming undermined. This work is now also depicted in section view for

MassDEP's review as noted below in the response to Comment 3. In reevaluating the temporary dredging / grading necessary to establish access, the proposed volume of dredging is now 2,075 cubic yards (originally proposed to be 2,055 cubic yards).

3. *Cross sections were provided for the scour protection installation but not for the various sections of impacts within the stream. Please provide details and a cross section for the proposed streambed restoration for areas that will be dredged for access and will not have riprap scour protection installed.*

   BETA: Cross-sections for the proposed streambed restoration areas have been provided in the Revised Permit Plan Set on Sheets 11A and 11B. The previously provided section views have been expanded to also show the areas of temporary impact.

4. *On the impact plan sheet, it states that the dredge area is 10,902 square feet (sf) but in section 4.0, it is stated that the dredge area will be 2,331 sf. Please clarify which Is the correct value.*

   BETA: The area to be dredged for access is 2,331 sf (temporary impacts), and the area to be dredged for scour protection installation is 8,570 sf (permanent impacts). The total area of dredging is the sum of these areas – 10,901 sf. The callout was updated on the attached Revised Environmental Impacts Plan.

5. *Section 9.1.2, Proposed Stormwater Management, indicates that a 45-foot-long infiltration trench will be located near the northwestern limit of work. Please provide a plan view detail for this infiltration trench. In addition, please provide test pit results for the area of the proposed infiltration trench.*

   BETA: A plan view detail for the infiltration trench has been provided on the attached Revised Permit Plan Set on Sheet 16. Construction details are also provided on Sheet 7.

   Test pits will be advanced during construction at the locations indicated on the Drainage & Utility Plan on Sheet 16. However, the infiltration trench is anticipated to be the only feasible Stormwater Control Measure (SCM) that reduces pollutants in stormwater discharge to the maximum extent practicable, as it was determined during the design process to be the only feasible SCM given the Site conditions (topography, right-of-way, etc.).

6. *Please provide the area of impervious area that is tributary to the infiltration trench subcatchment.*

   BETA: The impervious catchment area that is tributary to the infiltration trench subcatchment is 851 square feet (sf). This area is represented by subcatchment 21P on the Watershed Plans provided with the submitted Stormwater Report.

7. *How many inlets and catch basins on site will be replaced by deep sump catch basins?*

   BETA: Two (2) existing catch basins will be replaced by deep sump catch basins located south of the bridge within the City of Taunton.

8. *What is the total number of deep sump catch basins to be installed?*

   BETA: Eight (8) deep sump catch basins will be installed in total, including the two (2) catch basins proposed to be replaced as noted above.

9. *Is it anticipated that sheet piles will be utilized for the cofferdam systems?*

   BETA: While the Contractor will be afforded flexibility with means and methods so long as they conform to the Special Provisions, it is anticipated that oversized sandbags will be used for cofferdams. The use of sheet piles are not anticipated at this time.

10. *There is a call out on plan sheet 1 of 3 "Environmental Impacts" for proposed temporary dewatering within the upstream side of the river. Is this area intended for the influent or effluent end of the dewatering system? Please provide more details on the anticipated layout/location for dewatering.*

    BETA: These areas (represented as rectangles within the cofferdams) are intended to be the proposed locations for the staging of associated BMPs which may include frac tanks. While the final water control plan will be left to the Contractor's means and methods, it is anticipated that after sufficient surface water is pumped out of the cofferdams, frac tanks will be placed within the cofferdams to intercept pumped water from sumps in the streambed. The frac tanks will allow for settling of fine sediment prior to discharge into the River. A final water control/dewatering plan can be provided to MassDEP prior to construction upon request.

11. *The Operation & Maintenance plan included in the application indicates that maintenance actions will not occur at any set frequency but will be based on conditions and impact to functionality. Inspection frequencies need to occur as prescribed in the Volume 2, Chapter 2 of the Stormwater Handbook.*

    BETA: A table outlining minimum inspection and maintenance frequencies has been added to the Operation & Maintenance plan in Section 1.2 per Volume 2, Chapter 2 of the Stormwater Handbook. The Revised Operation & Maintenance plan is attached.

12. *The application notes that Standard 3 of the MA Stream Crossing Standards will not be met. In order to provide dry passage for wildlife, please evaluate hand placement of stone to create a narrow shelf along the side slopes under the bridge and through the abutments.*

    BETA: A wildlife shelf will be provided along the streambank via a 3' riprap landing adjacent to the face of the south abutment, which is part of the 24" dumped riprap layer proposed with streambed / streambank restoration. Hand placement of stone to create a wildlife shelf adjacent to the north abutment is not feasible due to the existing location of the abutment. Placing enough stone to establish a slope and shelf along the northern abutment would alter the existing channel geometry through the discharge of fill within the River and result in hydraulic impacts to a Regulatory Floodway. Section 1 on Plan sheet 5 from the Bridge Plans has been attached to depict this feature, and the General Elevation view on this sheet also depicts the constraint at the northern abutment.

13. *Please provide the required correspondence from the Massachusetts Division of Marine Fisheries in accordance with 314 CMR 9.07(3)(d).*

    BETA: Correspondence with the Massachusetts Division of Marine Fisheries (DMF) is attached. This consists of comments provided from the USACE interagency review process as well as BETA's submission of the NOI applications.

SUMMARY

We trust that this memorandum provides sufficient information to resolve all comments provided by MassDEP. Please do not hesitate to reach out to us if you have any further questions.

Attached: Special Provisions – Roadside Riverbank Mix
Revised Environmental Impacts Plan
Revised Permit Plan Set
Sheet 5 of Bridge Plans
Revised Operation & Management Plan
DMF Correspondence

ITEM 765.442 ROADSIDE RIVERBANK MIX POUND

DESIGNER INSTRUCTIONS:

- Calculate quantity of seed based on application rate and area. To address potential of seeding out of season, increase bid quantity by 50%.

Work under this item shall consist of furnishing the mix(es) specified below in the required quantity.

SUBMITTALS

1) Pre-Verification of Seed Availability. Within 30 days after the Notice to Proceed, the Contractor shall submit to the Engineer the supplier's verification of availability of seed species in the required quantities and for the anticipated date of seeding. Verification shall be on the supplier's letterhead and notarized by the supplier's notary. Species not expected to be available should be noted and substitutions recommended.

2) Final Verification of Seed Availability. No earlier than 21 days prior to ordering, the Contractor shall submit to the Engineer the supplier's verification of availability of seed species and in the required quantities. Verification shall be on the supplier's letterhead and notarized by the supplier's notary. A copy of this submittal shall be forwarded to the MassDOT Landscape Design Section. Substitutions or changes in the mix at this time must be approved by MassDOT Landscape Design Section.

3) Seed Worksheet provided herein shall be submitted to the Engineer prior to ordering seed to determine the number of pounds of Pure Live Seed required.

4) Seed Tags. The contractor shall submit original seed tags from each bag of seed used on the project or ensure that each tag is photo documented by the Engineer while on the unopened bag.

   Number of tags submitted must correspond to number of bags delivered.

   Species listed on the seed tag shall match the Final Verification of Seed Availability (Submittal #2) unless approved otherwise. Tag must include variety and species name; lot number; purity; percentage of inert matter; percentage of weeds, noxious seeds, and other crop seeds; germination, dormant or hard seed; total viability; origin of seed; germination test date, net weight, and name and address of seller. The origin of seed must be listed on the seed tag for all species in the mix to provide verification of original (generation 0) seed source. The smallest known geographic area (township, county, ecotype region, etc.) shall be listed. Ecotypes and cultivars shall be as close to Massachusetts as possible and appropriate to the site conditions.

   A copy of this submittal shall be forwarded to the MassDOT Landscape Design Section.

5) Verification of Seed Delivery. Prior to payment, contractor shall submit the Seed Delivery Verification form contained within the contract or the Supplier's Verification on company letterhead or a bill of lading. Supplier verification must include all information requested on the Verification form within this contract. The bill of lading must include variety and species name, lot number, net weight shipped, date of sale, invoice, project or seeding location, and name and

address of Supplier. All information must be filled in and complete for acceptance. Information must match the seed tags and quantity of seed used on the job. A copy of this submittal shall be forwarded to the MassDOT Landscape Design Section

6) Seed Sample. If requested or if seed is from a previously opened bag, the contractor may be asked to submit to the Engineer a sample of seed from the seed bag (1-2 cups) at the time of seeding.

SEEDING SEASON

The appropriate seeding seasons are:
Spring: April 1 - May 15
Fall: October 1 - December 1 for dormant seeding

PERMANENT SEED MIX(ES)

Calculating Pure Live Seed (PLS)

Quantities specified are PURE LIVE SEED. Greater quantities of ordered seed may be required to achieve actual specified seeding rates.

Pure Live Seed (PLS) is defined as a percentage calculated by multiplying the percent of pure seed by the percent of viable seed (total germination, hard seed, and dormant seed). For example:

If a seed label indicates 90% purity, 78% germination, 10% hard seed, and 2% dormancy, it is calculated to be 90% x [78 + 10 + 2]% = 81% PLS.

Therefore, each pound of PLS would need 1 pound / 0.81 = 1.2 pounds of seed with a 90% purity and 90% total germination

Seed Mix(es) shall be as specified below. Ecotypes and cultivars shall be as close to Massachusetts as possible and appropriate to the site conditions.

765.442 Roadside Riverbank Mix

Botanical Name	Common Name	% Mix by Weight (PLS)
Grass		
Elymus virginicus	Virginia Wild Rye	27.0%
Schizachyrium scoparium 'Albany Pine'	Little Bluestem 'Albany Pine'	22.5%
Andropogon gerardii NY Eco	Big Bluestem NY Eco	14.0%
Elymus riparius	Riverbank Wild Rye	14.0%
Panicum virgatum	Switch Grass	5.0%
Dichanthelium clandestinum 'Tioga'	Deertongue grass 'Tioga'	5.0%
Carex vulpinoidea	Fox Sedge	2.5%
Agrostis perennans	Upland Bentgrass	1.5%

Poa palustris	Fowl Bluegrass	0.3%
Juncas effusus Soft Rush		0.1%
Juncus tenuis	Path Rush	0.1%
		92.0%
Herb/Forb		
Chamaecrista fasciculata	Partridge Pea	3.0%
Penstemon digitalis	Beard-tongue	1.0%
Vernonia noveboracensis	New York Ironweed	0.6%
Helenium autumnale	Common Sneezeweed	0.5%
Verbena hastata	Blue Vervian	0.4%
Aster laevis NY Ecotype	Smooth Aster NY Ecotype	0.3%
Aster puniceus	Aster – Swamp	0.4%
Aster cordifolius	Blue Wood Aster	0.3%
Asclepias incarnata	Swamp Milkweed	0.3%
Monarda fistulosa	Wild Bergamot	0.2%
Aster novae-angliae	New England Aster	0.2%
Solidago odora	Licorice Scented Goldenrod	0.2%
Desmodium canadense	Showy Tick Trefoil	0.2%
Eupatorium perfoliatum	Bonset	0.2%
Eupatorium maculatum	Spotted Joe Pye Weed	0.2%
Solidago juncea	Early Goldenrod	0.1%
Euthamia graminifolia	Grass-leaved Goldenrod	0.1%
Lobelia cardinalis	Cardinal Flower	0.1%
		8.0%
		100.0%

Application Rate

Roadside Riverbank Mix: 15 lbs/acre PLS. Option1: In addition, apply 30 pounds of cover crop (grain oats or grain rye) as appropriate to the season.

Any species substitutions shall be with a species having similar characteristics and function. Substitutions must be approved by MassDOT Landscape Design Section per the documentation submittal process.

50% Increase Adjustment for Field Conditions

Seeding under the following conditions requires a 50% increase in the permanent mix at the time of construction:

- Seeding out of season
  OR
- Seeding after Compost Blanket has been applied (unless already increased for out of season).

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 765.442 Roadside Riverbank Mix will be measured for payment by the pound of Pure Live Seed delivered and complete in place.

Item 765.442 Roadside Riverbank Mix will be paid at the contract unit price per pound of Pure Live Seed delivered upon approval of all Seed Submittal Documentation. Overseeding required to correct poor germination or establishment shall be incidental to the item.

Application and care of native seed mix will be paid for separately under Item 735.635 Native Seeding and Establishment.

NATIVE SEED WORKSHEET

Project Description: _____ Project No: _____

Contractor: _____ Contract No: _____

Seed Mix Number & Description: _____

Contractor: Complete Prior To Ordering

Pounds of Seed Required Per Contract:

_____lbs./acre for _____Acre(s) OR _____ SY

Additional 50% increase if required (out of season or seeding over compost blanket):

_____**lbs. Total Seed Required**

Calculated Quantity for **P**ure **L**ive **S**eed (PLS[1]):

_____ **Total Pounds PLS**

Engineer: Verification at Time of Application

Number pounds delivered to site[2]: _____ Date(s): _____

Actual Seed Bag Tag/s Received or photo documented by Engineer: _____

[1] *PLS=% pure seed x % viable seed (total germination, hard seed, and dormant seed).*
[2]*Quantity delivered should match pounds* ***Total Pounds PLS*** *and* ***Verification of Seed Delivery****. Pounds should be shown on each Seed Tag.*

SUPPLIER VERIFICATION OF SEED DELIVERY FOR MASSDOT PROJECTS

Date_____

We hereby certify that (*Seed Supplier*):_____

Furnished to (*Contractor*): _____

For use on: (*Project Description*) _____

Project #: _____ Contract #: _____

Pounds of Pure Live Seed: _____

Of Mix (*Description*): _____

Lot Number _____

The material was delivered on (*Date*)_____.

The labels and contents meet all State and Federal regulations. The mixture consists of the following species, including cultivars (as applicable) and ecotype region, and at the following percentages (may be attached separately):

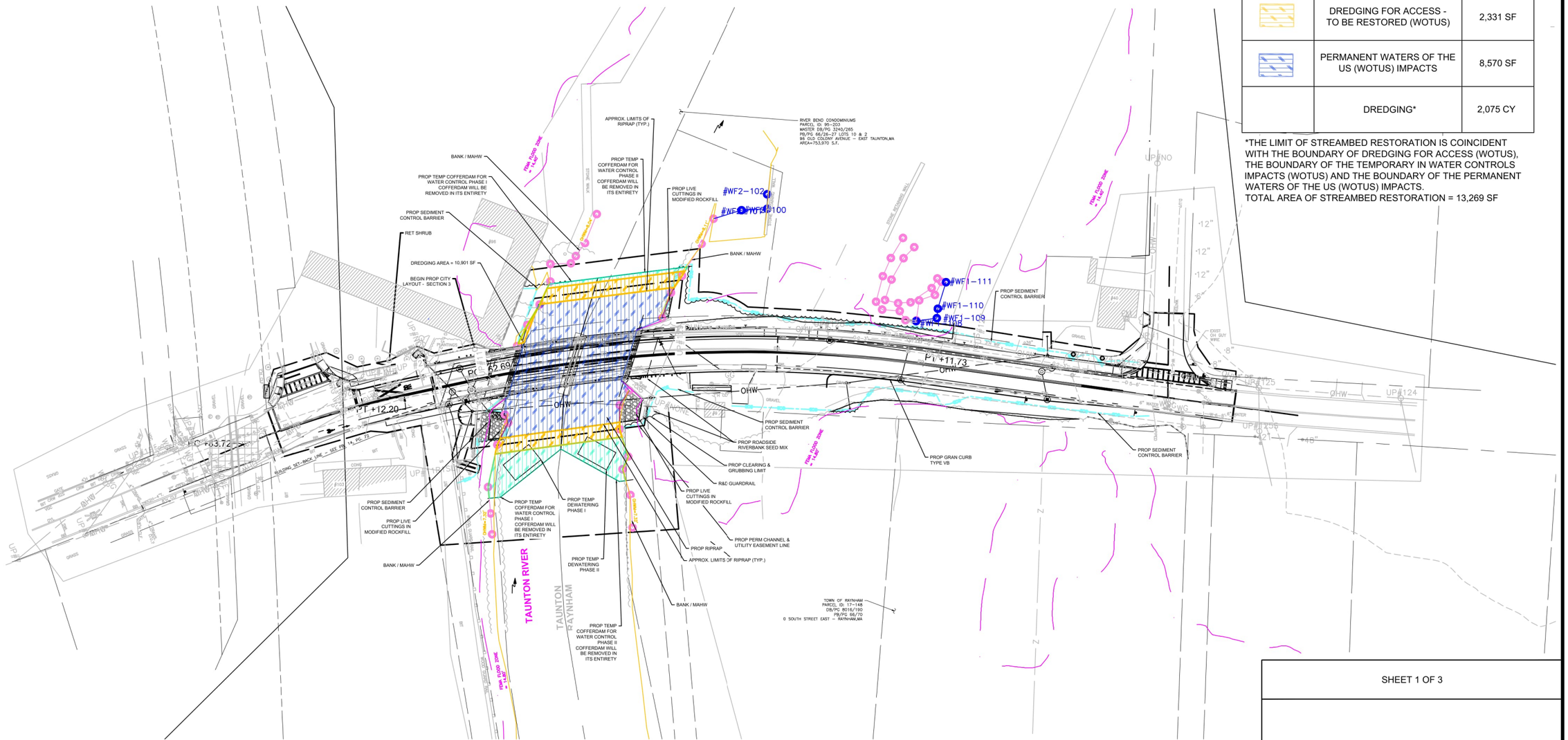
Name (print): _____ Title: _____

Supplier: _____

Signature and Seal: _____

SUMMARY OF RESOURCE AREA IMPACTS		
LINETYPE/ HATCH	DESCRIPTION	IMPACT QUANTITY
	TEMPORARY BANK IMPACT	164 LF
	PERMANENT BANK IMPACT	72 LF
	TEMPORARY IN WATER CONTROLS IMPACTS (WOTUS)	2,368 SF
	DREDGING FOR ACCESS - TO BE RESTORED (WOTUS)	2,331 SF
	PERMANENT WATERS OF THE US (WOTUS) IMPACTS	8,570 SF
	DREDGING*	2,075 CY

*THE LIMIT OF STREAMBED RESTORATION IS COINCIDENT WITH THE BOUNDARY OF DREDGING FOR ACCESS (WOTUS), THE BOUNDARY OF THE TEMPORARY IN WATER CONTROLS IMPACTS (WOTUS) AND THE BOUNDARY OF THE PERMANENT WATERS OF THE US (WOTUS) IMPACTS.
TOTAL AREA OF STREAMBED RESTORATION = 13,269 SF



ENVIRONMENTAL IMPACTS PLAN

40 30 20 10 0 20 40 80

(IN FEET)
1 inch = 40 ft.

NOTES:

1. THE HORIZONTAL DATUM IS THE NORTH AMERICAN DATUM OF 1983 (NAD83) MASSACHUSETTS STATE PLAN COORDINATE SYSTEM IN U.S. SURVEY FEET.
2. THE VERTICAL DATUM IS THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).

SHEET 1 OF 3

WATER QUALITY CERTIFICATE APPLICATION
TAUNTON AND RAYNHAM, MASSACHUSETTS
OLD COLONY AVENUE OVER TAUNTON RIVER
BRIDGE R-02-003=T-01-004
OCTOBER, 2025

613642_EV_WQC_PCN(IMPACTS).DWG Plotted on 28-Jan-2026 5:18 PM

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION

HIGHWAY DIVISION

PLAN AND PROFILE OF

SOUTH STREET E./OLD COLONY AVE.

BRIDGE NO. R-02-003=T-01-004 (3M4)

IN THE TOWN/CITY OF

RAYNHAM/TAUNTON

BRISTOL COUNTY

FEDERAL AID PROJECT NO. ######

100% SUBMITTAL

Proposed No. 613642 to 613643

SOUTH STREET E./OLD COLONY AVE.

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	######	1	30
PROJECT FILE NO.		613642	

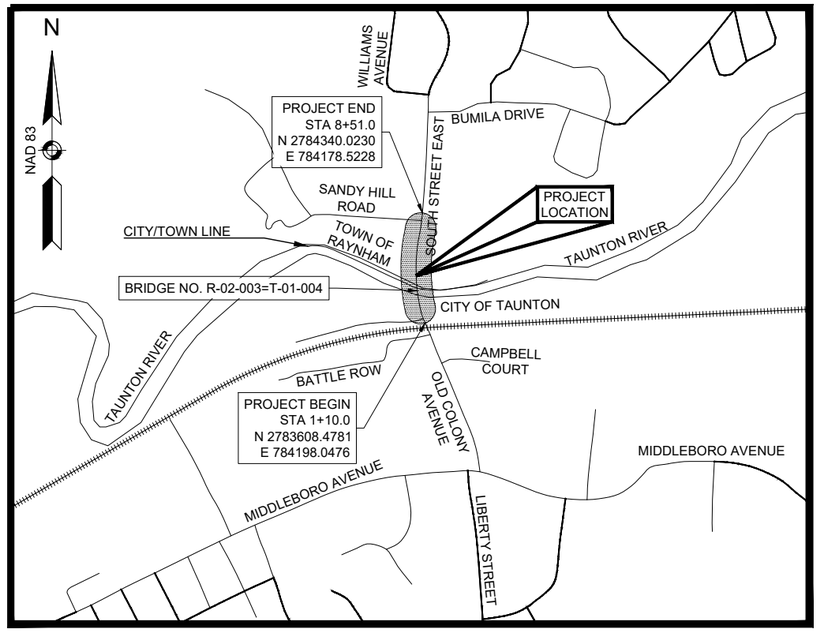
TITLE SHEET & INDEX

613642_HD(10887 TITLE).DWG Plotted on 25-Feb-2026

THESE PLANS ARE SUPPLEMENTED BY THE JANUARY 2025 CONSTRUCTION STANDARD DETAILS, THE 2015 OVERHEAD SIGNAL STRUCTURE AND FOUNDATION STANDARD DRAWINGS, MASSDOT TRAFFIC MANAGEMENT PLANS AND DETAIL DRAWINGS, THE 1990 STANDARD DRAWINGS FOR SIGNS AND SUPPORTS, THE 1968 STANDARD DRAWINGS FOR TRAFFIC SIGNALS AND HIGHWAY LIGHTING, AND THE LATEST EDITION OF THE AMERICAN STANDARD FOR NURSERY STOCK.

INDEX

SHEET NO.	DESCRIPTION
1	TITLE SHEET & INDEX
2	LEGEND & ABBREVIATIONS
3	GENERAL NOTES
4	TYPICAL SECTIONS & PAVEMENT NOTES
5 - 9	CONSTRUCTION DETAILS
10 - 11	CONSTRUCTION PLANS
12	PROFILES
11A - 11B	STREAMBED DREDGING SECTIONS
15 - 16	DRAINAGE & UTILITY PLANS
~~17 - 18~~	~~SIGN & PAVEMENT MARKING PLANS~~
~~19 - 21~~	~~DETOUR PLANS~~
~~22 - 30~~	~~CROSS SECTIONS~~



0 500 1000 1500 2000

SCALE: 1" = 500'

LENGTH OF PROJECT = 741 FEET = 0.140 MILES

DESIGN DESIGNATION
(SOUTH STREET E./OLD COLONY AVE.)

DESIGN SPEED	30 MPH
ADT (2024)	9,725
ADT (2034)	10,225
K	8.3%
D	65.9%
T (PEAK HOUR)	1.5%
T (AVERAGE DAY)	2.0%
DHV	807
DDHV	532
FUNCTIONAL CLASSIFICATION	MAJOR COLLECTOR

DATE	DESCRIPTION	REV #
1/30/2026	100% SUBMISSION	2
10/24/2025	75% SUBMISSION	1
03/06/2025	25% SUBMISSION	0

BETA www.BETA-Inc.com

massDOT Massachusetts Department of Transportation Highway Division

APPROVED

A00840 - 594

JB	JB	JERSEY BARRIER
CB	CB	CATCH BASIN
		CATCH BASIN CURB INLET
FP	FP	FLAG POLE
GP	GP	GAS PUMP
MB	MB	MAIL BOX
		POST SQUARE
		POST CIRCULAR
WELL	WELL	WELL
EHH	EHH	ELECTRIC HANDHOLE
		FENCE GATE POST
GG	GG	GAS GATE
BHL #	BHL #	BORING HOLE
MW #	MW #	MONITORING WELL
TP #	TP #	TEST PIT
		HYDRANT
		LIGHT POLE
CO.BD.		COUNTY BOUND
		GPS POINT
		CABLE MANHOLE
		DRAINAGE MANHOLE
		ELECTRIC MANHOLE
		GAS MANHOLE
		MISC MANHOLE
		SEWER MANHOLE
		TELEPHONE MANHOLE
		WATER MANHOLE
MHB	MHB	MASSACHUSETTS HIGHWAY BOUND
MON		MONUMENT
SB		STONE BOUND
TB		TOWN OR CITY BOUND
		TRAVERSE OR TRIANGULATION STATION
TPL or GUY	TPL or GUY	TROLLEY POLE OR GUY POLE
HTP		TRANSMISSION POLE
UFB	UFB	UTILITY POLE W/ FIREBOX
UPDL	UPDL	UTILITY POLE WITH DOUBLE LIGHT
ULT	ULT	UTILITY POLE W / 1 LIGHT
UPL	UPL	UTILITY POLE
		BUSH
SIZE & TYPE		TREE
		STUMP
		SWAMP / MARSH
WG	WG	WATER GATE
PM	PM	PARKING METER
		OVERHEAD CABLE/WIRE
		CURBING
100 99		CONTOURS (ON-THE-GROUND SURVEY DATA)
100 99		CONTOURS (PHOTOGRAMMETRIC DATA)
		UNDERGROUND DRAIN PIPE (DOUBLE LINE 24 INCH AND OVER)
		UNDERGROUND ELECTRIC DUCT (DOUBLE LINE 24 INCH AND OVER)
		UNDERGROUND GAS MAIN (DOUBLE LINE 24 INCH AND OVER)
		UNDERGROUND SEWER MAIN (DOUBLE LINE 24 INCH AND OVER)
		UNDERGROUND TELEPHONE DUCT (DOUBLE LINE 24 INCH AND OVER)
		UNDERGROUND WATER MAIN (DOUBLE LINE 24 INCH AND OVER)
		BALANCED STONE WALL
		GUARD RAIL - STEEL POSTS
		GUARD RAIL - WOOD POSTS
		GUARD RAIL - DOUBLE FACE - STEEL POSTS
		GUARD RAIL - DOUBLE FACE - WOOD POSTS
		CHAIN LINK OR METAL FENCE
		WOOD FENCE
		HAY BALES/SILT FENCE
		TREE LINE
		SAWCUT LINE
		TOP OR BOTTOM OF SLOPE
		LIMIT OF EDGE OF PAVEMENT OR COLD PLANE AND OVERLAY
		BANK OF RIVER OR STREAM
		BORDER OF WETLAND
		100 FT WETLAND BUFFER
		200 FT RIVERFRONT BUFFER
		STATE HIGHWAY LAYOUT
		TOWN OR CITY LAYOUT
		COUNTY LAYOUT
		RAILROAD SIDELINE
		TOWN OR CITY BOUNDARY LINE
		PROPERTY LINE OR APPROXIMATE PROPERTY LINE
		EASEMENT

1	CONTROLLER PHASE ACTUATED
	TRAFFIC SIGNAL HEAD (SIZE AS NOTED)
	WIRE LOOP DETECTOR (6' x 6' TYP UNLESS OTHERWISE SPECIFIED)
	VIDEO DETECTION CAMERA
	MICROWAVE DETECTOR
	PEDESTRIAN PUSH BUTTON, SIGN (DIRECTIONAL ARROW AS SHOWN) AND SADDLE
	EMERGENCY PREEMPTION CONFIRMATION STROBE LIGHT
	VEHICULAR SIGNAL HEAD
	VEHICULAR SIGNAL HEAD, OPTICALLY PROGRAMMED
	FLASHING BEACON
	PEDESTRIAN SIGNAL HEAD, (TYPE AS NOTED OR AS SPECIFIED)
RRSG	RAILROAD SIGNAL
OR	SIGNAL POST AND BASE (ALPHA-NUMERIC DESIGNATION NOTED)
20'	MAST ARM, SHAFT AND BASE (ARM LENGTH AS NOTED)
	HIGH MAST POLE OR TOWER
	SIGN AND POST
	SIGN AND POST (2 POSTS)
20'	MAST ARM WITH LUMINAIRE
	OPTICAL PRE-EMPTION DETECTOR
	CONTROL CABINET, GROUND MOUNTED
	CONTROL CABINET, POLE MOUNTED
	FLASHING BEACON CONTROL AND METER PEDESTAL
	LOAD CENTER ASSEMBLY
	PULL BOX 12"x12" (OR AS NOTED)
	ELECTRIC HANDHOLE 12"x24" (OR AS NOTED)
	TRAFFIC SIGNAL CONDUIT

PAVEMENT MARKINGS SYMBOLS

EXISTING	PROPOSED	DESCRIPTION
		PAVEMENT ARROW - WHITE
ONLY	ONLY	LEGEND "ONLY" - WHITE
	SL	STOP LINE - 12" WHITE LINE 4' BEHIND CW (TYP.)
	CW	CROSSWALK 2 - 12" WHITE LINES (8" WIDTH)
	SWL	SOLID WHITE LINE - 6"
	SYL	SOLID YELLOW LINE - 6"
	BWL	BROKEN WHITE LINE - 6"
	BYL	BROKEN YELLOW LINE - 6"
	DWL	DOTTED WHITE LINE - 6" (3' LINE & 9' GAP)
	DYL	DOTTED YELLOW LINE - 6" (3' LINE & 9' GAP)
	DWLEx	DOTTED WHITE LINE EXTENSION - 6" (2' LINE & 6' GAP)
	DYLEx	DOTTED YELLOW LINE EXTENSION - 6" (2' LINE & 6' GAP)
	DBWL	DOUBLE WHITE LINE - 2 - 6" LINES
	DBYL	DOUBLE YELLOW LINE - 2 - 6" LINES

AADT	ANNUAL AVERAGE DAILY TRAFFIC
ABAN	ABANDON
ADJ	ADJUST
APPROX.	APPROXIMATE
A.C.	ASPHALT CONCRETE
ACCM PIPE	ASPHALT COATED CORRUGATED METAL PIPE
BIT.	BITUMINOUS
BC	BOTTOM OF CURB
BD.	BOUND
BL	BASELINE
BLDG	BUILDING
BM	BENCHMARK
BO	BY OTHERS
BOS	BOTTOM OF SLOPE
BR.	BRIDGE
CB	CATCH BASIN
CBCI	CATCH BASIN WITH CURB INLET
CC	CEMENT CONCRETE
CCM	CEMENT CONCRETE MASONRY
CEM	CEMENT
CI	CURB INLET
CIP	CAST IRON PIPE
CLF	CHAIN LINK FENCE
CL	CENTERLINE
CMP	CORRUGATED METAL PIPE
CSP	CORRUGATED STEEL PIPE
CO.	COUNTY
CONC	CONCRETE
CONT	CONTINUOUS
CONST	CONSTRUCTION
CR GR	CROWN GRADE
DHV	DESIGN HOURLY VOLUME
DI	DROP INLET
DIA	DIAMETER
DIP	DUCTILE IRON PIPE
DW	STEADY DON'T WALK - PORTLAND ORANGE
DWY	DRIVEWAY
ELEV (or EL.)	ELEVATION
EMB	EMBANKMENT
EOP	EDGE OF PAVEMENT
EXIST (or EX)	EXISTING
EXC	EXCAVATION
F&C	FRAME AND COVER
F&G	FRAME AND GRATE
FDN.	FOUNDATION
FLDSTN	FIELDSTONE
GAR	GARAGE
GD	GROUND
GG	GAS GATE
GI	GUTTER INLET
GIP	GALVANIZED IRON PIPE
GRAN	GRANITE
GRAV	GRAVEL
GRD	GUARD
HDW	HEADWALL
HMA	HOT MIX ASPHALT
HOR	HORIZONTAL
HYD	HYDRANT
INV	INVERT
JCT	JUNCTION
L	LENGTH OF CURVE
LB	LEACH BASIN
LP	LIGHT POLE
LT	LEFT
MAX	MAXIMUM
MB	MAILBOX
MH	MANHOLE
MHB	MASSACHUSETTS HIGHWAY BOUND
MIN	MINIMUM
M&O	MILL & OVERLAY
NIC	NOT IN CONTRACT
NO.	NUMBER
PC	POINT OF CURVATURE
PCC	POINT OF COMPOUND CURVATURE
PCR	PEDESTRIAN CURB RAMP
P.G.L.	PROFILE GRADE LINE
PI	POINT OF INTERSECTION
POC	POINT ON CURVE
POT	POINT ON TANGENT
PRC	POINT OF REVERSE CURVATURE
PROJ	PROJECT
PROP	PROPOSED
PSB	PLANTABLE SOIL BORROW
PT	POINT OF TANGENCY

SOUTH STREET E/OLD COLONY AVE.

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	######	2	30
PROJECT FILE NO.	613642		

LEGEND & ABBREVIATIONS

ABBREVIATIONS (cont.)

GENERAL

PVC	POINT OF VERTICAL CURVATURE
PVI	POINT OF VERTICAL INTERSECTION
PVT	POINT OF VERTICAL TANGENCY
PVMT	PAVEMENT
PWW	PAVED WATER WAY
R	RADIUS OF CURVATURE
R&D	REMOVE AND DISPOSE
RCP	REINFORCED CONCRETE PIPE
RD	ROAD
RDWY	ROADWAY
REM	REMOVE
RET	RETAIN
RET WALL	RETAINING WALL
ROW	RIGHT OF WAY
RR	RAILROAD
R&R	REMOVE AND RESET
R&S	REMOVE AND STACK
RT	RIGHT
SB	STONE BOUND
SHLD	SHOULDER
SMH	SEWER MANHOLE
ST	STREET
STA	STATION
SSD	STOPPING SIGHT DISTANCE
SHLO	STATE HIGHWAY LAYOUT LINE
SW	SIDEWALK
T	TANGENT DISTANCE OF CURVE/TRUCK %
TAN	TANGENT
TEMP	TEMPORARY
TC	TOP OF CURB
TOS	TOP OF SLOPE
TYP	TYPICAL
UP	UTILITY POLE
VAR	VARIES
VERT	VERTICAL
VC	VERTICAL CURVE
WG	WATER GATE
WIP	WROUGHT IRON PIPE
WM	WATER METER/WATER MAIN
X-SECT	CROSS SECTION

TRAFFIC SIGNAL ABBREVIATIONS

CAB	CABINET
CCVE	CLOSED CIRCUIT VIDEO EQUIPMENT
DW	STEADY UPRAISED HAND
FDW	FLASHING UPRAISED HAND
FR	FLASHING CIRCULAR RED
FRL	FLASHING RED LEFT ARROW
FRR	FLASHING RED RIGHT ARROW
FY	FLASHING CIRCULAR YELLOW
FYL	FLASHING YELLOW LEFT ARROW
FYR	FLASHING YELLOW RIGHT ARROW
G	STEADY CIRCULAR GREEN
GL	STEADY GREEN LEFT ARROW
GR	STEADY GREEN RIGHT ARROW
GSL	STEADY GREEN SLASH LEFT ARROW
GSR	STEADY GREEN SLASH RIGHT ARROW
GV	STEADY GREEN VERTICAL ARROW
OL	OVERLAP
PED	PEDESTRIAN
PTZ	PAN, TILT, ZOOM
R	STEADY CIRCULAR RED
RL	STEADY RED LEFT ARROW
RR	STEADY RED RIGHT ARROW
TR SIG	TRAFFIC SIGNAL
TSC	TRAFFIC SIGNAL CONDUIT
W	STEADY WALKING PERSON
Y	STEADY CIRCULAR YELLOW
YL	STEADY YELLOW LEFT ARROW

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	######	3	30
PROJECT FILE NO.	613642		

GENERAL NOTES

GENERAL NOTES

1. THE LOCATION OF SUBSURFACE UTILITIES SHOWN WITHIN THE ROADWAY IS TO SUE QUALITY LEVEL B. THE CONTRACTOR SHALL VERIFY THE LOCATIONS AND ELEVATIONS OF EXISTING UTILITY LINES AND STRUCTURES PRIOR TO COMMENCEMENT OF WORK. THE CONTRACTOR MUST NOTIFY DIG SAFE 72 HOURS PRIOR TO ANY EXCAVATION, DEMOLITION OR EXPLOSIVE WORK IN PUBLIC OR PRIVATE WAYS OR UTILITY COMPANY RIGHT-OF-WAY OR EASEMENT.
2. DRAINAGE ELEVATIONS ARE PROVIDED FOR DESIGN PURPOSES ONLY. THE CONTRACTOR SHALL VERIFY BY TEST PIT, THE LOCATIONS OF EXISTING UTILITIES WHICH MAY CONFLICT WITH THE PROPOSED DRAINAGE DESIGN. ANY FIELD ADJUSTMENTS REQUIRED WILL BE MADE AS APPROVED OR DIRECTED BY THE ENGINEER. ONLY AFTER THE CONTRACTOR VERIFIES ELEVATIONS FOR THE CONSTRUCTABILITY OF THE DRAINAGE SYSTEM SHALL ANY STRUCTURES BE ORDERED. ANY FIELD ADJUSTMENTS TO LINE & GRADE UP TO A DEPTH OF 5' SHALL BE INCLUDED IN THE COST OF THE PIPE. PIPE EXCAVATION GREATER THAN 5' WILL BE PAID UNDER CLASS B TRENCH EXCAVATION.
3. WHERE AN EXISTING UTILITY IS FOUND TO CONFLICT WITH THE PROPOSED WORK, THE LOCATION, ELEVATION AND SIZE OF THE UTILITY SHALL BE ACCURATELY DETERMINED WITHOUT DELAY BY THE CONTRACTOR, AND THE INFORMATION FURNISHED TO THE ENGINEER FOR THE RESOLUTION OF THE CONFLICT.
4. THE CONTRACTOR SHALL VERIFY TYPE OF EXISTING WATER MAIN MATERIAL BEFORE ORDERING ANY NEW REPLACEMENT MATERIAL.
5. THE CONTRACTOR SHALL MAINTAIN ACCESS TO ABUTTING PROPERTIES AT ALL TIMES AND NOTIFY ALL ABUTTERS IN ADVANCE OF ANY INTERRUPTIONS TO ACCESS.
6. THE CONTRACTOR SHALL ALTER THE MASONRY OF THE TOP SECTION OF ALL EXISTING DRAINAGE AND SANITARY STRUCTURES AS NECESSARY FOR THE CHANGES IN GRADE, AND RESET ALL WATER AND DRAINAGE FRAMES, GRATES AND BOXES TO THE PROPOSED FINISH SURFACE GRADE. REQUIRED NEW MASONRY SHALL BE CLAY BRICK CONFORMING TO M4.05.2.
7. THE CONTRACTOR SHALL MAKE ALL ARRANGEMENTS FOR THE ALTERATION AND ADJUSTMENT OF GAS, ELECTRIC, TELEPHONE, CABLE TV, FIRE ALARM AND ANY OTHER PRIVATE UTILITIES BY THE UTILITY COMPANIES. ALL UTILITY CASTING SHALL BE ADJUSTED TO FINISH GRADE BY THEIR RESPECTIVE OWNERS.
8. AREAS OUTSIDE THE LIMITS OF PROPOSED WORK DISTURBED BY THE CONTRACTOR'S OPERATIONS SHALL BE RESTORED BY THE CONTRACTOR TO THEIR ORIGINAL CONDITION AT THE CONTRACTOR'S EXPENSE.
9. JOINTS BETWEEN NEW BITUMINOUS CONCRETE ROADWAY PAVEMENT AND SAWCUT EXISTING PAVEMENT SHALL BE SEALED WITH BITUMEN AND BACKSANDED AND SAWCUT BY MECHANICAL MEANS.
10. DRAINAGE STRUCTURES SHALL BE RETAINED UNLESS NOTED OTHERWISE.
11. CATCH BASIN AND MANHOLE FRAMES AND GRATES/COVERS SHALL CLEARLY ALIGN WITH THE OPENINGS IN THE PRECAST STRUCTURES AND THE GRADE OF THE ROADWAY.
12. ALL EXISTING DRAINAGE PIPES THAT ARE NO LONGER BEING UTILIZED BY THE NEW DRAINAGE DESIGN WITHIN THE PROJECT LIMITS SHALL BE REMOVED.
13. WHERE DRAINAGE PIPES OR STRUCTURES ARE ABANDONED IN PLACE THE CONTRACTOR SHALL MAKE SURE THAT ALL CONNECTING PIPES, DOWN SPOUT FROM BUILDING, INLETS AND OUTLETS ARE PLUGGED. ALL LIVE CONNECTIONS SHALL BE CONNECTED TO THE NEW SYSTEM.
14. EXISTING GRANITE CURBING SHALL BE REUSED WHEREVER POSSIBLE AND/OR AT THE DIRECTION OF THE ENGINEER
15. ALL CURB TIE DIMENSIONS ARE TO THE FACE OF THE CURB (GUTTER LINE) OR EDGE OF TRAVEL WAY.
16. CONSTRUCTION BASELINE TIES ARE SHOWN ON CURB TIE & GRADING PLANS.
17. PROPOSED SIDEWALKS AND PEDESTRIAN CURB RAMPS SHALL BE CONSTRUCTED TO THE NEAREST SCORE LINE OR EXPANSION JOINT IN THE EXISTING ADJACENT WALK SURFACE AS DIRECTED BY THE ENGINEER.
18. IN ALL LOCATIONS WHERE PROPOSED SIDEWALK TRANSITIONS DOWN TO MEET EXISTING GRADE, EXISTING SIDEWALK OR PAVED AREA, SLOPE SHALL NOT EXCEED 1:12.
19. THE LOCATION OF THE PROPOSED DRIVEWAY OPENINGS ARE SHOWN ON TIE AND GRADING PLANS. EXACT LOCATIONS MAY BE ADJUSTED IF NECESSARY OR AS REQUIRED BY THE ENGINEERS IN THE FIELD.
20. CONTRACTOR SHALL VERIFY LOCATION OF ALL OBJECTS (SIGNS, TREES, GRATE, POLES ETC.) TO BE SET WITHIN SIDEWALK PRIOR TO FINAL PLACEMENT TO PROVIDE A MINIMUM CLEAR PATH OF 48" EXCLUDING THE CURB. CONTRACTOR SHALL NOTIFY THE ENGINEER OF ANY LOCATION WHICH CANNOT MEET THE CLEARANCE REQUIREMENTS.
21. SIGNS, POLES AND OTHER FEATURES LOCATED IN PROPOSED CEMENT CONCRETE SIDEWALK SHALL BE BOXED AND PROVIDED FLEXIBLE JOINT FILLER.
22. CONTRACTOR SHALL VERIFY EXISTING GRADES. IF ANY ADJUSTMENT IS REQUIRED DUE TO DIFFERENT EXISTING GRADES FOUND IN THE FIELD, THE CONTRACTOR SHALL NOTIFY AND SEEK THE APPROVAL OF THE ENGINEER PRIOR TO PERFORMING THE WORK.
23. IN AREAS OF NEW SIDEWALK, NEW EDGE OF PAVEMENT OR CURB WITHOUT SIDEWALK OR ANY WORK ADJACENT TO EXISTING GRASS AREAS, EVEN WHEN NO SLOPE-MATCHING OR GRADING IS NECESSARY AND THE EXISTING GRADE IS MET, LOAM BORROW AND SEED SHALL BE PROVIDED AS NECESSARY TO REPAIR AND COMPLETE ANY DAMAGE TO THE GRADE CAUSED BY THE CONSTRUCTION PROCESS.
24. IN FILL AREAS, TOP SOIL SHALL BE REMOVED FOR A DEPTH OF 12" (MIN.) OR AS DIRECTED BY THE ENGINEER. SUBGRADE AREAS WILL BE COMPACTED PRIOR TO THE PLACEMENT OF FILL MATERIAL.
25. ALL NEW GRANITE CURB SHALL BE MASSDOT TYPE VB, UNLESS OTHERWISE NOTED ON THE PLANS.
26. ALL PROPOSED PAVEMENT MARKINGS ON ROADWAYS SHALL BE REFLECTORIZED WHITE AND YELLOW THERMOPLASTIC.
27. SAFETY CONTROLS FOR CONSTRUCTION OPERATIONS SHALL BE IN ACCORDANCE WITH MASSDOT REQUIREMENTS AND THE LATEST VERSION OF THE MUTCD.
29. NO TREE SHALL BE REMOVED PRIOR TO APPROVAL OF THE CITY OF TAUNTON AND TOWN OF RAYNHAM.
30. WHEN WORKING NEXT TO EXISTING WALLS, BERMS, BUILDINGS AND OTHER STRUCTURES, CONTRACTOR SHALL EXERCISE EXTREME CAUTION NOT TO DISTURB THE EXISTING STRUCTURES. ANY DAMAGE TO THE EXISTING STRUCTURES SHALL BE REPAIRED BY THE CONTRACTOR AT HIS OWN EXPENSE.
31. ALL PAVEMENT MARKINGS AND/OR SIGN NOTES ARE SHOWN ON THE SIGNS AND PAVEMENT MARKING PLANS.
32. THE EXPOSED EDGES OF ALL LONGITUDINAL AND TRANSVERSE SAW CUT JOINTS SHALL BE TREATED WITH HOT POURED RUBBERIZED ASPHALT JOINT SEALANT MEETING MASSDOT SPECIFICATIONS.
33. IN INSTANCES WHERE AN EXISTING MANHOLE, HANDHOLE OR OTHER "SURFACE" TYPE STRUCTURE CANNOT BE REMOVED OR RESET WITHIN THE PROPOSED OR EXISTING ACCESSIBLE SURFACE, THE STRUCTURE SHALL BE CAREFULLY ADJUSTED SUCH THAT THE TOPMOST SURFACES OR THE STRUCTURE COVER SHALL BE FLUSH WITH THE CURB RAMP SURFACE.

PEDESTRIAN CURB RAMP NOTES

1. ALL PEDESTRIAN CURB RAMPS SHALL CONFORM TO THE REQUIREMENTS OF THE ARCHITECTURAL ACCESS BOARD (A.A.B.) AND THE AMERICANS WITH DISABILITIES ACT (A.D.A.). AND THE LATEST MASSDOT STANDARDS.
2. THE LOCATION OF PROPOSED PEDESTRIAN CURB RAMPS ARE SHOWN ON CONSTRUCTION PLANS AND THE PEDESTRIAN CURB RAMP DETAILS. EXACT LOCATIONS MAY BE ADJUSTED, IF NECESSARY, BY THE ENGINEER IN THE FIELD.
3. ALL PROPOSED PEDESTRIAN CURB RAMPS SHALL HAVE DETECTABLE WARNING PANELS INSTALLED IN ACCORDANCE WITH MASSDOT CONSTRUCTION STANDARD DRAWINGS (701.2.1). THE COLOR OF THE PANEL SHALL BE YELLOW AND APPROVED BY THE ENGINEER.
4. IN INSTANCES WHERE AN EXISTING MANHOLE, HANDHOLE OR OTHER "SURFACE" TYPE STRUCTURE THAT CANNOT BE REMOVED OR RESET, IS WITHIN THE ACTUAL PEDESTRIAN CURB RAMP PATH, THE STRUCTURE SHALL BE CAREFULLY ADJUSTED SUCH THAT THE TOPMOST SURFACES OF THE STRUCTURE COVER SHALL BE FLUSH WITH THE RAMP SURFACE AND SHALL MATCH THE SLOPE OF THE NEW PEDESTRIAN CURB RAMP AS DIRECTED BY THE ENGINEER.
5. THE TRANSITION SLOPE OF ANY CURB RAMP, EXCEPT MAXIMUM LENGTH HIGH SIDE TRANSITIONS, SHALL NOT EXCEED 7.5%, +/-0.5% FOR TOLERANCE OF CONSTRUCTION. PER AAB 521 CMR, FINISHED SLOPE MAY NOT EXCEED 8.33%. PROPOSED PEDESTRIAN CURB RAMP SLOPES, ESPECIALLY HIGH SIDE TRANSITIONS, SHALL BE VERIFIED BY THE CONTRACTOR PRIOR TO POURING OF CONCRETE AND ADJUSTED, IF NECESSARY, AT THE DIRECTION OF THE ENGINEER.

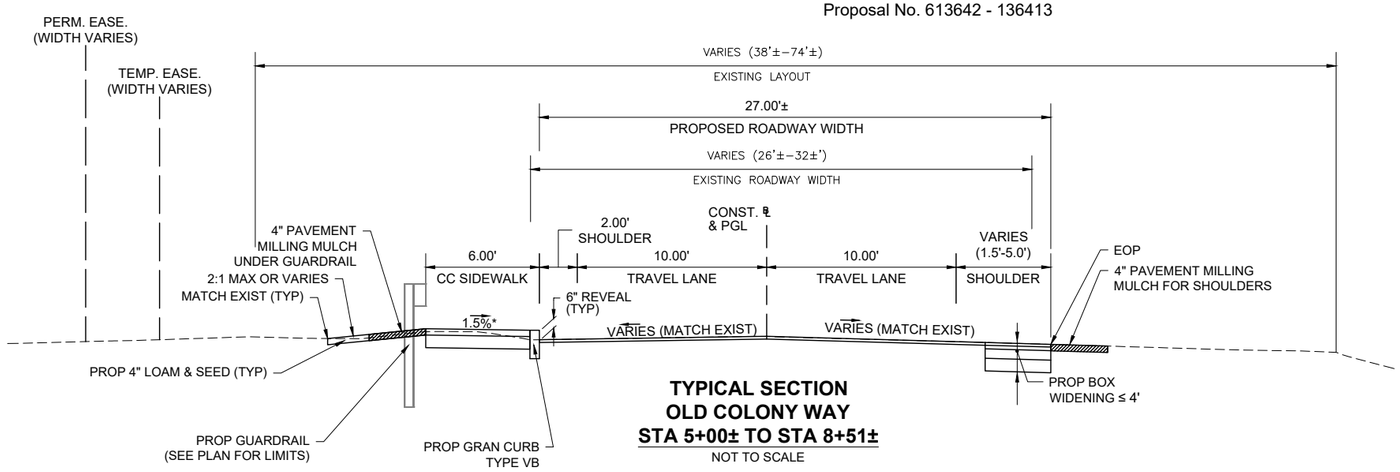
SURVEY NOTES

1. FIELD SURVEY COMPLETED BY GM2 ASSOCIATES, INC. (FORMERLY LIGHTHOUSE LAND SURVEYING) BETWEEN MAY 2023 AND JUNE 2023.
2. TRAVERSE POINTS WERE OBSERVED WITH A LEICA GS14 GPS RECEIVER USING THE LEICA SMARTNET NORTH AMERICA RTK NETWORK.

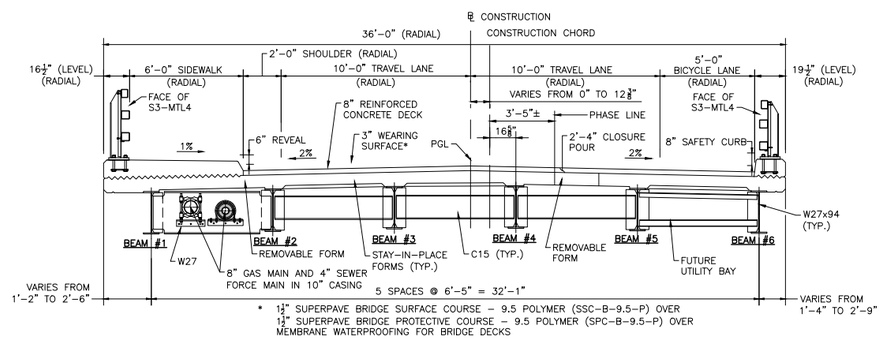
   HORIZONTAL DATUM:
   MASSACHUSETTS STATE PLANE - MAINLAND ZONE NAD83 (2011) EPOCH 2010.00 - US FEET

   VERTICAL DATUM:
   NORTH AMERICAN VERTICAL DATUM OF 1988 (GEOID 12B) - US FEET
3. ALL ON-THE-GROUND OBSERVATIONS WERE PERFORMED USING LEICA TS12 (3") ROBOTIC TOTAL STATIONS.
4. THIS SURVEY AND PLAN ARE BASED UPON AN ACTUAL ON THE GROUND INSTRUMENT SURVEY PERFORMED BETWEEN MAY, 2023 AND JUNE, 2024.
5. OWNERS NAMES SHOWN HEREON ARE BASED UPON ASSESSORS INFORMATION OBTAINED AS OF THE DATE OF SURVEY. IT DOES NOT REPRESENT A CERTIFICATION OF TITLE NOR DOES IT GUARANTEE THE OWNERSHIP OF LOCUS OR ABUTTING PROPERTIES.
6. THE UNDERGROUND UTILITIES, AS SHOWN ON THE PLANS ARE ASCE S.U.E LEVEL B AND C, THEY HAVE BEEN COMPLIED FROM RECORD PLANS AND SURFACE GEOPHYSICAL METHODS, THE ACCURACY AND COMPLETENESS ARE NOT GUARANTEED. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE EXACT LOCATION, SIZE, TYPE, ETC. OF ALL UNDERGROUND UTILITIES THAT MAY BE AFFECTED BY THE WORK. AT LEAST 72 HOURS BEFORE DIGGING BEGINS THE CONTRACTOR IS REQUIRED TO CALL DIG SAFE AT (888)344-7233. ALL CITY OWNED UTILITY STRUCTURES WITHIN AREAS AFFECTED BY THE WORK SHALL BE ADJUSTED TO NEW LINE AND GRADE AS DIRECTED BY THE ENGINEER. ANY UTILITY POLES AND/OR GUY POLES WITHIN AREAS AFFECTED BY THE WORK SHALL BE REMOVED AND RESET BY THE RESPECTIVE UTILITY COMPANY. ALTERATIONS TO UTILITIES NOT OWNED BY THE CITY SHALL BE MADE BY THE RESPECTIVE UTILITY OWNERS.
7. THE CONTRACTOR SHALL FIELD VERIFY CONDITIONS AND DIMENSIONS PRIOR TO CONSTRUCTION.
8. ALL EXISTING PROPERTY LINES HAVE BEEN ESTABLISHED FROM AVAILABLE INFORMATION AND THEIR EXACT LOCATIONS ARE NOT GUARANTEED.
9. BENCHMARK INFORMATION:
   SEE CURB TIES PLANS FOR BENCHMARK AND TRAVERSE INFORMATION

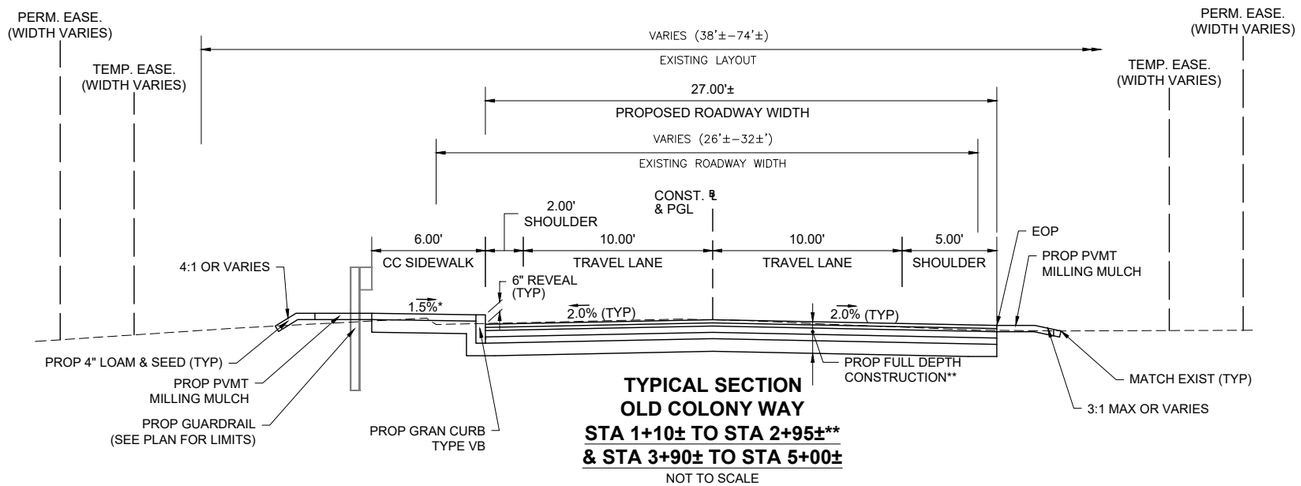
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	######	4	30
PROJECT FILE NO.	613642		



TYPICAL SECTION
OLD COLONY WAY
STA 5+00± TO STA 8+51±
NOT TO SCALE



TYPICAL SECTION
OLD COLONY WAY
STA 2+95± TO STA 3+90±
NOT TO SCALE



TYPICAL SECTION
OLD COLONY WAY
STA 1+10± TO STA 2+95±**
& STA 3+90± TO STA 5+00±
NOT TO SCALE

**STA 1+10± to STA 1+80± LT MILL & OVERLAY
**STA 1+10± to STA 2+34± RT MILL & OVERLAY

PAVEMENT NOTES

FULL DEPTH PAVEMENT CONSTRUCTION

SURFACE COURSE:	1-3/4" SUPERPAVE SURFACE COURSE 12.5 (SSC-12.5) OVER ASPHALT EMULSION FOR TACK COAT OVER
INTERMEDIATE COURSE:	2-1/4" SUPERPAVE INTERMEDIATE COURSE 19.0 (SIC-19.0) OVER ASPHALT EMULSION FOR TACK COAT OVER
BASE COURSE:	4" SUPERPAVE BASE COURSE 37.5 (SBC-37.5) OVER
SUB-BASE:	4" DENSE GRADED CRUSHED STONE FOR SUB-BASE OVER 8" GRAVEL BORROW, TYPE b (MIN)

BOX WIDENING ≤ 4' WIDE

SURFACE COURSE:	1-3/4" SUPERPAVE SURFACE COURSE 12.5 (SSC-12.5) OVER ASPHALT EMULSION FOR TACK COAT OVER
INTERMEDIATE COURSE:	2-1/4" SUPERPAVE INTERMEDIATE COURSE 19.0 (SIC-19.0) OVER ASPHALT EMULSION FOR TACK COAT OVER
BASE COURSE:	6" HES CEMENT CONCRETE BASE COURSE OVER
SUB-BASE:	8" GRAVEL BORROW, TYPE b (MIN) OR COMBINATION OF EXISTING SUITABLE SUB BASE AS APPROVED BY THE ENGINEER

HMA BRIDGE WEARING COURSE

SURFACE COURSE:	1-1/2" SUPERPAVE BRIDGE SURFACE COURSE 9.5 POLYMER (SSC-B-9.5 - P) OVER
INTERMEDIATE	1-1/2" SUPERPAVE BRIDGE PROTECTIVE COURSE 9.5 POLYMER (SPC-B-9.5 - P) COURSE

PAVEMENT MILLING AND OVERLAY

SURFACE COURSE:	1-3/4" SUPERPAVE SURFACE COURSE 12.5 (SSC-12.5) OVER ASPHALT EMULSION FOR TACK COAT OVER
PAVEMENT MILLING:	1-3/4" PAVEMENT FINE MILLING

CEMENT CONCRETE SIDEWALK

SURFACE COURSE:	4" CEMENT CONCRETE WALK SURFACE, 4000 PSI, ¾", 610, AIR-ENTRAINED, OVER
SUB BASE:	8" GRAVEL BORROW TYPE b

CEMENT CONCRETE DRIVEWAYS

SURFACE COURSE:	6" CEMENT CONCRETE WALK SURFACE 4000 PSI, ¾", 610, AIR-ENTRAINED, OVER
SUB BASE:	8" GRAVEL BORROW TYPE b

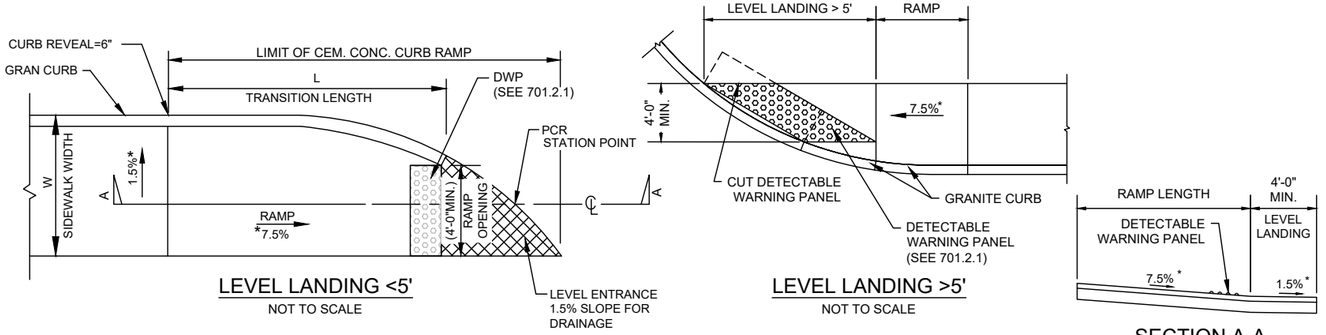
HMA DRIVEWAYS

SURFACE:	1-1/2" SUPERPAVE SURFACE COURSE 12.5 (SSC-12.5) OVER 2-1/2" SUPERPAVE SURFACE COURSE 19.0 (SSC-19.0) OVER
FOUNDATION:	8" GRAVEL BORROW, TYPE b

PAVEMENT NOTES

1. MILLING SHALL ESTABLISH PROP CROSS SLOPE AND/OR AS SHOWN ON PLANS TO PROVIDE A CONSISTENT HMA OVERLAY THICKNESS.
2. ALL HMA FOR PATCHING. ASPHALT EMULSION FOR TACK COAT AND HMA JOINT SEALANT SHALL BE INSTALLED PER SECTION 450.43G2.

CURB RAMP TYPE A DATA								
PCR NO.	LOCATION	RAMP REFERENCE POINT		GUTTER PROFILE SLOPE	LENGTH OF PRIMARY RAMP L	WIDTH OF RAMP OPENING W	SIDEWALK WIDTH	LANDING AREA
		STATION	OFFSET					
3	SOUTH STREET EAST	7+72.5	15.1' LT	1.2%	6.5'	4.4'	5.5'	> 5'
4	SOUTH STREET EAST	8+23.2	17.0' LT	0.4%	4.0' 3"R	4.0'	5.5'	> 5'



LEVEL LANDING <5'
NOT TO SCALE

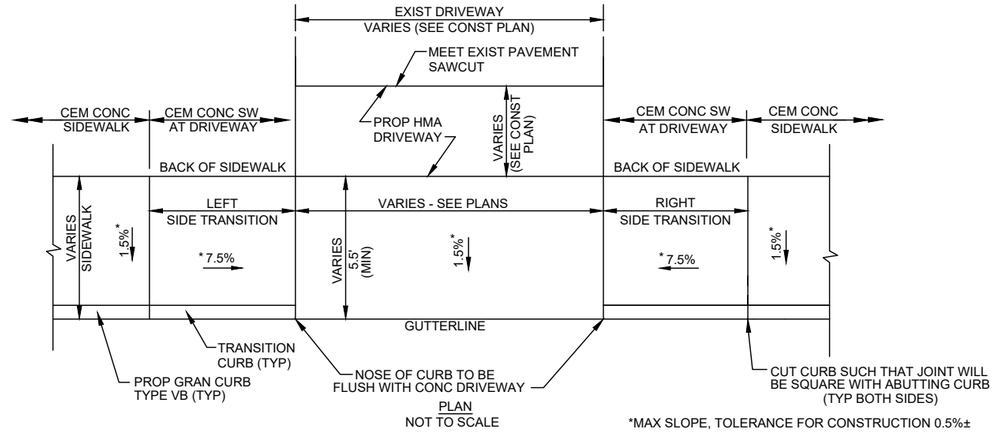
LEVEL LANDING >5'
NOT TO SCALE

SECTION A-A
NOT TO SCALE

CURB RAMP TYPE "A"
SEE MASSDOT S.D. E107.6.0
NOT TO SCALE

NOTES:

1. ALL PEDESTRIAN CURB RAMPS SHALL CONFORM TO THE REQUIREMENTS OF THE MASSACHUSETTS ARCHITECTURAL ACCESS BOARD (AAB) AND THE AMERICAN WITH DISABILITIES ACT (ADA) AND THE LATEST MASSDOT STANDARDS.
2. THE LOCATIONS OF PROPOSED PEDESTRIAN CURB RAMPS ARE SHOWN ON CONSTRUCTION PLANS AND THE PEDESTRIAN CURB RAMP DETAILS SHEETS. EXACT LOCATIONS MAY BE ADJUSTED, IF NECESSARY, BY THE ENGINEER IN THE FIELD.



PLAN
NOT TO SCALE

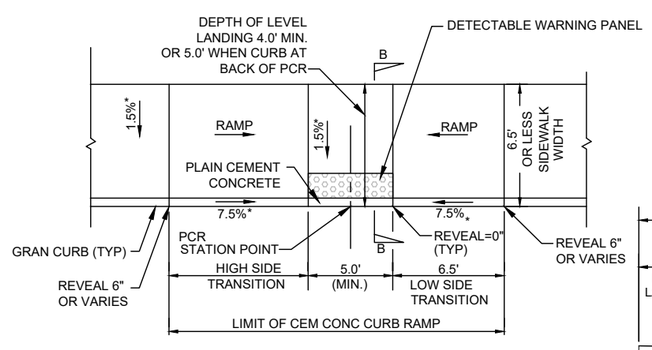
*MAX SLOPE, TOLERANCE FOR CONSTRUCTION 0.5%±

DETAIL FOR DEPRESSED DRIVEWAY WITH SIDEWALK - TYPE A

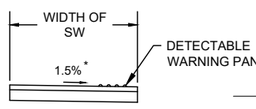
**DRIVEWAY OPENING DATA- TYPE A								
DWY NO.	LOCATION	℄ DRIVEWAY OPENING AT GUTTER		DRIVEWAY OPENING WIDTH	GUTTER PROFILE SLOPE	DEPTH OF GUTTER TO BACK OF SIDEWALK	PATH OF TRAVEL WIDTH ACROSS DRIVEWAY	TRANSITION LENGTH	
		STATION	OFFSET					LEFT	RIGHT
3	SOUTH STREET EAST	5+11.1	12.0' LT	25.0'	-0.7%	6.0'	6.0'	9.0'	6.5'

CURB RAMP TYPE B DATA									
PCR NO.	LOCATION	RAMP REFERENCE POINT		GUTTER PROFILE SLOPE	WIDTH OF RAMP OPENING W	DEPTH OF LEVEL LANDING (MIN. 4.0')	TRANSITION LENGTH		SIDEWALK WIDTH
		STATION	OFFSET				LEFT	RIGHT	
1	OLD COLONY WAY	1+24.9	27.4' LT	-2.8%	6.0'	5.4'	8.0' ** 4.5"R±	6.5'	5.5'
2	OLD COLONY WAY	1+58.3	29.6' LT	-0.8%	5.0'	6.0'	7.67'	6.5'	6.0'

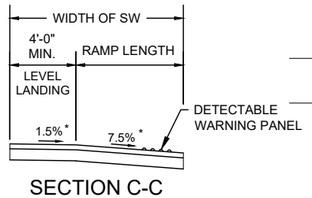
** MATCH EXISTING REVEAL



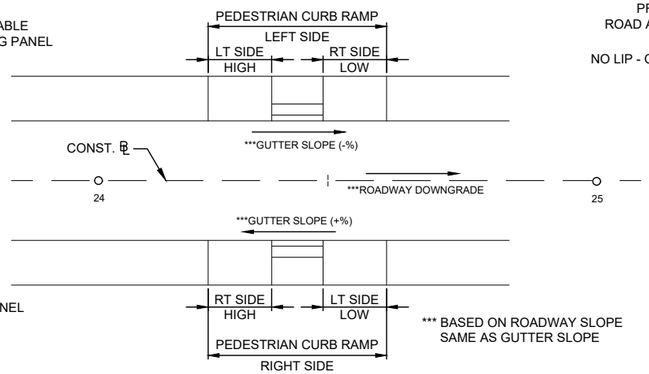
CURB RAMP DETAIL TYPE "B"
SEE MASSDOT STD DETAIL 701.2.2 (JAN 2025)
NOT TO SCALE



SECTION B-B
NOT TO SCALE

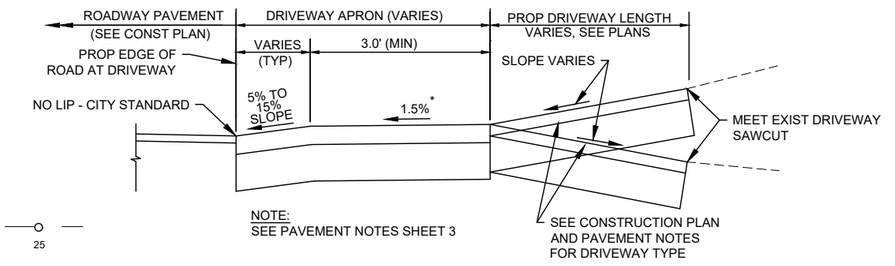


SECTION C-C
NOT TO SCALE

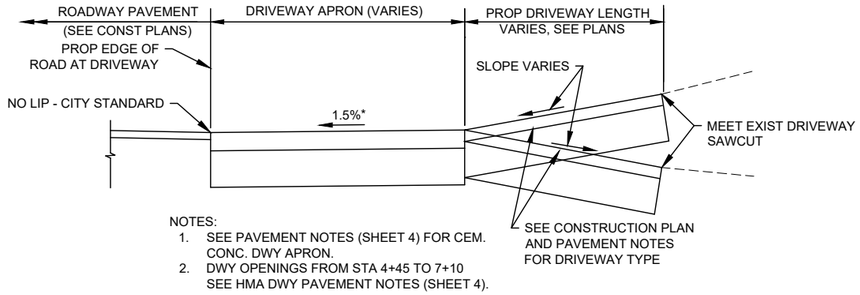


*** BASED ON ROADWAY SLOPE
SAME AS GUTTER SLOPE

GUTTER SLOPE DIAGRAM
NOT TO SCALE



SECTION FOR TYPICAL DRIVEWAY WITH SIDEWALK - TYPE A
NOT TO SCALE

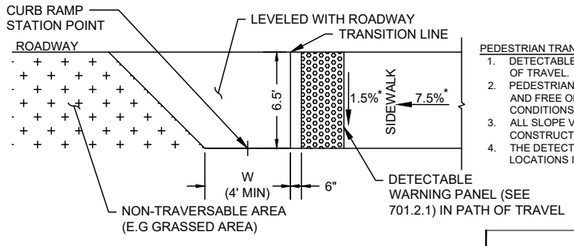


NOTES:
1. SEE PAVEMENT NOTES (SHEET 4) FOR CEM. CONC. DWY APRON.
2. DWY OPENINGS FROM STA 4+45 TO 7+10 SEE HMA DWY PAVEMENT NOTES (SHEET 4).

SECTION FOR DEPRESSED DRIVEWAY WITH SIDEWALK - TYPE B
NOT TO SCALE

TABLE I	
ROADWAY PROFILE GRADE	* HIGH SIDE TRANSITION LENGTH
%	ENGLISH UNITS
=0%	6'-6"
>0% TO 1%	7'-8"
>1% TO 2%	9'-0"
>2% TO 3%	11'-0"
>3% TO 4%	14'-0"
>4% TO 5%	15'-0" MAX.

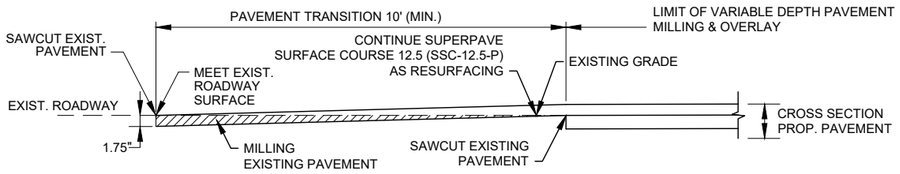
CURB TRANSITION LENGTH FOR CURB RAMPS
MASSDOT CONST. STD DETAIL 701.2.8 (JAN 2025)



CURB RAMP TYPE "C"
NOT TO SCALE

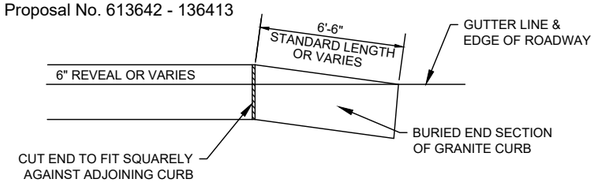
PEDESTRIAN TRANSITION RAMP TO SHOULDER NOTES:
1. DETECTABLE WARMING PANEL TO BE ALIGNED TO THE DIRECTION OF TRAVEL.
2. PEDESTRIAN PATH OF TRAVEL SHALL BE NO LESS THAN 4'-0" WIDE AND FREE OF VERTICAL OBSTRUCTIONS (FOR ALL CONSTRAINED CONDITIONS).
3. ALL SLOPE VALUES LISTED HERE ARE MAXIMUM VALUES WITH CONSTRUCTION TOLERANCE OF ±0.5%.
4. THE DETECTABLE WARNING PANEL IS 2 FEET DEEP MINIMUM AT ALL LOCATIONS IN THE PEDESTRIAN PATH OF TRAVEL

CURB RAMP TYPE C DATA							
PCR NO.	LOCATION	RAMP REFERENCE POINT	GUTTER PROFILE SLOPE	WIDTH OF RAMP OPENING W	DEPTH OF LEVEL LANDING (MIN. 4.0')	TRANSITION LENGTH	SIDEWALK WIDTH
		STATION					



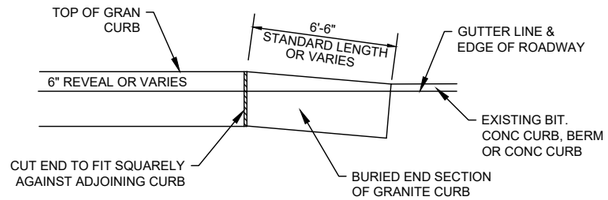
DETAIL FOR PAVEMENT TRANSITION AT LIMIT OF WORK

NOT TO SCALE



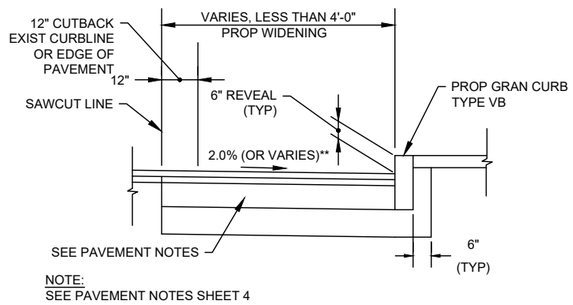
DETAIL FOR TRANSITION CURB
PROP CURB TO EXISTING EDGE OF TRAVEL WAY

NOT TO SCALE



DETAIL FOR TRANSITION CURB
TRANSITION CURB - PROP CURB TO EXISTING CURB

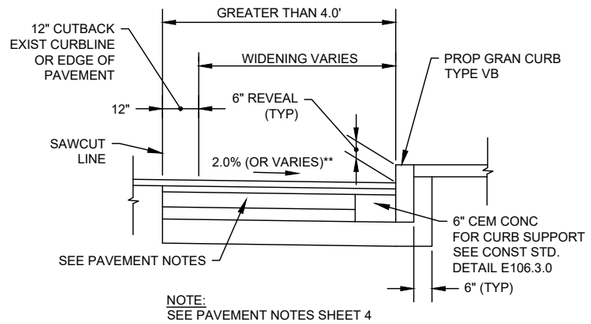
NOT TO SCALE



NOTE:
SEE PAVEMENT NOTES SHEET 4

DETAIL FOR BOX WIDENING 4.0' OR LESS

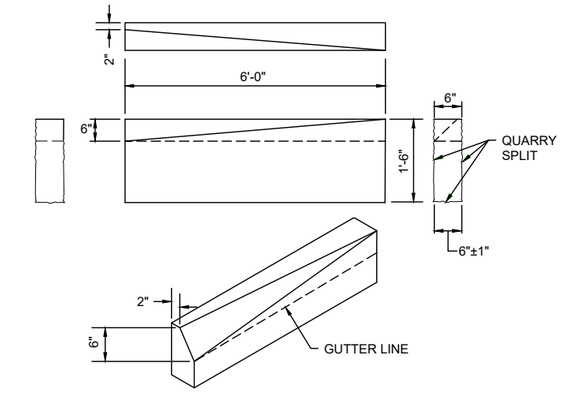
NOT TO SCALE



NOTE:
SEE PAVEMENT NOTES SHEET 4

DETAIL FOR BOX WIDENING GREATER THAN 4.0'

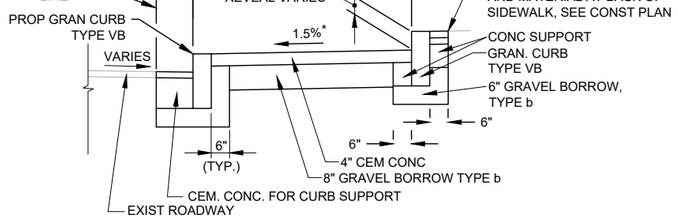
NOT TO SCALE



NOTES:
1. TOP SURFACE AND SLOPED SURFACE TO BE DRESSED BY SAW. REMAINDER TO BE QUARRY SPLIT.
2. DRAWING SHOWS TRANSITION CURB FOR ONE DIRECTION. FOR OTHER DIRECTION USE OPPOSITE HAND.

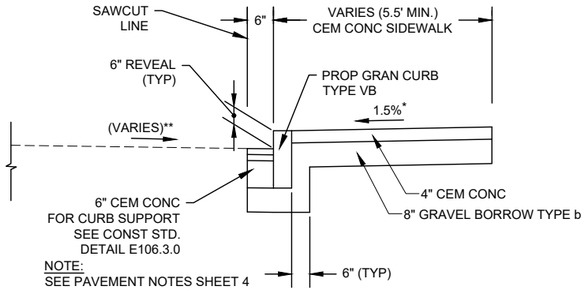
GRANITE CURB TYPE VA4-SPLAYED END
(ITEM 504.2)

NOT TO SCALE



DETAIL FOR GRANITE CURB AT BACK OF SIDEWALK

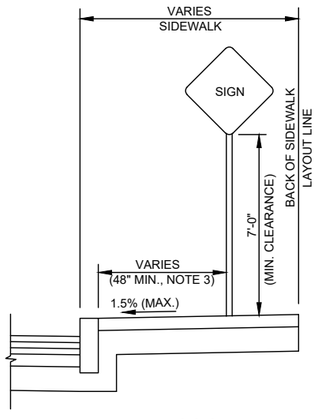
NOT TO SCALE



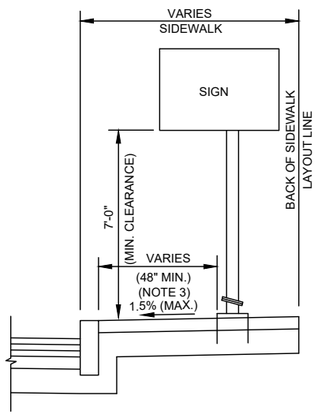
NOTE:
SEE PAVEMENT NOTES SHEET 4

DETAIL FOR SIDEWALK W/ GRANITE CURB - NO ROADWAY WORK

NOT TO SCALE



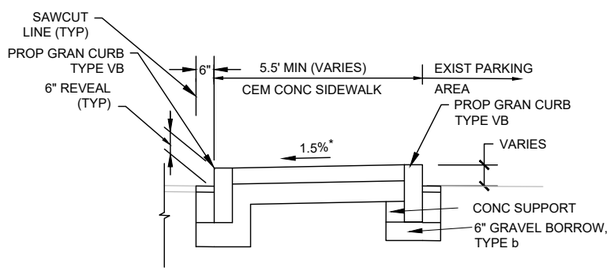
TRAFFIC SIGN



D6/D8 SIGN SUPPORT

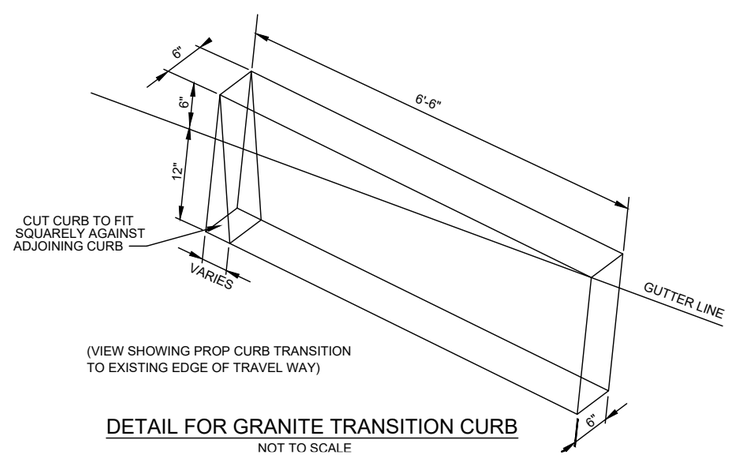
NOTES:
1. MINIMUM CLEAR PATH ON ALL SIDEWALKS SHALL BE 48 INCHES, EXCLUDING THE CURB.
2. CONTRACTOR TO ATTAIN 6'0" CLEAR

DETAIL FOR MINIMUM OFFSET DISTANCES



CURB AT BACK OF SIDEWALK
NEAR PARKING LOT AREAS
STA 50+45 TO 54+36±

NOT TO SCALE



(VIEW SHOWING PROP CURB TRANSITION TO EXISTING EDGE OF TRAVEL WAY)

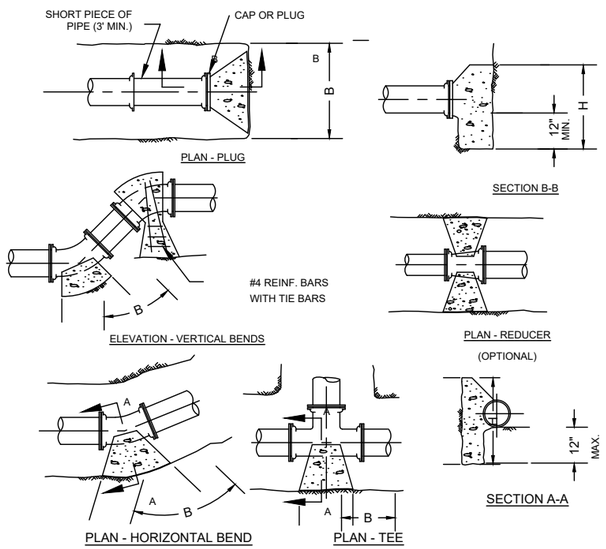
DETAIL FOR GRANITE TRANSITION CURB

NOT TO SCALE

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	######	7	30
PROJECT FILE NO.	613642		

CONSTRUCTION DETAILS

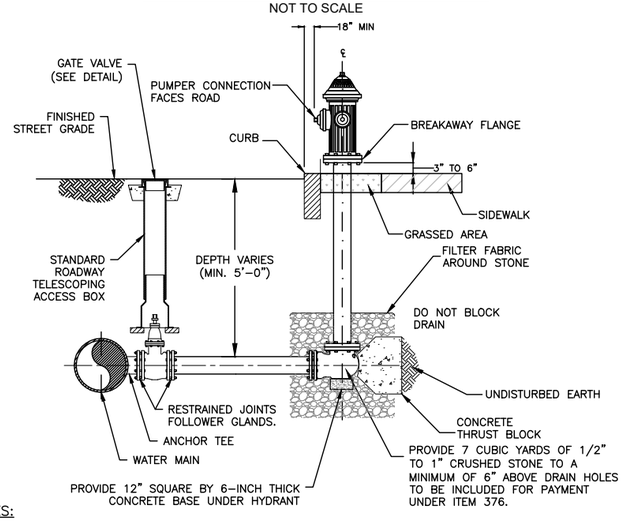
FITTING	MIN. BEARING AREA (H X B)
6" - 1/8 BEND	32" x 32"
8" - 1/8 BEND	24" x 24"
8" x 6" TEE	20" x 20"
12" - 1/8 BEND	32" x 32"
12" x 12" TEE	24" x 24"
12" x 6" TEE	24" x 24"
12" x 8" TEE	32" x 32"
16' x 12" TEE	24" x 24"
HYDRANT	24" x 24"
8" PLUG	32" x 32"
150 mm PLUG	24" x 24"
8" x 6" REDUCER	24" x 24"
8" - 1/16 BEND	20" x 20"
12' x 8" REDUCER	24" x 24"



NOTE:
ALL CONCRETE TO BE PLACED AGAINST UNDISTURBED EARTH

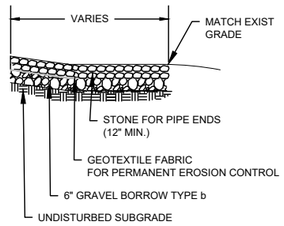
CONCRETE ANCHORAGE DETAILS

NOT TO SCALE



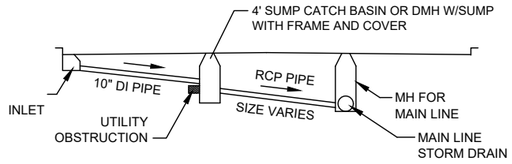
NOTES:

1. HYDRANTS SHALL BE OFFSET 1' FROM THE BACK OF SIDEWALK.
2. HYDRANTS SHALL BE PROVIDED BY THE CITY OF TAUNTON.
3. PROVIDE HYDRANT AND VALVE JOINTS WITH RESTRAINED MECHANICAL JOINTS.
4. ALL JOINTS BETWEEN ANCHOR TEE AND HYDRANT SHALL BE RESTRAINED.
5. SUPPORT BLOCKS TO BE CONCRETE MASONRY BLOCK.
6. SEE HYDRANT TABLE ON THRUST BLOCK BEARING AREAS FOR THE AREA OF CONCRETE REQUIRED.
7. **ALL HYDRANTS OUT OF SERVICE MUST BE BAGGED.**



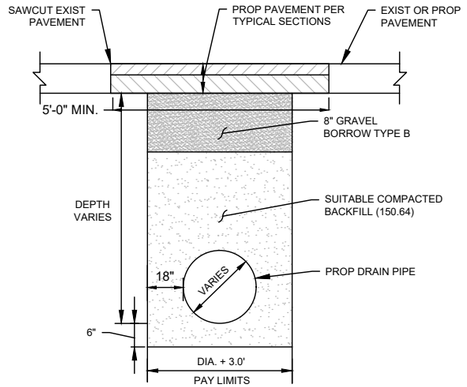
STONE FOR PIPE ENDS

NOT TO SCALE



CONTINGENCY DETAIL FOR STORM DRAIN LATERAL LINES

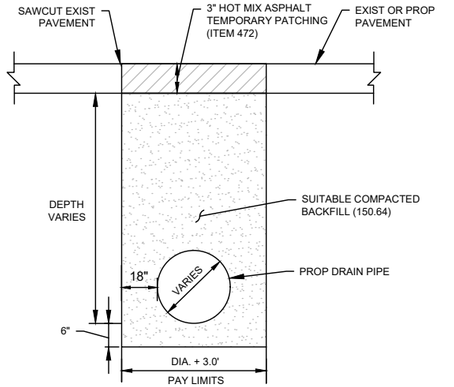
(USE ONLY IF OBSTRUCTION IS ENCOUNTERED)
NOT TO SCALE



NOTES:
1. ANY EXCAVATED MATERIALS DETERMINED BY THE ENGINEER TO BE UNSUITABLE FOR BACKFILL SHALL BE REPLACED WITH GRAVEL BORROW FOR BACKFILLING STRUCTURES AND PIPES AND PAID FOR UNDER ITEM 151.2.

PERMANENT DRAINAGE TRENCH IN MILL AND OVERLAY AREAS

NOT TO SCALE



NOTES:
1. ANY EXCAVATED MATERIALS DETERMINED BY THE ENGINEER TO BE UNSUITABLE FOR BACKFILL SHALL BE REPLACED WITH GRAVEL BORROW FOR BACKFILLING STRUCTURES AND PIPES AND PAID FOR UNDER ITEM 151.2.

TEMPORARY DRAINAGE TRENCH IN FULL DEPTH AREAS

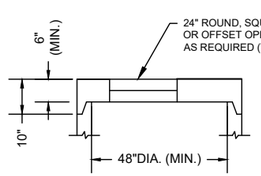
NOT TO SCALE

NOTES:

1. DESIGNED FOR AASHTO HS25-44 LOADING
2. CONCRETE STRENGTH fc=4000 PSI
3. REINFORCING STEEL: ASTM A185 (wwf) fy=60,000 PSI
4. CURB INLETS ARE REQUIRED WHEN GUTTER INLETS ARE INSTALLED AGAINST CURBING. PROVIDE 3"X6" OPENING WHERE CURB INLETS ARE PROPOSED.

SPECIAL GUTTER INLET (ITEM 2044)

ALTERNATE ECCENTRIC CONE SECTION



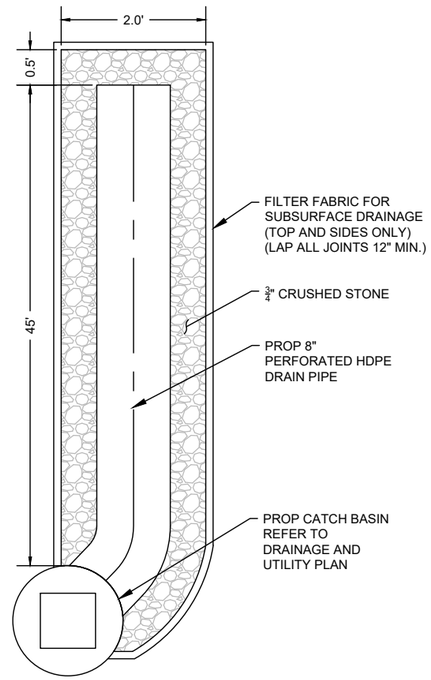
ALTERNATE FLAT TOP SLAB

NOTES:

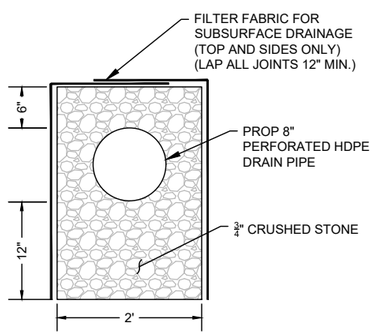
1. BASED ON ACTUAL FIELD CONDITIONS; THE CONTRACTOR SHALL DETERMINE WHICH STYLE OF TOP SECTION SHOULD BE USED.

ALTERNATE DRAINAGE STRUCTURE TOP CONFIGURATIONS

NOT TO SCALE



PLAN VIEW



SECTION VIEW

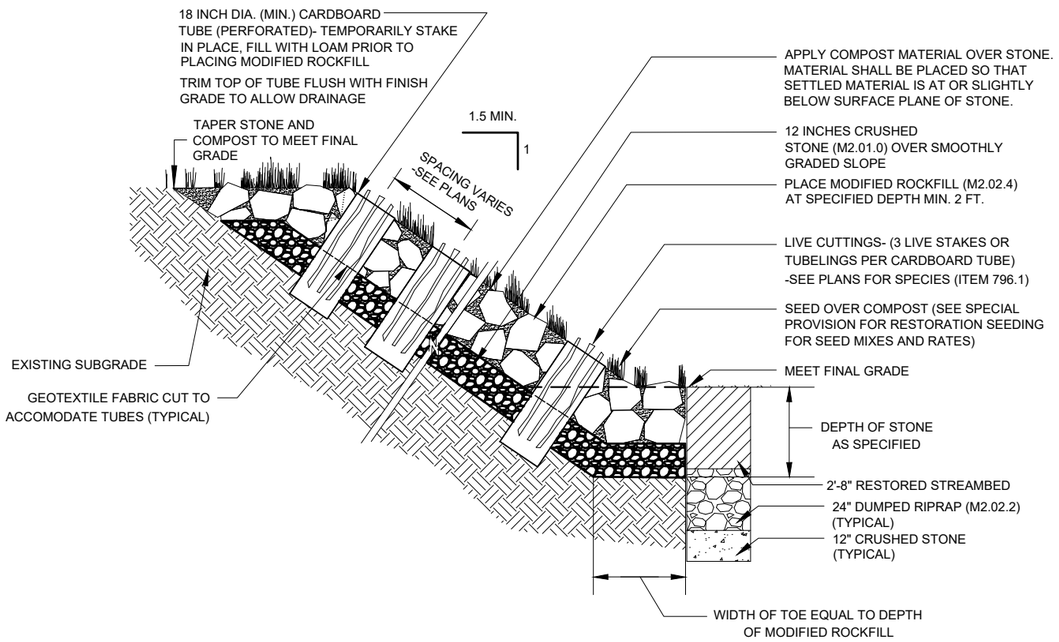
PERFORATED HDPE INFILTRATION TRENCH

NOT TO SCALE

SOUTH STREET E/OLD COLONY AVE.

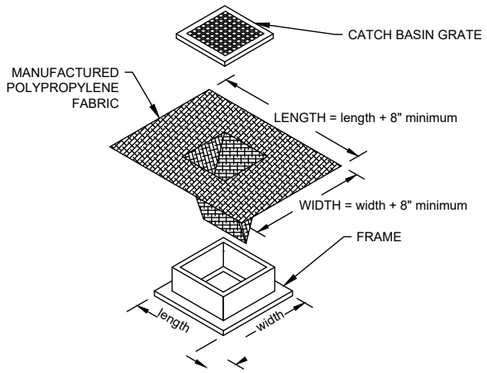
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	######	8	30
PROJECT FILE NO.	613642		

CONSTRUCTION DETAILS



LIVE CUTTINGS IN MODIFIED ROCKFILL

NOT TO SCALE

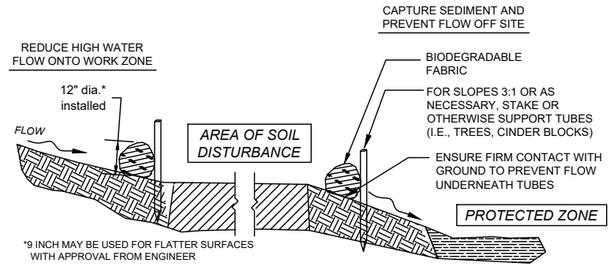


NOTES

1. LENGTH AND WIDTH OF POLYPROPYLENE FABRIC MUST EXCEED EXISTING CATCH BASIN FRAME DIMENSIONS BY A MINIMUM OF 8".
2. REMOVE CATCH BASIN GRATE AND INSTALL POLYPROPYLENE FABRIC OVER CATCH BASIN FRAME. REPLACE CATCH BASIN GRATE TO SECURE POLYPROPYLENE FABRIC IN PLACE.
3. PROVIDE EROSION CONTROL PROTECTION AT ALL EXISTING AND PROPOSED CATCH BASINS WITHIN THE PROJECT LIMITS.

CATCH BASIN EROSION CONTROL PROTECTION (TYP)

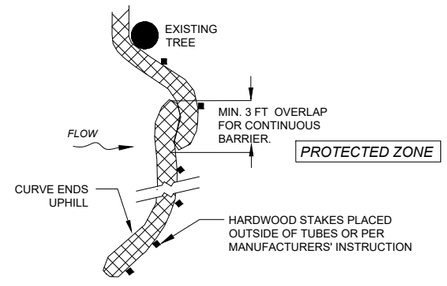
NOT TO SCALE



SECTION

SEDIMENT BARRIER - COMPOST FILTER TUBE

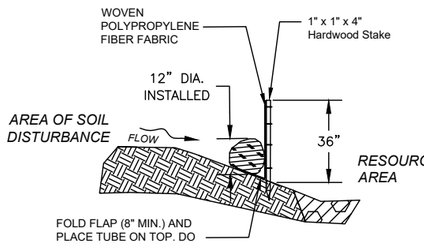
NOT TO SCALE



PLACE TUBE AS CLOSE TO LIMIT OF SOIL DISTURBANCE AS POSSIBLE, ALONG CONTOURS, AND PERPENDICULAR TO FLOW.

ADJUST LOCATION AS REQUIRED FOR OPTIMUM EFFECTIVENESS. DO NOT INSTALL IN WATERWAYS.

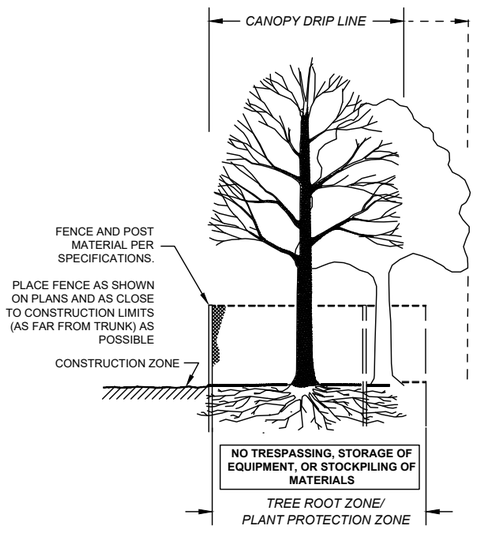
PLAN VIEW



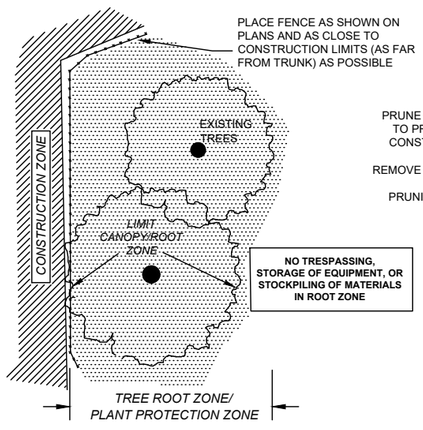
SECTION

COMPOST FILTER TUBE & SILT FENCE

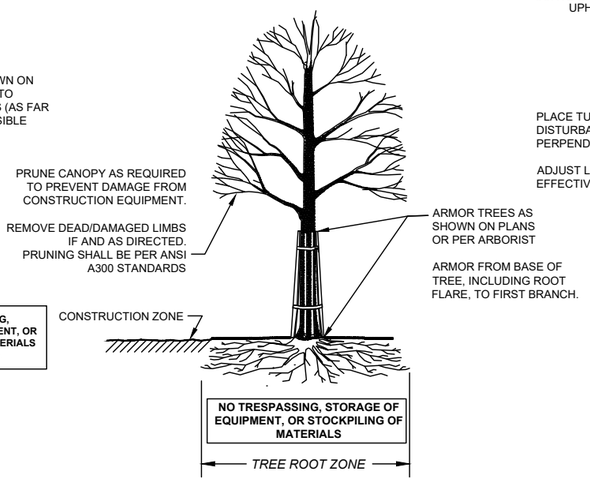
NOT TO SCALE



SECTION - FENCE PROTECTION OF ROOT ZONE

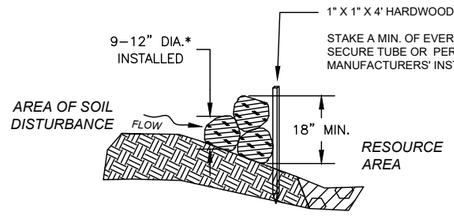


PLAN VIEW - FENCE PROTECTION OF ROOT ZONE

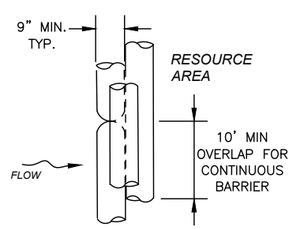


SECTION - TRUNK ARMORING & PRUNING

TREE PROTECTION DETAILS



SECTION



PLAN VIEW

COMPOST FILTER TUBE BERM (SLOPES 2:1 OR STEEPER)

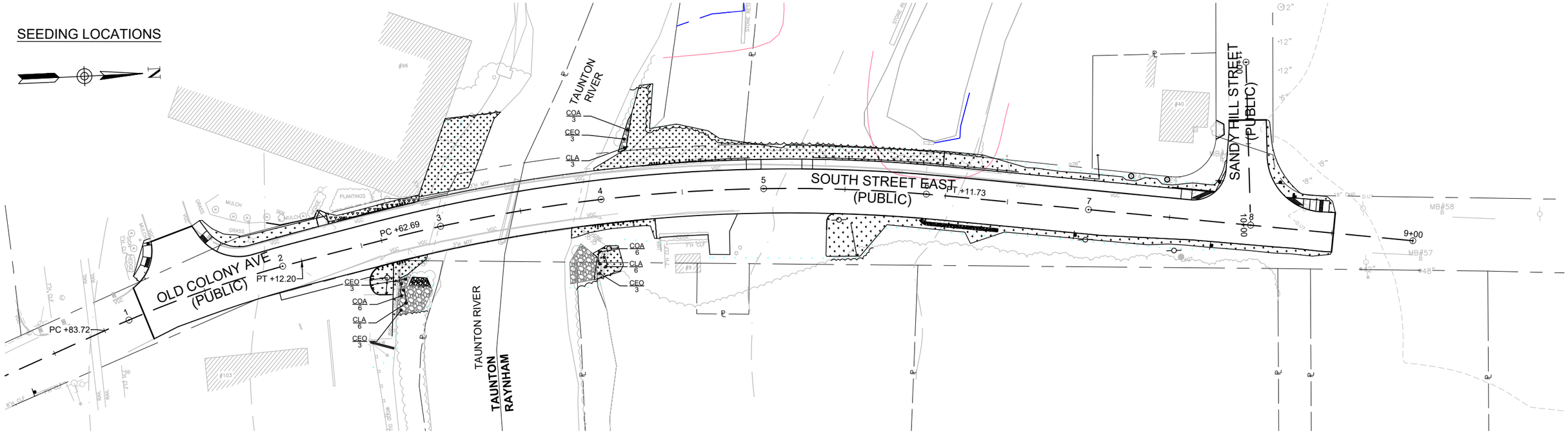
NOT TO SCALE

SOUTH STREET E./OLD COLONY AVE.

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	######	9	30
PROJECT FILE NO.	613642		

CONSTRUCTION DETAILS

SEEDING LOCATIONS



PLANT LIST

KEY	QU.	BOTANICAL NAME	COMMON NAME	SIZE	ROOT	NOTES
SHRUBS - LIVE CUTTINGS						
CEO	12	CEPHALANTHUS OCCIDENTALIS	BUTTONBUSH SHRUB	3-4' LONG	LIVE CUTTING	AS SHOWN/DIRECTED
CLA	15	CELTHRA ALNIFOLIA	SUMMERSWEET SHRUB	3-4' LONG	LIVE CUTTING	AS SHOWN/DIRECTED
COA	15	CORNUS AMOMUM	DOGWOOD - SILKY	3-4' LONG	LIVE CUTTING	AS SHOWN/DIRECTED

LEGEND

- SEED FOR LAWN
- MULCH
- ROADSIDE RIVERBANK MIX

Proposal No. 613642 - 136413

HIGHWAY GUARD DETAILS

TRAILING ANCHORAGE - STA 2+41 TO 2+50 LT
GUARDRAIL, TL-3 (SINGLE FACED) - STA 2+50 TO 2+54 LT
TRANSITION TO BRIDGE RAIL - STA 2+54 TO 2+88 LT

TERMINAL END TREAMENT - STA 2+50 RT
CURVED TRANSITION TO BRIDGE RAIL - STA 2+50 TO 2+80 RT

TERMINAL END TREATMENT - STA 2+54 RT (ALONG PARKING)
GUARDRAIL, TL-3 (SINGLE FACED) - STA 2+54 TO 2+64 RT
TERMINAL END TREATMENT - STA 2+64 RT

TRANSITION TO BRIDGE RAIL - STA 3+88 TO 4+22 RT
TRAILING ANCHORAGE - STA 4+22 TO 4+32 RT

TRANSITION TO BRIDGE RAIL - STA 4+26 TO 4+60 LT
GUARDRAIL, TL-3 (SINGLE FACED) - STA 4+60 TO 4+67 LT
TANGENT END TREATMENT - STA 4+67 TO 4+92 LT

TRAILING ANCHORAGE - STA 5+30 TO 5+39 LT
GUARDRAIL, TL-3 (SINGLE FACED) - STA 5+30 TO 5+70 LT
GUARDRAIL, TL-3 (SINGLE FACED) DEEP POST - STA 5+70 TO 6+30 LT
TANGENT END TREATMENT - STA 6+30 TO 6+55 LT

N

CURB TIE AND GRADING PLAN

SEE SHEET 13

DRAINAGE AND UTILITY PLAN

SEE SHEET 15

SIGN & PAVEMENT MARKING PLAN

SEE SHEET 17

WATER SUPPLY PLAN

SEE BELOW

RAYNHAM/TAUNTON
SOUTH STREET E./OLD COLONY AVE.

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	######	10	30
PROJECT FILE NO.	613642		

CONSTRUCTION PLANS

RIVER BEND CONDOMINIUMS
PARCEL ID: 95-203
MASTER DB/PG 3240/265
PB/PG 66/26-27 LOTS 10 & 2
96 OLD COLONY AVENUE - EAST TAUNTON,MA
AREA=753,970 S.F.

CITY OF TAUNTON - BOARD OF SEWER COMMISSIONERS
EASEMENT - PLAN BOOK 99, PAGE 47
DEED BOOK 1467, PAGE 383 (1965)

COMMONWEALTH OF MASSACHUSETTS
(MASSACHUSETTS BAY TRANSPORTATION AUTHORITY)
PARCEL ID: 96-193
DB/PG 2264/52
0 RR - TAUNTON,MA

JAMES THOMAS & LISA B. DIFFLEY
PARCEL ID: 96-15
DB/PG 25685/348
88 OLD COLONY AVENUE - EAST TAUNTON,MA

BATTLE ROW (PRIVATE)

RIVER BEND CONDOMINIUMS DWY (PRIVATE)

MBTA PERMANENT EASEMENT
ORDER OF TAKING NO. 737
MS-31-PE
DB/PG 25571/41

MBTA PERMANENT EASEMENT
ORDER OF TAKING NO. 753 MS-29-PE
DB/PG 25786/251

MBTA
ORDER OF TAKING NO. 753 - MS-
DB/PG 25786/251

PARCEL ID: 96-194
DB/PG 0/0
0 RR - TAUNTON,MA

OLD COLONY AVE (PUBLIC)

SOUTH STREET EAST (PUBLIC)

TAUNTON RIVER

PROJECT BEGIN
BEGIN MILL & OVERLAY
N2783608.4781
E784198.0476
STA 1+10
SAWCUT
MEET EXIST

PC +83.72
PT +12.20
PC +62.62
0+00
CONST ℄
BUILDING SET-BACK LINE - SEE PB. 14, PG. 72

PROP PROPERTY LINE CENTER OF RIVER PER PLAN BK. 66, PG. 26

PROP CITY ALT LINE
PROP FULL DEPTH CONSTRUCTION
PROP TREE PROTECTION - TEMPORARY FENCE
BEGIN LIMIT OF FULL DEPTH CONST
END LIMIT OF MILL & OVERLAY STA 1+80±
LIMIT OF SW MEET EXIST
PROP PCR-2
PROP LOAM & SEED
END PROP CITY LAYOUT - SECTION 1
PROP GRAN CURB TYPE VB
RET SHRUB
PROP SAWCUT LINE
LIMIT OF MILL & OVERLAY MEET EXIST
PROP MULCH
RET LIGHT
PROP TEMP EASEMENT LINE
R&R SIGN
RET HEDGES
PROP PCR-1
RET SMH
PROP TEMP FENCE
RET SIGN
R&R CURB
LIMIT OF WORK
BEGIN PROP CITY LAYOUT - SECTION 1
PROP LOAM & SEED
65.13'
PROP GRAN CURB TYPE VB
PROP SAWCUT LINE
RET HMA BERM
RET CONC APRON
SAWCUT CC DWY
PROP BOX WIDENING
PROP HMA DWY
RET PVMT
RET EOP
BEGIN LIMIT OF FULL DEPTH CONST
END LIMIT OF MILL & OVERLAY STA 2+34±
RET SMH
BEGIN PROP CITY LAYOUT - SECTION 2
RET CLF
REM GUARDRAIL & FENCE
RET WALL
RET GUARDRAIL
SMH Rim=21.05 INV=6.40 (A) 12" VC INV=6.45 (B) 12" VC
SMH Rim=20.34 INV=6.34 (A) 12" VC INV=6.39 (B) 12" VC INV=6.39 (C) 12" VC
SMH Rim=18.43 INV=6.48 (A) 8" AC INV=6.48 (B) 12" VC INV=6.43 (C) 12" VC
SMH Rim=18.56 INV=6.66 (A) 12" VC INV=6.66 (B) 12" VC
SMH Rim=17.70 INV = 9.30 (A) 8" AC (ABAND) INV= 17.70 (B) NOT VISIBLE
CB Rim=17.73 INV=13.03 12" RCP 11.83 BOTTOM
CB Rim=17.56 INV=12.66 (A) 12" RCP 13.26 (B) 12" RCP 13.36 (C) 12" CMP 13.01 (D) 15" RCP
REM SHRUBS
PROP MULCH
BEGIN PROP CITY LAYOUT - SECTION 3
REM CC SW & PROP LOAM & SEED
R&D CURB
PROP 6.0' CC SW
RET WALL & SHRUB
TRIM HEDGES FOR GUY WIRE
PROP CC SW
RET SHRUBS
RET CC SW
PROP STONE FOR PIPE ENDS
PROP RIVERBANK SEED MIX
REM TREES (8", 8")
END PROP CITY LAYOUT - SECTION 2
BR# R-02-003=T-01-004
PROP TEMP COFFERDAM FOR WATER CONTROL PHASE I COFFERDAM WILL BE REMOVED IN ITS ENTIRETY
END PROP CITY LAYOUT - SECTION 3
PROP CLEARING & GRUBBING LIMIT & PROP ROADSIDE RIVERBANK MIX
PROP LIVE CUTTINGS IN MODIFIED ROCKFILL
PROP CLEARING & GRUBBING LIMIT
PROP SEDIMENT CONTROL BARRIER
R&S HYD
R&R SIGN (BO)
PROP GUARDRAIL (TYP)
PROP TEMP DEWATERING PHASE I
PROP TEMP COFFERDAM FOR WATER CONTROL PHASE I COFFERDAM WILL BE REMOVED IN ITS ENTIRETY
PROP TEMP EASEMENT LINE
PROP TEMP COFFERDAM FOR WATER CONTROL PHASE II COFFERDAM WILL BE REMOVED IN ITS ENTIRETY
BEGIN PROP TOWN LAYOUT - SECTION 1
APPROX. LIMITS OF RIPRAP (TYP.)
PROP TEMP COFFERDAM FOR WATER CONTROL PHASE II COFFERDAM WILL BE REMOVED IN ITS ENTIRETY
PROP LIVE CUTTINGS IN MODIFIED ROCKFILL
PROP RIPRAP
PROP 6.0' CC SW
END PROP TOWN LAYOUT - SECTION 1
BEGIN BOX WIDENING <4FT STA 5+00±
112.96'
25.00'
REM ROCKS
RET GRAVEL DWY
PROP GRAN TRANSITION CURB
PROP HMA DWY
RET FENCE
RET HEDGES
RET PUMP STATION
RET RR TIES
PROP SEDIMENT CONTROL BARRIER
PROP ROADSIDE RIVERBANK SEED MIX
PROP CLEARING & GRUBBING LIMIT
R&D GUARDRAIL
PROP LIVE CUTTINGS IN MODIFIED ROCKFILL
PROP PERM CHANNEL & UTILITY EASEMENT LINE
PROP RIPRAP
APPROX. LIMITS OF RIPRAP (TYP.)
PROP TEMP DEWATERING PHASE II
PROP GUARDRAIL (TYP)
PROP TEMP EASEMENT LINE
R&D GUARDRAIL
PROP GUARDRAIL (TYP)
R&D CURB
PROP GRAN CURB TYPE VB
PROP CC SW THRU DWY (FOR FUTURE USE)
PROP ROADSIDE RIVERBANK MIX
BEGIN LIMIT OF MILL & OVERLAY END LIMIT OF FULL DEPTH CONSTRUCTION STA 5+00±
PROP BOX WIDENING <4'
PROP LOAM & SEED
PROP PROPERTY LINE CENTER OF RIVER PER PLAN BK. 66, PG. 26
STONE WALL
STONE RETAINING WALL
#WF2-102
#WF2-103
SMH Rim=17.14 INV=0.54 BOTTOM INV=17.14 NO PIPES VISIBLE
DMH Rim=16.00 INV= 16.00 UNABLE TO OPEN
LINE AS SHOWN ON PLAN BK. 66, PG. 70 NORTHERLY BANK OF TAUNTON RIVER (DEED)
PROP PROPERTY LINE - SEE PLAN BK. 66, PG. 70 RIGHT OF WAY
NO GRANT OF BENEFICIARY

TOWN OF RAYNHAM - CONSERVATION COMMISSION ASSESS. MAP 17 - PARCEL ID: 17-2
DB PG 8016/190
PB/PG 66/70
0 SOUTH STREET EAST - RAYNHAM,MA
AREA=167,683 S.F.

TOWN OF RAYNHAM - BOARD OF SELECTMEN
PARCEL ID: 17-1
DB/PG 5117/145
0 SOUTH STREET EAST - RAYNHAM,MA
AREA=14,102 S.F.

TOWN OF RAYNHAM
PARCEL ID: 17-151A
DB/PG 6266/303
PB/PG 342/58
9 SOUTH STREET EAST - RAYNHAM,MA

TOWN OF RAYNHAM
PARCEL ID: 17-148

SELPAN ASSOCIATES LIMITED

0 20 50 100
SCALE: 1" = 20'

SEE SHEET 14 | SEE SHEET 16 | SEE SHEET 18 | SEE BELOW

TRAILING ANCHORAGE - STA 4+22 TO 4+32 RT

TRANSITION TO BRIDGE RAIL - STA 4+26 TO 4+60 LT
GUARDRAIL, TL-3 (SINGLE FACED) - STA 4+60 TO 4+67 LT
TANGENT END TREATMENT - STA 4+67 TO 4+92 LT

TRAILING ANCHORAGE - STA 5+30 TO 5+39 LT
GUARDRAIL, TL-3 (SINGLE FACED) - STA 5+30 TO 5+70 LT
GUARDRAIL, TL-3 (SINGLE FACED) DEEP POST - STA 5+70 TO 6+30 LT
TANGENT END TREATMENT - STA 6+30 TO 6+55 LT

SOUTH STREET E/OLD COLONY AVE.

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	######	11	30
PROJECT FILE NO.	613642		

CONSTRUCTION PLANS

TAUNTON RIVER

RIVER BEND CONDOMINIUMS
PARCEL ID: 95-203
MASTER DB/PG 3240/265
PB/PG 66/26-27 LOTS 10 & 2
96 OLD COLONY AVENUE - EAST TAUNTON,MA
AREA=753,970 S.F.

TOWN OF RAYNHAM - CONSERVATION COMMISSION
ASSESS. MAP 17 - PARCEL ID: 17-2
DB PG 8016/190
PB/PG 66/70
0 SOUTH STREET EAST - RAYNHAM,MA
AREA=167,683 S.F.

TOWN OF RAYNHAM - BOARD OF SELECTMEN
PARCEL ID: 17-1
DB/PG 5117/145
0 SOUTH STREET EAST - RAYNHAM,MA
AREA=14,102 S.F.

SABA A. NESSRALLA AND AHLAM NESSRALLA
PARCEL ID: 17-37-3
DB/PG 4796/244
58 SOUTH STREET EAST - RAYNHAM,MA

LOIS A. HASKINS
PARCEL ID: 17-3
DB/PG 11594/76
40 SOUTH STREET EAST - RAYNHAM,MA
AREA= 5,447 S.F.

TOWN OF RAYNHAM
PARCEL ID: 17-151A
DB/PG 6266/303
PB/PG 342/58
9 SOUTH STREET EAST - RAYNHAM,MA

SELPAN ASSOCIATES LIMITED
PARCEL ID: 17-151
DB/PG 7993/68
0 SOUTH STREET EAST - RAYNHAM,MA
AREA=71,376 S.F.

TOWN OF RAYNHAM
PARCEL ID: 17-148
DB/PG 8016/190
PB/PG 66/70
0 SOUTH STREET EAST - RAYNHAM,MA

#WF2-102
#WF2-101
#WF2-100
#WF1-111
#WF1-110
#WF1-109
#WF1-108

PROP TEMP EASEMENT LINE
R&D GUARDRAIL
PROP GUARDRAIL (TYP)
R&D CURB
PROP GRAN CURB TYPE VB
PROP CC SW THRU DWY (FOR FUTURE USE)
PROP ROADSIDE RIVERBANK MIX
PROP CLEARING & GRUBBING LIMIT
BEGIN LIMIT OF MILL & OVERLAY
END LIMIT OF FULL DEPTH CONSTRUCTION STA 5+00±
PROP CLEARING & GRUBBING LIMIT
PROP PERM UTILITY EASEMENT LINE
PROP SEDIMENT CONTROL BARRIER
REM STUMP (36")
PROP 5.5' CC SW
R&S ENTIRE FENCE
PROP LOAM & SEED
PROP TREE PROTECTION - TEMPORARY FENCE
REM PVMT
PROP LOAM & SEED
RET TREE (24")
PROP TREE PROTECTION AND TRIMMING
PROP PCR-3
PROP CURB AT BSW
PROP FULL DEPTH CONST
RET TREE W/PROTECTION
PROP TRIMMING
LIMIT OF FULL DEPTH CONST 10+64 MEET EXIST
PROP EOP
REM PVMT
PROP LOAM & SEED
PROP TEMP EASEMENT LINE
PROP PCR-4
PROP PCR-5
END PROP TOWN LAYOUT - SECTION 1
BEGIN BOX WIDENING <4FT STA 5+00±
CONTINUED ON SHEET 10
RET GRAVEL DWY
REM ROCKS
PROP GRAN TRANSITION CURB
PROP HMA DWY
RET FENCE
RET HEDGES
RET PUMP STATION
RET RR TIES
PROP SEDIMENT CONTROL BARRIER
PROP BOX WIDENING <4'
PROP LOAM & SEED
END GRAN TRANSITION CURB
PROP GRAN CURB TYPE VB
PROP SEDIMENT CONTROL BARRIER
PROP LOAM & SEED
PROP EOP
END BOX WIDENING <4FT STA 7+66±
2.5"R
PROJECT END
END MILL & OVERLAY
N2784340.0230
E784178.5228
STA 8+51
SAWCUT
MEET EXIST
RET HMA PAD
OLD COLONY AVE CONST ℄ STA 8+00.00 =
SANDY HILL STREET CONST ℄ STA 10+00.00

SOUTH STREET EAST (PUBLIC)
SANDY HILL STREET (PUBLIC)
STONE RETAINING WALL
STREET LINE FROM PB 60, PG 70
RIGHT OF WAY - SEE PLAN BK. 66, PG. 7

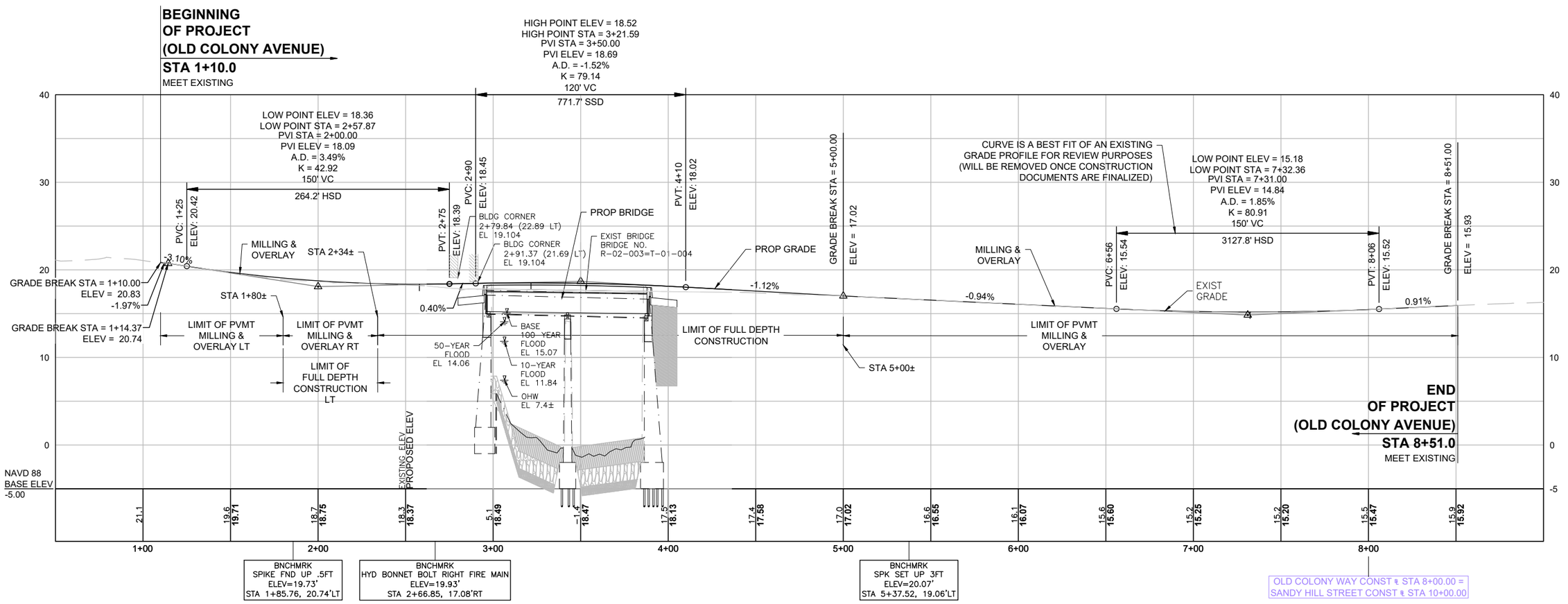
SCALE: 1" = 20'

SOUTH STREET E/OLD COLONY AVE.

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	######	12	30
PROJECT FILE NO.	613642		

PROFILES

OLD COLONY AVE



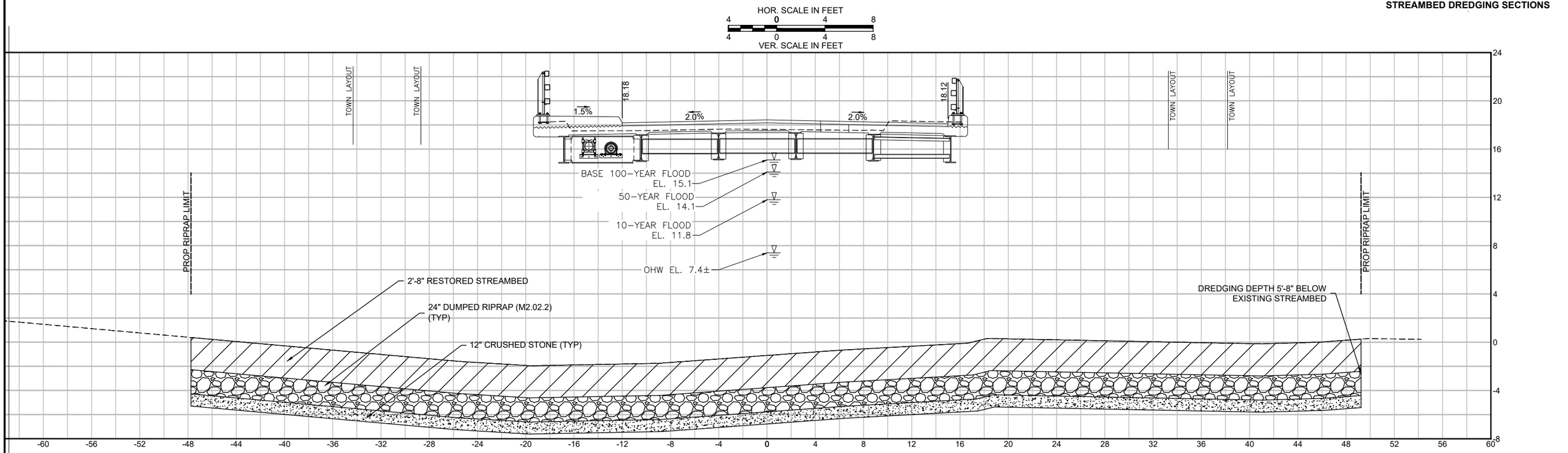
FOR CONSTRUCTION PLANS: SEE SHEETS 4 & 5

HOR. SCALE IN FEET
30 0 30 60
6 0 6 12
VER. SCALE IN FEET

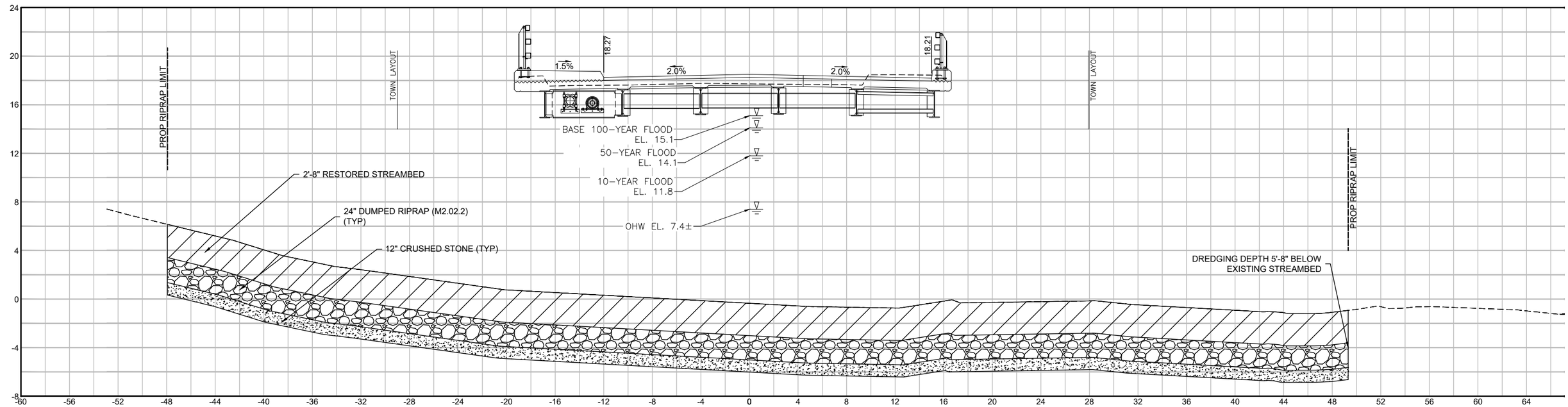
STREET NAME/ROUTE #

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	######	11A	15
PROJECT FILE NO.		613642	

STREAMBED DREDGING SECTIONS



3+60



3+30

Proposal No. 613642 - 136413

HOR. SCALE IN FEET

4 0 4 8

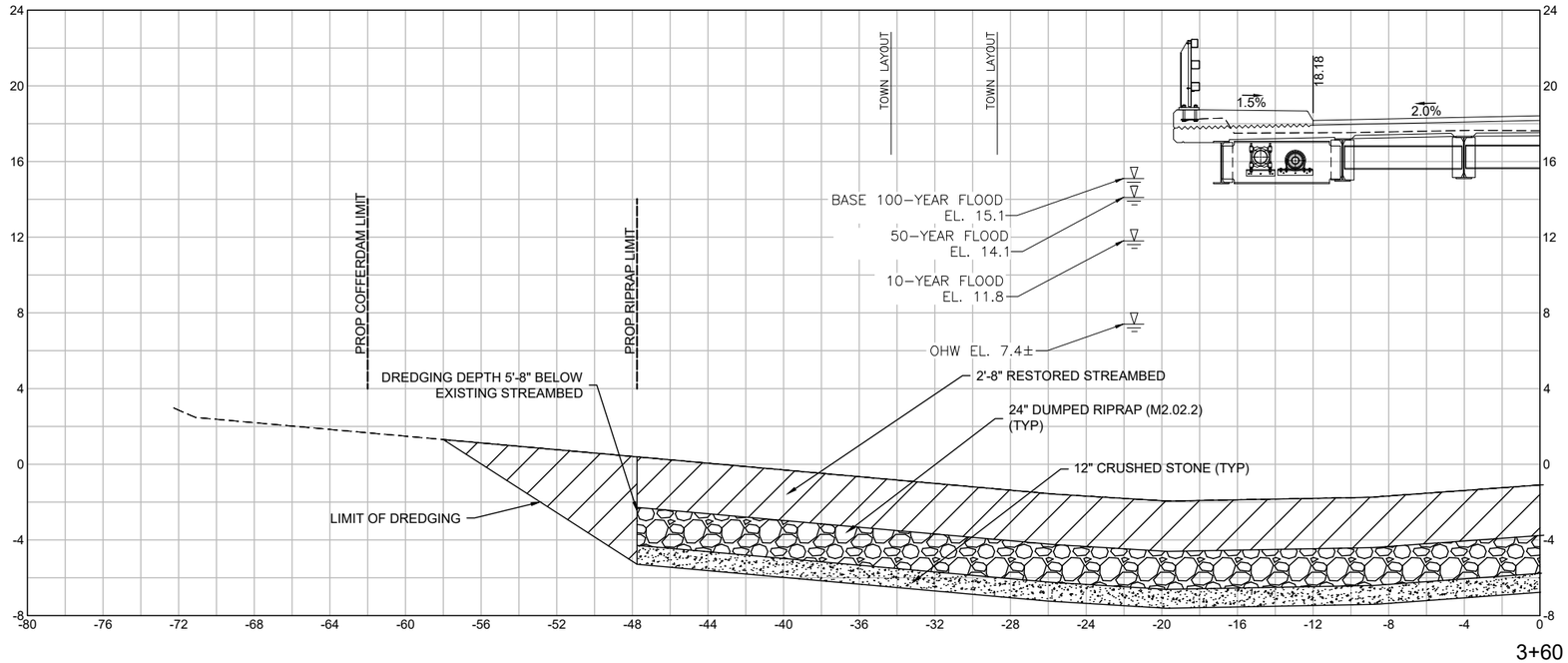
4 0 4 8

VER. SCALE IN FEET

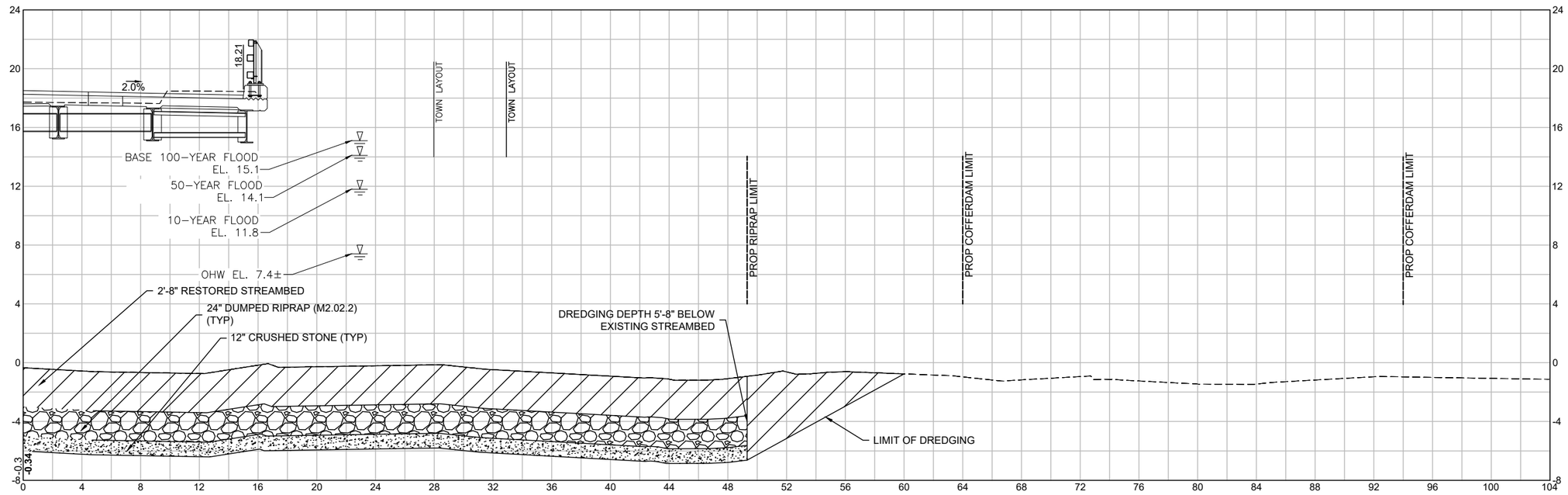
STREET NAME/ROUTE #

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	######	11B	16
PROJECT FILE NO.		613642	

STREAMBED DREDGING SECTIONS



3+60



3+30

Proposal No. 613642 - 136413

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	######	15	30
PROJECT FILE NO.	613642		

DRAINAGE & UTILITY PLAN

DRAINAGE STRUCTURE DATA

NO.	STATION	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
CB-1	2+44 14.0' RT	18.10		I=14.30' (DMH-1)	
CB-2	2+57.5 13.4' RT	18.09		I=14.50' (DMH-2)	LOW POINT OFFSET COVER
CBCI-3	2+57.9 -11.0' LT	18.14		I=14.50' (DMH-2)	LOW POINT
CBCI-4	2+77.7 -11.0' LT	18.18		I=14.50' (DMH-2)	
DMH-1	2+48.6 5.2' RT	18.26	I=14.10' (CB-1) I = 13.5' ± (EXIST)	I=13.40' (DMH-2)	BUILD ON EXIST
DMH-2	2+63.3 6.8' RT	18.23	I=14.30' (CBCI-3) I=14.30' (CBCI-4) I=14.30' (CB-2) I=13.10' (DMH-1)	I=13.00' (HW-1)	5' DIAMETER
HW-1	2+74.4 28.7' RT	N/A	I=12.50' (DMH-2)		

RIVER BEND CONDOMINIUMS
PARCEL ID: 95-203
MASTER DB/PG 3240/265
PB/PG 66/26-27 LOTS 10 & 2
96 OLD COLONY AVENUE - EAST TAUNTON,MA
AREA=753,970 S.F.

TOWN OF RAYNHAM - CONSERVATION COMMISSION
ASSESS. MAP 17 - PARCEL ID: 17-2
DB PG 8016/190
PB/PG 66/70
0 SOUTH STREET EAST - RAYNHAM,MA
AREA=167,683 S.F.

TOWN OF RAYNHAM -
BOARD OF SELECTMEN
PARCEL ID: 17-1
DB/PG 5117/145
0 SOUTH STREET EAST -
RAYNHAM,MA
AREA=14,102 S.F.

JAMES THOMAS & LISA B. DIFFLEY
PARCEL ID: 96-15
DB/PG 25685/348
88 OLD COLONY AVENUE - EAST TAUNTON,MA

MBTA PERMANENT EASEMENT
ORDER OF TAKING NO. 757
MS-31-PE
DB/PG 25571/41

MBTA PERMANENT EASEMENT
ORDER OF TAKING NO. 753 MS-29-PE
DB/PG 25786/251

MBTA
ORDER OF TAKING NO. 753 - MS-29
DB/PG 25786/251

RR
PARCEL ID: 96-194
DB/PG 0/0
0 RR - TAUNTON,MA

TMLP
PARCEL ID: 96-34
DB/PG 1606/1047

103 COLONY LLC
PARCEL ID: 96-1
DB/PG 25006/40
103 OLD COLONY AVENUE - TAUNTON,MA

SELPAN ASSOCIATES LIMITED
PARCEL ID: 17-151
DB/PG 7993/68
0 SOUTH STREET EAST - RAYNHAM,MA
AREA=71,376 S.F.

TOWN OF RAYNHAM
PARCEL ID: 17-148
DB/PG 8016/190
PB/PG 66/70
0 SOUTH STREET EAST - RAYNHAM,MA

TOWN OF RAYNHAM
PARCEL ID: 17-151A
DB/PG 6266/303
PB/PG 342/58
9 SOUTH STREET EAST - RAYNHAM,MA

BATTLE ROW (PRIVATE)

RIVER BEND CONDOMINIUMS DWY (PRIVATE)

OLD COLONY AVE (PUBLIC)

SOUTH STREET EAST (PUBLIC)

TAUNTON RIVER

FEMA FLOOD ZONE = 14.40'

FEMA FLOOD ZONE = 14.80'

PROP. LINE CENTER OF RIVER PER PLAN BK. 66, PG. 26

LINE AS SHOWN PER PLAN BK. 66, PG. 70 NORTHERLY BANK OF TAUNTON RIVER (DEED)

CITY OF TAUNTON BOARD OF SEWER COMMISSIONERS EASEMENT - PLAN BOOK 98, PAGE 48 DEED BOOK 1467, PAGE 383 (1965)

DEED CALLS BOUNDING ON THE RIVER. PLAN BOOK 70, PAGE 67 SHOWS TO WATER EDGE

NO GRANT FOUND BENEFICIARY UNKNOWN

RIGHT OF WAY - SEE PLAN BK. 66, PG.

SMH Rim=21.05 INV=6.40 (A) 12" VC INV=6.45 (B) 12" VC

SMH Rim=17.70 INV = 9.30 (A) 8" AC (ABAND) INV= 17.70 (B) NOT VISIBLE

CB Rim=17.73 INV=13.03 12" RCP 11.83 BOTTOM

CB Rim=17.56 INV=12.66 (A) 12" RCP 13.26 (B) 12" RCP 13.36 (C) 12" CMP 13.01 (D) 15" RCP

SMH Rim=18.43 INV=6.48 (A) 8" AC INV=6.48 (B) 12" VC INV=6.43 (C) 12" VC

SMH Rim=20.34 INV=6.34 (A) 12" VC INV=6.39 (B) 12" VC INV=6.39 (C) 12" VC

SMH Rim=18.56 INV= 6.66 (A) 12" VC INV= 6.66 (B) 12" VC

SMH Rim=17.14 INV=0.54 BOTTOM INV=17.14 NO PIPES VISIBLE

DMH Rim=16.00 INV= 16.00 UNABLE TO OPEN

BR# R-02-003=T-01-004

#96 REM SMH

REM PIPE

REM EXIST CB

REM EXIST CB

PROP SEWER GATE

CBCI-4

CONNECT TO EXIST 4" FM

18 LF - 12" RCP

REM WATER LINE

DMH-2 (5' DIA)

14 LF - 12" RCP

CBCI-3 (LP)

DMH-1

RETAIN IRRIGATION SYSTEM AT BACK OF EXISTING SIDEWALK

CAP WATER MAIN

TEST PIT TO CONFIRM EXISTING INVERT

UPGRADE UP#2 PROP 10' GUY & 10' SW GUY (BO)

PROP HYD, 6" GATE VALVE & BOX, 6"X12" TEE

RET

ADJ SMH

RET UP#10 & GUY WIRE (BO)

ADJ WG (5)

CONNECT TO EXIST

6 LF - 12" RCP

CB-1

ADJ WG

10 LF - 18" RCP

CB-2 (LP)

R&R UP #11 W/ TWO 10' GUY (BO)

REM OHW (BO)

RET OHW (BO)

ADJ SMH

RET UP#11R1SL W/ 15' PB (BO)

4 LF - 12" RCP

R&S HYD

PROP CONC. MASONRY PIPE END (HW-1) REM EXIST

STABILIZE EXISTING CHANNEL WITH STONE FOR PIPE ENDS

22 LF - 18" DI

REM

ABAN WATER

R&S SERVICE BOX

RELOCATE GAS (BO)

UPGRADE UP & GUY (BO)

PROP SEWER GATE

PROP 4" DISEWER FM

RELOCATE 2" INSULATED SEWER FORCE MAIN (4" DI)

-6" AC WATER ABAND

CONNECT TO EXIST

57 LF - 12" RCP

18 LF - 12" RCP

ADJ EX-DMH-6

CBCI-5

SEWER MAIN (FIELD MARKED LOCATION)

ADJ SMH

R&R UP#128 W/ 20 FT GUY (BO)

TEST PITS TO LOCATE SEWER & WATER

CONNECT TO EXIST 4" FM

PROJECT BEGIN
N2783608.4781
E784198.0476
STA 1+10

0 20 50 100

SCALE: 1" = 20'

A008402 608

NO.	STATION	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
CB-6	5+96.1 14.0' RT	15.65		I=12.00' (EX-DMH-6) I=11.00' (TRENCH)	
CB-7	7+09.1 14.0' RT	15.10		I=11.10' (DMH-7)	
CB-8	7+09.1 -10.4' LT	14.94		I=11.30' (DMH-7)	OFFSET CB
CBCI-5	5+39.1 -11.0' LT	16.57		I=11.60' (EX-DMH-6)	
DMH-7	7+02 -6.7' LT	15.05	I=10.90' (CB-7) I=11.20' (CB-8) I = 8.6' ± (EXIST)	I = 8.5' ± (EXIST)	BUILD ON EXIST
EX-DMH-6	5+99 -8.2' LT	16.00	I=11.00' (CBCI-5) I = 8.3' ± (EXIST) I=11.80' (CB-6)	I = 8.3' ± (EXIST)	

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	######	16	30
PROJECT FILE NO.	613642		

SOUTH STREET E./OLD COLONY AVE.

DRAINAGE & UTILITY PLAN

RIVER BEND CONDOMINIUMS
PARCEL ID: 95-203
MASTER DB/PG 3240/265
PB/PG 66/26-27 LOTS 10 & 2
96 OLD COLONY AVENUE - EAST TAUNTON,MA
AREA=753,970 S.F.

TAUNTON RIVER

TOWN OF RAYNHAM - CONSERVATION COMMISSION
ASSESS. MAP 17 - PARCEL ID: 17-2
DB PG 8016/190
PB/PG 66/70
0 SOUTH STREET EAST - RAYNHAM,MA
AREA=167,683 S.F.

TOWN OF RAYNHAM - BOARD OF SELECTMEN
PARCEL ID: 17-1
DB/PG 5117/145
0 SOUTH STREET EAST - RAYNHAM,MA
AREA=14,102 S.F.

SABA A. NESSRALLA AND AHLAM NESSRALLA
PARCEL ID: 17-37-3
DB/PG 4796/244
58 SOUTH STREET EAST - RAYNHAM,MA

LOIS A. HASKINS
PARCEL ID: 17-3
DB/PG 11594/76
40 SOUTH STREET
EAST - RAYNHAM,MA
AREA= 5,447 S.F.

SOUTH STREET EAST
(PUBLIC)

SANDY HILL STREET
(PUBLIC)

CONTINUED ON SHEET 15

CONNECT TO EXIST

57 LF - 12" RCP

ADJ EX-DMH-6

18 LF - 12" RCP

CBCI-5

CB-6

CB-7

RETAIN HEADWALL

RET

TEST PIT TO CONFIRM EXISTING INVERT

4 LF - 12" RCP

DMH-7

CBCI-8

ADJ DMH

ADJ CB (LP)

R&R UP#127 W/ 10' &15' GUY(BO)

R&R UP#126 (BO)

RET UP#1

R&R UP#128 W/ 20 FT GUY (BO)

TEST PITS TO LOCATE SEWER & WATER

45 LF - 8" PERFORATED HDPE INFILTRATION TRENCH (SEE DETAIL ON SHEET 8)

TEST PITS TO LOCATE SEWER & WATER

18 LF - 12" RCP

ADJ CB (LP)

ADJ SMH

ADJ WG (4)

RET HYD

ADJ SMH

RET SMH

RET

ADJ DMH

ADJ DMH

ADJ CB

RET UP#125

EXIST OH GUY WIRE

PROJECT END
N2784340.0230
E784178.5228
STA 8+51

SMH
Rim=17.14
INV=0.54 BOTTOM
INV=17.14 NO PIPES VISIBLE

CONNECT TO EXIST 4" FM

SMH
Rim=15.72
INV=7.00 (A) 8" PVC
INV=6.90 (B) 8" PVC
INV=6.92 (C) 8" PVC

SMH
Rim=15.55
INV=6.79 (A) 8" PVC
INV=6.23 (B) 8" PVC
INV=6.23 (C) 8" PVC

SMH
Rim=15.39
INV=7.13 (A) 8" PVC
INV=7.13 (B) 8" PVC

DMH
Rim=15.57
INV=10.57 (A) 15" RCP
INV=10.67 (B) 18" CMP
INV=10.85 (C) 12" PVC
INV=11.37 (D) 18" RCP

DMH
Rim=16.24
INV=10.62 (A) 18" CMP
INV=10.66 (B) 18" CMP

CB
Rim=15.52
INV=10.95 12" PVC
8.92 BOTTOM

DMH
Rim=16.00
INV= 16.00 UNABLE TO OPEN

DMH
Rim=14.86
INV=8.66 (A) 15" RCP
INV=8.91 (B) 12" RCP
INV=8.76 (C) 15" RCP
INV=8.86 (D) 12" RCP

CB
Rim=14.59
INV= 8.89 12" RCP
5.14 BOTTOM

CB
Rim=14.67
INV=9.02 12" RCP
5.97 BOTTOM

TOWN OF RAYNHAM
PARCEL ID: 17-151A
DB/PG 6266/303
PB/PG 342/58
9 SOUTH STREET EAST - RAYNHAM,MA

SELPAN ASSOCIATES LIMITED
PARCEL ID: 17-151
DB/PG 7993/68
0 SOUTH STREET EAST - RAYNHAM,MA
AREA=71,376 S.F.

TOWN OF RAYNHAM
PARCEL ID: 17-148
DB/PG 8016/190
PB/PG 66/70
0 SOUTH STREET EAST - RAYNHAM,MA

RIGHT OF WAY - SEE PLAN BK. 66, PG. 7

FEMA FLOOD ZONE = 14.80'

STONE RETAINING WALL

SEWER MAIN (FIELD MARKED LOCATION)

6" AC WATER ABAND

1" PE WATER SERVICE

STREET LINE FROM PB 60, PG 70

0 20 50 100

SCALE: 1" = 20'

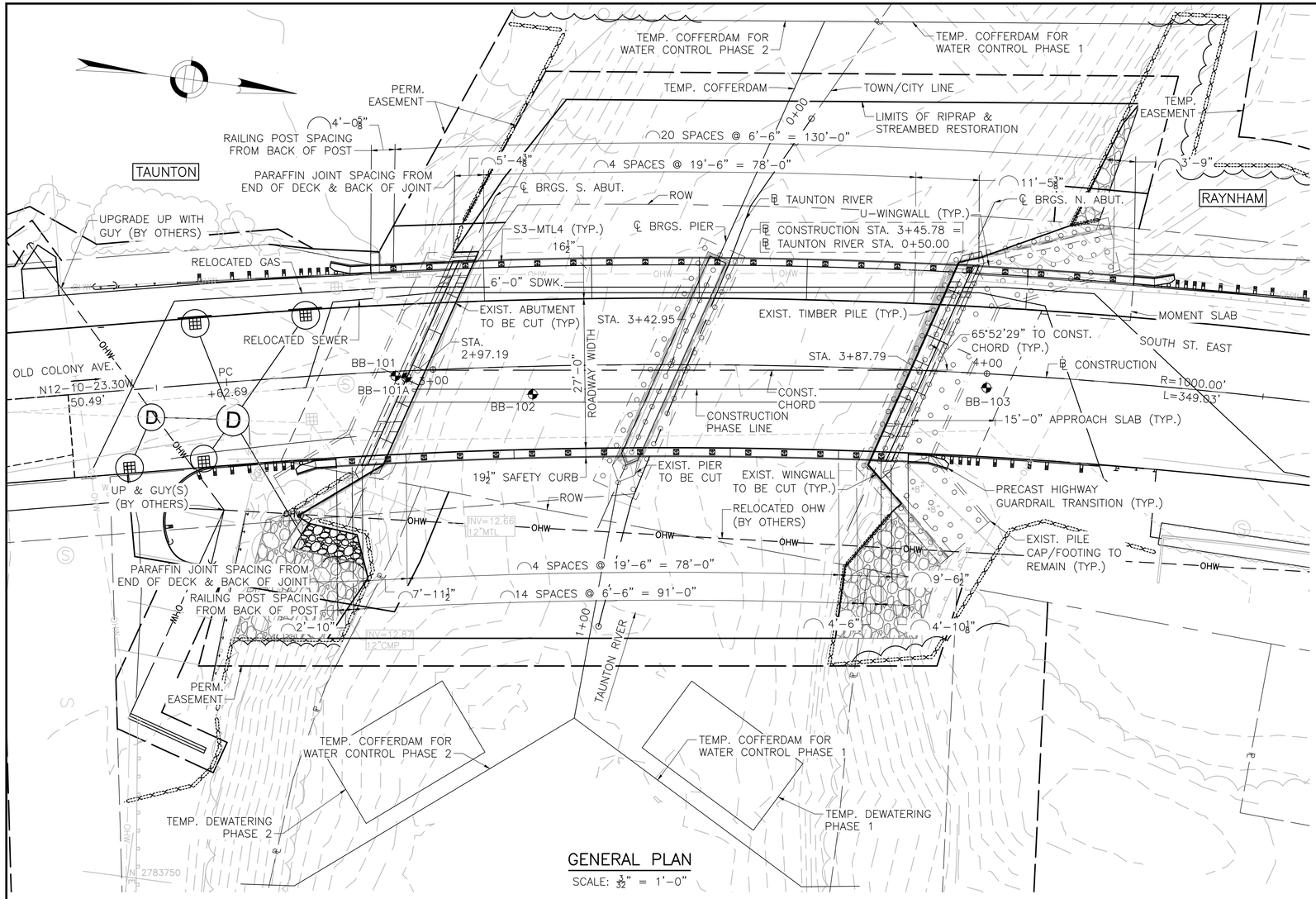
RAYNHAM/TAUNTON
SOUTH STREET E./OLD COLONY AVE.

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	#######	5	76
PROJECT FILE NO.	613642		

GENERAL PLAN, ELEVATION, & LIMITS OF RIPRAP

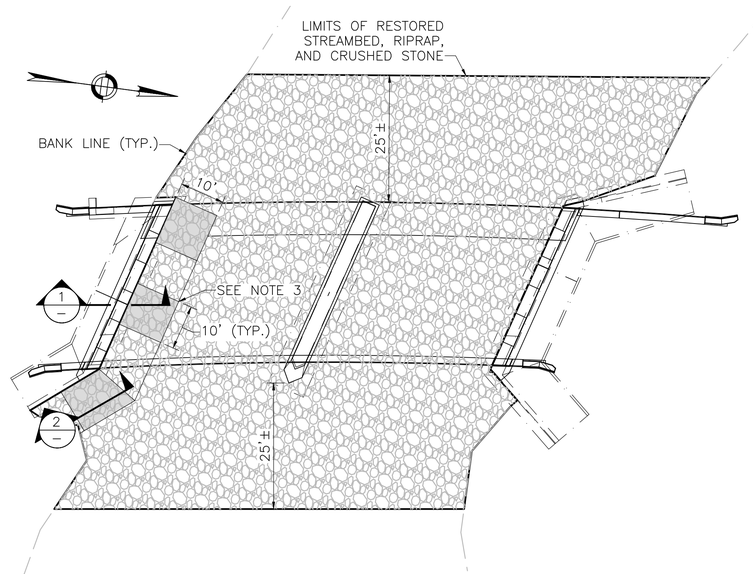
NOTES:

1. EXCAVATION FOR THE STREAMBED RESTORATION, RIPRAP, AND CRUSHED STONE SHALL BE PERFORMED IN A MANNER SO THAT THE FOOTING AND PILE CAPS ARE NOT UNDERMINED. EXCAVATION SLOPE SHALL BE A MINIMUM OF 1:1 FROM TOP OF FOOTING AND PILE CAPS.
2. 2:1 SLOPE FOR SOUTH ABUTMENT ONLY. TOP OF SLOPE AT FACE OF NORTH ABUTMENT SHALL MATCH EXISTING.
3. AT THE SOUTH ABUTMENT AND WINGWALLS, DREDGING, STREAMBED RESTORATION, RIPRAP, AND CRUSHED STONE IN FRONT OF THE WALLS OUT TO A DISTANCE OF 10 FEET SHALL BE PERFORMED IN A MANNER SUCH THAT ONLY ONE 10 FOOT WIDE STRIP IN FRONT OF THOSE WALLS IS DREDGED AT ANY TIME.



GENERAL PLAN

SCALE: $\frac{3}{32}$" = 1'-0"



LIMITS OF PROPOSED RIPRAP PLACEMENT

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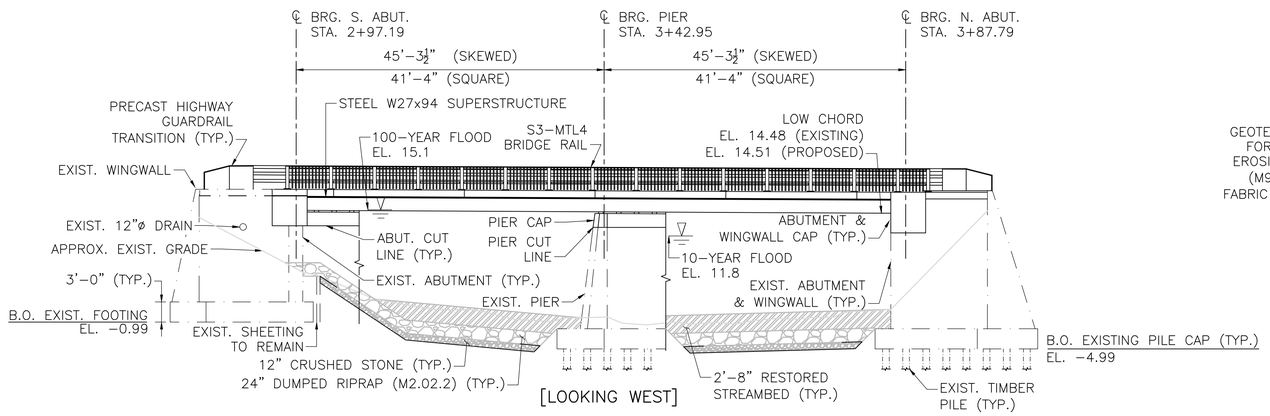

GENERAL ELEVATION

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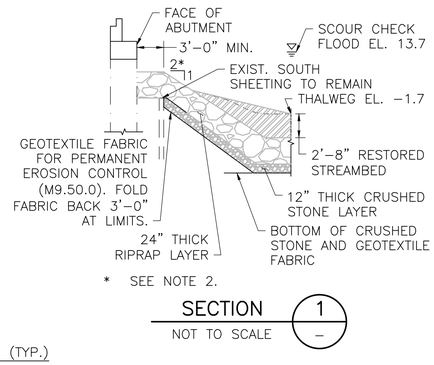
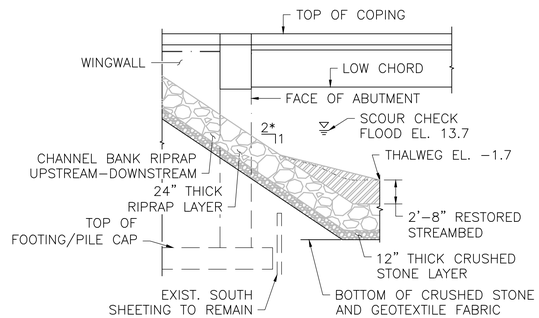


SECTION 1 — NOT TO SCALE



SECTION 2 — NOT TO SCALE

DATE	DESCRIPTION
THIS SHEET IS APPROVED FOR CONSTRUCTION BY MASSDOT	
AUTHORIZED SIGNATORY:	STATE BRIDGE ENGINEER
USE ONLY PRINTS OF LATEST DATE	

613642_BRS(R02003-T01004).DWG Plotted on 11-Feb-2026 4:27 PM
First Structural Submittal (S1) October 29, 2025

South Street East / Old Colony Avenue

Stormwater Management System Operation and Maintenance Plan and Long-Term Pollution Prevention Plan Raynham / Taunton, MA

PREPARED FOR

City of Taunton
Department of Public Works
10 Ingell Street
Taunton, MA 02780

PREPARED BY

www.BETA-Inc.com

BETA Group, Inc.
315 Norwood Park South
2nd Floor
Norwood, Massachusetts 02062

02/25/2026

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1

Stormwater Management System Operation and Maintenance (O&M) Plan

This Stormwater Management System Operation and Maintenance (O&M) Plan describes the approach for inspection and maintenance of drainage infrastructure and structural stormwater control measures (SCMs) to minimize contaminant loading for South Street East / Old Colony Ave in the Town of Raynham and City of Taunton, MA. In general, inspection and maintenance activities will be conducted consistent with the National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater Discharges from Small Municipal Separate Storm Sewer System (MS4).

This document has been prepared per the requirements of Massachusetts Department of Environmental Protection (MassDEP) Regulations 310 CMR 10.05 (6)(k)(9) and satisfies the requirements of Massachusetts Stormwater Standard 9.

1.1 Responsible Party

The Town of Raynham and City of Taunton will be responsible for the operation and maintenance of all stormwater management systems under their respective ownership within the project limits. Questions or concerns regarding activities associated with this O&M Plan should be addressed to the Raynham Highway Department located at 1555 King Phillip Street, Raynham, MA 02767, phone (508) 824-2718 and/or the Taunton Public Works Department located at 90 Ingell Street, Taunton, MA 02780, phone (508) 821-1431.

It shall be the responsibility of the Owner to provide a revised plan to the Conservation Commission indicating any change of ownership or responsible party. The responsible party shall also be responsible for financing maintenance and emergency repairs at the Site.

Project information is summarized in the following table:

Project Name:	South Street East / Old Colony Avenue
Project Type:	Transportation
Address:	Old Colony Ave, Taunton, MA, from approximately 75 feet north of Battle Row to the Taunton/Raynham Town Line South Street East , Raynham, MA, from the Taunton/Raynham Town Line to the north side of Sandy Hill Road.
SWMS Owner (Taunton):	Taunton Department of Public Works 90 Ingell Street, Taunton, MA
SWMS Owner (Raynham):	Raynham Highway Department 1555 King Phillip Street, Raynham, MA 02767
Responsible Party (Taunton):	Taunton Department of Public Works 90 Ingell Street, Taunton, MA
Responsible Party (Raynham):	Raynham Highway Department 1555 King Phillip Street, Raynham, MA 02767
Contact (Taunton):	Fred Cornaglia, Commissioner of Public Works (508) 821-1431
Contact (Raynham):	Norman Sturtevent, Superintendent (508) 824-2718

1.2 Inspection and Maintenance Measures and Record-Keeping

See Appendix F of the Stormwater Management Report for the proposed stormwater system within the project limits. The stormwater management system covered by this O&M Plan consists of the following measures:

- Deep Sump Catch Basins
- Infiltration Trench

The Town of Raynham and City of Taunton shall use a performance-based inspection and maintenance program for SCMs and catch basins. For SCMs, the overall approach is to inspect SCMs, and based on the results of the inspections, perform maintenance to preserve functionality. For catch basins, the overall approach is to perform maintenance at an interval that maintains the functionality of the catch basin (e.g., sump is less than 50% full of sediment). Catch basin inspections, including documentation of sediment accumulation, and maintenance will generally occur simultaneously.

Minimum inspection and maintenance frequencies are as follows:

Asset Type	Inspection Frequency	Maintenance Frequency
Catch Basins	Four times per year	Four times per year or whenever the depth of deposits is greater than or equal to one-half the depth from the bottom of the invert of the lowest pipe in the basin
Infiltration Trench	Every six months and after every major storm	Ever six months and after every major storm

Note: A “major storm” is defined as a rainfall event resulting in greater than 2.86 inches of precipitation within 24 hours, reflecting the 1-year storm.

The following table summarizes inspection requirements and tasks for each asset type.

Inspection Form	Applicable Stormwater Assets	Inspection Requirements
Inlets	› Catch basins	› Sediment accumulation › Trash/Debris accumulation › Signs of contamination › Frame and grate condition › Overall structure condition
SCMs	› Infiltration SCMs › Other SCMs	› SCM accessibility › Presence of standing water › Level of erosion › Sediment accumulation › Trash/Debris accumulation › Vegetation condition › Overall SCM condition
Storm Discharge Points	› Outlets to SCMs	› Presence of flow › Signs of contaminated flow › Sediment accumulation › Level of erosion › Pipe condition › Scour protection condition › Overall structure condition

Inspection and maintenance records can be made available by contacting the Town of Raynham Highway Department or the City of Taunton Department of Public Works. Representatives of each Town’s Conservation Commission, MassDEP, and US EPA may obtain access to these records, upon request.

Maintenance to be performed on the stormwater system is summarized in the following table:

Stormwater Feature	Potential Maintenance Actions	
Surface SCMs	• Remove and properly dispose of accumulated material (e.g., sediment, trash, leaf litter, debris) • Mow vegetated areas and remove and dispose of grass clippings • Regrade areas that show signs of unwanted ponding and channelization • Stabilize or reconstruct eroded areas and reseed • Replace stones/soil and/or replant vegetation	• Remove woody growth • Treat invasive plants • Address issues of standing water • Drain and reconstruct SCM • If rehabilitation is not possible, then retrofit to be a wet SCM while considering safety implications
Underground SCMs	• Remove and properly dispose of trash, sediment, debris, and root intrusions • Clean out sumps at an interval to maintain functionality (less than 50% full of sediment) • Jet and repair pipes	• Rehabilitate filtering and infiltration materials (e.g., geotextile fabric, crushed stone) • Stabilize and replace deteriorated structures • Perform evaluations (e.g., test pits) to evaluate subsurface conditions
Inlets and Outlets to SCMs	• Clear inlet and remove and properly dispose of sediment, trash, leaf litter, debris, and vegetation • Regrade areas that show signs of ponding and channelization • Repair or replace structural components • Repair damaged or eroded areas	• Provide or rehabilitate erosion control at the outlet • Regrade and replace the channel materials • Remove woody growth • Stabilize or reconstruct eroded areas • Treat invasive plants.

Based on the results of the inspection, repairs will be made in accordance with Town/City standard practices. Maintenance will be prioritized given the urgency of the required maintenance and availability of staff, contracts, etc. Maintenance may require contracting if existing maintenance personel are unavailable to perform the work. More intensive remedial activities may require permitting and/or an engineering solution.

Inspection, maintenance, and record keeping on will be performed in conjunction with the Town of Raynham / Taunton MS4 compliance requirements.

1.3 Erosion and Sediment Control Measures during Maintenance Activities

For maintenance activities that could result in discharges of sediments or other contaminants into wetlands, waterways, or other resource areas regulated under 310 CMR 10.00, the responsible maintenance personnel will employ measures to prevent migration of these sediments/contaminants. Such temporary measures may include, but are not necessarily limited to, the use of siltation barriers, catch basin silt sacks/filter bags, pipe plugs, cofferdams deployed within the stormwater structure, turbidity curtains, or other practices designed to prevent such discharges.

Where maintenance occurs in areas that are confined, with no risk of discharge to adjacent water bodies, no special measures may be needed. Examples include, but are not limited to: (1) cleaning of a forebay under dry conditions when the work can be completed and exposed surfaces stabilized prior to placing it back into service; and (2) catch basin cleaning where the activity is limited to removing material from a sump below the elevation of the outlet pipe.

1.4 O&M Budget

The Town of Raynham and City of Taunton perform maintenance for stormwater management systems as part of their routine operation and maintenance budget for roadways and bridges.

2

Long-Term Pollution Prevention Plan

This Long-Term Pollution Prevention Plan (LTPPP) describes the approach for pollution prevention and related maintenance activities for South Street East / Old Colony Ave in the Town of Raynham and City of Taunton, MA. In general, long-term pollution prevention and related maintenance activities will be conducted consistent with:

- The National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater Discharges from Small Municipal Separate Storm Sewer System (MS4),
- Measures outlined in the Town of Raynham's and City of Taunton's Stormwater Management Plans (SWMP).

This LTPPP satisfies the requirements related to pollution prevention under Massachusetts Stormwater Standards 4, 5, 6, and 10.

2.1 Practices for Long-Term Pollution Prevention

For the facilities covered, long-term pollution prevention includes the following measures.

2.1.1 Litter Pick-up

The municipalities will conduct litter pick-up from the stormwater management facilities in conjunction with routine road maintenance activities.

2.1.2 Material Storage and Handling

The following storage and handling practices shall be implemented at the Site:

- Avoid stockpiling of soil or materials within 100 feet of wetland resources and wellhead protection areas. If necessary, provide sufficient erosion controls to prevent migration of sediments.
- All materials shall be stored or disposed in accordance with all local, state, and federal regulations.
- All sand piles shall be contained and stabilized to prevent the discharge of sand to wetlands or water bodies and, where feasible, covered.
- Minimize hazardous materials stored on site. All materials stored on site shall be stored in original containers and sealed.
- All solid waste, if encountered, shall be handled and disposed of in accordance with all local, state, and federal regulations.
- No snow shall be stored within waterbodies, resource areas, wellhead protection areas, or associated buffer zones.

2.1.3 Inspection and Maintenance of Stormwater Assets

The municipalities will conduct inspection and maintenance of drainage infrastructure and the stormwater control measures (SCMs) in accordance with the O&M Plan, as described in Section 1.

2.1.4 Maintenance of Landscaped Areas

Routine mowing will be conducted according to standard Town practices. SCM basin bottoms and embankments designed to impound water should be mowed as required to prevent establishment of woody vegetation.

2.1.5 Snow and Ice Management

Snow and Ice Management will be conducted consistent with Town/City Snow and Ice Policy and Procedures.

2.1.6 Street Sweeping

Operations on Town-owned roadways with be conducted in accordance with Town Standard Operating Procedures.

2.1.7 Prohibition of Illicit Discharges

The MassDEP Stormwater Management Standard 10 prohibits illicit discharges to the stormwater management system. Illicit discharges are discharges that do not consist entirely of stormwater, except for certain specified non-stormwater discharges.

In accordance with the existing MS4 permit, examples of discharges from the following sources are not considered illicit discharges:

- Firefighting activities*
- Foundation drains
- Water line flushing
- Footing drains
- Landscape irrigation
- Individual residential car washing
- Uncontaminated groundwater
- Rising groundwater
- Diverted stream flows
- Flows from riparian habitats/wetlands
- Potable water sources
- Dechlorinated swimming pool water
- Street wash waters
- Wash water from residential buildings (no detergents)
- Condensation from air conditioning units
- Run-on from private driveways caused by precipitation
- Lawn watering
- Water from crawl space pumps

*Water from firefighting activities is allowed and need only be addressed where they are identified as significant sources of pollutants to waters of the United States.

Based on plan review and existing survey, there are no known or proposed illicit connections associated with the project. Should an interconnection to the stormwater management system be identified, the Town/City will determine if the connections are authorized. For unauthorized

connections, the Town/City will investigate the connections and if they are determined to be illicit, the connections will be managed through Town's/City's Illicit Discharge Detection and Elimination (IDDE) program.

2.1.8 Spill Prevention and Response

The following spill prevention and response measures shall be implemented at the Site:

- Refuel construction equipment off-site.
- Any spills of hazardous materials shall be reported, contained, and removed in accordance with local, State, and Federal regulations.
- Review on-site equipment and activities to ensure no illicit discharges are created.

3

Construction Period Pollution Prevention and Erosion and Sediment Control Plan

3.1.1 Introduction

The project is anticipated to disturb greater than one acre; therefore, filing a Notice of Intent with EPA and developing of a Stormwater Pollution Prevention Plan (SWPPP) is required. The SWPPP will be provided as part of the construction documents and will be submitted to the Town of Raynham and the City of Taunton Conservation Commission prior to commencement of construction. The following plan provides general guidance for the prevention of pollution and erosion and sedimentation during construction.

Potential Erosion and Sedimentation

Portions of the project involve soil disturbance in areas upgradient of stormwater collection systems and wetland resources. Site preparation, scheduling, and construction practices need to be carefully planned to prevent construction debris and erosion caused by stormwater runoff over exposed soils from causing degradation of downstream wetland resources. Although it is not always possible to avoid impacts from storm events, the following guidelines shall be followed:

- Minimize land disturbance area and soil exposure to stormwater and wind erosion.
- Minimize time that area is disturbed.
- Avoid routing stormwater runoff or dewatering flows through disturbed areas.
- Inspect and maintain erosion controls until all soils are stabilized.
- Maintain good housekeeping practices.
- Stabilize disturbed soils as soon as possible to limit exposure.

Erosion and Sedimentation Plan

This Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan has been prepared in accordance with the Department of Environmental Protection's Massachusetts Erosion and Sedimentation Guidelines for Urban and Suburban Areas.

Extent of Disturbance

The total area of disturbance is approximately 1.05± acres. The project has been designed to minimize disturbance to existing woodlands and the majority of proposed work is within an existing roadway and its associated right-of-way. The existing Site will be impacted by tree clearing/trimming, grading, roadway widening, sidewalk and shared use path construction, utility installation, and other associated activities. Off-site areas are not proposed to be

directly altered but may be impacted by erosion and sedimentation if the controls described in this plan are not followed. No off-site land disturbance is proposed.

Refer to construction drawings for locations of all proposed erosion and sedimentation controls and the proposed area of disturbance.

Pre-Construction and Site Preparation

- Install all erosion control barrier in accordance with the construction documents prior to commencing any land disturbance activity.
- Inspect and maintain erosion controls until all soils are stabilized.
- Monitor weather reports daily and stabilize/prepare site if storm event in excess of the 2-year storm is expected.
- Maintain an inspection logbook on-site at all times. The specific location of the logbook shall be conveyed to the Town.

3.1.2 Planned Erosion and Sedimentation Control Practices

Catch Basin Inlet Protection

Inlet protection is proposed at all existing and proposed drain inlets within the project area. Inlet protection shall also be provided at off-site drain inlets located immediately downgradient of the area of disturbance, pending coordination with the Town and/or abutting property owners.

The purpose of inlet protection is to intercept and capture sediment that would otherwise enter the drainage system. Inlet protection shall consist of manufactured polyproplylene fabric consistent with the construction details.

Inspection and maintenance shall consist of checking for sediment accumulation and removing sediment when the protection device is at least one-half full.

Sediment Control Barrier

Sediment control barrier is proposed along the downgradient limit of work, as depicted on the construction plans. Additional erosion control barrier may be required at other locations as needed.

The purpose of erosion control barrier is to intercept and capture sediment that would otherwise migrate off-site. Erosion control barrier shall consist of compost filter tubes, straw wattles, and silt fence.

Inspection and maintenance:

- Check for sedimentation accumulation and removing sediments when they reach excessive volumes (approximately 1/3 the height of the barrier).
- Remove sediments when runoff ponds for 24 or more hours to prevent potential mosquito breeding habitat. Restake/replace controls as necessary to maintain their effectiveness.

Control of Water

Control of water is proposed along the Taunton River upstream and downstream of the proposed bridge rehabilitation.

The purpose of control of water is redirect flows around the work area to prevent sedimentation transport downstream. The means and methods of the controls shall be the responsibility of contractor and will be based on their construction operations and the conditions at the site. Methods are anticipated to include temporary cofferdams and dewatering.

Inspection and maintenance, as applicable:

- Check for sediment accumulation, plant growth, or debris behind the control.
- Check for stability at anchoring points and identify any breaks in the control.
- Identify any areas where turbid water is passing through the control.
- Repair as necessary to maintain effectiveness.

Tree Protection

Tree protection is proposed at existing trees to remain near to the area of disturbance, as noted on the construction plans.

The purpose of tree protection is to minimize risk of damage to trees designated to remain. Tree protection shall consist of armoring, pruning, and/or fencing consistent with the construction details.

Temporary Seeding

Temporary seeding is proposed for disturbed areas which have remained exposed for more than 14 days.

The purpose of temporary seeding is to provide vegetative stabilization of loose soil to mitigate risk of erosion.

Inspection and maintenance:

- Confirm that vegetation has been established
- Provide additional seeding as needed

3.1.3 Additional Control Measures

Good Housekeeping

- Minimize hazardous materials stored on site. All materials stored on site shall be stored in original containers and sealed.
- Refuel construction equipment off-site.
- Any spills of hazardous materials shall be reported, contained, and removed in accordance with local, State, and Federal regulations.

Material Stockpiling

All construction materials shall be stored in designated stockpile areas. Stockpiles shall be surrounded with silt fence, straw wattles, and/or compost filter tubes to mitigate erosion potential. All waste materials shall be removed from the Site or placed in approved receptacles at the conclusion of each workday. Disposal of waste materials shall be in accordance with relevant local, state, and federal regulations.

Protection of Infiltration Areas

To protect the infiltrative capacity of proposed infiltration areas, SCMs shall be excavated as late as practicable in the construction sequence.

Potential Construction Site Pollutants

Pollutant-Generating Activity	Pollutants or Pollutant Constituents	Location on Site
Equipment Re-fueling	Diesel Fuel, Gasoline	Laydown Area
Leaking or Broken Hydraulic Lines	Hydraulic Oil	Building Work Areas and Laydown Area
Minor Equipment Maintenance	Diesel Fuel, Gasoline, Hydraulic Oil, Motor Oil, Anti-Freeze	Laydown Area
Applying Fertilizer	Nitrogen, Phosphorous	Newly Seeded Areas
Portable Sanitary Toilets	Bacteria, Parasites and Viruses	Laydown Area
Vehicle Accident	Diesel Fuel, Gasoline	Entire Site
Trash Containers/Dumpsters	Paper, Plastic, and Food Waste	Laydown Area

Refer to Long-Term Pollution Prevention Plan, included as Section 2, for measures to be implemented to minimize pollutant discharges.

Jonathan Niro

From: Jonathan Niro
Sent: Tuesday, February 17, 2026 4:04 PM
To: DMF EnvReview-South (FWE)
Cc: Collins, Lily R. (DOT); Walker, Courtney L. (DOT)
Subject: FW: Taunton Notice of Intent Submission - Old Colony Avenue over the Taunton River

Good afternoon,

Please see below for a link to the Notice of Intent that was submitted to the City of Taunton for the Old Colony Avenue Bridge replacement over the Taunton River. This is being submitted for MassDMF review and comment concurrently with the Conservation Commission's review of the NOI.

Let me know if you have any questions.

Thank you,

Jonathan Niro, PWS
Project Manager
BETA Group, Inc. | 844.800.2382 x7141

Build your future at BETA. ***Apply now!***

From: Jonathan Niro
Sent: Monday, February 9, 2026 9:05 AM
To: Jenna Freitas <jfreitas@taunton-ma.gov>
Cc: Chris Jones <cjones@BETA-Inc.com>; Laura Krause <LKrause@BETA-Inc.com>; Hannah Davis <HDavis@BETA-Inc.com>; Lamothe, Herrio (DOT) <herrio.lamothe@dot.state.ma.us>; Walker, Courtney L. (DOT) <courtney.l.walker@dot.state.ma.us>; Collins, Lily R. (DOT) <lily.r.collins@dot.state.ma.us>; Katherine Nunes <knunes@taunton-ma.gov>
Subject: Taunton Notice of Intent Submission - Old Colony Avenue over the Taunton River

Good morning,

On behalf of the City of Taunton (the Applicant), BETA Group, Inc. (BETA) is submitting a Notice of Intent (NOI) to the Taunton Conservation Commission for the proposed replacement of the Old Colony Avenue / South Street East bridge over the Taunton River. This replacement is limited to the bridge superstructure; however, in-water work including dredging and placement of riprap is proposed to provide scour countermeasures for the existing substructure. The Project is being filed under the MassDOT bridge exemption as specified in the 2014 Transportation Bond Bill. The bridge replacement design is substantially the functional equivalent of and in similar alignment to, the existing bridge. Therefore, the Project is not subject to the Massachusetts Wetlands Protection Act, and this NOI is being filed under the Taunton Wetlands Protection Ordinance only.

Hard copies will be delivered to your office today, and we will send you proof of abutter notification after mailing them out. A digital copy of the NOI can be accessed here: Old Colony Ave Bridge NOI - Taunton

We look forward to discussing the Project with you at the 3/2 meeting. If you could confirm our place on the agenda, that would be greatly appreciated. Please note that we have submitted to the Raynham Conservation Commission as well for this Project.

Best,

Jonathan Niro, PWS
Project Manager

BETA Group, Inc.
844.800.2382 x7141

Build your future at BETA. ***Apply now!***

Jonathan Niro

From: Jonathan Niro
Sent: Tuesday, February 17, 2026 4:04 PM
To: DMF EnvReview-South (FWE)
Cc: Collins, Lily R. (DOT); Walker, Courtney L. (DOT)
Subject: FW: Raynham Notice of Intent Submission - Old Colony Avenue/South Street East over the Taunton River

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Let me know if you have any questions.

Thank you,

Jonathan Niro, PWS
Project Manager
BETA Group, Inc. | 844.800.2382 x7141

Build your future at BETA. ***Apply now!***

From: Jonathan Niro
Sent: Monday, February 9, 2026 9:05 AM
To: aengelhardt <aengelhardt@town.raynham.ma.us>
Cc: Chris Jones <cjones@BETA-Inc.com>; Laura Krause <LKrause@BETA-Inc.com>; Hannah Davis <HDavis@BETA-Inc.com>; Lamothe, Herrio (DOT) <herrio.lamothe@dot.state.ma.us>; Walker, Courtney L. (DOT) <courtney.l.walker@dot.state.ma.us>; Collins, Lily R. (DOT) <lily.r.collins@dot.state.ma.us>; Katherine Nunes <knunes@taunton-ma.gov>
Subject: Raynham Notice of Intent Submission - Old Colony Avenue/South Street East over the Taunton River

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Hard copies will be delivered to your office today, and we will send you proof of abutter notification after mailing them out. A digital copy of the NOI can be accessed here: Old Colony Ave Bridge NOI - Raynham

We look forward to discussing the Project with you at the 2/18 meeting. If you could confirm our place on the agenda, that would be greatly appreciated. Please note that we have submitted to the Taunton Conservation Commission as well for this Project.

Best,

Jonathan Niro, PWS
Project Manager

IMPROVING COMMUNITIES TOGETHER

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844.800.2382 x7141

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IMPROVING COMMUNITIES TOGETHER

MEMORANDUM

Date:	March 20, 2026	Job No.:	22.10887.00
To:	Dan Vasconcelos, PWS (USACE)		
Cc:	Herrio Lamothe (MassDOT) Lily Collins (MassDOT) Courtney Walker (MassDOT) Heidi Davis (MassDEP) Tyler Lewis (MassDEP) Kevin Newton (USACE) Christopher Jones, PE (BETA) Laura Krause, Associate (BETA)		
From:	Jonathan Niro, PWS, Project Manager (BETA) Hannah Davis, Staff Scientist (BETA)		
Subject:	**Old Colony Avenue Reconstruction Pre-Construction Notification (NAE-2025-02437) Response to DMF & NPS Comments**		

INTRODUCTION

The purpose of this memorandum is to provide responses to comments provided by the Massachusetts Division of Marine Fisheries (DMF) and National Park Service (NPS) received via email on February 24, 2026. These comments were provided as part of DMF and NPS's review of the Pre-Construction Notification filed with the U.S. Army Corps of Engineers (USACE) for the Old Colony Avenue Bridge Reconstruction over the Taunton River in Raynham and Taunton, Massachusetts. The comments provided by DMF and NPS are quoted below in *italics*, with BETA's responses provided in **bold**.

DMF COMMENTS

1. *A spring time-of-year (TOY) restriction between March 1 – July 15 and fall TOY restriction between September 1 – November 15 is recommended for in-water work to protect diadromous fish migrations. No in-water work should take place during these recommended restriction periods.*

   BETA: These TOY restrictions will be observed within the Taunton River.

2. *MA DMF may be able to offer a fall TOY restriction waiver provided a Water Control/Diversion Plan is developed and submitted by the proponent for review, comments, and approval. More detailed Water Control/Diversion plans can be sent to Brad Chase (Brad.Chase@mass.gov) and Stephanie Berkman (Stephanie.Berkman@mass.gov).*

   BETA: No in-water work is proposed within the recommended TOY restriction periods and the project team has elected to not pursue a waiver. We appreciate MA DMF's willingness to work with us on alternative pathways should project conditions change.

3. *De-watering structures and water diversion channels should be in place prior to the time of year periods during spring immigration and fall emigration, and be designed to ensure adequate water depth for safe fish passage throughout these migratory periods.*

   BETA: Water controls will be installed and removed outside of these TOY periods. The Project has been designed to provide adequate water depth for safe fish passage, as only one half of the Taunton River will be subject to cofferdam installation at any given time, which will allow

fish to pass under the bridge within the remaining half of the channel and will preclude a need for diversion channels. A summary of the hydrologic and hydraulic analysis for temporary construction water control measures is provided in the attached "Temporary Construction Hydraulic Analysis Memorandum".

4. *Water levels should be maintained at sufficient levels to allow diadromous fish passage during in-water work until fall emigrations are completed in mid-November.*

   BETA: Temporary closure of only one half of the Taunton River at any given time will be required for cofferdam construction. Flow will be diverted from the southern half to the northern half of the River during Phase I of cofferdam installation, and flow will be diverted from the northern half to the southern half during Phase II. Proposed work is not anticipated to impact diadromous fish passage given that one-half of the channel will be available for fish passage at any given time.

5. *Dewatering pumps should include a two-part screen design to limit entertainment and entrapment of sensitive diadromous species that may be present during the construction period.*

   BETA: Dewatering methods have been designed to limit entrapment of sensitive diadromous species. Control of water specifications are provided in the attached "Special Provision Item 991.1". The Special Provision has been modified to require that a two-part screen be used on all pumps.

6. *MA DMF recommends the use of appropriate containment techniques to prevent siltation in the environment during construction.*

   BETA: Erosion and sedimentation control measures including compost filter tubes or similar and inlet protection will be used across the Site to prevent siltation during construction. Specifications for erosion and sedimentation control measures are provided in the attached "Special Provision Item 767.121" and specifications for inlet protection are provided in the attached "Special Provision Item 697.1". The Project may include the use of cofferdams and frac tanks designed to prevent migration of sediment outside of the dewatered work areas and prevent overtopping during storm events. Control of water specifications are provided in the attached "Special Provision Item 991.1". While the Contractor will be afforded flexibility with the final design/implementation of these controls, preventing sediment migration is a strict requirement of the relevant Special Provision.

7. *Care should be taken to remove and relocate any diadromous species observed in the draw-down footprint downstream of construction area. Hand nets should be kept onsite, and any fish relocation noted and reported to DMF.*

   BETA: Any diadromous fish requiring relocation will be noted and reported to DMF. Hand nets will be kept onsite.

NPS COMMENTS

1. *NPS appreciates that streambed material will be installed over the riprap. We kindly request that native streambed material is used; if no native streambed is available to use, then we request that the streambed material used is comparable in composition to native streambed material.*

   BETA: Native streambed material will be used as feasible based on the analytical test results of dredged sediment. BETA is currently coordinating with MassDEP as part of the 401 Water

Quality Certification process to permit analytical testing to occur during construction given that conditions did not allow for preconstruction testing. Proposed streambed restoration material is specified in the attached Special Provision Item 151.9, which includes a target gradation of streambed material in the event that import of material is required.

2. *The plans indicate that a fluvial geomorphologist will be overseeing the streambed restoration component. Can the applicant provide more information about this? Is this a known contractor? Will there be a report about the final streambed restoration plan?*

   BETA: MassDOT will receive on-call fluvial geomorphologist services through Roy Schiff of SLR. A report about the final streambed restoration plan can be submitted if requested.

3. *Can MassDOT provide justification for the need for 25 feet of riprap both upstream and downstream of the bridge? It is not clear from the plans that the current scour holes would require riprap to that extent. NPS asks that the applicant use only as much riprap as necessary to ensure bridge stability.*

   BETA: The limits of riprap upstream and downstream of the bridge are in accordance with Hydraulic Engineering Circular (HEC) No. 23 Design Guideline 14 and the MassDOT 100th Bridge Manual. The extent of riprap is needed to prevent localized scour at the abutments and preventing scour from undermining the installed riprap and progressing to the abutments upstream and downstream of the bridge. Hydraulic analysis confirms that the extent of riprap is required to provide scour protection. A copy of the Hydraulic and Scour Analysis Report prepared by BETA is attached.

4. *NPS is aware that the Town of Raynham is currently in the planning and design phase of a park that would be located on either side of the bridge at this location on the Raynham side. The plans include a canoe and kayak launch, pedestrian trails, picnic areas, and fishing access. We are curious if:*

   a. *The project applicant has been in touch with the Town of Raynham regarding the bridge project and has sought input in the design;*

      BETA: Abutters within the City of Taunton and the Town of Raynham have been notified about the Project through the Conservation Commission permitting process. In addition, Town of Raynham officials have been involved throughout the design of this Project due to half of the Project occurring within their municipal limits.

   b. *This project is doing anything or could do anything to proactively facilitate the Town of Raynham to achieve their project goals; and*

      BETA: The park proposed in the Town of Raynham is outside the scope of this Project. However, BETA and the Town have been in communication regarding the future park project. The bridge project includes a curb cut and break in the guardrail northeast of the bridge to facilitate a future entrance to the park. It was determined no other accommodations for the park were needed as part of the bridge project.

   c. *The streambed restoration (riprap) and/or any upland work would need to be undone or changed in order to accommodate the park project.*

      BETA: The Project has been designed in coordination with the City of Taunton and Town of Raynham. Streambed restoration and/or upland work are not anticipated to impact any part of a potential park project, as this Project is generally limited to roadway

improvements and in-water scour protection work that will not impact access to, or development within, the potential park parcels.

SUMMARY

We trust that this memorandum provides sufficient information to resolve all comments provided by NPS and DMF. Please do not hesitate to reach out to us if you have any further questions.

Attached: Special Provisions (Streambed Restoration, Silt Sack, Sediment Control Barrier, and Control of Water)
Temporary Construction Hydraulic Analysis Memorandum
Hydraulic and Scour Analysis Report

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IMPROVING COMMUNITIES TOGETHER

MEMORANDUM

Date:	March 31, 2026	Job No.:	22.10887.00
To:	Dan Vasconcelos, PWS (USACE) Division of Marine Fisheries (MA DMF) National Park Service (NPS)		
Cc:	Herrio Lamothe (MassDOT) Lily Collins (MassDOT) Courtney Walker (MassDOT) Heidi Davis (MassDEP) Tyler Lewis (MassDEP) Kevin Newton (USACE) Christopher Jones, PE (BETA) Laura Krause, Associate (BETA)		
From:	Jonathan Niro, PWS, Project Manager (BETA) Hannah Davis, Staff Scientist (BETA)		
Subject:	**Old Colony Avenue Reconstruction Pre-Construction Notification (NAE-2025-02437) Response to DMF & NPS Comments**		

INTRODUCTION

The purpose of this memorandum is to provide responses to comments provided by the Massachusetts Division of Marine Fisheries (DMF) and National Park Service (NPS) received via email on February 24, 2026. These comments were provided as part of DMF and NPS's review of the Pre-Construction Notification filed with the U.S. Army Corps of Engineers (USACE) for the Old Colony Avenue Bridge Reconstruction over the Taunton River in Raynham and Taunton, Massachusetts. The comments provided by DMF and NPS are quoted below in *italics*, with BETA's responses provided in **bold**.

DMF COMMENTS

1. *A spring time-of-year (TOY) restriction between March 1 – July 15 and fall TOY restriction between September 1 – November 15 is recommended for in-water work to protect diadromous fish migrations. No in-water work should take place during these recommended restriction periods.*

   BETA: These TOY restrictions will be observed within the Taunton River.

2. *MA DMF may be able to offer a fall TOY restriction waiver provided a Water Control/Diversion Plan is developed and submitted by the proponent for review, comments, and approval. More detailed Water Control/Diversion plans can be sent to Brad Chase (Brad.Chase@mass.gov) and Stephanie Berkman (Stephanie.Berkman@mass.gov).*

   BETA: No in-water work is proposed within the recommended TOY restriction periods and the project team has elected to not pursue a waiver. We appreciate MA DMF's willingness to work with us on alternative pathways should project conditions change.

3. *De-watering structures and water diversion channels should be in place prior to the time of year periods during spring immigration and fall emigration, and be designed to ensure adequate water depth for safe fish passage throughout these migratory periods.*

   BETA: Water controls will be installed and removed outside of these TOY periods. The Project has been designed to provide adequate water depth for safe fish passage, as only one half of

the Taunton River will be subject to cofferdam installation at any given time, which will allow fish to pass under the bridge within the remaining half of the channel and will preclude a need for diversion channels. A summary of the hydrologic and hydraulic analysis for temporary construction water control measures is provided in the attached "Temporary Construction Hydraulic Analysis Memorandum".

4. *Water levels should be maintained at sufficient levels to allow diadromous fish passage during in-water work until fall emigrations are completed in mid-November.*

   BETA: Temporary closure of only one half of the Taunton River at any given time will be required for cofferdam construction. Flow will be diverted from the southern half to the northern half of the River during Phase I of cofferdam installation, and flow will be diverted from the northern half to the southern half during Phase II. Proposed work is not anticipated to impact diadromous fish passage given that one-half of the channel will be available for fish passage at any given time.

5. *Dewatering pumps should include a two-part screen design to limit entertainment and entrapment of sensitive diadromous species that may be present during the construction period.*

   BETA: Dewatering methods have been designed to limit entrapment of sensitive diadromous species. Control of water specifications are provided in the attached "Special Provision Item 991.1". The Special Provision has been modified to require that a two-part screen be used on all pumps.

6. *MA DMF recommends the use of appropriate containment techniques to prevent siltation in the environment during construction.*

   BETA: Erosion and sedimentation control measures including compost filter tubes or similar and inlet protection will be used across the Site to prevent siltation during construction. Specifications for erosion and sedimentation control measures are provided in the attached "Special Provision Item 767.121" and specifications for inlet protection are provided in the attached "Special Provision Item 697.1". The Project may include the use of cofferdams and frac tanks designed to prevent migration of sediment outside of the dewatered work areas and prevent overtopping during storm events. Control of water specifications are provided in the attached "Special Provision Item 991.1". While the Contractor will be afforded flexibility with the final design/implementation of these controls, preventing sediment migration is a strict requirement of the relevant Special Provision.

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1. *NPS appreciates that streambed material will be installed over the riprap. We kindly request that native streambed material is used; if no native streambed is available to use, then we request that the streambed material used is comparable in composition to native streambed material.*

   BETA: Native streambed material will be used as feasible based on the analytical test results of dredged sediment. BETA is currently coordinating with MassDEP as part of the 401 Water Quality Certification process to permit analytical testing to occur during construction given that conditions did not allow for preconstruction testing. Proposed streambed restoration material is specified in the attached Special Provision Item 151.9, which includes a target gradation of streambed material in the event that import of material is required.

2. *The plans indicate that a fluvial geomorphologist will be overseeing the streambed restoration component. Can the applicant provide more information about this? Is this a known contractor? Will there be a report about the final streambed restoration plan?*

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the bridge to facilitate a future entrance to the park. It was determined no other accommodations for the park were needed as part of the bridge project.

c. *The streambed restoration (riprap) and/or any upland work would need to be undone or changed in order to accommodate the park project.*

BETA: The Project has been designed in coordination with the City of Taunton and Town of Raynham. Streambed restoration and/or upland work are not anticipated to impact any part of a potential park project, as this Project is generally limited to roadway improvements and in-water scour protection work that will not impact access to, or development within, the potential park parcels.

SUMMARY

We trust that this memorandum provides sufficient information to resolve all comments provided by NPS and DMF. Please do not hesitate to reach out to us if you have any further questions.

Attached: Special Provisions (Streambed Restoration, Silt Sack, Sediment Control Barrier, and Control of Water)
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ITEM 151.9 STREAMBED RESTORATION CUBIC YARD

This work shall consist of stockpiling and replacing river bed material in the proposed bridge replacement and the upstream and downstream approaches in the limits of work. The streambed restoration shall replicate the existing natural channel bed outside the work area in terms of material, roughness, shape, profile, and appearance. The ultimate product will, to the extent possible, replicate the function and appearance of the natural stream channel.

The Contractor shall coordinate with his/her sub-contractors to ensure all required equipment is available on-site to complete the work in this manner. The streambed restoration is required to comply with environmental permits issued for the project. MassDOT Environmental Services will provide a Fluvial Geomorphologist (Geomorphologist) or environmental specialist to provide a pre-construction meeting, on-site oversight during construction, and assistance during streambed restoration construction to ensure the restoration is constructed as shown on the Plans, as required by these Special Provisions and in accordance with permit requirements.

At least 30 days prior to the commencement of construction, the Contractor shall coordinate with David Paulson (MassDOT Wildlife & Endangered Species Unit Supervisor, (857) 262-3378 / david.j.paulson@state.ma.us) to set up an initial (virtual or in person) meeting with MassDOT's Geomorphologist, Contractor, and Engineer. At this meeting, the Geomorphologist will provide an overview of the restoration work. The Contractor should be prepared to discuss the anticipated means, methods, and schedule.

Process Approval:

In lieu of a mockup, the Contractor shall schedule an onsite meeting to discuss the streambed restoration with the Geomorphologist and respective parties from MassDOT. The Geomorphologist shall be onsite during initial streambed restoration. The Contractor shall provide the Geomorphologist adequate access to observe, direct, and inspect the channel restoration work throughout the duration of the removal, stockpile, and reinstallation of the existing streambed material. If material is being brought to the site for streambed restoration, the Contractor shall provide the Geomorphologist with photographs to see the material.

MATERIAL

Material excavated from the existing streambed shall be removed and stockpiled to facilitate reinstallation and replication of the natural streambed and to fill the voids in the proposed riprap placed below the top streambed restoration layer.

In the event that the excavated material is not suitable or there is not enough available suitable material, additional streambed restoration material shall be locally sourced that matches the composition of the existing native streambed.

The following gradation shall be used as a guide. For the streambed restoration material.

ITEM 151.9 (Continued)

Stream Bed Material Gradation

Particle	**Percent (%) Composition**
Boulder	0
Cobble	0
Gravel (course) (passing	25
Gravel (medium/fine)	45
Sand	30

The median grain size (D50) of the existing streambed as measured from vibracore samples taken from the top 2′± of streambed is approximately 1.9 mm (medium sand). Based on this data, the existing streambed material will need to be supplemented with additional gravel to meet the gradation requirements in the table above. As noted previously, supplemental streambed restoration material shall be locally sourced that matches the composition of the existing native streambed.

The streambed material shall be approved by the Engineer and Geomorphologist prior to use.

CONSTRUCTION

Channel

The streambed material shall be reinstalled over dumped riprap, as depicted on the plans, to an average thickness of 2’-8” feet, with variations in thickness as necessary to create the channel shape as shown on the plans. The initial placement of streambed material shall fill / choke the voids in the underlying riprap. Fill voids by shaking stone with the teeth of an excavator bucket, hand tamping with metal tamping rods, and by spraying water to settle fines between large stones. Plate compactors shall not be used. The purpose of filling the voids is to prevent subsurface flow where surface water disappears into large voids between the stone fill below the channel bed surface during low flow conditions. The final streambed shape and appearance shall be finalized in the field as directed by the Geomorphologist.

Reinstallation of the stockpiled streambed material shall be placed on top of the riprap to restore streambed habitat and fish passage. The streambed materials shall be installed during normal low water conditions behind cofferdams in accordance with the environmental permits.

Completion

Once all material has been placed in the stream channel and approved by the Geomorphologist and Engineer, the Contractor shall remove the cofferdams in such a way as to slowly wet the stream to minimize the initial sediment pulse. Every attempt shall be made to minimize the downstream movement of sediment.

ITEM 151.9 (Continued)
METHOD OF MEASUREMENT

The final streambed shall maintain the general configuration of the existing streambed bedform and there shall be minimal subsurface flow upon final inspection by the Engineer and Geomorphologist. The project must be passable by fish and other aquatic organisms following construction.

Item 151.9 will be measured in place for the complete and accepted work for restoration of the streambed within the limits shown on the Plans as approved by the Engineer and Geomorphologist. Streambed material used for filling of voids in riprap will be measured as 15% of the volume of riprap.

BASIS OF PAYMENT

Item 151.9 will be paid for at the contract unit price per cubic yard. Payment will be full compensation for stockpiling, transporting, and placing the material specified and for furnishing all labor, tools, equipment, testing, and incidentals necessary to complete the work.

The Geomorphologist will be provided by MassDOT at no cost to the Contractor.

Excavation of the existing streambed material will be paid for under Item 143.

Temporary cofferdams shall be paid for under Item 991.1.

ITEM 697.1 SILT SACK EACH

Work under this item shall conform to the relevant provisions of Subsections 227 and 670 of the Standard Specifications and the following:

The work under this item includes the furnishing, installation, maintenance and removal of a reusable fabric sack to be installed in drainage structures for the protection of wetlands and other resource areas and the prevention of silt and sediment from the construction site from entering the storm water collection system. Devices shall be ACF Environmental (800)-448-3636; Reed & Graham, Inc. Geosynthetics (888)-381-0800; The BMP Store (800)-644-9223; or approved equal.

CONSTRUCTION

Silt sacks shall be installed in retained existing and proposed catch basins and gutter inlets within the project limits and as directed by the Engineer.

The silt sack shall be as manufactured to fit the opening of the drainage structure under regular flow conditions, and shall be mounted under the grate. The insert shall be secured from the surface such that the grate can be removed without the insert discharging into the structure. The filter material shall be installed and maintained in accordance with the manufacturer's written literature and as directed by the Engineer.

Silt sacks shall remain in place until the placement of the pavement overlay or top course and the graded areas have become permanently stabilized by vegetative growth. All materials used for the filter fabric will become the property of the Contractor and shall be removed from the site.

The Contractor shall inspect the condition of silt sacks after each rainstorm and during major rain events. Silt sacks shall be cleaned periodically to remove and dispose of accumulated debris as required at no additional cost. Silt sacks, which become damaged during construction operations, shall be repaired or replaced immediately at no additional cost to the Department.

When emptying the silt sack, the contractor shall take all due care to prevent sediment from entering the structure. Any silt or other debris found in the drainage system at the end of construction shall be removed at the Contractor's expense.

All curb openings shall be blocked to prevent stormwater from bypassing the device.

All silt, sediment, and debris accumulated in silt sacks shall be handled and disposed of as specified in Section 227 of the Standard Specifications. Under no condition shall silt and sediment from the insert be deposited on site and used in construction.

COMPENSATION

Silt sacks will be measured and paid at the Contract unit price per each, complete in place, which price shall include all labor, materials, equipment and incidental costs required to complete the work. No separate payment will be made for removal and disposal of the sediment from the insert, but all costs in connection therewith shall be included in the Contract unit price bid.

ITEM 767.121 SEDIMENT CONTROL BARRIER FOOT

The work under this item shall conform to the relevant provisions of Subsections 670, 751 and 767 of the Standard Specifications and shall include the furnishing and placement of a sediment control barrier. Sediment control barrier shall be installed prior to disturbing upslope soil.

The purpose of the sediment control barrier is to slow runoff velocity and filter suspended sediments from storm water flow. Sediment barrier may be used to contain stockpile sediments, to break slope length, and to slow or prevent upgradient water or water off road surfaces from flowing into a work zone. Contractor shall be responsible for ensuring that barriers fulfill the intent of adequately controlling siltation and runoff.

Twelve-inch diameter (after installation) compost filter tubes with biodegradable natural fabric (i.e., cotton, jute, burlap) are intended to be the primary sedimentation control barrier.

For small areas of disturbance with minimal slope and slope length, the Engineer may approve the following sediment control methods:

- 9-inch compost filter tubes
- Straw bales which shall be trenched

No straw wattles may be used. Additional compost filter tubes (adding depth or height) shall be used at specific locations of concentrated flow such as at gully points, steep slopes, or identified failure points in the sediment capture line.

When required by permits, additional sediment barrier shall be stored on-site for emergency use and replacement for the duration of the contract.

Where shown on the plans or when required by permits, silt fence shall be used in addition to compost filter tubes and straw bales and shall be incidental to the item.

Sediment control barriers shall be installed in the approximate location as shown on the plans and as required so that no excavated or disturbed soil can enter mitigation areas or adjacent wetlands or waterways. Barriers shall be in place prior to excavation work. No work shall take place outside the barriers.

MATERIALS AND CONSTRUCTION

Prior to initial placement of barriers, the Contractor and the Engineer shall review locations specified on the plans and adjust placement to ensure that the placement will provide maximum effectiveness.

Barriers shall be staked, trenched, and/or wedged as specified herein and according to the Manufacturer’s instructions. Barriers shall be securely in contact with existing soil such that there is no flow beneath the barrier.

Compost Filter Tube

Compost material inside the filter tube shall meet M1.06.0, except for the following: no peat, manure or bio-solids shall be used; no kiln-dried wood or construction debris shall be allowed; material shall pass through a 2-inch sieve; and the C:N ratio shall be disregarded.

Outer tube fabric shall be made of 100% biodegradable materials (i.e., cotton, hemp or jute) and shall have a knitted mesh with openings that allow for sufficient water flow and effective sediment capture.

Tubes shall be tamped, but not trenched, to ensure good contact with soil. When reinforcement is necessary, tubes shall be stacked as shown on the detail plans.

Straw Bales

Straw bales shall be used if shown on the plans or when specified by Orders of Condition or other permit requirements.

Bales should be placed in a single row, lengthwise on the contour, with ends of adjacent bales tightly abutting one another. All bales should be either wire-bound or string-tied. Straw bales should be installed so that bindings are oriented around the sides (rather than along the tops and bottoms) of the bales in order to prevent deterioration of the bindings.

The barrier should be entrenched and backfilled. A trench should be excavated the width of a bale and the length of the proposed barrier to a minimum depth of 4 inches. The trench must be deep enough to remove all grass and other material which might allow underflow. After the bales are staked and chinked (filled by wedging), the excavated soil should be backfilled against the barrier. Backfill soil should conform to the ground level on the downhill side and should be built up to 4 inches against the uphill side of the barrier.

Each bale should be securely anchored by at least 2 stakes or re-bars driven through the bale. The first stake in each bale should be driven toward the previously laid bale to force the bales together. Stakes or re-bars should be driven deep enough into the ground to securely anchor the bales. For safety reasons, stakes should not extend above the bales but should be driven in flush with the top of the bale.

The gaps between the bales should be chinked (filled by wedging) with straw to prevent water from escaping between the bales. Loose straw scattered over the area immediately uphill from a straw bale barrier tends to increase barrier efficiency. Wedging must be done carefully in order not to separate the bales.

When used in a swale, the barrier should be extended to such a length that the bottoms of the end bales are higher in elevation than the top of the lowest middle bale to assure that sediment-laden runoff will flow either through or over the barrier but not around it.

Silt Fence

Materials and Installation shall be per Section 670.40 and 670.60 of the Standard Specifications and the following:

Silt fence shall only be used if shown on the plans or when specified by Orders of Condition or other permit requirements.

When used with compost filter tubes, the tube shall be placed on a minimum of 8 inches of folded fabric on the upslope side of the fence. Fabric does not need to be trenched.

When used with straw bales, an 8-inch deep and 4-inch wide trench or V-trench shall be dug on the upslope side of the fence line. One foot of fabric shall be placed in the bottom of the trench followed by backfilling with compacted earth or gravel. Stakes shall be on the down slope side of the trench and shall be spaced such that the fence remains vertical and effective.

Width of fabric shall be sufficient to provide a 36-inch high barrier after fabric is folded or trenched. Sagging fabric will require additional staking or other anchoring.

MAINTENANCE

Maintenance of the sediment control barrier shall be per Section 670.60 of the Standard Specifications or per the Stormwater Pollution Prevention Plan (SWPPP), whichever is more restrictive.

The contractor shall inspect the sediment barrier in accordance with relevant permits. At a minimum, barriers shall be inspected at least once every 7 calendar days and after a rain event resulting in 0.25 inches or more of rainfall. Contractor shall be responsible for ensuring that an effective barrier is in place and working effectively for all phases of the Contract.

Barriers that decompose such that they no longer provide the function required shall be repaired or replaced as directed. If the resulting berm of compost within the fabric tube is sufficiently intact and continues to provide effective water and sediment control, barrier does not necessarily require replacement.

DISMANTLING & REMOVING

Barriers shall be dismantled and/or removed, as required, when construction work is complete and upslope areas have been permanently stabilized and after receiving permission to do so from the Engineer.

Regardless of site context, nonbiodegradable material and components of the sediment barriers, including photo-biodegradable fabric, plastic netting, nylon twine, and silt fence, shall be removed and disposed off-site by the Contractor.

For naturalized areas, biodegradable, natural fabric and material may be left in place to decompose on-site. In urban, residential, or other locations where aesthetics is a concern, the following shall apply:

- Compost filter tube fabric shall be cut and removed, and compost shall be raked to blend evenly (as would be done with a soil amendment or mulch). No more than a 2-inch depth shall be left on soil substrate.
- Straw bales shall be removed and disposed off-site by the Contractor. Areas of trenching shall be raked smooth and disturbed soils stabilized with a seed mix matching adjacent seeding or existing grasses (i.e., lawn or native grass mix).
- Silt fence, stakes, and other debris shall be removed and disposed off-site. Site shall be restored to a neat and clean condition.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 767.121 will be measured and paid for at the contract unit price per foot of sediment control barrier which price shall include all labor, equipment, materials, maintenance, dismantling, removal, restoration of soil, and all incidental costs required to complete the work.

Silt fence, when used in conjunction with compost filter tubes or straw bales, will be incidental to this item.

Additional barrier, such as double or triple stacking of compost filter tubes, will be paid for per foot of tube installed.

Barriers that have been driven over or otherwise damage by construction activities shall be repaired or replaced as directed by the Engineer at the Contractors expense.

ITEM 991.1 **CONTROL OF WATER – STRUCTURE NO. R-02-003 = T-01-004** **LUMP SUM**

Work under this Item shall conform to the relevant provisions of Sections 7.02 and 140 of the Standard Specifications, all applicable environmental regulations and permits, and the following:

The work to be performed under this Item shall include all work necessary for the control of water within the excavations and cofferdam to construct the project in the dry. The work shall include designing, furnishing, installing, maintaining, operating, and removing temporary dewatering systems as required, to lower and control water levels. Work also includes properly disposing of pumped water, constructing, maintaining, observing, and removing of equipment and instrumentation for control of the system. Water shall be discharged as specified in the environmental permits obtained for this project. No direct discharge shall be allowed into the Taunton River during the dewatering operations.

It is the responsibility of the Contractor to determine the need and extent of dewatering required, sedimentation and dewatering techniques and controls and submit method and materials he/she proposes to use for approval by the Engineer.

The Contractor is cautioned that flow rates in the river can increase substantially during and after storm events. The flow diversion operations shall include contingencies for accommodating the increased flow during such events. At a minimum, the flow diversion operations shall be designed to accommodate a 2-year storm event with a flow rate of 2150 cubic feet per second and a water surface elevation of EL 10.05. In the event of a storm exceeding this capacity, the contractor shall be responsible for stabilizing the work zone and allowing the excess flow to overflow the diversion/bypass mechanisms and flow through the work zone.

Plans and calculations for the water control measures shall be developed by the Contractor for this Item. These plans and calculations shall be prepared and stamped by a Professional Engineer registered in the Commonwealth of Massachusetts and shall be submitted for review and approval prior to the start of construction.

The Contractor shall use such equipment and shall perform the operations in such a manner that boiling or other disturbances of the soil in the foundation area will be prevented. The Contractor shall keep the excavated area dry by such means that the water will be prevented from entering the excavations and adversely affecting the stability of the foundation material or supporting soils.

The pumping discharge shall not be allowed to enter directly into the water from the work areas, rather it shall be pumped to a temporary stilling basin or other appropriate treatment or containment device. The criteria that shall be implemented for the control of water must meet the following:

1. The enclosure shall be adequately sized and designed to achieve adequate water quality treatment/sedimentation trapping and prevent overtopping from dewatering and to provide the required filtering or containment.

2. The outlet from the containment structure shall not cause erosion of the surrounding area. An approved method of controlling erosion, such as an erosion control blanket, stone, etc. shall be used at the outlet.
3. Dewatering pumps shall include a two-part screen design to limit entrainment and entrapment of sensitive diadromous species that may be present during the construction period.
4. Impacts from dewatering will be minimized by designing support walls for minimal leakage, covering trucks, barges and stockpiles during rain events and land contouring to limit surface runoff from leaving the dewatering site.
5. Dewatered excavated material will be transported to the disposal site in accordance with local, state, and federal regulations.
6. The control of water containment structure shall be maintained as follows:
    a. Inspect at least twice daily during dewatering operations.
    b. Repair any damage immediately.
    c. Clean containment structure daily. Remove any debris immediately.
    d. Remove sediments when accumulated deposits reach a depth of 6 inches

The Contractor shall inspect the outlet daily and maintain the erosion controls at the outfall.

Placement of the dewatering stilling structure will be specified in the dewatering plan and will be submitted for approval by the Engineer. Pumping shall be conducted in a manner which will not adversely affect the freshly placed concrete within the excavation.

The Contractor shall provide and maintain pumps, pipes and other devices to promptly and continually remove and dispose of water from the excavation areas. The size and configuration of pumps and pipes shall be selected by the Contractor.

The Contractor is advised that the effectiveness of the water control method used will vary based on the field conditions and the time at which the actual excavation work is being performed. The Engineer shall to order the Contractor to stop all excavation operations when in his judgment the Contractor's water control operations are failing to produce adequate results or are posing a threat to the environment.

BASIS OF PAYMENT

Payment for work under this Item shall be paid at the contract unit bid price lump sum. Payment for all water control work, including design for the dewatering and treatment operations, used to maintain a water free excavation for construction of the proposed work shall include all labor, tools and equipment materials and installation, piping, pumping, maintenance, subsequent removal of all related materials and equipment all as outlined above; and restoration of site shall be included in the lump sum contract price bid under this Item. This work will include preparation of the Construction Dewatering Plan.

IMPROVING COMMUNITIES TOGETHER

TECHNICAL MEMORANDUM

Date:	December 11, 2025	Job No.:	10887
To:	City of Taunton, Massachusetts		
From:	BETA Group, Inc.		
Subject:	**Taunton, MA – Old Colony Ave Bridge – Temporary Construction Hydraulics**		

The purpose of this memorandum is to summarize the hydrologic and hydraulic analysis completed for the temporary construction water control measures at Old Colony Ave Bridge.

PROJECT LOCATION

The Old Colony Ave Bridge is in East Taunton, Massachusetts at Latitude 41.885989° N, Longitude 71.030044° W. The bridge spans the Taunton River, which runs from east to west under the structure.

Figure 1: Project Location Map

OBJECTIVE

The objective of this analysis is to determine the hydraulic characteristics of the Taunton River under the Old Colony Ave Bridge while temporary construction water control measures are in place. These measures consist of blocking flow between the existing pier and the existing river right embankment, only allowing flow down the river left side of the channel while work is done on the first span. Once the span is complete, flow will subsequently be blocked between the existing pier and the existing river left embankment, only

allowing flow down the river right side of the channel while work is done on the other span. See the following sections for more details regarding the hydrologic and hydraulic analyses.

HYDROLOGIC ANALYSIS

To analyze the hydraulic characteristics of the Taunton River while temporary water control measures are in place, it was necessary to determine the 50% AEP (2-year) flow in the river. The USGS StreamStats Application Version 4.29.4 was used to determine the peak discharge for the 2-year return interval at the crossing.

Table 1: Temporary Construction Hydrology

Target Flow Event	Peak Discharge (CFS)
2-year (50% AEP)	2150

HYDRAULIC ANALYSIS

The 2-year peak discharge for the Taunton River was analyzed in GeoHECRAS Version 5.1.0.2113, which uses the U.S. Army Corps of Engineers (USACE) HEC-RAS Version 6.4.1 as the analysis engine.

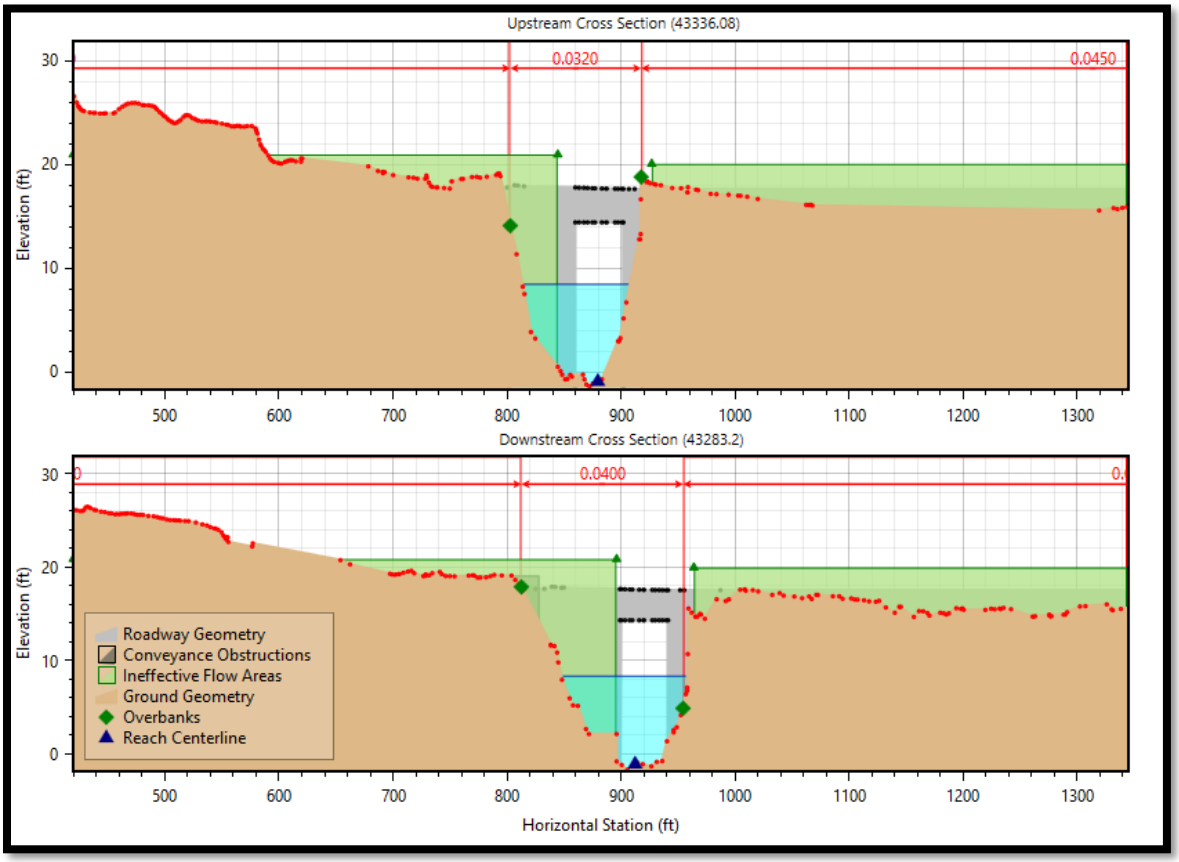

Figure 2: Bridge Cross Sections – River Left Blocked (Looking Downstream)

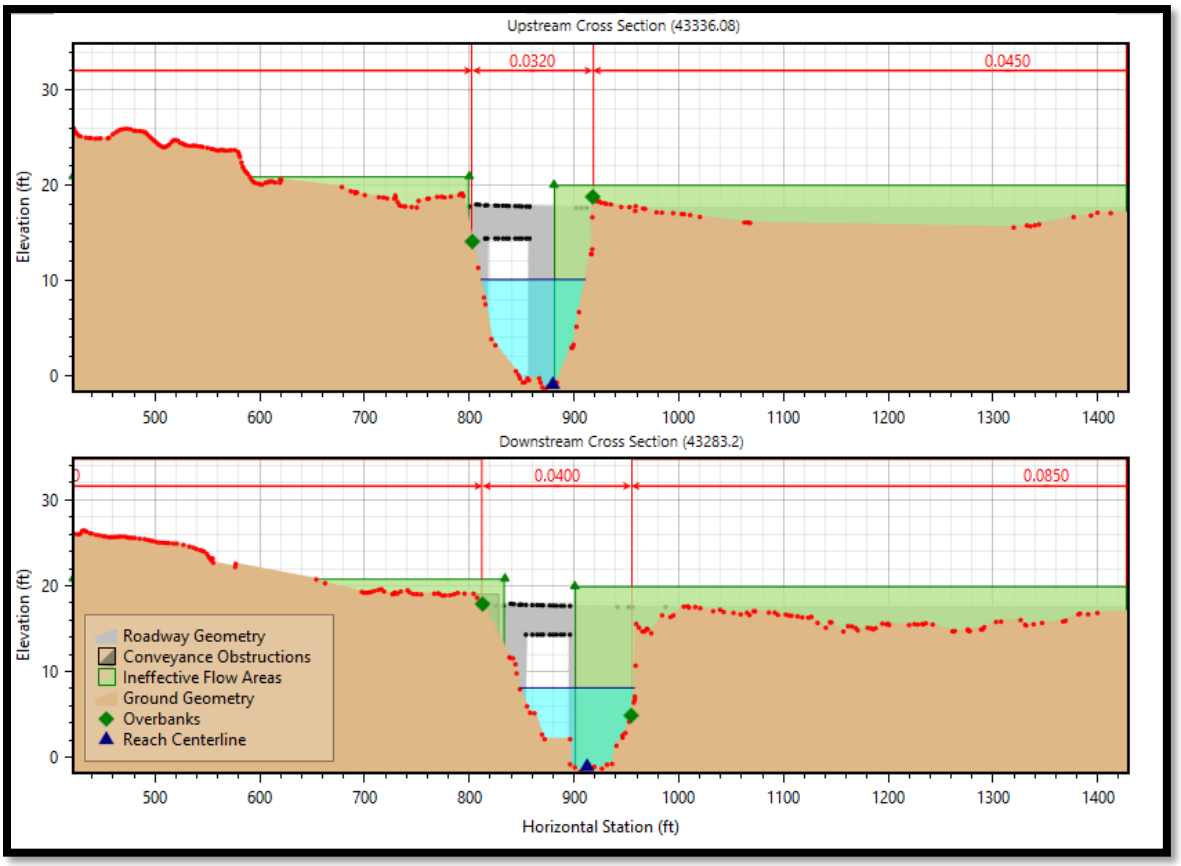

Figure 3: Bridge Cross Sections – River Right Blocked (Looking Downstream)

The figures above show the upstream and downstream bridge cross sections when the 2-year flow is analyzed for the two scenarios listed above (river left blocked, river right blocked). To simulate the blockage, the bridge geometry was altered to represent the flow obstruction, and ineffective areas were adjusted accordingly to simulate the contraction and expansion of flow as it moves through the opening. The results of the hydraulic analysis are summarized in Table 2 below:

Table 2: Hydraulic Analysis Results

	River Left Blocked		River Right Blocked	
	Upstream XS	**Downstream XS**	**Upstream XS**	**Downstream XS**
Flow (CFS)	2150	2150	2150	2150
WSEL (FT)	8.37	8.35	10.05	8.15
Velocity (FPS)	6.28	5.47	6.15	10.08

Taunton/Raynham, MA

Bridge Reconstruction R-02-003=T-01-004

MassDOT Project File #613642

December 2024

HYDRAULIC AND SCOUR ANALYSIS REPORT

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Bridge Reconstruction R-02-003=T-01-004

Taunton/Raynham, MA

MassDOT Project File #613642

HYDRAULIC AND SCOUR ANALYSIS REPORT

Prepared by: BETA GROUP, INC.
Prepared for: MassDOT Highway Division

December 2024

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Appendix B – Hydraulic Computations

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Appendix D – Scour Computations

Appendix E – Geotechnical Report

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1.0 EXECUTIVE SUMMARY

The following report presents the hydraulic and scour analysis conducted for South Street East/Old Colony Avenue Bridge (Bridge No. R-02-003) crossing over the Taunton River at the Taunton/Raynham town line.

South Street East (Raynham) and Old Colony Avenue (Taunton) are classified as Urban Collector Streets. The minimum hydraulic design for this bridge is a 10-year flood return frequency and a minimum scour design of a 25-year frequency with a 50-year scour countermeasure and check frequency.

The existing bridge spans the NFIP Regulatory Floodway Zone AE of the regulatory floodway delineations. FEMA provided a HECRAS hydraulic study of the Taunton River. This model was used to create a duplicate effective model of the Taunton River for use in the no-rise evaluation.

The proposed work includes the removal of the existing bridge superstructure and replacing it with new S3-MTL4 bridge barrier with a 6'-0" concrete sidewalk as well as a 3" wearing surface at the roadway over an 8" cast-in-place reinforced concrete deck supported by (6) W27 steel stringers. The existing substructure (abutments and pier) will remain in place. The proposed hydraulic opening, including the bridge low chord, will remain unchanged from existing conditions.

2.0 PROJECT DESCRIPTION

2.1 EXISTING STRUCTURE

The South Street East/Old Colony Avenue Bridge (Bridge No. R-02-003) crosses over the Taunton River on the Raynham/Taunton town line. The existing structure is an approximately 89′-6″ two span bridge with equal spans of approximately 44′-9″, constructed in 1945. The structure consists of eight (8) 27 WF steel beams spaced at 4′-6 ½″ on center supporting a 7″ concrete deck and 2-1/4″ of bituminous paving. The bridge is supported by unreinforced concrete gravity abutments and wingwalls and a reinforced concrete pier. The south abutment is founded on spread footings and the north abutment and pier are founded on timber piles. The bridge is 35′-0″ wide, which includes a 26′-0″ roadway, a 2′-6" safety walk and 5'-0" sidewalk with metal railings.

2.1.1 CROSSED WATERWAY AT BRIDGE LOCATION

The Taunton River is a major coastal river that flows from north to south, the river is formed at the confluence of the Matfield and Town Rivers in Bridgewater and flows south to the Narragansett Bay, passing under the South Street East/Old Colony Avenue Bridge. The hydraulic opening of the existing bridge is 87'-1" feet wide with a single sharp nose pier that varies in width from 3'-0" to 2'-9". The watershed of the Taunton River at the South Street East/Old Colony Avenue Bridge is approximately 293 square miles with an extensive network of tributaries.

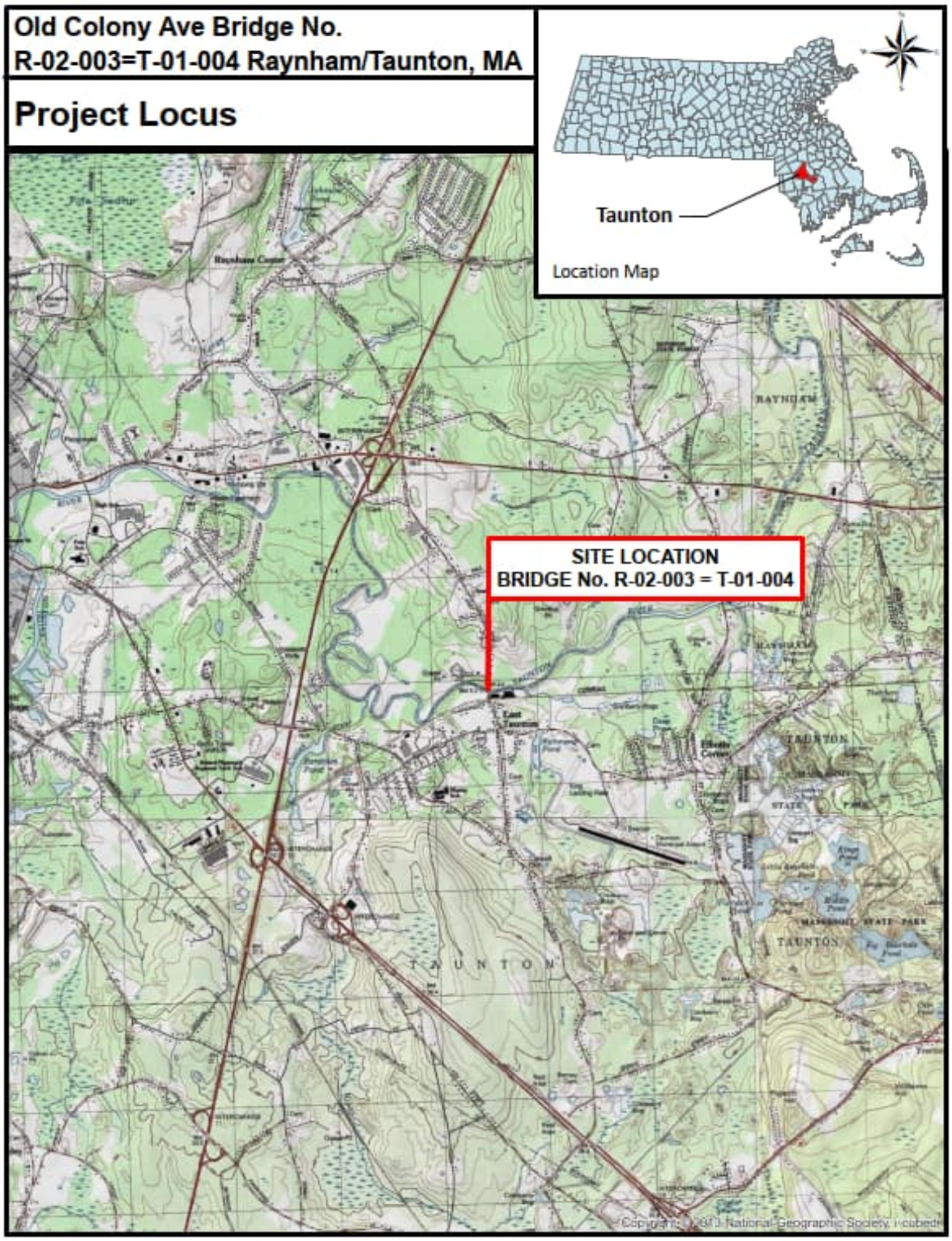


Figure 2.1-1 – Project Locus

2.1.2 HIGHWAY CONVEYED

The South Street East/Old Colony Avenue Bridge conveys vehicular and pedestrian traffic between the town of Raynham, to the north and Taunton to the south.

Old Colony Avenue is the Taunton roadway segment and is classified as an Urban Collector. The geometry of the approach roadway is (2) 13.5-foot-wide travel lanes with no shoulders. Directional flow along the roadway is separated by a double yellow line and there are no bicycle accommodations within the project area. The speed limit along the roadway is 30 miles per hour (mph).

South Street East is the roadway segment from Raynham and is also classified as an Urban Collector. The geometry of the approach roadway is (2) 11- to 11.5-foot-wide travel lanes with 1.5- to 2-ft shoulders. Guardrail exists on the southbound approach to the bridge. Directional flow along the roadway is separated by a double yellow line and there are no bicycle accommodations within the project area. The speed limit along the roadway is 30 miles per hour (mph).

The bridge is 35′-0″ wide, which includes a 26′-0″ roadway, a 2′-6” safety walk and 5’-0” sidewalk with metal railing.

2.1.3 LAND USE IN THE VICINITY OF THE BRIDGE

Land use in the vicinity of the bridge is a mix of forest, industrial, and residential.

Figure 2.1-2 – Land Use in the vicinity of the Bridge.

2.1.4 SPECIAL SITE CONSIDERATIONS

The South Street East/Old Colony Bridge is located within the National Flood Insurance Program (NFIP) Special Flood Hazard Area (SFHA) Zone AE delineation determined for the Taunton River by the Flood Insurance Rate Map (FIRM) No. 25005C0169G dated July 16, 2015. The base flood elevation determined for this Zone AE is 14.8 feet on the upstream side and 14.4 feet on the downstream side of the bridge.

2.2 PROPOSED ACTION

The proposed work will include the removal of the existing superstructure of the bridge and replacing it will a S3-MTL4 bridge barrier, a 3" wearing surface at the roadway over an 8" cast-in-place reinforced concrete deck supported by (6) W27 steel stringers. The proposed superstructure will utilize the existing substructure that is to remain in place. The proposed low chord will match the existing low chord elevation of 14.35' and the hydraulic opening will remain unchanged. The proposed work will include the removal of debris that has accumulated at the pier.

3.0 Data Collection

3.1 Data Sources

Table 3.1-1 – Data Sources

Data Type	Source	Details
South Street East/Old Colony Bridge Survey	GM2, Inc. (2024)	
Aerial Mapping	Nearmap (2024)	
FEMA Flood Insurance Rate Map for Bristol County	FEMA (2015)	Taunton River FIRM Map No. 25005C0169G
StreamStats Report	USGS (2022)	Workspace IDs: MA20240924191327203000
Web Soil Survey	USDA-NRCS (2022)	
LIDAR Data	USGS (2024)	
HEC-RAS 4.1.0	FEMA	Taunton River October 2012

3.2 Data Application

FEMA provided a copy of the hydraulic study of the Taunton River, the model provided was update in 2012 with field collected survey data and calibrated to previous storm events. This model was used to create a duplicate effective model for the no-rise evaluation. The flood insurance study, flood insurance rate map and a hydraulic analysis summary provided by FEMA of the model supplied is attached to this report in Appendix A.

Surface elevations were derived from GM2, Inc (2024) and supplemented with USGS Lidar Data. Survey limits end 1,000 feet upstream of the bridge and 1,500 feet downstream. Beyond the survey limits the channel geometry provided in the FEMA model was utilized.

Sediment samples were collected on August 2 and August 7, 2024 from five locations upstream of the South Street East/Old Colony Bridge. The samples were collected in accordance with the locations shown in Figure 1.3.1-2 of the Massachusetts Department of Transportation (MassDOT) Bridge Manual – Hundredth Anniversary Edition (2024). The samples were tested be GEI at their laboratory in Woburn, Massachusetts, the test results were used to perform the scour evaluation detailed in Section 4.3 Scour Safety and Stream Stability Analyses of this report.

4.0 Engineering Methods

4.1 Hydrologic Analyses

The South Street East/Old Colony Bridge is located within the National Flood Insurance Program (NFIP) Special Flood Hazard Area (SFHA) Zone AE delineation determined for the Taunton River by the Flood Insurance Rate Map (FIRM) No. 25005C0169G dated July 16, 2015. FEMA provided a model that was last updated in October of 2012. The model includes a 24.5 mile length of the main stem of the Taunton River from the Halifax/Bridgewater town line to just upstream of the confluence with the Three Mile River. Cross section data and structure elevations for the 24.5-mile study area of the Taunton River were obtained from field survey in May and October of 2012 and from cross sections from prior FIS models.

According to the Flood Insurance Study (25005CV002D) revised July 6, 2021, regression weighted log-Pearson type III flood frequency analysis was utilized along with flow optimization in HEC-RAS to calculate the amount of discharge in the main channel. The model was further calibrated to the high-water marks from the flood events from March and April of 2010. FEMA provided a hydraulic analysis summary of the model that is included in Appendix A.

BETA compared the peak discharges provided by FEMA to the peak flow data from the USGS StreamStats Peak Flow Report. Gage data is available approximately 7.9± miles upstream of the South Street East/Old Colony Bridge in Bridgewater.

Table 4.1-1 – Summary of Discharges

Source	River/Reach Name	Drainage Area (mi^2)	10% Annual Chance [10-yr] (CFS)	4% Annual Chance [25-yr] (CFS)	2% Annual Chance [50-yr] (CFS)	1% Annual Chance [100-yr] (CFS)
FEMA FIS	Taunton River		3,970	4,812	5,430	6,120
StreamStats		293	4,250	5,510	6,530	7,570

The peak flows provided in the FEMA FIS were utilized in the existing and proposed model. These flows were derived using Log-Pearson type III discharges from USGS streamgage 01108000. Flows were transferred upstream and downstream using a weighted hybrid method and calibrated with known storm events. USACE HEC-RAS 6.4.1 was utilized to analyze the existing and proposed conditions models as well as the duplicate effective.

To ensure a bridge can withstand future changes in stream conditions, the FHWA suggests using "The Climate Change Indicator (CCI)" to establish analysis levels for risk and vulnerability assessments. The CCI measures the variation in the mean value of the T-year 24-hour precipitation from observed to projected conditions. This change serves as a valuable indicator for assessing potential alterations in flood flows due to projected climate change. Supporting documents for CCI can be found in Appendix C and hydrologic calculations are included in Appendix B.

Table 4.1-2 – Climate Change Indicator Table

	10% AEP	4% AEP	2 % AEP	1% AEP
	10-Year	25-Year	50-Year	100-Year
$P_{24,T,O}$	5.10	6.14	6.93	7.76
$P_{24,T,O,U}$	6.12	7.64	8.77	10.10
RFB_p	1.15	1.15	1.15	1.15
$P_{24,T,P}$	5.87	7.06	7.97	8.92
CCI	0.75	0.61	0.56	0.50

4.2 HYDRAULIC ANALYSIS

4.2.1 NO-RISE HYDRAULIC ANALYSIS

The bridge is within the National Flood Insurance Program (NFIP) Special Flood Hazard Area (SFHA) Zone AE, therefore a 1D steady flow analysis was also performed to show "no-rise". The results of the no-rise analysis can be seen in Table 4.2-2. The model confirms that there is no rise in the BFE flood elevation because of the bridge replacement.

4.2.2 DUPLICATE/CORRECTED EFFECTIVE MODEL

The duplicate effective model was provided by FEMA and analyzed using USACE HEC-RAS 6.4.1. The limits of the model are the Cherry Street Bridge at the Halifax/Bridgewater town line approximately 16.2 miles upstream to the Plain Street Bridge approximately 8.3 miles downstream. The downstream boundary condition was estimated from normal depth slope calculations. No upstream boundary condition was set due to the subcritical flow condition. The Old Colony Ave/South Main Street bridge is located at station 43308 in the model. An overview of the 1D HEC-RAS model is shown in Figure 4.2-1.

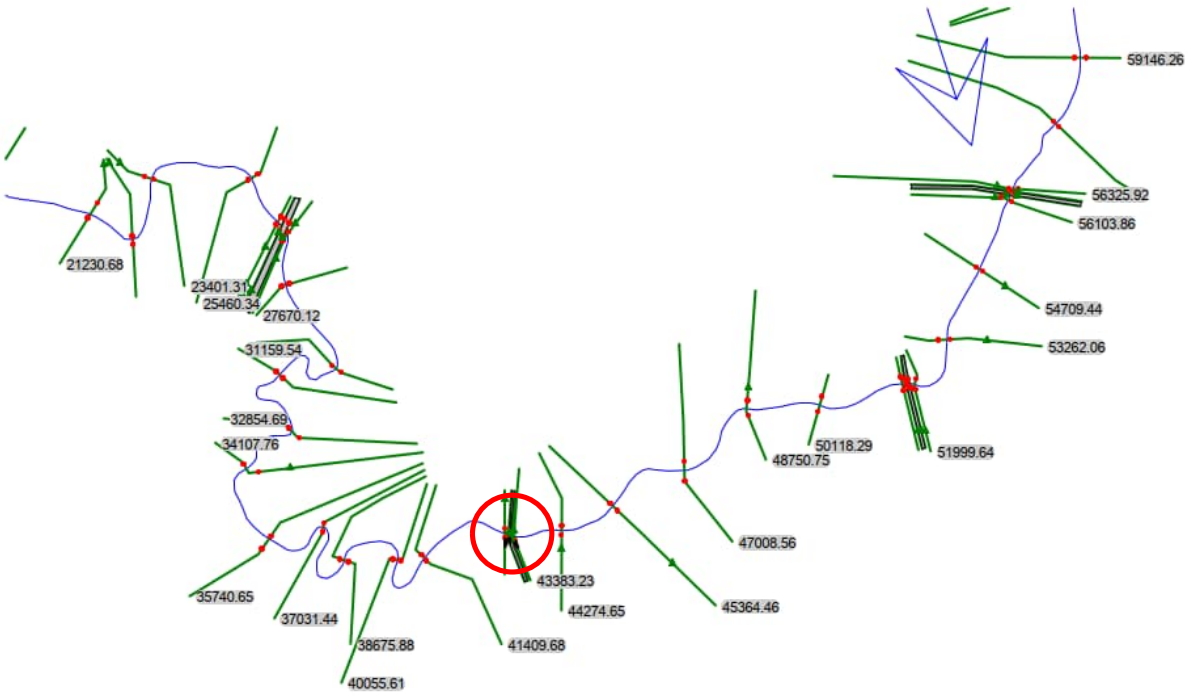


Figure 4.2-1 – HEC-RAS Model Overview

Table 4.2-1 compares the duplicate effective results to the published data in the FIS report.

Table 4.2-1 - Summary of Duplicate Effective Model Results

River Station	FIS Cross-Section	[1] Published Data (FEET, NAVD)	[2] Duplicate/Corrected Effective Model (FEET, NAVD)	[2]-[1]
47008.56	AV	16.0	15.71	-0.29
45364.46	AT	15.5	15.52	0.02
44274.65	AS	15.2	15.27	0.07
43383.23	AR	14.7	14.77	0.07
43336.08			14.52	
Bridge				
43283.2			14.19	
43197.27	AQ	14.4	14.34	-0.06
41409.68	AP	14.2	14.15	-0.05
40055.61	AO	14.1	14.07	-0.03
38675.88	AN	14.1	14.03	-0.07

4.2.3 Existing Conditions Model

The duplicate effective model was refined by incorporating supplemental survey from GM2 to create the 'Existing Conditions' model. Based on the survey and field observations, a 2' high stone dam was incorporated into the existing conditions model between the pier and the south abutment. The origins of the dam are unclear as it was not in the original bridge plans or FEMA model. The dam currently blocks low flow through the south bridge opening, which may be beneficial for fish passage and to limit erosion on the southern downstream riverbank.

The existing low chord elevation was determined to be 14.35 feet from field survey. Under existing conditions, the computed maximum water surface elevation of the Taunton River during the 10-year design storm is 11.79 feet, 2.56 feet below the low chord elevation of the superstructure. Under existing conditions, the 500-year model shows overtopping of the roadway. The downstream cross section of the South Street East/Old Colony Bridge is depicted in Figure 4.2-2.

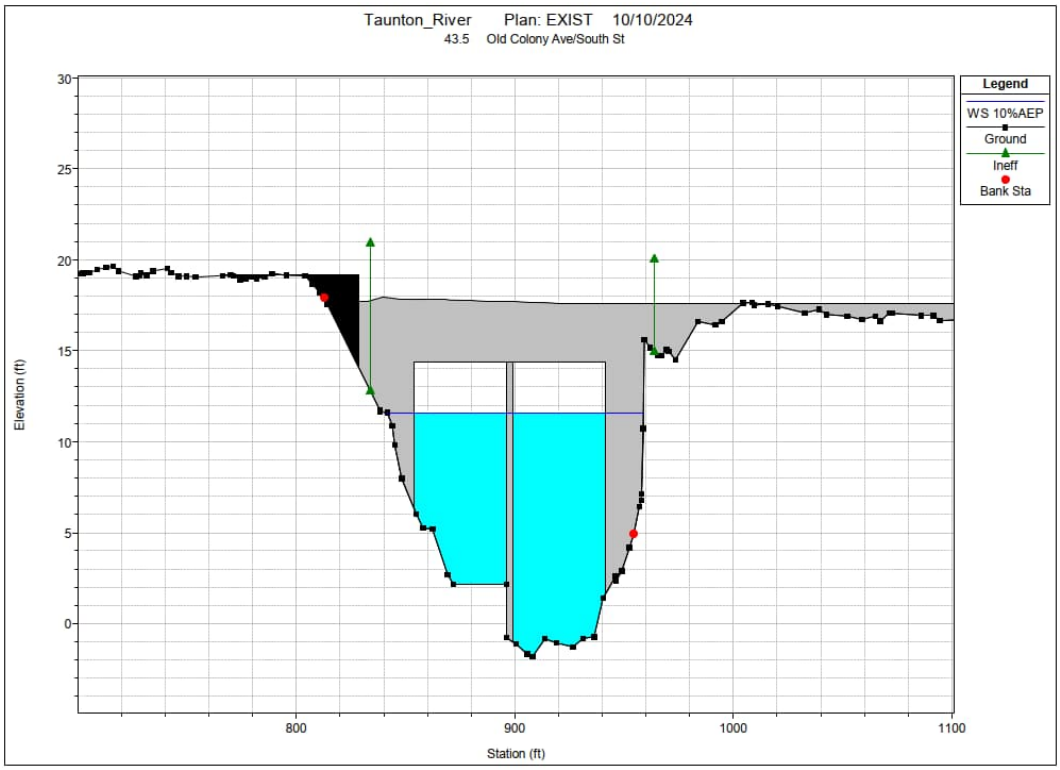


Figure 4.2-2 – Existing cross section at the South Street East/Old Colony Bridge.

Per bridge record plans (1945) the top of the south abutment to the top of the footing is approximately 13.4'. The measurement from the top of the south abutment to the top of the riprap at abutment was scaled off the record plans and determined to be approximately 9.3'. Field measurements indicate the distance from the top of the abutment to the top of the exposed sheeting is 8.75'. From the field measurement, it has been determined that the exposed sheeting was left high and not cut 4' below the riprap to the top of the footing as shown on the record plan. Therefore, the sheeting does not appear to be exposed as the result of scour.

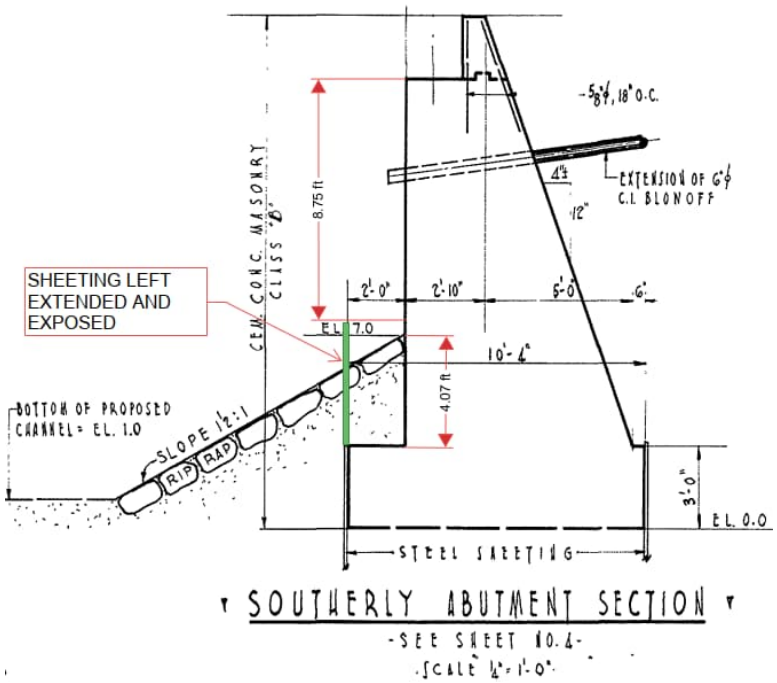
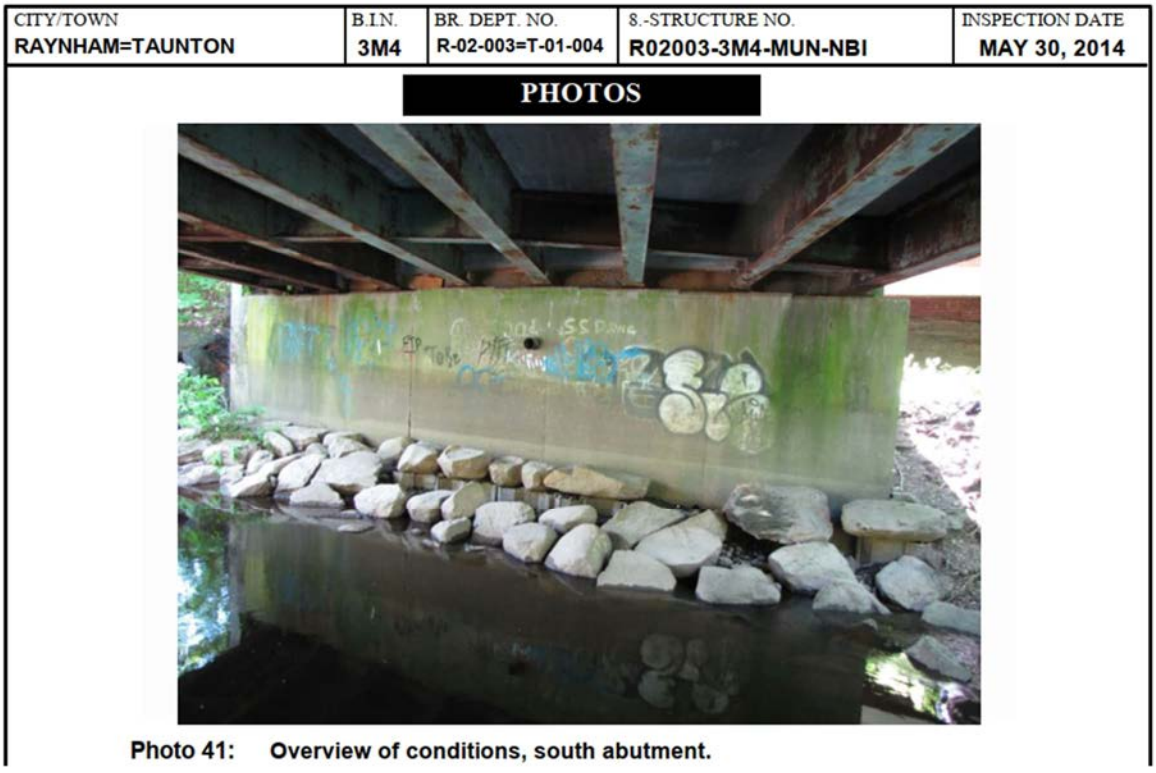


Figure 4.2-3 – Section from bridge record plans

The Figure 4.2-4 below is from a 2014 MassDOT bridge inspection which shows the south abutment sheeting and the riprap in the same position as current conditions.



CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
RAYNHAM=TAUNTON	3M4	R-02-003=T-01-004	R02003-3M4-MUN-NBI	MAY 30, 2014

PHOTOS

Photo 41: Overview of conditions, south abutment.

Figure 4.2-4 – Photo from 2014 bridge inspection

4.2.4 Proposed Conditions Model

The proposed bridge will use the existing pier and abutments. The bridge deck will be set to match the existing low chord of 14.35, therefore not changing the hydraulic opening.

In accordance with Sections 1.3.2.1 through 1.3.2.3 of the LRFD Bridge Manual, the proposed bridge design was analyzed and compared to the existing bridge geometry to ensure there will be no increase in flood water surface elevations for the 1% (100-yr) flood event caused by the proposed work. The horizontal datum is NAD83 Massachusetts State Plane Coordinates, and the vertical datum is the North American Vertical Datum of 1988 (NAVD88). The results of the no-rise analysis can be seen in Table 4.2-2. The model confirms that that the bridge replacement does not cause a rise to the flood elevations.

Table 4.2-2 – Comparison of Hydraulic Performance for Base Flood Elevation (BFE)

Model Cross Sections	FIS Cross-Section	[1] Existing Condition Model (FEET)	[2] Proposed Condition Model (FEET)	[2]-[1] No Rise Evaluation
47008.56	AV	16.01	16.01	0.00
45364.46	AT	15.86	15.86	0.00
44274.65	AS	15.62	15.62	0.00
43977		15.54	15.54	0.00
43616		15.47	15.47	0.00
43383.23	AR	15.28	15.28	0.00
43336.08		15.07	15.07	0.00
43283.2		14.66	14.66	0.00
43197.27	AQ	14.64	14.64	0.00
42387		14.16	14.16	0.00
41409.68	AP	14.15	14.15	0.00
40055.61	AO	14.07	14.07	0.00
38675.88	AN	14.03	14.03	0.00

Table 4.2-3 summarizes the existing and proposed hydraulic performance at the upstream section of the structure. The results of the hydraulic analysis for the 10-year storm can be found in Appendix B.

Table 4.2-3 -Summary of Hydraulic Performance at Cross Section 43336.08

AEP [%]	Peak Flow (CFS)	Existing		Proposed	
		WSEL (FT)	Velocity* (FT/S)	WSEL (FT)	Velocity* (FT/S)
10%	3,970	11.84	3.96	11.84	3.96
4%	4,812	13.19	4.19	13.19	4.19
2%	5,430	14.06	4.35	14.06	4.35
1%	6,120	15.07	4.49	15.07	4.49
0.2%	7,750	18.28	4.45	18.28	4.45

The existing and proposed results match as there will be no change to the hydraulic opening as the substructure is to remain in place.

Table 4.2-4 – Summary of Hydraulic Performance

Alternative	Description	Hydraulic Design Flood Elevation [Feet-Year]	Free Board (feet)	Base Flood Elevation [100-Year] (feet)	"NO-RISE" Required? [Y/N]	"LOMR" Required? [Y/N]
Proposed	Low chord = 14.35	11.84' 10-Year	2.51'	15.07	Y	N

4.3 Scour Safety and Stream Stability Analyses

In accordance with the MassDOT LRFD Bridge Manual guidance for an Urban Collector Street, the scour was analyzed for a 25-year storm event and countermeasures designed for the 50-year storm event. Contraction scour and abutment scour were calculated using the live bed routine as the critical velocity is greater than the velocity in the approach section. Abutment scour was calculated using NCHRP 24-20. Pier scour was calculated using equation 7.1 from the fifth edition of HEC-18 Evaluating Scour at Bridges. Effective Pier width with debris was used to calculate the existing scour hole in accordance with HEC-18 Section 7.7. Table 4.3-1 summarizes the scour calculations, detailed scour computations are provided in Appendix D.

The most recent MassDOT Underwater Inspection report is from March 1, 2023 (3M4-2023-03-01). The document describes evidence of scour, including an exposed footing on the north side of the pier. Overall, the scour was rated a 6 (good). The abutment and pier foundations are installed on piles.

Table 4.3-1 – Summary of Calculated Scour

	Return Period (Year)	[1] Long Term Degradation (Feet)	[2] Contraction Scour (Feet)	[3] Worst Local Pier Scour (Feet)	[4] Worst Local Abutment Scour (Feet)	[1]+[4] Total Abutment Scour* (Feet)	[1]+[2]+[3] Total Pier Scour (Feet)
Existing Conditions	25	N/A	2.61	4.45	13.04	13.04	7.06
	50	N/A	2.68	4.48	13.06	13.06	7.16
Proposed Conditions	25	N/A	2.61	2.45	13.04	13.04	5.06
	50	N/A	2.68	2.51	13.06	13.06	5.19

4.4 Scour Countermeasure Design

Scour countermeasures for the proposed bridge were sized using the Federal Highway Administration's Hydraulic Engineering Circular-23 (HEC-23) guidelines for Bridge Scour and Stream Instability Countermeasures. Riprap sizing for bridge piers was calculated using equation 5.1 from HEC-23. The abutment countermeasure riprap size was larger than the calculated size for pier scour. Therefore, the abutment countermeasure riprap size was used for the countermeasure. The placement of the countermeasures is in accordance with Section 2.6.5 of the MassDOT LRFD Bridge Manual. Table 4.4-1 summarizes the recommended scour countermeasure design.

Pier debris countermeasure alternatives will be reviewed during the design process to help prevent future debris build-up.

Table 4.4-1 – Scour Countermeasure Design at Bridge Abutments for the Scour Check Flood Event

Alternative	Class #	Riprap Thickness (ft)	Riprap Extend from Abutment (ft)	Riprap Extend along U/S and D/S of Embankment (ft)
Proposed	Class III (D_{50}=12in)	2’	full channel	25

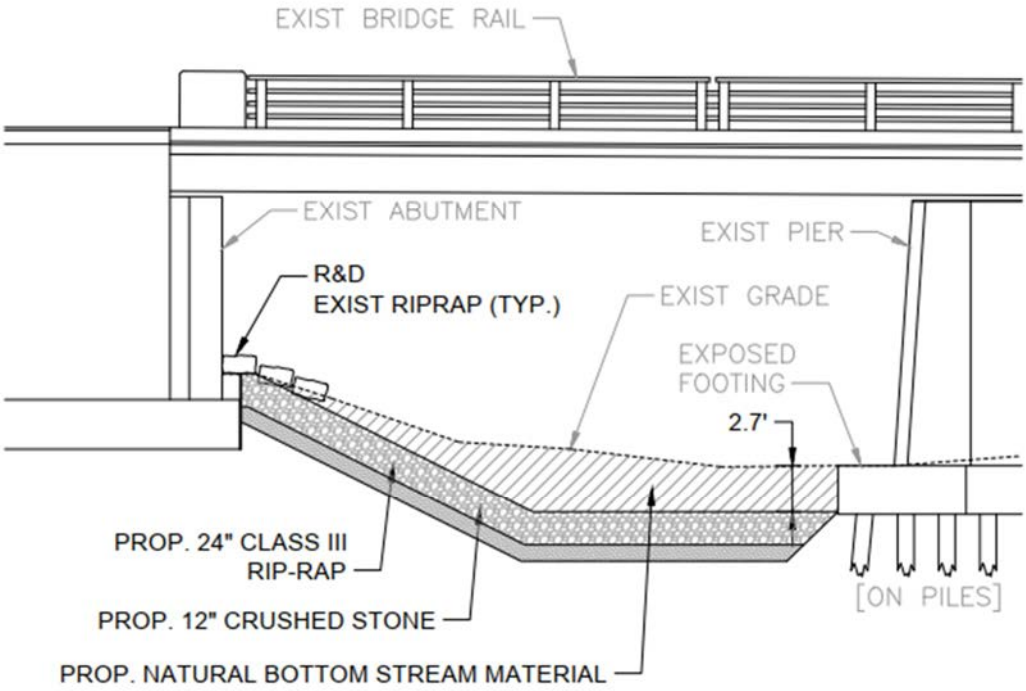


Figure 4.4-1 – Proposed Scour Countermeasure

4.5 Debris Mitigation

The existing bridge has a history of debris accumulation at the nose of the pier. MassDOT's routine bridge inspection reports began documenting debris in the river beginning in 2010. Photos of the debris taken from the bi-annual reports are copied below. The few inspection reports prior to 2010 that are stored on MassDOT's 4D database do not include any notations of debris accumulations, nor photographs of the river at the pier, so it is uncertain if debris was not a problem at the time of those inspections, or if the inspectors just did not include comments regarding debris. However, the 1985 Bridge Rating Report included a photograph of debris accumulation at the pier nose. That photograph is also copied below. As can be seen in the photos, since 2010 the amount and position of debris has varied considerably over this period. Taking into consideration the 1985 photo, it appears likely that debris accumulation has been occurring at this location over the lifetime of the bridge.

After a review of potential debris countermeasures, we don't believe that post-installed debris countermeasures at would be effective at this location. The efficacy of measures such as debris deflectors or fins at bridge piers has shown to be questionable in general. Because of the skew angle of the river pier and the bend in the river at this location, we believe that such deflectors or fins would be especially unlikely to be effective at this location.

Additionally, the municipalities, as the proponents of this project, would be unlikely to support the installation of such measure. The construction is being funded by a Community Project Funding Grant. It

is anticipated that there will be some cost overruns beyond that grant, which MassDOT has indicated they will not be contributing any funds to; therefore, the municipalities will be responsible for such costs. The municipalities have indicated a desire to minimize such costs and do not want to spend extra funds on debris mitigation measures of questionable value.

The bridge has been in service for 77 years. It appears likely that the pier has been a collector of debris for most, if not all, of that time. Yet the channel at this location shows minimal effects of additional scour that may have been a result of such debris collection. Because of that history and the new scour countermeasures proposed as part of this project, we believe that regular maintenance is a better solution than debris countermeasures for this bridge. We recommend that the municipalities be made aware of the need for regular debris removal and have such a program introduced into their maintenance operations.

Figure 4.5-1 – Debris Accumulation Photos

Figure 4.5-2 – Debris Accumulation Photos (Cont.)

5.0 CONCLUSIONS & RECOMMENDATIONS

5.1 CONCLUSIONS

The proposed bridge will match the existing, no alterations will be made to the low chord elevation. The pier and abutments will remain in place, therefore retaining the hydraulic opening. The proposed improvements will not cause any increase in the waterway's base flood elevation. The free board predicted during the 10% (10-year) design storm is 2.51' which exceeds the recommended 2' freeboard.

The scour calculations and underwater inspection report determined that countermeasures are warranted.

5.2 RECOMMENDATIONS

A natural bottom channel is recommended at the same elevation as the existing conditions to meet the no-rise condition. A 2' deep Class III (D50=1') riprap bed placed 2.7' beneath the natural bottom is recommended the entire width of the bridge as a countermeasure against scour.

It is recommended that tree debris are cleared from the nose of the pier. The stone dam is recommended to be replaced to match existing conditions.

5.3 HYDRAULIC DATA TABLES

Table 5.3-1 – Hydraulic Data Table

HYDRAULIC DESIGN DATA		
	Existing Conditions	Proposed Conditions
Drainage Area	293 sq. mi	293 sq. mi
Design Flood Discharge	3,970 cfs	3,970 cfs
Design Flood Frequency	10% (10-Year)	10% (10-Year)
Design Flood Velocity	4.42 ft/s	4.42 ft/s
Design Flood Elevation	11.84 Ft NAVD88	11.84 Ft NAVD88
BASE (100-YEAR) FLOOD DATA		
Base Flood Discharge	6,120 cfs	6,120 cfs
Base Flood Elevation	15.07 Ft NAVD88	15.07 Ft NAVD88
DESIGN AND CHECK SCOUR DATA		
Design Scour Flood Event Return Frequency	4% (25-Year)	4% (25-Year)
Design Flood Abutment Scour Depth	13.04	13.04
Design Flood Pier Scour Depth	7.06	5.06
Check Scour Flood Event Return Frequency	2% (50-Year)	2% (50-Year)
Check Flood Abutment Scour Depth	13.06	13.06
Check Flood Pier Scour Depth	7.16	5.19
FLOOD OF RECORD		
Discharge	Not Known	Not Known
Frequency	Not Known	Not Known
Maximum Elevation	Not Known	Not Known
Date	Not Known	Not Known
History of Ice Floes	None Documented	None Documented
Evidence of Scour and Erosion	Yes	-

APPENDIX A

FEMA FLOOD INSURANCE STUDY

Table 12: Summary of Hydrologic and Hydraulic Analyses

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Taunton River	Plain Street	2,800 feet upstream of State Route 25	Regression-weighted log-Pearson type III flood frequency analysis (Cohn et al. 2012)	HEC-RAS 4.1.0 (Brunner 2010)	7/1/2014	AE w/Floodway	Log-Pearson type III discharges from USGS streamgage 01108000 (Taunton River near Bridgewater) were from Zariello et al. (2012). Flows were transferred upstream and downstream using a weighted hybrid method (Guimaraes and Bohman 1992). At split-flow reach between County Street and Owen Parkway, flow optimization in HEC-RAS was used to calculate amount of discharge in main channel and side channel. The hydraulic model was calibrated to the high-water marks from the March and April 2010 flood event. Most underwater cross-section data and structure elevations were from field surveys in March and April, 2012. Underwater cross-section data for cross sections in Bridgewater and Middleborough were obtained from survey data collected for the previous effective study. Overbank cross-section data were from lidar topography (FEMA 2011, USGS 2011). Starting water-surface elevations were from normal depth, using a slope of 0.00033.
Ten Mile River	Omega Pond Dam	High Street	Regression-weighted log-Pearson type III flood frequency analysis (Cohn et al. 2012)	HEC-RAS 4.1.0 (Brunner 2010)	7/1/2014	AE w/Floodway	Log-Pearson type III discharges from USGS streamgage 01109403 (Ten Mile River at Pawtucket Avenue at East Providence) were from Zarriello et al. (2012). Flows were transferred upstream and downstream using a weighted hybrid method (Guimaraes and Bohman 1992). Underwater cross-section data and structure elevations were from field surveys in March and April, 2012. Overbank cross-section data were from lidar topography (FEMA 2011, USGS 2011). Starting water-surface elevations were from normal depth, using a slope of 0.0005. The hydraulic model was calibrated to high-water marks from the April 2010 flood (Zarriello and Bent 2011).

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
V	16,097	580	5,763	1.2	12.2	12.2	13.1	0.9
W	16,913	539	5,456	1.2	12.3	12.3	13.2	0.9
X	17,850	208	2,588	2.6	12.3	12.3	13.2	0.9
Y	18,078	175	2,434	2.8	12.6	12.6	13.4	0.8
Z	19,262	411	3,881	1.7	12.8	12.8	13.7	0.9
AA	21,231	312	3,813	1.8	13.0	13.0	13.9	0.9
AB	22,167	152	2,394	2.8	13.1	13.1	14.0	0.9
AC	23,401	1,078	8,994	0.8	13.3	13.3	14.2	0.9
AD	25,460	876	7,116	0.9	13.4	13.4	14.3	0.9
AE	26,420	608	5,173	1.2	13.4	13.4	14.4	1.0
AF	26,713	208	3,062	2.1	13.7	13.7	14.6	0.9
AG	27,670	1,041	7,340	0.9	13.8	13.8	14.7	0.9
AH	29,546	1,936	13,154	0.5	13.9	13.9	14.8	0.9
AI	31,160	2,108	18,321	0.4	13.9	13.9	14.9	1.0
AJ	32,855	2,371	17,742	0.4	14.0	14.0	14.9	0.9
AK	34,108	3,135	21,890	0.3	14.0	14.0	14.9	0.9
AL	35,741	2,908	18,666	0.3	14.0	14.0	14.9	0.9
AM	37,031	3,224	23,723	0.3	14.0	14.0	14.9	0.9
AN	38,676	2,917	19,446	0.3	14.1	14.1	15.0	0.9
AO	40,056	1,776	11,119	0.6	14.1	14.1	15.0	0.9
AP	41,410	1,403	8,730	0.7	14.2	14.2	15.0	0.8

[1]Feet above Taunton/Berkley corporate limit

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY

BRISTOL COUNTY, MASSACHUSETTS

(ALL JURISDICTIONS)

FLOODWAY DATA

FLOODING SOURCE: TAUNTON RIVER

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
AQ	43,197	469	3,050	2.1	14.4	14.4	15.2	0.8
AR	43,383	143	1,603	3.8	14.7	14.7	15.7	1.0
AS	44,275	183	2,158	2.8	15.2	15.2	16.1	0.9
AT	45,364	679	4,777	1.3	15.5	15.5	16.4	0.9
AU	47,009	318	2,840	2.2	15.7	15.7	16.7	1.0
AV	48,751	282	2,678	2.3	16.0	16.0	17.0	1.0
AW	50,118	290	2,707	2.3	16.3	16.3	17.3	1.0
AX	51,762	260	2,388	2.6	16.8	16.8	17.6	0.8
AY	52,000	194	2,210	2.8	17.1	17.1	17.9	0.8
AZ	53,262	222	2,473	2.5	17.3	17.3	18.2	0.9
BA	54,709	138	2,079	2.9	17.6	17.6	18.5	0.9
BB	56,104	221	2,685	2.2	17.8	17.8	18.8	1.0
BC	56,326	173	2,337	2.5	18.2	18.2	19.0	0.8
BD	57,814	512	4,583	1.3	18.4	18.4	19.2	0.8
BE	59,146	356	3,217	1.8	18.5	18.5	19.4	0.9
BF	60,313	300	2,776	2.1	18.6	18.6	19.6	1.0
BG	62,424	882	7,855	0.7	18.9	18.9	19.9	1.0
BH	64,419	282	2,663	2.2	19.1	19.1	20.0	0.9
BI	65,921	222	2,626	2.2	19.3	19.3	20.3	1.0
BJ	66,257	141	1,941	3.0	19.6	19.6	20.4	0.8
BK	67,190	211	2,307	2.5	19.7	19.7	20.7	1.0
BL	68,837	546	3,160	1.9	20.1	20.1	21.0	0.9

[1]Feet above Taunton/Berkley corporate limit

TABLE 23

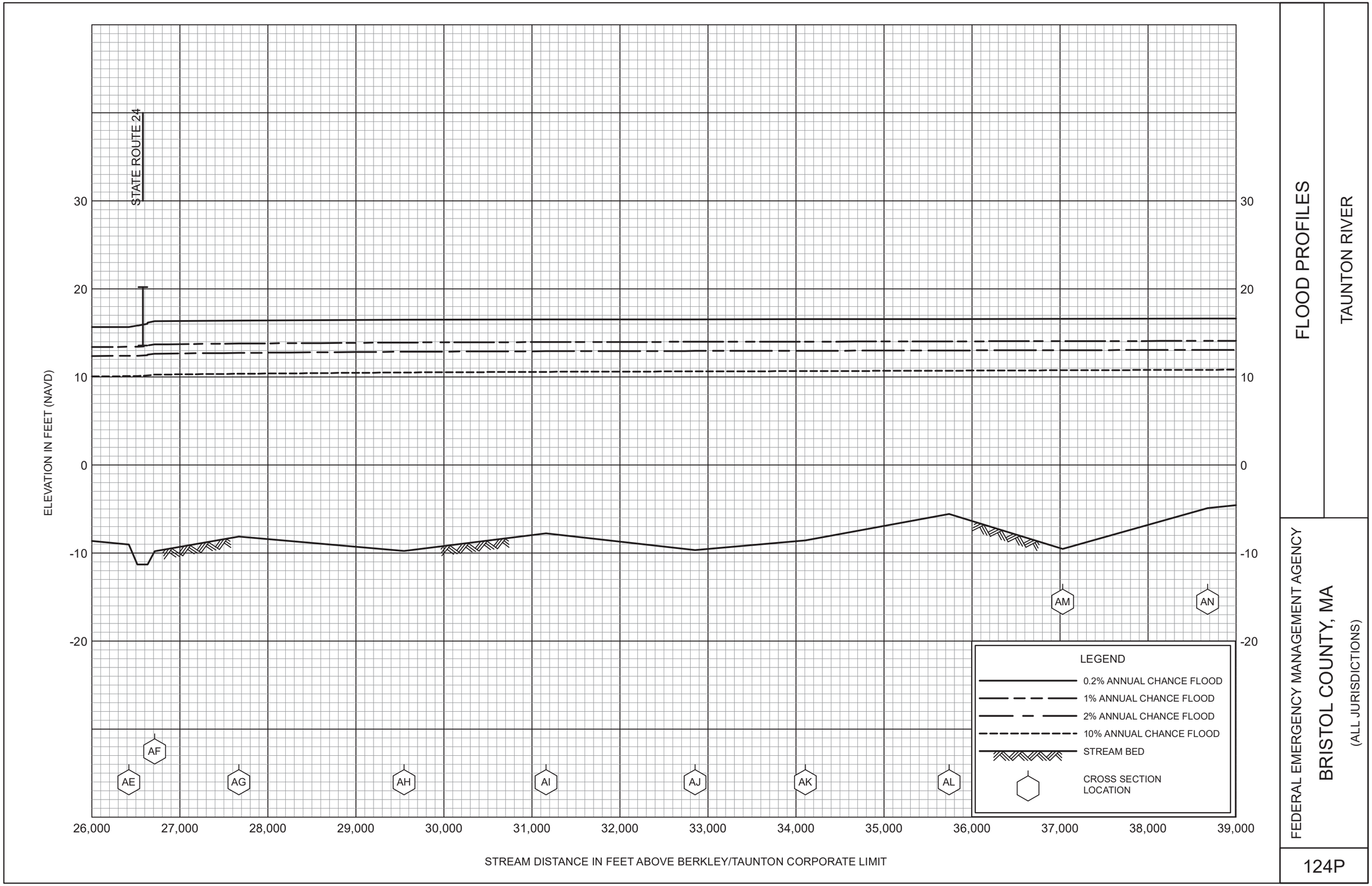
FEDERAL EMERGENCY MANAGEMENT AGENCY

BRISTOL COUNTY, MASSACHUSETTS

(ALL JURISDICTIONS)

FLOODWAY DATA

FLOODING SOURCE: TAUNTON RIVER



FLOOD PROFILES

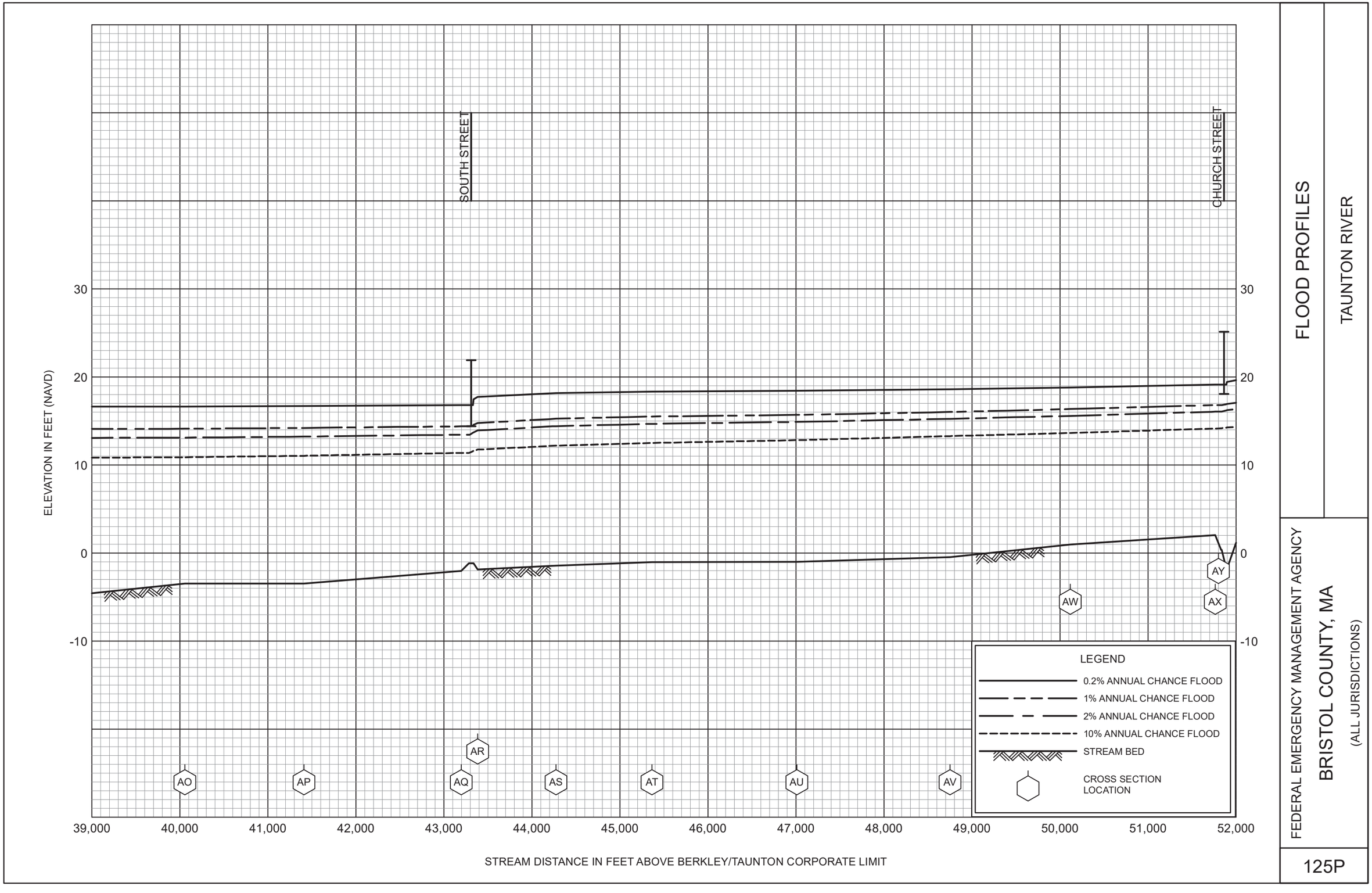
TAUNTON RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

BRISTOL COUNTY, MA

(ALL JURISDICTIONS)

124P



FLOOD PROFILES

TAUNTON RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

BRISTOL COUNTY, MA

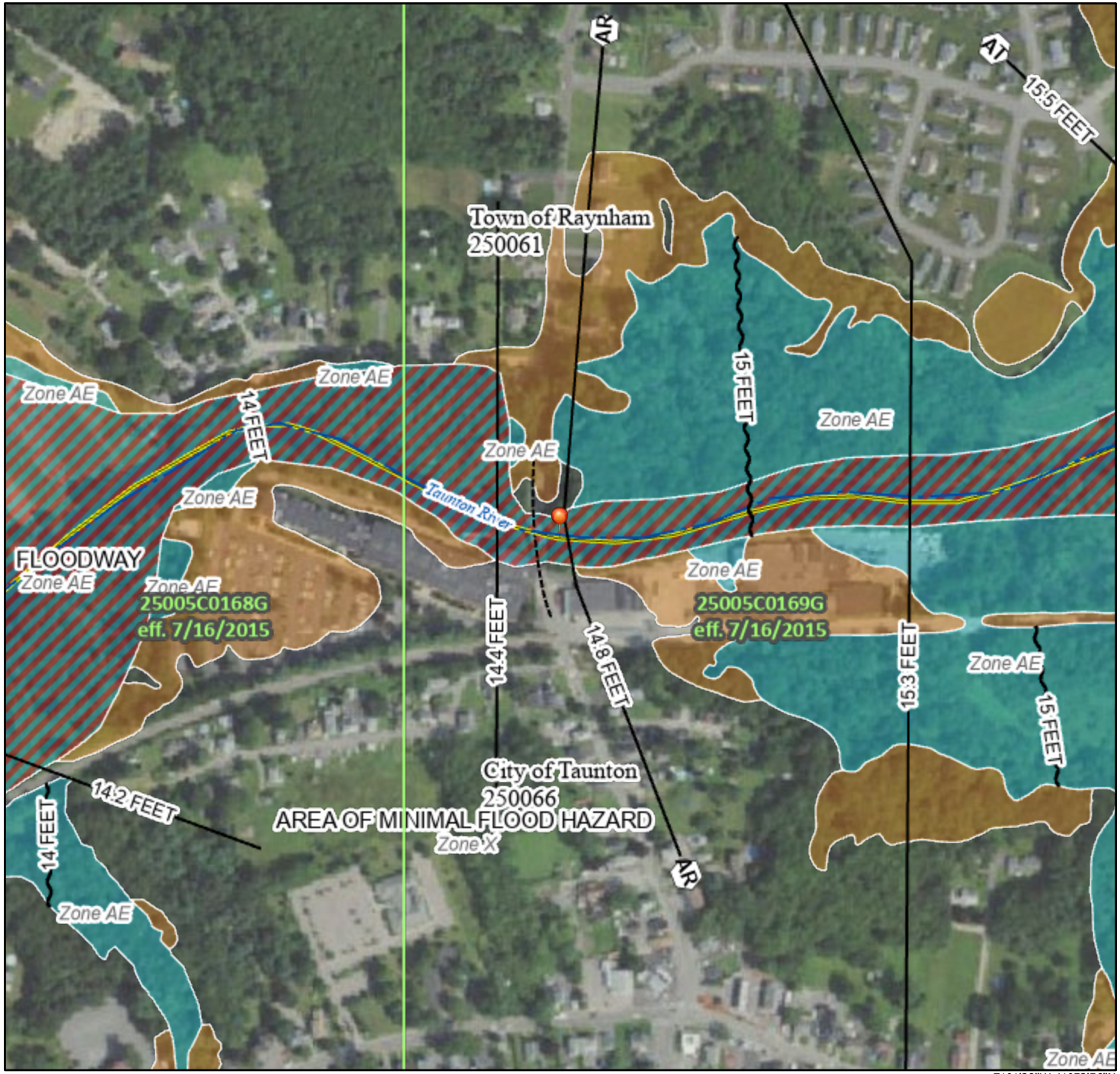
(ALL JURISDICTIONS)

125P

National Flood Hazard Layer FIRMette

FEMA

71°2'6"W 41°53'23"N



71°1'28"W 41°52'56"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

A00840 - 681

Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 10/10/2024 at 4:50 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

APPENDIX B

HYDRAULIC COMPUTATIONS

SECTION B-1

HECRAS REPORT – DUPLICATE EFFECTIVE

```
 HEC-RAS HEC-RAS 6.4.1 June 2023
 U.S. Army Corps of Engineers
 Hydrologic Engineering Center
 609 Second Street
 Davis, California


 X X XXXXXX XXXX XXXX XX XXXX
 X X X X X X X X X X
 X X X X X X X X X
 XXXXXXX XXXX X XXX XXXX XXXXXX XXXX
 X X X X X X X X X
 X X X X X X X X X X
 X X XXXXXX XXXX X X X X XXXXX




PROJECT DATA
Project Title: Taunton_River
Project File : 10887 - Taunton_River.prj
Run Date and Time: 10/10/2024 4:58:55 PM

Project in English units
 Project Description:
CRS Info=<SpatialReference> <CoordinateSystem Code="2249"
Unit="US_survey_Foot" AcadCode="" /> <Registration OffsetX="0" OffsetY="0"
OffsetZ="0" ScaleX="1" ScaleY="1" ScaleZ="1" /></SpatialReference>




PLAN DATA

Plan Title: Duplicate Effective
Plan File : \\beta-inc.com\ma\Projects\10800s\10887 - Taunton, MA - Old
Colony Ave Bridge\Engineering\Hydraulics\HECRAS\10887 - Taunton_River.p02

 Geometry Title: Taunton DE
 Geometry File : \\beta-inc.com\ma\Projects\10800s\10887 - Taunton, MA - Old
Colony Ave Bridge\Engineering\Hydraulics\HECRAS\10887 - Taunton_River.g02

 Flow Title : Taunton
 Flow File : \\beta-inc.com\ma\Projects\10800s\10887 - Taunton, MA - Old
Colony Ave Bridge\Engineering\Hydraulics\HECRAS\10887 - Taunton_River.f01

Plan Summary Information:
Number of: Cross Sections = 155 Multiple Openings = 0  Culverts = 0 Inline
Structures = 1
 Bridges = 20 Lateral Structures = 0

Computational Information
 Water surface calculation tolerance = 0.01
```

Critical depth calculation tolerance = 0.01
Maximum number of iterations = 40
Maximum difference tolerance = 0.3
Flow tolerance factor = 0.001

Computation Options
Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Subcritical Flow

FLOW DATA

Flow Title: Taunton
Flow File : \\beta-inc.com\ma\Projects\10800s\10887 - Taunton, MA - Old Colony Ave Bridge\Engineering\Hydraulics\HECRAS\10887 - Taunton_River.f01

Flow Data (cfs)
River Reach RS 10%AEP 4 AEP 2% AEP 1% AEP 0.2% AEP Taunton River Main Stem 128409 2280 3039 3590 4230 5720 Taunton River Main Stem 109992 2820 3584 4140 4780 6260 Taunton River Main Stem 88254.45 3660 4334 4830 5380 6690 Taunton River Main Stem 79104.25 3740 4459 4990 5570 6970 Taunton River Main Stem 74463.91 3860 4639 5210 5850 7370 Taunton River Main Stem 54709.44 3970 4812 5430 6120 7750 Taunton River Main Stem 35740.65 4080 4977 5630 6380 8120 Taunton River Main Stem 23401.31 4230 5220 5940 6770 8690 Taunton River Main Stem 9696.133 4890 6264 7260 8420 11100 Taunton River Main Stem 7.228003 4890 6264 7260 8420 11100

Boundary Conditions
River Reach Profile Upstream Downstream
Taunton River Main Stem 10%AEP Normal S = 0.0003 Taunton River Main Stem 4 AEP Normal S = 0.0003 Taunton River Main Stem 2% AEP Normal S = 0.0003 Taunton River Main Stem 1% AEP Normal S = 0.0003 Taunton River Main Stem 0.2% AEP Normal S = 0.0003

GEOMETRY DATA

Geometry Title: Taunton DE
Geometry File : \\beta-inc.com\ma\Projects\10800s\10887 - Taunton, MA - Old Colony Ave Bridge\Engineering\Hydraulics\HECRAS\10887 - Taunton_River.g02

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 128409

INPUT Description: 113 App Mill St Br
Station Elevation Data num= 84
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 35.87 13.05 35.86 26.1 35.53
65.24 35.34 78.29 35.25 84.82 35.4 123.97 34.94 130.49 35.01 137.01 35.25
143.54 33.2 150.06 32.76 169.64 32.41 202.26 30.93 221.83 29.72 228.36 29.45
241.41 29.21 267.5 29.23 274.03 29.07 293.6 29.13 300.13 28.98 306.65 27.99
313.17 27.51 319.7 26.88 326.22 25.81 333.03 24.02 338.49 23.04 340.24 22.22
341.38 20.18 348.62 15.99 359.34 12.87 373.14 12.14 388.24 11.87 406.61
11.19 421.81 12.59 430.87 17.73 442.83 17.06 444.63 20.68 457.44 21.82
463.24 22.52 476.29 23.7 482.81 24.5 489.34 25.1 495.86 25.52 508.91 26
515.43 26.09 521.96 25.97 541.53 26.37 554.58 26.06 561.11 25.12 567.63
24.71 580.68 24.44 587.2 24.2 593.73 24.1 606.78 24.65 613.3 25.51 639.4
27.22 645.92 27.54 672.02 30.1 678.55 30.86 685.07 31.17 691.59 31.31 704.64
32.21 724.22 33.09 737.27 34.11 743.79 34.38 750.32 34.89 756.84 35.59
763.36 36.53 769.89 36.98 789.46 37.88 795.99 38.32 809.04 38.88 822.08
39.89 828.61 40.5 835.13 40.62 841.66 41.32 854.71 43.3 861.23 43.41 867.76
44.21 880.8 47.11 887.33 48.24 893.85 49.09 906.9 50.18 919.95 50.7

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 300.13 .055 515.43 .095

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 300.13
515.43 90.02 90.01 93.04 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 541.53 919.95 26.37 F
Blocked Obstructions num= 3 Sta L Sta R Elev Sta L Sta R Elev Sta L Sta R
Elev
 31.92 73.2735.47613 86.21 138.4735.37749 172.65 219.3632.31081

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 128319

INPUT
Description: 112.7 US Face Mill St Br
Station Elevation Data num= 84
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 33.89 6.48 33.87 19.451
33.46 45.391 33.2 97.258 33.23 103.74 33.07 110.22 33.24 129.671 33.19
136.16 32.79 142.64 32.14 155.61 32.18 162.09 31.94 168.58 32.21 175.06
32.19 181.54 32.43 188.03 33.9 194.51 35.02 200.989 35.37 220.449 35.87
233.409 35.69 246.38 35.28 252.86 35.22 265.81 34.74 278.75 34.88 285.212
34.67 291.68 35.18 297.99 33.76 298.15 33.72 304.61 29.54 312.8 22.95 312.9
23.55 325.3 19.78 330.5 17.4 333.8 15.81 340.1 11.73 346.1 10.54 352.2 9.67
360.2 10.22 370.498 14.17 374.199 17.78 382.6 22.43 388.8 23.31 389.201
23.48 399.561 35.04 408.078 35.1 427.48 35.08 433.95 35.17 440.41 35.06
453.35 35.52 459.81 35.19 466.28 35.41 472.75 35.26 485.829 35.77 492.37
35.7 498.92 36.1 505.46 36.17 512 36.4 518.54 36.45 525.081 36.65 538.17
36.67 557.79 37.12 564.331 37.56 570.87 37.71 577.419 37.49 583.96 37.67
590.501 37.57 597.04 37.63 603.581 38.08 610.13 37.62 616.671 37.45 629.749
37.83 636.289 38.17 642.829 38.74 649.38 38.74 655.919 39.13 668.999 39.48
675.54 39.47 682.089 39.76 688.63 39.9 695.169 40.2 701.71 40.77 708.249

41.01 714.79 41.01 721.339 41.38

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .08 291.68 .055 399.561 .085
 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 291.68 399.561 65.53 65.15 67.23 .5 .8 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 307 36.5 T
 390 721.339 37 T

BRIDGE

RIVER: Taunton River
REACH: Main Stem RS: 128304

INPUT
Description: 112.5 Rte 104/Mill St/Plymouth St
Distance from Upstream XS = 5
Deck/Roadway Width = 50
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
 num= 14
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 99.999 34.4 233.999 36 237.001 35.18
 308 36.71 308.101 40.1 310 40.1
 310.1 36.57 31.64 387 37.11 32.18 387.1 40.6
 390 40.62 390.1 37.15 624 37.81   625 38.84 832 47.65

Upstream Bridge Cross Section Data
Station Elevation Data num= 84
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 33.89 6.48 33.87 19.451 33.46 45.391 33.2 97.258 33.23 103.74 33.07 110.22 33.24 129.671 33.19 136.16 32.79 142.64 32.14 155.61 32.18 162.09 31.94 168.58 32.21 175.06 32.19 181.54 32.43 188.03 33.9 194.51 35.02 200.989 35.37 220.449 35.87 233.409 35.69 246.38 35.28 252.86 35.22 265.81 34.74 278.75 34.88 285.212 34.67 291.68 35.18 297.99 33.76 298.15 33.72 304.61 29.54 312.8 22.95 312.9 23.55 325.3 19.78 330.5 17.4 333.8 15.81 340.1 11.73 346.1 10.54 352.2 9.67 360.2 10.22 370.498 14.17 374.199 17.78 382.6 22.43 388.8 23.31 389.201 23.48 399.561 35.04 408.078 35.1 427.48 35.08 433.95 35.17 440.41 35.06 453.35 35.52 459.81 35.19 466.28 35.41 472.75 35.26 485.829 35.77 492.37 35.7 498.92 36.1 505.46 36.17 512 36.4 518.54 36.45 525.081 36.65 538.17 36.67 557.79 37.12 564.331 37.56 570.87 37.71 577.419 37.49 583.96 37.67 590.501 37.57 597.04 37.63 603.581 38.08 610.13 37.62 616.671 37.45 629.749 37.83 636.289 38.17 642.829 38.74 649.38 38.74 655.919 39.13 668.999 39.48 675.54 39.47 682.089 39.76 688.63 39.9 695.169 40.2 701.71 40.77 708.249 41.01 714.79 41.01 721.339 41.38

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .08 291.68 .055 399.561 .085

Bank Sta: Left Right Coeff Contr. Expan.

```
 291.68 399.561 .5 .8
Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 307 36.5 T
 390 721.339 37 T
 Downstream Deck/Roadway Coordinates
 num= 14
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 99.999 34.4 233.999 36 237.001 35.18
 308 36.71 308.101 40.1 310 40.1
 310.1 36.57 31.64 387 37.11 32.18 387.1 40.6
 390 40.62 390.1 37.15 624 37.81
 625 38.84 832 47.65

Downstream Bridge Cross Section Data
Station Elevation Data num= 89
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  0 33.8 6.34 33.81 19.011 33.58
25.341 33.58 31.68 33.36  44.35 33.33 50.69 33.49 57.02 33.51 69.7 33.13
82.369 33.13  107.89 32.26 114.29 32.32 120.68 32.22 133.481 32.57 139.87
32.55  146.271 32.12 152.66 31.96 165.45 32.16 171.85 32.47 178.249 32.23
191.04 32.4 203.831 32.96 210.22 33.09 216.621 33.04 248.6 33.89  261.391
32.94 267.79 32.65 274.181 32.17 286.93 31.57 293.27 30.74  298.77 30.46
299.62 30.41 312.8 22.95 312.9 23.55 325.3 19.78  330.5 17.4 333.8 15.81
340.1 11.73 346.1 10.54 352.2 9.67  360.2 10.22 370.498 14.17 374.199 17.78
382.6 22.43 388.8 23.31  389.201 23.48 407.518 26.45 414.051 28.27 420.57
29.45 427.09 29.94  433.611 31.2 440.14 31.31 446.66 30.76 453.18 29.49 459.7
28.7  466.229 28.3 472.75 28.93 479.27 29.58 485.789 30.53 492.32 30.93
498.841 31.39 505.359 32.17 511.88 32.98 518.398 33.44 524.931 33.6  531.45
34.17 537.97 34.96 544.491 36.04 551.02 36.45 557.54 36.8  564.06 36.85
570.58 36.8 583.63 36.88 590.15 36.93 596.669 37.04  603.2 37.2 609.721 37.34
616.239 37.6 622.76 37.94 629.278 38.03  635.811 37.87 642.33 37.83 648.85
37.95 655.371 37.89 661.9 38.06  668.42 38.49 674.94 38.79 681.46 39.38
687.989 40.1

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .08 299.62 .055 433.611 .085

Bank Sta: Left Right Coeff Contr. Expan.
 299.62 433.611 .5 .8
Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 305.001 36 T
 390 687.989 37 T

Upstream Embankment side slope = 0 horiz. to 1.0 vertical Downstream
Embankment side slope = 0 horiz. to 1.0 vertical Maximum allowable
submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Bridge Coefficient Sets = 1
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 Low Flow Methods and Data
 Energy
 W.S. Pro Method

 W.S.Pro Data
 Left Embankment
 El of the top of the embankment = 36.7
 El of the toe of the abutment = 22.9
 Right Embankment
 El of the top of the embankment = 36.7
 El of the toe of the abutment = 22.9
 Abutment Type = 4 Vert. abutments and sloping embankments with wingwalls
Slope of abutments = 4
 Top with of embankment = 50
 Centroid station of bridge opening =
 Wing Wall Type = Angular wing walls
 Width = 25
 Angle = 45
 Radius =
 Guide Banks Type = No Guide Bank present
 Length =
 Offset =
 Angle =
 Optional Contraction and expansion coefficients
 At approach Section
 At Guide Bank
 At upstream outside
 At upstream inside (BU)
 At downstream inside (BD)
 Piers are Continuous for the width of the bridge
 Use Geometric mean as Friction Slope Method

Selected Low Flow Methods = W.S.Pro Method

High Flow Method
 Energy Only

Additional Bridge Parameters
 Add Friction component to Momentum
 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION


RIVER: Taunton River
REACH: Main Stem RS: 128253.8

INPUT
Description: 112.3 DS FAce Mill St Br
Station Elevation Data num= 89
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  0 33.8 6.34 33.81 19.011 33.58
```

25.341 33.58 31.68 33.36 44.35 33.33 50.69 33.49 57.02 33.51 69.7 33.13
82.369 33.13 107.89 32.26 114.29 32.32 120.68 32.22 133.481 32.57 139.87
32.55 146.271 32.12 152.66 31.96 165.45 32.16 171.85 32.47 178.249 32.23
191.04 32.4 203.831 32.96 210.22 33.09 216.621 33.04 248.6 33.89 261.391
32.94 267.79 32.65 274.181 32.17 286.93 31.57 293.27 30.74 298.77 30.46
299.62 30.41 312.8 22.95 312.9 23.55 325.3 19.78 330.5 17.4 333.8 15.81
340.1 11.73 346.1 10.54 352.2 9.67 360.2 10.22 370.498 14.17 374.199 17.78
382.6 22.43 388.8 23.31 389.201 23.48 407.518 26.45 414.051 28.27 420.57
29.45 427.09 29.94 433.611 31.2 440.14 31.31 446.66 30.76 453.18 29.49 459.7
28.7 466.229 28.3 472.75 28.93 479.27 29.58 485.789 30.53 492.32 30.93
498.841 31.39 505.359 32.17 511.88 32.98 518.398 33.44 524.931 33.6 531.45
34.17 537.97 34.96 544.491 36.04 551.02 36.45 557.54 36.8 564.06 36.85
570.58 36.8 583.63 36.88 590.15 36.93 596.669 37.04 603.2 37.2 609.721 37.34
616.239 37.6 622.76 37.94 629.278 38.03 635.811 37.87 642.33 37.83 648.85
37.95 655.371 37.89 661.9 38.06 668.42 38.49 674.94 38.79 681.46 39.38
687.989 40.1

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .08 299.62 .055 433.611 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 299.62
433.611 56.21 65.62 70.36 .5 .8 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 305.001 36 T
 390 687.989 37 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 128188.2

INPUT
Description: 112 App weir/Exit Mill St Br Station Elevation Data num= 70
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 34.1 6.49 34.23 12.99 34.22
19.48 34.07 25.97 33.7 32.47 33.18 45.45 31.85 58.44 31.12 71.42 31.24 84.41
31.56 103.65 31.41 110.03 31.55 116.4 31.31 122.78 31.3 129.15 31.45 154.66
31.29 167.41 31.48 173.78 31.47 180.16 31.32 205.66 31.37 237.53 32.03
256.66 32.09 263.04 31.33 275.79 28.32 282.16 27.32 288.54 25.75 294.92
23.97 301.3 23.75 303.45 23.73 311.64 21.86 319.79 15.57 328.52 13.11 341.97
12.8 354.17 12.94 362.69 12.88 368.73 14.34 376.66 15.28 385.89 16.63 402.23
24.53 403.37 24.88 409.75 25.87 416.13 26.17 435.63 26.52 448.75 26.48
455.31 26.89 461.88 26.9 468.44 26.62 488.12 26.8 494.68 26.68 501.24 26.39
507.8 26.27 514.36 26.54 527.49 26.56 534.05 27.59 540.61 29.85 547.17 32.89
553.73 35.43 560.29 36.25 566.85 36.68 619.34 37.19 625.9 37.09 639.02 37.29
645.58 37.16 658.71 36.59 678.39 36.78 684.95 37.14 691.51 38.14 698.07
39.31 711.19 41.24 724.32 42.23

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .08 256.66 .055 409.75 .095

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 256.66

409.75 169.78 167.62 165.71 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 128020.6

INPUT
Description: 111.7 us face weir
Station Elevation Data num= 90
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 34.24 12.88 34.27 25.77
34.07 38.65 33.96 51.53 34.24 64.42 34.04 70.86 33.43 77.3 31.03 90.18 31.27
103.07 31.15 109.51 30.84 115.95 30.69 122.39 30.82 167.48 29.69 173.92
29.45 180.36 28.88 186.92 28.44 200.04 27.93 213.15 27.79 226.27 27.47
232.83 27.43 239.38 27.77 245.94 28.55 259.06 31.37 265.61 31.58 278.73
31.53 285.29 31.07 298.4 30.98 324.63 31.2 328.16 31.18 331.19 31.16 337.75
26.6 344.31 23.78 350.86 19.99 358.52 12.97 371.97 12.66 384.17 12.8 392.69
12.74 398.73 14.2 406.66 15.14 416.44 19.92 423 22.2 424.52 22.34 429.56
22.8 436.11 22.6 442.67 22.63 449.23 24.24 455.79 26.13 462.35 27.31 468.9
27.75 475.46 27.75 482.02 27.93 495.13 27.81 514.81 27.16 521.36 26.7
527.92 25.26 534.48 24.83 541.04 25.06 547.6 24.61 560.71 23.52 567.27 23.49
573.83 23.3 580.38 23.27 586.94 24.29 593.5 26.14 600.06 26.94 606.61 28.44
613.17 32.29 619.73 35.23 626.29 36.13 639.4 37.08 645.96 37.38 652.52 37.52
665.63 37.44 672.19 37.53 704.98 36.59 724.65 35.34 744.33 35.42 750.88
35.28 757.44 36.23 764 38.88 770.56 40.97 777.12 42.71 783.67 43.87 790.23
45.34 796.79 45.49 803.35 45.38 809.9 45.47 816.46 45.94 823.02 46.74

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 331.19 .055 482.02 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 331.19
482.02 64.55 64.95 68.4 .5 .8 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 265.61 31.58 T
Blocked Obstructions num= 1
 Sta L Sta R Elev
 121.23 175.1530.79663

INLINE STRUCTURE

RIVER: Taunton River
REACH: Main Stem RS: 127981.3

INPUT
Description: 111.5
Distance from Upstream XS = 20 Deck/Roadway Width = 2
Weir Coefficient = 2.6
 Weir Embankment Coordinates num = 8
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 292 30.64 332 31.21 332.1
15.58 345 16.42 406 16.87 416 17.9 417 28.21 519 25.86

Upstream Embankment side slope = 0 horiz. to 1.0 vertical Downstream Embankment side slope = 0 horiz. to 1.0 vertical Maximum allowable submergence for weir flow = .95
Elevation at which weir flow begins =
Weir crest shape = Broad Crested

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 127955.6

INPUT
Description: 111.3 DS face weir
Station Elevation Data num= 92
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 33.51 6.42 33.47 19.26 33.66 32.1 33.25 51.36 33.15 70.63 32.45 83.47 31.51 89.89 31.17 102.73 30.85 141.25 30.66 173.36 30.41 179.78 30.47 186.2 30.38 192.62 29.78 199.04 28.96 205.46 28.38 224.89 27.28 231.39 27.16 257.41 27.24 263.91 26.93 289.93 26.41 296.43 25.88 302.93 24.22 309.44 23.45 315.94 22.97 322.44 23.13 328.95 24.32 335.45 26.52 341.96 27.79 348.46 28 367.97 29.11 374.48 28.75 380.98 27.71 383.34 27.12 387.48 26.07 393.99 22.45 400.49 18.67 406.99 17.12 426 17.4 434 14.4 442 13.6 450 12.3 458 14.5 466 17.3 478.54 17.11 485.04 17.32 491.54 18.31 498.05 18.64 504.55 18.82 504.7 18.84 511.05 19.72 524.06 22.44 543.57 27.23 550.08 27.76 556.58 27.53 569.59 26.31 576.09 25.48 582.6 22.68 589.1 20.13 595.6 19.58 602.11 20.13 608.61 20.19 615.11 20.82 621.62 22.2 628.12 24.24 634.63 25.82 641.13 26.32 647.63 26.43 654.14 26.76 667.14 28.24 673.65 29.2 680.15 30.9 686.66 32.98 693.16 34.32 699.66 35.29 706.17 36.11 712.67 36.71 725.68 37.45 738.69 37.87 758.2 37.84 777.71 37.39 784.21 37.08 790.72 36.61 797.22 36.59 803.72 36.78 810.23 36.61 816.73 36.81 829.74 38.66 836.24 39.43 849.25 41.46 862.26 43.09 881.77 45.04

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .085 367.97 .055 550.08 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 367.97 550.08 95.96 99.03 158.54 .5 .8 Ineffective Flow num= 1
Sta L Sta R Elev Permanent
0 367.97 29.11 T
Blocked Obstructions num= 1
Sta L Sta R Elev
129.27 182.1430.76699

CROSS SECTION

RIVER: Taunton River REACH: Main Stem RS: 127856.6

INPUT
Description: 111 exit weir
Station Elevation Data num= 92

Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 33.41 6.5 33.56 13 33.54 19.5 33.93 25.99 33.86 32.49 33.24 45.49 32.88 51.99 32.85 58.49 32.64 64.99 32.72 71.48 33.08 77.98 32.54 84.48 32.25 97.48 31.88 103.98 31.5 116.97 29.91 129.97 28.82 136.47 28.68 155.97 28.99 168.96 29.32 194.96 29.61 201.45 29.6 214.45 29.3 253.44 29.48 266.44 29 272.94 28.89 298.93 27.42 305.43 27.14 318.43 26.36 324.93 26.12 337.92 25.85 363.92 25.9 376.92 26.16 383.41 26.08 389.91 26.19 403.01 25.63 409.55 25.12 416.1 24.44 422.65 23.96 429.19 23.71 435.74 23.64 442.29 24.09 448.83 24.87 455.38 24.91 461.93 22.3 468.47 20.48 475.02 18.37 475.69 18.24 481.57 17.1 544 14.4 552 13.6 560 12.3 568 14.5 612.5 17.08 651.78 17.07 658.33 17.08 664.87 17.17 666.5 17.34 671.42 17.83 677.97 18.69 684.51 19.99 704.15 24.37 710.7 25.26 717.24 25.79 723.79 27.2 730.34 28.87 736.88 30.39 743.43 31.08 749.98 30.76 756.52 30.28 769.62 31.72 776.16 32.04 782.71 32.1 795.8 33 808.9 34.31 815.44 35.27 821.99 35.45 828.54 35.94 835.08 37.06 841.63 38.52 854.72 43.41 861.27 43.85 867.82 43.61 880.91 43.44 894 42.94 900.55 42.48 913.64 41.98 920.19 42.03 939.83 42.72 946.38 43.17 966.02 45.01 979.11 46.45

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .085 455.38 .055 743.43 .095

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 455.38 743.43 1443.78 1488.1 1605.74 .3 .5 Ineffective Flow num= 1
Sta L Sta R Elev Permanent
0 194.96 29.61 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 126368.5

INPUT
Description: 110
Station Elevation Data num= 189
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 46.85 25.85 46.86 32.31 46.76 38.77 46.42 45.23 45.95 71.08 44.81 84 43.96 90.46 43.26 96.92 42.74 103.38 42.46 122.77 41.12 129.23 40.98 135.69 40.69 148.61 40.6 168 39.95 180.92 39.78 193.84 39.15 200.3 39.03 213.23 38.35 219.69 38.21 226.15 38.21 251.99 38.94 258.46 39.43 264.92 39.22 277.84 39.5 290.76 38.94 297.22 38.54 303.69 37.82 310.15 36.79 316.61 36 323.07 35.4 329.53 34.27 348.92 30.53 355.38 27.11 361.84 26.66 368.3 25.39 374.76 24.47 381.22 23.95 387.68 23.89 394.14 23.49 407.07 23.05 413.53 23.38 419.95 23.97 432.78 24.38 439.19 24.98 445.61 26.13 452.03 26.63 458.44 28.67 464.86 31.4 471.27 32.76 477.69 33.64 484.11 34.15 490.52 34.24 503.36 34.04 516.19 33.63 522.6 33.01 541.85 30.89 554.68 29.65 567.52 28 593.18 25.96 599.6 25.63 606.01 25.53 618.85 24.63 625.28 24.65 631.71 24.47 638.15 24.16 651.02 23.81 657.45 23.42 663.88 22.61 676 22.7 696 16.4 704 13.4 712 12.6 720 11.3 728 13.5 736 16.3 760 20 766.82 23.51 771 24.35 773.26 24.8 786.13 24.9 792.56 24.83 798.99 24.29 805.52 24.04 818.57 24.22 857.73 24.25 870.78 24.13 877.31 23.86 909.94 23.71 916.47 23.57 923 23.58 929.52 23.34 949.1 22.86 968.68 21.9 975.21 21.44 988.26 20.16 994.79 19.17 1001.31 19.13 1007.84 18.9 1020.89 18.98 1033.95 18.91 1040.47 19.48 1047 20.54 1053.53 21.43 1060.05 21.91 1066.58 22.71 1079.63 23.28 1092.69 24.16 1112.26 24.89 1138.37 25.59

1164.48 25.73 1171 26.03 1203.64 26.49 1210.16 26.4 1236.27 26.75 1255.85 26.56 1262.37 26.79 1268.9 26.88 1275.43 26.82 1281.93 26.94 1294.94 26.95 1314.46 26.5 1333.97 25.45 1346.98 24.69 1353.49 24.47 1359.99 24.45 1379.51 24.83 1386.01 24.69 1392.52 24.74 1418.54 25.75 1431.55 26.56 1438.05 26.86 1444.56 26.85 1451.06 26.61 1457.57 26.95 1464.07 27.04 1470.58 26.08 1477.09 24.76 1490.1 23.56 1496.6 23.77 1503.11 24.62 1509.61 25.16 1516.12 25 1529.13 29.22 1535.63 29.25 1542.14 29.56 1548.64 29.62 1561.65 28.62 1568.16 28.22 1574.66 28.05 1581.17 26.9 1587.67 26.31 1594.18 26.2 1600.68 25.9 1607.19 25.84 1613.69 27.22 1620.2 27.96 1633.21 30.07 1646.22 31.81 1659.23 32.95 1665.73 33.05 1672.24 33.34 1698.26 34.08 1724.28 34.25 1743.84 35.64 1750.39 35.88 1770.05 37.7 1776.6 38.17 1783.15 38.43 1789.7 39.18 1796.25 39.78 1809.35 40.61 1815.91 41.16 1822.46 41.45 1835.56 41.75 1842.11 42.26 1861.76 42.84 1874.87 43.77 1881.42 44.42 1887.97 45.34 1894.52 45.93 1901.07 46.13 1907.62 45.7 1914.17 45.63 1920.73 45.78 1927.28 45.72 1933.83 45.4 1940.38 45.26 1953.48 45.44

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .1 606.01 .0552 773.26 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 606.01 773.26 1117.96 1081.96 1026.32 .3 .5 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 490.52 34.24 F
 1548.64 1953.48 29.62 F

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 125286.5
 INPUT
Description: 109
Station Elevation Data num= 203
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 41.92 6.54 43.43 19.61 46.06 26.15 47.01 39.23 46.79 52.3 46.1 58.84 45 65.38 42.39 71.91 40.37 78.45 35.92 84.99 34.22 91.53 31.57 98.07 28.68 104.6 27.54 111.14 27.69 117.68 26.81 124.22 25.63 137.29 24.38 150.37 23.7 156.9 23.1 163.44 21.58 176.52 20 183.06 19.39 189.59 19.03 202.67 19.17 209.21 19.08 215.74 18.24 222.28 18.09 228.82 18.35 235.36 19.01 237.82 18.78 241.89 18.41 248.43 16.57 261.51 16.56 269 15.9 276 13.3 283 12.3 290 11.6 297 13.2 298 16.2 300.73 16.55 307.27 16.54 313.81 19.17 320.35 22.31 320.62 22.33 339.96 22.27 346.5 22.19 359.57 22.46 366.11 22.39 372.65 21.9 385.72 21.4 392.26 21.3 398.8 21.49 405.34 21.13 411.87 21.43 431.49 20.97 438.02 20.7 444.56 20.9 451.1 21.57 457.64 21.97 483.79 22.53 490.33 22.49 496.86 22.67 503.4 22.4 516.48 22.98 523.01 22.69 529.55 22.21 542.63 22.09 549.16 21.68 555.7 21.57 562.24 21.15 575.32 20.07 588.39 19.28 601.49 18.97 608.04 18.95 621.16 19.54 627.72 20.04 634.27 20.36 647.39 20.13 660.5 20.34 667.06 20.17 693.29 19.84 699.85 19.5 726.07 19.4 745.75 19.81 765.42 19.53 778.53 19.53 785.09 19.66 791.65 19.43 830.99 19.49 850.66 19.26 870.34 19.75 876.89 20.47 883.45 20.67 896.56 20.48 916.24 20.63 922.79 20.78 935.91 20.79 942.47 20.46 949.02 20.47 955.58 20.34 968.69 19.44 975.25 19.3 994.92 20.26 1001.48 19.67 1014.6 18.06 1027.71 17.52 1034.27 17.65 1040.83 18.23 1047.38 19.01 1053.94 19.1 1060.5 18.95 1067.05 19.02 1073.61 19.26 1080.17 19.15

1093.28 19.52 1099.84 19.85 1112.96 20.24 1119.51 20.63 1145.74 21.17
1158.86 21.15 1171.97 22.3 1185.09 23.61 1191.64 23.61 1204.76 23.28 1211.32
23.48 1224.43 23.23 1237.55 24.02 1250.66 24.07 1257.22 24.25 1270.33 25.34
1290 26.17 1296.56 26.61 1303.12 27.66 1309.68 29.04 1316.23 29.73 1322.79
30.11 1329.35 30.7 1335.9 31.12 1355.58 31.29 1375.25 32.1 1381.81 32.2
1388.36 32.67 1394.92 33.41 1401.48 33.4 1408.04 33.11 1414.59 33.24 1421.15
33.87 1427.71 33.88 1440.82 34.77 1447.38 34.86 1460.49 35.58 1473.61 35.17
1486.72 36.06 1493.28 36.31 1526.07 36.9 1532.62 37.14 1539.18 37.78 1545.74
37.79 1558.85 38.08 1565.41 37.91 1578.53 38.68 1585.08 38.94 1591.64 39.45
1598.2 40.21 1604.76 40.49 1611.31 40.96 1617.87 40.92 1624.43 41.17 1630.98
41.21 1637.54 41.62 1650.66 42.62 1657.21 42.97 1663.77 43.48 1670.33 43.67
1683.44 44.41 1716.23 45.47 1722.79 45.58 1729.34 45.99 1749.02 46.47
1762.13 47.08 1775.25 48.3 1794.92 49.56 1808.03 51.17 1821.15 52.42 1847.38
53.89 1886.72 54.41 1912.95 53.84 1919.51 53.61 1939.18 53.27 1958.85 53.34
1965.41 53.8 1978.52 56.02 1985.08 56.89 1998.19 58.38 2011.31 59.5 2017.87
59.93 2030.98 60.52 2037.54 60.7 2050.65 60.73 2057.21 60.56 2070.32 59.92
2076.88 59.81

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 237.82 .055 320.62 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 237.82
320.62 3030.3 3003.78 3022.24 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 122282.8

INPUT
Description: 108
Station Elevation Data num= 249 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 70.81 6.56 68.04 13.11 64.74 19.67 61.03 26.23 59.41 39.34 58.97 52.46
59.39 65.57 59.26 85.24 59.54 91.8 59.88 98.36 59.99 111.47 59.66 118.03
59.79 124.59 59.54 131.14 59.02 144.26 56.17 157.37 53.06 163.93 52.19
170.49 52.02 177.04 52.28 183.6 53.33 190.16 52.89 196.72 49.04 203.27 48
262.29 47.8 275.4 47.92 288.52 47.89 301.63 48.2 308.19 48.6 314.75 49.18
321.3 50.11 327.86 50.49 334.42 50.48 340.97 50.3 354.09 49.36 360.65 48.35
373.76 46.78 386.87 46.29 399.99 44.52 406.55 43.79 413.1 42.54 419.66 41.81
426.22 41.67 432.78 41.39 439.33 41.29 472.12 41.18 498.35 41.27 511.46
41.05 596.71 41.33 616.38 41.34 622.93 41.48 629.49 41.48 636.05 41.76
642.61 42.84 649.16 44.91 655.72 47.72 662.28 47 668.83 46.9 675.39 46.23
688.51 43.58 708.18 41.45 721.29 40.27 727.85 39.58 734.41 39.06 740.96
38.32 780.31 35.94 793.42 34.97 813.09 34.17 819.65 34.28 826.21 34.1
832.76 33.76 839.32 33.08 845.88 32.22 858.99 29.86 865.55 28.44 878.66
26.31 885.22 25.65 898.34 23.9 904.89 23.61 911.45 22.69 918.01 21.99 924.57
21.57 931.12 21.32 937.68 20.91 944.24 20.24 950.79 20.05 963.91 20.46
970.47 20.49 983.58 19.65 990.14 19.55 996.69 19.69 1022.92 21.06 1029.48
21.01 1036.04 21.14 1042.6 21.09 1049.15 19.99 1055.71 18.61 1062.27 17.92
1068.82 17.91 1075.38 18.8 1081.94 19.41 1088.5 19.34 1095.05 18.96 1101.61
19.58 1108.17 20.66 1114.72 20.98 1121.28 20.85 1134.4 20.9 1140.95 20.74
1154.07 21.06 1160.62 20.95 1173.73 20.48 1180.29 20.39 1186.84 20.58

1191.56 20.81 1193.4 20.9 1199.95 20.56 1213 21.2 1215 15.2 1223 14.7 1230 10.3 1237 11.2 1244 12.7 1245 15.2 1267 16.7 1270.68 19.52 1272.06 20.24 1278.62 21.4 1285.17 21.56 1298.29 21.52 1304.84 21.14 1311.4 21.05 1317.95 20.68 1337.57 20.83 1344.11 20.62 1350.64 20.26 1363.72 20.47 1376.8 20.91 1383.34 20.98 1389.88 21.47 1396.42 21.65 1402.95 22.08 1409.49 22.66 1422.57 24.13 1429.11 24.63 1435.65 24.83 1448.72 24.39 1455.26 23.94 1474.88 22.01 1481.42 21.57 1487.96 20.99 1501.03 19.42 1507.57 18.46 1514.11 18.3 1520.65 17.97 1540.26 18.22 1553.34 18.13 1566.42 18.31 1579.5 18.23 1586.04 18.29 1592.57 18.64 1599.11 19.21 1605.65 20.72 1612.19 22.41 1618.73 23.66 1625.27 24.67 1638.34 25.43 1644.88 25.59 1657.96 25.37 1690.65 25.03 1697.19 24.83 1703.73 24.91 1710.27 25.32 1742.96 27.92 1749.5 28.3 1756.04 28.32 1769.12 28.92 1775.65 29.11 1782.19 29.48 1795.27 29.9 1801.81 29.97 1808.35 29.86 1814.89 30.3 1821.43 30.13 1847.58 29.99 1860.66 30.2 1873.73 31.05 1886.81 30.96 1899.89 31.1 1906.43 31.51 1912.97 31.63 1919.5 31.52 1926.04 31.65 1939.12 32.26 1945.66 32.36 1952.2 32.71 1958.74 32.74 1991.43 31.67 1997.97 32.04 2004.51 31.83 2011.05 32.04 2024.12 32.8 2030.66 33.28 2037.2 34.08 2043.74 34.31 2050.28 34.08 2056.82 32.45 2063.35 31.05 2076.43 29 2082.97 28.61 2089.51 29.92 2096.05 31.78 2102.59 33.4 2109.12 34.59 2115.66 35.14 2122.2 35.2 2128.74 35.46 2135.28 36.2 2141.82 36.8 2148.36 37.16 2154.9 37.77 2161.43 38.53 2174.51 39.13 2181.05 39.33 2187.59 39.69 2194.13 40.26 2207.2 40.43 2213.74 40.4 2220.28 40.55 2226.82 40.84 2239.9 40.89 2259.51 41.66 2272.59 41.97 2285.67 42.53 2305.28 43.2 2318.36 43.34 2337.98 43.76 2377.21 45.12 2396.82 46.68 2403.36 46.93 2409.9 46.96 2416.44 46.84 2429.52 46.35 2468.75 46.32 2475.29 46.44 2481.83 46.75 2501.44 48.1 2514.52 48.82 2521.06 49.06

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 1213 .055 1278.62 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1213 1278.62 754.72 768.18 785.63 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 2043.74 2521.06 34.31 F

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 121514.6

INPUT
Description: 107
Station Elevation Data num= 297
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 37.96 6.54 38.55 13.08 38.83 19.62 38.8 26.16 39.24 32.7 41.4 39.23 43.89 45.77 45.37 52.31 44.16 58.85 44.18 65.39 46.43 71.93 48.45 78.47 46 85.01 42.11 91.55 41.21 98.09 43.66 104.63 43.54 111.17 43.98 117.7 43.78 124.24 43.84 130.78 41.63 137.32 40.22 143.86 40.61 150.4 40.01 156.94 40.57 163.48 42.73 170.02 45.55 176.56 47.74 183.1 49.24 189.64 50.26 196.17 50.31 202.71 48.24 209.25 45.25 215.79 42.76 222.33 40.72 228.87 38.4 235.41 38.02 241.95 37.72 248.49 37.76 255.03 38.03 261.57 38.89 268.1 41.69 274.64 42.2 281.18 42.07 287.72 41.71 294.26 41.05 300.8 42.11 307.34 42.04 313.88 41.6 320.42 41.46 326.96 41.68 333.5 42.02 340.04 41.86 346.57 41.12 353.11 40.56 359.65 39.69 366.19 37.84 372.73

36.28 379.27 35.28 385.81 34.76 392.35 34.55 398.89 34.37 405.43 33.91
411.97 34.6 418.51 35.81 425.04 34.31 431.58 33.83 438.12 33.73 451.2 33.47
457.74 33.5 464.28 33.48 470.82 33.37 477.36 33.09 483.9 32.94 490.44 32.91
496.98 33.06 503.51 33.11 510.05 33.09 516.59 32.9 523.13 32.93 529.67 32.92
542.75 33.24 549.29 32.91 555.83 33.08 562.37 33.53 568.91 33.73 575.45
34.49 581.98 33.5 588.52 32.45 595.06 32.47 601.6 32.04 608.14 32.01 614.68
31.69 621.22 31.6 627.76 31.46 634.3 31.19 640.84 31.12 647.38 31.07 653.92
31.06 660.45 31 666.99 30.9 673.55 30.95 680.1 30.92 686.66 30.73 693.21
30.51 699.77 30.71 706.32 29.35 712.88 26.83 719.43 26.66 732.54 26.67
739.1 27.3 745.65 29.49 752.21 30.26 765.32 30.28 771.87 29.48 778.43 26.59
784.98 26.16 791.54 26.55 798.09 26.63 804.65 26.6 811.2 26.59 817.76 26.24
824.31 25.99 837.42 25.66 850.53 25.27 857.08 25.27 863.64 24.98 870.19
24.88 876.75 24.9 883.3 25.25 889.86 25.18 896.41 24.73 902.97 24.26 916.08
23.95 922.63 23.37 929.19 22.81 935.74 22.76 942.3 22.44 948.85 22.44 955.41
22.35 961.96 22.43 968.52 22.49 975.07 22.24 981.63 22.17 988.18 22.15
994.74 22.09 1001.29 22.49 1007.85 23.18 1014.4 23.68 1020.96 24.05 1027.51
24.19 1040.62 23.77 1047.18 23.01 1053.73 22.46 1060.29 22.43 1066.84 22.47
1107 23 1112 14.7 1118 9.9 1124 9.4 1130 7.9 1136 9 1140 10.6 1143 14.6 1151
18.6 1171.12 20.33 1171.72 20.35 1178.27 20.64 1184.83 20.71 1197.94 19.89
1211.05 19.39 1230.71 19.19 1237.27 19.39 1243.82 19.77 1250.38 19.84
1256.93 19.59 1283.15 17.98 1296.26 17.87 1368.36 17.92 1394.58 18.06
1414.25 18.4 1420.8 18.76 1427.36 19.36 1440.47 20.92 1453.58 21.65 1479.8
22.03 1486.35 21.98 1499.46 22.35 1506.01 22.21 1525.68 21.14 1532.23 20.97
1538.79 21.17 1571.56 20.98 1584.67 20.66 1597.76 20.72 1604.3 20.39 1610.84
20.45 1623.91 20.02 1630.45 20.24 1636.99 20.31 1643.52 20.17 1663.13 20.3
1669.67 20.23 1682.75 19.53 1689.28 18.95 1695.82 18.93 1702.36 18.63
1708.89 18.06 1715.43 18.08 1721.97 18.32 1735.04 19.45 1748.11 20.04
1767.73 20.06 1774.26 19.81 1780.8 19.11 1787.34 18.79 1793.87 18.93 1800.41
20.28 1806.95 20.34 1826.56 19.5 1833.1 19.37 1846.17 18.35 1852.71 18.22
1878.85 18.37 1911.54 19.13 1918.08 19.13 1931.15 19.46 1937.69 19.78
1944.22 20.88 1950.76 22.59 1957.3 24.51 1963.84 25.84 1970.37 25.95 1976.91
26.65 1983.45 26.83 1989.98 26.17 1996.52 26.89 2003.06 28.73 2009.59 30.14
2016.13 30.63 2022.67 30.94 2042.28 31 2055.35 30.52 2068.43 30.39 2074.96
30 2081.5 29.22 2088.04 29.93 2094.57 31.75 2101.11 32.74 2107.65 33.23
2127.26 33.45 2146.87 34.25 2159.94 34.48 2173.02 35.03 2179.55 35.01
2192.63 35.68 2199.16 35.87 2212.24 36.69 2225.31 37.6 2231.85 37.95 2238.39
38.47 2251.46 38.68 2258 39.07 2277.61 40.52 2290.68 41.75 2303.75 43.31
2316.83 44.07 2323.36 44.85 2336.44 46.09 2342.98 46.87 2356.05 48.14
2369.12 48.73 2382.2 48.99 2401.81 48.7 2408.34 48.46 2434.49 48.37 2441.03
48.56 2447.57 48.99 2460.64 48.86 2480.25 49.13 2486.79 49.04 2493.32 49.23
2499.86 49.01 2512.93 49.67 2526.01 50.15 2532.54 50.71 2539.08 50.69
2545.62 50.89 2558.69 50.99 2565.23 51.54 2584.84 52.74 2591.38 53.04
2597.91 53.61 2610.99 55 2617.52 56.05 2624.06 56.53 2630.6 57.18

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 1107 .055 1184.83 .095
 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1107
1184.83 1409.65 1470.4 1595.6 .3 .5 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 765.32 30.28 T
 2042.28 2630.6 31 F

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 120044.2

INPUT
Description: 106
Station Elevation Data num= 158
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 40.61 6.54 40.5 13.07 40.14
19.61 40.06 39.22 39.49 45.76 39.44 58.83 38.92 71.91 38.13 117.66 36.63
130.74 36.85 137.28 36.78 143.81 37.5 150.35 38.36 156.89 39.01 176.5 42.26
196.11 46.29 202.65 46.77 209.18 46.14 215.72 45.67 222.26 45.38 241.87
44.01 254.94 43.5 281.09 43.81 287.62 43.98 294.16 43.91 313.77 43.3 339.92
41.74 352.99 40.82 366.07 40.3 379.14 39.95 385.68 39.5 392.22 39.28 398.75
38.85 405.29 38.59 424.9 37.41 431.44 36.55 437.97 35.96 444.51 35.58 464.12
34.74 483.73 34.7 490.27 34.81 536.03 34.53 549.1 34.08 562.18 33.27 568.71
32.64 581.79 31.19 614.47 28.36 627.55 27.35 634.08 26.73 647.16 25.95
660.23 25.55 666.77 25.11 692.91 24.29 705.99 23.34 719.06 21.99 738.67
20.58 745.21 20.23 758.28 20.14 764.82 19.98 777.9 19.92 817.12 20.85 823.65
20.49 843.26 18.27 849.8 17.8 856.34 17.88 862.88 18.16 882.49 19.7 885.39
19.85 889.02 20.05 895.56 20.13 902.1 20.1 908.63 19.78 915.17 19.84 921.71
20.02 928.25 20.09 934.78 19.66 947.86 16.29 954.39 15.67 960.93 15.65 974
15.65 977 14.2 985 11.1 993 9.4 1001 7.2 1017 11.2 1018 14.3 1032.84 16.45
1039.37 18.22 1045.91 18.33 1052.45 17.97 1058.98 17.5 1065.52 17.31 1072.06
17.29 1078.59 18.55 1085.13 20.3 1089.47 21.05 1091.67 21.43 1104.74 21.84
1111.28 22.96 1117.82 24.81 1124.35 26.46 1130.89 28.29 1137.43 30.63
1143.96 35.23 1150.5 38.88 1157.04 41.31 1163.58 42.33 1170.11 42.63 1183.19
42.41 1209.33 43.49 1215.87 43.42 1222.41 43.49 1242.02 44.96 1255.09 46.63
1261.63 47.01 1268.17 47.77 1274.7 48.22 1287.78 48.58 1294.31 48.89 1313.93
50.49 1333.54 51.36 1346.61 51.41 1353.15 51.68 1359.68 51.72 1366.22 51.97
1379.29 52.93 1385.83 53.16 1392.37 52.98 1398.91 53.36 1411.98 53.79
1418.52 53.73 1425.05 53.84 1431.59 53.24 1444.66 52.63 1451.2 52.46 1477.35
52.74 1483.89 53.09 1503.5 55.43 1516.57 56.65 1523.11 57.15 1529.64 57.88
1536.18 58.17 1542.72 58.28 1549.26 59.01 1575.4 59.96 1581.94 60.55 1588.48
61.3 1595.01 61.85 1601.55 62.6 1608.09 63.59 1614.62 64.16 1621.16 64.55
1634.24 65.83 1640.77 65.99 1647.31 66.32 1660.38 66.63 1679.99 66.51
1699.61 68.05

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 928.25 .055 1039.37 .095

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 928.25
1039.37 1210.5 1269.44 1360.7 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 118774.7

INPUT
Description: 105
Station Elevation Data num= 399
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 57.23 6.55 57.41 13.1 57.63
19.65 57.78 26.2 57.96 32.75 58.09 39.3 58.11 45.85 58.36 52.41 58.82 58.96

59.08 65.51 58.92 72.06 58.26 78.61 57.33 85.16 56.44 91.71 55.68 98.26
55.06 104.81 54.57 111.36 54.08 117.91 53.58 124.46 53.64 131.01 53.69
137.56 53.66 144.11 53.61 150.66 53.64 157.22 53.68 163.77 53.71 170.32
53.76 176.87 53.79 183.42 53.86 189.97 53.99 196.52 54.27 203.07 54.4 209.62
54.2 216.17 53.56 222.72 52.99 229.27 52.57 235.82 52.35 242.37 52.19 248.92
51.92 255.48 52.24 262.03 51.97 268.58 51.73 275.13 51.66 281.68 51.5 288.23
51.34 294.78 51.18 301.33 50.91 307.88 50.34 314.43 49.95 320.98 49.59
327.53 49.24 334.08 48.94 340.63 48.54 347.18 48.35 353.74 48.2 360.29 47.89
366.84 47.51 373.39 47.27 379.94 47.22 386.49 47.51 393.04 47.76 399.59
47.75 406.14 47.43 412.69 46.94 419.24 46.6 425.79 46.37 432.34 46.08 438.89
45.87 445.44 45.99 452 46.23 458.55 46.44 465.1 46.45 471.65 46.09 478.2
45.5 484.75 45.09 491.3 44.5 497.85 43.67 504.4 43.05 510.95 42.67 517.5
42.71 524.05 42.71 530.6 42.58 537.15 41.8 543.7 41.22 550.26 41.52 556.81
41.64 563.36 41.83 569.91 41.56 576.46 41.78 583.01 41.69 589.56 41.75
596.11 41.16 602.66 41.44 609.21 41.58 615.76 41.6 622.31 41.7 628.86 41.8
635.41 41.59 641.96 41.61 648.52 41.8 655.07 41.73 661.62 41.7 668.17 41.87
674.72 42.09 681.27 42.28 687.82 42.35 694.37 42.24 700.92 42.05 707.47
41.97 714.02 42.04 720.57 42 727.12 41.93 733.67 41.82 740.22 41.59 746.77
41.19 753.33 40.69 759.88 40.19 766.43 39.75 772.98 39.41 779.53 39.25
786.08 39.25 792.63 39.26 799.18 39.22 805.73 39.23 812.28 39.31 818.83
39.45 825.38 39.7 831.93 40.06 838.48 40.43 845.03 40.85 851.59 41.22 858.14
41.33 864.69 41.54 871.24 41.64 877.79 41.65 884.34 42.21 890.89 42.69
897.44 43.26 903.99 43.43 910.54 43.66 917.09 42.37 923.64 41.16 930.19
40.23 936.74 39.42 943.29 38.83 949.85 40.81 956.4 43.26 962.95 43.45 969.5
43.1 976.05 42.29 982.6 41.85 989.15 41.64 995.7 41.54 1002.25 41.52 1008.8
41.4 1015.35 41.24 1021.9 41.27 1028.45 41.37 1035 41.55 1041.55 41.76
1048.11 41.9 1054.66 41.95 1061.21 41.9 1067.76 41.86 1074.31 41.9 1080.86
42.03 1087.41 42.15 1093.96 42.18 1100.51 42.36 1107.06 42.55 1113.61 42.63
1120.16 42.6 1126.71 42.8 1133.26 42.88 1139.81 42.76 1146.36 42.44 1152.92
42.18 1159.47 41.79 1166.02 41.69 1172.57 41.77 1179.12 41.99 1185.67 42.28
1192.22 42.49 1198.77 42.49 1205.32 42.45 1211.87 42.56 1218.42 42.88
1224.97 43 1231.52 42.91 1238.07 43.35 1244.62 43.4 1251.17 43.6 1257.73
43.63 1264.28 43.39 1270.83 43.47 1277.38 43.58 1283.93 43.62 1290.48 43.82
1297.03 43.91 1303.58 43.8 1310.13 43.93 1316.68 43.81 1323.23 43.74 1329.78
43.6 1336.33 43.87 1342.88 44.1 1349.43 44.3 1355.99 44.54 1362.54 45.11
1369.09 45.07 1375.64 44.78 1382.19 44.82 1388.74 44.94 1395.29 45 1401.84
44.99 1408.39 45.07 1414.94 45.31 1421.49 45.71 1428.04 45.98 1434.59 45.95
1441.14 46.04 1447.69 45.87 1454.24 45.65 1460.8 45.58 1467.35 45.57 1473.9
45.52 1480.45 45.45 1487 45.37 1493.55 45.55 1500.1 45.79 1506.65 45.8
1513.2 45.8 1519.75 46 1526.3 45.87 1532.85 45.69 1539.4 45.69 1545.95 46.1
1552.5 46.6 1559.05 46.76 1565.61 46.83 1572.16 46.81 1578.71 46.49 1585.26
46.26 1591.81 46.16 1598.36 46 1604.91 47.24 1611.46 47.37 1618.01 47.62
1624.56 46.81 1631.11 46.86 1637.66 47.18 1644.21 47.31 1650.76 47.28
1657.31 46.62 1663.86 45.55 1670.42 44.29 1676.97 42.93 1683.52 41.79
1690.07 40.63 1696.62 39.64 1703.17 38.55 1709.72 37.61 1716.27 36.8 1722.82
35.74 1729.37 35.32 1735.92 35.11 1742.47 34.93 1749.02 34.77 1755.57 34.69
1762.12 34.63 1768.67 34.52 1775.23 34.5 1781.78 34.66 1788.33 34.85 1794.88
35.13 1801.43 35.74 1807.98 36.59 1814.53 38.11 1821.08 39.19 1827.63 40.02
1839.64 39.01 1846.18 39.63 1852.73 39.65 1859.28 40.72 1865.82 42.06
1872.37 44.06 1878.92 46.22 1892.01 49.83 1898.55 52.08 1905.1 54.13 1911.65
55.46 1924.74 57.16 1937.83 57.13 1950.92 57.86 1957.47 58.9 1970.56 61.36
1977.11 62.34 1990.2 63.85 1996.75 64.39 2009.84 63.33 2016.39 62.54 2022.93
62.29 2029.48 62.31 2042.57 62.14 2062.21 62.48 2068.76 62.2 2075.3 61.25
2081.85 60.85 2088.4 59.51 2094.94 57.73 2108.03 54.73 2147.31 47.31 2153.86

45.84 2173.5 42.53 2206.23 37.91 2219.32 36.32 2225.87 35.64 2245.51 34.09
2252.05 33.79 2271.69 32.06 2297.87 28.89 2310.97 26.05 2317.51 24.87
2330.61 22.73 2350.24 20.91 2356.79 20.63 2363.34 20.55 2369.88 20.28
2376.43 19.82 2388.61 19.62 2389.52 19.61 2396.07 19.63 2402.61 19.44
2409.16 18.82 2415.71 16.83 2424 13.6 2431 11.8 2438 11 2445 9 2452 10.8
2459 11.6 2463 13.8 2487.09 18.83 2487.72 19.05 2494.26 20.32 2500.81 20.93
2507.35 21.3 2513.9 21.05 2520.45 21.07 2526.99 20.87 2533.54 20.39 2553.18
20.69 2566.27 21.37 2579.36 21.28 2585.91 20.46 2599 21.05 2605.55 21.16
2612.09 21 2625.19 21.21 2638.28 21.14 2644.83 21.36 2651.37 22.21 2657.92
23.43 2664.46 23.78 2671.01 24.58 2684.1 25.22 2690.65 25.87 2697.19 26.69
2723.38 29.52 2743.02 32.17 2756.11 33.44 2775.75 34.32 2795.39 34.75
2801.93 34.56 2808.48 34.93 2815.03 35.07 2834.67 36.41 2841.21 37.12
2860.85 38.32 2873.94 38.75 2887.04 38.52 2893.58 38.55 2906.67 38.38
2913.22 38.41 2919.77 38.07 2926.31 37.5 2932.86 37.18 2945.95 37.37 2952.5
37.31 2972.14 37.54 2985.23 37.28 2991.78 37.43 3017.96 37.27 3031.05 36.81
3035.78 36.77 3042.31 36.6 3048.84 36.7 3055.37 36.84 3061.9 37.03

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 2062.21 .055 2873.94 .095

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2062.21
2873.94 1513.57 1451.76 1410.95 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 117323

INPUT
Description: 104
Station Elevation Data num= 382
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 77.2 6.56 75.61 13.12 74.05
19.68 72.91 26.24 71.82 32.8 70.5 39.36 69.52 45.92 69.28 52.48 69.26 59.04
69.13 65.6 68.94 72.16 68.27 78.72 65.91 85.28 64.32 91.84 63.56 98.4 62.74
104.96 61.82 111.52 60.48 118.08 59.62 124.64 58.63 131.2 57.58 137.76 56.16
144.32 55.09 150.88 54.43 157.44 54.08 164 53.12 170.56 52.48 177.12 52.02
183.68 51.55 190.24 51.21 196.8 50.94 203.36 50.94 209.92 50.88 216.48 50.95
223.04 51.02 229.6 51.08 236.16 51.27 242.72 51.38 249.28 51.27 255.84 51.3
262.4 51.23 268.96 51.41 275.52 51.43 282.08 51.28 288.64 51.23 295.2 51.25
301.76 51.25 308.32 50.98 314.88 50.95 321.44 50.96 328 50.91 334.56 51.41
341.12 51.55 347.69 51.54 354.25 52.14 360.81 52.67 367.37 53.09 373.93
53.59 380.49 54.32 387.05 54.98 393.61 55.42 400.17 55.49 406.73 55.28
413.29 55.14 419.85 55.22 426.41 55.53 432.97 56.42 439.53 58.53 446.09 59.7
452.65 60.66 459.21 60.9 465.77 61.1 472.33 61.28 478.89 61.34 485.45 61.31
492.01 61.08 498.57 60.71 505.13 60.15 511.69 59.76 518.25 59.8 524.81 59.97
531.37 60.19 537.93 60.52 544.49 60.85 551.05 61.05 557.61 61.23 564.17
61.27 570.73 61.08 577.29 60.76 583.85 60.67 590.41 60.73 596.97 60.85
603.53 60.87 610.09 60.79 616.65 60.71 623.21 60.55 629.77 60.31 636.33
59.97 642.89 59.75 649.45 59.18 656.01 58.77 662.57 58.64 669.13 58.67
675.69 58.42 682.25 58.03 688.81 57.95 695.37 57.91 701.93 57.99 708.49
58.09 715.05 58.27 721.61 58.36 728.17 58.43 734.73 58.41 741.29 58.49
747.85 58.51 754.41 58.3 760.97 58 767.53 57.73 774.09 57.46 780.65 56.97

787.21 56.45 793.77 55.84 800.33 55.37 806.89 54.94 813.45 54.75 820.01
54.41 826.57 54.34 833.13 54.28 839.69 53.91 846.25 53.77 852.81 53.59
859.37 53.97 865.93 55.51 872.49 56.35 879.05 56.36 885.61 56.41 892.17
56.49 898.73 56.39 905.29 56.24 911.85 55.83 918.41 55.19 924.97 54.57
931.53 54.14 938.09 53.77 944.65 53.69 951.21 53.31 957.77 52.91 964.33
52.49 970.89 51.97 977.45 51.58 984.01 51.29 990.57 51.02 997.14 50.78
1003.7 50.66 1010.26 50.68 1016.82 50.86 1023.38 51.16 1029.94 51.24 1036.5
51.2 1043.06 51.16 1049.62 51.09 1056.18 50.86 1062.74 50.55 1069.3 50.06
1075.86 49.66 1082.42 49.24 1088.98 48.74 1095.54 47.87 1102.1 47.38 1108.66
47.26 1115.22 47.01 1121.78 47.57 1128.34 48.05 1134.9 47.28 1141.46 46.24
1148.02 45.62 1154.58 45.69 1161.14 45.76 1167.7 45.88 1174.26 45.92 1180.82
45.99 1187.38 46.2 1193.94 46.44 1200.5 46.76 1219.26 46.18 1225.81 45.67
1238.9 43.7 1245.44 43.09 1251.98 41.43 1258.53 40.24 1271.61 39.39 1278.16
38.44 1284.7 37.04 1291.25 36.13 1304.33 35.06 1317.42 34.55 1323.97 34.45
1330.51 34.87 1337.05 35.47 1343.6 35.74 1356.68 35.94 1369.77 36.87 1376.32
37.64 1389.4 38.83 1395.95 38.88 1402.49 39.14 1422.12 40.78 1428.67 41.5
1435.21 42.47 1448.3 42.79 1461.39 42.71 1467.93 42.92 1474.48 42.52 1494.11
40.39 1500.65 39.81 1507.19 38.92 1520.28 37.63 1526.83 37.11 1533.37 36.21
1539.91 35.77 1546.46 37.21 1553 38.32 1566.09 38.58 1572.63 38.55 1579.18
38.71 1592.27 39.31 1631.53 39.78 1651.16 39.64 1664.25 39.76 1670.79 39.57
1683.88 38.72 1690.42 38.47 1703.51 39.15 1710.06 38.91 1723.14 38.9 1729.69
38.67 1749.32 37.47 1788.58 36.13 1801.67 35.45 1808.21 34.85 1821.3 31.84
1834.39 29.64 1840.93 28.86 1854.02 27.75 1873.65 26.87 1886.74 26.62
1893.29 26.7 1899.83 26.6 1906.37 26.66 1912.92 26.99 1932.55 27.56 1958.72
27.5 1965.27 27.67 1971.81 27.65 1978.36 27.94 1984.9 27.88 1997.99 28.24
2004.53 28.54 2011.08 28.98 2037.25 28.88 2050.34 28.59 2056.88 28.89
2063.43 28.97 2069.97 29.26 2076.51 29.31 2083.06 29 2089.6 28.92 2102.69
28.12 2109.23 27.9 2122.32 27.74 2128.87 28.21 2135.41 28.25 2148.5 28.9
2155.04 29.06 2174.67 28.79 2187.76 28.92 2200.85 29.15 2207.39 29.07
2233.57 29.31 2240.11 29.05 2246.66 29.07 2253.2 28.95 2266.29 28.27 2272.83
28.13 2285.92 27.43 2305.55 26.87 2318.64 26.59 2325.18 26.68 2331.73 25.94
2331.92 25.87 2338.27 23.52 2342 20.6 2350 13.1 2360 10.4 2370 9.2 2380 8.1
2390 9 2400 10.2 2401 12.9 2409 18.4 2419 20 2424.92 20.27 2429.89 20.43
2449.52 19.54 2456.06 19.36 2462.6 19.89 2469.15 21.22 2475.69 21.45 2482.24
21.38 2495.32 21.49 2501.87 21.34 2508.41 21.02 2514.96 20.9 2534.59 19.59
2547.68 19.49 2560.76 18.61 2567.31 18.02 2573.85 17.71 2580.4 17.58 2586.94
17.61 2600.03 18.58 2606.57 19.2 2613.11 20.01 2619.66 20.62 2626.2 21.42
2632.75 21.98 2639.29 22.08 2652.38 21.78 2658.92 21.16 2665.47 20.33
2672.01 20.15 2678.55 20.23 2685.1 20.83 2704.73 25.29 2711.27 26.92 2717.82
28.14 2730.9 30.96 2737.45 32.2 2743.99 33.15 2757.08 33.5 2763.62 33.99
2770.17 33.92 2783.26 33.35 2809.43 33.98 2815.98 33.9 2822.52 34.12 2835.61
33.91 2842.15 33.61 2855.24 32.63 2861.78 32.55 2874.87 32.84 2887.96 32.57
2907.59 31.88 2914.13 31.74 2920.68 31.74 2933.77 32.16 2940.31 32.56
2946.85 32.8 2966.48 32.7 2973.03 32.85 2986.12 32.58 2992.66 32.7 3031.92
34.71 3051.56 35.15 3058.1 35.6 3064.64 35.91 3090.82 36.3 3097.36 36.49
3103.91 36.54 3110.45 36.44 3116.99 36.53 3123.54 36.41 3136.63 37.08 3162.8
37.75 3182.43 37.77 3188.98 38.08 3208.61 37.69 3215.15 37.82 3228.24 38.45
3240.24 38.93 3246.8 39.05 3253.36 39.09

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .095 2325.18 .055 2763.62 .095

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2325.18

2763.62 1270.29 1219.85 1204.17 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 116103.1

INPUT
Description: 103
Station Elevation Data num= 154
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 103.46 6.54 102.72 13.09 101.77 19.63 100.31 26.18 98.6 32.72 97.23 39.27 96.04 45.81 94.72 52.35 93.05 65.44 88.14 78.53 85.09 85.08 83.67 91.62 82.46 104.71 79.82 117.8 77.31 124.34 76.36 137.43 74.73 143.97 74.17 157.06 72.49 170.15 71.49 176.69 71.1 196.33 70.54 202.87 69.78 209.42 68.69 235.59 65.37 242.14 64.44 248.68 63.83 261.77 63.51 287.95 62.16 294.49 61.6 307.58 59.64 320.67 57.99 327.21 57.28 340.3 56.54 359.93 55.17 386.11 51.6 392.65 50.24 399.2 48.59 412.29 44.86 431.92 38.24 438.46 35.94 445.01 33.95 451.55 31.83 458.1 30.73 464.64 29.96 471.19 29.58 477.73 28.91 497.36 26.21 503.91 24.97 510.45 23.54 523.54 20.99 530.08 20.44 536.63 19.73 539.94 19.52 543.17 19.32 549.72 19.36 556.26 19.3 562.8 19.03 575 14.2 585 12.8 595 10.9 605 7.9 613 10.6 625 12.7 626 14.1 633 20.7 660.97 21.65 667.51 21.53 674.06 21.59 680.6 21.52 687.14 21.72 693.69 21.94 706.78 22.63 713.32 22.81 719.87 22.78 726.41 22.33 732.95 21.91 739.5 21.3 746.04 21.01 752.59 21.37 759.13 22.12 765.68 22.78 772.22 23.15 778.76 23.45 785.31 23.78 798.4 24.39 804.94 24.84 811.48 25.23 824.57 25.92 831.12 25.98 837.66 26.19 844.21 26.57 850.75 26.93 857.29 27.4 863.84 27.75 870.38 27.96 876.93 28.2 883.47 28.71 890.02 29.47 896.56 29.99 903.1 30.69 909.65 30.79 916.19 30.93 922.74 31.28 929.28 31.85 935.83 32.34 942.37 32.8 948.91 33.29 955.46 33.74 962 34.17 968.55 34.62 975.09 34.49 981.63 34.44 988.18 34.2 994.72 34.26 1001.27 34.66 1007.81 35.1 1020.9 35.5 1027.44 35.87 1033.99 36.01 1040.53 36.1 1047.08 36.32 1053.62 36.73 1060.17 37.39 1066.71 37.55 1073.25 38.12 1086.34 39.29 1092.89 39.78 1099.43 40.01 1105.98 40.27 1112.52 40.47 1119.06 40.35 1125.61 40.73 1132.15 41 1145.24 41.48 1151.79 41.69 1158.33 42.15 1164.87 42.51 1171.42 43.1 1177.96 43.65 1184.51 44.1 1197.6 45.23 1204.14 45.91 1210.68 46.35 1217.23 46.87 1223.77 47.69 1230.32 48.57 1236.86 49.13 1243.41 49.62 1256.49 50.41 1263.04 50.86 1269.58 51.18 1276.13 51.66 1282.67 51.91

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .095 562.8 .055 633 .095

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 562.8 633 1173.1 1178.45 1180.74 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 114924.7

INPUT

Description: 102 Approach Cherry St
Station Elevation Data num= 148 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 32.9 6.54 33.6 19.63 33.4 26.18 33.35 32.72 33.43 39.27 33.48 45.81 33.19
52.36 33 58.9 32.76 65.45 32.42 71.99 32.05 78.54 31.85 85.08 31.51 98.17
31.39 104.72 30.82 111.26 30.37 117.81 30.37 124.35 30.42 130.9 30.57 143.99
30.32 150.53 30.36 157.08 30.54 163.62 30.36 170.17 29.96 176.71 29.96
183.26 30.1 189.8 30.14 196.35 30.44 202.89 30.54 209.44 30.29 215.98 29.78
222.53 29.16 229.07 28.96 235.62 28.19 242.16 28.73 248.71 28.35 255.25
28.36 261.8 28.13 268.34 28.25 274.89 27.98 281.4 27.8 287.92 27.41 294.43
27.13 300.95 26.97 307.46 26.79 313.98 26.63 327.01 26.41 333.53 26.29
340.04 26.14 346.56 25.84 353.07 25.69 359.59 25.42 366.1 25.08 372.62 24.8
379.13 24.5 385.65 24.17 392.17 24.04 405.2 23.95 411.71 23.94 418.23 23.83
424.74 23.88 431.26 23.78 451.21 23.57 519.65 16.88 522.36 13.24 525.02
11.76 540.37 9.94 545.34 9.86 546.31 9.84 584.59 7.31 603.61 10.54 613.6
13.38 617.06 16.71 666.83 20.38 715.96 25.4 724.45 26.68 730.97 27.11 737.48
27.49 744 27.68 750.52 28.15 757.03 28.53 763.55 29.03 770.06 29.44 783.05
30.13 789.52 30.85 795.99 31.48 802.46 31.03 808.92 31.91 815.39 32.05
821.86 32.35 828.33 32.92 834.8 34.03 841.27 34.16 847.74 34.4 854.21 34.6
860.68 35.03 867.15 35.64 873.62 36.09 880.09 36.36 886.56 37.13 893.03
38.05 899.5 38.57 905.97 38.9 912.43 39.67 918.9 40.32 925.37 40.78 931.84
41.8 938.31 43.16 944.78 43.59 951.25 44.51 957.72 44.53 964.19 44.72 970.66
45.17 977.13 45.56 983.6 45.87 990.07 46.36 996.54 46.81 1003.01 47.08
1009.48 47.28 1015.95 47.64 1035.35 48.89 1041.82 49.35 1048.29 49.83
1054.76 50.45 1061.23 51.27 1067.7 52.14 1074.17 52.92 1080.64 53.63 1087.11
54.44 1093.58 55.28 1100.05 55.99 1106.52 56.85 1112.99 57.67 1119.46 58.6
1125.92 59.5 1132.39 60.3 1145.33 61.85 1151.8 62.95 1158.27 63.97 1164.74
64.66 1171.21 65.39 1177.68 66.17 1184.15 67.03 1190.62 67.74 1203.56 69.09
1210.03 69.47 1216.5 69.62 1222.97 69.66

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 451.21 .055 715.96 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 451.21
715.96 78.71 81.96 87.88 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 114842.7

INPUT
Description: 101.7 US Face Cherry St Station Elevation Data num= 164
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 33.71 5.324 33.71 10.657
33.53 15.982 33.02 21.306 32.97 37.288 33.67 42.612 33.76 53.269 32.82
63.927 32.87 74.576 32.48 79.908 31.98 85.233 31.83 95.89 31.95 101.214
31.53 127.845 31.04 133.178 31.07 138.502 30.94 143.827 31.01 159.808 30.85
170.466 30.32 175.79 30.2 186.447 30.2 191.772 30.02 207.753 28.93 213.078
28.91 218.411 28.69 223.735 28.22 229.059 27.92 239.717 27.69 245.041 27.26
250.366 26.31 255.698 25.92 261.023 25.37 266.347 25.35 282.329 24.8 287.653
24.49 292.986 23.85 303.635 23.71 308.968 23.54 319.617 24.16 330.274 24.11
335.598 24.42 340.931 24.46 346.256 24.11 351.58 23.62 362.237 23.6 372.886
23.22 378.219 23.42 383.543 23.78 388.868 23.78 404.85 23.44 410.182 23.67

415.507 23.45 420.831 23.94 436.813 23.92 447.47 23.5 452.794 23.79 456.374
24.49 458.119 24.83 463.452 25.49 475.002 23.84 483.177 22.29 490.926 20.7
498.97 18.11 506.523 15.04 512.888 11.11 517.721 9.87 522.922 10.51 526.109
9.34 528.812 8.96 533.727 9.12 535.775 9.16 538.724 9.2 541.664 9.47 544.613
9.48 548.766 10.59 553.657 13.74 560.39 16.97 567.14 20.49 573.259 22.36
579.001 23.53 580.934 25.18 600.766 27.35 606.042 27.87 611.325 28.36
616.609 29.03 621.892 29.46 627.167 30.03 632.451 30.46 637.734 30.61
643.018 31.01 648.293 31.45 653.618 31.7 658.934 31.88 664.259 32.41 674.899
32.61 680.224 33 685.54 33.18 690.865 33.32 696.189 33.51 701.505 33.53
706.83 33.87 712.146 34.28 717.471 34.76 722.787 35.2 728.112 35.59 733.436
35.74 738.752 35.82 744.077 36.21 749.393 36.68 754.718 37.04 760.034 37.3
765.358 37.72 770.683 38.78 775.999 39.25 781.324 39.53 786.64 39.64 791.964
40.49 797.281 40.97 802.605 41.54 807.93 41.63 813.246 42.11 818.57 42.98
829.211 43.94 834.528 44.64 839.852 45.19 845.177 45.58 850.493 46.11
855.817 46.7 861.134 47.17 866.458 47.52 871.783 47.92 877.099 48.43 882.423
48.85 887.74 49.23 893.064 49.63 898.38 50.12 903.705 50.75 914.346 52.62
919.67 53.4 924.986 54.09 930.311 54.88 935.627 55.75 940.952 56.64 946.276
57.58 956.917 59.4 962.233 60.34 967.558 61.26 972.874 62.12 978.199 63.1
983.523 63.89 988.839 64.39 994.164 64.98 999.48 65.731004.805 66.34 1010.121
66.741015.445 67.09 1020.77 67.411026.086 67.671031.411 67.77 1036.727
67.911042.052 68.181047.368 68.631052.692 68.33

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 463.452 .055 580.934 .09
 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
463.452 580.934 53.28 53.62 51.89 .5 .8 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 463.45 26.5 T
 6011052.692 29 T
Skew Angle = 35

BRIDGE

RIVER: Taunton River
REACH: Main Stem RS: 114815.5

INPUT
Description: 101.5 Childs Br/Cherry St

101.5 Cherry St/ Childs Br
Distance from Upstream XS = 12
Deck/Roadway Width = 35
Weir Coefficient = 2.6
Bridge Deck/Roadway Skew = 35
Upstream Deck/Roadway Coordinates
 num= 18
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 46.692 32.73 329.299 27.1 382.544 26.73
 465.278 27.59 465.36 31.62 470.193 31.83
 470.275 27.4 25.18 484.938 28.51 25.18 498.864 28.63 25.3 581.598 30.02
26.71 594.704 30.27 26.71 595.524 30.31
 595.605 33.9 601.258 33.92 601.339 29.86

695.46 34.52 798.673 41.75 953.493 56.54

Upstream Bridge Cross Section Data
Station Elevation Data num= 164
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 33.71 5.324 33.71 10.657 33.53 15.982 33.02 21.306 32.97 37.288 33.67 42.612 33.76 53.269 32.82 63.927 32.87 74.576 32.48 79.908 31.98 85.233 31.83 95.89 31.95 101.214 31.53 127.845 31.04 133.178 31.07 138.502 30.94 143.827 31.01 159.808 30.85 170.466 30.32 175.79 30.2 186.447 30.2 191.772 30.02 207.753 28.93 213.078 28.91 218.411 28.69 223.735 28.22 229.059 27.92 239.717 27.69 245.041 27.26 250.366 26.31 255.698 25.92 261.023 25.37 266.347 25.35 282.329 24.8 287.653 24.49 292.986 23.85 303.635 23.71 308.968 23.54 319.617 24.16 330.274 24.11 335.598 24.42 340.931 24.46 346.256 24.11 351.58 23.62 362.237 23.6 372.886 23.22 378.219 23.42 383.543 23.78 388.868 23.78 404.85 23.44 410.182 23.67 415.507 23.45 420.831 23.94 436.813 23.92 447.47 23.5 452.794 23.79 456.374 24.49 458.119 24.83 463.452 25.49 475.002 23.84 483.177 22.29 490.926 20.7 498.97 18.11 506.523 15.04 512.888 11.11 517.721 9.87 522.922 10.51 526.109 9.34 528.812 8.96 533.727 9.12 535.775 9.16 538.724 9.2 541.664 9.47 544.613 9.48 548.766 10.59 553.657 13.74 560.39 16.97 567.14 20.49 573.259 22.36 579.001 23.53 580.934 25.18 600.766 27.35 606.042 27.87 611.325 28.36 616.609 29.03 621.892 29.46 627.167 30.03 632.451 30.46 637.734 30.61 643.018 31.01 648.293 31.45 653.618 31.7 658.934 31.88 664.259 32.41 674.899 32.61 680.224 33 685.54 33.18 690.865 33.32 696.189 33.51 701.505 33.53 706.83 33.87 712.146 34.28 717.471 34.76 722.787 35.2 728.112 35.59 733.436 35.74 738.752 35.82 744.077 36.21 749.393 36.68 754.718 37.04 760.034 37.3 765.358 37.72 770.683 38.78 775.999 39.25 781.324 39.53 786.64 39.64 791.964 40.49 797.281 40.97 802.605 41.54 807.93 41.63 813.246 42.11 818.57 42.98 829.211 43.94 834.528 44.64 839.852 45.19 845.177 45.58 850.493 46.11 855.817 46.7 861.134 47.17 866.458 47.52 871.783 47.92 877.099 48.43 882.423 48.85 887.74 49.23 893.064 49.63 898.38 50.12 903.705 50.75 914.346 52.62 919.67 53.4 924.986 54.09 930.311 54.88 935.627 55.75 940.952 56.64 946.276 57.58 956.917 59.4 962.233 60.34 967.558 61.26 972.874 62.12 978.199 63.1 983.523 63.89 988.839 64.39 994.164 64.98 999.48 65.731004.805 66.34 1010.121 66.741015.445 67.09 1020.77 67.411026.086 67.671031.411 67.77 1036.727 67.911042.052 68.181047.368 68.631052.692 68.33

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .09 463.452 .055 580.934 .09

Bank Sta: Left Right Coeff Contr. Expan.
463.452 580.934 .5 .8
Ineffective Flow num= 2
Sta L Sta R Elev Permanent
0 463.45 26.5 T
6011052.692 29 T
Skew Angle = 35

Downstream Deck/Roadway Coordinates
num= 18
Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
97.479 32.73 380.087 27.1 433.331 26.73
516.066 27.59 516.148 31.62 25.18 521.8 31.83 25.18
521.882 27.4 25.18 535.725 28.51 25.18 549.651 28.63 25.3

```
 632.385 30.02 26.71 645.492 30.27 26.71 646.311 30.31   646.393 33.9 652.045
33.92 652.127 29.86
 746.247 34.52 850.28 41.75 1005.1 56.54

Downstream Bridge Cross Section Data
Station Elevation Data num= 162
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  0 32.85 10.649 32.58 15.973
32.71 26.631 32.28 47.929 32.44  53.253 32.3 79.884 32.71 85.208 32.54 95.857
31.87 101.19 32.02  106.514 31.71 111.839 31.01 117.163 30.52 122.488 30.25
133.137 30.03  138.469 31 143.794 31.75 149.118 31.59 159.767 30.56 165.092
30.31  170.416 29.81 175.741 30.2 207.696 30.4 213.02 30.54 223.678 30.08
229.002 29.69 239.651 29.27 244.976 28.77 250.3 28.48 260.957 28.75  266.282
28.64 271.606 28.1 276.931 27.36 282.255 26.89 287.58 26.64  292.904 26.13
298.237 25.98 303.561 25.68 314.21 25.53 319.535 25.7  324.859 25.27 330.184
25.14 335.508 25.16 346.165 26.03 351.49 25.81  362.139 25.73 367.463 26.01
372.788 25.7 383.445 25.63 388.77 25.89  394.094 26.68 399.419 26.73 404.743
26.57 410.059 26.81 420.692 26.85  426.008 26.97 431.324 26.92 436.641 27.14
441.957 26.94 463.222 27.05  468.539 27.32 473.855 27.18 489.804 27.69
505.753 27.66 509.357 27.49  513.51 27.4 520.055 23.84 528.23 22.29 535.979
20.7 544.023 18.11  551.576 15.04 557.941 11.11 562.774 9.87 567.975 10.51
571.162 9.34  573.865 8.96 578.78 9.12 580.828 9.16 583.777 9.2 586.718 9.47
589.667 9.48 593.82 10.59 598.71 13.74 605.443 16.97 612.193 20.49  618.312
22.36 624.055 23.53 625.988 25.18 638.529 28.73 643.976 29.82  649.293 30.21
654.609 30.38 659.925 30.77 665.242 30.71 670.558 30.79  675.874 31.16 681.19
31.14 686.564 31.29 691.938 31.65 697.311 32.05  702.685 32.36 708.059 32.52
713.432 32.82 718.806 33.06 724.18 33.5  729.553 33.61 734.927 33.86 740.3
34.01 745.674 34.63 751.048 35.15  761.795 35.8 767.169 36.42 772.542 36.72
777.916 37.04 783.29 37.79  788.663 38.36 794.037 38.49 799.411 38.93 804.784
39.16 810.158 39.33  815.531 39.64 820.905 39.92 826.279 40.32 831.652 40.94
837.026 41.5  842.4 41.73 847.773 41.94 869.268 43.68 874.641 44.14 880.015
44.73  885.389 45.59 890.762 46.42 901.51 48.15 906.883 48.77 912.257 49.3
917.63 50.13 923.004 50.78 928.378 51.27 933.751 52 939.125 53.06  944.499
53.72 949.872 53.97 955.246 54.34 960.62 54.81 965.993 55.39  971.367 55.8
976.741 56.12 982.114 56.66 987.488 56.99 992.862 57.44  998.235
58.121003.609 58.731008.982 59.21014.356 59.71 1019.73 60.28 1025.103
60.651030.477 611035.851 61.561041.224 62.181046.598 62.85 1051.971
63.311062.719 63.88
 Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 513.51 .055 638.529 .09

Bank Sta: Left Right Coeff Contr. Expan.
 513.51 638.529 .5 .8
Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 463 27 T
 6391062.719 30 T
Skew Angle = 35

Upstream Embankment side slope = 0 horiz. to 1.0 vertical Downstream
Embankment side slope = 0 horiz. to 1.0 vertical Maximum allowable
submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
```

```
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Piers = 1

Pier Data
Pier Station Upstream= 534.906 Downstream= 577.502
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.6 9 1.6 21.7 4.3 21.8 4.3 25.9
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.6 9 1.6 21.7 4.3 21.8 4.3 25.9

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
 Energy
 W.S. Pro Method

 W.S.Pro Data
 Left Embankment
 El of the top of the embankment = 27.6
 El of the toe of the abutment = 11.1
 Right Embankment
 El of the top of the embankment = 27.6
 El of the toe of the abutment = 11.1
 Abutment Type = 3 Sloping abutments and sloping embankments  Slope of
abutments = 4
 Top with of embankment = 35
 Centroid station of bridge opening =
 Wing Wall Type = No wing walls present
 Width =
 Angle =
 Radius =   Guide Banks Type = No Guide Bank present
 Length =
 Offset =
 Angle =
 Optional Contraction and expansion coefficients
 At approach Section
 At Guide Bank
 At upstream outside
 At upstream inside (BU)
 At downstream inside (BD)
 Piers are Continuous for the width of the bridge
 Use Geometric mean as Friction Slope Method

Selected Low Flow Methods = W.S.Pro Method

High Flow Method
 Pressure and Weir flow
 Submerged Inlet Cd =
 Submerged Inlet + Outlet Cd = .8
 Max Low Cord =
```

Additional Bridge Parameters
 Add Friction component to Momentum
 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end Criteria to check for pressure flow =
Upstream energy grade line

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 114789.1

INPUT
Description: 101.3 DS FAce Cherry St
Station Elevation Data num= 162
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 32.85 10.649 32.58 15.973
32.71 26.631 32.28 47.929 32.44 53.253 32.3 79.884 32.71 85.208 32.54 95.857
31.87 101.19 32.02 106.514 31.71 111.839 31.01 117.163 30.52 122.488 30.25
133.137 30.03 138.469 31 143.794 31.75 149.118 31.59 159.767 30.56 165.092
30.31 170.416 29.81 175.741 30.2 207.696 30.4 213.02 30.54 223.678 30.08
229.002 29.69 239.651 29.27 244.976 28.77 250.3 28.48 260.957 28.75 266.282
28.64 271.606 28.1 276.931 27.36 282.255 26.89 287.58 26.64 292.904 26.13
298.237 25.98 303.561 25.68 314.21 25.53 319.535 25.7 324.859 25.27 330.184
25.14 335.508 25.16 346.165 26.03 351.49 25.81 362.139 25.73 367.463 26.01
372.788 25.7 383.445 25.63 388.77 25.89 394.094 26.68 399.419 26.73 404.743
26.57 410.059 26.81 420.692 26.85 426.008 26.97 431.324 26.92 436.641 27.14
441.957 26.94 463.222 27.05 468.539 27.32 473.855 27.18 489.804 27.69
505.753 27.66 509.357 27.49 513.51 27.4 520.055 23.84 528.23 22.29 535.979
20.7 544.023 18.11 551.576 15.04 557.941 11.11 562.774 9.87 567.975 10.51
571.162 9.34 573.865 8.96 578.78 9.12 580.828 9.16 583.777 9.2 586.718 9.47
589.667 9.48 593.82 10.59 598.71 13.74 605.443 16.97 612.193 20.49 618.312
22.36 624.055 23.53 625.988 25.18 638.529 28.73 643.976 29.82 649.293 30.21
654.609 30.38 659.925 30.77 665.242 30.71 670.558 30.79 675.874 31.16 681.19
31.14 686.564 31.29 691.938 31.65 697.311 32.05 702.685 32.36 708.059 32.52
713.432 32.82 718.806 33.06 724.18 33.5 729.553 33.61 734.927 33.86 740.3
34.01 745.674 34.63 751.048 35.15 761.795 35.8 767.169 36.42 772.542 36.72
777.916 37.04 783.29 37.79 788.663 38.36 794.037 38.49 799.411 38.93 804.784
39.16 810.158 39.33 815.531 39.64 820.905 39.92 826.279 40.32 831.652 40.94
837.026 41.5 842.4 41.73 847.773 41.94 869.268 43.68 874.641 44.14 880.015
44.73 885.389 45.59 890.762 46.42 901.51 48.15 906.883 48.77 912.257 49.3
917.63 50.13 923.004 50.78 928.378 51.27 933.751 52 939.125 53.06 944.499
53.72 949.872 53.97 955.246 54.34 960.62 54.81 965.993 55.39 971.367 55.8
976.741 56.12 982.114 56.66 987.488 56.99 992.862 57.44 998.235
58.121003.609 58.731008.982 59.21014.356 59.71 1019.73 60.28 1025.103
60.651030.477 611035.851 61.561041.224 62.181046.598 62.85 1051.971
63.311062.719 63.88
 Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 513.51 .055 638.529 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 513.51
638.529 44.49 41.34 37.16 .5 .8 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent

```
 0 463 27 T
 6391062.719 30 T
Skew Angle = 35

CROSS SECTION


RIVER: Taunton River
REACH: Main Stem RS: 114747.8

INPUT
Description: 101 Exit Cherry St Br
Station Elevation Data num= 200
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  0 33.54 6.53 33.38 13.06 33.16
19.59 33.06 32.65 32.79  39.18 32.75 45.71 32.77 52.24 32.72 58.77 32.58 65.3
32.36  71.83 32.17 78.36 32.08 84.89 31.94 91.42 31.74 104.48 32.01  111.01
31.81 117.54 31.65 124.06 31.07 130.59 30.55 137.12 31.04  143.65 31.32
156.71 31.25 163.24 31.48 169.77 31.52 176.3 31.53  182.83 31.49 189.36 31.6
195.89 31.83 202.42 31.79 208.95 31.86  215.48 31.97 222.01 32.03 228.54
32.05 235.07 31.86 241.6 31.75  248.13 31.96 261.19 32.11 267.72 32.61 274.25
32.75 280.78 32.77  293.84 32.38 300.37 32.25 306.9 31.91 313.43 31.44 319.96
30.7  326.49 30.6 333.02 30.46 339.55 31.22 346.08 31.76 352.61 31.38  359.14
30.77 365.67 30.52 372.19 30.44 378.72 30.34 385.25 30.28  391.78 30.43
398.31 30.35 404.84 30.16 411.37 30.36 417.9 30.27  424.43 29.96 430.96 29.86
437.49 29.46 444.02 29.18 450.55 28.86  457.08 28.57 463.61 28.17 470.14
27.92 476.67 27.82 483.2 27.48  489.73 27.41 496.26 27.21 502.79 26.92 509.32
26.52 515.85 25.75  522.38 24.73 528.91 24.22 535.44 24.42 541.97 24.6 548.5
24.61  555.03 24.56 561.56 24.39 568.09 24.24 574.62 23.87 581.15 23.59
587.68 23.98 594.21 24.13 600.74 24.2 607.27 24.04 613.8 23.74  620.33 23.49
626.85 23.48 633.38 23.51 639.91 23.34 646.44 23.28  652.97 23.39 659.5 23.41
666.03 23.21 672.56 23.37 679.09 23.59  685.62 23.5 692.15 23.47 698.68 23.51
705.21 23.66 711.74 23.72  718.27 23.7 724.8 23.62 731.33 23.34 737.86 21.74
744.39 21.04  750.92 20.97 757.45 20.98 763.98 21.18 770.51 20.86 776.95
20.86  825.49 22.31 861.79 12.44 870.96 6.32 895.86 -2.38 905.29 -.71  910.67
-.82 925.72 1.6 933.96 4.12 941.6 9.8 941.72 8.7  945.17 13.66 959.2 13.93
976.83 25.38 983.19 26.49 989.64 27.11  996.08 27.57 1002.53 28.14 1008.97
28.94 1015.5 29.47 1022.03 29.75  1028.56 30.21 1035.08 30.84 1041.61 31.45
1048.14 31.9 1054.66 32.39  1061.19 32.46 1067.72 32.68 1074.24 33.11 1080.77
33.34 1087.3 33.68  1093.82 33.94 1100.35 34.18 1106.88 34.21 1113.4 34.42
1119.93 34.99  1126.46 35.58 1139.51 36.63 1146.04 37 1159.09 37.67 1165.62
38.03  1172.15 38.51 1178.67 38.97 1185.2 39.22 1191.73 39.51 1198.25 40.09
1211.31 41.3 1217.83 41.97 1224.36 42.52 1230.89 43.16 1237.41 44  1243.94
44.55 1250.47 44.78 1256.99 45.13 1263.52 45.61 1270.05 46.37  1276.58 47.28
1283.1 48.12 1289.63 49.03 1296.16 50.22 1302.68 51.43  1309.21 51.88 1315.74
52.23 1322.26 53.01 1328.79 54.04 1335.32 54.97  1341.84 55.79 1348.37 56.57
1354.9 57.14 1361.42 57.47 1367.95 57.77  1374.48 57.96 1381.01 58.52 1387.53
59.13 1394.06 59.18 1400.59 59.55  1407.11 60.15 1413.64 60.65 1426.69 61.74
1433.22 62.04 1439.75 62.17  1446.27 62.44 1452.8 62.81 1459.33 63.29 1472.38
63.89 1478.91 64.21

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 825.49 .055 976.83 .09
```

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 825.49
976.83 1281.74 1292.52 1315.33 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 705.21 27 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 113455.2

INPUT
Description: 100
Station Elevation Data num= 300
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 66.1 6.53 65.77 19.59 65.58
32.65 65.02 39.18 64.87 58.77 63.09 65.3 62.83 78.36 62.6 84.89 62.37 91.42
61.96 104.48 61.87 117.54 62.03 124.07 62.25 137.13 62.44 143.66 62.73
150.19 62.7 156.72 62.48 163.25 62.66 169.78 63.37 176.31 63.88 182.84 64.17
189.37 64.2 202.43 63.22 208.96 62.95 222.02 61.89 228.55 61.56 241.61 61.37
248.14 61.47 261.2 61.39 267.74 61.61 280.8 61.64 287.33 61.38 293.86 61.35
300.39 61.46 326.51 60.81 333.04 60.44 339.57 60.24 352.63 60.32 359.16
60.25 365.69 59.98 378.75 59.02 411.4 55.06 417.93 54.49 430.99 54.29 437.52
53.82 444.05 53.71 450.58 53.4 457.11 52.8 463.64 53.23 470.17 53.23 476.7
53.67 483.23 54.38 489.76 54.95 502.82 55.52 515.88 55.92 535.47 55.41
548.53 54.53 555.06 54.28 568.12 53.37 574.65 52.61 581.18 51.1 587.71 49.97
600.77 46.72 607.3 45.36 626.89 40.82 639.95 38.5 659.54 36.99 666.07 36.39
685.66 33.7 692.19 33.46 718.31 33.14 750.96 31.53 764.02 31.26 770.55 30.8
777.08 30.58 790.14 29.74 803.2 29.9 816.26 29.61 822.8 29.65 829.33 29.88
888.1 29.17 894.63 28.96 933.81 29.47 940.34 29.68 946.87 29.72 966.46 30.42
972.99 30.54 986.05 30.33 992.6 30.03 999.15 29.26 1012.25 28.11 1018.81
27.19 1031.91 25.6 1038.46 25.2 1045.01 25.52 1051.56 26.63 1058.12 27.11
1071.22 28.32 1084.32 28.81 1103.98 28.12 1117.08 27.32 1123.63 26.8 1130.18
26.43 1149.84 26.21 1169.49 25.42 1182.6 24.15 1189.15 23.73 1202.25 21.99
1208.8 21.32 1228.46 20.53 1235.01 20.17 1241.56 19.49 1248.11 19.15 1254.66
19.17 1267.77 20.11 1280.87 19.65 1287.42 19 1298.64 18.47 1300.52 18.4
1307.07 18.08 1313.63 16.93 1320.18 15.26 1332 11.9 1350 8.1 1362 9.8 1380
17 1393 21.1 1405.35 19.22 1411.9 19.08 1418.45 19.15 1425 19.1 1431.55
19.83 1438.11 20.92 1444.66 21.73 1451.21 21.97 1457.76 22.04 1464.31 21.76
1470.86 21.24 1477.42 20.75 1483.97 20.57 1490.52 20.21 1497.07 19.82
1503.62 19.61 1510.17 19.21 1516.72 18.79 1523.28 18.35 1529.83 18.1 1536.38
18.03 1542.93 18.05 1549.48 18.01 1556.03 17.95 1562.59 17.98 1569.14 18.27
1575.69 18.98 1582.24 19.67 1588.79 20.66 1595.34 21.7 1608.45 22.09 1615
21.9 1621.55 21.88 1628.1 21.69 1634.65 21.54 1641.2 21.41 1647.76 21.17
1654.31 21.03 1660.86 20.62 1667.41 20.27 1673.96 19.48 1680.51 19.28
1687.06 19.3 1693.62 19.72 1700.17 19.85 1706.72 20.3 1713.27 20.89 1719.82
21.36 1726.37 21.49 1732.93 21.86 1739.48 22.32 1746.03 23.06 1752.58 23.9
1772.23 26.59 1778.79 27.3 1785.34 27.77 1791.89 28.42 1798.44 29.27 1804.99
29.78 1811.51 30.49 1818.03 31.4 1824.55 32.51 1831.08 33.39 1844.12 34.97
1850.64 35.64 1863.68 35.99 1870.2 36.1 1876.72 36.41 1883.24 36.7 1889.76
37.02 1896.28 37.28 1902.8 37.44 1909.32 37.43 1915.84 37.25 1922.36 37.15
1928.88 37.13 1935.4 37.07 1941.92 37.03 1948.44 36.96 1954.96 36.99 1961.49
37.04 1968.01 36.94 1974.53 36.69 1981.05 36.57 1987.57 36.24 1994.09 36.06
2007.13 35.97 2013.65 35.89 2020.17 35.74 2026.69 35.37 2033.21 35.17
2039.73 35.18 2046.25 35.26 2052.77 35.37 2059.29 35.34 2065.81 35.33

2072.33 35.4 2078.85 35.61 2085.38 35.64 2091.9 35.76 2098.42 35.82 2104.94 35.79 2111.46 36.08 2117.98 36.23 2131.02 36.56 2137.54 36.71 2144.06 36.83 2150.58 36.85 2157.1 36.96 2163.62 37.28 2170.14 37.35 2176.66 37.36 2183.18 37.34 2189.7 37.08 2196.23 36.71 2202.75 36.54 2209.27 36.22 2215.79 35.79 2222.31 35.61 2228.83 35.56 2235.35 35.69 2241.87 35.92 2248.39 35.98 2254.91 35.85 2261.43 35.77 2267.95 35.55 2274.47 35.55 2280.99 35.43 2294.03 35.02 2300.55 34.89 2307.07 34.78 2313.6 34.78 2320.12 34.82 2326.64 34.91 2333.16 35.29 2339.68 35.37 2346.2 35.31 2352.72 35.05 2359.24 34.76 2365.76 34.44 2372.28 34.06 2378.8 33.6 2385.32 33.24 2391.84 33.22 2398.36 33.27 2404.88 33.14 2411.4 33.12 2417.92 33.3 2424.45 33.38 2430.97 33.48 2437.49 33.51 2444.01 33.31 2457.05 33.46 2463.57 33.51 2470.09 33.49 2476.61 33.36 2483.13 33.3 2489.65 33.3 2496.17 33.38 2502.69 33.34 2509.21 33.27 2515.73 33.31 2522.25 33.19 2528.77 33.25 2535.29 33.41 2541.82 33.32 2554.86 33.24 2561.38 33.24 2567.9 33.32 2574.42 33.42 2580.94 33.5 2587.46 33.41 2593.98 33.39

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .095 1267.77 .055 1393 .095

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1267.77 1393 1492.91 1457.13 1422.7 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 1084.32 28.81 F

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 111998.1

INPUT
Description: 99 US Winnetuxet Riv Trib
Station Elevation Data num= 405
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 41.4 6.55 40.99 19.66 39.95 26.21 39.55 39.32 39.36 45.87 39.08 52.42 38.57 58.98 38.4 65.53 37.9 72.08 38.16 78.63 38 85.19 38.73 104.85 38.39 111.4 38.52 117.95 38.42 124.5 38.17 131.06 37.43 137.61 37.2 144.16 37.62 150.72 37.32 157.27 36.85 163.82 37.21 176.93 36.36 183.48 36.07 190.03 36.23 196.59 35.98 203.14 35.87 216.24 36.74 222.8 36.66 229.35 36.44 235.9 35.73 242.46 35.39 262.11 35.63 268.67 35.81 288.33 35.9 301.43 35.34 307.98 34.89 314.54 34.75 321.09 35.01 327.64 35.5 340.75 35.22 347.3 34.61 353.85 34.66 366.96 35.15 373.51 34.72 380.06 34.57 393.17 34.55 399.72 35.06 406.28 35.39 412.83 35.4 419.38 35.61 432.49 35.22 439.04 35.43 445.59 35.29 452.15 35.38 458.7 35.31 478.36 35.84 491.46 35.9 498.02 36.03 511.12 35.68 517.67 36.09 537.33 36.44 543.89 36.27 556.99 36.7 570.1 36.74 589.76 37.11 596.31 37.09 602.86 36.87 615.97 36.05 622.52 35.74 642.18 35.19 648.73 35.28 668.39 35.1 681.5 35.2 733.92 33.98 773.23 32.79 779.79 32.51 832.21 31.48 845.32 31.37 858.42 31.08 884.63 31.01 891.19 30.86 930.5 30.85 956.71 31.11 989.48 30.93 1009.14 31.26 1028.8 31.31 1068.11 30.73 1087.77 30.74 1100.88 30.54 1113.98 30.83 1146.75 30.91 1179.51 30.55 1225.38 29.77 1238.49 29.29 1245.04 29.19 1251.59 29.23 1264.7 28.77 1284.36 29.13 1317.12 30.3 1336.78 30.75 1343.33 30.68 1382.65 31 1454.73 30.57 1461.29 30.64 1474.39 30.55 1480.94 30.66 1487.5 30.5 1500.6 30.63 1533.37 30.41 1566.13 30.69 1572.68 30.52 1631.66 30.37 1644.77

30.51 1684.08 30.63 1690.64 30.46 1710.3 30.73 1723.4 30.72 1762.72 31.31
1802.04 31.49 1828.25 30.81 1880.67 30.23 1893.78 30.18 1919.99 29.69
1933.09 29.6 1952.75 29.11 1972.41 28.9 2070.7 29.12 2090.36 29.01 2103.47
28.77 2116.57 28.88 2129.68 28.61 2169 28.42 2175.55 28.29 2182.1 28.37
2221.42 27.93 2227.97 27.71 2267.29 27.41 2280.4 26.75 2293.5 26.35 2300.06
26.26 2326.27 25.06 2352.48 24.97 2378.69 24.47 2418.01 22.57 2483.54 20.35
2503.2 19.39 2516.3 19.53 2522.85 19.48 2529.41 19.69 2555.62 18.99 2562.17
19.13 2575.28 19.88 2581.83 19.65 2588.38 19.11 2588.86 19.09 2594.94 18.78
2601.49 19.07 2608.04 19.24 2614.6 18.58 2621.15 18.44 2627.7 18.18 2634.25
17.69 2640.81 17.32 2663 17.2 2673 11.7 2690 8.7 2700 10.5 2705 19.1 2711
22.6 2719.44 22.11 2725.99 21.88 2739.1 21.19 2745.65 21.4 2752.21 21.81
2765.31 22.07 2771.86 22.17 2778.42 22.09 2784.97 21.8 2791.52 21.78 2798.08
21.84 2804.63 21.86 2811.18 21.75 2824.29 21.42 2830.84 21.28 2837.39 21.25
2843.95 21.24 2850.5 21.14 2857.05 20.95 2863.61 20.78 2870.16 20.86 2876.71
20.8 2883.26 20.78 2889.82 20.61 2902.92 20.63 2909.48 20.66 2916.03 20.81
2922.58 21.08 2929.13 21.63 2935.69 22.94 2942.24 26.19 2948.79 29.42
2955.35 30.16 2961.9 30.35 2968.45 30.33 2975.01 29.68 2981.56 29.56 2988.11
29.55 2994.66 29.49 3007.77 29.5 3014.32 29.36 3020.88 29.25 3027.43 29.26
3047.09 29.48 3053.64 29.19 3060.19 29.06 3066.75 29.31 3073.3 29.48 3079.85
29.32 3086.4 29.3 3092.96 29.24 3099.51 29.2 3106.06 29.32 3112.62 29.39
3119.17 29.43 3125.72 29.4 3132.27 29.41 3138.83 29.5 3145.38 29.57 3151.93
29.54 3158.49 29.62 3171.59 29.53 3178.15 29.59 3184.7 29.48 3191.25 29.3
3197.8 29.17 3204.36 29.17 3210.91 29.32 3217.46 29.39 3223.99 29.38 3243.59
29.3 3256.65 29.18 3263.18 29.13 3269.72 29.11 3276.25 29.14 3282.78 29.19
3315.44 29.33 3361.16 29.61 3374.22 29.71 3380.75 29.74 3387.28 29.73
3400.35 29.66 3406.88 29.6 3413.41 29.6 3426.47 29.79 3433.01 29.86 3439.54
30.24 3446.07 30.73 3452.6 30.88 3459.13 30.87 3465.66 30.92 3472.2 30.82
3478.73 30.14 3485.26 29.16 3491.79 27.68 3498.32 27.39 3504.85 27.42
3517.92 27.45 3524.45 27.45 3537.51 27.39 3570.17 27.28 3583.23 27.3 3589.76
27.35 3596.3 27.71 3602.83 28.25 3609.36 28.94 3615.89 30.27 3622.42 30.98
3628.95 31.05 3635.49 31.14 3642.02 31.16 3655.08 30.79 3661.61 30.96
3668.14 31.23 3674.67 31.26 3687.74 31.14 3694.27 31.15 3707.33 31.08
3713.86 30.85 3720.4 29.03 3726.93 28.83 3733.46 28.96 3739.99 29.05 3746.52
29.12 3753.05 29.11 3759.59 29.14 3766.12 29.22 3772.65 29.2 3779.18 29.13
3785.71 29.14 3792.24 29.18 3805.31 29.35 3811.84 29.37 3818.37 29.41 3824.9
29.38 3831.43 29.37 3837.96 29.46 3844.5 29.49 3851.03 29.41 3857.56 29.27
3864.09 29.24 3870.62 29.26 3877.15 29.3 3883.69 29.18 3890.22 29.24 3896.75
29.26 3903.28 29.24 3909.81 29.15 3916.34 29.15 3922.88 29.18 3929.41 29.25
3935.94 29.24 3942.47 29.2 3949 29.19 3962.07 29.46 3968.6 30 3975.13 30.57
3981.66 30.73 3994.72 31.02 4001.25 30.99 4007.79 31.01 4014.32 31.1 4020.85
31.06 4027.38 31.22 4033.91 31.28 4040.44 31.07 4046.98 31.06 4053.51 30.89
4060.04 30.97 4066.57 31.2 4073.1 31.06 4079.63 31.04 4086.17 30.8 4092.7
31.11 4099.23 31.15 4105.76 31.23 4112.29 31.24 4118.82 31.33 4125.35 31.37
4131.89 31.55 4138.42 31.6 4144.95 31.57 4151.48 31.52 4158.01 31.5 4164.54
31.58 4171.07 31.61 4177.61 31.61 4184.14 31.56 4190.67 31.55 4197.2 31.49
4203.73 31.54 4210.26 31.44 4216.79 31.56 4223.33 31.65 4229.86 31.51
4236.39 31.58 4242.92 31.6 4249.45 31.56 4255.98 31.63 4262.52 31.94 4269.05
31.81 4275.58 31.73 4282.11 31.69 4288.64 31.72 4301.7 31.7 4308.24 31.82
4314.77 31.82 4321.3 31.86 4327.83 31.97 4334.36 31.94 4340.89 31.8 4347.42
31.81 4353.96 31.79 4360.49 31.79 4367.02 31.75 4373.55 31.92 4380.08 32.02
4386.61 32.05 4393.14 32.11 4399.68 32.25 4406.21 32.26 4412.74 32.33
4419.27 32.16 4425.8 32.26 4432.33 32.33 4438.86 32.28 4445.4 32.27 4451.93
32.22 4464.99 32.29 4471.52 32.23 4478.05 32.07 4484.58 32.11 4491.12 32.36
4497.65 32.48 4504.18 32.37

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .082 2418.01 .055 2711 .095

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2418.01 2711 2057.48 2006.07 1966.74 .3 .5 Blocked Obstructions num= 1
Sta L Sta R Elev
2970.3 3664.9931.11488

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 109992

INPUT
Description: 98 DS Winnetuxet Riv Trib
Station Elevation Data num= 421
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 29.41 6.54 28.94 13.08 28.66 19.62 28.91 26.16 28.9 32.69 28.7 39.23 28.93 52.31 28.97 71.93 29.49 78.47 29.23 91.54 28.98 130.78 29.06 156.93 29.81 176.55 29.64 183.09 29.68 196.16 29.56 202.7 29.75 215.78 29.54 228.86 29.74 235.4 29.55 241.94 29.55 255.01 29.81 268.09 29.78 281.17 30.16 294.25 30.62 300.79 30.6 307.32 30.88 320.4 31.64 326.94 31.92 333.48 31.98 340.02 31.86 372.71 32.08 379.25 32.03 405.41 31.62 418.48 31.95 425.02 32.3 431.56 32.01 438.1 32.13 451.18 31.82 464.26 31.86 470.79 32.17 477.33 32.32 496.95 31.93 503.49 32.11 510.03 32.49 516.57 33.13 536.18 34.05 542.72 34.21 549.26 34.09 555.8 34.17 568.88 34.61 581.95 34.88 588.49 34.78 601.57 34.23 608.11 34.06 621.19 33.06 640.8 32.19 660.42 31.9 666.96 31.68 680.04 31.7 693.11 31.84 699.65 31.77 712.73 32.17 725.81 32.28 732.35 32.45 745.42 32.36 758.5 32.1 771.58 32.36 784.66 32.19 797.73 32.39 804.27 32.39 817.35 32.04 830.43 31.99 843.51 32.11 850.05 32.03 856.58 32.13 863.12 31.97 876.2 32.31 882.74 31.87 889.28 31.78 895.82 32.16 902.36 32.35 908.89 32.09 921.97 32.09 935.05 32.34 941.59 32.6 961.21 31.9 967.74 32.12 974.28 32.17 980.82 32.59 993.9 32.3 1006.98 32.37 1013.52 32.2 1026.59 32.2 1039.67 32.35 1046.21 32.11 1065.83 32.39 1078.9 32.16 1091.98 32.31 1105.06 32.11 1118.14 32.27 1124.68 32.53 1131.21 32.36 1137.75 32.35 1150.83 32.73 1170.45 32.8 1190.06 32.51 1196.6 32.56 1203.14 32.83 1222.76 32.76 1242.38 32.39 1248.91 32.11 1268.53 32.18 1281.61 32.4 1288.15 32.37 1294.69 32.56 1301.22 32.45 1307.76 32.12 1314.3 32 1320.84 32.3 1327.38 32.74 1333.92 32.94 1340.46 32.63 1353.54 32.61 1360.07 32.3 1366.61 33.07 1373.15 33.3 1386.23 34.83 1399.31 35.22 1412.39 35.06 1418.92 34.75 1438.54 34.28 1464.7 34.29 1484.31 34.79 1490.85 34.84 1503.93 34.59 1517.03 34.03 1530.14 34.15 1543.26 33.43 1556.38 33.28 1562.94 33.03 1569.5 32.97 1576.06 32.71 1589.17 32.4 1608.85 31.33 1615.41 30.81 1621.97 30.13 1628.53 29.18 1641.65 27.74 1654.76 25.98 1661.32 25.66 1700.68 23.09 1713.79 22.55 1720.35 22.04 1740.03 21.57 1753.15 21.74 1759.71 22.15 1785.94 22.89 1792.5 23.26 1805.62 24.32 1812.18 24.22 1818.74 24.31 1831.85 24.21 1844.97 23.66 1858.09 22.78 1884.33 22.44 1897.44 21.69 1910.56 20.39 1917.12 19.98 1923.68 20.02 1936.8 19.42 1943.36 19.44 1956.47 19.76 1963.03 19.47 1969.59 19.62 1982.71 20.31 1995.83 20.59 2008.94 20.99 2015.5 21.04 2022.06 20.91 2048.3 21.16 2054.86 20.69 2067.97 20.68 2074.53 20.81 2087.65 20.82 2100.77 21.08 2106.99 20.98 2108 21.1 2118 13 2135 8.5 2150 8.5 2165 8.3 2182 13 2196.87 18.41 2199.15 18.47 2212.27 17.96 2225.39 16.71 2231.95 17.11 2238.51 17.18 2251.62 16.35 2258.18 16.46 2284.42 16.32

2290.98 16.88 2304.1 19.26 2310.65 19.9 2330.33 20.19 2336.89 20.08 2343.45 19.75 2350.01 19.13 2356.57 18.31 2363.13 17.68 2369.69 17.26 2376.24 17.54 2382.8 17.96 2389.36 18.55 2395.92 18.26 2415.6 16.93 2428.72 16.14 2435.27 15.54 2441.83 15.15 2448.39 15.33 2454.95 15.35 2461.51 15.61 2474.63 16.76 2481.19 17.2 2487.75 16.73 2494.3 15.38 2500.86 14.85 2507.42 14.99 2513.98 15.49 2520.54 15.82 2533.66 15.62 2540.22 15.27 2553.33 15.13 2559.89 15.27 2566.45 15.25 2573.01 15.49 2579.57 16.55 2586.13 18.32 2592.69 19.75 2605.81 19.7 2625.48 20.14 2632.04 20.45 2664.84 20.23 2684.51 19.91 2697.63 19.39 2704.19 18.88 2717.31 18.13 2723.87 17.89 2736.98 17.93 2750.1 17.85 2763.22 18.21 2776.34 18.66 2789.46 20.02 2809.13 21.59 2822.25 22.45 2835.37 23.46 2848.49 23.86 2887.84 23.43 2920.63 23.73 2927.19 23.7 2940.31 23.06 2966.55 21.35 2979.66 20.91 2992.78 20.81 2999.34 20.62 3005.9 20.68 3012.46 20.6 3025.58 21.11 3045.25 20.88 3051.81 21.01 3058.37 21.39 3064.93 21.23 3071.49 20.79 3078.05 20.61 3091.17 21.1 3097.73 20.9 3110.84 20.95 3123.96 20.81 3130.52 21.17 3137.08 21.17 3143.64 21.35 3150.2 21.17 3163.31 21.26 3169.87 21.45 3176.43 22.05 3189.55 22.89 3196.11 23.41 3202.67 23.67 3209.23 23.54 3215.79 22.61 3222.34 22.22 3228.9 22.46 3235.46 24.1 3242.02 24.92 3255.14 27.09 3261.7 27.93 3274.82 28.31 3281.38 28.31 3301.05 27.84 3320.73 27.58 3340.41 26.91 3346.96 26.46 3353.52 26.16 3366.64 25.86 3379.76 26.26 3386.32 26.86 3399.44 27.59 3419.11 28.37 3438.79 28.06 3445.35 27.76 3458.47 27.74 3465.03 27.63 3478.14 27.7 3484.7 27.59 3517.5 28.81 3543.73 29.22 3550.29 29.23 3563.41 28.65 3576.53 27.32 3602.76 26.28 3622.44 25.84 3648.67 26.05 3661.79 26.05 3674.91 25.88 3688.03 25.99 3694.59 25.91 3701.15 26.01 3714.26 27.47 3720.82 27.92 3727.38 28.15 3733.94 28.56 3747.06 28.94 3753.62 28.93 3766.74 29.29 3773.29 29.01 3779.85 28.4 3786.41 28.22 3799.53 27.66 3812.65 27.44 3819.21 27.16 3825.77 27.52 3838.88 27.53 3845.44 27.68 3871.68 27.68 3884.8 27.44 3897.91 27.43 3904.47 27.73 3917.59 27.49 3924.15 27.59 3943.83 27.56 3950.39 27.78 3963.5 27.69 3970.06 27.82 3976.62 28.43 3989.74 29.08 4009.42 29.62 4022.53 29.39 4029.09 29.59 4035.65 29.59 4048.77 29.03 4055.33 28.9 4061.89 29.17 4075 29.16 4088.12 29.34 4094.68 29.03 4107.8 28.77 4120.92 28.82 4127.48 29.21 4134.03 29.28 4140.59 29.17 4160.27 29.48 4173.39 29.9 4199.62 30.01 4206.18 30.15 4212.74 30.15 4219.3 29.76 4232.42 29.5 4238.97 29.57 4252.09 30.41 4258.65 30.54 4278.33 30.63 4284.89 30.87 4291.44 30.96 4304.56 31.4 4317.68 31.62 4330.8 32.08 4337.36 31.98 4343.91 31.67 4357.03 31.54 4363.59 31.34 4370.15 31.29 4383.27 30.75 4389.83 30.18 4396.38 30.05 4409.5 30.47 4429.18 30.71 4442.3 30.44 4475.09 30.58 4501.32 30 4521 30.02 4527.56 29.83 4534.12 29.97 4560.35 30.07 4573.47 30.42 4580.03 30.24 4606.27 30.99 4612.82 31.26 4625.94 31.54 4639.06 32 4665.29 31.31 4684.97 31.43 4698.09 31.9 4704.65 31.95 4724.32 31.33 4730.88 31.39 4750.56 30.98 4776.79 31.1 4803.03 30.89 4816.15 30.87 4822.7 31

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val 0 .09 2106.99 .055 2330.33 .095

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2106.99 2330.33 808.34 781.04 811.8 .3 .5 Ineffective Flow num= 3
 Sta L Sta R Elev Permanent
 1620 1812 23.6 F
 2940 3300 23.6 F
 3320 5000 27.6 F

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 109211

INPUT
Description: 97
Station Elevation Data num= 427
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 30.43 13.12 29.3 19.68 29.09
26.23 29.04 45.91 29.18 52.47 29.12 78.7 29.73 85.26 29.71 91.82 30 98.38
30.52 111.5 31.06 124.62 31.07 137.73 31.67 144.29 31.79 150.85 31.65
157.41 31.79 163.97 31.55 170.53 31.52 183.64 31.03 190.2 30.89 196.76 30.56
203.32 30.03 216.44 29.8 249.23 29.85 255.79 29.94 268.91 29.87 275.47 30.02
295.14 29.86 314.82 30.16 321.38 29.93 334.5 29.9 341.05 30 373.85 29.8
400.08 30.1 413.2 29.95 419.76 30.66 426.32 30.48 432.88 30.89 439.44 30.98
459.11 30.91 465.67 31.06 472.23 31.02 485.35 31.2 491.91 31.04 498.47 31.06
505.02 30.86 518.14 31.14 531.26 31.07 544.38 30.72 557.49 30.99 564.05 31.3
570.61 32.37 577.17 33.84 583.73 34.98 590.29 35.36 616.52 35.66 629.64
35.45 636.2 35.24 649.32 34.43 655.88 33.69 675.55 34.39 682.11 35.11 695.23
35.23 708.35 36.27 714.9 37.52 721.46 37.55 728.02 36.46 734.58 35.51 741.14
34.98 747.7 34.62 760.82 34.05 767.37 33.93 773.93 33.99 780.49 33.85 787.05
33.28 793.61 32.88 806.73 33.18 832.96 34.02 846.08 34.68 852.64 35.17
865.76 35.12 872.31 36.15 878.87 35.42 885.43 34.48 891.99 32.83 898.55
32.17 905.11 32.14 911.67 32.81 918.23 33.66 924.78 35.3 937.9 35.47 944.46
35.79 951.02 35.87 957.58 35.65 964.14 35.27 977.25 34.07 983.81 34 996.93
34.09 1003.49 34.24 1010.05 34.18 1036.28 33.02 1049.4 33.05 1055.96 33.43
1062.52 34.21 1075.64 33.86 1082.19 33.94 1088.75 31.7 1095.31 32.07 1101.87
33.11 1108.43 32.65 1114.99 31.34 1121.55 29.12 1128.1 28.38 1134.66 28.05
1908.59 28.05 1915.15 28.43 1928.27 29.95 1934.82 30.18 1941.38 30.03 1954.5
29.22 1967.62 28.87 1980.74 28.82 1987.29 28.68 1993.85 28.68 2006.97 28.37
2013.53 28.37 2020.09 28.08 2026.65 27.18 2033.21 26.6 2039.76 26.18 2052.88
26.1 2059.44 25.87 2072.56 24.96 2085.67 24.24 2098.79 23.91 2105.35 23.86
2118.47 23.23 2138.14 22.61 2151.26 22.12 2157.82 22 2184.06 20.61 2190.61
20.05 2203.73 19.47 2210.29 18.97 2216.85 18.71 2236.53 18.44 2243.08 18.12
2249.64 18.22 2262.76 17.84 2269.32 17.86 2275.88 17.63 2302.11 17.78
2308.67 17.94 2321.79 17.94 2334.91 18.18 2341.46 18.46 2348.02 18.97
2361.14 19.02 2393.93 19.75 2407.05 19.75 2433.29 20.34 2439.84 20.19 2446.4
19.86 2452.96 18.93 2459.52 18.57 2472.64 18.35 2485.76 17.9 2492.31 17.89
2518.55 18.39 2525.11 18.36 2531.67 17.88 2538.23 17.22 2544.78 16.81 2557.9
15.71 2564.46 15.47 2584.14 15.35 2597.25 15.38 2603.81 15.66 2610.37 16.57
2616.93 17.28 2630.05 17.94 2636.61 18.15 2643.16 18.63 2656.28 18.96
2662.84 18.97 2675.88 19.78 2682.35 19.87 2688.83 19.69 2695.31 19.7 2701.79
19.51 2714.74 19.73 2721.22 19.63 2747.13 19.99 2760.08 20.35 2766.56 19.34
2773.04 16.63 2779.4 14.42 2779.52 14.38 2798 13 2815 8.5 2830 8.5 2845 8.3
2862 13 2870.2 14.38 2876.68 14.39 2883.15 14.79 2889.63 16.64 2892.35 16.57
2896.11 16.47 2902.59 16.43 2909.06 16.76 2915.54 17.96 2922.02 19.61 2928.5
20.43 2941.45 22.43 2947.93 22.85 2954.41 22.62 2967.36 22.78 2980.32 23.18
2993.27 23.27 2999.75 23.49 3019.18 23.49 3025.66 23.33 3038.61 22.64
3051.57 22.35 3064.52 22.72 3071 22.71 3077.48 22.88 3090.43 23.61 3096.91
23.71 3103.39 24.1 3122.82 24.73 3148.97 25.74 3168.58 25.88 3181.65 25.71
3194.73 25.86 3214.34 26.39 3227.41 26.34 3253.56 26.61 3273.17 26.45
3279.71 26.68 3286.24 26.77 3292.78 26.69 3299.32 26.33 3325.46 25.56
3338.54 25.66 3351.61 25.53 3364.69 25.2 3371.22 25.26 3377.76 25.15 3384.3
24.74 3397.37 25.03 3416.98 26.06 3423.52 26.16 3436.59 26.59 3443.13 27.03
3449.67 27.33 3469.28 27.05 3475.81 27.13 3495.42 26.44 3515.03 25.29
3521.57 24.7 3534.65 24.69 3541.18 24.44 3547.72 24.37 3554.26 23.97 3560.79

23.71 3567.33 23.98 3573.87 24.08 3586.94 23.75 3593.48 23.97 3600.01 24.05
3613.09 25.28 3619.63 25.7 3632.7 27.17 3639.24 27.46 3652.31 28.28 3658.85
28.31 3684.99 27.37 3704.6 26.91 3724.22 25.93 3730.75 25.86 3737.29 25.94
3743.83 26.21 3756.9 26.38 3763.44 26.14 3769.97 26.09 3789.58 25.13 3802.66
24.66 3809.2 24.28 3815.73 24.24 3822.27 24.54 3828.81 25.12 3835.34 25.87
3841.88 26.49 3854.95 28.12 3861.49 29.06 3868.03 29.73 3881.1 30.55 3887.64
30.82 3900.71 30.73 3913.79 31 3926.86 30.4 3933.4 29.5 3939.93 28.41
3946.47 27.77 3953.01 27.29 3959.54 27.01 3972.62 27.05 3979.16 26.89
3992.23 25.87 3998.77 25.26 4011.84 24.99 4024.91 25.18 4031.45 25.12
4044.52 25.24 4051.06 25.07 4070.67 25.08 4077.21 25.21 4090.28 24.96
4103.36 25.58 4109.89 25.75 4122.97 26.56 4129.5 27.21 4136.04 27.39 4162.19
28.36 4168.72 28.31 4175.26 28.01 4181.8 27.9 4188.33 27.64 4201.41 27.69
4214.48 28.08 4221.02 28.17 4227.55 28.02 4247.16 26.36 4253.7 25.95 4266.77
25.66 4273.31 25.37 4286.39 25.21 4292.92 24.94 4306 24.95 4319.07 25.2
4325.61 25.2 4332.14 25.43 4345.22 25.54 4351.75 25.73 4358.29 26.19 4364.83
26.34 4371.36 26.9 4390.97 27.93 4404.05 28.5 4423.66 30.52 4430.19 30.98
4443.27 31.17 4462.88 30.99 4482.49 30.33 4489.02 29.91 4495.56 29.78 4502.1
29.15 4508.64 29.08 4515.17 29.18 4521.71 28.99 4528.25 28.95 4541.32 29.89
4547.86 29.81 4560.95 30.41 4567.5 30.46 4587.17 31.15 4593.73 31.26 4606.84
31.01 4613.4 30.78 4633.06 30.6 4639.62 30.69 4659.29 30.33 4672.4 30.78
4685.51 30.79 4692.07 30.45 4698.62 30.31 4718.29 30.73 4724.85 30.64
4737.96 30.18 4744.51 30.14 4764.18 29.53 4770.74 29.22 4777.29 29.24
4783.85 29.4 4790.4 29.37 4803.52 29.03 4816.63 29.27 4862.52 29.18 4869.08
29.27 4888.74 28.97 4895.3 29.15 4908.41 29.1 4921.52 29.4 4934.63 29.29
4947.75 29.59 4960.86 29.5 4967.41 29.11 5006.75 29.57 5019.86 30.08 5032.97
30.36 5046.08 30.28 5052.64 30.59 5059.2 30.68 5065.75 30.52 5072.31 30.52
5078.86 30.28 5085.42 30.19 5118.2 30.85 5137.87 30.96 5144.42 31.09 5150.98
31.04 5157.53 31.46 5170.65 31.81 5216.54 31.67 5223.09 31.37 5229.65 30.7
5236.21 31.16 5242.76 31.3 5255.87 31.03 5275.54 31.49 5288.65 31.2 5295.21
31.22 5301.76 31.47 5327.99 31.89 5341.1 31.96

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .095 2760.08 .055 2999.75 .095

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2760.08
2999.75 1561.57 1566.81 1580.91 .3 .5 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 3292 3660 26.5 F
 3660 4400 27.5 F

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 107644.2

INPUT
Description: 96
Station Elevation Data num= 189
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 38.96 150.66 38.83 157.21
40.75 163.76 46.07 170.31 45.71 176.86 43.74 189.96 38.52 196.51 37.83
222.71 38.16 327.52 36.31 340.62 35.67 419.22 33.81 432.32 33.92 445.42
32.27 451.98 31.91 458.53 32.13 471.63 30.52 478.18 30.25 484.73 30.81

497.83 32.89 517.48 34.25 530.58 34.38 543.68 33.57 556.78 34.26 589.53
34.48 602.63 34.25 615.73 36.27 635.39 36.05 648.49 36.83 661.59 36.78
674.69 35.37 681.24 34.21 700.89 32.37 707.44 32.35 727.09 33.62 753.29
33.48 766.39 34.68 812.24 34.74 818.79 34.39 825.34 33.62 831.9 34.07 838.45
33.66 845 34.18 851.55 33.52 858.1 31.56 864.65 30.24 871.2 29.95 877.75
30.63 890.85 33.08 903.95 33.41 917.05 34.14 969.45 33.79 989.1 32.96
1021.86 31.92 1041.51 30.47 1048.06 30.4 1054.61 30.83 1074.26 32.82 1093.91
33.45 1231.47 32.21 1238.02 30.93 1244.57 29.21 1251.12 28.83 1270.77 30.67
1303.52 30.34 1323.17 29.09 1355.93 29 1369.03 29.56 1375.58 29.11 1382.13
28.1 1388.68 27.93 1401.78 28.98 1421.43 28.03 1447.63 25.98 1526.24 24.75
1558.99 25.64 1565.54 25.1 1572.09 23.11 1578.64 19.98 1606.31 17.4 1615.81
11.2 1632.01 6.34 1643.89 5.4 1661.42 4.74 1682.29 10.77 1690 17.52 1722.75
18.75 1755.49 17.06 1768.58 16.1 1775.12 15.29 1807.84 15.36 1814.38 15.11
1820.93 15.39 1827.47 16.24 1840.56 16.99 1860.19 16.52 1866.73 17.03
1873.27 17.1 1899.45 15.53 1905.99 15.4 1919.08 16.35 1945.25 20.02 1951.79
21.4 1958.34 22.11 1984.51 20.63 2233.16 19.08 2265.87 19.55 2344.39 21.51
2547.24 21.96 2612.67 21.9 2625.76 22.52 2632.3 22.46 2651.93 20.72 2684.65
20.23 2704.28 20.85 2717.37 22.01 2743.54 22.29 2776.26 23.36 2789.34 23.3
2808.97 22.22 2867.86 23.21 2913.67 23.3 2920.21 22.86 2926.75 23.19 2939.84
22.48 2966.01 22.61 2985.64 22.01 3005.27 22.41 3018.36 21.96 3051.08 21.96
3090.34 21.94 3123.05 21.39 3129.6 20.82 3142.68 21.55 3168.86 21.09 3201.57
21.66 3208.12 21.36 3240.83 22.68 3299.72 23.29 3312.81 22.37 3319.35 22.5
3378.24 25.42 3410.96 26.28 3450.22 25.05 3456.77 24.56 3489.48 24.9 3496.03
25.34 3535.29 24.79 3548.37 24.23 3581.09 24.18 3587.63 24.53 3607.26 27.01
3613.81 27.34 3659.61 27.46 3679.27 28.22 3705.5 30.12 3797.31 31.61 3830.1
30.94 3836.66 30.51 3876.01 30.89 3882.57 30.69 3889.12 31.16 3974.38 31.85
4007.17 31.74 4020.29 31.95 4033.4 31.31 4138.33 32.05 4177.68 30.52 4223.58
30.73 4236.7 31.16 4243.26 30.78 4262.93 31.05 4276.05 30.06 4348.18 29.33
4387.53 29.78 4400.65 29.25 4413.76 29.75 4420.32 29.41 4426.88 29.82
4479.34 29.77 4492.46 29.34 4518.69 29.68 4551.48 30.42 4636.73 29.64
4676.08 29.9 4689.19 31.04 4735.1 31.5 4767.89 30.87 4833.47 30.88

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .095 1558.99 .055 1722.75 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1558.99
1722.75 65.61 65.84 69.27 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent 2470 3160 28.4 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 107578.3

INPUT
Description: 95 Auburn St constriction
Station Elevation Data num= 387
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 39.5 111.55 39.2 118.11
39.04 124.67 39.29 137.79 45.34 144.35 46.35 150.92 45.23 157.48 42.9 164.04
38.9 170.6 38.21 183.72 38.41 203.41 38.09 216.53 38.12 229.65 37.85 236.22
37.57 242.78 37.65 249.34 37.54 255.9 37.12 275.59 36.44 282.15 36.12
295.27 36.26 301.83 36.19 308.39 36.34 314.95 36.16 341.2 35.83 360.89 35.07

380.57 34.56 387.13 34.28 393.69 34.36 400.26 34.14 406.82 34.22 413.38
33.84 419.94 32.15 426.5 31.54 433.06 32.46 439.62 34.35 446.19 35.21 452.75
35.56 459.31 35.62 465.87 35.97 478.99 36.27 492.12 36.27 498.68 36.52
505.24 36.31 511.8 35.89 524.92 34.35 538.05 33.21 557.73 33.23 570.86 32.79
590.54 32.86 603.66 32.62 629.91 32.56 636.47 32.8 643.03 32.6 649.59 32.83
682.4 33.22 695.52 33.74 708.65 34.66 715.21 35.64 728.33 35.86 734.89 35.85
748.02 35.67 761.14 35.79 774.26 35.34 780.82 34.87 787.39 34.15 800.51
33.11 813.63 32.69 826.76 33.13 833.32 33.11 846.44 33.51 859.56 33.38
866.12 32.69 872.69 31.63 879.25 31.22 885.81 31.25 892.37 31.71 912.06
34.17 925.18 35.18 931.74 35.45 957.99 35.44 964.55 35.31 977.67 34.73
990.79 33.41 997.36 32.88 1003.92 32.53 1017.04 32.42 1043.29 32.67 1049.85
32.62 1056.41 32.95 1089.22 33.08 1108.9 33.44 1122.03 33.44 1128.59 33.07
1148.27 32.25 1174.52 31.82 1181.08 31.61 1187.64 31 1194.2 29.88 1200.76
29.64 1207.33 32.39 1213.89 33.11 1220.45 32.83 1227.01 32.08 1233.57 31.57
1240.13 31.2 1246.69 31.01 1266.38 30.84 1286.06 30.43 1292.63 29.98 1299.19
29.16 1305.75 27.64 1312.31 26.81 1318.87 26.53 1331.99 26.42 1351.68 25.85
1358.24 26 1364.8 26.71 1371.36 27.72 1377.93 28.26 1384.49 29.05 1391.05
29.1 1397.61 28.78 1404.17 28.61 1410.73 28.28 1423.86 27.09 1430.42 26.63
1436.98 26.92 1443.54 27.35 1456.66 28.71 1469.79 27.25 1482.91 24.34
1489.47 23.36 1496.03 23.45 1502.6 22.51 1509.16 21.27 1515.72 20.32 1522.28
20.5 1535.4 20 1541.96 20.19 1554.26 21.15 1575 21.91 1575.07 17.99 1593.13
10.66 1597.06 10.7 1602.01 8.81 1610.59 8.17 1614.02 8.4 1617.69 10.55
1618.84 11.16 1622.71 11.59 1625.58 11.88 1628.69 11.77 1630.73 11.6 1630.96
16.68 1637.19 17.87 1638.51 21.56 1656.08 23.92 1666.63 24.1 1673.2 24.07
1679.76 24.2 1692.88 24.17 1699.44 24.4 1706 24.33 1712.57 24.43 1725.69
24.19 1758.5 24.22 1765.05 23.95 1771.59 24.16 1778.14 24.2 1784.69 24.08
1797.79 24.2 1804.34 23.78 1810.89 23.75 1817.44 23.39 1823.99 22.79 1830.54
22.41 1837.08 22.7 1843.63 23.27 1850.18 21.7 1856.73 21.04 1863.28 21.12
1869.83 20.83 1876.38 20.72 1882.93 20.14 1889.48 19.7 1896.03 18.83 1902.58
19.08 1909.12 19.69 1915.67 20.9 1922.22 21.46 1941.87 21.45 1954.97 21.1
1968.07 20.93 1981.16 20.9 2013.91 21.2 2040.11 20.9 2072.85 19.73 2079.4
19.37 2092.5 19.12 2112.15 19.22 2131.79 19.75 2157.99 19.75 2184.18 19.45
2203.83 19.51 2223.48 20.01 2262.77 20.95 2275.87 21.15 2321.71 22.23
2347.91 22.32 2374.11 22.63 2387.2 23 2393.75 22.92 2400.3 23.1 2433.05
24.91 2439.6 25.39 2446.15 25.73 2459.24 26.84 2472.34 27.38 2491.99 27.61
2524.73 27.06 2544.38 26.64 2577.13 26.52 2609.87 25.57 2622.97 25.58
2642.62 25.79 2649.16 25.42 2688.46 25.25 2695.01 25.1 2708.11 25.09 2753.95
24.7 2773.6 24.71 2806.34 25.43 2852.18 25.97 2891.48 26.14 2898.03 26.06
2904.58 25.84 2911.12 25.96 2943.87 25.68 2956.97 25.32 2963.52 25.02
3035.56 23.78 3055.2 23.71 3074.85 23.36 3087.95 22.89 3107.59 22.35 3120.69
22.24 3133.79 22.43 3140.34 22.39 3153.44 21.89 3173.08 21.72 3179.63 21.82
3199.28 21.51 3205.83 21.52 3212.38 21.67 3225.48 21.45 3232.03 21.87
3238.58 21.45 3258.22 21.83 3271.32 21.62 3277.87 20.97 3290.97 22.36
3297.52 22.69 3304.07 22.88 3323.71 22.98 3330.26 23.22 3356.46 23.16
3363.01 23.27 3369.56 23.54 3382.65 23.73 3389.2 24.1 3402.3 24.39 3415.4
25.02 3428.5 25.27 3448.14 24.87 3454.69 24.6 3467.79 24.83 3480.89 24.7
3493.99 24.19 3500.54 24.24 3513.63 24.58 3533.28 24.22 3559.48 24.56
3572.57 25 3585.67 25.79 3598.77 26.01 3618.42 25.79 3624.97 25.62 3631.52
25.67 3638.06 25.94 3657.71 25.8 3664.26 26.03 3670.81 27.05 3677.36 27.65
3683.91 27.86 3690.46 28.3 3697.01 29.18 3703.55 29.77 3716.65 30.56 3723.2
30.83 3729.75 30.87 3749.33 31.55 3762.39 31.11 3768.92 31.23 3781.97 30.72
3788.5 30.31 3808.08 28.37 3814.61 28.14 3821.14 28.24 3827.67 28.04 3866.83
28.27 3873.36 28.17 3892.94 28.81 3906 29.52 3932.11 30.01 3945.17 30.03
3951.69 29.86 3964.75 30.05 3971.28 30.31 3977.8 30.75 3984.33 30.78 3990.86

30.35 3997.39 30.21 4010.44 30.73 4016.97 30.79 4043.08 31.33 4049.61 31.35
4062.67 31.09 4095.3 30.99 4101.83 30.88 4108.36 31.15 4127.94 31.55 4141
31.3 4154.05 31.3 4173.64 31.6 4199.75 31.14 4225.86 30.48 4238.92 30.4
4251.97 30.02 4278.08 29.49 4291.14 29.37 4304.19 29.56 4323.78 29.35
4343.36 29.57 4356.42 29.16 4376 29.46 4382.53 29.37 4402.11 29.39 4408.64
29.57 4421.7 29.55 4428.22 29.76 4434.75 29.79 4447.81 29.52 4454.33 29.88
4460.86 29.69 4473.92 29.55 4480.45 29.23 4493.5 29.68 4545.72 29.68 4558.78
29.48 4565.31 29.48 4578.36 29.9 4591.42 29.86 4604.48 29.6 4611 29.57
4624.06 29.95 4630.59 29.54 4650.17 29.99 4656.7 29.85 4682.81 29.99 4689.34
29.92 4695.86 30.13 4708.92 29.78 4721.98 30.23 4741.56 29.91 4761.14 30.41
4774.2 30.16 4793.78 30.5 4800.31 30.77 4806.84 30.82 4813.37 30.65 4819.89
30.79 4826.42 31.29 4832.95 31.55 4852.53 31.7 4865.59 31.58 4891.7 31.88

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .095 1575 .055 1656.08 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1575
1656.08 123.92 126.38 129.99 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 2386 3076 28.4 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 107452

INPUT
Description: 94
Station Elevation Data num= 169
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 35.05 13.11 34.38 19.66 34.7
26.21 34.13 39.32 34.82 45.87 34.57 58.98 34.96 72.08 34.54 85.19 33.57
117.95 33.39 131.06 34.1 144.17 33.62 157.27 33.77 176.93 33.19 196.59 33.81
216.25 34.06 235.91 34.79 262.12 33.28 281.78 32.91 314.55 34.87 353.86
32.63 386.63 32.36 458.71 36.88 484.92 36.8 517.69 36.62 530.8 35.92 550.45
35.77 576.67 36.63 602.88 35.28 622.54 33.69 635.64 32.13 661.86 32.21
694.62 33.85 720.83 34.53 733.94 34.4 747.05 34.88 779.81 34.32 799.47 34.27
806.02 34.63 812.58 35.44 819.13 35.44 838.79 34.37 858.45 34.97 878.11
33.82 884.66 33.76 891.21 33.12 897.77 31.95 904.32 31.3 910.87 31.25 969.85
33.54 1002.61 33.43 1022.27 32.74 1035.38 33.11 1041.93 32.98 1074.7 33.91
1100.91 32.54 1107.46 32.46 1120.57 33.1 1153.33 33.08 1186.1 29.69 1231.97
28.81 1258.18 26.57 1264.74 25.42 1290.95 18.3 1297.5 16.96 1310.61 15.77
1323.71 16.2 1336.82 17.07 1369.58 16.92 1376.14 17.21 1382.69 18.35 1415.45
19.26 1450.9 18.89 1451 9.69 1453.4 1.01 1479 -6.95 1484.8 -6.48 1541.4 -
1.66 1560.1 8.21 1567.3 15.97 1612.05 18.81 1625.15 18.62 1638.26 17.18
1644.81 15.79 1651.36 15.36 1716.83 15.82 1729.92 15.63 1736.46 16.24
1749.55 20.69 1756.09 21.16 1769.18 20.29 1782.27 17.58 1788.81 16.93
1834.61 16.73 1873.87 17.13 1880.41 17.44 1893.5 19.08 1900.04 19.53 1939.3
18.87 1985.11 18.69 2024.37 19.17 2057.08 21.44 2063.63 22.34 2076.71 22.75
2083.25 23.47 2089.8 24.78 2096.34 25.06 2109.43 24.6 2214.12 25.9 2318.81
28.08 2436.59 32.74 2495.48 33.17 2920.79 28.6 3110.54 22.4 3156.34 22.54
3182.52 21.73 3208.69 22.25 3221.78 21.87 3300.3 23.36 3333.01 23.83 3346.1
23.52 3372.27 25.1 3398.44 25.44 3404.99 25.97 3450.79 25.33 3476.96 25.73

3529.31 29.13 3548.94 29.3 3562.02 27.93 3575.11 27.55 3588.2 28.31 3601.28 28.36 3627.46 27.7 3673.26 28.86 3679.8 29.41 3686.35 29.43 3705.96 28.21 3745.17 28.83 3784.37 30.7 3810.51 30.91 3836.65 30.66 3843.18 30.33 3862.79 30.97 3888.93 30.85 3928.13 31.51 4000.01 30.81 4019.62 32.14 4052.29 31.77 4058.83 32.05 4098.03 30.59 4117.64 31.15 4150.31 29.7 4294.07 30.39 4346.34 29.62 4359.41 30.11 4379.02 29.53 4398.62 29.97 4411.69 29.76 4463.96 30.36 4477.03 29.95 4516.24 30.36 4633.86 29.95 4640.39 30.31 4660 29.81 4692.67 30.31 4699.2 29.98 4771.08 30.71 4784.15 31.13 4810.29 31.3

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 1450.9 .055 1612.05 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1450.9 1612.05 2317.83 2224.61 2187.27 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 2287 2977 28.4 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 105227.3

INPUT
Description: 93
Station Elevation Data num= 438
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 29.15 6.56 29.27 13.11 29.24 19.67 29.35 45.9 29.19 52.45 28.89 59.01 28.76 72.12 28.81 91.79 28.43 98.35 28.56 104.9 28.5 118.02 28.15 137.69 28.15 163.91 27.72 170.47 27.9 183.58 27.63 196.69 27.84 209.81 27.54 216.36 27.6 229.48 28.07 236.03 28.18 242.59 28.03 255.7 27.15 262.26 26.93 275.37 27.69 281.93 27.81 288.49 28.23 295.04 28.43 314.71 28.34 327.82 28.44 334.38 28 347.49 28.03 354.05 28.16 367.16 27.79 386.83 27.57 419.61 27.01 426.17 26.74 445.84 25.47 452.4 25.32 458.95 25.53 472.07 26.38 478.62 26.51 511.41 26.5 531.08 25.84 537.63 25.53 550.74 25.14 557.3 25.5 563.86 26.34 570.41 26.8 576.97 27.67 583.53 28.04 590.08 27.76 596.64 27.86 603.2 28.31 609.75 28.94 622.87 29.39 629.42 29.9 635.98 30.15 649.09 29.53 655.65 29.45 668.76 29.9 694.99 30.15 701.54 29.98 727.77 30.41 734.33 30.36 740.88 30.13 754 30.17 767.11 30.5 780.22 30.21 793.33 30.13 799.89 29.92 806.45 29.95 813 30.2 819.56 30.27 839.23 30.89 852.34 30.74 858.9 30.84 865.46 31.08 872.01 31.05 878.57 31.31 885.13 31.79 891.68 32.04 898.24 32.1 904.79 31.82 917.91 30.61 924.46 29.89 931.02 29.39 937.58 29.36 944.13 29.12 970.36 28.82 983.47 28.39 990.03 27.98 996.59 27.75 1003.14 27.79 1022.81 27.26 1029.37 27.37 1042.48 28.5 1062.15 29.4 1068.71 29.5 1081.82 28.83 1121.16 24.79 1127.71 23.94 1140.83 21.73 1147.38 21.4 1153.94 21.35 1160.5 21.54 1180.17 21.49 1186.72 21.81 1193.28 22.59 1199.84 23.11 1212.95 23.57 1226.06 24.6 1232.62 24.95 1252.29 26.33 1271.96 27.2 1311.3 27.19 1317.85 26.98 1324.41 26.96 1330.97 26.8 1337.52 27.13 1344.08 27.27 1383.42 26.43 1396.53 25.6 1409.64 24.36 1416.2 24.01 1422.76 23.92 1435.87 24.5 1442.42 24.64 1475.06 27.3 1481.57 27.71 1507.6 28.75 1514.11 28.84 1520.62 28.69 1527.13 27.25 1533.64 24.09 1540.15 20.78 1546.65 18.51 1553.16 17.28 1563.47 15.03 1585 8.6 1600 8.2 1615 9.2 1637 12.8 1640.85 16.07 1644.28 16.12 1650.79 15.95 1657.3 15.64 1663.8 15.97 1670.31 16.59 1676.82 16.95 1683.33 16.77 1689.84 16.38 1696.35 16.17

1702.85 16.11 1728.89 16.42 1761.43 17.33 1774.45 17.43 1800.48 17.02
1846.04 16.43 1852.55 16.54 1878.58 16.36 1891.6 16.41 1911.12 16.14 1930.65
16.16 1995.73 17.67 2060.81 18.22 2067.32 18.17 2080.34 18.39 2093.36 18.7
2099.86 18.63 2106.37 18.73 2145.42 18.42 2158.44 18.18 2164.95 17.93
2177.96 17.84 2197.49 17.3 2204 16.99 2249.78 16.36 2302.19 17.57 2321.85
17.29 2348.06 17.2 2374.27 16.99 2380.82 17.15 2393.92 17.21 2400.48 17.35
2413.58 17.88 2446.34 18.35 2452.89 18.3 2459.45 17.92 2466 17.27 2472.55
16.43 2479.1 17.13 2485.65 17.97 2492.21 18.96 2498.76 19.27 2511.86 18.97
2538.07 19.9 2564.28 20.58 2583.94 21.18 2616.7 22.86 2629.8 23.35 2636.35
23.78 2642.91 24.4 2695.32 26.97 2747.74 27.41 2800.16 27.28 2819.81 26.77
2826.37 26.47 2865.68 25.85 2878.78 25.41 2885.34 25.39 2891.89 25.2 2924.65
25.37 2944.31 25.72 2957.41 26.08 2963.96 26.1 2977.07 26.4 3029.48 26.57
3055.69 26.17 3068.8 26.2 3081.9 26.53 3088.45 27.69 3095.01 31.02 3101.56
34.19 3108.11 34.08 3114.66 30.77 3121.21 28.15 3127.77 26.83 3134.32 26.36
3140.87 26.08 3147.42 27.42 3153.98 28.39 3186.74 27.95 3212.95 27.98 3219.5
28.11 3258.81 27.76 3265.36 27.56 3285.02 27.57 3317.78 26.99 3324.33 27.13
3330.88 27 3350.54 26.92 3370.2 26.97 3376.75 27.16 3383.3 27.09 3402.96
26.64 3409.51 26.64 3416.06 26.29 3422.62 25.4 3429.17 24.16 3435.72 23.4
3448.82 22.46 3455.38 22.42 3461.93 22.24 3468.48 22.44 3494.69 22.76
3507.79 22.61 3520.9 22.13 3527.45 22 3534 22.02 3540.55 21.79 3547.11 21.39
3553.66 21.52 3573.31 22.35 3586.42 21.79 3599.52 21.9 3612.63 21.71 3619.18
22.08 3625.73 22.12 3638.84 21.77 3651.94 21.74 3658.49 22.04 3665.05 22.04
3678.15 21.53 3697.81 21.55 3710.91 22.14 3717.46 21.86 3737.12 21.58
3743.67 21.62 3756.78 21.36 3769.88 21.54 3782.98 22.04 3796.09 21.71
3809.19 21.99 3822.3 21.77 3848.51 22.3 3861.61 22.24 3868.16 22.35 3881.27
22.27 3887.82 22.46 3894.37 22.01 3900.92 21.93 3914.03 22.27 3920.58 22.34
3927.13 22.23 3946.79 22.58 3953.34 22.27 3973 21.87 3979.55 21.93 3992.65
21.65 3999.21 21.77 4005.76 22.06 4012.31 22.15 4018.86 22.4 4025.42 22.26
4031.97 22.38 4045.07 22.86 4051.62 23.21 4058.18 23.71 4064.73 24.07
4071.28 24.62 4077.83 24.72 4084.38 25.02 4090.94 25.5 4097.49 25.73 4110.59
25.86 4123.7 25.37 4143.35 25.55 4176.12 26.4 4189.22 26.64 4202.33 27.31
4208.88 27.13 4215.43 27.44 4221.98 27.55 4254.74 28.75 4261.3 28.8 4274.4
29.1 4294.06 28.97 4300.61 28.75 4313.71 28.7 4320.27 28.95 4333.37 28.83
4353.03 29.27 4359.58 29.21 4379.24 28.61 4385.79 28.55 4392.34 28 4398.89
27.85 4405.44 27.85 4425.1 27.46 4438.21 26.96 4444.76 27 4451.31 26.83
4470.97 25.96 4484.07 25.79 4490.62 25.46 4497.18 24.96 4503.73 24.61
4516.83 24.59 4523.38 24.69 4529.94 24.65 4536.49 24.41 4556.15 24.41 4575.8
25 4582.35 25.08 4595.46 24.91 4608.56 24.93 4615.12 24.73 4621.67 24.72
4628.22 25.09 4641.33 25.01 4660.98 25.27 4680.64 24.91 4687.19 24.99
4693.74 25.3 4700.3 25.13 4706.85 25.25 4713.4 25.15 4739.52 26.02 4746.04
26.4 4752.56 26.24 4772.12 26.91 4785.16 27.1 4804.73 28.31 4811.25 28.6
4817.77 28.48 4824.29 28.61 4837.33 28.58 4869.94 29.04 4882.98 29.41 4889.5
29.74 4902.54 30.17 4915.58 30.8 4928.62 32.01 4941.67 32.33 4948.19 32.29
4954.71 32.43 4961.23 32.72 4967.75 32.76 4980.79 33.36 5013.4 34.06 5026.44
34.26 5065.57 35.3 5072.09 35.3 5085.13 35.8 5098.17 36.06 5104.69 36.54
5117.73 37.02 5124.25 37.11 5130.78 37.35 5150.34 36.96 5156.86 36.98
5163.38 36.81 5169.9 36.99 5176.42 36.88 5195.99 37.43 5202.51 37.52 5215.55
38.2 5228.59 38.61 5235.11 39.15 5241.63 39.35 5261.2 40.4 5274.24 40.9
5287.28 41.83 5326.41 42.96 5365.53 44 5372.05 44.06 5385.1 43.76 5398.14
44.37 5404.66 44.91 5417.7 47.05 5424.22 47.99 5437.26 49.02 5443.78 50.8
5450.31 52.18 5456.83 52.54 5469.87 52.84 5482.91 53.6 5489.43 53.86 5495.95
54.41 5515.52 55.28 5522.04 55.46 5548.12 56.77 5554.64 57.81 5567.68 60.82
5580.73 61.67 5606.81 63.95 5652.46 66.11

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .095 1520.62 .055 1676.82 .095

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1520.62 1676.82 1458.48 1428.11 1397.47 .3 .5 Ineffective Flow num= 3
 Sta L Sta R Elev Permanent
 0 1068.71 29.5 T
 1068.71 1475.06 27.3 F
 4353 5000 29.27 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 103799.2

INPUT
Description: 92
Station Elevation Data num= 439
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 30.96 13.11 30.95 19.67 30.72 32.79 29.34 45.9 29.31 59.01 29.04 72.13 29.26 85.24 29.02 91.8 29.08 98.36 29.36 104.91 29.33 124.59 29.72 144.26 29.46 163.93 29.51 170.49 29.35 177.04 29.35 183.6 29.56 209.83 29.14 229.5 29.32 236.06 29.22 242.61 29.32 249.17 29.73 281.96 29.97 288.51 30.1 295.07 30.44 308.19 30.29 314.74 30.6 321.3 30.7 340.97 30.28 367.2 30.39 373.76 30.54 380.32 30.47 393.43 30.75 399.99 30.59 406.54 30.63 413.1 30.52 432.77 30.89 459 32.12 465.56 32.09 478.67 32.74 485.23 32.88 524.57 32.55 531.13 32.64 550.8 31.54 563.92 30.05 577.03 28.98 583.59 28.15 590.14 27.63 596.7 27.65 603.26 26.94 609.82 26.49 622.93 25.85 629.49 25.25 636.04 25.6 649.16 25.25 655.72 25.26 662.27 25.41 668.83 25.74 675.39 25.42 681.94 25.56 688.5 25.84 701.62 25.66 721.29 27.1 747.52 27.09 754.07 26.89 760.63 26.89 767.19 27.29 773.74 27.84 780.3 28.57 793.41 28.64 806.53 29.23 813.09 29.1 819.64 29.17 832.76 29.78 839.29 29.88 858.89 28.97 878.49 27.52 885.03 26.84 891.56 25.99 898.09 24.97 911.16 21.94 917.7 21.59 930.76 21.49 937.3 21.75 950.36 22.7 956.9 23.39 969.97 25.04 976.5 25.6 989.57 27.05 1002.63 28.17 1009.17 28.83 1035.3 29.55 1041.84 29.27 1061.44 27.66 1067.97 26.77 1081.04 24.78 1100.64 22.83 1107.17 22.4 1126.77 20.3 1133.31 19.13 1139.84 18.5 1152.91 17.88 1159.44 17.32 1172.51 17.03 1179.04 17.09 1198.65 16.88 1205.18 17.35 1211.71 18.34 1231.31 19.58 1237.85 19.74 1244.38 19.74 1250.92 19.35 1263.98 18.12 1270.52 17.63 1277.05 16.84 1283.58 16.82 1290.12 18.59 1296.65 19.78 1303.19 19.71 1309.72 19.79 1322.79 19.74 1329.32 19.14 1361.99 18.09 1388.12 18.07 1394.66 17.83 1401.19 18.01 1420.79 17.62 1427.33 17.79 1433.86 17.72 1440.39 17.41 1460 17.55 1466.53 17.76 1473.06 17.78 1486.13 18.35 1492.66 18.31 1499.2 18.13 1505.73 18.17 1518.8 17.87 1525.33 17.53 1531.87 17.73 1538.4 17.64 1558 17.7 1571.07 17.23 1584.14 17.34 1603.74 17.15 1610.27 17.37 1636.41 17.41 1662.54 16.79 1701.74 17.7 1734.41 17.68 1760.55 18.19 1773.61 18.2 1780.15 18.33 1793.22 18.1 1812.82 18.05 1878.15 19.41 1884.69 19.74 1897.76 19.71 1904.29 19.45 1910.82 18.28 1917.36 16.88 1923.89 16.37 1930.42 16.82 1936.96 17.78 1943.49 18.87 1950.03 19.51 1956.56 19.71 1982.69 19.14 1995.76 18.29 2002.3 18.28 2008.83 18.46 2021.9 18.51 2034.94 18.26 2047.97 17.48 2054.49 17.39 2061 17.63 2074.03 18.54 2093.57 18.84 2106.6 18.74 2113.12 18.48 2132.66 17.33 2139.17 16.62 2142.98 15.95 2158 12.8 2175 9.7 2190 7.2 2205 8.2 2222 12.3 2228.16 14.36 2230.38

14.55 2236.89 16.6 2249.92 16.83 2262.95 17.66 2269.46 18.9 2275.98 20.31
2289 24.87 2295.52 26.64 2302.03 27.34 2315.06 27.39 2328.09 27.74 2341.12
27.7 2367.18 27.35 2373.69 27.37 2380.21 27.56 2425.81 28.35 2451.86 29.12
2458.38 29.17 2490.95 28.05 2503.98 27.96 2510.49 27.71 2536.55 27.36
2556.09 27.34 2562.61 27.2 2569.12 26.88 2608.38 27.25 2654.18 27.09 2686.89
27.85 2699.98 28.76 2713.06 29.89 2719.6 30.09 2745.77 29.94 2758.86 29.44
2778.49 28.33 2791.57 27.76 2811.2 27.48 2824.29 27.82 2843.92 28.54 2850.46
28.6 2870.09 28.31 2883.17 27.83 2902.8 27.33 2915.89 27.36 2942.06 27.69
2948.6 27.99 2987.86 27.77 3014.03 27.25 3020.57 27.25 3033.65 26.74 3046.74
26.39 3053.28 26.34 3066.37 26.56 3072.91 26.46 3079.45 26.1 3086 26.7
3105.62 27.46 3112.17 27.59 3118.71 27.44 3144.88 27.82 3151.42 27.78
3164.51 27.37 3177.59 27.27 3190.68 27.64 3197.22 27.63 3203.76 27.47
3216.85 27.41 3256.11 27.1 3262.65 26.74 3282.28 24.77 3295.36 24.16 3308.45
23.73 3314.99 23.98 3321.53 24 3328.08 23.63 3334.62 24.2 3341.16 24.24
3347.7 23.95 3354.25 24.04 3360.79 23.89 3367.33 23.6 3373.88 23.46 3406.59
23.43 3419.67 22.99 3432.76 22.22 3439.3 21.69 3445.85 21.6 3452.39 21.65
3458.93 21.41 3465.47 21.57 3478.56 21.29 3517.82 21.19 3530.9 21.42 3570.16
21.17 3583.24 21.29 3596.33 21.13 3622.5 21.27 3629.04 21.17 3642.13 21.35
3655.21 21.07 3674.84 21.4 3687.93 21.25 3701.01 21.42 3707.55 21.61 3720.64
21.64 3727.18 21.54 3733.73 21.87 3753.35 21.37 3779.52 21.25 3799.15 21.38
3805.7 21.33 3812.24 21.44 3818.78 21.7 3825.32 21.75 3831.87 21.41 3838.41
21.3 3858.04 21.42 3864.58 21.36 3884.21 21.49 3897.29 22.04 3903.84 22.03
3916.92 21.55 3943.09 21.57 3949.64 21.76 3956.18 21.79 3962.72 21.59
3969.26 21.7 3995.43 21.48 4008.52 21.82 4015.06 21.64 4028.15 21.75 4034.69
21.94 4054.32 21.87 4067.4 21.73 4073.95 21.95 4093.57 22.01 4100.12 22.35
4113.2 23.49 4126.29 23.58 4139.37 23.43 4159 24.06 4178.63 24.07 4198.26
24.45 4211.34 24.8 4224.43 24.95 4230.97 25.23 4244.05 26 4250.6 26.09
4270.22 27.15 4289.85 27.86 4309.48 28.16 4342.19 28.21 4348.73 28.33
4381.44 27.63 4407.62 27.54 4433.79 27.88 4440.33 28.06 4446.87 28.03
4453.41 27.74 4466.5 28.35 4479.58 28.63 4505.75 29.45 4512.28 29.46 4518.82
29.75 4525.35 29.81 4544.96 30.36 4590.71 32.5 4597.25 32.54 4610.32 32.84
4623.39 32.88 4636.46 33.33 4649.53 33.46 4669.14 32.76 4695.28 32.6 4708.35
32.21 4721.42 32.41 4747.57 32.51 4760.64 32.71 4767.17 32.52 4773.71 32.49
4780.25 32.89 4793.32 32.53 4812.92 32.7 4819.46 32.96 4832.53 32.94 4858.67
33.46 4871.74 33.33 4878.28 33.4 4884.82 33.22 4891.35 33.22 4910.96 33.78
4917.49 33.66 4943.64 34.86 4956.71 35.03 4969.78 35.52 4976.32 35.64
4989.39 35.46 4995.92 35.64 5022.07 36.03 5028.6 35.95 5035.14 35.65 5048.21
36.16 5067.82 36.66 5074.35 37.01 5080.89 37.17 5087.42 37.66 5100.49 38.02
5107.03 38.33 5120.1 39.16 5139.71 39.55 5146.24 39.81 5159.32 39.93 5172.39
40.48 5198.53 40.86 5205.07 41.12 5211.6 41.53 5218.14 41.65 5231.21 43.3
5237.74 44.53 5244.28 46.05 5250.82 46.98 5263.89 47.81 5270.42 48.35
5290.03 49.15 5316.17 50.5 5322.71 50.65 5335.78 51.4 5355.39 52.25 5361.92
52.39 5368.46 53.15 5374.99 54.26 5381.53 55.56 5388.06 57.23 5401.14 60.18
5407.67 61.17 5414.21 61.61 5427.28 61.71 5446.89 62.8 5459.96 63.33 5473.03
63.4 5479.56 63.63 5486.1 63.62 5492.64 63.75 5512.24 64.46 5525.31 64.59
5544.92 65.04 5597.21 65.63 5610.28 65.54 5623.35 64.84 5629.89 63.84
5636.42 61.8

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .095 2106.6 .055 2302.03 .087

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2106.6
2302.03 1511.12 1623.98 1750.94 .3 .5 Ineffective Flow num= 2

```
 Sta L Sta R Elev Permanent
 0 1040 29.1 F
 2376 3256 28.4 T

CROSS SECTION


RIVER: Taunton River
REACH: Main Stem RS: 102175.3

INPUT
Description: 91
Station Elevation Data num= 350
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  0 28.53 13.09 27.86 32.72
28.08 39.27 27.79 58.9 28  78.54 27.44 98.17 27.4 111.26 27.67 163.62 27.31
183.25 28.11  202.89 28.01 209.43 28.29 235.61 28.18 255.25 28.46 261.79
28.79  274.88 28.49 307.61 29.11 327.24 29.96 346.87 31.34 359.96 32.64
366.51 32.96 392.69 33.05 399.23 33.26 418.87 32.07 438.5 31.55  458.14 31.42
477.77 31.76 490.86 31.62 497.4 31.86 503.95 31.78  556.31 32.62 562.85 32.54
582.49 32.88 602.12 32.52 615.21 31.8  628.3 31.73 634.84 30.84 647.93 30.37
654.48 29.87 680.66 28.99  687.2 29.06 700.29 29.91 706.84 30.08 713.38 31.26
726.47 32.61  752.65 33.87 772.29 34.3 785.38 34.22 791.92 34.41 811.55 33.59
818.1 33.61 837.73 32.61 857.37 32.47 870.46 32.71 890.09 32.09  909.73 32.04
955.54 30.46 962.08 30.42 981.72 29.16 1001.35 26.94  1007.9 26.72 1020.99
25.45 1027.53 25.52 1034.08 24.92 1047.17 24.61  1053.71 24.93 1060.26 25.85
1073.35 26.17 1092.98 25.02 1099.52 24.9  1112.61 25.17 1119.16 25.08 1132.25
24.2 1145.34 22.55 1158.43 21.6  1171.52 19.43 1178.06 17.79 1200 6.2 1240
6.2 1262 12.8  1265.32 13.89 1269.83 13.89 1282.95 18.4 1296.06 19.29 1302.61
19.48  1315.72 19 1328.83 19.29 1341.94 18.77 1355.05 19.01 1368.16 18.62
1400.94 19.85 1427.16 18.18 1433.72 17.98 1446.83 18.34 1479.6 18.67  1512.38
18.06 1532.04 18.16 1545.15 17.35 1551.71 17.82 1564.82 17.29  1571.37 17.35
1591.04 16.22 1597.6 16.12 1604.15 16.55 1617.26 16.24  1623.82 16.98 1630.37
16.95 1636.93 16.41 1656.59 16.24 1669.7 15.58  1689.34 16.23 1695.89 15.94
1708.98 16.35 1715.53 15.96 1728.62 15.8  1735.17 16.1 1774.45 16.71 1807.19
15.58 1853.02 15.77 1866.11 16.78  1872.66 16.83 1885.75 17.69 1898.84 18.07
1925.03 17.45 1951.22 19.19  1970.86 19.85 1977.41 20.29 1997.05 20.4 2010.14
19.41 2016.69 19.74  2036.33 19.54 2049.42 18.2 2055.97 17.76 2075.61 17.45
2095.25 17.75  2121.44 20.06 2134.53 20.39 2147.63 19.8 2160.72 19.6 2173.81
20.08  2180.36 20.81 2193.45 21.39 2226.19 21.63 2245.83 20.76 2258.92 19.7
2278.57 18.81 2298.21 18.26 2317.85 18.26 2337.49 17.8 2344.04 18.01  2357.13
18.98 2370.22 20.25 2396.41 21.45 2416.05 22.96 2435.69 24.12  2442.24 24.19
2455.33 23.94 2468.43 22.61 2481.52 19.92 2494.62 19.3  2507.71 19.5 2514.26
19.27 2533.9 19.67 2540.44 19.11 2546.99 19.25  2560.09 18.82 2573.18 19.77
2586.27 21.08 2592.82 21.98 2605.91 23.21  2619.01 23.77 2632.1 23.85 2638.65
23.59 2651.74 22.57 2664.84 22.1  2691.03 20.37 2723.76 19.15 2756.5 18.39
2763.04 18 2769.59 17.27  2789.23 16.1 2795.78 16.56 2815.42 16.31 2828.51
16.57 2854.7 18.34  2867.79 18.96 2893.98 19.42 2913.62 19.44 2920.17 19.92
2946.36 20.98  2959.45 21.74 2979.09 22.1 3005.28 23.24 3024.92 25.46 3044.56
26.57  3051.11 26.63 3057.66 26.22 3070.75 26.03 3077.3 25.66 3096.94 25.28
3136.22 27.87 3175.5 28.75 3188.6 28.82 3214.78 30.1 3221.33 30.06  3247.52
30.69 3267.16 30.08 3273.71 30.4 3306.44 29.52 3332.63 29.72  3345.72 29.41
3365.36 29.6 3391.55 28.97 3404.65 27.94 3417.74 27.66  3430.83 27.76 3450.47
27.2 3457.02 26.53 3502.85 26.19 3509.4 26.5  3522.49 26.5 3568.32 27.78
3574.87 27.57 3587.96 27.85 3614.15 27.36  3731.99 27.47 3738.54 27.8 3758.18
```

28.02 3777.82 28.72 3790.92 28.45 3797.46 28 3810.56 27.7 3843.29 27.69
3856.39 28.26 3862.93 28.1 3869.48 28.25 3895.69 27.81 3908.8 28.24 3928.46
27.93 3935.02 27.49 3948.12 28.06 3954.68 28.02 3961.23 28.31 3980.89 27.91
3987.45 28.09 4026.77 27.6 4033.33 27.91 4066.1 28.24 4072.65 28.91 4098.87
29.72 4105.42 29.46 4131.64 29.8 4164.41 29.69 4210.29 30.19 4243.06 30.03
4249.61 30.42 4269.27 30.49 4282.38 30.33 4308.6 31.07 4334.81 31.02 4367.58
31.93 4420.02 32.38 4426.57 32.22 4433.12 32.5 4465.9 32.64 4479 33.13
4492.11 32.88 4524.88 32.97 4531.44 32.79 4544.54 33.48 4564.21 33.44
4577.31 33.15 4603.53 33.93 4616.64 34.1 4629.75 33.52 4636.3 33.49 4655.96
34.05 4662.52 33.82 4688.73 34.65 4714.95 34.4 4728.06 33.72 4754.27 34.22
4767.38 34.64 4839.48 34.04 4885.36 34.25 4905.02 34.71 4937.79 34.88 4950.9
34.39 4970.56 34.81 5003.33 34.98 5016.44 34.7 5062.32 34.85 5075.42 34.61
5095.09 35.14 5140.97 35.22 5173.74 35.71 5186.84 36.53 5213.06 36.48
5219.61 36.08 5232.72 36.1 5245.83 36.74 5258.94 35.93 5272.05 38 5278.6
38.17 5285.16 37.96 5298.26 39.37 5311.37 39.73 5324.48 39.62 5337.59 40.47
5350.7 40.3 5357.25 39.62 5370.36 39.1 5409.68 40.33 5416.24 40.83 5422.79
40.89 5435.9 39.48 5449.01 39.27 5455.56 39.69 5475.22 39.8 5494.89 39.51
5501.44 39.95 5540.76 40.19 5619.41 39.14 5632.52 39.65 5671.85 39.85
5684.95 40.45 5730.83 41.33 5743.94 41.27 5770.16 41.88 5789.82 42.02
5802.93 42.56 5822.59 42.52 5855.36 43.03 5868.47 43.47 5888.13 43.16
5934.01 44.69 5947.12 44.71 5960.23 45.55 6006.1 46.81 6038.88 49.13 6045.43
50.14 6065.09 52.32 6071.65 53.4 6078.2 55.06 6084.75 56.14 6124.08 58.32
6143.74 58.39 6156.85 58.83 6202.73 64.12 6209.28 64.62

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .095 1112.61 .055 1302.61 .095

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1112.61
1302.61 2000.77 1915.38 1882.93 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 1073.35 26.17 F

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 100259.9

INPUT
Description: 90
Station Elevation Data num= 489
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 31.53 6.54 31.37 13.08 31.55
19.62 32.04 26.16 32.27 39.23 32.28 45.77 32.05 52.31 31.64 58.85 31.51
65.39 31.59 71.93 31.4 78.47 30.69 85.01 30.81 98.09 29.66 104.62 29.48
117.7 29.31 137.32 30.01 143.86 30.15 150.4 29.81 156.94 29.62 170.02 29.82
183.09 29.71 202.71 30.08 209.25 30.1 215.79 29.84 228.87 30.02 241.94 30.4
248.48 30.4 255.02 30.01 268.1 29.71 287.72 28.74 294.26 28.8 300.8 28.59
307.34 28.23 320.41 28.42 326.95 28.18 333.49 28.13 353.11 26.7 359.65 26.81
372.73 27.98 392.34 28.61 398.88 28.47 405.42 28.54 418.5 28.99 425.04 29.45
431.58 29.73 444.66 30.82 457.73 31.17 464.27 31.24 477.35 30.71 496.97
29.26 523.12 28.47 536.2 28.56 549.28 28 555.82 28.22 595.05 27.48 608.13
27.68 614.67 27.9 621.21 27.83 627.75 27.6 634.29 27.89 640.83 28.04 647.37
28.33 653.9 28.34 666.98 27.93 673.52 27.85 686.6 28.4 693.14 28.53 706.22

28.39 725.83 28.73 745.45 28.67 751.99 28.82 765.07 28.59 771.61 28.73
784.69 28.25 797.76 27.22 804.3 26.85 810.84 26.21 817.38 25.75 850.08 24.81
856.62 25.04 863.15 24.9 869.69 25.07 882.77 24.66 895.85 24.6 908.93 24.71
922.01 24.6 928.54 24.78 935.08 24.81 941.62 24.63 954.7 24.48 961.24 24.71
987.4 24.98 993.93 25.42 1007.01 26.65 1052.79 29.24 1059.33 29.37 1065.86
29.75 1072.4 30.33 1085.48 30.23 1098.56 29.61 1111.64 28.2 1124.72 27.78
1137.79 27.91 1150.87 27.56 1170.49 27.94 1190.11 27.88 1196.65 27.51
1209.72 27.82 1222.8 28.86 1255.5 29.57 1268.58 29.54 1288.19 29.05 1294.73
29 1307.81 28.05 1320.89 27.38 1340.51 26.95 1360.12 26.68 1366.66 26.74
1373.2 27.02 1399.36 26.98 1412.44 27.09 1432.05 28.03 1445.13 28.1 1451.67
27.69 1464.75 26.56 1484.37 25.91 1490.9 25.96 1503.98 25.8 1517.06 25.95
1523.6 25.54 1530.14 25.62 1536.68 25.55 1543.22 25.77 1549.76 26.45 1556.29
26.79 1562.83 27.78 1569.37 28.57 1582.45 29.55 1595.53 30.39 1602.07 30.64
1608.61 30.69 1621.69 30.23 1628.22 29.72 1641.3 28.95 1647.84 28.36 1654.38
27.56 1660.92 27.18 1667.46 26.63 1693.62 25.8 1706.69 25.78 1713.23 25.67
1752.47 25.66 1759.01 26.28 1772.08 26.94 1785.16 27.34 1791.7 28.02 1804.78
28.46 1817.86 29.1 1830.94 30.01 1850.55 29.97 1857.09 30.13 1876.71 30.24
1883.25 30.53 1896.33 30.55 1902.85 30.45 1909.38 30.17 1915.9 29.75 1928.95
29.73 1948.52 30.26 1955.04 30.33 1981.14 29.64 1994.19 29.09 2007.24 28.65
2020.29 28.84 2026.81 28.78 2059.43 28.98 2085.53 28.6 2098.58 28.6 2170.34
27.28 2176.87 26.89 2183.39 26.37 2196.44 25.68 2209.49 25.34 2216.01 24.9
2222.54 24.64 2229.06 24.16 2235.58 24.03 2242.11 23.52 2248.63 23.2 2281.25
23.12 2287.78 22.86 2313.87 22.55 2326.92 22.08 2333.45 21.61 2339.97 21.28
2353.02 21.14 2366.07 20.58 2392.16 20.19 2405.21 19.5 2411.74 19.52 2418.26
19.76 2431.31 19.88 2437.83 20.47 2450.88 20.9 2457.41 20.82 2463.93 20.98
2476.98 20.93 2496.55 20.43 2516.12 20.54 2529.17 19.95 2535.7 20.26 2548.74
21.46 2555.27 21.79 2568.32 21.89 2574.84 21.79 2601.06 19.53 2614.17 18.58
2627.28 18 2646.94 16.62 2653.49 16.36 2660.05 16.25 2673.16 16.88 2686.27
16.82 2692.82 16.69 2699.38 16.75 2719.04 17.82 2732.15 18.15 2738.7 18.43
2745.26 18.97 2758.37 19.46 2771.48 19.57 2778.03 19.24 2784.59 19.39
2791.14 19.69 2810.8 19.16 2823.91 19.2 2830.47 19.09 2837.02 18.73 2850.13
17.53 2855.88 16.84 2865 12.2 2885 6.5 2905 5.2 2925 6.2 2945 11.2 2947.74
16.01 2948.45 16.2 2955 16.34 2961.56 15.66 2968.11 15.49 2974.67 15.79
2981.22 15.85 2994.33 15.49 3000.89 15.56 3033.66 15.24 3046.77 15.38
3079.54 15 3092.65 15.18 3099.2 15.11 3105.76 14.74 3118.87 14.44 3131.98
15.77 3138.53 16.17 3145.09 16.21 3151.64 15.99 3164.75 13.93 3204.08 14.3
3217.19 14.66 3230.3 14.54 3243.4 15.49 3256.51 16.74 3263.07 17.23 3276.18
17.3 3282.73 17.61 3295.84 17.86 3302.4 17.84 3308.95 18.14 3315.5 18.21
3322.06 18.1 3341.72 18.14 3348.28 17.94 3354.83 17.95 3361.39 18.3 3381.05
18.79 3387.6 19.17 3407.27 19.82 3420.38 20.47 3426.93 20.92 3433.49 21.1
3446.6 21.23 3453.15 21.52 3459.7 21.61 3472.81 22.05 3485.92 22.84 3512.14
23.93 3518.7 24.53 3531.81 25.02 3551.47 23.8 3558.02 23.5 3584.24 23.51
3590.8 23.84 3617.01 24.26 3643.23 23.92 3649.79 23.98 3669.45 23.62 3695.67
24.77 3702.22 24.96 3708.78 25.3 3721.89 26.18 3728.44 26.33 3741.55 26.45
3754.66 26.7 3767.77 26.63 3787.43 27.37 3793.99 27.47 3800.54 27.35 3820.21
27.65 3846.42 27.7 3859.53 27.91 3866.09 27.88 3872.64 27.7 3885.75 28.29
3892.31 28.39 3898.85 28.3 3918.49 28.64 3925.04 28.66 3931.59 28.91 3944.68
28.91 3964.32 29.24 3970.87 29.17 3990.51 27.94 4003.61 27.57 4016.7 26.63
4023.25 26.83 4029.79 27.21 4036.34 27.04 4042.89 27.28 4055.98 28.02
4062.53 28.26 4095.26 27.41 4108.36 27.45 4128 27.89 4141.09 27.93 4167.28
28.34 4200.02 28.64 4206.57 28.8 4232.75 28.57 4245.85 29 4291.68 28.7
4304.77 28.84 4357.15 28.39 4389.89 28.57 4402.98 28.45 4455.36 29.24
4461.91 29.24 4468.45 29.51 4488.09 29.92 4494.64 30.16 4507.74 30.26
4520.83 30.18 4527.38 30.03 4547.02 29.91 4573.21 29.47 4612.49 29.58

4691.06 29.43 4710.7 29.84 4736.89 30.11 4756.53 30.43 4854.74 30.26 4861.28 30.45 4913.66 31.12 4926.75 31.27 4952.94 32.04 4966.04 31.96 4972.58 32.43 4979.13 32.64 4992.23 32.88 4998.77 33.25 5011.87 33.44 5018.42 33.82 5024.96 33.89 5031.51 33.72 5038.06 34.04 5057.7 34.44 5070.79 34.47 5083.89 34.08 5096.98 34.32 5103.53 34.05 5116.62 34.26 5136.26 34.34 5155.91 33.97 5169 33.61 5195.19 33.66 5208.28 33.86 5214.83 34.1 5227.92 33.65 5234.47 33.57 5260.66 34.1 5273.75 34.01 5280.3 33.71 5293.4 33.87 5299.94 33.82 5313.04 33.52 5326.13 33.66 5332.68 33.85 5352.32 33.74 5371.96 34.34 5378.51 34.31 5385.06 33.91 5398.15 34.2 5417.79 34.28 5430.89 34.13 5437.43 34.39 5443.98 34.21 5463.62 34.04 5476.72 34.62 5489.81 34.84 5496.36 35.07 5516 34.97 5535.64 35.37 5542.19 35.06 5555.28 35.33 5581.47 35.95 5601.11 35.66 5607.66 35.87 5633.85 35.62 5653.49 35.8 5666.58 36.13 5673.13 36.13 5686.23 36.68 5699.32 36.79 5705.87 36.74 5718.96 37.01 5725.51 37.27 5738.6 37.44 5745.15 37.3 5751.7 37.32 5764.79 37.8 5790.98 37.96 5797.53 38.13 5810.62 38.22 5823.72 38.47 5830.26 38.72 5849.91 38.96 5856.45 38.84 5863 39.03 5869.55 39.04 5902.28 40.35 5908.83 40.43 5915.38 40.65 5935.02 40.8 5941.57 40.62 5948.11 40.65 5961.21 41.21 5967.75 41.03 5974.3 41.12 5980.85 41.35 5993.94 41.54 6007.04 42.14 6013.58 42.03 6020.13 42.25 6026.68 42.73 6033.23 42.97 6046.32 42.87 6052.87 43 6065.96 43.53 6072.51 43.68 6085.6 43.43 6098.7 43.77 6111.79 44 6118.34 43.81 6144.53 44.04 6151.08 44.01 6157.62 43.75 6177.26 44.22 6196.91 44.18 6216.55 44.79 6229.64 44.89 6236.19 45.13 6249.28 45.26 6262.38 45.12 6268.92 44.95 6282.02 45.24 6295.11 45.06 6314.75 45.23 6327.85 44.98 6340.94 45.37 6347.49 45.4

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .095 2791.14 .055 2955 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2791.14 2955 1027.78 1066.17 1112.6 .3 .5 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 1052.79 29.24 F
 3964.32 6347.49 29.24 F
 CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 99193.71

INPUT
Description: 89
Station Elevation Data num= 495
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 29.06 13.12 29.46 19.68 29.39 26.24 29.79 32.8 30.25 39.36 30.48 52.48 30.19 59.04 29.88 65.6 29.16 72.16 28.64 78.73 28.74 85.29 28.82 98.41 28.29 104.97 28.17 111.53 28.07 118.09 27.67 124.65 27.31 131.21 27.02 137.77 26.94 144.33 26.92 150.89 26.92 157.45 26.86 164.01 26.88 170.57 26.72 177.13 26.62 183.69 26.71 190.25 27.04 196.81 26.97 203.37 27.08 209.93 26.98 216.49 26.95 223.05 27.24 229.62 27.29 236.18 27.2 242.74 27.14 249.3 27.03 255.86 27.05 262.42 27.24 268.98 27.49 275.54 27.46 282.1 27.19 288.66 27.13 295.22 26.89 301.78 26.88 308.34 26.53 314.9 26.22 321.46 26.07 328.02 26.33 334.58 26.33 341.14 25.85 347.7 25.56 354.26 25.36 360.82 25.44 367.38 25.61 373.95 25.56 380.51 25.48 387.07 25.42 393.63 25.38 400.19 25.43 406.75 25.36 413.31 25.52 419.87 25.3 426.43 25.11 432.99 25.18 439.55 25.22 446.11 25.24 452.67

25.29 459.23 25.39 465.79 25.31 472.35 25.11 485.47 24.74 492.03 24.81
498.59 24.68 505.15 24.74 511.71 24.76 518.28 24.76 524.84 24.59 531.4 24.56
537.96 24.61 544.52 24.64 551.08 24.64 557.64 24.66 564.2 24.91 570.76 25.09
577.32 24.72 583.88 24.65 590.44 25.04 597 25.41 603.56 25.2 610.12 25.58
616.68 25.91 623.24 26.36 629.8 26.53 636.36 26.21 642.92 25.93 649.48 25.83
656.04 25.51 662.61 25.22 669.17 25.06 675.73 24.92 682.29 24.7 688.85 24.52
695.41 24.5 701.97 24.42 708.53 24.29 715.09 24.26 721.65 24.41 728.21 24.14
734.77 24.02 741.33 23.71 747.89 23.65 754.45 23.63 761.01 23.72 767.57
23.93 774.13 23.99 780.69 23.98 787.25 24.03 793.81 24 800.37 24.01 806.93
23.97 813.5 24.23 820.06 24.34 826.62 24.26 833.18 23.71 839.74 23.57 846.3
23.67 852.86 23.65 859.42 23.68 865.98 23.84 872.54 24.05 879.1 24.12 892.22
23.9 898.78 23.98 905.34 24.44 911.9 24.45 918.46 23.73 925.02 23.48 931.58
23.67 938.14 23.99 944.7 24.2 951.27 24.25 957.83 24.02 964.39 24.11 970.95
24.22 977.51 24.3 984.07 24.26 990.63 24.06 997.19 24 1003.75 23.99 1016.87
24.36 1023.43 24.46 1029.99 24.82 1036.55 24.28 1043.11 23.96 1049.67 24.96
1056.23 25.13 1062.79 25.9 1069.35 26.12 1075.91 26.23 1082.47 26.28 1089.03
26.38 1095.59 26.31 1102.16 26.29 1108.72 26.34 1115.28 26.41 1121.84 26.28
1128.4 26.21 1134.96 26.17 1141.52 25.94 1148.08 26.05 1154.64 25.94 1167.76
25.75 1174.32 25.8 1180.88 25.8 1187.44 25.76 1194 25.74 1200.56 25.8
1207.12 25.82 1213.68 25.47 1220.24 25.41 1226.8 25.21 1233.36 25.14 1239.92
25.37 1246.48 25.56 1253.05 25.6 1259.61 25.5 1266.17 25.42 1272.73 25.4
1279.29 25.21 1285.85 25.27 1292.41 25.54 1298.97 25.5 1305.53 25.41 1312.09
25.17 1318.65 24.84 1325.21 24.35 1331.77 23.5 1338.33 22.71 1344.89 24.47
1351.45 24.52 1358.01 24.51 1371.13 24.14 1377.69 24.12 1384.25 23.97
1390.81 24.11 1397.37 24.29 1403.94 24.5 1410.5 24.57 1417.06 24.72 1436.74
25.34 1443.3 25.53 1449.86 25.49 1456.42 25.76 1462.98 25.98 1476.1 25.95
1482.66 26.35 1489.22 26.66 1495.78 26.57 1502.34 26.3 1508.9 26.17 1515.46
26.14 1522.02 26.39 1528.58 26.72 1535.14 27.23 1541.7 27.45 1548.26 27.23
1554.83 27.45 1561.39 27.55 1567.95 26.8 1574.51 26.65 1581.07 26.91 1594.19
26.58 1600.75 26.34 1607.31 25.98 1613.87 25.85 1620.43 25.78 1626.99 25.73
1633.55 26.01 1640.11 26.33 1646.67 26.55 1653.23 26.56 1659.79 26.6 1666.35
26.7 1672.91 26.68 1679.47 26.36 1686.03 26.57 1692.59 26.84 1699.15 26.89
1705.72 27.54 1712.28 28.15 1718.84 27.78 1725.4 27.16 1731.96 27.03 1738.52
27.03 1745.08 26.89 1751.64 27.21 1758.2 27.94 1764.76 28.51 1771.32 28.55
1777.88 28.29 1784.44 28.71 1791 29.48 1797.56 29.57 1804.12 29.53 1810.68
29.61 1817.24 29.62 1830.36 29.77 1843.48 29.71 1850.04 29.58 1856.61 29.42
1863.17 29.53 1876.29 29.6 1882.85 29.57 1889.41 29.4 1895.97 29.36 1902.53
29.28 1909.09 29.23 1915.65 29.06 1922.21 28.98 1928.77 29.07 1935.33 29.2
1941.89 29.2 1948.45 29.07 1955.01 29.09 1961.57 29.05 1968.13 29.04 1974.69
29.14 1981.25 29.14 1987.81 29.02 1994.37 28.99 2000.93 29.03 2007.49 28.97
2014.06 28.89 2020.62 28.84 2027.18 28.63 2040.3 28.66 2053.42 28.27 2059.98
28.12 2066.54 28.27 2073.1 28.24 2079.66 27.89 2086.22 27.74 2092.78 27.56
2099.34 27.25 2105.9 26.8 2112.46 26.41 2125.58 25.44 2132.14 25.05 2138.7
24.71 2145.26 24.55 2151.82 24.45 2158.39 24.37 2164.95 24.27 2171.51 24.06
2178.07 23.91 2184.63 23.71 2191.19 23.74 2197.75 23.87 2204.31 24.17
2210.87 24.42 2217.43 24.61 2223.99 24.39 2237.11 23.52 2243.67 23.17
2250.23 22.88 2256.79 22.43 2263.35 21.85 2269.91 21.06 2276.47 20.44
2283.03 20.17 2289.59 20.26 2296.16 20.28 2302.72 20.08 2309.28 20.08
2315.84 20.02 2322.4 19.76 2328.96 19.74 2335.52 19.59 2342.08 19.39 2348.64
19.24 2355.2 19.33 2361.76 19.13 2374.88 19.35 2381.44 19.56 2388 19.88
2394.56 20.04 2407.69 20.07 2414.25 19.89 2420.81 19.79 2427.37 19.36
2433.93 19.25 2440.49 19.26 2447.05 19.08 2453.61 19.05 2460.17 18.99
2466.73 19.39 2473.29 19.69 2479.85 19.67 2486.41 19.63 2492.97 20.03
2499.53 20.59 2506.1 19.64 2512.66 19.3 2525.78 19.51 2532.34 19.6 2538.9

19.67 2545.46 19.71 2552.02 19.56 2558.58 19.72 2565.14 19.92 2571.7 19.99
2578.26 20.35 2584.82 20.84 2591.38 20.71 2597.95 20.17 2604.51 19.66
2611.07 19.25 2617.63 19.12 2624.19 19.07 2630.75 19.33 2637.31 19.28
2643.87 19.36 2663.55 19.1 2670.11 18.93 2676.67 18.69 2683.23 18.29 2689.79
18.05 2696.36 17.95 2702.92 17.32 2709.48 17.36 2716.04 17.37 2722.6 17.02
2735.72 15.84 2742.28 15.7 2748.84 15.48 2755.4 15.44 2761.96 15.73 2768.52
16 2775.08 15.92 2781.64 15.87 2788.2 15.71 2794.77 15.6 2801.33 15.74
2807.89 15.5 2814.45 15.52 2821.01 15.47 2827.57 15.35 2834.13 15.27 2840.69
15.12 2847.25 15.47 2853.81 16.14 2860.37 16.55 2866.93 16.98 2873.49 17.48
2880.05 17.95 2886.61 18.48 2893.18 19.05 2899.74 19.55 2906.3 19.64 2912.86
19.42 2919.42 18.77 2925.98 18.76 2932.54 18.97 2939.1 18.08 2945.66 17.7
2952.22 18.02 2958.78 17.86 2965.34 16.96 2970 12.9 2990 8.1 3010 6.3 3030
8.6 3050 12 3068 18.7 3069.68 17.47 3083.44 19.32 3103.12 18.72 3175.28
20.64 3267.13 24.53 3313.06 23.81 3345.86 24.31 3372.1 25.5 3398.35 27.77
3411.47 27.99 3437.71 29.62 3457.39 30.11 3503.32 29.6 3621.41 31.49 3739.5
31.85 3811.67 33.19 3851.03 32.19 3929.76 32.18 3942.88 31.51 4047.86 31.32
4100.34 32.05 4159.39 31.72 4198.75 32.43 4277.48 31.94 4323.4 32.52 4362.77
32.08 4507.1 33.01 4520.22 33.54 4631.75 33.91 4671.12 34.48 4710.48 34.09
4776.09 34.48 4795.77 33.74 4835.13 34.09 4867.94 33.72 4940.1 33.78 5064.76
34.56 5071.32 33.51 5077.88 33.08 5091 33.61 5104.12 34.98 5176.29 36.23
5222.21 36.36 5241.9 37.22 5300.94 38.33 5307.5 38.09 5314.06 36.58 5320.62
35.83 5327.18 35.76 5340.3 36.86 5359.99 36.89 5373.11 38.46 5399.35 38.99
5438.71 38.93 5464.96 39.46 5484.64 39.19 5701.14 41.5 5819.23 44.46 5825.79
45.06 5852.04 45.4 5871.72 46.54

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .095 2906.3 .055 3267.13 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2906.3
3267.13 1067.1 1087.9 1112.89 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 1922.21 29 F

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 98105.8

INPUT Description: 88
Station Elevation Data num= 304
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 35.15 19.65 35.21 32.75
34.92 45.85 34.87 52.4 34.72 65.5 34.68 78.6 34.27 85.15 34.17 98.25 34.23
111.35 33.77 124.45 33.68 131 33.26 144.1 32.73 150.65 32.66 163.75 32.92
170.3 33.35 176.85 33.49 189.95 34.22 196.49 34.27 203.04 34.14 216.14 34.35
222.69 34.23 235.79 34.52 242.34 34.41 255.44 34.57 261.99 34.3 275.09 33.46
281.64 33.31 294.74 33.42 301.29 33.13 314.39 33.37 327.49 31.81 334.04
31.68 340.59 31.95 347.14 31.99 360.24 31.65 379.89 31.51 406.09 31.26
432.29 31.17 458.49 30.66 465.04 30.72 484.69 30.52 510.89 29.96 550.19
30.19 569.84 30.71 576.39 31.01 589.48 31.9 615.68 33.1 641.88 33.81 648.43
34.15 661.53 34.49 681.18 34.69 700.83 34.63 713.93 34.29 733.58 33.23
746.68 32.71 753.23 32.55 785.98 30.92 805.63 30.45 812.18 30.53 818.73
30.21 825.28 30.21 858.03 29.59 871.13 29.04 877.68 28.91 890.78 29.22

923.53 29 949.72 29.33 962.82 29.64 969.37 29.37 1021.77 29.35 1093.82 28.86
1113.47 28.79 1120.02 28.67 1133.12 28.7 1172.42 29.98 1178.97 29.71 1192.07
29.69 1198.62 29.34 1211.72 28.42 1231.37 27.48 1237.92 26.93 1244.47 26.71
1251.02 26.64 1264.12 26.94 1277.22 26.88 1296.87 26.34 1309.97 26.23
1316.52 26.03 1323.07 26.03 1336.16 25.69 1342.71 25.75 1355.81 26.12
1382.01 25.38 1388.56 25.53 1408.21 24.72 1414.76 24.93 1440.96 24.81
1447.51 24.25 1454.06 23.22 1460.61 22.8 1467.16 23.1 1473.71 23.26 1480.26
23.06 1486.81 22.64 1499.91 21.61 1526.11 21.12 1552.31 20.84 1558.86 20.5
1571.96 20.46 1578.51 20.67 1591.61 21.81 1598.16 22.26 1617.81 24.37
1624.36 24.66 1630.91 24.59 1637.46 24.1 1650.56 22.87 1676.76 21.24 1683.31
20.92 1696.41 21.06 1748.8 20.65 1768.45 21.06 1781.55 21.09 1801.2 20.66
1827.4 20.85 1833.95 21.03 1847.05 21.91 1853.6 22.46 1873.25 24.63 1879.8
25.25 1886.35 25.68 1892.9 25.94 1899.45 26.06 1912.55 26.78 1919.1 26.68
1925.65 25.78 1932.2 25.26 1938.75 24.6 1951.85 24.59 1958.4 24.84 1964.95
25.28 1971.5 25.92 1978.05 26.22 1984.6 26.11 1991.15 25.8 2010.8 23.61
2023.9 21.86 2043.55 19.54 2063.2 17.88 2069.75 17.17 2109.04 16.25 2115.59
16.34 2135.24 15.93 2148.34 16.25 2154.89 16.57 2161.44 16.49 2167.99 16.86
2174.54 17.68 2187.64 19.52 2194.19 20.22 2213.84 21.27 2226.94 21.32
2253.14 19.91 2259.69 19.39 2266.24 19.14 2272.79 19.12 2279.34 19.27
2285.89 19.66 2292.44 20.3 2298.99 20.54 2305.54 20.51 2312.09 19.63 2318.64
18.56 2331.74 16.85 2338.29 15.81 2344.84 15.32 2351.39 15.19 2357.94 15.34
2377.59 17.6 2384.14 18.11 2397.24 19.58 2403.79 20.49 2410.34 21 2416.84
21.08 2423.34 20.77 2429.84 20.21 2436.33 19.41 2442.83 18.08 2449.33 16.47
2455.83 15.39 2462.33 15 2488.33 14.64 2494.83 15.38 2507.83 16.08 2527.32
16.82 2533.82 17.35 2540.32 18.02 2546.82 18.23 2553.32 18.11 2559.82 17.69
2566.32 17.59 2572.82 17.7 2579.32 16.6 2581.67 15.97 2590 8.1 2610 7 2630 8
2667.02 16.19 2670.31 17.5 2676.8 18.77 2689.8 19.16 2702.8 19.82 2722.3
20.2 2741.8 21.08 2748.3 21.22 2780.79 23.1 2787.29 23.38 2793.79 23.91
2806.79 24.64 2813.29 24.89 2826.29 25.53 2852.28 26.25 2858.78 26.2 2871.78
26.41 2884.78 26.52 2897.78 26.86 2910.78 27.27 2917.28 27.32 2930.27 27.75
2943.28 27.68 2949.79 27.48 2956.31 27.04 2975.84 26.29 2982.35 26.62
2995.37 26.71 3008.39 27.15 3014.9 27.49 3040.95 27.87 3047.46 28.06 3060.48
28.91 3073.5 30.12 3080.01 30.83 3093.03 32.59 3099.54 33.12 3106.05 33.31
3119.07 33.28 3132.1 32.25 3145.12 30.89 3151.63 29.82 3158.14 28.92 3164.65
29.4 3171.16 29.37 3177.67 29.04 3184.18 29.16 3190.69 29.12 3203.71 29.28
3210.22 29.49 3223.25 29.28 3229.76 29.37 3236.27 29.61 3249.29 30.3 3275.33
31.01 3288.35 30.72 3294.86 30.77 3307.89 30.31 3327.42 30.11 3346.95 30.06
3359.97 31.09 3366.48 31.72 3379.5 32.4 3386.01 32.54 3399.04 32.32 3412.06
32.28 3425.08 31.91 3431.59 31.91 3444.61 32.16 3457.63 31.86 3470.65 31.27
3477.17 31.45 3483.68 31.79 3496.7 32.21 3509.72 32.1 3516.23 32.27 3529.25
31.9 3535.76 31.56 3548.78 31.14 3587.85 31.6 3607.38 32.1 3626.91 31.52
3659.47 31.65 3665.98 31.77 3672.49 31.72 3679 31.5 3685.51 31.89 3692.02
31.72 3698.53 31.83 3711.55 31.75 3718.06 31.57 3724.57 31.57 3731.08 31.19
3737.59 31.32 3744.11 31.71 3763.64 31.84

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .095 2546.82 .055 2676.8 .095

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2546.82
2676.8 1679.58 1694.82 1701.02 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 1978 26.22 F

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 96410.98

INPUT
Description: 87
Station Elevation Data num= 402
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 31.59 6.55 31.84 13.1 31.9
19.65 31.82 26.2 31.85 32.75 31.91 39.3 32.06 45.85 31.92 52.4 32.07 58.95
32.07 65.5 32.15 72.05 32.04 78.6 31.89 85.15 31.8 91.7 31.83 98.25 32.01
104.8 32.05 111.35 32.11 117.9 31.88 124.45 31.81 131 31.72 137.55 31.59
144.1 31.32 150.65 31.07 157.2 30.77 163.75 30.45 170.3 30.1 176.85 29.77
183.4 29.63 189.95 29.6 203.05 29.35 209.6 29.36 222.7 29.15 229.25 29.12
235.8 29.24 242.35 29.18 248.9 28.93 255.45 28.87 262 28.93 268.55 28.74
275.1 28.53 288.2 28.76 294.75 28.18 301.3 27.16 307.85 27.05 314.4 26.79
320.95 26.08 327.5 25.47 334.05 25.37 340.6 25.07 353.7 25.02 360.25 25.27
366.8 25.37 373.35 26.14 379.9 26.14 386.45 25.84 393 25.67 406.1 25.74
412.65 25.49 425.75 25.27 432.3 25.19 438.85 25.33 445.4 25.5 451.95 25.55
458.5 25.51 465.05 25.67 471.6 25.62 478.15 25.62 484.7 25.7 491.25 25.93
497.8 25.78 504.35 25.58 510.9 25.54 517.45 25.56 524 25.54 530.55 25.62
537.1 25.78 543.65 25.77 556.76 25.86 563.3 25.86 569.86 25.94 576.41 26.05
582.96 26.18 589.51 26.48 596.06 26.46 602.61 26.42 609.16 26.42 615.71 26.4
622.26 26.13 628.81 26.23 635.36 26.25 641.91 26.08 648.46 26.11 655.01
25.92 661.56 25.69 668.11 25.71 674.66 25.59 687.76 24.94 694.31 24.59
700.86 24.04 707.41 23.62 713.96 23.32 720.51 22.43 727.06 21.9 733.61 21.66
740.16 21.61 746.71 21.59 753.26 22.3 759.81 22.57 766.36 22.88 772.91 22.99
779.46 23.14 786.01 23.26 792.56 23.4 799.11 23.51 805.66 23.66 812.21 23.79
818.76 23.77 825.31 23.67 831.86 23.59 838.41 23.62 844.96 23.6 851.51 23.55
858.06 23.57 864.61 23.61 871.16 23.76 877.71 23.78 884.26 23.73 890.81 23.8
897.36 23.97 903.91 24.31 917.01 23.83 923.56 23.83 930.11 23.77 936.66
23.77 943.21 23.29 949.76 23.79 956.31 24.51 962.86 24.58 969.41 24.52
975.96 24.55 982.51 24.39 989.06 24.43 995.61 24.34 1002.16 24.14 1008.71
24.05 1015.26 23.89 1021.81 23.79 1028.36 23.61 1034.91 23.13 1041.46 22.71
1048.01 22.42 1054.56 22.31 1061.11 22.42 1067.66 22.97 1074.21 23.1 1080.76
23.28 1087.31 23.5 1093.86 23.55 1100.41 23.47 1106.96 23.33 1113.51 23.52
1120.06 23.62 1126.61 23.47 1133.16 23.21 1139.71 23.12 1152.81 22.87
1159.36 22.88 1165.91 22.64 1172.46 22.68 1185.56 22.69 1192.11 22.8 1198.66
22.75 1205.21 22.44 1211.76 22.26 1218.31 21.93 1224.86 21.8 1237.96 21.95
1244.51 22.09 1251.06 22.02 1270.71 21.26 1277.26 21.07 1283.81 20.65
1290.36 20.5 1296.91 20.12 1303.46 19.54 1310.01 19.6 1316.56 20.37 1323.11
21.09 1329.66 21.26 1336.21 21.24 1342.76 21.16 1349.31 21.13 1355.86 21.25
1362.41 21.46 1368.96 21.91 1375.51 22.68 1382.06 23.14 1388.61 23.3 1395.16
23.36 1401.71 23.21 1408.26 22.77 1421.36 21.82 1427.91 21.18 1434.46 20.87
1447.56 20.67 1454.11 20.6 1467.21 20.17 1473.76 19.8 1480.31 19.57 1486.86
19.64 1493.41 19.91 1499.96 20.02 1506.51 20.27 1513.06 20.76 1519.61 21.14
1532.71 21.95 1539.26 22.16 1545.81 22.04 1552.36 21.82 1558.91 21.48
1565.46 20.86 1572.01 20.15 1578.56 19.64 1585.12 19.5 1591.67 19.7 1598.21
20.24 1604.77 20.95 1611.32 21.81 1617.87 22.12 1624.42 22.11 1630.97 21.93
1637.52 21.23 1644.07 20.5 1650.62 19.83 1657.17 19.14 1663.72 18.48 1670.27
17.78 1676.82 17.17 1683.37 16.84 1689.92 16.55 1696.47 15.96 1703.02 15.51
1709.57 15.42 1722.67 15.42 1729.22 15.35 1735.77 15.17 1742.32 15.16
1748.87 15.27 1755.42 15.19 1768.52 14.72 1775.07 14.59 1781.62 14.59

1788.17 14.71 1794.72 15.22 1801.27 15.68 1807.82 15.65 1814.37 15.52
1820.92 15.56 1834.02 15.79 1840.57 15.86 1847.12 15.85 1853.67 15.79
1860.22 15.8 1866.77 16.04 1873.32 16.19 1879.87 16.46 1886.42 16.84 1899.52
17.08 1906.07 17.59 1912.62 18.24 1919.17 18.58 1925.72 18.75 1932.27 19.24
1938.82 19.89 1945.37 20.32 1951.92 20.77 1958.47 21.1 1965.02 21.08 1971.57
20.75 1978.12 20.27 1984.67 19.82 1991.22 19.39 1997.77 19.02 2004.32 18.76
2010.87 18.68 2017.42 18.76 2023.97 18.67 2030.52 18.23 2037.07 17.64
2043.62 17.31 2050.17 17.15 2056.72 16.93 2069.82 16.39 2076.37 16.21
2082.92 16.39 2089.47 16.87 2096.02 17.58 2102.57 18.46 2109.12 18.69
2115.67 17.87 2130 8.3 2150 7.9 2169 7.4 2190 9 2200 9.9 2217.06 17.66
2220.47 18.11 2227.02 18.44 2246.67 18.27 2253.22 18.42 2259.77 18.74
2266.32 19.37 2272.87 20.17 2279.42 21.26 2285.97 22.56 2292.52 23.41
2299.07 23.62 2305.62 23.46 2318.73 22.8 2331.83 22.69 2351.48 22.27 2371.13
21.57 2377.68 21.54 2384.23 21.9 2397.33 23.03 2410.43 23.77 2416.98 24.03
2423.53 24.44 2436.63 24.86 2443.18 25.29 2449.73 25.46 2456.28 25.49
2469.38 26.11 2495.58 26.51 2508.68 26.91 2515.23 27.01 2521.78 27.25
2574.18 27.74 2600.38 27.28 2606.93 27.3 2620.03 27 2626.58 26.97 2633.13
27.22 2646.23 27.45 2652.78 27.38 2692.08 27.77 2698.63 27.97 2711.73 27.96
2744.48 28.6 2764.13 28.73 2770.68 28.97 2783.79 29.15 2809.99 29.27 2823.09
29.56 2829.64 29.51 2842.74 29.66 2849.29 29.5 2862.39 29.61 2882.04 29.43
2895.14 29.72 2914.79 29.74 2921.34 29.63 2927.89 29.73 2934.44 29.64
2954.09 29.89 2960.64 30.2 2967.19 30.29 2980.29 30.2 2986.84 30.42 2993.39
30.5 3019.59 30.16 3032.69 29.81 3039.24 29.5 3052.34 29.2 3058.89 29.38
3065.44 28.77 3071.99 26.34 3078.54 23.61 3085.09 23.49 3098.19 28.4 3104.74
29.05 3111.29 29.5 3124.39 29.46 3130.94 29.02 3137.49 28.82 3150.59 28.75
3170.24 29.05 3189.89 28.8 3202.99 28.91 3209.54 29.11 3216.09 28.93 3229.19
29.13 3248.85 29.9 3268.5 30.16 3275.05 30.15 3281.6 30.37 3288.15 30.44
3294.7 30.73 3307.8 30.81 3320.9 31.21 3327.45 31.31

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .095 1958.47 .055 2292.52 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1958.47
2292.52 1563.06 1558.27 1560.01 .3 .5 Ineffective Flow num= 4
 Sta L Sta R Elev Permanent
 0 589.51 26.4 T 589.51 962.86 24.58 F
 2299 2420 23.62 F
 3019 3500 30.2 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 94852.71

INPUT
Description: 86 Approach Summer St
Station Elevation Data num= 67
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 30.9 104.79 27.4 157.19
30.99 203.03 30.79 268.53 27.41 334.02 28.1 386.41 27.12 399.51 26.07 425.71
26.49 445.36 27.7 484.66 25.33 523.95 25.21 556.7 25.73 596 24.97 609.09
25.07 628.74 24.19 661.49 25.85 674.59 27.28 707.33 27.29 720.43 26.76
818.67 31.18 877.62 34.44 969.31 34.35 1303.38 33.99 1377.76 31.42 1515.52

27.32 1594.24 28.02 1640.16 27.7 1653.28 28.54 1732 26.91 1745.12 27.67
1758.24 29.8 1817.28 29.8 1836.96 29.13 1922.24 30.8 1968.16 31.09 1981.28
31.99 2060 31.36 2099.36 32.94 2289.61 34.66 2401.13 34.52 2512.65 29.05
2545.45 30.97 2683.21 30.2 2801.29 28.18 2932.49 25.78 2991.53 22.05 3075.8
17.41 3126.6 15.67 3150.8 15.79 3155.1 12.91 3172.7 5.19 3193 2.98 3207 3.85
3226.3 7.35 3259 10.7 3272.5 16.55 3309.4 16.52 3376 18.4 3447.6 19.1
3555.66 22.03 3692.97 24.31 4170.3 32.3 4183.38 34.16 4294.54 35.5 4529.94
41.36 4613.05 42.44

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 2932.49 .055 3692.97 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2932.49
3692.97 85.28 49.74 36.25 .3 .5 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 2932 30 T
 3555.66 4613.05 29 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 94802.97

INPUT Description: 85.7 US Face Summer St
Station Elevation Data num= 84
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 34.89 49.961 35.87 184.847
32.42 199.838 33.1 214.822 32.61 239.803 30.71 334.731 32.75 494.597 30.13
569.539 30.23 594.519 32.98 599.514 33.13 614.498 31.79 629.489 32.87
644.473 31.34 649.475 31.35 654.47 32.7 659.465 32.97 709.426 29.29 739.401
29.38 789.355 26.66 829.496 27.02 834.521 27.56 899.826 26.26 929.97 27.8
985.233 27.29 1020.402 24.431025.427 24.52 1045.52 23.011050.546
22.031120.876 22.46 1135.952 21.53 1151.02 22.821161.071 25.061281.646
32.811402.214 31.6 1422.315 30.321432.358 28.511442.408 27.661452.451
26.171462.501 25.94 1477.577 24.561507.713 25.41542.882 29.061598.145
29.891643.365 29.48 1668.483 28.761683.551 29.381753.889 30.161773.983
29.11879.482 29.7 1894.558 30.531990.007 29.792005.083 302165.845
32.072396.945 29.14 2447.183 24.282562.419 29.052567.781 26.922576.208
20.722576.973 20.28 2582.336 17.712590.762 16.822590.762 8.952594.593
6.972603.785 5.06 2613.744 3.82623.702 4.642633.661 4.232643.619 7.572649.748
10.03 2650.514 10.19 2651.28 17.712654.344 18.122668.899 22.32681.922 27.07
2783.675 22.032818.752 19.683039.212 24.313319.792 31.643324.802 31.44
3349.859 34.213394.948 34.833409.978 35.843725.634 43.34

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .0952562.419 .0552681.922 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
2562.4192681.922 97.12 92.48 89.62 .5 .8 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 02572.377 29 T
2672.7293725.634 27 T

Skew Angle = 40

BRIDGE

RIVER: Taunton River
REACH: Main Stem RS: 94760.71

INPUT
Description: 85.5 Summer St/ Woodward
Distance from Upstream XS = 23
Deck/Roadway Width = 35
Weir Coefficient = 2.6
Bridge Deck/Roadway Skew = 40
Upstream Deck/Roadway Coordinates
 num= 16
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord 2125.007 32.81
2306.56 29.66 2373.206 28.18 2449.044 27.48 2547.098 29.29 2550.928 32.12
2580.804 31.59 24.042664.302 29.97 23.442665.069 29.97 2730.948 29.04
2731.025 26.72 2808.319 24.68 2887.221 23.96 2986.041 24.86 3107.076 26.93
3261.051 31.16

Upstream Bridge Cross Section Data
Station Elevation Data num= 84
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 34.89 49.961 35.87 184.847
32.42 199.838 33.1 214.822 32.61 239.803 30.71 334.731 32.75 494.597 30.13
569.539 30.23 594.519 32.98 599.514 33.13 614.498 31.79 629.489 32.87
644.473 31.34 649.475 31.35 654.47 32.7 659.465 32.97 709.426 29.29 739.401
29.38 789.355 26.66 829.496 27.02 834.521 27.56 899.826 26.26 929.97 27.8
985.233 27.29 1020.402 24.431025.427 24.52 1045.52 23.011050.546
22.031120.876 22.46 1135.952 21.53 1151.02 22.821161.071 25.061281.646
32.811402.214 31.6 1422.315 30.321432.358 28.511442.408 27.661452.451
26.171462.501 25.94 1477.577 24.561507.713 25.41542.882 29.061598.145
29.891643.365 29.48 1668.483 28.761683.551 29.381753.889 30.161773.983
29.11879.482 29.7 1894.558 30.531990.007 29.792005.083 302165.845
32.072396.945 29.14 2447.183 24.282562.419 29.052567.781 26.922576.208
20.722576.973 20.28 2582.336 17.712590.762 16.822590.762 8.952594.593
6.972603.785 5.06 2613.744 3.82623.702 4.642633.661 4.232643.619 7.572649.748
10.03 2650.514 10.19 2651.28 17.712654.344 18.122668.899 22.32681.922 27.07
2783.675 22.032818.752 19.683039.212 24.313319.792 31.643324.802 31.44
3349.859 34.213394.948 34.833409.978 35.843725.634 43.34

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .0952562.419 .0552681.922 .085

Bank Sta: Left Right Coeff Contr. Expan.
 2562.4192681.922 .5 .8
Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 02572.377 29 T
2672.7293725.634 27 T
Skew Angle = 40

Downstream Deck/Roadway Coordinates
num= 16
Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord 1348.238 32.81
1529.791 29.66 1596.437 28.18 1672.275 27.48 1771.095 29.29 1774.159 32.12
1801.737 31.59 24.041889.066 29.97 23.441889.449 29.97
1954 29.04 1954.179 26.72 2032.316 24.68 2110.452 23.96 2209.272 24.86
2331.073 26.93 2485.048 31.16

Downstream Bridge Cross Section Data
Station Elevation Data num= 424
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 27.83 10.043 27.6 15.068
27.62 25.111 28.04 50.222 27.93 60.265 28.09 65.29 27.97 70.308 28.07 90.401
27.63 100.444 27.89 110.487 27.42 125.555 27.45 130.58 27.3 140.623 26.58
155.691 26.07 165.734 25.29 170.759 25.04 180.802 24.22 205.913 21.91 210.93
21.58 220.981 21.68 225.998 21.37 231.024 21.68 241.067 22 251.109 22.78
256.135 23.05 271.203 22.75 281.246 22.31 296.314 22.56 306.357 21.77
311.382 22.1 316.399 22.85 321.425 22.83 326.442 22.97 331.467 22.93 341.51
23.67 346.536 24.45 351.553 24.76 356.578 25.64 361.604 25.98 366.621 26.02
371.646 25.83 376.664 25.81 381.689 26.39 386.715 26.54 406.8 26.66 416.843
27.36 421.868 27.57 431.911 27.59 436.936 27.18 441.954 26.39 446.979 26.31
457.022 25.5 462.047 25.26 477.108 25.52 482.133 25.28 492.176 25.6 497.201
26.39 502.226 27.39 507.244 27.94 512.269 29.05 522.312 29.21 542.398 28.5
547.423 28.04 562.491 27.27 572.534 26.55 587.602 24.96 592.62 24.99 597.645
24.7 602.67 24.91 607.688 24.8 617.731 25.71 622.756 25.8 632.799 25.79
637.824 26.28 657.91 27.23 662.935 27.31 672.978 27.05 683.021 26.22 688.046
26.08 693.071 26.34 698.089 26.89 703.114 26.92 708.131 26.38 713.157 25.53
723.2 25.53 733.242 27.57 738.268 28.26 748.31 28.58 753.336 28.6 773.421
29.56 778.447 29.56 788.49 29.79 793.515 29.63 798.532 29.61 803.558 29.74
808.575 30.07 813.6 30.25 823.643 30.39 833.686 30.26 838.711 30.32 843.737
30.24 848.754 29.85 853.78 28.85 858.797 27.32 863.822 27.19 868.848 28.24
873.865 27.71 878.891 28.1 883.908 28.1 888.933 28.74 898.976 28.58 904.001
29.16 909.027 29.25 914.044 29.75 919.069 29.82 924.087 29.23 929.112 29.45
939.155 29.35 944.18 29.59 969.291 29.75 974.309 29.47 984.359 29.38 989.377
29.621014.488 29.95 1019.513 30.281029.556 30.371039.599 30.011054.667
29.781059.692 30.11 1064.71 30.171079.778 29.541089.821 29.531094.846
29.821104.889 29.84 1109.914 29.541119.957 29.841124.982 29.86 1130
30.041135.025 30.01 1140.043 30.291145.068 29.621150.093 29.91155.111
29.781160.136 29.85 1165.154 29.721170.179 29.391180.222 29.341215.375
29.991220.401 29.89 1230.444 30.071240.486 30.551255.554 30.821275.648
31.741285.691 31.86 1295.734 31.661300.759 31.411305.776 31.551310.802
31.471315.827 31.6 1325.87 31.581330.887 31.761335.913 31.651350.981
32.21355.998 32.07 1366.049 32.271371.066 32.511376.092 32.061381.109
31.81386.134 31.82 1391.16 31.681396.177 31.71 1406.22 31.41426.313
31.651431.331 31.62 1451.424 30.681456.442 30.791461.467 30.541476.535
30.461481.553 30.26 1491.603 29.491501.646 29.241511.689 29.321516.714
29.731526.757 28.78 1531.782 28.9 1536.8 28.521546.843 28.411551.868
28.511561.911 28.22 1566.936 27.911576.979 27.911582.004 27.281592.047
26.931597.065 27.03 1602.09 26.451612.133 27.061622.176 25.761637.244
24.821642.269 24.83 1647.293 24.551652.312 24.511662.355 24.681672.405
24.621677.423 24.23 1682.448 23.641687.466 23.381697.516 23.31712.584
22.231722.627 21.21 1732.67 20.891737.695 20.881747.738 19.961752.756
19.361757.781 19.58 1762.806 18.961767.824 18.93 1787 20.721798.672
20.281804.035 17.71 1812.461 16.821812.461 8.951820.888 2.671835.443
1.391849.997 2.46 1867.616 5.61872.213 10.191872.979 17.711876.043

18.121890.598 22.3 1928.54 20.171933.565 20.121938.583 20.781943.608
21.761948.625 22.4 1953.651 22.431958.676 21.91963.694 20.681968.719
19.551973.744 19.2 1978.762 19.671983.787 19.891988.805 20.04 1993.83
20.071998.855 20.07 2003.873 19.962008.898 19.982013.916 20.112018.941
20.412023.966 20.5 2028.984 20.52034.009 20.632039.034 20.582044.052
20.622049.077 20.37 2054.094 19.86 2059.12 19.452064.145 19.382069.164
19.462074.188 21.33 2079.205 23.532084.231 24.62089.256 24.832094.273
24.642099.299 24.34 2104.324 24.742109.343 25.072114.367 24.772119.385 24.02
2124.41 23.61 2129.435 23.682134.453 23.582139.478 23.252144.495
23.242149.521 23 2154.546 22.782159.564 22.832164.589 22.972169.614
23.152174.632 23.27 2179.657 23.372184.674 23.43 2189.7 23.662194.725
23.792199.743 24.18 2209.785 24.992214.811 25.362219.836 25.922224.854
25.972229.879 25.98 2234.904 27.142239.922 27.62244.947 27.762249.965 27.74
2254.99 27.78 2260.015 27.882265.032 27.882270.058 27.952275.074
27.582280.101 27.26 2290.144 26.192295.169 26.042300.194 26.192305.212
26.252310.237 26.44 2315.254 26.45 2320.28 26.322325.305 26.52330.323
26.522340.365 26.69 2345.391 26.822350.416 26.712355.434 26.552360.459
26.632370.501 27.34 2375.527 27.542380.544 27.632385.571 27.552390.595
27.642395.613 27.53 2400.638 28.052405.655 28.16 2410.68 28.142415.706
28.222420.723 28.48 2425.749 28.772435.792 28.852440.817 29.092445.834 29.15
2450.86 29.35 2455.885 29.722460.902 29.942465.928 30.032470.945 30.24
2475.97 30.54 2480.996 30.612486.013 30.962491.039 31.032496.064
30.972501.081 31.32 2506.107 31.632511.124 31.67 2516.15 31.92521.175
31.972526.192 32.21 2531.219 32.432536.235 32.6 2541.26 32.822546.286
33.022551.303 33.28 2556.329 33.592561.354 33.882566.371 34.342571.397 34.56
2581.44 35.2 2586.465 35.312591.482 35.442596.508 35.162601.525 352606.551
35.43 2611.576 35.982616.593 36.482621.619 36.932626.636 37.152631.661 36.98
2636.687 37.042641.704 37.192646.729 37.292656.771 37.662661.798 38 2671.841
38.492676.866 38.752681.883 38.92686.908 38.952691.926 39.23 2696.95
39.422701.977 39.632706.993 39.91 2712.02 40.12717.045 40.24 2722.062
40.562727.088 40.862732.105 40.87 2737.13 40.992742.156 41.26 2747.173
41.392752.198 41.612757.216 41.792762.241 41.922767.267 42 2777.309
42.362792.377 42.742797.395 42.85 2802.42 42.992807.447 42.94 2812.463
43.162822.506 43.452827.531 43.662832.556 43.772842.599 43.95 2847.625
44.112852.642 44.152857.667 44.062862.685 43.94 2867.71 43.87 2877.753
43.442882.778 43.392887.796 43.42892.821 43.562897.847 43.75 2902.864
43.732907.889 43.672912.915 43.642917.932 43.652922.957 43.84 2927.975 43.95
2933 43.922938.026 44.022943.043 44.192948.068 44.28 2953.086 44.352963.136
44.742968.154 44.862973.178 45.01

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .095 1787 .0551890.598 .085

Bank Sta: Left Right Coeff Contr. Expan.
 17871890.598 .5 .8
Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 1785 28 T
1911.2812973.178 24 T
Skew Angle = 40
 Upstream Embankment side slope = 0 horiz. to 1.0 vertical Downstream
Embankment side slope = 0 horiz. to 1.0 vertical Maximum allowable
submergence for weir flow = .98

Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
 Energy
 W.S. Pro Method

 W.S.Pro Data
 Left Embankment
 El of the top of the embankment = 30
 El of the toe of the abutment = 9
 Right Embankment
 El of the top of the embankment = 30
 El of the toe of the abutment = 9
 Abutment Type = 4 Vert. abutments and sloping embankments with wingwalls
Slope of abutments = 4
 Top with of embankment = 35 Centroid station of bridge opening =
 Wing Wall Type = Angular wing walls
 Width = 25
 Angle = 45
 Radius =
 Guide Banks Type = No Guide Bank present
 Length =
 Offset =
 Angle =
 Optional Contraction and expansion coefficients
 At approach Section
 At Guide Bank
 At upstream outside
 At upstream inside (BU)
 At downstream inside (BD)
 Piers are Continuous for the width of the bridge
 Use Geometric mean as Friction Slope Method

Selected Low Flow Methods = W.S.Pro Method

High Flow Method
 Pressure and Weir flow
 Submerged Inlet Cd =
 Submerged Inlet + Outlet Cd = .8
 Max Low Cord =

Additional Bridge Parameters Add Friction component to Momentum
 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 94710.49

INPUT
Description: 85.3 DS FAce Summer St
Station Elevation Data num= 424
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 27.83 10.043 27.6 15.068
27.62 25.111 28.04 50.222 27.93 60.265 28.09 65.29 27.97 70.308 28.07 90.401
27.63 100.444 27.89 110.487 27.42 125.555 27.45 130.58 27.3 140.623 26.58
155.691 26.07 165.734 25.29 170.759 25.04 180.802 24.22 205.913 21.91 210.93
21.58 220.981 21.68 225.998 21.37 231.024 21.68 241.067 22 251.109 22.78
256.135 23.05 271.203 22.75 281.246 22.31 296.314 22.56 306.357 21.77
311.382 22.1 316.399 22.85 321.425 22.83 326.442 22.97 331.467 22.93 341.51
23.67 346.536 24.45 351.553 24.76 356.578 25.64 361.604 25.98 366.621 26.02
371.646 25.83 376.664 25.81 381.689 26.39 386.715 26.54 406.8 26.66 416.843
27.36 421.868 27.57 431.911 27.59 436.936 27.18 441.954 26.39 446.979 26.31
457.022 25.5 462.047 25.26 477.108 25.52 482.133 25.28 492.176 25.6 497.201
26.39 502.226 27.39 507.244 27.94 512.269 29.05 522.312 29.21 542.398 28.5
547.423 28.04 562.491 27.27 572.534 26.55 587.602 24.96 592.62 24.99 597.645
24.7 602.67 24.91 607.688 24.8 617.731 25.71 622.756 25.8 632.799 25.79
637.824 26.28 657.91 27.23 662.935 27.31 672.978 27.05 683.021 26.22 688.046
26.08 693.071 26.34 698.089 26.89 703.114 26.92 708.131 26.38 713.157 25.53
723.2 25.53 733.242 27.57 738.268 28.26 748.31 28.58 753.336 28.6 773.421
29.56 778.447 29.56 788.49 29.79 793.515 29.63 798.532 29.61 803.558 29.74
808.575 30.07 813.6 30.25 823.643 30.39 833.686 30.26 838.711 30.32 843.737
30.24 848.754 29.85 853.78 28.85 858.797 27.32 863.822 27.19 868.848 28.24
873.865 27.71 878.891 28.1 883.908 28.1 888.933 28.74 898.976 28.58 904.001
29.16 909.027 29.25 914.044 29.75 919.069 29.82 924.087 29.23 929.112 29.45
939.155 29.35 944.18 29.59 969.291 29.75 974.309 29.47 984.359 29.38 989.377
29.621014.488 29.95 1019.513 30.281029.556 30.371039.599 30.011054.667
29.781059.692 30.11 1064.71 30.171079.778 29.541089.821 29.531094.846
29.821104.889 29.84 1109.914 29.541119.957 29.841124.982 29.86 1130
30.041135.025 30.01 1140.043 30.291145.068 29.621150.093 29.91155.111
29.781160.136 29.85 1165.154 29.721170.179 29.391180.222 29.341215.375
29.991220.401 29.89 1230.444 30.071240.486 30.551255.554 30.821275.648
31.741285.691 31.86 1295.734 31.661300.759 31.411305.776 31.551310.802
31.471315.827 31.6 1325.87 31.581330.887 31.761335.913 31.651350.981
32.21355.998 32.07 1366.049 32.271371.066 32.511376.092 32.061381.109
31.81386.134 31.82 1391.16 31.681396.177 31.71 1406.22 31.41426.313
31.651431.331 31.62 1451.424 30.681456.442 30.791461.467 30.541476.535
30.461481.553 30.26 1491.603 29.491501.646 29.241511.689 29.321516.714
29.731526.757 28.78 1531.782 28.9 1536.8 28.521546.843 28.411551.868
28.511561.911 28.22 1566.936 27.911576.979 27.911582.004 27.281592.047
26.931597.065 27.03 1602.09 26.451612.133 27.061622.176 25.761637.244
24.821642.269 24.83 1647.293 24.551652.312 24.511662.355 24.681672.405
24.621677.423 24.23 1682.448 23.641687.466 23.381697.516 23.31712.584
22.231722.627 21.21 1732.67 20.891737.695 20.881747.738 19.961752.756
19.361757.781 19.58 1762.806 18.961767.824 18.93 1787 20.721798.672
20.281804.035 17.71 1812.461 16.821812.461 8.951820.888 2.671835.443
1.391849.997 2.46 1867.616 5.61872.213 10.191872.979 17.711876.043
18.121890.598 22.3 1928.54 20.171933.565 20.121938.583 20.781943.608
21.761948.625 22.4 1953.651 22.431958.676 21.91963.694 20.681968.719
19.551973.744 19.2 1978.762 19.671983.787 19.891988.805 20.04 1993.83
20.071998.855 20.07 2003.873 19.962008.898 19.982013.916 20.112018.941

20.412023.966 20.5 2028.984 20.52034.009 20.632039.034 20.582044.052
20.622049.077 20.37 2054.094 19.86 2059.12 19.452064.145 19.382069.164
19.462074.188 21.33 2079.205 23.532084.231 24.62089.256 24.832094.273
24.642099.299 24.34 2104.324 24.742109.343 25.072114.367 24.772119.385 24.02
2124.41 23.61 2129.435 23.682134.453 23.582139.478 23.252144.495
23.242149.521 23 2154.546 22.782159.564 22.832164.589 22.972169.614
23.152174.632 23.27 2179.657 23.372184.674 23.43 2189.7 23.662194.725
23.792199.743 24.18 2209.785 24.992214.811 25.362219.836 25.922224.854
25.972229.879 25.98 2234.904 27.142239.922 27.62244.947 27.762249.965 27.74
2254.99 27.78 2260.015 27.882265.032 27.882270.058 27.952275.074
27.582280.101 27.26 2290.144 26.192295.169 26.042300.194 26.192305.212
26.252310.237 26.44 2315.254 26.45 2320.28 26.322325.305 26.52330.323
26.522340.365 26.69 2345.391 26.822350.416 26.712355.434 26.552360.459
26.632370.501 27.34 2375.527 27.542380.544 27.632385.571 27.552390.595
27.642395.613 27.53 2400.638 28.052405.655 28.16 2410.68 28.142415.706
28.222420.723 28.48 2425.749 28.772435.792 28.852440.817 29.092445.834 29.15
2450.86 29.35 2455.885 29.722460.902 29.942465.928 30.032470.945 30.24
2475.97 30.54 2480.996 30.612486.013 30.962491.039 31.032496.064
30.972501.081 31.32 2506.107 31.632511.124 31.67 2516.15 31.92521.175
31.972526.192 32.21 2531.219 32.432536.235 32.6 2541.26 32.822546.286
33.022551.303 33.28 2556.329 33.592561.354 33.882566.371 34.342571.397 34.56
2581.44 35.2 2586.465 35.312591.482 35.442596.508 35.162601.525 352606.551
35.43 2611.576 35.982616.593 36.482621.619 36.932626.636 37.152631.661 36.98
2636.687 37.042641.704 37.192646.729 37.292656.771 37.662661.798 38 2671.841
38.492676.866 38.752681.883 38.92686.908 38.952691.926 39.23 2696.95
39.422701.977 39.632706.993 39.91 2712.02 40.12717.045 40.24 2722.062
40.562727.088 40.862732.105 40.87 2737.13 40.992742.156 41.26 2747.173
41.392752.198 41.612757.216 41.792762.241 41.922767.267 42 2777.309
42.362792.377 42.742797.395 42.85 2802.42 42.992807.447 42.94 2812.463
43.162822.506 43.452827.531 43.662832.556 43.772842.599 43.95 2847.625
44.112852.642 44.152857.667 44.062862.685 43.94 2867.71 43.87 2877.753
43.442882.778 43.392887.796 43.42892.821 43.562897.847 43.75 2902.864
43.732907.889 43.672912.915 43.642917.932 43.652922.957 43.84 2927.975 43.95
2933 43.922938.026 44.022943.043 44.192948.068 44.28 2953.086 44.352963.136
44.742968.154 44.862973.178 45.01

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .095 1787 .0551890.598 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
17871890.598 111.72 138.76 147.03 .5 .8 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent 0 1785 28 T
1911.2812973.178 24 T
Skew Angle = 40

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 94571.73

INPUT
Description: 85 Exit Summer St

Station Elevation Data num= 453
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 27.41 6.55 27.76 13.09 28.24
19.64 28.56 26.18 28.71 32.73 28.81 39.27 28.67 45.82 28.61 52.37 28.15
58.91 27.74 65.46 27.44 72 27.29 78.55 27.08 85.1 27.04 91.64 26.92 98.19
26.91 104.73 26.4 111.28 26.3 117.82 25.95 124.37 25.57 130.92 25.4 137.46
25.28 144.01 25.26 150.55 25.27 157.1 25.3 163.65 25.21 176.74 25.53 183.28
25.47 189.83 25.34 196.37 25.6 202.92 25.76 209.47 25.62 216.01 25.82 222.56
25.94 229.1 25.8 235.65 25.61 242.19 25.61 248.74 25.65 255.29 25.52 261.83
25.49 268.38 25.49 274.92 25.4 281.47 25.51 288.02 25.55 301.11 25.34
307.65 25.28 314.2 25.16 320.74 25.11 327.29 24.98 333.84 24.83 340.38 24.84
346.93 24.89 353.47 24.63 360.02 24.48 366.56 24.63 373.11 24.57 379.66
24.29 386.2 24.35 392.75 24.1 399.29 23.75 405.84 23.52 412.39 23.23 418.93
22.89 425.48 22.71 432.02 22.6 438.57 22.31 445.11 22.15 451.66 22.13 458.21
22.07 464.75 21.81 471.3 21.72 477.84 21.78 484.39 21.78 490.94 21.81 497.48
21.61 504.03 21.73 517.12 22.54 523.66 22.8 530.21 22.94 536.76 23.14 543.3
23.27 549.85 22.66 556.39 22.27 562.94 22.19 569.48 22.25 576.03 22.17
582.58 21.84 589.12 21.38 595.67 21.61 602.21 21.88 608.76 21.82 615.31
22.08 621.85 22.42 634.94 22.88 641.49 23.19 648.03 23.44 654.58 23.37
661.13 23.68 667.67 24.23 674.22 24.34 680.76 24.26 687.31 24.13 693.86
23.98 700.4 23.74 706.95 23.46 713.49 23.39 720.04 23.55 726.58 23.48 733.13
23.46 739.68 23.4 746.22 23.12 752.77 23.06 759.31 23.52 765.86 23.7 772.4
23.77 778.95 23.78 785.5 23.81 792.04 23.74 798.59 23.63 805.13 23.68
811.68 23.9 818.23 23.89 824.77 23.77 831.32 23.49 837.86 23.56 844.41 23.52
850.95 23.46 857.5 23.42 864.05 23.4 870.59 23.43 877.14 23.33 883.68 23.27
890.23 23.36 896.78 23.38 903.32 23.38 909.87 23.34 916.41 23.21 922.96
23.04 929.5 22.79 936.05 22.49 942.6 22.31 949.14 22.18 955.69 22.16 962.23
22.2 968.78 22.09 975.32 22.07 988.42 22.08 994.96 22.04 1001.51 22.32
1008.05 22.72 1014.6 23.14 1021.15 23.6 1027.69 24 1034.24 24.26 1047.33
24.95 1053.87 25.39 1060.42 25.63 1066.97 25.9 1073.51 26.2 1080.06 26.56
1086.6 27.21 1093.15 27.33 1099.69 27.27 1106.24 27.44 1112.79 27.66 1119.33
28.05 1125.88 28.37 1132.42 28.77 1145.52 29.74 1152.06 30.06 1158.61 30.51
1165.15 30.58 1171.7 31.09 1178.24 31.58 1184.79 31.87 1191.34 31.99 1197.88
32.06 1210.97 32.15 1217.52 32.23 1224.07 32.23 1230.61 31.96 1237.16 32.09
1243.7 32.2 1250.25 31.58 1256.79 30.36 1263.34 29.05 1269.89 28.29 1276.43
28.32 1282.98 27.7 1289.52 27.12 1296.07 27.24 1302.62 27.6 1309.16 27.85
1315.71 28.25 1322.25 28.55 1328.8 28.66 1335.34 28.6 1341.89 28.64 1348.44
28.77 1354.98 28.82 1361.53 28.81 1368.07 28.7 1374.62 28.32 1381.16 28.26
1387.71 28.17 1394.26 28.11 1400.8 28.18 1407.35 28.22 1413.89 28.38 1426.99
28.45 1433.53 28.74 1440.08 28.94 1446.62 29.06 1459.71 29.15 1466.26 29.07
1472.81 29.06 1479.35 28.95 1485.9 28.81 1498.99 28.41 1505.54 28.14 1512.08
28.02 1518.63 27.99 1525.17 27.99 1531.72 27.95 1538.26 27.88 1544.81 27.75
1551.36 27.65 1557.9 27.65 1564.45 27.58 1570.99 27.57 1577.54 27.7 1590.63
27.86 1603.72 27.97 1610.27 28.06 1616.81 28.21 1623.36 28.41 1629.91 28.65
1636.45 28.86 1643 28.97 1649.54 29.19 1656.09 29.37 1662.63 29.58 1669.18
29.66 1675.73 29.8 1682.27 29.9 1695.36 29.81 1708.46 29.92 1715 29.89
1721.55 29.83 1728.09 29.66 1734.64 29.61 1747.73 29.61 1754.28 29.57
1760.82 29.5 1773.91 29.57 1780.46 29.59 1793.55 29.86 1800.1 29.91 1806.64
30.05 1813.19 30.11 1819.73 30.03 1826.28 30.25 1832.83 30.4 1839.37 30.59
1845.92 30.72 1852.46 30.87 1859.01 31.05 1865.55 31.09 1872.1 31.2 1878.65
31.15 1891.74 31.2 1898.28 31.29 1904.83 31.43 1911.38 31.43 1917.92 31.34
1924.47 31.37 1931.01 31.27 1937.56 31.35 1944.1 31.3 1957.2 31.15 1963.74
31.06 1970.29 30.99 1976.83 30.89 1983.38 30.83 1989.93 30.94 1996.47 30.95
2003.02 30.78 2009.56 30.71 2022.65 30.63 2029.2 30.63 2035.75 30.6 2048.84
30.69 2055.38 30.85 2068.47 30.53 2075.02 30.58 2081.57 30.53 2088.11 30.55

2094.66 30.5 2101.2 30.52 2107.75 30.5 2120.84 30.39 2127.39 30.44 2133.93 30.37 2140.48 30.23 2147.02 30.04 2153.57 30.04 2160.12 30.26 2166.66 30.05 2173.21 29.78 2179.75 29.46 2192.84 28.96 2199.39 28.8 2205.94 28.76 2212.48 28.65 2219.03 28.67 2225.57 28.62 2232.12 28.5 2245.21 28.39 2251.76 28.28 2258.3 28.08 2264.85 28.18 2271.39 28.05 2277.94 27.9 2284.49 27.7 2291.03 27.26 2297.58 26.72 2304.12 26.63 2310.67 26.44 2317.21 25.93 2323.76 25.49 2330.31 25.1 2343.4 24.55 2349.82 24.3 2358.7 23.75 2405.3 21.05 2426.5 17.28 2430.2 13.53 2445.7 .37 2466.4 -6.48 2485 -4.97 2519.1 -2.55 2528.1 .57 2538.9 1.72 2560.6 14.59 2567.2 19.62 2596.5 18.88 2649.9 17.16 2700.7 16.13 2748.7 19.04 2769.1 19.35 2827.9 18.48 2875.7 21.13 2888.55 21.24 2895.11 21.21 2901.67 21.14 2908.23 21.26 2914.78 21.41 2921.34 21.49 2927.9 21.48 2934.46 21.57 2941.01 21.86 2947.57 22.21 2954.13 22.69 2960.69 23.37 2967.25 23.64 2973.8 23.83 2980.36 23.86 2986.92 23.93 2993.48 24.1 3000.03 24.12 3006.59 24.07 3013.15 23.8 3026.27 23.5 3032.82 23.47 3045.94 23.38 3052.5 23.57 3059.05 23.57 3065.61 23.38 3072.17 23.11 3078.73 22.89 3091.84 22.51 3098.4 22.39 3104.96 22.4 3111.52 22.29 3118.07 22.05 3124.63 22.04 3131.19 22.14 3137.75 22.08 3144.31 22.05 3150.86 22.23 3157.42 22.74 3163.98 22.88 3170.54 23.49 3177.09 24.7 3183.65 25.18 3196.77 25.24 3203.33 25.48 3209.88 25.79 3216.44 26.13 3223 26.6 3229.56 27.23 3236.11 27.58 3249.23 28.01 3255.79 28.27 3262.35 28.71 3268.9 28.81 3275.46 29.12 3282.02 29.21 3288.58 29.68 3295.13 30.03 3301.69 30.32 3308.25 30.78 3314.81 31.04 3321.37 31.36 3327.92 31.87 3334.48 32.12 3341.04 32.68 3347.6 32.86 3354.16 33.31 3360.71 33.61 3367.27 33.88 3373.83 34.33 3380.39 34.62 3386.94 35.13 3393.5 35.72 3400.06 36.5 3406.62 36.89 3413.18 37.4 3419.73 38.45 3426.29 38.91 3432.85 39.34 3439.41 39.86 3445.96 40.36 3452.52 40.88 3459.08 41.29 3465.64 41.52 3472.2 41.73 3478.75 41.92 3485.31 42.34 3491.87 42.6 3498.43 42.81 3504.98 42.98 3511.54 43.05 3518.1 43.03 3524.66 43.12 3531.22 43.33 3537.77 43.59 3544.33 43.75 3550.89 43.81 3557.45 43.92 3564 43.77 3570.56 43.52 3577.12 43.59

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .093 2405.3 .055 2567.2 .09
 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2405.3 2567.2 1383.91 1376.7 1373.13 .3 .5 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 1132 28.8 T
 3000 3577.12 28.8 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 93195.04

INPUT
Description: 84
Station Elevation Data num= 342
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 37.26 6.56 37.18 13.12 36.97 19.68 36.73 26.23 36.44 32.79 36.44 39.35 36.47 45.91 36.51 52.47 36.43 59.03 36.59 65.59 36.74 72.15 36.78 78.7 36.83 85.26 36.78 91.82 36.5 98.38 36.17 104.94 36.02 111.5 35.83 118.06 35.7 124.62 35.77 131.17 35.33 137.73 35.34 144.29 35.54 150.85 36.13 157.41 36.44 163.97 36.87 170.53 37.08 177.09 37.13 183.64 37.21 190.2 37.21 196.76 37.28 203.32 37.42 209.88 37.6

216.44 37.85 223 37.85 229.55 37.74 236.11 37.73 242.67 37.8 249.23 37.62
255.79 37.44 262.35 37.32 268.91 37.29 275.47 37.16 282.02 37.02 288.58
36.78 295.14 36.65 301.7 36.65 308.26 36.57 314.82 36.32 321.38 36.42
327.94 36.37 334.49 36.27 341.05 36.37 347.61 36.37 354.17 36.24 360.73
36.22 367.29 36.2 373.85 36.26 380.41 36.58 386.96 36.96 393.52 37.26 400.08
37.55 406.64 37.84 413.2 38.05 419.76 38.03 426.32 37.79 432.87 37.5 439.43
37.54 445.99 37.33 452.55 37.34 459.11 37.57 465.67 37.71 472.23 37.63
478.79 37.51 485.34 37.41 491.9 37.44 498.46 37.34 505.02 37.16 511.58 37.2
518.14 37.29 524.7 37.47 531.26 37.62 537.81 37.37 544.37 37.26 550.93 37.37
557.49 37.68 564.05 37.85 570.61 37.59 577.17 37.68 583.72 37.7 590.28 37.55
596.84 36.98 603.4 36.84 609.96 36.67 616.52 36.43 623.08 36.32 629.64 36.26
636.19 36.14 642.75 36.01 649.31 35.8 655.87 35.71 662.43 35.63 668.99 35.47
675.55 35.38 682.11 35.4 688.66 35.45 695.22 35.48 701.78 35.43 708.34 35.43
714.9 35.57 721.46 35.37 728.02 35.6 734.58 35.76 741.13 35.8 747.69 36.07
754.25 36.46 760.81 37.17 767.37 37.49 773.93 37.62 780.49 37.54 787.04
37.42 793.6 37.14 800.16 36.29 806.72 35.39 813.28 35.09 819.84 34.83 826.4
34.67 832.96 34.71 839.51 34.82 846.07 35 852.63 35.36 859.19 35.56 865.75
35.82 872.31 35.96 878.87 36.22 885.43 36.29 891.98 36.35 898.54 36.74 905.1
37.04 911.66 37.44 918.22 37.07 924.78 36.95 931.34 36.92 937.9 37.02 944.45
36.97 951.01 36.88 957.57 36.56 964.13 36.19 970.69 35.9 977.25 35.57
983.81 35.2 990.36 34.93 996.92 34.75 1003.48 34.68 1010.04 34.64 1016.6
34.65 1023.16 34.67 1029.72 34.66 1036.28 34.53 1042.83 34.46 1049.39 34.14
1055.95 33.53 1062.51 32.56 1069.07 31.14 1075.63 29.93 1082.19 29.67
1088.74 29.88 1095.3 30.08 1101.86 30.07 1108.42 30.09 1114.98 30.11 1121.54
30.06 1128.1 29.93 1134.66 29.68 1141.21 29.67 1147.77 29.81 1154.33 30.09
1160.89 30.26 1167.45 30.46 1174.01 30.62 1180.57 30.98 1187.12 31.19
1193.68 31.41 1200.24 31.64 1206.8 31.93 1213.36 32.32 1219.92 32.86 1226.48
33.48 1233.04 34.24 1239.59 34.76 1246.15 35.04 1252.71 35.24 1259.27 35.37
1265.83 35.46 1288.35 35.69 1426.04 35.73 1498.17 36.85 1504.73 36.34
1550.62 35.91 1576.85 36.67 1662.09 35.14 1780.11 37.72 1832.57 36.92
1845.68 36.31 1858.79 36.51 1878.46 34.63 1924.36 32.83 1970.26 32.17
2016.16 29.95 2094.84 29.13 2121.07 28.43 2127.62 28.69 2147.29 30.55
2186.63 30.6 2212.86 29.82 2225.97 28.76 2278.43 28.01 2291.54 28.62 2311.21
30.41 2330.88 31.06 2370.22 29.79 2448.9 27.58 2639.05 28.18 2665.28 28.79
2691.51 28.62 2698.06 28.28 2730.85 28.81 2743.96 27.96 2816.09 28.95
2848.87 28.13 2901.32 28.64 2920.99 29.43 2973.45 28.75 2986.56 28.66
3084.91 24.75 3130.81 24.79 3143.92 24.51 3150.48 24.75 3242.28 25.59
3261.95 25.25 3301.29 26.55 3314.4 26.63 3353.74 27.97 3399.64 27.68 3412.75
27.38 3432.42 25.84 3438.98 24.98 3445.54 23.29 3452.1 22.99 3471.77 23.13
3511.11 20.16 3642.24 20.09 3661.91 19.74 3668.47 20.07 3688.14 23.1 3701.25
25.5 3707.81 25.68 3714.37 27.35 3720.92 28.27 3734.04 27.86 3747.15 26.5
3766.82 25.77 3786.49 26.44 3799.61 28.24 3819.28 28.85 3825.83 28.37
3838.95 28.72 3845.5 28.45 3852.06 29.03 3891.4 28.13 3904.52 28.33 3950.41
26.52 3989.75 26.65 4015.98 25.81 4022.54 26.21 4035.65 25.56 4061.88 25.96
4081.55 26.58 4160.23 26.53 4350.23 26.39 4389.54 26.48 4422.29 25.84
4468.14 23.09 4527.09 23.49 4559.84 22.1 4572.94 20.9 4586.04 20.13 4625.34
16.39 4664.65 16.51 4671.2 16.85 4677.75 17.67 4684.3 18.35 4690 18.3 4700
12.3 4740 9 4765 9.8 4790 9 4815 8.8 4830 12.7 4841.5 15.49 4880.8 15.55
4887.35 16.34 4907 20.29 4913.55 21.17 4926.65 21.7 4972.51 17.27 4992.16
16.52 5018.36 16.53 5057.66 15.8 5077.31 16.48 5096.96 18.59 5110.06 19.59
5155.91 24.41 5175.56 25.84 5267.27 26.54 5313.12 27.9 5319.67 27.75 5332.77
26.54 5345.87 26.31 5398.27 28.99 5444.12 28.97 5470.32 29.25 5476.88 29.04
5575.13 30.89 5581.68 30.64 5601.29 31.91 5614.36 31.71 5842.99 33.99
5856.05 34.49 5875.65 34.69 5908.31 33.75 5960.57 33.94 5986.7 34.32 6050.05

34.06 6056.58 33.77 6063.12 33.68 6069.65 33.3 6076.18 33.06 6082.71 32.88
6089.24 32.68 6095.78 32.87 6102.31 32.76

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .095 4389.54 .055 5175.56 .095

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 4389.54
5175.56 1691.41 1644.24 1589.83 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 3852 28.3 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 91550.79

INPUT
Description: 83 Approach RR Br
Station Elevation Data num= 161
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 37.41 52.45 34.82 137.68
33.89 150.8 32.74 222.92 34.58 236.03 33.17 288.48 32.9 314.71 34.08 340.93
35.11 373.71 38.48 393.38 41.69 439.28 42.7 465.5 40.9 498.29 41.64 517.95
42.86 531.07 42.57 570.41 43.11 590.07 44.81 708.09 47.75 721.2 47.53
1140.81 57.28 1271.94 56.76 1376.84 52.67 1521.08 51.25 1625.99 48.66 1639.1
50.91 1645.66 51.24 1658.77 49.65 1744 46.85 1770.23 46.94 1829.24 43.65
2117.72 39.48 2275.07 37.69 2288.19 38.26 2301.3 36.9 2517.66 36.77 2543.89
35.84 2589.78 37.75 2642.23 37.99 2694.69 38.43 2747.14 35.56 2773.36 32.88
2930.72 31.5 3081.52 28.24 3278.21 27.36 3337.22 30.11 3481.46 27.18 3488.02
26.65 3514.24 26.3 3533.91 25.46 3547.02 25.52 3560.14 24.93 3566.69 24.09
3573.25 23.91 3579.81 22.69 3606.03 19.94 3619.15 19.27 3625.7 16.92 3638.81
16.89 3645.37 18.54 3651.93 19.19 3665.04 19.4 3671.6 21.69 3697.82 22.4
3710.94 23.94 3737.16 20.72 3763.39 20.09 3776.5 17.55 3783.06 16.88 3796.17
16.64 3809.28 14.64 4209.22 14.88 4215.78 15.39 4222.33 16.54 4235.45 20.32
4274.78 19.76 4386.24 23.67 4635.38 27.77 4661.6 28.83 4694.38 28.68 5146.48
31.79 5153 31.29 5158.06 31.64 5217.08 27.42 5223.64 26.37 5282.67 26.34
5308.91 26.99 5394.17 29.3 5433.52 26.57 5466.31 21.54 5580.19 16.87 5621.49
16.09 5725.9 19.36 5769.77 8.22 5781.51 6.88 5801.8 6.75 5824.05 4.6 5846.24
4.41 5853.69 4.11 5877.12 6.96 5895.61 12.56 5896.32 18.09 5911.99 18.42
5918.54 19.05 5964.37 17.13 5977.46 15.78 5997.1 14.91 6036.38 17.04 6049.48
16.37 6062.57 14.85 6114.94 15.12 6134.58 17.67 6167.32 19.82 6173.86 19.84
6239.33 17.08 6272.06 20.28 6317.89 21.14 6357.17 21.21 6389.91 22.27
6448.83 20.7 6468.47 21.65 6553.57 18.77 6599.4 19.61 6632.14 21.13 6736.88
22.13 6815.44 22.75 6848.18 22.95 6880.91 22.37 7110.05 22.87 7116.59 22.2
7201.7 22.89 7280.26 27.26 7332.63 25.95 7352.27 24.49 7430.84 24.88 7470.12
26.46 7489.76 26.33 7529.04 28.47 7581.41 27.42 7587.96 27.88 7594.5 27.72
7607.6 25.19 7620.69 25.54 7653.42 26.01 7666.52 27.33 7686.16 26.38 7692.7
26.64 7699.25 27.67 7738.53 27.48 7771.26 29.03 7849.82 28.45 7889.1 30.21
7895.65 29.95 7902.2 28.93 7934.93 26.24 7941.48 27.76 8013.49 29.43 8020.04
30.14 8039.68 28.96 8089.75 31.36 8096.3 31.17

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

0 .093 5725.9 .055 5918.54 .095

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 5725.9 5918.54 103.47 107.37 104.58 .3 .5 Ineffective Flow num= 1 Sta L Sta R Elev Permanent
0 5000 28.3 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 91443.41

INPUT
Description: 82.7 US Face RR Br
Station Elevation Data num= 192
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 37.5 23.165 31.66 46.33 30.63 55.593 29.19 60.231 27.45 83.396 23.11 129.726 19.4 143.62 19.08 347.472 19.97 384.539 19.21 481.83 21.67 495.724 20.78 583.752 22.12 639.352 24.35 676.411 21.81 713.478 22.99 741.274 21.78 875.631 22.48 940.494 22.05 945.126 22.35 1019.252 21.61037.785 23.851051.687 24.491070.213 25.691172.143 25.5 1209.202 27.441213.841 28.211241.637 28.641283.335 26.38 1352.83 27.8 1408.422 27.031454.752 26.171510.345 21.811524.246 23.5 1542.78 23.38 1575.208 24.721755.895 27.21783.691 26.941802.224 26.241825.389 26.16 1885.613 22.541908.778 19.191918.041 18.25 1922.68 16.271927.311 15.11 1955.108 15.241978.273 17.732047.767 17.092080.195 16.572089.465 15.66 2094.097 14.682172.854 14.852205.282 16.572209.921 17.592214.552 17.83 2228.447 20.132233.086 21.392242.349 24.96 2256.25 27.682274.777 28.36 2284.047 27.712307.211 27.692330.376 28.482353.541 28.992358.173 28.54 2372.068 29.22376.706 30.32385.969 29.582390.601 30.012399.871 29.15 2404.502 29.472413.766 28.382423.036 29.162427.667 28.952432.299 30.26 2455.464 29.922464.727 29.26 2483.26 29.212487.891 28.362506.425 28.92 2534.228 29.362543.499 28.212580.579 27.952594.488 27.142603.758 28.99 2645.47 28.472668.649 29.98 2715 28.182733.541 28.422742.811 27.42 2798.432 27.162812.333 26.022821.604 24.012844.782 22.22909.674 20.35 2923.582 18.962932.854 18.782946.753 16.672960.663 16.222983.835 17.24 3053.365 19.843058.003 19.643062.635 19.383067.273 18.763071.905 18.34 3076.544 17.723079.401 16.613081.175 15.923085.814 14.133089.434 13.91 3090.276 12.233101.229 7.78 3109.41 8.223129.895 6.333137.362 5.25 3160.697 5.883165.583 5.73172.922 11.883174.315 14.023178.516 14.09 3183.154 15.323187.786 16.143201.695 15.173206.326 15.983215.596 15.73 3224.866 16.073229.504 15.493234.136 15.913243.407 15.673280.488 15.14 3285.126 15.853289.765 15.813294.396 15.083354.656 15.63387.098 16.74 3401.007 18.543419.547 19.573447.357 18.333465.898 20.833502.979 20.84 3512.249 19.163516.887 19.113526.158 20.593586.417 19.33618.858 22.94 3628.13 22.893642.038 21.453651.308 21.493660.579 20.833669.849 21.31 3693.028 23.573711.568 23.663730.108 25.143739.378 24.59 3744.01 22.84 3753.28 21.163767.189 20.42 3804.27 20.253818.179 21.974012.852 22.59 4031.393 23.354068.472 22.784082.382 23.444091.652 24.74124.101 25.83 4133.372 27.094156.542 26.834175.083 24.974221.441 25.834230.711 27.04 4258.521 26.594272.424 25.564295.603 26.784323.414 26.494365.133 29.06 4388.305 31.84406.845 31.194430.024 27.494485.645 29.164499.555 28.49 4508.824 27.374536.634 29.354629.336 30.414712.768 30.524726.676 29.46 4731.308 29.574740.584 27.934749.854 30.114754.487 30.134763.755 29.39 4782.297

31.134805.477 31.46

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .0933101.229 .0553187.786 .095

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
3053.3653187.786 115.34 121.17 129.47 .5 .8 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 03076.622 28 T
3187.6374805.477 28 T
Skew Angle = 45

BRIDGE

 RIVER: Taunton River
REACH: Main Stem RS: 91395.74

INPUT
Description: 82.5 RR Br
Distance from Upstream XS = 15
Deck/Roadway Width = 20
Weir Coefficient = 2.6
Bridge Deck/Roadway Skew = 45
Upstream Deck/Roadway Coordinates
 num= 7
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord 2466.388 28.63
3059.651 28.71 3081.571 29.36 3082.278 29.24 24.23182.688 29.24 24.23184.102
29.24 4375.577 29.36

Upstream Bridge Cross Section Data
Station Elevation Data num= 192
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 37.5 23.165 31.66 46.33
30.63 55.593 29.19 60.231 27.45 83.396 23.11 129.726 19.4 143.62 19.08
347.472 19.97 384.539 19.21 481.83 21.67 495.724 20.78 583.752 22.12 639.352
24.35 676.411 21.81 713.478 22.99 741.274 21.78 875.631 22.48 940.494 22.05
945.126 22.35 1019.252 21.61037.785 23.851051.687 24.491070.213 25.691172.143
25.5 1209.202 27.441213.841 28.211241.637 28.641283.335 26.38 1352.83 27.8
1408.422 27.031454.752 26.171510.345 21.811524.246 23.5 1542.78 23.38
1575.208 24.721755.895 27.21783.691 26.941802.224 26.241825.389 26.16
1885.613 22.541908.778 19.191918.041 18.25 1922.68 16.271927.311 15.11
1955.108 15.241978.273 17.732047.767 17.092080.195 16.572089.465 15.66
2094.097 14.682172.854 14.852205.282 16.572209.921 17.592214.552 17.83
2228.447 20.132233.086 21.392242.349 24.96 2256.25 27.682274.777 28.36
2284.047 27.712307.211 27.692330.376 28.482353.541 28.992358.173 28.54
2372.068 29.22376.706 30.32385.969 29.582390.601 30.012399.871 29.15 2404.502
29.472413.766 28.382423.036 29.162427.667 28.952432.299 30.26 2455.464
29.922464.727 29.26 2483.26 29.212487.891 28.362506.425 28.92 2534.228
29.362543.499 28.212580.579 27.952594.488 27.142603.758 28.99 2645.47
28.472668.649 29.98 2715 28.182733.541 28.422742.811 27.42 2798.432
27.162812.333 26.022821.604 24.012844.782 22.22909.674 20.35 2923.582
18.962932.854 18.782946.753 16.672960.663 16.222983.835 17.24 3053.365
19.843058.003 19.643062.635 19.383067.273 18.763071.905 18.34 3076.544
17.723079.401 16.613081.175 15.923085.814 14.133089.434 13.91 3090.276

12.233101.229 7.78 3109.41 8.223129.895 6.333137.362 5.25 3160.697
5.883165.583 5.73172.922 11.883174.315 14.023178.516 14.09 3183.154
15.323187.786 16.143201.695 15.173206.326 15.983215.596 15.73 3224.866
16.073229.504 15.493234.136 15.913243.407 15.673280.488 15.14 3285.126
15.853289.765 15.813294.396 15.083354.656 15.63387.098 16.74 3401.007
18.543419.547 19.573447.357 18.333465.898 20.833502.979 20.84 3512.249
19.163516.887 19.113526.158 20.593586.417 19.33618.858 22.94 3628.13
22.893642.038 21.453651.308 21.493660.579 20.833669.849 21.31 3693.028
23.573711.568 23.663730.108 25.143739.378 24.59 3744.01 22.84 3753.28
21.163767.189 20.42 3804.27 20.253818.179 21.974012.852 22.59 4031.393
23.354068.472 22.784082.382 23.444091.652 24.74124.101 25.83 4133.372
27.094156.542 26.834175.083 24.974221.441 25.834230.711 27.04 4258.521
26.594272.424 25.564295.603 26.784323.414 26.494365.133 29.06 4388.305
31.84406.845 31.194430.024 27.494485.645 29.164499.555 28.49 4508.824
27.374536.634 29.354629.336 30.414712.768 30.524726.676 29.46 4731.308
29.574740.584 27.934749.854 30.114754.487 30.134763.755 29.39 4782.297
31.134805.477 31.46

Manning's n Values num= 3 Sta n Val Sta n Val Sta n Val
 0 .0933101.229 .0553187.786 .095

Bank Sta: Left Right Coeff Contr. Expan.
 3053.3653187.786 .5 .8
Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 03076.622 28 T
3187.6374805.477 28 T
Skew Angle = 45

Downstream Deck/Roadway Coordinates
 num= 7
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord 2466.388 28.63
2988.233 28.71 3010.154 29.36 3010.861 29.24 24.2 3111.27 29.24 24.23112.684
29.24 4375.577 29.36

Downstream Bridge Cross Section Data
Station Elevation Data num= 244
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 42.28 9.27 39.98 18.547
37.25 32.455 35.12 41.726 34.4 60.274 34.2 64.912 33.21 69.543 31.52 78.821
29.85 88.091 27.37 92.73 26.46 106.639 25.24 115.909 22.94 129.825 20.92
157.642 18.9 162.275 18.25 185.46 17.76 194.73 17.16 227.186 17.25 241.094
17.5 296.737 17.32 306.008 17.72 319.916 17.86 324.555 18.25 361.643 17.5
370.92 17.61 384.828 18.49 389.467 19.16 412.647 20.01 431.194 19.99 440.464
19.57 468.281 19.53 486.829 20.27 500.738 19.5 593.468 20.42 612.015 19.76
621.285 18.55 658.38 17.23 681.566 18.62 709.384 19.39 737.201 22.99 741.841
23.1 751.109 24.16 783.566 26.02 802.114 26.16 811.384 25.75 825.293 24.54
843.839 23.43 857.75 23.26 867.018 22.56 885.566 22.65 890.205 22.29 899.475
22.76 922.66 22.5 950.479 23.6 978.296 26.481038.569 25.81 1052.48
25.511080.304 25.451126.669 24.98 1163.756 26.121173.034 25.891186.942 26.47
1214.76 271228.669 25.77 1247.216 26.271275.034 28.171302.851 28.521312.121
29.571363.125 30.39 1428.037 27.481455.855 24.661497.581 19.711534.676
17.931548.585 18.05 1557.855 19.321562.493 19.631576.403 19.391599.582
19.821650.585 24.82 1669.133 25.361729.406 25.041757.223 26.091785.042
25.741887.041 15.49 1914.86 14.571956.593 15.821970.501 14.462021.498

15.042100.319 14.56 2142.046 15.392151.322 16 2179.14 14.572183.779 15.63
2188.41 17.68 2202.319 26.242206.958 27.142225.505 26.472267.233 24.17
2271.87 23.54 2281.141 23.492290.418 22.482308.958 21.342318.235
21.582336.783 23.36 2341.414 24.582355.323 27.182373.871 29.092401.688
28.982420.236 27.47 2424.875 28.542438.783 27.52485.148 28.62531.514
31.012596.417 30.68 2605.696 30.242624.236 30.042642.782 28.252656.691
26.622679.878 25.07 2698.418 23.732712.334 23.532758.691 20.512763.331
20.572786.516 19.77 2800.425 19.452832.882 14.44 2865.33 14.052869.969
14.532902.425 14.18 2916.334 14.852925.612 16.12934.882 16.832976.608
18.852990.517 20.06 3018.724 13.913019.565 12.233030.518 7.783038.699
8.223059.184 6.33 3066.65 5.253089.986 5.883094.872 5.7 3102.21
11.883103.605 14.02 3138.889 24.663162.075 24.83194.531 24.433245.534
23.553366.082 24.95 3440.271 24.43449.543 24.993537.641 24.343565.456 24.16
3635.01 24.32 3648.918 24.953667.466 24.763672.096 23.353676.736
23.573681.375 24.49 3699.921 23.943723.101 24.343732.377 23.723755.557
24.053760.196 23.74 3769.468 24.193783.375 24.123797.291 23.33811.199 23.55
3815.83 22.81 3820.469 22.473829.747 24.193866.834 233876.112 23.253908.568
23.13 3917.838 23.473950.294 23.843954.934 24.213959.564 23.914019.844 24.81
4029.113 26.264061.572 29.684075.481 29.914089.389 29.214098.667 28.23
4103.305 28.234117.215 27.014140.393 26.94158.938 25.434172.849 25.69
4182.125 25.284186.758 25.424196.034 26.54205.306 26.494219.213 26.15
4242.399 27.19 4251.67 28.124260.949 27.784270.218 28.254284.125 28.01
4302.672 31.254330.499 31.834335.126 31.34 4349.04 30.954367.586 32.11
4376.861 31.624381.495 30.994390.771 30.644400.042 27.464404.681 26.34
4413.951 26.644418.589 25.644423.229 25.564437.138 27.284441.776 27.29
4446.409 27.974451.045 30.324460.313 30.284464.955 30.574478.864 32.37
4488.14 35.07 4497.41 36.524502.048 36.94515.958 36.284529.869 36.84 4543.774
35.384548.415 33.514557.685 32.154562.324 32.184566.961 31.59 4576.232 31.79
4585.51 31.364608.688 31.644617.966 32.34 4650.42 31.99 4659.688
32.644668.967 324678.237 32.634715.333 33.494733.882 32.84 4743.152
33.234757.061 32.714775.607 30.564780.248 30.58

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val 0 .12990.517 .0553138.889 .095

Bank Sta: Left Right Coeff Contr. Expan.
 2990.5173138.889 .5 .8
Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 02998.133 28 T
 31204780.248 28 T
Skew Angle = 45

Upstream Embankment side slope = 0 horiz. to 1.0 vertical Downstream
Embankment side slope = 0 horiz. to 1.0 vertical Maximum allowable
submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Piers = 3

Pier Data

```
Pier Station Upstream=3105.613 Downstream=3034.195
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 3 5.6 3 20.5 6.8 20.6 6.8 25.22 Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 3 5.6 3 20.5 6.8 20.6 6.8 25.22

Pier Data
Pier Station Upstream=3132.483 Downstream=3061.065
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 3 5.6 3 20.5 6.8 20.6 6.8 25.22
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 3 5.6 3 20.5 6.8 20.6 6.8 25.22

Pier Data
Pier Station Upstream= 3160.06 Downstream=3088.642
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 3 5.6 3 20.5 6.8 20.6 6.8 25.22
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 3 5.6 3 20.5 6.8 20.6 6.8 25.22

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data  Energy
 W.S. Pro Method

 W.S.Pro Data
 Left Embankment
 El of the top of the embankment = 28.6
 El of the toe of the abutment = 16.9
 Right Embankment
 El of the top of the embankment = 28.6
 El of the toe of the abutment = 16.9
 Abutment Type = 2 Vert. abutments and sloping embankments  Slope of
abutments =
 Top with of embankment = 20
 Centroid station of bridge opening =
 Wing Wall Type = No wing walls present
 Width =
 Angle =
 Radius =
 Guide Banks Type = No Guide Bank present
 Length =
 Offset =
 Angle =
 Optional Contraction and expansion coefficients
 At approach Section
 At Guide Bank  At upstream outside
 At upstream inside (BU)
 At downstream inside (BD)
```

```
 Piers are Continuous for the width of the bridge
 Use Geometric mean as Friction Slope Method

Selected Low Flow Methods = W.S.Pro Method

High Flow Method
 Pressure and Weir flow
 Submerged Inlet Cd =
 Submerged Inlet + Outlet Cd = .8
 Max Low Cord =

Additional Bridge Parameters
 Add Friction component to Momentum
 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION


RIVER: Taunton River
REACH: Main Stem RS: 91322.25

INPUT
Description: 82.3 - DS Face RR Br
Station Elevation Data num= 244
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  0 42.28 9.27 39.98 18.547
37.25 32.455 35.12 41.726 34.4  60.274 34.2 64.912 33.21 69.543 31.52 78.821
29.85 88.091 27.37  92.73 26.46 106.639 25.24 115.909 22.94 129.825 20.92
157.642 18.9  162.275 18.25 185.46 17.76 194.73 17.16 227.186 17.25 241.094
17.5  296.737 17.32 306.008 17.72 319.916 17.86 324.555 18.25 361.643 17.5
370.92 17.61 384.828 18.49 389.467 19.16 412.647 20.01 431.194 19.99  440.464
19.57 468.281 19.53 486.829 20.27 500.738 19.5 593.468 20.42  612.015 19.76
621.285 18.55 658.38 17.23 681.566 18.62 709.384 19.39  737.201 22.99 741.841
23.1 751.109 24.16 783.566 26.02 802.114 26.16  811.384 25.75 825.293 24.54
843.839 23.43 857.75 23.26 867.018 22.56  885.566 22.65 890.205 22.29 899.475
22.76 922.66 22.5 950.479 23.6  978.296 26.481038.569 25.81 1052.48
25.511080.304 25.451126.669 24.98 1163.756 26.121173.034 25.891186.942 26.47
1214.76 271228.669 25.77 1247.216 26.271275.034 28.171302.851 28.521312.121
29.571363.125 30.39 1428.037 27.481455.855 24.661497.581 19.711534.676
17.931548.585 18.05 1557.855 19.321562.493 19.631576.403 19.391599.582
19.821650.585 24.82 1669.133 25.361729.406 25.041757.223 26.091785.042
25.741887.041 15.49  1914.86 14.571956.593 15.821970.501 14.462021.498
15.042100.319 14.56 2142.046 15.392151.322 16 2179.14 14.572183.779 15.63
2188.41 17.68 2202.319 26.242206.958 27.142225.505 26.472267.233 24.17
2271.87 23.54 2281.141 23.492290.418 22.482308.958 21.342318.235
21.582336.783 23.36 2341.414 24.582355.323 27.182373.871 29.092401.688
28.982420.236 27.47 2424.875 28.542438.783 27.52485.148 28.62531.514
31.012596.417 30.68 2605.696 30.242624.236 30.042642.782 28.252656.691
26.622679.878 25.07 2698.418 23.732712.334 23.532758.691 20.512763.331
20.572786.516 19.77 2800.425 19.452832.882 14.44 2865.33 14.052869.969
14.532902.425 14.18 2916.334 14.852925.612 16.12934.882 16.832976.608
18.852990.517 20.06 3018.724 13.913019.565 12.233030.518 7.783038.699
```

8.223059.184 6.33 3066.65 5.253089.986 5.883094.872 5.7 3102.21
11.883103.605 14.02 3138.889 24.663162.075 24.83194.531 24.433245.534
23.553366.082 24.95 3440.271 24.43449.543 24.993537.641 24.343565.456 24.16
3635.01 24.32 3648.918 24.953667.466 24.763672.096 23.353676.736
23.573681.375 24.49 3699.921 23.943723.101 24.343732.377 23.723755.557
24.053760.196 23.74 3769.468 24.193783.375 24.123797.291 23.33811.199 23.55
3815.83 22.81 3820.469 22.473829.747 24.193866.834 233876.112 23.253908.568
23.13 3917.838 23.473950.294 23.843954.934 24.213959.564 23.914019.844 24.81
4029.113 26.264061.572 29.684075.481 29.914089.389 29.214098.667 28.23
4103.305 28.234117.215 27.014140.393 26.94158.938 25.434172.849 25.69
4182.125 25.284186.758 25.424196.034 26.54205.306 26.494219.213 26.15
4242.399 27.19 4251.67 28.124260.949 27.784270.218 28.254284.125 28.01
4302.672 31.254330.499 31.834335.126 31.34 4349.04 30.954367.586 32.11
4376.861 31.624381.495 30.994390.771 30.644400.042 27.464404.681 26.34
4413.951 26.644418.589 25.644423.229 25.564437.138 27.284441.776 27.29
4446.409 27.974451.045 30.324460.313 30.284464.955 30.574478.864 32.37
4488.14 35.07 4497.41 36.524502.048 36.94515.958 36.284529.869 36.84 4543.774
35.384548.415 33.514557.685 32.154562.324 32.184566.961 31.59 4576.232 31.79
4585.51 31.364608.688 31.644617.966 32.34 4650.42 31.99 4659.688
32.644668.967 324678.237 32.634715.333 33.494733.882 32.84 4743.152
33.234757.061 32.714775.607 30.564780.248 30.58

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .12990.517 .0553138.889 .095

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
2990.5173138.889 49.58 50.95 49.51 .5 .8 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 02998.133 28 T
 31204780.248 28 T
Skew Angle = 45

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 91271.3

INPUT
Description: 82 Exit RR Br
Station Elevation Data num= 233
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 35.84 137.39 36.97 235.53
38.52 268.24 39.96 477.6 37.88 503.77 39.47 700.05 41.48 732.76 42.52 752.39
41.88 765.47 42.22 791.64 41.06 804.73 41.4 824.35 45.92 830.9 46.44 837.44
47.61 843.98 47.86 857.07 45.86 876.69 46.05 896.32 43.8 902.86 45.82
909.41 46.62 915.95 48.59 922.49 51.3 929.03 52 942.12 49.31 961.75 52.51
968.29 54.32 974.83 54.7 1020.63 54.8 1072.97 50.63 1118.77 51.77 1151.48
48.16 1249.62 44.43 1269.24 43.08 1360.88 42.09 1367.43 41.38 1380.54 36.7
1387.1 35.99 1406.76 37.7 1420.57 37.49 1459.93 34.54 1479.61 30.97 1499.29
25.77 1512.41 24.32 1545.21 19.62 1558.33 18.22 1591.13 17.13 1715.78 17.45
1728.9 17.88 1781.38 17.47 1801.06 16.93 1814.18 17.68 1827.3 17.18 1879.78
17 1925.7 18.05 1945.39 18.22 1971.63 20.01 1991.31 20.75 2017.55 20.79
2030.67 20.07 2056.91 20.48 2122.51 23.45 2214.36 20.63 2266.84 17.9 2332.44

17.58 2352.12 19.65 2391.48 22.27 2424.28 23.86 2522.69 26.26 2614.53 25.89
2667.01 27.21 2706.37 26.37 2732.61 26.67 2804.78 25.3 2870.38 24.75 2896.62
25.22 2942.54 24.91 2975.34 25.5 2988.46 25.07 2995.02 25.31 3008.14 24.84
3027.82 25.57 3073.74 25.31 3126.23 27.85 3185.27 29.76 3237.75 30.6 3263.99
30.57 3336.15 28.39 3408.32 23.76 3421.44 22.11 3487.04 17.04 3513.28 17.24
3532.96 16.8 3565.76 17.96 3578.88 19.35 3592 19.97 3651.04 25.04 3677.29
25.23 3696.97 24.36 3703.53 23.22 3716.65 23.23 3736.33 22.07 3756.01 20.05
3762.57 20.41 3788.81 23.77 3815.05 24.93 3834.73 24.39 3867.53 22.24
3893.77 21.18 3920.01 17.92 3939.7 17 3979.06 17.48 4024.98 15.15 4051.22
15.24 4077.46 16.32 4103.7 15.54 4116.82 14.53 4169.3 14.16 4208.67 14.78
4293.95 14.55 4326.75 15.84 4346.43 14.81 4385.79 15.81 4392.35 16.63
4398.91 18.61 4412.03 23.8 4418.59 24.58 4444.83 23.47 4536.68 16.88 4543.24
17.5 4556.36 16.32 4569.48 15.91 4654.76 17.42 4707.24 21.58 4726.93 21.7
4759.73 19.97 4785.97 20.76 4805.65 20.6 4825.33 21.66 4884.37 28.18 4897.49
28.69 4930.29 28.72 4982.77 29.74 4989.34 29.29 5009.02 30.6 5041.82 30.06
5081.18 27.31 5113.98 23.95 5173.02 22.02 5192.7 20.32 5232.06 19.51 5258.31
17.96 5297.67 14.04 5310.79 13.78 5330.47 14.41 5389.51 13.78 5422.31 14.96
5435.43 16.19 5527.28 18.97 5553.52 20.45 5564.48 20.33 5574.58 14.69
5578.28 10.69 5593.29 3.27 5624.73 4.87 5649.74 2.5 5650.05 11.85 5653.66
15.81 5663.71 18.79 5684.72 20.02 5691.28 22.22 5697.84 23.65 5704.4 24.17
5724.08 23.49 5743.77 23.54 5789.69 24.69 5979.94 24.25 6084.9 25.04 6235.79
24.95 6281.71 23.68 6334.19 23.57 6386.67 25.14 6485.08 25.03 6537.56 27.17
6570.36 27.14 6629.35 28.52 6662.08 30 6681.73 29.61 6734.1 30.76 6858.49
31.74 6950.15 31.32 6969.79 30.3 6976.33 28.7 6995.98 28.84 7022.16 26.1
7028.71 25.03 7035.26 24.59 7054.9 25.36 7067.99 26.61 7081.08 28.57 7094.18
29.86 7153.1 28.9 7212.02 30.11 7251.3 28.92 7270.94 27.88 7284.04 28.89
7303.68 26.77 7329.87 27.9 7342.96 28 7356.05 28.97 7447.71 31.44 7467.35
31.02 7519.73 32.47 7526.27 33.05 7532.82 32.96 7559.01 35.07 7637.57 37.48
7650.66 37.35 7696.49 39.46 7716.13 40.8 7755.41 42.51 7768.51 43.62 7807.79
45.74 7840.52 49.06 7879.8 51.24 7925.63 55.73 7945.27 57.18 8030.38 65.88
8076.21 69.38 8180.96 72.68 8194.05 72.54 8207.15 73.19 8444.69 76.65

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .095 5553.52 .055 5704.4 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 5553.52
5704.4 3090.08 3016.84 2959.28 .3 .5 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 5435 28 T
 5980 8444.69 28 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 88254.45

INPUT
Description: 81 DS Nemasket River Trib
Station Elevation Data num= 388
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 50.83 26.2 50.37 39.3 50.41
78.59 50.08 117.89 49.03 130.99 49.26 157.19 49.21 170.29 48.53 189.93 48.71
255.43 47.69 261.98 47.9 268.53 47.88 275.08 47.6 281.63 47.6 294.73 47.15

307.83 47.2 327.47 46.53 347.12 46.27 386.42 45.27 406.07 44.94 419.17 44.32
432.27 43.24 445.36 42.63 465.01 41.01 497.76 39.87 517.41 38.36 530.51
36.73 537.06 36.09 550.16 35.5 556.71 35.48 563.26 35.7 569.8 35.7 582.9
36.19 602.55 35.89 628.75 34.91 648.4 34.34 654.95 34.33 674.6 33.63 746.64
32.3 753.19 32.36 772.84 31.84 812.14 31.39 844.88 30.68 864.53 30.94 877.63
30.55 897.28 30.51 903.83 30.34 910.38 29.95 975.87 29.74 988.97 29.35
1015.17 30.55 1021.72 30.63 1034.82 30.16 1080.66 31.23 1093.76 31.08
1106.86 30.65 1113.41 30.78 1133.06 30.19 1146.16 29.99 1152.71 29.6 1159.26
29.45 1165.81 29.64 1172.36 30.09 1178.91 30.09 1192.01 29.37 1205.1 29.59
1211.65 29.91 1224.75 29.86 1231.3 29.53 1237.85 30.47 1244.4 30.92 1250.95
30.94 1257.5 30.68 1264.05 30.02 1270.6 29.65 1277.15 29.69 1290.25 29.16
1342.64 29.36 1362.29 29.72 1368.84 30.19 1395.04 31.04 1408.14 31.16
1421.24 30.98 1447.43 31.45 1467.08 31.17 1493.28 31.52 1552.23 31.28
1558.78 31.47 1584.97 30.9 1604.62 30.02 1617.72 30.31 1637.37 29.66 1663.57
29.42 1670.12 29.86 1683.22 30.23 1696.31 29.64 1709.41 29.35 1722.51 27.51
1729.06 26.88 1735.61 26.67 1742.16 26.99 1748.71 27.73 1755.26 28.14
1761.81 28.02 1788.01 26.87 1794.56 27.08 1801.11 27.51 1807.66 27.62
1814.21 28.02 1820.76 28.18 1833.85 28.13 1840.4 28.4 1860.05 28.39 1879.7
28.86 1886.25 28.83 1892.8 28.59 1905.9 28.43 1912.45 28.52 1925.55 29.96
1932.1 30.83 1938.65 30.87 1945.19 31.23 1951.74 31.87 1958.29 31.14 1964.84
30.11 1977.94 29.22 1984.49 28.01 1991.04 27.59 1997.59 27.52 2036.89 24.86
2049.99 24.52 2063.09 23.61 2082.73 25.1 2095.83 26.51 2102.38 26.77 2108.93
26.81 2128.58 26.46 2135.13 25.46 2141.68 23.76 2148.23 22.91 2154.78 22.68
2159.27 22.35 2165.81 21.16 2172.36 20.76 2185.45 22.03 2191.99 22.18
2205.08 21.68 2218.17 21.82 2224.72 22.12 2231.26 22.1 2244.35 22.74 2250.89
23.23 2257.44 24.06 2270.53 27.33 2277.07 28.66 2283.62 29.34 2296.71 30.1
2316.34 30.44 2329.43 29.95 2335.98 29.28 2349.07 27.38 2355.61 26.84 2368.7
26.33 2388.33 26.43 2394.88 26.22 2407.97 26.38 2421.06 26.25 2447.24 26.56
2460.33 26.33 2466.87 26.6 2486.51 26.98 2499.59 27 2525.77 27.44 2538.86
27.87 2551.95 27.81 2571.59 27.99 2604.31 28.62 2610.86 28.6 2656.67 29.5
2669.76 30.03 2676.3 30.1 2682.85 30.4 2748.29 31.93 2794.11 32.45 2800.65
32.81 2846.47 34.26 2872.64 34.35 2905.37 34.76 2911.91 34.59 2925 34.97
2990.45 35.3 3003.54 35.5 3023.17 35.41 3036.26 35.69 3068.99 35.62 3088.62
35.8 3101.71 35.73 3114.8 35.89 3134.43 35.48 3180.22 34.89 3193.26 34.44
3206.29 33.72 3225.85 33.06 3238.89 32.31 3251.92 31.96 3271.48 30.82
3291.03 29.97 3304.07 29.59 3310.59 28.93 3323.62 28.14 3343.18 27.59
3362.74 26.66 3388.81 24.78 3395.33 24.18 3401.85 23.87 3414.88 23.66 3421.4
23.35 3427.92 22.34 3434.44 21.56 3447.47 20.45 3467.03 19.24 3480.07 18.03
3486.59 17.31 3493 16.8 3498 11.5 3530 5.8 3562 11.9 3578.45 19.09 3583.38
17.62 3590.88 16.9 3603.92 16.61 3616.95 16.79 3623.47 17.09 3636.51 17.17
3649.55 16.75 3656.06 16.82 3669.17 16.24 3675.72 16.16 3688.82 16.55
3695.37 17 3708.47 17.21 3728.12 16.97 3734.67 16.65 3747.77 16.32 3754.33
16.44 3760.88 16.79 3787.08 17.11 3806.73 16.95 3813.28 16.53 3819.83 15.61
3826.38 15.03 3846.04 15.3 3865.69 16.39 3878.79 16.54 3898.44 15.36 3904.99
15.31 3918.09 15.94 3931.2 16.14 3944.3 15.76 3950.85 15.85 3957.4 15.68
3970.5 14.9 3977.05 14.75 3996.7 14.93 4009.8 15.85 4016.35 15.8 4036.01
14.62 4042.56 14.62 4055.66 15.15 4062.21 16.84 4068.76 19.55 4075.31 22.85
4081.86 25.83 4088.41 27.13 4094.96 25.92 4101.51 24.27 4108.06 23.57
4114.62 23.21 4121.17 21.68 4127.72 20.74 4134.27 20.45 4140.82 19.72
4147.37 19.72 4153.92 20.12 4173.57 20.51 4186.67 21.04 4199.77 17.75
4212.88 12.45 4219.43 10.33 4225.98 8.56 4232.53 7.12 4245.63 3.49 4258.73
3.06 4271.83 1.16 4284.93 -1.67 4291.48 -2.74 4298.04 -3.08 4304.59 -4.14
4317.69 -6.58 4324.24 -8.41 4330.79 -9.85 4343.89 -10.15 4350.44 -9.8
4376.64 -10.37 4383.2 -10.19 4389.75 -9.7 4409.4 -7.02 4429.05 -3.81 4435.6

-1.74 4448.7 -2.34 4468.35 -.9 4474.91 .04 4481.46 1.57 4494.56 3.72 4507.66
4.78 4514.21 7.17 4520.76 9.16 4527.31 12.09 4540.41 13.84 4546.96 15.02
4553.51 16.42 4560.06 18.1 4566.62 20.39 4573.17 23.54 4579.72 22.59 4586.27
22.46 4612.47 22.79 4625.57 23.24 4632.12 23.83 4638.67 23.96 4645.22 24.51
4651.78 25.33 4658.33 26.44 4664.88 26.43 4671.43 25.57 4677.98 24.96
4684.53 23.78 4691.08 22.04 4704.18 18.15 4710.73 16.57 4717.28 10 5064.47
10 5071.02 15.66 5077.57 20.65 5084.12 24.06 5090.67 26.2 5097.23 26.71
5103.78 26.26 5110.33 26.02 5129.98 26.56 5149.63 26.17 5156.18 25.71
5162.73 24.51 5169.28 22.84 5175.83 21.98 5182.38 20.88 5188.94 17.32
5195.49 14.56 5202.04 14.74 5208.59 10 5496.82 10 5503.37 16.41 5509.92
20.29 5516.47 25.53 5523.02 30.19 5529.57 34.31 5536.12 36.11 5542.67 35.08
5549.22 34.77 5555.78 35.17 5562.33 35.17 5568.88 32.28 5575.43 29.63
5581.98 28.1 5595.08 27.21 5601.63 26.52 5608.18 26.07 5614.73 25.13 5627.44
26.16 5633.8 27.53 5646.51 28.67 5652.86 28.83 5678.29 28.23 5687.22 28.26
5693.57 28.75 5699.93 30.25 5706.28 30.05 5712.64 28.18

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 3467.03 .055 3578.45 .085
 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
3467.03 3578.45 973.59 1026.95 1087.56 .3 .5 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 3088 29 F
 4088 5712.64 27.13 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 87227.5

INPUT
Description: 80
Station Elevation Data num= 277
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 28.83 19.66 28.87 32.76
29.54 39.31 30.11 45.87 30.3 52.42 30.32 78.63 31.33 85.18 31.24 91.73 30.35
98.28 29.09 104.84 28.77 111.39 29.59 117.94 29.88 124.49 29.67 131.04 29.85
144.15 29.99 150.7 29.68 157.25 29.98 183.46 30.2 209.67 29.33 222.78 29.27
229.33 29.34 235.88 29.55 242.43 29.92 248.98 29.96 255.54 29.72 262.09
29.77 268.64 29.99 275.19 30 281.75 30.17 294.85 30.1 301.4 29.95 307.96
30.03 314.51 29.94 321.06 30.01 327.61 29.15 334.16 28.83 347.27 29.25
353.82 29.23 366.93 29.72 393.13 30.22 399.69 30.53 419.34 30.89 432.45
30.92 452.1 31.36 465.21 31.11 478.31 31.14 484.87 31.51 497.97 31.42 511.07
31.63 524.18 31.54 537.28 31.64 543.84 31.59 556.94 31.94 576.6 32.18
602.81 32.18 615.91 32.43 622.46 32.43 635.57 32.78 642.12 32.69 655.22
32.86 674.88 32.82 687.98 32.62 714.19 32.92 740.4 32.7 753.51 33.25 766.61
33.2 779.72 32.87 786.27 32.86 792.82 33.01 799.37 32.93 812.48 33.25 819.03
32.69 838.69 32.43 845.24 32.45 864.89 32.23 878 32.36 884.55 32.3 897.66
32.55 930.42 32.36 950.07 32.48 956.63 32.61 963.18 32.9 969.73 32.83 989.39
31.75 1048.32 29.68 1074.45 29.12 1087.51 28.63 1113.64 27.19 1120.18 26.92
1126.71 27.59 1133.24 30.05 1139.77 30.27 1146.31 29.83 1152.84 29.04
1159.37 30.06 1165.91 28.06 1172.44 25.82 1185.5 25.02 1192.04 25.38 1198.57
25.22 1205.1 25.31 1211.63 24.52 1218.17 25.25 1224.7 27.16 1231.23 26.4
1237.76 23.11 1244.3 21.85 1257.36 21.08 1263.9 20.59 1270.43 20.27 1290.03

20.13 1296.56 19.9 1309.62 19.24 1322.69 18.22 1329.22 17.85 1342.29 17.93
1348.82 17.66 1355.35 17.54 1368.42 17.78 1374.95 17.66 1388.02 16.7 1394.55
16.65 1407.61 18.02 1414.15 18.15 1427.21 17.61 1440.28 16.79 1453.34 15.61
1466.41 15.69 1486.01 16.5 1505.6 16.61 1525.2 16.38 1538.27 15.58 1544.8
15.84 1551.33 16.25 1557.86 16.36 1570.93 16.16 1584 17.03 1590.53 17.23
1603.59 17.08 1616.66 17.61 1623.19 17.75 1629.72 17.6 1639.86 16.94 1642.79
16.75 1649.32 16.37 1655.85 15.03 1663 16.8 1668 11.5 1700 5.8 1732 11.9
1744 18.9 1779.98 16.55 1793.04 15.07 1799.57 14.48 1812.64 13.91 1819.17
14.05 1825.7 14.36 1832.24 14.53 1838.77 14.33 1871.43 14.6 1891.03 14.52
1904.1 14.25 1910.63 14.84 1917.16 16.69 1923.69 19.65 1930.23 23.07 1936.76
24.24 1943.29 23.94 1949.82 23.11 1956.36 20.42 1962.89 17.25 1969.42 12.34
1975.95 9.14 1982.49 7.84 1989.02 6.72 1995.55 3.71 2002.09 -.43 2008.62 -
5.16 2015.15 -9.23 2021.68 -9.81 2028.22 -10.11 2047.81 -10.49 2073.94 -
10.41 2093.54 -10.06 2100.08 -10.09 2106.61 -9.86 2113.14 -8.29 2119.67 -
7.08 2126.21 -5.59 2132.74 -5.01 2139.27 -3.27 2145.8 -1.77 2152.34 -.44
2158.87 .37 2165.4 2.16 2171.93 4.46 2178.47 5.61 2185 6.53 2191.53 6.66
2198.06 8.13 2204.6 11.72 2211.13 17.66 2217.66 19.43 2224.2 19.17 2230.73
18.51 2237.26 17.56 2243.79 18.09 2250.33 19.4 2256.86 19.95 2263.39 20.31
2269.92 19.28 2276.46 18.9 2282.99 18.85 2289.52 19.36 2296.05 18.99 2302.59
16.42 2315.65 15.41 2328.72 15.1 2335.25 15.16 2341.78 15.06 2374.45 16.39
2380.98 18.48 2387.51 22.41 2394.04 22.72 2400.58 23.72 2407.11 21.79
2413.64 21.54 2420.18 22.04 2433.24 22.05 2439.77 22.29 2446.31 21.97
2452.84 22.1 2465.9 22.13 2472.44 22.32 2478.98 22.7 2485.52 22.24 2492.06
21.42 2498.6 21.26 2511.68 20.54 2518.22 18.42 2524.76 16.13 2531.3 15.32
2537.84 15.08 2544.38 15.07 2550.92 15.65 2564 16.11 2570.54 16.64 2577.08
18.96 2583.62 20.6 2590.16 21.04 2596.7 20.3 2616.32 16.63 2622.86 14.94
2629.4 0 2845.21 0 2851.75 14.59 2858.29 16.17 2864.83 19.77 2871.37 25.67
2877.91 30.36 2884.45 32.46 2890.99 32.93 2897.53 32.64 2904.07 33.01
2917.15 33.13 2936.77 33.84 2943.31 31.91 2949.85 29.6 2956.39 27.66 2962.93
26.28 2969.47 25.53 2976.01 25.28 2989.09 25.87 3002.17 25.82 3008.7 25.64
3034.86 25.77

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .0875 1663 .055 1744 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1663
1744 1820.81 1790.19 1770.77 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 1936 3034.86 24.24 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 85437.3

INPUT
Description: 79 Approach Titicut St
Station Elevation Data num= 381
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 30.23 19.66 30.06 32.77
29.56 52.43 29 65.54 28.37 72.09 28.22 91.75 27.22 98.31 27.08 104.86 26.32
111.41 25.91 124.52 26.04 131.08 25.9 144.18 25.79 150.74 25.62 163.84 25.62
170.4 25.52 176.95 25.57 190.06 24.32 196.61 24.03 209.72 24.38 216.27 24.32

222.83 23.88 229.38 24.11 235.94 24.04 255.6 23.33 262.15 23.32 268.7 23.08
275.26 22.7 288.37 22.8 301.47 22.73 308.03 22.56 314.58 22.9 327.69 22.94
334.24 22.71 340.8 23.05 347.35 23.11 360.46 23.68 380.12 23.9 386.67 24.09
406.33 24.2 412.89 24.46 419.44 24.41 426 24.11 432.55 23.19 445.66 23.48
452.21 22.76 458.76 21.51 465.32 20.4 471.87 19.58 484.98 19.43 511.19 19.88
517.75 19.61 524.3 19.58 530.86 19.41 543.96 19.4 550.52 19.16 557.07 19.2
583.29 20.06 596.39 19.07 602.95 18.84 622.61 18.48 635.72 18.79 655.38
20.13 661.93 20.48 681.59 19.72 720.92 19.43 734.02 19.61 740.58 19.54
753.68 19.13 760.24 18.76 766.79 18.25 773.35 18.19 779.9 17.4 786.45 17.04
799.56 15.74 825.78 14.8 832.33 14.81 845.44 15.49 851.99 15.52 871.65 15.86
878.21 16.59 884.76 17.45 891.31 17.84 896.2 17.14 903.13 16.84 909.99 16.37
918.26 13.93 936.91 14.42 939.09 9.63 957.78 6.63 962.96 5.24 972.96 4.71
987.88 3.1 1011.1 1.63 1037.68 1.86 1054.98 4.01 1060.55 8.76 1074.19 15.5
1094.48 15.87 1101.04 16.42 1107.59 16.46 1114.14 16.6 1120.7 16.36 1127.25
16.41 1133.8 16.42 1140.36 16.37 1146.91 16.43 1153.47 16.47 1160.02 16.54
1166.57 16.44 1173.13 16.31 1179.68 16.12 1186.24 15.78 1192.79 15.68
1199.34 15.52 1205.9 15.54 1212.45 15.74 1225.56 16 1232.11 16.03 1238.67
16.14 1245.22 16.04 1251.77 15.84 1258.33 15.93 1264.88 16.05 1277.99 16.7
1284.54 16.97 1291.1 17.32 1297.65 17.57 1310.76 17.61 1317.31 17.65 1323.86
17.48 1330.42 17.64 1336.97 17.66 1350.08 17.93 1356.63 17.87 1363.19 17.89
1369.74 17.87 1376.3 18.09 1382.85 18.21 1389.4 18.21 1395.96 18.14 1402.51
18.16 1409.06 18.4 1415.62 18.39 1422.17 18.42 1428.73 18.54 1435.28 18.97
1441.83 19.75 1448.39 21.49 1454.94 24.27 1461.49 24.86 1468.05 25.21 1474.6
25.32 1481.16 25.21 1487.71 24.92 1494.26 24.84 1507.37 24.96 1513.92 25.08
1520.48 25.23 1527.03 25.26 1533.59 25.08 1540.14 25.17 1546.69 25.07
1553.25 24.99 1559.8 24.94 1566.36 24.83 1572.91 25.16 1579.46 25.25 1586.02
25.05 1592.57 24.77 1599.12 25.27 1605.68 25.7 1612.23 25.46 1618.77 25.05
1625.31 24.6 1631.85 25.04 1638.39 25.85 1644.94 27.45 1651.48 28.71 1658.02
28.69 1664.56 28.34 1671.1 28.22 1677.64 28.06 1684.18 27.97 1690.72 27.71
1697.26 27.43 1703.8 26.7 1710.34 26.97 1716.88 27.86 1723.42 28.35 1736.51
28.48 1743.05 28.46 1749.59 28.57 1756.13 28.39 1762.67 27.52 1769.21 26.67
1775.75 25.9 1782.29 25.54 1788.83 25.71 1795.37 26 1801.91 26.55 1808.45
26.55 1815 27.06 1821.54 27.41 1828.08 27.45 1834.62 27.05 1841.16 26.38
1847.7 26.66 1854.24 26.76 1860.78 25.84 1867.32 25.51 1873.86 25.55 1880.4
25.69 1886.94 25.69 1893.48 25.71 1900.03 26.15 1906.57 26.63 1913.11 27.08
1919.65 27.3 1926.19 27.28 1932.73 27.49 1939.27 27.67 1945.81 27.76 1952.35
27.95 1958.89 27.85 1965.43 28.04 1971.97 28.17 1978.51 28.38 1985.06 28.65
1991.6 28.48 1998.14 28.36 2004.68 28.72 2011.22 28.65 2017.76 28.64 2024.3
28.69 2030.84 28.67 2037.38 28.21 2043.92 28.43 2050.46 28.58 2057 28.76
2063.54 28.91 2070.09 29.03 2076.63 29.06 2083.17 29.07 2089.71 29.17
2096.25 29.22 2102.79 29.34 2115.87 29.45 2122.41 29.45 2128.95 29.49
2135.49 29.49 2142.03 29.42 2148.57 29.42 2155.12 29.49 2161.66 29.59
2174.74 29.74 2181.28 29.75 2194.36 29.87 2200.9 29.89 2207.44 29.84 2213.98
29.85 2220.52 30.05 2227.06 30.23 2233.6 30.15 2240.15 30.25 2246.69 30.32
2253.23 30.32 2259.77 30.27 2266.31 30.28 2272.85 30.51 2285.93 30.15
2292.47 30.29 2299.01 30.53 2312.09 30.78 2318.64 30.83 2325.18 30.97
2331.72 31.29 2338.26 31.43 2344.8 31.41 2351.34 31.34 2357.88 31.45 2364.42
31.59 2370.96 31.67 2377.5 31.72 2384.04 31.83 2390.58 31.78 2397.12 31.75
2403.67 31.52 2410.21 31.16 2416.75 30.93 2423.29 30.98 2429.83 30.85
2436.37 30.67 2442.91 30.78 2449.45 30.65 2455.99 30.75 2462.53 30.82
2469.07 30.79 2475.61 30.51 2482.15 30.55 2488.7 30.57 2495.24 30.46 2501.78
30.46 2508.32 30.38 2514.86 30.4 2521.4 30.34 2527.94 30.3 2534.48 30.12
2541.02 30.1 2547.56 30.02 2554.1 30 2560.64 29.88 2567.18 29.7 2580.27
29.39 2586.81 29.33 2593.35 29.16 2599.89 29.06 2606.43 28.84 2612.97 28.57

2619.51 28.19 2632.59 27.6 2639.13 26.98 2645.67 26.33 2652.21 26.24 2658.76 26.25 2665.3 26.47 2671.84 26.66 2678.38 26.36 2684.92 26.5 2691.46 26.57 2698 26.62 2704.54 27.02 2711.08 27.07 2717.62 27.23 2724.16 27.69 2730.7 28.02 2737.24 27.88 2743.79 28.46 2750.33 29.28 2756.87 31.34 2763.41 33.31 2769.95 35.11 2776.49 36.95 2783.03 38.16 2789.57 38.78 2796.11 38.09 2802.65 37.82 2809.19 37.25 2815.73 37.54 2822.27 37.15 2828.82 34.17 2835.36 30.58 2841.9 27.76 2848.44 26.62 2854.98 27.5 2861.52 27.99 2868.06 27.94 2874.6 27.56 2881.14 27.33 2887.68 27.14 2894.22 27.05 2900.76 27.13 2907.3 27.16 2913.85 27.23 2920.39 27.51 2926.93 27.6 2933.47 27.59 2940.01 27.76 2946.55 27.91 2953.09 28.02 2959.63 28.22 2966.17 28.45 2972.71 28.8 2979.25 29.11 2992.33 29.68 2998.88 30 3005.42 30.13 3011.96 30.32 3018.5 30.4 3025.04 30.45 3031.58 30.56

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 891.31 .055 1114.14 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 891.31 1114.14 103.69 101.02 107.47 .3 .5 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 426 25.5 T
 1464 3031.58 25.5 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 85336.28

INPUT
Description: 78.7- US Face Titicut St
Station Elevation Data num= 278
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 30.5 10.005 29.95 14.999 29.87 40.003 30.21 55.009 29.74 65.006 28.84 80.013 27.17 90.01 26.54 95.012 25.93 115.014 25.42 120.016 25.02 125.019 24.89 130.02 24.3 135.016 24.05 140.018 24.3 145.019 24.17 150.022 24.59 160.02 24.78 165.021 24.52 170.023 23.91 175.026 24.05 180.028 24.54 185.022 24.89 190.025 25.82 200.03 26.53 220.031 26.35 230.028 26.03 235.03 26.09 240.033 25.99 245.034 25.75 250.037 25.69 255.032 25.38 265.036 25.35 270.038 25 275.041 24.23 280.035 22.99 285.037 21.59 290.04 21.03 295.042 20.76 300.045 19.99 305.039 20.23 310.041 19.86 320.046 19.91 330.043 20.38 335.045 20.35 340.047 20.15 350.044 20.16 355.046 20.68 360.048 21.93 365.051 21.72 370.053 21.16 375.047 21.17 385.052 21.39 390.055 21.72 395.057 23.34 400.051 25.21 410.056 26.12 425.055 26.64 435.059 26.57 450.058 26.97 455.061 26.77 465.066 26.82 485.067 26.57 495.064 26.08 510.071 25.68 525.07 24.95 540.076 22.79 545.072 22.16 550.073 21.8 555.076 21.15 560.078 19.02 565.08 17.9 570.075 17.97 575.077 18.23 590.084 18.7 595.079 19.13 615.08 18.86 640.083 19.54 645.086 19.48 650.088 19.75 655.09 20.26 660.093 21.52 675.092 22.6 685.097 23.03 690.091 23.12 691.777 22.87 715.616 12.43 718.557 11.78 721.56 11.33 725.276 11.24 732.224 10.78 738.866 10.72 744.013 10.09 749.966 9.83 754.967 10.86 761.18 10.96 766.749 11.24 772.127 11.43 777.642 12.8 779.772 11.89 797.621 22.19 800.111 22.86 805.112 22.76 810.108 22.41 815.11 22.22 820.111 21.89 825.114 22.18 835.112 20.16 845.108 19 850.111 19.03 855.105 18.7 865.102 18.31 870.104 17.93 880.101 17.59 885.095 17.79 895.1 17.56 900.094 17.75

905.097 17.46 910.091 17.72 915.093 17.54 930.093 17.5 935.087 18.06 940.089
16.55 950.086 16.72 955.082 16.7 965.078 16.91 970.081 17.32 980.077 17.51
990.074 16.971000.071 17.59 1005.073 18.031020.072 18.421030.069
18.961040.066 19.051045.061 18.88 1055.065 18.961060.059 18.861065.062
19.281070.057 19.41 1075.06 19.35 1080.054 19.11085.056 19.511090.051
19.711095.053 19.251100.055 19.74 1120.049 20.471130.046 20.991135.048
20.781145.045 20.731155.042 20.84 1160.036 21.241165.038 21.231170.034
21.471175.035 22.271185.033 22.82 1190.034 23.31 1195.03 23.481200.032
23.81210.029 24.211215.023 24.64 1220.025 24.851225.028 25.281230.022
25.271235.025 25.471250.016 24.79 1260.021 24.031265.015 24.011270.032
24.561280.068 24.741285.085 24.65 1290.104 24.71295.121 24.531300.139
24.611305.148 25.391315.183 26.43 1320.201 26.441325.218 26.161345.289
27.061350.306 26.891360.342 26.16 1365.359 25.621370.376 25.251375.387
25.121385.422 25.131390.439 25.28 1395.457 25.241415.527 25.791425.562 25.81
1430.58 25.931435.597 25.89 1475.731 26.881505.836 27.421520.882
27.451540.952 27.821545.969 27.77 1596.138 28.491601.155 28.78 1611.19
28.731616.208 28.821621.226 29.06 1656.34 28.71661.359 28.561666.376
28.581686.447 28.111691.464 27.89 1716.546 27.84 1726.58 27.91736.615
27.621741.632 27.741756.685 28.52 1761.703 29.06 1766.72 29.341771.738
29.771776.755 29.951781.773 30.43 1786.783 30.421791.801 30.671801.836
31.551806.854 31.681816.889 31.74 1821.906 31.921826.924 32.281841.976
32.31846.994 32.091867.057 32.19 1872.075 32.31892.145 31.71897.162
31.641912.215 32.031917.233 31.61 1922.243 30.931942.313 29.851947.331
30.021952.348 29.911957.366 29.55 1967.401 29.581982.454 29.992002.517 29.93
2037.64 29.9 2062.72 29.61 2067.738 29.062072.755 29.282077.773 29.1 2082.79
28.622087.808 28.42 2097.843 28.212102.861 27.692107.878 27.972117.913
28.142122.931 27.93 2137.976 28.52148.012 28.292153.029 28.082163.063 27.91
2173.1 27.37 2183.134 27.42 2198.18 26.622203.198 26.542213.233 26.68 2218.25
26.86 2223.268 27.382228.285 28.172233.303 28.25 2238.32 27.692243.338 27.8
2248.356 28.052253.373 28.162258.391 28.062263.401 27.762278.454 27.75
2288.489 28.322298.524 28.412308.559 29.242318.594 29.612328.629 29.67
2333.64 30.092343.675 30.532348.692 30.51

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .095 690.091 .055 800.111 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 690.091
800.111 60.24 60.79 60.96 .5 .8 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent 0 690 25 T
 8002348.692 22.86 T
Skew Angle = 40

BRIDGE

RIVER: Taunton River
REACH: Main Stem RS: 85311.66

INPUT
Description: 78.5 Titicut St
Distance from Upstream XS = 2
Deck/Roadway Width = 35
Weir Coefficient = 2.6

Bridge Deck/Roadway Skew = 40
Upstream Deck/Roadway Coordinates
num= 16
Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
218.322 27.89 395.279 27.05 540.827 25.33
671.055 25.7 711.578 26.24 711.655 29.68
714.72 29.69 714.72 26.24 21.65 779.068 26.54 21.96
779.068 30.04 782.131 30.01 782.131 26.54
853.374 25.39 909.295 24.47 1153.663 22.83 1306.106 24.65

Upstream Bridge Cross Section Data
Station Elevation Data num= 278 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 30.5 10.005 29.95 14.999 29.87 40.003 30.21 55.009 29.74 65.006 28.84
80.013 27.17 90.01 26.54 95.012 25.93 115.014 25.42 120.016 25.02 125.019
24.89 130.02 24.3 135.016 24.05 140.018 24.3 145.019 24.17 150.022 24.59
160.02 24.78 165.021 24.52 170.023 23.91 175.026 24.05 180.028 24.54 185.022
24.89 190.025 25.82 200.03 26.53 220.031 26.35 230.028 26.03 235.03 26.09
240.033 25.99 245.034 25.75 250.037 25.69 255.032 25.38 265.036 25.35
270.038 25 275.041 24.23 280.035 22.99 285.037 21.59 290.04 21.03 295.042
20.76 300.045 19.99 305.039 20.23 310.041 19.86 320.046 19.91 330.043 20.38
335.045 20.35 340.047 20.15 350.044 20.16 355.046 20.68 360.048 21.93
365.051 21.72 370.053 21.16 375.047 21.17 385.052 21.39 390.055 21.72
395.057 23.34 400.051 25.21 410.056 26.12 425.055 26.64 435.059 26.57
450.058 26.97 455.061 26.77 465.066 26.82 485.067 26.57 495.064 26.08
510.071 25.68 525.07 24.95 540.076 22.79 545.072 22.16 550.073 21.8 555.076
21.15 560.078 19.02 565.08 17.9 570.075 17.97 575.077 18.23 590.084 18.7
595.079 19.13 615.08 18.86 640.083 19.54 645.086 19.48 650.088 19.75 655.09
20.26 660.093 21.52 675.092 22.6 685.097 23.03 690.091 23.12 691.777 22.87
715.616 12.43 718.557 11.78 721.56 11.33 725.276 11.24 732.224 10.78 738.866
10.72 744.013 10.09 749.966 9.83 754.967 10.86 761.18 10.96 766.749 11.24
772.127 11.43 777.642 12.8 779.772 11.89 797.621 22.19 800.111 22.86 805.112
22.76 810.108 22.41 815.11 22.22 820.111 21.89 825.114 22.18 835.112 20.16
845.108 19 850.111 19.03 855.105 18.7 865.102 18.31 870.104 17.93 880.101
17.59 885.095 17.79 895.1 17.56 900.094 17.75 905.097 17.46 910.091 17.72
915.093 17.54 930.093 17.5 935.087 18.06 940.089 16.55 950.086 16.72 955.082
16.7 965.078 16.91 970.081 17.32 980.077 17.51 990.074 16.971000.071 17.59
1005.073 18.031020.072 18.421030.069 18.961040.066 19.051045.061 18.88
1055.065 18.961060.059 18.861065.062 19.281070.057 19.41 1075.06 19.35
1080.054 19.11085.056 19.511090.051 19.711095.053 19.251100.055 19.74
1120.049 20.471130.046 20.991135.048 20.781145.045 20.731155.042 20.84
1160.036 21.241165.038 21.231170.034 21.471175.035 22.271185.033 22.82
1190.034 23.31 1195.03 23.481200.032 23.81210.029 24.211215.023 24.64
1220.025 24.851225.028 25.281230.022 25.271235.025 25.471250.016 24.79
1260.021 24.031265.015 24.011270.032 24.561280.068 24.741285.085 24.65
1290.104 24.71295.121 24.531300.139 24.611305.148 25.391315.183 26.43
1320.201 26.441325.218 26.161345.289 27.061350.306 26.891360.342 26.16
1365.359 25.621370.376 25.251375.387 25.121385.422 25.131390.439 25.28
1395.457 25.241415.527 25.791425.562 25.81 1430.58 25.931435.597 25.89
1475.731 26.881505.836 27.421520.882 27.451540.952 27.821545.969 27.77
1596.138 28.491601.155 28.78 1611.19 28.731616.208 28.821621.226 29.06
1656.34 28.71661.359 28.561666.376 28.581686.447 28.111691.464 27.89 1716.546
27.84 1726.58 27.91736.615 27.621741.632 27.741756.685 28.52 1761.703 29.06
1766.72 29.341771.738 29.771776.755 29.951781.773 30.43 1786.783
30.421791.801 30.671801.836 31.551806.854 31.681816.889 31.74 1821.906

31.921826.924 32.281841.976 32.31846.994 32.091867.057 32.19 1872.075
32.31892.145 31.71897.162 31.641912.215 32.031917.233 31.61 1922.243
30.931942.313 29.851947.331 30.021952.348 29.911957.366 29.55 1967.401
29.581982.454 29.992002.517 29.93 2037.64 29.9 2062.72 29.61 2067.738
29.062072.755 29.282077.773 29.1 2082.79 28.622087.808 28.42 2097.843
28.212102.861 27.692107.878 27.972117.913 28.142122.931 27.93 2137.976
28.52148.012 28.292153.029 28.082163.063 27.91 2173.1 27.37 2183.134 27.42
2198.18 26.622203.198 26.542213.233 26.68 2218.25 26.86 2223.268
27.382228.285 28.172233.303 28.25 2238.32 27.692243.338 27.8 2248.356
28.052253.373 28.162258.391 28.062263.401 27.762278.454 27.75 2288.489
28.322298.524 28.412308.559 29.242318.594 29.612328.629 29.67 2333.64
30.092343.675 30.532348.692 30.51

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .095 690.091 .055 800.111 .09

Bank Sta: Left Right Coeff Contr. Expan.
 690.091 800.111 .5 .8
Ineffective Flow num= 2
 Sta L Sta R Elev Permanent 0 690 25 T
 8002348.692 22.86 T
Skew Angle = 40

Downstream Deck/Roadway Coordinates
 num= 16
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 248.965 27.89 425.92 27.05 571.47 25.33
 701.697 25.7 742.221 26.24 742.297 29.68
 745.361 29.69 745.361 26.24 21.65 809.709 26.54 21.96
 809.709 30.04 812.773 30.01 812.773 26.54
 884.015 25.39 939.936 24.47 1184.305 22.83
 1372 24.65

Downstream Bridge Cross Section Data
Station Elevation Data num= 224
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 31.14 25.057 30.17 45.104
28.81 50.115 28.56 60.135 27.32 65.144 26.83 75.172 26.41 85.191 26.27
90.202 25.65 95.219 25.41 100.229 26.28 105.239 26.54 115.259 26.64 130.297
26.28 135.306 26.29 145.334 26.11 160.364 26.1 165.373 26.36 170.392 26.37
185.421 27.01 195.441 27.1 210.479 27.73 215.488 27.74 225.516 27.37 250.574
27.01 255.583 27.07 265.603 26.81 280.641 26.03 295.67 24.85 300.68 24.9
325.737 26.83 340.774 27.2 365.832 27.24 370.842 27.55 385.88 27.54 400.909
27.79 405.919 28.44 410.936 29.36 415.947 29.79 420.956 29.84 430.976 29.47
435.994 29.47 451.024 28.29 456.034 28.59 466.062 28.41 476.082 27.68
486.109 26.65 496.129 26.19 501.138 25.81 516.176 24.11 531.206 23.14
541.233 22.89 556.264 21.96 561.273 21.83 566.291 21.42 571.301 20.56
576.311 20.3 591.34 20.29 596.358 20.12 601.368 20.19 611.388 19.81 631.435
19.84 636.445 20.22 641.455 20.08 651.483 21.06 656.492 22.28 666.512 21.97
671.537 21.17 676.563 20.68 681.588 19.88 686.613 18.61 691.638 18.08
696.656 18.22 701.682 18.87 711.732 19.65 716.758 19.58 720.817 19.07
746.878 10.21 751.88 9 755.733 6.54 760.276 6.75 764.658 5.98 767.086 8.24
770.595 5.98 773.996 6.24 778.814 7.53 783.993 8.35 788.988 8.58 794.878
9.05 800.455 10.1 804.738 11.68 829.495 17.96 832.315 18.99 837.34 19.49

842.358 20.18 847.383 20.65 857.434 20.75 862.459 20.57 867.484 19.89
872.509 19.52 877.527 19.33 887.577 18.46 892.603 18.52 902.653 16.96
907.679 16.59 922.747 16.19 927.772 15.67 937.822 15.34 942.847 14.96
947.866 14.89 952.89 14.67 957.916 14.75 962.94 14.64 972.992 14.8 988.059
15.64 993.085 15.47 998.11 15.151018.203 14.671028.253 14.951033.279 14.77
1038.305 14.771048.355 15.671053.372 16.271063.423 17.141068.448 17.45
1078.498 17.551088.542 17.221093.566 17.191098.592 17.411103.618 17.42
1113.668 18.421138.787 19.571148.837 19.621153.863 19.771163.905 19.57
1173.955 18.871189.031 17.451199.074 16.8 1204.1 16.591219.176 15.16 1224.2
15.071234.243 15.461249.319 16.571259.369 17.481264.387 17.58 1274.437
16.921284.487 16.771289.513 16.891294.539 17.251304.581 17.35 1309.607
17.631314.632 18.191319.657 18.571329.708 19.971344.776 22.61 1349.8
23.681354.826 24.261359.852 25.261364.876 25.371369.895 25.9 1374.919
26.111379.945 25.881395.021 24.31400.046 241420.139 24.02 1435.215
24.331455.308 24.031470.384 24.261475.402 24.541480.427 24.64 1490.478
25.081500.528 25.741535.697 26.891565.841 27.041575.891 26.79 1580.917
26.891590.967 26.851595.991 26.941636.202 26.721641.227 26.6 1661.329
26.861686.454 26.7 1701.53 26.91746.765 27.871751.791 27.63 1791.993
27.211802.043 27.341847.278 27.471852.303 27.571857.328 27.87 1872.404
27.711877.429 27.541912.606 28.011932.714 28.911957.841 29.39 1998.043
29.362013.119 28.712043.278 28.22048.304 27.962053.328 27.96 2068.404
27.512088.506 27.442098.556 26.972113.632 26.832118.656 26.55 2123.682
25.92128.708 26.012133.732 26.762143.782 27.082158.866 27.12 2168.917
26.832173.942 27.022183.992 27.22194.043 27.12199.068 27.5 2214.144
29.932219.169 30.232244.296 29.972259.372 302264.404 29.81 2269.429 29.8
2279.48 29.322284.505 29.29 2289.53 28.87

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .093 656.492 .055 857.434 .093

Bank Sta: Left Right Coeff Contr. Expan.
 656.492 857.434 .5 .8
Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 720 25 T
 829 2289.53 22.8 T
Skew Angle = 40

Upstream Embankment side slope = 0 horiz. to 1.0 vertical Downstream
Embankment side slope = 0 horiz. to 1.0 vertical Maximum allowable
submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
 Energy
 W.S. Pro Method

 W.S.Pro Data

```
 Left Embankment
 El of the top of the embankment = 26.2
 El of the toe of the abutment = 12.4
 Right Embankment
 El of the top of the embankment = 26.2
 El of the toe of the abutment = 12.4
 Abutment Type = 4 Vert. abutments and sloping embankments with wingwalls
Slope of abutments =
 Top with of embankment = 35
 Centroid station of bridge opening =
 Wing Wall Type = Angular wing walls  Width = 16
 Angle = 45
 Radius =
 Guide Banks Type = No Guide Bank present
 Length =
 Offset =
 Angle =
 Optional Contraction and expansion coefficients
 At approach Section
 At Guide Bank
 At upstream outside
 At upstream inside (BU)
 At downstream inside (BD)
 Piers are Continuous for the width of the bridge
 Use Geometric mean as Friction Slope Method

Selected Low Flow Methods = W.S.Pro Method

High Flow Method
 Pressure and Weir flow
 Submerged Inlet Cd =
 Submerged Inlet + Outlet Cd = .8
 Max Low Cord =

Additional Bridge Parameters
 Add Friction component to Momentum
 Do not add Weight component to Momentum  Class B flow critical depth
computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION


RIVER: Taunton River
REACH: Main Stem RS: 85275.49

INPUT
Description: 78.3 DS FAce Titicut St
Station Elevation Data num= 224
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  0 31.14 25.057 30.17 45.104
28.81 50.115 28.56 60.135 27.32  65.144 26.83 75.172 26.41 85.191 26.27
90.202 25.65 95.219 25.41  100.229 26.28 105.239 26.54 115.259 26.64 130.297
26.28 135.306 26.29  145.334 26.11 160.364 26.1 165.373 26.36 170.392 26.37
```

185.421 27.01 195.441 27.1 210.479 27.73 215.488 27.74 225.516 27.37 250.574
27.01 255.583 27.07 265.603 26.81 280.641 26.03 295.67 24.85 300.68 24.9
325.737 26.83 340.774 27.2 365.832 27.24 370.842 27.55 385.88 27.54 400.909
27.79 405.919 28.44 410.936 29.36 415.947 29.79 420.956 29.84 430.976 29.47
435.994 29.47 451.024 28.29 456.034 28.59 466.062 28.41 476.082 27.68
486.109 26.65 496.129 26.19 501.138 25.81 516.176 24.11 531.206 23.14
541.233 22.89 556.264 21.96 561.273 21.83 566.291 21.42 571.301 20.56
576.311 20.3 591.34 20.29 596.358 20.12 601.368 20.19 611.388 19.81 631.435
19.84 636.445 20.22 641.455 20.08 651.483 21.06 656.492 22.28 666.512 21.97
671.537 21.17 676.563 20.68 681.588 19.88 686.613 18.61 691.638 18.08
696.656 18.22 701.682 18.87 711.732 19.65 716.758 19.58 720.817 19.07
746.878 10.21 751.88 9 755.733 6.54 760.276 6.75 764.658 5.98 767.086 8.24
770.595 5.98 773.996 6.24 778.814 7.53 783.993 8.35 788.988 8.58 794.878
9.05 800.455 10.1 804.738 11.68 829.495 17.96 832.315 18.99 837.34 19.49
842.358 20.18 847.383 20.65 857.434 20.75 862.459 20.57 867.484 19.89
872.509 19.52 877.527 19.33 887.577 18.46 892.603 18.52 902.653 16.96
907.679 16.59 922.747 16.19 927.772 15.67 937.822 15.34 942.847 14.96
947.866 14.89 952.89 14.67 957.916 14.75 962.94 14.64 972.992 14.8 988.059
15.64 993.085 15.47 998.11 15.151018.203 14.671028.253 14.951033.279 14.77
1038.305 14.771048.355 15.671053.372 16.271063.423 17.141068.448 17.45
1078.498 17.551088.542 17.221093.566 17.191098.592 17.411103.618 17.42
1113.668 18.421138.787 19.571148.837 19.621153.863 19.771163.905 19.57
1173.955 18.871189.031 17.451199.074 16.8 1204.1 16.591219.176 15.16 1224.2
15.071234.243 15.461249.319 16.571259.369 17.481264.387 17.58 1274.437
16.921284.487 16.771289.513 16.891294.539 17.251304.581 17.35 1309.607
17.631314.632 18.191319.657 18.571329.708 19.971344.776 22.61 1349.8
23.681354.826 24.261359.852 25.261364.876 25.371369.895 25.9 1374.919
26.111379.945 25.881395.021 24.31400.046 241420.139 24.02 1435.215
24.331455.308 24.031470.384 24.261475.402 24.541480.427 24.64 1490.478
25.081500.528 25.741535.697 26.891565.841 27.041575.891 26.79 1580.917
26.891590.967 26.851595.991 26.941636.202 26.721641.227 26.6 1661.329
26.861686.454 26.7 1701.53 26.91746.765 27.871751.791 27.63 1791.993
27.211802.043 27.341847.278 27.471852.303 27.571857.328 27.87 1872.404
27.711877.429 27.541912.606 28.011932.714 28.911957.841 29.39 1998.043
29.362013.119 28.712043.278 28.22048.304 27.962053.328 27.96 2068.404
27.512088.506 27.442098.556 26.972113.632 26.832118.656 26.55 2123.682
25.92128.708 26.012133.732 26.762143.782 27.082158.866 27.12 2168.917
26.832173.942 27.022183.992 27.22194.043 27.12199.068 27.5 2214.144
29.932219.169 30.232244.296 29.972259.372 302264.404 29.81 2269.429 29.8
2279.48 29.322284.505 29.29 2289.53 28.87

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .093 656.492 .055 857.434 .093

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 656.492
857.434 159.18 160.23 161.81 .5 .8 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 720 25 T
 829 2289.53 22.8 T
Skew Angle = 40

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 85115.27

INPUT
Description: 78 Exit Titicut St
Station Elevation Data num= 365
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 31.94 6.52 31.69 13.04 31.29 19.56 30.57 26.08 30.15 32.6 30.31 39.12 30.52 45.64 30.45 52.15 30.31 58.67 30.09 65.19 30.06 71.71 30.18 78.23 30.07 84.75 29.8 91.27 29.34 97.79 28.91 104.31 28.58 110.83 28.13 117.35 27.77 123.87 27.35 130.39 26.8 136.91 26.22 143.43 25.89 149.94 26.81 156.46 26.94 162.98 27.09 169.5 27.05 176.02 26.52 182.54 26.46 189.06 26.31 195.58 26.41 202.1 26.4 208.62 26.42 221.66 26.51 241.22 26.72 247.74 26.8 254.25 26.93 260.77 26.91 267.29 26.93 273.81 26.97 280.33 27.13 286.85 27.18 293.37 27.2 299.89 27.31 306.41 27.33 312.93 27.39 319.45 27.42 325.97 27.33 332.49 27.38 339.01 27.38 345.53 27.47 358.56 27.28 365.08 27.3 371.6 27.3 378.12 27.34 384.64 27.43 391.16 27.45 397.68 27.39 404.2 27.5 410.72 27.43 417.24 27.45 423.76 27.57 430.28 27.51 443.32 27.52 449.83 27.59 456.35 27.58 462.87 27.63 469.39 27.73 482.43 27.73 488.95 27.8 495.47 27.83 508.51 27.7 515.03 27.62 521.55 27.74 528.07 27.76 534.59 27.91 541.11 28.08 547.62 28.38 554.14 28.79 560.66 29.24 567.18 29.59 573.7 29.75 580.22 29.73 586.74 29.61 593.26 29.33 599.78 29.07 606.3 28.84 612.82 28.51 619.34 28.06 632.38 27.29 638.9 26.98 645.41 26.71 651.93 26.56 658.45 26.33 664.97 25.98 678.01 25.65 684.53 25.39 691.05 25.01 697.57 24.67 704.09 24.38 710.61 24.16 717.13 23.77 723.65 23.53 730.17 23.56 736.69 23.25 743.21 23.01 749.72 23.12 756.24 23 762.76 22.7 769.28 22.64 775.8 22.46 782.32 22.15 788.84 21.89 795.33 21.65 801.82 21.36 808.31 21.18 814.81 21.08 821.3 21.08 827.79 21.04 834.28 20.63 840.77 20.45 847.26 20.03 860.25 19.93 866.74 19.44 899.15 17.59 919.99 17.44 927.65 10.59 956 5.96 959.1 4.65 977.02 3.02 993.28 1.83 1003.03 -.61 1015.38 -2.22 1033.16 -3.31 1051.37 -2.53 1069.46 -.38 1074.78 3.47 1081.61 11.14 1085.01 17.06 1096.85 17.73 1117.81 17.21 1135 15.37 1172.27 16.2 1218.72 13.7 1268.73 15.41 1365 13.42 1391.39 15.53 1432.3 17.9 1438.82 18.71 1445.34 19.56 1451.86 19.86 1458.38 19.85 1464.9 19.59 1471.42 19.35 1477.94 19.22 1484.47 18.95 1490.99 18.51 1497.51 18 1504.03 17.72 1510.55 17.54 1517.07 17.32 1523.59 17.16 1530.11 17.03 1536.63 16.67 1543.16 16.37 1549.68 15.97 1556.2 15.53 1562.72 14.92 1569.24 14.91 1575.76 14.7 1582.28 14.44 1588.8 14.57 1595.33 14.94 1601.85 15.6 1608.37 16.19 1621.41 17 1627.93 17.35 1634.45 17.34 1640.97 16.96 1647.5 16.4 1654.02 16.15 1660.54 16.6 1667.06 17.2 1673.58 17.9 1680.1 18.15 1686.62 18.55 1693.14 18.66 1699.66 18.94 1706.19 19.2 1712.71 19.85 1719.23 20.66 1725.75 21.07 1732.27 21.28 1738.79 21.28 1745.31 21.23 1751.83 20.95 1758.36 20.98 1764.88 21.23 1771.4 21.55 1777.92 22.36 1784.44 23.78 1790.96 24.6 1797.48 24.65 1804 24.24 1810.52 23.98 1817.05 23.98 1823.57 24.25 1830.09 24.46 1836.61 24.65 1843.13 24.76 1849.65 24.84 1856.17 25.03 1862.69 25.17 1869.22 25.21 1875.74 25.18 1882.26 24.99 1895.3 24.56 1901.82 24.44 1908.34 24.43 1914.86 24.32 1927.91 24.43 1934.43 24.58 1940.95 24.58 1947.47 24.9 1953.99 25.09 1960.51 25.17 1967.03 25.35 1973.55 25.45 1980.08 25.46 1986.6 25.52 1993.12 25.55 1999.64 25.56 2006.16 25.53 2012.68 25.47 2019.2 25.43 2025.72 25.52 2032.25 25.41 2038.79 25.43 2045.33 25.26 2051.87 25.31 2058.41 25.26 2071.5 25.24 2078.04 25.22 2084.58 25.13 2091.12 25.12 2097.67 25.17 2104.21 25.15 2110.75 25.15 2117.29 25.21 2123.83 25.25 2130.38 25.23 2136.92 25.26 2143.46 25.35 2156.54 25.45 2163.09 25.64 2169.63 25.61 2176.17 25.64 2182.71 25.84 2195.8 25.67 2202.34 25.6 2208.88 25.58 2221.96 25.67 2228.5 25.68 2235.05 25.77 2241.59 25.81 2248.13 25.87 2254.67 25.97 2274.3 26.18

2280.84 26.39 2287.38 26.43 2293.92 26.44 2300.47 26.5 2307.01 26.5 2313.55 26.61 2320.09 26.66 2326.63 26.86 2333.18 26.98 2339.72 27.17 2346.26 27.31 2352.8 27.42 2359.34 27.72 2365.89 27.81 2372.43 27.85 2378.97 27.8 2385.51 27.84 2398.6 27.73 2405.14 27.79 2411.68 27.69 2418.22 27.56 2431.31 27.25 2437.85 27.26 2450.93 27.03 2457.47 26.84 2470.56 26.84 2477.1 26.8 2483.64 26.68 2490.18 26.66 2503.27 26.55 2516.35 26.3 2522.89 26.23 2529.44 26.08 2535.98 25.9 2542.52 25.85 2549.06 25.9 2555.6 25.86 2562.15 25.97 2568.69 25.91 2575.23 25.74 2581.77 25.68 2588.31 25.55 2594.86 25.49 2601.4 25.45 2607.94 25.33 2621.02 25.34 2627.57 25.3 2634.11 25.15 2640.65 25.05 2647.19 25.18 2653.73 25.29 2660.28 25.32 2666.82 25.2 2673.36 25.03 2679.9 24.96 2686.44 25.02 2692.99 25.16 2699.53 25.46 2706.07 25.3 2712.61 25.26 2719.15 25.33 2725.69 24.65 2732.24 23.95 2738.78 24.12 2745.32 24.7 2751.86 25.19 2758.4 25.24 2764.95 25.33 2771.49 25.5 2778.03 25.53 2784.57 25.64 2791.11 25.86 2797.66 25.81 2804.2 25.84 2810.74 25.79 2823.82 25.84 2830.37 26.06 2836.91 26.14 2843.45 26.28 2849.99 26.24 2856.53 26.15 2863.08 26.34 2869.62 26.58 2876.16 26.73 2882.7 26.74 2889.24 26.88 2895.79 26.93 2902.33 26.95 2908.87 26.94 2915.41 26.99 2921.95 26.98 2928.5 27.07 2935.04 27.2 2941.58 27.26 2948.12 27.12 2954.66 27.01 2961.21 26.84

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 919.99 .055 1096.85 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 919.99 1096.85 1317.95 1325.49 1349.87 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 1335 2961.21 25.4 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 83789.77

INPUT
Description: 77
Station Elevation Data num= 277
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 34.75 13.12 34.38 26.24 34.48 39.37 34.38 45.93 34.19 52.49 34.47 59.05 34.31 72.17 34.76 78.73 34.82 85.29 34.31 98.41 33.96 111.54 34.03 118.1 33.78 137.78 33.9 144.34 33.61 150.9 33.61 157.46 33.37 170.58 33.26 183.7 33.39 190.27 33.3 196.83 33.42 209.95 33.34 223.07 34.02 229.63 33.81 236.19 34.6 242.75 35.92 249.31 36.96 255.87 36.91 262.44 36.39 269 36.12 275.56 37.1 282.12 36.96 288.68 35.53 295.24 33.94 301.8 32.85 308.36 32.2 314.92 31.38 321.48 30.4 334.61 29.89 347.73 28.18 354.29 27.59 360.85 27.15 373.97 26.66 413.34 23.87 419.9 23.16 426.46 22.64 433.02 22.5 439.58 22.15 465.82 20.24 478.94 19.5 498.63 17.98 505.19 17.33 511.75 16.92 518.31 16.8 531.43 16.26 544.55 16.03 557.68 16.07 564.24 16.23 583.92 15.65 590.48 15.67 597.04 15.84 603.6 15.87 616.72 15.54 623.28 15.59 629.85 15.79 636.41 16.21 642.97 16.35 649.53 16.01 656.09 15.96 669.21 16.17 675.77 15.92 682.33 16.08 688.89 16.62 695.45 17.33 702.01 17.64 708.58 17.77 715.14 18.26 721.7 18.52 728.26 18.92 734.82 18.89 741.38 19.24 747.94 19.07 754.5 18.45 761.06 17.42 767.62 15.66 774.18 14.81 793.87 14.75 800.43 14.91 820.11 14.81 833.23 14.95 846.35 14.7 859.48 15.05 866.04 14.97 872.6 15.26 879.16 15.87 885.72 16.06 892.28 16.08

898.84 16.34 918.52 17.87 931.65 18.43 938.21 18.33 944.77 17.77 957.89
16.25 968.36 15.45 985 10.1 1015 7.9 1047 6.4 1075 6.1 1109 10.4 1115 18.5
1121.91 19.49 1128.47 19.79 1135.03 19.86 1141.59 19.81 1148.16 19.7 1154.72
19.5 1161.28 19.51 1167.84 19.55 1174.4 19.51 1180.96 19.32 1194.08 19.5
1200.64 19.78 1207.2 20.02 1213.76 20.24 1220.32 20.39 1233.45 20.24 1240.01
19.96 1246.57 19.65 1253.13 19.57 1259.69 19.53 1266.25 19.6 1272.81 19.62
1279.37 19.86 1285.93 20.22 1292.49 20.31 1299.06 20.68 1305.62 21.16
1312.18 21.47 1318.74 21.74 1325.3 22.19 1331.86 22.49 1338.42 22.58 1344.98
22.6 1351.54 22.6 1358.1 22.68 1364.66 22.46 1371.23 22.31 1377.79 21.93
1384.35 21.8 1390.91 21.19 1397.47 20.9 1404.03 20.73 1410.59 20.86 1417.15
20.7 1423.71 20.7 1430.27 20.96 1436.83 21.15 1443.4 21.37 1449.96 21.77
1456.52 21.87 1463.08 22.26 1476.2 23.16 1482.76 23.39 1489.32 23.65 1495.88
23.85 1502.44 24.03 1509 24.23 1515.56 24.65 1522.13 24.88 1528.69 25.19
1535.25 25.3 1541.81 25.29 1548.37 25.31 1554.93 25.07 1561.49 24.68 1568.05
24.47 1574.61 24.22 1581.17 23.75 1587.73 23.38 1594.3 23.23 1600.86 23.2
1607.42 23.34 1613.98 23.39 1620.54 23.57 1627.1 23.81 1633.66 23.89 1640.22
24.17 1646.78 24.48 1653.34 24.37 1659.9 24.29 1666.47 24.15 1673.03 23.91
1686.15 23.78 1692.71 23.65 1699.27 23.54 1712.39 23.13 1718.95 22.9 1725.51
22.59 1732.07 22.46 1738.64 22.47 1745.2 22.37 1751.76 22.47 1764.88 22.44
1778 22.86 1784.56 22.99 1791.12 22.71 1797.68 21.99 1804.24 20.79 1810.8
19.74 1817.37 18.88 1823.93 18.41 1830.49 17.42 1837.05 16.29 1843.61 16.46
1850.17 16.54 1856.73 16.42 1863.29 16.26 1869.85 17.59 1876.41 18.37
1882.97 19.1 1889.54 19.23 1896.1 19.09 1902.66 19.02 1909.22 18.61 1915.78
17.88 1922.34 17.05 1928.9 16.66 1935.46 17.22 1942.02 17.03 1948.58 16.73
1955.14 16.25 1961.71 16.88 1968.27 16.73 1974.83 16.88 1981.39 17.09
1987.95 17.27 1994.51 17.55 2001.07 17.72 2007.63 18.3 2014.19 18.41 2020.75
18.76 2027.31 19.23 2033.88 19.68 2040.44 20.17 2047 21.02 2053.56 22.63
2060.12 24.75 2066.68 26.14 2073.24 26.62 2079.8 26.59 2086.36 26.43 2092.92
25.98 2099.48 25.51 2106.05 24.82 2119.17 23.13 2125.73 22.44 2132.29 22.05
2138.85 21.9 2145.41 21.9 2151.97 22.43 2158.53 22.76 2165.09 22.96 2171.65
23.59 2178.22 24.39 2191.34 25.3 2197.9 25.95 2204.46 26.82 2211.02 27.58
2217.58 28.01 2224.14 28.35 2230.7 28.63 2243.83 28.88 2250.39 28.99 2256.95
29.06 2263.51 29.17 2270.07 29.37 2276.63 29.45

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .095 938.21 .055 1128.47 .095

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 938.21
1128.47 1097.27 1096.54 1095.28 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 1548.4 2276.63 25.3 F

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 82693.23

INPUT
Description: 76 Approach Bedford St
Station Elevation Data num= 305 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 41.32 6.56 41.09 13.12 41.08 19.68 41.17 26.24 41.19 32.8 41.19 39.36
41.29 45.92 41.12 52.48 40.91 65.6 40.56 72.16 40.47 78.72 40.33 85.28 40.24

91.84 40.13 98.4 39.97 111.52 39.57 118.08 39.36 124.64 39.17 131.2 38.86
137.76 38.46 144.32 38.33 150.88 38.32 157.44 38.13 164 37.81 170.56 37.63
177.12 37.37 183.68 36.97 190.24 36.52 196.8 36.16 203.36 36.1 209.92 36.01
216.48 35.89 223.04 35.71 229.6 35.49 236.16 35.25 242.72 34.91 249.28 34.67
255.84 34.45 262.4 34.25 268.96 33.96 275.51 33.6 282.07 33.41 288.63 33.36
295.19 33.4 301.75 33.19 308.31 33 314.87 32.78 321.43 32.52 327.99 32.2
334.55 31.63 341.11 30.97 347.67 30.7 354.23 30.52 360.79 30.51 367.35 30.36
373.91 29.93 380.47 29.89 387.03 29.7 393.59 29.73 400.15 29.7 406.71 29.62
413.27 29.66 419.83 29.62 426.39 29.41 432.95 29.37 439.51 29.42 446.07
29.31 452.63 29.09 459.19 28.8 465.75 28.76 472.31 28.56 485.43 28.3 491.99
28.24 498.55 28.1 505.11 28.02 511.67 27.85 518.23 27.41 524.79 27.17 531.35
26.83 537.91 26.26 544.47 25.57 551.03 24.9 557.59 24.43 564.15 24.06 570.71
23.52 577.27 22.92 583.83 22.6 590.39 22.53 596.95 22.24 603.51 22.03
610.07 21.94 616.63 21.53 629.75 21.36 636.31 21.15 642.87 20.86 649.43
20.33 655.99 20.11 662.55 20.09 669.11 20.04 675.67 20.06 682.23 20.04
688.79 19.63 695.35 18.98 701.91 18.53 708.47 18.39 715.03 18.32 721.59
18.14 728.15 17.85 734.71 17.58 760.95 16.65 767.51 16.51 774.07 16.4 780.63
16.22 793.75 16.39 800.31 16.4 806.87 16.54 813.43 16.53 819.99 16.14 826.55
15.9 833.1 15.75 839.66 15.69 852.78 15.52 859.34 15.51 865.9 15.72 872.46
15.69 879.02 15.48 885.58 15.82 892.14 16.47 898.7 17.61 905.26 17.73
911.82 17.61 924.94 17.48 931.5 17.34 938.06 16.8 944.62 16.35 951.18 15.78
957.74 15.16 964.3 15.07 1000.4 14.3 1041.6 16.79 1065.66 14.27 1073.16 7.12
1078.7 4.63 1093.06 2.96 1113.48 3.2 1131.73 4.04 1145.79 4.42 1170.48 5.98
1193.1 16.26 1216.79 15.76 1253.03 19.74 1303.8 17.74 1310.36 17.14 1316.92
16.31 1323.48 16 1336.59 15.87 1343.15 15.88 1349.71 15.71 1356.27 15.41
1362.83 15.32 1369.39 15.53 1375.94 15.7 1382.5 15.66 1389.06 15.6 1395.62
15.77 1402.18 15.98 1408.74 16.13 1415.3 16.19 1421.85 16.37 1428.41 16.79
1448.09 19.1 1454.65 19.78 1461.21 20.57 1467.76 21.19 1474.32 21.6 1480.88
21.61 1487.44 21.36 1494 21.07 1500.56 20.64 1507.12 20 1513.67 19.24
1520.23 18.37 1526.79 18.06 1533.35 17.63 1539.91 17.52 1546.47 18.05
1553.03 18.37 1559.58 18.44 1566.14 18.58 1572.7 18.56 1585.82 17.95 1592.38
17.78 1598.94 18.13 1605.49 18.39 1618.61 18.33 1625.17 18.48 1631.73 18.59
1638.29 18.53 1644.85 18.37 1651.4 18.13 1657.96 18.01 1664.52 18.09 1671.08
18.35 1677.64 18.73 1684.2 19.2 1690.76 19.94 1697.31 20.74 1703.87 21.15
1710.43 21.65 1716.99 21.91 1723.55 21.85 1730.11 21.91 1736.67 22.23
1743.22 22.62 1749.78 22.89 1756.34 23.28 1762.9 23.78 1769.46 23.86 1776.02
23.84 1782.58 23.86 1789.14 23.83 1795.69 23.61 1802.25 23.58 1808.81 23.53
1815.37 23.42 1821.93 23.75 1828.49 23.89 1835.05 23.8 1841.6 23.67 1848.16
23.6 1854.72 23.8 1861.28 24.42 1874.4 25.75 1880.96 26.37 1887.51 26.91
1894.07 27.59 1900.63 28.36 1907.19 28.67 1913.75 29.03 1920.31 29.12
1926.87 29.33 1933.42 29.4 1939.98 29.17 1953.1 28.84 1959.66 28.72 1966.22
28.5 1972.78 28.38 1979.33 27.93 1985.89 28.09 1992.45 28.16 1999.01 27.83
2005.57 27.9 2012.13 28.03 2018.69 28.11 2025.24 28.25 2031.8 28.12 2038.36
28.16 2044.92 28.14 2051.48 28.07 2058.04 27.98 2064.6 27.97 2071.15 28.01
2077.71 27.93 2084.27 27.71 2090.83 27.45 2097.39 27.27 2103.95 27.22
2110.51 27.19 2123.62 27.32 2130.18 27.27 2136.74 27.13 2143.3 27.06 2149.86
27.01 2156.42 26.92 2162.98 27.14 2169.53 27.21 2176.09 27.04 2182.65 26.85
2189.21 26.68 2195.77 26.46 2202.33 26.19 2208.89 25.88 2215.44 25.55 2222
26.36 2228.56 26.32 2235.12 26.42 2241.68 26.05 2248.24 26.04 2254.8 25.98
2261.35 26.19 2267.91 26.43 2274.47 26.51 2281.03 26.38 2287.59 26.42
2300.71 26.61 2307.26 26.59 2313.82 26.45 2320.38 26.46 2326.94 26.6 2333.5
26.66 2340.06 26.6 2346.62 26.61 2353.18 26.58 2359.73 26.6 2366.29 26.81

Manning's n Values num= 3

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 Sta n Val Sta n Val Sta n Val
 0 .09 1041.6 .055 1253.03 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  1041.6
1253.03 72.73 101.63 122.4 .3 .5

CROSS SECTION


RIVER: Taunton River
REACH: Main Stem RS: 82591.6

INPUT
Description: 75.7 US FAce Bedford St
Station Elevation Data num= 350
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  0 41.35 5.936 41.17 11.873
41.08 17.809 41.17 23.736 41.13  29.673 40.96 41.545 40.87 47.481 40.73
53.418 40.64 59.354 40.6  65.29 40.51 71.218 40.39 77.154 40.3 83.09 40.16
89.027 39.93  94.963 39.75 100.899 39.74 106.836 39.68 112.763 39.5 118.699
39.23  124.635 39.1 130.572 39.02 136.508 38.82 142.444 38.5 148.381 38.23
154.317 37.94 160.244 37.62 166.181 37.37 172.117 37.47 178.053 37.39  183.99
37.19 189.926 36.77 195.862 36.51 201.789 36.33 207.726 36.03  213.662 35.62
219.598 35.24 225.535 34.98 231.471 34.8 237.407 34.54  243.344 34.33 249.271
34.27 255.207 34.16 261.144 34.1 267.08 34.34  273.016 34.56 278.952 34.12
284.889 33.66 290.816 33.4 296.752 33.12  302.689 32.62 308.625 31.89 314.561
31.74 320.498 31.84 326.434 31.62  332.37 31.54 338.298 31.51 344.234 30.88
350.17 30.51 356.106 30.21  362.043 30.12 373.915 30.24 379.843 29.76 385.779
29.49 397.652 29.8  403.588 29.82 409.524 29.61 415.461 29.13 421.397 29.06
427.324 29.21  433.26 28.86 439.197 28.49 445.133 28.39 451.069 28.25 457.006
28.08  462.942 27.83 468.869 27.6 474.806 27.41 480.742 27.15 486.678 26.81
492.615 26.35 498.551 25.82 504.487 25.48 510.423 25.25 516.351 25  522.287
24.95 528.223 25.11 534.16 24.91 546.032 24.86 551.969 24.08  557.896 23.69
563.832 23.51 569.768 23.31 575.705 22.74 581.641 22.12  587.578 22.41
593.514 22.3 599.45 22.01 605.377 21.83 611.314 21.77  617.25 21.67 623.186
21.36 629.123 20.94 635.059 20.47 640.995 19.89  646.922 20.06 652.859 19.98
658.795 20.05 664.732 20.2 670.668 19.74  676.604 18.77 682.54 19.82 688.468
20.28 694.404 20.34 700.34 20.36  706.277 20.98 712.213 20.69 718.149 20.79
724.086 20.92 730.022 20.65  735.949 20.49 741.885 20.4 747.822 20.39 753.758
20.72 759.694 18.9  765.631 17.94 771.567 18.09 777.494 18.37 783.431 18.81
789.367 19.2  795.303 19.34 801.24 19.74 813.112 20.67 819.039 20.98 830.912
21.47  836.848 22.2 842.785 22.48 848.721 22.32 854.657 22.34 860.594 22.47
866.521 22.68 872.457 22.73 878.394 22.8 884.33 22.85 890.266 22.85  896.202
22.77 902.139 22.66 908.066 22.5 919.939 22.85 925.875 23.17  931.811 23.52
937.748 24.01 943.684 24.17 949.62 24.02 955.547 24.05  997.183 21.54 997.555
16.131005.367 15.971008.141 9.761020.249 6.01 1035.212 3.84 1044.91
3.851071.283 4.351080.736 4.921097.294 5.73  1107.3 6.791117.541
12.081117.876 15.161126.522 15.391128.489 20.92 1157.346 22.671169.219
21.241175.146 20.621181.082 20.781187.019 20.87 1192.955 21.031198.891
20.951204.828 20.551210.764 20.31216.691 20.45 1222.627 20.361228.564 20.31
1234.5 20.51240.436 20.51246.373 20.31 1252.309 20.371258.245 20.511264.172
20.581270.109 20.61276.045 20.6 1281.991 20.771287.927 20.851293.872
21.051299.809 21.141305.754 21.34  1311.69 21.581317.636 21.361323.572
21.181329.517 21.221335.454 21.21 1341.399 21.021347.335 21.121353.281
21.561359.217 21.71365.162 21.68 1371.099 20.791377.044 18.921388.926
```

18.791394.862 18.861400.807 18.88 1406.744 19.181412.689 19.081418.625
19.11424.571 19.251430.507 19.21 1436.453 19.211442.389 19.121454.271
18.551460.216 18.461466.152 18.58 1472.098 19.141478.034 18.991483.979
19.561489.916 19.291495.861 19.31 1501.797 19.71507.743 19.811513.679
19.741519.624 19.751525.561 19.81 1531.506 20.251537.443 19.811543.388
20.111549.324 20.25 1555.27 20.59 1561.206 20.51567.151 20.871573.088
21.321579.033 20.31584.969 20.01 1590.915 20.121596.851 20.321602.796
20.581608.733 20.951614.678 20.92 1620.614 20.92 1626.56 20.731632.496
20.851638.441 20.751644.378 21.02 1650.323 21.321656.259 21.41662.205
20.811668.141 20.81674.087 21.07 1680.023 21.361685.968 21.431691.905 21.35
1697.85 21.341709.732 21.2 1715.668 21.711721.613 22.02 1727.55 22.221733.495
22.531739.431 22.64 1745.377 22.461751.313 22.371757.258 22.551763.195 22.6
1769.14 22.89 1775.076 23.431781.022 22.41786.958 21.131792.903 21.06 1798.84
21.08 1810.721 20.691816.667 20.551822.603 20.941828.548 21.491834.485 21.99
1840.43 22.041846.367 21.961852.312 22.241858.248 22.461864.193 22.58
1870.13 22.351876.075 21.911882.012 21.91887.957 21.831893.893 21.66 1899.839
21.361905.775 21.23 1911.72 21.381917.666 21.371923.602 21.89 1929.538
21.841935.484 21.7 1941.42 21.941947.365 22.281953.311 22.73 1959.247
22.841965.193 23.941971.129 23.841977.074 251983.011 25.64 1988.956
26.11994.892 26.242000.838 26.432006.774 26.542012.719 26.45 2018.656
26.632024.601 26.562036.483 26.72042.419 26.372048.365 25.35 2054.301
24.192060.246 22.552066.182 21.982072.128 22.042078.064 22.06 2084.01
22.492089.946 22.862095.891 22.722101.828 22.262107.773 22.28 2113.709
22.942119.655 23.232125.591 23.992131.536 24.292137.473 23.83 2149.354 23.03
2155.3 23.282161.236 23.52167.181 23.742173.118 24.36 2179.063 24.552184.999
24.292190.945 24.492196.881 24.392202.826 23.85 2208.763 23.352214.708
23.432220.645 24.01 2226.59 24.332232.526 23.92 2238.471 23.832244.408
24.062250.353 24.7 2256.29 25.512262.235 26.12

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 955.547 .0551157.346 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
955.5471157.346 94.57 98.76 101.32 .5 .8 Ineffective Flow num= 3
 Sta L Sta R Elev Permanent
 534 980 24 T
 1150 2000 22.8 T 2000 2262 26 T
Skew Angle = 25

BRIDGE

RIVER: Taunton River
REACH: Main Stem RS: 82538.7

INPUT
Description: 75.5 SR 18/28 Bedford St
Distance from Upstream XS = 8
Deck/Roadway Width = 50
Weir Coefficient = 2.6
Bridge Deck/Roadway Skew = 25
Upstream Deck/Roadway Coordinates
 num= 15

Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
328.083 32.92 532.003 26.66 537.441 27.09
644.385 24.9 972.468 25.56 975.187 26.19
975.187 28.75 998.751 28.75 21.541130.166 28.43 20.92 1151.917 28.43
1151.917 25.21 1176.388 24.57 1376.682 23.56 1538.004 22.82 1866.088 25.18

Upstream Bridge Cross Section Data
Station Elevation Data num= 350
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 41.35 5.936 41.17 11.873
41.08 17.809 41.17 23.736 41.13 29.673 40.96 41.545 40.87 47.481 40.73
53.418 40.64 59.354 40.6 65.29 40.51 71.218 40.39 77.154 40.3 83.09 40.16
89.027 39.93 94.963 39.75 100.899 39.74 106.836 39.68 112.763 39.5 118.699
39.23 124.635 39.1 130.572 39.02 136.508 38.82 142.444 38.5 148.381 38.23
154.317 37.94 160.244 37.62 166.181 37.37 172.117 37.47 178.053 37.39 183.99
37.19 189.926 36.77 195.862 36.51 201.789 36.33 207.726 36.03 213.662 35.62
219.598 35.24 225.535 34.98 231.471 34.8 237.407 34.54 243.344 34.33 249.271
34.27 255.207 34.16 261.144 34.1 267.08 34.34 273.016 34.56 278.952 34.12
284.889 33.66 290.816 33.4 296.752 33.12 302.689 32.62 308.625 31.89 314.561
31.74 320.498 31.84 326.434 31.62 332.37 31.54 338.298 31.51 344.234 30.88
350.17 30.51 356.106 30.21 362.043 30.12 373.915 30.24 379.843 29.76 385.779
29.49 397.652 29.8 403.588 29.82 409.524 29.61 415.461 29.13 421.397 29.06
427.324 29.21 433.26 28.86 439.197 28.49 445.133 28.39 451.069 28.25 457.006
28.08 462.942 27.83 468.869 27.6 474.806 27.41 480.742 27.15 486.678 26.81
492.615 26.35 498.551 25.82 504.487 25.48 510.423 25.25 516.351 25 522.287
24.95 528.223 25.11 534.16 24.91 546.032 24.86 551.969 24.08 557.896 23.69
563.832 23.51 569.768 23.31 575.705 22.74 581.641 22.12 587.578 22.41
593.514 22.3 599.45 22.01 605.377 21.83 611.314 21.77 617.25 21.67 623.186
21.36 629.123 20.94 635.059 20.47 640.995 19.89 646.922 20.06 652.859 19.98
658.795 20.05 664.732 20.2 670.668 19.74 676.604 18.77 682.54 19.82 688.468
20.28 694.404 20.34 700.34 20.36 706.277 20.98 712.213 20.69 718.149 20.79
724.086 20.92 730.022 20.65 735.949 20.49 741.885 20.4 747.822 20.39 753.758
20.72 759.694 18.9 765.631 17.94 771.567 18.09 777.494 18.37 783.431 18.81
789.367 19.2 795.303 19.34 801.24 19.74 813.112 20.67 819.039 20.98 830.912
21.47 836.848 22.2 842.785 22.48 848.721 22.32 854.657 22.34 860.594 22.47
866.521 22.68 872.457 22.73 878.394 22.8 884.33 22.85 890.266 22.85 896.202
22.77 902.139 22.66 908.066 22.5 919.939 22.85 925.875 23.17 931.811 23.52
937.748 24.01 943.684 24.17 949.62 24.02 955.547 24.05 997.183 21.54 997.555
16.131005.367 15.971008.141 9.761020.249 6.01 1035.212 3.84 1044.91
3.851071.283 4.351080.736 4.921097.294 5.73 1107.3 6.791117.541
12.081117.876 15.161126.522 15.391128.489 20.92 1157.346 22.671169.219
21.241175.146 20.621181.082 20.781187.019 20.87 1192.955 21.031198.891
20.951204.828 20.551210.764 20.31216.691 20.45 1222.627 20.361228.564 20.31
1234.5 20.51240.436 20.51246.373 20.31 1252.309 20.371258.245 20.511264.172
20.581270.109 20.61276.045 20.6 1281.991 20.771287.927 20.851293.872
21.051299.809 21.141305.754 21.34 1311.69 21.581317.636 21.361323.572
21.181329.517 21.221335.454 21.21 1341.399 21.021347.335 21.121353.281
21.561359.217 21.71365.162 21.68 1371.099 20.791377.044 18.921388.926
18.791394.862 18.861400.807 18.88 1406.744 19.181412.689 19.081418.625
19.11424.571 19.251430.507 19.21 1436.453 19.211442.389 19.121454.271
18.551460.216 18.461466.152 18.58 1472.098 19.141478.034 18.991483.979
19.561489.916 19.291495.861 19.31 1501.797 19.71507.743 19.811513.679
19.741519.624 19.751525.561 19.81 1531.506 20.251537.443 19.811543.388
20.111549.324 20.25 1555.27 20.59 1561.206 20.51567.151 20.871573.088
21.321579.033 20.31584.969 20.01 1590.915 20.121596.851 20.321602.796

20.581608.733 20.951614.678 20.92 1620.614 20.92 1626.56 20.731632.496
20.851638.441 20.751644.378 21.02 1650.323 21.321656.259 21.41662.205
20.811668.141 20.81674.087 21.07 1680.023 21.361685.968 21.431691.905 21.35
1697.85 21.341709.732 21.2 1715.668 21.711721.613 22.02 1727.55 22.221733.495
22.531739.431 22.64 1745.377 22.461751.313 22.371757.258 22.551763.195 22.6
1769.14 22.89 1775.076 23.431781.022 22.41786.958 21.131792.903 21.06 1798.84
21.08 1810.721 20.691816.667 20.551822.603 20.941828.548 21.491834.485 21.99
1840.43 22.041846.367 21.961852.312 22.241858.248 22.461864.193 22.58
1870.13 22.351876.075 21.911882.012 21.91887.957 21.831893.893 21.66 1899.839
21.361905.775 21.23 1911.72 21.381917.666 21.371923.602 21.89 1929.538
21.841935.484 21.7 1941.42 21.941947.365 22.281953.311 22.73 1959.247
22.841965.193 23.941971.129 23.841977.074 251983.011 25.64 1988.956
26.11994.892 26.242000.838 26.432006.774 26.542012.719 26.45 2018.656
26.632024.601 26.562036.483 26.72042.419 26.372048.365 25.35 2054.301
24.192060.246 22.552066.182 21.982072.128 22.042078.064 22.06 2084.01
22.492089.946 22.862095.891 22.722101.828 22.262107.773 22.28 2113.709
22.942119.655 23.232125.591 23.992131.536 24.292137.473 23.83 2149.354 23.03
2155.3 23.282161.236 23.52167.181 23.742173.118 24.36 2179.063 24.552184.999
24.292190.945 24.492196.881 24.392202.826 23.85 2208.763 23.352214.708
23.432220.645 24.01 2226.59 24.332232.526 23.92 2238.471 23.832244.408
24.062250.353 24.7 2256.29 25.512262.235 26.12

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 955.547 .0551157.346 .09

Bank Sta: Left Right Coeff Contr. Expan. 955.5471157.346 .5 .8
Ineffective Flow num= 3
 Sta L Sta R Elev Permanent
 534 980 24 T
 1150 2000 22.8 T
 2000 2262 26 T
Skew Angle = 25

Downstream Deck/Roadway Coordinates
 num= 15
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 362.523 32.92 566.442 26.66 571.88 27.09
 678.825 24.9 1006.908 25.56 1009.627 26.19 1009.627 28.75 1033.191 28.75
21.541164.606 28.43 20.92 1186.357 28.43 1186.357 25.21 1210.827 24.57
1411.121 23.56 1572.444 22.82 1900.527 25.18

Downstream Bridge Cross Section Data
Station Elevation Data num= 477
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 44.26 5.927 44.02 11.864
44.43 17.791 43.86 23.727 42.97 35.591 42.74 41.518 42.61 53.382 42.24
59.318 41.99 65.245 41.69 71.181 41.55 83.045 41.15 88.972 40.91 94.899
40.87 100.836 40.81 106.763 41.43 112.699 42.95 118.627 43.6 124.563 43.79
130.49 43.65 136.427 43.57 142.354 43.21 148.29 43.1 154.217 43.06 160.154
42.71 172.017 42.31 183.872 42.15 189.808 42.06 195.735 41.87 201.672 41.49
207.599 41.04 219.462 40.11 225.399 39.61 231.326 39.05 237.262 38.37 243.19
37.29 249.126 36.5 255.053 36.35 260.989 36.16 266.917 36.19 272.844 36.34
284.708 36.36 290.644 36.16 296.571 35.85 302.507 35.59 308.435 35.24
314.371 35.04 320.298 35.23 326.235 35.09 332.162 34.47 338.098 33.55

344.025 32.93 349.962 32.44 355.889 32.23 361.816 31.91 367.753 31.65 373.68
31.43 379.616 31.27 385.543 30.98 391.48 30.41 397.407 30.12 403.343 29.7
409.27 29.48 415.207 29.52 421.134 29.6 427.07 29.51 432.998 29.05 438.925
28.67 444.861 28.37 450.788 28.19 456.725 28.1 462.652 27.97 474.516 27.82
480.452 27.85 486.379 28.19 492.315 28.36 498.243 28.49 504.179 28.46
510.106 28.09 516.043 27.59 521.97 27.45 527.897 27.47 533.833 27.63 539.761
27.86 545.697 28.13 551.624 27.78 557.561 27.35 563.488 27.01 569.424 26.72
575.351 26.12 581.288 25.41 587.215 24.74 593.151 24.34 599.079 24.19
605.015 24.02 610.942 23.6 616.869 23.35 622.806 23.18 628.733 22.86 634.669
22.35 640.596 21.91 646.533 21.6 652.46 21.27 658.396 21.13 664.324 21.01
670.26 20.8 682.124 20.54 688.051 20.4 693.978 20.22 699.914 19.88 711.778
19.33 717.705 19.09 723.641 18.98 735.505 18.63 741.432 18.32 747.369 17.93
753.296 17.68 759.232 17.47 765.159 17.41 771.096 17.17 777.023 16.73 782.95
16.56 788.887 16.41 794.814 16.24 800.75 16.31 806.677 16.17 812.614 16.11
818.541 16.29 824.477 16.01 830.405 16.03 836.341 15.98 842.268 15.7 848.204
15.58 854.132 15.36 860.059 15.45 865.995 15.65 871.922 16.13 877.859 17.05
883.786 17.04 889.722 17.7 895.65 17.81 901.586 17.79 907.513 16.66 969.749
25.551009.699 25.85 1033.436 21.541033.807 16.13 1041.62 15.971044.393
9.761056.501 6.01 1071.464 3.841081.162 3.851107.535 4.351116.988
4.921133.546 5.73 1143.552 6.791153.793 12.081154.129 15.161162.775
15.391164.741 20.92 1186.139 24.71221.884 18.851227.811 19.31233.748
19.281245.611 18.96 1251.539 18.531257.475 18.381263.402 18.481269.339
18.951275.266 19.2 1281.202 19.291287.129 19.571293.057 19.641298.993 19.34
1304.92 19.09 1316.784 18.5 1322.72 18.081328.647 17.811334.584 17.561340.511
17.52 1346.447 17.621352.374 17.651358.311 17.591364.238 17.731370.174 17.71
1376.102 17.961382.029 18.081387.965 18.421393.892 18.641399.829 18.95
1405.756 19.371411.692 19.63 1417.62 19.851423.556 20.11429.483 20.4 1435.419
20.671441.347 20.671447.283 20.93 1453.21 20.91459.137 21.03 1465.074
20.941471.001 20.621476.937 20.431482.865 20.551488.801 20.7 1494.728
20.811500.665 21.631506.592 22.291512.528 22.351518.455 22.37 1524.392
22.411530.319 22.161536.255 21.771542.182 21.51 1548.11 21.13 1554.046
20.941559.973 21.06 1565.91 21.111571.837 21.091577.773 21.33 1583.7
21.51589.637 21.541595.564 21.84 1601.5 22.451607.427 23.17 1613.364
23.671619.291 23.811625.227 23.851631.155 23.71637.082 23.35 1643.018
22.981648.946 22.921654.882 22.941660.809 22.761666.745 22.67 1672.673
22.011684.536 21.621690.473 21.48 1696.4 21.421708.263 21.57 1714.2
21.71720.127 21.641726.054 21.69 1731.99 21.471737.918 21.51 1743.854
21.851749.781 21.881755.718 21.721761.645 21.951767.581 22.24 1773.508
22.271785.372 231791.308 23.661797.236 23.811803.163 24.35 1809.099
24.471815.026 24.271820.963 23.9 1826.89 23.831832.826 23.73 1838.754 24.72
1844.69 25.431850.617 25.711856.553 25.871862.481 26.15 1868.417
26.411874.344 26.281880.281 25.561886.208 25.291892.135 25.49 1898.071
25.741903.999 26.011909.935 26.141915.862 26.331921.798 26.58 1927.726
26.481939.589 25.61945.526 24.991951.453 24.441957.389 24.45 1963.317
24.361969.253 24.18 1975.18 24.161981.107 24.211992.971 25.01 1998.907
24.962004.835 24.962010.771 24.892016.698 25.152022.634 25.9 2028.562
26.742040.425 27.752046.361 27.782052.289 27.522058.225 27.34 2064.152 27.26
2070.08 27.362076.016 27.422087.879 27.492099.743 27.72 2105.67
28.112111.606 27.712117.534 26.83 2123.47 27.572129.397 27.54 2135.334
27.742141.261 27.22147.197 27.012153.125 27.552159.052 27.4 2164.988
27.482170.916 27.192176.852 27.672182.779 27.522188.715 27.27 2194.643
27.222200.579 27.562206.506 27.642212.442 27.67 2218.37 27.6 2224.306
27.642230.233 27.622236.161 27.912242.097 27.922248.024 28.11 2259.888
28.362265.824 28.382271.751 28.422283.633 28.362289.569 28.26 2295.506

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28.122301.451 27.952307.387 27.972313.323 27.712325.205 27.7 2331.141
27.792337.078 27.792343.023 27.652348.959 27.252354.896 27.21 2360.841
27.292366.778 27.52372.714 26.87 2378.65 27.312384.596 27.34 2390.532
27.242396.468 26.792402.414 26.61 2408.35 26.992414.286 27.16 2420.222
27.282426.168 26.812432.104 27.412438.041 27.752443.986 27.59 2449.922
27.582455.859 27.492461.795 27.442473.677 27.412479.613 27.35 2485.558
27.342491.495 27.422497.431 27.592503.367 27.592509.312 27.37 2515.249
26.662521.185 25.82 2527.13 25.542533.067 25.642539.003 25.71 2544.939
25.72550.885 25.672556.821 25.212562.758 24.872568.703 24.89 2574.639
25.022580.576 25.052586.512 25.022592.457 25.282598.394 25.56  2604.33
25.872610.266 26.32616.211 26.62622.148 26.492628.084 26.34 2639.966
25.992645.902 25.912651.839 25.972657.784 25.86 2663.72 25.97 2669.656
262681.538 25.572687.475 25.422693.411 24.882699.356 24.62 2705.292
24.512711.229 24.612717.174 24.862723.111 24.942729.047 24.88 2734.983
24.742746.865 24.262752.801 24.082758.747 24.072764.683 23.17 2770.619
23.12776.556 22.962782.501 22.912788.437 22.772794.374 22.77 2800.319
22.522806.255 22.212812.191 22.342818.128 22.052824.073 21.97  2830.01
22.082835.946 21.972841.891 22.342847.828 22.282853.764 22.11  2859.7
22.052865.646 22.142877.518 22.562883.464 22.53 2889.4 22.91 2895.336
23.022901.272 22.982907.218 23.192913.154 23.52919.091 23.54 2925.036
23.42930.972 23.362936.909 23.132942.845 22.74 2948.79 22.59 2954.727
22.272960.663 21.92966.608 21.472972.545 21.072978.481 21.12 2984.417
20.992990.363 20.892996.299 20.913002.235 20.883008.181 21.06 3014.117
21.133020.053 21.6 3025.99 22.213031.935 22.443037.871 22.47 3043.808
22.043049.753 21.183055.689 20.913067.562 20.983073.507 21.16 3079.444 21.29
3085.38 21.483091.325 21.63097.262 21.743109.134 21.79  3115.08 21.783121.016
21.53126.952 21.33132.898 21.573138.834 21.44 3144.771 21.543150.707
21.823156.652 21.633168.525 21.95 3174.47 20.2 3180.406 20.033186.343
20.233192.279 20.253198.224 20.363204.161 20.45 3210.097 20.523216.042 24.5

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .091009.699 .041186.139 .09
 Bank Sta: Left Right Coeff Contr. Expan.
 1009.6991186.139 .5 .8
Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 1009 25.5 T
 11863216.042 23.9 T
Skew Angle = 25

Upstream Embankment side slope = 0 horiz. to 1.0 vertical Downstream
Embankment side slope = 0 horiz. to 1.0 vertical Maximum allowable
submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Piers = 1

Pier Data
Pier Station Upstream=1066.724 Downstream=1101.164
Upstream num= 2
```

```
 Width Elev Width Elev
 3 6 3 21
Downstream num= 2
 Width Elev Width Elev
 3 6 3 21

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
 Energy
 W.S. Pro Method

 W.S.Pro Data
 Left Embankment
 El of the top of the embankment = 25.5
 El of the toe of the abutment = 9
 Right Embankment
 El of the top of the embankment = 25.5
 El of the toe of the abutment = 9
 Abutment Type = 2 Vert. abutments and sloping embankments  Slope of
abutments =
 Top with of embankment = 50
 Centroid station of bridge opening =
 Wing Wall Type = No wing walls present
 Width =
 Angle =
 Radius =
 Guide Banks Type = No Guide Bank present
 Length =
 Offset =
 Angle =
 Optional Contraction and expansion coefficients
 At approach Section  At Guide Bank
 At upstream outside
 At upstream inside (BU)
 At downstream inside (BD)
 Piers are Continuous for the width of the bridge
 Use Geometric mean as Friction Slope Method

Selected Low Flow Methods = W.S.Pro Method

High Flow Method
 Pressure and Weir flow
 Submerged Inlet Cd =
 Submerged Inlet + Outlet Cd = .8
 Max Low Cord =

Additional Bridge Parameters
 Add Friction component to Momentum
 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line
```

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 82492.84

INPUT
Description: 75.3 DS FAce Bedford St
Station Elevation Data num= 477 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 44.26 5.927 44.02 11.864 44.43 17.791 43.86 23.727 42.97 35.591 42.74
41.518 42.61 53.382 42.24 59.318 41.99 65.245 41.69 71.181 41.55 83.045
41.15 88.972 40.91 94.899 40.87 100.836 40.81 106.763 41.43 112.699 42.95
118.627 43.6 124.563 43.79 130.49 43.65 136.427 43.57 142.354 43.21 148.29
43.1 154.217 43.06 160.154 42.71 172.017 42.31 183.872 42.15 189.808 42.06
195.735 41.87 201.672 41.49 207.599 41.04 219.462 40.11 225.399 39.61
231.326 39.05 237.262 38.37 243.19 37.29 249.126 36.5 255.053 36.35 260.989
36.16 266.917 36.19 272.844 36.34 284.708 36.36 290.644 36.16 296.571 35.85
302.507 35.59 308.435 35.24 314.371 35.04 320.298 35.23 326.235 35.09
332.162 34.47 338.098 33.55 344.025 32.93 349.962 32.44 355.889 32.23
361.816 31.91 367.753 31.65 373.68 31.43 379.616 31.27 385.543 30.98 391.48
30.41 397.407 30.12 403.343 29.7 409.27 29.48 415.207 29.52 421.134 29.6
427.07 29.51 432.998 29.05 438.925 28.67 444.861 28.37 450.788 28.19 456.725
28.1 462.652 27.97 474.516 27.82 480.452 27.85 486.379 28.19 492.315 28.36
498.243 28.49 504.179 28.46 510.106 28.09 516.043 27.59 521.97 27.45 527.897
27.47 533.833 27.63 539.761 27.86 545.697 28.13 551.624 27.78 557.561 27.35
563.488 27.01 569.424 26.72 575.351 26.12 581.288 25.41 587.215 24.74
593.151 24.34 599.079 24.19 605.015 24.02 610.942 23.6 616.869 23.35 622.806
23.18 628.733 22.86 634.669 22.35 640.596 21.91 646.533 21.6 652.46 21.27
658.396 21.13 664.324 21.01 670.26 20.8 682.124 20.54 688.051 20.4 693.978
20.22 699.914 19.88 711.778 19.33 717.705 19.09 723.641 18.98 735.505 18.63
741.432 18.32 747.369 17.93 753.296 17.68 759.232 17.47 765.159 17.41
771.096 17.17 777.023 16.73 782.95 16.56 788.887 16.41 794.814 16.24 800.75
16.31 806.677 16.17 812.614 16.11 818.541 16.29 824.477 16.01 830.405 16.03
836.341 15.98 842.268 15.7 848.204 15.58 854.132 15.36 860.059 15.45 865.995
15.65 871.922 16.13 877.859 17.05 883.786 17.04 889.722 17.7 895.65 17.81
901.586 17.79 907.513 16.66 969.749 25.551009.699 25.85 1033.436
21.541033.807 16.13 1041.62 15.971044.393 9.761056.501 6.01 1071.464
3.841081.162 3.851107.535 4.351116.988 4.921133.546 5.73 1143.552
6.791153.793 12.081154.129 15.161162.775 15.391164.741 20.92 1186.139
24.71221.884 18.851227.811 19.31233.748 19.281245.611 18.96 1251.539
18.531257.475 18.381263.402 18.481269.339 18.951275.266 19.2 1281.202
19.291287.129 19.571293.057 19.641298.993 19.34 1304.92 19.09 1316.784 18.5
1322.72 18.081328.647 17.811334.584 17.561340.511 17.52 1346.447
17.621352.374 17.651358.311 17.591364.238 17.731370.174 17.71 1376.102
17.961382.029 18.081387.965 18.421393.892 18.641399.829 18.95 1405.756
19.371411.692 19.63 1417.62 19.851423.556 20.11429.483 20.4 1435.419
20.671441.347 20.671447.283 20.93 1453.21 20.91459.137 21.03 1465.074
20.941471.001 20.621476.937 20.431482.865 20.551488.801 20.7 1494.728
20.811500.665 21.631506.592 22.291512.528 22.351518.455 22.37 1524.392
22.411530.319 22.161536.255 21.771542.182 21.51 1548.11 21.13 1554.046
20.941559.973 21.06 1565.91 21.111571.837 21.091577.773 21.33 1583.7
21.51589.637 21.541595.564 21.84 1601.5 22.451607.427 23.17 1613.364
23.671619.291 23.811625.227 23.851631.155 23.71637.082 23.35 1643.018
22.981648.946 22.921654.882 22.941660.809 22.761666.745 22.67 1672.673

22.011684.536 21.621690.473 21.48 1696.4 21.421708.263 21.57 1714.2
21.71720.127 21.641726.054 21.69 1731.99 21.471737.918 21.51 1743.854
21.851749.781 21.881755.718 21.721761.645 21.951767.581 22.24 1773.508
22.271785.372 231791.308 23.661797.236 23.811803.163 24.35 1809.099
24.471815.026 24.271820.963 23.9 1826.89 23.831832.826 23.73 1838.754 24.72
1844.69 25.431850.617 25.711856.553 25.871862.481 26.15 1868.417
26.411874.344 26.281880.281 25.561886.208 25.291892.135 25.49 1898.071
25.741903.999 26.011909.935 26.141915.862 26.331921.798 26.58 1927.726
26.481939.589 25.61945.526 24.991951.453 24.441957.389 24.45 1963.317
24.361969.253 24.18 1975.18 24.161981.107 24.211992.971 25.01 1998.907
24.962004.835 24.962010.771 24.892016.698 25.152022.634 25.9 2028.562
26.742040.425 27.752046.361 27.782052.289 27.522058.225 27.34 2064.152 27.26
2070.08 27.362076.016 27.422087.879 27.492099.743 27.72 2105.67
28.112111.606 27.712117.534 26.83 2123.47 27.572129.397 27.54 2135.334
27.742141.261 27.22147.197 27.012153.125 27.552159.052 27.4 2164.988
27.482170.916 27.192176.852 27.672182.779 27.522188.715 27.27 2194.643
27.222200.579 27.562206.506 27.642212.442 27.67 2218.37 27.6 2224.306
27.642230.233 27.622236.161 27.912242.097 27.922248.024 28.11 2259.888
28.362265.824 28.382271.751 28.422283.633 28.362289.569 28.26 2295.506
28.122301.451 27.952307.387 27.972313.323 27.712325.205 27.7 2331.141
27.792337.078 27.792343.023 27.652348.959 27.252354.896 27.21 2360.841
27.292366.778 27.52372.714 26.87 2378.65 27.312384.596 27.34 2390.532
27.242396.468 26.792402.414 26.61 2408.35 26.992414.286 27.16 2420.222
27.282426.168 26.812432.104 27.412438.041 27.752443.986 27.59 2449.922
27.582455.859 27.492461.795 27.442473.677 27.412479.613 27.35 2485.558
27.342491.495 27.422497.431 27.592503.367 27.592509.312 27.37 2515.249
26.662521.185 25.82 2527.13 25.542533.067 25.642539.003 25.71 2544.939
25.72550.885 25.672556.821 25.212562.758 24.872568.703 24.89 2574.639
25.022580.576 25.052586.512 25.022592.457 25.282598.394 25.56 2604.33
25.872610.266 26.32616.211 26.62622.148 26.492628.084 26.34 2639.966
25.992645.902 25.912651.839 25.972657.784 25.86 2663.72 25.97 2669.656
262681.538 25.572687.475 25.422693.411 24.882699.356 24.62 2705.292
24.512711.229 24.612717.174 24.862723.111 24.942729.047 24.88 2734.983
24.742746.865 24.262752.801 24.082758.747 24.072764.683 23.17 2770.619
23.12776.556 22.962782.501 22.912788.437 22.772794.374 22.77 2800.319
22.522806.255 22.212812.191 22.342818.128 22.052824.073 21.97 2830.01
22.082835.946 21.972841.891 22.342847.828 22.282853.764 22.11 2859.7
22.052865.646 22.142877.518 22.562883.464 22.53 2889.4 22.91 2895.336
23.022901.272 22.982907.218 23.192913.154 23.52919.091 23.54 2925.036
23.42930.972 23.362936.909 23.132942.845 22.74 2948.79 22.59 2954.727
22.272960.663 21.92966.608 21.472972.545 21.072978.481 21.12 2984.417
20.992990.363 20.892996.299 20.913002.235 20.883008.181 21.06 3014.117
21.133020.053 21.6 3025.99 22.213031.935 22.443037.871 22.47 3043.808
22.043049.753 21.183055.689 20.913067.562 20.983073.507 21.16 3079.444 21.29
3085.38 21.483091.325 21.63097.262 21.743109.134 21.79 3115.08 21.783121.016
21.53126.952 21.33132.898 21.573138.834 21.44 3144.771 21.543150.707
21.823156.652 21.633168.525 21.95 3174.47 20.2 3180.406 20.033186.343
20.233192.279 20.253198.224 20.363204.161 20.45 3210.097 20.523216.042 24.5
 Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .091009.699 .041186.139 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1009.6991186.139 128.81 112.38 109.35 .5 .8 Ineffective Flow num= 2

```
 Sta L Sta R Elev Permanent
 0 1009 25.5 T
 11863216.042 23.9 T
Skew Angle = 25

CROSS SECTION


RIVER: Taunton River
REACH: Main Stem RS: 82380.46

INPUT
Description: 75 Exit Bedford St
Station Elevation Data num= 332
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  0 54.96 6.55 54.85 13.09 54.29
19.64 54 26.19 53.8  32.74 53.42 39.29 52.93 45.83 52.55 52.38 52.11 58.93
51.73  65.48 51.6 72.02 51.38 78.57 50.96 85.12 50.7 91.66 50.48  98.21 50.19
104.76 49.93 111.31 49.57 117.85 49.33 124.4 49.26  130.95 48.94 137.5 48.69
144.04 48.49 150.59 48.25 157.14 47.97  163.69 47.65 170.23 47.4 176.78 47.1
183.33 46.85 189.88 46.63  196.42 46.35 202.97 46.16 209.52 45.9 216.07 45.72
222.61 45.48  235.71 45.09 242.26 44.88 248.8 44.8 255.35 44.66 268.45 44.05
274.99 43.73 281.54 43.45 288.09 43.39 294.64 43.26 301.18 43.21  307.73
43.04 314.28 42.9 320.83 42.79 327.37 42.49 333.92 42.34  340.47 42.13 347.02
41.75 353.56 41.54 360.11 41.3 373.21 40.89  379.75 40.64 386.3 40.31 392.85
40.04 399.4 39.81 405.94 39.56  412.49 39.26 419.04 39 425.59 38.61 432.13
38.18 438.68 37.83  445.23 37.61 451.78 37.31 458.32 37.08 464.87 36.81
471.42 36.48  477.97 36.03 484.51 35.74 491.06 35.38 497.61 34.97 504.16
34.66  510.7 34.46 517.25 34.29 530.35 34.06 536.89 33.8 549.99 33.19  556.54
33.01 563.08 32.8 576.18 31.95 582.73 31.63 589.27 31.38  602.37 31.23 608.92
30.9 615.46 30.39 622.01 30.06 628.56 29.86  635.11 29.55 641.65 29.14 648.2
28.88 654.75 28.84 661.3 28.56  667.84 28.22 674.39 27.9 680.94 27.64 694.03
27.15 700.58 26.82  713.68 26.35 720.22 26.05 726.77 25.78 739.87 25.59
759.51 24.78  766.06 24.67 772.6 24.51 779.15 24.28 785.7 24.31 792.25 24.22
798.79 24.17 805.34 23.83 811.89 23.6 818.44 23.44 824.98 23.32  831.53 22.8
838.08 22.22 844.63 21.83 851.17 21.53 857.72 21.26  864.27 21.06 870.82
20.76 877.36 20.61 883.91 20.59 890.46 20.42  897.01 20.19 903.55 20.05 910.1
19.88 916.65 19.45 923.2 18.87  929.74 18.31 936.29 18 942.84 17.58 949.39
17.05 955.93 16.73  1001.14 14.94 1066.06 13.83 1107.83 16.62 1159.8 6.51
1169.38 4.9  1184.93 3.62 1199.94 4.05 1209.63 3.96 1228.12 4.33 1244.36 5.18
1255.8 7.87 1277.03 14.02 1333.92 16.45 1340.46 17 1347 17.75  1353.55 18.25
1360.09 18.52 1366.64 18.71 1373.18 18.86 1379.73 18.83  1386.27 18.74
1392.81 18.91 1399.36 18.99 1405.9 18.9 1412.45 18.73  1418.99 18.66 1425.53
18.55 1432.08 18.42 1438.62 18.26 1445.17 18.15  1451.71 18.15 1458.26 18.13
1464.8 18.27 1471.34 18.57 1490.98 19.1  1497.52 19.26 1504.06 19.5 1517.15
19.91 1523.7 20.43 1536.79 21.6  1543.33 21.98 1549.87 22.21 1556.42 22.38
1562.96 22.51 1576.05 23.16  1582.59 23.2 1589.14 23.3 1595.68 23.38 1602.23
23.38 1608.77 23.35  1615.32 23.48 1621.86 23.41 1628.4 23.41 1634.95 23.54
1641.49 23.56  1648.04 23.5 1654.58 23.78 1661.12 23.96 1667.67 23.01 1674.21
23.06  1680.76 22.7 1687.3 22.28 1693.85 21.69 1700.39 21.84 1706.93 22.08
1713.48 22.24 1720.02 22.24 1726.57 22.19 1733.11 22 1746.2 21.45  1752.74
21.28 1759.29 21.37 1765.83 21.53 1772.38 21.6 1778.92 21.96  1785.46 21.98
1792.01 21.89 1805.1 21.86 1811.64 21.68 1818.18 21.7  1824.73 21.41 1831.27
21.45 1837.82 21.96 1844.36 21.97 1850.91 22.13  1857.45 21.76 1863.99 21.45
1870.54 21.65 1877.08 21.6 1883.63 21.66  1890.17 22.1 1896.72 22.31 1903.26
```

22.75 1909.8 23.43 1916.35 24.3 1922.89 24.98 1929.44 25.42 1935.98 25.41
1942.52 25.1 1949.07 25.31 1955.61 25.92 1962.16 25.86 1968.7 25.06 1975.25
24.43 1988.33 23.82 1994.88 23.73 2001.42 23.93 2007.97 23.76 2014.51 23.5
2021.05 23.5 2027.6 23.58 2034.14 23.68 2040.69 23.59 2047.23 23.87 2053.78
24.66 2060.32 25.16 2066.86 25.5 2073.41 25.63 2079.95 25.67 2086.5 25.51
2093.04 25.24 2099.58 24.58 2106.13 24.05 2112.67 23.93 2119.22 23.78
2125.76 23.57 2132.31 23.53 2138.85 23.55 2145.39 23.74 2151.94 24.37
2158.48 26.03 2165.03 27.77 2171.57 28.53 2178.11 28.53 2184.66 28.39 2191.2
28.62 2197.75 28.83 2204.29 29.11 2210.84 29.28 2217.38 29.29 2223.92 29.32
2237.01 29.23 2243.56 29.16 2250.1 29.07 2256.64 29.1 2263.19 29.62 2269.73
29.76 2276.28 29.71 2282.82 29.71 2289.37 29.44 2295.91 29.28 2302.45 29.14
2309 29.08 2315.54 29.12 2322.09 29.29 2328.63 29.19 2335.18 28.72 2341.72
28.52 2348.26 28.2 2354.81 27.91 2361.35 27.49 2367.9 27.3 2374.44 27.63
2380.98 28.24 2387.53 28.21 2394.07 28.69 2400.62 28.67 2407.16 28.1 2413.71
26.83 2420.25 25.92 2426.79 25.78 2433.34 25.67 2439.88 25.6 2446.43 25.45
2459.51 25.33 2466.06 25.4 2472.6 25.4 2479.15 25.56 2485.69 25.67 2492.24
25.8 2498.78 26.5 2505.32 27.31 2511.87 27.96 2518.41 28.65 2524.96 29.07
2531.5 29.19 2538.04 29.4 2544.59 29.63 2551.13 29.71 2557.68 29.66 2564.22
29.63 2570.76 29.44 2577.31 29.16 2583.85 29.08 2590.4 28.85 2596.94 28.52
2603.48 28.11

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 1107.83 .04 1379.73 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1107.83
1379.73 1341.34 1298.77 1269.65 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 1621.9 2603.48 24.2 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 81081.69

INPUT
Description: 74
Station Elevation Data num= 297
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 43.27 19.63 42.67 45.8 42.57
65.43 42.03 78.52 41.9 91.6 42.16 98.14 42.16 111.23 41.96 117.77 41.73
130.86 41.5 143.95 40.96 176.66 40.55 202.83 40.59 255.18 39.37 287.89 38.17
307.52 37.77 314.06 37.28 340.24 37.05 346.78 36.89 366.41 36.67 372.95 36.8
386.04 36.61 392.58 36.24 399.12 36.16 405.66 36.27 418.75 35.7 425.29 35.59
431.84 35.67 444.92 35.48 458.01 34.96 464.55 34.55 471.09 34.44 477.64
34.55 490.72 34.48 497.27 34.6 536.52 34.45 543.07 34.27 549.61 34.26 562.7
34.56 569.24 34.48 582.33 34.11 588.87 34.1 601.95 33.67 615.04 33.61 634.67
34 641.21 34.45 660.84 34.29 673.93 34.27 680.47 33.94 700.1 33.71 706.64
33.44 713.19 32.87 726.27 32.78 732.81 32.85 745.9 32.61 752.44 32.39 765.53
32.24 778.62 31.77 785.16 31.39 798.24 31.14 804.79 30.89 824.42 30.64
850.59 29.42 863.67 29.14 870.22 29.13 876.76 29.31 896.39 29.52 902.93
29.44 909.48 29.13 922.56 28.06 929.1 27.85 942.19 27.08 955.28 26.98 961.82
26.75 968.36 26.35 994.53 25.53 1001.08 25.5 1014.16 24.95 1020.71 24.98
1027.25 24.15 1033.79 23.56 1040.34 23.56 1046.88 23.84 1053.42 24.29

1066.51 24.27 1073.05 24.11 1105.77 22.37 1112.31 21.84 1125.39 22.11
1138.48 22.08 1177.74 21.12 1190.82 20.83 1203.91 20.24 1236.62 17.71
1243.17 17.11 1262.8 15.89 1282.43 15.64 1295.51 15.08 1302.05 14.91 1328.23
15.5 1334.77 15.82 1341.31 15.97 1347.85 15.92 1360.94 16.2 1367.48 16.23
1380.57 15.99 1387.11 15.29 1393.66 14.14 1400.2 13.39 1406.74 13.68 1413.28
13.49 1426.37 13.61 1432.91 13.52 1439.46 14 1446 14.68 1452.54 15.52
1459.09 16.07 1472.17 16.71 1478.71 16.82 1491.8 16.29 1492.52 16.23 1498.34
15.73 1504.89 15.09 1511.43 14.24 1517.97 13.27 1524 10.2 1545 4.7 1570 5.3
1595 5.2 1616 10.3 1622.66 12.08 1629.2 13.54 1635.75 17.72 1642.29 19.79
1648.83 20.73 1655.37 21.05 1661.92 21.05 1668.46 20.87 1675 20.35 1681.55
19.56 1688.09 18.83 1694.63 17.65 1701.17 17.24 1707.72 17.29 1714.26 17.37
1720.8 17.9 1727.35 18.74 1733.89 19.37 1740.43 19.69 1746.98 19.62 1760.06
18.9 1766.6 18.09 1773.15 17.66 1779.69 17.61 1786.23 17.41 1792.78 17.85
1799.32 17.71 1805.86 17.61 1812.41 17.85 1818.95 18.41 1825.49 19.05
1832.03 19.67 1838.58 19.92 1845.12 20 1851.66 20.15 1858.21 20.46 1864.75
20.46 1871.29 20.54 1877.83 20.85 1884.38 20.88 1890.92 21.28 1897.46 21.87
1904.01 22.3 1910.55 22.54 1917.09 22.89 1923.64 23.46 1930.18 24.06 1936.72
24.38 1943.26 24.43 1949.81 24.53 1956.35 24.72 1962.89 25.14 1969.44 25.4
1975.98 25.55 1982.52 25.45 1989.07 24.93 1995.61 24.13 2002.15 23.42
2008.69 22.62 2015.24 22.38 2021.78 22.29 2034.87 22.19 2041.41 22.16
2047.95 22.26 2054.49 22.43 2061.04 22.42 2067.58 22.16 2074.11 22.03
2080.64 22.45 2093.7 22.99 2100.23 23.22 2106.76 23.62 2113.29 23.83 2119.82
23.6 2126.35 23.58 2132.88 23.21 2139.42 23.17 2145.95 23.18 2152.48 23.05
2159.01 22.7 2165.54 22.71 2172.07 22.94 2178.6 23.14 2185.13 23.29 2191.66
23.6 2198.19 23.84 2204.72 24.5 2211.25 24.85 2217.78 25.69 2224.31 26.71
2237.37 28.33 2243.9 29.07 2250.43 29.87 2256.96 30.41 2263.49 30.79 2270.02
31.09 2276.55 31.11 2283.08 31.08 2289.61 31.12 2296.15 30.88 2302.68 30.81
2309.21 31.09 2315.74 31.17 2322.27 31.21 2328.8 31.27 2335.33 31.54 2341.86
31.5 2354.92 31.65 2361.45 31.75 2367.98 31.77 2374.51 31.61 2381.04 31.57
2387.57 31.43 2394.1 31.38 2400.63 30.22 2407.16 28.97 2413.69 27.64 2420.22
26.85 2426.75 27.48 2433.28 28.35 2439.81 28.51 2446.34 28.37 2452.88 27.92
2459.41 27.32 2465.94 26.55 2472.47 25.87 2485.53 23.8 2492.06 23.29 2498.59
22.93 2505.12 22.85 2511.65 23.46 2518.18 23.89 2524.71 24.34 2531.24 24.63
2537.77 25.07 2544.3 25.63 2550.83 25.99 2557.36 26.05 2563.89 26.02 2570.42
25.71 2576.95 25.57 2583.48 25.16 2590.01 25.1 2596.54 25.57 2603.07 26.23
2609.61 27.04 2616.14 27.73 2622.67 28.46 2635.73 30.03 2642.26 30.08
2648.79 30 2655.32 30.05 2661.85 30.08 2668.38 30.06 2674.91 29.99 2681.44
29.94 2687.97 29.92 2694.5 29.79 2701.03 29.71 2707.56 29.6 2714.09 29.58
2720.62 29.62 2733.68 29.75 2740.21 29.72 2746.74 29.85 2753.27 30.23
2759.81 30.66

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 1478.71 .04 1655.37 .095
 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1478.71 1655.37 1963.31 1977.44 1977.97 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 1969 2759.81 25.4 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 79104.25

INPUT
Description: 73
Station Elevation Data num= 387
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 29.82 6.56 29.71 19.68 29.52
26.24 29.48 32.8 29.49 39.36 29.56 45.92 29.67 52.48 29.83 59.04 30.03 72.15
30.48 78.71 30.63 85.27 30.65 91.83 30.57 98.39 30.35 104.95 30.21 111.51
30.22 118.07 30.35 131.19 30.1 137.75 30.3 144.31 29.93 150.87 27.64 157.43
25.7 163.99 25.56 177.11 26.55 183.67 27.08 190.23 27.29 196.79 27.43 203.35
27.54 209.91 27.61 216.46 27.58 229.58 27.89 236.14 28.11 242.7 28.28 249.26
28.36 255.82 28.39 262.38 28.9 268.94 29.37 275.5 29.72 282.06 30.03 288.62
30.81 295.18 31.33 301.74 32.06 308.3 32.53 314.86 32.54 327.98 32.43
334.54 32.47 341.1 32.33 347.66 31.3 354.22 29.28 360.77 27.21 367.33 25.73
373.89 23.83 387.01 23.04 393.57 22.82 400.13 22.45 406.69 22.65 413.25
23.16 419.81 23.85 426.37 24.17 432.93 24.24 439.49 24.79 446.05 24.42
452.61 25.52 459.17 27.22 465.73 28.59 472.29 29.42 478.85 29.72 491.97
29.29 498.53 29.2 505.08 29.33 511.64 29.31 518.2 29.03 524.76 28.63 531.32
28.15 537.88 27.93 544.44 28.15 551 28.03 557.56 27.56 564.12 26.81 570.68
26.25 577.24 25.99 590.36 25.32 596.92 25.44 603.48 25.46 610.04 25.06
616.6 24.99 623.16 25.07 629.72 25.03 642.84 24.85 649.39 24.97 655.95 25.13
662.51 25.05 669.07 25.01 675.63 24.91 682.19 24.54 688.75 24.46 695.31
24.45 701.87 24.08 708.43 22.59 714.99 22.25 721.55 22.48 728.11 23.14
734.67 23.23 741.23 22.46 747.79 21.25 754.35 20.57 760.91 20.18 767.47
20.28 774.03 20.93 780.59 21.7 787.15 22.16 793.7 22.01 800.26 20.93 806.82
18.21 813.38 17.91 819.94 18.27 826.5 18 833.06 18.05 839.62 17.98 846.18
18.59 852.74 19.34 859.3 19.69 865.86 19.71 872.42 19.6 878.98 19.51 885.54
19.23 892.1 19.25 898.66 19.84 905.22 20.63 911.78 20.91 918.34 20.98 931.46
21.7 938.01 21.68 944.57 21.55 951.13 21.5 957.69 21.75 964.25 22.07 977.37
22.5 983.93 22.76 990.49 23.34 997.05 23.79 1003.61 24.57 1010.17 25.17
1016.73 25.58 1023.29 25.72 1029.85 25.77 1036.41 25.88 1049.53 25.75
1062.65 25.85 1069.21 25.76 1075.77 25.71 1082.32 25.68 1088.88 25.68
1095.44 25.42 1102 25.39 1108.56 25.22 1115.12 25.38 1121.68 25.29 1128.24
25.41 1134.8 25.51 1141.36 25.73 1147.92 25.66 1154.48 25.64 1161.04 25.58
1167.6 25.39 1174.16 25.01 1180.72 24.68 1193.84 25.04 1200.4 25.17 1206.96
25.6 1213.52 25.76 1220.08 25.94 1226.64 26.06 1233.19 26 1239.75 26.01
1246.31 25.93 1252.87 25.96 1259.43 25.87 1272.55 25.58 1279.11 25.63
1285.67 25.76 1292.23 25.52 1298.79 25.33 1305.35 25.2 1311.91 24.93 1318.47
24.52 1325.03 24.21 1331.59 23.94 1338.15 23.84 1344.71 23.71 1351.27 23.52
1357.83 23.5 1370.95 23.53 1377.5 23.47 1384.06 23.38 1390.62 23.03 1397.18
22.88 1403.74 22.68 1410.3 22.67 1416.86 22.53 1423.42 22.41 1429.98 22.01
1436.54 21.69 1443.1 21.5 1449.66 21.51 1456.22 21.65 1462.78 21.99 1469.34
22.65 1475.89 23.47 1482.44 24.01 1489 24.59 1495.55 25.07 1502.1 25.26
1508.65 25.38 1515.2 25.43 1521.76 25.37 1528.31 25.14 1534.86 24.93 1547.96
23.89 1554.52 23.43 1561.07 22.92 1567.62 22.37 1574.17 22 1580.73 21.61
1587.28 21.15 1593.83 20.96 1600.38 20.79 1606.93 20.65 1613.49 20.4 1620.04
20.24 1626.59 19.77 1633.14 19.15 1639.69 18.73 1646.25 18.1 1652.8 17.62
1659.35 17.65 1665.9 17.83 1672.46 17.99 1679.01 18.55 1685.56 19.05 1692.11
19.64 1698.66 19.73 1705.22 19.97 1711.77 20.15 1718.32 20.3 1724.87 20.4
1731.42 20.42 1737.98 20.42 1751.08 20.36 1757.63 20.45 1770.74 20.52
1777.29 20.26 1783.84 20.18 1790.39 20.45 1796.95 20.47 1803.5 20.59 1810.05
20.51 1816.6 19.02 1823.15 16.17 1835 5.9 1845 3.8 1858 -1.6 1870 -2.8 1880
-2.2 1895 .2 1905 6.2 1918 10.7 1935.21 15.55 1941.09 16.09 1954.2 16.1
1967.3 15.72 1973.85 15.84 1986.96 16.51 1993.51 16.5 2006.61 15.64 2013.17
15.03 2019.72 14.65 2026.27 14.52 2032.82 14.61 2045.93 15.84 2052.48 16.13
2065.58 16.26 2104.9 14.95 2124.55 15.25 2131.1 15.21 2137.66 14.91 2144.21

14.89 2150.76 15.53 2163.86 18.04 2170.42 18.68 2183.52 19.53 2190.07 19.81
2196.62 19.8 2209.73 19.31 2216.28 18.87 2229.39 18.87 2275.25 17.57 2294.91
16.3 2308.01 15.94 2321.11 15.34 2327.67 15.17 2334.22 15.32 2347.32 15.16
2366.98 15.34 2380.08 15.15 2386.64 15.32 2399.74 15.1 2406.29 15.38 2419.4
15.32 2458.71 15.71 2478.36 15.57 2498.02 16.31 2511.12 17.48 2524.23 18.23
2537.33 18.71 2543.89 18.65 2550.44 18.41 2556.99 18.63 2570.09 19.75 2596.3
21.54 2609.41 22.27 2615.96 22.46 2622.51 22.4 2635.61 22.89 2648.72 23.09
2668.37 23.1 2681.48 23.43 2694.58 23.91 2720.79 23.91 2733.9 23.31 2740.45
23.15 2747 23.37 2753.55 23.31 2766.66 23 2773.21 23.17 2779.76 23.63
2786.31 23.49 2792.86 23.68 2799.42 24.26 2805.97 25.39 2812.52 26.16
2819.07 26.31 2825.62 27.01 2832.18 27.49 2838.73 28.37 2845.28 28.72
2851.83 28.55 2858.38 28.93 2864.94 29.14 2878.04 29.31 2884.59 29.13
2904.25 28.89 2910.8 28.66 2917.35 27.85 2923.91 28.37 2930.46 28.7 2937.01
28.62 2943.56 28.84 2950.11 29.38 2956.67 30.12 2963.22 30.65 2976.32 30.67
2982.87 30.23 2989.43 30.08 2995.98 29.67 3002.53 28.56 3009.08 27.96
3015.63 28.76 3022.19 29.1 3028.74 29.04 3035.29 28.44 3041.84 28.13 3074.6
28.36 3087.71 28.19 3100.81 28.91 3107.36 29.47 3127.02 30.13 3146.68 31.22
3159.78 32.04 3172.88 32.56 3199.09 32.99 3231.85 32.67 3258.06 33.1 3277.72
33.77 3297.37 34.89 3303.93 35.16 3317.03 35.35

Manning's n Values num= 3 Sta n Val Sta n Val Sta n Val
 0 .09 1810.05 .04 1941.09 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1810.05
1941.09 1084.58 1111.59 1135.96 .3 .4 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 1016 25.6 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 77992.66

INPUT
Description: 72
Station Elevation Data num= 359
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 26.51 13.1 26.76 19.65 27.05
26.2 27.32 32.75 27.13 39.3 26.67 45.85 26.69 58.95 26.98 65.5 27.43 72.05
27.75 78.6 28.31 85.15 28.9 91.71 29.45 98.26 29.83 104.81 29.95 111.36
30.2 117.91 30.31 124.46 30.26 131.01 30.04 137.56 29.63 144.11 29.46 150.66
29.39 157.21 29.37 163.76 29.26 170.31 29 176.86 28.86 183.41 28.79 189.96
28.7 196.51 28.69 203.06 28.57 209.61 28.58 216.16 28.63 222.71 28.64 229.26
28.69 235.81 28.86 242.36 29.07 248.91 29.19 255.46 29.22 262.01 29.09
268.57 29.06 275.12 28.87 281.67 28.94 288.22 29.14 294.77 29.29 301.32
29.41 307.87 29.4 314.42 29.23 320.97 29.26 327.52 29.03 334.07 28.94
340.62 28.91 347.17 28.75 353.72 28.67 360.27 28.57 373.37 28.28 379.92
28.26 386.47 28.28 393.02 28.22 406.12 28.21 412.67 28.23 419.22 28.32
425.77 28.51 432.32 28.47 445.43 28.35 458.53 28.54 465.08 28.67 471.63
28.69 478.18 28.8 484.73 28.81 491.28 28.71 497.83 28.78 504.38 28.67 510.93
28.58 530.58 27.76 537.13 27.78 543.68 27.63 550.23 27.27 556.78 26.95
563.33 26.89 569.88 26.79 576.43 26.6 582.98 26.56 589.53 26.6 596.08 26.45
602.63 26.53 609.18 26.51 615.73 26.67 622.29 26.68 628.84 26.72 635.39
26.91 641.94 27.01 648.49 26.94 655.04 27.17 661.59 27.2 668.14 27.48

674.69 27.7 681.24 27.79 694.34 28.26 700.89 28.34 707.44 28.32 713.99 28.37
720.54 28.61 727.09 28.64 733.64 28.52 740.19 28.33 746.74 28.07 753.29
27.87 759.84 27.7 766.39 27.42 772.94 27.22 779.49 26.93 792.59 26.28 799.15
26.14 805.7 25.81 812.25 25.62 825.35 25.5 831.9 25.56 838.45 25.53 845 25.4
851.55 25.31 864.65 24.76 871.2 24.68 877.75 24.67 884.3 24.53 890.85 24.43
897.4 24.48 903.95 24.16 917.05 23.56 923.6 23.56 930.15 23.43 936.7 23.13
943.25 22.87 949.8 22.77 956.35 22.77 962.9 22.59 969.46 22.34 976.01 22
982.56 22.22 989.11 22.36 995.66 22.41 1002.21 22.18 1008.76 21.23 1015.31
19.39 1021.86 17.93 1028.41 16.99 1034.96 16.42 1041.51 16.02 1048.06 15.81
1054.61 15.5 1061.16 15.58 1067.71 15.38 1074.26 15.24 1080.81 15.25 1087.36
15.33 1093.91 15.12 1100.46 15.12 1107.01 15.22 1113.56 15.18 1120.11 15.24
1126.66 15.19 1133.21 15.48 1139.76 15.94 1146.31 15.84 1152.86 15.54
1159.42 15.57 1165.97 15.82 1172.52 15.81 1179.07 15.78 1185.62 15.91
1192.17 16.08 1198.72 16.4 1205.27 16.52 1218.37 16.72 1224.92 16.88 1231.47
17.52 1238.02 17.98 1244.57 18.1 1251.12 18.35 1257.67 18.52 1264.22 18.37
1270.77 18.29 1277.31 17.98 1283.86 17.94 1290.4 17.84 1296.95 17.67 1303.49
17.62 1310.03 17.82 1316.58 18.13 1323.12 18.59 1329.67 18.97 1336.21 19
1342.75 19.1 1349.3 19.43 1355.84 19.53 1362.39 19.46 1368.93 19.57 1375.47
19.91 1382.02 20.28 1388.56 20.47 1395.11 20.73 1401.65 20.57 1408.19 20.13
1414.74 19.47 1421.28 17.93 1427.83 16.14 1434.37 14.74 1440.91 13.71
1447.46 13.52 1454 14.04 1460.55 14.85 1467.09 15.42 1473.63 15.53 1480.18
15.52 1486.72 15.32 1493.26 15.45 1499.81 15.69 1506.35 15.85 1512.9 16.13
1519.44 16.08 1525.98 16.05 1546 17.5 1564 9.9 1585 5.9 1610 4.2 1635 4.6
1656 9.7 1682 16.7 1696.13 16.08 1702.67 15.69 1709.22 15.79 1715.76 16.36
1728.85 18.01 1735.39 18.72 1741.93 19.47 1748.48 20.13 1755.02 20.59
1761.57 20.82 1768.11 20.74 1781.2 20.49 1787.74 20.41 1800.83 20.12 1807.37
20.04 1813.92 20.22 1827.01 21.28 1833.55 22.21 1840.09 23.11 1846.64 23.72
1853.18 24.54 1859.73 25.55 1866.27 26.94 1872.81 27.59 1879.36 28.18 1885.9
28.82 1892.45 29.29 1898.99 29.6 1905.53 29.72 1912.08 29.7 1918.62 29.65
1925.17 29.52 1931.71 29.53 1938.25 29.67 1951.34 29.28 1957.89 29.37
1964.43 29.39 1970.97 29.59 1977.52 30.08 1984.06 30.36 1990.6 30.7 1997.15
30.97 2003.69 31.07 2010.24 31.1 2016.78 31.39 2023.32 31.77 2029.87 32.31
2036.41 32.74 2049.5 33.57 2056.04 33.79 2062.59 33.96 2069.13 34.06 2075.65
34 2082.17 34.02 2088.68 33.93 2095.2 34.05 2101.72 34.23 2108.24 34.3
2114.75 34.08 2121.27 34.2 2127.79 34.3 2134.3 34.77 2140.82 34.97 2147.34
35.06 2153.86 35.02 2160.37 35 2173.41 35.15 2179.93 35.13 2192.96 34.75
2199.48 34.55 2205.99 34.33 2219.03 33.98 2225.55 33.95 2232.06 33.86
2238.58 34.09 2245.1 34.16 2251.62 33.79 2258.13 33.74 2264.65 33.87 2271.17
33.89 2277.68 33.85 2284.2 33.94 2290.72 33.86 2297.24 33.64 2303.75 33.47
2310.27 33.59 2316.79 33.78 2323.3 33.95 2329.82 34.05 2336.34 34.12 2342.86
34.16 2349.37 34.03 2362.41 34.06 2375.44 34.03 2381.96 34.57 2388.48 34.77
2394.99 34.85 2401.51 34.97 2408.03 35 2414.55 35.25 2427.58 35.47 2434.1
35.71 2447.13 36.02 2453.65 36.24 2460.17 36.58 2473.2 37.1 2479.72 37.32
2486.24 37.43 2492.75 37.48 2499.27 37.58 2505.79 37.77 2512.3 38.09 2518.82
38.18 2525.34 38.31 2531.86 38.32 2538.37 38.41 2544.89 38.53 2551.41 38.9
2557.93 39.23 2564.44 39.46 2570.96 39.66 2577.48 40 2583.99 40.43 2597.03
41.18 2603.55 41.64 2610.06 42.24 2616.58 42.6 2623.1 43 2629.62 43.21
2636.13 43.51 2642.65 43.47 2649.17 43.55

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 1546 .04 1682 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1546

1682 1393.51 1401.69 1405.75 .3 .4

CROSS SECTION

RIVER: Taunton River REACH: Main Stem RS: 76590.96

INPUT
Description: 71 875 ft US Snows Bk Trib
Station Elevation Data num= 138
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 26.53 6.51 26.4 13.01 26.17
19.52 25.92 26.02 25.6 32.53 25.27 39.03 24.99 45.54 24.48 52.04 24.08 58.55
23.8 65.06 23.47 71.56 23.17 78.07 22.91 84.57 22.65 91.08 22.48 97.58
22.39 104.09 22.27 110.59 22.05 117.1 21.99 123.61 22.05 130.11 21.92 136.62
21.7 143.12 21.72 149.63 22.01 156.13 22.39 162.64 22.85 166.21 23.14 192.42
23.7 218.63 23.51 225.18 23.37 231.73 23.37 244.84 23.74 251.39 23.81 271.04
24.54 303.81 25.24 330.01 25.03 356.22 24.16 369.33 23.61 388.98 23.22
402.09 23.12 408.64 23.24 415.19 23.09 434.85 23.27 441.4 23.18 447.95 22.87
467.61 22.28 474.16 21.99 487.27 20.9 500.37 19.57 513.48 18.64 526.58 17.1
539.68 15.93 552.79 15.09 559.34 14.92 572.45 14.78 585.55 15.1 618.31 17.51
637.97 18.38 644.52 18.48 664.18 18.12 677.28 18.4 683.83 17.95 690.39 16.17
694.36 14.81 709 9.2 735 4.9 760 3.5 811 9.2 811.7 13.96 814.88 14.56
821.43 15.05 834.53 16.43 847.64 16.57 867.29 16.51 873.85 16.34 880.4 15.69
886.95 14.86 893.5 14.26 900.06 13.99 913.16 13.78 932.82 13.92 945.92 14.84
959.03 15.27 965.58 15.77 972.13 16.51 978.68 16.91 1011.44 17.3 1018 17.53
1031.1 17.44 1037.65 17.7 1044.2 17.73 1063.86 18.86 1070.41 19.48 1076.97
20.58 1083.52 21.24 1090.07 21.39 1109.73 23.9 1116.28 25.16 1122.83 25.73
1129.38 25.95 1149.04 27.42 1162.14 28.85 1188.35 30.8 1201.46 31.3 1227.67
32.12 1234.22 32.21 1240.77 31.96 1247.32 31.95 1260.43 32.12 1266.98 32.43
1273.53 32.14 1280.08 32 1306.29 32.53 1325.95 33.1 1332.5 33.4 1352.16
34.02 1358.71 34.44 1391.47 35.55 1398.02 35.86 1404.58 36.51 1411.13 37.92
1424.23 38.17 1476.65 37.66 1502.86 37.63 1515.96 37.58 1529.07 37.72
1542.17 37.69 1555.28 38.2 1561.83 38.29 1568.38 38.06 1594.59 38.17 1601.14
38.04 1621.86 38.64 1628.4 38.76 1634.94 38.78 1641.49 38.73 1648.03 38.71
1654.58 38.75

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 677.28 .04 834.53 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 677.28
834.53 982.05 1055.95 1121.6 .3 .4

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 75535.01

INPUT
Description: 70- Approach Sturtevant Station Elevation Data num= 191
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 25.57 6.51 25.48 13.03 25.36
19.54 25.23 26.05 24.97 32.56 24.77 39.08 24.55 45.59 24.36 52.1 24.19 58.62
23.92 65.13 23.64 71.64 23.38 78.15 23.19 84.67 23.06 91.18 22.83 97.69

22.69 104.2 22.45 110.72 22.29 117.23 22.25 123.74 22.2 130.26 21.98 136.77
21.91 143.28 21.91 149.79 21.67 156.31 21.42 162.82 21.25 169.33 21.1 175.85
20.99 182.36 20.76 188.87 20.61 195.38 20.64 201.9 20.66 208.41 20.83 214.92
20.98 221.44 21.03 227.95 21.16 234.46 21.17 240.97 21.26 247.49 21.25 254
21.38 260.51 21.57 267.03 21.54 305 21.5 311.54 21.65 318.08 21.83 324.63
22.18 331.17 22.26 337.71 22.28 344.25 22.38 350.79 22.5 357.33 22.57 363.88
22.56 370.42 22.49 383.5 22.3 390.04 22.23 396.58 22.27 403.13 22.38 409.67
22.53 416.21 22.57 422.75 22.59 429.29 22.57 435.83 22.57 442.38 22.55
455.46 22.36 462 22.28 468.54 22.01 475.09 21.79 481.63 21.43 488.17 20.92
494.71 20.43 501.25 20.03 507.79 19.69 514.34 19.12 520.88 18.47 527.42
18.03 533.96 17.55 540.5 16.86 547.04 16.2 553.59 15.99 560.13 16 596.16
17.2 648.8 11.76 688.79 11.42 714.8 11.87 734.43 15.37 743.42 12.33 755.67
13.39 771.11 15.22 788.21 15.8 820.22 13.79 820.79 10.07 833.15 9.4 844.21
9.48 852.25 8.93 858.92 9.78 864.22 8.44 867.64 8.42 873.63 8.95 907.59
12.34 923.28 14.29 937.86 15.63 950.6 21.57 974.58 22.33 1023.69 22.92
1057.78 23.46 1132.61 24.33 1139.1 24.28 1145.59 23.9 1152.14 23.86 1158.69
23.75 1171.79 23.96 1178.34 24.03 1191.44 24.29 1197.99 24.62 1204.55 24.92
1211.1 25.36 1217.65 26.17 1224.2 27.25 1230.75 28.6 1237.3 29.87 1243.85
30.81 1250.4 31.44 1256.95 31.75 1263.5 31.85 1270.05 31.93 1276.6 31.82
1283.16 31.66 1289.71 31.56 1302.81 31.25 1309.36 31.19 1315.91 31.19
1322.46 31.13 1329.01 31.21 1335.56 31.45 1342.11 31.5 1348.66 31.46 1355.22
31.54 1361.77 31.72 1368.32 32 1374.87 32.42 1381.42 33.04 1387.97 33.79
1394.52 34.51 1401.07 35.1 1407.62 35.48 1414.17 35.89 1420.72 36.13 1427.28
36.32 1433.83 36.43 1440.38 36.64 1446.93 36.79 1453.48 36.86 1460.03 37.05
1466.58 37.18 1479.68 37.2 1486.23 37.14 1492.78 36.85 1499.33 36.49 1505.89
35.95 1512.44 35.06 1518.99 34.13 1525.54 34.75 1532.09 35.62 1538.64 36.73
1545.19 37.42 1551.74 37.6 1558.29 37.64 1564.84 37.71 1571.39 37.63 1577.95
37.72 1584.5 37.63 1591.05 37.61 1597.6 37.65 1604.15 37.76 1610.7 37.7
1617.25 37.75 1630.35 37.52 1636.9 37.21 1643.45 36.87 1650.01 36.62 1656.56
36.27 1663.11 36.06 1669.66 36.48 1676.21 37.41 1682.76 38.26 1689.31 38.82
1695.86 39.26 1701.64 39.58 1708.19 39.89 1714.74 40.12 1721.29 40.23

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 455.46 .04 974.58 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 455.46
974.58 90.65 91.01 91.43 .3 .4 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 357.3 24 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 75444

INPUT
Description: 69.7 US FAce Sturtevant
Station Elevation Data num= 211
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 25.12 6.52 25.13 13.04 24.96
19.57 24.83 26.09 24.88 32.61 24.92 39.13 24.68 45.66 24.49 52.18 24.41 58.7
24.36 65.22 24.24 71.75 24.13 78.27 23.93 84.79 23.76 91.31 23.5 97.83
23.33 104.36 23.28 110.88 23.1 117.4 22.98 123.92 22.96 130.45 22.97 136.97

22.68 143.49 22.59 150.01 22.5 156.54 22.34 163.06 22.07 169.58 21.89 176.1
21.81 182.63 21.65 189.15 21.39 195.67 21.1 202.19 20.69 208.71 20.49 215.24
20.67 221.76 20.84 228.28 20.81 234.8 20.72 241.33 20.65 247.85 20.66 254.37
20.86 260.89 20.95 267.42 21.09 273.94 21.18 280.5 21.25 287.06 21.27
293.62 21.43 295.77 21.4 302.31 21.25 308.85 21.21 315.39 20.76 321.93 21.12
328.47 21.6 335.01 22.24 341.55 22.27 348.09 22.25 354.63 22.5 361.16 22.77
367.7 22.89 374.24 23.03 380.78 23.07 387.32 22.92 393.86 22.91 400.4 22.28
406.94 22.61 413.48 22.78 420.02 22.42 426.56 22.58 433.09 22.43 439.63
22.16 446.17 21.91 452.71 21.51 459.25 21.31 465.79 21.3 472.33 21.07 478.87
21.1 485.41 20.78 491.95 20.35 498.49 19.19 505.02 18.23 511.56 18.47 518.1
18.02 524.64 18.12 531.18 18.08 537.72 17.45 544.26 17.48 550.8 17.56 557.34
17.25 563.88 17.05 570.42 16.98 576.96 17.13 583.49 17.02 590.03 16.52
596.57 16.98 603.11 17.95 609.64 18.99 616.17 19.72 622.71 20.74 629.24
21.33 635.78 21.63 642.31 21.83 648.85 21.89 655.38 21.78 661.91 21.62
668.45 21.75 674.98 21.94 681.52 21.95 688.05 22.02 694.58 21.96 701.12
21.87 707.65 22.08 714.19 22.12 727.25 21.68 733.79 21.38 752.11 11.1 756.54
10.33 760.99 8.67 767.94 5.2 777.12 6.63 796.64 8.2 802.95 6.47 809.7 6.62
814.65 6.96 819.31 7.24 834.57 8.51 840.81 9.15 847.56 9.37 857.77 9.96
862.16 10.4 884.07 22.29 890.61 22.35 897.14 22.46 903.67 22.45 910.21 22.35
916.74 22.41 923.28 22.56 929.81 22.73 942.88 23.54 949.41 23.54 955.95
23.61 962.48 23.71 969.02 23.83 982.08 23.99 988.62 24.14 995.15 24.23
1001.69 24.25 1008.22 24.33 1014.75 24.36 1021.29 24.37 1027.82 24.27
1034.36 24.14 1040.89 24.03 1047.42 23.95 1053.96 24.09 1060.49 24.12
1067.03 24.18 1073.56 24.42 1080.09 24.53 1093.16 24.84 1099.7 24.9 1106.23
25.02 1112.76 25.4 1119.3 26.24 1125.83 27.23 1132.37 27.8 1138.9 28.29
1145.44 28.61 1151.97 28.66 1158.5 28.76 1165.04 28.84 1171.57 28.98 1178.11
29.17 1184.64 29.47 1191.17 29.74 1197.71 29.92 1210.78 30.36 1217.31 30.44
1223.84 30.29 1230.38 30.16 1236.91 30.35 1243.45 30.69 1249.98 31.18
1256.51 31.58 1263.05 31.91 1269.58 32.11 1276.12 32.23 1282.61 32.13 1289.1
32.36 1295.59 33.18 1302.08 34.05 1308.57 34.87 1315.06 35.78 1321.55 36.1
1328.04 36.19 1334.53 36.25 1341.02 36.53 1354 37.18 1366.99 37.52 1373.48
37.51 1386.46 37.42 1399.44 37.49 1405.93 37.43 1412.42 37.24 1418.91 36.9
1425.4 36.38 1431.89 35.88 1438.38 34.98 1444.87 34.32 1451.36 34.86 1456.63
35.7 1463.12 36.51 1469.61 36.97

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 714.19 .04 884.07 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 714.19
884.07 83.92 85.68 87.62 .5 .4 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 715 24 T
 880 1469.61 24.5 T

BRIDGE

RIVER: Taunton River
REACH: Main Stem RS: 75397.22

INPUT Description: 69.5 Sturtevant St/Plymouth St
Distance from Upstream XS = 36
Deck/Roadway Width = 35

Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 24
Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
0 25.1 184 25.08 270 23.6
396 22.31 573 22.37 738 24.52
744 25.05 744.1 28.99 749 29 21.16
787 29.53 21.28 821 29.46 21.4 859 28.92 21.52
864 28.92 21.52 864.1 24.87 869 24.87
910 24.12 951 23.52 1040 24.16
1098 25.22 1146 26.52 1205 29.2
1228 30.08 1287 31.74 1338 32.62

Upstream Bridge Cross Section Data
Station Elevation Data num= 211 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 25.12 6.52 25.13 13.04 24.96 19.57 24.83 26.09 24.88 32.61 24.92 39.13
24.68 45.66 24.49 52.18 24.41 58.7 24.36 65.22 24.24 71.75 24.13 78.27 23.93
84.79 23.76 91.31 23.5 97.83 23.33 104.36 23.28 110.88 23.1 117.4 22.98
123.92 22.96 130.45 22.97 136.97 22.68 143.49 22.59 150.01 22.5 156.54 22.34
163.06 22.07 169.58 21.89 176.1 21.81 182.63 21.65 189.15 21.39 195.67 21.1
202.19 20.69 208.71 20.49 215.24 20.67 221.76 20.84 228.28 20.81 234.8 20.72
241.33 20.65 247.85 20.66 254.37 20.86 260.89 20.95 267.42 21.09 273.94
21.18 280.5 21.25 287.06 21.27 293.62 21.43 295.77 21.4 302.31 21.25 308.85
21.21 315.39 20.76 321.93 21.12 328.47 21.6 335.01 22.24 341.55 22.27 348.09
22.25 354.63 22.5 361.16 22.77 367.7 22.89 374.24 23.03 380.78 23.07 387.32
22.92 393.86 22.91 400.4 22.28 406.94 22.61 413.48 22.78 420.02 22.42 426.56
22.58 433.09 22.43 439.63 22.16 446.17 21.91 452.71 21.51 459.25 21.31
465.79 21.3 472.33 21.07 478.87 21.1 485.41 20.78 491.95 20.35 498.49 19.19
505.02 18.23 511.56 18.47 518.1 18.02 524.64 18.12 531.18 18.08 537.72 17.45
544.26 17.48 550.8 17.56 557.34 17.25 563.88 17.05 570.42 16.98 576.96 17.13
583.49 17.02 590.03 16.52 596.57 16.98 603.11 17.95 609.64 18.99 616.17
19.72 622.71 20.74 629.24 21.33 635.78 21.63 642.31 21.83 648.85 21.89
655.38 21.78 661.91 21.62 668.45 21.75 674.98 21.94 681.52 21.95 688.05
22.02 694.58 21.96 701.12 21.87 707.65 22.08 714.19 22.12 727.25 21.68
733.79 21.38 752.11 11.1 756.54 10.33 760.99 8.67 767.94 5.2 777.12 6.63
796.64 8.2 802.95 6.47 809.7 6.62 814.65 6.96 819.31 7.24 834.57 8.51 840.81
9.15 847.56 9.37 857.77 9.96 862.16 10.4 884.07 22.29 890.61 22.35 897.14
22.46 903.67 22.45 910.21 22.35 916.74 22.41 923.28 22.56 929.81 22.73
942.88 23.54 949.41 23.54 955.95 23.61 962.48 23.71 969.02 23.83 982.08
23.99 988.62 24.14 995.15 24.23 1001.69 24.25 1008.22 24.33 1014.75 24.36
1021.29 24.37 1027.82 24.27 1034.36 24.14 1040.89 24.03 1047.42 23.95
1053.96 24.09 1060.49 24.12 1067.03 24.18 1073.56 24.42 1080.09 24.53
1093.16 24.84 1099.7 24.9 1106.23 25.02 1112.76 25.4 1119.3 26.24 1125.83
27.23 1132.37 27.8 1138.9 28.29 1145.44 28.61 1151.97 28.66 1158.5 28.76
1165.04 28.84 1171.57 28.98 1178.11 29.17 1184.64 29.47 1191.17 29.74
1197.71 29.92 1210.78 30.36 1217.31 30.44 1223.84 30.29 1230.38 30.16
1236.91 30.35 1243.45 30.69 1249.98 31.18 1256.51 31.58 1263.05 31.91
1269.58 32.11 1276.12 32.23 1282.61 32.13 1289.1 32.36 1295.59 33.18 1302.08
34.05 1308.57 34.87 1315.06 35.78 1321.55 36.1 1328.04 36.19 1334.53 36.25
1341.02 36.53 1354 37.18 1366.99 37.52 1373.48 37.51 1386.46 37.42 1399.44
37.49 1405.93 37.43 1412.42 37.24 1418.91 36.9 1425.4 36.38 1431.89 35.88
1438.38 34.98 1444.87 34.32 1451.36 34.86 1456.63 35.7 1463.12 36.51 1469.61
36.97

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 714.19 .04 884.07 .09

Bank Sta: Left Right Coeff Contr. Expan.
 714.19 884.07 .5 .4
Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 715 24 T
 880 1469.61 24.5 T

Downstream Deck/Roadway Coordinates num= 24
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 -86 25.1 -85 25.08 2 23.6
 127 22.31 304 22.37 469 24.52
 475 25.05 475 28.99 480 29 21.16
 518 29.53 21.28 552 29.46 21.4 590 28.92 21.52
 595 28.9 21.52 595 24.87 600 24.87
 641 24.12 682 23.52 771 24.16
 829 25.22 877 26.52 936 29.2
 959 30.08 1018 31.74 1069 32.62

Downstream Bridge Cross Section Data
Station Elevation Data num= 164
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 23.89 6.54 23.57 13.07 23.04
19.61 22.53 32.69 22 39.23 21.79 45.76 21.72 52.3 21.76 58.84 21.57 65.38
21.54 71.91 21.48 78.45 21.51 84.99 21.74 98.06 22.31 104.6 22.42 111.14
22.5 117.68 22.69 124.21 23.26 130.75 24.13 137.29 25.06 143.83 25.4 150.36
25.62 156.9 25.69 163.44 25.55 169.97 25.14 176.51 24.03 183.05 22.66 189.59
21.98 196.13 21.32 202.66 21.04 222.27 20.34 228.81 20.2 235.35 20.24 241.89
20.3 248.43 20.16 254.96 19.7 261.5 19.12 268.04 18.73 274.58 18.66 281.11
18.39 287.65 18.35 294.19 18.2 300.73 18.08 313.8 18.39 320.36 18.43 326.92
18.63 333.48 18.62 340.04 18.69 346.6 19 353.16 19.11 359.72 18.93 366.28
18.55 372.84 17.94 379.4 17.51 385.96 17.38 392.52 16.95 399.08 16.44 405.64
16.56 412.2 16.87 418.76 18.34 425.32 19.69 431.88 19.14 438.44 18.88 445
19.16 451.56 19.17 482.11 11.1 486.54 10.33 490.99 8.67 497.94 5.2 507.12
6.63 526.64 8.2 532.95 6.47 539.7 6.62 544.65 6.96 549.31 7.24 564.57 8.51
570.81 9.15 577.56 9.37 587.77 9.96 592.16 10.4 608.99 19.09 615.55 19.35
622.11 18.81 628.67 18.59 635.23 19.07 641.79 20.4 648.35 21.33 654.91 21.28
661.47 21.85 668.03 22.08 674.59 22.1 681.15 22.93 687.71 23.84 694.27 24.57
700.83 24.46 707.39 23.65 713.95 22.99 720.51 22.57 727.07 22.34 733.63
22.41 746.75 23.2 753.31 23.46 759.87 23.47 766.43 23.26 772.99 23.43
779.55 23.72 786.11 23.74 792.67 23.66 799.23 24.07 805.79 25.06 812.35
25.74 818.91 26.07 825.47 26.34 832.03 26.55 838.59 26.72 845.15 26.87
851.71 26.99 858.27 26.85 864.83 27.04 871.39 27.41 877.95 27.17 884.51 26.8
891.07 26.56 897.63 26.51 904.19 26.65 917.31 26.24 930.43 26.17 936.99
26.32 943.55 26.83 950.11 28.14 956.67 29.66 963.23 30.58 969.79 31.17
976.35 31.67 982.88 32.04 989.42 32.2 995.96 32.3 1002.5 32.34 1009.03 32.45
1015.57 32.51 1022.11 32.4 1028.65 32.35 1035.18 32.35 1041.72 32.47 1048.26
32.47 1054.8 32.36 1067.87 32.33 1074.41 32.33 1080.95 32.46 1087.48 32.48
1094.02 32.47 1100.56 32.65 1107.09 32.85 1113.63 32.94 1120.17 33 1126.71
32.92 1139.78 32.73 1146.32 32.68 1152.86 32.69 1159.39 32.84 1165.93 33.11
1172.47 33.18 1179.01 33.08 1185.54 33.07

```
Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 451.56 .04 608.99 .09

Bank Sta: Left Right Coeff Contr. Expan.
 451.56 608.99 .3 .4
Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 465 24 T
 610 1185.54 24 T

Upstream Embankment side slope = 0 horiz. to 1.0 vertical Downstream
Embankment side slope = 0 horiz. to 1.0 vertical Maximum allowable
submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Piers = 2

Pier Data
Pier Station Upstream= 785 Downstream= 517
Upstream num= 3
 Width Elev Width Elev Width Elev
 4 8 4 20.76 6 21.2
Downstream num= 3
 Width Elev Width Elev Width Elev
 4 8 4 20.76 6 21.2

Pier Data
Pier Station Upstream= 822 Downstream= 554
Upstream num= 3
 Width Elev Width Elev Width Elev
 4 8 4 20.76 6 21.2
Downstream num= 3
 Width Elev Width Elev Width Elev  4 8 4 20.76 6 21.2

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
 Energy
 W.S. Pro Method

 W.S.Pro Data
 Left Embankment
 El of the top of the embankment = 25.1
 El of the toe of the abutment = 11.1
 Right Embankment
 El of the top of the embankment = 25.1
 El of the toe of the abutment = 11.1
 Abutment Type = 4 Vert. abutments and sloping embankments with wingwalls
Slope of abutments =
 Top with of embankment = 35
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 Centroid station of bridge opening =
 Wing Wall Type = Angular wing walls
 Width = 12
 Angle = 45
 Radius =
 Guide Banks Type = No Guide Bank present
 Length =
 Offset =   Angle =
 Optional Contraction and expansion coefficients
 At approach Section
 At Guide Bank
 At upstream outside
 At upstream inside (BU)
 At downstream inside (BD)
 Piers are Continuous for the width of the bridge
 Use Geometric mean as Friction Slope Method

Selected Low Flow Methods = W.S.Pro Method

High Flow Method
 Pressure and Weir flow
 Submerged Inlet Cd =
 Submerged Inlet + Outlet Cd = .8
 Max Low Cord =

Additional Bridge Parameters
 Add Friction component to Momentum
 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION


RIVER: Taunton River
REACH: Main Stem RS: 75358.33

INPUT Description: 69.3 DS Face Sturtevant
Station Elevation Data num= 164
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  0 23.89 6.54 23.57 13.07 23.04
19.61 22.53 32.69 22  39.23 21.79 45.76 21.72 52.3 21.76 58.84 21.57 65.38
21.54  71.91 21.48 78.45 21.51 84.99 21.74 98.06 22.31 104.6 22.42  111.14
22.5 117.68 22.69 124.21 23.26 130.75 24.13 137.29 25.06  143.83 25.4 150.36
25.62 156.9 25.69 163.44 25.55 169.97 25.14  176.51 24.03 183.05 22.66 189.59
21.98 196.13 21.32 202.66 21.04  222.27 20.34 228.81 20.2 235.35 20.24 241.89
20.3 248.43 20.16  254.96 19.7 261.5 19.12 268.04 18.73 274.58 18.66 281.11
18.39  287.65 18.35 294.19 18.2 300.73 18.08 313.8 18.39 320.36 18.43  326.92
18.63 333.48 18.62 340.04 18.69 346.6 19 353.16 19.11  359.72 18.93 366.28
18.55 372.84 17.94 379.4 17.51 385.96 17.38  392.52 16.95 399.08 16.44 405.64
16.56 412.2 16.87 418.76 18.34  425.32 19.69 431.88 19.14 438.44 18.88 445
19.16 451.56 19.17  482.11 11.1 486.54 10.33 490.99 8.67 497.94 5.2 507.12
6.63  526.64 8.2 532.95 6.47 539.7 6.62 544.65 6.96 549.31 7.24  564.57 8.51
570.81 9.15 577.56 9.37 587.77 9.96 592.16 10.4  608.99 19.09 615.55 19.35
```

622.11 18.81 628.67 18.59 635.23 19.07 641.79 20.4 648.35 21.33 654.91 21.28
661.47 21.85 668.03 22.08 674.59 22.1 681.15 22.93 687.71 23.84 694.27 24.57
700.83 24.46 707.39 23.65 713.95 22.99 720.51 22.57 727.07 22.34 733.63
22.41 746.75 23.2 753.31 23.46 759.87 23.47 766.43 23.26 772.99 23.43
779.55 23.72 786.11 23.74 792.67 23.66 799.23 24.07 805.79 25.06 812.35
25.74 818.91 26.07 825.47 26.34 832.03 26.55 838.59 26.72 845.15 26.87
851.71 26.99 858.27 26.85 864.83 27.04 871.39 27.41 877.95 27.17 884.51 26.8
891.07 26.56 897.63 26.51 904.19 26.65 917.31 26.24 930.43 26.17 936.99
26.32 943.55 26.83 950.11 28.14 956.67 29.66 963.23 30.58 969.79 31.17
976.35 31.67 982.88 32.04 989.42 32.2 995.96 32.3 1002.5 32.34 1009.03 32.45
1015.57 32.51 1022.11 32.4 1028.65 32.35 1035.18 32.35 1041.72 32.47 1048.26
32.47 1054.8 32.36 1067.87 32.33 1074.41 32.33 1080.95 32.46 1087.48 32.48
1094.02 32.47 1100.56 32.65 1107.09 32.85 1113.63 32.94 1120.17 33 1126.71
32.92 1139.78 32.73 1146.32 32.68 1152.86 32.69 1159.39 32.84 1165.93 33.11
1172.47 33.18 1179.01 33.08 1185.54 33.07

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val 0 .085 451.56 .04 608.99 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 451.56
608.99 55.08 52.55 49.93 .3 .4 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 465 24 T
 610 1185.54 24 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 75305.77

INPUT
Description: 69 Exit Sturtevant St
Station Elevation Data num= 106
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 25.7 13 23.18 19.5 22.31
25.99 22 32.49 21.83 45.49 21.28 64.98 20.99 77.98 21.19 90.98 22.14 97.48
23.01 103.97 23.64 110.47 23.88 116.97 24.28 136.47 26.38 142.96 26.89
149.46 27.25 155.96 27.29 168.96 26.83 181.95 25.99 207.95 22.82 227.44
21.07 246.94 20.3 253.44 20.19 259.94 19.93 272.93 18.96 292.45 18.01 325.01
17.14 331.52 17.14 344.55 17.63 357.57 17.92 364.08 18.28 370.59 18.38 377.1
17.76 383.61 16.31 390.13 15.19 396.64 14.99 409.66 15.34 429.2 16.64 435.71
16.53 442.22 15.24 448.73 13.33 455.24 11.95 459.73 11.56 462.56 11.12
467.83 6.63 479.3 3.76 509.45 3.76 519.8 4.04 537.58 5.31 564.99 8.64
570.38 12.24 578.91 15.46 579.31 14.91 585.47 16.31 591.98 16.35 605.01
15.92 611.52 15.99 637.56 15.49 650.59 15.96 657.1 16.73 663.61 18.13 670.12
19.01 676.63 19.55 696.17 19.78 715.7 20.3 722.21 20.84 735.24 20.55 741.75
20.65 748.26 21.06 754.77 21.09 767.79 21.99 774.31 22.34 780.82 22.88
793.84 24.72 806.86 24.63 813.37 25.22 819.89 26.01 826.4 26.54 852.28 26.93
858.71 26.46 865.14 26.21 884.43 26.41 890.86 26.35 910.15 26.78 916.57
27.31 923 28.93 929.43 30.68 942.29 31.63 948.72 31.72 955.15 31.28 961.58
30.99 968.01 30.83 974.44 30.85 980.87 31.16 987.3 31.87 993.73 32.33
1000.16 32.06 1006.59 31.6 1013.02 31.33 1019.45 31.21 1058.02 31.83 1083.74
31.56 1096.6 31.79 1115.89 31.22 1122.32 30.92 1135.18 31.31

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 435.71 .04 591.98 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 435.71
591.98 864.05 841.86 823.45 .1 .3 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 155 27 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 74463.91

INPUT
Description: 68
Station Elevation Data num= 84 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 33.9 26.2 34.76 39.3 34.99 45.85 35.23 72.05 35.5 111.35 35.73 117.9 35.69
137.54 36.18 163.74 36.22 203.04 36.69 216.14 36.61 229.24 36.36 235.79 36.1
248.89 35.73 268.54 34.62 281.64 34.41 294.74 34.39 307.84 34.47 320.94
34.33 340.59 34.35 366.78 33.26 373.33 33.14 392.98 33.17 399.53 33.55
412.63 33.81 419.18 34.04 432.28 34.25 438.83 33.71 445.38 31.44 451.93
28.46 465.03 25.88 471.58 24.69 478.13 23.8 484.68 22.74 491.23 21.84
497.78 21.26 510.88 20.66 517.43 20.57 523.98 20.84 530.53 20.8 543.63 20.37
550.18 20 556.73 19.9 563.28 19.47 569.83 18.48 576.38 17.22 582.93 14.07
589.48 11.26 595.11 10.94 620 5.8 645 4.3 670 6.3 695.73 11.22 700.82 12.47
707.37 15.57 713.92 16.32 720.47 15.93 733.57 14.84 740.12 14.89 759.77
16.32 766.32 16.61 772.87 16.44 779.42 15.43 785.97 15.22 799.07 15.09
805.62 15.17 812.17 15.49 825.27 16.58 844.91 19.03 851.46 19.58 871.11
20.73 890.76 21.29 903.86 21.48 916.96 21.81 930.06 21.86 969.36 22.69
995.56 23.45 1002.11 23.48 1106.9 25.75 1126.55 25.97 1139.65 26.24 1165.85
25.91 1192.05 26.13 1198.6 26.27

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 530.53 .04 871.11 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 530.53
871.11 1832.03 1771.2 1714.64 .1 .3

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 72692.7

INPUT
Description: 67- Approach Vernon St
Station Elevation Data num= 199 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 35.64 6.51 35.52 13.02 35.08 19.53 34.21 32.55 33.08 39.06 32.72 45.56
32.82 65.09 33.59 71.6 33.62 78.11 33.47 84.62 33.14 91.13 33.31 97.64 33.8
110.66 35.96 117.17 36.44 123.67 36.35 130.18 36.49 143.2 37.22 156.22 37.64
162.73 37.13 169.24 37.19 175.75 37.03 182.26 36.54 195.28 36.11 201.78 35.6

208.29 35.46 221.31 34.66 253.86 33.41 260.37 33.36 286.4 32.59 318.95 32.6
331.97 32.28 344.99 32.1 351.5 31.89 358.01 31.92 371.02 31.57 384.04 31.52
397.06 31.07 403.57 30.99 416.59 30.99 423.1 30.89 436.12 30.33 449.13 29.93
455.64 29.46 468.66 28.22 475.17 27.43 481.68 26.42 501.21 24.48 507.72
23.95 520.73 23.39 527.24 23.23 540.26 22.4 546.77 21.52 553.28 21.05 559.79
20.87 579.32 19.24 585.83 18.88 598.85 18.35 605.35 18.43 611.86 18.15
618.37 18.02 624.88 17.69 637.9 17.44 644.41 17.68 650.92 17.72 657.43 18.14
663.94 18.04 670.45 18.32 683.46 19.53 702.99 20.83 735.59 21.48 748.66
21.51 755.19 21.31 774.8 21.2 781.33 21.3 800.94 20.94 846.68 20.67 859.75
19.38 872.82 18.81 879.35 18.9 885.89 19.21 898.96 20.56 905.49 20.5 925.1
19.65 931.63 19.67 938.17 19.51 944.7 18.81 951.24 17.55 957.77 15.88 964.31
14.06 970.84 12.8 978.56 11.86 984.9 10.85 991 7.8 1003.8 7.7 1022.9 8.12
1033.7 7.6 1052.3 7.35 1065.8 6.97 1076.7 7.14 1088.2 7.24 1100 6.84 1105.8
7.1 1115 9.5 1124 14.02 1134.21 14.5 1140.74 16.08 1147.28 17.24 1153.81
17.64 1160.35 17.72 1166.88 17.74 1173.42 17.74 1179.95 17.72 1186.49 17.65
1193.02 17.49 1199.56 17.28 1206.09 17.1 1219.16 17 1225.7 17.06 1232.23
17.08 1238.77 16.79 1245.3 16.22 1251.84 15.82 1258.37 15.69 1264.91 15.59
1271.44 15.23 1277.97 14.81 1284.51 14.56 1291.04 14.52 1297.58 14.54
1304.11 14.62 1310.65 14.6 1317.2 14.38 1323.75 14.06 1330.3 14.1 1336.85
14.52 1343.4 15.94 1349.95 17.48 1356.5 18.16 1363.05 18.47 1369.6 18.96
1376.15 19.56 1382.7 20.05 1389.25 20.31 1395.8 20.54 1402.35 21.02 1408.9
21.62 1415.45 22.08 1422 22.05 1428.55 21.83 1435.1 21.73 1441.66 21.72
1448.21 21.86 1461.31 21.86 1467.86 21.67 1474.41 21.55 1480.96 21.46
1487.51 21.3 1494.06 21.23 1500.61 21.2 1507.16 21.03 1513.71 21.11 1520.26
21.14 1526.81 20.97 1533.36 21.03 1539.91 22.1 1546.46 23.4 1553.01 24.26
1559.56 24.75 1566.11 24.89 1572.66 24.66 1579.21 24.67 1585.76 24.75
1592.31 24.69 1598.86 24.58 1605.41 24.62 1611.96 24.58 1618.51 24.69
1625.06 24.77 1638.17 24.9 1644.72 25.24 1651.27 25.96 1657.82 25.88 1664.37
26.66 1670.92 27.6 1677.47 28.35 1690.57 30.78 1697.12 31.05 1703.67 31.38
1710.22 31.88 1723.32 33.15 1729.87 33.74 1736.42 34.35 1742.97 35.32
1749.52 35.76 1756.07 36.39 1762.62 36.69 1769.17 37.03 1775.72 37.22

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 905.49 .04 1160.35 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 905.49
1160.35 102.69 95.32 96.09 .1 .3 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 749 24.5 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 72597.39

INPUT
Description: 66.7 US FAce Vernon St
Station Elevation Data num= 170 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 32.98 12.31 32.81 18.456 32.86 30.766 32.57 43.076 32.59 49.23 32.45
61.531 32.59 67.686 32.96 86.151 33.37 110.762 33.12 123.072 33.28 129.217
33.03 141.527 32.91 147.682 32.71 166.138 32.4 172.293 31.99 184.603 30.31
190.758 29.78 203.058 28.94 209.213 28.42 227.678 26.1 233.833 25.57 246.134

24.91 270.754 22.56 283.054 21.7 289.209 21.38 295.364 21.32 313.82 20.22
338.44 18.4 344.595 18.38 356.895 18.84 363.05 19.31 381.515 20.17 393.816
21.12 406.126 21.77 424.581 22.1 449.164 22.1 486.037 21.36 541.338 20.9
553.629 21.01 565.92 21.52 572.066 21.56 578.202 21.03 584.348 20.79 596.639
21.54 602.785 21.76 615.076 23.33 627.367 23.37 633.513 23.24 639.658 22.8
645.804 22.15 651.949 21.71 664.231 22.09 670.377 22.13 676.522 22 682.668
21.45 694.959 21.44 701.105 21.23 707.25 20.53 713.396 19.13 719.541 18.24
725.687 18.16 731.833 18.26 737.969 18.81 744.114 18.93 750.26 20.8 750.636
20.77 756.406 20.36 772.07 11.24 780.264 8.69 795.074 8.51 800.383 8.54
806.284 7.98 816.865 8.04 828.696 6.92 840.395 7.49 859.321 8.29 860.27 10.2
864.367 10.65 872.796 16.58 872.974 19.88 879.308 19.75 885.454 22.36
891.599 23.25 897.735 23.9 903.881 24.27 910.026 24.28 916.172 24.32 922.318
24.2 934.609 24.05 940.754 24.3 946.9 24.91 953.046 24.73 959.191 24.61
965.337 24.68 971.482 24.97 977.619 25.55 983.764 25.22 989.91 25.69 996.055
25.96 1002.201 26.071008.347 26.331014.492 26.651020.657 25.451026.821 25.14
1032.985 24.53 1039.15 23.961045.323 23.631051.488 23.411057.652 23.93
1063.817 24.061069.981 24.461076.145 24.49 1082.31 25.31088.474 25.22
1094.639 23.571100.803 23.481106.977 23.73 1125.47 24.291137.799 24.56
1143.963 24.881150.127 25.221156.292 24.911162.456 24.67 1168.63 24.48
1174.794 24.711180.959 25.291187.123 25.841193.287 26.11199.452 26.12
1205.616 25.521211.781 25.091217.945 24.811224.109 24.861230.283 25.42
1236.448 26.241242.612 27.081248.776 27.91254.941 28.71261.105 29.39 1267.269
29.651273.434 29.111279.598 28.81285.763 28.021291.936 28.12 1298.101
28.451304.265 28.82 1310.43 29.161316.594 29.951322.758 31.2 1328.923
32.691335.087 33.431341.251 34.91347.416 35.73 1353.59 35.76 1359.754
35.831365.918 36.051372.083 36.161384.411 36.291390.576 36.38 1396.74
36.521409.078 36.91421.407 37.21427.572 37.321433.736 37.54 1439.9
37.631446.065 37.381452.229 371458.394 37.121464.558 36.91

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val 0 .09 750.26 .04 903.881 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 750.26
903.881 67.7 64.48 66.6 .3 .4 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 744.237 24.5 T
 878.6131464.558 25.6 T
Skew Angle = 20

BRIDGE

RIVER: Taunton River
REACH: Main Stem RS: 72569.03

INPUT
Description: 66.5 Vernon St/Pratts Br
Distance from Upstream XS = 7
Deck/Roadway Width = 35
Weir Coefficient = 2.6
Bridge Deck/Roadway Skew = 20
Upstream Deck/Roadway Coordinates
 num= 18
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord

228.345 25.91 484.881 22.81 530.926 23.02
744.237 24.99 767.729 25 767.823 27.73
769.608 27.73 769.702 25.32 770.548 25.3 21.15 863.578 25.4 21.6 866.397 25.96 21.6 866.491 27.51
868.276 27.51 868.37 26 874.854 26.04 1032.722 26.63 1157.701 27.85 1400 28

Upstream Bridge Cross Section Data
Station Elevation Data num= 170
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 32.98 12.31 32.81 18.456 32.86 30.766 32.57 43.076 32.59 49.23 32.45 61.531 32.59 67.686 32.96 86.151 33.37 110.762 33.12 123.072 33.28 129.217 33.03 141.527 32.91 147.682 32.71 166.138 32.4 172.293 31.99 184.603 30.31 190.758 29.78 203.058 28.94 209.213 28.42 227.678 26.1 233.833 25.57 246.134 24.91 270.754 22.56 283.054 21.7 289.209 21.38 295.364 21.32 313.82 20.22 338.44 18.4 344.595 18.38 356.895 18.84 363.05 19.31 381.515 20.17 393.816 21.12 406.126 21.77 424.581 22.1 449.164 22.1 486.037 21.36 541.338 20.9 553.629 21.01 565.92 21.52 572.066 21.56 578.202 21.03 584.348 20.79 596.639 21.54 602.785 21.76 615.076 23.33 627.367 23.37 633.513 23.24 639.658 22.8 645.804 22.15 651.949 21.71 664.231 22.09 670.377 22.13 676.522 22 682.668 21.45 694.959 21.44 701.105 21.23 707.25 20.53 713.396 19.13 719.541 18.24 725.687 18.16 731.833 18.26 737.969 18.81 744.114 18.93 750.26 20.8 750.636 20.77 756.406 20.36 772.07 11.24 780.264 8.69 795.074 8.51 800.383 8.54 806.284 7.98 816.865 8.04 828.696 6.92 840.395 7.49 859.321 8.29 860.27 10.2 864.367 10.65 872.796 16.58 872.974 19.88 879.308 19.75 885.454 22.36 891.599 23.25 897.735 23.9 903.881 24.27 910.026 24.28 916.172 24.32 922.318 24.2 934.609 24.05 940.754 24.3 946.9 24.91 953.046 24.73 959.191 24.61 965.337 24.68 971.482 24.97 977.619 25.55 983.764 25.22 989.91 25.69 996.055 25.96 1002.201 26.071008.347 26.331014.492 26.651020.657 25.451026.821 25.14 1032.985 24.53 1039.15 23.961045.323 23.631051.488 23.411057.652 23.93 1063.817 24.061069.981 24.461076.145 24.49 1082.31 25.31088.474 25.22 1094.639 23.571100.803 23.481106.977 23.73 1125.47 24.291137.799 24.56 1143.963 24.881150.127 25.221156.292 24.911162.456 24.67 1168.63 24.48 1174.794 24.711180.959 25.291187.123 25.841193.287 26.11199.452 26.12 1205.616 25.521211.781 25.091217.945 24.811224.109 24.861230.283 25.42 1236.448 26.241242.612 27.081248.776 27.91254.941 28.71261.105 29.39 1267.269 29.651273.434 29.111279.598 28.81285.763 28.021291.936 28.12 1298.101 28.451304.265 28.82 1310.43 29.161316.594 29.951322.758 31.2 1328.923 32.691335.087 33.431341.251 34.91347.416 35.73 1353.59 35.76 1359.754 35.831365.918 36.051372.083 36.161384.411 36.291390.576 36.38 1396.74 36.521409.078 36.91421.407 37.21427.572 37.321433.736 37.54 1439.9 37.631446.065 37.381452.229 371458.394 37.121464.558 36.91

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .09 750.26 .04 903.881 .09

Bank Sta: Left Right Coeff Contr. Expan.
750.26 903.881 .3 .4
Ineffective Flow num= 2
Sta L Sta R Elev Permanent
0 744.237 24.5 T
878.6131464.558 25.6 T
Skew Angle = 20

Downstream Deck/Roadway Coordinates
num= 17
Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
257.476 25.91 514.012 22.81 645.569 23.02
773.367 24.99 796.859 25 796.953 27.73
798.739 27.73 798.833 25.32 799.678 25.3 21.15 892.708 25.4 21.6 895.527 25.96 21.6 895.621 27.51
897.406 27.51 897.5 26 903.984 26.04 1061.853 26.63 1186.832 27.85

Downstream Bridge Cross Section Data
Station Elevation Data num= 211
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 34.89 6.089 34.81 12.178 34.66 30.455 34.05 36.545 33.81 42.634 33.66 48.723 33.72 54.822 33.69 60.911 33.59 67 33.45 73.089 33.25 79.179 33.09 85.277 33.04 91.366 32.89 97.456 32.68 103.545 32.51 109.634 32.16 115.723 31.77 121.822 31.16 127.911 30.64 134 30.23 140.089 30.07 146.179 30.03 152.277 29.83 158.366 29.57 164.456 29.22 170.545 28.83 176.634 28.48 182.723 28.11 194.911 27.32 201 26.81 207.089 26.27 213.179 25.88 219.277 25.51 225.366 25.12 231.456 24.88 237.545 24.36 243.634 23.95 255.822 23.32 261.911 23.03 268 22.89 274.09 22.69 280.179 22.24 286.277 22.16 292.367 22.17 298.456 21.92 304.545 21.78 310.634 21.99 316.733 22.46 322.822 22.69 328.911 22.67 335 22.41 341.09 22.11 347.179 21.93 353.277 21.61 359.367 21.37 365.456 21.4 377.634 21.59 383.723 21.7 389.822 21.74 395.911 21.71 408.09 21.96 414.179 22.07 420.278 22.13 426.367 22.26 438.545 22.31 444.653 22.45 450.752 22.51 456.86 22.53 462.958 22.47 469.066 22.24 481.273 21.93 487.372 21.88 493.48 21.8 499.578 22.02 505.686 22.26 511.785 22.19 517.893 21.81 530.099 21.18 536.198 20.99 542.306 21.02 548.405 21.01 554.513 20.92 560.611 21.05 566.719 21.23 572.818 21.29 578.926 21.53 585.024 21.83 591.132 21.89 597.231 21.75 603.339 21.43 609.438 21.22 615.546 21.22 621.644 21.29 627.752 21.54 633.851 21.96 639.959 22.01 646.057 22.24 652.165 22.67 658.264 22.99 664.372 23.22 670.471 23.32 676.579 23.47 682.677 23.64 688.785 23.61 700.992 23.02 707.09 22.97 713.198 23.24 719.297 24.07 725.405 24.2 731.504 22.81 779.945 18.72 780.152 16.67 800.261 11.24 808.455 8.69 823.265 8.51 828.574 8.54 834.475 7.98 845.056 8.04 856.887 6.92 868.586 7.49 887.511 8.29 888.461 10.2 892.558 10.65 900.987 16.58 901.165 19.88 914.612 18.66 920.711 18.51 926.819 17.76 932.917 17.11 939.025 16.93 945.124 16.47 951.232 15.67 957.331 15.21 963.439 16.04 969.537 15.4 975.645 15.13 981.744 15.39 987.852 15.31 993.95 15.86 1006.148 22.731012.246 24.771018.335 25.491024.434 26.021030.523 26.47 1036.622 26.49 1048.81 26.781060.998 27.031067.087 27.391073.185 27.66 1079.275 27.711085.364 27.821091.462 27.91097.552 28 1103.65 28.2 1109.739 28.331121.927 28.341128.026 28.481140.214 28.611152.401 28.87 1164.589 29.181170.678 29.311182.866 29.431188.965 29.681195.054 30.04 1201.153 30.351207.242 30.77 1219.43 31.81225.528 32.131237.716 32.44 1243.805 32.521249.904 32.571255.993 32.731262.092 33.021268.181 33.25 1274.27 33.291280.369 33.241286.458 33.31292.557 33.281298.646 33.07 1304.744 33.191310.834 33.621316.932 33.981323.021 34.27 1329.12 34.6 1335.209 34.911341.308 34.931347.397 35.041353.496 35.281365.683 35.63 1371.773 35.741377.871 35.821383.961 35.841396.148 35.671402.247 35.72 1408.336 36.051414.435 36.21420.524 36.481432.712 36.54 1438.81 36.43 1444.9 36.211450.989 36.381457.087 36.461463.177 36.851469.275 37.32 1475.364 37.261481.463 37.31487.552 37.731493.651 38.13 1499.74 37.85 1505.839 37.55

Manning's n Values num= 3

```
 Sta n Val Sta n Val Sta n Val
 0 .09 725.405 .04 901.165 .09
 Bank Sta: Left Right Coeff Contr. Expan.
 725.405 901.165 .3 .4
Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 779.945 24.5 T
 911.5021505.839 26 T
Skew Angle = 20

Upstream Embankment side slope = 0 horiz. to 1.0 vertical Downstream
Embankment side slope = 0 horiz. to 1.0 vertical Maximum allowable
submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
 Energy
 W.S. Pro Method

 W.S.Pro Data
 Left Embankment
 El of the top of the embankment = 25.3
 El of the toe of the abutment = 11.2
 Right Embankment
 El of the top of the embankment = 25.3  El of the toe of the abutment = 11.2
 Abutment Type = 4 Vert. abutments and sloping embankments with wingwalls
Slope of abutments =
 Top with of embankment = 35
 Centroid station of bridge opening =
 Wing Wall Type = Angular wing walls
 Width = 20
 Angle = 45
 Radius =
 Guide Banks Type = No Guide Bank present
 Length =
 Offset =
 Angle =
 Optional Contraction and expansion coefficients
 At approach Section
 At Guide Bank
 At upstream outside
 At upstream inside (BU)
 At downstream inside (BD)
 Piers are Continuous for the width of the bridge
 Use Geometric mean as Friction Slope Method

Selected Low Flow Methods = W.S.Pro Method

High Flow Method
```

```
 Pressure and Weir flow
 Submerged Inlet Cd =
 Submerged Inlet + Outlet Cd = .8
 Max Low Cord =

Additional Bridge Parameters
 Add Friction component to Momentum
 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION


RIVER: Taunton River
REACH: Main Stem RS: 72532.91

INPUT
Description: 66.3 DS FAce Vernon St
Station Elevation Data num= 211
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  0 34.89 6.089 34.81 12.178
34.66 30.455 34.05 36.545 33.81  42.634 33.66 48.723 33.72 54.822 33.69
60.911 33.59 67 33.45  73.089 33.25 79.179 33.09 85.277 33.04 91.366 32.89
97.456 32.68  103.545 32.51 109.634 32.16 115.723 31.77 121.822 31.16 127.911
30.64  134 30.23 140.089 30.07 146.179 30.03 152.277 29.83 158.366 29.57
164.456 29.22 170.545 28.83 176.634 28.48 182.723 28.11 194.911 27.32  201
26.81 207.089 26.27 213.179 25.88 219.277 25.51 225.366 25.12  231.456 24.88
237.545 24.36 243.634 23.95 255.822 23.32 261.911 23.03  268 22.89 274.09
22.69 280.179 22.24 286.277 22.16 292.367 22.17  298.456 21.92 304.545 21.78
310.634 21.99 316.733 22.46 322.822 22.69  328.911 22.67 335 22.41 341.09
22.11 347.179 21.93 353.277 21.61  359.367 21.37 365.456 21.4 377.634 21.59
383.723 21.7 389.822 21.74  395.911 21.71 408.09 21.96 414.179 22.07 420.278
22.13 426.367 22.26  438.545 22.31 444.653 22.45 450.752 22.51 456.86 22.53
462.958 22.47  469.066 22.24 481.273 21.93 487.372 21.88 493.48 21.8 499.578
22.02  505.686 22.26 511.785 22.19 517.893 21.81 530.099 21.18 536.198 20.99
542.306 21.02 548.405 21.01 554.513 20.92 560.611 21.05 566.719 21.23
572.818 21.29 578.926 21.53 585.024 21.83 591.132 21.89 597.231 21.75
603.339 21.43 609.438 21.22 615.546 21.22 621.644 21.29 627.752 21.54
633.851 21.96 639.959 22.01 646.057 22.24 652.165 22.67 658.264 22.99
664.372 23.22 670.471 23.32 676.579 23.47 682.677 23.64 688.785 23.61
700.992 23.02 707.09 22.97 713.198 23.24 719.297 24.07 725.405 24.2  731.504
22.81 779.945 18.72 780.152 16.67 800.261 11.24 808.455 8.69  823.265 8.51
828.574 8.54 834.475 7.98 845.056 8.04 856.887 6.92  868.586 7.49 887.511
8.29 888.461 10.2 892.558 10.65 900.987 16.58  901.165 19.88 914.612 18.66
920.711 18.51 926.819 17.76 932.917 17.11  939.025 16.93 945.124 16.47
951.232 15.67 957.331 15.21 963.439 16.04  969.537 15.4 975.645 15.13 981.744
15.39 987.852 15.31 993.95 15.86 1006.148 22.731012.246 24.771018.335
25.491024.434 26.021030.523 26.47 1036.622 26.49 1048.81 26.781060.998
27.031067.087 27.391073.185 27.66 1079.275 27.711085.364 27.821091.462
27.91097.552 28 1103.65 28.2 1109.739 28.331121.927 28.341128.026
28.481140.214 28.611152.401 28.87 1164.589 29.181170.678 29.311182.866
29.431188.965 29.681195.054 30.04 1201.153 30.351207.242 30.77 1219.43
31.81225.528 32.131237.716 32.44 1243.805 32.521249.904 32.571255.993
```

32.731262.092 33.021268.181 33.25 1274.27 33.291280.369 33.241286.458
33.31292.557 33.281298.646 33.07 1304.744 33.191310.834 33.621316.932
33.981323.021 34.27 1329.12 34.6 1335.209 34.911341.308 34.931347.397
35.041353.496 35.281365.683 35.63 1371.773 35.741377.871 35.821383.961
35.841396.148 35.671402.247 35.72 1408.336 36.051414.435 36.21420.524
36.481432.712 36.54 1438.81 36.43 1444.9 36.211450.989 36.381457.087
36.461463.177 36.851469.275 37.32 1475.364 37.261481.463 37.31487.552
37.731493.651 38.13 1499.74 37.85 1505.839 37.55

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 725.405 .04 901.165 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 725.405
901.165 70.06 59.59 49.81 .3 .4 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 779.945 24.5 T
 911.5021505.839 26 T
Skew Angle = 20

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 72473.31

INPUT
Description: 66 Exit Vernon St
Station Elevation Data num= 229
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 34.89 6.52 34.82 13.04 34.66
26.08 34.38 32.6 34.25 45.64 34.14 58.68 34.07 71.72 34.03 78.24 34 84.76
34.01 91.28 33.94 97.8 33.82 104.32 33.74 110.84 33.5 117.36 31.31 123.88
30.76 130.4 30.48 136.91 30.4 143.43 30.07 156.47 29.02 162.99 28.55 169.51
28.02 176.03 27.34 182.55 26.63 189.07 26.16 202.11 25.27 208.63 24.72
215.15 24.27 221.67 23.79 228.19 23.41 241.23 22.78 247.75 22.44 254.27
22.13 260.79 21.9 267.31 21.37 273.83 21.06 280.35 20.81 286.87 20.53 299.91
20.24 306.43 20.24 312.95 20.31 325.99 20.5 332.51 20.64 339.03 20.72 345.55
20.87 352.07 20.73 358.59 21.4 365.11 22.35 371.63 22.34 378.15 21.95
384.67 21.87 391.19 21.98 397.71 22.03 404.22 22.42 410.74 22.57 417.26
22.81 430.3 23.12 436.82 23.3 443.34 23.46 456.38 24.15 462.9 24.16 469.42
24.04 482.46 23.93 488.98 23.83 495.5 23.67 502.02 23.53 508.57 23.2 515.12
23.29 521.66 23.01 528.21 22.85 534.76 22.67 547.85 22.12 554.4 21.69 560.95
21.42 567.5 21.03 574.04 20.66 580.59 20.52 587.14 20.55 593.69 20.39 600.23
20.33 613.33 20.36 619.88 20.08 626.42 19.91 632.97 19.8 639.52 19.76
646.06 19.8 652.61 19.79 659.16 19.75 665.71 20.15 672.25 20.72 678.8 21.73
685.35 22.64 691.9 23.41 698.44 23.8 704.99 24.07 711.54 24.19 718.09 24.36
724.63 24.34 731.18 24.43 737.73 24.6 744.28 24.65 750.82 24.5 757.37 24.32
763.92 24.1 777.01 22.89 783.56 22.5 790.11 22.17 796.66 21.91 803.2 21.86
809.75 21.14 816.3 17.73 830.39 11.32 851.35 12.33 882.88 9.63 886.95 7.75
897.37 6.84 910.58 6.18 914.82 6.56 925.8 5.97 937.82 5.99 948.13 6.63
972.41 7.47 979.03 7.74 981.24 10.95 1021.63 12.14 1094.25 13.57 1117.48
24.42 1124.03 25.46 1130.57 26.29 1137.12 26.81 1150.22 27.05 1156.76 27.19
1163.31 27.28 1169.86 27.32 1176.41 27.29 1182.95 27.35 1189.5 27.58 1202.6
28.31 1209.14 28.59 1222.24 29.01 1228.78 29.16 1235.33 29.24 1241.88 29.34

1254.97 29.8 1261.52 29.93 1268.07 30.08 1274.62 30.1 1281.16 30.25 1287.71 30.63 1294.26 31.06 1300.81 31.45 1313.9 32.31 1320.45 32.67 1327 32.98 1333.54 33.24 1340.09 33.46 1346.64 33.61 1353.19 33.82 1359.73 34.06 1366.28 34.23 1372.83 34.28 1379.37 34.28 1385.92 34.31 1392.47 34.29 1399.02 34.17 1405.56 34.1 1412.11 34.17 1418.66 34.4 1431.6 35.15 1438.07 35.3 1444.54 35.37 1451.01 35.51 1457.48 35.69 1463.95 35.77 1470.42 35.77 1483.36 35.89 1489.83 35.97 1496.3 36.02 1502.77 36 1509.24 35.86 1515.71 35.68 1528.65 35.68 1535.12 35.65 1541.59 35.73 1548.06 35.89 1554.53 35.99 1561 36 1567.47 35.89 1573.94 36.16 1580.41 36.53 1586.88 36.83 1593.35 37.05 1612.76 37.48 1619.23 37.57 1625.7 37.56 1638.64 37.38 1645.11 37.4 1651.58 37.47 1658.05 37.43 1664.52 37.46 1670.99 37.33 1677.46 37.41 1683.93 37.72 1690.4 37.5 1696.87 36.05 1703.34 35.5 1709.81 35.39 1716.28 35.34 1722.75 35.34 1729.22 35.31 1735.69 35.3 1748.63 35.35 1761.57 35.44 1768.04 35.51 1774.51 34.79 1780.98 34.29 1787.45 34.72 1793.92 35.27 1800.39 35.46 1806.86 35.42 1813.33 34.81 1819.8 33.96 1826.27 33.38 1832.74 32.98 1839.21 32.83 1845.68 32.64 1852.15 32.43 1858.62 32.26 1865.09 32.57

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 744.28 .04 1137.12 .09
 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 744.28 1137.12 1517.78 1599.96 1630.87 .1 .4 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 734 24 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 70873.35

INPUT
Description: 65
Station Elevation Data num= 324
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 34.29 19.66 34.5 32.77 34.98 39.32 34.85 45.88 34.56 52.43 33.57 78.65 33.16 85.2 32.82 91.75 32.72 157.29 32.77 170.4 33.08 183.51 33.71 196.62 34.03 203.17 34.32 209.72 34.45 222.83 35.11 229.39 35.21 255.6 34.84 268.71 34.82 275.26 34.71 281.82 34.84 294.93 34.7 301.48 34.44 308.03 33.92 321.14 33.56 327.69 33.55 340.8 33.3 367.02 32.1 386.68 30.79 412.9 28.79 426 28.13 439.11 27.23 458.77 25.64 478.43 24.43 491.54 23.29 504.65 22.48 517.76 21.96 524.31 21.46 530.87 21.1 537.42 20.59 557.08 19.71 576.74 18.42 589.85 17.32 609.51 16.41 616.07 16.22 635.73 16.41 648.84 16.41 655.39 16.73 694.71 17.18 701.27 17.77 707.82 18.69 720.93 19.54 734.04 20.95 740.59 21.9 747.14 22.57 760.25 23.19 766.81 24.25 773.36 26.56 779.91 26.86 786.47 26.6 793.02 26.63 806.13 27.2 832.34 27.58 838.9 27.55 858.56 27.12 897.88 26.78 910.99 26.99 950.31 26.66 956.87 26.74 969.98 26.64 989.64 26.71 1002.75 26.49 1015.85 26.39 1028.96 26.61 1055.18 26.65 1081.39 26.39 1094.45 26.12 1107.5 25.6 1133.62 24.95 1146.67 24.33 1153.2 24.22 1166.26 23.8 1192.37 22.65 1205.43 22.49 1218.48 22.06 1231.54 21.49 1238.07 21.08 1244.59 21.59 1251.12 21.46 1257.65 21.57 1264.18 21.17 1270.71 20.93 1277.23 20.96 1283.76 20.76 1290.29 20.41 1296.82 19.92 1329.46 18.81 1342.51 18.08 1349.04 17.86 1381.68 18.23 1388.21 18.42 1394.74 18.42 1401.27 18.16 1407.79 18.16 1414.32 17.97 1420.85 17.94 1427.38 18.06 1440.43 17.76 1446.96 17.36 1479.6 17.12 1492.66

16.89 1525.3 15.54 1538.35 15.3 1544.88 15.32 1551.41 15.56 1564.47 16.39
1570.99 16.95 1590.58 18.95 1597.11 19.42 1610.16 19.7 1623.22 19.62 1629.75
19.42 1636.28 19.44 1642.8 19.61 1649.33 19.62 1655.86 19.35 1662.39 18.86
1668.92 18.22 1675.44 17.45 1681.97 16.26 1695.03 12.48 1701.56 11.69
1714.61 11.67 1727.67 12 1734.2 13.28 1740.72 13.62 1747.25 14.25 1760.31
14.8 1766.84 14.85 1779.89 14.61 1792.95 14.82 1806 14.77 1812.53 14.86
1819.06 14.67 1825.59 14.06 1832.12 13.66 1845.17 12.49 1858.23 11.99
1871.28 11.79 1877.81 11.58 1884.34 11.62 1897.4 12.17 1910.45 12.96 1923.51
13.33 1930.04 13.73 1936.57 13.66 1943.09 13.93 1949.62 14.39 1962.68 14.81
1982.26 14.86 2001.85 14.68 2008.37 14.31 2021.43 14.13 2027.96 13.6 2047.54
13.12 2054.07 12.85 2073.65 12.43 2086.71 12.72 2106.29 12.28 2112.82 12.25
2119.35 12.36 2125.88 12.69 2138.93 12.89 2145.46 13.39 2165.05 14.34
2171.57 14.81 2178.1 15.09 2184.63 15.15 2197.69 14.76 2204.21 14.68 2217.27
15.09 2249.91 14.79 2262.97 13.95 2269.49 13.9 2282.55 13.45 2295.61 13.36
2302.13 13.6 2315.19 13.21 2328.24 12.4 2341.33 12.59 2347.9 12.58 2367.58
12.9 2393.83 15.3 2400.39 15.6 2426.64 15.56 2433.2 15.09 2452.88 15.62 2466
15.5 2479.13 15.91 2492.25 16.09 2498.81 16.28 2518.5 15.95 2519.86 15.97
2525.06 16.05 2545 13.7 2555 7.2 2575 4.5 2600 4 2625 4.7 2645 7.5 2656.29
18.13 2662.85 22.78 2669.41 27.53 2675.98 29.91 2682.54 31.29 2689.1 32.28
2695.66 33.38 2702.22 35.17 2708.78 36.23 2715.34 37.01 2721.91 37.67
2728.47 38.74 2741.59 38.55 2748.15 38.55 2754.71 39 2761.28 39.77 2767.84
40.23 2780.96 40.59 2787.52 41.08 2794.08 41.48 2800.65 41.9 2807.21 42.28
2813.77 42.53 2820.33 42.65 2826.89 42.81 2833.45 43.11 2840.01 43.43
2846.58 43.61 2853.14 44.06 2859.7 44.06 2866.26 43.82 2872.82 43.5 2879.38
44.29 2885.95 44.77 2892.51 45.13 2899.07 45.47 2905.63 45.77 2912.19 45.93
2918.75 46.17 2925.32 46.44 2931.88 46.63 2938.44 46.87 2945 47.04 2951.56
47.26 2958.12 47.75 2964.68 48.17 2971.25 48.52 2977.81 49.38 2984.37 50.7
2990.93 52.37 2997.49 53.89 3004.05 54.99 3010.62 56.34 3017.18 57.33
3023.74 58.64 3030.3 59.62 3036.86 60.73 3043.42 61.73 3049.99 62.67 3056.55
63.37 3063.11 63.83 3069.67 63.85 3076.23 63.7 3082.79 63.15 3089.35 62.12
3095.92 60.75 3102.48 59.4 3109.04 58.17 3115.6 57.19 3122.16 56.45 3128.72
56.05 3135.29 54.96 3141.85 54.16 3148.41 53.98 3154.97 53.92 3161.53 54.24
3168.09 54.01 3174.66 54.27 3181.22 54.24 3187.78 53.99 3194.34 53.71 3200.9
53.7 3207.46 53.9 3214.02 54.49 3220.59 55.51 3227.15 56.86 3233.71 57.59
3240.27 58.39 3246.83 59.12 3253.39 60.29 3259.96 61.54 3266.52 62.09
3273.08 63.1 3279.64 63.32 3286.2 63.78 3292.76 63.93 3305.89 63.63 3312.45
63.33 3319.01 63.05 3325.57 62.84 3332.13 62.52 3338.69 61.85 3345.26 60.98
3351.82 60.14 3358.38 59.47 3364.94 59.14 3371.5 58.62 3378.06 58.48 3391.19
58.55 3397.75 58.8 3404.31 58.52 3417.43 58.22 3424 58.28 3430.56 58.06

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val 0 .085 2519.86 .04 2728.47 .093

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2519.86
2728.47 2059.45 2036.14 2092.49 .1 .4 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 832 27.5 F

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 68837.21

INPUT
Description: 64
Station Elevation Data num= 417
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 36.39 6.55 36.12 13.1 35.95
19.65 35.8 26.19 35.38 32.74 34.89 39.29 34.57 45.87 34.05 52.42 33.45 58.98
33.24 65.53 33.21 72.08 33.13 78.64 33.12 85.19 33.13 91.74 33.09 98.29 33
104.85 32.88 111.4 32.81 117.95 32.67 124.51 32.59 131.06 32.4 137.61 32.16
144.16 32.09 150.72 31.94 157.27 31.81 163.82 31.78 170.38 31.82 176.93
31.81 183.48 31.97 196.59 32.09 203.14 32.16 209.69 32.27 222.8 32.64 229.35
32.89 235.91 33.17 242.46 33.48 249.01 33.86 255.56 34.16 268.67 34.53
275.22 34.63 281.78 34.56 288.33 34.52 294.88 34.4 301.43 34.3 307.99 34.18
314.54 34.02 321.09 33.93 327.65 33.82 334.2 33.68 340.75 33.66 347.3 33.6
353.86 33.51 360.41 33.29 373.52 32.73 386.62 31.76 393.18 31.25 399.73
30.68 406.28 30.06 412.83 29.38 419.39 28.88 425.94 28.54 432.49 28.36
439.05 28.21 445.6 27.99 452.15 27.65 458.7 27.38 465.26 27.26 471.81 27.23
478.36 27.3 484.92 27.16 491.47 27.24 498.02 27.17 504.57 26.85 511.13 26.8
517.68 26.78 524.23 26.52 530.79 26.2 537.34 25.9 543.89 25.29 550.45 24.04
563.55 21.63 570.1 20.6 576.66 19.83 583.21 19.04 596.32 18.07 602.87 17.29
609.42 16.81 615.97 16.69 622.53 16.55 629.08 16.26 635.63 16.04 642.19
16.64 655.29 16.69 661.84 16.85 668.4 17.21 674.95 17.37 681.5 17.8 688.06
18.04 694.61 18.16 701.16 18.39 707.72 18.45 720.82 19.54 727.37 20.21
733.93 20.72 740.48 21.12 747.03 21.26 753.59 21.24 766.69 21.08 773.24
21.02 779.8 20.79 786.35 20.42 792.9 20.34 799.46 20.28 806.01 20.32 812.56
20.44 819.11 20.68 825.67 20.99 832.22 21.54 838.77 22.05 845.33 22.59
851.88 23.11 858.43 23.72 864.99 24.43 871.54 25.1 878.09 25.63 891.2 26.36
897.75 26.48 904.3 26.39 910.86 26.47 917.41 26.51 923.96 26.59 930.51 26.6
937.07 26.58 943.62 26.32 950.17 26.24 956.73 26.22 963.28 26.51 969.83
26.52 976.38 26.34 982.94 26.41 989.49 26.38 996.04 26.29 1002.6 26.38
1009.15 26.53 1015.7 26.47 1022.26 26.57 1028.81 26.33 1035.36 26.42 1041.91
26.39 1055.02 26.09 1061.57 26.24 1068.13 26.19 1074.68 26.39 1081.23 26.36
1087.78 26.35 1094.34 26.42 1100.89 26.18 1107.44 26.24 1114 26.22 1120.55
26.28 1127.1 26.17 1133.66 25.86 1140.21 25.51 1146.76 25.9 1153.31 26.11
1159.87 26.23 1166.42 26.2 1172.97 26 1179.53 26.26 1192.63 25.71 1199.19
25.42 1205.74 25.09 1212.29 24.63 1218.84 24.1 1225.4 23.63 1231.95 24.1
1238.5 24.01 1245.06 23.25 1251.61 22.85 1258.16 22.76 1264.71 22.69 1271.27
22.72 1277.82 22.72 1284.37 22.51 1290.93 22.2 1297.48 21.95 1310.59 21.7
1317.14 21.41 1323.69 21.5 1330.24 21.26 1336.8 20.78 1343.35 20.51 1349.9
20.2 1356.46 19.78 1363.01 19.16 1376.12 18.02 1382.67 17.28 1389.22 17.06
1395.77 16.99 1402.33 16.49 1408.88 16.22 1415.43 15.2 1421.99 14.76 1428.54
14.78 1435.09 14.56 1441.65 14.85 1448.2 15.02 1454.75 15.21 1461.3 15.58
1467.86 15.81 1474.41 15.95 1480.96 15.91 1487.52 16.26 1494.07 16.7 1500.62
16.77 1507.18 16.78 1513.73 16.71 1520.28 16.36 1526.83 16.22 1533.39 16.01
1539.94 15.43 1546.49 14.87 1553.05 14.28 1559.6 13.98 1566.15 13.57 1572.7
13.46 1579.26 13.22 1585.81 13.19 1592.36 13.5 1598.92 13.71 1605.47 14.26
1612.02 14.99 1618.58 15.67 1625.13 16.13 1631.68 16.74 1638.23 17 1644.79
17.29 1651.34 17.14 1657.89 17.4 1664.45 17.56 1671 17.53 1677.55 17.75
1684.11 17.58 1690.66 18.02 1697.21 18.41 1703.76 18.53 1710.32 18.46
1716.87 18.53 1723.42 18.66 1729.98 18.75 1736.53 18.78 1743.08 18.78
1749.63 18.96 1756.19 18.72 1769.29 18.94 1782.4 19.37 1788.95 19.2 1795.51
19.4 1802.06 19.7 1808.61 19.74 1815.16 19.81 1821.72 20.11 1828.27 20.21
1841.38 20.7 1847.93 20.77 1854.48 20.54 1861.04 20.39 1867.59 20.13 1874.14
19.37 1880.69 18.7 1887.25 18.1 1893.8 17.65 1900.35 17.12 1906.91 16.34
1913.46 15.67 1920.01 15.06 1926.57 14.86 1933.12 15.01 1946.22 14.96
1952.78 14.98 1959.33 15.09 1965.88 15.32 1972.44 15.76 1978.99 16.08

1985.54 16.24 1992.1 16.42 1998.65 16.47 2005.2 16.82 2011.75 16.5 2018.31 15.55 2024.86 14.27 2031.41 13.77 2050 14.1 2083 13.7 2090 6.6 2110 2.9 2130 3.1 2150 3.9 2170 7.1 2182.13 22.14 2188.68 27.54 2195.24 31.46 2201.79 33.64 2208.34 34.57 2214.9 35.39 2221.45 35.82 2228 35.88 2241.11 35.73 2247.66 35.59 2254.21 35.32 2260.77 35.59 2267.32 35.59 2273.87 35.52 2280.43 35.59 2286.98 35.59 2293.53 35.83 2300.08 35.89 2306.64 36.14 2311.62 36.25 2318.15 36.11 2324.68 36.14 2331.21 36.2 2337.74 36.09 2344.26 36.12 2350.79 36.36 2357.32 36.9 2363.85 37.32 2370.38 37.44 2376.91 37.61 2383.44 37.83 2389.97 38.12 2396.5 38.59 2403.03 39 2409.56 39.2 2416.09 39.47 2422.61 39.83 2429.14 40.04 2435.67 40.2 2442.2 40.35 2448.73 40.41 2455.26 40.42 2461.79 40.54 2468.32 40.72 2474.85 40.88 2481.38 40.93 2487.91 40.87 2494.44 40.95 2500.96 41.06 2507.49 41.04 2514.02 40.82 2520.55 40.79 2527.08 41.03 2533.61 41.12 2540.14 41.17 2546.67 41.25 2553.2 41.43 2559.73 41.61 2566.26 41.74 2572.79 41.98 2579.32 42.09 2585.84 42.09 2592.37 42.18 2598.9 42.08 2605.43 42.28 2611.96 42.33 2618.49 42.28 2625.02 42.54 2631.55 42.66 2638.08 42.59 2644.61 42.77 2651.14 42.75 2657.67 42.78 2664.2 42.75 2670.72 42.9 2677.25 43.47 2683.78 43.62 2690.31 43.79 2696.84 43.83 2703.37 43.98 2709.9 44.02 2716.43 44.23 2722.96 44.65 2729.49 45.05 2736.02 45.45 2742.55 45.61 2749.07 46 2755.6 46.36 2762.13 46.6 2768.66 46.93 2775.19 47.35 2781.72 47.77 2788.25 48.21 2794.78 48.63 2801.31 49.03 2807.84 49.45 2814.37 50.2 2820.9 51.03 2827.42 51.63 2833.95 52.09 2840.48 52.63 2847.01 52.93 2853.54 53.38 2860.07 53.64 2866.6 54.13 2873.13 54.59 2879.66 54.81 2886.19 54.95 2892.72 54.76 2899.25 54.47 2905.77 54.66 2912.3 55.84 2918.83 57.45 2925.36 59.75 2931.89 61.09 2938.42 62.25 2944.95 62.54 2951.48 62.57

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .087 2083 .04 2221.45 .095

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2083 2221.45 1628.08 1647.15 1663.03 .1 .4 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 1000 26.4 F

CROSS SECTION

RIVER: Taunton River REACH: Main Stem RS: 67190.06

INPUT
Description: 63
Station Elevation Data num= 374
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 40.46 6.54 39.81 13.08 39.82 19.61 39.9 26.15 39.75 32.69 39.75 39.23 39.85 45.77 39.9 52.3 39.78 58.84 39.75 65.38 40.12 78.46 40.69 84.99 41.08 91.53 41 98.07 41.24 104.61 41.45 111.14 40.72 124.22 39.03 130.76 38.67 137.3 38.75 143.83 38.77 150.37 39.27 156.91 39.63 163.45 39.74 176.52 39.31 183.06 39.22 189.6 39.24 196.14 39.34 202.68 39.51 209.21 39.37 222.29 38 228.83 37.51 235.37 37.04 241.9 36.6 248.44 36.21 254.98 35.93 261.52 35.62 268.06 35.42 281.13 35.21 287.67 35 294.21 34.6 300.75 34.37 307.28 34.27 313.82 33.97 326.9 33.32 333.43 33.16 339.97 33.16 346.51 33.18 353.05 33.12 359.59 32.99 366.12 32.88 379.2 32.76 385.74 32.71 392.28 32.54 398.81 32.46 405.35 32.26 411.89 32.36 418.43 32.65 424.97 33.1 431.5 33.35 438.04 33.57 444.58 33.5 451.12 32.95 457.66

32.8 464.19 32.78 470.73 32.73 477.27 32.78 490.35 32.76 496.88 32.84 503.42
32.97 509.96 32.94 516.5 32.8 523.04 32.78 529.57 32.86 536.11 32.88 542.65
33.02 555.72 33.86 562.26 34.17 568.8 34.53 575.34 34.69 581.88 34.68 588.41
34.73 594.95 34.68 601.49 35.03 608.03 35.4 614.57 35.39 621.1 35.45 627.64
35.55 634.18 35.53 640.72 35.46 647.26 35.34 653.79 35.18 660.33 35.14
666.87 35.03 673.41 34.76 679.95 34.55 686.48 34.01 693.02 33.55 699.56
33.39 706.1 33.2 712.64 32.95 719.17 32.57 725.68 32.5 738.69 32.83 745.2
32.94 751.71 32.85 758.21 32.68 764.72 32.84 771.23 32.9 777.73 32.67
784.24 32.05 790.74 30.59 797.25 29.68 803.76 29.34 810.26 29.18 816.77
28.99 823.28 28.82 829.78 28.25 836.29 27.94 842.8 27.58 855.81 27.61 862.32
27.36 868.82 26.94 875.33 26.86 881.83 26.89 888.34 26.83 894.85 26.69
907.86 26.35 914.37 26.04 920.87 25.75 927.38 25.8 933.89 25.5 940.39 25.1
946.9 24.92 959.91 24.72 972.92 24.59 979.43 24.63 985.94 24.65 992.44 24.58
998.95 24.43 1005.46 24.31 1011.96 24.61 1024.98 25.02 1031.48 25.21 1037.99
25.31 1044.49 25.39 1051 25.5 1057.51 25.47 1064.01 25.15 1070.52 25.06
1077.03 24.7 1083.53 24.28 1090.04 24.16 1096.55 24.06 1103.05 24.09 1109.56
24.47 1116.07 24.8 1122.57 25.17 1129.08 25.58 1135.59 26.04 1142.09 26.29
1148.6 26.48 1155.1 26.81 1161.61 27.02 1168.12 27.4 1174.62 27.46 1181.13
27.41 1187.64 27.48 1194.14 27.57 1200.65 27.5 1207.16 27.25 1213.66 27.03
1220.17 26.79 1226.68 26.53 1233.18 25.86 1239.69 25.05 1246.2 24.27 1252.7
23.34 1259.21 22.53 1265.71 21.56 1272.22 20.42 1278.73 19.58 1285.26 18.67
1291.8 18.15 1298.33 18.05 1304.86 18.12 1311.4 18.26 1317.93 18.19 1324.47
18.33 1331 18.58 1337.53 18.92 1344.07 18.9 1350.6 18.67 1357.14 18.73
1363.67 18.81 1370.21 19.24 1376.74 19.35 1383.27 18.87 1389.81 18 1396.34
8.57 1408 7 1425 3.1 1450 2.2 1475 4 1492 7.2 1493.21 11.12 1494.35 11.55
1500.89 12.9 1513.96 13.15 1520.49 13.74 1527.02 15.37 1533.56 15.9 1540.09
15.56 1546.63 15 1553.16 13.95 1559.69 13.24 1566.23 12.75 1579.3 12.69
1585.83 12.48 1592.36 12.87 1598.9 13.73 1611.97 15.21 1618.5 15.72 1631.57
15.39 1638.1 15.05 1644.64 15.15 1657.71 15.15 1670.71 14.81 1690.13 15.51
1703.08 15.62 1716.03 15.38 1735.45 15.31 1748.39 14.95 1754.87 14.46
1761.34 13.84 1767.82 13.39 1793.71 12.38 1800.18 12.26 1813.13 12.77 1819.6
12.79 1826.08 12.99 1832.55 13.02 1845.5 12.72 1864.92 12.43 1871.39 12.82
1877.86 13.92 1884.34 15.52 1890.81 17.41 1903.76 18.55 1923.18 18.05
1929.65 17.68 1942.6 17.6 1949.07 17.32 1955.55 17.92 1968.49 18.52 1974.97
18.64 1981.44 18.93 1994.39 19.05 2000.86 18.84 2007.33 18.46 2026.75 18.18
2033.23 17.85 2046.18 16.69 2052.65 16.34 2072.07 16.06 2085.02 16.86
2091.49 16.97 2104.44 17.99 2117.38 19.16 2123.86 19.52 2136.97 19.84
2150.09 20.66 2163.21 21.93 2169.77 21.85 2176.33 21.91 2182.89 22.34 2196
23.74 2209.12 25.01 2228.8 27.84 2261.59 31.88 2268.15 32.56 2274.71 33.44
2281.27 34.74 2300.94 40.19 2314.06 43.5 2320.62 45.3 2333.74 48.31 2340.3
49.97 2353.42 52.31 2359.97 53.61 2366.53 54.27 2379.65 56.01 2386.21 56.48
2419 59.38 2425.56 59.69 2438.68 59.98 2458.36 61.12 2471.47 60.48 2478.03
60.27 2497.71 60.35 2510.83 60.95 2517.39 61.36 2523.94 61.96 2550.18 63.94
2556.74 64.17 2563.3 64.25 2589.53 63.5 2596.09 63.21 2609.21 62.07 2628.88
59.59 2635.44 58.59 2648.56 56.18 2655.12 54.72 2661.68 52.81 2720.71 38.65
2727.27 37.38 2740.38 35.21 2753.5 34.06 2766.62 32.29 2773.18 31.67 2779.74
30.87 2786.3 30.25 2792.85 29.97 2805.97 28.33 2812.53 27.74 2819.09 27.47
2825.65 27.75 2832.21 27.42 2845.32 26.01 2858.44 25.74 2878.12 26.1 2884.68
26.09 2904.35 26.54 2937.15 28.15 2963.38 29 2969.94 28.83 2976.5 28.89
2983.06 29.23 2989.62 29.78 2996.18 30.05 3002.74 29.91 3015.85 31.05
3024.23 31.61 3030.75 31.96 3037.2 32.43 3043.64 32.91 3050.08 33.31 3056.53
33.98 3062.97 34.67 3069.41 34.76 3075.86 35.33 3082.3 36.04 3088.75 36.46
3095.19 36.27 3101.63 36.63 3108.08 37.18 3114.52 37.46 3120.96 37.32
3127.41 36.9 3133.85 36.59 3140.29 36.59 3146.74 36.78 3153.18 36.63 3159.63

37.32 3166.07 38.67 3172.51 40.31 3178.96 42.23 3185.4 43.93 3191.84 45.52
3198.29 47.22 3204.73 48.88 3211.18 50.28 3217.62 51.75 3224.06 53.11

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .087 1376.74 .04 1533.56 .093

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1376.74
1533.56 997.16 932.92 890.31 .1 .4 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 1994 3224.06 19 F

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 66257.14

INPUT
Description: 62 Approach 495
Station Elevation Data num= 324 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 32.88 6.55 32.71 13.1 32.8 19.64 33.04 26.19 32.86 32.74 32.9 39.29 32.9
45.84 33.07 52.39 33.12 65.48 32.86 72.03 33.15 78.58 33.38 85.13 33.42
98.22 33.46 104.77 33.35 111.32 33.15 117.87 33.08 130.97 33.33 137.51 33.18
144.06 33.05 150.61 32.8 157.16 32.76 163.71 32.57 176.8 32.27 183.35 32.14
189.9 32.04 196.45 31.96 203 32.04 209.54 32.14 216.09 32.14 222.64 32.23
229.19 32.35 235.74 32.33 242.29 32.43 248.83 32.51 255.38 32.51 268.48
32.64 275.03 32.77 281.58 32.64 288.12 32.76 294.67 32.86 301.22 33.27
307.77 33.43 314.32 33.38 320.87 33.11 333.96 33.41 340.51 33.5 347.06 33.35
353.61 33.17 360.16 33.14 366.7 33.16 373.25 32.91 386.35 31.98 399.44 31.71
405.99 31.65 412.54 31.56 419.09 31.49 425.64 31.4 432.19 31.21 445.28 31.34
451.83 31.24 458.38 31.44 464.93 31.45 471.48 31.18 478.02 31.21 484.57
30.95 491.12 31.06 497.67 31.11 504.22 31 510.77 30.54 523.86 29.34 530.41
29.36 536.96 28.56 543.51 28 550.06 27.75 556.6 27.22 563.15 26.71 569.7
26.31 576.25 26.06 582.8 26.13 589.34 26.26 595.89 26.5 602.44 27.04 608.99
26.95 615.54 27.21 622.09 27.21 628.63 27.3 635.18 27.95 641.73 29.38 648.28
30.38 654.83 31.4 661.38 32.22 667.92 32.48 674.47 32.5 681.02 32.47 687.57
32.26 694.12 32.23 700.67 32.15 713.76 32.12 720.31 32.21 726.86 31.98
733.41 31.8 739.96 31.65 746.5 31.84 753.05 31.86 759.6 31.74 766.15 31.51
772.7 31.4 779.24 31.38 785.79 31.43 792.34 31.19 805.44 30.49 811.99 30.46
818.53 30.22 825.08 30.04 838.18 30 844.73 30 851.28 30.07 857.82 29.88
870.92 29.66 877.47 29.4 884.02 29.34 890.57 29.22 897.11 29.14 903.66 29.31
910.21 29.02 916.76 28.75 929.86 28.33 936.4 28.07 942.95 27.62 949.5 26.71
956.05 25.66 962.6 25.32 969.15 25.21 975.69 25.36 982.24 25.07 988.79 24.4
995.34 24.23 1001.89 24.31 1008.44 23.69 1014.98 22.69 1021.53 22.3 1028.08
22.25 1034.63 21.76 1041.18 19.24 1057.66 9.83 1058.6 6.74 1062.21 5.77
1073.02 2.46 1094.79 -.34 1115.31 -.94 1130.91 3.91 1140.47 5.64 1146.53 8
1154.42 11.85 1159.05 12.86 1165.59 14.86 1172.14 16.43 1178.69 16.92
1204.88 16.83 1217.98 16.33 1224.53 16.23 1244.17 15.05 1257.27 13.87
1270.37 13.03 1276.91 12.72 1283.46 12.21 1296.56 11.96 1309.66 11.03 1316.2
10.73 1322.75 10.19 1329.3 10.01 1342.4 9.99 1348.95 10.68 1355.49 11.02
1362.04 11.1 1375.14 10.71 1381.69 10.78 1388.24 11.09 1401.33 11 1407.88
11.24 1414.43 11.32 1434.07 12.01 1440.62 12.36 1453.72 13.89 1466.82 14.44
1473.36 14.56 1479.91 14.43 1486.46 14.54 1493.01 14.49 1499.56 14.29

1512.65 13.42 1519.2 12.79 1525.75 12.52 1532.3 12.62 1538.85 12.95 1545.39 13.76 1551.94 14.38 1565.04 14.43 1571.59 14.77 1578.14 14.91 1591.23 15.68 1597.78 16.36 1604.33 16.9 1610.88 16.14 1617.43 16.1 1637.07 16.48 1643.62 16.24 1650.17 16.98 1669.81 17.29 1682.91 17.22 1702.55 17.47 1709.1 17.42 1715.65 17.58 1722.2 17.92 1728.75 17.76 1735.29 17.75 1748.39 18.18 1787.68 19.82 1794.23 19.93 1807.33 20.58 1813.87 21.01 1826.97 21.39 1833.52 21.28 1840.07 20.85 1846.62 21.29 1853.16 22.53 1859.71 23.07 1872.81 24.67 1885.91 25.77 1892.45 26.54 1905.55 28.65 1918.65 30.27 1931.74 31.25 1938.29 32.12 1944.84 33.22 1951.39 33.32 1957.94 33.96 1964.49 35.11 1971.03 36.84 1977.58 37.41 1984.13 37.7 2036.52 44.28 2049.61 45.32 2056.16 46.14 2075.81 47.98 2102 51.04 2115.09 52.69 2121.64 53.37 2134.74 55.09 2141.29 56.22 2147.83 57.11 2154.38 57.64 2167.48 57.9 2174.03 58.44 2180.58 59.28 2193.67 59.43 2206.77 59.09 2226.41 59.25 2232.96 59.1 2252.61 59.24 2265.7 61.81 2272.25 62.65 2278.8 61.86 2285.35 61.21 2291.89 61.11 2298.44 61.73 2304.99 62.52 2311.54 63.1 2318.09 63.21 2324.64 63.71 2331.18 63.34 2344.28 62.84 2363.92 61.64 2370.47 61.12 2377.02 61.01 2390.12 60.28 2403.21 60.1 2409.76 59.84 2422.86 59.64 2429.41 59.28 2455.6 58.82 2462.15 58.8 2475.24 57.99 2488.34 57.87 2501.44 57.39 2514.53 57.49 2534.18 56.22 2540.72 55.57 2547.27 54.46 2553.82 54.15 2560.37 53.22 2566.92 52.74 2573.47 53.83 2580.01 52.47 2586.56 50.97 2593.11 49.68 2599.66 48.68 2619.3 44.62 2625.85 43.13 2638.95 41.27 2645.5 39.99 2652.04 38.9 2658.59 38.09 2665.14 37.14 2671.69 36.85 2678.24 36.76 2684.78 36.46 2697.88 36.35 2704.43 36.14 2710.98 36.23 2717.53 36.6 2724.07 36.57 2730.62 36.72 2737.17 37.06 2743.72 37.09 2756.81 37.56 2763.36 38.05 2769.91 38.05 2776.46 38.2 2796.1 39.49 2809.2 39.93 2822.3 40.12 2828.84 40.38

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 1034.63 .04 1178.69 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1034.63 1178.69 57.41 52.76 51.67 .1 .4 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 1500 2828.84 29.5 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 66204.38

INPUT Description: 61.7 US Face 495
Station Elevation Data num= 321
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 43.4 12.216 42.98 42.765 42.81 48.883 42.87 54.991 42.7 73.324 42.63 79.432 42.74 85.54 42.33 103.874 41.97 109.982 42.12 116.09 41.97 122.198 40.19 128.306 39.67 134.423 39.48 140.531 39.57 152.747 39.34 158.855 38.92 164.972 38.75 171.08 38.73 177.188 38.97 183.296 38.32 189.404 38.04 226.071 37.81 232.179 36.48 238.287 35.89 262.729 36.18 268.837 36.35 274.945 36.19 281.062 36.24 287.17 36.62 299.386 36.45 305.503 36.49 317.719 37.01 336.053 36.9 342.161 36.61 366.602 36.58 378.818 36.23 391.034 36.16 415.476 36.37 421.584 36.01 427.701 35.02 433.809 34.72 439.917 34.62 446.025 34.67 452.143 34.57 458.251 34.33 470.467 34.3 476.575 34.09 482.692 34.32 494.908 34.04 513.241 33.92 519.349 33.32 525.457 33.02 531.565 33.29 537.673 33.27 549.899 33.79 556.007 34.19

568.232 33.65 574.34 33.5 586.556 33.58 592.664 33.47 611.045 33.5 629.519
33.25 635.674 33.36 647.993 33.25 654.148 33.3 660.303 33.2 666.468 33.44
672.623 32.86 691.097 32.28 709.571 32.27 715.726 32.03 721.881 31.57
734.201 31.11 740.356 31.14 746.52 30.99 752.675 31.01 758.83 31.18 771.149
31.12 777.304 30.69 789.624 30.43 795.779 30.12 801.934 29.99 814.253 29.49
820.408 28.85 826.563 28.4 832.727 27.71 845.037 27.3 851.202 26.61 857.357
26.26 869.676 26.21 881.986 25.8 900.46 25.76 906.615 26.18 912.78 26.46
918.935 26.25 925.09 25.18 931.254 24.45 943.564 23.89 949.719 23.03 955.883
21.27 962.039 19.34 968.193 16.89 971.924 15.33 988.641 5.98 993.405
4.141015.817 -.791029.349 -1.131047.701 -.711057.427 3.67 1064.174
8.591085.599 9.46 1095.71 15.391097.514 16.151103.669 18.08 1109.824
20.031115.979 21.541122.143 22.581128.298 23.251134.453 23.41 1140.618
231146.773 21.471152.928 21.261159.092 21.191165.247 21.08 1171.402
21.191177.557 21.21 1183.72 21.151189.876 21.581196.031 21.72 1202.196
20.831208.351 20.771214.506 21.051220.661 21.541226.825 22.35 1232.98
22.681239.135 22.731245.298 22.911251.454 23.371257.609 23.18 1263.774
23.311276.084 23.861282.239 24.411288.403 24.521294.558 22.87 1300.713
22.71306.878 22.81313.033 23.021319.188 23.441325.352 23.54 1331.507
23.551337.662 23.941343.817 23.931349.981 23.851356.136 23.86 1362.291
24.211368.457 24.53 1374.61 24.551380.766 24.91386.922 25.17 1393.085 25.22
1399.24 25.41405.395 25.621411.559 25.291417.714 25.87 1423.869 25.941430.034
25.541436.189 25.51448.499 25.671454.663 25.82 1460.818 25.681466.973
25.291473.137 24.871479.292 25.051485.447 25.25 1491.612 25.11497.767
25.331503.922 25.631516.241 26.181522.396 26.23 1528.551 26.31534.714 26.7
1540.87 27.281547.025 27.23 1553.18 27.42 1559.345 27.46 1565.5 27.351571.655
28.261577.819 27.321583.974 26.21 1590.129 26.291596.293 26.861602.448
26.481608.603 26.331620.923 27.95 1627.078 27.571633.233 27.791639.397
28.451645.552 28.51651.707 29.1 1657.871 29.491664.026 29.961670.182
30.11682.501 30.061688.656 30.73 1694.811 31.011700.975 30.76 1707.13
31.171713.285 31.02 1719.44 31.25 1725.604 31.68 1731.76 31.811744.079
32.641750.234 33.041756.389 33.67 1762.553 33.821768.708 34.381774.863
34.571781.018 34.141787.183 34.28 1793.338 34.611799.493 34.741805.657
35.131811.812 35.51817.967 35.82 1824.131 36.421830.286 36.961836.441
37.31842.596 37.551854.916 38.36 1861.071 38.94 1873.39 40.511879.545 41.21
1885.7 41.811891.864 42.12 1898.019 42.321910.339 42.911916.494 42.871922.649
42.761928.813 42.79 1934.968 43.021941.123 43.131947.278 43.131953.443
42.931959.598 43.12 1965.751 43.211984.227 43.711990.391 43.571996.546
43.572002.701 43.48 2015.021 43.62021.174 43.442027.329 43.342033.495 43.55
2039.65 43.6 2045.805 43.512051.969 43.722058.124 43.722064.279 43.462070.445
43.53 2076.6 43.412088.918 43.562095.073 43.732101.228 44.762107.392 44.93
2113.547 452119.702 44.832125.857 44.952132.022 45.022138.177 45.35 2144.332
46.912150.496 47.022156.651 46.912162.806 46.46 2168.97 46.42 2175.125 46.47
2181.28 46.352187.445 46.46 2193.6 46.372199.755 46.39 2205.91 46.392212.074
46.362218.229 46.492224.384 46.652230.548 46.65 2236.703 46.722242.858
46.832249.023 46.762255.178 46.752261.333 46.91 2267.497 47.132273.652
47.072279.807 47.062285.962 47.152292.125 46.9 2298.281 46.732304.438
46.72310.601 46.492316.756 46.42322.911 46.25 2329.075 46.22 2335.23
46.32341.385 46.46 2347.55 46.492353.705 46.57 2359.86 46.582366.015
46.522372.179 46.572384.489 46.62390.653 46.53 2396.808 46.622402.963
46.672415.282 46.72421.438 46.432427.602 46.12 2433.757 45.452439.912
45.122446.067 44.572452.231 44.692458.386 44.65 2464.541 44.8

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

0 .09 918.935 .041134.453 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
918.9351134.453 221.18 217.52 217.92 .3 .4 Skew Angle = 20

BRIDGE

RIVER: Taunton River
REACH: Main Stem RS: 66018.66

INPUT
Description: 61.5 I-495/ SR 25/ Star Mem Hwy Distance from Upstream XS = 22
Deck/Roadway Width = 175
Weir Coefficient = 2.6
Bridge Deck/Roadway Skew = 20
Upstream Deck/Roadway Coordinates
num= 9
Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
744.237 33.83 909.622 31.45 949.09 34.85 27.42 1029.903 34.19 26.681102.259
33.81 26.241138.907 29.58
1193.41 29.65 1249.791 29.89 1487.533 32.57

Upstream Bridge Cross Section Data
Station Elevation Data num= 321
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 43.4 12.216 42.98 42.765
42.81 48.883 42.87 54.991 42.7 73.324 42.63 79.432 42.74 85.54 42.33 103.874
41.97 109.982 42.12 116.09 41.97 122.198 40.19 128.306 39.67 134.423 39.48
140.531 39.57 152.747 39.34 158.855 38.92 164.972 38.75 171.08 38.73 177.188
38.97 183.296 38.32 189.404 38.04 226.071 37.81 232.179 36.48 238.287 35.89
262.729 36.18 268.837 36.35 274.945 36.19 281.062 36.24 287.17 36.62 299.386
36.45 305.503 36.49 317.719 37.01 336.053 36.9 342.161 36.61 366.602 36.58
378.818 36.23 391.034 36.16 415.476 36.37 421.584 36.01 427.701 35.02
433.809 34.72 439.917 34.62 446.025 34.67 452.143 34.57 458.251 34.33
470.467 34.3 476.575 34.09 482.692 34.32 494.908 34.04 513.241 33.92 519.349
33.32 525.457 33.02 531.565 33.29 537.673 33.27 549.899 33.79 556.007 34.19
568.232 33.65 574.34 33.5 586.556 33.58 592.664 33.47 611.045 33.5 629.519
33.25 635.674 33.36 647.993 33.25 654.148 33.3 660.303 33.2 666.468 33.44
672.623 32.86 691.097 32.28 709.571 32.27 715.726 32.03 721.881 31.57
734.201 31.11 740.356 31.14 746.52 30.99 752.675 31.01 758.83 31.18 771.149
31.12 777.304 30.69 789.624 30.43 795.779 30.12 801.934 29.99 814.253 29.49
820.408 28.85 826.563 28.4 832.727 27.71 845.037 27.3 851.202 26.61 857.357
26.26 869.676 26.21 881.986 25.8 900.46 25.76 906.615 26.18 912.78 26.46
918.935 26.25 925.09 25.18 931.254 24.45 943.564 23.89 949.719 23.03 955.883
21.27 962.039 19.34 968.193 16.89 971.924 15.33 988.641 5.98 993.405
4.141015.817 -.791029.349 -1.131047.701 -.711057.427 3.67 1064.174
8.591085.599 9.46 1095.71 15.391097.514 16.151103.669 18.08 1109.824
20.031115.979 21.541122.143 22.581128.298 23.251134.453 23.41 1140.618
231146.773 21.471152.928 21.261159.092 21.191165.247 21.08 1171.402
21.191177.557 21.21 1183.72 21.151189.876 21.581196.031 21.72 1202.196
20.831208.351 20.771214.506 21.051220.661 21.541226.825 22.35 1232.98
22.681239.135 22.731245.298 22.911251.454 23.371257.609 23.18 1263.774
23.311276.084 23.861282.239 24.411288.403 24.521294.558 22.87 1300.713
22.71306.878 22.81313.033 23.021319.188 23.441325.352 23.54 1331.507

23.551337.662 23.941343.817 23.931349.981 23.851356.136 23.86 1362.291
24.211368.457 24.53 1374.61 24.551380.766 24.91386.922 25.17 1393.085 25.22
1399.24 25.41405.395 25.621411.559 25.291417.714 25.87 1423.869 25.941430.034
25.541436.189 25.51448.499 25.671454.663 25.82 1460.818 25.681466.973
25.291473.137 24.871479.292 25.051485.447 25.25 1491.612 25.11497.767
25.331503.922 25.631516.241 26.181522.396 26.23 1528.551 26.31534.714 26.7
1540.87 27.281547.025 27.23 1553.18 27.42 1559.345 27.46 1565.5 27.351571.655
28.261577.819 27.321583.974 26.21 1590.129 26.291596.293 26.861602.448
26.481608.603 26.331620.923 27.95 1627.078 27.571633.233 27.791639.397
28.451645.552 28.51651.707 29.1 1657.871 29.491664.026 29.961670.182
30.11682.501 30.061688.656 30.73 1694.811 31.011700.975 30.76 1707.13
31.171713.285 31.02 1719.44 31.25 1725.604 31.68 1731.76 31.811744.079
32.641750.234 33.041756.389 33.67 1762.553 33.821768.708 34.381774.863
34.571781.018 34.141787.183 34.28 1793.338 34.611799.493 34.741805.657
35.131811.812 35.51817.967 35.82 1824.131 36.421830.286 36.961836.441
37.31842.596 37.551854.916 38.36 1861.071 38.94 1873.39 40.511879.545 41.21
1885.7 41.811891.864 42.12 1898.019 42.321910.339 42.911916.494 42.871922.649
42.761928.813 42.79 1934.968 43.021941.123 43.131947.278 43.131953.443
42.931959.598 43.12 1965.751 43.211984.227 43.711990.391 43.571996.546
43.572002.701 43.48 2015.021 43.62021.174 43.442027.329 43.342033.495 43.55
2039.65 43.6 2045.805 43.512051.969 43.722058.124 43.722064.279 43.462070.445
43.53 2076.6 43.412088.918 43.562095.073 43.732101.228 44.762107.392 44.93
2113.547 452119.702 44.832125.857 44.952132.022 45.022138.177 45.35 2144.332
46.912150.496 47.022156.651 46.912162.806 46.46 2168.97 46.42 2175.125 46.47
2181.28 46.352187.445 46.46 2193.6 46.372199.755 46.39 2205.91 46.392212.074
46.362218.229 46.492224.384 46.652230.548 46.65 2236.703 46.722242.858
46.832249.023 46.762255.178 46.752261.333 46.91 2267.497 47.132273.652
47.072279.807 47.062285.962 47.152292.125 46.9 2298.281 46.732304.438
46.72310.601 46.492316.756 46.42322.911 46.25 2329.075 46.22 2335.23
46.32341.385 46.46 2347.55 46.492353.705 46.57 2359.86 46.582366.015
46.522372.179 46.572384.489 46.62390.653 46.53 2396.808 46.622402.963
46.672415.282 46.72421.438 46.432427.602 46.12 2433.757 45.452439.912
45.122446.067 44.572452.231 44.692458.386 44.65 2464.541 44.8
 Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 918.935 .041134.453 .09

Bank Sta: Left Right Coeff Contr. Expan.
 918.9351134.453 .3 .4
Skew Angle = 20

Downstream Deck/Roadway Coordinates
 num= 9
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 800.618 33.83 966.004 31.45 1005.471 34.85 27.42 1086.285 34.19
26.681158.641 33.81 26.241195.289 29.58 1249.791 29.65 1306.173 29.89
1543.915 32.57

Downstream Bridge Cross Section Data
Station Elevation Data num= 320
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 29.52 6.136 29.57 12.263
29.59 24.535 29.66 30.662 29.88 36.798 30.29 42.935 30.34 49.061 30.26
55.198 30.32 61.334 30.42 67.47 31.1 73.597 31.67 79.733 31.46 85.869 31.45
91.996 31.61 98.132 31.65 104.268 31.73 110.395 31.56 116.531 31.98 122.667

32.23 128.794 31.81 141.067 32.08 147.203 32.14 153.33 32.54 159.466 32.45
165.602 32.32 177.865 32.53 184.001 32.35 190.128 32.3 196.264 32.55 202.4
32.78 208.527 32.67 214.663 32.67 220.8 32.65 226.926 32.27 233.063 32.49
239.199 32.49 245.335 32.71 251.462 32.63 257.598 32.69 263.734 32.67
269.861 32.46 275.997 32.47 282.133 32.45 288.26 32.22 294.396 32.15 300.533
32.22 306.659 32.36 312.795 32.56 318.932 32.54 325.058 32.37 331.195 32.06
337.331 32.42 343.467 32.64 349.594 33.22 355.73 33.57 361.866 34.39 367.993
36.29 374.129 37.64 380.265 37.8 386.392 38.13 392.528 38.1 398.665 38.27
404.791 38.47 410.928 38.7 417.064 38.47 423.191 38.16 429.327 38.29 435.463
38.49 447.726 38.6 453.862 38.51 459.998 38.25 466.125 38.24 472.261 38.33
478.398 38.28 484.524 38.14 490.661 38.21 496.797 38.31 502.923 38.18 509.06
38.14 515.196 38.21 521.323 38.19 527.459 37.91 533.595 37.7 539.731 37.64
545.858 37.52 558.13 37.38 564.257 37.21 570.393 37.1 576.53 36.82 582.656
36.66 588.793 36.42 594.929 36.12 607.192 36.33 613.328 36.09 619.455 35.74
625.591 35.46 631.727 35.24 637.863 35.13 650.126 34.83 656.263 34.64
662.389 35.67 668.526 36.5 674.662 37.58 680.789 37.12 686.925 37.01 693.061
37.04 699.188 36.64 705.324 36.04 711.46 35.96 717.587 35.76 723.723 35.39
729.859 35.23 735.995 35.2 742.122 35 748.258 34.97 754.395 34.88 760.521
34.81 772.794 33.57 778.921 33.62 785.057 33.63 791.193 33.21 797.32 33.26
803.456 32.87 809.592 32.51 815.719 32.19 821.855 32.03 827.991 31.5 834.128
31.18 840.254 30.9 846.391 30.72 852.527 30.48 858.654 30.08 864.79 29.71
870.926 29.23 877.053 28.42 883.189 28.02 889.325 27.55 895.452 27.28
901.588 26.92 907.724 26.31 913.851 26.15 919.987 26.15 926.123 26.23 932.25
25.7 938.385 25.52 944.523 25.55 950.659 25.37 956.786 25.08 962.941 28.11
969.105 29.16 975.26 28.79 981.415 28.63 987.57 27.99 993.734 26.14 999.889
24.091006.044 22.11016.522 17.581025.374 12.181031.519 10.78 1035.551
5.841043.256 2.81063.102 .71079.857 -.71098.322 .78 1110.012 5.411119.991
8.181130.929 9.1 1137.78 11.571141.501 13.14 1147.665 15.55 1153.82
18.251159.975 20.19 1166.13 21.61172.295 22.58 1178.45 22.711184.605
23.011203.079 23.131209.234 23.331215.389 23.69 1221.552 23.081227.708
22.881233.863 22.991240.017 24.811246.183 24.52 1252.338 23.831258.493
23.341270.803 23.541276.967 23.361283.122 23.97 1289.277 25.691295.432
25.761301.596 25.991326.226 26.41332.381 25.96 1338.536 26.4 1369.32
25.781375.484 25.79 1381.64 25.661387.793 25.11 1393.949 25.041400.114
25.121412.424 24.771424.734 24.081430.898 24.58 1437.053 24.421449.363
24.981455.526 24.711467.838 24.591486.312 25.35 1492.467 25.461504.786
24.811510.941 24.781517.096 25.361523.251 27.37 1529.415 27.55 1547.88
27.331554.045 27.79 1560.2 27.8 1572.51 27.31 1578.665 26.931584.829
26.691590.984 27.161597.139 27.161603.294 27.69 1609.458 28.521615.615
28.121621.768 28.391627.923 28.381640.243 28.71 1652.553 28.81664.872
29.21683.347 29.41695.656 29.841707.966 29.92 1720.286 30.321732.596 31.3
1738.76 32.09 1751.07 34.381757.225 35.17 1763.39 34.671769.545 35.27 1775.7
36.291788.019 36.811800.329 37.16 1806.484 37.491818.803 38.371824.958
38.651831.113 38.791849.588 39.9 1855.743 39.931868.062 40.441880.372
40.741892.691 41.331898.846 41.34 1911.156 41.961923.476 42.361929.631 42.45
1941.95 42.141960.415 41.84 1966.579 41.921978.889 42.391991.209
43.091997.364 43.232009.673 43.76 2015.829 43.752021.993 43.952028.148
43.872040.458 44.142046.621 43.72 2052.777 43.542071.252 43.412077.407
43.482083.562 43.82089.717 43.6 2108.191 44.162114.346 44.53 2120.51 44.72
2132.82 44.812138.975 44.52 2145.14 44.552151.295 44.87 2157.45
45.342188.234 45.782194.389 45.97 2200.553 45.822206.708 46.022219.018
45.782237.493 46.562255.967 45.89 2268.277 46.47 2274.44 46.382292.906
45.292305.226 45.142311.381 45.4 2329.855 47.232342.165 47.82354.485
48.92360.638 48.92366.793 48.3 2372.949 48.282379.114 48.482391.424

48.372397.579 48.552409.898 48.6 2428.372 49.242434.527 49.672440.682
49.872446.836 50.232453.002 50.74 2465.312 51.542471.467 51.82489.941
51.972496.096 51.822502.251 52.05 2508.415 51.972520.725 50.77 2526.88
50.372533.045 49.8 2551.51 50.09

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 981.415 .04 1178.45 .09

Bank Sta: Left Right Coeff Contr. Expan.
 981.415 1178.45 .5 .7
Skew Angle = 20

Upstream Embankment side slope = 0 horiz. to 1.0 vertical Downstream
Embankment side slope = 0 horiz. to 1.0 vertical Maximum allowable
submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Piers = 2

Pier Data
Pier Station Upstream= 992.315 Downstream=1053.395
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev 3.2 .1 3.2 6.9 3.2 22.5 3.2 30
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 3.2 .1 3.2 6.9 3.2 22.5 3.2 30

Pier Data
Pier Station Upstream=1059.034 Downstream=1112.596
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 3.2 .1 3.2 6.9 3.2 22.5 3.2 26.5
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 3.2 .1 3.2 6.9 3.2 22.5 3.2 26.5

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
 Energy
 W.S. Pro Method

 W.S.Pro Data
 Left Embankment
 El of the top of the embankment = 32
 El of the toe of the abutment = 6
 Right Embankment
 El of the top of the embankment = 32
 El of the toe of the abutment = 6 Abutment Type = 3 Sloping abutments and
sloping embankments Slope of abutments = 4

```
 Top with of embankment = 175
 Centroid station of bridge opening =
 Wing Wall Type = No wing walls present
 Width =
 Angle =
 Radius =
 Guide Banks Type = No Guide Bank present
 Length =
 Offset =
 Angle =
 Optional Contraction and expansion coefficients
 At approach Section
 At Guide Bank
 At upstream outside
 At upstream inside (BU)
 At downstream inside (BD)
 Piers are Continuous for the width of the bridge
 Use Geometric mean as Friction Slope Method

Selected Low Flow Methods = W.S.Pro Method

High Flow Method
 Energy Only

Additional Bridge Parameters  Add Friction component to Momentum
 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION


RIVER: Taunton River
REACH: Main Stem RS: 65986.86

INPUT
Description: 61.3 DS Face 495
Station Elevation Data num= 320
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  0 29.52 6.136 29.57 12.263
29.59 24.535 29.66 30.662 29.88  36.798 30.29 42.935 30.34 49.061 30.26
55.198 30.32 61.334 30.42  67.47 31.1 73.597 31.67 79.733 31.46 85.869 31.45
91.996 31.61  98.132 31.65 104.268 31.73 110.395 31.56 116.531 31.98 122.667
32.23  128.794 31.81 141.067 32.08 147.203 32.14 153.33 32.54 159.466 32.45
165.602 32.32 177.865 32.53 184.001 32.35 190.128 32.3 196.264 32.55  202.4
32.78 208.527 32.67 214.663 32.67 220.8 32.65 226.926 32.27  233.063 32.49
239.199 32.49 245.335 32.71 251.462 32.63 257.598 32.69  263.734 32.67
269.861 32.46 275.997 32.47 282.133 32.45 288.26 32.22  294.396 32.15 300.533
32.22 306.659 32.36 312.795 32.56 318.932 32.54  325.058 32.37 331.195 32.06
337.331 32.42 343.467 32.64 349.594 33.22  355.73 33.57 361.866 34.39 367.993
36.29 374.129 37.64 380.265 37.8  386.392 38.13 392.528 38.1 398.665 38.27
404.791 38.47 410.928 38.7  417.064 38.47 423.191 38.16 429.327 38.29 435.463
38.49 447.726 38.6  453.862 38.51 459.998 38.25 466.125 38.24 472.261 38.33
478.398 38.28  484.524 38.14 490.661 38.21 496.797 38.31 502.923 38.18 509.06
```

38.14 515.196 38.21 521.323 38.19 527.459 37.91 533.595 37.7 539.731 37.64
545.858 37.52 558.13 37.38 564.257 37.21 570.393 37.1 576.53 36.82 582.656
36.66 588.793 36.42 594.929 36.12 607.192 36.33 613.328 36.09 619.455 35.74
625.591 35.46 631.727 35.24 637.863 35.13 650.126 34.83 656.263 34.64
662.389 35.67 668.526 36.5 674.662 37.58 680.789 37.12 686.925 37.01 693.061
37.04 699.188 36.64 705.324 36.04 711.46 35.96 717.587 35.76 723.723 35.39
729.859 35.23 735.995 35.2 742.122 35 748.258 34.97 754.395 34.88 760.521
34.81 772.794 33.57 778.921 33.62 785.057 33.63 791.193 33.21 797.32 33.26
803.456 32.87 809.592 32.51 815.719 32.19 821.855 32.03 827.991 31.5 834.128
31.18 840.254 30.9 846.391 30.72 852.527 30.48 858.654 30.08 864.79 29.71
870.926 29.23 877.053 28.42 883.189 28.02 889.325 27.55 895.452 27.28
901.588 26.92 907.724 26.31 913.851 26.15 919.987 26.15 926.123 26.23 932.25
25.7 938.385 25.52 944.523 25.55 950.659 25.37 956.786 25.08 962.941 28.11
969.105 29.16 975.26 28.79 981.415 28.63 987.57 27.99 993.734 26.14 999.889
24.091006.044 22.11016.522 17.581025.374 12.181031.519 10.78 1035.551
5.841043.256 2.81063.102 .71079.857 -.71098.322 .78 1110.012 5.411119.991
8.181130.929 9.1 1137.78 11.571141.501 13.14 1147.665 15.55 1153.82
18.251159.975 20.19 1166.13 21.61172.295 22.58 1178.45 22.711184.605
23.011203.079 23.131209.234 23.331215.389 23.69 1221.552 23.081227.708
22.881233.863 22.991240.017 24.811246.183 24.52 1252.338 23.831258.493
23.341270.803 23.541276.967 23.361283.122 23.97 1289.277 25.691295.432
25.761301.596 25.991326.226 26.41332.381 25.96 1338.536 26.4 1369.32
25.781375.484 25.79 1381.64 25.661387.793 25.11 1393.949 25.041400.114
25.121412.424 24.771424.734 24.081430.898 24.58 1437.053 24.421449.363
24.981455.526 24.711467.838 24.591486.312 25.35 1492.467 25.461504.786
24.811510.941 24.781517.096 25.361523.251 27.37 1529.415 27.55 1547.88
27.331554.045 27.79 1560.2 27.8 1572.51 27.31 1578.665 26.931584.829
26.691590.984 27.161597.139 27.161603.294 27.69 1609.458 28.521615.615
28.121621.768 28.391627.923 28.381640.243 28.71 1652.553 28.81664.872
29.21683.347 29.41695.656 29.841707.966 29.92 1720.286 30.321732.596 31.3
1738.76 32.09 1751.07 34.381757.225 35.17 1763.39 34.671769.545 35.27 1775.7
36.291788.019 36.811800.329 37.16 1806.484 37.491818.803 38.371824.958
38.651831.113 38.791849.588 39.9 1855.743 39.931868.062 40.441880.372
40.741892.691 41.331898.846 41.34 1911.156 41.961923.476 42.361929.631 42.45
1941.95 42.141960.415 41.84 1966.579 41.921978.889 42.391991.209
43.091997.364 43.232009.673 43.76 2015.829 43.752021.993 43.952028.148
43.872040.458 44.142046.621 43.72 2052.777 43.542071.252 43.412077.407
43.482083.562 43.82089.717 43.6 2108.191 44.162114.346 44.53 2120.51 44.72
2132.82 44.812138.975 44.52 2145.14 44.552151.295 44.87 2157.45
45.342188.234 45.782194.389 45.97 2200.553 45.822206.708 46.022219.018
45.782237.493 46.562255.967 45.89 2268.277 46.47 2274.44 46.382292.906
45.292305.226 45.142311.381 45.4 2329.855 47.232342.165 47.82354.485
48.92360.638 48.92366.793 48.3 2372.949 48.282379.114 48.482391.424
48.372397.579 48.552409.898 48.6 2428.372 49.242434.527 49.672440.682
49.872446.836 50.232453.002 50.74 2465.312 51.542471.467 51.82489.941
51.972496.096 51.822502.251 52.05 2508.415 51.972520.725 50.77 2526.88
50.372533.045 49.8 2551.51 50.09

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val 0 .09 981.415 .04 1178.45 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 981.415
1178.45 60.77 66.17 74.2 .5 .7 Skew Angle = 20

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 65920.69

INPUT
Description: 61 Exit 495
Station Elevation Data num= 221
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 31.14 19.65 31.17 26.2 31.36 32.75 31.72 78.6 31.9 85.15 31.83 91.7 31.59 124.44 31.5 137.54 31.8 150.64 31.8 157.19 31.95 163.74 31.94 170.29 31.78 196.49 31.96 209.59 31.97 229.24 32.5 235.79 32.89 242.34 32.54 255.44 31.49 261.99 31.87 275.09 31.75 288.18 31.24 301.28 31.02 307.83 31.06 314.38 30.68 340.58 29.86 353.68 29.06 360.23 29.02 373.33 29.4 379.88 29.73 392.98 30.12 399.53 30.21 412.63 30.02 445.38 30.32 458.48 30.24 465.02 30.08 484.67 30.06 497.77 29.27 510.87 28.84 517.42 28.51 523.97 28 530.52 28.04 543.62 27.43 550.17 27.32 576.37 27.44 582.92 27.28 589.47 26.9 609.12 26.08 615.67 26 622.22 26.28 628.77 26.24 648.42 25.24 668.06 24.75 681.16 24.13 694.26 23.89 713.91 23.16 727.01 23.39 733.56 23.24 785.96 21.12 805.61 21.09 825.26 20.33 838.36 19.41 864.55 18.01 877.65 17.61 890.75 16.77 903.85 14.99 916.95 13.9 930.02 13.98 943.06 13.46 956.1 14.3 962.62 14.25 969.14 14.02 982.18 13.83 988.7 14.06 995.22 14.06 1001.74 14.38 1008.26 14.94 1014.78 15.33 1021.3 15.11 1027.82 15.03 1034.34 15.13 1053.9 16.14 1060.42 16.22 1066.94 15.71 1073.46 14.45 1079.98 11.16 1081.05 10.73 1082.27 7.26 1092.91 .4 1107.2 -.43 1123.95 -2.05 1137.61 -1.24 1152.42 -.93 1164.7 3.04 1174.49 6.25 1187 10.48 1190.83 11.26 1203.87 13.38 1210.39 14.26 1216.91 14.63 1223.43 14.77 1229.95 15.07 1242.99 15.04 1249.51 14.62 1256.03 14.57 1262.55 15.69 1269.07 17.97 1275.59 19.23 1282.11 19.68 1288.63 19.57 1295.15 18.94 1308.22 18.11 1327.87 18.47 1340.97 16.97 1347.52 16.5 1367.18 15.81 1380.28 15.65 1386.83 15.88 1393.38 16.5 1399.93 16.88 1406.48 17.07 1413.03 17.78 1426.14 18.6 1432.69 18.79 1445.79 18.45 1452.34 18.64 1465.44 20.95 1471.99 21.64 1478.54 21.93 1491.64 21.49 1498.2 20.24 1504.75 20.09 1511.3 19.67 1517.85 19.77 1530.95 20.53 1537.5 20.06 1544.05 19.98 1557.15 21.16 1563.7 21.47 1583.36 21.69 1589.91 22.66 1596.46 23.44 1603.01 23.93 1616.11 24.38 1642.32 23.97 1655.42 24.13 1681.62 23.32 1694.72 23.73 1701.27 24.05 1714.38 25.31 1720.93 26.81 1727.48 27.87 1734.03 29.14 1740.58 30.25 1747.13 31.21 1753.68 31.64 1760.23 33.2 1773.33 35.2 1786.44 36.52 1792.99 37.44 1799.54 37.95 1812.64 38.32 1819.19 38.37 1838.84 38.92 1845.39 38.84 1865.05 39.22 1878.15 39.71 1891.25 41.07 1897.8 40.76 1904.35 39.72 1910.9 39.35 1924 39.61 1950.21 39.26 1969.86 39.82 1982.96 39.27 1996.06 39.16 2002.62 39.36 2015.72 39.49 2048.47 39.42 2055.02 39.52 2061.57 39.91 2068.12 40.07 2081.23 40.04 2100.88 40.5 2107.43 40.48 2113.98 40.09 2120.53 39.9 2140.18 40.15 2146.73 40 2153.28 39.67 2199.14 38.75 2212.24 38.77 2218.79 38.96 2225.34 39.76 2238.45 42.08 2251.55 45.2 2258.1 45.98 2277.75 46.83 2284.3 47.3 2297.4 47.16 2317.06 49.09 2323.61 50.24 2330.16 49.75 2336.71 49.08 2343.26 48.85 2362.91 49.12 2376.01 49.17 2389.12 48.77 2395.67 48.84 2408.77 48.66 2415.32 49.24 2421.87 48.93 2428.42 48.76 2434.97 48.75 2441.52 49.07 2461.18 48.95 2467.73 48.76 2474.28 48.77 2480.83 49.44 2487.38 49.84 2493.93 50.05

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .09 1060.42 .04 1282.11 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1060.42 1282.11 1486.1 1501.44 1534.95 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 1282 2493.93 29.5 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 64419.25

INPUT
Description: 60
Station Elevation Data num= 202
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 25.23 13.03 24.69 19.55 24.58 39.1 24.71 52.13 24.36 58.65 24.32 65.16 24.44 71.68 24.14 84.71 23.94 91.23 23.47 97.75 23.22 104.26 23.46 110.78 23.84 117.29 24 169.43 23.65 182.46 24.02 188.97 24.35 202.01 24.46 215.04 24.84 234.59 25.68 241.11 26.08 247.62 26.11 254.14 25.96 260.65 25.48 267.17 24.26 273.69 24.11 364.92 24.13 371.43 24.21 377.95 24.71 384.46 25.43 390.98 25.96 397.5 26.15 423.56 25.71 430.08 25.43 443.11 25.09 449.63 24.81 456.14 24.68 462.66 24.29 475.69 24.04 501.76 22.85 527.82 21.19 547.37 20.39 560.41 20.12 566.92 19.85 573.44 19.74 579.96 19.83 592.99 19.32 606.02 19.15 612.54 18.95 619.05 18.53 625.57 18.26 645.12 17.88 651.64 17.63 658.15 17.03 664.67 16.78 671.18 16.34 710.28 15.77 723.32 15.79 729.83 15.91 736.35 15.86 742.86 15.33 755.9 15.52 762.41 15.39 768.93 16.01 788.48 17.32 801.51 17.46 814.54 17.29 834.13 16.73 840.69 16.73 847.24 16.96 860.35 17.04 866.91 17.32 880.02 17.25 886.57 16.94 893.13 17.09 919.35 17.11 932.46 16.85 939.01 16.87 965.23 17.54 971.78 17.62 984.89 18.18 991.45 18.02 1011.11 16.92 1017.67 16.39 1024.22 16.05 1030.78 16.25 1037.33 16.31 1050.44 15.84 1057 15.33 1063.55 14.54 1070.11 13.44 1076.66 12.52 1083.22 12.1 1089.77 12.11 1102.88 11.59 1109.44 11.69 1122.55 12.43 1129.1 12.25 1135.66 11.78 1148.76 11.35 1155.32 11.32 1168.43 11.71 1181.54 12.51 1194.65 14.06 1207.76 15.1 1214.31 15.43 1233.98 15.46 1247.09 16.2 1253.64 16.4 1266.75 16.36 1273.31 16.24 1279.86 15.45 1286.42 13.36 1292.97 11.1 1299.53 8.11 1301.73 8.11 1304 6.6 1325 3.3 1350 1.2 1375 1.1 1396 7.1 1403.54 11.73 1404.4 11.85 1410.96 13.04 1417.51 16.02 1424.07 17.99 1430.62 18.96 1437.18 19.15 1443.73 18.7 1450.29 18.54 1463.4 19.23 1469.95 19.29 1476.51 19.57 1483.06 19.59 1496.17 20.58 1502.73 20.58 1515.84 19.78 1522.39 19.66 1528.95 20.8 1535.5 22.34 1542.06 22.8 1555.16 22.86 1587.94 22.45 1601.05 22.66 1607.6 22.54 1614.16 22.21 1620.71 22.06 1640.38 21.97 1679.71 21.33 1686.26 21.35 1699.37 22.21 1712.48 23.33 1725.59 24.76 1738.7 25.69 1745.26 25.96 1804.25 26.46 1810.8 26.34 1817.36 26.37 1823.91 26.25 1830.47 26.35 1837.02 26.23 1843.58 26.37 1850.13 26.13 1856.69 25.24 1863.24 24.88 1876.35 24.71 1889.46 24.19 1915.68 24.28 1935.32 24.5 1954.91 24.3 1967.97 24.41 1987.56 24.4 2000.61 24.12 2033.26 24.2 2046.32 23.99 2059.38 24.2 2078.97 24.02 2111.62 23.86 2124.67 23.93 2157.32 23.55 2203.03 23.87 2229.15 24.8 2255.26 25 2294.44 25.88 2307.5 25.91 2340.15 26.42 2353.2 26.79 2372.79 27.93 2392.38 28.11 2398.91 28.04 2411.97 28.72 2425.03 29.71 2444.62 30.32 2477.26 30.89 2483.79 30.88 2503.38 31.76 2509.91 31.96 2516.44 32.39 2522.97 32.58 2536.03 32.37 2542.56 32.64 2562.15 32.62

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

0 .09 1273.31 .04 1437.18 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1273.31 1437.18 1895.09 1994.8 2138.57 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 62424.45

INPUT
Description: 59
Station Elevation Data num= 351
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 27.99 6.56 27.54 32.8 26.7 45.92 25.99 52.48 25.52 59.04 25.48 65.6 25.97 72.16 27 78.72 27.44 85.28 27.65 104.97 27.77 118.09 26.87 124.65 26.63 131.21 25.94 137.77 24.86 144.33 24.07 150.89 23.75 157.45 23.59 164.01 24.01 170.57 24.28 183.69 24.54 196.81 25.28 216.49 25.45 223.05 25.23 236.17 24.57 249.29 24.3 268.97 23.64 282.1 23.5 288.66 23.31 295.22 23.33 308.34 23.56 328.02 23.19 347.7 22.52 354.26 22.64 360.82 22.33 367.38 22.37 380.5 22.11 393.62 21.38 400.18 21.5 413.3 20.41 426.42 19.94 439.54 19.86 446.1 19.72 452.66 19.2 459.22 18.3 472.34 15.74 478.91 15.39 485.47 15.19 492.03 14.72 498.59 14.63 505.15 14.94 524.83 15.05 531.39 15.21 537.95 15.6 551.07 15.28 564.19 14.59 570.75 14.41 583.87 14.5 590.43 14.29 610.11 14.14 623.23 14.18 636.35 13.86 649.47 13.96 656.03 14.12 662.59 14.42 675.72 15.85 682.28 16.25 695.4 16.52 701.96 16.54 708.52 16.41 715.08 16.52 728.2 15.99 741.32 16.09 747.88 15.86 761 14.61 774.12 14.66 780.68 14.52 787.24 14.21 793.8 13.63 800.36 12.89 806.92 12 813.48 11.26 820.04 10.87 826.6 10.33 833.16 10.32 839.72 11.9 846.28 12.02 852.85 11.76 859.41 11.23 865.97 10.85 872.53 10.76 879.09 11.01 885.65 11.06 898.77 10.95 905.33 10.71 918.45 10.51 925.01 10.24 938.13 10.44 957.81 10.4 964.37 10.68 970.93 11.21 977.49 11.58 984.05 11.74 997.17 11.69 1003.73 11.92 1016.85 11.45 1023.41 11.69 1029.97 12.19 1036.54 12.3 1043.1 12.09 1049.66 12.15 1056.22 12.02 1062.78 12.14 1069.34 11.95 1075.9 11.57 1082.46 11.44 1089.02 11.5 1102.14 11.44 1108.7 11.67 1115.23 12.12 1121.77 12.85 1128.3 13.16 1134.83 13.31 1141.37 13.16 1147.9 12.73 1154.44 12.69 1160.97 12.19 1167.5 11.55 1180.57 10.79 1187.11 10.72 1200.17 11.17 1232.84 11.76 1239.38 11.32 1245.91 11.09 1252.45 11.52 1258.98 11.6 1265.51 11.32 1272.05 10.78 1278.58 10.5 1304.72 10.68 1311.25 10.96 1317.78 11.64 1324.32 11.97 1330.85 12.14 1343.92 12.21 1356.99 12.65 1370.06 13.48 1376.59 13.23 1383.12 12.68 1396.19 12.05 1402.73 11.55 1409.26 11.92 1415.79 12.56 1422.33 12.45 1428.86 11.99 1435.4 11.18 1448.46 9.78 1455 9.48 1461.53 9.49 1474.6 9.1 1481.13 9.27 1487.67 9.61 1494.2 10.27 1507.27 11 1513.8 11.53 1539.94 12.92 1546.47 13.02 1553.01 12.76 1566.07 12.42 1572.61 11.91 1579.14 12.02 1585.68 11.89 1592.21 11.92 1598.74 12.12 1605.28 12.48 1618.35 13.48 1624.88 13.69 1631.41 13.68 1637.95 13.51 1639.32 13.35 1644.48 12.75 1651.02 12.06 1657.55 11.76 1670.62 11.55 1677.15 10.45 1683.69 9.17 1692 6.3 1710 1.7 1725 .3 1740 1.6 1758 6.8 1781.7 15.19 1788.23 16.67 1792.5 16.43 1794.76 16.31 1801.3 16.06 1807.83 15.53 1814.36 15.31 1820.9 15.6 1827.43 15.62 1833.97 15.42 1847.03 15.32 1860.1 14.89 1873.17 14.76 1879.7 14.55 1886.23 14.14 1892.76 13.97 1905.83 13.93 1912.36 14.42 1931.96 15.19 1938.49 15.33 1945.02 15.22 1964.62 15.48 1971.15 15.46 1984.21 15.9 2003.81 16.09 2010.34 16.29 2016.88 16.26 2023.41 16.48 2062.6 16.89 2075.67 17.22 2082.2 17.61 2095.26 18 2101.79 17.9

2121.39 18.14 2127.92 18.37 2140.99 18.55 2147.52 18.87 2154.05 19.43
2180.18 20.79 2199.78 21.21 2219.37 21.36 2271.63 22.61 2284.7 22.66 2317.36
23.48 2330.42 24.41 2343.49 24.61 2356.55 24.09 2376.15 23.78 2395.74 24.17
2402.28 24.48 2415.34 24.65 2421.87 24.57 2448 24.56 2480.66 25.2 2487.2
24.71 2500.26 24.74 2519.86 24.05 2526.39 24.02 2532.92 24.16 2545.99 23.86
2552.52 23.81 2565.58 23.27 2572.11 24.11 2591.71 24.45 2598.24 24.68
2611.31 24.34 2617.84 24.31 2637.44 23.9 2663.62 24.07 2670.17 23.68 2676.71
23.53 2702.9 23.69 2709.45 23.89 2729.08 24.9 2735.63 25.12 2748.72 25.16
2761.82 25.58 2781.46 25.01 2807.64 24.82 2814.19 24.94 2820.73 24.68
2827.28 24.16 2840.37 24.14 2853.47 25.92 2879.65 26.88 2892.74 26.37
2899.29 26.23 2905.84 25.94 2918.93 24.95 2925.47 24.34 2938.57 23.65
2945.11 23.69 2951.66 25.34 2958.21 26.41 2977.85 26.87 2984.39 26.76
2997.48 26.32 3004.03 26.2 3023.67 26.48 3036.76 26.34 3043.31 26.99 3049.85
28.02 3069.49 31.7 3076.04 32.68 3082.59 33.13 3095.68 33.32 3115.32 33.17
3134.96 32.54 3141.5 32.17 3154.6 30.88 3161.14 30.09 3167.69 29.47 3174.24
29.2 3206.97 29.24 3213.51 29.63 3239.7 32.38 3252.79 33.41 3265.88 34.15
3272.43 34.41 3278.98 34.51 3285.52 34.42 3292.07 34.16 3298.62 33.72
3305.16 33.48 3318.25 33.72 3324.8 33.7 3337.89 33.86 3350.99 33.44 3357.53
33.38 3370.62 33.68 3383.72 34.26 3390.26 34.41 3403.36 34.36 3409.9 34.55
3423 34.57 3429.54 34.47 3436.09 34.54 3455.73 34.11 3462.27 33.75 3468.82
33.56 3488.46 33.64 3495.01 33.89 3508.1 35.01 3514.64 35.32 3521.19 35.45
3534.28 35.41 3547.38 35.1 3560.47 34.43 3573.56 34.43 3593.2 33.97 3599.75
33.91 3606.29 33.99 3619.39 34.68 3625.93 34.77 3639.02 33.02 3645.57 32.25
3652.12 31.74 3658.66 32.11 3671.76 31.7 3691.39 31.5

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .093 1631.41 .04 1792.5 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1631.41
1792.5 2215.34 2110.96 2048.7 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 60313.49

INPUT
Description: 58 Station Elevation Data num= 209
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 50.49 6.56 50.2 19.67 49.91
39.34 49.12 85.23 45.95 98.35 44.53 104.9 43.93 124.57 42.94 131.13 42.75
144.24 41.68 150.8 41.59 170.46 40.92 177.02 40.47 190.13 40.65 196.69 40.09
203.25 39.38 209.8 38.82 216.36 38.53 229.47 38.47 236.03 38.29 249.14 38.18
262.25 37.19 275.37 36.66 288.48 35.32 301.59 34.67 314.7 33.53 340.93 32.09
354.04 31 360.6 30.98 380.27 28.73 386.82 28.14 393.38 27.92 399.94 27.42
406.49 26.6 413.05 25.26 432.72 22.43 439.27 21.01 445.83 19.83 458.94 18.46
478.61 18.19 485.17 18.27 498.28 16.99 511.39 15.38 517.95 14.73 531.06 13.7
544.18 12.12 550.43 10.33 560 6.8 585 4.1 610 2 635 3.2 660 6.9 662.06 8.08
662.19 8.09 668.75 10.13 675.3 12.76 681.86 14.55 688.42 15.17 708.08 14.97
714.64 14.66 727.75 13.78 734.31 13.06 753.98 12.11 760.54 12.02 780.2 12.65
786.76 13.19 799.87 13.54 806.43 14.08 826.1 15.01 839.21 15 852.32 14.56
865.44 14.61 878.55 14.35 898.22 14.37 904.77 14.49 911.33 14.23 924.44
13.04 931 12.33 944.11 12.15 957.22 12.2 963.78 12.1 970.34 12.22 976.89

12.66 983.45 14.68 990.01 16.06 996.56 16.74 1009.68 17.28 1029.34 17.35 1049.01 17.64 1081.8 17.53 1088.35 17.65 1140.8 16.28 1153.91 16.11 1173.58 15.35 1199.81 14.11 1219.48 13.53 1239.15 13.38 1258.82 13.63 1278.48 14.44 1285.04 15.19 1298.15 16.24 1317.82 16.94 1330.94 17.7 1337.49 17.87 1363.72 17.51 1370.27 17.75 1383.39 17.78 1429.28 18.58 1442.39 19.09 1501.4 20.54 1553.85 20.84 1560.41 20.74 1573.52 21.08 1586.63 21.16 1606.3 21.86 1612.86 22.21 1619.41 22.09 1632.53 22.66 1658.75 22.61 1665.31 22.76 1671.87 22.32 1678.42 22.5 1691.53 23.22 1698.09 23.36 1711.2 24.14 1717.76 24.18 1743.98 24.65 1757.1 24.57 1776.77 25 1789.88 25.11 1796.44 25.04 1802.97 24.47 1809.5 24.15 1816.04 24.26 1822.57 24.01 1848.71 24.51 1861.78 26.04 1868.31 25.86 1881.38 24.3 1887.92 23.86 1894.45 23.83 1907.52 24.04 1920.59 24.4 1927.12 24.41 1953.26 23.89 1966.33 24.01 1972.87 23.57 1985.93 23.21 1999 23.27 2031.68 24.19 2038.21 23.85 2064.35 24.25 2090.49 24.13 2097.02 24.48 2103.55 24.64 2116.62 24.33 2129.69 24.96 2136.23 24.78 2142.76 24.45 2155.83 24.17 2168.9 23.42 2175.43 23.39 2214.64 24.41 2221.18 24.48 2234.24 24.08 2240.78 24.15 2253.85 24.97 2260.38 25.22 2273.45 25.12 2286.52 25.72 2293.05 25.8 2299.59 25.7 2306.12 26.16 2312.66 26.94 2319.19 27.96 2325.73 28.48 2338.8 28.92 2345.33 29.02 2358.4 28.78 2423.74 29.26 2436.81 29.09 2476.02 29.71 2482.55 29.72 2495.62 29.46 2515.23 28.59 2534.83 27.41 2567.5 27.19 2600.18 27.82 2619.78 27.82 2626.31 27.95 2645.92 28.08 2672.05 28.42 2685.12 28.8 2711.26 29.23 2717.8 29.46 2724.33 29.83 2730.87 29.94 2737.4 29.35 2743.93 28.97 2763.54 28.83 2770.07 28.89 2783.14 28.81 2815.81 29.58 2828.88 29.59 2848.49 30.03 2861.56 30.84 2868.09 31.1 2907.3 31.09 2913.83 31

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .087 485.17 .04 688.42 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 485.17 688.42 1181.48 1167.23 1157.27 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 59146.26

INPUT
Description: 57 Station Elevation Data num= 352
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 30.38 6.55 30.37 13.09 30.15 19.64 29.5 72 28.42 78.55 28.6 91.64 29.19 117.82 29.27 130.91 29.45 144 29.25 157.09 29.38 163.64 29.32 176.73 29.57 189.82 29.56 196.37 29.45 209.46 28.97 229.1 28.71 248.73 29.28 281.46 29.59 294.55 30 301.1 30.06 327.28 29.11 333.83 28.97 340.37 29.17 346.92 29.23 353.46 28.98 366.55 28.95 379.65 28.58 392.74 28.1 412.37 27.88 432.01 26.97 438.56 26.96 471.28 27.72 490.92 27.8 497.47 27.66 504.01 27.05 510.56 26.58 523.65 26.32 543.29 26.49 556.38 26.26 569.47 25.56 582.56 25.96 595.65 25.8 602.2 25.4 608.74 24.84 615.29 24.5 621.83 24.45 628.38 24.22 634.93 23.35 641.47 21.81 648.02 19.61 661.11 13.71 667.65 11.97 672.5 11.36 676 12.1 687 5.9 705 2.8 730 1.4 755 2.9 773 6.2 780 11.2 788.42 11.88 798.57 11.67 805.11 11.9 818.2 13 824.75 13.19 831.29 13.7 837.84 14.61 844.39 15.06 850.93 14.98 864.02 14.28 870.57 14.31 896.75 12.78 909.84 12.35 922.93 11.62 929.48 11.88 936.02 12.31 942.57 12.48 955.66 12.3 975.3 12.25 988.39 11.9 994.93 11.61

1001.48 11.17 1008.03 11.01 1021.12 11.15 1027.66 11.07 1040.75 11.35
1060.39 11.31 1073.48 11.38 1080.03 11.22 1086.57 11.25 1099.66 11.64
1125.85 11.2 1132.39 11.39 1158.58 10.98 1165.12 11.09 1171.67 11.42 1178.21
12.19 1184.76 14.1 1191.3 15.65 1197.85 16.39 1204.39 16.29 1210.94 15.9
1217.49 15.36 1224.03 15.3 1237.12 15.97 1250.21 16.13 1256.76 16.33 1269.85
16.47 1276.4 16.77 1282.94 16.71 1289.49 15.93 1296.03 15.57 1309.12 15.66
1315.67 15.83 1335.31 15.57 1348.4 14.58 1354.94 14.31 1368.03 14.56 1374.58
14.88 1381.13 14.98 1387.67 14.54 1394.22 13.56 1400.76 13.2 1407.31 13.11
1413.85 12.6 1420.4 12.5 1433.49 12.53 1440.04 12.66 1446.58 12.99 1459.67
12.94 1479.31 13.39 1485.86 13.69 1492.4 14.53 1498.95 14.6 1505.49 14.91
1512.04 14.55 1518.58 13.9 1525.13 13.71 1538.22 13.77 1557.86 13.54 1564.4
13.73 1570.95 13.56 1577.49 13.15 1584.04 13.09 1590.59 13.25 1597.13 13.65
1610.22 15.13 1636.41 16.91 1649.5 18.34 1656.04 18.91 1669.13 20.3 1675.68
20.89 1688.77 21.37 1701.86 21.58 1708.41 21.84 1721.5 21.94 1734.59 22.27
1747.68 22.08 1754.23 21.6 1760.77 20.87 1773.86 20.5 1780.41 21.75 1786.95
22.25 1806.59 22.94 1813.14 22.39 1826.23 21.65 1832.77 21.16 1845.87 20.48
1852.41 20.25 1865.5 20.13 1872.05 20.3 1878.59 20.15 1891.68 20.31 1898.23
20.28 1911.32 21.48 1917.87 22.35 1924.41 22.76 1930.96 22.69 1937.5 22.46
1944.05 22.08 1950.6 21.5 1957.14 20.68 1976.78 20.67 1983.32 20.53 1989.87
20.24 2002.96 19.9 2009.51 20.06 2022.6 20.07 2029.14 20.3 2035.69 20.29
2042.23 20.57 2048.78 20.46 2055.33 20.5 2068.42 21.28 2074.96 21.95 2081.51
22.87 2088.05 23.34 2101.14 23.97 2120.79 23.97 2133.88 23.64 2140.43 23.81
2160.07 24.92 2166.62 25.07 2179.71 25.18 2186.26 25.35 2199.35 25.02
2212.45 24.33 2225.54 24.11 2238.63 23.58 2251.73 23.33 2258.28 23.56
2271.37 24.81 2277.92 25.03 2284.46 24.94 2297.56 25.17 2304.11 24.53
2310.65 24.59 2323.75 25.13 2330.29 25.24 2336.84 25.52 2343.39 25.29
2369.58 25.34 2376.12 25.5 2389.22 25.42 2402.31 24.5 2408.86 24.15 2421.95
24.67 2435.05 24.3 2448.14 24.1 2454.69 23.5 2461.24 23.19 2467.78 23.15
2474.33 22.79 2480.88 23.28 2487.43 23.5 2500.52 23.01 2507.07 23.14 2513.61
23 2526.71 23.11 2533.26 23.35 2539.8 23.4 2552.9 23.06 2559.44 23.04
2572.54 22.77 2585.63 23.06 2592.18 23.46 2624.92 24.09 2644.56 24.03 2651.1
24.21 2657.65 24.59 2664.2 24.78 2670.75 24.63 2683.84 24.93 2690.39 25.25
2696.93 25.36 2703.48 25.62 2710.03 25.58 2723.12 26.12 2729.67 26.51
2742.76 26.71 2755.86 27.48 2762.41 27.56 2782.05 27.56 2788.59 27.78
2827.88 27.21 2834.42 27.28 2847.52 27.66 2867.16 27.67 2873.71 27.55 2886.8
27.55 2899.9 27.79 2906.44 28.05 2912.99 28.07 2919.54 28.25 2926.08 28.07
2945.73 28.42 2952.27 28.63 2958.82 28.67 2965.37 28.46 2991.55 28.6 2998.1
29.06 3011.2 29.01 3024.29 29.13 3043.93 29.74 3050.48 30.13 3063.57 30.53
3070.12 30.41 3076.67 30.03 3083.21 29.85 3102.86 29.63 3122.5 29.82 3129.04
29.76 3135.59 29.52 3142.14 29.46 3155.23 29.77 3161.78 29.49 3174.87 29.97
3181.42 29.9 3201.06 30.38 3207.61 30.31 3214.16 30.38 3227.25 30.75 3240.35
30.84 3246.89 31.14 3259.99 31.34 3266.53 31.54 3273.08 31.58 3299.27 31.5
3305.82 31.74 3312.36 31.72 3325.46 32.02 3332.01 31.56 3345.1 31.63 3351.65
31.8 3358.19 31.55 3390.93 31.72 3397.48 32.33 3404.02 32.61 3410.57 32.64
3423.67 32.14 3430.21 32.22 3436.76 32.55 3449.85 32.55 3476.04 33.17
3508.78 33.53 3521.87 33.82 3534.97 33.93 3561.16 33.75 3580.8 33.99 3587.34
34.27 3593.89 34.27 3600.44 33.91 3606.99 34.04 3613.53 34.44 3620.08 34.59
3633.17 34.49 3646.27 34.67 3652.82 34.98 3659.36 35.1 3672.46 35.6 3685.55
35.9 3698.65 35.9 3711.74 35.52 3731.38 35.46 3737.93 35.71 3764.12 35.8
3777.21 35.69 3783.76 35.53 3790.31 35.19 3796.85 34.99 3809.95 35.17

Manning's n Values num= 3 Sta n Val Sta n Val Sta n Val
 0 .09 628.38 .04 844.39 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 628.38
844.39 1379 1332.76 1299.32 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 57813.5

INPUT
Description: 56
Station Elevation Data num= 496
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 43.13 6.54 43.26 32.72 39.61
78.54 36.66 91.62 35.41 183.25 34.94 222.52 35.22 229.06 34.56 242.15 35.1
268.33 34.86 281.42 34.12 294.51 34.02 320.69 34.71 333.77 34.16 346.86
34.39 353.41 34.03 373.04 34.42 386.13 35.15 471.21 36.13 503.93 35.41
517.02 35.64 536.66 35.25 647.91 35.54 706.82 36.44 726.45 37.27 765.72
36.22 778.81 35.19 804.98 35.11 831.19 34.52 837.75 33.91 890.24 32.38
903.36 32.57 923.04 31.64 995.2 31.1 1093.6 28.7 1211.68 29.31 1251.05 27.9
1277.29 27.79 1329.77 28.38 1369.13 29.42 1401.93 30.88 1474.09 30.68
1500.33 30.07 1520.01 29.06 1592.17 27.17 1618.42 27.51 1690.58 29.28
1697.14 30.01 1729.94 29.18 1769.3 27.32 1808.66 27.05 1828.34 25.78 1854.58
23.59 1874.26 22.67 1900.5 20.87 1907.06 20.76 1913.62 19.75 1920.18 18.28
1926.74 16.16 1933.3 13.62 1939.86 11.97 1946.42 11.1 1952.98 11.28 1972.67
10.35 1998.91 9.78 2012.03 10.08 2025.15 9.77 2038.27 10.05 2057.95 9.81
2071.07 10.47 2090.75 10.26 2110.43 9.1 2123.55 9.51 2136.67 8.92 2143.23
8.98 2156.35 10.17 2176.03 10.44 2189.15 9.71 2208.83 10.76 2215.4 10.74
2241.64 11.97 2254.76 13.65 2258.7 13.87 2266 13 2271 6.1 2305 .2 2306 -2.5
2355 -.5 2369 5.8 2387 16.1 2430 16.2 2461 16.2 2489 10.4 2510.61 10.24
2517.17 10.49 2523.73 11.01 2530.29 11.1 2536.85 11.21 2543.41 11.43 2549.97
11.51 2556.53 11.77 2563.09 12.47 2569.65 13 2576.21 13.03 2582.77 12.92
2595.89 12.24 2609.01 11.27 2615.57 10.96 2622.13 10.93 2628.69 11.21
2635.25 11.43 2641.81 11.71 2648.38 11.97 2654.94 12.15 2661.5 12.18 2668.06
12.18 2674.62 12.06 2687.74 11.69 2694.3 11.55 2700.86 11.44 2707.42 11.41
2713.98 10.92 2720.54 10.81 2733.66 10.78 2740.22 10.85 2746.78 10.85
2753.34 10.78 2759.9 10.74 2766.45 10.87 2773.01 11.04 2779.57 10.89 2786.12
10.99 2792.68 11.04 2799.23 10.98 2805.79 10.99 2812.35 10.87 2818.9 11.04
2825.46 11.11 2832.02 11.03 2838.57 11.08 2845.13 11.3 2851.68 11.4 2858.24
11.61 2864.8 11.66 2871.35 11.58 2877.91 11.54 2884.47 11.53 2891.02 11.68
2904.14 12.87 2910.69 13.14 2917.25 13.61 2923.8 13.82 2930.36 13.73 2936.92
13.59 2943.47 13.28 2950.03 13.46 2956.59 13.68 2963.14 13.67 2969.7 13.82
2976.26 14.17 2982.81 14.17 2989.37 14.34 2995.92 14.79 3002.48 15.54
3009.04 16.31 3015.59 16.96 3022.15 17.69 3028.71 18.25 3035.26 18.43
3041.82 18.4 3048.37 18.61 3054.93 18.5 3061.49 18.34 3068.04 18.34 3074.6
18.19 3081.16 18.31 3087.71 18.3 3094.27 18.07 3100.83 18.16 3107.38 17.95
3113.94 17.54 3120.49 17.66 3127.05 17.82 3133.61 17.61 3146.72 17.43
3153.28 17.37 3159.83 17.58 3166.39 17.91 3172.94 17.64 3179.5 17.39 3186.06
17.29 3192.61 17.64 3199.17 17.53 3205.73 17.31 3212.28 16.87 3218.84 16.54
3225.4 16.6 3231.95 16.47 3238.51 16.21 3245.06 16.18 3251.62 16.42 3258.18
16.45 3264.73 16.42 3271.29 16.23 3277.85 16.07 3284.4 15.73 3290.96 15.53
3297.52 15.4 3304.07 15.39 3310.63 15.35 3317.18 15.24 3323.74 15.74 3330.3
15.72 3336.85 15.88 3343.41 16.07 3349.97 16.01 3363.08 16.02 3369.63 16.21
3376.19 16.27 3382.75 16.45 3389.3 16.75 3395.86 17.28 3402.42 17.79 3408.97
17.94 3415.53 18.07 3422.09 18.65 3428.64 19.25 3435.2 19.37 3441.75 19.32

3448.31 19.41 3454.87 19.68 3461.42 20.1 3467.98 20.35 3474.54 20.77 3481.09
21.12 3487.65 21.38 3494.2 21.41 3500.76 21.61 3507.32 21.99 3513.87 22.3
3520.43 22.56 3526.99 22.47 3533.54 22.6 3540.1 22.59 3553.21 23.68 3559.77
24.02 3572.88 24.29 3579.44 24.51 3585.99 24.54 3592.55 24.81 3599.11 24.9
3605.66 25.01 3612.22 25.09 3618.78 24.97 3625.31 25.02 3631.85 25.2 3638.39
25.42 3644.93 25.49 3651.47 25.41 3658 25.25 3664.54 24.98 3671.08 24.84
3677.62 24.66 3684.16 24.45 3690.7 24.35 3697.23 24.49 3703.77 24.33 3716.85
24.12 3723.39 24.06 3729.93 24.33 3736.46 24.22 3743 24.27 3749.54 24.07
3756.08 23.93 3762.62 23.92 3769.16 23.8 3782.23 23.62 3788.77 23.44 3795.31
23.47 3801.85 23.67 3808.39 23.78 3814.92 23.74 3821.46 23.76 3828 23.76
3834.54 24.16 3841.08 24.21 3847.62 24.05 3854.15 24.08 3860.69 24.43
3867.23 24.8 3873.77 25.13 3880.31 25.21 3886.85 25.43 3893.38 25.58 3899.92
25.77 3906.46 25.87 3913 26.1 3919.54 26.46 3926.08 26.69 3932.61 26.67
3939.15 26.7 3945.69 26.68 3952.23 26.57 3958.77 26.68 3965.31 26.65 3971.84
26.73 3978.38 26.87 3984.92 26.99 3991.46 26.88 3998 26.75 4011.07 26.62
4017.61 26.77 4024.15 26.9 4030.69 26.75 4037.23 26.64 4043.77 26.74 4050.3
26.94 4056.84 26.96 4063.38 26.7 4069.92 26.52 4076.46 26.62 4083 26.81
4089.53 26.72 4096.07 26.47 4102.61 26.12 4109.15 26.27 4115.69 26.22
4122.22 26.23 4128.76 26.17 4135.3 26.03 4141.84 25.64 4148.38 25.2 4154.92
24.53 4161.45 24.3 4167.99 24.22 4174.53 24.05 4181.07 23.8 4187.61 23.77
4194.14 23.96 4200.68 24.38 4207.22 24.56 4213.76 24.63 4220.3 24.68 4226.84
24.56 4233.37 24.57 4239.91 24.63 4252.99 24.56 4259.53 24.16 4266.06 23.98
4272.6 24.14 4279.14 24.27 4285.68 24.17 4298.76 23.94 4305.29 23.91 4311.83
23.9 4318.37 23.96 4324.91 24.1 4331.45 24.1 4337.98 24.13 4344.52 24.07
4351.06 23.99 4357.6 24.16 4364.14 24.18 4370.68 24.26 4377.21 24.38 4383.75
24.21 4390.29 24.07 4396.83 24.12 4403.37 23.94 4409.91 24.17 4416.44 23.98
4436.06 24.11 4442.6 24.02 4455.67 24.09 4468.75 23.96 4475.29 23.97 4481.83
24.05 4494.9 24.13 4501.44 23.93 4507.98 23.95 4514.52 23.95 4521.05 24.16
4527.59 24.07 4540.67 24.09 4547.21 24.07 4560.28 24.22 4566.82 24.27 4579.9
24.15 4586.44 24.14 4592.98 24.33 4599.51 24.2 4606.05 23.99 4612.59 24.03
4619.13 24.09 4625.67 24 4632.2 23.89 4645.28 23.98 4651.82 23.93 4658.36
23.92 4664.9 23.81 4677.97 23.92 4684.51 24.08 4691.05 24.04 4697.59 24.16
4704.12 24.04 4710.66 24.07 4717.2 24.03 4736.82 23.8 4743.35 23.89 4749.89
24.04 4756.43 24.23 4762.97 24.46 4769.51 24.33 4776.04 24.17 4782.58 24.22
4789.12 23.99 4795.66 24.21 4802.2 24.27 4808.74 24.16 4815.27 24.42 4821.81
24.39 4828.35 24.08 4834.89 24.05 4841.43 24.06 4847.96 24.09 4854.5 24.22
4861.04 24.44 4867.58 24.57 4874.12 24.55 4880.66 24.37 4887.19 24.17
4893.73 24.05 4900.27 24.1 4906.81 24.1 4913.35 24.05 4919.89 24.22 4926.42
24.3 4932.96 24.57 4939.5 24.65 4946.04 24.55 4952.58 24.38 4959.11 24.57
4965.65 24.58 4972.19 24.42 4978.73 24.46 4985.27 24.45 4991.81 24.68
5004.88 24.91 5011.42 25.17 5017.96 25.32 5024.5 25.26 5031.03 25.35 5037.57
25.7 5044.11 26.08 5050.65 26.37 5057.19 26.58 5063.73 26.73 5070.26 26.71
5076.8 27.16 5083.34 27.57 5089.88 27.94 5096.42 28.24 5102.96 28.43 5109.49
28.54 5116.03 28.77 5122.57 29.14 5129.11 29.53 5135.65 29.81 5142.18 30.23
5148.72 30.91 5155.26 31.71 5161.8 32.7 5168.34 34.3 5174.88 36.06 5181.41
38.6 5187.95 42.26 5194.49 43.85 5201.03 44.95 5207.57 45.67 5214.1 45.96
5220.64 46.13 5227.18 46.19 5233.72 46.19 5240.26 46.21 5246.8 46.17 5253.33
46.18 5259.87 46.29 5272.95 46.28 5279.49 46.31 5286.02 46.41 5292.56 46.61
5299.1 46.97 5312.18 48.12 5318.72 48.63 5325.25 48.93 5331.79 49.21

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 2258.7 .04 2387 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2258.7 2387 1426.36 1487.57 1534.98 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 56325.92

INPUT
Description: 55 Approach Harding St Rte 44
Station Elevation Data num= 497
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 29.47 209.09 27.29 287.5 24.67 300.57 23.27 326.7 25.58 457.39 27.66 692.61 26.64 731.82 28.15 823.29 25.55 901.7 25.5 1012.78 19.85 1032.39 17.2 1078.12 14.36 1156.53 13.26 1176.14 11.94 1247.88 14.89 1261.21 11.57 1267.1 10.04 1273.17 8.85 1278.45 4.78 1287.16 3.55 1302.31 2.55 1313.27 2.08 1325.95 1.84 1337.09 2.07 1348.96 2.56 1356.07 2.82 1369.08 2.98 1382.73 3.18 1388.22 3.31 1391.74 4.5 1393.71 5.56 1400.02 9.46 1408.14 11.16 1414.64 12.72 1421.15 13.73 1427.65 14.06 1434.16 14 1440.66 13.27 1447.17 12.96 1453.67 12.71 1460.18 12.61 1466.68 12.54 1473.19 12.51 1479.69 12.98 1486.2 14.39 1492.7 15.58 1499.21 16.38 1505.71 17.08 1518.72 17.57 1525.23 17.78 1531.73 17.85 1544.74 18.23 1551.25 18.09 1557.75 18.14 1570.76 18.58 1577.27 18.68 1583.77 18.9 1590.28 19.07 1596.78 19.09 1603.29 19.28 1609.79 19.53 1616.3 19.98 1622.8 20.2 1629.31 20.76 1635.81 20.96 1642.32 21.14 1648.82 20.99 1655.33 20.81 1661.83 20.56 1668.34 20.07 1674.84 19.48 1681.35 18.44 1687.85 18.14 1694.36 17.93 1700.86 17.06 1707.37 15.53 1713.87 14.08 1720.38 12.95 1726.88 12.26 1733.39 11.73 1739.89 11.28 1746.4 11.25 1752.9 11.26 1759.41 11.29 1772.42 11.28 1791.93 11.31 1804.94 11.34 1817.95 11.32 1830.96 11.23 1837.47 11.14 1843.97 11.07 1850.48 11.18 1856.98 12.07 1863.49 14.13 1869.99 17.2 1876.5 18.66 1883 19.6 1889.51 20.65 1896.01 22.74 1902.52 24.35 1909.02 25.34 1915.53 26.07 1922.03 26.34 1928.54 26.57 1941.55 26.69 1954.56 26.88 1961.06 26.93 1967.57 26.94 1974.07 27.02 1980.58 27.19 1987.08 27.5 1993.59 27.83 2000.09 27.82 2006.6 27.57 2013.1 27.54 2019.61 27.56 2026.11 27.65 2032.62 27.7 2039.12 27.53 2045.63 26.45 2052.13 26.12 2058.64 25.89 2065.14 25.89 2071.69 25.84 2078.24 25.65 2091.33 25.75 2097.88 25.82 2104.43 25.54 2110.98 25.41 2117.52 25.38 2124.07 25.86 2130.62 26 2137.16 26.08 2143.71 25.86 2150.26 25.44 2156.81 24.77 2163.35 24.33 2169.9 24.36 2176.45 24.29 2183 24.1 2189.54 24.06 2196.09 23.74 2202.64 23.4 2209.19 23.22 2215.73 23.27 2222.28 23.03 2228.83 23.23 2235.38 23.32 2241.92 23.77 2248.47 24.41 2255.02 25.2 2261.57 25.36 2268.11 25.73 2274.66 25.47 2281.21 24.08 2287.75 24.12 2294.3 25.47 2300.85 25.75 2307.4 25.59 2313.94 25.24 2320.49 24.85 2327.04 24.91 2333.59 25.31 2340.13 25.37 2346.68 25.48 2353.23 25.24 2359.78 25.18 2366.32 24.77 2372.87 24.46 2379.42 24.47 2385.96 24.7 2392.51 24.77 2399.06 24.67 2405.61 25.02 2412.15 24.66 2418.7 24.32 2425.25 24.3 2431.8 24.97 2438.34 25.04 2444.89 25.17 2451.44 25.18 2457.99 25.27 2471.08 25.15 2477.63 25.28 2484.18 25.04 2490.72 25.06 2497.27 24.89 2503.82 24.64 2510.37 24.61 2516.91 24.74 2523.46 24.85 2530.01 24.78 2536.55 25 2543.1 25.02 2549.65 25.07 2556.2 25 2562.74 25.25 2569.29 25.35 2582.39 25.3 2588.93 25.47 2595.48 25.7 2602.03 25.7 2608.58 25.47 2615.12 25.49 2621.67 25.73 2628.22 25.87 2634.77 25.53 2641.31 25.63 2654.41 25.56 2660.96 25.8 2667.5 26.25 2674.05 26.65 2680.6 26.87 2687.14 26.93 2693.69 26.61 2700.24 26.78 2706.79 27.08 2713.33 27.29 2719.88 27.2 2726.43 27.04 2732.98 27.14 2739.52 27.3 2746.07 26.87 2752.62

26.91 2759.17 27.21 2765.71 27.42 2772.26 27.55 2778.81 27.66 2785.36 27.71
2791.9 27.78 2798.45 28.22 2805 29.25 2811.54 30.18 2818.09 30.41 2824.64
30.27 2837.73 29.1 2844.28 28.95 2850.83 29 2863.92 29 2870.47 29.21 2877.02
29.67 2883.57 29.93 2890.11 30.22 2896.66 30.42 2903.21 30.5 2909.76 30.99
2916.3 31.34 2922.85 31.54 2929.4 31.8 2935.95 32.13 2942.49 32.31 2949.04
32.18 2955.59 31.94 2962.13 31.93 2968.68 31.7 2975.23 31.64 2981.78 31.55
2988.32 31.69 2994.87 31.91 3001.42 32.22 3007.97 32.65 3014.51 33.28
3021.06 34.11 3027.61 35.02 3034.16 35.8 3040.7 36.5 3047.25 37.52 3053.8
38.76 3060.35 40.03 3066.89 41.85 3073.44 44.1 3079.99 45.64 3086.53 46.28
3093.08 46.65 3099.63 46.87 3106.18 46.92 3112.72 46.95 3132.37 47.12
3138.91 47.19 3145.46 47.4 3152.01 47.71 3158.56 47.86 3165.1 48.05 3171.65
48.28 3178.2 48.4 3184.75 48.58 3191.29 48.84 3197.84 49.04 3204.39 49.13
3210.93 49.13 3217.48 49.05 3224.03 48.89 3230.58 48.66 3237.12 48.53
3250.22 48.31 3256.77 48.31 3263.31 48.34 3269.86 48.41 3276.41 48.44
3282.96 48.43 3289.5 48.52 3302.6 48.92 3309.15 49.11 3315.69 49.2 3322.24
49.21 3328.79 49.2 3335.34 49.04 3341.88 49.01 3348.43 49 3354.98 48.89
3361.53 49.02 3368.07 49.45 3374.62 50.06 3381.17 51.1 3387.71 52.32 3394.26
53.39 3400.81 54.19 3407.36 54.6 3413.9 54.76 3420.45 54.97 3427 55.44
3433.55 55.87 3440.09 55.87 3446.64 55.76 3453.19 55.74 3459.74 55.57
3466.28 55.5 3472.83 55.54 3492.47 55.8 3499.02 55.86 3505.57 55.63 3512.12
55.14 3518.66 54.82 3525.21 54.83 3531.76 54.98 3538.3 54.98 3544.85 55.03
3551.4 55.01 3557.95 54.95 3564.49 54.84 3571.04 54.69 3577.59 54.63 3584.14
54.67 3590.68 54.82 3597.23 54.99 3603.78 55.04 3616.87 54.91 3623.42 54.81
3636.51 54.74 3643.06 54.88 3649.61 55.04 3662.7 55.03 3669.25 55.01 3675.8
55.02 3688.89 54.95 3695.44 55.56 3701.99 56.04 3708.54 56.38 3715.08 56.33
3734.73 55.9 3741.27 55.72 3747.82 55.73 3754.37 55.82 3760.91 55.97 3774.01
55.75 3780.56 55.85 3787.1 56.04 3793.65 56.4 3800.2 56.71 3806.75 56.9
3813.29 56.97 3819.84 57.08 3826.39 57.07 3832.94 56.99 3839.48 57.36
3846.03 59.14 3852.58 61.74 3859.13 64.12 3865.67 65.7 3872.22 66.26 3878.77
66.58 3885.32 66.55 3891.86 66.09 3898.41 65.77 3904.96 65.88 3911.5 65.67
3918.05 65.34 3924.6 65.06 3931.15 64.95 3937.69 64.75 3944.24 64.4 3950.79
63.86 3957.34 63.47 3963.88 63.02 3976.98 62.45 3983.53 62.09 3990.07 61.61
3996.62 61.28 4003.17 60.72 4009.72 59.57 4016.26 56.84 4022.81 54.97
4029.36 51.65 4035.91 48.71 4042.45 47.23 4049 46.15 4055.55 45.13 4062.09
44.7 4068.64 44.22 4075.19 43.57 4081.74 42.73 4088.28 42.11 4094.83 42.04
4101.38 42.04 4107.93 42.14 4114.47 42.42 4121.02 42.27 4127.57 42.25
4134.12 42.31 4140.66 42.39 4147.21 42.41 4153.76 42.37 4160.31 42.3 4173.4
42.06 4186.49 42.76 4193.04 43.44 4199.59 43.81 4206.14 43.76 4212.68 43.92
4219.23 44.2 4225.78 44.46 4232.33 44.8 4238.87 45.11 4245.42 45.14 4251.97
45.29 4258.52 45.06 4265.06 45.05 4271.61 45.37 4278.16 45.42 4284.71 45.28
4291.25 45.88 4297.8 46.36 4304.35 46.82 4310.89 47.61 4317.44 47.9 4323.99
47.84 4330.54 47.9 4337.08 47.94 4343.63 48.06 4350.18 47.99 4356.73 47.95
4363.27 48.1 4369.82 48.31 4376.37 48.24 4382.92 48.26 4389.46 48.41 4396.01
48.52 4402.56 49.28 4409.1 49.54 4415.65 49.52 4422.2 48.91 4428.75 47.19
4435.29 45.92 4441.84 45.33 4448.39 45.83 4454.94 48.33 4461.48 50.99
4468.03 52.45 4474.58 53.17 4481.13 53.24 4487.67 53.16 4494.22 53.26
4500.77 53.3 4513.86 53.61 4520.41 53.8 4526.96 54.09 4533.5 54.17 4546.6
54.28 4553.15 54.5 4559.69 54.93 4572.79 55.1 4579.34 55.3 4585.88 55.01
4592.43 55.05 4598.98 55.12 4605.53 55.31 4612.07 55.55 4618.62 55.64
4625.17 55.83 4631.72 56.06 4638.26 56.41 4644.81 56.84 4651.36 56.91 4657.9
56.8 4664.45 56.64 4671 56.71

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

0 .09 1247.88 .04 1421.15 .093

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1247.88 1421.15 58 48.47 42.98 .3 .5 Ineffective Flow num= 1
Sta L Sta R Elev Permanent
1640 4671 21.1 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 56277.45

INPUT
Description: 54.7 US Face Harding St- Rte 44
Station Elevation Data num= 447
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 29.34 6.155 29.21 12.301 29.15 18.456 29.29 24.601 29.15 30.756 28.88 36.902 28.91 43.057 29.15 49.202 29.3 55.357 29.26 61.512 28.99 67.658 28.82 73.813 28.89 79.958 29.09 86.113 29.17 92.259 29.03 98.414 28.29 104.569 27.7 110.715 27.65 116.87 28.09 123.015 27.69 129.17 27.41 135.316 27.23 141.471 27.18 153.771 26.83 159.926 26.73 166.072 26.61 172.227 26.08 178.372 26.49 184.527 26.96 190.673 27.18 196.828 27.03 202.974 27.1 209.129 27.01 215.284 27.12 221.429 27.41 227.584 27.81 233.73 28 239.885 27.99 252.185 28.09 258.34 28.13 264.486 28.3 270.641 28.21 276.786 28.02 282.941 28.08 295.242 28.47 301.388 28.56 307.543 28.27 313.698 28.39 319.843 28.47 325.998 28.27 332.144 27.89 338.299 27.97 344.444 28.39 356.754 28.78 362.9 28.91 375.2 28.64 381.355 28.71 387.501 28.92 393.656 29.18 399.802 29.37 405.957 29.47 412.112 29.46 418.257 29.42 424.412 29.35 430.558 29.23 436.713 29.23 442.858 29.32 449.013 29.34 461.314 29.26 467.469 29.34 473.614 29.32 479.769 29.46 485.915 29.54 492.07 29.5 498.216 29.34 504.371 29.24 510.526 29.24 516.671 29.36 522.826 29.3 528.972 29.02 535.127 29.1 541.272 29.11 547.427 28.87 553.573 28.59 559.728 28.5 565.883 28.44 572.029 28.27 578.183 28.18 584.329 27.9 590.484 27.87 596.63 27.77 602.785 27.82 608.93 28.08 615.085 28.27 621.24 28.29 627.386 28.55 633.541 28.06 639.686 27.76 645.841 27.54 651.987 27.59 658.142 27.77 670.442 27.18 676.597 27.03 682.743 27.01 688.898 26.91 695.044 26.9 707.344 26.71 713.499 26.54 719.654 26.3 725.8 26.4 731.955 26.35 738.1 26.02 744.255 25.94 750.401 25.82 756.556 25.63 762.711 25.48 768.857 25.23 781.157 25.2 787.312 25.34 793.458 25.46 799.613 25.45 805.758 25.13 811.913 25.11 818.068 25.33 824.214 25.5 830.369 25.61 836.514 25.56 848.815 25.73 854.97 25.9 861.125 25.86 867.271 25.48 873.425 25.12 879.571 24.98 885.726 24.96 891.872 25.05 898.027 25.18 904.172 24.8 910.327 24.63 916.482 24.9 922.628 25.03 928.783 24.87 934.928 24.74 941.083 24.9 947.229 24.81 953.384 24.05 959.539 22.8 965.685 20.75 971.839 19.02 977.985 17.78 984.14 17.32 996.441 18.431002.586 18.771008.741 18.851014.896 18.61 1021.042 18.591027.197 18.961033.342 18.771045.643 18.041051.798 17.88 1057.943 18.161064.099 18.411070.253 18.421076.399 18.411082.554 18.76 1088.7 19.171094.855 19.18 1101 19.351107.155 19.441113.301 19.46 1119.456 19.531125.611 19.371131.756 17.971137.911 16.971156.546 5.68 1157.495 5.731165.191 4.31173.404 4.08 1181.41 2.951185.093 2.27 1202.074 .521207.928 2.091215.342 2.781223.085 2.231227.624 .64 1242.076 1.141246.061 2.311251.548 3.171258.305 3.81266.424 4.68 1269.816 5.631269.938 5.481270.399 22.91 1272.25 22.31322.429 20.63 1334.739 20.761340.885 20.8 1347.04 20.731353.186 20.8 1359.34 20.82 1365.486 20.81371.641 20.631377.787 19.351383.942

18.111390.097 18.11 1396.242 18.321402.397 18.331408.543 18.31414.698
18.431420.844 18.63 1426.998 18.61433.144 18.511439.299 18.541445.454 18.72
1451.6 18.82 1457.755 19.08 1463.9 19.361470.055 19.391476.201 19.251482.356
19.5 1488.511 20.051494.656 20.291500.811 20.061506.957 19.761513.112 19.71
1519.257 18.891525.412 18.731537.713 19.041543.868 19.041550.014 18.3
1556.169 18.341562.314 19.011568.469 18.421574.615 17.78 1580.77 18.08
1586.915 18.44 1593.07 17.511599.225 17.561611.526 17.21617.671 17.53
1636.127 17.341642.282 17.371648.428 17.291654.583 17.571660.728 17.63
1666.883 17.911673.029 18.071679.184 18.051685.329 18.241691.484 18.38
1697.639 18.71703.785 18.94 1709.94 18.831716.085 18.61 1722.24 18.66
1728.386 18.981734.541 19.521740.687 20.331746.842 21.211752.997 22 1759.142
22.561765.297 22.981771.443 23.341777.598 23.621796.053 24.23 1802.199
24.41808.354 24.661814.499 24.721820.654 24.38 1826.8 24.1 1832.955
24.071839.101 24.021845.256 24.511851.411 25.441857.556 25.79 1863.711
25.891869.857 26.221876.012 26.531882.157 26.441888.312 25.97 1894.467
25.781900.613 25.911906.768 26.061912.914 26.131919.068 26.18 1931.331
25.891937.468 25.551943.594 25.151949.731 24.951955.867 24.91 1961.994 24.8
1968.13 24.921974.266 25.261980.393 25.441992.665 25.73 2004.928
25.792011.064 25.872017.191 25.932023.327 25.812029.464 25.84 2035.59
25.832041.727 25.842047.863 25.77 2053.99 25.772060.126 26.05 2066.262
25.922072.389 25.712078.525 25.372084.661 25.472090.788 25.53 2096.924 25.71
2103.06 26.242109.187 26.172115.323 26.32121.459 26.22 2127.586 26.092133.722
25.872139.859 25.962145.985 25.882152.122 25.85 2158.258 25.962164.385
262170.521 25.912176.657 25.642182.784 25.48 2188.92 25.662195.056
25.272201.183 24.752207.319 24.862213.455 25.51 2219.582 25.532225.719
26.092231.855 25.962244.117 26.172250.254 26.32 2256.38 26.182262.517
26.282268.653 26.24 2274.78 26.42280.916 26.59 2287.052 26.682299.315
26.952305.451 27.12311.578 27.32317.714 26.92 2323.85 26.892329.977
26.62336.114 26.8 2342.25 26.872348.376 26.76 2354.513 27.082360.649
26.462366.776 26.442372.912 26.672379.048 26.84 2385.175 26.622391.311
27.62397.447 27.772403.574 27.3 2409.71 27.42 2415.846 26.952421.973
26.992428.109 27.82434.246 27.732440.372 27.4 2446.509 27.522452.645
27.872458.771 28.352464.908 28.52471.044 28.36 2477.171 28.992483.307
30.382489.443 31.52 2495.57 32.252501.706 31.82 2507.842 30.772513.969
29.962520.105 29.682526.241 29.652532.368 29.73 2538.504 29.482544.641
29.512550.767 29.512556.904 29.99 2563.04 30.29 2569.167 30.122575.303
29.812581.439 30.042587.566 30.032593.702 30.11 2599.838 30.082605.965
30.392612.101 30.62624.364 30.85 2630.5 31.29 2636.637 31.492642.763
31.582648.899 31.382655.036 29.722661.162 28.95 2667.299 29.052673.435
29.422679.562 29.642685.698 29.672691.834 29.86 2697.961 30.332704.097
30.712710.233 30.82 2716.36 31.132722.496 31.35 2728.632 31.422734.759
31.712740.896 32.252747.032 32.762759.294 33.49 2765.431 33.952771.558
34.352777.694 34.64 2783.83 34.362789.957 34.23 2802.229 34.822808.356
34.742814.492 33.722820.628 32.822826.755 34.33 2832.891 382839.028
41.772845.154 44.062851.291 44.892857.427 45.19 2863.553 45.77 2869.69
46.162881.953 46.272888.089 46.32894.225 46.36 2900.352 46.372906.488
46.42912.624 46.462918.751 46.562924.887 46.77 2931.023 47.03 2937.15
47.232949.423 47.562955.549 47.682967.822 48.04 2980.085 48.152986.221 48.11

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .091125.611 .041270.399 .093

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

1125.6111270.399 84.16 80.55 81.19 .5 .8 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 01118.234 23 T
Skew Angle = 20

BRIDGE

RIVER: Taunton River
REACH: Main Stem RS: 56238.98

INPUT
Description: 54.5 Harding St/Rte 44/ Cape Hwy
Distance from Upstream XS = 20
Deck/Roadway Width = 50
Weir Coefficient = 2.6
Bridge Deck/Roadway Skew = 20
Upstream Deck/Roadway Coordinates
 num= 26
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 642.75 27.74 970.702 25.17 1123.872 23.8 1152.063 23.96 1152.063 27.7
1155.822 27.7 1155.916 25.67 18.141164.279 25.6 18.821177.435 25.53 18.87
1186.832 25.46 18.09 1193.41 25.39 18.051207.505 25.32 18.54
 1221.6 25.25 18.281231.937 25.18 17.71235.696 25.11 17.55 1246.032 25.04
18.251257.309 24.97 18.241269.525 24.9 17.5 1269.619 26.67 1273.283 26.71
1273.377 23.12
 1314.63 22.6 1441.489 21.77 1594.658 21.73 1731.854 22.85 1800 22.85

Upstream Bridge Cross Section Data
Station Elevation Data num= 447
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 29.34 6.155 29.21 12.301
29.15 18.456 29.29 24.601 29.15 30.756 28.88 36.902 28.91 43.057 29.15
49.202 29.3 55.357 29.26 61.512 28.99 67.658 28.82 73.813 28.89 79.958 29.09
86.113 29.17 92.259 29.03 98.414 28.29 104.569 27.7 110.715 27.65 116.87
28.09 123.015 27.69 129.17 27.41 135.316 27.23 141.471 27.18 153.771 26.83
159.926 26.73 166.072 26.61 172.227 26.08 178.372 26.49 184.527 26.96
190.673 27.18 196.828 27.03 202.974 27.1 209.129 27.01 215.284 27.12 221.429
27.41 227.584 27.81 233.73 28 239.885 27.99 252.185 28.09 258.34 28.13
264.486 28.3 270.641 28.21 276.786 28.02 282.941 28.08 295.242 28.47 301.388
28.56 307.543 28.27 313.698 28.39 319.843 28.47 325.998 28.27 332.144 27.89
338.299 27.97 344.444 28.39 356.754 28.78 362.9 28.91 375.2 28.64 381.355
28.71 387.501 28.92 393.656 29.18 399.802 29.37 405.957 29.47 412.112 29.46
418.257 29.42 424.412 29.35 430.558 29.23 436.713 29.23 442.858 29.32
449.013 29.34 461.314 29.26 467.469 29.34 473.614 29.32 479.769 29.46
485.915 29.54 492.07 29.5 498.216 29.34 504.371 29.24 510.526 29.24 516.671
29.36 522.826 29.3 528.972 29.02 535.127 29.1 541.272 29.11 547.427 28.87
553.573 28.59 559.728 28.5 565.883 28.44 572.029 28.27 578.183 28.18 584.329
27.9 590.484 27.87 596.63 27.77 602.785 27.82 608.93 28.08 615.085 28.27
621.24 28.29 627.386 28.55 633.541 28.06 639.686 27.76 645.841 27.54 651.987
27.59 658.142 27.77 670.442 27.18 676.597 27.03 682.743 27.01 688.898 26.91
695.044 26.9 707.344 26.71 713.499 26.54 719.654 26.3 725.8 26.4 731.955
26.35 738.1 26.02 744.255 25.94 750.401 25.82 756.556 25.63 762.711 25.48
768.857 25.23 781.157 25.2 787.312 25.34 793.458 25.46 799.613 25.45 805.758
25.13 811.913 25.11 818.068 25.33 824.214 25.5 830.369 25.61 836.514 25.56

848.815 25.73 854.97 25.9 861.125 25.86 867.271 25.48 873.425 25.12 879.571
24.98 885.726 24.96 891.872 25.05 898.027 25.18 904.172 24.8 910.327 24.63
916.482 24.9 922.628 25.03 928.783 24.87 934.928 24.74 941.083 24.9 947.229
24.81 953.384 24.05 959.539 22.8 965.685 20.75 971.839 19.02 977.985 17.78
984.14 17.32 996.441 18.431002.586 18.771008.741 18.851014.896 18.61 1021.042
18.591027.197 18.961033.342 18.771045.643 18.041051.798 17.88 1057.943
18.161064.099 18.411070.253 18.421076.399 18.411082.554 18.76 1088.7
19.171094.855 19.18 1101 19.351107.155 19.441113.301 19.46 1119.456
19.531125.611 19.371131.756 17.971137.911 16.971156.546 5.68 1157.495
5.731165.191 4.31173.404 4.08 1181.41 2.951185.093 2.27 1202.074 .521207.928
2.091215.342 2.781223.085 2.231227.624 .64 1242.076 1.141246.061 2.311251.548
3.171258.305 3.81266.424 4.68 1269.816 5.631269.938 5.481270.399 22.91
1272.25 22.31322.429 20.63 1334.739 20.761340.885 20.8 1347.04 20.731353.186
20.8 1359.34 20.82 1365.486 20.81371.641 20.631377.787 19.351383.942
18.111390.097 18.11 1396.242 18.321402.397 18.331408.543 18.31414.698
18.431420.844 18.63 1426.998 18.61433.144 18.511439.299 18.541445.454 18.72
1451.6 18.82 1457.755 19.08 1463.9 19.361470.055 19.391476.201 19.251482.356
19.5 1488.511 20.051494.656 20.291500.811 20.061506.957 19.761513.112 19.71
1519.257 18.891525.412 18.731537.713 19.041543.868 19.041550.014 18.3
1556.169 18.341562.314 19.011568.469 18.421574.615 17.78 1580.77 18.08
1586.915 18.44 1593.07 17.511599.225 17.561611.526 17.21617.671 17.53
1636.127 17.341642.282 17.371648.428 17.291654.583 17.571660.728 17.63
1666.883 17.911673.029 18.071679.184 18.051685.329 18.241691.484 18.38
1697.639 18.71703.785 18.94 1709.94 18.831716.085 18.61 1722.24 18.66
1728.386 18.981734.541 19.521740.687 20.331746.842 21.211752.997 22 1759.142
22.561765.297 22.981771.443 23.341777.598 23.621796.053 24.23 1802.199
24.41808.354 24.661814.499 24.721820.654 24.38 1826.8 24.1 1832.955
24.071839.101 24.021845.256 24.511851.411 25.441857.556 25.79 1863.711
25.891869.857 26.221876.012 26.531882.157 26.441888.312 25.97 1894.467
25.781900.613 25.911906.768 26.061912.914 26.131919.068 26.18 1931.331
25.891937.468 25.551943.594 25.151949.731 24.951955.867 24.91 1961.994 24.8
1968.13 24.921974.266 25.261980.393 25.441992.665 25.73 2004.928
25.792011.064 25.872017.191 25.932023.327 25.812029.464 25.84 2035.59
25.832041.727 25.842047.863 25.77 2053.99 25.772060.126 26.05 2066.262
25.922072.389 25.712078.525 25.372084.661 25.472090.788 25.53 2096.924 25.71
2103.06 26.242109.187 26.172115.323 26.32121.459 26.22 2127.586 26.092133.722
25.872139.859 25.962145.985 25.882152.122 25.85 2158.258 25.962164.385
262170.521 25.912176.657 25.642182.784 25.48 2188.92 25.662195.056
25.272201.183 24.752207.319 24.862213.455 25.51 2219.582 25.532225.719
26.092231.855 25.962244.117 26.172250.254 26.32 2256.38 26.182262.517
26.282268.653 26.24 2274.78 26.42280.916 26.59 2287.052 26.682299.315
26.952305.451 27.12311.578 27.32317.714 26.92 2323.85 26.892329.977
26.62336.114 26.8 2342.25 26.872348.376 26.76 2354.513 27.082360.649
26.462366.776 26.442372.912 26.672379.048 26.84 2385.175 26.622391.311
27.62397.447 27.772403.574 27.3 2409.71 27.42 2415.846 26.952421.973
26.992428.109 27.82434.246 27.732440.372 27.4 2446.509 27.522452.645
27.872458.771 28.352464.908 28.52471.044 28.36 2477.171 28.992483.307
30.382489.443 31.52 2495.57 32.252501.706 31.82 2507.842 30.772513.969
29.962520.105 29.682526.241 29.652532.368 29.73 2538.504 29.482544.641
29.512550.767 29.512556.904 29.99 2563.04 30.29 2569.167 30.122575.303
29.812581.439 30.042587.566 30.032593.702 30.11 2599.838 30.082605.965
30.392612.101 30.62624.364 30.85 2630.5 31.29 2636.637 31.492642.763
31.582648.899 31.382655.036 29.722661.162 28.95 2667.299 29.052673.435
29.422679.562 29.642685.698 29.672691.834 29.86 2697.961 30.332704.097

30.712710.233 30.82 2716.36 31.132722.496 31.35 2728.632 31.422734.759
31.712740.896 32.252747.032 32.762759.294 33.49 2765.431 33.952771.558
34.352777.694 34.64 2783.83 34.362789.957 34.23 2802.229 34.822808.356
34.742814.492 33.722820.628 32.822826.755 34.33 2832.891 382839.028
41.772845.154 44.062851.291 44.892857.427 45.19 2863.553 45.77 2869.69
46.162881.953 46.272888.089 46.32894.225 46.36 2900.352 46.372906.488
46.42912.624 46.462918.751 46.562924.887 46.77 2931.023 47.03 2937.15
47.232949.423 47.562955.549 47.682967.822 48.04 2980.085 48.152986.221 48.11

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .091125.611 .041270.399 .093

Bank Sta: Left Right Coeff Contr. Expan.
 1125.6111270.399 .5 .8 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 01118.234 23 T
Skew Angle = 20

Downstream Deck/Roadway Coordinates
 num= 26
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 653.086 27.74 981.039 25.17 1134.209 23.8
 1162.4 23.96 1162.4 27.7 1166.159 27.7 1166.252 25.67 18.141174.616 25.6
18.821187.771 25.53 18.87 1197.168 25.46 18.091203.746 25.39 18.051217.842
25.32 18.54 1231.937 25.25 18.281242.274 25.18 17.71246.032 25.11 17.55
1256.369 25.04 18.251267.645 24.97 18.241279.861 24.9 17.5 1279.955 26.67
1283.62 26.71 1283.714 23.12 1324.967 22.6 1451.825 21.77 1604.995 21.73
 1742.19 22.85 1800 22.85

Downstream Bridge Cross Section Data
Station Elevation Data num= 281 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 29.39 6.155 29.56 12.301 29.42 18.456 29.55 30.766 29.35 43.066 29.5
49.221 29.42 61.522 28.94 67.677 29.05 79.987 28.42 92.287 28.35 98.442
28.44 104.597 28.37 110.743 27.97 116.898 27.72 123.053 27.76 129.208 28.07
135.353 28.04 141.508 26.47 147.663 25.99 153.818 27.05 159.964 27.72
172.274 28.23 178.429 28.89 184.574 29.3 190.729 29.2 196.884 28.57 203.039
28.72 209.185 28.63 215.34 28.32 246.105 28.71 252.251 28.65 264.561 29.09
289.172 29.11 295.327 29.03 301.472 29.09 332.238 30.57 338.393 30.69
363.003 30.38 369.158 30.22 387.614 30.25 399.914 30.02 436.835 30.36
492.202 30.23 498.357 29.9 510.667 29.66 516.812 29.44 522.967 29.56 541.423
29.36 553.733 28.89 566.033 29 590.644 28.48 596.799 28.17 633.719 27.09
639.865 27 646.02 27.13 707.542 26.67 726.006 27.1 738.307 26.88 750.617
26.86 762.918 27.14 769.073 27.05 781.373 26.45 805.984 25.92 818.294 25.95
842.904 26.67 849.059 26.7 873.67 25.84 879.815 25.85 885.97 25.59 898.28
24.59 904.426 24.38 910.581 24.43 922.882 23.49 929.036 22.8 935.192 21.68
941.346 21.54 947.492 20.88 953.647 20.58 972.103 20.37 978.258 20.11
984.413 20.24 996.713 19.471002.868 19.351015.178 18.76 1021.324
19.031027.479 18.811033.634 18.921039.789 19.641045.934 20.02 1052.089
19.791058.244 19.261064.399 19.63 1076.7 19.591082.855 19.46 1101.31
19.521113.611 19.831119.766 19.781132.076 18.991138.221 20.24 1144.376
20.751150.531 18.961156.687 15.761162.832 12.751168.893 9.39 1169.917
6.511173.375 5.921190.356 3.471213.397 1.241220.943 1.83 1228.573
2.121238.383 .811258.878 1.551265.428 3.1 1273.96 3.32 1282.671 5.46 1287.83

8.25 1292.04 9.951298.195 12.62 1304.34 15.54 1310.495 17.88 1316.65
18.131322.805 18.021335.106 18.321341.261 18.15 1353.562 18.681359.716
20.471378.172 20.421384.327 20.051390.482 19.99 1396.637 19.761427.393
19.311433.548 19.491439.703 19.531458.159 20.3 1464.314 20.121470.459
20.11476.614 20.661488.924 20.94 1495.07 20.5 1501.225 20.21 1507.38
20.431513.535 20.44 1519.68 20.31 1531.99 19.84 1538.145 19.731544.291
19.31556.601 19.591562.756 19.411568.901 19.53 1575.056 19.511581.211
19.11587.366 18.961593.512 18.971605.822 19.36 1618.122 19.461630.432
19.841661.189 19.771673.499 20.31679.654 20.39 1691.954 19.73 1710.41 19.65
1735.02 20.29 1747.33 21.091753.485 21.14 1759.631 21.471765.786
21.651771.941 22.121778.086 22.251784.241 23.65 1796.551 23.761821.162
24.611839.617 24.751864.228 25.21882.684 25.22 1888.839 25.381894.994
25.371901.139 25.531925.769 25.551938.088 25.7 1968.872 25.831975.027
25.961981.192 25.881993.501 25.951999.656 26.51 2005.821 26.74 2030.45
26.662036.605 26.77 2055.08 26.762079.709 26.51 2092.028 26.662110.503
26.492122.813 26.262128.977 26.392135.132 26.23 2141.287 26.42153.606
27.022172.081 27.382178.236 27.68 2196.71 27.74 2202.865 27.65 2209.02
28.432215.185 28.622221.339 28.662227.494 28.85 2258.288 292270.598
29.412276.762 29.362289.073 29.612301.392 28.92 2313.702 28.812326.021 29.05
2338.34 28.85 2350.65 29.062356.805 28.77 2381.444 29.142393.754
29.722406.073 30.992412.229 31.462418.384 32.59 2424.548 33.142430.703
32.912443.022 31.72449.177 32.072455.332 31.86 2461.487 32.012473.807
31.932486.126 31.512492.281 31.422498.436 31.47 2504.591 31.722510.755 31.83
2516.91 31.46 2529.23 31.172547.704 31.7 2566.169 31.622572.333 31.752584.643
31.552603.118 30.782609.273 30.37 2615.437 30.312621.592 30.092627.747
30.922633.911 32.752640.066 33.28 2646.221 33.362658.541 32.922664.696
33.32670.851 33.42677.015 33.3 2683.17 33.56 2695.49 33.652701.645
33.852726.274 33.682744.748 34.19 2750.903 34.532757.058 34.092775.532
34.782781.697 35.212787.852 35.25 2800.171 35.592806.326 34.772812.481
33.122818.636 32.642824.801 34.08 2830.956 37.092843.275 40.05 2849.43
41.032855.585 41.452867.904 43.45 2874.059 43.92886.379 44.082898.688
44.682904.853 44.852917.163 44.85 2923.318 45.072929.482 45.152935.637
45.472941.792 46.062954.112 47.59 2960.267 48.25

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .091144.376 .041310.495 .093

Bank Sta: Left Right Coeff Contr. Expan.
 1144.3761310.495 .5 .8 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 01118.234 23 T
 13102960.267 23 T
Skew Angle = 20

Upstream Embankment side slope = 0 horiz. to 1.0 vertical Downstream
Embankment side slope = 0 horiz. to 1.0 vertical Maximum allowable
submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Piers = 2

Pier Data
Pier Station Upstream=1189.651 Downstream=1199.987
Upstream num= 6
 Width Elev Width Elev Width Elev Width Elev Width Elev 11 .8 11 5 3.5 5.1 3
8 2 18 3 18.1
Downstream num= 6
 Width Elev Width Elev Width Elev Width Elev Width Elev 11 .8 11 5 3.5 5.1 3
8 2 18 3 18.1

Pier Data
Pier Station Upstream=1232.877 Downstream=1243.213
Upstream num= 6
 Width Elev Width Elev Width Elev Width Elev Width Elev 11 .8 11 5 3.5 5.1 3
8 2 18 3 18.1
Downstream num= 6
 Width Elev Width Elev Width Elev Width Elev Width Elev 11 .8 11 5 3.5 5.1 3
8 2 18 3 18.1

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
 Energy
 W.S. Pro Method

 W.S.Pro Data
 Left Embankment
 El of the top of the embankment = 24
 El of the toe of the abutment = 5.7
 Right Embankment
 El of the top of the embankment = 24
 El of the toe of the abutment = 5.7 Abutment Type = 4 Vert. abutments and
sloping embankments with wingwalls Slope of abutments =
 Top with of embankment = 50
 Centroid station of bridge opening =
 Wing Wall Type = Angular wing walls
 Width = 22
 Angle = 45
 Radius =
 Guide Banks Type = No Guide Bank present
 Length =
 Offset =
 Angle =
 Optional Contraction and expansion coefficients
 At approach Section
 At Guide Bank
 At upstream outside
 At upstream inside (BU)
 At downstream inside (BD)
 Piers are Continuous for the width of the bridge
 Use Geometric mean as Friction Slope Method

Selected Low Flow Methods = W.S.Pro Method

High Flow Method

```
 Pressure and Weir flow  Submerged Inlet Cd =
 Submerged Inlet + Outlet Cd = .8
 Max Low Cord =

Additional Bridge Parameters
 Add Friction component to Momentum
 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION


RIVER: Taunton River
REACH: Main Stem RS: 56196.91

INPUT
Description: 54.3 DS FAce Harding St Rte 44
Station Elevation Data num= 281
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  0 29.39 6.155 29.56 12.301
29.42 18.456 29.55 30.766 29.35  43.066 29.5 49.221 29.42 61.522 28.94 67.677
29.05 79.987 28.42  92.287 28.35 98.442 28.44 104.597 28.37 110.743 27.97
116.898 27.72  123.053 27.76 129.208 28.07 135.353 28.04 141.508 26.47
147.663 25.99  153.818 27.05 159.964 27.72 172.274 28.23 178.429 28.89
184.574 29.3  190.729 29.2 196.884 28.57 203.039 28.72 209.185 28.63 215.34
28.32  246.105 28.71 252.251 28.65 264.561 29.09 289.172 29.11 295.327 29.03
301.472 29.09 332.238 30.57 338.393 30.69 363.003 30.38 369.158 30.22
387.614 30.25 399.914 30.02 436.835 30.36 492.202 30.23 498.357 29.9  510.667
29.66 516.812 29.44 522.967 29.56 541.423 29.36 553.733 28.89  566.033 29
590.644 28.48 596.799 28.17 633.719 27.09 639.865 27  646.02 27.13 707.542
26.67 726.006 27.1 738.307 26.88 750.617 26.86  762.918 27.14 769.073 27.05
781.373 26.45 805.984 25.92 818.294 25.95  842.904 26.67 849.059 26.7 873.67
25.84 879.815 25.85 885.97 25.59  898.28 24.59 904.426 24.38 910.581 24.43
922.882 23.49 929.036 22.8  935.192 21.68 941.346 21.54 947.492 20.88 953.647
20.58 972.103 20.37  978.258 20.11 984.413 20.24 996.713 19.471002.868
19.351015.178 18.76 1021.324 19.031027.479 18.811033.634 18.921039.789
19.641045.934 20.02 1052.089 19.791058.244 19.261064.399 19.63 1076.7
19.591082.855 19.46  1101.31 19.521113.611 19.831119.766 19.781132.076
18.991138.221 20.24 1144.376 20.751150.531 18.961156.687 15.761162.832
12.751168.893 9.39 1169.917 6.511173.375 5.921190.356 3.471213.397
1.241220.943 1.83 1228.573 2.121238.383 .811258.878 1.551265.428 3.1 1273.96
3.32 1282.671 5.46 1287.83 8.25 1292.04 9.951298.195 12.62 1304.34 15.54
1310.495 17.88 1316.65 18.131322.805 18.021335.106 18.321341.261 18.15
1353.562 18.681359.716 20.471378.172 20.421384.327 20.051390.482 19.99
1396.637 19.761427.393 19.311433.548 19.491439.703 19.531458.159 20.3
1464.314 20.121470.459 20.11476.614 20.661488.924 20.94 1495.07 20.5 1501.225
20.21 1507.38 20.431513.535 20.44 1519.68 20.31 1531.99 19.84 1538.145
19.731544.291 19.31556.601 19.591562.756 19.411568.901 19.53 1575.056
19.511581.211 19.11587.366 18.961593.512 18.971605.822 19.36 1618.122
19.461630.432 19.841661.189 19.771673.499 20.31679.654 20.39 1691.954 19.73
1710.41 19.65 1735.02 20.29 1747.33 21.091753.485 21.14 1759.631
21.471765.786 21.651771.941 22.121778.086 22.251784.241 23.65 1796.551
23.761821.162 24.611839.617 24.751864.228 25.21882.684 25.22 1888.839
```

25.381894.994 25.371901.139 25.531925.769 25.551938.088 25.7 1968.872
25.831975.027 25.961981.192 25.881993.501 25.951999.656 26.51 2005.821 26.74
2030.45 26.662036.605 26.77 2055.08 26.762079.709 26.51 2092.028
26.662110.503 26.492122.813 26.262128.977 26.392135.132 26.23 2141.287
26.42153.606 27.022172.081 27.382178.236 27.68 2196.71 27.74 2202.865 27.65
2209.02 28.432215.185 28.622221.339 28.662227.494 28.85 2258.288 292270.598
29.412276.762 29.362289.073 29.612301.392 28.92 2313.702 28.812326.021 29.05
2338.34 28.85 2350.65 29.062356.805 28.77 2381.444 29.142393.754
29.722406.073 30.992412.229 31.462418.384 32.59 2424.548 33.142430.703
32.912443.022 31.72449.177 32.072455.332 31.86 2461.487 32.012473.807
31.932486.126 31.512492.281 31.422498.436 31.47 2504.591 31.722510.755 31.83
2516.91 31.46 2529.23 31.172547.704 31.7 2566.169 31.622572.333 31.752584.643
31.552603.118 30.782609.273 30.37 2615.437 30.312621.592 30.092627.747
30.922633.911 32.752640.066 33.28 2646.221 33.362658.541 32.922664.696
33.32670.851 33.42677.015 33.3 2683.17 33.56 2695.49 33.652701.645
33.852726.274 33.682744.748 34.19 2750.903 34.532757.058 34.092775.532
34.782781.697 35.212787.852 35.25 2800.171 35.592806.326 34.772812.481
33.122818.636 32.642824.801 34.08 2830.956 37.092843.275 40.05 2849.43
41.032855.585 41.452867.904 43.45 2874.059 43.92886.379 44.082898.688
44.682904.853 44.852917.163 44.85 2923.318 45.072929.482 45.152935.637
45.472941.792 46.062954.112 47.59 2960.267 48.25

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .091144.376 .041310.495 .093

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1144.3761310.495 110.85 93.05 75.7 .5 .8 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 01118.234 23 T
 13102960.267 23 T
Skew Angle = 20

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 56103.86

INPUT Description: 54 Exit Harding St Rte 44
Station Elevation Data num= 386
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 28.27 6.54 28.26 13.07 28.27
19.61 28.32 26.15 28.4 32.68 28.44 39.22 28.68 45.76 28.95 58.83 29.04 65.37
29.18 71.9 29.34 78.44 29.37 84.98 29.34 91.51 29.38 98.05 29.83 104.59
30.14 111.13 30.19 124.2 29.89 130.74 29.83 137.27 29.83 143.81 29.96 150.35
29.97 156.88 29.91 163.42 30.07 169.96 30.14 176.49 30.12 183.03 30.24
189.57 30.39 196.1 30.56 209.18 30.4 215.71 30.61 228.79 30.48 235.32 30.34
241.86 30.45 248.4 30.59 254.93 30.47 261.47 30.58 268.01 30.61 274.54 30.6
281.08 30.77 287.62 30.78 294.15 30.57 300.69 30.42 313.77 30.17 320.3 30.29
326.84 30.29 333.38 30.14 339.91 30.13 346.45 30.14 352.99 30.07 359.52
29.83 366.06 29.76 372.6 29.85 379.13 29.99 385.67 29.89 392.21 29.53 398.74
29.41 405.28 29.41 411.82 29.31 418.35 29.12 424.89 29.07 431.43 28.88
437.96 28.76 444.5 28.53 451.04 28.58 464.11 28.61 470.65 28.72 477.18 28.79
483.72 28.68 490.26 28.7 496.8 28.69 503.33 28.59 509.87 28.75 522.94 28.78

529.48 28.69 536.02 28.48 542.55 28.45 549.09 28.28 555.63 28.13 562.16
28.27 568.7 28.37 575.24 28.21 581.77 28.1 588.31 28.34 594.85 28.34 601.38
27.58 607.92 26.4 614.46 25.47 620.99 25.26 627.53 25.22 634.07 25.33 640.6
25.41 653.68 25.34 666.75 25.31 699.43 25.35 712.51 25.35 725.58 25.32
738.66 25.23 751.73 25.07 758.27 25 764.8 24.95 771.34 24.93 777.88 24.89
784.41 24.7 790.95 24.33 797.49 23 804.02 22.05 810.56 22.16 817.1 22.86
823.63 23.62 830.17 23.87 836.71 23.66 843.24 23.34 849.78 23.04 856.32
22.09 862.85 20.44 869.39 18.9 875.93 17.32 882.46 16.45 889 16.22 895.54
15.96 902.08 14.86 908.61 14.32 915.15 13.66 921.69 13.81 928.22 13.6 934.76
13.7 941.3 13.58 947.83 13.39 954.37 13.36 960.91 13.41 967.44 13.38 973.98
13.06 980.52 12.76 987.05 12.6 993.59 12.53 1000.13 12.74 1006.66 13.08
1055.36 14.35 1087.33 10.17 1177.61 12.89 1193.55 9.09 1198.38 3.46 1214.37
2.87 1234.25 2.01 1250.52 1.17 1262.83 .63 1272.4 1.28 1279.49 .8 1288.91
1.26 1298.05 1.66 1309.47 4.54 1313.32 8.87 1366.33 11.88 1398.96 17.27
1438.36 17.51 1444.92 17.45 1451.48 17.64 1458.04 17.76 1464.6 18.07 1477.71
19.01 1484.27 19.29 1490.83 19.38 1497.39 19.53 1503.95 19.89 1510.51 19.83
1517.07 19.37 1523.63 19.46 1530.18 19.46 1543.3 19.17 1549.86 18.66 1556.42
18.48 1562.98 18.12 1569.54 17.93 1576.1 18.01 1582.65 18.12 1589.21 18.34
1595.77 18.64 1602.33 18.59 1608.89 18 1615.45 17.48 1622.01 16.72 1628.57
16.37 1635.12 15.88 1641.68 15.2 1648.24 15 1654.8 14.95 1661.36 14.76
1667.92 15.28 1674.48 15.59 1681.03 15.44 1687.59 15.14 1694.15 15.33
1700.71 15.54 1707.27 15.62 1713.83 15.35 1720.39 15.33 1726.95 15.02 1733.5
15.59 1740.06 16.4 1746.62 16.13 1753.18 15.18 1759.74 14.79 1766.3 14.86
1772.86 15.1 1779.42 15.21 1785.97 15.23 1792.53 15.17 1799.09 15.04 1805.65
14.62 1812.21 14.7 1818.77 15.61 1825.33 16.71 1838.44 17.8 1851.56 18.53
1858.12 19.07 1864.68 19.48 1871.24 20 1877.8 20.27 1884.35 20.79 1890.91
21.17 1897.47 21.44 1904.03 21.68 1910.59 22.03 1917.15 22.29 1923.71 22.26
1930.27 22.13 1943.38 21.69 1949.94 21.03 1956.5 20.53 1963.06 20.21 1969.62
20.08 1976.18 20.02 1982.74 19.94 1989.29 20.06 1995.85 20.53 2002.41 21.12
2008.97 21.69 2015.53 21.91 2022.09 21.77 2028.65 21.93 2035.2 22.12 2041.76
22.16 2048.32 22.24 2054.88 22.45 2061.44 22.72 2068 22.96 2074.56 23.12
2081.12 23.32 2087.67 23.56 2094.23 23.77 2100.79 23.82 2107.35 24.01
2113.91 24.15 2120.47 24.36 2127.03 24.73 2133.58 25.05 2140.14 25.57
2153.26 25.98 2159.82 26.27 2166.38 26.43 2179.5 26.5 2192.61 26.66 2199.17
26.77 2205.73 26.82 2212.29 26.73 2218.85 26.75 2225.41 26.73 2245.08 26.56
2251.64 26.61 2258.2 26.56 2264.76 26.48 2271.32 26.36 2277.88 26.13 2284.43
26.04 2290.99 26.03 2297.55 25.96 2304.11 25.93 2310.67 26 2317.23 25.94
2323.79 25.83 2330.34 25.7 2336.9 25.54 2343.46 25.28 2350.02 25.1 2356.58
25.11 2363.14 25.42 2369.7 25.77 2376.26 25.91 2382.81 25.99 2389.37 26.11
2395.93 26.19 2402.49 26.29 2409.05 26.3 2415.61 26.34 2422.17 26.51 2428.72
26.76 2435.28 26.75 2441.84 26.71 2448.4 26.89 2454.96 27.09 2461.52 27.2
2468.08 27.34 2481.19 27.57 2487.75 27.78 2494.31 27.93 2500.87 27.89
2507.43 27.77 2513.99 27.8 2520.55 27.93 2527.1 28.08 2533.66 28.16 2540.22
28.09 2546.78 28.07 2553.34 28.02 2559.9 28.13 2566.46 28.57 2573.02 28.94
2579.57 28.98 2586.13 28.88 2592.69 28.45 2599.25 28.17 2605.81 28.18
2612.37 28.13 2618.93 28.02 2625.48 28.02 2632.04 28.08 2638.6 28.16 2645.16
28.49 2651.72 28.91 2658.28 29.17 2664.84 29.28 2671.4 29.29 2684.51 29.06
2691.07 29.01 2697.63 28.58 2704.19 28.19 2710.75 28.17 2717.31 28.18
2723.86 27.85 2730.42 28.14 2736.98 28.46 2743.54 28.41 2750.1 28.15 2763.22
28.04 2769.78 27.93 2776.33 27.67 2782.89 27.48 2789.45 27.8 2796.01 27.75
2802.57 27.48 2809.13 27.59 2815.69 27.82 2822.24 28 2828.8 28.01 2841.92
27.69 2848.48 27.72 2855.04 27.95 2861.6 28.21 2868.16 28.93 2874.71 29.73
2881.27 30.34 2887.83 30.69 2900.95 31.23 2907.51 31.45 2914.07 31.73
2920.62 32.29 2927.18 33.33 2933.74 35.26 2940.3 38.07 2946.86 40.7 2953.42

42.48 2959.98 43.53 2966.54 43.98 2973.09 44.21 2979.65 44.49 2986.21 44.72
2992.77 44.85 2999.33 45.05 3012.45 45.59 3019 46.69 3025.56 48.48 3032.12
50.69 3038.68 52.6 3045.24 53.19 3051.8 53.36

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 1177.61 .04 1398.96 .093

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1177.61
1398.96 1404.65 1394.42 1387.7 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 1504 3051.8 19.9 T
 CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 54709.44

INPUT
Description: 53
Station Elevation Data num= 245
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 54.31 6.56 53.82 13.12 53.15
26.24 52.53 45.93 51.98 59.05 50.79 72.17 50.59 78.73 50.22 85.29 49.64
104.98 46.75 137.78 43.05 144.34 42.41 150.9 41.97 164.03 41.52 177.15 40.63
190.27 39.27 196.83 38.31 203.39 37.04 209.95 36.07 229.64 34.07 236.2 33.66
249.32 33.28 275.56 32 282.13 31.54 295.25 31.01 308.37 30.34 314.93 30.12
328.05 29.93 347.74 28.81 373.98 27.96 380.54 27.86 387.1 27.49 393.66 26.96
400.22 26.69 406.79 26.6 413.35 25.95 433.03 24.7 439.59 24.46 446.15 23.92
459.27 23.42 472.4 23.27 485.52 23.4 498.64 22.97 505.2 22.94 538.01 22.37
551.13 22.47 564.25 22.29 570.81 22.3 577.37 22.46 583.93 22.44 590.5 22.11
597.06 20.95 603.62 19.96 610.18 19.23 616.74 19.08 728.28 19.08 734.84
19.86 741.4 20.9 747.96 21.6 767.64 21.31 780.77 21.44 787.33 21.26 800.45
20.57 820.13 19.94 826.69 19.87 859.5 20.74 879.18 20.73 885.74 20.97 898.87
20.73 918.55 20.04 944.79 19.62 1003.84 19.08 1023.53 18.26 1049.77 17.84
1082.58 16.73 1089.14 16.28 1095.7 16.51 1102.26 16.16 1115.38 14.81 1128.5
14.28 1161.31 12.26 1167.87 11.7 1207.24 11.03 1226.92 11.15 1238.36 10.82
1240.04 10.76 1246.6 9.44 1253.16 7.18 1259.72 6.37 1265 2.68 1265.67 2.45
1266.54 2.04 1267.35 1.63 1268.46 1.22 1269.24 .97 1269.81 .83 1270.58 .74
1271.6 .54 1272.79 .4 1274.25 .27 1275.85 .18 1279.5 .04 1281.57 .07 1283.35
.12 1285.16 .2 1286.84 .39 1288.46 .51 1290 .58 1291.73 .79 1293.43 .39
1295.54 .64 1297.53 .05 1299.63 .19 1301.63 .08 1303.73 .18 1305.6 .08
1307.89 .15 1309.91 .05 1312.17 .05 1314.26 -.03 1316.66 .01 1319 -.33
1321.42 -.27 1323.54 -.06 1325.73 -.01 1327.74 .1 1329.7 .23 1331.56 .43
1333.48 .6 1335.26 .89 1337.12 1.18 1338.8 1.4 1340.56 1.6 1342.29 1.7
1343.89 1.66 1345.58 1.55 1347.44 1.42 1349.31 1.28 1351.23 1.29 1352.99 3
1358.14 6.88 1364.7 9.6 1367.96 10.49 1371.26 11.4 1377.82 12.74 1384.38
12.96 1390.94 12.91 1404.07 12.31 1410.63 12.34 1417.19 12.74 1430.31 14.09
1436.87 15.08 1443.43 15.85 1449.99 16.15 1476.24 16.02 1495.92 16.72
1515.61 16.65 1535.29 16.88 1541.85 17.13 1548.41 17.04 1554.97 17.14
1561.53 17.4 1568.09 17.35 1574.65 16.76 1581.22 17.83 1587.78 18.48 1594.34
18.77 1607.46 19.12 1614.02 19.18 1633.7 18.78 1640.27 18.83 1659.95 18.59
1666.51 18.35 1673.07 17.85 1679.63 17.62 1686.19 17.22 1705.88 15.47
1712.44 14.76 1719 14.29 1725.56 14.19 1732.12 13.88 1758.36 13.77 1764.93
13.84 1771.49 14.16 1784.61 13.96 1791.17 14.21 1797.73 14.26 1804.29 14.06

1810.85 14.06 1817.41 14.45 1830.54 14.71 1843.66 14.68 1869.9 15.41 1889.59 16.91 1896.15 17.02 1902.71 17.51 1909.27 18.46 1915.83 19.08 1948.64 20.65 1974.88 21.26 1988 21.98 2001.12 23 2007.68 23.37 2014.25 23.51 2020.81 23.98 2047.05 24.15 2053.61 24.09 2066.73 24.45 2079.86 24.19 2099.54 24.39 2106.1 24.25 2119.22 24.56 2125.78 24.56 2138.91 25.06 2145.47 25.08 2158.59 24.81 2171.71 24.94 2178.27 25.22 2184.84 25.33 2191.4 25.18 2211.08 25.37 2224.2 26.22 2230.76 27.36 2237.32 27.79 2243.88 27.75 2250.45 27.42 2257.01 27.57 2270.13 28.21 2276.69 28.26 2289.81 28.01 2302.94 28.22 2316.06 28.21 2322.62 28.31 2335.74 28.2 2355.42 28.43 2375.11 28.15 2381.67 28.27 2394.79 28.83 2447.28 29.66 2460.4 30.12 2466.96 30.51 2473.52 30.76 2480.08 30.82 2493.21 31.34 2499.77 31.5

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 1240.04 .04 1377.82 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1240.04 1377.82 1402 1447.38 1492.06 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 741 20.9 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 53262.06

INPUT
Description: 52
Station Elevation Data num= 230
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 56.56 13.09 52.88 26.17 49.61 32.71 48.2 39.26 46.65 52.34 43.12 65.43 39.85 71.97 38.4 78.51 37.6 85.05 36.23 91.6 34.6 104.68 31.8 111.22 30.73 117.77 30.02 124.31 29.55 150.48 28.11 163.56 27.48 170.11 26.85 183.19 25.93 215.91 24.38 222.45 23.75 228.99 22.55 235.53 21.14 242.08 20.16 340.22 20.16 346.76 20.27 359.84 21.08 392.56 21.69 405.64 21.47 412.18 21.67 425.27 21.72 438.35 22.1 444.9 21.91 457.98 22.09 464.52 22.32 497.24 22.89 510.32 22.81 529.95 22.24 549.58 21.53 556.12 21.45 575.75 20.69 582.29 20.26 595.38 19.73 608.46 19.48 634.63 19.33 647.72 19.48 673.89 19.48 772.03 18.93 778.57 18.97 785.11 18.87 798.2 19.37 811.28 19.16 824.37 19.61 837.45 19.01 850.54 18.83 870.17 19.12 876.71 19.31 883.25 19.35 889.79 18.92 896.34 18.01 902.88 17.82 915.96 18.29 922.51 18.92 929.05 19.27 942.13 19.31 955.22 19.58 961.76 19.84 968.31 19.85 981.39 18.42 987.93 18.43 994.48 18.69 1001.02 19.17 1007.56 19.88 1014.1 20.32 1020.65 20.47 1033.73 20.3 1053.36 20.35 1059.9 20.51 1072.99 20.53 1079.53 20.69 1086.07 20.65 1105.7 20.92 1118.79 21.77 1125.33 21.23 1131.87 21.35 1151.5 21.02 1158.04 21.06 1184.21 20.79 1190.75 20.48 1197.3 20.02 1203.84 19.73 1216.92 20.08 1223.47 19.82 1230.01 19.71 1236.55 20.93 1243.09 22.63 1249.64 23.92 1256.18 24.57 1269.27 25.28 1288.89 25.24 1301.98 25.01 1321.61 24.89 1334.69 24.03 1367.39 22.85 1373.92 22.47 1380.44 21.96 1419.61 21.34 1426.13 21.06 1432.66 20.5 1445.72 19.72 1452.24 19.11 1465.3 16.79 1478.35 15.33 1497.93 13.7 1504.46 13.33 1517.52 12.28 1524.04 11.6 1530.57 10.66 1537.1 10.48 1550.15 11.56 1556.68 12.21 1569.73 12.91 1582.79 14.01 1602.37 14.75 1608.9 14.6 1615.43 14.14 1628.48 12.8 1641.53 11.29 1648.06 11.12 1661.12 11.6 1687.23 13.04 1693.26

13.13 1693.75 13.13 1700.28 12.92 1706.81 12.38 1713.33 11.57 1719.86 10.19
1726.39 7.8 1732 3.11 1733.34 2.82 1735.01 2.36 1736.79 1.68 1738.45 1.06
1741.04 .7 1743.34 .51 1745.57 .28 1747.65 .13 1749.92 .13 1752.28 .1
1754.93 .05 1757.44 .08 1760.14 .15 1762.53 .18 1765.04 .09 1767.28 0
1769.67 .02 1771.83 .02 1773.98 .04 1775.96 .1 1778.15 .22 1780.12 .36
1782.06 .42 1783.79 .54 1785.68 .56 1787.29 .94 1789.06 .86 1790.77 .94
1792.62 1.09 1794.24 1.1 1795.96 1.31 1797.46 1.15 1799.03 1.25 1800.27 1.31
1801.31 1.33 1802.42 1.42 1803.33 1.59 1804.24 1.58 1805.22 1.71 1806.53
2.08 1808.23 1.94 1809.74 2.1 1812.08 2.56 1814.74 2.53 1816.47 2.44 1817.99
2.67 1820.21 2.25 1823.81 2.93 1830.83 8.02 1832.32 8.74 1837.35 11.17
1843.88 11.37 1856.93 11.1 1863.46 11.27 1876.52 12.11 1883.04 12.63 1902.63
13.64 1915.68 14.55 1967.9 16.55 1974.43 16.89 1980.95 17.05 2000.53 18.07
2033.17 18.9 2046.23 19.66 2059.28 20 2078.86 20.08 2085.39 19.94 2137.2
20.46 2188.95 21.23 2208.35 21.88 2221.29 22.12 2240.69 22.74 2247.16 22.79
2253.63 23 2260.1 23.06 2279.51 22.7 2318.32 22.51 2324.79 22.22 2331.26
22.18 2370.07 23.54 2389.47 24.53 2415.35 26.6 2434.75 27.69 2473.57 30.53
2480.03 31.18 2492.97 32.34 2499.44 33.46 2505.91 34.02 2518.85 34.04
2531.78 33.73 2538.25 33.42

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .087 1693.26 .04 1915.68 .085
 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1693.26 1915.68 1383.55 1262.42 1156.9 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 1014 20.3 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 51999.64

INPUT
Description: 51 Approach Church St
Station Elevation Data num= 261
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 20.23 6.56 20.75 13.12 20.83
19.68 20.6 26.24 20.49 32.8 20.4 39.36 20.29 45.92 20.34 59.04 20.09 65.6
20.12 72.16 19.85 78.72 19.71 85.28 19.89 91.84 19.85 98.41 19.6 104.97
19.09 111.53 18.82 124.65 18.69 131.21 18.46 137.77 18.34 150.89 18.19
157.45 17.94 164.01 17.77 170.57 17.63 177.13 17.63 183.69 17.72 190.25
17.78 196.81 17.71 203.37 17.56 209.93 17.36 216.49 17.23 223.05 17.18
229.61 17.04 236.17 16.74 242.73 16.78 249.29 16.7 255.85 16.67 268.97 16.26
275.53 15.92 282.09 15.45 288.65 15.28 295.21 15.41 301.78 15.32 308.34
15.36 314.9 15.73 321.46 15.89 328.02 16.24 334.58 16.71 341.14 16.96 347.7
17.54 360.82 18.45 367.38 19.31 373.94 20 380.5 20.38 387.06 20.44 393.62
20.6 400.18 20.56 406.74 20.57 413.3 20.63 419.86 20.62 426.42 20.55 432.98
20.52 439.54 20.58 446.1 20.59 452.66 20.62 459.22 20.87 465.78 21.16 472.34
21.41 478.9 21.4 485.46 21.49 492.03 21.82 498.59 22.3 505.15 22.76 511.71
23.07 518.27 23.57 524.83 23.99 531.39 24.61 537.95 25.1 544.51 25.53 551.07
25.36 557.63 25.6 564.19 25.79 570.75 25.79 577.31 25.66 583.87 25.6 590.43
25.68 596.99 25.74 603.55 25.74 610.11 25.55 616.67 25.38 623.23 25.14
629.79 25.14 636.35 25.33 642.91 25.25 649.47 25.25 656.03 25.46 669.15
25.61 675.71 25.72 688.83 26.12 695.39 26.35 701.96 26.82 708.52 27.33

715.08 27.76 721.64 27.99 728.2 28.39 734.76 28.48 741.32 28.69 747.88 28.96
754.44 28.94 761 28.8 767.56 28.68 774.12 28.58 780.68 28.33 787.24 28.26
800.36 28.58 806.92 28.72 820.04 28.94 826.6 28.9 833.16 28.71 839.72 28.4
846.28 28.14 852.84 27.9 859.4 27.87 872.52 28.12 879.08 28.26 885.64 28.2
892.2 28.12 905.33 27.87 911.89 27.79 918.45 27.67 931.57 27.16 938.13 27.04
944.69 26.98 951.25 26.83 957.81 26.52 964.37 26.55 970.93 26.4 977.49 26.62
984.05 26.33 990.61 25.81 997.17 24.92 1003.73 24.7 1010.29 24.73 1016.85
24.5 1023.41 24.51 1029.97 24.35 1036.53 23.98 1043.09 23.45 1049.65 22.78
1062.77 21.41 1069.33 20.32 1075.89 19.42 1082.45 18.97 1089.01 18.35
1095.57 17.71 1102.14 17.14 1108.7 16.68 1115.26 16.31 1121.82 16.08 1146.82
14.81 1174.39 14.89 1195.35 13.57 1209.63 10.51 1215.33 5.51 1231.3 4.16
1242.8 2.86 1252.07 1.33 1259.46 1.18 1263.14 2.79 1273.05 2.99 1303.69 2.35
1316.2 2.34 1321.48 3.85 1326.85 8.36 1336.58 9.31 1343.03 9.66 1349.47 9.97
1355.92 10.22 1362.37 10.44 1368.81 10.6 1375.26 10.55 1381.7 10.58 1388.15
10.73 1394.59 10.81 1401.04 10.87 1407.48 10.95 1413.93 11.09 1420.37 11.27
1426.82 11.41 1433.27 11.5 1439.71 11.65 1446.16 11.84 1452.71 12.07 1459.26
12.34 1472.36 12.5 1478.91 12.63 1485.46 12.8 1492.02 12.89 1498.57 13.16
1505.12 13.35 1511.67 13.56 1518.22 13.89 1531.32 14.38 1537.87 14.61
1544.43 14.86 1550.98 14.99 1564.08 15.32 1570.63 15.52 1577.18 16.12
1583.73 17.1 1590.28 17.67 1596.84 17.94 1603.39 18.73 1609.94 19.71 1616.49
20.64 1623.04 21.16 1629.59 21.55 1636.14 21.73 1642.69 21.81 1649.25 22.44
1655.8 21.64 1662.35 20.46 1668.9 20.15 1675.45 20.26 1682 20.67 1688.55
21.3 1695.1 22.17 1701.66 22.76 1708.21 23.08 1714.76 23.22 1721.31 23.23
1727.86 23.27 1734.41 23.39 1740.96 23.4 1747.51 23.48 1760.62 23.49 1767.17
23.53 1773.72 23.62 1780.27 23.73 1786.82 23.7 1793.37 23.74 1799.92 23.9
1806.48 24.12 1813.03 24.32 1826.13 24.93 1832.68 25.38 1839.23 25.69
1845.78 25.83 1852.33 26.09 1858.89 26.23 1871.99 26.6 1878.54 26.64 1885.09
26.71 1891.64 26.86 1904.74 27.11 1911.3 27.26 1917.85 27.37 1924.4 27.5
1930.95 27.65 1937.5 27.76 1944.05 27.95

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 1174.39 .04 1368.81 .085
 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1174.39 1368.81 86.45 102.74 130.56 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 373 20 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 51896.9

INPUT
Description: 50.7 US Face Church St
Station Elevation Data num= 168
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 19.79 12.272 19.6 42.963
19.32 61.371 19.56 85.916 19.24 92.052 18.59 116.597 18.44 135.015 18.71
141.151 18.98 147.287 19.11 159.56 18.79 202.523 18.38 208.659 18.18 220.931
17.12 227.067 16.86 233.204 16.92 239.34 17.15 245.476 17.23 251.612 17.7
257.748 17.79 276.157 18.46 282.302 18.92 288.439 19.18 300.711 20.01
306.847 19.84 312.983 20.03 319.12 20.46 349.801 21.09 362.082 21.51 368.219
21.55 380.491 22.26 386.627 22.4 392.763 22.77 398.9 23.36 411.172 24.27

423.444 24.84 429.58 25.23 447.998 25.71 484.816 26.31 497.088 26.72 509.36
26.34 533.915 26.17 540.051 26.24 558.459 25.99 570.732 26.34 583.004 27.05
589.14 27.27 607.558 28.43 619.831 28.33 638.239 28.84 650.512 28.88 675.056
29.5 724.155 30.58 736.428 31.55 742.564 31.79 748.7 31.56 754.836 31.14
767.118 30.76 791.663 29.53 803.935 29.27 810.071 28.98 822.344 28.85
840.762 28.1 859.17 27.07 871.443 26.7 883.715 26.58 895.987 26.01 902.124
26.21 908.26 26.1 926.678 25.07 945.086 24.65 963.495 24.81 969.631 25.02
981.904 24.77 988.04 25.12 994.176 25.051000.322 25.231006.458 24.77 1018.73
24.971024.866 24.8 1031.003 24.781043.275 25.141049.411 25.451073.956
24.831079.322 24.93 1080.102 24.941086.238 24.361092.374 23.451106.901
4.091108.114 3.09 1116.665 2.851124.615 2.851130.488 1.11132.724 .331133.749
1.74 1134.284 -.131139.744 -.271146.679 -.741155.089 -1.791164.899 -1.4
1173.845 -.17 1183.28 -.481193.757 .631200.382 2.011207.693 4.71 1227.38
20.51233.525 20.691239.661 20.81245.797 21.02 1258.07 21.33 1264.206
21.451270.229 21.721276.262 21.731282.286 21.521288.309 20.95 1294.342
21.081300.365 21.371306.389 21.221312.422 21.281318.445 21.51 1324.469
21.761330.501 20.661336.525 20.211342.548 20.21348.581 20.12 1360.628
20.071366.661 20.11372.684 20.451378.708 20.86 1384.74 21.13 1390.764
21.351396.787 21.85 1402.82 22.231414.876 22.43 1420.9 22.49 1426.923
22.751432.947 22.91 1438.97 23.181445.003 23.291451.026 23.42 1457.05
23.481463.073 23.621469.097 23.73 1475.12 23.791481.143 23.87 1487.176
24.011499.223 24.231505.247 24.38 1511.27 24.55 1529.35 24.79 1535.373 24.82
1547.42 25.041559.467 25.57 1565.49 25.741571.523 25.83 1577.547 26.1 1583.57
26.191589.593 26.451595.617 26.73 1601.64 26.93 1607.664 27.041613.697 27.39
1619.72 27.511625.743 27.61631.767 27.72 1637.79 27.91643.814 28.111649.837
28.14

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .091079.322 .04 1227.38 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1079.322 1227.38 72.49 67.2 64.58 .5 .8 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 300 20 T
Skew Angle = 20

BRIDGE

RIVER: Taunton River
REACH: Main Stem RS: 51859.01

INPUT
Description: 50.5 Church St
Distance from Upstream XS = 6
Deck/Roadway Width = 53 Weir Coefficient = 2.6
Bridge Deck/Roadway Skew = 20
Upstream Deck/Roadway Coordinates
 num= 19
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 428.5 27.4 724.503 28.26 804.377 27.59
 918.08 26.04 1060.913 25.02 1100.38 25
 1100.38 28.25 1103.199 28.25 1103.199 25.62 18.39 1153.943 25.12

18.081207.505 24.76 17.281207.505 28.27 1209.384 28.25 1210.324 28.19
1210.324 23.12 1297.715 22.75 1406.72 22.34 1547.674 24.79
 1681.11 29.1

Upstream Bridge Cross Section Data
Station Elevation Data num= 168
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 19.79 12.272 19.6 42.963
19.32 61.371 19.56 85.916 19.24 92.052 18.59 116.597 18.44 135.015 18.71
141.151 18.98 147.287 19.11 159.56 18.79 202.523 18.38 208.659 18.18 220.931
17.12 227.067 16.86 233.204 16.92 239.34 17.15 245.476 17.23 251.612 17.7
257.748 17.79 276.157 18.46 282.302 18.92 288.439 19.18 300.711 20.01
306.847 19.84 312.983 20.03 319.12 20.46 349.801 21.09 362.082 21.51 368.219
21.55 380.491 22.26 386.627 22.4 392.763 22.77 398.9 23.36 411.172 24.27
423.444 24.84 429.58 25.23 447.998 25.71 484.816 26.31 497.088 26.72 509.36
26.34 533.915 26.17 540.051 26.24 558.459 25.99 570.732 26.34 583.004 27.05
589.14 27.27 607.558 28.43 619.831 28.33 638.239 28.84 650.512 28.88 675.056
29.5 724.155 30.58 736.428 31.55 742.564 31.79 748.7 31.56 754.836 31.14
767.118 30.76 791.663 29.53 803.935 29.27 810.071 28.98 822.344 28.85
840.762 28.1 859.17 27.07 871.443 26.7 883.715 26.58 895.987 26.01 902.124
26.21 908.26 26.1 926.678 25.07 945.086 24.65 963.495 24.81 969.631 25.02
981.904 24.77 988.04 25.12 994.176 25.051000.322 25.231006.458 24.77 1018.73
24.971024.866 24.8 1031.003 24.781043.275 25.141049.411 25.451073.956
24.831079.322 24.93 1080.102 24.941086.238 24.361092.374 23.451106.901
4.091108.114 3.09 1116.665 2.851124.615 2.851130.488 1.11132.724 .331133.749
1.74 1134.284 -.131139.744 -.271146.679 -.741155.089 -1.791164.899 -1.4
1173.845 -.17 1183.28 -.481193.757 .631200.382 2.011207.693 4.71 1227.38
20.51233.525 20.691239.661 20.81245.797 21.02 1258.07 21.33 1264.206
21.451270.229 21.721276.262 21.731282.286 21.521288.309 20.95 1294.342
21.081300.365 21.371306.389 21.221312.422 21.281318.445 21.51 1324.469
21.761330.501 20.661336.525 20.211342.548 20.21348.581 20.12 1360.628
20.071366.661 20.11372.684 20.451378.708 20.86 1384.74 21.13 1390.764
21.351396.787 21.85 1402.82 22.231414.876 22.43 1420.9 22.49 1426.923
22.751432.947 22.91 1438.97 23.181445.003 23.291451.026 23.42 1457.05
23.481463.073 23.621469.097 23.73 1475.12 23.791481.143 23.87 1487.176
24.011499.223 24.231505.247 24.38 1511.27 24.55 1529.35 24.79 1535.373 24.82
1547.42 25.041559.467 25.57 1565.49 25.741571.523 25.83 1577.547 26.1 1583.57
26.191589.593 26.451595.617 26.73 1601.64 26.93 1607.664 27.041613.697 27.39
1619.72 27.511625.743 27.61631.767 27.72 1637.79 27.91643.814 28.111649.837
28.14

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .091079.322 .04 1227.38 .085

Bank Sta: Left Right Coeff Contr. Expan.
 1079.322 1227.38 .5 .8
Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 300 20 T
Skew Angle = 20
 Downstream Deck/Roadway Coordinates
 num= 19
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 457.63 27.4 753.633 28.26 833.507 27.59

947.21 26.04 1090.043 25.02 1129.51 25
1129.51 28.25 1132.33 28.25 1132.33 25.62 18.39 1183.073 25.12 18.081236.635
24.76 17.281236.635 28.27 1238.515 28.25 1239.455 28.19 1239.455 23.12
1326.846 22.75 1435.85 22.34 1576.804 24.79 1710.241 29.1

Downstream Bridge Cross Section Data
Station Elevation Data num= 244
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 23.49 6.164 23.79 12.329
23.96 18.493 24.43 24.658 24.5 30.822 24.61 36.986 24.53 43.151 24.26 49.315
24.18 55.479 24.13 67.808 23.92 73.973 23.75 80.137 23.55 86.301 23.29
92.466 22.97 98.63 22.73 104.795 22.36 110.959 21.33 117.123 20.23 123.288
19.77 129.452 19.9 141.781 20.09 147.936 20.24 154.1 20.16 160.265 19.92
166.429 19.78 172.593 19.53 178.758 19.2 184.922 19.03 191.087 18.72 197.251
18.61 203.415 18.57 209.58 18.5 215.744 18.41 221.908 18.65 228.073 18.58
234.237 18.6 240.402 18.85 246.566 19.06 252.73 18.89 258.895 19.05 271.223
18.9 277.388 19.19 283.552 19.36 289.717 19.55 295.881 19.81 302.045 19.92
308.21 19.95 314.374 20.29 320.539 20.68 326.703 21.05 332.867 21.3 339.032
21.68 345.196 22.01 351.36 22.16 357.525 22.5 363.689 22.93 369.854 23.42
376.018 23.68 388.347 24.78 394.511 25.02 400.676 25.28 406.84 25.38 413.004
25.74 419.169 26.19 425.333 26.55 431.488 26.68 437.652 26.74 443.817 26.9
449.981 26.88 456.146 27.01 462.31 27.11 474.639 27.39 480.803 27.22 486.967
27.38 493.132 27.47 499.296 27.5 505.461 27.61 511.625 27.62 517.789 27.65
530.118 27.8 536.283 27.81 548.611 27.8 554.776 27.75 560.94 27.83 567.104
27.83 573.269 27.9 585.598 27.93 591.762 28.07 597.926 28 604.091 28.04
610.255 28.13 616.42 28.1 622.584 28.24 628.748 28.32 634.913 28.16 641.077
28.21 647.242 28.33 653.406 28.32 659.57 28.49 665.735 28.46 671.899 28.49
678.063 28.67 684.228 28.66 690.392 28.77 696.557 28.64 702.721 28.62
708.885 28.52 715.05 28.76 721.214 28.88 727.378 28.93 733.543 28.9 739.707
28.96 745.862 29.21 752.027 29.41 758.191 29.52 764.355 29.6 770.52 29.78
776.684 29.93 782.849 30.01 789.013 30.18 801.342 30.67 807.506 30.78 813.67
30.95 819.835 30.91 825.999 30.9 832.164 30.85 838.328 30.72 844.492 30.65
850.657 30.54 862.985 30.71 869.15 30.34 875.314 30.02 881.479 28.92 887.643
27.66 893.807 27.31 899.972 27.24 906.136 27.19 918.465 27.02 924.629 26.97
930.794 26.9 943.122 26.58 955.451 26.3 961.616 26.18 967.78 26.12 980.109
25.79 986.273 25.66 992.438 25.62 998.602 25.411004.766 25.27 1010.931
25.421017.095 25.42 1023.26 25.31029.424 25.161035.588 25.16 1041.753
25.11047.917 24.841054.081 24.931060.236 24.741066.401 24.65 1072.565
24.421078.729 24.381084.894 24.091091.058 23.831097.223 23.75 1103.387 23.81
1132.33 25.521132.743 4.561148.107 2.451165.106 .79 1179.192 .361186.982
.791199.236 1.81210.503 .651220.642 1.33 1233.046 3.841233.083 21.041245.168
23.491251.332 23.391257.497 23.22 1263.661 23.211269.825 23.48 1275.99
23.561282.154 23.451288.319 23.21 1294.483 23.331300.647 23.311306.812
22.761312.976 22.331319.141 22.19 1325.305 22.141331.469 22.231337.634
22.281343.798 22.541349.962 22.73 1356.117 22.561362.282 22.411368.446 22.44
1374.61 22.521380.775 22.47 1386.939 22.471393.104 22.341399.268 22.11405.432
22.111411.597 22.04 1417.761 21.991423.926 22.181430.034 22.411436.151
22.571442.259 22.66 1448.367 22.841454.475 23.111460.583 23.421466.691
23.631472.799 23.71 1478.907 23.831485.015 24.011491.132 24.26 1497.24
24.41503.348 24.5 1509.456 24.651515.564 24.881521.672 25.05 1527.78
25.291533.888 25.76 1540.006 25.921546.114 26.041552.222 26.1 1558.33
25.841564.438 25.42 1570.546 25.41576.654 25.771582.762 26.73 1588.87
27.111594.987 27.21 1601.095 27.461607.203 27.751613.311 28.121625.527
28.391631.635 28.67 1637.743 28.921643.861 29.041649.969 29.321656.077 29.37

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 1132.33 .041245.168 .08

Bank Sta: Left Right Coeff Contr. Expan. 1132.331245.168 .5 .8
Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 320 20 T
Skew Angle = 20

Upstream Embankment side slope = 0 horiz. to 1.0 vertical Downstream Embankment side slope = 0 horiz. to 1.0 vertical Maximum allowable submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
 Energy
 W.S. Pro Method

 W.S.Pro Data
 Left Embankment
 El of the top of the embankment = 25
 El of the toe of the abutment = 4.5
 Right Embankment
 El of the top of the embankment = 25
 El of the toe of the abutment = 4.5 Abutment Type = 4 Vert. abutments and sloping embankments with wingwalls Slope of abutments =
 Top with of embankment = 53
 Centroid station of bridge opening =
 Wing Wall Type = Angular wing walls
 Width = 5
 Angle = 45
 Radius =
 Guide Banks Type = No Guide Bank present
 Length =
 Offset =
 Angle =
 Optional Contraction and expansion coefficients
 At approach Section
 At Guide Bank
 At upstream outside
 At upstream inside (BU)
 At downstream inside (BD)
 Piers are Continuous for the width of the bridge
 Use Geometric mean as Friction Slope Method

Selected Low Flow Methods = W.S.Pro Method

High Flow Method

```
 Pressure and Weir flow  Submerged Inlet Cd =
 Submerged Inlet + Outlet Cd = .8
 Max Low Cord =

Additional Bridge Parameters
 Add Friction component to Momentum
 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION


RIVER: Taunton River
REACH: Main Stem RS: 51829.71

INPUT
Description: 50.3 DS Face Church St
Station Elevation Data num= 244
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  0 23.49 6.164 23.79 12.329
23.96 18.493 24.43 24.658 24.5  30.822 24.61 36.986 24.53 43.151 24.26 49.315
24.18 55.479 24.13  67.808 23.92 73.973 23.75 80.137 23.55 86.301 23.29
92.466 22.97  98.63 22.73 104.795 22.36 110.959 21.33 117.123 20.23 123.288
19.77  129.452 19.9 141.781 20.09 147.936 20.24 154.1 20.16 160.265 19.92
166.429 19.78 172.593 19.53 178.758 19.2 184.922 19.03 191.087 18.72  197.251
18.61 203.415 18.57 209.58 18.5 215.744 18.41 221.908 18.65  228.073 18.58
234.237 18.6 240.402 18.85 246.566 19.06 252.73 18.89  258.895 19.05 271.223
18.9 277.388 19.19 283.552 19.36 289.717 19.55  295.881 19.81 302.045 19.92
308.21 19.95 314.374 20.29 320.539 20.68  326.703 21.05 332.867 21.3 339.032
21.68 345.196 22.01 351.36 22.16  357.525 22.5 363.689 22.93 369.854 23.42
376.018 23.68 388.347 24.78  394.511 25.02 400.676 25.28 406.84 25.38 413.004
25.74 419.169 26.19  425.333 26.55 431.488 26.68 437.652 26.74 443.817 26.9
449.981 26.88  456.146 27.01 462.31 27.11 474.639 27.39 480.803 27.22 486.967
27.38  493.132 27.47 499.296 27.5 505.461 27.61 511.625 27.62 517.789 27.65
530.118 27.8 536.283 27.81 548.611 27.8 554.776 27.75 560.94 27.83  567.104
27.83 573.269 27.9 585.598 27.93 591.762 28.07 597.926 28  604.091 28.04
610.255 28.13 616.42 28.1 622.584 28.24 628.748 28.32  634.913 28.16 641.077
28.21 647.242 28.33 653.406 28.32 659.57 28.49  665.735 28.46 671.899 28.49
678.063 28.67 684.228 28.66 690.392 28.77  696.557 28.64 702.721 28.62
708.885 28.52 715.05 28.76 721.214 28.88  727.378 28.93 733.543 28.9 739.707
28.96 745.862 29.21 752.027 29.41  758.191 29.52 764.355 29.6 770.52 29.78
776.684 29.93 782.849 30.01  789.013 30.18 801.342 30.67 807.506 30.78 813.67
30.95 819.835 30.91  825.999 30.9 832.164 30.85 838.328 30.72 844.492 30.65
850.657 30.54  862.985 30.71 869.15 30.34 875.314 30.02 881.479 28.92 887.643
27.66  893.807 27.31 899.972 27.24 906.136 27.19 918.465 27.02 924.629 26.97
930.794 26.9 943.122 26.58 955.451 26.3 961.616 26.18 967.78 26.12  980.109
25.79 986.273 25.66 992.438 25.62 998.602 25.411004.766 25.27 1010.931
25.421017.095 25.42 1023.26 25.31029.424 25.161035.588 25.16 1041.753
25.11047.917 24.841054.081 24.931060.236 24.741066.401 24.65 1072.565
24.421078.729 24.381084.894 24.091091.058 23.831097.223 23.75 1103.387 23.81
1132.33 25.521132.743 4.561148.107 2.451165.106 .79 1179.192 .361186.982
.791199.236 1.81210.503 .651220.642 1.33 1233.046 3.841233.083 21.041245.168
23.491251.332 23.391257.497 23.22 1263.661 23.211269.825 23.48 1275.99
```

23.561282.154 23.451288.319 23.21 1294.483 23.331300.647 23.311306.812
22.761312.976 22.331319.141 22.19 1325.305 22.141331.469 22.231337.634
22.281343.798 22.541349.962 22.73 1356.117 22.561362.282 22.411368.446 22.44
1374.61 22.521380.775 22.47 1386.939 22.471393.104 22.341399.268 22.11405.432
22.111411.597 22.04 1417.761 21.991423.926 22.181430.034 22.411436.151
22.571442.259 22.66 1448.367 22.841454.475 23.111460.583 23.421466.691
23.631472.799 23.71 1478.907 23.831485.015 24.011491.132 24.26 1497.24
24.41503.348 24.5 1509.456 24.651515.564 24.881521.672 25.05 1527.78
25.291533.888 25.76 1540.006 25.921546.114 26.041552.222 26.1 1558.33
25.841564.438 25.42 1570.546 25.41576.654 25.771582.762 26.73 1588.87
27.111594.987 27.21 1601.095 27.461607.203 27.751613.311 28.121625.527
28.391631.635 28.67 1637.743 28.921643.861 29.041649.969 29.321656.077 29.37

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 1132.33 .041245.168 .08
 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1132.331245.168 68.99 67.69 68.38 .5 .8 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 320 20 T
Skew Angle = 20

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 51762.02

INPUT
Description: 50 Exit Church St
Station Elevation Data num= 157
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 25.27 13.11 25.29 32.77
25.22 52.43 25.51 72.09 25.31 98.31 24.61 111.42 23.84 124.52 23.42 131.08
22.87 144.19 21.01 150.74 20.61 157.29 20.52 163.85 20.7 176.95 21.4 183.51
21.46 196.62 20.55 203.17 20.38 209.72 20.56 216.28 21.02 222.83 21.83
235.94 23.72 249.05 24.87 262.15 25.5 281.82 25.29 308.03 25.44 321.14 25.26
334.25 25.25 347.36 25.04 360.46 25.07 386.68 25.53 393.23 25.53 419.45
25.19 426 25.19 445.66 24.91 452.22 24.91 471.88 24.64 478.43 24.68 491.54
24.46 498.09 24.47 517.76 25.04 530.86 24.87 550.53 25.24 609.51 28.16
635.73 28.88 642.28 29.17 661.94 29.27 668.49 29.59 681.6 29.78 694.71 30.55
701.26 31.12 707.82 31.52 714.37 31.56 727.48 31.1 734.03 31.05 747.14 31.4
773.36 31.87 806.13 32.94 832.34 33.17 865.11 33.87 897.88 33.78 904.43
33.49 910.99 32.69 917.54 31.42 924.1 31.25 930.65 31.34 943.76 31.29 950.31
31.01 969.97 28.88 976.53 28.26 989.63 26.62 1022.4 21.43 1035.51 19.55
1042.07 18.75 1048.62 18.47 1055.17 18.33 1061.73 17.5 1068.28 16.34 1081.39
15.47 1094.5 14.98 1120.71 14.56 1127.27 14.35 1153.48 12.09 1160.04 11.79
1179.7 10.45 1186.25 9.6 1192.8 9.25 1193.99 9.21 1215.13 8.29 1223.96 3.75
1228.38 2.93 1238.2 2.31 1245.13 2.04 1251.81 3.19 1262.56 3.16 1270.33 3.9
1277.49 3.87 1288.91 3.32 1299.85 3.12 1305.63 2.05 1312.18 3.45 1320.97
5.03 1322.43 8.36 1369.71 15.97 1376.21 17.11 1382.72 17.8 1389.22 18.33
1395.73 18.67 1402.23 18.79 1408.73 19.07 1421.74 19.77 1428.25 20.1 1434.75
20.27 1441.26 20.4 1447.76 20.55 1460.77 20.94 1467.27 21.22 1473.78 21.61
1480.28 21.86 1486.79 21.98 1493.29 22.25 1499.79 22.59 1506.3 22.88 1512.8
22.99 1519.31 23 1525.81 23.26 1532.31 23.47 1538.82 23.57 1545.32 23.73

1551.83 23.99 1558.33 24.13 1564.84 24.23 1571.34 24.4 1577.84 24.65 1584.35 25.02 1590.85 25.42 1597.36 25.61 1603.86 25.75 1610.36 25.93 1616.87 26.38 1623.37 26.94 1629.88 27.52 1636.38 27.98 1642.89 28.12 1649.39 28.12 1662.4 28.25 1675.41 28.27 1681.91 28.44 1688.41 28.64 1701.42 28.71 1707.93 28.56 1714.43 28.6 1720.94 29.45 1727.44 30.24 1733.94 30.43 1740.45 30.54 1746.95 30.97 1753.46 31.07

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 1120.71 .04 1389.22 .08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1120.71 1389.22 1675.78 1643.73 1610.01 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 50118.29

INPUT
Description: 49
Station Elevation Data num= 159
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 23.45 6.56 23.3 19.67 22.81 52.44 22.61 65.55 23 72.11 22.88 78.66 23.4 85.22 23.52 91.77 23.18 98.33 23.12 104.88 23.2 111.44 23.54 137.66 23.44 157.32 23.64 170.43 24.18 203.21 24.54 209.76 24.7 222.87 24.62 229.43 24.47 242.54 24.8 255.65 24.61 262.21 24.7 268.76 24.64 281.87 24.77 288.43 25.12 321.2 25.12 334.31 25.26 367.09 24.49 380.2 23.82 399.86 23.78 406.42 23.93 419.53 23.73 439.19 22.95 445.75 22.92 458.86 22.36 478.53 21.25 491.64 20.76 511.3 19.8 517.86 19.2 524.41 18.4 530.97 17.75 557.19 15.88 570.3 15.2 589.96 14.54 596.52 14.71 609.63 14.35 629.29 14.9 648.96 13.64 655.51 13.12 662.07 12.09 668.62 10.56 672.5 9.55 675.18 8.85 681.74 6.33 690 2.06 690.42 1.98 690.81 1.99 691.19 1.93 691.48 1.83 691.83 1.78 692.18 1.7 692.62 1.94 693.09 1.46 693.7 1.35 694.46 1.26 695.41 1.17 696.41 .97 697.76 1.01 699.83 1.11 701.97 1.31 704.23 1.13 705.85 1.38 708.61 1.26 710.41 1.43 712.29 1.7 717.25 1.65 718.83 1.55 720.43 1.4 727.16 1.36 728.42 1.31 729.57 1.27 729.57 2.43 735.28 1.78 736.44 1.28 737.78 1.27 739.38 1.28 740.82 1.33 742.31 1.44 742.31 1.2 745.14 1.22 746.39 1.32 748.12 1.36 749.86 1.32 751.76 1.26 756.56 1.4 758.3 1.34 759.91 1.34 761.6 1.37 763.07 1.37 764.67 1.43 766.14 1.45 767.7 1.6 769.16 1.82 770.69 1.94 772.12 1.82 773.58 1.86 774.99 1.89 776.51 1.91 777.88 1.96 779.42 2.08 780.9 2.23 782.39 2.25 783.68 2.19 784.98 2.25 789.08 2.37 790.11 2.41 791.04 2.49 792.18 2.78 799.73 5.17 806.28 5.96 808.69 6.58 812.84 7.64 819.39 9.64 825.95 10.41 832.5 10.56 839.06 10.43 845.61 10.46 858.72 10.87 865.28 11.71 871.83 13 878.39 13.88 884.94 14.58 898.05 15.51 904.61 16.4 917.72 17.22 924.28 17.43 957.05 17.59 963.61 17.8 976.72 18.75 983.27 19.05 989.83 19.76 1002.94 20.91 1009.49 21.34 1022.6 21.53 1029.16 21.79 1081.6 22.64 1101.26 22.82 1107.82 23.22 1114.37 23.13 1140.6 23.54 1153.71 23.94 1160.26 23.94 1173.37 24.46 1199.59 24.89 1212.7 24.93 1278.25 26.29 1291.36 26.52 1317.58 26.65 1343.81 27.16

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 629.29 .04 924.28 .082

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 629.29
924.28 1344.97 1367.54 1376.48 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 48750.75

INPUT
Description: 48
Station Elevation Data num= 403
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 24.73 6.55 24.63 13.11 24.55
19.66 24.75 26.21 24.49 32.76 24.55 39.32 24.71 45.87 24.74 52.42 24.72
58.98 24.7 65.53 24.62 85.19 24.61 98.29 24.79 104.85 24.61 117.95 24.74
131.06 24.63 144.16 24.68 157.27 24.93 163.82 24.72 190.03 24.51 196.59
24.35 209.69 24.55 216.25 24.54 222.8 24.2 229.35 23.68 235.9 23.41 262.12
23.35 275.22 24.17 281.77 24.39 288.33 24.88 294.88 25.51 301.43 25.38
314.54 24.61 321.09 24.71 334.2 24.61 347.3 25.3 353.86 25.41 366.96 24.78
380.07 24.97 386.62 24.93 393.17 25.04 399.73 25.32 406.28 25.4 432.49 25.15
452.15 25.14 465.25 24.62 478.36 23.46 484.91 21.58 491.47 19.56 511.12
15.02 517.68 13.92 524.23 13.55 530.78 13.46 543.89 12.97 550.44 12.87 557
13 570.1 13.51 602.87 12.83 615.97 13.06 622.52 13.47 629.08 13.57 642.18
13.31 661.84 13.32 701.16 13.67 707.71 13.61 720.82 13.34 733.92 13.72
747.03 13.48 753.58 13.55 760.14 13.34 806.01 14.13 812.56 13.97 819.11
14.08 825.66 14.37 832.22 14.48 838.77 14.77 851.88 14.78 864.98 15.53
878.09 15.84 891.19 15.53 897.75 15.03 904.3 14.37 910.85 13.43 923.96 12.2
937.06 11.78 943.62 11.03 947.09 10.14 950.17 9.36 956.72 6.88 963.28 5.03
970 1.75 970.78 1.73 971.59 1.66 972.25 1.62 972.95 1.59 973.91 1.58 974.99
1.51 975.74 1.43 976.83 1.38 977.98 1.33 979.59 1.29 981.1 1.22 983.02 1.25
992.52 1.02 994.08 .91 995.85 .89 995.85 .95 999.13 .84 1000.83 .59 1002.68
.48 1004.44 -.07 1012.35 -.02 1015.25 -.11 1015.25 .09 1024.94 -.03 1027.97
-.13 1030.7 -.25 1033.1 -.38 1035.4 -.44 1037.52 -.48 1039.51 -.4 1041.46
-.3 1043.57 -.21 1045.86 -.21 1048.41 -.2 1050.7 -.26 1052.96 -.07 1055.02
-.17 1056.94 -.33 1059.38 -.14 1061.37 .3 1063.31 .56 1064.04 5.2 1068.19
5.63 1074.74 7.15 1081.3 8.28 1087.86 8.99 1107.53 9.84 1120.64 9.89 1127.2
10.69 1140.31 13.51 1146.87 14.73 1153.43 15.57 1159.98 15.78 1179.65 15.58
1212.44 16.01 1238.67 15.92 1251.78 15.97 1278.01 15.55 1291.12 15.53
1297.68 15.74 1310.79 15.87 1323.91 16.45 1337.02 16.76 1350.13 17.38
1382.92 18.09 1402.59 18.13 1461.6 17.19 1474.72 17.14 1487.83 17.39 1500.94
17.36 1514.06 17.67 1533.73 17.65 1559.96 17.36 1566.51 17.45 1579.63 17.36
1612.41 17.63 1618.97 17.55 1645.2 17.65 1658.31 17.61 1671.42 17.48 1677.98
17.54 1684.94 17.44 1691.5 17.45 1698.05 17.27 1704.6 17.11 1711.16 16.93
1717.71 16.97 1724.27 17.04 1730.82 16.89 1737.38 16.75 1743.93 16.62
1750.48 16.27 1757.04 16.32 1763.59 16.29 1770.15 16.07 1776.7 16.21 1783.25
16.05 1789.81 15.92 1796.36 15.89 1802.92 15.97 1809.47 15.82 1816.03 15.62
1822.58 15.72 1829.13 15.84 1835.69 15.84 1842.24 15.89 1848.8 15.9 1855.35
16 1861.91 15.95 1868.46 16.21 1875.01 16.58 1881.57 17.99 1888.12 18.83
1894.68 19.23 1901.23 19.28 1907.78 19.49 1914.34 19.66 1920.89 20.04
1927.45 20.4 1934 20.74 1940.56 21.15 1947.11 21.53 1953.66 22.01 1960.22
22.48 1966.77 22.98 1973.33 23.33 1979.88 23.74 1986.43 24.11 1992.99 24.38
1999.54 24.69 2006.1 25.22 2012.65 25.4 2019.21 25.48 2025.76 25.56 2032.31
25.89 2038.87 25.94 2045.42 25.93 2051.98 25.85 2058.53 25.87 2065.09 25.69
2071.64 25.76 2078.19 25.92 2084.75 25.93 2091.3 25.97 2097.86 26.09 2104.41

26.04 2110.96 26.07 2117.52 26.25 2124.07 26.3 2130.63 26.18 2137.18 25.96
2143.74 25.34 2150.29 24.53 2156.84 23.98 2163.4 23.52 2169.95 23.2 2176.51
23.37 2183.06 23.32 2189.62 23.46 2196.17 23.31 2202.72 23.43 2209.28 23.76
2215.83 23.77 2222.39 23.76 2228.94 23.78 2235.49 23.95 2242.05 24.09 2248.6
23.93 2255.16 23.43 2261.71 22.68 2268.27 22.2 2274.82 22.45 2281.37 22.63
2287.93 22.65 2294.48 23.19 2301.04 23.38 2307.59 23.4 2314.15 23.21 2320.7
22.85 2327.25 22.58 2333.81 22.23 2340.36 21.81 2346.92 21.51 2353.47 20.6
2360.02 18.99 2366.58 18.09 2373.13 17.73 2379.69 17.53 2386.24 17.53 2392.8
17.49 2399.35 17.3 2405.9 17.45 2412.46 17.83 2419.01 17.82 2425.57 17.84
2432.12 18.14 2438.68 18.44 2445.23 18.66 2451.78 18.8 2458.34 18.96 2464.89
19 2471.45 18.89 2478 18.81 2484.55 18.74 2491.11 18.64 2497.66 18.64
2504.22 18.65 2510.77 18.73 2517.33 18.79 2523.88 18.73 2530.43 18.84
2536.99 19.14 2543.54 19.49 2550.1 19.9 2556.65 20.5 2563.21 21.07 2569.76
21.38 2576.31 21.58 2582.87 22.02 2589.42 22.72 2595.98 23.89 2602.53 25.32
2609.08 26.58 2615.64 27.68 2622.19 28.53 2628.75 29.09 2635.3 29.55 2641.86
30.02 2648.41 30.49 2654.96 30.88 2661.52 31.03 2668.07 31.03 2674.63 31.12
2681.18 31.18 2687.74 31.18 2694.29 31.13 2700.84 31.06 2707.4 30.91 2713.95
30.79 2720.51 30.67 2727.06 30.32 2733.61 29.79 2740.17 29.15 2746.72 28.61
2753.28 28.39 2759.83 28.18 2766.39 28.06 2772.94 28.17 2779.49 28.15
2786.05 28.15 2792.6 28.41 2799.16 28.74 2805.71 28.85 2812.27 28.95 2818.82
29.02 2825.37 29.03 2831.93 28.98 2838.48 28.91 2845.04 28.73 2851.59 28.37
2858.14 27.92 2864.7 27.36 2871.25 26.79 2877.81 26.5 2884.36 26.41 2890.92
26.26 2897.47 26.31 2904.02 26.65 2910.58 26.77 2917.13 26.46 2923.69 25.61
2930.24 24.66 2936.8 24.37 2943.35 24.48 2949.9 24.21 2956.46 23.85 2963.01
24.68 2969.57 24.44 2976.12 24.25 2982.67 24.19 2989.23 24.33 2995.78 24.2
3002.34 24.11 3008.89 23.99 3015.45 23.82 3022 23.82 3028.55 23.59 3035.11
23.31 3041.66 23.12 3048.22 23.2 3054.77 23.41 3061.33 23.66 3067.88 23.69
3074.43 23.73 3080.99 23.81 3087.54 23.97 3094.1 24.13 3100.65 23.9 3107.2
23.72 3113.76 23.88 3120.31 23.91 3126.87 23.9 3133.42 23.97 3139.98 24.12
3146.53 24.29 3153.08 24.35 3159.64 24.4 3166.19 24.5 3172.75 24.64 3179.3
24.78 3185.85 25.27 3192.41 26.17

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .088 878.09 .04 1159.98 .08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 878.09
1159.98 1747.9 1742.19 1739.19 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 1403 3192.41 18.13 F

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 47008.56

INPUT
Description: 47
Station Elevation Data num= 157
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 22.35 19.61 23.42 39.23
22.11 411.89 21.91 509.96 22.24 575.34 24.98 653.8 24.79 974.16 22.94
1026.46 20.6 1098.38 20.41 1111.46 20.93 1137.61 20.71 1150.68 22.17 1281.44
21.45 1359.9 19 1431.81 19.33 1464.49 18.28 1536.38 10.95 1555.99 11.28

1562.53 10.51 1565.97 9.52 1569.06 8.64 1575.6 5.69 1593.04 2.11 1594 2.05
1595.04 2 1596 1.96 1597.09 1.91 1598.26 1.89 1599.56 1.85 1600.77 1.83
1602.06 1.8 1603.17 1.68 1604.54 1.62 1605.81 1.58 1607.19 1.59 1608.42 1.56
1609.92 1.55 1611.14 1.49 1611.14 1.74 1613.6 1.51 1614.77 1.41 1615.9 1.36
1617.2 1.35 1618.32 1.26 1619.5 1.28 1620.62 1.23 1621.84 1.2 1622.93 1.43
1624.19 1.37 1625.42 1.14 1626.76 1.1 1628.03 1.13 1629.44 1.02 1630.78 1.05
1632.14 1.23 1633.32 1.17 1634.55 1.05 1635.72 .95 1636.96 .9 1639.29 .81
1641.91 1.08 1642.75 1.07 1643.84 .81 1644.84 .93 1646.24 .45 1647.9 .15
1650.88 -.03 1653.84 -.11 1656.61 -.24 1659.26 -.33 1662.04 -.39 1664.51
-.37 1667.23 -.37 1669.64 -.31 1674.11 -.51 1680.96 -1.01 1681.41 -.5
1683.45 -.4 1685.38 -.06 1687.91 4.48 1693.24 4.98 1699.78 7.16 1706.32 8.28
1712.85 8.7 1719.39 9.29 1725.92 10.04 1732.46 10.43 1738.99 10.6 1745.53
10.83 1752.07 10.95 1758.6 11.18 1765.14 11.72 1771.67 12.42 1778.21 13.11
1784.75 13.58 1791.28 13.75 1797.82 13.99 1830.5 11.56 1837.03 10.27 1843.57
9.69 1908.93 9.81 1928.53 12.65 1935.07 14.42 1948.14 15.19 1993.89 23.11
2000.43 23.22 2039.64 26.97 2150.75 32.86 2157.29 33.56 2163.82 33.05
2222.64 34.79 2242.25 35.85 2425.25 38.68 2457.93 37.32 2503.68 36.85
2557.35 31.44 2577 30.21 2603.19 31.25 2622.84 30.51 2681.77 21.22 2753.81
23.64 2780 22.24 2786.55 21.25 2812.74 13.66 2819.29 12.78 2871.68 13
2884.78 13.45 2897.88 12.5 2917.52 12.85 2937.17 14.19 2976.46 13.2 3015.75
10.73 3081.24 10.41 3087.79 10.87 3094.33 10.72 3100.88 9.93 3159.82 10.81
3172.92 10.38 3231.85 13.83 3271.15 13.77 3310.44 17.87 3421.76 23.3 3565.83
23 3670.61 19.75 3736.09 21.8 3742.64 22.62 3749.19 24.99 3755.74 26.26
3775.39 27.73 3788.48 27.37 3808.13 24.53 3821.23 20.66 3827.77 20.72
3847.42 23.87 3893.26 25.1 3958.75 31.19

Manning's n Values num= 3 Sta n Val Sta n Val Sta n Val
 0 .085 1431.81 .04 1797.82 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1431.81
1797.82 1593.35 1644.1 1707.52 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 45364.46

INPUT
Description: 46
Station Elevation Data num= 399
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 24.22 13.09 24.02 26.19
24.06 32.73 23.94 52.37 24.09 65.46 23.47 78.56 23.32 85.1 22.84 91.65 22.66
104.74 22.54 130.93 23.34 144.02 23.19 150.56 22.98 157.11 23.2 176.75 23.06
196.39 22.68 202.93 22.8 209.48 23.1 216.03 23.15 222.57 22.86 255.3 22.84
281.49 22.29 288.04 22.25 294.58 21.69 307.68 21.49 314.22 21.01 320.77
20.86 340.41 21.07 353.5 20.94 360.05 21.03 373.14 20.74 392.78 20.76 399.32
20.65 405.87 20.81 425.51 20.8 438.6 21.18 445.15 21.2 458.24 20.82 471.33
20.83 477.88 21.16 484.42 21.26 497.52 21.17 510.61 20.75 517.16 20.4 530.25
20.16 543.34 20.49 556.43 20.55 562.98 20.32 569.53 20.75 576.07 20.55
582.62 19.83 595.71 19.29 608.8 18.96 615.35 19.3 621.9 19.29 634.99 19.83
654.63 19.59 674.27 19.98 700.45 19.91 713.54 19.96 726.64 19.8 739.73 19.1
752.82 19.09 759.37 18.97 765.91 18.99 772.46 18.61 779.01 18.78 792.1 18.2
798.65 18.01 811.74 18.1 818.28 18.28 824.83 18.15 851.02 17.12 864.11 17.12

870.66 17.23 883.75 16.61 890.29 16.03 896.84 16.05 903.39 16.6 909.93 16.26
923.03 16.16 936.12 15.76 942.66 15.88 949.21 15.79 968.85 15.9 975.4 15.72
988.49 16.11 995.03 16.02 1001.58 16.09 1021.22 15.77 1027.77 16 1034.31
16.9 1040.86 18 1053.95 18.66 1067.04 19.08 1073.59 19.11 1099.77 20 1119.41
20.45 1132.51 20.33 1145.6 20.65 1165.24 20.73 1178.33 20.52 1184.88 20.53
1191.42 20.79 1204.52 20.91 1211.06 21.19 1230.7 21.32 1250.34 20.81 1263.43
20.18 1276.52 19.95 1283.07 19.53 1296.16 19.43 1302.71 19.82 1328.89 20.33
1335.44 20.56 1348.53 20.65 1361.63 21.17 1374.72 21.49 1381.27 22.13
1387.81 22.14 1394.36 22.29 1400.9 22.19 1407.45 21.72 1414 20.93 1427.09
18.99 1440.18 17.38 1446.73 16.94 1453.27 16.84 1459.82 16.58 1466.37 16.59
1479.46 16.04 1486.01 15.5 1492.55 15.11 1499.1 15.09 1505.64 15.39 1525.28
15.58 1531.83 15.75 1538.38 15.78 1571.11 15.35 1584.2 16.65 1590.75 16.93
1597.29 16.69 1603.84 17.85 1610.38 18.86 1616.93 19.33 1630.02 18.47
1636.57 17.76 1649.66 15.52 1656.21 14.2 1662.76 13.51 1675.85 11.43 1688.94
11.06 1695.49 11.09 1702.03 10.94 1708.58 11.12 1754.4 11.28 1767.5 10.74
1780.59 11.18 1787.13 11.12 1819.87 11.41 1826.41 11.33 1832.96 11.4 1846.05
10.92 1852.6 10.21 1865.69 9.74 1878.78 9.09 1898.42 9.23 1918.06 8.74
1937.7 8.66 1950.79 8.76 1976.97 8.6 1996.6 8.21 2016.24 8.24 2022.78 8
2042.42 7.96 2048.96 8.07 2075.14 7.87 2088.23 8.02 2101.32 7.92 2114.41
7.67 2120.96 7.76 2140.59 7.71 2153.68 8.14 2160.23 8.48 2166.77 9.31
2173.32 10.43 2179.86 11.07 2199.5 12.27 2206.04 12.89 2212.59 13.73 2225.68
14.05 2251.86 13.58 2264.95 12.83 2271.49 12.3 2284.58 12.17 2291.13 12.25
2297.67 11.92 2317.3 11.8 2350.03 11.32 2356.57 11.49 2369.66 11.49 2376.21
11.7 2395.84 11.79 2415.48 11.46 2422.02 11.16 2428.57 11 2435.11 10.42
2448.2 9.64 2454.75 9.62 2467.84 10.54 2474.38 11.8 2487.47 13.15 2500.56
14.2 2513.65 14.79 2526.74 14.76 2539.83 14.17 2546.38 12.78 2552.92 11.55
2559.47 10.67 2572.56 9.26 2579.1 8.11 2585.65 5.56 2586.56 5.35 2600 .52
2600.61 .42 2601.19 .4 2601.87 .42 2602.29 .4 2602.73 .37 2603.1 .37
2603.86 .49 2604.65 .47 2605.77 .23 2607.03 .2 2608.55 .19 2609.98 .17
2611.55 .13 2613.01 .03 2614.55 -.11 2615.91 -.13 2617.33 -.2 2618.58 -.2
2619.89 -.24 2621.04 -.37 2622.28 -.31 2624.56 -.54 2625.64 -.66 2626.9 -.75
2628.25 -.84 2630.51 -.87 2632.68 -.94 2634.81 -.94 2637.07 -.89 2639.38
-.87 2641.62 -.92 2643.07 -1.01 2645.32 -1.02 2647.52 -1.01 2649.67 -1.02
2651.76 -1.01 2653.71 -1.02 2655.48 -1.01 2657.1 -1.02 2658.74 -.94 2660.51
-.85 2662.65 -.65 2664.94 -.58 2666.54 -.32 2668.07 -.15 2669.66 -.05
2671.15 .09 2672.78 .21 2674.22 .39 2675.71 .43 2677.07 .58 2678.48 .56
2678.48 .67 2680.85 .63 2681.93 .64 2692.83 7.87 2696.91 9.56 2703.46 11.34
2710 12.18 2716.55 12 2723.09 11.46 2736.18 9.62 2742.73 8.86 2749.27 8.27
2755.82 7.92 2782 7.59 2801.63 7.14 2821.27 6.9 2847.44 7.31 2853.99 6.5
2860.53 6.94 2867.08 7.75 2880.17 8.08 2886.71 8.98 2893.26 10.36 2899.8
11.57 2906.35 12.23 2919.44 13.31 2932.53 13.53 2945.62 13.26 2958.71 12.62
2971.8 12.39 2984.89 12.68 2991.43 12.64 2997.98 12.37 3004.52 12.39 3017.61
12.81 3024.16 13.14 3037.25 14.26 3063.43 15.43 3076.52 16.16 3089.61 16.07
3115.79 15.47 3128.88 15.62 3148.51 16.4 3161.6 16 3168.15 16.11 3187.78
17.07 3207.42 17.15 3220.51 17.32 3240.14 18.14 3253.23 19.22 3259.78 20.05
3272.87 23.03 3279.41 23.57 3285.96 23.68 3292.5 23.65 3305.59 24.02 3318.68
24.8 3351.41 26.23 3377.58 26.8 3403.76 27.05 3416.85 27.09 3423.4 27.36
3475.76 27.61 3495.39 27.23 3501.94 26.94 3515.03 26.81 3521.57 26.96
3547.75 27.06 3560.84 26.89 3573.93 27.05 3587.02 27.61 3606.66 28.86
3632.84 29.98 3652.47 30.15 3665.56 30.54 3672.11 30.48 3691.74 30.94
3704.83 31.41 3731.01 31.9 3750.65 33.01 3783.37 33.9 3789.92 34.17 3803.01
34.33 3816.1 34.18 3881.55 35.22 3888.09 35.14 3914.27 35.82 3920.81 36.23
3927.36 36.85 3946.99 38.92 3953.54 39.37 3966.63 41.38 3973.17 41.36
3979.72 41.06 3986.26 40.41 3992.81 39.61 3999.35 39.39 4012.44 39.88

4018.99 40.33 4025.53 41.66 4032.08 44.38 4038.62 45.27 4045.17 42.66
4051.71 40.25 4058.26 40.19 4064.8 41.01 4071.35 41.33 4077.89 41.45 4084.44
40.7 4104.07 40.8 4123.71 41.04 4130.25 41.49 4156.43 42.43 4162.98 42.57
4176.07 42.64 4208.79 43.75 4221.88 44.35 4228.42 44.89 4234.97 45.64
4241.51 46.16 4248.06 46.38 4254.6 46.38 4261.15 46.11

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 2526.74 .04 2716.55 .08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2526.74
2716.55 1089.81 1089.81 1089.81 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 1119 20.4 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 44274.65

INPUT
Description: 45
Station Elevation Data num= 338
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 22.72 6.54 23.28 13.08 23.8
19.62 24.21 26.16 24.44 45.86 24.21 72.06 23.55 85.16 22.64 91.71 22.32
104.81 22.1 117.91 21.67 137.57 21.7 157.22 21.89 170.32 21.73 196.52 20.86
203.07 20.56 216.17 20.67 235.83 20.26 242.38 19.98 275.13 19.57 307.88
19.05 334.09 19.23 360.29 19.88 373.39 19.74 379.94 19.49 386.49 19.53
393.04 19.82 399.6 19.76 406.15 19.41 412.7 19.46 425.8 19.77 445.45 19.94
458.55 20.28 484.75 20.23 497.86 20.28 510.96 19.86 550.26 19.22 563.36
19.22 609.22 17.92 641.97 17.54 655.07 17.67 687.83 17.03 707.48 16.37
714.03 16.27 733.68 16.36 772.99 17.23 786.09 17.09 799.19 17.19 812.29
17.07 818.84 17.19 825.39 17.1 838.49 15.93 845.05 15.61 877.8 12.03 884.35
11.55 904 10.71 917.1 9.91 923.65 10.24 930.2 10.81 936.76 11.08 949.86
10.45 956.41 10.4 969.51 11.02 989.16 11.44 1008.81 11.68 1021.92 11.12
1035.02 10.66 1048.12 9.97 1054.67 9.8 1061.22 9.93 1067.77 10.36 1087.42
11.04 1093.97 11.05 1107.08 11.51 1113.63 11.64 1120.18 11.94 1126.73 13.14
1139.83 15.76 1146.38 16.57 1152.93 16.73 1166.03 15.76 1172.58 15.65
1185.68 16.47 1198.79 16.42 1205.34 16.2 1211.89 15.84 1224.99 15.39 1238.09
15.21 1270.84 15.35 1290.5 14.92 1297.05 14.89 1323.25 14.25 1329.8 14.26
1342.9 14.01 1349.45 13.78 1362.56 13.14 1382.21 12.97 1401.86 13.18 1408.41
12.54 1409.45 12.23 1414.96 10.58 1421.51 7.89 1428.06 5.17 1435 .49 1435.31
.46 1435.81 .43 1436.17 .35 1436.54 .35 1436.81 .3 1437.23 .33 1437.84 .3
1438.66 .21 1439.78 .16 1441.2 .04 1442.68 -.08 1444.55 -.16 1446.25 -.24
1449.89 -.44 1451.72 -.63 1453.28 -.7 1454.86 -.75 1456.16 -.89 1460.26 -.97
1462.4 -.95 1464.65 -.92 1467.15 -.83 1469.75 -.95 1471.55 -1.02 1474.35
-.99 1477.05 -1.22 1479.99 -1.38 1482.8 -1.42 1485.37 -1.38 1487.5 -1.43
1489.77 -1.34 1492.19 -1.26 1494.37 -1.3 1496.54 -1.36 1498.66 -1.44 1500.64
-1.43 1503.09 -1.39 1505.36 -1.25 1507.52 -.91 1519.77 6.08 1526.32 6.75
1530.73 7.05 1532.88 7.2 1539.43 7.51 1545.98 8.43 1559.08 9.46 1565.63 9.5
1572.18 9.27 1585.28 8.36 1598.38 7.88 1604.93 7.81 1611.48 7.51 1618.04
7.51 1624.59 7.68 1637.69 7.44 1670.44 8.86 1676.99 9.23 1683.54 10.09
1690.09 10.67 1703.2 11.11 1716.3 11.15 1729.4 10.98 1735.95 11.88 1742.5

12.4 1749.05 12.74 1762.15 13.06 1781.81 12.88 1801.46 13.4 1808.01 13.46
1814.56 13.93 1821.11 14.26 1834.21 14.13 1893.17 15.43 1899.72 16.25
1919.37 16.65 1925.92 16.62 1932.47 16.85 1939.02 16.82 1952.13 17.5 1971.78
18.14 1978.33 18.08 1991.43 18.84 2011.08 20.78 2017.63 23.08 2024.18 24.73
2030.73 27.31 2037.29 30.36 2043.84 30.34 2050.39 29.23 2056.94 30.18
2063.49 32.23 2070.04 30.94 2076.59 27.11 2083.14 25.13 2089.69 25 2099.58
25.24 2106.11 25.57 2112.63 27.03 2119.16 28.62 2125.68 27.7 2132.2 26.46
2138.73 25.82 2145.25 25.89 2151.77 26.31 2158.3 26.42 2164.82 26.44 2171.34
26.76 2177.87 26.66 2184.39 27.23 2190.91 27.1 2197.44 27.38 2203.96 27.21
2210.48 27.35 2217.01 27.52 2223.53 27.74 2230.05 27.92 2236.58 27.97 2243.1
28.09 2249.62 28.21 2256.15 28.41 2262.67 28.48 2269.2 28.57 2275.72 28.75
2282.24 28.89 2288.77 28.99 2295.29 29.04 2301.81 29.2 2308.34 29.36 2314.86
30.63 2321.38 33.6 2327.91 36.59 2334.43 38.9 2340.95 39.84 2347.48 37.37
2354 33.74 2360.52 31.51 2367.05 31.03 2373.57 31.12 2380.09 31.45 2386.62
31.72 2393.14 31.76 2399.66 31.37 2406.19 30.69 2412.71 30.21 2419.24 29.85
2425.76 29.43 2432.28 29.32 2438.81 29.48 2445.33 29.51 2451.85 29.59
2458.38 29.73 2464.9 29.78 2471.42 29.85 2477.95 29.87 2484.47 29.81 2490.99
29.95 2497.52 30.04 2504.04 30 2510.56 30.08 2517.09 30.34 2523.61 31.56
2530.13 32.52 2536.66 33.07 2543.18 33.22 2549.7 33.24 2556.23 33.28 2562.75
33.31 2569.28 33.4 2575.8 33.46 2582.32 33.57 2588.85 33.47 2595.37 33.28
2601.89 33.34 2608.42 33.56 2614.94 33.65 2621.46 33.68 2627.99 33.64
2634.51 33.6 2641.03 33.72 2647.56 33.78 2654.08 33.8 2660.6 33.77 2667.13
34.13 2673.65 34.37 2680.17 34.6 2686.7 34.79 2693.22 34.7 2699.74 34.83
2706.27 34.5 2712.79 34.54 2719.31 34.56 2725.84 34.52 2732.36 34.46 2738.89
34.64 2745.41 35.09 2751.93 35.95 2758.46 37.4 2764.98 39.56 2771.5 40.1
2778.03 41.62 2784.55 42.23 2791.07 41.87 2797.6 41.36 2804.12 41.3 2810.64
40.48 2817.17 39.81 2823.69 39.64 2830.21 39.97 2836.74 40.31 2843.26 40.12
2849.78 40.41 2856.31 41.03 2862.83 41.54 2869.35 41.77 2875.88 41.98 2882.4
42.35 2888.93 43.35 2895.45 44.01 2901.97 44.36 2908.5 44.54 2915.02 44.29
2921.54 43.92 2928.07 43.67 2934.59 43.4 2941.11 43.16 2947.64 42.73 2954.16
42.51 2960.68 42.17 2967.21 41.62 2973.73 41.08 2980.25 40.72 2986.78 40.53
2993.3 40.45 2999.82 40.02

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 1401.86 .04 1565.63 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1401.86
1565.63 891.42 891.42 891.42 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 1146 20 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 43383.23

INPUT
Description: 44 Approach Old Col Ave Station Elevation Data num= 247
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 24.32 6.56 24.43 13.12 24.4
19.68 24.31 26.24 24.17 32.8 24 45.92 23.58 65.6 22.52 78.71 22.12 98.39
21.99 111.51 21.71 131.19 21.49 137.75 21.31 144.31 20.91 150.87 20.8
177.11 21.13 190.23 21.21 196.79 21.46 209.91 22.33 249.26 23.83 262.38

```
24.21 275.5 24.38 295.18 25.73 314.86 26.39 327.98 26.52  334.54 26.44 354.22
25.91 360.78 25.61 367.34 25.69 380.46 26.77  393.57 27.36 419.81 27.83
432.93 27.41 439.49 27.35 452.61 27.54  459.17 27.47 472.29 26.58 485.41
26.72 498.53 26.53 505.09 26.01  511.65 24.76 518.21 24.19 524.77 23.78
544.45 23.45 557.56 23.38  564.12 23.2 570.68 22.3 577.24 20.37 583.8 19.15
590.36 19.91  603.48 19.89 616.6 19.48 655.96 19.84 662.52 19.81 708.44 17.82
728.11 16.54 734.67 16.33 747.53 18.02 760.38 17.88 773.23 17.58  779.18
17.04 782.82 17.38 804.92 .84 806.63 -1.88 815.2 -1.42  822.9 -1.62 838.64 -
1.36 857.61 -1.43 872.98 -1.39 875.21 2.27  891.76 9.03 911.39 14.65 927.67
15.45 934.19 18.44 940.72 20.74  947.25 21.1 953.77 21.58 960.3 22.08 966.83
21.85 973.35 21.2  979.88 20.58 986.41 19.99 992.93 19.37 999.46 18.85
1005.99 18.48  1012.51 18.23 1019.04 17.87 1025.57 17.42 1032.09 17.27
1038.62 16.51  1045.15 14.19 1051.67 11.24 1058.2 9.73 1064.73 10.13 1071.25
10.26  1077.78 10.16 1084.31 10.36 1090.83 10.53 1097.36 10.5 1103.89 10.52
1110.41 10.6 1116.94 10.51 1123.47 10.56 1129.99 10.82 1136.52 11.25  1143.05
11.45 1149.57 11.62 1156.1 11.81 1162.63 11.77 1169.15 11.97  1175.68 12.15
1182.21 12.43 1188.73 13.13 1195.26 14.22 1201.79 14.66  1208.31 14.67
1214.84 14.93 1221.37 15.37 1227.89 15.67 1234.42 15.64  1240.95 15.4 1247.47
15.25 1254 15.38 1260.53 15.39 1267.05 15.42  1273.58 15.31 1280.11 14.99
1286.63 14.75 1293.16 14.49 1299.69 14.46  1306.21 14.55 1312.74 14.88
1319.27 15.29 1325.79 15.42 1332.32 15.32  1338.85 15.28 1345.37 15.35 1351.9
15.3 1358.43 15.21 1364.95 15.16  1371.48 15.14 1378.01 15.19 1391.06 15.46
1397.59 15.79 1404.11 15.87  1410.64 16.05 1417.17 16.3 1430.22 16.64 1436.75
16.75 1443.27 16.72  1449.8 16.53 1456.33 17.11 1462.85 17.38 1469.38 17.59
1475.91 17.5  1482.43 17.32 1488.96 17.24 1495.49 17.37 1502.01 17.36 1508.54
17.48  1515.07 17.64 1521.59 17.75 1528.12 17.91 1541.17 17.84 1547.7 17.93
1554.23 18.04 1560.75 18.5 1567.28 18.66 1573.81 18.61 1580.33 18.58  1586.86
18.57 1599.91 18.51 1612.97 18.43 1626.02 18.33 1632.55 18.27  1639.07 18.17
1652.13 17.82 1658.65 17.71 1665.18 17.49 1672.8 17.35  1679.33 17.35 1685.86
17.28 1692.39 17.15 1698.92 17.02 1705.45 17.06  1711.98 17.08 1718.51 17.07
1725.04 16.97 1731.57 16.88 1738.1 16.83  1744.63 16.81 1751.16 16.54 1757.69
16.22 1764.22 16.15 1770.75 16.39  1777.28 16.49 1783.81 16.7 1790.34 16.9
1796.87 17.01 1803.4 17.12  1809.93 17.22 1816.46 17.31 1822.99 17.35 1829.52
17.34 1836.05 17.28  1842.58 17.78 1849.11 18.61 1855.64 19.3 1862.17 19.77
1868.7 20.06  1875.23 20.32 1881.76 20.56 1888.29 20.72 1894.82 20.87 1901.35
21.09  1907.88 21.37 1914.41 21.53 1920.94 21.6 1927.47 21.71 1934 21.92
1940.53 22.29 1947.06 22.62 1953.59 22.87 1960.12 23.33 1966.65 24.07
1973.18 24.76 1979.71 25.16 1986.24 25.28 1992.77 25.13 1999.3 24.97  2005.83
24.92 2012.36 24.99 2018.89 25.13 2025.42 25.28 2031.95 25.32  2038.48 25.37
2045.01 25.54 2051.54 25.55 2058.07 25.59 2064.6 26.03  2071.13 26.81 2077.67
27.05 2084.19 27.19 2090.73 27.57 2097.25 27.89  2103.79 28.2 2110.31 28.43

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 782.82 .04 960.3 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  782.82
960.3 47.15 47.15 47.15 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 960.3 2110.31 22 T
Blocked Obstructions num= 1
 Sta L Sta R Elev
 655 748 19.857
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CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 43336.08

INPUT
Description: 43.7 US Face Old Col Ave
Station Elevation Data num= 195
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 24.19 6.51 24.21 13.03 24.2
19.54 24.03 26.05 23.7 32.57 23.58 39.08 23.51 45.59 23.46 58.62 23.44 65.13
23.2 71.65 23.04 84.67 22.68 91.19 22.69 97.7 22.6 110.73 22.67 117.24
22.58 123.75 22.59 130.27 22.64 136.78 22.75 143.29 22.73 156.32 21.9 162.84
21.73 169.35 21.81 175.86 21.93 182.38 21.8 188.89 22.01 195.4 22.27 201.92
22.31 208.43 22.54 214.94 22.94 221.46 23.17 227.97 23.44 234.48 23.75 241
24.14 247.51 24.41 254.02 24.18 260.54 23.88 273.56 24.85 286.59 25.5 293.1
25.47 299.62 25.34 306.13 25.43 312.64 25.56 319.16 25.71 325.67 25.75
338.7 25.62 345.21 25 351.72 24.4 364.75 24.74 371.26 26 377.78 27.72 384.29
27.9 397.32 27.77 403.83 27.77 410.34 27.82 416.86 27.27 423.37 26.28 429.88
25.21 436.4 24.9 442.91 24.84 449.42 24.82 455.94 25.02 462.45 25.46 468.96
25.79 475.48 25.87 481.99 25.8 488.5 25.68 495.02 25.05 501.53 24.48 508.05
24.22 514.56 24.39 521.07 24.44 527.59 24.28 534.1 24.19 540.61 24.14
547.13 24.06 553.64 23.87 560.15 23.78 566.67 23.65 573.18 23.56 579.69
23.16 586.21 21.59 592.72 20.47 599.23 20.22 605.75 20.15 618.77 20.16
625.29 20.11 631.8 19.96 638.31 19.89 644.83 19.78 651.34 19.79 657.85 19.55
664.37 19.56 670.88 19.34 677.39 19.14 690.42 18.98 696.93 18.95 703.45
18.86 709.96 18.7 716.47 18.61 722.99 18.54 729.37 18.6 735.75 18.37 742.14
17.67 748.52 17.71 754.9 18.36 767.67 18.67 774.05 18.87 786.82 18.63 793.2
18.69 800 18.61 813.24 18.53 813.83 6.68 825.05 2.39 834.23 1.19 843.59 -.5
852.49 .12 862 -.79 871.93 -1.17 881.42 .47 889.92 .24 900.13 .31 900.21
18.89 914.58 18.79 927.25 17.92 933.78 18 940.3 17.8 946.83 17.84 959.88
17.47 979.46 17.35 985.99 17.07 1012.09 16.89 1031.67 16.46 1038.19 16.51
1044.72 16.34 1057.77 16.22 1064.3 16.05 1070.82 15.57 1077.35 15.38 1083.87
14.93 1090.4 14.34 1103.45 14.18 1116.5 14.18 1129.55 13.37 1136.08 13.27
1142.6 12.96 1155.66 12.79 1168.71 13.07 1175.23 12.91 1188.29 13.76 1194.81
13.98 1201.34 14.48 1207.86 14.83 1220.91 14.85 1227.44 14.97 1240.49 14.79
1247.02 14.91 1260.07 15.52 1266.59 15.61 1286.17 15.09 1292.7 15.04 1305.75
15.24 1318.8 15.08 1325.33 15.18 1338.38 15.79 1344.9 15.72 1351.43 15.46
1364.48 15.46 1390.58 15.83 1403.64 15.86 1429.74 16.48 1455.84 16.61
1462.37 16.95 1468.89 17.44 1475.42 17.68 1481.94 17.54 1488.47 17.2 1495
17.15 1501.52 16.96 1508.05 16.96 1514.57 17.18 1521.1 17.14 1560.25 17.51
1573.31 17.85 1599.41 18.07 1605.93 17.98 1618.99 18.39 1625.51 18.42
1632.04 18.14 1645.09 18.06 1651.62 17.86 1658.14 17.86 1664.67 17.63 1697.3
17.48 1710.35 17.36

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .085 813.24 .04 900.21 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 813.24
900.21 52.88 52.88 52.88 .5 .8 Ineffective Flow num= 2
Sta L Sta R Elev Permanent
0 800 20.9 T
927 1710.35 20 T

BRIDGE

RIVER: Taunton River
REACH: Main Stem RS: 43308.41

INPUT
Description: 43.5 Old Colony Ave/South St
Distance from Upstream XS = 7
Deck/Roadway Width = 35
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 15 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
522 23.85 547 22.5 616 21.01
703 18.8 792 18.58 793 20.95 14.54
820 20.9 14.54 820 22.1 14.54 822 22.1 14.54
912 21.74 14.29 914 20.04 933 20.04
1008 16.88 1131 15.63 1299 15.16

Upstream Bridge Cross Section Data
Station Elevation Data num= 195
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 24.19 6.51 24.21 13.03 24.2
19.54 24.03 26.05 23.7 32.57 23.58 39.08 23.51 45.59 23.46 58.62 23.44 65.13
23.2 71.65 23.04 84.67 22.68 91.19 22.69 97.7 22.6 110.73 22.67 117.24
22.58 123.75 22.59 130.27 22.64 136.78 22.75 143.29 22.73 156.32 21.9 162.84
21.73 169.35 21.81 175.86 21.93 182.38 21.8 188.89 22.01 195.4 22.27 201.92
22.31 208.43 22.54 214.94 22.94 221.46 23.17 227.97 23.44 234.48 23.75 241
24.14 247.51 24.41 254.02 24.18 260.54 23.88 273.56 24.85 286.59 25.5 293.1
25.47 299.62 25.34 306.13 25.43 312.64 25.56 319.16 25.71 325.67 25.75
338.7 25.62 345.21 25 351.72 24.4 364.75 24.74 371.26 26 377.78 27.72 384.29
27.9 397.32 27.77 403.83 27.77 410.34 27.82 416.86 27.27 423.37 26.28 429.88
25.21 436.4 24.9 442.91 24.84 449.42 24.82 455.94 25.02 462.45 25.46 468.96
25.79 475.48 25.87 481.99 25.8 488.5 25.68 495.02 25.05 501.53 24.48 508.05
24.22 514.56 24.39 521.07 24.44 527.59 24.28 534.1 24.19 540.61 24.14
547.13 24.06 553.64 23.87 560.15 23.78 566.67 23.65 573.18 23.56 579.69
23.16 586.21 21.59 592.72 20.47 599.23 20.22 605.75 20.15 618.77 20.16
625.29 20.11 631.8 19.96 638.31 19.89 644.83 19.78 651.34 19.79 657.85 19.55
664.37 19.56 670.88 19.34 677.39 19.14 690.42 18.98 696.93 18.95 703.45
18.86 709.96 18.7 716.47 18.61 722.99 18.54 729.37 18.6 735.75 18.37 742.14
17.67 748.52 17.71 754.9 18.36 767.67 18.67 774.05 18.87 786.82 18.63 793.2
18.69 800 18.61 813.24 18.53 813.83 6.68 825.05 2.39 834.23 1.19 843.59 -.5
852.49 .12 862 -.79 871.93 -1.17 881.42 .47 889.92 .24 900.13 .31 900.21
18.89 914.58 18.79 927.25 17.92 933.78 18 940.3 17.8 946.83 17.84 959.88
17.47 979.46 17.35 985.99 17.07 1012.09 16.89 1031.67 16.46 1038.19 16.51
1044.72 16.34 1057.77 16.22 1064.3 16.05 1070.82 15.57 1077.35 15.38 1083.87
14.93 1090.4 14.34 1103.45 14.18 1116.5 14.18 1129.55 13.37 1136.08 13.27
1142.6 12.96 1155.66 12.79 1168.71 13.07 1175.23 12.91 1188.29 13.76 1194.81
13.98 1201.34 14.48 1207.86 14.83 1220.91 14.85 1227.44 14.97 1240.49 14.79
1247.02 14.91 1260.07 15.52 1266.59 15.61 1286.17 15.09 1292.7 15.04 1305.75
15.24 1318.8 15.08 1325.33 15.18 1338.38 15.79 1344.9 15.72 1351.43 15.46
1364.48 15.46 1390.58 15.83 1403.64 15.86 1429.74 16.48 1455.84 16.61
1462.37 16.95 1468.89 17.44 1475.42 17.68 1481.94 17.54 1488.47 17.2 1495
17.15 1501.52 16.96 1508.05 16.96 1514.57 17.18 1521.1 17.14 1560.25 17.51
1573.31 17.85 1599.41 18.07 1605.93 17.98 1618.99 18.39 1625.51 18.42

1632.04 18.14 1645.09 18.06 1651.62 17.86 1658.14 17.86 1664.67 17.63 1697.3 17.48 1710.35 17.36

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 813.24 .04 900.21 .085

Bank Sta: Left Right Coeff Contr. Expan. 813.24 900.21 .5 .8
Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 800 20.9 T
 927 1710.35 20 T

Downstream Deck/Roadway Coordinates
 num= 15
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 554 23.85 579 22.5 648 21.01
 735 18.8 824 18.58 825 20.95 14.54
 852 20.9 14.54 852 22.1 14.54 854 22.1 14.54
 944 21.74 14.29 946 20.04 965 20.04
 1040 16.88 1163 15.63 1331 15.16

Downstream Bridge Cross Section Data
Station Elevation Data num= 185
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 23.86 6.53 23.85 26.11 23.59 45.7 24.19 52.22 24.3 84.87 23.81 97.92 23.13 104.45 23.21 137.09 24.54 143.62 24.67 156.67 24.5 163.2 24.14 169.73 23.98 182.79 23.38 195.84 23.62 202.37 23.62 228.48 23.88 241.54 23.9 261.12 24.17 280.71 24.05 306.82 24.45 319.88 24.33 345.99 24.77 378.63 24.86 391.69 24.58 398.21 24.71 411.27 25.79 424.33 25.96 430.85 26.15 443.91 26.06 456.97 25.44 463.5 25.59 476.55 25.32 496.14 25.21 509.19 24.92 515.72 24.92 522.25 24.74 541.83 24.44 548.36 24.14 554.89 23.3 561.42 22.73 581 22.23 587.53 22.23 600.58 21.38 607.11 20.76 620.17 20.02 626.7 20.5 633.23 20.78 646.28 20.65 698.51 19.53 705.03 19.23 711.56 19.08 750.73 19.43 757.14 19.18 776.36 19.03 795.59 19.56 808.41 19.16 814.81 18.6 821.22 16.91 834.04 12.14 840.45 10.86 844.39 9.96 846.85 9.4 860.05 2.39 869.23 1.19 878.59 -.5 887.49 .12 897 -.79 906.93 -1.17 916.42 .47 924.92 .24 935.13 .31 935.21 18.89 949.58 18.79 964.58 18.79 975.02 17.17 981.43 17.3 987.96 17.22 994.5 17.24 1001.03 17.28 1007.57 17.29 1014.1 17.25 1020.63 17.14 1027.17 17.09 1033.7 17.12 1040.24 17.06 1046.77 16.98 1053.31 16.95 1066.37 16.85 1072.91 16.88 1079.44 16.83 1085.98 16.59 1092.51 16.33 1099.05 16.29 1105.58 16.29 1112.12 16.25 1118.65 16.27 1125.18 16.2 1131.72 16.06 1138.25 16.02 1144.79 16.01 1157.86 15.88 1164.39 15.83 1170.92 15.87 1177.46 15.8 1183.99 15.79 1190.53 15.89 1197.06 15.89 1203.6 15.82 1210.13 15.8 1216.66 15.81 1223.2 15.8 1229.73 15.75 1236.27 15.49 1242.8 15.11 1249.34 14.89 1262.41 14.89 1268.94 14.95 1275.47 15.16 1282.01 15.44 1288.54 15.82 1295.08 15.87 1301.61 15.85 1308.15 15.93 1314.68 16.14 1321.21 15.87 1327.75 15.53 1334.28 15.31 1340.82 15.49 1347.35 15.57 1360.42 15.63 1366.95 15.83 1373.49 15.86 1380.02 16.09 1386.56 16.46 1393.09 16.63 1399.63 16.67 1406.16 16.76 1419.23 17.07 1425.76 17.06 1432.3 17.2 1438.83 17.12 1445.37 17.23 1458.44 17.3 1464.97 17.36 1471.5 17.3 1478.04 17.31 1484.57 17.17 1491.11 17.08 1497.64 17.05 1504.18 17.21 1510.71 17.25 1517.24 17.19 1523.78 17.32 1530.31 17.24 1536.85 17.03 1543.38 17.04 1549.92 16.94 1556.45 17.19 1562.99 17.38 1569.52 17.31 1576.05 17.29 1582.59 17.14 1589.12 17.11

1602.19 17.02 1608.73 17.06 1615.26 16.98 1621.79 16.98 1634.86 17.21 1641.4
17.28 1647.93 17.24 1654.47 17.29 1661 17.18 1667.54 17.25 1674.07 17.05
1680.6 17.06 1687.14 16.94 1693.67 16.74 1700.21 16.8 1706.74 17 1713.28
17.14 1719.81 17.32 1726.34 17.43 1732.88 17.61 1745.95 17.86

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val 0 .085 808.41 .04 935.21 .085

Bank Sta: Left Right Coeff Contr. Expan.
 808.41 935.21 .5 .8
Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 834 20.9 T
 964 1745.95 20 T
Blocked Obstructions num= 1
 Sta L Sta R Elev
 766.68 851.7519.14989

Upstream Embankment side slope = 0 horiz. to 1.0 vertical Downstream
Embankment side slope = 0 horiz. to 1.0 vertical Maximum allowable
submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Piers = 1

Pier Data
Pier Station Upstream= 866 Downstream= 898
Upstream num= 2
 Width Elev Width Elev
 3 0 3 15 Downstream num= 2
 Width Elev Width Elev
 3 0 3 15

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
 Energy
 W.S. Pro Method

 W.S.Pro Data
 Left Embankment
 El of the top of the embankment = 19
 El of the toe of the abutment = 6
 Right Embankment
 El of the top of the embankment = 19
 El of the toe of the abutment = 6
 Abutment Type = 1 Vert. abutments and vert. embankments with or without
wingwalls Slope of abutments =
 Top with of embankment = 35
 Centroid station of bridge opening =
 Wing Wall Type = No wing walls present

```
 Width =
 Angle =
 Radius =
 Guide Banks Type = No Guide Bank present
 Length =   Offset =
 Angle =
 Optional Contraction and expansion coefficients
 At approach Section
 At Guide Bank
 At upstream outside
 At upstream inside (BU)
 At downstream inside (BD)
 Piers are Continuous for the width of the bridge
 Use Geometric mean as Friction Slope Method

Selected Low Flow Methods = W.S.Pro Method

High Flow Method
 Pressure and Weir flow
 Submerged Inlet Cd =
 Submerged Inlet + Outlet Cd = .8
 Max Low Cord =

Additional Bridge Parameters
 Add Friction component to Momentum
 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION


RIVER: Taunton River  REACH: Main Stem RS: 43283.2

INPUT
Description: 43.3 DS FAce Old Col Ave
Station Elevation Data num= 185
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  0 23.86 6.53 23.85 26.11 23.59
45.7 24.19 52.22 24.3  84.87 23.81 97.92 23.13 104.45 23.21 137.09 24.54
143.62 24.67  156.67 24.5 163.2 24.14 169.73 23.98 182.79 23.38 195.84 23.62
202.37 23.62 228.48 23.88 241.54 23.9 261.12 24.17 280.71 24.05  306.82 24.45
319.88 24.33 345.99 24.77 378.63 24.86 391.69 24.58  398.21 24.71 411.27
25.79 424.33 25.96 430.85 26.15 443.91 26.06  456.97 25.44 463.5 25.59 476.55
25.32 496.14 25.21 509.19 24.92  515.72 24.92 522.25 24.74 541.83 24.44
548.36 24.14 554.89 23.3  561.42 22.73 581 22.23 587.53 22.23 600.58 21.38
607.11 20.76  620.17 20.02 626.7 20.5 633.23 20.78 646.28 20.65 698.51 19.53
705.03 19.23 711.56 19.08 750.73 19.43 757.14 19.18 776.36 19.03  795.59
19.56 808.41 19.16 814.81 18.6 821.22 16.91 834.04 12.14  840.45 10.86 844.39
9.96 846.85 9.4 860.05 2.39 869.23 1.19  878.59 -.5 887.49 .12 897 -.79
906.93 -1.17 916.42 .47  924.92 .24 935.13 .31 935.21 18.89 949.58 18.79
964.58 18.79  975.02 17.17 981.43 17.3 987.96 17.22 994.5 17.24 1001.03 17.28
1007.57 17.29 1014.1 17.25 1020.63 17.14 1027.17 17.09 1033.7 17.12  1040.24
17.06 1046.77 16.98 1053.31 16.95 1066.37 16.85 1072.91 16.88  1079.44 16.83
```

1085.98 16.59 1092.51 16.33 1099.05 16.29 1105.58 16.29 1112.12 16.25
1118.65 16.27 1125.18 16.2 1131.72 16.06 1138.25 16.02 1144.79 16.01 1157.86
15.88 1164.39 15.83 1170.92 15.87 1177.46 15.8 1183.99 15.79 1190.53 15.89
1197.06 15.89 1203.6 15.82 1210.13 15.8 1216.66 15.81 1223.2 15.8 1229.73
15.75 1236.27 15.49 1242.8 15.11 1249.34 14.89 1262.41 14.89 1268.94 14.95
1275.47 15.16 1282.01 15.44 1288.54 15.82 1295.08 15.87 1301.61 15.85
1308.15 15.93 1314.68 16.14 1321.21 15.87 1327.75 15.53 1334.28 15.31
1340.82 15.49 1347.35 15.57 1360.42 15.63 1366.95 15.83 1373.49 15.86
1380.02 16.09 1386.56 16.46 1393.09 16.63 1399.63 16.67 1406.16 16.76
1419.23 17.07 1425.76 17.06 1432.3 17.2 1438.83 17.12 1445.37 17.23 1458.44
17.3 1464.97 17.36 1471.5 17.3 1478.04 17.31 1484.57 17.17 1491.11 17.08
1497.64 17.05 1504.18 17.21 1510.71 17.25 1517.24 17.19 1523.78 17.32
1530.31 17.24 1536.85 17.03 1543.38 17.04 1549.92 16.94 1556.45 17.19
1562.99 17.38 1569.52 17.31 1576.05 17.29 1582.59 17.14 1589.12 17.11
1602.19 17.02 1608.73 17.06 1615.26 16.98 1621.79 16.98 1634.86 17.21 1641.4
17.28 1647.93 17.24 1654.47 17.29 1661 17.18 1667.54 17.25 1674.07 17.05
1680.6 17.06 1687.14 16.94 1693.67 16.74 1700.21 16.8 1706.74 17 1713.28
17.14 1719.81 17.32 1726.34 17.43 1732.88 17.61 1745.95 17.86

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 808.41 .04 935.21 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 808.41
935.21 85.94 85.94 85.94 .5 .8 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 834 20.9 T
 964 1745.95 20 T
Blocked Obstructions num= 1
 Sta L Sta R Elev
 766.68 851.7519.14989

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 43197.27

INPUT
Description: 43 Exit Old Col Ave Station Elevation Data num= 162
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 22.41 13.11 22.7 19.66 22.46
26.21 21.88 32.77 21.86 39.32 21.51 45.87 21.38 58.98 21.33 65.53 21.44
72.09 21.13 91.75 20.98 98.3 21.06 111.41 21.49 124.52 21.57 131.07 21.74
144.18 21.46 157.28 21.67 163.84 22.12 170.39 22.11 190.05 22.77 196.6 23.14
209.71 23.42 216.26 23.98 222.82 24.77 229.37 25.02 235.92 24.87 242.48
24.94 249.03 26.05 262.14 26.81 275.24 26.81 281.8 27.05 294.9 26.36 327.67
25.95 340.78 26.05 353.89 25.32 373.55 25.09 380.1 23.4 386.65 21.99 393.21
21.53 399.76 20.83 406.31 19.55 412.87 18.5 419.42 19.82 425.97 20.22 432.53
20.1 439.08 20.59 445.63 20.51 458.74 18.76 478.4 18.5 491.51 19.09 511.17
19.55 570.15 19.37 596.36 18.71 609.47 18.04 616.02 17.57 622.58 16.93
648.79 13.49 655.34 12.97 661.9 11.82 671.44 11.89 675 11.95 680 8.39 696.14
7.3 711.59 1.26 740.78 -.94 748.98 -2.02 759.51 -1.8 775.79 -.07 786.76 1.5
786.88 1.47 811.41 2.08 840 12.12 861.3 11.21 879.67 13.39 935.87 12.6
937.14 11.55 943.69 8.75 950.25 7.94 956.8 7.88 963.36 7.91 969.91 7.89

976.46 7.58 983.02 7.24 989.57 8.18 996.12 9.73 1002.68 11.91 1009.23 12.98
1015.78 13.25 1022.34 13.21 1028.89 13.36 1035.44 13.69 1042 13.93 1048.55
14.04 1055.1 14.04 1061.66 13.83 1074.76 13.82 1081.32 13.92 1087.87 14.15
1094.42 14.24 1100.98 14.46 1107.53 14.66 1114.08 15.02 1120.64 15.32
1127.19 15.82 1133.74 16.29 1140.3 16.26 1146.85 16.25 1153.4 16.29 1159.96
16.27 1166.51 16.55 1173.06 16.62 1179.62 16.77 1186.17 16.94 1192.72 17.02
1199.28 17.05 1205.83 17.29 1212.39 17.37 1218.94 17.37 1225.49 17.52
1232.05 17.61 1238.6 17.64 1245.15 17.71 1251.71 17.68 1271.37 17.53 1277.92
17.6 1284.47 17.74 1291.03 17.95 1297.58 18.22 1304.13 18.35 1310.69 18.41
1317.24 18.38 1323.79 18.41 1330.35 18.47 1336.9 18.6 1343.45 18.71 1356.56
18.99 1363.11 19.12 1369.67 19.13 1376.22 19.16 1382.77 19.24 1395.88 19.18
1402.43 19.04 1408.99 18.85 1415.54 18.57 1422.09 18.22 1428.65 17.93 1435.2
17.58 1441.75 17.31 1448.31 16.85 1461.42 15.78 1467.97 15.15 1474.52 14.4
1481.08 13.76 1487.63 13.24 1494.18 13.08 1500.74 13.2 1507.29 13.46 1513.84
13.69 1520.4 14.2 1526.95 14.62 1533.5 15.2 1546.61 16.8

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 671.44 .04 840 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 671.44
840 1787.59 1787.59 1787.59 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 1383 1546.61 19.2 T
Blocked Obstructions num= 1
 Sta L Sta R Elev
 513.33 648.3 19.5626

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 41409.68

INPUT
Description: 42
Station Elevation Data num= 357
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 20.98 19.66 21.93 26.21
22.14 39.32 22.32 45.87 22.61 52.42 22.64 58.97 22.96 78.63 23.36 85.19
23.29 91.74 23.58 104.84 23.79 117.95 23.6 131.05 23.66 137.61 23.8 157.27
23.72 170.37 24.21 183.48 24.18 203.14 25.02 242.45 25.83 255.56 25.78
268.66 25.46 294.87 24.36 301.43 24.39 314.53 23.61 321.08 23.42 334.19
23.35 340.74 23.51 347.3 23.88 353.85 23.9 366.95 23.32 373.51 23.46 393.16
23.56 412.82 23.91 425.93 23.95 432.48 23.83 439.03 23.94 465.25 23.69 484.9
23.85 491.46 23.77 498.01 23.97 504.56 23.68 517.67 23.91 524.22 23.89
543.88 24.07 556.98 24.56 570.09 24.55 583.19 24.28 602.85 24.31 609.41
24.43 648.72 24.12 655.27 24.17 661.83 24.41 668.38 24.08 674.93 24.27
688.04 24.24 701.14 24.44 714.25 24.29 727.36 23.61 733.91 23.71 740.46
23.65 747.01 23.78 753.57 23.53 760.12 23.67 766.67 24.13 773.22 24.78
779.78 25.12 805.99 25.19 812.54 25.33 825.65 25.38 851.86 25.93 871.52
25.69 884.62 25.4 891.17 25.4 897.73 25.26 904.28 25.59 910.83 25.66 930.49
25.51 943.6 24.98 956.7 24.92 963.25 24.78 969.81 24.43 989.46 24.19 996.02
24.42 1002.57 24.22 1015.68 24.11 1022.23 23.91 1028.78 24.06 1035.33 24.01
1054.99 24.65 1074.65 26.15 1081.2 26.31 1087.76 26.12 1094.31 25.22 1100.86

23.02 1107.42 22.08 1113.97 22.44 1133.63 22.49 1140.18 22.68 1159.84 22.43
1166.39 22.56 1172.94 24.12 1179.5 24.87 1186.05 24.16 1192.6 22.61 1199.15
22.85 1205.71 23.23 1212.26 23.07 1218.81 22.32 1225.37 22.13 1231.92 22.53
1238.47 22.42 1245.02 22.02 1258.13 21.63 1271.24 21.73 1284.34 21.66
1323.57 22.09 1336.6 22.32 1349.62 22.21 1369.16 22.42 1382.18 22.45 1408.22
22.94 1421.25 22.59 1460.32 23.54 1479.85 23.82 1492.87 23.7 1499.38 23.48
1505.9 23.57 1512.41 23.43 1544.96 24.26 1577.52 24.58 1584.03 24.5 1597.06
24.71 1603.57 24.58 1610.08 24.62 1623.1 24.46 1629.61 24.2 1636.13 24.2
1649.15 24.59 1681.71 25.02 1688.22 24.81 1694.73 24.46 1701.24 24.6 1707.75
24.9 1714.26 25.04 1727.29 24.58 1733.8 24.16 1740.31 23.95 1746.82 23.38
1753.33 23.09 1759.84 22.61 1766.35 21.58 1772.87 20.38 1779.38 19.54
1785.89 19.2 1792.4 19.07 1805.42 17.5 1811.94 15.7 1818.45 14.39 1824.96
14.03 1831.47 13.99 1844.49 14.74 1857.52 16.38 1864.03 16.97 1870.54 16.86
1877.05 16.26 1890.07 15.42 1896.58 14.44 1903.1 12.78 1909.61 11.28 1916.12
10.54 1929.14 10.46 1935.65 10.22 1942.16 9.73 1948.68 9.48 1955.19 9.56
1961.7 9.4 1981.23 8.47 2000.77 6.07 2013.79 5.85 2020.3 6.28 2026.81 6.44
2033.33 6.74 2039.84 7.21 2046.35 7.49 2052.86 7.62 2059.37 7.6 2078.91 6.85
2085.42 6.78 2104.95 7.89 2111.46 7.78 2131 7.17 2150.64 7.08 2163.73 7.49
2170.28 7.52 2176.83 7.69 2183.37 7.62 2196.47 7.86 2203.02 8.27 2216.11
9.42 2222.66 9.44 2229.2 9.3 2235.75 9.32 2235.82 9.31 2242.3 8.02 2248.85
5.09 2256.52 -1.05 2261.84 -1.73 2263.54 -2.09 2265.07 -2.68 2267.58 -3.01
2270.02 -3.07 2272.47 -3.14 2274.9 -3.04 2277.44 -3.1 2280.01 -3.01 2282.56
-2.83 2285.35 -3.01 2287.65 -2.96 2290.37 -2.93 2292.88 -3.02 2295.15 -2.87
2297.21 -2.89 2299.28 -3.01 2301.22 -2.89 2304.79 -3.16 2306.46 -3.23
2308.08 -3.24 2309.95 -3.35 2311.9 -3.47 2314.24 -3.42 2316.58 -3.42 2318.87
-3.36 2320.96 -3.28 2323 -3.19 2325.3 -3.07 2327.59 -2.96 2329.64 -2.85
2331.89 -2.71 2334.02 -2.48 2336.18 -2.31 2338.09 -2.25 2339.87 -2.16
2341.44 -.15 2347.72 -.27 2359.03 5.16 2360.15 5.56 2366.7 9.1 2373.24 10.45
2379.79 10.01 2386.34 9.26 2399.43 9.12 2412.53 9.24 2432.17 8.54 2445.26
7.88 2464.9 7.63 2478 6.85 2484.54 7.62 2491.09 7.47 2497.64 7.15 2517.28
7.33 2523.83 7.28 2530.36 7.41 2536.9 7.34 2543.43 7.1 2549.97 6.55 2556.5
6.16 2569.58 6.11 2576.11 5.9 2589.18 5.96 2602.25 6.43 2608.79 6.54 2621.86
6.25 2628.39 6.49 2634.93 7.67 2648 9.78 2654.54 11.17 2661.07 11.22 2674.14
11.12 2706.82 11.3 2719.89 11.12 2739.5 11.58 2765.64 11.58 2778.71 11.44
2791.78 11.57 2811.39 11.42 2830.99 11.01 2889.81 10.46 2896.34 10.5 2909.42
10.41 2935.56 10.65 2974.77 10.81 3000.91 10.74 3033.59 10.96 3105.48 10.92
3125.08 11.06 3138.15 11.47 3164.3 11.53 3177.37 11.8 3190.44 12.29 3210.04
12.68 3223.11 13.34 3236.18 14.47 3255.79 14.77 3281.93 15.6 3301.54 16.73
3308.07 17.22 3314.61 17.52 3321.14 18.22 3327.68 18.59 3334.21 18.36
3340.75 18.41 3347.29 18.6 3353.82 18.58 3360.36 18.13 3366.89 17.55 3373.43
17.31 3379.96 17.31 3386.5 16.93 3393.03 16.09 3412.64 15.81 3425.71 15.92
3445.32 17.24 3451.85 17.4 3458.39 17.7 3491.06 19.83 3504.13 20.4 3510.67
20.87 3536.81 21.81 3543.35 22.46 3549.88 24.34 3556.42 26.54 3562.95 27.3
3569.49 26.57 3582.56 24.38 3589.09 23.98 3595.63 24.32 3608.7 25.84 3615.24
26.43 3621.77 27.29 3628.31 28.38 3634.84 29.17 3641.38 30.37 3647.91 32.95
3654.45 33.51 3660.98 31.87 3667.52 32.17 3674.05 34.49 3680.59 33.72
3687.13 31.85 3693.66 31.03 3700.2 31.13 3713.27 32.33 3726.34 32.7 3732.87
33.06 3739.41 33.25 3745.94 33.27 3765.55 34.4

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 2235.82 .04 2373.24 .08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2235.82

2373.24 1488.16 1354.06 1248.76 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 40055.61

INPUT
Description: 41
Station Elevation Data num= 362
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 47.87 19.64 47.58 39.28 46.86 45.83 46.74 58.92 46.78 65.47 46.26 78.56 45.92 91.66 45.83 104.75 45.47 117.84 45.26 130.94 45.43 137.48 45.06 150.58 44.78 157.13 44.79 170.22 45.43 183.31 45.48 202.95 45.22 209.5 45.04 222.59 44.06 229.14 43.26 235.69 42.71 248.78 42.54 261.88 42.85 268.42 43.17 274.97 43.15 294.61 42.38 314.25 40.67 320.8 40.3 327.34 39.47 333.89 38.85 346.98 38.21 360.08 38.23 366.62 37.78 373.17 37.47 392.81 37.19 399.36 36.76 405.91 36.55 412.45 36.05 451.73 35.2 458.28 35.16 471.37 34.75 491.02 34.65 523.75 33.73 536.84 34.41 543.39 34.38 556.48 33.61 576.12 33.03 595.77 32.71 608.86 32.71 635.05 32.22 641.59 32.39 648.14 32.38 654.69 32.21 667.78 32.4 680.87 32.26 693.97 32.45 700.52 32.39 707.06 32.04 713.61 32.03 726.7 32.83 752.89 33.33 759.44 33.3 765.98 33.05 779.08 31.92 785.62 31.51 798.72 31.49 805.27 31.2 818.36 30.96 824.91 31.02 831.45 30.89 838 30.59 851.09 29.61 857.64 29.52 870.73 30.03 877.28 30.08 883.83 29.08 890.37 28.56 910.02 28.04 929.66 27.86 942.75 27.82 949.3 27.56 962.39 28.03 975.48 27.6 982.03 27.03 1040.95 26.06 1054.05 25.99 1073.69 26.1 1080.23 26.37 1126.06 26.39 1132.61 26.51 1152.25 26.51 1198.08 27.02 1224.26 27.07 1237.36 26.67 1250.45 26.69 1296.28 26.3 1302.83 26.38 1315.92 26.09 1342.11 25.73 1348.65 25.75 1361.75 25.35 1374.84 25.35 1381.39 25.48 1387.94 25.94 1394.48 26.18 1401.03 26.04 1407.58 25.67 1414.12 25.55 1420.67 25.89 1427.22 26.08 1433.76 25.83 1440.31 25.44 1446.86 24.9 1459.95 24.74 1473.05 24.93 1518.87 25.1 1531.97 25.38 1551.61 25.36 1558.15 25.59 1571.25 25.64 1610.53 25.55 1636.72 25.62 1682.54 25.77 1741.47 25.46 1780.75 25.71 1787.29 25.65 1806.94 24.73 1820.03 23.92 1826.58 23.87 1833.12 23.14 1839.67 21.55 1846.22 20.46 1852.76 18.65 1865.86 14.54 1872.4 12.38 1878.95 10.51 1885.5 9.14 1892.04 8.48 1905.14 7.92 1911.68 8.22 1924.78 8.19 1931.33 8.35 1937.87 8.72 1944.42 9.33 1957.51 9.74 1964.06 10.22 1970.61 10.56 1996.79 10.22 2003.34 10.24 2009.89 9.85 2016.43 9.31 2042.62 7.96 2055.72 6.65 2062.26 6.23 2068.81 6.3 2081.9 7.34 2101.54 8.53 2108.09 8.78 2114.64 8.76 2121.19 8.54 2127.73 8.08 2140.83 7.64 2147.37 7.31 2153.92 7.14 2160.47 7.18 2186.65 8.24 2193.2 8.39 2199.75 8.26 2225.94 8.55 2232.48 8.77 2245.58 9.42 2252.12 9.58 2297.95 8.63 2311.05 8.63 2343.78 9.51 2369.97 9.86 2376.52 10.32 2383.06 10.28 2389.61 10.44 2396.16 10.08 2402.7 9.56 2409.25 9.27 2428.89 9.21 2435.44 9.1 2441.99 8.71 2448.53 8 2455.08 7.64 2468.15 7.9 2474.68 7.91 2487.74 8.21 2494.26 7.91 2507.32 6.86 2513.85 7.21 2520.38 8.07 2526.9 8.79 2533.43 8.38 2537.8 6.7 2539.96 5.88 2546.49 3.05 2560 -1.16 2560.71 -1.33 2561.67 -1.58 2562.57 -1.73 2563.71 -1.8 2564.74 -2.22 2566.38 -2.7 2568.01 -3.11 2569.6 -3.35 2571.04 -3.47 2572.45 -3.47 2573.97 -3.45 2575.36 -3.36 2576.9 -3.24 2578.4 -3.2 2580.18 -3.14 2581.95 -3.13 2585.96 -3.03 2588.18 -2.97 2592.41 -2.91 2594.44 -2.77 2599.13 -2.59 2601.56 -2.59 2603.58 -2.61 2606.1 -2.74 2608.34 -2.78 2610.56 -2.85 2612.64 -2.69 2614.78 -2.57 2616.59 -2.59 2618.67 -2.76 2620.64 -2.69 2623.07 -2.93 2625.5 -3.06 2627.91 -3.05 2630.24 -3.09 2632.73 -3.12 2634.69 -2.96 2636.9

-2.21 2638.95 -.69 2641.31 -.16 2657.46 3.24 2663.99 5.69 2666.53 6.09
2670.51 6.71 2677.04 6.94 2683.57 6.86 2690.1 6.92 2696.63 6.78 2703.18 6.91
2709.74 6.72 2716.3 6.81 2722.86 7.04 2729.42 6.95 2735.97 7.6 2742.53 8.07
2749.09 8.29 2762.21 8.04 2775.32 6.87 2781.88 6.59 2788.44 6.52 2801.56 6.7
2834.35 6.27 2847.46 6.67 2854.02 7.11 2860.58 6.85 2867.14 6.96 2873.69
7.38 2880.25 8.14 2893.37 9.28 2899.93 10.33 2906.48 11.6 2913.04 12.38
2926.16 12.98 2939.27 13.12 2958.95 13.15 2972.07 12.96 2985.18 12.36
2991.74 12.19 3011.41 11.93 3017.97 12.04 3031.09 11.72 3044.2 11.63 3057.32
10.87 3076.99 10.91 3103.23 10.79 3129.46 11.01 3136.02 10.82 3142.58 10.45
3149.13 10.38 3168.81 9.5 3201.6 9.78 3214.71 9.97 3234.39 9.69 3240.95 9.89
3254.06 9.85 3260.62 9.65 3280.3 9.29 3299.97 9.48 3306.53 9.64 3326.2 9.68
3339.32 9.97 3358.99 10.09 3385.22 10.01 3391.78 9.79 3398.34 9.9 3404.9 9.7
3411.46 9.65 3418.01 10.07 3431.13 10.5 3444.25 10.38 3457.36 10.69 3463.92
10.7 3483.6 10.16 3516.39 10.26 3536.06 10.28 3542.62 10.48 3549.18 10.54
3555.73 10.45 3562.29 10.51 3575.41 11 3601.64 12.33 3608.2 12.42 3614.76
12.88 3627.87 14.34 3640.99 15.01 3647.55 15.59 3654.11 15.94 3660.66 16.43
3673.78 17.06 3680.34 16.89 3686.9 17.13 3719.69 17.38 3732.8 17.31 3745.92
17.56 3778.71 17.31 3785.27 17.15 3791.83 17.16 3798.38 16.95 3804.94 16.52
3811.5 16.23 3837.73 16.19 3844.29 16.09 3857.41 15.6 3863.96 15.51 3896.75
16.21 3929.54 16.3 3942.66 16.95 3962.34 17.34 3968.89 17.57 3982.01 18.31
4001.68 18.96 4047.59 20.85 4054.15 21.36 4067.26 21.67 4073.82 22.13
4086.94 22.35 4113.17 23.36 4126.29 23.62 4145.96 24.67 4172.19 25.56
4178.75 25.62 4185.31 25.38
 Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 2526.9 .04 2677.04 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2526.9
2677.04 1195.98 1379.74 1532.92 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 38675.88

INPUT
Description: 40
Station Elevation Data num= 497
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 32.52 6.55 32.36 19.66 32.57
26.21 32.42 32.76 31.94 72.07 30.91 91.73 30.94 111.38 30.5 124.49 30.51
157.25 29.55 275.19 27.47 307.95 27.63 360.36 26.96 366.91 27.2 393.12 29.12
406.23 27.57 432.43 25.94 445.54 25.44 517.61 25.31 589.68 25.9 629 25.31
661.76 25.73 694.52 25.77 727.28 24.91 733.83 25.03 740.38 25.5 746.93 25.31
753.48 24.21 760.04 21.5 779.69 10.59 786.24 7.43 792.8 5.49 799.35 4.92
805.9 4.81 812.45 5 832.11 4.95 838.66 5.24 864.87 4.98 877.97 4.74 891.08
5.38 910.73 5.38 923.84 6.06 936.94 6.04 963.15 6.7 976.25 6.49 1009.01
6.88 1022.12 6.73 1035.22 5.94 1041.77 5.12 1048.33 4.95 1054.88 4.4 1067.98
4.03 1074.53 4.19 1081.09 3.96 1113.85 3.95 1120.4 4.17 1146.61 4.27 1172.81
3.95 1179.37 4.12 1185.92 3.97 1192.47 4.13 1205.57 3.9 1225.23 4.39 1238.33
3.97 1264.54 4.22 1277.65 3.84 1284.2 4.54 1297.3 5.05 1316.96 5.31 1330.06
5.81 1356.27 5.22 1389.03 5.63 1415.24 4.79 1434.89 5.5 1448 6.55 1454.55
6.34 1480.76 6.69 1493.87 7.18 1506.98 6.52 1526.65 5.91 1539.76 6.78
1546.32 6.99 1565.98 6.29 1592.2 7.56 1605.31 7.86 1611.87 7.56 1624.98 5.44

1630.37 4.79 1631.53 4.65 1638.09 4.52 1644.64 3.6 1655 .02 1658.75 -.06
1661.34 -.1 1662.85 -.37 1664.31 -.76 1667.25 -1 1668.97 -1.32 1670.59 -2.29
1674.61 -2.39 1676.76 -2.86 1678.68 -3.22 1680.48 -3.27 1682.15 -3.45
1683.85 -3.37 1685.34 -2.92 1686.71 -3.14 1688.17 -3.26 1689.71 -3.59
1691.29 -4.15 1693.14 -4.36 1695.04 -4.55 1696.95 -4.78 1698.74 -4.66
1700.61 -4.88 1702.29 -4.9 1704.07 -4.58 1705.64 -4.62 1707.24 -4.64 1708.72
-4.51 1710.24 -4.54 1711.62 -4.46 1713.21 -4.45 1714.93 -4.49 1716.71 -4.5
1718.42 -4.49 1720.09 -4.46 1721.48 -4.26 1723.08 -4.05 1724.51 -3.51
1726.02 -3.78 1727.37 -3.41 1728.91 -3.27 1730.4 -2.93 1732.08 -2.29 1733.82
-1.46 1735.89 -1.32 1737.25 -.92 1749.53 5.34 1756.09 8.89 1762.64 8.85
1769.2 8.41 1775.75 7.66 1782.31 7.57 1788.86 7.54 1795.42 7.66 1801.97 7.73
1808.53 7.71 1815.08 7.72 1821.64 7.68 1828.19 7.69 1834.75 7.78 1841.3 7.76
1847.86 7.54 1854.41 7.36 1860.97 7.22 1874.08 7.11 1880.64 7.04 1887.19
6.91 1893.75 6.71 1900.3 6.57 1906.86 6.33 1913.41 6.53 1926.53 6.83 1939.65
6.99 1946.21 7.18 1952.77 7.66 1959.33 8.07 1965.89 8.01 1972.45 7.89
1979.01 7.63 1985.57 7.75 1992.13 7.85 1998.69 7.99 2005.25 8.17 2011.81
8.19 2018.37 8.31 2024.93 8.33 2031.49 8.28 2038.05 8.21 2044.61 8.2 2051.17
8.14 2057.73 8.06 2064.29 8.03 2070.85 8.15 2077.4 8.17 2083.96 8.33 2090.52
8.43 2097.08 8.51 2110.2 8.75 2116.76 8.74 2123.32 8.76 2129.88 8.89 2136.44
8.87 2143 9.01 2149.56 9.21 2156.12 9.37 2162.68 9.48 2169.24 9.47 2175.8
9.42 2182.36 9.4 2188.92 9.45 2195.48 9.42 2202.04 9.5 2208.6 9.76 2215.16
9.97 2221.72 10 2234.84 10.19 2241.4 10.16 2247.96 10.21 2254.52 10.22
2261.08 10.21 2267.64 10.28 2274.2 10.44 2280.76 10.4 2293.88 10.28 2300.44
10.25 2307 10.17 2313.56 10.05 2320.12 9.79 2326.68 9.74 2333.24 9.6 2339.79
9.62 2346.35 9.55 2352.91 9.42 2359.47 9.25 2366.03 9.55 2372.59 10.07
2379.15 10.39 2385.71 10.65 2392.27 11.1 2398.83 11.45 2405.39 11.76 2411.95
11.94 2418.51 12.03 2425.07 12.01 2431.63 11.97 2438.19 11.99 2444.75 11.94
2451.31 11.78 2464.43 11.63 2470.99 11.62 2477.55 11.7 2484.11 11.74 2490.67
11.61 2497.23 11.52 2503.79 11.54 2510.35 11.53 2516.91 11.38 2523.47 11.5
2530.03 11.35 2536.59 11.32 2543.15 11.44 2549.71 11.35 2562.83 11.26
2569.39 11.17 2575.95 11.1 2582.51 10.91 2589.07 10.87 2608.75 10.69 2615.3
10.66 2621.86 10.6 2628.42 10.61 2634.98 10.53 2641.54 10.49 2648.1 10.34
2654.66 10.23 2661.22 10.37 2667.78 10.1 2674.34 10.05 2680.9 9.74 2694.02
9.09 2700.58 8.71 2713.7 8.16 2720.26 7.9 2726.82 7.86 2733.33 7.69 2739.84
7.64 2746.35 7.35 2752.87 7.21 2759.38 7.4 2765.89 7.51 2778.91 7.06 2785.42
7.3 2791.93 7.18 2798.44 6.85 2804.95 6.84 2811.47 6.94 2817.98 7.07 2824.49
7.24 2831 7.21 2837.51 7.05 2844.02 7.31 2850.53 7.48 2857.04 7.55 2863.55
7.54 2870.07 7.47 2876.58 7.36 2883.09 7.27 2889.6 7.49 2896.11 7.59 2902.62
7.46 2909.13 7.35 2915.64 7.35 2922.15 7.22 2928.67 7.33 2935.18 7.46
2941.69 7.31 2948.2 7.6 2954.71 7.87 2961.22 8.19 2967.73 8.07 2980.75 8.59
2987.27 8.83 2993.78 9.11 3000.29 9.13 3006.8 9.23 3013.31 9.51 3019.82 9.28
3032.84 9.04 3039.35 8.65 3045.87 8.11 3052.38 7.77 3058.89 7.83 3065.4 7.71
3071.91 7.56 3078.42 7.51 3084.93 7.44 3097.95 7.79 3104.47 7.84 3110.98
7.75 3117.49 7.83 3124 7.83 3130.51 7.72 3137.02 7.73 3143.53 7.91 3150.04
8.27 3156.55 8.38 3163.07 8.76 3176.09 9.63 3189.11 10.55 3195.62 10.97
3202.13 11.52 3221.67 12.75 3228.18 13.09 3234.69 13.57 3247.71 14.1 3254.22
14.29 3260.73 14.41 3267.24 14.57 3273.76 14.69 3280.27 14.67 3286.78 14.68
3293.29 14.59 3299.8 14.47 3306.31 14.25 3312.82 14.25 3319.33 14.22 3325.84
14.01 3332.36 14.16 3338.87 14.28 3345.38 14.27 3351.89 14.41 3358.4 14.7
3364.91 14.95 3371.42 15.14 3377.93 15.36 3384.44 15.49 3390.96 15.71
3397.47 15.76 3403.99 15.67 3410.5 15.63 3417.02 15.61 3423.53 15.47 3430.05
15.42 3436.56 15.51 3443.08 15.46 3449.59 15.35 3456.11 15.36 3462.62 15.24
3469.14 15.15 3475.65 15.04 3482.17 14.79 3495.2 14.57 3501.71 14.33 3508.23
14.06 3514.74 14.1 3521.26 13.99 3527.77 13.86 3534.29 13.93 3547.32 13.71

3553.83 13.66 3560.35 13.65 3566.86 13.54 3573.38 13.34 3579.89 13.19
3586.41 13.23 3592.93 13.15 3599.44 13.05 3605.96 12.91 3612.47 12.64
3618.99 12.51 3625.5 12.51 3632.02 12.48 3638.53 12.39 3645.05 12.39 3651.56
12.19 3658.08 11.97 3664.59 11.87 3671.11 11.87 3677.62 12.1 3684.14 12.23
3690.65 12.46 3697.17 12.6 3703.68 12.96 3710.2 13.11 3716.71 13.45 3723.23
13.9 3729.74 14.08 3736.26 14.16 3749.29 14.44 3755.8 14.61 3762.32 14.54
3768.83 14.63 3775.35 14.56 3781.86 14.55 3794.9 14.72 3801.41 14.96 3807.93
15.07 3814.44 15.16 3827.47 15.28 3833.99 15.23 3840.5 15.21 3847.02 15.23
3853.53 15.28 3860.05 15.39 3866.56 15.47 3873.08 15.73 3886.11 15.86
3892.62 15.94 3899.14 16.05 3912.17 16.1 3918.68 16.11 3925.2 16.7 3931.71
17.05 3938.23 17.1 3944.74 17.2 3951.26 17.32 3957.77 17.32 3964.29 17.5
3970.8 17.56 3977.32 17.47 3990.35 17.4 3996.86 17.42 4003.38 17.35 4009.9
17.37 4016.41 17.46 4022.93 17.58 4029.44 17.76 4035.96 18.13 4042.47 18.37
4048.99 18.56 4055.5 18.83 4062.02 18.87 4068.53 18.97 4081.56 19.24 4088.08
19.44 4094.59 19.59 4101.11 19.84 4107.62 19.99 4120.65 20.74 4127.17 20.89
4133.68 21.07 4140.2 21.48 4146.71 21.86 4153.23 22.08 4159.74 21.85 4166.26
21.6 4172.77 21.86 4179.29 21.77 4185.8 21.61 4192.32 21.55 4198.83 21.62
4205.35 21.63 4211.86 21.76 4218.38 21.97 4224.9 22.07 4231.41 22.25 4237.93
22.46 4244.44 22.82 4250.96 23.13 4257.47 23.61 4263.99 24.16 4270.5 24.58
4277.02 24.95 4283.53 25.55 4290.05 26.08

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .082 1605.31 .04 1762.64 .08
 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1605.31 1762.64 1736.85 1644.44 1625.84 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 37031.44

INPUT
Description: 39 500 ft US Cotley Riv Trib
Station Elevation Data num= 196
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 30.36 26.21 30.12 52.42
30.73 85.19 29.37 190.03 28.25 216.24 26.74 235.9 25.08 249.01 25 262.11
24.53 281.77 22.62 307.98 19.26 327.64 15.28 334.19 14.89 347.3 12.89 353.85
11.26 360.4 10.05 366.96 9.39 380.06 11.4 386.61 12.03 393.17 13.6 399.72
13.63 406.27 12.74 419.38 8.76 439.04 6.76 478.35 6.33 498.01 5.17 530.77
5.24 556.99 5.89 563.54 5.75 576.64 4.37 602.85 3.8 635.62 4.98 655.28 4.86
674.94 3.92 688.04 4.28 701.15 3.88 760.12 4.43 786.33 3.06 799.44 4.04
812.54 4.42 819.1 4.99 832.2 4.5 845.31 5.11 871.52 4.5 891.18 4.87 897.73
4.58 904.28 3.6 910.84 3.15 976.36 2.61 989.47 3.68 1068.1 3.05 1087.76 3.64
1100.87 3.03 1120.52 2.88 1133.63 3.72 1140.18 3.71 1146.73 5.07 1153.29
5.74 1192.6 5.51 1199.16 3.92 1205.71 3.08 1297.45 3.48 1323.66 4.05 1343.32
3.23 1356.42 3.62 1362.97 4.54 1369.53 6.58 1376.08 7.61 1395.74 5.78
1474.37 5.67 1500.58 6.93 1533.35 5.63 1572.66 6.9 1631.64 5.41 1644.74 5.83
1664.4 7.33 1749.59 7.58 1769.24 6.96 1842.42 7.66 1847.44 7.46 1853.9 6.77
1860.37 5.97 1866.83 5.48 1873.3 4.88 1879.76 3.71 1890 -.94 1890.62 -1
1891.34 -1.08 1891.91 -1.3 1892.57 -1.39 1892.98 -1.44 1893.54 -1.47 1894.27
-1.74 1895.38 -2.02 1896.93 -2.33 1898.8 -2.97 1901 -4.12 1905.57 -5.28
1907.3 -5.45 1909.17 -5.62 1911.17 -5.78 1913.75 -6.02 1916.24 -6.33 1918.97

-6.69 1921.25 -7.33 1923.71 -7.83 1926 -8.46 1928.4 -8.97 1930.69 -9.2
1932.96 -9.51 1935.08 -9.54 1937.34 -9.41 1939.41 -9.15 1941.84 -9 1944.27 -
8.38 1946.46 -7.99 1948.35 -7.34 1950.27 -6.9 1951.95 -6.48 1953.45 -6.16
1954.54 -5.72 1955.5 -5.49 1956.38 -5.11 1957.55 -4.86 1959.06 -4.43 1960.92
-4.05 1962.65 -3.6 1964.72 -2.75 1966.66 -2.22 1968.72 -1.95 1970.17 -1.73
1971.33 -1.48 1973.68 -.87 1975.66 -.51 1978.17 -.64 1993.81 6.89 1996.13
7.97 2002.6 8.29 2041.72 6.83 2048.27 6.34 2094.11 6.32 2107.21 6.04 2113.76
7.27 2126.86 11.64 2133.41 12.63 2146.5 13.26 2153.05 13.04 2166.15 11
2192.35 11.06 2205.44 11.45 2251.29 10.87 2316.78 10.72 2388.81 9.21 2408.46
9.22 2447.75 7.31 2460.85 7.38 2480.5 6.46 2552.54 7.15 2565.63 7.77 2624.57
7.55 2644.22 7.62 2650.77 7.35 2683.51 7.54 2696.61 7.77 2716.26 7.3 2749
8.97 2768.65 8.6 2794.84 7.47 2840.69 8.47 2853.78 8.4 2919.27 10.9 2932.37
12.16 2971.66 14.12 3004.41 14.41 3187.78 13.38 3286.01 11.55 3423.54 13
3443.18 13.01 3489.03 14.03 3521.77 13.53 3547.97 14.42 3574.16 15.89
3639.65 16.12 3659.3 15.75 3678.94 16.25 3698.59 15.56 3764.08 17.31 3816.47
18.37 3868.86 18.28 3895.06 20.04 3934.35 21.05 3960.55 20.2 3999.84 20.67
4006.39 21.35 4078.43 24.33 4104.62 26.7

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 1842.42 .04 2002.6 .08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1842.42
2002.6 1361.41 1290.79 1264.72 .3 .5

CROSS SECTION

 RIVER: Taunton River
REACH: Main Stem RS: 35740.65

INPUT
Description: 38
Station Elevation Data num= 481
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 41.08 6.53 43.39 13.07 45.74
19.6 46.46 26.14 47.03 32.67 46.77 39.21 46.7 45.74 46.69 52.28 46.73 58.81
46.62 65.34 46.54 71.88 46.35 78.41 46.36 84.95 46.02 91.48 44.58 98.02
42.72 104.55 40.81 111.09 38.78 117.62 38.34 124.15 37.32 130.69 34.84
137.22 32.4 143.76 30.18 150.29 28.26 156.83 28.13 163.36 28.21 169.9 28.43
176.43 28.79 182.97 29.2 189.5 29.53 196.03 29.81 215.64 30.76 222.17 31.12
228.71 31.33 235.24 31.61 241.78 32.2 248.31 32.96 261.38 34.44 267.91 35.35
274.45 36.68 280.98 36.67 287.52 36.61 294.05 36.63 300.59 36.48 307.12
36.51 320.19 36.49 326.72 36.52 333.26 36.88 339.79 37.22 346.33 37.77
352.86 38.74 359.4 40.27 365.93 40.69 372.46 40.77 379 40.92 385.53 41.09
392.07 41.35 398.6 41.44 405.14 41.44 411.67 41.74 418.21 42.42 424.74 43.08
431.27 43.69 444.34 44.56 450.88 45.01 463.95 45.64 470.48 45.8 477.02 45.99
483.55 46.29 490.08 46.31 496.62 46.38 503.15 46.52 509.69 46.61 516.22
46.57 522.76 46.51 535.83 46.53 542.36 46.37 548.89 46.18 555.43 46.13 568.5
46.09 575.03 46.04 581.57 45.95 588.1 45.76 594.64 45.35 601.17 44.57 607.7
42.14 614.24 39.86 620.77 39.4 627.31 39.28 633.84 39.02 640.38 38.81 653.45
38.31 659.98 38.07 666.52 37.98 673.05 37.87 692.65 37.76 699.19 37.74
705.72 37.82 712.26 37.83 718.79 37.74 725.33 37.57 731.86 37.38 738.39
37.02 744.93 36.73 751.46 36.29 758 36.06 764.53 35.37 771.07 33.42 777.6
30.95 784.14 29.66 790.67 29.43 797.2 29.58 803.74 29.6 810.27 30.28 816.81
31.26 823.34 31.76 829.88 31.71 836.41 31.7 842.95 31.46 849.48 31.36

856.01 31.4 869.08 31.09 875.62 30.9 882.15 30.89 888.69 30.9 901.76 31.03
908.29 31 914.82 31.09 921.36 31.53 927.89 31.75 934.43 31.79 947.5 31.97
954.03 32.13 960.57 32.12 967.1 32.14 980.17 31.75 986.7 31.52 999.77 30.81
1006.31 30.37 1012.84 30.19 1019.38 29.97 1025.91 29.69 1032.44 29.55
1038.98 29.07 1045.51 28.7 1052.05 28.48 1058.58 28.42 1065.12 28.33 1071.65
28.43 1078.19 28.3 1084.72 28.05 1091.25 27.86 1097.79 27.64 1104.32 27.53
1110.86 27.39 1117.39 27.19 1123.93 26.92 1130.46 27.37 1137 27.56 1143.53
27.48 1150.06 27.46 1156.6 27.56 1163.13 27.52 1169.67 27.25 1176.2 27.32
1182.74 27.59 1189.27 28.06 1195.81 28.29 1202.34 28.21 1208.87 28.04
1215.41 28.31 1221.94 28.92 1228.48 29.09 1241.55 29.13 1248.08 29.16
1254.62 29.57 1261.15 29.67 1267.69 29.57 1274.22 29.7 1280.75 29.7 1287.29
29.68 1293.82 29.57 1300.36 29.62 1306.89 29.32 1313.43 29.12 1319.96 28.94
1326.49 28.86 1333.03 28.59 1339.56 28.3 1346.1 28.35 1352.63 27.85 1359.17
27.58 1365.7 27.4 1372.24 27.38 1378.77 27.38 1385.3 27.33 1391.84 27.11
1398.37 27.02 1404.91 27 1411.44 26.9 1417.98 26.76 1424.51 26.58 1431.05
26.32 1437.58 26.02 1444.12 26.21 1450.65 26.16 1457.18 25.95 1463.72 25.83
1470.25 25.73 1476.79 25.38 1483.32 25.14 1489.86 25.04 1496.38 25.04
1502.91 25 1509.43 24.89 1515.96 24.62 1522.49 24.74 1529.01 24.67 1535.54
24.45 1542.06 24.37 1548.59 24.27 1555.11 24.4 1561.64 24.61 1568.17 24.31
1574.69 24.2 1581.22 24 1587.74 23.96 1594.27 24.28 1600.8 24.47 1607.32
24.49 1613.85 24.31 1620.37 23.97 1633.42 23.32 1639.95 22.79 1646.48 22.39
1653 21.63 1659.53 20.66 1666.05 19.57 1672.58 18.53 1679.11 17.58 1685.63
17.05 1692.16 16.48 1698.68 15.86 1705.21 15.16 1711.73 14.82 1718.26 14.14
1724.79 13.41 1737.84 12.63 1744.36 12.83 1750.89 13.08 1757.42 12.98
1763.94 10.62 1770.47 5.86 1780 -1.14 1780.66 -1.22 1781.2 -1.43 1782 -1.4
1782.91 -1.55 1783.95 -1.65 1784.67 -1.9 1785.25 -2 1785.87 -2.22 1786.63 -
2.42 1787.26 -2.87 1788.43 -3.73 1790.71 -4.39 1792.98 -5.13 1795.19 -5.48
1797.36 -5.25 1799.46 -5.39 1801.81 -5.57 1804.12 -5.12 1806.74 -4.78
1809.13 -4.6 1811.43 -4.6 1813.94 -4.42 1816.49 -4.34 1818.85 -4.2 1821.34 -
4.26 1823.68 -4.24 1826.1 -4.34 1828.51 -4.32 1830.97 -4.46 1833.24 -4.55
1835.71 -4.72 1838.12 -4.73 1840.62 -4.87 1843.02 -4.97 1845.65 -4.96
1848.21 -4.81 1850.64 -4.81 1852.81 -4.76 1855.07 -4.64 1856.99 -4.74
1858.96 -4.57 1860.74 -4.32 1862.49 -4.27 1864 -3.89 1865.44 -3.77 1866.57 -
3.59 1867.61 -3.33 1868.39 -3.19 1869.17 -2.98 1869.83 -2.68 1870.59 -2.32
1887.93 5.45 1890.4 6.08 1894.46 7.12 1900.98 7.34 1914.04 6.26 1953.19 5.48
1959.72 5.81 2018.45 6.65 2024.98 6.93 2070.66 7.32 2090.23 7.03 2129.39
7.53 2175.07 7.62 2194.65 8.26 2207.75 8.17 2247.05 6.93 2253.6 6.95 2266.7
6.21 2292.91 6.27 2312.56 6.69 2338.76 6.25 2345.31 5.95 2351.86 6.09
2397.72 5.51 2410.82 5.15 2430.47 5.68 2443.57 6.25 2450.12 6.17 2463.22
6.77 2482.88 6.39 2495.98 6.53 2509.08 6.11 2522.18 5.32 2535.28 5.15
2561.49 5.97 2581.14 5 2594.24 4.73 2607.34 5.18 2646.64 5.67 2659.75 7.64
2672.85 8.66 2692.5 8.1 2725.25 8.56 2751.45 8.55 2758.01 8.17 2797.31 7.03
2816.96 7.27 2830.06 6.95 2836.61 7.02 2849.72 6.17 2856.27 6.05 2869.37
6.47 2875.92 6.32 2882.47 5.84 2889.02 5.96 2902.12 7.14 2908.67 7.37
2921.77 6.08 2934.87 5.49 2954.53 5.11 2967.63 5.24 2974.18 4.97 2980.73
5.55 2993.83 7.44 3000.38 7.85 3033.13 8.32 3039.68 7.82 3046.24 6.59
3052.79 4.99 3072.44 4.2 3098.64 4.36 3111.74 5.18 3137.95 5.46 3144.5 6.28
3157.6 8.34 3164.15 9.09 3170.7 9.27 3203.45 8.86 3216.55 9.1 3236.21 8.87
3255.86 9.22 3268.96 8.99 3282.06 8.37 3301.71 7.92 3314.81 7.99 3347.57
7.39 3354.12 8.31 3386.87 8.81 3413.07 7.63 3426.17 7.81 3439.28 7.3 3465.48
7.33 3491.68 6.68 3504.78 6.95 3530.99 6.56 3557.19 7.69 3570.29 7.59
3589.94 7.04 3609.59 6.99 3622.7 7.58 3629.25 7.54 3635.8 7.86 3655.45 8.14
3675.1 9.28 3701.3 10.04 3720.96 10.15 3753.71 12.48 3760.26 11.86 3773.36
8.73 3779.91 8.78 3786.46 10.07 3793.01 12.62 3799.56 13.83 3806.11 14.66

3812.67 15.06 3819.22 14.91 3832.32 14.15 3838.87 14.15 3851.97 13.65
3858.52 13.68 3871.62 13.24 3910.93 13.62 3937.13 12.84 3943.68 12.36
3963.33 12.46 3982.98 11.92 4041.94 12.14 4055.04 12.55 4087.79 12.57
4107.45 13.23 4133.65 13.45 4166.4 13.26 4199.16 11.13 4205.71 10.9 4231.91
10.83 4251.56 12.06 4271.21 12.12 4297.42 11.41 4317.07 11.79 4349.82 13.45
4382.58 13.48 4415.33 12.75 4441.53 12.36 4461.18 13.12 4467.74 13.16
4474.29 13.51 4480.84 13.54 4493.94 13.1 4520.14 14.16 4526.69 14.22 4546.34
13.52 4559.44 14.3 4585.65 14.65 4611.85 13.89 4631.5 15.3 4664.26 15.69
4690.46 15.52 4716.66 15.88 4742.86 15.53 4762.52 15.69 4788.72 16.28
4814.92 15.86 4834.57 16 4841.12 16.39 4880.43 17.54 4900.08 17.53 4952.49
18.76 4959.04 18.57 4985.24 19.65 4991.79 20.45 5004.89 20.63 5011.44 20.24
5017.99 20.51 5024.54 21.39 5031.1 21.74 5050.75 21.57

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .088 1607.32 .04 1894.46 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1607.32
1894.46 1785.36 1632.89 1530.18 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 34107.76

INPUT
Description: 37
Station Elevation Data num= 499
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 24.64 360.62 19.68 406.52
23.9 661.51 23.33 686.2 12.7 687.25 12.13 693.68 5.4 700 -1.08 700.45 -1.25
700.85 -1.5 701.42 -1.62 701.98 -1.84 702.33 -2.1 702.62 -2.24 703.35 -2.35
704.28 -2.81 705.63 -3.83 708.31 -4.91 711.03 -5.93 713.31 -6.71 716.1 -7.14
718.64 -7.51 721.01 -7.69 723.53 -7.63 726.11 -8.19 728.78 -8.2 731.64 -8.54
734.05 -8.56 736.6 -8.45 739.04 -8.25 741.38 -8.07 743.66 -7.66 745.87 -7.41
748.18 -7 750.75 -6.73 752.97 -6.33 756.13 -6.1 758.72 -5.66 761.27 -5.15
763.83 -4.96 766.37 -4.91 768.72 -5.02 770.97 -4.94 773.08 -4.54 775.4 -4.4
777.28 -4.25 779.14 -4.15 780.64 -3.86 782.15 -2.98 783.44 -3.18 803.08 2.33
809.52 2.09 815.95 2.1 822.39 2.16 828.82 2.54 841.69 2.83 854.68 2.92
861.23 2.9 867.78 3.12 874.33 3.24 880.89 3.41 887.44 3.43 893.99 3.4 907.1
3.7 913.65 3.76 920.2 3.36 926.75 2.82 933.3 1.9 939.86 1.57 966.07 1.57
972.62 2.31 979.17 4.62 985.72 7.6 992.27 9.93 998.83 11.21 1005.38 12.63
1011.93 14.18 1018.48 16.03 1025.03 18.5 1031.59 20.65 1038.14 21.71 1044.69
21.54 1051.24 20.35 1057.8 18.81 1064.35 17.5 1070.9 16.22 1077.45 15.06
1084 13.51 1090.56 12.08 1097.11 10.58 1103.66 8.14 1110.21 6.12 1116.77
5.17 1123.32 4.74 1129.87 4.55 1136.42 4.55 1142.97 4.64 1149.53 4.55
1156.08 4.31 1162.63 4.27 1169.18 4.4 1175.73 4.55 1188.84 4.64 1195.39 4.41
1201.94 3.82 1208.5 3.52 1215.05 4.11 1221.6 4.48 1228.15 4.59 1234.7 4.67
1241.26 4.77 1247.81 5.06 1254.36 5.1 1260.91 4.95 1267.47 5.12 1274.02 5.24
1280.57 4.86 1287.12 4.72 1300.23 4.57 1306.78 4.42 1313.33 4.51 1332.99
4.47 1339.54 4.42 1346.09 4.43 1352.64 4.33 1359.2 4.01 1372.3 3.13 1378.85
3.23 1385.4 3.4 1391.96 3.4 1398.51 3.55 1405.06 4.22 1411.61 3.99 1418.17
3.78 1424.72 3.66 1431.27 3.67 1437.82 3.37 1444.37 3.35 1450.93 3.46
1457.48 3.61 1464.03 3.49 1470.58 3.54 1477.14 3.56 1490.24 3.27 1496.79

3.31 1503.34 3.65 1509.9 3.72 1516.45 4.34 1523 4.98 1529.55 5.25 1536.11
5.43 1542.66 5.18 1549.21 5.28 1555.76 5.31 1562.31 5.57 1568.87 5.96
1575.42 6.33 1581.97 6.52 1588.52 6.67 1595.07 6.61 1614.73 6.83 1621.28
6.97 1627.84 7.16 1634.39 7 1640.94 5.48 1647.49 2.44 1654.04 1.55 1745.77
1.55 1752.33 1.56 1758.88 2.63 1765.43 3.89 1771.98 4.47 1778.54 5.73
1785.09 8.27 1791.64 10.52 1798.19 11.55 1804.74 11.62 1811.3 11.3 1817.85
11.03 1824.4 10.79 1830.95 10.71 1837.51 10.72 1850.61 10.69 1857.16 10.66
1870.27 10.48 1876.82 10.44 1883.37 10.37 1889.92 10.22 1903.03 10.19
1909.58 10.16 1916.13 10.28 1922.68 10.43 1935.79 10.55 1942.34 10.51
1948.89 10.6 1955.44 10.74 1962 10.71 1968.55 10.49 1975.1 10.31 1981.65
10.03 1988.21 9.79 1994.76 9.27 2001.31 8.82 2007.86 8.46 2014.41 8.31
2020.97 8.21 2027.52 8.04 2034.07 7.92 2040.62 7.78 2047.18 7.67 2053.73
7.66 2066.83 7.52 2073.38 7.48 2079.94 7.41 2086.49 7.46 2093.04 7.38
2106.14 7.08 2112.7 6.94 2119.25 6.84 2125.8 6.78 2132.35 6.66 2138.91 6.64
2145.46 6.72 2152.01 6.77 2158.56 6.88 2165.11 7.01 2171.67 7.18 2178.22
7.37 2184.77 7.33 2191.32 7.03 2197.88 6.76 2204.43 6.67 2210.98 6.7 2217.53
7.59 2224.08 7.73 2237.19 7.45 2243.74 7.12 2250.29 6.89 2263.4 6.7 2269.95
6.59 2283.05 6.53 2289.61 6.67 2296.16 6.64 2302.71 6.65 2309.26 6.85
2315.81 6.85 2322.37 7.08 2328.92 7.16 2335.47 7.31 2342.02 7.55 2348.58 7.7
2355.13 7.74 2361.68 7.75 2368.23 7.62 2374.79 8.14 2381.34 8.39 2387.89
8.45 2394.44 8.39 2400.99 8.47 2407.55 8.42 2414.1 8.56 2420.65 8.83 2427.2
8.58 2433.75 8.24 2440.31 8.34 2446.86 8.48 2453.41 8.41 2459.96 8.48
2466.52 8.59 2473.07 8.52 2479.62 8.27 2486.17 8.1 2492.72 8.01 2499.28 7.81
2505.83 7.65 2512.38 7.38 2518.93 7.05 2525.49 6.59 2532.04 6.43 2538.59
6.57 2545.14 6.64 2551.69 6.54 2558.25 6.49 2564.8 6.52 2571.35 6.57
2584.46 6.43 2591.01 6.42 2597.56 6.46 2604.11 6.54 2610.66 6.57 2617.22
6.72 2623.77 6.83 2630.32 6.76 2636.87 6.75 2643.43 6.92 2649.98 6.95
2656.53 7 2663.08 7.28 2669.63 7.54 2676.19 7.64 2682.74 7.56 2689.29 7.7
2695.84 8.09 2702.4 8.44 2708.95 8.65 2722.05 8.92 2728.6 8.92 2735.16 8.88
2741.71 8.89 2748.26 8.92 2754.81 9.04 2761.36 9.07 2767.92 8.8 2774.47 8.27
2781.02 7.88 2787.57 7.65 2794.13 7.51 2807.23 7.62 2813.78 7.6 2820.33 7.9
2826.89 8.33 2839.99 9.6 2846.54 9.7 2853.1 9.5 2859.65 9.85 2866.2 9.82
2872.75 9.73 2879.3 9.45 2885.86 9.06 2892.41 8.56 2898.96 8.17 2905.51 7.63
2912.07 7.65 2918.62 7.52 2925.17 7.5 2931.72 7.54 2938.27 7.39 2951.38 7.76
2957.93 7.9 2964.48 7.8 2971.03 7.91 2977.59 8.19 2984.14 8.22 2990.69 8.6
2997.24 8.96 3003.8 9.26 3010.35 9.53 3016.9 9.75 3023.45 10.19 3030 10.96
3036.56 11.09 3043.11 10.73 3049.66 11.24 3056.21 11.46 3062.77 10.91
3069.32 10.33 3075.87 10.2 3082.42 9.77 3088.97 9.77 3095.53 9.98 3102.08
9.94 3108.63 10.46 3115.18 11.25 3121.74 11.83 3128.29 12.09 3134.84 12.49
3141.39 13.16 3147.94 13.6 3161.05 14.35 3167.6 14.48 3174.15 14.5 3180.7
14.23 3187.26 14.18 3193.81 13.9 3200.36 13.68 3206.91 13.59 3213.47 13.52
3220.02 13.01 3226.57 12.74 3233.12 13.05 3239.67 13.05 3246.23 12.91
3252.78 12.5 3259.33 12.46 3265.88 13.06 3272.43 13.35 3278.99 13.28 3285.54
13.05 3292.09 13 3298.64 12.98 3305.2 12.92 3318.3 12.6 3324.85 12.93 3331.4
13.12 3337.96 13.09 3344.51 13.13 3351.06 13.23 3357.61 13.24 3364.17 13.27
3370.72 13.1 3377.27 12.77 3383.82 12.53 3390.37 12.75 3396.93 13.14 3403.48
13.38 3410.03 13.57 3416.58 13.6 3423.13 13.37 3429.69 13.36 3436.24 13.54
3442.79 13.36 3449.34 13.23 3462.45 13.14 3469 13 3475.55 12.81 3482.1 12.49
3488.66 12.26 3495.21 12.15 3508.31 11.99 3514.87 11.96 3521.42 12.09
3527.97 12.07 3534.52 12.03 3541.07 12.15 3547.63 12.13 3554.18 12 3560.73
11.99 3567.28 12.01 3573.84 12.05 3580.39 12.17 3586.94 12.24 3593.49 12.35
3606.6 12.52 3613.15 12.76 3619.7 12.79 3626.25 12.84 3632.8 13.11 3639.36
13.29 3645.91 13.16 3652.46 13.13 3659.01 13.02 3665.57 13.07 3672.12 13.04
3678.67 13.09 3685.22 13.25 3691.77 13.32 3698.33 13.37 3704.88 13.33

3711.43 13.24 3724.54 12.89 3731.09 12.99 3737.64 13.3 3744.19 13.35 3750.74 13.17 3757.3 12.8 3763.85 12.97 3770.4 13.38 3776.95 13.66 3783.51 14.2 3796.61 14.1 3803.16 14.13 3809.71 14.26 3816.27 14.44 3822.82 14.64 3829.37 14.74 3835.92 14.96 3842.47 15.14 3849.03 14.99 3855.58 14.58 3862.13 14.64 3875.24 14.67 3881.79 14.89 3888.34 14.66 3901.44 15.04 3908 15.25 3914.55 15.22 3921.1 15.48 3927.65 15.86 3934.21 16.09 3940.76 16.12 3947.31 16.31 3953.86 16.43 3960.41 16.8 3966.97 16.99 3973.52 17.09 3986.62 16.96 3993.18 17.12 3999.73 17.95 4006.28 18.7 4012.83 19.2 4019.38 19.54 4032.49 19.62 4039.04 19.49 4045.59 19.4 4052.15 19.12 4058.7 18.59 4065.25 18.03 4071.8 17.97 4084.91 18.26

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .08 661.51 .04 1038.14 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 661.51 1038.14 1212.6 1253.07 1397.48 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 1621 4084.91 6.9 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 32854.69

INPUT
Description: 36
Station Elevation Data num= 349
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 22.49 6.55 22.23 13.1 22.15 39.29 22.9 52.39 22.61 58.94 22.83 65.49 23.29 72.04 23.58 78.58 23.7 104.78 23.44 130.97 23.78 163.72 23.59 170.27 23.38 176.81 23.02 189.91 22.6 209.56 22.67 216.11 22.39 222.65 22.25 235.75 21.53 255.4 21.2 261.95 20.85 275.04 20.64 281.59 20.8 288.14 20.77 301.24 21.41 314.34 21.5 327.43 22 333.98 22.52 347.08 22.6 392.92 21.58 412.57 20.82 432.21 20.36 445.31 19.84 451.86 19.82 458.41 19.98 478.05 20.06 484.6 20.25 510.8 21.34 530.44 22.58 543.54 23.04 595.93 23.47 615.57 23.23 622.12 23.26 641.77 23.01 654.87 22.08 661.41 21.74 681.06 21.16 694.16 21.47 700.71 21.37 707.26 20.29 720.35 15.85 726.9 13.25 733.45 10.25 740 8.88 753.1 7.14 759.64 6.69 766.19 6.53 779.29 6.76 785.84 6.7 798.94 6.95 805.49 6.64 812.03 6.07 825.13 5.8 831.68 6.05 838.23 6.02 844.78 5.51 851.33 5.83 864.42 7.06 870.97 7.49 877.52 7.68 890.62 7.59 923.36 6.35 929.91 6.24 936.46 6.82 943.01 7.13 949.56 7.06 956.1 7.21 969.2 7.03 975.75 6.53 982.3 6.43 988.85 6.15 995.4 6.07 1008.49 5.43 1015.04 5.31 1028.14 5.94 1034.69 6.11 1047.79 6.77 1060.88 7.02 1073.98 6.85 1080.53 7.05 1087.08 7.54 1093.63 7.61 1100.17 7.41 1106.72 7.37 1113.27 7.49 1146.02 6.99 1152.56 7.26 1159.11 7.35 1172.21 7.03 1178.76 6.69 1185.24 6.68 1191.72 6.53 1204.68 6.8 1215.75 6.86 1217.64 6.89 1224.12 7.17 1230.6 7.25 1237.08 5.71 1243.56 3.38 1300 -3.36 1301 -3.88 1301.75 -4.3 1302.23 -4.54 1303.13 -4.81 1305.04 -5.29 1307.37 -6.15 1309.97 -6.85 1312.3 -7.39 1314.8 -7.81 1317.17 -8.29 1319.97 -8.71 1325.55 -9.32 1328.29 -9.63 1331.36 -9.61 1334 -9.66 1336.79 -9.6 1339.46 -9.61 1342.06 -9.46 1344.6 -9.29 1347.41 -9.17 1350.23 -9.02 1353.37 -8.82 1356.24 -8.61 1359.11 -8.53 1361.58 -8.43 1364.05 -8.25 1366.44 -8.02 1368.83 -7.6 1370.89 -7.31 1373.07 -6.98 1377.46 -6.2 1379.79 -5.78 1381.83

-5.39 1384.11 -5 1386.57 -4.64 1389.38 -4.27 1392.04 -3.87 1394.84 -3.31
1397.42 -2.96 1402.03 -2.5 1404.35 -2.25 1406.41 -2.04 1408.42 -1.83 1409.85
-1.64 1411.13 -1.5 1412.45 -1.38 1413.68 -1.2 1414.98 -1.08 1416.1 -.99
1417.3 -.89 1418.26 -.79 1419.33 -.71 1420.22 -.52 1468.42 1.45 1470.38 1.45
1476.86 2.77 1483.42 5.66 1489.98 7.28 1503.09 8.68 1516.21 8.96 1535.88
8.85 1548.99 9.07 1588.34 9.16 1601.45 9.09 1614.56 9.17 1621.12 9.09
1640.79 9.46 1673.58 9.21 1686.69 8.92 1706.37 9.11 1726.04 8.73 1745.71
8.24 1765.38 7.95 1791.61 8.03 1817.84 8.89 1844.07 8.67 1870.3 8.67 1876.86
8.55 1896.53 7.6 1922.76 7.27 1942.43 7.18 1962.1 7.32 1975.21 7.08 1981.77
6.74 1994.89 5.3 2001.44 5.15 2008 5.37 2014.56 6.13 2021.12 7.03 2027.67
7.34 2040.79 7.11 2060.46 7.21 2073.57 7.45 2139.15 6.7 2158.82 5.9 2165.38
5.73 2171.93 5.9 2178.49 6.24 2198.16 6.54 2204.72 6.39 2224.39 6.69 2237.51
7.06 2250.62 7.09 2263.74 7.39 2270.29 7.15 2276.85 7.31 2296.52 6.87
2329.31 6.84 2335.87 7.02 2342.42 7.06 2348.98 7.66 2355.54 8.45 2362.09
9.01 2368.65 9.14 2375.21 9.43 2408 9.62 2414.55 9.94 2427.67 10.02 2434.22
9.88 2447.34 8.51 2453.9 8.25 2460.45 9.06 2467.01 9.59 2480.13 10.13
2493.24 10.28 2499.8 9.88 2506.36 9.64 2519.47 8.67 2526.03 8.51 2539.14
8.46 2545.7 8.19 2552.26 8.36 2565.37 8.15 2578.49 8.42 2585.04 8.32 2591.6
8.41 2598.16 8.33 2604.71 8.83 2611.27 9.58 2630.94 10.93 2637.5 11.72
2650.62 12.71 2657.17 13.04 2670.29 13.23 2689.96 13.01 2703.07 12.05
2709.63 11.29 2716.19 10.27 2742.42 9.05 2748.98 9.08 2755.53 9.32 2762.09 9
2768.65 9.21 2781.76 10.09 2788.32 10.15 2794.88 11.06 2801.43 11.38 2807.99
11.44 2821.11 12.02 2840.78 11.64 2847.33 11.04 2867.01 10.3 2873.56 9.96
2880.12 10.15 2886.68 10.61 2899.79 10.98 2919.47 10.64 2932.58 11.14
2945.69 10.84 2952.25 11.2 2958.81 10.93 2965.37 11.22 2991.6 11.53 3004.71
12.11 3017.82 12.14 3024.38 12.59 3030.94 13.49 3037.5 13.92 3050.61 13.64
3057.17 13.81 3063.73 13.7 3070.28 13.31 3083.4 14.38 3116.18 15.99 3129.3
16.43 3135.86 16.35 3142.41 16.49 3148.97 16.3 3168.64 16.27 3194.87 15.71
3207.99 16.34 3214.54 16.82 3234.22 16.14 3253.89 16.26 3260.44 16.06 3267
16.19 3273.56 16.73 3280.12 16.78 3286.67 17.54 3293.23 17.91 3299.79 17.99
3312.9 18.6 3319.46 18.51 3326.02 18.16 3332.57 18.24 3345.69 18.7 3365.36
18.57 3371.92 18.69 3398.15 18.9 3404.71 18.15 3411.26 17.86 3417.82 17.77
3430.93 18.35 3437.49 18.41 3444.05 18.65 3450.61 18.62 3463.72 18.16
3470.28 18.06 3476.84 18.1 3483.39 17.87 3489.95 18.17 3496.51 18.62 3503.06
18.35 3509.62 18.44 3522.74 19.26 3542.41 19.29 3555.52 19.84 3568.64 19.84
3575.2 19.99 3581.75 20.33 3588.31 20.33 3601.42 20.02 3607.98 20.28 3627.65
20.66 3640.77 21.27 3653.88 21.53 3660.44 21.39 3673.55 22.38 3680.11 22.73

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .082 1230.6 .04 1503.09 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1230.6
1503.09 1846.6 1695.15 1689.56 .3 .5

CROSS SECTION

RIVER: Taunton River REACH: Main Stem RS: 31159.54

INPUT
Description: 35
Station Elevation Data num= 311
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 20.95 6.55 19.39 13.1 18.29

19.65 17.89 26.2 17.95 32.75 18.16 39.3 18.16 45.85 18.02 58.95 18.36 85.15
19.67 91.7 19.88 104.8 19.8 117.9 19.32 124.45 19.32 131 19.61 137.55 19.65
150.65 19.11 157.2 19 170.3 19.28 176.85 19.59 183.4 19.59 189.95 19.87
196.5 19.67 203.05 19.67 209.6 19.82 216.15 19.74 229.25 19.3 235.8 19.31
248.9 20 268.55 19.75 281.65 19.2 294.75 19.11 347.15 17.63 353.7 17.6
373.35 17.12 379.9 17.15 386.45 17.38 393 17.47 406.1 17.31 412.65 17.12
432.3 17.4 451.95 17.88 458.5 17.8 465.05 18.1 478.15 18.31 491.25 19.09
504.35 19.45 517.45 19.55 524 19.76 537.1 19.86 543.66 20.13 556.76 19.99
563.31 20.03 569.86 20.26 576.41 19.85 582.96 18.13 589.51 15.41 596.06
11.99 602.61 8.71 609.16 6.78 615.71 5.49 622.26 4.75 628.81 4.37 641.91
4.08 648.46 3.32 655.01 2.7 681.21 2.3 687.76 2.36 700.86 2.27 727.06 2.4
746.71 2.21 786.01 2.46 792.56 2.86 805.66 3.88 812.21 4.96 825.25 6.68
831.74 6.42 838.23 4.98 842.57 3.82 844.72 3.25 851.21 2.84 857.7 1.97
864.19 1.28 870 -1.54 870.33 -1.55 870.7 -1.52 871 -1.43 871.28 -1.45 871.64
-1.52 871.82 -1.43 871.88 -1.52 872.41 -2.55 873.56 -3.16 874.86 -4.13
877.45 -4.92 879.68 -5.67 881.76 -6.3 884.07 -6.84 886.17 -7.39 888.47 -7.56
890.61 -7.61 892.85 -7.75 895.17 -7.64 897.7 -7.61 899.94 -7.46 902.06 -7.16
904.32 -6.97 906.77 -7.08 909.18 -6.77 911.65 -6.94 913.99 -6.97 916.27 -
6.86 918.34 -6.63 920.51 -6.31 922.57 -6.03 924.69 -5.65 927 -5.34 929.74 -
5.08 932.26 -4.91 934.6 -4.69 937.13 -4.23 939.48 -3.85 941.57 -3.02 943.49
-2.35 945.55 -2.17 946.83 -1.98 947.96 -2.05 949.15 -2.01 950.4 -1.99 951.76
-1.89 952.98 -1.71 954.27 -1.59 955.38 -1.4 956.54 -1.18 957.53 -.96 968.02
4.7 973.48 5.16 974.51 5.25 981 5.2 993.98 7.56 1000.47 7.71 1006.96 7.48
1013.45 7.07 1026.43 6.85 1045.9 6.76 1058.88 6.32 1065.37 5.7 1084.84 4.41
1097.82 4.51 1104.31 4.26 1110.8 4.44 1117.29 4.31 1136.76 4.51 1149.73 5.2
1156.22 5.22 1162.71 5.48 1169.2 5.46 1175.69 5.27 1182.18 5.45 1188.67 5.32
1195.16 5.37 1201.65 5.58 1208.14 6.07 1221.12 6.67 1227.61 6.38 1234.1 5.59
1247.08 5.55 1253.64 5.08 1260.2 5.05 1266.76 4.86 1273.32 4.15 1279.88 3.62
1286.44 3.71 1293 3.98 1299.57 4.04 1306.13 4.28 1338.93 4.61 1345.49 4.8
1352.05 4.84 1371.73 4.63 1397.97 4.76 1404.53 4.9 1424.22 5.72 1437.34 6.48
1443.9 6.59 1457.02 6.55 1470.14 6.01 1476.7 6.05 1483.26 6.36 1496.38 7.25
1522.62 7.59 1535.74 7.57 1548.87 7.83 1555.43 7.86 1561.99 8.04 1568.55
8.03 1581.67 7.77 1594.79 7.3 1660.39 7.72 1666.96 7.63 1686.64 8.01 1693.2
7.94 1699.76 7.72 1726 7.66 1739.12 7.26 1778.48 7.28 1791.61 7.14 1798.17
6.94 1824.41 7.35 1837.53 7.27 1844.09 7.35 1850.65 7.27 1870.33 7.27
1876.89 7.4 1896.57 7.41 1903.13 7.25 1935.94 7.68 1955.62 8.04 1968.74 8.61
1988.42 8.28 2021.22 8.93 2054.03 8.52 2086.83 7.38 2126.19 5.52 2145.87
5.21 2159 4.79 2178.68 4.54 2211.48 4.79 2224.6 5.3 2237.72 5.5 2250.84 6
2263.96 6.79 2270.52 6.89 2277.08 6.81 2283.65 7.16 2303.33 7.62 2316.45
8.37 2329.57 8.67 2342.69 8.78 2355.81 8.78 2362.37 8.98 2368.93 8.9 2375.49
9.07 2382.05 9.49 2395.17 9.82 2401.73 10.1 2427.98 9.82 2441.1 9.88 2447.66
9.7 2467.34 7.99 2473.9 7.65 2487.02 7.78 2493.58 7.65 2500.14 7.66 2506.7
7.83 2519.82 8.77 2532.94 9.35 2539.51 9.45 2552.63 8.58 2559.19 8.4
2565.75 8.38 2572.31 8.5 2578.87 8.48 2585.43 8.26 2591.99 8.29 2618.23 9.44
2624.79 9.9 2631.35 10.59 2644.47 11.74 2677.28 13.11 2683.84 13.55 2696.96
14.79 2716.64 16.04 2742.88 17.38 2756 17.88 2775.68 19.43 2788.8 19.95
2821.61 20.46 2841.29 21.44 2847.85 21.62 2854.41 22.08 2867.53 22.43
2874.09 22.85 2880.65 23.07 2906.89 23.21 2926.58 23.04 2952.82 23.35
2959.38 23.15 2979.06 23.02 2985.62 22.87 2992.18 22.58 3005.3 22.49 3011.86
22.92 3038.1 23.57 3044.66 23.38 3064.35 23.32 3070.91 23.19 3077.47 22.92
3084.03 22.9 3090.59 22.3 3097.15 20.4 3110.27 20.58 3116.83 20.43 3123.39
19.14 3129.95 20.16 3136.51 20.79 3143.07 21.27 3149.63 21.96 3156.19 22.32
3169.31 22.3 3175.88 21.98

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 825.25 .04 993.98 .082

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 825.25 993.98 1600.85 1613.53 1832.86 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 29546.01

INPUT
Description: 34
Station Elevation Data num= 298
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 22.98 6.52 22.86 19.56 23.4 26.08 23.81 32.6 23.75 39.12 23.45 52.17 23.49 84.77 22.2 91.29 22.13 97.81 22.24 110.85 22.68 123.89 22.76 143.46 22.46 149.98 22.54 176.06 21.84 182.58 21.81 202.14 22.25 221.71 22.18 234.75 21.89 241.27 21.54 247.79 21.03 254.31 20.26 267.35 18.43 273.87 18 280.39 18.26 293.43 19.85 299.95 20.49 313 21.33 326.04 21.79 332.56 21.86 345.6 21.53 352.12 20.92 371.68 18.51 378.2 18.02 384.72 17.38 397.77 16.94 404.29 16.91 410.81 17.02 417.33 16.84 430.37 17.22 436.89 17.72 443.41 17.85 449.93 18.14 456.45 18.08 462.97 17.58 469.49 16.75 476.01 15.68 482.53 14.3 489.06 13.08 495.58 11.52 502.1 10.38 508.62 9.89 515.14 10.09 521.66 9.84 528.18 9.82 541.22 10.27 547.74 10.39 554.26 10.07 560.78 9.94 567.3 10.06 573.83 11.09 580.35 11.47 593.39 11.92 619.47 11.94 625.99 12.12 632.51 11.78 639.03 11.64 645.55 11.68 652.07 11.57 658.59 11.71 671.64 11.72 684.68 12.07 691.2 12.06 704.24 11.81 717.28 11.73 730.32 11.43 743.36 11.38 762.93 10.33 775.97 10.23 782.49 9.99 808.57 10.59 821.61 10.36 834.65 10.48 854.22 10.1 867.26 10.42 886.82 10.24 899.86 10.31 912.9 10.02 919.42 10.01 925.95 10.16 932.47 10.45 938.99 10.91 952.03 11.52 971.59 12.69 978.13 12.78 991.21 13.14 1004.29 13.2 1017.36 12.97 1030.44 12.96 1036.98 12.81 1043.52 12.47 1050.06 12.32 1056.6 12.02 1063.14 11.87 1069.68 11.46 1076.22 10.91 1082.75 10.53 1108.91 10.04 1141.61 10.73 1148.14 10.65 1161.22 10.88 1167.76 11.3 1180.84 11.85 1200.46 12.01 1213.54 11.74 1220.07 11.17 1233.15 10.35 1239.69 9.52 1252.77 8.7 1259.31 8.41 1265.85 8.33 1278.93 7.25 1285.46 6.59 1292 6.39 1298.54 6.65 1311.62 7.66 1318.16 7.85 1331.24 7.09 1344.32 5.98 1350.85 5.73 1357.39 5.9 1363.93 6.44 1370.47 6.73 1377.01 6.78 1383.55 6.63 1390.09 6.65 1403.17 5.53 1409.71 5.23 1416.24 6.03 1422.78 6.46 1429.32 6.36 1435.86 5.7 1442.4 4.88 1448.94 4.83 1462.02 6.22 1468.56 6.81 1475.1 7.21 1481.63 7.19 1488.17 6.79 1494.71 6.67 1501.25 6.73 1520.87 6.43 1533.95 6.01 1547.03 6 1553.56 6.42 1560.1 6.68 1573.18 6.43 1586.26 6.52 1592.8 6.92 1599.34 7.05 1611.52 6.52 1612.42 6.48 1618.95 6.93 1625.49 5.27 1631.91 2.87 1638.33 1.49 1650 -.76 1656.01 -.87 1657.41 -1.05 1658.79 -1.41 1660.28 -1.67 1661.73 -2.03 1663.38 -2.35 1664.87 -2.96 1667.11 -3.25 1669.2 -3.49 1671.82 -3.8 1674.41 -3.94 1676.97 -4.23 1679.73 -4.56 1682.54 -4.79 1685.27 -4.94 1688.14 -5.17 1691.12 -5.38 1694.06 -5.63 1697.38 -5.95 1700.28 -6.42 1703.19 -6.95 1705.96 -7.53 1708.82 -8.12 1711.78 -8.58 1714.83 -8.96 1717.71 -9.25 1720.63 -9.5 1723.54 -9.73 1726.52 -9.77 1729.06 -9.72 1731.61 -9.77 1734.24 -9.61 1737.21 -9.51 1740.37 -9.15 1743.26 -8.76 1745.94 -8.21 1748.61 -7.59 1750.7 -6.68 1752.88 -5.99 1754.79 -5.1 1756.76 -4.3 1758.47 -3.65 1760.1 -3.2 1761.58 -2.71 1763.39 -2.41 1765.5 -2.09 1767.43 -1.84

1768.71 -1.57 1769.92 -1.36 1770.97 -1.12 1772.01 -.83 1805.21 2.9 1811.63 4.47 1818.04 5.88 1822.22 6.34 1824.46 6.6 1830.88 6.8 1850.53 6.94 1857.07 6.83 1863.62 6.58 1870.17 6.52 1889.81 5.66 1922.55 5.84 1929.1 5.79 1955.29 6.32 1968.39 6.4 1974.94 6.05 1988.03 6.5 1994.58 6.49 2020.77 7.34 2040.42 7.4 2053.52 7.76 2079.71 8.06 2086.26 8.7 2092.8 8.87 2099.35 8.59 2105.9 8.12 2112.45 8.22 2119 7.97 2125.54 8.3 2145.19 8.37 2151.74 8.56 2184.48 8.56 2197.57 8.31 2210.67 8.84 2236.86 8.97 2243.41 8.75 2249.96 8.68 2256.5 8.85 2276.15 8.75 2315.44 8.76 2321.98 8.97 2335.08 10.36 2341.63 11.42 2348.18 12.25 2367.82 13.6 2380.92 13.73 2387.46 14.01 2394.01 14.09 2413.66 14.64 2420.2 15.25 2433.3 15.8 2446.4 16.11 2485.69 17.77 2492.23 18.15 2498.78 18.26 2524.97 19.62 2538.07 19.99 2551.17 20.56 2557.71 21.13 2564.26 21.98 2570.81 22.42 2583.91 22.66 2590.45 23.02 2597 23.56 2603.55 24.48 2610.1 24.83 2616.65 25.41 2623.19 25.83 2629.74 25.88 2655.93 25.71 2669.03 25.43 2688.67 25.46 2708.32 24.91 2721.41 24.96 2727.96 25.09 2767.25 24.59 2780.35 24.93 2793.44 25.85 2806.54 26.36 2832.73 26.53

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .088 1618.95 .04 1822.22 .085
 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1618.95 1822.22 1803.19 1875.89 1978.98 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 27670.12

INPUT
Description: 33
Station Elevation Data num= 225
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 22.42 6.56 22.27 13.11 21.73 19.67 20.95 26.22 20.61 59 20.77 65.55 20.54 72.11 20.1 85.22 18.76 104.89 17.01 111.44 16.52 118 16.32 131.11 16.49 150.77 17.45 157.33 17.49 163.88 17.26 176.99 16.44 190.11 15.21 196.66 14.86 203.22 14.28 209.77 13.86 222.88 13.45 235.99 13.35 255.66 13.6 268.77 14.01 288.44 15.34 294.99 15.67 301.55 15.8 308.1 15.64 314.66 15.21 321.21 14.54 327.77 13.54 334.32 12.06 340.88 10.2 347.43 9.24 353.99 8.42 360.54 8.08 380.21 7.96 399.88 8.34 406.43 9.49 412.99 10.36 426.1 11.25 432.65 11.59 439.21 11.76 452.32 11.76 465.43 11.95 485.1 11.47 491.65 11.42 498.21 11.22 504.76 11.18 524.43 10.66 544.09 8.8 550.65 8.3 557.2 8.2 570.32 7.56 629.31 7.16 648.98 7.33 655.53 7.81 662.09 8.5 668.65 9.58 675.2 10.17 681.76 10.94 694.87 10.78 707.98 11.01 714.53 10.37 721.09 7.88 727.48 1.71 729.4 1.48 740 -1.63 740.46 -1.82 740.93 -2.06 741.47 -2.24 741.95 -2.63 742.36 -2.84 744.01 -3.17 746.08 -3.85 748.76 -4.57 751.39 -5.33 753.78 -6.12 756.23 -6.85 758.35 -7.45 760.33 -7.93 762.12 -7.98 763.78 -8.12 765.47 -8.14 767.26 -8.12 769.28 -8 771.56 -7.83 773.87 -7.55 775.92 -7.39 778.08 -7.32 780.06 -7.17 782.12 -7.16 784.02 -7.09 786.37 -7.02 788.45 -6.88 792.8 -6.63 794.92 -6.58 797.14 -6.44 799.45 -6.41 801.79 -6.35 804.57 -6.23 807.05 -6.21 809.62 -5.99 811.8 -5.58 814.03 -5.13 816 -4.25 817.91 -1.54 820.74 -1 822.18 -.38 836.15 1.65 837.15 1.73 842.54 2.17 855.46 4.88 861.99 5.38 868.51 5.41 875.04 4.6 881.57 4.12 888.09 4.61 894.62 5.29 901.15 5.64 907.67 5.79 920.73 7.37 927.25 7.42 933.78 7.15 940.3 6.57 953.36 6.31 979.46 6.29 992.52 5.96 1005.57 5.84 1012.1 5.59 1018.62 5.79 1025.15 6.25 1031.68 6.41 1051.26 6.33 1057.78 5.87

1064.31 5.25 1077.36 4.82 1083.89 5.01 1090.42 5.6 1096.94 7.63 1103.47 8.55
1110 9.02 1116.52 9.64 1129.58 10.36 1136.1 10.54 1142.63 10.42 1149.16
10.52 1155.68 10.48 1181.79 9.95 1188.32 9.92 1194.84 10.17 1220.95 10.83
1227.47 11.21 1240.53 12.37 1247.05 12.6 1260.11 13.57 1273.16 14.13 1286.21
15.52 1292.74 15.59 1299.27 16.1 1305.79 16.74 1318.85 17.8 1331.9 19.06
1338.43 19.39 1344.95 19.97 1351.48 20.71 1364.53 22.52 1371.06 22.99
1377.59 23.92 1384.11 25.28 1390.64 26.24 1403.69 26.91 1410.22 26.93
1416.75 27.27 1423.27 27.39 1429.8 27.72 1442.85 28.07 1449.38 27.96 1455.91
26.9 1462.43 24.73 1468.96 23.74 1475.49 24.64 1482.01 25.3 1488.54 25.83
1514.65 27.24 1540.75 27.69 1547.28 28.1 1553.8 28.19 1573.38 29.26 1592.96
29.35 1599.49 29.88 1606.02 30.09 1612.54 30.1 1619.07 30.36 1625.6 30.81
1632.12 30.71 1645.18 29.98 1651.7 29.97 1677.81 30.5 1684.34 30.76 1723.5
31.58 1730.02 31.46 1743.08 32.29 1749.6 31.88 1756.13 32.16 1769.18 32.3
1775.71 32.57 1788.76 32.54 1808.34 32.87 1821.4 33.92 1834.45 34.31 1840.98
34.69 1847.5 35.21 1854.03 35.56 1867.08 36.86 1873.61 36.98 1880.13 37.25
1886.66 37.72 1893.19 37.95 1906.24 38.84 1912.77 39.13 1919.29 39.69
1925.82 40.44 1964.98 42.55

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .088 707.98 .04 861.99 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 707.98
861.99 918.95 956.75 981.98 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 26713.37

INPUT
Description: 32 Approach Am Vets HWY (Rte 24)
Station Elevation Data num= 312
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 19.83 6.56 19.43 13.12 19.29
19.67 19.33 26.23 19.32 32.79 19.15 39.35 18.82 45.9 18.85 52.46 19 59.02
19.25 65.58 19.45 72.13 19.39 78.69 19.38 85.25 18.96 91.81 18.42 98.36
17.76 104.92 17 111.48 16.39 118.04 16.27 124.59 16.27 131.15 16.06 137.71
15.95 144.27 16.08 150.83 16.16 157.38 16.3 163.94 16.38 170.5 16.48 177.06
16.5 183.61 16.41 190.17 16.16 196.73 15.97 203.29 16.02 209.84 15.92 216.4
15.68 222.96 15.78 229.52 15.72 236.07 15.48 242.63 15.36 249.19 15.22
255.75 15.12 262.31 15.11 268.86 15.08 275.42 15 281.98 14.78 288.54 14.71
295.09 14.52 301.65 14.46 308.21 14.36 314.77 13.84 321.32 13.56 327.88
12.75 334.44 12.14 341 11.39 347.55 10.26 354.11 9.08 360.67 8.41 367.23
8.01 373.78 7.75 380.34 7.69 386.9 7.89 393.46 8.11 400.01 8.01 406.57 7.83
413.13 7.81 426.25 7.65 432.8 7.66 439.36 7.51 445.92 7.14 452.48 7.45
459.03 7.66 465.59 7.44 472.15 7.15 478.71 7.17 485.26 7.26 491.82 7.23
498.38 7.29 504.94 7.24 511.49 6.91 518.05 7.13 524.61 6.94 531.17 6.87
537.72 7.14 544.28 7.28 550.84 7.32 557.4 7.01 563.96 6.97 570.51 7.26
577.07 7.51 583.63 7.7 590.19 7.75 603.3 7.58 616.42 7.73 622.97 8.01 629.53
8.07 636.09 8 642.65 7.56 649.2 7.34 655.76 7.32 662.32 7.2 668.88 6.98
675.43 6.86 681.99 7.04 688.55 7.11 695.11 7.13 701.67 7.18 708.22 7.03
714.78 7.25 721.34 7.49 727.9 7.34 734.45 7.42 741.01 7.64 747.57 7.66
754.13 7.88 760.68 8.06 767.24 8.01 780.36 8.11 786.91 7.76 793.47 7.43

800.03 7.23 806.59 7.58 813.14 7.78 819.7 7.85 826.26 8.17 832.82 8.35
839.37 8.49 845.93 8.51 852.49 8.59 859.05 9.1 865.61 9.52 872.16 9.65
878.72 9.91 885.28 9.77 891.84 9.22 898.39 8.6 904.95 8.02 911.51 7.81
918.07 8.17 924.62 8.69 931.18 8.92 937.74 9.01 944.3 9.32 950.85 9.44
957.41 9.49 963.97 9.76 970.53 10.08 977.08 10.47 983.64 10.95 990.2 11.06
996.76 11.06 1003.32 11.17 1016.43 12.12 1022.99 12.25 1029.55 12.86 1036.1
12.77 1042.66 12.82 1055.78 13.01 1062.33 13.19 1068.89 13.39 1075.45 13.66
1082.01 13.98 1095.12 14.34 1101.68 14.06 1114.8 13.26 1121.35 12.8 1127.91
12.49 1134.47 12.2 1141.03 11.82 1147.58 11.5 1154.14 11.22 1160.7 10.83
1167.26 10.38 1173.81 9.6 1180.37 8.94 1186.93 8.52 1193.49 8.16 1206.6 7.93
1213.16 7.94 1232.83 8.17 1239.39 8.23 1245.95 8.1 1252.51 8.09 1259.06 8.18
1265.62 8.15 1272.18 8.43 1278.74 7.93 1285.29 7.58 1291.85 7.37 1298.41
7.31 1304.97 7.48 1311.52 7.61 1318.08 7.78 1324.64 7.77 1331.2 7.85 1344.31
8.1 1350.87 8.11 1357.43 8.15 1363.99 8.03 1370.54 8.09 1377.1 7.99 1383.66
8.07 1390.22 7.94 1396.77 7.93 1403.33 8.04 1409.89 8.3 1416.45 8.46 1423
8.69 1429.56 8.52 1436.12 8.58 1442.68 8.6 1449.23 8.26 1455.79 8.15 1462.25
7.94 1468.71 7.43 1475.16 7.51 1481.62 6.96 1515.74 5.39 1517.69 1 1536.34 -
5.39 1561.94 -8.6 1583.07 -9.75 1583.41 -9.8 1601.44 -6.22 1621.31 -1.2
1636.36 2 1637.5 5 1643.1 5.4 1649.53 8.05 1761.63 14.64 1775.07 15.13
1781.61 15.28 1788.14 15.54 1794.67 15.62 1801.2 15.35 1807.74 14.71 1814.27
14.27 1820.8 14.99 1827.34 16.15 1833.87 18.37 1840.4 19.49 1846.94 17.81
1853.47 14.29 1860 8.71 1866.54 5.22 1873.07 4.27 1879.6 4.97 1886.14 5.89
1892.67 8.26 1899.2 8.11 1905.73 8.09 1912.27 8.19 1918.8 8.54 1925.33 8.67
1931.87 8.67 1938.4 8.84 1944.93 8.83 1951.47 8.76 1964.53 9.29 1971.07 9.61
1977.6 9.66 1984.13 9.87 1990.67 9.91 1997.2 9.91 2003.73 9.99 2010.27 10.34
2016.8 10.94 2023.33 11.37 2029.86 12.1 2036.4 12.61 2042.93 13 2049.46
13.69 2056 14.6 2062.53 17.61 2069.06 18.61 2075.6 18.26 2082.13 16.65
2088.66 16.06 2101.73 15.76 2108.26 15.55 2114.79 15.64 2121.33 15.77
2127.86 15.84 2134.39 15.82 2140.93 15.49 2147.46 15.14 2153.99 14.9 2167.06
14.77 2173.59 14.8 2180.12 14.64 2186.66 14.53 2193.19 14.6 2199.72 14.77
2206.26 14.82 2212.79 14.78 2225.85 14.82 2238.92 14.65 2245.45 14.37
2251.99 14.26 2258.52 14.2 2265.05 14.22 2271.59 14.42 2278.12 14.98 2284.65
15.75 2291.18 16.65 2297.72 17.32 2304.25 17.47 2310.78 17.77 2317.32 17.67
2323.85 17.05 2330.38 18.54 2336.92 20.59 2343.45 23.14 2349.98 25.15

Manning's n Values num= 3 Sta n Val Sta n Val Sta n Val
 0 .085 1442.68 .04 1649.53 .088

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1442.68
1649.53 43.75 79.77 95.66 .5 .5 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 1095 14.3 T
 1840 2349.98 19.5 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 26633.6

INPUT
Description: 31.7 US Face Am Vets HWY (Rte 24)
Station Elevation Data num= 315
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 23.76 4.639 23.71 9.27 23.68

13.909 23.62 18.54 23.58 23.179 23.57 27.811 23.46 32.449 22.74 37.081 22.91
46.351 22.68 50.989 22.71 55.621 22.5 60.26 22.51 64.891 22.36 69.53 22.25
74.161 22.11 78.8 21.79 83.432 21.49 88.07 21.42 92.702 21.33 97.34 21.51
101.972 21.54 106.61 21.63 111.242 21.79 115.881 21.89 120.512 21.86 125.151
21.75 129.782 21.73 134.421 21.84 139.053 21.82 143.691 21.69 148.323 21.72
152.961 21.7 157.593 21.7 162.232 21.68 171.502 21.77 176.133 21.72 180.772
21.64 185.403 21.51 190.042 21.67 194.674 21.56 199.312 21.59 203.944 21.56
208.582 21.18 213.214 20.78 217.853 20.7 222.484 20.72 227.123 20.6 231.754
20.42 236.393 20.36 241.024 19.86 245.663 19.3 250.295 18.77 254.933 18.19
259.565 17.71 264.203 17.53 268.835 17.37 273.474 17.15 278.105 16.66
282.744 16.67 287.375 16.83 292.014 16.9 296.645 16.86 301.284 16.73 305.916
16.93 310.554 16.92 319.824 16.76 324.456 16.85 329.095 17.02 333.726 17.05
338.365 16.81 342.996 16.84 347.635 16.9 352.266 16.93 356.905 16.89 366.175
17.12 375.445 17.21 380.084 16.34 384.723 14.66 389.361 14.48 393.993 14.69
398.631 14.45 403.27 14.49 407.909 14.34 412.547 14.41 417.179 14.56 421.817
14.62 426.456 14.6 431.095 14.74 440.365 14.98 445.004 14.91 449.642 14.39
454.281 14.08 458.919 13.81 463.551 13.99 468.19 14.06 472.828 14.24 477.467
14.28 482.105 14.58 486.737 14.97 491.376 15.11 496.014 14.85 500.653 14.78
505.291 15.09 509.923 14.87 514.562 14.94 519.2 15.05 523.839 14.98 528.47
15.12 537.748 15.57 542.386 15.35 547.025 15.36 551.656 15 556.295 14.66
560.934 12.19 565.572 12.44 570.211 12.97 574.842 13.39 579.481 13.89 584.12
13.98 588.758 13.9 593.397 13.98 598.028 14.02 602.667 14.25 607.306 14.02
611.944 14.06 616.583 14.56 621.215 14.73 625.853 14.94 630.492 14.97 635.13
14.89 639.762 15.07 644.401 15.09 649.039 15.01 653.678 15.14 658.316 15.24
662.948 15.25 667.587 15.43 672.225 16 676.864 15.68 681.502 15.62 686.134
15.83 690.773 15.96 695.411 16.25 700.05 16.11 704.688 16.43 709.32 16.48
713.959 16.55 718.597 16.65 723.236 16.83 727.875 17.06 732.506 15.53
737.145 15.38 741.783 15.48 746.422 15.44 751.061 15.51 755.692 15.79
760.331 16.11 769.608 16.22 778.878 16.16 783.517 16.22 788.155 16.43
792.794 16.29 797.425 16.37 802.064 16.29 806.703 16.31 811.341 16.56 815.98
16.65 820.612 16.66 825.25 16.26 829.889 15.79 834.527 15.73 839.166 15.73
843.798 15.7 848.436 15.58 853.075 15.66 857.713 15.65 866.984 15.71 871.622
15.66 876.261 15.87 880.899 15.7 885.538 15.67 890.17 15.76 894.808 15.76
899.447 15.68 904.085 15.62 913.356 14.13 917.994 14.31 922.633 14.31
927.272 14.48 931.91 14.81 936.542 14.37 941.18 14.45 945.819 14.55 950.458
14.48 955.096 14.62 959.728 14.72 964.366 14.77 969.005 15.04 973.644 14.98
978.282 15.09 982.914 15.09 992.191 15.76 996.83 15.961001.468 16.22 1006.1
16.41010.738 16.561015.377 16.821020.016 16.831024.654 16.91 1029.286
16.891033.924 16.951038.563 17.241043.202 17.18 1047.84 17.67 1052.472 17.49
1057.11 17.581061.749 17.831066.388 17.811071.026 18.14 1075.658
18.141080.297 18.041084.935 17.231089.574 17.281094.212 17.55 1106.629
13.441112.632 10.711125.134 4.55 1130.72 3.961131.816 2.3 1142.706 -
3.171147.182 -2.571160.688 -7.84 1171.45 -8.461190.718 -11.29 1206.437 -
6.481225.579 -.891242.266 3.091247.237 5.521251.876 8.17 1256.507
10.691261.146 14.81265.785 16.611270.423 18.051275.062 19.28 1279.694
20.121284.332 20.81288.971 21.281293.609 21.191298.248 21.33 1302.88
21.311307.518 21.221312.157 21.441316.795 21.461321.434 21.56 1326.066
21.551330.704 21.691339.981 21.9 1344.62 21.991349.252 21.91 1353.89
22.021363.168 22.151367.806 22.161372.438 22.151377.076 22.31 1381.715
22.231386.354 22.261390.992 22.351395.624 22.411400.262 22.37 1404.901
22.381414.178 22.531428.087 22.561432.726 22.681437.364 22.69 1441.996
22.621446.634 23.041451.273 231455.912 23.21 1460.55 23.13 1465.182 23.36
1469.82 23.271474.459 23.341479.098 23.341483.736 23.4 1488.368 23.551493.006
23.541497.645 23.551502.284 23.611506.915 23.73 1511.554 23.681516.193

23.851520.831 23.67 1525.47 23.861530.101 23.89 1534.74 23.831539.379
23.861548.656 23.981553.287 24.071557.926 24.13 1562.565 24.211567.203
24.261571.842 24.391576.473 24.451581.112 24.56 1585.751 24.571590.389
24.511595.021 24.571599.659 24.71604.298 24.7 1608.937 24.751613.575
24.931622.845 25.081627.484 25.251632.123 25.13

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val 0 .0851094.212 .041288.971 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1094.2121288.971 137.27 118.57 119.67 .6 .8 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 1071 18.14 T
Skew Angle = 45

BRIDGE

RIVER: Taunton River
REACH: Main Stem RS: 26591.05

INPUT
Description: 31.5 Rte 24/ Am Vets Mem Hwy
Distance from Upstream XS = 2
Deck/Roadway Width = 105
Weir Coefficient = 2.6
Bridge Deck/Roadway Skew = 45
Upstream Deck/Roadway Coordinates
 num= 13
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 0 17 998.435 17.06 1050.054 18.11 1100.965 18.88 1107.329 19.25 14.95
1129.25 19.61 15.46 1143.392 19.98 13.031227.537 20.34 13.931233.901 20.71
16.61 1263.6 21.07 16.91 1268.55 21.43 1330.068 21.7 1370.373 22.47

Upstream Bridge Cross Section Data
Station Elevation Data num= 315
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 23.76 4.639 23.71 9.27 23.68
13.909 23.62 18.54 23.58 23.179 23.57 27.811 23.46 32.449 22.74 37.081 22.91
46.351 22.68 50.989 22.71 55.621 22.5 60.26 22.51 64.891 22.36 69.53 22.25
74.161 22.11 78.8 21.79 83.432 21.49 88.07 21.42 92.702 21.33 97.34 21.51
101.972 21.54 106.61 21.63 111.242 21.79 115.881 21.89 120.512 21.86 125.151
21.75 129.782 21.73 134.421 21.84 139.053 21.82 143.691 21.69 148.323 21.72
152.961 21.7 157.593 21.7 162.232 21.68 171.502 21.77 176.133 21.72 180.772
21.64 185.403 21.51 190.042 21.67 194.674 21.56 199.312 21.59 203.944 21.56
208.582 21.18 213.214 20.78 217.853 20.7 222.484 20.72 227.123 20.6 231.754
20.42 236.393 20.36 241.024 19.86 245.663 19.3 250.295 18.77 254.933 18.19
259.565 17.71 264.203 17.53 268.835 17.37 273.474 17.15 278.105 16.66
282.744 16.67 287.375 16.83 292.014 16.9 296.645 16.86 301.284 16.73 305.916
16.93 310.554 16.92 319.824 16.76 324.456 16.85 329.095 17.02 333.726 17.05
338.365 16.81 342.996 16.84 347.635 16.9 352.266 16.93 356.905 16.89 366.175
17.12 375.445 17.21 380.084 16.34 384.723 14.66 389.361 14.48 393.993 14.69
398.631 14.45 403.27 14.49 407.909 14.34 412.547 14.41 417.179 14.56 421.817
14.62 426.456 14.6 431.095 14.74 440.365 14.98 445.004 14.91 449.642 14.39
454.281 14.08 458.919 13.81 463.551 13.99 468.19 14.06 472.828 14.24 477.467

```
14.28 482.105 14.58 486.737 14.97  491.376 15.11 496.014 14.85 500.653 14.78
505.291 15.09 509.923 14.87  514.562 14.94 519.2 15.05 523.839 14.98 528.47
15.12 537.748 15.57  542.386 15.35 547.025 15.36 551.656 15 556.295 14.66
560.934 12.19  565.572 12.44 570.211 12.97 574.842 13.39 579.481 13.89 584.12
13.98  588.758 13.9 593.397 13.98 598.028 14.02 602.667 14.25 607.306 14.02
611.944 14.06 616.583 14.56 621.215 14.73 625.853 14.94 630.492 14.97  635.13
14.89 639.762 15.07 644.401 15.09 649.039 15.01 653.678 15.14  658.316 15.24
662.948 15.25 667.587 15.43 672.225 16 676.864 15.68  681.502 15.62 686.134
15.83 690.773 15.96 695.411 16.25 700.05 16.11  704.688 16.43 709.32 16.48
713.959 16.55 718.597 16.65 723.236 16.83  727.875 17.06 732.506 15.53
737.145 15.38 741.783 15.48 746.422 15.44  751.061 15.51 755.692 15.79
760.331 16.11 769.608 16.22 778.878 16.16  783.517 16.22 788.155 16.43
792.794 16.29 797.425 16.37 802.064 16.29  806.703 16.31 811.341 16.56 815.98
16.65 820.612 16.66 825.25 16.26  829.889 15.79 834.527 15.73 839.166 15.73
843.798 15.7 848.436 15.58  853.075 15.66 857.713 15.65 866.984 15.71 871.622
15.66 876.261 15.87  880.899 15.7 885.538 15.67 890.17 15.76 894.808 15.76
899.447 15.68  904.085 15.62 913.356 14.13 917.994 14.31 922.633 14.31
927.272 14.48  931.91 14.81 936.542 14.37 941.18 14.45 945.819 14.55 950.458
14.48  955.096 14.62 959.728 14.72 964.366 14.77 969.005 15.04 973.644 14.98
978.282 15.09 982.914 15.09 992.191 15.76 996.83 15.961001.468 16.22  1006.1
16.41010.738 16.561015.377 16.821020.016 16.831024.654 16.91 1029.286
16.891033.924 16.951038.563 17.241043.202 17.18 1047.84 17.67 1052.472 17.49
1057.11 17.581061.749 17.831066.388 17.811071.026 18.14 1075.658
18.141080.297 18.041084.935 17.231089.574 17.281094.212 17.55 1106.629
13.441112.632 10.711125.134 4.55 1130.72 3.961131.816 2.3 1142.706 -
3.171147.182 -2.571160.688 -7.84 1171.45 -8.461190.718 -11.29 1206.437 -
6.481225.579 -.891242.266 3.091247.237 5.521251.876 8.17 1256.507
10.691261.146 14.81265.785 16.611270.423 18.051275.062 19.28 1279.694
20.121284.332 20.81288.971 21.281293.609 21.191298.248 21.33  1302.88
21.311307.518 21.221312.157 21.441316.795 21.461321.434 21.56 1326.066
21.551330.704 21.691339.981 21.9 1344.62 21.991349.252 21.91  1353.89
22.021363.168 22.151367.806 22.161372.438 22.151377.076 22.31 1381.715
22.231386.354 22.261390.992 22.351395.624 22.411400.262 22.37 1404.901
22.381414.178 22.531428.087 22.561432.726 22.681437.364 22.69 1441.996
22.621446.634 23.041451.273 231455.912 23.21 1460.55 23.13 1465.182 23.36
1469.82 23.271474.459 23.341479.098 23.341483.736 23.4 1488.368 23.551493.006
23.541497.645 23.551502.284 23.611506.915 23.73 1511.554 23.681516.193
23.851520.831 23.67 1525.47 23.861530.101 23.89  1534.74 23.831539.379
23.861548.656 23.981553.287 24.071557.926 24.13 1562.565 24.211567.203
24.261571.842 24.391576.473 24.451581.112 24.56 1585.751 24.571590.389
24.511595.021 24.571599.659 24.71604.298 24.7 1608.937 24.751613.575
24.931622.845 25.081627.484 25.251632.123 25.13

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .0851094.212 .041288.971 .085

Bank Sta: Left Right Coeff Contr. Expan.
 1094.2121288.971 .6 .8
Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 1071 18.14 T
Skew Angle = 45
```

Downstream Deck/Roadway Coordinates
 num= 13
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord 0 17 1005.506
17.06 1057.125 18.11 1108.036 18.88 1117.936 19.25 14.951139.856 19.61 15.46
1153.998 19.98 13.031238.144 20.34 13.931244.508 20.71 16.61 1274.206 21.07
16.911275.621 21.43 1337.139 21.7 1377.444 22.47

Downstream Bridge Cross Section Data
Station Elevation Data num= 317
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 16.93 4.603 16.73 9.214
16.85 13.817 16.95 18.42 17 23.023 17.56 27.634 17.92 32.237 17.99 36.84
17.56 41.444 16.57 46.054 15.99 50.657 15.6 55.26 15.5 59.864 15.47 64.474
15.19 69.077 15.24 73.681 15.53 78.284 15.25 82.894 14.86 87.497 15.13
92.101 15.44 96.711 15.51 101.314 15.63 105.918 16.06 110.521 16.25 115.131
16.35 119.734 16.3 124.338 16.36 128.941 16.68 133.551 16.98 138.155 17.31
142.758 17.33 147.361 17 151.971 16.85 156.575 16.72 161.178 16.62 165.781
16.33 170.392 16.02 174.995 15.73 179.598 15.41 184.208 15.43 188.812 15.39
193.415 14.99 198.018 14.51 202.629 13.97 207.232 14.03 211.835 13.89
216.438 14.09 221.049 14.39 225.652 14.57 230.255 14.84 234.858 15.15
239.469 15.43 244.072 15.79 248.675 15.76 253.279 15.63 257.889 15.53
262.492 15.48 267.095 15.18 271.706 14.42 276.309 13.62 280.912 13.06
285.551 12.31 290.19 11.33 294.821 10.48 299.46 10.85 304.098 10.6 308.737
10.62 313.376 11.93 318.014 12.9 322.646 12.88 327.284 12.51 336.562 12.14
341.2 12.07 345.832 11.97 350.47 11.76 355.109 11.88 359.748 11.7 364.386
11.56 369.018 11.88 373.656 12.05 382.934 11.8 387.572 11.91 392.211 11.87
396.842 12.06 401.481 12.18 406.12 11.92 410.758 12.06 415.397 11.88 420.029
12 424.667 12.14 429.306 12.15 433.944 12.11 438.583 12.3 443.215 11.79
447.853 11.64 452.492 11.58 457.13 11.37 461.769 11.59 471.039 11.36 475.678
11.2 480.316 11.17 484.955 11.33 489.594 11.53 494.225 13.39 498.864 12.89
503.502 12.56 508.141 12.58 512.78 12.39 522.05 12.4 526.688 12.58 531.327
12.5 535.966 12.34 540.604 12.56 545.236 12.26 549.875 12.22 554.513 12.02
559.152 12.04 563.79 12.04 568.422 11.84 573.061 11.72 577.699 11.8 582.338
11.7 586.976 11.53 591.615 11.8 596.247 11.58 600.885 11.38 605.524 11.26
610.162 11.17 614.801 11.22 619.433 11.85 624.071 12.34 628.71 12.42 633.348
12.24 637.987 11.76 642.619 11.85 647.257 11.99 651.896 11.94 656.534 12.02
661.173 11.74 665.812 12.91 670.443 13.68 675.082 13.45 679.721 13.01
684.359 13.03 688.998 12.99 693.629 12.79 698.268 12.87 702.907 12.62
707.545 12.83 712.184 12.95 716.815 12.88 721.454 12.63 726.093 12.5 730.731
12.62 735.37 12.64 740.008 12.69 744.64 12.65 749.279 12.71 753.917 12.9
758.556 13.02 763.194 13.21 767.826 13.14 772.465 13.2 777.103 13.31 781.742
13.49 786.38 13.48 791.012 13.67 795.651 13.55 800.289 13.78 804.928 14.06
809.567 14.01 814.198 14.05 818.837 14.38 823.475 14.54 828.114 14.5 832.753
14.48 837.391 14.41 842.023 14.39 846.661 14.56 851.3 14.39 855.939 14.18
860.577 14.07 865.209 14.13 869.847 14.27 874.486 14.36 879.125 14.23
883.763 14.36 888.395 14.19 893.033 14.17 897.672 13.86 902.311 13.89
906.949 13.88 911.581 13.61 916.219 13.02 920.858 12.54 925.497 12.3 930.135
12.27 939.406 12.13 944.044 11.89 948.683 11.97 953.321 12 957.96 11.78
962.592 11.63 967.23 11.55 971.869 11.84 976.507 11.92 981.146 12.15 985.778
12.27 990.416 12.24 995.055 12.38 999.693 11.961004.332 12.051008.971
11.771013.602 11.32 1018.241 12.561022.879 13.651027.518 13.431036.788
13.511041.427 13.45 1050.704 13.641055.343 13.881059.974 13.991064.613
13.881069.251 13.93 1073.89 14.131078.529 14.31 1083.16 14.391087.799
14.561092.438 14.82 1097.076 14.311101.715 14.091106.346 13.931110.985
13.371120.771 13.44 1126.775 10.711139.276 4.551144.862 3.961145.958

2.31156.848 -3.17 1161.324 -2.57 1174.83 -7.841185.592 -8.46 1204.86 -
11.291220.579 -6.48 1239.721 -.891256.408 3.091259.378 10.191264.017
12.811268.656 15.89 1273.294 18.421277.926 19.981282.564 20.481287.203
20.951291.842 21.14 1296.48 21.281301.112 21.46 1305.75 21.671310.389
21.81315.028 21.59 1319.666 21.781324.305 21.791328.937 21.731333.575
21.71338.214 21.63 1342.852 21.581347.491 21.291352.122 21.281356.761 21.37
1361.4 21.24 1370.677 21.281375.308 21.291379.947 21.321384.586 21.421389.224
21.36 1393.863 21.241398.495 20.941403.133 21.211407.772 21.2 1412.41 21.08
1417.049 20.991421.688 20.881426.319 20.941430.958 20.721435.596 20.85
1440.235 20.851444.874 20.991449.505 20.941454.144 20.781458.782 20.92
1463.421 20.96 1468.06 20.951472.691 20.84 1477.33 20.821481.969 20.86
1486.607 20.871491.246 20.861495.884 20.921500.516 21.021505.155 20.93
1509.793 20.871514.432 21.3 1519.07 21.491523.702 21.59 1528.34 21.37
1532.979 21.031537.618 20.831542.256 20.951546.895 21.131551.527 21.98
1556.165 22.331560.804 22.421570.081 22.271574.713 22.11579.351 22.3 1583.99
22.31588.628 22.32

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .0851120.771 .041282.564 .085

Bank Sta: Left Right Coeff Contr. Expan.
 1120.7711282.564 .5 .8 Ineffective Flow num= 3
 Sta L Sta R Elev Permanent
 0 138 17 F
 138 243 16 F
 243 1092 14.8 F
Skew Angle = 45

Upstream Embankment side slope = 0 horiz. to 1.0 vertical Downstream
Embankment side slope = 0 horiz. to 1.0 vertical Maximum allowable
submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Piers = 2

Pier Data
Pier Station Upstream=1137.735 Downstream=1150.463
Upstream num= 3
 Width Elev Width Elev Width Elev
 7 .85 7 3.9 7 16.8
Downstream num= 3
 Width Elev Width Elev Width Elev
 7 .85 7 3.9 7 16.8

Pier Data Pier Station Upstream= 1231.78 Downstream=1244.508
Upstream num= 3
 Width Elev Width Elev Width Elev
 7 .85 7 3.9 7 16.8
Downstream num= 3
 Width Elev Width Elev Width Elev

```
 7 .85 7 3.9 7 16.8

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
 Energy
 W.S. Pro Method

 W.S.Pro Data
 Left Embankment
 El of the top of the embankment = 20
 El of the toe of the abutment = 0
 Right Embankment
 El of the top of the embankment = 20
 El of the toe of the abutment = 0
 Abutment Type = 3 Sloping abutments and sloping embankments  Slope of
abutments = 4
 Top with of embankment = 105
 Centroid station of bridge opening =
 Wing Wall Type = Angular wing walls
 Width = 25  Angle = 45
 Radius =
 Guide Banks Type = No Guide Bank present
 Length =
 Offset =
 Angle =
 Optional Contraction and expansion coefficients
 At approach Section
 At Guide Bank
 At upstream outside
 At upstream inside (BU)
 At downstream inside (BD)
 Piers are Continuous for the width of the bridge
 Use Geometric mean as Friction Slope Method

Selected Low Flow Methods = W.S.Pro Method

High Flow Method
 Pressure and Weir flow
 Submerged Inlet Cd =
 Submerged Inlet + Outlet Cd = .8
 Max Low Cord =

Additional Bridge Parameters
 Add Friction component to Momentum
 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth   inside the
bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION


RIVER: Taunton River
```

REACH: Main Stem RS: 26515.04

INPUT
Description: 31.3 DS Face Am Vets HWY (Rte 24)
Station Elevation Data num= 317
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 16.93 4.603 16.73 9.214
16.85 13.817 16.95 18.42 17 23.023 17.56 27.634 17.92 32.237 17.99 36.84
17.56 41.444 16.57 46.054 15.99 50.657 15.6 55.26 15.5 59.864 15.47 64.474
15.19 69.077 15.24 73.681 15.53 78.284 15.25 82.894 14.86 87.497 15.13
92.101 15.44 96.711 15.51 101.314 15.63 105.918 16.06 110.521 16.25 115.131
16.35 119.734 16.3 124.338 16.36 128.941 16.68 133.551 16.98 138.155 17.31
142.758 17.33 147.361 17 151.971 16.85 156.575 16.72 161.178 16.62 165.781
16.33 170.392 16.02 174.995 15.73 179.598 15.41 184.208 15.43 188.812 15.39
193.415 14.99 198.018 14.51 202.629 13.97 207.232 14.03 211.835 13.89
216.438 14.09 221.049 14.39 225.652 14.57 230.255 14.84 234.858 15.15
239.469 15.43 244.072 15.79 248.675 15.76 253.279 15.63 257.889 15.53
262.492 15.48 267.095 15.18 271.706 14.42 276.309 13.62 280.912 13.06
285.551 12.31 290.19 11.33 294.821 10.48 299.46 10.85 304.098 10.6 308.737
10.62 313.376 11.93 318.014 12.9 322.646 12.88 327.284 12.51 336.562 12.14
341.2 12.07 345.832 11.97 350.47 11.76 355.109 11.88 359.748 11.7 364.386
11.56 369.018 11.88 373.656 12.05 382.934 11.8 387.572 11.91 392.211 11.87
396.842 12.06 401.481 12.18 406.12 11.92 410.758 12.06 415.397 11.88 420.029
12 424.667 12.14 429.306 12.15 433.944 12.11 438.583 12.3 443.215 11.79
447.853 11.64 452.492 11.58 457.13 11.37 461.769 11.59 471.039 11.36 475.678
11.2 480.316 11.17 484.955 11.33 489.594 11.53 494.225 13.39 498.864 12.89
503.502 12.56 508.141 12.58 512.78 12.39 522.05 12.4 526.688 12.58 531.327
12.5 535.966 12.34 540.604 12.56 545.236 12.26 549.875 12.22 554.513 12.02
559.152 12.04 563.79 12.04 568.422 11.84 573.061 11.72 577.699 11.8 582.338
11.7 586.976 11.53 591.615 11.8 596.247 11.58 600.885 11.38 605.524 11.26
610.162 11.17 614.801 11.22 619.433 11.85 624.071 12.34 628.71 12.42 633.348
12.24 637.987 11.76 642.619 11.85 647.257 11.99 651.896 11.94 656.534 12.02
661.173 11.74 665.812 12.91 670.443 13.68 675.082 13.45 679.721 13.01
684.359 13.03 688.998 12.99 693.629 12.79 698.268 12.87 702.907 12.62
707.545 12.83 712.184 12.95 716.815 12.88 721.454 12.63 726.093 12.5 730.731
12.62 735.37 12.64 740.008 12.69 744.64 12.65 749.279 12.71 753.917 12.9
758.556 13.02 763.194 13.21 767.826 13.14 772.465 13.2 777.103 13.31 781.742
13.49 786.38 13.48 791.012 13.67 795.651 13.55 800.289 13.78 804.928 14.06
809.567 14.01 814.198 14.05 818.837 14.38 823.475 14.54 828.114 14.5 832.753
14.48 837.391 14.41 842.023 14.39 846.661 14.56 851.3 14.39 855.939 14.18
860.577 14.07 865.209 14.13 869.847 14.27 874.486 14.36 879.125 14.23
883.763 14.36 888.395 14.19 893.033 14.17 897.672 13.86 902.311 13.89
906.949 13.88 911.581 13.61 916.219 13.02 920.858 12.54 925.497 12.3 930.135
12.27 939.406 12.13 944.044 11.89 948.683 11.97 953.321 12 957.96 11.78
962.592 11.63 967.23 11.55 971.869 11.84 976.507 11.92 981.146 12.15 985.778
12.27 990.416 12.24 995.055 12.38 999.693 11.961004.332 12.051008.971
11.771013.602 11.32 1018.241 12.561022.879 13.651027.518 13.431036.788
13.511041.427 13.45 1050.704 13.641055.343 13.881059.974 13.991064.613
13.881069.251 13.93 1073.89 14.131078.529 14.31 1083.16 14.391087.799
14.561092.438 14.82 1097.076 14.311101.715 14.091106.346 13.931110.985
13.371120.771 13.44 1126.775 10.711139.276 4.551144.862 3.961145.958
2.31156.848 -3.17 1161.324 -2.57 1174.83 -7.841185.592 -8.46 1204.86 -
11.291220.579 -6.48 1239.721 -.891256.408 3.091259.378 10.191264.017
12.811268.656 15.89 1273.294 18.421277.926 19.981282.564 20.481287.203
20.951291.842 21.14 1296.48 21.281301.112 21.46 1305.75 21.671310.389

21.81315.028 21.59 1319.666 21.781324.305 21.791328.937 21.731333.575
21.71338.214 21.63 1342.852 21.581347.491 21.291352.122 21.281356.761 21.37
1361.4 21.24 1370.677 21.281375.308 21.291379.947 21.321384.586 21.421389.224
21.36 1393.863 21.241398.495 20.941403.133 21.211407.772 21.2 1412.41 21.08
1417.049 20.991421.688 20.881426.319 20.941430.958 20.721435.596 20.85
1440.235 20.851444.874 20.991449.505 20.941454.144 20.781458.782 20.92
1463.421 20.96 1468.06 20.951472.691 20.84 1477.33 20.821481.969 20.86
1486.607 20.871491.246 20.861495.884 20.921500.516 21.021505.155 20.93
1509.793 20.871514.432 21.3 1519.07 21.491523.702 21.59 1528.34 21.37
1532.979 21.031537.618 20.831542.256 20.951546.895 21.131551.527 21.98
1556.165 22.331560.804 22.421570.081 22.271574.713 22.11579.351 22.3 1583.99
22.31588.628 22.32

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .0851120.771 .041282.564 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1120.7711282.564 99.49 94.6 91.95 .5 .8 Ineffective Flow num= 3
 Sta L Sta R Elev Permanent
 0 138 17 F
 138 243 16 F
 243 1092 14.8 F
Skew Angle = 45

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 26420.44

INPUT
Description: 31- Exit Am Vets HWY (Rte 24)
Station Elevation Data num= 260
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 16.58 6.56 16.58 13.12 16.65
19.68 16.5 26.24 16.43 32.81 16.31 39.37 16.32 52.49 16.61 59.05 16.67 65.61
16.55 72.17 16.53 78.73 16.54 85.29 16.51 91.85 16 98.42 15.77 104.98 15.23
111.54 14.53 118.1 14.25 124.66 14.56 131.22 15.05 137.78 15.36 144.34 15.35
150.9 15.36 157.47 15.23 170.59 15.43 177.15 15.7 183.71 15.82 190.27 15.7
196.83 15.91 203.39 16.17 209.95 16.41 216.52 16.53 223.08 16.52 229.64
16.69 236.2 16.71 242.76 16.89 249.32 16.81 255.88 16.67 262.44 16.64 269
16.57 275.56 16.44 282.13 16.26 288.69 15.89 301.81 14.68 308.37 14.19
314.93 13.07 321.49 11.86 328.05 10.69 334.61 9.8 341.18 9.36 347.74 9.14
354.3 8.76 360.86 8.89 367.42 8.74 380.54 8.83 387.1 9.03 393.66 9.28 400.23
9.56 406.79 10.35 413.35 11.51 419.91 12.58 426.47 13.08 439.59 12.95 446.15
12.85 452.71 12.58 459.27 11.84 465.84 10.83 472.4 9.84 478.96 9.07 485.52
8.57 492.08 8.28 498.64 7.9 505.2 7.68 511.76 7.49 518.32 7.45 524.89 7.47
531.45 7.55 538.01 7.43 544.57 7.39 551.13 7.57 557.69 7.35 564.25 7.25
570.81 7.17 577.37 7.31 583.94 7.38 590.5 7.39 597.06 7.46 603.62 7.4 610.18
7.52 616.74 7.51 623.3 7.69 636.42 7.86 642.98 8.08 649.55 8.61 656.11 8.82
662.67 9.13 669.23 9.26 675.79 9.19 682.35 9.2 688.91 9.11 695.47 9.1 702.03
9.05 708.6 8.77 715.16 8.36 721.72 8.31 728.28 8.22 734.84 7.97 741.4 7.59
747.96 7.43 754.52 7.43 761.08 7.52 767.64 7.5 774.21 7.59 780.77 7.25
787.33 7.2 800.45 7.31 807.01 7.29 813.57 7.17 820.13 7.01 826.69 6.75

833.26 6.57 839.82 6.69 846.38 6.84 852.94 7.56 859.5 7.84 872.62 8.13
879.18 8.17 885.74 7.99 892.3 7.91 898.87 8 905.43 7.92 911.99 7.72 918.55
7.13 925.11 7.05 938.23 7.38 944.79 7.23 951.35 7.28 957.92 7.06 964.48 6.74
971.04 6.67 984.16 6.8 990.72 6.72 997.28 7.11 1003.84 7.65 1010.4 7.42
1016.97 7.04 1023.53 7.18 1030.09 7.3 1036.65 7.44 1043.21 7.56 1049.77 7.77
1056.33 8.17 1062.89 8.68 1069.45 8.93 1076.01 9.1 1082.58 9.19 1089.14 9.46
1095.7 9.77 1102.26 10.03 1108.82 10.32 1115.38 10.49 1121.94 10.7 1128.5
10.88 1135.06 11.1 1141.63 11 1148.19 11.42 1154.75 11.58 1161.31 11.69
1174.43 11.64 1180.99 11.81 1187.55 12.12 1194.11 12.5 1200.67 12.94 1207.24
13.11 1213.8 13.35 1220.36 13.33 1226.92 13.34 1240.04 13.29 1246.6 13.19
1253.16 13.01 1259.72 12.76 1266.29 12.53 1272.85 12.12 1279.41 11.96
1285.97 11.78 1292.53 11.77 1299.09 11.88 1305.65 12.15 1318.77 12.82
1325.34 12.91 1331.9 12.93 1338.46 12.86 1345.02 12.59 1351.58 12.12 1403.41
7.12 1474.33 8.92 1495.55 5.74 1542.67 4.32 1569.41 4.13 1582.63 5.03
1598.15 3.98 1672.87 5.26 1684.67 4.17 1687.57 3.11 1707.63 -5.25 1719.18 -
7.6 1736.56 -8.88 1760.93 -8.32 1766.03 -9.03 1785.84 .78 1788.07 4.75
1800.36 4.68 1832.57 21.6 1881.87 22.76 1928.95 22.85 1935.51 22.72 1942.08
22.46 1948.64 22.09 1955.2 21.65 1961.76 21.15 1968.32 20.86 1974.88 20.59
1981.44 19.99 1988 19.8 1994.56 19.43 2001.12 19.38 2007.69 19.3 2014.25
19.38 2020.81 19.58 2027.37 19.66 2040.49 19.65 2047.05 19.63 2053.61 19.54
2060.17 19.61 2066.74 19.3 2073.3 18.91 2079.86 18.81 2086.42 18.67 2092.98
18.81 2099.54 19.2 2112.66 19.77 2119.22 19.66 2132.35 20.22 2138.91 20.36
2145.47 20.53 2152.03 20.83 2158.59 20.93 2165.15 20.8 2171.71 20.77 2178.27
20.53 2184.83 20.43 2191.4 20.54 2197.96 20.78 2204.52 21.14 2211.08 21.62
2217.64 21.96 2224.2 22.06 2230.76 22.26 2237.32 22.31 2243.88 22.67

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .088 1672.87 .04 1832.57 .085
 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1672.87 1832.57 990.69 960.09 928.97 .3 .5 Ineffective Flow num= 3
 Sta L Sta R Elev Permanent
 0 242 16.9 F
 242 426 13 F
 426 1214 13 F

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 25460.34

INPUT
Description: 30
Station Elevation Data num= 345
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 24.35 13.11 24.16 26.22
23.51 32.77 23.39 52.44 22.35 58.99 21.72 65.55 21.45 78.66 20.47 98.32
19.78 111.43 19.15 131.09 17.74 137.65 17.56 150.76 16.54 176.98 15.63
190.09 16.01 203.2 15.7 209.75 15.82 216.31 16.3 229.41 17.64 235.97 17.87
242.52 17.68 255.63 17.02 268.74 15.92 275.3 15.12 281.85 14.59 288.41 14.51
294.96 14.27 308.07 14.38 314.63 14.24 321.18 13.92 347.4 13.98 360.51 14.12
367.06 13.95 380.17 14.15 399.84 14.04 412.95 13.67 432.61 13.73 439.16
13.56 465.38 14.42 471.94 15.05 491.6 15.54 498.16 15.42 511.27 16.59 517.82
16.87 524.38 17.52 530.93 17.78 544.04 17.33 563.7 16.08 576.81 14.92 583.37

14.14 603.03 11.25 609.59 10.05 622.7 9.16 629.25 8.94 635.81 9.08 642.36 8.92 655.47 9.23 675.13 9.14 688.24 8.82 701.35 9.22 714.46 8.9 727.57 9.74 753.79 9.86 760.35 9.44 766.9 8.82 780.01 8.88 786.57 9.52 793.12 9.98 799.67 10.11 812.78 9.76 819.34 9.7 825.89 9.05 839 8.15 858.67 7.34 865.22 6.88 898 6.69 904.55 6.74 911.1 6.64 924.21 6.78 930.77 6.62 950.43 6.62 963.54 6.87 970.1 6.64 976.65 6.78 983.21 6.69 989.76 6.39 1015.98 6.54 1022.53 6.38 1042.2 6.6 1068.42 6.4 1094.64 6.63 1114.3 6.59 1120.86 6.84 1133.96 6.62 1140.52 6.67 1166.74 7.4 1173.29 7.36 1179.85 7.68 1192.96 7.87 1212.62 8.79 1225.73 9.53 1258.5 10.27 1284.72 9.25 1297.83 9.49 1304.39 9.47 1310.94 9.71 1330.61 9.85 1350.27 10.91 1356.82 10.88 1363.38 11.01 1376.49 10.92 1389.6 11 1396.15 11.26 1402.71 11.35 1415.82 10.99 1442.04 9.3 1455.15 8.83 1481.36 8.53 1487.92 8.22 1494.47 8.3 1501.03 8.1 1507.58 8.53 1520.69 8.81 1527.25 8.8 1540.36 9.32 1546.91 9.38 1553.47 9.72 1560.02 9.87 1566.57 9.8 1579.68 10.16 1592.79 10.36 1605.9 10.81 1612.46 10.73 1632.12 10.07 1651.79 9.72 1664.9 9.26 1684.56 9.03 1697.67 9.16 1717.33 8.98 1730.44 9.1 1737 9.34 1750.11 10.16 1769.77 10.62 1782.88 10.69 1789.43 10.6 1809.1 10.04 1815.65 10.04 1822.21 10.18 1841.87 11.34 1861.54 12.93 1868.09 13.35 1894.31 12.63 1900.86 12.03 1913.97 11.35 1927.08 10.39 1933.64 10.19 1940.19 10.19 1959.86 10.92 1986.08 11.18 1992.63 11.13 1999.18 10.94 2018.85 9.59 2031.96 8.91 2038.51 8.92 2045.07 9.32 2058.18 9.45 2064.73 9.4 2071.29 9.52 2084.4 9.33 2097.51 9.51 2104.06 9.46 2117.13 8.79 2123.65 8.1 2136.69 6.31 2143.2 5.21 2149.72 4.8 2156.24 4.79 2175.79 5.09 2201.86 4.73 2214.9 4.87 2221.41 4.78 2227.93 4.86 2247.48 4.68 2260.52 4.78 2273.56 5.13 2280.07 5.66 2286.59 5.88 2293.11 5.52 2299.63 5.01 2312.66 4.67 2325.7 4.92 2332.21 5.18 2338.73 5.01 2351.77 5.04 2358.28 5.37 2364.8 6.3 2371.32 6.67 2384.35 6.79 2390.87 7.41 2397.39 7.85 2410.43 8.32 2423.46 8.11 2443.01 8.31 2449.53 8.65 2456.05 8.85 2462.57 8.9 2469.08 8.51 2475.6 8.88 2482.12 8.62 2488.64 8.64 2501.67 9 2508.19 8.95 2540.78 7.2 2547.29 7.29 2560.33 7.96 2561.89 7.98 2566.85 8.02 2573.37 5.26 2579.88 1.51 2585 -4.01 2586.46 -4.44 2588.21 -4.88 2589.89 -5.45 2592.04 -5.83 2594.17 -6.33 2596.35 -6.66 2598.37 -6.67 2600.48 -6.55 2602.24 -6.55 2604.42 -6.47 2606.44 -6.48 2608.55 -6.53 2610.58 -6.59 2612.91 -6.72 2617.15 -6.72 2619.3 -6.81 2621.63 -6.84 2623.73 -6.95 2625.85 -6.93 2627.82 -7.03 2629.94 -6.98 2635.86 -6.98 2637.71 -7.01 2639.61 -7.08 2641.64 -7.13 2643.57 -7.32 2647.48 -7.63 2651.26 -7.94 2653.16 -7.95 2654.98 -8.09 2656.91 -8.13 2658.46 -7.96 2660.23 -7.89 2661.93 -7.72 2663.77 -7.37 2665.59 -6.94 2667.57 -6.4 2669.53 -5.08 2671.44 -4.61 2673.33 -3.66 2675.14 -2.5 2676.8 -1 2680.65 1.2 2684.25 1.75 2690.77 4.12 2697.3 4.57 2703.86 4.85 2710.42 5.43 2716.98 6.61 2723.54 8.15 2736.66 11.72 2743.22 14.18 2749.79 16.47 2756.35 19.94 2762.91 22.2 2769.47 22.76 2776.03 22.97 2815.4 23.09 2835.06 23.03 2848.16 23.27 2861.25 24.03 2867.8 24.69 2874.35 24.95 2907.08 25.35 2920.18 25.19 2926.73 25.22 2933.27 25.04 2939.82 24.67 2946.37 24.49 2952.91 24.56 2979.1 24.01 2998.74 23.37 3011.84 23.29 3038.03 22.71 3051.12 22.54 3057.67 22.27 3064.22 22.14 3070.76 21.79 3077.31 21.94 3083.86 21.7 3123.14 21.2 3129.69 21 3142.78 20.89 3149.33 20.66 3155.88 20.69 3162.43 20.45 3188.61 20.02 3195.16 20.06 3221.35 19.81 3247.54 20.56 3254.09 20.6 3267.18 20.94 3313.01 21.53 3326.11 21.43 3358.84 21.48 3371.94 21.18 3378.48 21.34 3391.58 21.08 3417.77 20.98 3424.31 21.1 3437.41 21.57 3463.6 21.28 3470.14 21.09 3476.69 20.68 3483.24 20.76 3496.33 20.67 3509.43 21.15 3515.98 21.25 3522.52 21.5 3529.07 21.98 3535.62 23.04 3542.16 24.88 3548.71 27.27 3555.26 29.26 3561.81 30.15 3568.35 30.47 3574.9 30.02 3607.64 30.33 3646.92 30.2 3653.47 30.06 3660.01 30.38 3673.11 31.41 3692.75 30.78 3705.84 30.81 3712.39 30.68

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .088 2561.89 .04 2776.03 .08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2561.89 2776.03 1917.46 2059.03 2182.8 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 23401.31

INPUT
Description: 29- 1000 Ft DS Dam Lot Trib
Station Elevation Data num= 308
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 19.76 13.09 19.43 52.36 19.36 65.45 19.1 71.99 19.09 78.54 18.88 91.63 17.79 98.17 17.04 130.9 16.13 157.08 16.27 163.62 16.5 176.71 16.21 183.26 16.27 189.8 15.77 202.89 15.91 222.53 16.38 235.62 16.45 248.71 16.07 261.8 15.33 274.89 15.27 281.43 15.46 294.52 16.26 307.61 16.83 327.25 17.23 333.79 17.27 353.43 16.63 359.97 16.29 366.52 15.8 373.06 15.14 379.61 13.99 392.7 11.33 399.24 10.16 412.33 9.63 425.42 8.78 445.06 8.07 458.15 8.52 464.69 9.43 471.24 9.93 490.87 9.33 497.42 9.37 503.96 9.18 510.51 8.81 530.14 7.97 536.69 7.9 543.23 7.51 575.96 7.23 582.5 7.02 595.59 7.18 602.14 7.11 608.68 7.29 621.77 7.19 628.32 7.35 641.41 7.27 654.5 6.73 667.59 6.7 687.22 6.44 693.77 6.26 700.31 6.37 706.86 6.3 713.4 6.45 733.04 6.28 746.13 6.38 752.67 6.13 759.22 6.15 778.85 6.67 785.4 7.03 791.94 7.25 811.58 7.48 824.67 7.5 837.76 7.81 850.85 8.85 857.39 9.21 863.94 9.39 870.48 9.4 883.57 8.93 890.12 8.91 903.21 9.58 916.3 10.58 922.84 10.64 929.39 10.17 949.02 7.65 955.57 7.34 962.11 7.36 968.66 7.69 981.75 9.4 988.29 9.56 994.83 9.47 1007.93 8.76 1021.01 7.14 1027.56 7.22 1034.1 7.58 1040.65 7.54 1047.19 7.18 1053.74 7.02 1060.28 7.06 1066.83 7.34 1079.92 7.48 1093.01 7.09 1106.1 7.32 1119.19 7.87 1132.28 7.74 1145.37 7.17 1158.46 7 1165 7.52 1178.09 8.01 1184.64 7.8 1191.18 7.36 1197.73 7.36 1210.82 8.5 1243.54 9.42 1256.63 10.14 1276.27 10.85 1295.9 10.67 1308.99 9.97 1315.54 9.79 1335.17 10.34 1367.9 10.06 1380.99 10.24 1387.53 10.43 1394.08 10.38 1413.71 9.6 1426.8 9.33 1433.35 9.09 1452.98 9.21 1459.53 9.37 1472.62 9.95 1479.16 9.97 1505.34 9.24 1511.89 9.19 1531.52 8.27 1538.07 8.24 1544.61 8.37 1564.25 8.36 1570.79 8.12 1596.97 6.24 1610.06 4.8 1616.61 4.47 1623.15 4.49 1636.24 4.21 1642.79 4.3 1662.42 4.29 1668.97 4.13 1675.51 4.35 1682.05 4.28 1688.6 4.39 1695.15 4.65 1701.69 4.75 1721.32 4.58 1727.87 4.84 1734.41 4.87 1740.96 4.64 1760.59 4.49 1773.68 4.18 1806.41 4.34 1826.04 4.12 1858.77 4.4 1871.86 4.41 1878.4 4.6 1884.94 5.25 1891.47 6.16 1898 6.69 1904.54 6.88 1924.14 6.92 1930.67 6.59 1943.74 5.66 1950.28 5.6 1956.81 5.99 1963.34 6.77 1969.88 7.17 1982.94 7.2 1996.01 7.65 2002.55 7.74 2015.61 7.52 2022.15 7.23 2028.68 7.09 2035.21 7.55 2041.75 7.71 2054.82 7.26 2061.35 6.73 2067.88 5.5 2074.42 4.92 2080.95 5.74 2087.49 6.32 2100.55 7.25 2107.09 6.96 2113.62 5.88 2120.16 5.88 2126.69 6.48 2133.22 6.41 2139.76 6.16 2146.29 6.48 2152.82 7.01 2159.36 7.4 2185.49 6.16 2191.58 6.32 2192.03 6.33 2198.56 6.1 2205.1 4.26 2211.63 1.88 2220 -1.34 2220.17 -1.77 2220.31 -2.09 2220.4 -1.84 2220.47 -2.23 2220.49 -2.31 2220.79 -2.32 2221.4 -2.49 2221.97 -3.11 2223.69 -3.64 2225.91 -3.75 2228.18 -3.91 2230.17 -4.37 2232.39 -4.41 2234.49 -4.81 2236.64 -5.03 2238.51 -5.16 2240.42 -5.34 2242.1 -5.73 2244.11 -6.08 2245.99

-6.44 2248.08 -6.94 2250.2 -7.46 2252.39 -7.72 2256.55 -8.56 2258.56 -8.82
2260.67 -8.98 2262.8 -9.43 2264.86 -9.48 2266.93 -8.77 2269.17 -8.53 2270.94
-8.21 2272.98 -7.65 2276.78 -6.73 2279.06 -6.41 2283.93 -5.79 2286.72 -5.69
2289.2 -5.35 2291.94 -5.02 2294.46 -4.71 2297.03 -4.29 2299.07 -3.76 2301.08
-3.11 2302.78 -2.24 2304.38 -1.49 2305.73 -.99 2307.43 1.83 2309.64 2.45
2316.17 5.2 2322.71 6.45 2329.24 7.19 2335.77 8.23 2342.31 9.53 2348.84
11.64 2355.38 15.18 2361.91 18.22 2368.44 19.94 2374.98 20.6 2381.51 20.07
2394.58 17.69 2401.11 17.48 2486.05 18 2518.72 18.34 2538.33 18.25 2577.53
18.53 2584.06 19.38 2590.6 20.37 2597.13 20.32 2610.2 19.03 2623.27 18.11
2636.33 18.01 2655.94 17.57 2662.47 17.57 2682.07 17.1 2695.14 17.09 2714.76
16.71 2721.3 15.94 2727.85 15.96 2740.93 16.97 2767.1 17.38 2780.19 18.08
2799.82 17.99 2806.36 18.26 2852.16 19.01 2911.05 19.24 2917.59 19.15
2937.22 18.19 2969.94 17.14 2983.02 16.42 3002.65 15.8 3009.2 15.36 3015.74
14.44 3022.28 14.75 3041.91 15.01 3074.63 14.4 3087.71 14.86 3094.26 14.78
3100.8 14.48 3113.89 13.51 3120.43 12.65 3126.97 11.98 3133.51 9.89 3140.06
9.15 3146.6 8.85 3179.32 8.5 3198.94 9.31 3212.03 10.63 3218.57 11.05
3231.66 16

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 2198.56 .04 2374.98 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2198.56
2374.98 1321.59 1234.68 1184.64 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 2911 3231.66 19 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 22166.63

INPUT
Description: 28
Station Elevation Data num= 326
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 17.92 13.12 18.12 19.68
18.15 26.24 18.2 32.8 18.18 45.92 18.27 52.48 18.33 59.04 18.47 72.16 18.66
78.72 18.82 85.28 19.13 91.84 19.21 98.39 19.54 104.95 20.07 111.51 20.5
118.07 20.85 124.63 21.16 131.19 21.33 137.75 21.41 144.31 21.66 150.87
21.64 157.43 21.11 163.99 21.08 170.55 21.19 177.11 21.39 183.67 21.53
190.23 21.65 196.79 21.9 203.35 22.1 209.91 22.53 216.47 22.82 223.03 22.79
229.59 22.58 249.27 21.61 255.83 21.34 262.39 21.12 268.95 21.05 275.51
20.91 282.07 20.8 288.62 20.92 295.18 20.92 301.74 20.89 308.3 20.79 314.86
20.59 321.42 20.49 327.98 20.3 334.54 20.08 341.1 19.9 347.66 19.74 354.22
19.53 360.78 19.49 367.34 19.43 373.9 19.46 380.46 19.54 387.02 19.52
393.58 19.19 400.14 18.97 406.7 18.78 419.82 18.47 432.94 18.24 439.5 18.1
446.06 18.09 452.62 17.92 459.18 18.08 465.74 18.09 472.3 17.75 478.85 17.71
485.41 17.77 491.97 17.46 498.53 17.28 505.09 16.95 511.65 16.75 518.21
16.63 524.77 16.22 531.33 15.93 537.89 15.75 544.45 15.28 551.01 15.48
557.57 15.48 564.13 15.28 570.69 15.34 577.25 15.35 583.81 15.63 590.37 15.4
596.93 15.25 603.49 14.94 610.05 14.86 616.61 14.8 623.17 14.93 629.73 14.91
636.29 14.84 642.85 14.96 649.41 15.12 655.97 15.19 662.52 14.94 669.08
14.97 675.64 14.8 682.2 14.83 688.76 15.26 695.32 15.53 701.88 15.61 715 16

721.56 16.18 728.12 16.29 734.68 16.37 741.24 16.58 747.8 16.74 754.36 17.04
760.92 16.77 767.48 16.68 774.04 16.43 780.6 16.11 806.84 15.49 813.4 15.38
819.96 15.41 826.52 15.07 833.08 14.52 839.64 14.05 846.2 13.56 852.75 13.18
859.31 12.89 865.87 12.37 872.43 12.08 878.99 11.94 885.55 11.83 892.11
11.43 898.67 11.17 905.23 11.08 911.79 10.83 918.35 10.7 924.91 10.45 931.47
10.44 938.03 10.5 944.59 10.61 951.15 10.58 964.27 10.45 970.83 10.06 977.1
6.04 983.37 2.07 990 -.72 995.16 -.81 996.24 -.91 997.38 -1.18 998.67 -1.55
999.88 -1.79 1002.25 -2.21 1003.56 -2.51 1004.76 -2.89 1006.45 -3.02 1007.96
-3.32 1009.16 -3.45 1010.19 -3.41 1011.23 -3.46 1012.42 -3.51 1013.94 -3.57
1015.82 -3.77 1018.15 -4.06 1020.43 -4.86 1024.85 -6.17 1029.72 -7.23
1032.25 -7.68 1034.76 -8.12 1037.29 -8.43 1039.58 -8.84 1041.82 -8.98
1043.75 -9.05 1045.63 -9.08 1047.18 -9.25 1048.84 -9.31 1050.4 -9.17 1052.31
-9.23 1054.44 -9.28 1057.01 -9.2 1059.24 -9.12 1061.74 -9.1 1064.1 -8.68
1066.6 -8.47 1068.84 -8.22 1071.23 -7.56 1073.37 -7.25 1075.46 -7.03 1077.27
-6.31 1078.97 -5.8 1080.4 -5.34 1081.82 -4.8 1082.98 -4.07 1084.03 -3.68
1084.79 -3.01 1085.37 -2.15 1085.84 -1.94 1094.08 4.04 1096.27 5.29 1102.78
6.64 1109.29 7.73 1115.79 7.84 1128.81 6.38 1141.83 6.4 1148.34 6.58 1161.36
6.43 1180.88 6.52 1193.9 6.36 1219.94 6.9 1232.96 6.79 1239.46 6.97 1245.97
6.88 1252.48 6.54 1272.01 6.07 1278.52 6.21 1291.54 6.04 1298.05 6.34
1304.55 6.42 1311.06 6.36 1324.08 5.65 1363.14 4.77 1376.15 4.73 1389.17
4.24 1421.72 4.31 1434.73 4.59 1447.75 4.7 1454.26 5.92 1460.77 8 1473.79
11.48 1480.3 12.52 1486.81 12.23 1493.31 11.77 1506.33 11.9 1512.84 11.42
1525.86 11.77 1532.37 11.75 1538.88 12.22 1545.39 12.47 1558.4 12.53 1564.91
12.7 1577.93 12.66 1597.46 13.72 1603.97 13.83 1610.48 13.77 1623.49 15.03
1630 15.02 1636.51 14.82 1649.53 14.73 1662.55 14.35 1675.57 14.56 1688.58
15.01 1695.09 15.08 1701.6 15.34 1708.11 15.37 1714.62 15.61 1721.13 16.03
1734.15 16.62 1740.66 17.58 1753.67 18.3 1760.18 19.03 1773.2 19.46 1779.71
19.5 1786.22 19.75 1805.75 21.32 1812.25 21.34 1818.76 21.99 1825.27 23.02
1831.78 23.48 1844.8 23.07 1851.31 23 1870.84 23.45 1877.34 23.76 1883.85
23.81 1890.4 23.68 1903.49 23.1 1929.66 22.76 1936.21 22.44 1942.75 22.33
1949.3 22.97 1955.84 23.03 1962.38 22.94 1968.93 23.03 1982.02 23.5 2001.65
23.57 2008.19 23.1 2014.74 22.78 2027.83 22.79 2034.37 22.93 2040.92 22.91
2054 22.34 2060.55 22.25 2067.09 22 2073.64 21.47 2086.73 21.6 2112.9 21.54
2119.45 21.62 2145.63 21.33 2152.17 21.42 2171.8 21.32 2217.61 22.02 2224.16
21.88 2256.88 21.9 2276.51 22.17 2302.69 21.41 2309.23 21.58 2315.78 22.06
2328.87 22.12 2335.41 21.63 2341.96 21.38 2355.04 21.35 2368.13 21.18
2387.77 21.05 2400.85 20.71 2407.4 20.8 2427.03 20.78 2453.21 20.9 2472.84
20.55 2479.39 20.58 2518.65 20 2538.29 19.4 2544.83 19.1 2551.37 19.08
2571.01 18.57 2590.64 17.7 2616.82 17.34 2623.36 16.97 2629.91 16.12 2636.45
14.9 2643 14.13 2649.54 13.92 2656.08 13.98 2662.63 14.19 2675.72 16

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 964.27 .04 1115.79 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 964.27
1115.79 978.05 935.95 915.59 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 2590 2675.72 17.7 T

CROSS SECTION

RIVER: Taunton River

REACH: Main Stem RS: 21230.68

INPUT
Description: 27 - 5 ft US Forge River Trib
Station Elevation Data num= 269
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 27.52 26.22 27.7 39.32 27.69
52.43 27.25 78.65 25.61 98.31 25.08 111.42 24.36 117.97 23.85 124.53 23.2
131.08 22.83 137.64 22.61 163.85 22.49 170.41 22.55 183.51 22.22 190.07
21.91 203.18 22.72 209.73 22.66 216.28 22.14 222.84 20.37 235.95 18.22
242.5 17.85 255.61 17.77 262.16 18.1 275.27 19.21 281.82 19.6 288.38 19.69
294.93 19.22 301.49 18.61 308.04 17.62 314.59 17.25 327.7 17.41 340.81 17.19
347.37 17.2 353.92 17.39 386.69 17.25 393.24 17.1 406.35 17.48 412.91 17.82
419.46 17.77 426.01 17.53 445.68 17.79 452.23 18.17 471.89 20.34 478.45 20.9
517.77 23.36 530.88 23.79 550.54 24.82 557.09 24.91 563.65 24.79 576.76
24.06 583.31 23.56 589.86 22.86 596.42 22.41 616.08 22.56 622.64 22.38
629.19 22.49 642.3 23.09 661.96 24.34 675.07 24.64 681.62 24.64 714.39 23.99
727.5 23.12 740.61 22.09 760.27 20.96 766.82 20.23 773.38 19.71 779.93 19.41
786.49 18.87 799.59 17.03 812.7 16.15 819.26 15.87 832.37 14.95 838.92 14.73
845.47 14.33 852.03 13.72 858.58 12.9 871.69 11.93 878.24 11.71 891.35 11.57
897.91 11.28 911.01 11.05 924.12 11.26 937.23 10.49 950.34 9.38 970 8.34
976.55 7.85 983.11 7.75 989.66 7.83 995.65 7.41 996.22 7.37 1002.51 6.27
1008.81 4.7 1015.1 2.34 1021.39 .67 1030 -4.34 1031.85 -4.87 1033.27 -4.82
1033.37 -4.83 1033.93 -5.08 1034.43 -5.18 1036 -5.53 1037.96 -5.64 1039.68 -
5.83 1041.43 -5.83 1042.9 -6.03 1044.42 -6.17 1046.27 -6.17 1048.99 -6.19
1051.5 -6.33 1056.76 -6.45 1059.36 -6.45 1061.99 -6.47 1065 -6.52 1067.86 -
6.5 1070.85 -6.44 1073.48 -6.14 1076.16 -5.8 1078.85 -5.49 1084.58 -5.17
1087.33 -5.06 1089.96 -4.98 1092.9 -4.98 1095.64 -5.05 1098.82 -5.15 1101.76
-5.18 1104.94 -5.23 1107.88 -5.15 1110.34 -5.1 1112.83 -4.99 1115.85 -4.95
1118.54 -4.75 1121.36 -4.5 1123.66 -4.06 1126.09 -3.43 1128.14 -2.64 1130.21
-2.06 1132.02 -1.49 1133.12 -.84 1135.29 .67 1141.79 1.48 1148.29 3.16
1154.78 3.89 1161.28 4.1 1167.77 4.36 1174.27 4.43 1180.77 4.41 1187.26 4.36
1193.76 4.14 1200.26 4.23 1206.75 4.64 1213.25 4.9 1219.74 5.25 1226.24 5.39
1232.74 5.59 1239.23 5.88 1245.73 6.33 1252.23 6.52 1265.22 7 1271.71 7.21
1278.21 7.44 1284.71 7.89 1291.2 9.17 1297.7 11.51 1304.19 15.43 1310.69
16.28 1317.19 16.66 1323.68 16.62 1330.18 16.41 1336.68 16.29 1343.17 16.31
1349.67 16.13 1356.16 16.3 1362.66 16.43 1369.16 16.42 1375.65 16.6 1382.15
16.84 1388.64 17.35 1395.14 17.59 1401.64 17.66 1408.13 17.7 1414.63 17.69
1421.13 17.59 1427.62 17.34 1434.12 17.3 1440.61 17.18 1447.11 17.08 1453.61
17.01 1460.1 17.01 1466.6 17.11 1473.1 17.02 1486.09 17.26 1492.58 17.37
1499.08 17.38 1505.58 17.43 1512.07 17.5 1518.57 17.54 1525.06 17.65 1538.06
17.64 1544.55 17.66 1551.05 17.52 1557.55 17.62 1564.04 17.62 1570.54 17.67
1577.03 17.74 1583.53 17.69 1596.52 17.8 1603.02 17.96 1622.51 18.36 1629.05
18.43 1635.59 18.54 1642.14 18.62 1648.68 18.76 1655.22 18.81 1661.77 18.83
1668.31 18.92 1674.85 19.06 1687.94 19.13 1694.48 19.19 1701.03 19.19
1707.57 19.23 1714.11 19.15 1727.2 19.1 1746.83 19.11 1753.37 19.16 1759.92
19.07 1766.46 18.95 1773 19.09 1779.55 19.33 1786.09 19.41 1792.63 19.55
1799.18 19.59 1805.72 19.72 1812.26 19.82 1818.8 20 1825.35 20.1 1831.89
20.32 1838.43 20.47 1844.98 20.45 1851.52 20.45 1864.61 20.62 1871.15 20.67
1877.69 20.68 1903.87 20.67 1969.3 20.82 1982.39 20.81 1995.47 20.77 2015.1
20.73 2021.65 20.7 2028.19 20.69 2034.73 20.62 2041.28 20.6 2047.82 20.25
2054.36 20 2060.91 19.56 2067.45 19.08 2073.99 18.55 2080.54 17.9 2087.08
17.22 2093.62 16.81 2100.17 16.31 2106.71 15.78 2113.25 15.18 2119.79 15
2126.34 14.48 2132.88 13.9 2139.42 13.52 2145.97 13.53 2152.51 13.79 2159.05
16

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .082 989.66 .04 1317.19 .08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 989.66 1317.19 1970.54 1969.09 1971.46 .3 .5 Ineffective Flow num= 1
Sta L Sta R Elev Permanent
2080 2159.05 17.9 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 19261.59

INPUT
Description: 26
Station Elevation Data num= 185 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 22.45 91.78 22.29 144.23 22.33 157.34 22.21 177.01 22.31 183.57 22.23 196.68 22.3 203.24 22.22 216.35 22.32 222.9 22.23 255.68 22.38 327.8 22.67 340.91 22.36 360.58 20.95 367.13 20.37 373.69 19.95 393.36 17.94 399.91 17.62 413.03 17.55 426.14 17.87 432.69 18.18 439.25 18.3 452.36 18.22 458.92 18.06 465.47 17.75 472.03 17.22 485.14 16.62 491.7 16.21 504.81 15.62 524.48 15.29 531.03 15.35 550.7 14.24 563.81 13.43 570.37 12.9 596.59 12.39 609.71 11.82 622.82 11.49 629.37 11.13 635.93 11 642.49 11.04 649.04 10.85 662.15 11.01 688.38 10.76 694.93 10.9 708.05 10.6 740.83 10.38 747.38 10.24 753.94 10.29 760.49 10.11 780.16 10.39 819.5 11.3 832.61 11.4 845.72 11.18 865.39 11.52 871.95 11.3 885.06 11.17 891.61 10.25 898.17 6.06 901.26 4 904.73 1.69 915 -1.23 915.5 -1.28 915.75 -1.46 916.24 -1.49 916.44 -1.7 917.04 -1.61 917.48 -1.91 918.66 -1.93 919.76 -2.3 921.23 -2.71 922.79 -3.19 924.42 -3.77 926.79 -4.49 931.51 -5.33 934.07 -5.71 936.43 -5.92 938.96 -6.04 941.32 -6.28 946.22 -6.51 948.83 -6.5 951.22 -6.53 953.69 -6.51 956.08 -6.45 958.64 -6.44 960.98 -6.41 963.4 -6.33 968.44 -6.1 970.81 -5.97 973.25 -5.72 975.53 -5.67 977.94 -5.52 980.4 -5.55 982.68 -5.56 985.19 -5.61 987.51 -5.8 989.86 -5.93 992.01 -6.13 994.38 -6.25 996.55 -6.17 998.42 -6.02 1000.43 -5.63 1002.16 -5.28 1003.85 -4.65 1005.39 -4.29 1006.99 -3.77 1008.48 -3.25 1010.13 -2.62 1011.66 -1.63 1013.42 -1.16 1022.73 1.18 1023.65 1.55 1029.29 3.83 1035.85 5.81 1042.4 5.97 1048.96 6.38 1068.62 6.86 1075.18 6.72 1081.74 6.87 1101.4 6.47 1114.52 6.53 1121.07 6.69 1160.41 7.12 1173.52 7.12 1180.08 7.3 1193.19 7.31 1212.86 7.66 1225.97 8.08 1232.52 8.5 1239.08 9.13 1252.19 10.13 1258.75 11.04 1265.3 11.65 1271.86 12.65 1278.42 13.36 1291.53 14.34 1298.08 14.38 1311.2 14.65 1343.98 16.06 1357.09 16.37 1383.31 17.2 1416.09 17.73 1468.54 17.48 1488.21 17.87 1501.32 17.95 1507.87 17.73 1514.43 17.75 1534.1 18.18 1547.21 18.23 1553.77 17.91 1573.43 17.94 1579.99 18.11 1586.55 18.77 1593.1 19.59 1599.66 20.68 1606.21 23.62 1612.77 24.42 1625.88 24.47 1645.55 24.81 1658.66 25.67 1671.77 25.93 1678.33 25.65 1698 25.85 1717.67 26.28 1724.22 26.32 1763.56 27.03 1770.11 27.31 1776.67 27.31 1809.45 28.01 1829.12 28.27 1835.67 28.45 1861.9 28.54 1881.56 28.93 1894.68 29.33 1927.46 28.96 2006.13 27.54 2143.8 25.62 2170.03 25.69 2183.14 25.53 2196.25 25.66 2202.81 25.86 2209.36 26.79 2215.92 27.53 2222.48 27.83 2229.03 27.81 2242.14 28.08

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val

0 .082 871.95 .04 1291.53 .082

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 871.95 1291.53 1135.1 1183.89 1211.84 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 18077.71

INPUT
Description: 25 App Trestle Br
Station Elevation Data num= 198
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 18.73 6.56 18.62 13.12 18.58 19.68 18.52 26.24 18.42 32.8 18.29 39.36 18.2 52.48 17.91 59.03 17.69 65.59 17.49 78.71 17.21 85.27 17.03 91.83 17.04 98.39 17.02 104.95 16.8 111.51 16.54 118.07 16.2 124.63 15.95 131.19 15.78 137.75 15.57 144.31 15.23 157.43 14.88 163.99 14.76 170.54 14.75 177.1 14.67 183.66 14.77 190.22 14.75 196.78 14.63 209.9 14.73 216.46 14.68 223.02 14.57 229.58 14.37 236.14 14.27 242.7 14.45 249.26 14.53 255.82 14.43 262.38 14.4 268.94 14.39 275.49 14.32 282.05 14.31 288.61 14.27 301.73 14.04 308.29 13.91 314.85 13.8 321.41 13.79 327.97 13.7 334.53 13.46 341.09 13.27 347.65 13.12 354.21 13.06 360.77 12.91 367.33 12.85 373.89 12.74 380.45 12.59 387 12.46 393.56 12.28 413.24 12.11 426.36 11.92 439.48 11.66 446.04 11.58 459.16 11.33 465.72 11.39 472.28 11.31 478.84 11.14 491.96 11 505.07 10.75 511.63 10.69 518.19 10.66 524.75 10.52 531.31 10.4 537.87 10.2 544.43 10.09 550.99 10.01 557.55 9.91 564.11 9.93 570.67 9.9 577.23 9.79 583.79 9.75 590.35 9.54 596.91 9.45 603.46 9.32 610.02 9.05 623.14 8.56 629.7 8.53 636.26 8.64 642.82 8.88 649.38 8.98 655.94 9.2 662.5 9.28 669.06 9.45 675.62 9.46 682.18 9.55 688.74 9.62 695.3 9.66 701.86 9.8 708.42 9.64 714.97 9.44 721.53 9.42 728.09 9.43 734.65 9.49 741.21 9.5 747.77 9.66 754.33 9.67 767.45 9.82 774.01 9.73 787.13 9.72 793.69 9.69 800.25 9.62 806.81 9.58 813.37 9.46 826.48 9.52 833.04 9.45 839.6 9.57 846.16 9.58 852.72 9.52 859.28 9.63 865.84 9.66 872.4 9.67 878.96 9.64 885.52 9.66 892.08 9.65 898.64 9.69 905.2 9.62 911.76 9.58 918.32 9.56 924.87 9.52 931.43 9.54 937.99 9.58 951.11 9.5 957.67 9.39 964.23 9.35 970.79 9.28 977.35 9.06 983.91 8.93 990.47 8.74 997.03 8.76 1003.59 8.88 1010.15 7.83 1016.71 6.64 1023.27 6.04 1029.82 5.47 1036.38 4.73 1042.94 3.72 1049.5 4.16 1056.06 4.42 1062.62 4.46 1069.18 4.46 1082.3 4.15 1088.86 3.93 1095.42 4.26 1101.98 4.55 1179.84 8.31 1204.75 7.18 1269.14 10.73 1306.31 9.88 1307.02 6.5 1313.49 5.94 1319.44 .89 1353.11 -6.32 1384.09 -7.81 1413.85 -5.93 1436.19 .77 1443.77 9.09 1493.04 10.17 1563.65 10.29 1633.29 12.45 1639.85 12.78 1646.41 13.09 1652.97 13.31 1659.53 13.51 1666.09 13.82 1672.65 14.11 1679.21 14.31 1685.76 14.33 1692.32 14.22 1705.44 14.25 1731.68 14.25 1757.92 14.19 1764.48 14.2 1771.04 14.23 1777.6 14.17 1784.16 14.05 1790.72 14.05 1797.27 14.24 1803.83 14.4 1810.39 14.71 1816.95 14.95 1823.51 15.28 1830.07 15.57 1836.63 15.82 1843.19 16.11 1849.75 16.28 1856.31 16.6 1869.43 17.07 1875.99 17.25 1882.55 17.56 1889.11 17.92 1895.67 18.12

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .082 1269.14 .04 1443.77 .082

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1269.14
1443.77 80.62 78.41 79.01 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 17999.3

INPUT
Description: 24.7 US Face Trestle Br
Station Elevation Data num= 161
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 18.6 6.317 18.59 12.634
18.74 25.269 18.32 31.586 18.36 44.23 18.11 50.547 18.22 63.181 17.44 75.816
18.47 82.133 18.63 94.767 18.51 126.362 17.04 132.68 16.86 164.265 15.26
170.583 15.12 183.217 14.32 195.851 14.01 208.495 14.04 221.129 13.86
240.081 13.06 252.715 13.13 271.667 12.62 277.984 12.27 284.301 12.1 303.262
12.21 315.896 12.13 328.531 12.27 347.482 11.74 398.029 11.41 410.663 11.05
442.249 10.73 454.883 10.45 486.479 10.33 505.43 10.57 537.016 10.61 562.294
10.75 606.514 10.6 631.793 9.93 669.696 9.72 688.647 9.88 707.599 9.36
713.925 9.44 720.243 9.33 739.194 9.41 745.511 9.25 758.146 9.12 777.097
8.67 783.414 8.41 802.375 8.09 833.961 8.18 840.278 8.02 846.595 8.06 859.23
8.6 871.864 8.76 878.191 8.96 890.825 8.24 903.459 8.27 909.777 8.12 935.045
8 941.362 8.23 953.997 8.32 960.314 8.01 966.641 7.38 972.958 6.1 979.275
5.06 985.592 4.16 991.909 3.471004.544 3.131010.861 3.211029.812 4.41
1042.446 4.551048.773 4.84 1055.09 4.371067.725 3.91080.359 4.03 1099.31
4.641105.628 5.191111.945 5.911118.262 6.841124.589 7.53 1137.223
7.661168.809 7.771194.077 8.61206.721 9.161213.039 9.18 1231.99 8.681238.307
9.121244.624 10.811250.942 11.991257.259 12.18 1269.893 12.04 1274.22
11.41279.861 12.211287.734 12.631293.462 13 1304.512 12.441304.531 -
1.251318.759 -5.881341.285 -7.51364.689 -7.98 1395.512 .681395.802
12.351398.796 13.261440.476 11.561446.793 11.29 1453.12 11.061459.437
10.961465.754 10.841472.071 10.821478.388 10.77 1484.705 10.571491.022 10.62
1497.34 11.121503.657 11.761509.974 12 1516.291 11.971522.608 12.021528.925
12.211535.252 12.381541.569 12.62 1547.886 12.891554.204 13.031560.521
13.351566.838 13.741573.155 13.99 1579.472 13.671585.789 13.131592.107
12.321598.424 10.91604.741 10.29 1611.058 10.461617.385 10.581623.702
10.531636.336 10.851642.653 10.98 1648.971 11.091655.288 10.961661.605
10.891667.922 10.761674.239 11.18 1680.556 11.971686.874 13.121693.191
13.871699.517 14.11705.835 14.29 1712.152 14.511718.469 14.671724.786
14.911731.103 14.99 1737.42 15.32 1743.738 15.471750.055 15.731756.372
15.841762.689 15.991769.006 16.27 1775.323 16.51 1781.65 16.711787.967
17.111794.284 17.891800.602 18.98 1806.919 19.27

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .0821293.462 .041398.796 .082

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1293.4621398.796 50.15 48.83 48.16 .6 .8 Ineffective Flow num= 3
 Sta L Sta R Elev Permanent
 209 1293.46 13 F
 1398 1573.16 13.26 T
 1573.16 1699.52 14.1 T

Skew Angle = 15

BRIDGE

RIVER: Taunton River
REACH: Main Stem RS: 17978.26

INPUT
Description: 24.5 Closed Trestle Br Distance from Upstream XS = 5
Deck/Roadway Width = 30
Weir Coefficient = 2.6
Bridge Deck/Roadway Skew = 15
Upstream Deck/Roadway Coordinates
 num= 3
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 1293 13.85 12.451394.797 13.15 12.351436.332 11.34

Upstream Bridge Cross Section Data
Station Elevation Data num= 161
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 18.6 6.317 18.59 12.634
18.74 25.269 18.32 31.586 18.36 44.23 18.11 50.547 18.22 63.181 17.44 75.816
18.47 82.133 18.63 94.767 18.51 126.362 17.04 132.68 16.86 164.265 15.26
170.583 15.12 183.217 14.32 195.851 14.01 208.495 14.04 221.129 13.86
240.081 13.06 252.715 13.13 271.667 12.62 277.984 12.27 284.301 12.1 303.262
12.21 315.896 12.13 328.531 12.27 347.482 11.74 398.029 11.41 410.663 11.05
442.249 10.73 454.883 10.45 486.479 10.33 505.43 10.57 537.016 10.61 562.294
10.75 606.514 10.6 631.793 9.93 669.696 9.72 688.647 9.88 707.599 9.36
713.925 9.44 720.243 9.33 739.194 9.41 745.511 9.25 758.146 9.12 777.097
8.67 783.414 8.41 802.375 8.09 833.961 8.18 840.278 8.02 846.595 8.06 859.23
8.6 871.864 8.76 878.191 8.96 890.825 8.24 903.459 8.27 909.777 8.12 935.045
8 941.362 8.23 953.997 8.32 960.314 8.01 966.641 7.38 972.958 6.1 979.275
5.06 985.592 4.16 991.909 3.471004.544 3.131010.861 3.211029.812 4.41
1042.446 4.551048.773 4.84 1055.09 4.371067.725 3.91080.359 4.03 1099.31
4.641105.628 5.191111.945 5.911118.262 6.841124.589 7.53 1137.223
7.661168.809 7.771194.077 8.61206.721 9.161213.039 9.18 1231.99 8.681238.307
9.121244.624 10.811250.942 11.991257.259 12.18 1269.893 12.04 1274.22
11.41279.861 12.211287.734 12.631293.462 13 1304.512 12.441304.531 -
1.251318.759 -5.881341.285 -7.51364.689 -7.98 1395.512 .681395.802
12.351398.796 13.261440.476 11.561446.793 11.29 1453.12 11.061459.437
10.961465.754 10.841472.071 10.821478.388 10.77 1484.705 10.571491.022 10.62
1497.34 11.121503.657 11.761509.974 12 1516.291 11.971522.608 12.021528.925
12.211535.252 12.381541.569 12.62 1547.886 12.891554.204 13.031560.521
13.351566.838 13.741573.155 13.99 1579.472 13.671585.789 13.131592.107
12.321598.424 10.91604.741 10.29 1611.058 10.461617.385 10.581623.702
10.531636.336 10.851642.653 10.98 1648.971 11.091655.288 10.961661.605
10.891667.922 10.761674.239 11.18 1680.556 11.971686.874 13.121693.191
13.871699.517 14.11705.835 14.29 1712.152 14.511718.469 14.671724.786
14.911731.103 14.99 1737.42 15.32 1743.738 15.471750.055 15.731756.372
15.841762.689 15.991769.006 16.27 1775.323 16.51 1781.65 16.711787.967
17.111794.284 17.891800.602 18.98 1806.919 19.27

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

```
 0 .0821293.462 .041398.796 .082

Bank Sta: Left Right Coeff Contr. Expan.
 1293.4621398.796 .6 .8
Ineffective Flow num= 3
 Sta L Sta R Elev Permanent
 209 1293.46 13 F
 1398 1573.16 13.26 T
 1573.16 1699.52 14.1 T
Skew Angle = 15

Downstream Deck/Roadway Coordinates
 num= 3
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord 1328.148 13.85
12.451436.332 13.15 12.351465.309 11.34

Downstream Bridge Cross Section Data
Station Elevation Data num= 272
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  0 18.87 6.327 18.77 12.663
18.74 18.99 18.65 25.327 18.65  31.653 18.48 37.99 18.42 44.317 18.38 50.653
18.45 56.98 18.49  63.316 18.35 69.643 18.89 75.97 19.31 82.307 19.16 88.633
18.84  94.97 18.57 101.297 18.24 107.633 17.78 113.96 17.25 120.296 16.74
126.623 16.27 132.96 15.95 139.286 15.55 145.613 15.11 151.95 14.77  158.277
14.64 170.94 14.48 177.276 14.08 183.603 13.83 189.94 13.69  196.266 13.64
202.603 13.8 208.93 13.82 215.257 13.67 227.92 13.19  234.256 13.05 246.92
12.68 253.246 12.63 259.583 12.53 265.91 12.52  278.573 12.43 284.9 12.43
291.236 12.36 303.9 12.33 310.226 12.44  316.563 12.52 322.89 12.66 329.226
12.87 335.553 12.85 348.216 12.32  354.553 12.24 360.88 12.2 367.206 12.14
373.543 12.05 379.87 11.98  386.206 11.94 392.533 11.84 398.869 11.76 405.196
11.6 411.533 11.38  417.86 11.31 424.196 11.26 430.523 11.13 436.85 11.02
443.186 10.99  449.513 10.94 455.849 10.79 462.176 10.66 468.513 10.59
474.839 10.58  481.176 10.71 487.503 10.76 493.839 10.78 506.493 10.93
519.156 11  538.156 11.26 544.483 11.31 550.819 11.31 557.146 11.35 563.482
11.34  569.809 11.23 582.473 11.22 588.799 11.16 595.136 11.13 607.799 11.1
614.126 11.02 620.462 10.97 626.789 10.87 639.453 10.75 645.779 10.73
652.116 10.79 658.443 10.79 664.779 10.71 671.106 10.68 677.442 10.67
683.769 10.68 690.106 10.8 696.432 10.77 702.769 10.7 709.096 10.65  715.423
10.49 721.759 10.39 734.422 10.33 740.749 10.4 753.412 10.41  759.749 10.36
766.076 10.16 778.739 10.32 785.066 9.99 791.402 9.53  797.729 9.46 804.066
8.67 810.392 6.79 816.729 6.24 823.056 6.41  829.392 6.35 835.719 6.03
842.055 5.67 848.382 5.85 854.709 6.14  861.046 6.33 867.372 6.58 873.709
6.79 880.036 7.34 886.372 7.8  892.699 7.77 899.035 6.79 905.362 5.89 911.699
5.42 918.026 4.87  924.352 4.61 930.689 4.46 937.016 4.2 943.352 4.14 949.679
3.52  956.015 3.52 962.342 3.36 968.679 3.26 975.006 3.35 981.342 3.21
994.005 3.981000.332 4.271006.659 4.271012.995 4.091019.322 3.94 1025.659
3.061031.985 3.421038.322 3.851044.649 4.081057.312 4.35 1063.649
4.881069.975 4.721076.302 4.581082.639 4.471088.965 3.99 1095.302
3.681101.629 3.681107.965 4.141114.292 4.651120.629 4.35 1126.955
5.181133.292 6.261139.619 6.61145.945 7.131152.282 7.4 1158.609 7.711164.945
7.891171.272 8.211177.609 8.351190.272 8.77 1196.599 8.971202.935
8.811209.262 8.951215.589 9.181221.925 9.27 1228.252 9.521234.588
9.561240.915 9.451247.252 9.31253.579 9.28 1259.915 9.241266.242 9.461272.578
9.91278.905 10.661285.232 10.73 1294.341 10.81 1298.33 11.27 1302.85
11.691308.839 12.211316.711 12.63 1322.439 13 1333.49 12.441333.509 -
```

1.251347.737 -5.881370.262 -7.5 1393.667 -7.981424.489 .681424.779
12.351427.774 13.261462.508 11.54 1468.845 11.331475.172 11.241481.508
11.171487.835 11.021500.498 10.83 1506.825 11.151519.488 12.131525.825
12.561532.151 12.771538.488 12.93 1551.151 13.191557.478 13.481563.815
13.81570.141 13.951576.468 14.13 1582.805 14.421589.131 14.611595.468
14.611608.131 14.421620.795 14.26 1639.785 14.11646.111 14.011652.448
13.91658.775 13.811684.101 13.51 1709.428 13.371715.755 12.891722.091
12.511728.418 13.131734.754 14.15 1741.081 15.121747.418 15.951753.745
16.361760.081 16.541766.408 16.54 1772.744 16.641779.071 16.931785.398
17.21791.734 17.411798.061 17.48 1804.398 17.671810.724 18.021817.061
18.351823.388 18.641829.647 18.36 1842.165 17.691848.415 17.481854.674
17.421860.933 17.221867.193 16.96 1873.452 16.661879.701 16.51 1885.96 16.52
1892.22 16.371898.479 16.02 1904.729 15.341910.988 14.451917.247
13.621923.506 12.841929.765 12.82 1936.015 13.261942.274 13.341954.792
13.411967.301 13.521979.819 13.69 1992.338 13.842004.847 14.042017.365
14.142029.874 14.272042.392 14.46 2054.901 14.672186.305 15.5

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .0821322.439 .041427.774 .082

Bank Sta: Left Right Coeff Contr. Expan.
 1322.4391427.774 .5 .8
Ineffective Flow num= 3
 Sta L Sta R Elev Permanent
 329.2 1322.4 13 T
 1427.7 1582.8 13.26 T
 1582.8 2054.9 14.6 T
Skew Angle = 15
 Upstream Embankment side slope = 0 horiz. to 1.0 vertical Downstream
Embankment side slope = 0 horiz. to 1.0 vertical Maximum allowable
submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
 Energy
 W.S. Pro Method

 W.S.Pro Data
 Left Embankment
 El of the top of the embankment = 13.8
 El of the toe of the abutment = -5.88
 Right Embankment
 El of the top of the embankment = 13.8
 El of the toe of the abutment = -5.88
 Abutment Type = 1 Vert. abutments and vert. embankments with or without
wingwalls Slope of abutments =
 Top with of embankment = 30 Centroid station of bridge opening =
 Wing Wall Type = Angular wing walls

```
 Width = 35
 Angle = 20
 Radius =
 Guide Banks Type = No Guide Bank present
 Length =
 Offset =
 Angle =
 Optional Contraction and expansion coefficients
 At upstream inside (BU)
 Piers are Continuous for the width of the bridge
 Use Geometric mean as Friction Slope Method

Selected Low Flow Methods = W.S.Pro Method

High Flow Method
 Energy Only

Additional Bridge Parameters
 Add Friction component to Momentum
 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line
 CROSS SECTION


RIVER: Taunton River
REACH: Main Stem RS: 17950.46

INPUT
Description: 24.3 DS Face Trestle Br
Station Elevation Data num= 272
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  0 18.87 6.327 18.77 12.663
18.74 18.99 18.65 25.327 18.65  31.653 18.48 37.99 18.42 44.317 18.38 50.653
18.45 56.98 18.49  63.316 18.35 69.643 18.89 75.97 19.31 82.307 19.16 88.633
18.84  94.97 18.57 101.297 18.24 107.633 17.78 113.96 17.25 120.296 16.74
126.623 16.27 132.96 15.95 139.286 15.55 145.613 15.11 151.95 14.77  158.277
14.64 170.94 14.48 177.276 14.08 183.603 13.83 189.94 13.69  196.266 13.64
202.603 13.8 208.93 13.82 215.257 13.67 227.92 13.19  234.256 13.05 246.92
12.68 253.246 12.63 259.583 12.53 265.91 12.52  278.573 12.43 284.9 12.43
291.236 12.36 303.9 12.33 310.226 12.44  316.563 12.52 322.89 12.66 329.226
12.87 335.553 12.85 348.216 12.32  354.553 12.24 360.88 12.2 367.206 12.14
373.543 12.05 379.87 11.98  386.206 11.94 392.533 11.84 398.869 11.76 405.196
11.6 411.533 11.38  417.86 11.31 424.196 11.26 430.523 11.13 436.85 11.02
443.186 10.99  449.513 10.94 455.849 10.79 462.176 10.66 468.513 10.59
474.839 10.58  481.176 10.71 487.503 10.76 493.839 10.78 506.493 10.93
519.156 11  538.156 11.26 544.483 11.31 550.819 11.31 557.146 11.35 563.482
11.34  569.809 11.23 582.473 11.22 588.799 11.16 595.136 11.13 607.799 11.1
614.126 11.02 620.462 10.97 626.789 10.87 639.453 10.75 645.779 10.73
652.116 10.79 658.443 10.79 664.779 10.71 671.106 10.68 677.442 10.67
683.769 10.68 690.106 10.8 696.432 10.77 702.769 10.7 709.096 10.65  715.423
10.49 721.759 10.39 734.422 10.33 740.749 10.4 753.412 10.41  759.749 10.36
766.076 10.16 778.739 10.32 785.066 9.99 791.402 9.53  797.729 9.46 804.066
8.67 810.392 6.79 816.729 6.24 823.056 6.41  829.392 6.35 835.719 6.03
```

842.055 5.67 848.382 5.85 854.709 6.14 861.046 6.33 867.372 6.58 873.709
6.79 880.036 7.34 886.372 7.8 892.699 7.77 899.035 6.79 905.362 5.89 911.699
5.42 918.026 4.87 924.352 4.61 930.689 4.46 937.016 4.2 943.352 4.14 949.679
3.52 956.015 3.52 962.342 3.36 968.679 3.26 975.006 3.35 981.342 3.21
994.005 3.981000.332 4.271006.659 4.271012.995 4.091019.322 3.94 1025.659
3.061031.985 3.421038.322 3.851044.649 4.081057.312 4.35 1063.649
4.881069.975 4.721076.302 4.581082.639 4.471088.965 3.99 1095.302
3.681101.629 3.681107.965 4.141114.292 4.651120.629 4.35 1126.955
5.181133.292 6.261139.619 6.61145.945 7.131152.282 7.4 1158.609 7.711164.945
7.891171.272 8.211177.609 8.351190.272 8.77 1196.599 8.971202.935
8.811209.262 8.951215.589 9.181221.925 9.27 1228.252 9.521234.588
9.561240.915 9.451247.252 9.31253.579 9.28 1259.915 9.241266.242 9.461272.578
9.91278.905 10.661285.232 10.73 1294.341 10.81 1298.33 11.27 1302.85
11.691308.839 12.211316.711 12.63 1322.439 13 1333.49 12.441333.509 -
1.251347.737 -5.881370.262 -7.5 1393.667 -7.981424.489 .681424.779
12.351427.774 13.261462.508 11.54 1468.845 11.331475.172 11.241481.508
11.171487.835 11.021500.498 10.83 1506.825 11.151519.488 12.131525.825
12.561532.151 12.771538.488 12.93 1551.151 13.191557.478 13.481563.815
13.81570.141 13.951576.468 14.13 1582.805 14.421589.131 14.611595.468
14.611608.131 14.421620.795 14.26 1639.785 14.11646.111 14.011652.448
13.91658.775 13.811684.101 13.51 1709.428 13.371715.755 12.891722.091
12.511728.418 13.131734.754 14.15 1741.081 15.121747.418 15.951753.745
16.361760.081 16.541766.408 16.54 1772.744 16.641779.071 16.931785.398
17.21791.734 17.411798.061 17.48 1804.398 17.671810.724 18.021817.061
18.351823.388 18.641829.647 18.36 1842.165 17.691848.415 17.481854.674
17.421860.933 17.221867.193 16.96 1873.452 16.661879.701 16.51 1885.96 16.52
1892.22 16.371898.479 16.02 1904.729 15.341910.988 14.451917.247
13.621923.506 12.841929.765 12.82 1936.015 13.261942.274 13.341954.792
13.411967.301 13.521979.819 13.69 1992.338 13.842004.847 14.042017.365
14.142029.874 14.272042.392 14.46 2054.901 14.672186.305 15.5

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .0821322.439 .041427.774 .082

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1322.4391427.774 90.54 100.66 105.81 .5 .8 Ineffective Flow num= 3
 Sta L Sta R Elev Permanent
 329.2 1322.4 13 T
 1427.7 1582.8 13.26 T
 1582.8 2054.9 14.6 T
Skew Angle = 15

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 17849.81

INPUT
Description: 24 Exit Trestle Br
Station Elevation Data num= 208
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 19.31 26.18 19.33 32.73
19.31 45.82 19.23 52.37 19.21 58.92 19.31 65.46 19.52 72.01 19.63 78.55

19.38 85.1 18.96 98.19 17.88 104.74 17.55 111.28 17.19 117.83 16.74 130.92
15.65 137.47 15.2 144.02 14.84 150.56 14.51 157.11 14.22 163.65 14.03 170.2
13.81 176.75 13.5 183.29 13.12 189.84 13 196.38 13.19 202.93 13.58 209.48
13.88 216.02 13.78 235.66 13.18 242.21 13.04 248.75 12.97 261.85 12.89
268.39 12.86 274.94 12.92 281.48 12.94 288.03 12.88 294.58 12.9 301.12 13.07
307.67 13.22 314.22 13.24 320.76 13.42 327.31 13.42 333.85 13.12 340.4 12.91
353.49 12.71 360.04 12.66 366.58 12.59 373.13 12.58 379.68 12.51 386.22 12.4
392.77 12.33 399.32 12.28 405.86 12.15 418.95 11.98 425.5 11.88 438.59 11.79
445.14 11.71 451.68 11.59 458.23 11.63 471.32 11.51 477.87 11.53 484.42 11.7
490.96 11.74 497.51 11.81 504.05 11.77 510.6 11.78 517.15 11.77 523.69 11.84
530.24 11.99 536.78 11.98 543.33 12.05 549.88 12.01 562.97 11.85 569.52 11.8
576.06 11.73 582.61 11.74 595.7 11.79 602.25 11.8 615.34 11.68 621.88 11.66
634.98 11.67 641.52 11.58 648.07 11.45 654.62 11.47 661.16 11.36 667.71
11.42 674.25 11.36 680.8 11.4 693.89 11.33 700.44 11.19 706.98 11.17 713.53
11.18 720.08 11.11 726.62 11.13 733.17 11.21 739.72 11.18 746.26 11.04
752.81 10.88 759.35 10.93 765.9 10.93 772.45 10.83 778.99 10.8 785.54 10.79
792.09 10.87 798.63 10.68 805.18 10.74 811.72 10.71 818.27 10.81 824.82
10.88 831.36 10.38 837.91 10.29 844.45 9.37 851 7.93 857.55 7.1 864.09 5.9
870.64 5.81 877.19 6.55 883.73 6.96 890.28 6.93 896.82 6.94 903.37 6.5
909.92 5.67 916.46 5.18 923.01 5.03 929.55 4.72 936.1 4.8 942.65 4.9 949.19
5.08 955.74 4.94 962.29 4.71 968.83 4.65 975.38 4.75 981.92 4.71 988.47 4.24
995.02 4.12 1001.56 3.85 1008.11 3.82 1014.65 3.81 1021.2 3.97 1027.75 3.95
1034.29 4.03 1040.84 3.98 1047.39 3.9 1053.93 3.47 1060.48 3.32 1067.02 3.64
1073.57 3.82 1086.66 3.59 1099.76 3.4 1106.3 3.53 1112.85 3.76 1119.39 4.1
1132.49 4.13 1139.03 4.12 1152.12 4.88 1158.67 5.3 1165.22 6.59 1171.76 7.38
1178.31 7.4 1184.86 7.35 1191.4 7.36 1197.95 7.49 1204.49 7.72 1211.04 7.75
1217.59 7.94 1224.13 8.2 1230.68 8.24 1237.23 8.22 1243.77 8.27 1250.32 8.2
1256.88 8.29 1263.44 8.43 1270 8.49 1276.56 8.69 1291.2 8.68 1339.54 6.53
1374.16 5.55 1379.52 1.74 1410.91 -6.63 1433.27 -7.73 1454.85 -8.3 1472.27 -
4.98 1483.19 .61 1487.95 5.55 1498.67 10.79 1547.22 11.17 1722.6 15.71
1735.72 15.76 1742.28 15.75 1748.84 15.68 1761.96 15.73 1768.52 15.77
1775.08 15.72 1781.64 15.72 1788.2 15.89 1794.76 15.97 1801.32 15.96 1814.44
15.97 1821 16.05 1827.56 16.07 1834.12 16.11 1840.67 16.3 1847.23 16.33
1853.79 16.22 1860.35 16.2 1866.91 16.25 1873.47 16.27 1886.59 16.27

Manning's n Values num= 3 Sta n Val Sta n Val Sta n Val
 0 .082 1291.2 .04 1498.67 .082

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1291.2
1498.67 887.1 936.69 998.6 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 16913.12

INPUT
Description: 23
Station Elevation Data num= 456
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 19.4 78.43 19.25 111.1 19.25
117.64 19.03 150.32 18.69 163.39 18.79 189.53 18.27 196.07 18.35 202.6 18.23
209.14 17.59 228.74 17.05 235.28 17.14 254.88 16.16 274.49 14.75 307.17
13.64 359.45 12.29 372.52 11.73 405.2 11.03 424.81 10.33 450.95 9.89 457.48

9.87 477.09 10.28 483.63 10.55 490.16 10.41 503.23 9.2 509.77 8.88 529.38
8.45 562.05 8.59 575.12 8.49 594.73 8.68 614.34 8.36 640.48 8.52 653.55 8.27
666.62 8.19 699.3 7.6 745.05 7.64 771.19 7.84 777.72 8.07 784.26 8.49 790.79
8.71 797.33 8.68 816.94 9.39 823.47 8.64 830.01 7.68 836.49 6.59 849.46
5.05 855.94 4.44 862.43 3.98 875.4 3.5 894.85 3.23 901.33 3.31 933.76 2.87
940.24 2.89 953.21 3.1 959.69 3 966.18 3.1 972.66 3.39 985.63 3.63 992.11
3.95 998.6 4.52 1005.08 5.28 1011.57 5.66 1031.02 5.84 1043.99 6.29 1050.47
6.25 1063.44 5.64 1069.92 5.73 1082.89 5.12 1102.35 5.3 1108.83 5.18 1121.8
5.61 1141.25 5.56 1147.73 5.71 1154.22 6.05 1160.7 5.8 1167.19 5.78 1173.67
5.56 1180.16 5.47 1186.64 5.56 1199.61 5.24 1212.58 4.23 1215.2 4.09 1219.06
3.87 1225.55 3.93 1232.03 4.2 1238.54 3.19 1250 -.96 1250.62 -1.13 1252.35 -
1.49 1254.47 -1.7 1256.24 -1.54 1257.64 -2.08 1258.8 -3.18 1260.28 -4.39
1262.36 -5.49 1264.56 -6.31 1266.7 -7.12 1268.91 -7.64 1271.03 -7.99 1273.46
-8.06 1275.8 -8.11 1278.4 -8.23 1280.73 -8.24 1283.12 -8.18 1285.25 -8.2
1287.5 -8.13 1289.54 -8.05 1291.39 -7.94 1293.1 -7.97 1295.08 -7.94 1296.78
-7.77 1298.56 -7.77 1300.16 -7.61 1301.79 -7.6 1303.31 -7.45 1304.84 -7.38
1306.2 -7.16 1307.65 -7.07 1309.06 -7 1310.52 -6.85 1311.97 -6.66 1313.89 -
6.62 1315.88 -6.47 1318.09 -6.19 1320.33 -6.01 1322.53 -5.68 1324.52 -5.43
1328.31 -4.79 1329.88 -4.32 1331.38 -3.78 1332.58 -3.18 1333.73 -2.69
1334.42 -2.25 1342.71 3.21 1349.23 9.58 1355.74 10.87 1362.26 10.7 1368.78
10.64 1375.3 10.6 1388.33 10.31 1394.85 10.23 1401.37 10.42 1407.88 9.94
1414.4 9.62 1420.92 9.58 1427.44 9.61 1433.96 9.59 1440.47 9.36 1446.99 9.17
1453.51 9.21 1460.03 9.72 1466.54 10.05 1473.06 10.29 1479.58 10.5 1486.1
10.67 1492.61 10.88 1505.65 11.69 1512.17 11.18 1518.68 10.88 1525.2 10.71
1531.72 10.48 1538.24 10.11 1544.75 9.89 1551.27 9.78 1557.79 9.78 1564.31
9.73 1570.83 9.82 1577.34 10.28 1583.86 10.39 1590.38 10.48 1596.9 10.72
1603.41 10.8 1609.93 10.6 1616.45 10.44 1622.97 9.97 1629.48 9.52 1636 8.98
1642.52 8.58 1649.04 7.82 1655.55 7.34 1662.07 6.45 1668.59 5.53 1675.11
5.15 1681.63 5.49 1688.14 5.48 1694.66 5.74 1701.18 5.89 1707.7 6.58 1714.21
7.71 1720.73 8.22 1727.26 8.48 1733.79 8.49 1740.32 7.74 1746.85 6.35
1753.38 5.46 1759.91 5.63 1766.44 5.84 1772.97 6.14 1779.5 6.82 1786.03 7.55
1792.57 7.94 1799.1 8 1812.16 8.06 1818.69 8.44 1825.22 9.16 1838.28 9.35
1844.81 9.32 1851.34 8.96 1857.87 9.41 1864.4 10.05 1870.93 10.93 1877.46
11.9 1883.99 12.98 1890.52 14.17 1897.05 15.25 1903.58 15.71 1910.11 15.78
1916.64 15.72 1923.17 15.45 1929.7 15.44 1936.23 15.5 1942.76 15.79 1949.29
16.29 1955.82 16.59 1962.35 16.73 1968.88 17.06 1975.41 17.43 1988.48 17.87
1995.01 18.01 2001.54 18.1 2008.07 18.22 2014.6 18.29 2027.66 18.22 2034.19
18.02 2040.72 17.6 2047.25 17.3 2053.78 17.15 2060.31 16.97 2066.84 16.84
2073.37 16.76 2079.9 16.64 2086.43 16.7 2092.96 16.82 2099.49 16.91 2106.02
17.03 2112.55 17.21 2119.08 17.43 2132.14 17.74 2138.67 17.7 2145.2 17.56
2151.73 17.4 2158.26 17.2 2164.8 17.04 2171.33 17.28 2177.87 17.26 2184.4
16.88 2190.94 16.43 2197.47 16.46 2204.01 16.2 2210.54 16.25 2217.07 16.43
2223.61 16.51 2230.14 16.33 2236.68 16.12 2243.21 16 2249.75 16.1 2256.28
16.27 2269.35 16.3 2275.88 16.39 2282.42 16.9 2288.95 17.18 2302.02 17.45
2308.56 17.45 2321.62 17.24 2328.16 17.09 2334.69 16.89 2341.23 16.66
2347.76 16.39 2354.3 16.07 2360.83 15.46 2367.36 15.19 2373.9 14.34 2380.43
12.97 2386.97 9.92 2393.5 9.21 2400.04 9.21 2406.57 9.39 2413.11 9.48
2419.64 9.27 2426.17 9.39 2432.71 9.66 2439.24 9.71 2445.78 9.84 2452.31
9.95 2458.85 9.65 2465.38 9.11 2471.92 9.17 2478.45 9.93 2491.52 9.6 2498.05
9.83 2504.59 9.69 2511.12 9.6 2517.66 9.82 2524.19 10.01 2530.73 10.15
2537.26 11.2 2543.79 12.86 2550.33 14.35 2556.86 15.3 2563.4 15.65 2569.93
15.67 2576.47 15.71 2583 15.52 2589.54 15.42 2596.07 15.35 2602.6 15.43
2609.14 15.55 2615.67 15.56 2622.21 15.59 2628.74 15.48 2635.28 15.46
2641.81 15.42 2648.34 15.4 2654.88 15.31 2661.41 15.12 2667.95 14.95 2674.48

14.84 2681.02 14.88 2687.55 14.84 2694.09 14.74 2707.15 14.7 2713.69 14.64
2720.22 14.51 2726.76 14.48 2733.29 14.48 2739.83 14.5 2746.36 14.61 2752.9
14.63 2759.43 14.69 2765.96 14.69 2772.5 15.03 2785.57 15.16 2798.64 15.34
2805.17 15.45 2811.7 15.65 2824.77 15.67 2831.31 15.73 2844.38 15.88 2850.91
15.94 2863.98 16.01 2870.51 15.99 2877.05 15.94 2883.58 15.85 2890.1 15.72
2896.62 15.67 2903.14 15.64 2909.65 15.59 2916.17 15.49 2922.69 15.49
2929.21 15.71 2935.73 15.75 2942.24 15.76 2948.76 15.81 2955.28 16.14 2961.8
16.49 2968.31 16.45 2974.83 16.43 2987.87 16.46 3007.42 16.58 3013.94 16.61
3020.46 16.61 3026.98 16.52 3033.49 16.38 3046.53 16.35 3066.08 16.21 3072.6
16.19 3092.15 16.25 3098.67 16.37 3105.19 16.57 3111.71 16.72 3118.22 16.79
3124.74 16.82 3131.26 16.79 3137.78 16.89 3144.3 17.03 3157.33 17.43 3163.85
17.29 3170.37 17.35 3176.88 17.59 3183.4 18.62 3189.92 19.49 3196.44 19.82
3202.96 19.98 3209.47 20.03 3215.99 20.06 3222.51 20.13 3229.03 20.1 3235.54
20.12 3242.06 20.08 3248.58 20.12 3261.62 20.36 3268.13 20.45 3281.17 20.81
3287.69 20.98 3294.21 21.09 3300.72 21.06 3307.24 21.06 3313.76 21.14
3320.28 21.2 3333.31 21.26 3339.83 21.3 3346.35 21.37 3352.87 21.48 3359.38
21.57 3385.45 21.73 3391.97 21.76 3398.49 21.77 3405.01 21.76 3411.53 21.73
3424.56 21.62 3431.08 21.77 3437.6 21.85 3444.11 21.87 3457.15 21.78 3463.67
21.79 3470.19 21.63 3476.7 21.76 3496.26 21.69 3502.77 21.91 3509.29 21.9
3515.81 21.97 3522.33 21.97 3528.85 22.1 3535.36 22.1 3541.88 21.94 3548.4
21.87 3554.92 21.86 3561.44 21.75 3567.95 21.46 3574.47 21.6 3580.99 22
3587.51 22.17 3594.02 22.11 3600.54 21.98 3607.06 21.78 3613.58 21.91 3620.1
21.87 3626.61 22.07 3633.13 22.08 3639.65 21.62 3652.68 21.59 3659.2 21.56
3665.72 21.4 3672.24 21.29 3678.76 21.24 3685.27 21.21

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .082 816.94 .04 1355.74 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 816.94
1355.74 882.21 816.31 764.31 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 2300 3685.27 17.4 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 16096.81

INPUT
Description: 22 - App GorOwPkwy
Station Elevation Data num= 443
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 19.13 12.95 19.94 19.43
20.31 25.91 20.58 32.38 21.16 38.86 21.65 45.34 21.95 51.81 22.11 58.29
21.99 64.76 21.25 71.24 20.48 77.72 19.87 84.19 19.29 90.67 19.01 97.15
18.91 103.62 18.85 110.1 18.67 116.58 18.57 123.05 18.52 129.53 18.5 136.01
18.83 142.48 19.36 148.96 19.64 155.44 19.61 161.91 19.67 174.86 19.66
181.34 19.67 187.82 19.85 194.29 19.18 200.77 17.5 207.25 15.57 213.72 14.65
220.2 14.68 226.68 14.61 233.15 14.45 239.63 14.24 246.11 13.96 252.58 13.63
259.06 13.41 265.54 12.94 272.01 12.38 278.49 11.55 284.96 11.44 291.44
11.25 297.92 10.86 304.39 10.24 310.87 10.04 330.3 9.64 343.25 9.08 349.73
8.88 356.21 8.79 362.68 8.68 369.16 8.62 375.64 8.6 382.11 8.43 395.06 8.31
401.54 8.11 408.02 7.87 414.49 7.84 420.97 7.68 427.45 7.49 433.92 7.36

440.4 7.16 446.88 6.99 453.35 6.93 459.83 6.69 466.31 6.5 472.78 6.11 485.74
5.28 492.22 4.39 498.7 4.27 505.18 3.97 511.66 3.74 518.14 3.85 524.62 4.04
531.11 4.09 537.59 3.99 544.07 3.79 550.55 3.75 557.03 3.83 569.99 3.8
576.47 3.89 582.95 3.88 589.43 3.76 602.4 3.85 615.36 3.88 621.84 3.82
628.32 3.79 634.8 3.82 647.76 4.17 654.24 4.64 660.72 6.29 667.2 8.57 673.69
10.2 680.17 10.45 686.65 10 693.13 9.46 699.61 8.71 706.09 8.08 712.57 7.84
725.53 7.61 732.01 7.42 738.49 7.28 744.98 7.07 751.46 7 764.42 7.21 770.9
6.81 777.38 6.24 783.72 6.54 790.06 6.86 796.4 6.84 802.74 6.78 809.09 5.97
811.36 6.17 812.5 2.53 828.11 -1.03 853.59 -8.07 878.23 -7.1 899.9 -4.86
912.8 -4.05 932.23 -.89 985.03 3.1 1224.32 5.35 1259.85 11.56 1315.71 11.32
1328.83 11.1 1335.39 11.29 1341.95 11.55 1348.51 10.79 1355.07 9.72 1361.63
9.22 1368.19 9.18 1374.75 9.04 1381.31 9.08 1387.87 9.24 1394.43 9.5 1400.99
9.68 1407.55 9.8 1414.11 9.8 1420.67 9.77 1427.23 9.82 1433.79 10.13 1440.35
10.4 1446.91 10.55 1453.47 10.67 1460.03 10.91 1466.59 11.05 1473.15 11.22
1479.71 11.37 1486.27 11.59 1492.83 11.79 1499.39 12.16 1505.95 12.43
1512.51 12.63 1519.07 13.07 1525.63 13.54 1532.19 13.79 1538.75 14.06
1545.31 14.21 1551.87 14.39 1558.43 14.37 1564.99 14.26 1571.55 14.34
1584.66 14.54 1591.22 14.53 1597.78 14.46 1604.34 14.31 1610.9 14.26 1617.46
14.16 1630.58 13.93 1637.14 13.95 1643.7 14 1650.26 13.85 1656.82 13.75
1663.38 13.67 1676.5 12.53 1683.06 12.19 1689.62 12.25 1702.74 12.51 1709.3
12.71 1715.86 12.83 1722.42 12.84 1728.98 12.75 1735.54 12.59 1742.1 11.81
1748.66 10.27 1755.22 9.69 1768.34 9.91 1774.9 9.92 1781.46 9.72 1788.02
9.05 1801.14 8.29 1807.7 7.94 1820.82 7.79 1827.38 7.73 1833.94 7.72 1840.5
7.67 1847.06 7.67 1853.61 7.45 1860.17 7.57 1866.73 7.74 1873.29 7.63
1879.85 7.67 1886.41 7.5 1892.97 7.49 1906.09 7.33 1912.65 7.24 1919.21 7.25
1925.77 7.38 1932.33 7.82 1938.89 8.22 1945.45 8.47 1952.01 8.5 1958.57 8.7
1965.13 9.14 1971.69 9.52 1978.25 9.78 1984.81 9.89 1991.37 10.07 1997.93
10.07 2004.49 10.2 2017.61 10.37 2024.17 10.75 2030.73 10.94 2037.29 10.74
2043.85 10.57 2050.41 10.69 2056.97 10.85 2063.53 11.07 2070.09 11.13
2076.65 11.1 2083.21 11.14 2089.77 11.12 2102.89 11.44 2109.45 11.56 2116
11.54 2122.56 11.6 2135.68 11.8 2142.24 11.63 2148.8 11.39 2155.36 11.32
2161.92 11.29 2168.48 11.01 2175.04 10.84 2181.6 10.96 2188.16 11.03 2194.72
11.23 2201.28 11.68 2207.84 10.88 2214.4 10.91 2220.96 10.41 2227.52 10.07
2234.08 10.07 2240.64 9.69 2247.2 9.82 2253.76 10.71 2260.32 11.75 2266.88
12.65 2273.44 13.03 2280 13.34 2286.56 13.51 2293.12 13.74 2299.68 13.81
2306.24 14.01 2319.36 14.28 2325.92 13.97 2332.48 13.98 2339.04 13.97 2345.6
13.82 2352.15 13.79 2358.71 13.93 2365.27 13.97 2371.83 14.03 2378.39 14.29
2384.95 14.38 2391.51 14.23 2404.63 14.1 2411.19 14.09 2417.75 13.97 2424.31
13.93 2430.87 13.71 2437.43 14.05 2443.99 14.12 2450.55 14.04 2463.67 14.19
2470.23 14.11 2483.35 14.01 2489.91 13.79 2496.47 13.61 2503.03 13.52
2509.59 13.39 2516.15 13.52 2522.71 13.55 2529.27 13.63 2535.83 13.59
2542.39 13.65 2548.95 13.57 2555.51 13.47 2562.07 13.35 2568.63 13.34
2575.19 13.41 2581.75 13.38 2588.3 13.29 2594.86 13.22 2607.98 12.97 2614.54
12.87 2621.1 12.67 2627.66 12.56 2634.22 12.4 2647.34 12.43 2653.9 12.5
2667.02 12.49 2693.26 12.79 2699.82 12.8 2706.38 12.88 2712.94 12.84 2719.5
12.82 2726.06 12.85 2739.18 12.38 2745.74 12.18 2752.3 12.19 2758.86 12.18
2765.42 12.24 2771.98 12.19 2778.54 12.24 2785.1 12.37 2791.66 12.39 2798.22
12.61 2804.78 12.89 2811.34 13.25 2817.9 13.28 2824.46 13.12 2831.02 13.18
2837.58 13.09 2844.14 13.14 2850.7 12.86 2857.26 12.61 2863.82 12.6 2870.38
12.64 2876.94 12.66 2883.5 12.66 2890.06 12.75 2896.62 12.88 2903.18 12.94
2909.74 13.07 2922.86 13.37 2929.42 13.47 2935.98 13.49 2942.54 13.49 2949.1
13.55 2955.66 13.55 2962.22 13.67 2968.78 13.84 2975.34 13.8 2981.9 13.74
2988.46 13.66 2995.02 13.71 3008.14 13.85 3014.7 13.86 3021.26 13.69 3027.82
13.43 3034.38 13.48 3040.94 13.62 3047.49 13.59 3054.05 13.52 3060.61 13.52

3067.17 13.67 3073.73 13.76 3080.29 13.69 3086.85 13.57 3093.41 13.73
3099.97 13.92 3106.53 13.91 3113.09 13.96 3119.65 14.1 3126.21 14.43 3132.77
15 3139.33 15.31 3145.89 15.38 3152.45 15.24 3159.01 15.05 3165.57 14.8
3172.13 14.82 3178.69 14.81 3185.25 14.69 3191.81 14.72 3198.37 14.82
3204.93 14.9 3211.49 15.02 3218.05 15.02 3224.61 15.11 3231.17 15.23 3237.73
15.28 3244.29 15.87 3250.85 17.3 3257.41 18.75 3263.97 19.03 3270.53 19.18
3277.09 19.11 3283.65 18.93 3296.77 18.64 3303.33 18.56 3309.89 18.51
3316.45 17.86 3323.01 16.08 3329.57 14.86 3336.13 15.05 3342.69 15.55
3349.25 16.08 3355.81 17.1 3362.37 17.45 3368.93 17.43 3375.49 17.27 3382.05
17.18 3388.61 16.82 3395.17 16.54 3401.73 15.86 3408.29 14.84 3414.85 14.39
3421.41 14.74 3427.97 15.25 3441.09 16.21 3447.65 16.14 3454.21 16.27
3460.77 16.14 3467.33 15.82 3473.89 15.53 3480.45 17.16 3487.01 19.18
3493.57 19.9 3500.12 20.05 3506.68 20.17 3513.24 20.34 3519.8 20.48 3526.36
18.87 3532.92 17.71 3539.48 17.75 3546.04 17.64 3552.6 17.22 3559.16 16.72
3565.72 16.35 3572.28 16.38 3578.84 16.26

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .08 680.17 .04 1259.85 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 680.17
1259.85 106.5 128.05 139.73 .3 .5 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 673 10.2 T
 1545 3578.84 14.2 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 15968.76

INPUT
Description: 21.7 -US Face GorOwPkwy
Station Elevation Data num= 492
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 21.56 13.11 21.49 19.67
21.56 26.22 21.48 32.78 21.11 39.33 20.48 45.89 19.56 52.45 18.78 59 18.05
65.56 17.41 72.11 16.93 78.67 16.56 85.22 16.36 91.78 16.22 98.34 15.89
104.89 15.68 111.45 15.8 118 16.12 124.56 16.25 131.11 16.33 137.67 16.69
144.23 16.99 150.78 17.18 157.34 18.06 163.89 19.92 170.45 21.89 177 22.64
183.56 22.99 190.11 23 196.67 22.95 203.23 22.95 209.78 22.87 216.34 22.85
229.45 23.33 236 23.41 242.56 23.29 249.12 23.31 255.67 23.6 262.23 23.56
268.78 22.67 275.34 22.91 288.45 22.87 295.01 23.12 301.56 23.13 308.12
23.29 314.67 23.61 321.23 23.85 327.78 23.79 334.34 23.75 340.9 23.94
360.56 23.69 367.12 23.66 373.67 23.54 380.23 23.44 386.79 23.4 393.34 23.23
399.9 23.11 406.45 23.1 413.01 23.01 419.56 22.96 432.68 22.93 439.23 22.84
445.79 22.82 452.34 22.78 458.9 22.7 465.45 22.59 472.01 22.43 478.56 22.29
485.12 22.39 491.68 22.81 498.23 22.85 504.79 22.79 511.34 22.79 517.9 22.72
524.45 22.68 531.01 22.57 537.57 22.4 544.12 22.33 550.68 22.46 557.23 22.56
563.79 22.51 570.34 22.3 576.9 22.17 583.46 21.77 590.01 21.67 596.57 21.65
603.08 21.91 609.59 21.67 616.1 21.67 622.61 21.85 629.13 21.71 635.64 21.8
642.15 22.03 648.66 21.89 655.17 21.91 661.68 21.87 668.2 21.78 674.71 21.81
681.22 22.01 687.73 21.79 694.24 21.78 700.76 21.75 713.78 21.6 720.29 21.42
726.8 21.13 733.31 20.71 739.83 20.56 746.34 20.23 752.85 20.48 759.36 21.21

765.87 21.12 772.38 20.68 778.9 20.44 798.78 11.26 804.26 9.9 814.14 3.79
816.39 1.54 820.83 .07 830.49 -1.96 841.67 -5.82 857.23 -6.8 876.24 -8.13
882.69 -5.49 884.65 -6.24 885.77 -5.45 905.83 -3 925.98 -3.48 946.52 -1
954.71 1.12 961.23 4.3 967.74 6.96 974.25 9.6 980.76 12.13 987.3 14.18
993.84 15.37 1000.38 15.82 1006.91 15.76 1013.45 15.21 1019.99 14.53 1026.53
14.95 1033.06 15.07 1039.6 14.52 1046.14 14.65 1052.68 15.22 1059.22 14.98
1065.75 15 1072.29 15.36 1078.83 14.88 1085.37 14.66 1091.91 14.78 1098.44
14.31 1104.98 13.72 1111.52 13.35 1118.06 13.14 1124.6 12.91 1131.13 12.5
1137.67 12.11 1144.21 11.86 1150.75 11.59 1157.29 11.24 1170.36 11 1176.9
11.05 1183.44 11.04 1189.97 10.98 1196.51 10.88 1203.05 10.95 1209.59 11.14
1216.13 11.25 1222.66 11.01 1235.74 10.69 1242.28 10.85 1248.82 10.86
1255.35 10.85 1261.89 10.88 1268.43 10.72 1274.97 10.62 1288.04 10.33
1294.58 10.28 1307.66 10.23 1320.73 10.32 1327.27 10.61 1333.81 10.94
1340.35 11.16 1346.88 11.16 1353.42 11.11 1359.96 11.28 1373.04 11.37
1379.57 11.61 1386.11 11.96 1392.65 12.33 1399.19 12.49 1412.26 13.07 1418.8
13.12 1425.34 13.34 1431.88 13.65 1438.42 13.86 1444.95 14.22 1458.03 14.36
1464.57 14.5 1477.64 14.51 1484.18 14.54 1497.26 14.76 1503.79 14.72 1516.87
14.27 1523.41 14.22 1529.95 14.58 1536.48 14.72 1543.02 14.76 1549.56 14.93
1556.1 14.89 1569.17 15.4 1575.71 15.41 1588.79 15.33 1595.33 15.31 1601.86
15.38 1608.4 15.26 1614.94 15.03 1621.48 15.25 1628.02 14.99 1634.55 15.18
1641.09 15.21 1647.63 15.22 1660.7 15.28 1667.24 15.34 1673.78 15.44 1680.32
15.49 1693.39 15.68 1699.93 15.8 1706.47 15.76 1713.01 15.93 1719.55 16.06
1726.08 16.05 1732.62 15.99 1739.16 16.06 1745.7 16.18 1752.24 16.15 1758.77
16.02 1765.31 15.97 1771.85 15.97 1778.39 16.06 1784.92 16.09 1791.46 16.25
1798 17.04 1804.54 17.39 1811.08 17.31 1817.61 17.39 1824.15 17.6 1830.69
17.58 1837.23 17.49 1850.3 16.92 1856.84 17.12 1863.38 17.37 1869.92 17.33
1876.46 17.48 1882.99 17.54 1889.53 17.55 1896.07 17.61 1902.61 17.43
1909.15 17.48 1915.68 17.49 1928.76 17.29 1935.3 17.34 1941.83 17.37 1948.37
17.33 1954.91 17.23 1961.45 17.1 1974.52 17.21 1981.06 17.36 1987.6 17.69
1994.14 17.9 2000.68 18.03 2007.21 18.34 2013.75 18.62 2020.29 18.93 2026.83
19.22 2033.37 19.36 2039.9 19.34 2046.44 19.2 2052.98 19.14 2059.52 19.14
2066.05 18.92 2072.59 18.58 2079.13 18.57 2085.67 18.62 2092.21 18.53
2098.74 18.47 2111.82 18.41 2118.36 18.42 2124.9 18.34 2131.43 18.34 2137.97
18.51 2144.51 18.36 2151.05 18.13 2157.59 17.84 2164.12 17.7 2170.66 17.8
2177.2 17.73 2183.74 17.72 2190.27 17.76 2196.81 17.83 2203.35 17.82 2216.43
17.47 2222.96 17.45 2229.5 17.49 2236.04 17.46 2242.58 17.51 2249.12 17.54
2255.65 17.49 2262.19 17.53 2268.73 17.49 2275.27 17.54 2281.81 17.42
2288.34 17.05 2294.88 16.74 2301.42 16.67 2314.49 16.71 2321.03 16.75
2327.57 16.84 2334.11 16.9 2340.65 16.81 2353.72 16.86 2360.26 16.82 2373.34
16.5 2379.87 16.46 2386.41 16.49 2392.95 16.3 2399.49 15.99 2406.03 15.74
2412.56 15.56 2419.1 15.42 2432.18 15.36 2438.71 15.39 2445.25 15.52 2451.79
15.71 2458.33 15.76 2464.87 15.93 2471.4 15.93 2484.48 15.68 2497.56 15.64
2504.09 15.52 2510.63 15.22 2517.17 15.56 2523.71 15.44 2530.25 15.44
2536.78 15.52 2543.32 15.55 2549.86 15.56 2556.4 15.59 2562.93 15.73 2576.01
15.92 2582.55 15.87 2595.62 15.94 2602.16 15.72 2608.7 15.59 2615.24 15.91
2621.78 15.98 2634.85 16.18 2641.38 16.31 2647.91 16.38 2654.43 16.37
2660.96 16.1 2674.02 16.15 2680.55 16 2687.07 15.58 2693.6 15.25 2700.13
15.08 2713.18 14.71 2719.71 14.62 2726.24 14.64 2732.77 14.6 2745.82 14.37
2752.35 14.24 2758.88 14.02 2765.4 13.9 2771.93 14.13 2778.46 14.34 2784.99
14.31 2798.04 14.08 2804.57 14.07 2817.63 14.01 2824.15 14.07 2830.68 14.23
2837.21 14.42 2843.74 14.51 2850.26 14.65 2856.79 14.68 2863.32 14.78
2876.38 14.67 2882.9 14.72 2889.43 14.84 2895.96 14.84 2902.49 14.96 2909.01
14.8 2915.54 14.78 2922.07 14.62 2928.6 14.92 2935.12 14.78 2941.65 14.95
2948.18 14.73 2954.71 14.69 2961.23 14.88 2967.76 14.89 2974.29 15.31

2980.82 15.43 2987.34 15.49 2993.87 15.52 3000.4 15.73 3006.93 15.96 3013.46 16.34 3019.98 16.67 3026.51 16.82 3033.04 17.09 3039.57 17.39 3046.09 17.5 3052.62 17.57 3059.15 17.89 3065.68 18.11 3072.2 18.42 3085.26 18.89 3091.79 17.65 3098.32 17.17 3104.84 17.62 3117.9 18.04 3124.43 18.27 3130.95 18.67 3137.48 19.15 3144.01 19.57 3150.54 19.96 3157.06 20.04 3163.59 19.95 3170.12 20.03 3176.65 20.13 3183.17 20.17 3189.7 20.33 3196.23 20.47 3202.76 20.47 3209.29 20.43 3215.81 20.46 3222.34 20.51 3228.87 20.39 3235.4 20.12 3241.92 20.08 3248.45 20.13 3261.51 20.36 3268.03 20.37 3274.56 20.36 3281.09 20.51 3287.62 20.8 3294.15 21.01 3300.67 21.16 3307.2 21.07 3313.73 21.01 3320.26 21.1 3326.78 21.47 3333.31 21.55 3339.84 21.74 3346.37 21.71 3352.89 21.83 3359.42 22.15 3365.95 22.25 3372.48 21.89 3379 21.85 3385.53 21.95 3392.06 22.07 3398.59 22.45 3405.11 22.77 3411.64 22.73 3418.17 22.61 3424.7 22.66 3431.23 22.84 3437.75 23.11 3444.28 23.27 3457.34 23.3 3470.39 23.41 3476.92 23.59 3483.45 23.64 3489.97 23.91 3496.5 24.09 3509.56 24.09 3516.09 24.07 3522.61 24.19 3529.14 24.26 3535.67 24.24 3542.2 24.27 3548.72 24.16 3561.78 24.03 3568.31 23.92 3574.83 23.95 3581.36 24 3587.89 24.03 3594.42 24.02 3600.94 24.05
 Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 778.9 .04 1000.38 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 778.9 1000.38 71.69 72.2 74.47 .5 .8 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 1051.7 3600.94 15.1 T

BRIDGE

RIVER: Taunton River
REACH: Main Stem RS: 15933.16

INPUT
Description: 21.5 Hon Gordon Owen Pkwy
Distance from Upstream XS = 8
Deck/Roadway Width = 60
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
 num= 12
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 0 23.89 272 23.89 587 21.32
 785 20.92 15.19 885 20.33 14.44 957 19.45 13.69
 1002 17.81 13.69 1100 13.31 1206 10.72   1326 10.81 1526 14.47 1691 15.47

Upstream Bridge Cross Section Data
Station Elevation Data num= 492
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 21.56 13.11 21.49 19.67 21.56 26.22 21.48 32.78 21.11 39.33 20.48 45.89 19.56 52.45 18.78 59 18.05 65.56 17.41 72.11 16.93 78.67 16.56 85.22 16.36 91.78 16.22 98.34 15.89 104.89 15.68 111.45 15.8 118 16.12 124.56 16.25 131.11 16.33 137.67 16.69 144.23 16.99 150.78 17.18 157.34 18.06 163.89 19.92 170.45 21.89 177 22.64 183.56 22.99 190.11 23 196.67 22.95 203.23 22.95 209.78 22.87 216.34 22.85 229.45 23.33 236 23.41 242.56 23.29 249.12 23.31 255.67 23.6 262.23 23.56 268.78 22.67 275.34 22.91 288.45 22.87 295.01 23.12 301.56 23.13 308.12

23.29 314.67 23.61 321.23 23.85 327.78 23.79 334.34 23.75 340.9 23.94
360.56 23.69 367.12 23.66 373.67 23.54 380.23 23.44 386.79 23.4 393.34 23.23
399.9 23.11 406.45 23.1 413.01 23.01 419.56 22.96 432.68 22.93 439.23 22.84
445.79 22.82 452.34 22.78 458.9 22.7 465.45 22.59 472.01 22.43 478.56 22.29
485.12 22.39 491.68 22.81 498.23 22.85 504.79 22.79 511.34 22.79 517.9 22.72
524.45 22.68 531.01 22.57 537.57 22.4 544.12 22.33 550.68 22.46 557.23 22.56
563.79 22.51 570.34 22.3 576.9 22.17 583.46 21.77 590.01 21.67 596.57 21.65
603.08 21.91 609.59 21.67 616.1 21.67 622.61 21.85 629.13 21.71 635.64 21.8
642.15 22.03 648.66 21.89 655.17 21.91 661.68 21.87 668.2 21.78 674.71 21.81
681.22 22.01 687.73 21.79 694.24 21.78 700.76 21.75 713.78 21.6 720.29 21.42
726.8 21.13 733.31 20.71 739.83 20.56 746.34 20.23 752.85 20.48 759.36 21.21
765.87 21.12 772.38 20.68 778.9 20.44 798.78 11.26 804.26 9.9 814.14 3.79
816.39 1.54 820.83 .07 830.49 -1.96 841.67 -5.82 857.23 -6.8 876.24 -8.13
882.69 -5.49 884.65 -6.24 885.77 -5.45 905.83 -3 925.98 -3.48 946.52 -1
954.71 1.12 961.23 4.3 967.74 6.96 974.25 9.6 980.76 12.13 987.3 14.18
993.84 15.37 1000.38 15.82 1006.91 15.76 1013.45 15.21 1019.99 14.53 1026.53
14.95 1033.06 15.07 1039.6 14.52 1046.14 14.65 1052.68 15.22 1059.22 14.98
1065.75 15 1072.29 15.36 1078.83 14.88 1085.37 14.66 1091.91 14.78 1098.44
14.31 1104.98 13.72 1111.52 13.35 1118.06 13.14 1124.6 12.91 1131.13 12.5
1137.67 12.11 1144.21 11.86 1150.75 11.59 1157.29 11.24 1170.36 11 1176.9
11.05 1183.44 11.04 1189.97 10.98 1196.51 10.88 1203.05 10.95 1209.59 11.14
1216.13 11.25 1222.66 11.01 1235.74 10.69 1242.28 10.85 1248.82 10.86
1255.35 10.85 1261.89 10.88 1268.43 10.72 1274.97 10.62 1288.04 10.33
1294.58 10.28 1307.66 10.23 1320.73 10.32 1327.27 10.61 1333.81 10.94
1340.35 11.16 1346.88 11.16 1353.42 11.11 1359.96 11.28 1373.04 11.37
1379.57 11.61 1386.11 11.96 1392.65 12.33 1399.19 12.49 1412.26 13.07 1418.8
13.12 1425.34 13.34 1431.88 13.65 1438.42 13.86 1444.95 14.22 1458.03 14.36
1464.57 14.5 1477.64 14.51 1484.18 14.54 1497.26 14.76 1503.79 14.72 1516.87
14.27 1523.41 14.22 1529.95 14.58 1536.48 14.72 1543.02 14.76 1549.56 14.93
1556.1 14.89 1569.17 15.4 1575.71 15.41 1588.79 15.33 1595.33 15.31 1601.86
15.38 1608.4 15.26 1614.94 15.03 1621.48 15.25 1628.02 14.99 1634.55 15.18
1641.09 15.21 1647.63 15.22 1660.7 15.28 1667.24 15.34 1673.78 15.44 1680.32
15.49 1693.39 15.68 1699.93 15.8 1706.47 15.76 1713.01 15.93 1719.55 16.06
1726.08 16.05 1732.62 15.99 1739.16 16.06 1745.7 16.18 1752.24 16.15 1758.77
16.02 1765.31 15.97 1771.85 15.97 1778.39 16.06 1784.92 16.09 1791.46 16.25
1798 17.04 1804.54 17.39 1811.08 17.31 1817.61 17.39 1824.15 17.6 1830.69
17.58 1837.23 17.49 1850.3 16.92 1856.84 17.12 1863.38 17.37 1869.92 17.33
1876.46 17.48 1882.99 17.54 1889.53 17.55 1896.07 17.61 1902.61 17.43
1909.15 17.48 1915.68 17.49 1928.76 17.29 1935.3 17.34 1941.83 17.37 1948.37
17.33 1954.91 17.23 1961.45 17.1 1974.52 17.21 1981.06 17.36 1987.6 17.69
1994.14 17.9 2000.68 18.03 2007.21 18.34 2013.75 18.62 2020.29 18.93 2026.83
19.22 2033.37 19.36 2039.9 19.34 2046.44 19.2 2052.98 19.14 2059.52 19.14
2066.05 18.92 2072.59 18.58 2079.13 18.57 2085.67 18.62 2092.21 18.53
2098.74 18.47 2111.82 18.41 2118.36 18.42 2124.9 18.34 2131.43 18.34 2137.97
18.51 2144.51 18.36 2151.05 18.13 2157.59 17.84 2164.12 17.7 2170.66 17.8
2177.2 17.73 2183.74 17.72 2190.27 17.76 2196.81 17.83 2203.35 17.82 2216.43
17.47 2222.96 17.45 2229.5 17.49 2236.04 17.46 2242.58 17.51 2249.12 17.54
2255.65 17.49 2262.19 17.53 2268.73 17.49 2275.27 17.54 2281.81 17.42
2288.34 17.05 2294.88 16.74 2301.42 16.67 2314.49 16.71 2321.03 16.75
2327.57 16.84 2334.11 16.9 2340.65 16.81 2353.72 16.86 2360.26 16.82 2373.34
16.5 2379.87 16.46 2386.41 16.49 2392.95 16.3 2399.49 15.99 2406.03 15.74
2412.56 15.56 2419.1 15.42 2432.18 15.36 2438.71 15.39 2445.25 15.52 2451.79
15.71 2458.33 15.76 2464.87 15.93 2471.4 15.93 2484.48 15.68 2497.56 15.64
2504.09 15.52 2510.63 15.22 2517.17 15.56 2523.71 15.44 2530.25 15.44

2536.78 15.52 2543.32 15.55 2549.86 15.56 2556.4 15.59 2562.93 15.73 2576.01 15.92 2582.55 15.87 2595.62 15.94 2602.16 15.72 2608.7 15.59 2615.24 15.91 2621.78 15.98 2634.85 16.18 2641.38 16.31 2647.91 16.38 2654.43 16.37 2660.96 16.1 2674.02 16.15 2680.55 16 2687.07 15.58 2693.6 15.25 2700.13 15.08 2713.18 14.71 2719.71 14.62 2726.24 14.64 2732.77 14.6 2745.82 14.37 2752.35 14.24 2758.88 14.02 2765.4 13.9 2771.93 14.13 2778.46 14.34 2784.99 14.31 2798.04 14.08 2804.57 14.07 2817.63 14.01 2824.15 14.07 2830.68 14.23 2837.21 14.42 2843.74 14.51 2850.26 14.65 2856.79 14.68 2863.32 14.78 2876.38 14.67 2882.9 14.72 2889.43 14.84 2895.96 14.84 2902.49 14.96 2909.01 14.8 2915.54 14.78 2922.07 14.62 2928.6 14.92 2935.12 14.78 2941.65 14.95 2948.18 14.73 2954.71 14.69 2961.23 14.88 2967.76 14.89 2974.29 15.31 2980.82 15.43 2987.34 15.49 2993.87 15.52 3000.4 15.73 3006.93 15.96 3013.46 16.34 3019.98 16.67 3026.51 16.82 3033.04 17.09 3039.57 17.39 3046.09 17.5 3052.62 17.57 3059.15 17.89 3065.68 18.11 3072.2 18.42 3085.26 18.89 3091.79 17.65 3098.32 17.17 3104.84 17.62 3117.9 18.04 3124.43 18.27 3130.95 18.67 3137.48 19.15 3144.01 19.57 3150.54 19.96 3157.06 20.04 3163.59 19.95 3170.12 20.03 3176.65 20.13 3183.17 20.17 3189.7 20.33 3196.23 20.47 3202.76 20.47 3209.29 20.43 3215.81 20.46 3222.34 20.51 3228.87 20.39 3235.4 20.12 3241.92 20.08 3248.45 20.13 3261.51 20.36 3268.03 20.37 3274.56 20.36 3281.09 20.51 3287.62 20.8 3294.15 21.01 3300.67 21.16 3307.2 21.07 3313.73 21.01 3320.26 21.1 3326.78 21.47 3333.31 21.55 3339.84 21.74 3346.37 21.71 3352.89 21.83 3359.42 22.15 3365.95 22.25 3372.48 21.89 3379 21.85 3385.53 21.95 3392.06 22.07 3398.59 22.45 3405.11 22.77 3411.64 22.73 3418.17 22.61 3424.7 22.66 3431.23 22.84 3437.75 23.11 3444.28 23.27 3457.34 23.3 3470.39 23.41 3476.92 23.59 3483.45 23.64 3489.97 23.91 3496.5 24.09 3509.56 24.09 3516.09 24.07 3522.61 24.19 3529.14 24.26 3535.67 24.24 3542.2 24.27 3548.72 24.16 3561.78 24.03 3568.31 23.92 3574.83 23.95 3581.36 24 3587.89 24.03 3594.42 24.02 3600.94 24.05

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 778.9 .04 1000.38 .085

Bank Sta: Left Right Coeff Contr. Expan.
 778.9 1000.38 .5 .8
Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 1051.7 3600.94 15.1 T

Downstream Deck/Roadway Coordinates
 num= 12
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 0 23.89 266 23.89 580 21.32   778 20.92 15.19 878 20.33 14.44 950 19.45 13.69
 995 17.81 1093 13.31 1199 10.72
 1319 10.81 1519 14.47 1685 15.47

Downstream Bridge Cross Section Data
Station Elevation Data num= 99
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 20.57 13.06 20.8 19.59 21.35 130.62 21.07 156.74 19.97 202.46 18.98 235.12 17.82 320.02 17.61 333.08 18.13 457.73 16.38 470.85 16.59 483.97 18.97 549.57 20.2 562.69 21.02 575.68 20.94 588.68 20.18 601.67 20.08 627.66 19.44 686.14 18.49 692.64 18.7 705.63 18.27 712.13 20.47 725.12 19.99 731.62 20.55 757.5 19.94 778.78 11.26

784.26 9.9 794.14 3.79 796.39 1.54 800.83 .07 810.49 -1.96 821.67 -5.82
837.23 -6.8 856.24 -8.13 862.69 -5.49 864.65 -6.24 865.77 -5.45 885.83 -3
905.98 -3.48 926.52 -1 942.82 3.67 949.21 6.85 955.6 10.12 961.99 13.22
968.38 15.67 974.77 16.93 994.09 17.04 1013.71 16.45 1020.25 15.75 1033.33
15.53 1052.95 13.99 1085.65 13.2 1151.04 10.66 1229.52 10.46 1281.84 9.84
1340.7 12.04 1360.32 13.38 1419.17 15.78 1451.87 15.08 1471.49 15.38 1582.67
17.85 1595.75 17.15 1602.29 16.43 1608.83 16.23 1634.99 17.62 1667.68 18.29
1713.46 17.83 1739.62 17.05 1837.72 18.89 1857.34 18.17 1883.5 15.91 1909.65
15.18 1961.97 15.77 2020.83 14.9 2027.37 14.49 2105.85 14.28 2118.93 18.69
2151.62 19.51 2210.48 17.93 2282.42 18.75 2354.35 18.05 2360.89 17.75
2380.51 18.25 2511.31 16.77 2524.39 17.45 2746.59 17.68 2955.65 18.3 2968.72
17.62 3001.38 18.57 3086.31 18.56 3177.78 21.49 3230.04 23.04 3262.71 23.29
3275.77 23.08 3314.97 24.11 3334.57 25.94 3393.37 26.76 3543.63 26.2 3576.3
25.95

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 757.5 .035 974.77 .085

Bank Sta: Left Right Coeff Contr. Expan.
 757.5 974.77 .5 .8
Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 994 3576.3 17 T

Upstream Embankment side slope = 0 horiz. to 1.0 vertical Downstream
Embankment side slope = 0 horiz. to 1.0 vertical Maximum allowable
submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Piers = 1

Pier Data
Pier Station Upstream= 871 Downstream= 883
Upstream num= 4 Width Elev Width Elev Width Elev Width Elev
 1.6 3.2 1.6 6 1.3 10 1.3 14.5
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.6 3.2 1.6 6 1.3 10 1.3 14.5

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
 Energy
 W.S. Pro Method

 W.S.Pro Data
 Left Embankment
 El of the top of the embankment = 20.3
 El of the toe of the abutment = -1
 Right Embankment

```
 El of the top of the embankment = 17.8
 El of the toe of the abutment = -1
 Abutment Type = 2 Vert. abutments and sloping embankments  Slope of
abutments =
 Top with of embankment = 60
 Centroid station of bridge opening =
 Wing Wall Type = No wing walls present
 Width =   Angle =
 Radius =
 Guide Banks Type = No Guide Bank present
 Length =
 Offset =
 Angle =

Selected Low Flow Methods = W.S.Pro Method

High Flow Method
 Energy Only

Additional Bridge Parameters
 Add Friction component to Momentum
 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION


RIVER: Taunton River
REACH: Main Stem RS: 15896.56

INPUT
Description: 21.3 - DS Face GorOwPkwy
Station Elevation Data num= 99
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  0 20.57 13.06 20.8 19.59 21.35
130.62 21.07 156.74 19.97  202.46 18.98 235.12 17.82 320.02 17.61 333.08
18.13 457.73 16.38  470.85 16.59 483.97 18.97 549.57 20.2 562.69 21.02 575.68
20.94  588.68 20.18 601.67 20.08 627.66 19.44 686.14 18.49 692.64 18.7
705.63 18.27 712.13 20.47 725.12 19.99 731.62 20.55 757.5 19.94  778.78 11.26
784.26 9.9 794.14 3.79 796.39 1.54 800.83 .07  810.49 -1.96 821.67 -5.82
837.23 -6.8 856.24 -8.13 862.69 -5.49  864.65 -6.24 865.77 -5.45 885.83 -3
905.98 -3.48 926.52 -1  942.82 3.67 949.21 6.85 955.6 10.12 961.99 13.22
968.38 15.67  974.77 16.93 994.09 17.04 1013.71 16.45 1020.25 15.75 1033.33
15.53  1052.95 13.99 1085.65 13.2 1151.04 10.66 1229.52 10.46 1281.84 9.84
1340.7 12.04 1360.32 13.38 1419.17 15.78 1451.87 15.08 1471.49 15.38  1582.67
17.85 1595.75 17.15 1602.29 16.43 1608.83 16.23 1634.99 17.62  1667.68 18.29
1713.46 17.83 1739.62 17.05 1837.72 18.89 1857.34 18.17  1883.5 15.91 1909.65
15.18 1961.97 15.77 2020.83 14.9 2027.37 14.49  2105.85 14.28 2118.93 18.69
2151.62 19.51 2210.48 17.93 2282.42 18.75  2354.35 18.05 2360.89 17.75
2380.51 18.25 2511.31 16.77 2524.39 17.45  2746.59 17.68 2955.65 18.3 2968.72
17.62 3001.38 18.57 3086.31 18.56  3177.78 21.49 3230.04 23.04 3262.71 23.29
3275.77 23.08 3314.97 24.11  3334.57 25.94 3393.37 26.76 3543.63 26.2 3576.3
25.95
```

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 757.5 .035 974.77 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 757.5 974.77 162.26 134.72 118.38 .5 .8 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent 994 3576.3 17 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 15761.84

INPUT
Description: 21 Exit GorOwPkwy
Station Elevation Data num= 353
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 21.7 6.55 21.29 13.1 21.04 19.65 20.82 26.2 20.62 39.3 20.27 45.85 20.26 52.4 20.36 58.94 20.43 65.49 20.57 78.59 21.05 85.14 21.07 91.69 21.03 98.24 21.09 111.34 21.17 137.54 21.27 203.03 21.3 209.58 21.29 222.68 21.32 229.23 21.28 235.78 21.14 248.88 20.75 255.43 20.59 261.97 20.45 268.52 20.08 275.07 19.64 281.62 19.35 288.17 19.13 294.72 19.06 301.27 19.03 307.82 18.79 314.37 18.6 320.92 18.45 434.54 15.43 668.24 11.27 896.01 8.54 901.01 1.61 935.32 -1.49 952.06 -6.57 978.62 -5.64 994.78 -4.62 1012.02 -5.53 1025.12 -6.83 1047.31 .44 1063.44 1.98 1070.61 6.65 1105.64 6.75 1138.68 5.62 1184.64 4.61 1250.1 9.14 1257.37 10.37 1339.24 9.74 1449.3 15.16 1455.86 15.44 1462.42 16.1 1468.98 16.25 1482.1 16.32 1495.23 16.21 1501.79 16.04 1508.35 15.97 1514.91 15.84 1521.47 15.83 1528.03 16.03 1534.59 16.01 1541.15 15.84 1547.71 15.58 1554.27 15.45 1560.83 15.67 1567.4 15.99 1573.96 16.13 1580.52 16.21 1587.08 16.37 1593.64 16.7 1600.2 17.01 1606.76 17.22 1613.32 17.51 1619.88 17.74 1626.44 17.53 1633.01 17.58 1639.57 17.35 1652.69 16.92 1659.25 16.58 1665.81 16.16 1672.37 15.82 1678.93 15.73 1685.49 15.72 1698.61 15.76 1705.18 15.7 1711.74 15.88 1718.3 15.75 1724.86 15.75 1737.98 15.5 1744.54 15.5 1751.1 15.65 1757.66 15.54 1764.22 15.45 1770.79 15.88 1777.35 15.65 1783.91 15.34 1790.47 15 1797.03 14.68 1803.59 14.81 1810.15 14.75 1816.71 14.66 1823.27 14.72 1829.83 14.82 1836.39 14.84 1849.52 15.01 1862.64 15 1869.2 15.11 1875.76 15.3 1882.32 15.37 1888.88 15.5 1895.44 15.61 1902 15.5 1915.13 14.97 1921.69 14.84 1928.25 14.77 1934.81 14.58 1941.37 14.31 1947.93 14.22 1954.49 14.04 1961.05 14.1 1967.61 13.76 1974.17 13.23 1980.74 12.87 1987.3 12.89 1993.86 12.98 2000.42 13.19 2006.98 13.38 2013.54 13.59 2020.1 14 2026.66 14.01 2033.22 13.75 2039.78 13.52 2046.35 13.45 2052.91 13.23 2059.47 13.08 2066.03 13.27 2072.59 13.32 2079.15 13.11 2085.71 13.25 2092.27 13.37 2098.83 13.31 2105.39 13.01 2111.95 12.89 2118.51 12.96 2131.64 13.01 2138.2 13.15 2144.76 13.22 2151.32 13.18 2157.88 13.16 2164.44 13.12 2171 13.12 2177.56 13.01 2184.12 12.94 2190.68 12.97 2197.25 13.06 2203.81 13.07 2210.37 13.1 2216.93 13.17 2230.05 12.94 2236.61 13.01 2243.17 13.11 2249.73 13.24 2256.29 13.5 2262.85 13.66 2269.41 13.69 2282.54 13.87 2289.1 13.59 2295.66 13.48 2302.22 13.66 2308.78 13.9 2315.34 14.12 2321.9 14.36 2328.46 14.65 2335.02 14.97 2341.58 14.97 2348.14 15.38 2354.71 15.36 2361.27 15.67 2367.83 15.85 2374.39 15.99 2380.95 16.16 2387.51 16.1 2394.07 16.21 2400.63 16.4 2407.19 16.57 2413.75 16.92 2420.31 17.24 2426.88 17.48 2433.44 17.64 2440 17.4 2446.56 17.07 2453.12 16.84 2459.68 16.72 2466.24 16.69 2472.8 16.76 2479.36 16.77 2485.92 16.81 2492.48 16.79 2499.04 16.93

2505.61 16.94 2512.17 16.92 2518.73 16.76 2531.85 16.68 2538.41 16.71
2544.97 16.77 2551.53 16.66 2558.09 16.39 2564.65 16.23 2577.77 16.29
2584.34 16.17 2597.46 16.12 2617.14 16.11 2630.26 16.06 2649.94 16.06
2656.51 16.08 2663.07 15.98 2669.63 15.96 2682.75 15.85 2702.43 16 2708.99
15.97 2715.55 15.82 2722.08 15.69 2728.6 15.69 2735.13 15.64 2741.65 15.61
2748.18 15.65 2754.7 15.85 2761.23 16 2767.75 16.06 2774.28 16.18 2780.8
16.44 2787.33 16.73 2793.85 16.85 2800.38 16.74 2806.9 16.71 2813.43 16.98
2819.95 17.03 2826.48 17.12 2833 17.26 2839.53 17.42 2846.05 17.13 2852.58
17.1 2859.1 17.17 2865.63 17.07 2872.15 17.05 2878.68 16.94 2885.2 16.91
2891.73 16.73 2898.25 16.8 2904.78 16.7 2911.3 16.84 2917.83 16.85 2924.35
16.93 2930.88 16.98 2937.4 17.12 2943.93 17.14 2950.45 17.2 2956.98 17.36
2963.5 17.03 2970.03 17.42 2976.55 17.09 2983.08 16.56 2996.13 15.25 3002.65
15.08 3009.18 15.08 3015.7 14.93 3028.75 14.67 3041.8 14.49 3048.33 14.48
3054.85 14.55 3061.38 14.47 3067.91 14.44 3074.43 14.58 3080.95 14.68
3087.48 14.58 3094 14.58 3100.53 14.71 3107.06 14.89 3113.58 15.15 3120.11
15.71 3126.63 17.13 3133.16 18.34 3139.68 19.11 3146.21 20.28 3152.73 21.64
3159.26 22.84 3165.78 23.44 3172.31 23.63 3178.83 23.77 3185.36 23.84
3191.88 23.86 3204.93 23.73 3211.46 23.69 3217.98 23.71 3224.51 23.83
3231.03 23.92 3237.56 23.92 3244.08 24.08 3250.61 24.34 3257.13 24.2 3263.66
23.95 3270.18 23.93 3276.71 24.05 3283.23 24.26 3289.76 24.45 3296.28 24.53
3302.81 24.51 3309.33 24.62 3315.86 24.85 3328.91 24.97 3335.43 25 3341.96
25.11 3348.48 24.93 3355.01 25.18 3361.53 25.24 3368.06 24.95 3374.58 25.22
3381.11 25.17 3387.63 25.14 3394.16 25.24 3400.68 25.25 3407.21 25.45
3413.73 25.61 3420.26 26.09 3426.78 26.29 3433.31 26.45 3439.83 26.57
3446.36 26.72 3452.88 26.84 3459.41 27.17 3465.93 27.36 3472.46 27.46
3485.51 27.75 3492.03 27.88 3498.56 27.98 3511.61 28.26 3518.13 28.31
3524.66 28.31 3531.18 28.44 3537.71 28.53 3544.23 28.45 3550.76 28.48
3557.28 28.44 3563.81 28.48 3576.86 28.63 3583.38 28.64 3589.91 28.55
3596.43 28.63 3602.96 28.67 3609.48 28.64

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 896.01 .035 1070.61 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 896.01
1070.61 770.87 758.69 764.06 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 1650 3609.48 17.2 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 15003.16

INPUT
Description: 20
Station Elevation Data num= 476
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 23.41 6.54 23.49 19.61 22.9
58.84 22.9 65.37 22.82 84.99 23.17 91.52 23.47 98.06 23.51 104.6 23.73
117.67 24.73 150.36 25.29 156.9 25.61 196.12 25.55 215.73 24.96 235.34 24.86
241.88 24.72 261.49 23.26 274.57 22.07 287.64 20.44 294.18 20.34 307.26
19.21 313.79 18.78 320.33 18.09 333.41 17.24 346.48 16.78 353.02 16.81
372.63 15.99 379.17 15.81 411.85 14.19 418.39 14.02 431.47 14.85 444.54

14.18 457.62 13.79 483.76 11.76 490.3 11.37 496.84 11.14 503.38 10.72 509.91
10.15 529.53 8.76 549.14 8.4 555.68 8.19 568.75 8.13 575.29 7.96 581.82 7.57
588.36 7.49 594.9 8.04 601.44 8.07 607.97 7.91 634.12 7.83 647.2 7.94
660.27 7.77 679.89 7.98 686.42 7.89 692.96 8.22 699.5 8.28 712.57 8.06
725.65 8.13 738.72 7.91 751.8 7.35 758.33 7.3 771.41 7.73 791.02 8.18 830.24
8.93 843.32 9.45 882.54 10.77 895.62 10.72 902.16 10.82 921.77 10.49 928.3
10.17 934.84 10.07 947.92 9.49 954.45 9.38 960.99 9.62 980.6 10.68 993.68
11.06 1000.22 11.41 1006.75 11.53 1013.29 11.29 1019.83 10.87 1032.9 10.48
1052.51 8.96 1059.05 8.03 1065.59 6.61 1072.13 4.49 1072.97 4.17 1078.58
2.03 1090 -.84 1095.6 -1.12 1096.58 -1.29 1097.84 -1.6 1099.12 -2 1100.8 -
2.55 1102.25 -3.36 1104.34 -4.26 1107.39 -5.33 1112.74 -6.71 1115.3 -7.26
1117.28 -7.56 1119.52 -7.94 1124.46 -8 1126.95 -7.93 1129.61 -7.68 1134.73 -
7.45 1137.33 -7.21 1139.88 -7.04 1142.39 -6.9 1144.89 -6.73 1147.38 -6.6
1149.94 -6.57 1152.32 -6.57 1154.6 -6.46 1156.68 -6.46 1158.89 -6.51 1161.01
-6.47 1163.2 -6.42 1165.31 -6.36 1167.39 -6.31 1169.21 -6.15 1171.06 -6.06
1172.65 -6.09 1174.2 -5.98 1175.63 -5.93 1177.43 -5.84 1179.18 -5.73 1181.2
-5.53 1183.23 -5.22 1185.47 -4.84 1187.51 -4.24 1189.45 -3.68 1191.07 -3.08
1192.79 -2.35 1194.34 -1.81 1195.32 -1.07 1201.7 1.96 1208.26 4.89 1214.82
5.38 1221.38 5.16 1227.95 5.14 1234.51 5.38 1241.07 5.31 1247.63 5.44
1254.19 5.3 1260.75 5.1 1267.32 4.78 1273.88 4.99 1280.44 4.82 1287 4.53
1293.56 4.5 1300.12 4.4 1306.69 4.45 1313.25 4.43 1319.81 4.31 1326.37 4.69
1332.93 4.38 1339.49 4.27 1346.06 4.44 1352.62 4.98 1359.18 5.23 1365.74
5.24 1372.3 6.35 1378.86 8.69 1385.43 10.59 1391.99 11.92 1398.55 12.39
1405.11 11.35 1411.67 11.1 1418.23 10.98 1424.79 10.9 1437.92 10.68 1444.48
10.99 1451.04 11.25 1457.6 11.44 1464.16 11.42 1470.73 11.24 1477.29 11.18
1490.41 11.3 1496.97 11.4 1510.1 11.99 1516.66 12.23 1523.22 12.45 1536.34
13.04 1542.9 13.41 1549.47 13.76 1556.03 14.06 1562.59 14.41 1569.15 14.67
1575.71 14.84 1582.27 15.22 1588.84 15.79 1595.4 16 1608.52 16.51 1615.08
16.65 1621.64 16.83 1634.77 16.98 1641.33 17.17 1647.89 17.3 1654.45 17.03
1661.01 17.01 1667.57 16.89 1674.14 16.79 1687.26 16.77 1713.51 16.74
1726.63 16.77 1733.19 16.55 1739.75 16.01 1746.31 15.31 1759.44 14.14 1766
14.11 1772.56 13.92 1779.12 13.66 1785.68 13.44 1792.25 13.53 1798.81 13.45
1805.37 13.52 1811.93 13.5 1818.49 13.61 1825.05 13.84 1831.62 13.96 1838.18
14.02 1844.74 13.84 1851.3 13.82 1857.86 13.82 1864.42 13.53 1870.99 13.54
1877.55 13.3 1890.67 12.95 1897.23 13.02 1903.79 13 1910.35 13.02 1916.92
13.01 1923.48 12.93 1930.04 12.81 1936.6 12.75 1943.16 12.82 1949.72 12.85
1956.29 12.76 1962.85 12.59 1969.41 12.49 1975.97 12.58 1982.53 12.38
1989.09 12.11 2002.22 11.92 2008.78 11.92 2021.9 11.88 2028.46 11.95 2035.03
11.89 2041.59 11.87 2067.83 11.7 2074.4 11.69 2087.52 11.73 2094.08 11.78
2100.64 11.79 2107.2 11.82 2113.77 11.93 2120.33 12.07 2126.89 12.29 2133.45
12.48 2140.01 13.15 2146.57 13.77 2153.14 13.86 2159.7 13.91 2166.26 14.11
2172.82 14.28 2179.38 14.36 2185.94 14.46 2199.07 14.59 2205.63 14.58
2212.19 14.55 2218.75 14.61 2225.31 14.37 2231.87 14.27 2238.44 13.97 2245
13.59 2251.56 13.55 2258.12 13.19 2264.68 13.13 2277.81 13.47 2284.37 13.48
2290.93 13.83 2297.49 13.78 2304.05 14.09 2310.61 14.23 2317.18 14.43
2323.74 14.5 2336.86 14.15 2343.42 14.1 2349.98 14.11 2356.55 14.44 2363.11
14.54 2369.67 14.77 2376.23 14.94 2382.79 14.92 2395.92 15.04 2402.48 14.8
2409.04 14.75 2415.6 14.76 2422.16 14.75 2428.72 14.51 2435.29 14.42 2441.85
14.55 2448.41 14.53 2454.97 14.57 2461.53 14.48 2468.09 14.2 2474.66 14.31
2481.22 14.27 2487.78 14.31 2494.34 14.44 2500.9 14.55 2507.46 14.99 2514.02
16.2 2520.59 16.3 2527.15 15.92 2533.71 15.91 2540.27 16.4 2546.83 16.7
2553.39 16.12 2559.96 15.78 2566.52 15.81 2579.64 16.02 2586.2 16 2599.33
15.88 2605.89 15.93 2612.45 16.18 2619.01 16.3 2625.57 16.26 2632.13 16.14
2638.7 16.24 2645.26 16.4 2651.82 16.38 2658.38 16.42 2664.94 16.56 2671.5

16.58 2678.07 16.71 2684.63 16.66 2691.19 16.58 2704.31 16.5 2710.87 16.6
2717.44 16.43 2724 16.43 2730.56 16.46 2737.12 16.45 2743.68 16.46 2750.24
16.56 2756.8 16.56 2763.37 16.35 2769.93 16.37 2783.05 16.32 2789.61 16.25
2796.17 16.25 2802.74 16.37 2809.3 16.29 2815.86 16.23 2822.42 16.34 2828.98
16.3 2835.54 16.23 2842.11 16.23 2848.67 16.19 2861.79 16 2874.91 15.92
2881.48 15.85 2888.04 15.7 2894.6 15.64 2901.16 15.73 2914.28 15.79 2920.85
15.71 2927.41 15.8 2933.97 15.82 2940.53 15.72 2947.09 15.69 2953.65 15.72
2960.22 16.01 2966.78 16.24 2973.34 16.23 2979.9 16.08 2986.46 16.57 2993.02
17.39 2999.59 19.14 3006.15 22.24 3012.71 22.37 3019.27 19.67 3025.83 16.93
3032.39 15.5 3038.95 15.2 3045.52 15.31 3052.08 14.78 3058.64 14.08 3065.2
14.07 3071.76 14.2 3078.32 14.19 3084.89 14.14 3091.45 14.29 3098.01 14.24
3117.69 14.41 3124.26 14.5 3137.38 14.3 3143.94 14.28 3150.5 14.19 3157.06
14.29 3163.63 14.36 3170.19 14.4 3183.31 14.44 3196.43 14.47 3203 14.5
3209.56 14.68 3216.12 14.68 3222.68 14.58 3229.24 14.67 3235.8 14.58 3242.31
14.58 3248.82 14.64 3255.33 14.62 3261.84 14.58 3268.35 14.58 3274.86 14.67
3281.37 14.88 3287.88 15.35 3294.39 16.34 3307.41 21.71 3313.92 23.47
3320.43 24.21 3326.94 24.27 3333.45 23.91 3339.96 23.58 3346.47 23.38
3352.98 23.26 3359.49 23.08 3366 22.84 3372.51 22.97 3379.02 23.08 3385.53
23.01 3392.04 23.01 3398.55 23.15 3405.06 23.41 3411.57 23.71 3418.08 23.99
3424.59 24.24 3431.1 24.41 3437.61 24.48 3444.12 24.62 3457.14 24.87 3463.65
24.91 3470.16 24.73 3476.67 24.67 3483.18 25.05 3489.69 25.26 3496.2 25.07
3502.71 25.01 3509.22 24.98 3515.73 25.02 3522.24 24.99 3528.75 24.83
3535.26 24.88 3541.77 25.07 3548.28 25.21 3554.79 25.33 3561.3 25.32 3567.81
25.41 3574.32 25.89 3580.83 26.08 3587.34 26.17 3593.85 26.08 3600.36 26.11
3613.38 26.29 3619.89 26.42 3626.4 26.33 3632.91 26.26 3639.42 26.24 3645.93
26.19 3652.44 26.18 3658.95 26.25 3698.01 27.08 3711.03 27.34 3717.54 27.45
3724.05 27.52 3730.56 27.55

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 1006.75 .035 1398.55 .085
 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1006.75 1398.55 749.32 742.03 737.61 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 3012 3730.56 22 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 14261.13

INPUT
Description: 19 Approach RR Br
Station Elevation Data num= 121
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 23.58 32.8 23.06 78.72 24.08
124.64 26.95 150.88 26.91 190.24 27.31 255.84 24.57 275.53 23.4 282.09 22.71
295.21 19.36 308.33 18.48 406.73 13.18 432.97 12.63 472.33 9.51 505.13 7.75
524.81 7.59 557.61 8.43 583.85 7.65 675.69 7.74 741.29 9.01 787.22 11.02
806.9 10.86 859.38 8.88 970.9 8.91 997.14 10.24 1010.26 10 1016.82 10.21
1023.38 9.95 1036.5 6.77 1043.06 5.54 1056.18 4.2 1069.3 3.86 1134.9 4.57
1161.14 4.78 1213.62 5.62 1272.67 3.65 1305.47 3.34 1449.73 4.74 1482.24
6.71 1527.76 6.47 1537.58 6.98 1606.13 5.76 1652.08 5.3 1654.17 2.05 1667.89
-.84 1699.29 -7.38 1713.7 -10.22 1736.02 -11.33 1750.35 -11.98 1762.16 .14

1768.2 3.68 1794.82 14.93 1845.18 14.52 1858.28 14.93 1877.92 14.25 1891.02 14.55 1982.72 12.14 2008.92 12.47 2041.67 13.26 2048.22 12.78 2061.32 13.04 2080.97 12.51 2120.26 12.86 2126.81 12.54 2316.75 14.51 2369.15 13.51 2395.35 14.72 2401.9 14.2 2415 12.47 2434.64 12.35 2487.04 13.27 2526.34 15 2644.23 15.74 2683.53 14.76 2781.77 15.35 2834.17 16.57 2906.22 17.54 2932.42 16.9 2965.16 17.02 3011.01 15.96 3017.56 16.32 3024.11 16.11 3037.21 16.47 3050.31 15.85 3069.96 16.01 3207.5 14.89 3227.15 15.36 3233.7 15.24 3240.25 15.57 3266.45 15.07 3273 16.08 3279.55 14.98 3325.39 14.49 3358.14 15.24 3377.79 14.84 3403.99 16.47 3410.54 16.27 3449.84 17.84 3456.39 17.57 3462.94 18.04 3469.48 17.35 3476.03 17.56 3482.58 16.88 3508.78 16.62 3515.33 15.75 3521.88 15.9 3528.43 16.58 3534.98 16.83 3548.08 16.55 3561.18 16.76 3574.28 17.55 3593.93 17.28 3613.58 18.36 3620.13 19.45 3626.68 19.93 3659.42 19.87 3672.52 20.6 3724.92 21.2 3836.26 23.02 3862.46 23.83 3908.31 23.98

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 1652.08 .035 1794.82 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1652.08 1794.82 78.25 69.35 66.1 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 14191.78

INPUT
Description: 18.7 - US Face RR Br
Station Elevation Data num= 110 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 31.38 78.42 28.3 111.09 28.3 137.23 27.94 156.84 28.1 241.79 23.74 261.39 21.19 326.74 18.25 365.95 16.29 372.49 16.2 392.09 15.04 411.7 12.76 483.58 8.24 503.18 8.21 529.32 6.42 542.39 7.13 620.81 6.63 712.3 8.63 744.97 10.16 784.18 10.79 823.39 8.96 927.95 9.1 947.55 9.39 954.09 9.1 973.69 8.93 993.3 10.26 1006.37 10.2 1032.51 8.48 1058.65 4.84 1078.25 3.57 1189.34 4.45 1208.95 5.78 1228.55 5.55 1241.62 4.38 1261.23 3.82 1293.9 3.89 1333.11 3.68 1418.06 3.36 1450.74 4.47 1463.81 5.47 1483.41 5.2 1489.95 4.65 1496.48 5.34 1503.02 7.47 1509.55 10.58 1529.23 11.42 1535.79 10.64 1542.35 9.29 1575.15 7.11 1607.95 11.4 1621.07 10.42 1627.63 11.13 1634.19 11.13 1647.31 9.71 1653.87 10.74 1660.43 10.52 1666.99 10.91 1680.11 10.77 1693.23 11.81 1719.47 11.65 1740 13.96 1753.45 13.89 1753.69 13.75 1754.08 2.65 1759.81 .53 1763.3 -1.58 1769.05 -3.33 1772.95 -5.41 1779.66 -6.96 1783.33 -7.36 1790.85 -6.94 1794.65 -5.3 1799.89 -5.32 1803.29 -5.31 1809.58 -4.97 1813.69 -2.69 1821.52 -7.23 1825.23 -9.32 1829.72 -10.03 1841.06 -11.09 1846.96 -9.3 1850.3 -7.08 1857.36 -4.21 1861.19 -2.77 1870.09 .46 1870.37 13.32 1870.58 13.39 1890.45 12.9 1896.64 14.94 1994.78 15.57 2053.67 15.02 2197.61 14.35 2230.33 14.39 2269.59 13.93 2295.76 14.82 2335.02 14.77 2374.27 15.62 2400.45 15.36 2406.99 14.81 2433.16 14.51 2583.65 14.94 2590.19 14.73 2629.45 15.31 2806.11 16.08 2812.65 15.82 3022.02 17.35 3192.14 18.46 3859.52 22.79 3872.61 22.4 4049.26 24.1

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val 0 .085 1753.45 .035 1896.64 .082

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1753.45 1896.64 44.24 43.72 44.72 .6 .8 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 1500 1753 13.89 T

BRIDGE

RIVER: Taunton River
REACH: Main Stem RS: 14174.03

INPUT
Description: 18.5 RR
Distance from Upstream XS = 5
Deck/Roadway Width = 20
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
 num= 18
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 1289 13.55 1507 14.6 1744 15.04
 1753 16.76 12.55 1759 16.76 12.55 1762 16.76 12.53
 1812 16.76 12.62 1821 16.76 12.7 1821.5 16.76 10.88
 1825 16.76 10.88 1850 16.86 10.87 1850.1 16.86 12.65 1856 16.86 12.67 1867 16.86 12.69 1870 14.93
 1954 14.56 2085 15.16 2271 15.21

Upstream Bridge Cross Section Data
Station Elevation Data num= 110
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 31.38 78.42 28.3 111.09 28.3 137.23 27.94 156.84 28.1 241.79 23.74 261.39 21.19 326.74 18.25 365.95 16.29 372.49 16.2 392.09 15.04 411.7 12.76 483.58 8.24 503.18 8.21 529.32 6.42 542.39 7.13 620.81 6.63 712.3 8.63 744.97 10.16 784.18 10.79 823.39 8.96 927.95 9.1 947.55 9.39 954.09 9.1 973.69 8.93 993.3 10.26 1006.37 10.2 1032.51 8.48 1058.65 4.84 1078.25 3.57 1189.34 4.45 1208.95 5.78 1228.55 5.55 1241.62 4.38 1261.23 3.82 1293.9 3.89 1333.11 3.68 1418.06 3.36 1450.74 4.47 1463.81 5.47 1483.41 5.2 1489.95 4.65 1496.48 5.34 1503.02 7.47 1509.55 10.58 1529.23 11.42 1535.79 10.64 1542.35 9.29 1575.15 7.11 1607.95 11.4 1621.07 10.42 1627.63 11.13 1634.19 11.13 1647.31 9.71 1653.87 10.74 1660.43 10.52 1666.99 10.91 1680.11 10.77 1693.23 11.81 1719.47 11.65 1740 13.96 1753.45 13.89 1753.69 13.75 1754.08 2.65 1759.81 .53 1763.3 -1.58 1769.05 -3.33 1772.95 -5.41 1779.66 -6.96 1783.33 -7.36 1790.85 -6.94 1794.65 -5.3 1799.89 -5.32 1803.29 -5.31 1809.58 -4.97 1813.69 -2.69 1821.52 -7.23 1825.23 -9.32 1829.72 -10.03 1841.06 -11.09 1846.96 -9.3 1850.3 -7.08 1857.36 -4.21 1861.19 -2.77 1870.09 .46 1870.37 13.32 1870.58 13.39 1890.45 12.9 1896.64 14.94 1994.78 15.57 2053.67 15.02 2197.61 14.35 2230.33 14.39 2269.59 13.93 2295.76 14.82 2335.02 14.77 2374.27 15.62 2400.45 15.36 2406.99 14.81 2433.16 14.51 2583.65 14.94 2590.19 14.73 2629.45 15.31 2806.11 16.08 2812.65 15.82 3022.02 17.35 3192.14 18.46 3859.52 22.79 3872.61 22.4 4049.26 24.1

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 1753.45 .035 1896.64 .082

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Bank Sta: Left Right Coeff Contr. Expan.
 1753.45 1896.64 .6 .8
Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 1500 1753 13.89 T

Downstream Deck/Roadway Coordinates
 num= 18
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 1374 13.55 1592 14.6 1829 15.04
 1838 16.76 12.55 1844 16.76 12.55 1847 16.76 12.53
 1897 16.76 12.62 1906 16.76 12.7 1906.1 16.76 10.88
 1910 16.76 10.88 1935 16.86 10.87 1935.1 16.86 12.65
 1941 16.86 12.67 1952 16.86 12.69 1955 14.93   2039 14.56 2170 15.16 2356
15.21

Downstream Bridge Cross Section Data
Station Elevation Data num= 493
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  0 32.67 19.62 32.01 26.16
31.57 39.25 31.04 52.33 30.21  65.41 28.88 71.95 28.4 85.03 27.93 104.66
26.38 124.28 26.33  130.82 26.16 137.36 25.76 150.44 25.84 163.52 26.11
176.61 25.96  189.69 25.37 196.23 24.96 222.39 22.77 228.93 22.33 235.48
21.63  242.02 20.69 248.56 19.93 268.18 19.8 300.89 18.46 327.05 17.87
359.75 16.57 372.84 16.4 392.46 14.85 418.62 12.36 438.25 11.11  444.79 10.97
451.33 10.62 464.41 9.55 484.03 8.37 490.57 8.18  497.12 7.85 503.66 7.69
510.2 7.73 529.82 7.43 542.9 6.03  549.44 6.25 555.98 6.7 562.53 6.94 569.07
6.56 575.61 6.49  595.23 6.77 608.31 6.5 614.85 6.77 634.48 7.23 647.56 7.71
660.64 7.78 673.72 8.06 693.35 8.63 699.89 8.99 712.97 9.33  739.13 10.51
758.76 10.7 765.3 10.57 798 10.45 817.63 8.98  837.25 8.56 843.79 8.51 850.33
8.6 869.95 8.36 896.12 8.71  915.74 8.72 922.28 8.94 928.82 8.92 948.45 9.43
961.53 9.52  974.61 9.37 981.15 9 987.69 9.16 994.23 9.74 1000.77 10.04
1007.31 9.94 1013.86 10.3 1026.94 10.68 1033.48 10.51 1040.02 10.15  1046.56
9.61 1059.64 7.01 1072.72 4.54 1079.27 4.06 1085.81 3.78  1098.89 3.55
1125.05 3.92 1131.59 3.8 1144.67 3.88 1151.22 4.06  1157.76 3.9 1170.84 4.04
1183.92 3.76 1190.46 3.9 1197 4.37  1203.54 5.1 1216.63 6.19 1223.17 6.43
1229.71 6.4 1236.25 5.7  1242.79 4.8 1249.33 4.54 1255.87 4.54 1288.58 3.4
1301.66 3.67  1314.74 3.55 1321.28 3.34 1334.36 3.32 1340.9 3.17 1353.99 3.69
1360.53 3.41 1373.61 3.72 1393.23 3.65 1399.77 3.42 1406.31 3.34  1412.85
3.44 1425.94 4.04 1445.56 4.2 1452.1 4.88 1458.64 7.69  1465.18 10.82 1471.72
12.95 1484.81 13.44 1491.35 13.47 1497.89 13.29  1504.43 12.05 1510.97 9.44
1517.51 5.42 1524.05 4.35 1537.11 4.73  1550.14 4.64 1556.66 4.39 1563.17
5.46 1569.69 4.87 1576.21 4.69  1582.72 5.08 1589.24 4.91 1595.76 4.58
1608.79 4.94 1615.31 4.58  1628.34 4.87 1634.86 5.51 1654.41 6.38 1660.92
5.67 1667.44 5.49  1680.47 6.17 1686.99 6.67 1700.02 7.24 1706.54 7.05
1713.06 6.7  1719.57 6.79 1726.09 7.27 1732.61 7.37 1745.64 6.4 1752.16 6.19
1758.67 6.73 1765.19 6.96 1771.7 6.48 1778.22 6.74 1784.74 7.39  1797.77 7.14
1804.29 6.79 1810.8 6.6 1817.32 6.94 1823.85 6.82  1830.37 5.99 1830.9 5.87
1836.9 4.46 1839.08 2.65 1844.81 .53  1848.3 -1.58 1854.05 -3.33 1857.95 -
5.41 1864.66 -6.96 1868.33 -7.36  1875.85 -6.94 1879.65 -5.3 1884.89 -5.32
1888.29 -5.31 1894.58 -4.97  1898.69 -2.69 1906.52 -7.23 1910.23 -9.32
1914.72 -10.03 1926.06 -11.09  1931.96 -9.3 1935.3 -7.08 1942.36 -4.21
1946.19 -2.77 1955.09 .46  1955.37 13.32 1955.58 13.39 1980.45 13.83 1987.01
14.72 1993.57 14.86  2006.69 15.19 2013.25 15.22 2019.81 15.19 2026.37 14.9
2032.93 14.84  2039.49 15.03 2046.05 15.35 2052.61 15.58 2059.17 15.4 2065.73
```

14.8 2072.29 14.41 2078.85 14.62 2085.41 15.15 2091.97 15.44 2098.53 15.26
2105.1 15.15 2118.22 15.22 2124.78 15.2 2131.34 15.21 2137.9 15.38 2144.46
15.64 2151.02 15.74 2157.58 15.81 2164.14 15.86 2170.7 15.89 2177.26 15.89
2183.82 15.78 2196.94 15.48 2203.5 15.37 2210.06 15.29 2216.62 15.25 2223.18
15.24 2236.3 15.33 2242.86 15.41 2249.42 15.52 2255.98 15.65 2262.54 15.75
2269.1 15.78 2275.66 15.75 2288.78 15.64 2295.34 15.56 2301.9 15.6 2308.46
15.56 2315.02 15.42 2328.14 15.33 2334.7 15.26 2347.82 15.16 2354.38 15.14
2360.94 15.17 2367.5 15.07 2374.06 15.06 2380.62 15.07 2387.18 14.98 2393.74
14.96 2400.3 14.84 2406.86 14.8 2413.42 14.81 2419.98 14.89 2426.54 14.77
2433.1 14.86 2439.66 14.86 2446.22 14.76 2452.78 14.76 2459.34 14.85 2465.9
14.97 2472.46 15.02 2479.02 15.02 2485.58 15.16 2492.15 15.24 2498.71 15.12
2505.27 15.34 2511.83 15.4 2518.39 15.32 2524.95 15.11 2531.51 14.95 2538.07
14.9 2557.75 14.61 2570.87 14.82 2577.43 14.71 2590.55 14.82 2597.11 14.86
2610.23 15.04 2616.79 15.24 2623.35 15.36 2629.91 15.41 2636.47 15.48
2643.03 15.25 2649.59 15.6 2656.15 15.74 2662.71 15.83 2669.27 15.9 2675.83
15.95 2688.95 15.96 2695.51 15.99 2702.07 16.05 2708.63 16.15 2715.19 16.31
2721.75 16.57 2728.31 16.85 2734.87 16.8 2741.43 16.86 2747.99 17 2754.55
17.06 2761.11 17.06 2767.67 16.89 2774.23 16.69 2780.79 16.45 2787.35 16.27
2793.91 16.35 2800.47 16.35 2807.03 16.31 2813.59 16.37 2826.71 16.4 2833.27
16.5 2852.95 16.64 2859.51 16.76 2866.07 16.76 2872.63 16.8 2879.19 16.69
2885.75 16.68 2898.88 16.77 2905.44 16.76 2918.56 16.69 2925.12 16.64
2931.68 16.7 2938.24 16.62 2951.36 16.71 2957.92 16.62 2964.48 16.68 2971.04
16.7 2977.6 16.66 2984.16 16.57 2990.72 16.64 3003.84 16.7 3010.4 16.63
3016.96 16.67 3023.52 16.74 3030.08 16.72 3043.2 16.71 3056.32 16.65 3062.88
16.69 3069.44 16.75 3076 16.69 3082.56 16.73 3089.12 16.71 3102.24 16.59
3108.8 16.65 3115.36 16.54 3121.92 16.59 3128.48 16.73 3135.04 17.15 3141.6
17.37 3148.16 19.29 3154.72 19.88 3161.28 17.85 3167.84 17.75 3180.96 18.16
3187.52 18.12 3194.08 17.95 3200.64 17.66 3207.2 17.7 3213.76 17.89 3220.32
18.03 3226.88 18.33 3233.44 18.76 3240 19.03 3246.56 19.41 3253.12 19.65
3259.68 19.6 3266.24 19.65 3272.8 19.92 3279.36 20.07 3285.92 20.08 3292.48
20.04 3299.04 19.74 3305.61 19.02 3312.17 17.24 3318.73 15.12 3325.29 14.36
3331.85 14.3 3338.41 14.34 3344.97 14.7 3351.53 15.23 3358.09 15.42 3364.65
15.33 3371.21 15.37 3377.77 15.72 3384.33 16.84 3390.89 16.49 3397.45 14.71
3404.01 14.49 3410.57 14.23 3417.13 14.8 3423.69 14.8 3430.25 14.97 3436.81
15.08 3443.37 15.06 3449.93 14.65 3456.49 13.71 3463.05 13.1 3469.61 13.09
3476.17 13.16 3482.73 13.27 3489.29 13.13 3495.85 13.1 3502.41 13.13 3508.97
13.18 3515.53 13.31 3522.09 13.37 3528.65 13.45 3535.21 13.48 3541.77 13.44
3548.33 13.22 3554.89 13.12 3561.45 13.07 3568.01 13.05 3574.57 13.23
3581.13 13.27 3587.69 13.27 3594.25 13.23 3600.81 13.35 3607.37 13.4 3620.49
13.9 3633.61 13.59 3640.17 13.56 3646.73 13.59 3653.29 13.38 3659.85 13.27
3666.41 13.41 3679.53 13.76 3686.09 13.57 3692.65 13.62 3699.22 13.62
3705.78 13.77 3712.34 13.68 3718.9 13.88 3725.46 13.95 3732.02 13.64 3738.58
13.59 3745.14 13.68 3751.7 13.8 3758.26 13.83 3764.82 13.76 3771.38 13.86
3784.5 13.92 3791.06 14.01 3797.62 14.07 3804.18 14.22 3810.74 14.42 3817.3
14.42 3823.86 14.36 3836.98 14.3 3843.54 14.38 3850.1 14.38 3863.22 14.59
3869.78 14.75 3876.34 14.76 3882.9 14.84 3889.46 14.72 3896.02 15.05 3902.58
15.07 3909.14 15.26 3915.7 15.32 3922.26 15.36 3928.82 15.36 3935.38 15.63
3941.94 15.71 3948.5 15.62 3955.06 15.86 3961.62 15.97 3968.18 15.81 3974.74
16.01 3981.3 16.06 3987.86 16 3994.42 16.05 4000.98 16.17 4007.54 16.32
4027.22 16.59 4033.78 16.63 4040.34 16.74 4046.9 16.95 4060.02 17.1 4066.58
17.23 4073.14 17.41 4079.7 17.27 4086.26 17.79 4092.82 18.07 4099.39 18.09
4105.95 18.28 4112.51 18.15 4119.07 18.1 4125.63 18.14 4132.19 18.44 4138.75
18.63 4145.31 18.87 4158.43 19.24 4164.99 19.29 4171.55 19.1

```
Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 1817.32 .035 1955.37 .082

Bank Sta: Left Right Coeff Contr. Expan.
 1817.32 1955.37 .5 .5

Upstream Embankment side slope = 0 horiz. to 1.0 vertical Downstream
Embankment side slope = 0 horiz. to 1.0 vertical Maximum allowable
submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Piers = 21

Pier Data
Pier Station Upstream= 1759 Downstream= 1844
Upstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14
Downstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14

Pier Data
Pier Station Upstream= 1762 Downstream= 1847
Upstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14
Downstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14

Pier Data
Pier Station Upstream= 1768 Downstream= 1853
Upstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14
Downstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14

Pier Data
Pier Station Upstream= 1772 Downstream= 1857 Upstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14
Downstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14

Pier Data
Pier Station Upstream= 1778 Downstream= 1863
```

```
Upstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14
Downstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14

Pier Data
Pier Station Upstream= 1782 Downstream= 1867
Upstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14
Downstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14

Pier Data
Pier Station Upstream= 1790 Downstream= 1875
Upstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14
Downstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14

Pier Data Pier Station Upstream= 1793 Downstream= 1878
Upstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14
Downstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14

Pier Data
Pier Station Upstream= 1799 Downstream= 1884
Upstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14
Downstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14

Pier Data
Pier Station Upstream= 1802 Downstream= 1887
Upstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14
Downstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14

Pier Data
Pier Station Upstream= 1808 Downstream= 1893
Upstream num= 2
```

```
 Width Elev Width Elev
 .8 -12 .8 14
Downstream num= 2
 Width Elev Width Elev  .8 -12 .8 14

Pier Data
Pier Station Upstream= 1813 Downstream= 1898
Upstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14
Downstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14

Pier Data
Pier Station Upstream= 1820 Downstream= 1905
Upstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14
Downstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14

Pier Data
Pier Station Upstream= 1820 Downstream= 1905
Upstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14
Downstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14

Pier Data
Pier Station Upstream= 1824 Downstream= 1909
Upstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14
Downstream num= 2  Width Elev Width Elev
 .8 -12 .8 14

Pier Data
Pier Station Upstream= 1829 Downstream= 1914
Upstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14
Downstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14

Pier Data
Pier Station Upstream= 1840 Downstream= 1925
Upstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14
```

```
Downstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14

Pier Data
Pier Station Upstream= 1846 Downstream= 1931
Upstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14
Downstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14

Pier Data
Pier Station Upstream= 1849 Downstream= 1934
Upstream num= 2
 Width Elev Width Elev  .8 -12 .8 14
Downstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14

Pier Data
Pier Station Upstream= 1856 Downstream= 1941
Upstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14
Downstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14

Pier Data
Pier Station Upstream= 1860 Downstream= 1945
Upstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14
Downstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
 Energy
 W.S. Pro Method

 W.S.Pro Data
 Left Embankment
 El of the top of the embankment = 15
 El of the toe of the abutment = 2.6
 Right Embankment
 El of the top of the embankment = 15
 El of the toe of the abutment = 2.6
 Abutment Type = 3 Sloping abutments and sloping embankments  Slope of
abutments = 4
```

```
 Top with of embankment = 17
 Centroid station of bridge opening =
 Wing Wall Type = No wing walls present
 Width =
 Angle =
 Radius =
 Guide Banks Type = No Guide Bank present
 Length =
 Offset =
 Angle =

Selected Low Flow Methods = W.S.Pro Method

High Flow Method
 Energy Only

Additional Bridge Parameters
 Add Friction component to Momentum
 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line
 CROSS SECTION


RIVER: Taunton River
REACH: Main Stem RS: 14148.05

INPUT
Description: 18.3 DS Face RR Br
Station Elevation Data num= 493
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  0 32.67 19.62 32.01 26.16
31.57 39.25 31.04 52.33 30.21  65.41 28.88 71.95 28.4 85.03 27.93 104.66
26.38 124.28 26.33  130.82 26.16 137.36 25.76 150.44 25.84 163.52 26.11
176.61 25.96  189.69 25.37 196.23 24.96 222.39 22.77 228.93 22.33 235.48
21.63  242.02 20.69 248.56 19.93 268.18 19.8 300.89 18.46 327.05 17.87
359.75 16.57 372.84 16.4 392.46 14.85 418.62 12.36 438.25 11.11  444.79 10.97
451.33 10.62 464.41 9.55 484.03 8.37 490.57 8.18  497.12 7.85 503.66 7.69
510.2 7.73 529.82 7.43 542.9 6.03  549.44 6.25 555.98 6.7 562.53 6.94 569.07
6.56 575.61 6.49  595.23 6.77 608.31 6.5 614.85 6.77 634.48 7.23 647.56 7.71
660.64 7.78 673.72 8.06 693.35 8.63 699.89 8.99 712.97 9.33  739.13 10.51
758.76 10.7 765.3 10.57 798 10.45 817.63 8.98  837.25 8.56 843.79 8.51 850.33
8.6 869.95 8.36 896.12 8.71  915.74 8.72 922.28 8.94 928.82 8.92 948.45 9.43
961.53 9.52  974.61 9.37 981.15 9 987.69 9.16 994.23 9.74 1000.77 10.04
1007.31 9.94 1013.86 10.3 1026.94 10.68 1033.48 10.51 1040.02 10.15  1046.56
9.61 1059.64 7.01 1072.72 4.54 1079.27 4.06 1085.81 3.78  1098.89 3.55
1125.05 3.92 1131.59 3.8 1144.67 3.88 1151.22 4.06  1157.76 3.9 1170.84 4.04
1183.92 3.76 1190.46 3.9 1197 4.37  1203.54 5.1 1216.63 6.19 1223.17 6.43
1229.71 6.4 1236.25 5.7  1242.79 4.8 1249.33 4.54 1255.87 4.54 1288.58 3.4
1301.66 3.67  1314.74 3.55 1321.28 3.34 1334.36 3.32 1340.9 3.17 1353.99 3.69
1360.53 3.41 1373.61 3.72 1393.23 3.65 1399.77 3.42 1406.31 3.34  1412.85
3.44 1425.94 4.04 1445.56 4.2 1452.1 4.88 1458.64 7.69  1465.18 10.82 1471.72
12.95 1484.81 13.44 1491.35 13.47 1497.89 13.29  1504.43 12.05 1510.97 9.44
1517.51 5.42 1524.05 4.35 1537.11 4.73  1550.14 4.64 1556.66 4.39 1563.17
```

5.46 1569.69 4.87 1576.21 4.69 1582.72 5.08 1589.24 4.91 1595.76 4.58
1608.79 4.94 1615.31 4.58 1628.34 4.87 1634.86 5.51 1654.41 6.38 1660.92
5.67 1667.44 5.49 1680.47 6.17 1686.99 6.67 1700.02 7.24 1706.54 7.05
1713.06 6.7 1719.57 6.79 1726.09 7.27 1732.61 7.37 1745.64 6.4 1752.16 6.19
1758.67 6.73 1765.19 6.96 1771.7 6.48 1778.22 6.74 1784.74 7.39 1797.77 7.14
1804.29 6.79 1810.8 6.6 1817.32 6.94 1823.85 6.82 1830.37 5.99 1830.9 5.87
1836.9 4.46 1839.08 2.65 1844.81 .53 1848.3 -1.58 1854.05 -3.33 1857.95 -
5.41 1864.66 -6.96 1868.33 -7.36 1875.85 -6.94 1879.65 -5.3 1884.89 -5.32
1888.29 -5.31 1894.58 -4.97 1898.69 -2.69 1906.52 -7.23 1910.23 -9.32
1914.72 -10.03 1926.06 -11.09 1931.96 -9.3 1935.3 -7.08 1942.36 -4.21
1946.19 -2.77 1955.09 .46 1955.37 13.32 1955.58 13.39 1980.45 13.83 1987.01
14.72 1993.57 14.86 2006.69 15.19 2013.25 15.22 2019.81 15.19 2026.37 14.9
2032.93 14.84 2039.49 15.03 2046.05 15.35 2052.61 15.58 2059.17 15.4 2065.73
14.8 2072.29 14.41 2078.85 14.62 2085.41 15.15 2091.97 15.44 2098.53 15.26
2105.1 15.15 2118.22 15.22 2124.78 15.2 2131.34 15.21 2137.9 15.38 2144.46
15.64 2151.02 15.74 2157.58 15.81 2164.14 15.86 2170.7 15.89 2177.26 15.89
2183.82 15.78 2196.94 15.48 2203.5 15.37 2210.06 15.29 2216.62 15.25 2223.18
15.24 2236.3 15.33 2242.86 15.41 2249.42 15.52 2255.98 15.65 2262.54 15.75
2269.1 15.78 2275.66 15.75 2288.78 15.64 2295.34 15.56 2301.9 15.6 2308.46
15.56 2315.02 15.42 2328.14 15.33 2334.7 15.26 2347.82 15.16 2354.38 15.14
2360.94 15.17 2367.5 15.07 2374.06 15.06 2380.62 15.07 2387.18 14.98 2393.74
14.96 2400.3 14.84 2406.86 14.8 2413.42 14.81 2419.98 14.89 2426.54 14.77
2433.1 14.86 2439.66 14.86 2446.22 14.76 2452.78 14.76 2459.34 14.85 2465.9
14.97 2472.46 15.02 2479.02 15.02 2485.58 15.16 2492.15 15.24 2498.71 15.12
2505.27 15.34 2511.83 15.4 2518.39 15.32 2524.95 15.11 2531.51 14.95 2538.07
14.9 2557.75 14.61 2570.87 14.82 2577.43 14.71 2590.55 14.82 2597.11 14.86
2610.23 15.04 2616.79 15.24 2623.35 15.36 2629.91 15.41 2636.47 15.48
2643.03 15.25 2649.59 15.6 2656.15 15.74 2662.71 15.83 2669.27 15.9 2675.83
15.95 2688.95 15.96 2695.51 15.99 2702.07 16.05 2708.63 16.15 2715.19 16.31
2721.75 16.57 2728.31 16.85 2734.87 16.8 2741.43 16.86 2747.99 17 2754.55
17.06 2761.11 17.06 2767.67 16.89 2774.23 16.69 2780.79 16.45 2787.35 16.27
2793.91 16.35 2800.47 16.35 2807.03 16.31 2813.59 16.37 2826.71 16.4 2833.27
16.5 2852.95 16.64 2859.51 16.76 2866.07 16.76 2872.63 16.8 2879.19 16.69
2885.75 16.68 2898.88 16.77 2905.44 16.76 2918.56 16.69 2925.12 16.64
2931.68 16.7 2938.24 16.62 2951.36 16.71 2957.92 16.62 2964.48 16.68 2971.04
16.7 2977.6 16.66 2984.16 16.57 2990.72 16.64 3003.84 16.7 3010.4 16.63
3016.96 16.67 3023.52 16.74 3030.08 16.72 3043.2 16.71 3056.32 16.65 3062.88
16.69 3069.44 16.75 3076 16.69 3082.56 16.73 3089.12 16.71 3102.24 16.59
3108.8 16.65 3115.36 16.54 3121.92 16.59 3128.48 16.73 3135.04 17.15 3141.6
17.37 3148.16 19.29 3154.72 19.88 3161.28 17.85 3167.84 17.75 3180.96 18.16
3187.52 18.12 3194.08 17.95 3200.64 17.66 3207.2 17.7 3213.76 17.89 3220.32
18.03 3226.88 18.33 3233.44 18.76 3240 19.03 3246.56 19.41 3253.12 19.65
3259.68 19.6 3266.24 19.65 3272.8 19.92 3279.36 20.07 3285.92 20.08 3292.48
20.04 3299.04 19.74 3305.61 19.02 3312.17 17.24 3318.73 15.12 3325.29 14.36
3331.85 14.3 3338.41 14.34 3344.97 14.7 3351.53 15.23 3358.09 15.42 3364.65
15.33 3371.21 15.37 3377.77 15.72 3384.33 16.84 3390.89 16.49 3397.45 14.71
3404.01 14.49 3410.57 14.23 3417.13 14.8 3423.69 14.8 3430.25 14.97 3436.81
15.08 3443.37 15.06 3449.93 14.65 3456.49 13.71 3463.05 13.1 3469.61 13.09
3476.17 13.16 3482.73 13.27 3489.29 13.13 3495.85 13.1 3502.41 13.13 3508.97
13.18 3515.53 13.31 3522.09 13.37 3528.65 13.45 3535.21 13.48 3541.77 13.44
3548.33 13.22 3554.89 13.12 3561.45 13.07 3568.01 13.05 3574.57 13.23
3581.13 13.27 3587.69 13.27 3594.25 13.23 3600.81 13.35 3607.37 13.4 3620.49
13.9 3633.61 13.59 3640.17 13.56 3646.73 13.59 3653.29 13.38 3659.85 13.27
3666.41 13.41 3679.53 13.76 3686.09 13.57 3692.65 13.62 3699.22 13.62

3705.78 13.77 3712.34 13.68 3718.9 13.88 3725.46 13.95 3732.02 13.64 3738.58 13.59 3745.14 13.68 3751.7 13.8 3758.26 13.83 3764.82 13.76 3771.38 13.86 3784.5 13.92 3791.06 14.01 3797.62 14.07 3804.18 14.22 3810.74 14.42 3817.3 14.42 3823.86 14.36 3836.98 14.3 3843.54 14.38 3850.1 14.38 3863.22 14.59 3869.78 14.75 3876.34 14.76 3882.9 14.84 3889.46 14.72 3896.02 15.05 3902.58 15.07 3909.14 15.26 3915.7 15.32 3922.26 15.36 3928.82 15.36 3935.38 15.63 3941.94 15.71 3948.5 15.62 3955.06 15.86 3961.62 15.97 3968.18 15.81 3974.74 16.01 3981.3 16.06 3987.86 16 3994.42 16.05 4000.98 16.17 4007.54 16.32 4027.22 16.59 4033.78 16.63 4040.34 16.74 4046.9 16.95 4060.02 17.1 4066.58 17.23 4073.14 17.41 4079.7 17.27 4086.26 17.79 4092.82 18.07 4099.39 18.09 4105.95 18.28 4112.51 18.15 4119.07 18.1 4125.63 18.14 4132.19 18.44 4138.75 18.63 4145.31 18.87 4158.43 19.24 4164.99 19.29 4171.55 19.1

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 1817.32 .035 1955.37 .082

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1817.32 1955.37 99.87 117.75 129.37 .5 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 14030.31

INPUT
Description: 18 Exit RR Br
Station Elevation Data num= 491
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
  0 32.79 6.56 32.79 13.12 32.61 19.68 32.47 26.24 32.25 32.81 31.81 39.37 31.4 45.93 30.86 52.49 30.42 59.05 29.72 65.61 28.95 72.17 28.38 78.73 27.73 85.3 27.57 91.86 27.49 98.42 27.18 111.54 26.42 118.1 26.07 124.66 26.1 131.22 25.94 137.78 25.75 144.35 25.51 150.91 25.36 157.47 25.34 164.03 25.25 170.59 25 183.71 24.83 190.27 24.82 196.84 24.28 203.4 23.65 209.96 23.48 216.52 22.94 223.08 22.5 229.64 22.02 236.2 21.02 242.76 20.09 249.32 19.61 255.89 19.63 262.45 19.41 275.57 18.8 282.13 18.57 288.69 18.38 295.25 18.16 301.81 17.99 308.38 17.76 314.94 17.63 321.5 17.54 328.06 17.43 334.62 17.17 341.18 17.03 347.74 16.83 354.3 16.69 360.86 16.7 367.43 16.62 373.99 16.36 380.55 15.9 387.11 15.47 393.67 14.86 400.23 14.2 406.79 13.72 413.35 13.18 419.92 12.66 426.48 12.2 433.04 11.78 439.6 11.5 446.16 11.05 452.72 10.72 459.28 10.17 465.84 9.68 472.4 9.14 478.97 9 485.53 8.69 492.09 8.16 498.65 7.78 505.21 7.63 511.77 7.52 518.33 7.28 524.89 7.31 531.46 7.09 538.02 7.02 551.14 6.48 557.7 6.64 564.26 6.64 570.82 6.59 577.38 6.36 583.94 6.53 590.51 6.74 597.07 6.66 603.63 6.65 610.19 6.78 616.75 6.76 623.31 7.06 629.87 7.21 636.43 7.38 643 7.58 649.56 7.66 662.68 7.97 669.24 8.01 675.8 8.37 682.36 8.63 688.92 8.86 695.48 9.01 702.05 9.29 708.61 9.47 715.17 9.69 721.73 10.04 728.29 10.26 734.85 10.51 741.41 10.91 747.97 10.84 754.54 10.7 761.1 10.58 767.66 10.41 774.22 10.32 780.78 10.29 787.34 10.2 793.9 10.06 807.02 9.41 813.59 9.1 820.15 8.74 826.71 8.54 833.27 8.53 846.39 8.6 852.95 8.59 859.51 8.6 866.08 8.55 872.64 8.54 879.2 8.72 885.76 8.76 892.32 8.77 905.44 8.88 912 8.85 918.57 8.92 925.13 9.13 931.69 9.08 938.25 9.25 944.81 9.36 951.37 9.55 957.93 9.56 964.49 9.53 977.62 9.3 984.18 9 990.74 9.08 997.3 9.58 1003.86 10.03 1016.98 10.16 1023.54 10.15

1030.11 10.21 1036.67 10.22 1043.23 9.67 1049.79 8.8 1056.35 7.74 1062.91
6.76 1069.47 5.72 1076.03 4.91 1082.59 4.22 1089.16 3.82 1095.72 3.71
1108.84 3.45 1115.4 3.24 1121.96 3.43 1128.52 3.47 1135.08 3.42 1141.64 3.42
1148.21 3.38 1154.77 3.44 1161.33 3.53 1167.89 3.49 1174.45 3.57 1181.01
3.82 1187.57 3.77 1194.13 3.79 1200.69 3.95 1207.26 4.06 1213.82 3.98
1233.5 4.22 1240.06 4.06 1253.18 4.11 1259.74 3.9 1266.31 3.87 1272.87 3.64
1279.43 3.53 1285.99 3.55 1292.55 3.65 1299.11 3.7 1305.67 3.63 1312.23 3.69
1318.8 3.55 1325.36 3.57 1331.92 3.77 1338.48 3.9 1345.04 3.87 1351.6 3.75
1358.16 3.85 1364.72 3.97 1371.28 4.12 1377.85 4.15 1384.41 3.95 1390.97
3.88 1397.53 4.05 1404.09 6.48 1410.65 7.48 1417.21 9.55 1423.77 11.13
1430.33 12.19 1436.9 12.8 1443.46 12.89 1450.02 12.79 1456.58 12.57 1463.14
10.98 1469.7 8.49 1476.26 5.97 1482.82 5.1 1489.38 5.08 1495.95 5.68
1502.51 5.42 1509.07 4.53 1515.63 4.08 1522.19 4.26 1528.75 4.37 1535.31
4.53 1541.84 4.34 1548.36 4.43 1561.41 5.37 1567.94 5.88 1574.46 6.18
1580.99 6.37 1587.51 6.65 1594.04 6.96 1600.56 7.06 1607.09 7.09 1613.61
7.06 1620.14 7 1626.66 7.28 1633.19 7.51 1639.72 7.27 1646.24 7.27 1652.77
7.09 1659.29 7.2 1665.82 7.23 1672.34 7.17 1678.87 7.23 1685.39 7.34 1698.44
8 1704.97 7.89 1711.49 7.95 1724.54 8.11 1731.07 8.13 1802.71 7.13 1869.98
5.86 1872.42 2.65 1886.07 -2.67 1907.09 -4.65 1948.08 -11.39 1969.32 -1.61
1978.62 10.39 2023.63 10.62 2225.71 12.58 2231.25 12.93 2244.32 13.22
2250.86 13.15 2263.93 12.88 2270.46 12.77 2277 12.8 2283.53 12.68 2290.07
12.4 2296.6 12.18 2303.13 12.03 2309.67 12.2 2316.2 12.34 2322.74 12.44
2329.27 12.47 2335.81 12.35 2342.34 12.08 2348.88 12.09 2355.41 12.03
2361.95 11.75 2368.48 11.67 2375.02 11.76 2381.55 11.97 2388.09 12.01
2394.63 12 2401.16 12.02 2407.7 12 2414.23 12.12 2420.77 12.13 2427.31 12.18
2433.84 12.38 2440.38 12.42 2446.91 12.27 2453.45 12.35 2459.99 12.54
2466.52 12.93 2473.06 13.02 2486.13 12.88 2492.67 12.77 2499.2 11.76 2505.74
9.99 2512.27 9.31 2518.81 9.74 2525.35 10.21 2531.88 10.32 2538.42 10.29
2544.95 10.52 2551.49 10.94 2558.03 11.26 2564.56 11.48 2571.1 11.82 2577.63
12.3 2584.17 12.56 2590.71 12.37 2597.24 12.06 2603.78 11.95 2610.31 12.06
2616.85 12.28 2623.39 12.63 2629.92 13.03 2636.46 13.17 2642.99 13.11
2656.06 12.92 2662.6 12.95 2669.14 12.87 2682.21 12.53 2688.74 12.62 2695.28
12.67 2708.35 12.86 2721.42 12.84 2727.96 12.77 2734.5 12.57 2741.03 12.48
2747.57 12.53 2754.1 12.46 2760.64 12.15 2767.18 10.24 2773.71 8.02 2780.25
7.19 2786.78 8.2 2793.32 9.4 2799.86 9.86 2806.39 10.4 2812.93 10.85 2819.46
11.02 2826 11.04 2832.54 11.24 2845.61 11.7 2852.14 11.94 2858.68 12.15
2865.22 12.11 2871.75 11.99 2878.29 11.95 2891.36 11.78 2897.9 11.66 2904.43
11.6 2910.97 11.74 2917.5 11.85 2924.04 11.99 2930.57 12.18 2937.11 12.41
2943.65 12.76 2950.18 13.07 2956.72 13.52 2963.25 14.11 2969.79 14.45
2976.33 14.56 2989.4 14.7 2995.93 14.78 3002.47 14.7 3009.01 14.33 3015.54
14.18 3028.61 14.39 3035.15 14.44 3041.69 14.42 3048.22 14.58 3054.76 14.68
3061.29 14.65 3067.83 14.88 3074.37 14.82 3080.9 14.9 3093.97 14.87 3100.51
15.11 3107.05 15.19 3113.58 15.22 3120.12 15.39 3126.65 15.42 3133.19 15.42
3139.73 15.49 3146.26 15.49 3152.8 15.45 3165.87 15.52 3172.41 15.51 3178.94
15.67 3185.48 15.81 3192.01 15.87 3198.55 16.01 3205.08 16.31 3211.62 16.34
3218.16 16.52 3224.69 18.15 3231.23 20.02 3237.76 21.65 3244.3 23 3250.84
21.44 3257.37 19.28 3263.91 17.73 3270.44 17.19 3276.98 16.82 3283.52 16.87
3290.05 16.98 3296.59 16.66 3303.12 16.49 3309.66 16.97 3316.2 17.29 3322.73
17.22 3329.27 17.54 3335.8 17.83 3342.34 17.91 3348.88 18.05 3355.41 18.44
3361.95 19.49 3368.48 20.6 3375.02 21.21 3381.56 21.31 3388.09 21.2 3401.16
21.04 3407.7 20.92 3414.24 20.56 3420.77 20.06 3427.31 19.95 3433.84 20.17
3440.38 20.37 3446.92 20.62 3459.99 20.96 3466.52 21.04 3473.06 21.29
3479.59 21.41 3486.13 21.46 3492.67 21.57 3499.2 21.49 3505.74 21.81 3512.27
22.61 3518.81 23.19 3525.35 23.8 3531.88 24.39 3538.42 24.56 3544.95 24.88

3551.49 25.32 3558.03 25.8 3564.56 26.42 3571.1 27.07 3577.63 27.67 3584.17 28.18 3590.71 28.51 3597.24 28.69 3603.78 28.8 3610.31 28.86 3623.39 28.93 3629.92 28.79 3636.46 28.48 3642.99 28.3 3649.53 28.22 3656.07 28.22 3662.6 28.17 3669.14 28.15 3675.67 28.3 3682.21 28.58 3688.75 28.78 3695.28 29.38 3701.82 29.75 3708.35 29.9 3714.89 29.91 3721.43 29.88 3727.96 29.81 3734.5 29.61 3741.03 29.59 3747.57 29.69 3754.1 29.72 3760.64 29.72 3773.71 29.65 3780.25 29.67 3786.78 29.62 3793.32 29.3 3799.86 29.11 3806.39 28.87 3819.46 28.53 3826 28.5 3832.54 28.39 3845.61 27.91 3852.14 27.8 3858.68 27.44 3865.22 27 3871.75 26.53

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 1869.98 .035 1978.62 .082

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1869.98 1978.62 684.11 778.6 861.6 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 2244 3871.75 13.22 F

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 13251.71

INPUT
Description: 17
Station Elevation Data num= 312
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 32.57 26.15 31.62 45.75 31.23 52.29 30.9 58.83 30.18 78.44 28.7 84.97 28.5 104.58 28.32 111.12 28.35 124.19 27.81 150.34 25.88 163.41 25.32 169.95 24.74 183.02 24.02 196.09 23.54 215.7 22.28 222.24 22.17 235.31 21.2 241.85 20.82 248.38 20.88 254.92 20.72 267.99 19.31 274.53 18.76 307.21 17.37 346.43 16.83 352.96 16.83 359.5 17 372.57 16.73 385.65 16.15 411.79 14.21 437.94 12.51 444.47 11.93 457.55 11.16 470.62 10.07 477.16 9.68 483.69 9.08 490.23 8.78 509.84 8.41 522.91 7.82 529.45 7.25 535.98 7.13 549.06 6.74 555.59 6.39 562.13 6.52 568.66 6.92 575.2 6.79 581.74 6.47 594.81 6.37 601.35 6.51 607.88 6.86 620.96 7.16 627.49 7.21 640.56 7.79 653.64 8.45 660.17 8.53 666.71 8.92 699.39 10.1 719 10.46 725.54 10.39 738.61 10.66 751.68 10.69 764.76 10.4 771.29 10.01 784.36 9.6 790.9 9.53 797.44 9.3 817.05 8.93 823.58 8.63 830.12 8.49 856.26 8.98 895.48 9.18 908.56 9.14 915.09 9.02 941.24 9.17 954.31 9.52 967.38 9.55 980.46 9.23 986.99 8.83 993.53 8.61 1013.14 9.56 1019.67 9.64 1032.75 9.52 1045.82 9.02 1052.35 8.48 1071.96 6.31 1078.5 5.38 1085.04 4.81 1098.11 4.26 1104.65 3.71 1117.72 3.43 1130.79 3.48 1143.86 3.06 1163.47 3.58 1170.01 3.34 1183.08 3.45 1189.62 3.85 1202.69 4.4 1209.23 4.84 1222.3 5.92 1228.84 6.28 1235.37 6.46 1248.45 6.33 1254.98 5.82 1261.52 4.89 1281.13 4.13 1294.2 4.13 1300.74 4.46 1313.81 4.11 1320.34 4.27 1326.88 8.52 1333.42 11.27 1339.95 12.53 1346.49 12.7 1353.03 12.6 1359.56 12.33 1366.1 11.9 1372.64 10.41 1379.17 7.19 1385.71 4.91 1392.24 4.09 1398.78 4.2 1411.85 4.05 1424.93 3.59 1431.46 3.83 1438 4.31 1444.54 5.16 1451.07 5.58 1457.61 5.52 1470.68 4.32 1477.22 3.88 1483.75 3.62 1490.29 3.72 1503.36 4.93 1509.9 5.29 1516.44 5.38 1536.04 4.83 1542.58 4.75 1562.19 5.07 1568.73 5.3 1575.26 5.71 1621.02 6.66 1634.09 6.64 1640.63 6.34 1660.23 4.91 1673.3 3.73 1679.84 3.64 1686.37 4.07 1692.9 4.78 1699.44 5.31 1712.51 6.1 1719.04 6.27

1732.11 6.82 1738.64 7.25 1745.17 7.44 1751.71 7.27 1758.24 6.87 1764.78 6.06 1771.31 5.44 1777.84 5.38 1790.91 5.73 1797.45 6.17 1803.98 6.25 1810.51 5.95 1817.05 5.16 1823.58 4.69 1830.11 4.92 1836.65 4.97 1842.91 3.05 1843.18 2.97 1855 -2.51 1855.23 -2.5 1855.41 -2.28 1855.5 -2.32 1855.56 -2.37 1855.64 -2.76 1855.76 -2.93 1855.83 -2.94 1855.96 -2.97 1856.08 -3.05 1857.17 -3.05 1858.58 -3.19 1859.98 -3.63 1861.49 -4.2 1863.1 -4.87 1864.75 -5.25 1866.93 -5.86 1869.15 -6.5 1871.37 -6.93 1873.3 -7.49 1875.27 -8.01 1876.97 -8.23 1878.57 -8.6 1880.15 -8.84 1881.58 -8.96 1883.18 -9.13 1884.84 -9.37 1886.94 -9.52 1889 -9.86 1891.09 -10.04 1892.95 -10.26 1894.9 -10.52 1896.79 -10.86 1898.64 -11.11 1900.24 -11.11 1901.87 -11.13 1903.22 -11.08 1904.55 -11.01 1905.74 -10.97 1907.04 -10.81 1908.44 -10.45 1910.02 -10.16 1911.86 -9.77 1913.65 -9.34 1915.5 -8.61 1917.12 -7.74 1918.68 -6.74 1920.05 -6.07 1921.51 -4.51 1922.72 -4.31 1923.81 -3.7 1924.78 -2.59 1925.83 -2.12 1926.74 -1.76 1934.66 4.61 1936.87 5.75 1941.19 7.99 1954.26 10.4 1960.79 11.91 1967.32 13.17 1973.86 13.96 1986.93 14.7 1993.46 15.35 2006.53 16.21 2013.06 16.45 2019.6 16.93 2026.13 17.99 2032.66 18.16 2045.73 18.11 2052.26 17.84 2058.8 17.32 2065.33 17.03 2078.4 17.62 2091.47 17.97 2098 19 2104.53 21.5 2111.07 23.53 2117.6 25.06 2143.74 26.6 2156.81 27.04 2169.87 27.17 2189.5 28.11 2196.05 27.78 2202.59 27.03 2209.13 26.52 2215.68 26.18 2228.76 25.82 2248.39 24.5 2254.94 24.34 2261.48 24.41 2268.02 24.15 2281.11 24.71 2307.29 25 2313.83 25.28 2320.37 26.43 2326.92 28.25 2333.46 29.13 2346.55 29.23 2366.18 29.48 2385.81 30.05 2411.98 30.22 2418.53 30.08 2425.07 29.62 2438.16 28.17 2444.7 27.71 2451.24 27.96 2477.42 28.31 2483.96 28.55 2490.5 28.93 2523.22 29.8 2601.74 29.89 2621.37 29.73 2641 29.76 2660.63 29.69 2667.18 29.85 2680.26 29.96 2719.53 29.39 2732.61 29.5 2752.24 30.02 2758.79 29.74 2765.33 29.78 2771.87 29.46 2804.59 28.85 2824.22 28.3 2843.85 28.6 2850.4 28.61 2863.48 29.21 2883.11 29.53 2902.74 29.45 2968.18 30.42 2981.27 30.49 3000.9 29.84 3033.61 29.72 3053.24 30.34 3066.33 30.96 3112.14 31.74 3118.68 32.02 3131.77 32.15 3144.85 32.4 3157.94 32.41 3171.03 32.87 3177.57 33.4 3190.66 33.53
 Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 1803.98 .035 2026.13 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1803.98 2026.13 602.45 635.08 678.37 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 12616.64

INPUT
Description: 16 Approach RR Br
Station Elevation Data num= 262
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 32.63 6.54 32.58 13.08 32.49 19.62 31.93 26.16 31.5 32.7 31.39 39.24 31.42 45.78 31.39 58.85 31.52 65.39 31.42 71.93 31.47 78.47 31.12 85.01 30.88 98.09 30.57 104.63 30.11 111.17 29.87 117.71 29.68 124.25 29.39 130.79 29.08 137.33 28.69 143.87 28.32 156.94 27.51 163.48 27.09 170.02 26.72 176.56 26.43 183.1 26.09 189.64 25.78 196.18 25.36 202.72 25.17 209.26 24.63 215.8 24.01 222.34 23.24 228.88 22.56 241.96 21.24 248.5 20.67 255.03 19.96 268.11 19.35 274.65 18.61 281.19 18.07 287.73 17.43 294.27 17.26 300.81 17 307.35 16.87 313.89 16.84 320.43 16.74

326.97 16.49 333.51 16.26 340.05 16.29 346.59 16.38 353.13 16.21 359.66 16.02 366.2 15.96 372.74 15.76 379.28 15.64 385.82 15.63 392.36 15.27 398.9 15.23 405.44 14.91 411.98 14.45 418.52 14.54 425.06 14.95 431.6 14.81 438.14 14.1 444.68 13.6 457.75 12.67 464.29 11.85 470.83 11.21 477.37 10.77 483.91 10.51 490.45 10.15 496.99 9.6 503.53 9.2 510.07 8.82 516.61 8.26 523.15 7.79 529.69 7.18 536.23 7.03 542.77 6.22 549.31 5.77 555.85 6.19 562.38 6.32 568.92 6.36 575.46 6.54 588.54 6.86 595.08 7.1 601.62 7.38 608.16 7.45 614.7 7.3 621.24 7.42 627.78 7.85 634.32 8.4 640.86 8.76 647.4 9.08 653.94 9.44 660.47 9.77 667.01 9.87 673.55 10.19 680.09 10.39 686.63 10.51 693.17 10.59 706.25 10.9 712.79 11.03 719.33 11.12 725.87 11.18 732.41 11.01 745.49 10.86 752.03 10.63 771.64 9.61 778.18 9.59 784.72 9.46 791.26 9.1 797.8 8.9 804.34 8.9 810.88 8.8 817.42 8.34 823.96 8.04 830.5 7.67 837.04 7.67 850.12 7.8 856.66 7.93 863.19 8.04 869.73 7.99 876.27 7.99 889.35 8.24 895.89 8.34 902.43 8.57 908.97 8.76 915.51 8.89 922.05 8.92 928.59 8.84 935.13 8.91 941.67 8.54 948.21 8.35 954.75 8.09 961.29 7.93 967.82 7.93 974.36 7.83 980.9 7.59 987.44 7.45 993.98 7.46 1000.52 7.64 1007.06 7.72 1013.6 7.6 1020.14 7.45 1026.68 7.19 1033.22 7.06 1039.76 7.21 1046.3 7.18 1052.84 7.55 1059.38 7.95 1065.91 8.03 1072.45 7.9 1078.99 7.49 1085.53 7.17 1092.07 6.49 1098.61 5.7 1105.15 5.39 1111.69 5.38 1118.23 5.24 1124.77 4.6 1131.31 4.51 1137.85 4.6 1150.93 4.65 1157.47 4.39 1164.01 3.97 1170.54 4.16 1183.62 4.67 1190.16 4.62 1196.7 4.96 1203.24 5.34 1209.78 5.11 1234.91 4.35 1264.02 3.13 1265.09 1.53 1286.92 -.7 1397.53 -7.34 1409.57 -9.2 1420.3 -9.58 1432.59 -8.07 1444.06 -4.83 1453.35 -2.03 1489.73 .98 1492.64 6.05 1515.17 6.73 1521.65 6.46 1528.13 6.11 1534.61 5.93 1541.09 6.04 1547.57 6.11 1554.04 6.14 1560.52 6.03 1567 6.05 1573.48 6.36 1579.96 6.47 1586.44 6.37 1592.92 6.18 1599.4 6.02 1605.88 6.04 1612.43 6.12 1618.97 5.95 1625.52 5.67 1638.61 5.27 1645.16 4.9 1651.7 4.78 1658.25 4.81 1664.8 4.61 1671.34 4.44 1677.89 4.48 1684.43 4.56 1690.98 4.76 1697.52 5.37 1710.62 7.56 1717.16 8.17 1723.71 8.59 1730.25 9.12 1743.34 10.13 1749.89 10.99 1756.44 11.69 1762.98 11.99 1769.53 12.63 1776.07 13.07 1782.62 13.58 1789.17 14.32 1795.71 15.09 1802.26 15.6 1815.35 17.27 1821.89 17.97 1828.44 18.64 1834.99 19.23 1841.53 19.76 1854.62 21.91 1867.71 23.94 1874.26 24.44 1880.81 25.07 1887.35 25.65 1893.9 26.16 1900.44 26.92 1906.99 26.85 1913.53 26.71 1920.08 26.77 1926.63 26.88 1933.17 27.24 1939.72 27.53 1946.26 27.71 1952.81 27.71 1959.36 27.66 1965.9 27.59 1972.45 27.47 1985.54 26.9 1992.08 26.92 1998.63 27 2005.18 26.94 2011.72 26.86 2018.27 27.2 2024.81 27.76 2031.36 28.07 2044.45 28.2 2051 28.38 2057.54 28.48 2064.09 28.54 2070.63 28.57 2077.18 28.72

Manning's n Values num= 3 Sta n Val Sta n Val Sta n Val
 0 .085 1203.24 .035 1492.64 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1203.24 1492.64 48.11 89.77 157.92 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 12526.87

INPUT
Description: 15.7 - US Face RR Br
Station Elevation Data num= 238
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 32.29 13.888 31.74 32.4

31.51 46.28 31.07 55.536 31.03 78.68 29.92 83.304 29.99 92.56 29.51 97.192
29.12 115.704 27.11 124.96 26.52 129.584 26.05 134.216 25.86 157.352 24.48
166.608 23.53 171.24 23.29 180.496 22.12 185.121 22.67 189.752 21.86 194.377
20.74 199.008 19.99 203.633 19.5 212.889 18.06 217.52 17.77 222.152 17.3
226.776 17.25 231.408 16.9 254.544 16.69 259.176 16.79 268.432 16.55 273.056
16.62 282.312 16.42 291.568 15.77 296.2 15.55 328.593 12.67 337.849 12.03
342.48 11.39 356.361 10.16 360.992 9.16 370.248 7.99 384.129 7.19 388.76 6.8
393.385 6.2 398.016 5.33 402.641 5.9 411.904 6.01 425.784 6.63 439.672 7.6
444.296 7.79 453.552 8.72 458.184 9.32 467.44 9.91 476.696 10.97 485.952
11.54 490.577 11.41 499.833 11.69 509.089 11.72 513.72 11.19 518.345 9.69
522.976 7.7 527.601 7.8 532.232 8.43 536.857 8.72 541.488 8.84 550.744 7.76
555.369 7.36 564.625 7.18 569.256 6.97 573.881 7.3 583.137 7.31 597.024 8.12
601.649 8.25 610.905 8.32 620.161 8.66 624.792 8.54 629.424 8.72 638.68 8.71
647.936 9.08 652.561 9.1 666.448 8.63 671.073 8.37 684.96 8.39 689.585 8.2
698.841 8.31 703.472 8.5 708.097 8.39 721.984 7.6 735.865 7.31 745.121 7.44
754.377 7.04 763.633 6.98 777.52 6.26 786.777 5.6 805.289 5.01 809.913 4.76
823.801 4.35 828.425 4.06 833.057 4.42 842.313 4.33 846.944 4.43 851.569
4.94 856.2 5.03 865.456 4.59 870.081 4.94 874.712 7.01 879.337 10.7 883.968
13.1 888.593 14.33 893.224 14.41 897.849 13.78 902.48 12.38 907.105 9.55
911.673 9.78 920.809 8.98 925.377 9.25 925.879 9.26 929.944 9.33 934.519
9.14 939.087 9.39 943.655 10.15 954.594 7.63 954.644 13.43 971.77 12.93
971.932 12.51 972.088 -.25 976.09 -1.49 982.85 -4.23 994.496 -4.951006.199 -
9.031013.093 -10.71 1021.593 -13.621027.066 -3.931042.254 -2.311056.686 -
1.221070.666 .23 1084.659 1.341090.458 1.91091.992 .87 1092.65 12.071103.079
12.52 1108.114 12.861112.739 11.381117.363 9.41121.995 6.571126.619 5.39
1131.244 5.571135.868 5.83 1140.5 5.911145.124 5.851149.749 5.77 1154.38
5.931159.005 5.991163.629 5.741172.885 5.33 1177.51 5.14 1182.134
5.291186.766 5.35 1191.39 5.671196.015 5.821205.271 5.27 1209.895 5.02
1214.52 4.871219.151 4.79 1228.4 4.881233.032 4.62 1237.656 4.561242.281
4.871246.905 4.841251.536 4.71256.161 4.69 1260.786 4.761265.417 4.861270.042
4.891274.666 4.89 1279.29 5.02 1283.922 5.31288.547 5.671293.171 5.961297.802
6.221302.427 6.62 1307.052 7.221311.676 7.781316.308 8.311320.932
8.821325.557 9.39 1330.188 9.991334.812 10.891339.437 12.091344.062
13.21348.693 14.01 1353.318 14.671357.942 15.811362.573 17.091367.198
17.681371.823 18.29 1376.447 19.091381.078 20.561385.703 21.211390.327
21.671394.959 22.73 1399.583 23.661404.208 24.41408.833 24.861413.464
25.111418.089 25.26 1422.713 25.441427.344 25.81431.969 26.331436.594
26.831441.218 27.21 1445.849 27.571450.474 27.74 1459.73 27.821464.354
27.921468.979 28.09 1473.603 28.061478.235 27.861482.859 27.631487.484
27.421492.115 27.17 1496.74 27.361501.365 27.421505.989 27.32 1510.62
27.481515.245 27.82 1519.869 27.881524.501 28.051529.125 28.11 1533.75
28.091538.375 28.16 1543.006 28.02 1547.63 27.961552.255 27.671556.879
27.651561.511 27.53 1566.135 27.56 1570.76 27.441575.391 27.43

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 971.77 .035 1092.65 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 971.77
1092.65 48.42 57.44 51.66 .6 .8 Skew Angle = 45

BRIDGE

RIVER: Taunton River
REACH: Main Stem RS: 12498.05

INPUT
Description: 15.5 RR
Distance from Upstream XS = 2
Deck/Roadway Width = 15 Weir Coefficient = 2.6
Bridge Deck/Roadway Skew = 45
Upstream Deck/Roadway Coordinates
 num= 17
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 756.604 13.53 821.658 14 890.247 14.5
 955.301 13.43 958.837 15.87 969.443 15.87 11.69
 969.443 15.87 12.61001.263 15.87 11.681001.263 15.87 9.29 1026.012 15.87
9.371026.012 15.87 11.681088.944 15.87 12.54 1089.651 15.87 12.561093.187
15.87 1095.308 14.53 1205.617 13.66 1361.888 12.21

Upstream Bridge Cross Section Data
Station Elevation Data num= 238
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 32.29 13.888 31.74 32.4
31.51 46.28 31.07 55.536 31.03 78.68 29.92 83.304 29.99 92.56 29.51 97.192
29.12 115.704 27.11 124.96 26.52 129.584 26.05 134.216 25.86 157.352 24.48
166.608 23.53 171.24 23.29 180.496 22.12 185.121 22.67 189.752 21.86 194.377
20.74 199.008 19.99 203.633 19.5 212.889 18.06 217.52 17.77 222.152 17.3
226.776 17.25 231.408 16.9 254.544 16.69 259.176 16.79 268.432 16.55 273.056
16.62 282.312 16.42 291.568 15.77 296.2 15.55 328.593 12.67 337.849 12.03
342.48 11.39 356.361 10.16 360.992 9.16 370.248 7.99 384.129 7.19 388.76 6.8
393.385 6.2 398.016 5.33 402.641 5.9 411.904 6.01 425.784 6.63 439.672 7.6
444.296 7.79 453.552 8.72 458.184 9.32 467.44 9.91 476.696 10.97 485.952
11.54 490.577 11.41 499.833 11.69 509.089 11.72 513.72 11.19 518.345 9.69
522.976 7.7 527.601 7.8 532.232 8.43 536.857 8.72 541.488 8.84 550.744 7.76
555.369 7.36 564.625 7.18 569.256 6.97 573.881 7.3 583.137 7.31 597.024 8.12
601.649 8.25 610.905 8.32 620.161 8.66 624.792 8.54 629.424 8.72 638.68 8.71
647.936 9.08 652.561 9.1 666.448 8.63 671.073 8.37 684.96 8.39 689.585 8.2
698.841 8.31 703.472 8.5 708.097 8.39 721.984 7.6 735.865 7.31 745.121 7.44
754.377 7.04 763.633 6.98 777.52 6.26 786.777 5.6 805.289 5.01 809.913 4.76
823.801 4.35 828.425 4.06 833.057 4.42 842.313 4.33 846.944 4.43 851.569
4.94 856.2 5.03 865.456 4.59 870.081 4.94 874.712 7.01 879.337 10.7 883.968
13.1 888.593 14.33 893.224 14.41 897.849 13.78 902.48 12.38 907.105 9.55
911.673 9.78 920.809 8.98 925.377 9.25 925.879 9.26 929.944 9.33 934.519
9.14 939.087 9.39 943.655 10.15 954.594 7.63 954.644 13.43 971.77 12.93
971.932 12.51 972.088 -.25 976.09 -1.49 982.85 -4.23 994.496 -4.951006.199 -
9.031013.093 -10.71 1021.593 -13.621027.066 -3.931042.254 -2.311056.686 -
1.221070.666 .23 1084.659 1.341090.458 1.91091.992 .87 1092.65 12.071103.079
12.52 1108.114 12.861112.739 11.381117.363 9.41121.995 6.571126.619 5.39
1131.244 5.571135.868 5.83 1140.5 5.911145.124 5.851149.749 5.77 1154.38
5.931159.005 5.991163.629 5.741172.885 5.33 1177.51 5.14 1182.134
5.291186.766 5.35 1191.39 5.671196.015 5.821205.271 5.27 1209.895 5.02
1214.52 4.871219.151 4.79 1228.4 4.881233.032 4.62 1237.656 4.561242.281
4.871246.905 4.841251.536 4.71256.161 4.69 1260.786 4.761265.417 4.861270.042
4.891274.666 4.89 1279.29 5.02 1283.922 5.31288.547 5.671293.171 5.961297.802
6.221302.427 6.62 1307.052 7.221311.676 7.781316.308 8.311320.932
8.821325.557 9.39 1330.188 9.991334.812 10.891339.437 12.091344.062
13.21348.693 14.01 1353.318 14.671357.942 15.811362.573 17.091367.198

17.681371.823 18.29 1376.447 19.091381.078 20.561385.703 21.211390.327
21.671394.959 22.73 1399.583 23.661404.208 24.41408.833 24.861413.464
25.111418.089 25.26 1422.713 25.441427.344 25.81431.969 26.331436.594
26.831441.218 27.21 1445.849 27.571450.474 27.74 1459.73 27.821464.354
27.921468.979 28.09 1473.603 28.061478.235 27.861482.859 27.631487.484
27.421492.115 27.17 1496.74 27.361501.365 27.421505.989 27.32 1510.62
27.481515.245 27.82 1519.869 27.881524.501 28.051529.125 28.11 1533.75
28.091538.375 28.16 1543.006 28.02 1547.63 27.961552.255 27.671556.879
27.651561.511 27.53 1566.135 27.56 1570.76 27.441575.391 27.43

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 971.77 .035 1092.65 .085

Bank Sta: Left Right Coeff Contr. Expan. 971.77 1092.65 .6 .8
Skew Angle = 45

Downstream Deck/Roadway Coordinates
 num= 17
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 705.693 13.53 770.746 14 839.336 14.5
 904.39 13.43 907.925 15.87 918.532 15.87 11.69
 918.532 15.87 12.6 950.352 15.87 11.68 950.352 15.87 9.29
 975.1 15.87 9.37 975.1 15.87 11.681038.033 15.87 12.54
 1038.74 15.87 12.561042.275 15.87 12.561044.397 14.53 1154.705 13.66
1310.976 12.21

Downstream Bridge Cross Section Data
Station Elevation Data num= 229
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 30.39 13.866 29.54 27.733
29.3 36.975 29.22 55.465 28.71 78.574 28.34 87.816 27.8 97.057 27.69 106.299
27.27 115.548 27.32 120.166 26.85 124.79 25.95 129.415 25.32 134.032 24.84
152.523 24.02 157.14 23.58 166.389 23.17 189.498 21.34 194.115 20.86 217.23
19.5 221.848 19.12 226.472 18.92 231.09 18.53 240.339 18.06 244.956 18.03
249.58 17.83 258.822 17.84 277.313 17 286.555 16.79 305.039 16.74 314.288
17.55 323.53 17.34 332.772 16.72 337.396 15.98 342.013 14.61 360.504 10.91
365.129 10.19 374.371 8.01 378.995 7.24 383.612 7.03 392.854 6.17 402.103
4.68 406.721 5.25 411.345 5.61 415.97 5.71 420.587 6 425.212 6.59 448.32
8.85 457.562 7.64 462.186 7.66 466.804 7.47 471.428 6.82 476.053 6.42
485.294 6.43 489.919 6.33 494.536 6.38 499.161 6.27 517.645 6.41 531.511
6.35 536.135 6.47 545.377 7.02 550.002 6.99 554.619 7.28 559.244 7.38
563.868 7.29 573.11 6.83 577.734 6.9 582.352 7.11 586.976 7.54 591.594 7.67
600.843 8.28 614.709 8.74 619.327 8.7 623.951 8.89 633.193 8.92 642.435 9.16
656.301 9.06 679.409 7.92 684.034 7.87 693.276 8.14 711.767 8.03 721.008
7.67 725.633 7.59 734.875 6.85 744.117 6.67 757.983 6.5 767.225 5.93 776.474
4.92 785.716 4.87 794.958 4.63 808.824 4.77 818.066 5.08 827.315 4.89
831.932 4.44 836.557 4.21 841.181 4.34 845.799 4.26 850.423 4.58 855.041
4.66 864.29 3.13 868.907 2.96 873.531 4.8 878.156 8.74 882.766 8.52 887.384
8.77 888.826 8.77 892.001 8.77 896.618 9.01 905.097 7.63 905.146 13.43
922.272 12.93 922.435 12.51 922.59 -.25 926.593 -1.49 933.353 -4.23 944.999
-4.95 956.701 -9.03 963.596 -10.71 972.095 -13.62 977.568 -3.93 992.757 -
2.311007.189 -1.221021.168 .231035.162 1.34 1040.96 1.9 1042.495 .871043.152
12.071043.272 11.71043.308 14.721076.676 14.3 1081.308 14.411085.932
14.371090.557 13.641095.188 11.671104.437 7.02 1109.062 5.971113.693

```
5.731118.318 5.681122.942 5.441127.574 5.3 1132.198 5.261136.823 5.141141.447
5.071146.079 5.141150.703 5.28 1155.328 5.291159.959 5.321164.584
5.431169.208 5.33 1173.84 5.08 1178.464 4.951183.089 4.881187.713
4.931192.345 5.051196.969 4.98 1201.594 4.781206.225 4.62 1210.85
4.581215.474 4.511220.099 4.49  1224.73 4.661229.355 4.671233.979
4.651238.611 4.741243.235 4.78  1247.86 4.921252.484 5.021257.116 5.07
1261.74 5.331270.996 5.29 1275.621 5.411280.245 5.721284.877 6.331289.501
7.31294.126 8.55  1298.75 10.211303.382 12.371308.006 14.381312.631
15.891317.262 16.69 1321.887 17.451326.511 18.091331.143 18.711335.767
19.31340.392 19.75 1345.016 20.161349.648 20.491354.272 20.841358.897
21.291363.528 21.77 1368.153 22.331372.777 22.931377.401 23.51382.033
23.941386.658 24.18 1391.282 24.391395.914 24.721405.163 25.291409.787
25.61414.419 25.83 1419.043 25.961423.668 26.181428.299 26.491432.924
26.871437.548 27.28 1446.804 27.661451.428 27.661456.053 27.631465.309
27.511469.934 27.68 1479.189 27.161483.814 27.081488.438 26.54 1493.07
26.91497.695 26.99 1502.319 26.971506.951 27.031511.575 27.45 1516.2
28.041520.824 29.08 1525.456 29.1 1530.08 28.771534.704 28.461539.336
28.211543.961 28.02 1548.585 27.98 1553.21 281557.841 281562.465 28.2

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 922.272 .0351043.308 .085

Bank Sta: Left Right Coeff Contr. Expan.
 922.2721043.308 .5 .5
Skew Angle = 45

Upstream Embankment side slope = 0 horiz. to 1.0 vertical Downstream
Embankment side slope = 0 horiz. to 1.0 vertical Maximum allowable
submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Piers = 28

Pier Data
Pier Station Upstream= 973.686 Downstream= 924.189
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream= 978.636 Downstream= 927.724
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
```

Pier Data
Pier Station Upstream= 980.757 Downstream= 929.845
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream= 985 Downstream= 934.088
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream= 987.121 Downstream= 936.209
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev 1.1 -5.14 1.1 10.6 1 10.7 1
12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream= 992.778 Downstream= 941.866
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream= 995.606 Downstream= 944.695
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream= 999.849 Downstream= 948.937
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream= 1001.97 Downstream= 951.059
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream=1003.385 Downstream= 952.473
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7 Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream=1023.183 Downstream= 972.272
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream=1024.598 Downstream= 973.686
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream=1035.911 Downstream= 985 Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream=1040.861 Downstream= 989.949
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream= 1043.69 Downstream= 992.778

```
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4  Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream=1047.225 Downstream= 996.313
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream=1050.054 Downstream= 999.142
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream=1055.003 Downstream=1004.092
Upstream num= 4  Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream=1057.125 Downstream=1006.213
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream=1061.367 Downstream=1010.456
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev  1.1 -5.14 1.1 10.6 1 10.7 1
12.7

Pier Data
Pier Station Upstream=1064.196 Downstream=1013.284
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
```

```
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream=1069.145 Downstream=1018.234
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream=1071.267 Downstream=1020.355
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev  1.1 -5.14 1.1 10.6 1 10.7 1
12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream=1076.217 Downstream=1025.305
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream=1078.338 Downstream=1027.426
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream=1083.288 Downstream=1032.376
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream=1084.702 Downstream= 1033.79
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
```

```
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream=1088.237 Downstream= 1038.74
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7 Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
 Energy
 W.S. Pro Method

 W.S.Pro Data
 Left Embankment
 El of the top of the embankment = 13.4
 El of the toe of the abutment = -0.2
 Right Embankment
 El of the top of the embankment = 13.4
 El of the toe of the abutment = -0.2
 Abutment Type = 3 Sloping abutments and sloping embankments  Slope of
abutments = 4
 Top with of embankment = 15
 Centroid station of bridge opening =
 Wing Wall Type = No wing walls present
 Width =
 Angle =
 Radius =
 Guide Banks Type = No Guide Bank present  Length =
 Offset =
 Angle =

Selected Low Flow Methods = W.S.Pro Method

High Flow Method
 Energy Only

Additional Bridge Parameters
 Add Friction component to Momentum
 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION


RIVER: Taunton River
```

REACH: Main Stem RS: 12469.43

INPUT
Description: 15.3 -DS Face RR Br
Station Elevation Data num= 229
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 30.39 13.866 29.54 27.733
29.3 36.975 29.22 55.465 28.71 78.574 28.34 87.816 27.8 97.057 27.69 106.299
27.27 115.548 27.32 120.166 26.85 124.79 25.95 129.415 25.32 134.032 24.84
152.523 24.02 157.14 23.58 166.389 23.17 189.498 21.34 194.115 20.86 217.23
19.5 221.848 19.12 226.472 18.92 231.09 18.53 240.339 18.06 244.956 18.03
249.58 17.83 258.822 17.84 277.313 17 286.555 16.79 305.039 16.74 314.288
17.55 323.53 17.34 332.772 16.72 337.396 15.98 342.013 14.61 360.504 10.91
365.129 10.19 374.371 8.01 378.995 7.24 383.612 7.03 392.854 6.17 402.103
4.68 406.721 5.25 411.345 5.61 415.97 5.71 420.587 6 425.212 6.59 448.32
8.85 457.562 7.64 462.186 7.66 466.804 7.47 471.428 6.82 476.053 6.42
485.294 6.43 489.919 6.33 494.536 6.38 499.161 6.27 517.645 6.41 531.511
6.35 536.135 6.47 545.377 7.02 550.002 6.99 554.619 7.28 559.244 7.38
563.868 7.29 573.11 6.83 577.734 6.9 582.352 7.11 586.976 7.54 591.594 7.67
600.843 8.28 614.709 8.74 619.327 8.7 623.951 8.89 633.193 8.92 642.435 9.16
656.301 9.06 679.409 7.92 684.034 7.87 693.276 8.14 711.767 8.03 721.008
7.67 725.633 7.59 734.875 6.85 744.117 6.67 757.983 6.5 767.225 5.93 776.474
4.92 785.716 4.87 794.958 4.63 808.824 4.77 818.066 5.08 827.315 4.89
831.932 4.44 836.557 4.21 841.181 4.34 845.799 4.26 850.423 4.58 855.041
4.66 864.29 3.13 868.907 2.96 873.531 4.8 878.156 8.74 882.766 8.52 887.384
8.77 888.826 8.77 892.001 8.77 896.618 9.01 905.097 7.63 905.146 13.43
922.272 12.93 922.435 12.51 922.59 -.25 926.593 -1.49 933.353 -4.23 944.999
-4.95 956.701 -9.03 963.596 -10.71 972.095 -13.62 977.568 -3.93 992.757 -
2.311007.189 -1.221021.168 .231035.162 1.34 1040.96 1.9 1042.495 .871043.152
12.071043.272 11.71043.308 14.721076.676 14.3 1081.308 14.411085.932
14.371090.557 13.641095.188 11.671104.437 7.02 1109.062 5.971113.693
5.731118.318 5.681122.942 5.441127.574 5.3 1132.198 5.261136.823 5.141141.447
5.071146.079 5.141150.703 5.28 1155.328 5.291159.959 5.321164.584
5.431169.208 5.33 1173.84 5.08 1178.464 4.951183.089 4.881187.713
4.931192.345 5.051196.969 4.98 1201.594 4.781206.225 4.62 1210.85
4.581215.474 4.511220.099 4.49 1224.73 4.661229.355 4.671233.979
4.651238.611 4.741243.235 4.78 1247.86 4.921252.484 5.021257.116 5.07
1261.74 5.331270.996 5.29 1275.621 5.411280.245 5.721284.877 6.331289.501
7.31294.126 8.55 1298.75 10.211303.382 12.371308.006 14.381312.631
15.891317.262 16.69 1321.887 17.451326.511 18.091331.143 18.711335.767
19.31340.392 19.75 1345.016 20.161349.648 20.491354.272 20.841358.897
21.291363.528 21.77 1368.153 22.331372.777 22.931377.401 23.51382.033
23.941386.658 24.18 1391.282 24.391395.914 24.721405.163 25.291409.787
25.61414.419 25.83 1419.043 25.961423.668 26.181428.299 26.491432.924
26.871437.548 27.28 1446.804 27.661451.428 27.661456.053 27.631465.309
27.511469.934 27.68 1479.189 27.161483.814 27.081488.438 26.54 1493.07
26.91497.695 26.99 1502.319 26.971506.951 27.031511.575 27.45 1516.2
28.041520.824 29.08 1525.456 29.1 1530.08 28.771534.704 28.461539.336
28.211543.961 28.02 1548.585 27.98 1553.21 281557.841 281562.465 28.2

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 922.272 .0351043.308 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

922.2721043.308 83.23 42.79 17.93 .5 .5 Skew Angle = 45

CROSS SECTION

RIVER: Taunton River REACH: Main Stem RS: 12426.64

INPUT
Description: 15 - Exit RR Br
Station Elevation Data num= 207
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 30.29 6.53 30.35 13.06 30.38
19.59 30.26 26.11 30.06 32.64 29.81 39.17 29.48 45.7 29.06 52.23 28.79 58.76
28.7 65.29 28.68 71.81 28.63 78.34 28.67 84.87 28.58 91.4 28.32 97.93 28.22
104.46 28.14 110.99 27.95 117.51 28.2 124.04 28.25 130.57 28.09 137.1 27.82
143.63 27.74 150.16 27.53 156.69 27.44 163.21 27.06 176.27 26.81 182.8 26.53
189.33 26.02 195.86 25.46 208.91 24.69 215.44 24.35 221.97 24.07 228.5 23.93
235.03 23.57 241.56 22.92 248.08 22.43 254.61 22.12 261.14 21.72 267.67 21.4
274.2 21.24 280.73 20.87 287.26 20.44 293.78 19.96 300.31 19.63 306.84 19.5
313.37 19.28 319.9 19.02 326.43 19.02 332.96 19.08 339.48 18.78 346.01 18.38
359.07 17.97 372.13 17.42 378.66 17.17 385.18 17 391.71 17.04 398.24 16.83
411.3 17.04 417.83 17.38 424.36 17.68 430.88 17.82 437.41 17.71 443.94 17.95
450.47 18.22 457 18.12 463.53 18.08 470.06 17.88 476.58 17.48 483.11 16.75
489.64 15.83 496.17 14.61 502.7 13.74 509.23 12.58 522.28 10.06 528.81 8.96
535.34 7.95 548.4 6.22 554.93 5.72 561.45 5.36 567.98 4.8 574.51 4.86 581.04
5.09 587.57 5.4 594.1 6.23 600.63 8.26 607.15 9.33 613.68 8.78 620.21 8.02
626.74 7.35 633.27 7.34 639.8 7.51 646.33 7.58 652.85 7.48 659.38 6.95
665.91 6.47 672.44 6.38 678.97 6.36 685.5 6.38 692.03 6.28 698.55 6.12
705.08 6.03 711.61 6.12 718.14 6.47 724.67 6.46 731.2 6.39 737.73 6.48
744.25 6.95 750.78 7.48 757.31 7.47 763.84 7.54 913.11 3.61 1041.67 4.59
1121.32 4.87 1201.45 4.07 1203.35 1.71 1205.25 .24 1217.38 -5.61 1240.17 -
8.55 1277.46 -20.01 1284.43 -22.69 1303.24 -15.82 1315.73 -9.67 1364.17 .79
1367.47 4.01 1417.05 3.29 1472.54 3.18 1539.23 5.15 1545.78 5 1552.34 4.98
1558.9 4.89 1565.45 4.86 1572.01 4.78 1578.57 4.68 1585.12 4.67 1591.68 4.52
1598.24 4.34 1604.79 4.35 1611.35 4.34 1617.91 4.16 1624.46 4.03 1631.02
4.05 1637.58 4.11 1644.13 4.15 1650.69 4.09 1657.25 4.06 1663.8 4.17 1670.36
4.01 1676.92 4.2 1683.48 4.15 1690.03 4.5 1696.59 4.76 1703.15 4.88 1709.7
4.95 1716.26 5.16 1722.82 5.29 1729.37 5.65 1735.93 6.33 1742.49 7.67
1749.04 9.85 1755.6 12.23 1762.16 14.08 1768.71 15.27 1775.27 15.75 1781.83
16.04 1788.38 16.61 1794.94 17.22 1808.05 18.26 1821.17 19.44 1827.72 20.11
1840.84 21.22 1847.39 21.67 1853.95 22.24 1860.51 22.89 1867.06 23.37
1873.62 23.82 1880.18 24.4 1886.73 24.85 1893.29 25.32 1899.85 25.7 1906.4
26.05 1912.96 26.27 1919.52 26.44 1926.07 26.51 1939.19 26.54 1945.74 26.57
1958.86 26.72 1985.09 27.2 1991.64 27.26 1998.2 26.97 2004.76 26.79 2011.31
26.88 2017.87 26.87 2024.43 26.73 2030.98 26.54 2037.54 26.4 2044.1 26.47
2050.65 26.42 2057.21 26.35 2063.77 26.61 2076.88 27.42 2083.44 27.97
2089.99 28.34 2096.55 28.57 2103.11 28.76 2116.22 29.09 2122.78 29.24

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 1201.45 .035 1367.47 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1201.45
1367.47 810.43 834.52 1253.76 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 11592.12

INPUT Description: 14
Station Elevation Data num= 322
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 32.7 6.53 32.87 13.06 33.06 19.59 33.09 26.12 32.94 32.65 32.53 39.17 32.21 45.7 31.99 52.23 31.85 58.76 31.6 65.29 31.18 71.82 30.91 78.35 30.48 84.88 29.99 91.41 29.36 97.94 28.75 104.46 28.39 110.99 28.17 117.52 27.84 124.05 27.18 130.58 26.67 137.11 26.45 143.64 25.94 150.17 24.98 156.7 23.98 163.23 22.92 169.75 22.26 176.28 21.67 182.81 21.15 189.34 20.71 195.87 20.41 208.93 20.13 215.46 20.01 221.99 19.74 228.52 19.56 235.04 19.65 241.57 19.63 248.1 19.58 254.63 19.48 261.16 19.15 267.69 18.95 274.22 18.95 280.75 19.23 287.28 19.39 293.81 19.26 300.34 19.19 313.39 18.88 326.45 18.51 332.98 18.35 339.51 18.35 346.04 18.45 352.57 18.49 359.1 18.4 372.15 18.43 378.68 18.23 385.21 18.11 391.74 18.44 398.27 18.65 411.33 18.99 417.86 19.2 424.39 19.24 430.92 19.15 437.44 19.17 443.97 18.93 450.5 18.71 457.03 18.55 463.56 18.47 470.09 18.78 476.62 18.45 483.15 17.65 489.68 16.58 496.21 15.77 502.73 15.22 509.26 14.7 515.79 13.84 522.32 12.82 528.85 11.46 541.91 7.93 548.44 6.85 554.97 6.08 561.5 5.49 568.02 4.86 574.55 4.41 581.08 4 587.61 3.94 594.14 4.23 600.67 4.4 607.2 4.43 613.73 4.85 620.26 5.64 626.79 6.79 633.31 7.37 639.84 7.33 646.37 7.27 659.43 7.02 665.96 7.12 672.49 7.19 679.02 7.21 685.55 7.18 692.08 7.02 698.61 7.1 705.13 7.3 711.66 7.28 718.19 7.05 724.72 6.77 731.25 6.44 737.78 6.06 750.84 5.47 757.37 5.21 763.9 5.05 770.42 5.28 783.48 6.47 790.01 7.02 796.54 7.76 803.07 8.53 809.6 8.85 822.66 8.92 829.19 9.06 835.71 9.27 842.24 9.31 848.77 9.09 855.3 8.65 861.83 8.11 868.36 7.63 874.89 7.34 881.42 7.41 894.48 7.69 901 7.8 907.53 7.86 914.06 7.82 920.59 7.65 927.12 7.84 933.65 8.05 940.18 8.03 953.15 7.95 959.6 7.56 966.05 7.24 972.49 6.81 985.38 5.64 991.83 5.18 998.27 4.49 1004.72 3.99 1011.16 3.85 1017.61 3.79 1024.06 3.85 1030.5 4.01 1036.95 4.28 1043.39 4.5 1049.84 4.47 1056.28 4.29 1062.73 4.24 1069.18 4.44 1075.62 4.46 1082.07 4.57 1088.51 4.66 1094.96 4.43 1101.4 4.76 1107.85 5.11 1114.3 5.31 1120.74 5.56 1127.19 5.52 1133.63 4.87 1140.08 3.24 1146.52 2.15 1153.06 .79 1165 -1.26 1165.05 -1.25 1165.49 -1.55 1168.05 -4.02 1168.64 -3.63 1169.27 -3.87 1169.82 -4.62 1170.38 -4.91 1171.34 -4.97 1172.91 -5.66 1175 -6.14 1177.08 -7.08 1179.23 -7.34 1181.08 -7.57 1183 -7.69 1184.76 -7.75 1186.69 -7.86 1188.64 -7.88 1190.93 -7.92 1192.98 -8.05 1195.19 -8.05 1197.03 -8.31 1199.24 -8.39 1201.37 -8.62 1205.92 -8.7 1208.27 -8.64 1210.54 -8.59 1213.11 -8.35 1215.52 -8.19 1217.89 -8.05 1220.17 -7.86 1222.41 -7.71 1224.3 -7.6 1226.1 -7.51 1227.61 -7.41 1229.1 -7.22 1230.31 -7.08 1231.53 -7.1 1232.6 -7.02 1233.71 -6.96 1234.69 -6.9 1235.69 -6.79 1236.59 -6.87 1237.54 -6.82 1238.4 -6.7 1239.37 -6.72 1240.26 -6.6 1241.29 -6.54 1242.23 -6.24 1243.36 -6.01 1244.63 -5.36 1245.94 -4.85 1247.2 -4.3 1248.6 -3.74 1249.84 -3.1 1251.21 -2.54 1252.55 -2.28 1253.33 -1.92 1254.01 -1.68 1254.7 -1.46 1255.27 -.91 1270.42 2.42 1276.8 5.19 1283.18 6.25 1286.15 6.53 1289.55 6.86 1295.93 7.37 1302.31 8.33 1308.69 11.15 1315.06 13.33 1321.44 15.25 1327.82 18.11 1340.57 21.99 1346.95 23.54 1353.33 24.05 1359.71 24.69 1372.46 25.64 1378.84 26.24 1391.83 26.4 1398.32 26.31 1411.3 25.34 1417.8 24.67 1424.29 24.36 1437.27 24.55 1456.75 25.27 1469.74 25.49 1476.23 25.82 1489.21 25.9 1495.71 26.06 1502.2 25.93 1508.69 25.35 1515.18 23.04 1528.17 15.1 1534.66 11.59 1541.16 9.8 1547.65 9.89 1554.14 9.18 1560.63 10.08 1567.13 11.55

1573.62 12.63 1580.11 12.96 1586.6 14.84 1593.1 17.55 1599.59 19.76 1606.08 21.46 1612.57 21.99 1619.07 21.66 1625.56 20.92 1632.05 19.74 1638.54 17.16 1645.04 15.23 1651.53 14.82 1671.01 15.48 1683.99 16.23 1690.48 16.91 1703.47 19.76 1709.96 22.39 1716.45 23.16 1722.95 23.57 1729.44 23.78 1735.9 22.35 1742.36 20.32 1748.82 18.08 1768.2 18.03 1787.59 18.97 1800.51 19.39 1813.43 20.12 1819.89 20.1 1832.81 20.34 1839.27 20.2 1845.73 20.56 1858.65 21.76 1865.11 22.74 1871.58 23.16 1878.04 23.36 1890.96 23.25 1897.42 23.77 1903.88 24.83 1929.72 26.13 1936.18 26.36 1942.64 27.89 1949.1 28.76 1955.56 29.31 1974.95 29.56 1981.41 29.53 2007.25 28.64 2026.63 28.32 2039.55 27.8 2046.01 27.25 2052.48 27.1 2065.4 27.39 2078.32 27.16 2084.78 27.32 2091.24 27.67 2097.7 28.16 2104.16 28.44 2110.62 28.56

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 1127.19 .035 1378.84 .088

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1127.19 1378.84 680.73 637.06 583.23 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 1515 2110.62 23 T

CROSS SECTION

RIVER: Taunton River REACH: Main Stem RS: 10955.06

INPUT
Description: 13 - Approach County St (Rte 140) Br
Station Elevation Data num= 178
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 27.18 13.01 27.4 19.52 27.3 26.03 27.28 32.53 27.29 39.04 27.36 85.43 26.59 298.37 16.17 447.49 15.67 606.13 13.97 681.58 16.52 700.61 16.55 703.41 15.25 704.03 -2.21 718.35 -4.16 736.89 -5.23 749.83 -2.62 752.75 10.85 757.07 10.83 759.04 -4.05 768.77 -6.13 777.69 -6.22 787.46 -4.58 800.53 -1.82 804.74 16.7 893.09 14.19 954.9 15.35 975.18 24.27 978.31 18.48 978.54 21.97 1078.67 20.98 1091.78 21.29 1098.33 21.28 1104.88 21.78 1111.44 22.9 1117.99 23.48 1124.54 23.56 1131.1 23.26 1137.65 23.41 1163.87 24.11 1170.42 24.39 1176.97 24.49 1183.53 24.43 1190.08 24.24 1196.64 24.22 1203.19 24.26 1209.74 24.16 1216.3 24.48 1222.85 25.85 1229.4 27.63 1235.96 28.29 1249.07 28.34 1262.17 28.07 1275.28 27.48 1281.83 27.35 1288.39 27.33 1301.5 27.34 1308.05 27.37 1314.6 27.13 1327.71 26.75 1334.26 26.45 1340.82 26.41 1347.37 26.44 1353.92 26.55 1360.46 26.74 1367.01 26.78 1373.55 26.75 1380.1 26.86 1386.64 27.22 1393.19 28.28 1399.73 28.47 1406.28 28.59 1412.82 28.53 1432.46 28.15 1439.01 27.96 1445.55 27.4 1452.1 27.08 1458.64 27.11 1471.73 27.03 1478.28 27.05 1484.82 27.09 1491.37 27.11 1504.46 27.06 1511 27.07 1517.55 27.1 1524.1 27.22 1530.64 27.19 1537.19 27.13 1543.73 27.3 1550.28 27.4 1556.82 25.52 1563.37 21.64 1569.91 15.39 1576.46 10.42 1583 9.64 1589.55 9.69 1596.09 11.1 1602.64 14.52 1609.18 17.77 1615.73 18.5 1622.27 18.41 1628.82 18.74 1635.37 19.9 1641.91 21.86 1648.46 23.56 1655 24.18 1661.55 24.49 1668.09 24.29 1674.64 23.48 1681.18 21.72 1687.73 19.06 1694.27 17.53 1700.82 17.29 1707.36 17.64 1713.91 18.11 1720.45 18.43 1727 19.02 1733.55 20.47 1740.09 23.24 1746.64 24.3 1753.18 24.72 1759.73 25.12 1766.27 25.24 1772.82 25.13 1779.33 24.63 1785.84 23.1 1792.34 19.63 1798.85 18.79 1805.36 19.22 1811.87 19.5 1818.38 19.95 1824.89 20.34 1831.4 20.65 1844.42 21.1 1850.93 21.18

1857.43 21.44 1863.94 21.82 1870.45 22.15 1876.96 22.44 1889.98 22.93
1896.49 23.24 1903 23.43 1909.51 23.3 1916.02 23.71 1922.52 24.02 1929.03
24.21 1935.54 24.67 1942.05 25.03 1948.56 25 1955.07 25.77 1961.58 26.14
1974.6 26.4 1981.11 26.82 1987.61 28.47 1994.12 29.38 2013.65 29.39 2020.16
29.38 2026.67 29.47 2033.18 29.34 2039.69 29.04 2046.2 28.76 2059.21 28.68
2065.72 28.49 2072.23 27.84 2078.74 27.1 2085.25 26.88 2091.76 27.16 2098.27
27.33 2104.78 27.27 2111.29 27.25 2117.79 27.19 2124.3 27.42 2130.81 27.73
2137.32 28.15 2143.83 28.12 2150.34 28.12 2156.85 28.09 2163.36 28.29

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 700.61 .035 804.74 .088

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 700.61
804.74 122 83.42 73.8 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 1400 2163.36 28 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 10871.64

INPUT
Description: 12.7 - US Face County St (rte140) Br
Station Elevation Data num= 348
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 22.12 5.918 22.22 11.827
22.26 17.746 22.32 23.655 22.31 29.573 22.34 35.482 22.28 41.4 22.2 47.309
22.19 53.227 22.03 59.146 21.71 65.055 21.52 70.973 21.56 76.882 21.75 82.8
21.97 94.628 22.48 100.537 22.77 106.455 22.98 112.373 23.02 118.282 23.04
124.2 23.04 130.11 22.96 141.937 22.91 147.855 22.91 153.773 23.11 159.682
23.12 165.601 22.97 177.428 23.06 183.337 23.03 195.164 22.94 201.083 22.92
207.001 22.96 212.91 22.95 218.828 22.82 224.737 22.81 236.564 22.86 248.392
23.08 254.31 23.16 260.228 23.16 266.137 23.12 272.055 23.17 277.965 23.26
283.883 23.25 289.792 23.2 301.619 23.49 307.537 23.5 313.456 23.77 319.365
24.47 325.283 24.89 331.192 25.01 337.11 25.05 343.019 25.04 354.856 24.94
366.683 25.25 372.592 25.22 378.51 25.14 384.42 24.91 390.338 24.35 396.247
23.74 402.165 23.31 408.083 22.8 413.992 22.54 419.911 22.44 425.82 22.32
431.738 22.23 437.647 22.36 443.565 22.34 449.474 22.45 455.392 22.49
461.311 22.6 467.22 22.54 473.138 22.44 479.047 22.62 490.874 22.09 496.793
22.16 502.702 21.9 508.62 21.85 514.538 21.78 520.447 21.51 526.365 21.6
532.275 21.61 538.193 21.6 544.102 21.11 550.02 20.66 555.929 20.54 561.847
20.25 567.766 20.46 573.675 20.24 579.593 20.13 585.502 20.25 591.42 20.26
597.329 20.13 603.248 19.84 609.166 18.73 615.075 17.9 620.993 17.6 626.902
17.55 632.82 17.09 638.729 16.67 644.648 16.58 650.557 16.51 662.393 16.14
668.302 15.98 674.221 15.77 680.13 15.62 691.957 15.43 697.875 15.48 703.784
15.47 709.702 15.54 715.621 15.78 721.53 16 733.357 15.97 739.275 15.97
745.184 15.91 751.103 16.28 757.021 16.63 762.93 16.65 768.848 17.38 774.757
18.44 780.675 18.64 786.585 18.49 792.503 18.25 798.412 17.94 810.248 17.7
816.157 17.36 822.076 15.75 827.985 14.16 833.903 13.84 839.812 13.38 845.73
13.06 851.639 13.42 857.558 13.82 863.476 14.15 875.285 14.2 881.194 14.25
887.094 14.37 892.994 14.71 898.894 15.11 904.803 15.2 910.703 15.38 916.603
15.67 922.504 15.67 928.413 15.17 940.213 14.34 969.749 16.77 976.447 17.36

996.893 17.7 996.93 -1.091009.591 -5.331025.478 -4.39 1034.043 .511041.511 -
4.991054.063 -5.261058.368 -6.03 1062.99 17.87 1128.906 15.841134.716
15.451140.525 15.121146.343 14.871152.153 14.48 1157.962 14.621163.772
15.311169.581 15.461175.391 14.92 1181.2 14.47 1187.009 14.341192.819
14.071198.628 13.951204.438 14.031210.247 14.06 1216.057 14.131221.866
14.291227.685 14.281233.494 14.391239.303 14.61 1250.922 14.781256.859
14.851268.731 14.741274.667 14.791280.604 14.65 1286.54 14.571298.413
15.021304.349 15.231310.276 15.361316.213 15.45 1322.149 15.661328.085
15.831334.022 16.121339.958 16.331345.894 16.49 1351.831 16.741357.767
17.041363.703 17.62 1369.64 19.191375.576 21.34 1381.512 21.651387.448
21.581399.321 21.931405.257 22.15 1417.13 22.65 1423.066 22.941429.003
23.271434.939 23.491440.875 23.631446.812 23.64 1452.748 23.681458.684
23.671464.621 23.641470.557 23.81482.421 23.95 1488.357 24.13 1494.23
24.241500.103 24.391505.975 24.61511.848 24.79 1517.721 24.921523.594
25.221529.467 25.82 1535.34 26.121541.213 26.38 1547.086 27.071552.958
27.461558.831 27.481570.577 27.43 1576.45 27.49 1582.323 27.431588.196
27.41594.059 27.391599.932 27.411605.805 27.29 1611.678 27.241617.551
27.161623.424 27.131629.297 27.2 1635.17 27.43 1641.042 27.731664.697
28.151670.624 28.311676.543 28.21 1682.47 28.25 1688.397 28.171694.324
28.181700.252 28.161712.106 28.21718.033 28.11 1723.961 28.081729.888
281735.815 28.031741.733 27.971747.661 27.85 1753.588 28.031759.515
27.911765.442 28.03 1771.37 28.181777.297 28.18 1783.224 28.131789.151
28.231801.006 28.181806.924 28.071812.851 28.17 1818.779 27.141824.706
19.841830.633 11.63 1836.56 9.511842.488 9.79 1848.415 12.821860.269
25.851866.188 27.871872.115 27.771878.042 27.02 1883.969 25.971889.896
25.131895.824 24.581901.751 24.511907.678 24.93 1913.605 25.561919.533 26.01
1925.46 25.051931.378 23.911937.306 22.97 1943.233 22.31 1949.16
22.071955.087 22.221961.015 22.611966.942 23.19 1972.869 23.91978.796
24.721984.723 25.651990.651 25.761996.569 25.95 2002.496 26.162008.423
26.262014.351 26.212020.278 26.482026.196 26.1 2032.123 25.462038.042 25.06
2043.96 25.162055.805 25.212061.733 25.28 2067.651 25.182073.578
25.282079.496 25.362091.342 25.69 2097.26 26.01 2103.187 26.152109.105
26.142115.032 26.12120.951 25.942126.878 25.63 2132.796 25.722138.723
25.942144.642 26.272150.569 26.482162.405 26.41 2174.25 26.442180.178
26.52186.096 26.642197.941 26.462203.869 27.32 2209.787 28.372221.632
28.382227.551 28.42233.478 28.342245.323 28.42 2251.241 28.422257.169
28.462263.087 28.482269.014 28.382274.932 27.51 2280.85 26.942286.778
26.722292.696 26.812298.623 26.872304.542 26.95 2310.469 26.942316.387
272322.314 27.012334.159 27.192345.996 27.25 2351.923 27.142357.842
27.182363.769 27.282369.687 27.262375.614 27.33 2381.532 27.522387.459
27.62393.378 27.52

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 996.893 .035 1062.99 .088

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 996.893
1062.99 69.68 77.94 70.04 .6 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 18002393.378 28 T
Skew Angle = 25

BRIDGE

RIVER: Taunton River
REACH: Main Stem RS: 10832.75

INPUT
Description:
Distance from Upstream XS = 5
Deck/Roadway Width = 55
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
 num= 21
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 270.99 23 402.4 23.21 626.26 17.21
 708.73 15.41 886.37 15.12 941.65 16.96
 992.41 17.7 12.53 1041.35 17.9 12.29 1043.16 17.93 12.29
 1075.79 17.8 12.29 1087.57 17.61 1102.07 17.5
 1159.17 16 1224.42 13.49 1252.52 14.16
 1316.87 15.27 1382.12 20.62 1433.78 24.08
 1456.44 25.34 1513.53 26.75 1547 26.75
 Upstream Bridge Cross Section Data
Station Elevation Data num= 348
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 22.12 5.918 22.22 11.827
22.26 17.746 22.32 23.655 22.31 29.573 22.34 35.482 22.28 41.4 22.2 47.309
22.19 53.227 22.03 59.146 21.71 65.055 21.52 70.973 21.56 76.882 21.75 82.8
21.97 94.628 22.48 100.537 22.77 106.455 22.98 112.373 23.02 118.282 23.04
124.2 23.04 130.11 22.96 141.937 22.91 147.855 22.91 153.773 23.11 159.682
23.12 165.601 22.97 177.428 23.06 183.337 23.03 195.164 22.94 201.083 22.92
207.001 22.96 212.91 22.95 218.828 22.82 224.737 22.81 236.564 22.86 248.392
23.08 254.31 23.16 260.228 23.16 266.137 23.12 272.055 23.17 277.965 23.26
283.883 23.25 289.792 23.2 301.619 23.49 307.537 23.5 313.456 23.77 319.365
24.47 325.283 24.89 331.192 25.01 337.11 25.05 343.019 25.04 354.856 24.94
366.683 25.25 372.592 25.22 378.51 25.14 384.42 24.91 390.338 24.35 396.247
23.74 402.165 23.31 408.083 22.8 413.992 22.54 419.911 22.44 425.82 22.32
431.738 22.23 437.647 22.36 443.565 22.34 449.474 22.45 455.392 22.49
461.311 22.6 467.22 22.54 473.138 22.44 479.047 22.62 490.874 22.09 496.793
22.16 502.702 21.9 508.62 21.85 514.538 21.78 520.447 21.51 526.365 21.6
532.275 21.61 538.193 21.6 544.102 21.11 550.02 20.66 555.929 20.54 561.847
20.25 567.766 20.46 573.675 20.24 579.593 20.13 585.502 20.25 591.42 20.26
597.329 20.13 603.248 19.84 609.166 18.73 615.075 17.9 620.993 17.6 626.902
17.55 632.82 17.09 638.729 16.67 644.648 16.58 650.557 16.51 662.393 16.14
668.302 15.98 674.221 15.77 680.13 15.62 691.957 15.43 697.875 15.48 703.784
15.47 709.702 15.54 715.621 15.78 721.53 16 733.357 15.97 739.275 15.97
745.184 15.91 751.103 16.28 757.021 16.63 762.93 16.65 768.848 17.38 774.757
18.44 780.675 18.64 786.585 18.49 792.503 18.25 798.412 17.94 810.248 17.7
816.157 17.36 822.076 15.75 827.985 14.16 833.903 13.84 839.812 13.38 845.73
13.06 851.639 13.42 857.558 13.82 863.476 14.15 875.285 14.2 881.194 14.25
887.094 14.37 892.994 14.71 898.894 15.11 904.803 15.2 910.703 15.38 916.603
15.67 922.504 15.67 928.413 15.17 940.213 14.34 969.749 16.77 976.447 17.36
996.893 17.7 996.93 -1.091009.591 -5.331025.478 -4.39 1034.043 .511041.511 -
4.991054.063 -5.261058.368 -6.03 1062.99 17.87 1128.906 15.841134.716
15.451140.525 15.121146.343 14.871152.153 14.48 1157.962 14.621163.772
15.311169.581 15.461175.391 14.92 1181.2 14.47 1187.009 14.341192.819
14.071198.628 13.951204.438 14.031210.247 14.06 1216.057 14.131221.866
14.291227.685 14.281233.494 14.391239.303 14.61 1250.922 14.781256.859
14.851268.731 14.741274.667 14.791280.604 14.65 1286.54 14.571298.413

```
15.021304.349 15.231310.276 15.361316.213 15.45 1322.149 15.661328.085
15.831334.022 16.121339.958 16.331345.894 16.49 1351.831 16.741357.767
17.041363.703 17.62 1369.64 19.191375.576 21.34 1381.512 21.651387.448
21.581399.321 21.931405.257 22.15 1417.13 22.65 1423.066 22.941429.003
23.271434.939 23.491440.875 23.631446.812 23.64 1452.748 23.681458.684
23.671464.621 23.641470.557 23.81482.421 23.95 1488.357 24.13 1494.23
24.241500.103 24.391505.975 24.61511.848 24.79 1517.721 24.921523.594
25.221529.467 25.82 1535.34 26.121541.213 26.38 1547.086 27.071552.958
27.461558.831 27.481570.577 27.43 1576.45 27.49 1582.323 27.431588.196
27.41594.059 27.391599.932 27.411605.805 27.29 1611.678 27.241617.551
27.161623.424 27.131629.297 27.2 1635.17 27.43 1641.042 27.731664.697
28.151670.624 28.311676.543 28.21 1682.47 28.25 1688.397 28.171694.324
28.181700.252 28.161712.106 28.21718.033 28.11 1723.961 28.081729.888
281735.815 28.031741.733 27.971747.661 27.85 1753.588 28.031759.515
27.911765.442 28.03 1771.37 28.181777.297 28.18 1783.224 28.131789.151
28.231801.006 28.181806.924 28.071812.851 28.17 1818.779 27.141824.706
19.841830.633 11.63 1836.56 9.511842.488 9.79 1848.415 12.821860.269
25.851866.188 27.871872.115 27.771878.042 27.02 1883.969 25.971889.896
25.131895.824 24.581901.751 24.511907.678 24.93 1913.605 25.561919.533 26.01
1925.46 25.051931.378 23.911937.306 22.97 1943.233 22.31 1949.16
22.071955.087 22.221961.015 22.611966.942 23.19 1972.869 23.91978.796
24.721984.723 25.651990.651 25.761996.569 25.95 2002.496 26.162008.423
26.262014.351 26.212020.278 26.482026.196 26.1 2032.123 25.462038.042 25.06
2043.96 25.162055.805 25.212061.733 25.28 2067.651 25.182073.578
25.282079.496 25.362091.342 25.69 2097.26 26.01 2103.187 26.152109.105
26.142115.032 26.12120.951 25.942126.878 25.63 2132.796 25.722138.723
25.942144.642 26.272150.569 26.482162.405 26.41  2174.25 26.442180.178
26.52186.096 26.642197.941 26.462203.869 27.32 2209.787 28.372221.632
28.382227.551 28.42233.478 28.342245.323 28.42 2251.241 28.422257.169
28.462263.087 28.482269.014 28.382274.932 27.51  2280.85 26.942286.778
26.722292.696 26.812298.623 26.872304.542 26.95 2310.469 26.942316.387
272322.314 27.012334.159 27.192345.996 27.25 2351.923 27.142357.842
27.182363.769 27.282369.687 27.262375.614 27.33 2381.532 27.522387.459
27.62393.378 27.52

Manning's n Values num= 3  Sta n Val Sta n Val Sta n Val
 0 .085 996.893 .035 1062.99 .088

Bank Sta: Left Right Coeff Contr. Expan.
 996.893 1062.99 .6 .5
Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 18002393.378 28 T
Skew Angle = 25

Downstream Deck/Roadway Coordinates
 num= 21
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 270.99 25.35 402.4 23.21 626.26 17.21
 708.73 15.41 886.37 15.12 941.65 16.96
 992.41 17.7 12.53 1041.35 17.9 12.29 1043.16 17.93 12.29
 1075.79 17.8 12.29 1087.57 17.61 1102.07 17.5
 1159.17 16 1224.42 13.49 1252.52 14.16
 1316.87 15.27 1382.12 20.62 1433.78 24.08
```

1456.44 25.34 1513.53 26.75 1725 26.75

Downstream Bridge Cross Section Data Station Elevation Data num= 379
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 22.57 5.927 22.65 11.855
22.7 17.782 22.67 23.709 22.79 29.636 22.86 35.564 22.87 41.491 22.89 47.418
22.83 53.345 22.81 59.282 22.85 65.209 22.82 71.136 22.81 77.063 22.88
82.991 22.95 88.918 22.99 94.845 22.99 100.772 23.05 106.7 23.15 112.627
23.18 118.554 23.11 124.481 23.29 130.409 23.38 136.336 23.43 142.263 23.48
148.19 23.62 154.118 23.75 160.045 23.8 165.972 23.77 171.908 23.67 177.836
23.55 183.763 23.62 189.69 23.7 195.617 24.01 201.545 24.51 207.472 24.86
213.399 24.87 219.326 24.78 225.254 24.82 231.181 24.87 237.108 24.86
243.036 24.85 248.963 24.93 254.89 24.64 260.817 24.72 266.745 24.75 272.672
24.85 278.599 24.8 284.535 24.82 290.463 24.9 296.39 24.83 302.317 24.91
308.244 25.04 314.172 25.31 320.099 25.68 326.026 26.28 331.953 26.39
337.881 26.41 343.808 26.43 349.735 26.34 355.662 26.06 361.59 25.86 367.517
25.7 373.444 25.61 379.371 25.38 385.299 25.1 391.226 24.67 397.162 24.14
403.089 23.91 409.017 23.54 414.944 23.5 420.871 23.41 426.798 23.24 432.726
23.08 438.653 22.59 444.58 22.36 450.507 21.93 456.435 21.4 462.362 21.25
468.289 21.26 474.216 21.22 480.144 21.09 486.071 21.26 491.998 21.61
497.926 21.7 503.853 21.97 509.78 21.9 515.716 20.86 521.644 20.44 527.571
19.9 533.498 19.65 539.425 19.69 545.353 19.53 557.207 19.23 569.062 18.9
574.989 18.8 580.916 18.65 586.843 18.32 592.771 18.32 598.698 18.2 604.625
17.82 610.552 17.63 616.48 17.61 622.407 17.42 640.198 17.31 652.052 17.26
663.907 17.11 669.834 16.94 675.761 16.62 681.688 16.45 687.616 16.35
693.543 16.39 699.47 16.58 705.398 16.71 711.325 16.78 717.252 16.88 729.107
16.97 735.034 17 740.97 17.01 746.897 16.98 752.825 16.95 758.752 17.11
764.679 17.2 770.606 17.14 776.534 17.11 782.461 17.07 788.388 17 794.315
16.9 800.243 16.65 806.17 16.1 812.097 15.5 818.024 15.01 823.952 14.75
829.879 14.68 835.806 14.5 841.733 14.26 847.661 14.13 853.597 14.11 859.524
13.99 865.451 13.74 871.379 13.34 877.306 12.87 883.233 12.44 889.16 11.97
895.088 11.83 901.015 11.72 906.942 11.6 912.869 11.59 918.797 11.77 924.724
12.06 930.651 12.9 936.578 13.39 945.225 15.11 951.098 14.73 978.812 16.77
985.51 17.361005.956 17.71005.993 -1.091018.654 -5.331034.541 -4.39 1043.106
.511050.574 -4.991063.126 -5.261067.431 -6.031072.053 17.87 1125.843
15.981131.679 16.021137.525 16.181143.371 16.481149.207 16.12 1155.053
16.081160.899 15.911166.735 15.811172.581 15.831178.427 15.66 1184.263
15.531190.109 15.511195.946 15.461201.791 15.811207.637 15.83 1213.474
15.441219.319 15.451225.165 15.061231.002 14.681236.847 14.38 1242.693 14.24
1248.53 14.131254.375 13.951260.212 13.871266.058 13.91 1271.903
14.051283.586 14.271289.431 14.321301.114 14.411306.986 14.32 1312.868
14.221324.623 14.361330.505 14.42 1342.26 14.451348.133 14.41 1359.888
14.561371.642 14.931377.525 15.121383.406 15.351389.279 15.5 1395.161
15.421406.916 161418.671 171424.544 17.231430.426 17.44 1436.299 17.75
1442.18 18.091448.062 18.491453.935 18.7 1465.69 19.22 1471.572 20.351477.445
20.761483.327 20.78 1489.2 20.671495.082 20.73 1506.836 21.211512.709
21.561524.473 21.71530.346 22.021542.101 22.59 1547.983 22.71553.856
22.711559.738 22.79 1565.61 22.871577.365 23.07 1583.247 23.181600.884
23.741606.757 24.21612.639 24.31618.512 24.34 1630.267 24.541636.148
24.731642.021 24.641647.903 24.571653.776 24.45 1665.54 25.121671.413
25.211677.295 25.141683.168 25.11 1689.05 25.09 1694.922 25.11700.804
25.121706.677 25.011712.559 24.791718.432 24.79 1724.323 25.471730.205
26.851736.087 26.831741.969 26.81747.851 26.24 1753.733 25.881759.615
25.681765.497 25.511771.379 25.09 1777.27 24.64 1783.152 24.371789.033
24.511794.915 24.621800.797 24.831806.679 24.95 1812.561 25.251818.443

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25.781824.334 26.141830.216 26.081836.098 25.93  1841.98 25.781847.862
25.651853.744 25.531859.626 25.411865.508 25.35 1871.399 25.21877.281
24.181883.163 21.191889.045 15.461894.927 9.73 1900.808 9.5 1906.69
10.591912.572 14.451918.454 19.371924.345 23.96 1930.227 26.171936.109
26.171941.991 26.231947.873 26.481953.755 26.29 1959.637 26.031965.519 25.85
1971.41 25.791977.292 25.791983.174 25.76 1989.056 25.641994.938
25.572000.819 25.532006.701 25.432012.583 25.34 2018.474 25.112024.356
25.092030.238 25.09 2036.12 24.962042.002 24.9 2047.884 24.642053.766
24.512059.648 24.352065.539 24.192071.421 23.93 2077.303 23.722083.185
23.432089.067 23.262094.949 23.072100.831 22.95 2106.712 22.92112.604
22.782118.485 22.92124.358 23.482130.231 24.02 2136.104 24.272141.977 24.2
2147.85 24.352153.723 24.572159.596 24.8 2165.469 24.842171.341 24.822177.214
24.792183.087 24.68 2188.96 24.54 2194.842 24.262200.715 24.072206.588 24.68
2212.46 24.222218.333 24.2 2224.206 24.042230.079 23.912235.952 23.962241.825
24.172247.698 24.29 2253.571 24.582259.444 24.822265.316 252271.189
25.12277.071 25.13 2282.944 25.062288.817 24.99 2294.69 24.932300.562
24.872306.436 24.82 2312.309 24.582318.181 24.552324.054 24.582329.927 24.46
2335.8 24.1 2341.673 24.042347.546 24.262353.427 23.882359.301 23.522365.173
24.02 2371.046 25.122376.919 25.752382.792 26.162388.665 26.572394.538 26.91
2400.411 26.982406.283 27.052412.156 27.042418.029 26.732423.902 26.61
2429.775 26.412435.657 26.45 2441.53 26.532447.403 26.652453.275 26.75
2459.148 26.952465.021 27.122470.894 27.42476.767 27.52

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .0851005.956 .0351072.053 .088

Bank Sta: Left Right Coeff Contr. Expan.
 1005.9561072.053 .5 .5
Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 18502476.767 25 T
Skew Angle = 25

Upstream Embankment side slope = 0 horiz. to 1.0 vertical Downstream
Embankment side slope = 0 horiz. to 1.0 vertical Maximum allowable
submergence for weir flow = .98 Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
 Energy
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
 Pressure and Weir flow
 Submerged Inlet Cd =
 Submerged Inlet + Outlet Cd = .8
 Max Low Cord =

Additional Bridge Parameters
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 Add Friction component to Momentum
 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION


RIVER: Taunton River
REACH: Main Stem RS: 10793.7

INPUT Description: 12.3- DS Face County St (Rte140) Br
Station Elevation Data num= 379
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  0 22.57 5.927 22.65 11.855
22.7 17.782 22.67 23.709 22.79  29.636 22.86 35.564 22.87 41.491 22.89 47.418
22.83 53.345 22.81  59.282 22.85 65.209 22.82 71.136 22.81 77.063 22.88
82.991 22.95  88.918 22.99 94.845 22.99 100.772 23.05 106.7 23.15 112.627
23.18  118.554 23.11 124.481 23.29 130.409 23.38 136.336 23.43 142.263 23.48
148.19 23.62 154.118 23.75 160.045 23.8 165.972 23.77 171.908 23.67  177.836
23.55 183.763 23.62 189.69 23.7 195.617 24.01 201.545 24.51  207.472 24.86
213.399 24.87 219.326 24.78 225.254 24.82 231.181 24.87  237.108 24.86
243.036 24.85 248.963 24.93 254.89 24.64 260.817 24.72  266.745 24.75 272.672
24.85 278.599 24.8 284.535 24.82 290.463 24.9  296.39 24.83 302.317 24.91
308.244 25.04 314.172 25.31 320.099 25.68  326.026 26.28 331.953 26.39
337.881 26.41 343.808 26.43 349.735 26.34  355.662 26.06 361.59 25.86 367.517
25.7 373.444 25.61 379.371 25.38  385.299 25.1 391.226 24.67 397.162 24.14
403.089 23.91 409.017 23.54  414.944 23.5 420.871 23.41 426.798 23.24 432.726
23.08 438.653 22.59  444.58 22.36 450.507 21.93 456.435 21.4 462.362 21.25
468.289 21.26  474.216 21.22 480.144 21.09 486.071 21.26 491.998 21.61
497.926 21.7  503.853 21.97 509.78 21.9 515.716 20.86 521.644 20.44 527.571
19.9  533.498 19.65 539.425 19.69 545.353 19.53 557.207 19.23 569.062 18.9
574.989 18.8 580.916 18.65 586.843 18.32 592.771 18.32 598.698 18.2  604.625
17.82 610.552 17.63 616.48 17.61 622.407 17.42 640.198 17.31  652.052 17.26
663.907 17.11 669.834 16.94 675.761 16.62 681.688 16.45  687.616 16.35
693.543 16.39 699.47 16.58 705.398 16.71 711.325 16.78  717.252 16.88 729.107
16.97 735.034 17 740.97 17.01 746.897 16.98  752.825 16.95 758.752 17.11
764.679 17.2 770.606 17.14 776.534 17.11  782.461 17.07 788.388 17 794.315
16.9 800.243 16.65 806.17 16.1  812.097 15.5 818.024 15.01 823.952 14.75
829.879 14.68 835.806 14.5  841.733 14.26 847.661 14.13 853.597 14.11 859.524
13.99 865.451 13.74  871.379 13.34 877.306 12.87 883.233 12.44 889.16 11.97
895.088 11.83  901.015 11.72 906.942 11.6 912.869 11.59 918.797 11.77 924.724
12.06  930.651 12.9 936.578 13.39 945.225 15.11 951.098 14.73 978.812 16.77
985.51 17.361005.956 17.71005.993 -1.091018.654 -5.331034.541 -4.39 1043.106
.511050.574 -4.991063.126 -5.261067.431 -6.031072.053 17.87 1125.843
15.981131.679 16.021137.525 16.181143.371 16.481149.207 16.12 1155.053
16.081160.899 15.911166.735 15.811172.581 15.831178.427 15.66 1184.263
15.531190.109 15.511195.946 15.461201.791 15.811207.637 15.83 1213.474
15.441219.319 15.451225.165 15.061231.002 14.681236.847 14.38 1242.693 14.24
1248.53 14.131254.375 13.951260.212 13.871266.058 13.91 1271.903
14.051283.586 14.271289.431 14.321301.114 14.411306.986 14.32 1312.868
14.221324.623 14.361330.505 14.42 1342.26 14.451348.133 14.41 1359.888
14.561371.642 14.931377.525 15.121383.406 15.351389.279 15.5 1395.161
15.421406.916 161418.671 171424.544 17.231430.426 17.44 1436.299 17.75
```

1442.18 18.091448.062 18.491453.935 18.7 1465.69 19.22 1471.572 20.351477.445
20.761483.327 20.78 1489.2 20.671495.082 20.73 1506.836 21.211512.709
21.561524.473 21.71530.346 22.021542.101 22.59 1547.983 22.71553.856
22.711559.738 22.79 1565.61 22.871577.365 23.07 1583.247 23.181600.884
23.741606.757 24.21612.639 24.31618.512 24.34 1630.267 24.541636.148
24.731642.021 24.641647.903 24.571653.776 24.45 1665.54 25.121671.413
25.211677.295 25.141683.168 25.11 1689.05 25.09 1694.922 25.11700.804
25.121706.677 25.011712.559 24.791718.432 24.79 1724.323 25.471730.205
26.851736.087 26.831741.969 26.81747.851 26.24 1753.733 25.881759.615
25.681765.497 25.511771.379 25.09 1777.27 24.64 1783.152 24.371789.033
24.511794.915 24.621800.797 24.831806.679 24.95 1812.561 25.251818.443
25.781824.334 26.141830.216 26.081836.098 25.93 1841.98 25.781847.862
25.651853.744 25.531859.626 25.411865.508 25.35 1871.399 25.21877.281
24.181883.163 21.191889.045 15.461894.927 9.73 1900.808 9.5 1906.69
10.591912.572 14.451918.454 19.371924.345 23.96 1930.227 26.171936.109
26.171941.991 26.231947.873 26.481953.755 26.29 1959.637 26.031965.519 25.85
1971.41 25.791977.292 25.791983.174 25.76 1989.056 25.641994.938
25.572000.819 25.532006.701 25.432012.583 25.34 2018.474 25.112024.356
25.092030.238 25.09 2036.12 24.962042.002 24.9 2047.884 24.642053.766
24.512059.648 24.352065.539 24.192071.421 23.93 2077.303 23.722083.185
23.432089.067 23.262094.949 23.072100.831 22.95 2106.712 22.92112.604
22.782118.485 22.92124.358 23.482130.231 24.02 2136.104 24.272141.977 24.2
2147.85 24.352153.723 24.572159.596 24.8 2165.469 24.842171.341 24.822177.214
24.792183.087 24.68 2188.96 24.54 2194.842 24.262200.715 24.072206.588 24.68
2212.46 24.222218.333 24.2 2224.206 24.042230.079 23.912235.952 23.962241.825
24.172247.698 24.29 2253.571 24.582259.444 24.822265.316 252271.189
25.12277.071 25.13 2282.944 25.062288.817 24.99 2294.69 24.932300.562
24.872306.436 24.82 2312.309 24.582318.181 24.552324.054 24.582329.927 24.46
2335.8 24.1 2341.673 24.042347.546 24.262353.427 23.882359.301 23.522365.173
24.02 2371.046 25.122376.919 25.752382.792 26.162388.665 26.572394.538 26.91
2400.411 26.982406.283 27.052412.156 27.042418.029 26.732423.902 26.61
2429.775 26.412435.657 26.45 2441.53 26.532447.403 26.652453.275 26.75
2459.148 26.952465.021 27.122470.894 27.42476.767 27.52

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .0851005.956 .0351072.053 .088

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1005.9561072.053 110.75 131.98 150.03 .5 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 18502476.767 25 T
Skew Angle = 25

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 10661.72

INPUT Description: 12- Exit County St (Rte 140) Br
Station Elevation Data num= 368
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 22.51 6.53 22.64 13.07 22.54
19.6 22.41 26.14 22.37 32.67 22.64 39.21 23.02 45.74 23.19 52.28 23.08 65.35

23.11 71.88 22.75 78.42 22.28 84.95 21.77 91.49 21.47 98.02 21.35 104.56
21.16 111.09 20.99 117.63 20.6 124.16 20.34 130.7 20.86 137.23 21.84 143.76
22.49 150.3 22.68 163.37 22.52 169.9 22.12 176.44 21.62 182.97 20.86 189.51
20.3 196.04 20.13 202.58 20.11 209.11 20.04 215.65 20 222.18 20 228.72 20.23
235.25 20.58 241.79 20.86 248.32 21.22 254.86 21.55 261.39 21.71 267.93
21.93 280.99 21.92 287.53 22 294.06 22.05 300.6 21.98 307.13 21.85 313.67
21.79 320.2 21.67 333.27 21.55 339.81 21.43 346.34 21.23 352.88 20.66 359.41
19.91 365.95 19.33 372.48 19.02 379.02 18.9 385.55 18.89 392.09 18.94 398.62
19.02 405.16 19.22 411.69 19.58 418.22 19.97 424.76 20.3 431.29 20.66 437.83
21.07 444.36 21.45 450.9 21.64 457.43 21.65 463.97 21.57 470.5 21.45 477.04
21.36 483.57 21.17 490.11 21.11 496.64 21.33 503.18 21.52 509.71 21.64
516.25 21.74 522.78 21.87 529.32 22.08 535.85 22.39 542.39 22.49 548.92
22.47 555.46 22.33 561.99 21.77 568.52 21.4 575.06 21.28 581.59 20.95 588.13
20.78 594.66 20.64 601.2 20.53 607.73 20.59 614.27 20.73 620.8 20.82 627.34
20.86 633.87 20.79 640.41 20.69 646.94 20.64 653.48 20.61 660.01 20.55
666.55 20.61 673.08 20.79 679.62 20.94 686.15 21.03 692.69 21.04 705.75
21.22 712.29 21.32 725.36 21.67 731.89 21.86 738.43 22.01 744.96 22.18 751.5
22.41 758.03 22.6 764.57 22.71 771.1 22.84 777.64 23.03 784.17 23.19 790.71
23.43 797.24 23.6 803.78 23.69 810.31 23.68 816.85 23.53 823.38 23.41 829.92
23.33 836.45 23.15 842.99 22.9 849.52 22.82 856.05 22.83 862.59 22.79 869.12
22.81 875.66 22.86 882.19 22.87 888.73 22.86 895.26 22.98 901.8 23.29 908.33
23.58 914.87 23.9 921.4 24.14 927.94 24.29 934.47 24.56 941.01 24.65 947.54
24.56 954.08 24.7 960.61 24.78 967.15 24.76 973.68 24.76 980.22 24.83
986.75 24.84 993.29 24.72 999.82 24.77 1006.35 24.92 1012.89 24.91 1019.42
24.94 1025.96 24.94 1032.49 25.17 1039.03 25.55 1045.56 25.97 1052.1 26.16
1058.63 26.08 1071.7 25.8 1084.77 25.65 1097.84 25.39 1104.38 25.36 1110.91
25.38 1117.45 25.44 1123.98 25.44 1137.05 25.37 1143.58 25.29 1150.12 25.23
1156.65 25.19 1163.19 25.25 1169.72 25.14 1176.26 24.77 1182.79 23.62
1189.33 23.04 1195.86 24.38 1202.4 24.38 1208.93 23.95 1215.47 23.76 1222
23.64 1235.07 23.45 1241.61 23.48 1248.14 23.38 1254.68 23.1 1261.21 22.91
1267.74 22.78 1280.81 22.31 1287.35 22.25 1293.88 22.08 1300.42 21.85
1306.95 21.72 1313.49 21.85 1320.02 21.75 1339.06 21.92 1342.07 20.28
1472.56 19.77 1586.79 19.53 1625.79 17.65 1671.94 18.44 1711.72 16.56
1815.56 5.22 1817.54 2.37 1835.16 -.21 1836.63 .45 1848.07 -4.27 1860.2 -
5.36 1882.27 -8.58 1904.26 -7.66 1926.37 -8.42 1959.41 -4.06 1972.09 -.45
1972.89 .12 1979.26 1.38 1982.44 4.69 1986.89 5.25 2011.22 5.11 2068.44 3.88
2076.75 -1.17 2117.63 -.74 2139.51 10.4 2146.45 11.68 2174.91 11.66 2184.6
11.25 2221.65 12.08 2228.21 12.19 2234.77 12.18 2241.33 12.07 2247.89 11.82
2254.45 11.66 2261 11.66 2274.12 11.89 2280.68 11.78 2287.24 11.56 2293.8
11.61 2300.36 11.77 2306.92 11.65 2313.48 11.57 2320.04 11.7 2326.6 11.76
2333.16 11.46 2339.71 11.32 2346.27 11.24 2352.83 11.21 2359.39 11.12
2365.95 11.05 2372.51 10.96 2379.07 10.82 2385.63 10.55 2392.19 10.37
2405.31 10.11 2418.43 9.82 2424.98 9.71 2438.1 9.45 2444.66 9.28 2451.22
9.44 2457.78 9.33 2464.34 9.1 2470.9 8.56 2477.46 8.09 2484.02 7.47 2490.58
7.06 2497.14 6.96 2503.7 6.97 2510.25 6.9 2516.81 6.68 2523.37 6.38 2529.93
5.93 2536.49 5.84 2543.05 5.82 2549.61 5.88 2556.17 5.89 2562.73 5.69
2569.29 5.72 2575.85 6.01 2582.41 6.33 2588.96 6.54 2602.08 7.03 2608.64 7.2
2615.2 7.24 2621.76 7.25 2628.32 7.19 2634.88 6.94 2641.44 6.74 2654.56 6.52
2661.12 6.57 2667.68 6.41 2674.23 6.13 2680.79 6.15 2687.35 6.38 2693.91
6.81 2700.47 7.42 2707.03 8.52 2713.59 10.73 2720.15 13.67 2726.71 17.3
2733.27 19.32 2739.83 20.41 2746.39 20.62 2752.95 20.5 2759.5 20.55 2766.06
20.71 2772.62 20.89 2779.18 21.09 2785.74 21.11 2792.3 21.23 2798.86 21.37
2805.42 21.46 2811.98 21.72 2818.54 21.78 2825.1 22.33 2831.66 22.51 2838.22
22.49 2844.77 22.65 2851.33 22.89 2857.89 23.01 2871.01 23.33 2877.57 23.47

2890.69 23.48 2903.81 23.46 2910.37 23.41 2916.93 23.31 2923.48 23.3 2936.6
23.43 2962.84 23.39 2982.52 23.39 2989.08 23.4 2995.64 23.37 3002.2 23.2
3008.75 22.92 3015.31 22.61 3021.87 22.51 3028.43 22.52 3048.11 22.77
3054.67 22.92 3061.23 23.25 3067.79 23.62 3074.35 23.73 3080.91 23.71
3087.46 23.76 3094.02 23.6 3100.58 22.17 3107.14 20.11 3113.7 16.83 3120.26
12.37 3126.82 11.02 3133.38 11.05 3139.94 11.24 3146.5 11.72 3153.06 15.16
3159.62 19.6 3166.18 22.1 3172.73 23.54 3179.29 23.94 3185.85 24.03 3192.41
24.03 3198.97 24.12 3205.53 24.28 3212.09 24.47 3218.65 24.62 3225.21 24.89
3238.33 25.34 3244.89 25.4 3251.44 25.42 3258 25.39 3264.56 25.32 3271.12
25.27 3284.24 25.24 3290.8 25.26 3297.36 25.4 3303.92 25.94

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 1671.94 .035 2146.45 .088

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1671.94
2146.45 1040.28 965.59 915.55 .3 .5 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 2235 2740 12.18 F
 2740 3500 24 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 9696.133

INPUT
Description: 11- 600 ft DS Mill River Trib
Station Elevation Data num= 400
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 30.26 13.11 30.24 39.32
29.88 45.88 29.64 65.54 29.75 72.09 29.91 85.2 30.69 91.75 30.81 98.31 30.68
104.86 30.32 117.97 29.15 124.52 28.99 131.08 29.22 137.63 29.67 150.74
29.99 157.29 30.32 163.85 30.49 170.4 30.51 190.06 30.15 203.17 30.05
216.28 28.32 222.83 28 255.6 27.65 262.15 27.69 275.26 28.97 281.82 29.01
288.37 28.76 294.92 28.35 308.03 27.26 321.14 26.6 334.25 26.26 340.8 26.27
347.35 26.09 367.02 26.2 373.57 26.08 386.68 26.52 393.23 26.61 399.79 26.56
406.34 26.68 419.45 26.52 439.11 26.53 445.66 26.8 458.77 26.82 471.88 27.3
530.86 27.5 537.42 27.43 543.97 27.54 576.74 26.94 583.29 26.69 589.85 26.83
602.96 26.81 616.06 26.87 622.62 26.44 629.17 25.53 642.28 24.73 648.83
24.52 661.94 24.33 675.05 23.95 681.6 23.63 688.16 24.21 694.71 25.23 701.26
25.63 707.82 25.63 740.59 27.32 773.36 27.93 793.02 27.47 799.57 26.9 806.13
26.81 812.68 26.93 819.23 26.87 825.79 26.99 832.34 26.93 845.45 25.83 852
25.39 865.11 25.06 891.33 23.81 897.88 23.59 924.1 23.17 937.2 22.52 950.31
22.6 956.86 21.93 963.42 21.03 976.53 20.03 989.63 19.65 996.19 19.33
1002.74 18.79 1009.3 18.08 1015.85 17.61 1028.96 17.95 1042.06 16.57 1061.73
15.53 1094.5 14.88 1114.16 14.25 1153.48 13.88 1179.7 13.28 1212.47 13.51
1225.57 13.45 1238.68 13.72 1264.9 13.68 1284.56 14.05 1330.43 14.05 1343.54
13.97 1363.2 14.26 1376.31 14.62 1389.42 14.54 1395.97 14.78 1402.53 14.66
1409.08 14.23 1428.74 11.98 1441.85 10.7 1454.96 10.1 1468.07 8.92 1474.62
9.12 1481.17 9.55 1487.73 10.27 1494.28 10.8 1500.84 11.19 1527.05 11.42
1540.16 11.01 1553.27 10.95 1566.37 10.75 1572.93 10.4 1586.04 9.95 1592.59
9.56 1599.14 9.03 1618.8 8.96 1625.36 8.68 1631.91 7.78 1638.47 7.72 1645.02
8.49 1651.57 8.86 1664.68 9.34 1677.79 8.96 1684.34 8.93 1697.45 8.64

1704.01 8.34 1723.67 8.22 1730.22 8.08 1749.88 8.03 1762.99 7.58 1776.1 7.6
1782.65 7.5 1789.21 7.63 1802.31 8.32 1808.87 8.11 1815.42 8.04 1848.19 8.75
1867.85 8.42 1874.41 8.76 1880.96 9.29 1887.51 9.22 1894.07 8.91 1900.62
8.75 1907.18 8.75 1913.73 8.58 1926.84 8.81 1939.94 7.93 1966.16 6.59
1972.71 6.41 1992.38 6.5 2005.48 6.64 2018.59 6.34 2025.14 5.88 2038.25 4.42
2044.81 4.47 2051.36 4.89 2071.02 5.04 2077.58 5.28 2084.13 4.8 2090.68 3.25
2097.24 2.36 2234.87 2.36 2241.42 2.5 2247.98 2.93 2261.08 4.06 2267.64 4.27
2287.3 3.88 2293.85 3.9 2306.96 4.14 2320.07 3.7 2359.39 4.16 2365.95 4.34
2372.5 4.67 2379.05 4.66 2385.61 4.32 2398.72 3.98 2405.27 3.62 2411.82 3.58
2418.38 3.8 2424.93 4.47 2431.49 4.39 2438.04 4.14 2464.26 4.24 2497.03 4.77
2516.69 5.67 2523.24 6.2 2536.35 6.04 2542.9 6.15 2556.01 5.8 2562.56 5.8
2575.67 5.4 2582.23 5.3 2588.78 5.49 2608.44 5.16 2621.55 5.8 2628.1 5.55
2634.66 5.64 2647.76 5.38 2667.43 5.51 2673.98 5.43 2700.2 7.01 2706.75 6.63
2739.52 7.26 2746.07 7.47 2759.18 7.58 2778.84 7 2785.4 7.17 2791.95 7.15
2798.5 6.87 2805.06 6.85 2818.17 6.6 2831.27 6.75 2837.83 7.18 2850.94 7.36
2857.49 7.13 2877.15 7.21 2883.71 7.12 2896.81 7.52 2903.37 7.82 2909.92
8.44 2916.47 9.86 2923.03 10.04 2929.58 9.47 2942.69 9.47 2949.24 9.15
2955.8 8.45 2962.35 7.58 2975.46 6.42 2982.01 5.94 2988.57 5.61 2995.12 5.02
3014.78 5.12 3034.44 4.94 3047.55 4.55 3054.11 4.68 3067.21 5.59 3073.77 5.9
3083.18 6.07 3086.88 6.1 3093.43 6.02 3099.98 5.25 3106.54 2.42 3120 -1.22
3122.59 -1.25 3122.94 -1.27 3123.29 -1.3 3123.67 -1.32 3124.35 -1.4 3124.68
-1.43 3124.98 -1.45 3125.24 -1.48 3125.51 -1.48 3125.75 -1.49 3126.07 -1.55
3126.79 -1.64 3127.89 -1.88 3129.01 -2.53 3130.39 -3.29 3131.68 -4.27
3133.75 -5.14 3135.69 -5.75 3137.67 -6.27 3139.91 -6.83 3142.13 -7.16
3144.32 -7.48 3146.38 -7.75 3149 -7.97 3151.52 -8.06 3154.02 -8.14 3156.43 -
8.29 3158.89 -8.32 3161.1 -8.31 3163.53 -8.23 3166 -8.28 3168.59 -8.38
3171.06 -8.4 3173.82 -8.46 3176.38 -8.5 3178.95 -8.59 3181.45 -8.74 3184.26
-8.82 3186.76 -8.88 3189.25 -8.93 3191.61 -8.95 3194.28 -8.84 3196.58 -8.81
3199.21 -8.45 3201.58 -8.54 3204.04 -8.56 3206.24 -8.54 3208.58 -8.56
3210.63 -8.6 3212.86 -8.56 3215.38 -8.56 3218.33 -8.42 3221.03 -7.93 3223.61
-8.05 3226.03 -7.56 3228.39 -7.56 3230.33 -7.39 3232.36 -7.01 3234.22 -6.57
3236.03 -6.18 3237.55 -5.52 3239.07 -4.83 3240.39 -4.29 3241.52 -3.46
3242.46 -2.06 3243.67 -1.9 3244.04 -1.9 3244.45 -1.77 3244.84 -1.64 3245.25
-1.56 3245.63 -1.47 3246 -1.41 3246.29 -1.14 3263.86 7.38 3270.37 9.48
3276.88 9.61 3289.9 9.43 3302.91 9.52 3315.93 9.83 3322.44 9.93 3328.95 9.89
3335.46 10.04 3341.96 10.16 3348.47 10.12 3354.98 10.29 3361.49 10.48 3368
10.64 3374.51 10.82 3381.01 10.94 3387.52 11.08 3394.03 11.24 3400.54 11.49
3407.05 11.87 3413.56 12.13 3420.06 12.34 3426.57 12.7 3439.59 13.1 3446.1
13.33 3452.61 13.54 3465.62 13.76 3472.13 13.84 3478.64 13.89 3485.15 13.88
3491.66 13.83 3498.17 14.02 3504.67 14.32 3511.18 14.47 3524.2 14.62 3537.22
14.58 3543.72 14.5 3550.23 14.49 3556.74 14.39 3563.25 14.4 3569.76 14.58
3582.78 14.48 3589.28 14.62 3602.3 14.61 3608.81 14.63 3615.32 14.74 3621.83
14.87 3628.33 14.76 3634.84 14.74 3647.86 14.79 3654.37 14.91 3660.88 15.14
3667.38 15.19 3680.4 15.52 3686.91 15.51 3693.42 15.7 3699.93 15.7 3706.44
15.76 3719.45 16 3725.96 16.14 3732.47 16.08 3738.98 16.31 3745.49 16.36
3751.99 16.51 3758.5 16.69 3771.52 16.92 3778.03 16.89 3784.54 17.09 3797.55
17.29 3817.08 17.81 3823.59 18.03 3830.1 18.1 3836.6 18.29 3843.11 18.46

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 3083.18 .035 3276.88 .082

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 3083.18
3276.88 1323.89 1298.37 1295.7 .3 .5 Ineffective Flow num= 1 Sta L Sta R

Elev Permanent
 0 2516 5.66 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 8397.759

INPUT
Description: 10
Station Elevation Data num= 319
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 22.85 19.68 22.76 26.24
22.99 39.36 22.48 52.47 22.28 65.59 22.31 78.71 22.57 91.83 22.22 111.51
22.3 124.63 22.62 137.75 23.23 144.3 23.22 150.86 22.75 170.54 22.34 177.1
22.3 183.66 22.71 196.78 22.64 203.34 22.8 229.58 22.94 249.25 22.32 255.81
22.24 268.93 22.58 295.17 22.68 308.29 22.64 321.41 22.95 327.96 22.88
334.52 23.14 380.44 23.55 400.12 23.39 419.8 23.81 459.15 23.71 465.71 23.89
472.27 23.86 478.83 24.14 485.39 23.93 498.51 24.44 505.07 24.39 511.63
24.54 518.18 24.35 524.74 23.98 531.3 23.91 550.98 23.92 564.1 24.29 577.22
24 590.34 24.51 636.25 25.2 649.37 25.62 655.93 26.05 662.49 26.73 669.05
28.07 675.61 28.56 688.73 28.59 701.84 28.2 721.52 28 728.08 27.67 760.88
27.15 767.44 27.19 780.56 26.13 787.12 25.48 800.23 25.47 813.35 25.33
833.03 25.78 872.39 24.64 878.95 24.33 885.51 24.2 892.06 23.89 905.18 23.05
911.74 22.85 918.3 22.47 924.86 22.41 944.54 21.76 951.1 21.44 970.78 20.92
990.45 20.89 1003.57 20.54 1010.13 20.54 1016.69 20.77 1088.84 20.06 1095.4
19.68 1128.2 19.19 1147.88 19.11 1161 18.87 1180.67 18.66 1187.23 18.46
1193.79 18.58 1239.71 17.99 1252.83 17.77 1272.5 17.84 1279.06 18.06 1292.18
19.78 1298.74 20.25 1305.3 20.19 1311.86 20.51 1344.66 20.63 1384.01 20.29
1390.57 20.37 1397.13 20.13 1403.69 19.62 1410.25 19.45 1429.93 19.45
1449.61 19.15 1456.16 18.93 1462.72 18.49 1469.28 17.83 1475.84 17.01 1482.4
16.04 1488.96 14.85 1502.08 12.9 1508.64 12.11 1521.76 11.32 1534.88 10.9
1554.55 10.71 1567.67 10.34 1574.23 9.91 1580.79 9.17 1600.47 8.02 1607.03
7.8 1639.83 7.44 1646.38 7.52 1685.74 6.69 1698.86 6.58 1705.42 6.22 1711.98
5.11 1718.54 3.03 1725.1 1.35 2131.77 1.35 2138.33 1.65 2144.89 2.81 2151.45
5.2 2158.01 8.34 2164.57 9.67 2171.13 9.77 2177.69 8.56 2184.25 8.19 2190.81
8.49 2203.93 8.78 2236.72 8.78 2249.84 7.49 2256.4 7.37 2269.52 7.73
2276.08 8.01 2282.64 8.14 2289.2 8.07 2295.76 8.2 2302.32 7.8 2308.87 6.82
2321.99 6.75 2328.55 7.03 2335.11 8.72 2341.67 8.99 2348.23 8.9 2361.35 7.85
2367.91 7.78 2381.03 8.02 2381.54 8.02 2387.59 8.01 2394.15 5.49 2400.7 2.06
2407.26 .29 2420 -1.44 2420.83 -1.59 2421.84 -1.76 2422.84 -2.04 2424.01 -
2.29 2425.15 -2.68 2426.3 -3.07 2427.37 -3.36 2429.07 -3.62 2430.68 -3.78
2432.17 -4.2 2434 -4.4 2435.71 -4.79 2437.6 -5.31 2439.39 -5.86 2441.32 -
6.23 2443.12 -6.63 2445.07 -7.53 2447 -7.88 2449.14 -8.28 2453.26 -8.59
2455.23 -8.81 2457.38 -8.89 2459.33 -9.02 2461.48 -9.01 2463.39 -8.97
2465.31 -8.89 2467.32 -8.84 2469.41 -8.7 2471.43 -8.47 2473.54 -8.36 2475.48
-8.3 2477.53 -8.11 2479.57 -8.03 2481.72 -7.96 2483.71 -7.8 2485.95 -7.8
2487.94 -7.66 2490.18 -7.58 2492.31 -7.29 2494.63 -7.02 2496.8 -6.72 2499.01
-6.63 2501.14 -6.51 2503.53 -6.38 2505.73 -6.19 2507.85 -5.9 2509.96 -5.77
2512.17 -5.65 2514.29 -5.54 2516.58 -5.41 2518.58 -5.34 2520.83 -5.19
2525.02 -5.01 2526.99 -4.88 2529.15 -4.81 2531.19 -4.69 2533.35 -4.59 2535.2
-4.57 2537.43 -4.5 2539.68 -4.31 2542.42 -4.09 2545.04 -3.75 2547.77 -3.31
2550.39 -3.07 2553.31 -3.02 2556.48 -2.49 2559.54 -2 2561.69 -1.83 2563.52 -
1.67 2565.32 -1.53 2566.78 -1.01 2575.96 .42 2580.97 1.5 2587.52 4.34

2594.06 4.29 2600.6 4.05 2613.69 4 2620.23 3.68 2626.78 3.66 2633.32 3.85
2639.86 4.36 2646.41 5.18 2659.49 7.21 2672.58 7.14 2685.67 6.48 2698.75
6.22 2711.84 4.91 2738.01 3.52 2751.1 3.09 2757.64 2.98 2764.19 3.31 2803.44
3.48 2816.53 3.2 2829.62 3.41 2836.16 3.69 2842.7 4.34 2849.25 4.8 2855.79
5.09 2875.42 5.1 2888.51 4.8 2895.05 4.36 2908.14 3.97 2934.31 3.73 2953.94
3.89 2967.02 3.68 3006.28 3.65 3012.83 3.78 3019.37 4.47 3039 5.13 3052.09
6.22 3058.63 6.5 3071.72 8.13 3078.26 9.08 3084.8 9.85 3097.89 10.77
3143.69 13.1 3163.32 14.43 3169.86 15.09 3176.41 15.42 3189.49 15.51 3196.04
15.72 3202.58 15.72 3215.67 16.27 3241.84 16 3261.47 15.8 3274.56 15.37
3300.73 15.35 3313.82 15.5 3339.99 15.48 3353.08 15.32 3392.33 15.34 3398.88
15.43 3405.42 15.37 3411.96 15.46 3418.51 15.33 3438.14 15.33 3444.68 15.11
3457.77 15.14 3464.31 15.01 3510.11 15.24 3536.29 15.13 3542.83 15.43
3549.37 15.25 3555.92 15.69 3569 16.13 3575.55 16.48 3608.26 16.47 3627.89
16.02 3634.43 16.08 3640.98 16 3647.52 16.14 3667.15 16.01 3680.24 16.07
3686.78 15.93 3706.41 16.13 3712.95 16.36 3719.5 16.44 3726.04 16.68 3745.67
17.06

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 2341.67 .035 2659.49 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2341.67
2659.49 1233.41 1204.5 1191.8 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent 0 2163.6 9.48 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 7193.258

INPUT
Description: 9- Approach RR Br
Station Elevation Data num= 188
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 19.77 215.94 19.11 229.03
19.89 248.66 19.52 261.75 19.67 274.84 18.71 287.93 15.92 301.01 14.13
307.56 12.84 320.64 12.1 327.19 13.2 340.28 13.5 366.45 13.07 372.99 13.63
379.54 12.7 405.71 13.56 418.8 13.05 425.35 13.69 431.89 15.5 444.98 15.61
458.06 15.12 471.15 15.46 490.78 14.82 543.13 14.69 549.68 14.41 569.31
15.08 602.03 15.13 608.57 15.76 615.11 15.8 628.2 14.63 641.29 15.44 680.55
16.06 713.27 15.94 726.36 16.32 752.53 14.47 772.17 15.52 778.71 14.46
785.25 13.96 791.8 13.89 804.88 12.24 817.97 9.76 850.69 10.38 870.32 12.15
896.5 11.49 922.67 9.27 981.57 9.6 994.65 9.28 1001.2 9.9 1033.92 10.01
1060.09 8.45 1066.63 8.71 1073.18 8 1092.81 8.65 1112.44 8 1125.53 6.57
1132.07 6.47 1145.16 8.73 1158.25 9.26 1164.79 10.74 1190.97 12.66 1217.14
9.7 1230.23 8.98 1243.32 7.3 1249.86 6.85 1269.49 8.38 1276.04 7.82 1282.58
6.73 1289.12 6.54 1295.67 7.21 1308.75 9.52 1315.3 9 1321.84 9.72 1334.93
9.62 1354.56 7.34 1387.28 7.78 1393.82 5.83 1400.37 4.44 1406.91 3.75
1433.08 2.88 1439.63 2.93 1446.17 2.31 1452.72 .67 1472.35 -.85 1596.68 -.98
1603.22 -.45 1616.31 3.66 1622.85 4.45 1649.03 4.68 1662.12 5.3 1668.66 4.95
1675.2 5.25 1688.29 4.35 1694.83 2.42 1734.1 3.32 1740.64 3.8 1747.19 3.47
1766.82 4.29 1779.9 3.02 1786.45 3.28 1792.99 2.9 1799.53 2.12 1845.34 3.52
1864.97 4.71 1871.52 4.68 1878.06 4.07 1891.15 3.56 1904.23 3.52 1917.32
5.07 1923.87 4.1 1930.41 .9 1936.95 1.89 1950.04 5.42 1963.13 5.99 1969.67

5.43 1982.76 5.13 1989.3 4.15 1995.85 3.77 2022.02 5.33 2028.57 4.89 2041.65
5.97 2061.29 6.3 2067.83 5.92 2074.37 4.99 2080.92 4.54 2087.46 5.1 2094
4.91 2107.09 3.55 2120.18 2.93 2126.72 1.41 2146.36 3.2 2159.44 1.38 2165.99
1.26 2179.07 1.99 2192.16 3.57 2218.74 1.13 2295.02 1.13 2329.25 .16 2359.85
-.25 2375.28 .4 2400.41 -2.77 2423.16 -11.21 2446.97 -12.12 2463.06 -8.69
2494.08 -9.46 2521.15 -2.01 2539.53 .89 2566.75 8.04 2655.64 7.79 2704.83
10.94 2935.12 13.62 2941.64 13.03 3281.02 13.15 3339.85 13.86 3352.92 15.16
3359.45 15 3365.99 14.3 3450.95 12.38 3490.17 12.79 3529.38 12.02 3535.92
11.29 3542.45 11.54 3548.99 13.14 3555.52 15.27 3575.13 19.15 3588.2 22.09
3601.27 22.8 3660.1 19.09 3679.7 17.03 3692.77 17.47 3725.41 14.48 3731.9
14.72 3738.4 14.49 3751.38 16.01 3913.69 17.83 3933.17 17.04 3939.66 16.42
3946.16 15.18 3952.65 14.68 3991.6 16.06 4004.59 15.89 4011.08 16.11 4017.57
17.89 4024.07 18.91 4030.56 18.85 4037.05 16.39 4043.54 15.97 4127.95 16.31
4186.38 16.86

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 2192.16 .035 2566.75 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2192.16
2566.75 86.6 82.39 79.32 .3 .5 Blocked Obstructions num= 1
 Sta L Sta R Elev
 2786.11 2878.0312.79738

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 7110.866

INPUT
Description: 8.7- US Face RR Br Station Elevation Data num= 430
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 20.18 13.1 19.95 19.66 20.5
32.76 20.61 39.309 20.9 45.87 20.69 58.97 20.79 65.521 20.72 78.63 20.27
85.179 20.24 91.73 19.93 111.391 20.42 117.94 20.36 137.6 20.58 150.71 20.52
163.81 20.8 176.92 21.35 183.47 21.4 190.019 21.19 209.68 21.15 222.78 21.62
242.44 21.34 268.65 21.7 288.31 21.13 307.97 20.28 314.52 20.47 321.07 20.47
327.62 20.15 347.28 20.27 353.831 20.48 360.39 20.05 366.94 19.09 380.04
19.09 393.15 19.55 412.81 19.52 419.36 19.14 425.91 19.14 432.459 19.64
445.571 19.17 465.23 18.98 471.78 19.79 478.329 20.27 484.88 20.3 491.441
19.89 497.99 19.97 504.54 20.2 517.65 20.44 524.199 20.43 530.75 20.19
537.299 20.23 543.86 20.71 556.96 20.64 563.51 20.42 570.069 19.99 583.169
20.17 589.72 19.97 609.38 19.84 615.93 19.7 622.49 19.29 629.039 19.13
635.59 19.49 648.7 19.84 661.8 19.83 668.35 20.07 674.909 19.93 681.46 19.5
688.011 18.72 694.56 18.08 701.12 15.55 707.67 12.62 714.22 11.96 720.77
13.8 727.33 16.59 733.881 16.89 740.43 16.93 746.981 17.86 753.54 17.81
760.09 17.62 773.19 16.79 779.751 17.1 786.3 17.66 799.4 17.25 805.96 17.26
812.51 17.92 819.06 17.83 825.609 17.27 832.17 17.35 838.721 17.2 851.82
17.63 858.38 16.33 864.93 15.43 871.479 16.02 878.03 15.51 884.591 15.24
891.14 15.39 897.69 15.03 904.24 15.32 910.8 16.78 917.349 16.91 923.9 16.49
930.449 16.35 937.01 16.51 943.56 16.87 950.11 17.44 956.66 17.13 963.219 17
969.77 17.3 982.87 17.03 989.43 17.54 1002.53 17.39 1009.08 17.751022.189
17.27 1028.74 17.611035.291 17.47 1041.85 16.65 1048.4 17.13 1054.95
16.31068.059 15.75 1074.61 16.631081.161 16.76 1087.71 17.38 1094.27 16.89

1107.37 17.051113.919 16.611127.031 17.26 1140.13 17.52 1146.69 17.38
1153.24 17.54 1166.34 16.151172.901 15.69 1179.45 14.71 1186 14.64 1199.11
15.92 1205.66 16.08 1212.21 16.42 1231.87 16.77 1244.97 16.73 1258.08
17.141264.629 17.82 1271.18 17.78 1277.741 17.31 1284.29 15.53 1290.84 9.09
1297.39 8.46 1303.95 10.48 1310.499 13.89 1317.05 16.31323.601 16.88 1330.16
17.61 1336.71 17.55 1343.26 16.991356.369 16.65 1362.92 16.911369.471 16.95
1376.02 16.44 1382.58 15.64 1389.13 15.53 1395.68 16.16 1435 16.56 1441.55
16.53 1454.65 16.761461.209 16.58 1467.76 16.181474.311 16.42 1480.86 16.22
1487.42 16.271493.969 16.55 1500.52 16.241507.069 16.23 1513.63 16.52
1520.181 16.41 1539.84 16.47 1546.39 16.391552.939 16.56 1559.49 16.31
1566.051 16.21 1572.6 16.281579.151 16.051598.809 15.93 1605.36 15.32
1611.909 15.27 1618.47 16.03 1631.57 16.321657.781 15.91 1677.44 15.99
1683.99 16.3 1690.54 16.31703.649 15.881716.751 15.9 1723.31 15.75 1742.96
15.88 1756.07 15.621762.619 15.6 1769.17 15.3 1788.83 15.55 1801.94
15.221808.491 15.41 1821.59 15.1 1834.7 15.08 1847.8 15.2 1854.359 15.36
1860.91 15.371867.461 15.15 1893.67 15.361900.219 15.15 1913.33 15.39
1926.43 15.23 1939.54 15.17 1952.64 15.371959.201 15.16 1972.3 15.13 1978.85
14.91 2011.62 14.932037.829 14.82050.929 15.1 2064.04 15.06 2070.59
15.382083.689 15.24 2090.25 14.992096.799 14.97 2109.901 14.72 2129.56 14.65
2136.11 14.78 2149.22 14.72155.771 14.52 2181.98 14.39 2188.53 14.49 2214.74
14.41 2227.85 14.52234.399 14.34 2240.95 13.882247.499 13.86 2254.05 14.37
2286.82 14.312306.471 14.47 2313.03 14.692339.239 14.54 2345.79 14.68
2358.89 14.65 2372 14.83 2391.65 14.572398.211 14.912404.519 15.092410.839
14.69 2413.75 14.07 2417.439 8.57 2421 11.21 2421 10.11 2441 9.33 2442 -.97
2483 -12.29 2489 -16.31 2499 -18.82 2513 -17.59 2525 -12.23 2538.209 9.37
2544.57 12.99 2550.93 13.72 2556.11 14.54 2562.63 14.93 2582.18 14.66
2595.22 14.78 2621.29 14.532653.879 14.46 2660.39 14.62 2666.91
14.422673.429 14.74 2679.95 14.41 2686.46 14.442692.979 14.22 2706.02
14.452719.051 14.2 2738.61 14.26 2751.64 14.19 2758.16 13.29 2771.19 13.14
2777.71 13.36 2784.23 13.1 2790.75 13.772797.261 13.78 2803.78 14.03 2810.3
13.752816.819 13.72 2823.34 13.43 2829.85 13.31 2836.369 13 2842.89
13.62855.919 13.66 2862.44 13.84 2868.96 13.59 2888.51 13.52 2895.03
13.862901.551 14.34 2908.07 14.45 2927.62 14.16 2934.14 14.232940.651 13.92
2947.17 14.01 2953.69 13.82960.211 14.06 2973.24 13.61 2986.28 13.62999.311
13.83 3005.83 14.393018.871 15.09 3031.9 14.883038.419 14.61 3044.94 14.48
3051.45 14.63 3077.53 14.15 3116.63 13.923123.149 13.72 3129.67 13.88
3136.18 13.79 3155.74 14.31 3168.77 14.19 3175.29 13.98 3181.85 13.44
3194.96 12.973201.519 12.86 3221.19 13.33 3227.74 12.68 3234.3 12.73247.411
12.52 3260.53 12.83 3267.079 12.68 3280.2 12.8 3286.76 12.72 3293.31
12.453299.871 12.48 3312.981 12.91 3319.54 12.993332.649 12.59 3339.21 12.74
3345.77 12.68 3358.88 12.953365.439 12.713378.551 12.5 3385.11 12.17 3391.66
12.21 3398.219 12.08 3404.78 12.183411.331 12.47 3417.89 12.57 3424.45 12.89
3431 12.62 3437.56 12.493444.121 12.05 3450.67 12.65 3457.23 12.93 3463.79
12.98 3470.34 13.223476.901 13.6 3483.46 13.51 3490.01 13.19 3496.569
12.663509.681 12.15 3516.24 11.65 3522.8 11.53529.349 12.22 3535.91
12.413542.471 13.35 3549.02 13.49 3555.58 14.2 3581.81 14.55 3588.37 14.28
3601.48 153608.041 15.51 3647.38 15.93 3653.93 15.83 3667.05 15.91 3686.72
15.83 3699.83 16.743706.389 17.45 3712.94 17.94 3719.5 18.583726.059 18.71
3732.61 18.483739.169 18.763758.839 18.28 3798.129 17.863811.189 17.97
3817.72 17.84 3824.26 18.263830.791 19.03 3837.32 19.293843.849 18.23
3850.38 18 3856.91 17.97 3863.44 18.31 3883.04 18.79 3889.57 18.69 3896.1
18.29 3902.63 18.12 3915.69 18.17 3928.76 18.46 3948.35 18.11 3961.41 18.27
3967.94 18.25 3974.48 18.07 3981.01 18.283987.539 18.21 3994.07 18.28
4007.13 18.774020.191 18.87 4033.261 18.644046.319 16.584052.851 16.42

4059.38 17.164065.909 18.2 4078.979 19.57 4092.04 19.554098.569 19.724111.629
20.27 4118.16 20.68 4124.701 20.71 4131.23 21.03 4137.76 21.154144.291
21.614157.349 22.01 4163.88 21.91 4170.41 22.14176.951 21.83 4183.48
22.044190.009 21.54 4196.54 20.74203.069 20.2 4209.6 19.92 4229.2
19.74235.729 19.47

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .092404.519 .035 2562.63 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
2404.519 2562.63 22.89 21.96 21.2 .3 .5

BRIDGE

RIVER: Taunton River
REACH: Main Stem RS: 7100.789

INPUT
Description: 8.5 RR
Distance from Upstream XS = 4
Deck/Roadway Width = 15
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
 num= 14
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 1865 15.82 1998 15.34 2371 14.76   2421 15.05 2421 15.02 11.21 2480 15.1
11.22
 2481 15.11 11.22 2481 16.89 11.23 2517 16.81 11.23
 2517 15 11.23 2546 14.89 11.24 2603 14.54
 2813 14.33 3023 14.19

Upstream Bridge Cross Section Data
Station Elevation Data num= 430
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 20.18 13.1 19.95 19.66 20.5
32.76 20.61 39.309 20.9 45.87 20.69 58.97 20.79 65.521 20.72 78.63 20.27
85.179 20.24 91.73 19.93 111.391 20.42 117.94 20.36 137.6 20.58 150.71 20.52
163.81 20.8 176.92 21.35 183.47 21.4 190.019 21.19 209.68 21.15 222.78 21.62
242.44 21.34 268.65 21.7 288.31 21.13 307.97 20.28 314.52 20.47 321.07 20.47
327.62 20.15 347.28 20.27 353.831 20.48 360.39 20.05 366.94 19.09 380.04
19.09 393.15 19.55 412.81 19.52 419.36 19.14 425.91 19.14 432.459 19.64
445.571 19.17 465.23 18.98 471.78 19.79 478.329 20.27 484.88 20.3 491.441
19.89 497.99 19.97 504.54 20.2 517.65 20.44 524.199 20.43 530.75 20.19
537.299 20.23 543.86 20.71 556.96 20.64 563.51 20.42 570.069 19.99 583.169
20.17 589.72 19.97 609.38 19.84 615.93 19.7 622.49 19.29 629.039 19.13
635.59 19.49 648.7 19.84 661.8 19.83 668.35 20.07 674.909 19.93 681.46 19.5
688.011 18.72 694.56 18.08 701.12 15.55 707.67 12.62 714.22 11.96 720.77
13.8 727.33 16.59 733.881 16.89 740.43 16.93 746.981 17.86 753.54 17.81
760.09 17.62 773.19 16.79 779.751 17.1 786.3 17.66 799.4 17.25 805.96 17.26
812.51 17.92 819.06 17.83 825.609 17.27 832.17 17.35 838.721 17.2 851.82
17.63 858.38 16.33 864.93 15.43 871.479 16.02 878.03 15.51 884.591 15.24
891.14 15.39 897.69 15.03 904.24 15.32 910.8 16.78 917.349 16.91 923.9 16.49
930.449 16.35 937.01 16.51 943.56 16.87 950.11 17.44 956.66 17.13 963.219 17

969.77 17.3 982.87 17.03 989.43 17.54 1002.53 17.39 1009.08 17.751022.189
17.27 1028.74 17.611035.291 17.47 1041.85 16.65 1048.4 17.13 1054.95
16.31068.059 15.75 1074.61 16.631081.161 16.76 1087.71 17.38 1094.27 16.89
1107.37 17.051113.919 16.611127.031 17.26 1140.13 17.52 1146.69 17.38
1153.24 17.54 1166.34 16.151172.901 15.69 1179.45 14.71 1186 14.64 1199.11
15.92 1205.66 16.08 1212.21 16.42 1231.87 16.77 1244.97 16.73 1258.08
17.141264.629 17.82 1271.18 17.78 1277.741 17.31 1284.29 15.53 1290.84 9.09
1297.39 8.46 1303.95 10.48 1310.499 13.89 1317.05 16.31323.601 16.88 1330.16
17.61 1336.71 17.55 1343.26 16.991356.369 16.65 1362.92 16.911369.471 16.95
1376.02 16.44 1382.58 15.64 1389.13 15.53 1395.68 16.16 1435 16.56 1441.55
16.53 1454.65 16.761461.209 16.58 1467.76 16.181474.311 16.42 1480.86 16.22
1487.42 16.271493.969 16.55 1500.52 16.241507.069 16.23 1513.63 16.52
1520.181 16.41 1539.84 16.47 1546.39 16.391552.939 16.56 1559.49 16.31
1566.051 16.21 1572.6 16.281579.151 16.051598.809 15.93 1605.36 15.32
1611.909 15.27 1618.47 16.03 1631.57 16.321657.781 15.91 1677.44 15.99
1683.99 16.3 1690.54 16.31703.649 15.881716.751 15.9 1723.31 15.75 1742.96
15.88 1756.07 15.621762.619 15.6 1769.17 15.3 1788.83 15.55 1801.94
15.221808.491 15.41 1821.59 15.1 1834.7 15.08 1847.8 15.2 1854.359 15.36
1860.91 15.371867.461 15.15 1893.67 15.361900.219 15.15 1913.33 15.39
1926.43 15.23 1939.54 15.17 1952.64 15.371959.201 15.16 1972.3 15.13 1978.85
14.91 2011.62 14.932037.829 14.82050.929 15.1 2064.04 15.06 2070.59
15.382083.689 15.24 2090.25 14.992096.799 14.97 2109.901 14.72 2129.56 14.65
2136.11 14.78 2149.22 14.72155.771 14.52 2181.98 14.39 2188.53 14.49 2214.74
14.41 2227.85 14.52234.399 14.34 2240.95 13.882247.499 13.86 2254.05 14.37
2286.82 14.312306.471 14.47 2313.03 14.692339.239 14.54 2345.79 14.68
2358.89 14.65 2372 14.83 2391.65 14.572398.211 14.912404.519 15.092410.839
14.69 2413.75 14.07 2417.439 8.57 2421 11.21 2421 10.11 2441 9.33 2442 -.97
2483 -12.29 2489 -16.31 2499 -18.82 2513 -17.59 2525 -12.23 2538.209 9.37
2544.57 12.99 2550.93 13.72 2556.11 14.54 2562.63 14.93 2582.18 14.66
2595.22 14.78 2621.29 14.532653.879 14.46 2660.39 14.62 2666.91
14.422673.429 14.74 2679.95 14.41 2686.46 14.442692.979 14.22 2706.02
14.452719.051 14.2 2738.61 14.26 2751.64 14.19 2758.16 13.29 2771.19 13.14
2777.71 13.36 2784.23 13.1 2790.75 13.772797.261 13.78 2803.78 14.03 2810.3
13.752816.819 13.72 2823.34 13.43 2829.85 13.31 2836.369 13 2842.89
13.62855.919 13.66 2862.44 13.84 2868.96 13.59 2888.51 13.52 2895.03
13.862901.551 14.34 2908.07 14.45 2927.62 14.16 2934.14 14.232940.651 13.92
2947.17 14.01 2953.69 13.82960.211 14.06 2973.24 13.61 2986.28 13.62999.311
13.83 3005.83 14.393018.871 15.09 3031.9 14.883038.419 14.61 3044.94 14.48
3051.45 14.63 3077.53 14.15 3116.63 13.923123.149 13.72 3129.67 13.88
3136.18 13.79 3155.74 14.31 3168.77 14.19 3175.29 13.98 3181.85 13.44
3194.96 12.973201.519 12.86 3221.19 13.33 3227.74 12.68 3234.3 12.73247.411
12.52 3260.53 12.83 3267.079 12.68 3280.2 12.8 3286.76 12.72 3293.31
12.453299.871 12.48 3312.981 12.91 3319.54 12.993332.649 12.59 3339.21 12.74
3345.77 12.68 3358.88 12.953365.439 12.713378.551 12.5 3385.11 12.17 3391.66
12.21 3398.219 12.08 3404.78 12.183411.331 12.47 3417.89 12.57 3424.45 12.89
3431 12.62 3437.56 12.493444.121 12.05 3450.67 12.65 3457.23 12.93 3463.79
12.98 3470.34 13.223476.901 13.6 3483.46 13.51 3490.01 13.19 3496.569
12.663509.681 12.15 3516.24 11.65 3522.8 11.53529.349 12.22 3535.91
12.413542.471 13.35 3549.02 13.49 3555.58 14.2 3581.81 14.55 3588.37 14.28
3601.48 153608.041 15.51 3647.38 15.93 3653.93 15.83 3667.05 15.91 3686.72
15.83 3699.83 16.743706.389 17.45 3712.94 17.94 3719.5 18.583726.059 18.71
3732.61 18.483739.169 18.763758.839 18.28 3798.129 17.863811.189 17.97
3817.72 17.84 3824.26 18.263830.791 19.03 3837.32 19.293843.849 18.23
3850.38 18 3856.91 17.97 3863.44 18.31 3883.04 18.79 3889.57 18.69 3896.1

18.29 3902.63 18.12 3915.69 18.17 3928.76 18.46 3948.35 18.11 3961.41 18.27
3967.94 18.25 3974.48 18.07 3981.01 18.283987.539 18.21 3994.07 18.28
4007.13 18.774020.191 18.87 4033.261 18.644046.319 16.584052.851 16.42
4059.38 17.164065.909 18.2 4078.979 19.57 4092.04 19.554098.569 19.724111.629
20.27 4118.16 20.68 4124.701 20.71 4131.23 21.03 4137.76 21.154144.291
21.614157.349 22.01 4163.88 21.91 4170.41 22.14176.951 21.83 4183.48
22.044190.009 21.54 4196.54 20.74203.069 20.2 4209.6 19.92 4229.2
19.74235.729 19.47

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .092404.519 .035 2562.63 .085

Bank Sta: Left Right Coeff Contr. Expan.
 2404.519 2562.63 .3 .5

Downstream Deck/Roadway Coordinates
 num= 14
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 1851 15.82 1984 15.34 2357 14.76   2407 15.05 2407 15.02 11.21 2466 15.1
11.22
 2467 15.11 11.22 2467 16.89 11.23 2503 16.81 11.23
 2503 15 11.23 2532 14.89 11.24 2589 14.54
 2799 14.33 3009 14.19

Downstream Bridge Cross Section Data
Station Elevation Data num= 409
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 21.17 6.551 21.57 13.11
21.74 19.66 21.74 26.22 21.91 32.77 21.94 72.099 21.29 85.211 21.16 91.76
21.22 98.32 21.62 104.87 21.27 117.979 21.37 124.54 21.32 144.2 21.66 150.75
21.53 157.31 21.75 163.861 21.76 170.42 21.39 176.97 21.48 183.53 21.71
203.19 21.57 209.75 21.72 216.3 22.15 222.85 22.06 235.96 21.5 249.07 21.58
255.63 21.75 262.18 21.78 268.74 21.36 275.289 20.8 281.85 20.86 294.95
20.58 327.73 20.24 347.39 20.24 353.949 20.1 380.16 20.24 386.72 19.95
419.49 19.33 426.05 19.1 432.599 19.34 445.711 18.7 452.26 18.1 458.82 18
465.37 17.23 471.93 16.74 478.479 16.94 491.591 15.88 504.7 15.12 511.25
14.63 524.361 14.08 530.92 13.94 544.03 13.18 550.58 12.93 557.139 13.6
563.69 13.44 576.8 12.73 583.35 13.12 589.909 15.15 596.46 15.37 609.57
14.89 622.68 15.44 629.24 16.37 635.789 16.6 655.45 15.69 668.56 15.63
688.23 15.08 694.78 15.34 701.34 15.33 707.89 15.46 721 15.19 740.66 15.07
747.22 14.43 760.331 14.82 766.88 14.24 779.99 14.66 786.54 14.99 793.099
15.49 799.65 15.23 819.32 13.68 832.43 13.61 838.979 13.38 845.53 12.83
858.64 13.27 871.75 12.12 878.31 12.22 884.859 13.85 891.42 14.5 897.97
14.25 904.53 13.83 911.08 14.43 917.629 14.8 924.19 14.72 937.3 15.14 943.85
13.68 950.409 13.14 956.96 13.57 963.521 13.49 970.07 14.52 976.63 15.86
989.73 15.31 996.289 15.56 1002.84 15.21009.401 16.12 1022.51 15.05 1029.06
15.3 1042.169 14.76 1048.73 14.71055.281 15.68 1061.83 16 1068.39 15.84
1074.939 15.5 1081.5 15.641107.719 13.69 1114.27 13.57 1127.38 13.72 1133.94
14.23 1147.04 13.971153.599 13.63 1160.15 13.741166.711 13.63 1173.26 13.23
1179.82 13.78 1186.37 15.191199.479 15.89 1206.04 15.41 1212.591 15.46
1219.14 15.89 1232.25 16.01 1238.81 15.46 1251.92 15.57 1258.47 16.04
1265.03 15.65 1271.58 13.021278.139 9.36 1284.69 8.09 1297.8 13.71 1304.35
14.38 1310.91 13.361324.021 14.64 1330.57 14.78 1337.13 14.47 1343.68 14.37
1350.24 14.43 1363.34 13.58 1376.45 13.3 1383.01 12.93 1389.56 13 1396.12

12.73 1409.23 12.48 1422.34 12.1 1428.89 12.31435.449 12.16 1442
12.621448.551 12.53 1455.11 12.27 1468.219 12.31 1474.77 12.21481.329 13.1
1487.88 14.39 1507.55 14.42 1514.099 14 1520.65 13.941527.211 14.23 1533.76
14.09 1540.32 14.23 1546.87 13.971573.091 14.06 1579.65 13.74 1586.2 13.75
1599.31 14.31 1612.42 14.28 1632.08 15.631638.639 15.87 1645.19 15.53 1658.3
15.53 1671.409 15.091684.519 14.5 1691.07 13.95 1710.74 12.78 1723.85 12.81
1730.401 12.31 1743.51 12.04 1750.06 12.14 1769.73 11.331776.281 11.43
1782.84 13.341795.949 13.36 1802.5 13.551809.061 13.36 1815.61 13.53 1841.829
13.21 1848.38 12.99 1854.94 13.01 1861.49 12.82 1868.05 12.42 1874.599 12.37
1881.16 12.671887.709 12.4 1900.82 12.75 1907.37 12.5 1913.93 12.421920.479
12.081933.591 12.43 1940.15 12.32 1946.7 12.39 1953.259 12.68 1959.81 12.05
1972.92 11.93 1979.48 11.21 1986.03 11.19 1992.58 11.331999.139 11.16
2005.69 12.04 2012.25 13.31 2018.8 12.97 2025.36 12.952031.909 13.09 2038.47
12.52 2064.68 12.152077.789 12.47 2084.35 13.62 2097.46 13.862110.569 13.83
2117.12 13.49 2130.23 13.67 2149.89 13.28 2182.66 13.212189.219 12.9 2215.44
12.8 2221.99 12.96 2228.55 12.82235.099 12.15 2241.65 11.752248.209 11.89
2254.76 11.52 2274.43 11.33 2287.54 11.532294.091 11.11 2300.65 11.6 2307.2
11.61 2313.75 11.42 2320.31 11.562326.861 11.4 2339.97 11.57 2346.53 11.76
2353.08 13.122359.639 13.56 2366.19 13.732372.741 14.372392.009 14.37
2398.37 14.492402.429 13.15 2404.72 12.38 2407 11.21 2407 10.11 2427 9.33
2428 -.97 2469 -12.29 2475 -16.31 2485 -18.82 2499 -17.59 2511 -12.23 2532
-.15 2533 11.24 2550.93 13.72 2557.28 14.19 2582.89 13.732589.419 13.39
2615.56 13.28 2628.63 13.43 2635.159 13.34 2641.7 13.65 2661.3 13.51 2667.84
13.91 2674.37 13.88 2680.899 13.62693.969 13.75 2700.51 14.03 2713.58 14.13
2765.85 13.96 2772.39 13.752798.529 13.47 2831.2 13.4 2837.73 13.52844.271
13.35 2850.8 13.542870.409 13.51 2890.01 13.792903.081 13.82916.149 14.1
2935.75 14.34 2942.29 14.322961.889 14.75 2988.03 14.712994.561 14.79 3001.1
14.733007.629 14.443020.699 14.283066.441 14.37 3118.72 14.38 3125.249 14.53
3144.86 14.393151.389 14.51 3164.46 14.4 3177.53 14.45 3184.059 14.29 3190.6
13.84 3203.67 14.02 3216.74 14.613229.811 14.07 3249.41 14.09 3262.38 13.82
3268.87 14.6 3275.35 14.82 3281.84 15.18 3294.809 14.99 3307.79 15.13 3327.25
14.98 3333.73 14.56 3346.7 14.85 3353.189 14.553372.649 14.27 3379.14 14.35
3385.62 14.82 3392.11 15.05 3405.08 14.83 3411.57 14.91 3418.05 15.13
3437.51 15.18 3456.97 15.91 3482.919 15.323489.399 15.353495.889 15.55
3502.38 15.59 3508.86 15.39 3515.35 15.47 3521.83 15.31 3534.81 15.63
3541.29 15.65 3547.78 15.41 3554.27 15.543560.749 15.443567.239 15.11
3606.16 15.04 3612.64 15.22 3619.13 15.543632.099 15.393645.071 15.86
3651.56 15.7 3658.05 15.89 3664.53 15.68 3671.02 16 3677.51 16.153690.479
15.983696.971 16.03 3703.451 15.72 3709.94 15.13 3716.42 15.05 3729.4 14.57
3735.88 14.16 3742.369 14.13748.859 13.483761.831 12.58 3768.31 12.38 3774.8
12.41 3781.29 13.81 3787.77 15.76 3794.26 15.64 3807.21 16.12 3826.6 16.19
3833.06 16.073852.451 16.743858.909 16.723865.369 16.83 3884.76 18.42
3891.22 18.72 3917.07 18.673929.991 18.863942.919 18.323949.379 18.23
3955.839 18.523962.309 18.54 3981.69 18.87 3988.15 18.78 3994.62 18.85
4001.08 18.764026.929 19.034033.389 18.64039.849 18.31 4052.78 17.21 4059.24
17.32 4065.7 18.21 4072.16 17.96 4078.63 17.19 4085.09 15.94 4091.55 14.88
4104.48 12.99 4110.94 12.654117.399 12.13 4130.33 11.76 4143.25 11.9 4156.18
11.83 4162.64 12.57 4169.1 13.51 4175.56 14.32 4182.03 14.794194.951
15.444220.799 15.51 4227.26 15.61

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 2398.37 .035 2557.28 .085

```
Bank Sta: Left Right Coeff Contr. Expan.
 2398.37 2557.28 .1 .3

Upstream Embankment side slope = 0 horiz. to 1.0 vertical Downstream
Embankment side slope = 0 horiz. to 1.0 vertical Maximum allowable
submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Piers = 5

Pier Data
Pier Station Upstream= 2457 Downstream= 2443 Upstream num= 2
 Width Elev Width Elev
 2 -20 2 13
Downstream num= 2
 Width Elev Width Elev
 2 -20 2 13

Pier Data
Pier Station Upstream= 2480 Downstream= 2466
Upstream num= 2
 Width Elev Width Elev
 2 -20 2 13
Downstream num= 2
 Width Elev Width Elev
 2 -20 2 13

Pier Data
Pier Station Upstream= 2484 Downstream= 2470
Upstream num= 2
 Width Elev Width Elev
 4 -20 4 13
Downstream num= 2
 Width Elev Width Elev
 4 -20 4 13

Pier Data
Pier Station Upstream= 2514 Downstream= 2500
Upstream num= 2
 Width Elev Width Elev
 4 -20 4 13
Downstream num= 2
 Width Elev Width Elev
 4 -20 4 13

Pier Data Pier Station Upstream= 2518 Downstream= 2504
Upstream num= 2
 Width Elev Width Elev
 2 -20 2 13
Downstream num= 2
 Width Elev Width Elev
```

```
 2 -20 2 13

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
 Energy
 W.S. Pro Method

 W.S.Pro Data
 Left Embankment
 El of the top of the embankment = 15
 El of the toe of the abutment = 0
 Right Embankment
 El of the top of the embankment = 15
 El of the toe of the abutment = 0
 Abutment Type = 2 Vert. abutments and sloping embankments  Slope of
abutments =
 Top with of embankment = 15
 Centroid station of bridge opening =
 Wing Wall Type = No wing walls present
 Width =
 Angle =
 Radius =   Guide Banks Type = No Guide Bank present
 Length =
 Offset =
 Angle =

Selected Low Flow Methods = W.S.Pro Method

High Flow Method
 Energy Only

Additional Bridge Parameters
 Add Friction component to Momentum
 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION


RIVER: Taunton River
REACH: Main Stem RS: 7088.903

INPUT
Description: 8.3- DS Face RR Br
Station Elevation Data num= 409
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  0 21.17 6.551 21.57 13.11
21.74 19.66 21.74 26.22 21.91  32.77 21.94 72.099 21.29 85.211 21.16 91.76
21.22 98.32 21.62  104.87 21.27 117.979 21.37 124.54 21.32 144.2 21.66 150.75
21.53  157.31 21.75 163.861 21.76 170.42 21.39 176.97 21.48 183.53 21.71
203.19 21.57 209.75 21.72 216.3 22.15 222.85 22.06 235.96 21.5  249.07 21.58
255.63 21.75 262.18 21.78 268.74 21.36 275.289 20.8  281.85 20.86 294.95
```

20.58 327.73 20.24 347.39 20.24 353.949 20.1 380.16 20.24 386.72 19.95
419.49 19.33 426.05 19.1 432.599 19.34 445.711 18.7 452.26 18.1 458.82 18
465.37 17.23 471.93 16.74 478.479 16.94 491.591 15.88 504.7 15.12 511.25
14.63 524.361 14.08 530.92 13.94 544.03 13.18 550.58 12.93 557.139 13.6
563.69 13.44 576.8 12.73 583.35 13.12 589.909 15.15 596.46 15.37 609.57
14.89 622.68 15.44 629.24 16.37 635.789 16.6 655.45 15.69 668.56 15.63
688.23 15.08 694.78 15.34 701.34 15.33 707.89 15.46 721 15.19 740.66 15.07
747.22 14.43 760.331 14.82 766.88 14.24 779.99 14.66 786.54 14.99 793.099
15.49 799.65 15.23 819.32 13.68 832.43 13.61 838.979 13.38 845.53 12.83
858.64 13.27 871.75 12.12 878.31 12.22 884.859 13.85 891.42 14.5 897.97
14.25 904.53 13.83 911.08 14.43 917.629 14.8 924.19 14.72 937.3 15.14 943.85
13.68 950.409 13.14 956.96 13.57 963.521 13.49 970.07 14.52 976.63 15.86
989.73 15.31 996.289 15.56 1002.84 15.21009.401 16.12 1022.51 15.05 1029.06
15.3 1042.169 14.76 1048.73 14.71055.281 15.68 1061.83 16 1068.39 15.84
1074.939 15.5 1081.5 15.641107.719 13.69 1114.27 13.57 1127.38 13.72 1133.94
14.23 1147.04 13.971153.599 13.63 1160.15 13.741166.711 13.63 1173.26 13.23
1179.82 13.78 1186.37 15.191199.479 15.89 1206.04 15.41 1212.591 15.46
1219.14 15.89 1232.25 16.01 1238.81 15.46 1251.92 15.57 1258.47 16.04
1265.03 15.65 1271.58 13.021278.139 9.36 1284.69 8.09 1297.8 13.71 1304.35
14.38 1310.91 13.361324.021 14.64 1330.57 14.78 1337.13 14.47 1343.68 14.37
1350.24 14.43 1363.34 13.58 1376.45 13.3 1383.01 12.93 1389.56 13 1396.12
12.73 1409.23 12.48 1422.34 12.1 1428.89 12.31435.449 12.16 1442
12.621448.551 12.53 1455.11 12.27 1468.219 12.31 1474.77 12.21481.329 13.1
1487.88 14.39 1507.55 14.42 1514.099 14 1520.65 13.941527.211 14.23 1533.76
14.09 1540.32 14.23 1546.87 13.971573.091 14.06 1579.65 13.74 1586.2 13.75
1599.31 14.31 1612.42 14.28 1632.08 15.631638.639 15.87 1645.19 15.53 1658.3
15.53 1671.409 15.091684.519 14.5 1691.07 13.95 1710.74 12.78 1723.85 12.81
1730.401 12.31 1743.51 12.04 1750.06 12.14 1769.73 11.331776.281 11.43
1782.84 13.341795.949 13.36 1802.5 13.551809.061 13.36 1815.61 13.53 1841.829
13.21 1848.38 12.99 1854.94 13.01 1861.49 12.82 1868.05 12.42 1874.599 12.37
1881.16 12.671887.709 12.4 1900.82 12.75 1907.37 12.5 1913.93 12.421920.479
12.081933.591 12.43 1940.15 12.32 1946.7 12.39 1953.259 12.68 1959.81 12.05
1972.92 11.93 1979.48 11.21 1986.03 11.19 1992.58 11.331999.139 11.16
2005.69 12.04 2012.25 13.31 2018.8 12.97 2025.36 12.952031.909 13.09 2038.47
12.52 2064.68 12.152077.789 12.47 2084.35 13.62 2097.46 13.862110.569 13.83
2117.12 13.49 2130.23 13.67 2149.89 13.28 2182.66 13.212189.219 12.9 2215.44
12.8 2221.99 12.96 2228.55 12.82235.099 12.15 2241.65 11.752248.209 11.89
2254.76 11.52 2274.43 11.33 2287.54 11.532294.091 11.11 2300.65 11.6 2307.2
11.61 2313.75 11.42 2320.31 11.562326.861 11.4 2339.97 11.57 2346.53 11.76
2353.08 13.122359.639 13.56 2366.19 13.732372.741 14.372392.009 14.37
2398.37 14.492402.429 13.15 2404.72 12.38 2407 11.21 2407 10.11 2427 9.33
2428 -.97 2469 -12.29 2475 -16.31 2485 -18.82 2499 -17.59 2511 -12.23 2532
-.15 2533 11.24 2550.93 13.72 2557.28 14.19 2582.89 13.732589.419 13.39
2615.56 13.28 2628.63 13.43 2635.159 13.34 2641.7 13.65 2661.3 13.51 2667.84
13.91 2674.37 13.88 2680.899 13.62693.969 13.75 2700.51 14.03 2713.58 14.13
2765.85 13.96 2772.39 13.752798.529 13.47 2831.2 13.4 2837.73 13.52844.271
13.35 2850.8 13.542870.409 13.51 2890.01 13.792903.081 13.82916.149 14.1
2935.75 14.34 2942.29 14.322961.889 14.75 2988.03 14.712994.561 14.79 3001.1
14.733007.629 14.443020.699 14.283066.441 14.37 3118.72 14.38 3125.249 14.53
3144.86 14.393151.389 14.51 3164.46 14.4 3177.53 14.45 3184.059 14.29 3190.6
13.84 3203.67 14.02 3216.74 14.613229.811 14.07 3249.41 14.09 3262.38 13.82
3268.87 14.6 3275.35 14.82 3281.84 15.18 3294.809 14.99 3307.79 15.13 3327.25
14.98 3333.73 14.56 3346.7 14.85 3353.189 14.553372.649 14.27 3379.14 14.35
3385.62 14.82 3392.11 15.05 3405.08 14.83 3411.57 14.91 3418.05 15.13

3437.51 15.18 3456.97 15.91 3482.919 15.323489.399 15.353495.889 15.55
3502.38 15.59 3508.86 15.39 3515.35 15.47 3521.83 15.31 3534.81 15.63
3541.29 15.65 3547.78 15.41 3554.27 15.543560.749 15.443567.239 15.11
3606.16 15.04 3612.64 15.22 3619.13 15.543632.099 15.393645.071 15.86
3651.56 15.7 3658.05 15.89 3664.53 15.68 3671.02 16 3677.51 16.153690.479
15.983696.971 16.03 3703.451 15.72 3709.94 15.13 3716.42 15.05 3729.4 14.57
3735.88 14.16 3742.369 14.13748.859 13.483761.831 12.58 3768.31 12.38 3774.8
12.41 3781.29 13.81 3787.77 15.76 3794.26 15.64 3807.21 16.12 3826.6 16.19
3833.06 16.073852.451 16.743858.909 16.723865.369 16.83 3884.76 18.42
3891.22 18.72 3917.07 18.673929.991 18.863942.919 18.323949.379 18.23
3955.839 18.523962.309 18.54 3981.69 18.87 3988.15 18.78 3994.62 18.85
4001.08 18.764026.929 19.034033.389 18.64039.849 18.31 4052.78 17.21 4059.24
17.32 4065.7 18.21 4072.16 17.96 4078.63 17.19 4085.09 15.94 4091.55 14.88
4104.48 12.99 4110.94 12.654117.399 12.13 4130.33 11.76 4143.25 11.9 4156.18
11.83 4162.64 12.57 4169.1 13.51 4175.56 14.32 4182.03 14.794194.951
15.444220.799 15.51 4227.26 15.61

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 2398.37 .035 2557.28 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2398.37
2557.28 57.75 56.88 56.46 .1 .3

CROSS SECTION

RIVER: Taunton River REACH: Main Stem RS: 7032.026

INPUT
Description: 8- Exit RR Br
Station Elevation Data num= 416
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 23.05 6.55 24.26 13.1 23.03
19.65 20.87 26.21 19.81 32.76 19.5 39.31 19.44 45.86 19.3 52.41 19.35 58.96
20.33 65.52 21.18 72.07 21.93 78.62 22.28 85.17 22.5 98.27 22.79 104.82
22.82 111.38 22.74 117.93 22.9 124.48 22.94 131.03 23.04 144.13 22.81 150.69
22.73 157.24 22.63 163.79 22.63 170.34 22.4 176.89 22.06 183.44 21.7 196.55
21.11 203.1 20.78 209.65 20.63 216.2 20.59 222.75 20.57 229.3 20.46 235.86
20.22 242.41 20.29 248.96 20.2 255.51 19.99 268.61 19.73 281.72 19.98 288.27
19.82 294.82 19.62 301.37 19.63 307.92 19.7 314.47 19.72 321.03 19.71
327.58 19.93 334.13 19.98 340.68 19.84 347.23 19.65 353.78 19.63 360.34
19.41 366.89 19.08 373.44 18.68 379.99 18.21 386.54 18 399.64 17.54 406.2
17.23 412.75 16.95 419.3 16.81 425.85 16.32 432.4 15.77 438.95 15.59 445.51
15.11 452.06 14.49 458.61 13.81 465.16 13.04 471.71 12.51 478.26 12.4 484.81
12.16 491.37 11.87 497.92 11.56 504.47 11.48 511.02 10.84 517.57 10.35
524.12 10.15 530.68 9.93 537.23 9.87 550.33 9.83 556.88 9.73 563.43 9.7
569.98 9.69 576.54 9.74 583.09 9.72 589.64 9.77 596.19 9.66 602.74 9.62
609.29 9.71 615.85 9.73 622.4 9.79 628.95 9.92 635.5 10.15 642.05 10.27
648.6 10.23 655.16 10.04 661.71 9.81 668.26 9.38 674.81 9.52 681.36 9.51
687.91 9.41 694.46 9.64 701.02 9.58 707.57 8.95 714.12 7.14 720.67 5.93
727.22 5.91 1192.38 5.91 1198.93 6.56 1205.49 7.32 1212.04 6.92 1218.59 6.94
1225.14 7.43 1231.69 8.01 1238.24 8.44 1244.79 8.82 1251.35 9.67 1257.9
11.15 1264.45 11.73 1271 11.02 1277.55 10.44 1284.1 10.02 1290.66 9.76
1297.21 8.95 1303.76 8.78 1310.31 8.86 1316.86 8.57 1323.41 7.96 1329.96 7.3

1343.07 7.19 1349.62 7.01 1356.17 6.71 1362.72 7.1 1369.27 7.18 1382.38 7.27
1388.93 7.21 1395.48 7.06 1402.03 7.44 1408.58 7.51 1415.13 7.2 1421.69 6.91
1428.24 6.56 1441.34 6.51 1447.89 6.4 1454.44 6.38 1460.99 6.7 1467.55 6.91
1474.1 7.21 1480.65 7.33 1487.2 7.12 1500.3 6.95 1506.86 7.11 1513.41 7.23
1519.96 7.27 1526.51 7.37 1533.06 7.42 1546.16 7.34 1552.72 7.19 1559.27 7.3
1565.82 7.36 1572.37 7.39 1578.92 7.6 1585.47 7.75 1592.03 7.76 1598.58 7.7
1605.13 7.6 1618.23 7.56 1624.78 7.6 1631.33 7.54 1637.89 6.53 1644.44 5.71
1650.99 5.85 1657.54 5.86 1664.09 5.91 1670.64 5.99 1677.19 5.99 1683.75
5.92 1690.3 6.42 1696.85 6.54 1703.4 6.93 1709.95 7.7 1716.5 9 1723.06 9.78
1729.61 10.53 1736.16 11.63 1742.71 11.94 1749.26 11.89 1755.81 11.46
1762.36 10.44 1768.92 9.02 1775.47 7.57 1782.02 6.65 1788.57 6.29 1795.12
6.16 1808.23 5.76 1814.78 5.66 1821.33 5.64 1827.88 5.39 1834.43 5.23
1840.98 4.98 1854.09 4.83 1860.64 4.78 1867.19 4.75 1873.74 4.47 1880.29
4.31 1893.4 4.12 1899.95 4.41 1906.5 4.52 1913.05 4.48 1919.6 4.15 1926.15
3.9 1932.7 3.73 1939.26 3.69 1945.81 3.73 1952.36 3.83 1958.91 3.83 1972.01
3.69 1978.56 3.57 1985.12 3.47 1991.67 3.4 1998.22 3.41 2004.77 3.29
2011.32 3.3 2017.87 3.41 2024.43 3.46 2030.98 3.65 2037.53 3.67 2044.08 3.92
2050.63 3.75 2057.18 3.61 2063.73 3.35 2070.29 3.43 2076.84 3.37 2083.39
3.64 2208.08 2.88 2343.94 3.23 2364.33 7.96 2371.19 1.69 2379.02 .13 2396.94
-12.6 2406.72 -14.01 2420.7 -17.95 2442.46 -20.19 2461.27 -20.88 2476.74 -
16.17 2491.29 -9.07 2497.23 -4.15 2502.98 6.11 2504.02 6.22 2529.89 12.74
2571.59 11.49 2946.27 14 2952.82 13.91 2959.38 13.65 2965.94 13.24 2972.49
13.15 2979.05 13.15 2985.61 13.12 2992.17 13.24 2998.72 13.33 3005.28 13.39
3011.84 13.31 3018.39 13.29 3031.51 13.31 3038.07 13.38 3044.62 13.55
3057.74 13.56 3064.29 13.77 3077.41 13.63 3090.52 13.7 3097.08 13.67 3103.64
13.59 3110.19 13.61 3116.75 13.61 3123.31 13.53 3129.86 13.01 3136.42 13.05
3142.98 13.15 3149.54 13.06 3156.09 12.62 3162.65 12.64 3169.21 12.59
3175.76 12.62 3182.32 12.43 3188.88 12.02 3195.44 11.83 3201.99 11.97
3208.55 12.33 3215.11 12.72 3221.66 13.03 3228.22 13.26 3234.78 13.37
3247.89 13.63 3254.45 13.73 3261.01 13.76 3267.56 13.74 3280.68 13.83
3287.23 13.76 3300.32 14.17 3306.87 14.43 3313.42 14.77 3319.97 14.99
3326.52 14.88 3339.62 14.39 3346.17 14.23 3352.72 14.14 3359.27 13.95
3365.82 13.9 3372.37 13.77 3378.91 13.69 3385.46 13.5 3392.01 13.43 3398.56
13.61 3405.11 13.84 3411.66 14.04 3418.21 14.34 3424.76 14.29 3431.31 14.08
3437.86 13.64 3444.41 13 3450.96 12.52 3457.5 12.22 3464.05 12.04 3470.6
11.73 3477.15 11.16 3483.7 10.69 3490.25 10.13 3496.8 10.16 3503.35 10.25
3509.9 10.23 3516.45 10.19 3523 10.1 3529.54 10.03 3536.09 9.99 3542.64
10.08 3549.19 10.2 3555.74 10.18 3562.29 9.91 3575.39 10.17 3581.94 10.4
3588.49 10.6 3595.04 10.72 3601.59 10.7 3608.13 10.65 3614.68 10.39 3621.23
10.36 3627.78 10.26 3634.33 10.32 3640.88 10.25 3647.43 10.03 3660.53 10.15
3667.08 10.15 3680.18 9.92 3686.72 9.89 3693.27 10.04 3699.82 9.89 3706.37
9.66 3712.92 9.71 3719.47 9.69 3726.02 9.86 3732.57 9.99 3739.12 12.73
3745.67 15.62 3752.22 16.67 3758.76 16.77 3765.31 16.81 3771.86 16.81
3784.96 16.92 3791.51 17.06 3798.06 17.61 3804.61 18.22 3811.16 18.59
3817.71 18.35 3824.26 18.65 3830.8 18.81 3837.35 18.53 3843.9 18.33 3850.45
18.29 3857 18.19 3863.55 18.04 3870.1 17.59 3876.65 16.78 3883.2 14.96
3889.75 13.07 3896.3 11.31 3902.85 10.54 3909.39 10.74 3915.94 10.96 3922.49
12.09 3929.04 12.72 3935.59 13.81 3942.14 14.37 3948.69 14.59 3955.24 14.9
3961.79 15.13 3968.34 14.95 3974.89 14.88 3981.44 14.83 3987.98 14.68
3994.53 14.8 4001.08 14.97 4007.63 14.97 4014.18 14.91 4020.73 15.15 4027.28
15.29 4033.83 15.32 4046.93 15.41 4066.57 15.44 4073.12 15.46 4086.22 15.45
4099.32 15.47 4132.06 15.53 4138.61 15.51 4151.71 15.4 4171.36 15.17 4184.46
15.06 4197.56 15.05 4204.1 15.07

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .085 2364.33 .035 2529.89 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2364.33 2529.89 1208.71 1041.61 935.52 .1 .3 Ineffective Flow num= 2
Sta L Sta R Elev Permanent
0 1251 9.67 T
3424 4204.1 14.3 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 5990.413

INPUT
Description: 7
Station Elevation Data num= 206
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 23.22 26.08 24.85 156.48 24.77 182.56 24.09 195.6 24.58 215.15 23.64 241.23 24.41 254.27 24.13 267.31 23.16 312.95 22.29 325.99 22.68 339.03 22.19 423.79 21.96 436.83 21.25 502.03 20.44 521.59 21.17 573.75 20.97 586.79 20.54 593.31 19.67 599.83 18.33 710.66 17.34 769.34 18.08 886.73 17.47 932.49 17.75 971.72 17.38 991.33 18.11 1017.48 17.92 1030.55 18.56 1056.7 18.59 1082.85 19.57 1122.08 18.89 1135.15 17.85 1167.84 17.81 1200.52 18.63 1207.06 18.19 1220.14 18.3 1226.67 17.68 1239.75 17.8 1259.36 17.5 1285.51 18.34 1292.05 18.86 1344.35 19.81 1363.96 19.6 1475.09 22.84 1514.32 22.65 1625.45 24.97 1645.06 24.02 1658.14 22.6 1690.82 22.57 1710.46 20.98 1736.68 19.61 1782.58 19.13 1789.14 18.78 1795.7 17.56 1808.81 12.91 1815.37 11.89 1821.93 11.79 1848.15 13.43 1874.38 13.36 1880.94 13.76 1894.05 16 1907.17 16.65 1926.84 16.56 1933.39 15.67 1939.95 16.12 1953.07 15.87 1959.62 15.03 1966.18 15.19 1985.85 17.52 1998.96 18.66 2012.08 19.28 2018.64 19.04 2025.19 17.28 2031.75 17.64 2051.42 20.93 2071.09 21.96 2084.2 21.35 2090.76 20.55 2110.43 15.56 2116.99 14.32 2123.55 13.6 2136.66 13.3 2189.11 13.13 2215.33 12.09 2221.88 12.15 2300.54 11.44 2326.76 10.77 2333.31 11.09 2384.5 9.54 2390.89 8.26 2397.29 5.93 2403.69 2.01 2420 -1.01 2420.9 -1.16 2422.67 -1.46 2422.87 -1.25 2423.27 -1.2 2423.9 -1.34 2424.56 -1.49 2425.33 -1.64 2426.19 -1.7 2427.17 -1.99 2428.25 -2.21 2429.47 -2.71 2430.61 -3.19 2432.03 -3.66 2434.39 -4.41 2436.83 -5.27 2439.29 -6.1 2442 -6.83 2444.54 -7.28 2447.29 -7.84 2449.88 -8.1 2452.31 -8.26 2454.84 -8.46 2457.06 -8.57 2459.42 -8.63 2461.45 -8.75 2463.76 -8.96 2466.3 -8.91 2469.13 -9.1 2471.69 -8.95 2474.36 -9.43 2476.97 -9.32 2479.72 -9.27 2482.34 -9.17 2485.22 -8.96 2487.86 -8.61 2490.42 -8.34 2492.88 -8.04 2495.06 -7.61 2497.29 -7.22 2499.32 -7.05 2501.44 -6.77 2503.21 -6.52 2505.32 -6.16 2507.24 -5.86 2508.99 -5.42 2510.58 -5.18 2512.33 -4.81 2513.96 -4.59 2515.81 -4.19 2517.88 -3.76 2520.36 -3.45 2522.71 -2.85 2525.25 -2.51 2527.8 -2.3 2529.49 -2.02 2531.03 -1.89 2532.66 -1.83 2534.11 -1.76 2535.66 -1.62 2536.89 -1.48 2538.22 -1.39 2539.31 -1.28 2540.31 -1.14 2543.95 4.79 2550.21 7.62 2556.47 9.27 2562.73 9.46 2575.24 9.02 2587.76 8.18 2637.82 9.37 2714.81 9.63 2747.45 10.26 2845.37 10.51 2858.43 10.76 2871.49 10.29 2897.6 11.6 3028.46 10.74 3192.3 10.41 3343.02 11.76 3349.57 10.86 3356.13 9.51 3369.23 8.27 3382.34 7.61 3408.55 7.78 3415.11 8.11 3460.98 7.33 3513.41 8.34 3533.07 9.23 3605.15 8.2 3631.37 9.07 3716.56 8.05 3723.11 7.23 3775.54 8.72 3782.09 9.85 3788.65 11.53 3795.2

13.72 3801.75 15.25 3814.86 15.45 3834.52 17.14 3841.07 17.26 3847.63 16.39
3854.18 14.99 3860.73 13.07 3867.28 11.9 3919.71 13.13 3985.24 10.65 4004.9
10.55 4018.01 11.33 4024.56 11.32 4031.12 11.99 4044.22 15.65 4050.78 16.57
4057.33 16.06

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 2333.31 .035 2556.47 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2333.31
2556.47 373.51 485.71 679.74 .1 .3 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 2897 4057.33 11.6 T
Blocked Obstructions num= 1
 Sta L Sta R Elev
 2896.5 3167.111.55081

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 5504.704

INPUT
Description: 6- Approach Plain St Br
Station Elevation Data num= 421 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 24.78 6.56 25.23 13.11 25.58 19.67 25.61 26.22 25.55 32.78 25.64 39.33
25.66 45.89 25.9 52.45 26.03 59 26.29 72.11 26.55 78.67 26.66 85.22 26.89
91.78 27.21 98.34 27.35 104.89 27.69 111.45 27.9 118 27.97 124.56 28.19
131.11 28.33 137.67 28.57 144.23 28.64 150.78 28.53 157.34 28.21 163.89
28.06 170.45 27.95 177 28.13 183.56 28.26 190.12 28.35 196.67 28.4 203.23
28.55 209.78 28.82 216.34 28.76 222.89 28.59 229.45 28.52 236 28.41 242.56
28.35 249.12 28.48 255.67 28.65 262.23 28.71 268.78 28.57 275.34 28.2 281.89
27.87 288.45 27.64 295.01 27.6 301.56 27.42 308.12 27.2 314.67 26.9 321.23
26.64 327.78 26.58 334.34 26.47 340.9 26.22 347.45 26.07 354.01 25.83 360.56
25.76 367.12 25.56 373.67 25.24 380.23 25.11 386.79 24.92 393.34 24.82
399.9 24.79 406.45 24.66 413.01 24.14 419.56 24.01 426.12 23.94 432.68 23.82
439.23 24.13 445.79 24.25 452.34 24.24 458.9 24.16 465.45 24.14 472.01 24.01
478.56 23.82 485.12 23.82 491.68 23.96 498.23 24.08 504.79 24 511.34 24.35
517.9 25.42 524.45 25.3 537.57 24.89 544.12 23.96 550.68 23.35 557.23 22.59
563.79 22.05 570.34 21.64 576.9 21.46 583.46 21.24 590.01 21.21 596.57 21.29
603.12 21.17 609.68 21.1 616.23 21.1 629.35 20.87 635.9 20.8 642.46 20.86
649.01 20.96 662.12 21.45 668.68 21.55 675.24 21.53 681.79 21.25 688.35
21.21 694.9 20.58 701.46 20.06 708.01 20.27 714.57 20.26 721.13 20.27 734.24
20.45 740.79 20.53 753.9 20.73 760.46 20.76 767.02 20.85 780.13 20.34 786.68
20.2 793.24 20.18 799.79 20.27 812.91 20.31 819.46 20.36 826.02 20.3 832.57
20.18 839.13 20.17 845.68 20.07 852.24 19.63 858.8 19.64 871.91 19.75
878.46 19.79 885.02 19.73 891.57 19.72 898.13 19.75 904.69 19.88 911.24
19.82 924.35 19.97 930.91 20.26 937.46 20.37 944.02 20.58 950.57 20.73
957.13 20.79 963.69 20.54 970.24 20.52 983.35 20.94 989.91 20.95 996.46
20.88 1003.02 20.95 1009.58 21 1016.13 21 1022.69 20.98 1029.24 21.03 1035.8
21.06 1042.35 21.41 1048.91 21.86 1055.47 21.91 1062.02 22.08 1068.58 22.33
1075.13 22.63 1081.69 22.77 1088.24 22.84 1094.8 22.83 1101.36 22.65 1107.91
22.28 1114.47 21.81 1121.02 21.26 1127.58 20.83 1134.13 20.86 1140.69 21.15

1147.25 21.47 1153.8 21.57 1166.91 21.67 1173.47 21.78 1180.02 21.7 1186.58
21.5 1193.14 21.59 1199.69 21.65 1206.25 21.5 1212.8 21.45 1219.36 21.34
1225.91 21.03 1232.47 20.83 1245.58 20.85 1252.14 20.93 1258.69 20.94
1265.25 20.86 1271.8 20.81 1278.36 20.93 1284.92 21.1 1298.03 21.12 1304.58
21.29 1311.14 21.55 1317.69 21.79 1324.25 21.87 1330.81 21.89 1343.92 22.15
1350.47 22.32 1357.03 22.45 1363.58 22.64 1370.14 23.04 1376.7 23.27 1383.25
23.3 1389.81 23.38 1396.36 23.53 1402.92 23.66 1409.47 23.56 1422.59 23.57
1429.14 23.67 1435.7 23.79 1442.25 23.88 1448.81 24 1455.36 23.9 1468.47
24.01 1475.03 23.94 1481.59 23.9 1488.14 23.71 1494.7 23.55 1501.25 23.79
1507.81 24.49 1514.36 24.93 1520.92 25.07 1527.48 25.11 1534.03 25.27
1540.59 25.46 1547.14 25.57 1553.7 25.72 1560.25 25.9 1566.81 25.99 1573.37
25.97 1579.92 25.91 1586.48 25.9 1599.59 25.73 1606.14 25.74 1612.7 25.71
1625.81 25.5 1632.37 25.26 1638.92 25.07 1645.48 24.81 1652.03 24.63 1658.59
24.52 1665.15 24.59 1671.7 24.7 1684.81 24.01 1691.37 23.79 1697.92 23.37
1704.44 23.14 1717.48 23.2 1724 23.22 1730.52 23.16 1737.04 22.74 1743.56
21.76 1750.08 21.29 1756.6 20.94 1763.12 20.36 1769.64 20.2 1776.16 20
1782.68 19.85 1789.2 19.42 1795.72 18.65 1802.24 17.36 1808.76 16.13 1815.28
15.84 1821.8 15.97 1828.32 16.71 1834.84 17.59 1841.36 18.52 1847.88 18.64
1854.4 18.83 1860.92 18.95 1867.44 19.09 1873.96 19.14 1886.99 19.53 1900.03
19.8 1906.55 19.92 1913.07 19.92 1919.59 20.2 1926.11 20.45 1932.63 20.57
1939.15 20.41 1945.67 20.32 1952.19 20.34 1958.71 20.54 1965.23 21.14
1971.75 21.95 1978.27 22.69 1984.79 22.85 1991.31 22.98 1997.83 23.34
2004.35 23.44 2010.87 23.22 2017.39 22.97 2023.91 23.32 2030.43 23.47
2036.95 23.64 2043.47 23.42 2049.99 23.3 2056.5 23.14 2063.02 22.93 2069.54
22.85 2076.06 22.5 2082.58 21.46 2089.1 19.25 2095.62 18.89 2102.14 18.88
2108.66 18.48 2115.18 17.65 2121.7 17.19 2128.22 16.84 2134.74 16.42 2147.78
15.17 2154.3 15.05 2167.37 14.48 2173.91 14.13 2180.45 13.95 2193.53 13.74
2200.06 13.7 2206.6 13.52 2213.14 13.22 2219.68 12.78 2226.21 12.43 2239.29
12.19 2245.83 12.23 2252.37 12.32 2258.9 12.19 2265.44 11.85 2271.98 11.66
2278.52 11.71 2291.59 11.54 2298.13 11.33 2311.21 11.2 2317.74 11.29 2324.28
11.36 2330.82 11.4 2337.36 11.59 2343.9 11.92 2350.43 12.2 2356.97 12.43
2370.05 12.24 2376.58 12.28 2383.12 12.36 2389.66 12.53 2555.27 11.7 2571.37
6.39 2572.07 -3.74 2580.16 -6.2 2608.37 -10.12 2625.36 -10.88 2644.33 -9.87
2650.91 -10.66 2670.95 -9.1 2674.87 -6.86 2681.57 11.72 2722.61 11.83
2781.61 11.44 2788.1 11.47 2801.07 11.23 2820.54 10.83 2827.03 10.81 2833.52
10.75 2840.01 10.61 2846.5 10.56 2852.99 10.7 2859.48 10.86 2865.97 10.92
2872.46 10.81 2878.95 10.43 2885.43 10.13 2891.92 10.03 2898.41 9.87 2904.9
9.74 2911.39 9.98 2917.88 10.3 2924.37 10.54 2930.86 10.69 2937.35 11.01
2943.84 10.79 2956.82 10.45 2963.31 10.19 2969.79 10.24 2976.28 9.84 2982.77
9.76 2989.26 9.73 2995.75 9.67 3002.24 9.72 3008.73 9.62 3015.22 9.64
3021.71 9.75 3028.2 9.65 3034.69 9.76 3041.18 9.83 3047.67 9.69 3054.15 9.6
3060.64 9.59 3073.62 9.95 3086.6 10.01 3093.09 10.13 3099.58 10.17 3106.07
10.16 3112.56 10.46 3119.05 14.98 3125.54 20.67 3132.03 20.75 3138.51 20.51
3145 19.74 3151.49 19.46 3157.98 19.44 3164.47 19.45 3170.96 19.57 3177.45
18.89 3183.94 17.62 3190.43 17.4 3196.92 18.14 3203.41 17.77 3209.9 17.61
3216.39 17.55 3222.87 17.74 3229.36 18.01 3235.85 17.72 3242.34 17.41
3248.83 17.3 3255.32 17.5 3261.81 18.17 3268.3 18.97 3274.79 19.02 3281.28
19.23 3287.77 19.18

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 2555.27 .035 2681.57 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2555.27

2681.57 98.06 95.18 93.88 .1 .3 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 2722 3287.77 11.6 T
Blocked Obstructions num= 1
 Sta L Sta R Elev
 2791.49 2855.8811.40867

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 5409.52

INPUT
Description: 5.7- US Face Plain St Br
Station Elevation Data num= 429
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 29.95 6.52 30.1 13.05 30.45
19.57 31.19 26.09 31.36 32.62 31.23 39.14 31.05 45.66 30.89 52.19 30.46
58.71 30.14 65.23 30.03 71.75 30.11 78.28 30.08 84.8 30.07 91.32 30.28
97.85 30.47 104.37 30.57 110.89 30.3 117.42 29.89 123.94 29.63 130.46 29.82
136.99 29.94 143.51 30.17 150.03 30.43 156.56 30.52 169.6 30.6 182.65 30.65
195.7 30.48 202.22 30.58 208.74 30.74 215.27 30.96 221.79 31.06 228.31 31.07
234.83 31.01 241.36 31.14 247.88 30.34 254.4 29.99 260.93 30.33 267.45 30.48
273.97 30.49 287.02 30.4 293.54 30.09 300.07 29.34 306.59 28.8 313.11 29.18
319.64 29.77 326.16 30.04 332.68 30.68 339.21 30.92 345.73 30.9 352.25 30.78
358.78 30.35 365.3 29.8 371.82 30.06 378.34 30.87 384.87 31.63 391.39 31.84
397.91 32.26 404.44 32.43 410.96 32.23 430.53 30.92 437.05 30.45 443.58
30.23 450.1 30.54 456.62 31.05 463.15 30.9 469.67 30.39 476.19 29.92 482.72
29.67 489.24 29.58 495.76 29.65 502.29 29.91 508.81 30.46 515.33 31.27
521.85 32.23 528.38 32.82 534.9 32.97 541.42 33.06 547.95 32.41 554.47 32.31
560.99 32.43 574.04 32.86 580.56 32.8 587.09 32.57 600.13 32.78 619.7 32.19
626.23 32.05 632.75 31.27 639.27 30.46 645.8 29.73 652.32 29.4 658.84 29.13
665.36 28.83 671.89 28.7 678.41 29.34 684.93 31.05 691.46 31.69 697.98 31.97
704.5 32.2 711.03 32.1 717.55 31.82 724.07 31.51 730.6 31.17 737.12 30.76
743.64 30.45 750.17 30.58 756.69 30.85 763.21 31.14 769.74 31.5 776.26 31.89
782.78 31.76 789.31 32.29 795.83 32.5 802.35 32.69 808.88 32.85 815.4 32.95
821.92 32.86 828.44 32.72 834.97 32.7 841.49 32.64 848.01 32.56 854.54 32.74
861.06 32.98 867.58 33.45 874.11 33.94 880.63 34.2 887.15 34.09 893.68 34.53
900.2 34.86 906.72 35.06 913.25 34.97 926.25 35.02 945.76 35.36 952.27 35.25
958.77 35.28 965.28 35.34 971.78 35.55 978.28 35.52 984.79 35.29 991.29 35.2
997.79 34.7 1004.3 33.79 1010.8 32.8 1017.31 31.72 1023.81 31.15 1030.31
30.61 1036.82 30.36 1043.32 31.67 1049.82 33.52 1056.33 34.4 1062.83 33.97
1082.34 32.57 1088.85 32.08 1095.35 31.78 1101.85 31.67 1108.36 31.89
1114.86 32.19 1127.87 32.32 1134.37 32.44 1147.38 32.48 1153.88 32.41
1160.39 32.22 1166.89 31.79 1179.9 32.23 1186.4 32.43 1192.91 32.58 1199.41
32.52 1205.91 32.65 1212.42 32.66 1218.92 32.69 1225.43 32.7 1231.93 32.81
1238.43 33.03 1244.94 33.4 1251.44 33.82 1257.94 33.85 1270.95 33.81 1277.46
33.83 1290.46 33.76 1296.97 33.66 1309.97 33.51 1316.48 33.23 1322.98 32.65
1329.48 32.04 1335.99 31.57 1342.49 31.39 1349 31.15 1355.5 31.25 1362 31.28
1375.01 31.43 1381.52 31.52 1388.02 31.69 1394.52 31.81 1401.03 31.85
1407.53 31.83 1414.03 31.76 1420.54 31.52 1427.04 31.2 1433.54 31.29 1440.05
31.29 1446.55 31.27 1453.06 31.18 1459.56 30.99 1466.06 30.68 1472.57 30.67
1479.07 30.57 1485.57 30.41 1492.08 30.17 1498.58 29.97 1505.09 29.97
1511.59 30 1518.09 30.01 1524.6 30.21 1531.1 30.63 1537.6 30.62 1544.11

30.41 1550.61 30.31 1557.12 30.42 1563.62 30.35 1570.12 29.97 1576.63 29.73
1583.13 29.64 1589.63 29.41 1596.14 28.66 1602.64 28.28 1609.15 28.26
1615.65 28 1622.15 28.17 1628.66 28.23 1635.16 28.27 1641.71 28.23 1648.27
28.1 1654.82 27.9 1661.38 27.58 1667.93 26.89 1674.48 26.22 1681.04 25.93
1687.59 25.76 1694.14 25.16 1700.7 24.76 1707.25 24.72 1713.8 24.25 1720.36
24 1726.91 24.26 1733.47 24.54 1740.02 24.92 1746.57 24.95 1753.13 24.85
1759.68 24.87 1766.23 24.94 1772.79 24.46 1779.34 24.13 1785.89 24.48
1792.45 24.97 1805.56 25.14 1818.66 25.41 1825.22 25.21 1831.77 24.06
1838.32 23.96 1844.88 23.75 1851.43 23.88 1857.98 24.15 1864.54 24.57
1871.09 24.77 1877.65 24.76 1884.2 24.62 1890.75 24.35 1897.31 24.19 1903.86
24.12 1910.41 24.08 1923.52 24.35 1930.07 24.52 1936.63 24.74 1943.18 24.77
1962.84 24.54 1969.4 24.13 1975.95 22.67 1982.5 21.37 1995.61 20.92 2015.27
20.41 2021.82 20.2 2028.38 19.71 2034.93 19.56 2041.49 19.24 2048.04 18.64
2054.59 18.09 2061.13 17.65 2067.66 17.47 2074.19 17.62 2080.72 17.68
2087.26 17.54 2106.86 17.23 2113.39 17.15 2119.92 16.84 2126.45 16.17
2132.99 15.13 2139.52 14.62 2146.05 14.65 2159.12 14.85 2172.18 15.02
2178.72 15.12 2185.25 14.81 2191.78 14.47 2204.85 14.46 2217.91 14.21
2224.45 14.13 2230.98 13.97 2237.51 13.87 2244.04 13.85 2250.58 13.9 2257.11
13.81 2263.64 13.65 2270.17 13.59 2276.71 13.56 2283.24 13.59 2289.77 13.71
2296.31 13.78 2302.84 14.02 2315.84 14.12 2322.31 14.33 2328.78 14.48
2335.25 14.67 2341.72 14.77 2348.19 14.9 2354.66 14.97 2361.13 15.13 2367.6
15.11 2374.07 15.19 2380.54 15.37 2387.01 15.25 2393.47 15.25 2399.94 15.4
2406.41 15.5 2412.88 15.39 2419.35 15.26 2425.82 14.58 2432.29 11.87 2438.76
4.39 2441.97 -3.65 2460.77 -9.63 2473.43 -10.96 2519.95 -9.19 2547.66 -4.85
2551.91 -3.45 2552.45 14.33 2568.15 13.28 2574.62 13.83 2581.09 13.58
2587.56 13.43 2594.03 12.93 2600.5 12.63 2606.97 12.44 2613.44 12.29 2619.91
12.2 2626.38 12.18 2632.85 12.09 2639.32 11.98 2645.87 11.7 2652.43 11.72
2658.99 12.02 2665.55 12.13 2672.11 11.9 2678.67 11.57 2691.79 11.05 2698.34
10.77 2704.9 10.52 2711.46 10.25 2718.02 9.94 2724.58 9.51 2731.14 9.32
2737.7 9.18 2744.25 9.07 2750.81 8.99 2757.37 8.84 2763.93 8.79 2770.49 8.69
2777.05 8.91 2783.61 9.21 2790.17 9.15 2796.72 9.14 2803.28 9.27 2809.84
9.31 2816.4 9.39 2822.96 9.42 2829.52 9.52 2855.75 9.55 2862.31 9.73 2875.43
10.24 2881.99 10.27 2888.55 10.15 2895.11 10.28 2901.66 10.33 2908.22 10.28
2914.78 10.26 2934.46 10.38 2947.57 10.36 2954.13 10.36 2960.69 10.81
2967.25 12.12 2973.81 11.64 2980.37 12.35 2986.93 17.36 2993.49 20.71
3000.04 20.87 3006.6 20.86 3013.16 20.93 3019.72 20.91 3026.28 21.07 3032.84
20.74 3039.4 20.38 3045.96 20.35 3052.51 20.26 3059.07 20.4 3065.63 19.79
3072.19 19.35 3078.75 19.81 3085.31 20.06 3091.87 19.81 3098.43 18.68
3104.98 18.04 3111.54 18.21 3118.1 18.45 3124.66 18.53 3131.22 18.75 3137.78
18.99 3150.89 19.09 3157.45 19.29 3164.01 19.57 3170.57 19.73

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 2419.35 .035 2552.45 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2419.35
2552.45 81.29 73.58 68.36 .1 .3 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 2630 3170.57 11.6 T
Blocked Obstructions num= 1
 Sta L Sta R Elev
 2662.35 272512.09707

BRIDGE

RIVER: Taunton River
REACH: Main Stem RS: 5376.326

INPUT
Description: 5.5 Plain St
Distance from Upstream XS = 4
Deck/Roadway Width = 58
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
 num= 14
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 2126 14 2300 14 2410 14 2410 19.95 2425 19.95 2425 16.34 12.06
 2490 15.34 11.64 2552 14.33 10.13 2552 17.95 10.13
 2567 17.95 2567 13.1 2649 13.1
 2722 12.55 2981 12.55

Upstream Bridge Cross Section Data
Station Elevation Data num= 429
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 29.95 6.52 30.1 13.05 30.45
19.57 31.19 26.09 31.36 32.62 31.23 39.14 31.05 45.66 30.89 52.19 30.46
58.71 30.14 65.23 30.03 71.75 30.11 78.28 30.08 84.8 30.07 91.32 30.28
97.85 30.47 104.37 30.57 110.89 30.3 117.42 29.89 123.94 29.63 130.46 29.82
136.99 29.94 143.51 30.17 150.03 30.43 156.56 30.52 169.6 30.6 182.65 30.65
195.7 30.48 202.22 30.58 208.74 30.74 215.27 30.96 221.79 31.06 228.31 31.07
234.83 31.01 241.36 31.14 247.88 30.34 254.4 29.99 260.93 30.33 267.45 30.48
273.97 30.49 287.02 30.4 293.54 30.09 300.07 29.34 306.59 28.8 313.11 29.18
319.64 29.77 326.16 30.04 332.68 30.68 339.21 30.92 345.73 30.9 352.25 30.78
358.78 30.35 365.3 29.8 371.82 30.06 378.34 30.87 384.87 31.63 391.39 31.84
397.91 32.26 404.44 32.43 410.96 32.23 430.53 30.92 437.05 30.45 443.58
30.23 450.1 30.54 456.62 31.05 463.15 30.9 469.67 30.39 476.19 29.92 482.72
29.67 489.24 29.58 495.76 29.65 502.29 29.91 508.81 30.46 515.33 31.27
521.85 32.23 528.38 32.82 534.9 32.97 541.42 33.06 547.95 32.41 554.47 32.31
560.99 32.43 574.04 32.86 580.56 32.8 587.09 32.57 600.13 32.78 619.7 32.19
626.23 32.05 632.75 31.27 639.27 30.46 645.8 29.73 652.32 29.4 658.84 29.13
665.36 28.83 671.89 28.7 678.41 29.34 684.93 31.05 691.46 31.69 697.98 31.97
704.5 32.2 711.03 32.1 717.55 31.82 724.07 31.51 730.6 31.17 737.12 30.76
743.64 30.45 750.17 30.58 756.69 30.85 763.21 31.14 769.74 31.5 776.26 31.89
782.78 31.76 789.31 32.29 795.83 32.5 802.35 32.69 808.88 32.85 815.4 32.95
821.92 32.86 828.44 32.72 834.97 32.7 841.49 32.64 848.01 32.56 854.54 32.74
861.06 32.98 867.58 33.45 874.11 33.94 880.63 34.2 887.15 34.09 893.68 34.53
900.2 34.86 906.72 35.06 913.25 34.97 926.25 35.02 945.76 35.36 952.27 35.25
958.77 35.28 965.28 35.34 971.78 35.55 978.28 35.52 984.79 35.29 991.29 35.2
997.79 34.7 1004.3 33.79 1010.8 32.8 1017.31 31.72 1023.81 31.15 1030.31
30.61 1036.82 30.36 1043.32 31.67 1049.82 33.52 1056.33 34.4 1062.83 33.97
1082.34 32.57 1088.85 32.08 1095.35 31.78 1101.85 31.67 1108.36 31.89
1114.86 32.19 1127.87 32.32 1134.37 32.44 1147.38 32.48 1153.88 32.41
1160.39 32.22 1166.89 31.79 1179.9 32.23 1186.4 32.43 1192.91 32.58 1199.41
32.52 1205.91 32.65 1212.42 32.66 1218.92 32.69 1225.43 32.7 1231.93 32.81
1238.43 33.03 1244.94 33.4 1251.44 33.82 1257.94 33.85 1270.95 33.81 1277.46
33.83 1290.46 33.76 1296.97 33.66 1309.97 33.51 1316.48 33.23 1322.98 32.65
1329.48 32.04 1335.99 31.57 1342.49 31.39 1349 31.15 1355.5 31.25 1362 31.28
1375.01 31.43 1381.52 31.52 1388.02 31.69 1394.52 31.81 1401.03 31.85
1407.53 31.83 1414.03 31.76 1420.54 31.52 1427.04 31.2 1433.54 31.29 1440.05
31.29 1446.55 31.27 1453.06 31.18 1459.56 30.99 1466.06 30.68 1472.57 30.67

```
1479.07 30.57 1485.57 30.41 1492.08 30.17 1498.58 29.97 1505.09 29.97
1511.59 30 1518.09 30.01 1524.6 30.21 1531.1 30.63 1537.6 30.62  1544.11
30.41 1550.61 30.31 1557.12 30.42 1563.62 30.35 1570.12 29.97  1576.63 29.73
1583.13 29.64 1589.63 29.41 1596.14 28.66 1602.64 28.28  1609.15 28.26
1615.65 28 1622.15 28.17 1628.66 28.23 1635.16 28.27  1641.71 28.23 1648.27
28.1 1654.82 27.9 1661.38 27.58 1667.93 26.89  1674.48 26.22 1681.04 25.93
1687.59 25.76 1694.14 25.16 1700.7 24.76  1707.25 24.72 1713.8 24.25 1720.36
24 1726.91 24.26 1733.47 24.54  1740.02 24.92 1746.57 24.95 1753.13 24.85
1759.68 24.87 1766.23 24.94  1772.79 24.46 1779.34 24.13 1785.89 24.48
1792.45 24.97 1805.56 25.14  1818.66 25.41 1825.22 25.21 1831.77 24.06
1838.32 23.96 1844.88 23.75  1851.43 23.88 1857.98 24.15 1864.54 24.57
1871.09 24.77 1877.65 24.76  1884.2 24.62 1890.75 24.35 1897.31 24.19 1903.86
24.12 1910.41 24.08  1923.52 24.35 1930.07 24.52 1936.63 24.74 1943.18 24.77
1962.84 24.54  1969.4 24.13 1975.95 22.67 1982.5 21.37 1995.61 20.92 2015.27
20.41  2021.82 20.2 2028.38 19.71 2034.93 19.56 2041.49 19.24 2048.04 18.64
2054.59 18.09 2061.13 17.65 2067.66 17.47 2074.19 17.62 2080.72 17.68
2087.26 17.54 2106.86 17.23 2113.39 17.15 2119.92 16.84 2126.45 16.17
2132.99 15.13 2139.52 14.62 2146.05 14.65 2159.12 14.85 2172.18 15.02
2178.72 15.12 2185.25 14.81 2191.78 14.47 2204.85 14.46 2217.91 14.21
2224.45 14.13 2230.98 13.97 2237.51 13.87 2244.04 13.85 2250.58 13.9  2257.11
13.81 2263.64 13.65 2270.17 13.59 2276.71 13.56 2283.24 13.59  2289.77 13.71
2296.31 13.78 2302.84 14.02 2315.84 14.12 2322.31 14.33  2328.78 14.48
2335.25 14.67 2341.72 14.77 2348.19 14.9 2354.66 14.97  2361.13 15.13 2367.6
15.11 2374.07 15.19 2380.54 15.37 2387.01 15.25  2393.47 15.25 2399.94 15.4
2406.41 15.5 2412.88 15.39 2419.35 15.26  2425.82 14.58 2432.29 11.87 2438.76
4.39 2441.97 -3.65 2460.77 -9.63  2473.43 -10.96 2519.95 -9.19 2547.66 -4.85
2551.91 -3.45 2552.45 14.33  2568.15 13.28 2574.62 13.83 2581.09 13.58
2587.56 13.43 2594.03 12.93  2600.5 12.63 2606.97 12.44 2613.44 12.29 2619.91
12.2 2626.38 12.18  2632.85 12.09 2639.32 11.98 2645.87 11.7 2652.43 11.72
2658.99 12.02  2665.55 12.13 2672.11 11.9 2678.67 11.57 2691.79 11.05 2698.34
10.77  2704.9 10.52 2711.46 10.25 2718.02 9.94 2724.58 9.51 2731.14 9.32
2737.7 9.18 2744.25 9.07 2750.81 8.99 2757.37 8.84 2763.93 8.79  2770.49 8.69
2777.05 8.91 2783.61 9.21 2790.17 9.15 2796.72 9.14  2803.28 9.27 2809.84
9.31 2816.4 9.39 2822.96 9.42 2829.52 9.52  2855.75 9.55 2862.31 9.73 2875.43
10.24 2881.99 10.27 2888.55 10.15  2895.11 10.28 2901.66 10.33 2908.22 10.28
2914.78 10.26 2934.46 10.38  2947.57 10.36 2954.13 10.36 2960.69 10.81
2967.25 12.12 2973.81 11.64  2980.37 12.35 2986.93 17.36 2993.49 20.71
3000.04 20.87 3006.6 20.86  3013.16 20.93 3019.72 20.91 3026.28 21.07 3032.84
20.74 3039.4 20.38  3045.96 20.35 3052.51 20.26 3059.07 20.4 3065.63 19.79
3072.19 19.35  3078.75 19.81 3085.31 20.06 3091.87 19.81 3098.43 18.68
3104.98 18.04  3111.54 18.21 3118.1 18.45 3124.66 18.53 3131.22 18.75 3137.78
18.99  3150.89 19.09 3157.45 19.29 3164.01 19.57 3170.57 19.73

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 2419.35 .035 2552.45 .085

Bank Sta: Left Right Coeff Contr. Expan.
 2419.35 2552.45 .1 .3
Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 2630 3170.57 11.6 T
Blocked Obstructions num= 1
 Sta L Sta R Elev
```

2662.35 272512.09707
Downstream Deck/Roadway Coordinates
num= 14
Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
2126 14 2175 14 2285 14
2285 19.95 2300 19.95 2300 16.23 11.92
2365 15.48 11.15 2412 14.73 10.5 2412 17.95 10.5
2427 17.95 2427 13.1 2510 13.1
2582 12.55 2981 12.55

Downstream Bridge Cross Section Data
Station Elevation Data num= 429
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 33.95 6.51 34.25 13.02 34.92
19.52 35.01 26.03 35.37 32.54 35.43 39.05 35.4 45.55 35.17 52.06 35.06 58.57
35.13 65.08 35.13 71.58 35.04 78.09 34.66 84.6 34.03 91.11 33.96 97.61
33.82 104.12 33.79 110.63 34.31 117.14 34.8 123.64 34.91 130.15 35.06 136.66
35.41 143.17 35.16 149.67 34.12 156.18 33.87 162.69 34.3 169.2 34.89 175.71
35.11 188.72 35.15 195.23 35.2 201.74 35.16 208.24 35.17 214.75 35.22 221.26
35.24 227.77 35.24 234.27 35.09 240.78 34.8 247.29 34.39 253.8 34.27 260.3
34.31 266.81 34.11 273.32 33.52 279.83 33.25 286.33 33.9 292.84 34.33
299.35 34.44 305.86 34.43 312.36 34.37 318.87 34.14 325.38 33.82 331.89
33.82 338.4 33.74 344.9 33.8 351.41 33.96 357.92 33.89 364.43 33.72 370.93
34.01 377.44 34.26 383.95 34.4 390.46 34.33 396.96 34.37 409.98 34.55 416.49
34.5 422.99 34.32 429.5 34.33 436.01 34.37 442.52 34.36 449.02 34.48 455.53
34.91 462.04 35.27 468.55 35.31 475.06 35.38 481.56 35.28 488.07 34.9 494.58
35.03 501.09 35.22 507.59 35.53 514.1 35.74 520.61 35.62 527.12 35.02
533.62 34.67 540.13 35.01 546.64 35.81 553.15 36 559.65 36.08 566.16 36.11
572.67 36.05 579.18 35.9 585.68 35.71 592.19 35.94 598.7 37.51 605.21 38.83
611.71 39.46 618.22 39.68 624.73 39.67 631.24 39.57 637.74 39.43 644.25
39.18 650.76 38.47 657.27 38.18 670.28 38.09 676.79 38.41 683.3 38.62 689.81
38.56 696.31 38.34 702.82 38 709.33 37.79 715.84 38.38 722.34 38.99 728.85
39.21 735.36 39.23 741.87 39.18 748.37 39.03 754.88 38.82 761.39 38.5 767.9
38.6 774.4 38.87 780.96 39.06 787.52 39.89 794.07 40.63 800.63 40.86 807.18
40.88 813.74 40.84 820.29 40.67 826.85 39.92 833.41 39.51 839.96 39.26
846.52 39.32 853.07 39.65 866.19 40.16 872.74 40.26 879.3 38.69 885.85 37.59
892.41 37.46 898.96 37.2 905.52 38.59 912.08 40.08 918.63 40.99 925.19 41.02
931.74 40.97 938.3 40.62 944.85 40.42 951.41 40.25 957.97 40.06 964.52 39.75
971.08 39.67 977.63 39.39 984.19 39.06 990.75 38.85 997.3 38.71 1003.86
38.66 1010.41 38.01 1016.97 36.23 1023.52 36.25 1030.08 36.83 1036.64 37.17
1043.19 37.29 1056.3 37.37 1062.86 37.34 1069.41 37.17 1075.97 37.02 1082.53
36.93 1089.08 36.9 1095.64 36.68 1102.19 35.9 1108.75 35.69 1115.31 35.5
1121.86 35.35 1128.42 34.91 1134.97 34.68 1141.53 34.42 1148.08 34.14
1154.64 33.81 1161.2 33.67 1174.31 33.79 1180.86 33.86 1187.42 33.97 1200.53
34.22 1207.09 34.32 1220.2 34.47 1226.75 34.61 1233.31 34.7 1239.86 34.37
1246.42 34.25 1252.98 34.23 1259.53 34.32 1266.09 34.75 1272.64 35.08 1279.2
35.66 1285.76 35.98 1292.31 35.95 1305.42 36.34 1318.53 36.7 1325.09 36.74
1331.65 36.71 1338.2 36.61 1344.76 36.21 1351.31 35.09 1357.87 34.14 1364.42
33.9 1370.98 33.93 1377.54 33.99 1384.09 34 1390.65 33.99 1397.2 33.91
1403.76 33.53 1416.87 32.96 1423.43 32.97 1429.98 33.32 1436.54 33.79
1443.09 34.21 1449.65 34.53 1456.21 34.78 1469.32 35.14 1475.87 34.78
1482.43 34.03 1488.98 32.11 1495.54 29.87 1502.1 27.85 1508.65 27.33 1515.2
26.79 1534.84 24.47 1541.38 23.67 1547.93 22.77 1554.48 22.18 1561.02 22.03
1567.57 21.76 1574.11 21.01 1580.66 20.5 1587.21 20.65 1593.75 20.63 1606.85
18.68 1613.39 17.98 1619.94 17.42 1626.49 17.03 1633.03 16.88 1639.58 17.59

1646.12 18.53 1652.67 19.16 1659.22 20.17 1665.76 21.02 1672.31 21.72
1678.86 21.75 1685.4 22.3 1691.95 22.42 1698.49 22.45 1705.04 22.23 1711.59
21.71 1718.13 21.24 1724.68 20.9 1731.23 20.71 1737.77 20.57 1744.32 20.48
1750.87 20.34 1757.41 20.23 1763.96 20.16 1770.5 20.13 1777.05 20.16 1783.6
20.16 1790.14 20.02 1796.69 20.4 1803.24 20 1809.78 19.31 1816.33 18.73
1822.87 18.27 1829.42 17.98 1835.97 17.65 1842.51 17.03 1849.06 17.06
1855.61 17.64 1862.15 17.77 1868.7 17.64 1875.24 17.57 1881.79 17.86 1888.34
17.72 1901.43 16.82 1907.98 16.65 1914.52 16.86 1921.07 16.95 1927.62 17.01
1934.16 17.27 1940.71 17.3 1947.25 16.93 1953.8 16.06 1960.35 15.05 1966.89
13.96 1973.44 13.03 1979.99 13.63 1986.35 15.39 1992.72 16.25 1999.09 16.18
2005.46 16.16 2011.83 16.06 2024.57 15.82 2030.94 15.68 2037.31 15.56
2043.68 15.55 2050.04 15.57 2056.41 15.65 2062.78 15.82 2069.15 16.22
2075.52 16.67 2081.89 16.73 2088.26 16.67 2094.63 16.57 2101 16.51 2107.36
16.43 2113.73 16.28 2120.1 16.1 2126.47 15.78 2132.84 15.35 2139.21 14.21
2145.58 13.34 2151.95 12.67 2158.32 12.27 2164.69 12.75 2171.05 12.81
2177.42 12.99 2183.89 13.35 2190.36 13.27 2196.84 13.12 2203.31 13.06
2209.78 13.03 2216.25 13.11 2222.72 13.25 2235.66 14.03 2242.13 14.4 2255.07
14.78 2261.54 14.93 2268.02 15.13 2274.49 15.1 2280.96 15.1 2300 16.34
2300.05 12.06 2301.97 -3.65 2320.77 -9.63 2333.43 -10.96 2379.95 -9.19
2407.66 -4.85 2411.91 -3.45 2412.45 14.33 2442.73 14.04 2449.2 13.75 2455.67
13 2462.23 12.56 2468.79 12.42 2475.35 12.3 2481.91 12.23 2488.47 12.19
2495.03 12.13 2501.59 11.97 2508.16 11.78 2514.72 11.84 2521.28 12.12
2527.84 12.14 2534.4 12 2547.52 11.48 2554.08 11.2 2560.64 10.9 2573.76
10.25 2580.32 9.94 2586.88 9.78 2593.44 9.56 2606.57 9.39 2613.13 9.28
2626.25 8.88 2632.81 8.81 2639.37 8.83 2645.93 8.93 2652.49 9.01 2659.05
9.06 2665.61 9.29 2672.17 9.32 2678.73 9.31 2685.29 9.24 2691.85 9.2 2698.42
9.28 2704.98 9.58 2711.54 9.81 2718.1 10.14 2724.66 10.34 2731.22 10.34
2737.78 10.42 2744.34 10.38 2764.02 10.45 2770.58 10.45 2777.14 10.33 2783.7
10.32 2790.26 10.37 2796.83 10.39 2809.95 10.36 2816.51 11.56 2823.07 16.74
2829.63 20.25 2836.19 20.17 2842.75 20.22 2849.31 20.21 2855.87 20.28
2862.43 20.55 2868.99 20.86 2875.55 20.91 2882.11 20.9 2888.67 20.74 2895.24
20.46 2901.8 20.57 2908.36 20.64 2914.92 20.35 2921.48 20.4 2928.04 20.63
2934.6 20.45 2941.16 20.49 2947.72 20.81 2954.28 20.67 2960.84 19.98 2967.4
19.25 2973.96 18.84 2980.52 18.7 2987.09 18.61 2993.65 18.64 3000.21 18.69
3006.77 18.83 3013.33 19.08 3019.89 19.36 3026.45 19.39 3033.01 19.4 3039.57
19.44 3046.13 19.41 3052.69 19.4 3059.25 19.48

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 2300 .035 2412.45 .082

Bank Sta: Left Right Coeff Contr. Expan. 2300 2412.45 .1 .3
Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 2442 3059.25 14 T
Blocked Obstructions num= 1
 Sta L Sta R Elev
 2531.59 2581.5712.08772

Upstream Embankment side slope = 0 horiz. to 1.0 vertical Downstream
Embankment side slope = 0 horiz. to 1.0 vertical Maximum allowable
submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =

```
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Piers = 1

Pier Data
Pier Station Upstream= 2500 Downstream= 2350
Upstream num= 2
 Width Elev Width Elev
 2.9 -7 2.6 13
Downstream num= 2
 Width Elev Width Elev
 2.9 -7 2.6 13

Number of Bridge Coefficient Sets = 1
 Low Flow Methods and Data
 Energy
 W.S. Pro Method

 W.S.Pro Data
 Left Embankment
 El of the top of the embankment = 14
 El of the toe of the abutment = -5
 Right Embankment
 El of the top of the embankment = 14
 El of the toe of the abutment = -5
 Abutment Type = 1 Vert. abutments and vert. embankments with or without
wingwalls  Slope of abutments =
 Top with of embankment = 58
 Centroid station of bridge opening =
 Wing Wall Type = No wing walls present
 Width =
 Angle =
 Radius =
 Guide Banks Type = Straight
 Length = 100
 Offset = 100
 Angle = 100

Selected Low Flow Methods = W.S.Pro Method

High Flow Method  Pressure and Weir flow
 Submerged Inlet Cd =
 Submerged Inlet + Outlet Cd = .8
 Max Low Cord =

Additional Bridge Parameters
 Add Friction component to Momentum
 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION
```

RIVER: Taunton River
REACH: Main Stem RS: 5335.943

INPUT
Description: 5.3- DS Face Plain St Br
Station Elevation Data num= 429
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 33.95 6.51 34.25 13.02 34.92
19.52 35.01 26.03 35.37 32.54 35.43 39.05 35.4 45.55 35.17 52.06 35.06 58.57
35.13 65.08 35.13 71.58 35.04 78.09 34.66 84.6 34.03 91.11 33.96 97.61
33.82 104.12 33.79 110.63 34.31 117.14 34.8 123.64 34.91 130.15 35.06 136.66
35.41 143.17 35.16 149.67 34.12 156.18 33.87 162.69 34.3 169.2 34.89 175.71
35.11 188.72 35.15 195.23 35.2 201.74 35.16 208.24 35.17 214.75 35.22 221.26
35.24 227.77 35.24 234.27 35.09 240.78 34.8 247.29 34.39 253.8 34.27 260.3
34.31 266.81 34.11 273.32 33.52 279.83 33.25 286.33 33.9 292.84 34.33
299.35 34.44 305.86 34.43 312.36 34.37 318.87 34.14 325.38 33.82 331.89
33.82 338.4 33.74 344.9 33.8 351.41 33.96 357.92 33.89 364.43 33.72 370.93
34.01 377.44 34.26 383.95 34.4 390.46 34.33 396.96 34.37 409.98 34.55 416.49
34.5 422.99 34.32 429.5 34.33 436.01 34.37 442.52 34.36 449.02 34.48 455.53
34.91 462.04 35.27 468.55 35.31 475.06 35.38 481.56 35.28 488.07 34.9 494.58
35.03 501.09 35.22 507.59 35.53 514.1 35.74 520.61 35.62 527.12 35.02
533.62 34.67 540.13 35.01 546.64 35.81 553.15 36 559.65 36.08 566.16 36.11
572.67 36.05 579.18 35.9 585.68 35.71 592.19 35.94 598.7 37.51 605.21 38.83
611.71 39.46 618.22 39.68 624.73 39.67 631.24 39.57 637.74 39.43 644.25
39.18 650.76 38.47 657.27 38.18 670.28 38.09 676.79 38.41 683.3 38.62 689.81
38.56 696.31 38.34 702.82 38 709.33 37.79 715.84 38.38 722.34 38.99 728.85
39.21 735.36 39.23 741.87 39.18 748.37 39.03 754.88 38.82 761.39 38.5 767.9
38.6 774.4 38.87 780.96 39.06 787.52 39.89 794.07 40.63 800.63 40.86 807.18
40.88 813.74 40.84 820.29 40.67 826.85 39.92 833.41 39.51 839.96 39.26
846.52 39.32 853.07 39.65 866.19 40.16 872.74 40.26 879.3 38.69 885.85 37.59
892.41 37.46 898.96 37.2 905.52 38.59 912.08 40.08 918.63 40.99 925.19 41.02
931.74 40.97 938.3 40.62 944.85 40.42 951.41 40.25 957.97 40.06 964.52 39.75
971.08 39.67 977.63 39.39 984.19 39.06 990.75 38.85 997.3 38.71 1003.86
38.66 1010.41 38.01 1016.97 36.23 1023.52 36.25 1030.08 36.83 1036.64 37.17
1043.19 37.29 1056.3 37.37 1062.86 37.34 1069.41 37.17 1075.97 37.02 1082.53
36.93 1089.08 36.9 1095.64 36.68 1102.19 35.9 1108.75 35.69 1115.31 35.5
1121.86 35.35 1128.42 34.91 1134.97 34.68 1141.53 34.42 1148.08 34.14
1154.64 33.81 1161.2 33.67 1174.31 33.79 1180.86 33.86 1187.42 33.97 1200.53
34.22 1207.09 34.32 1220.2 34.47 1226.75 34.61 1233.31 34.7 1239.86 34.37
1246.42 34.25 1252.98 34.23 1259.53 34.32 1266.09 34.75 1272.64 35.08 1279.2
35.66 1285.76 35.98 1292.31 35.95 1305.42 36.34 1318.53 36.7 1325.09 36.74
1331.65 36.71 1338.2 36.61 1344.76 36.21 1351.31 35.09 1357.87 34.14 1364.42
33.9 1370.98 33.93 1377.54 33.99 1384.09 34 1390.65 33.99 1397.2 33.91
1403.76 33.53 1416.87 32.96 1423.43 32.97 1429.98 33.32 1436.54 33.79
1443.09 34.21 1449.65 34.53 1456.21 34.78 1469.32 35.14 1475.87 34.78
1482.43 34.03 1488.98 32.11 1495.54 29.87 1502.1 27.85 1508.65 27.33 1515.2
26.79 1534.84 24.47 1541.38 23.67 1547.93 22.77 1554.48 22.18 1561.02 22.03
1567.57 21.76 1574.11 21.01 1580.66 20.5 1587.21 20.65 1593.75 20.63 1606.85
18.68 1613.39 17.98 1619.94 17.42 1626.49 17.03 1633.03 16.88 1639.58 17.59
1646.12 18.53 1652.67 19.16 1659.22 20.17 1665.76 21.02 1672.31 21.72
1678.86 21.75 1685.4 22.3 1691.95 22.42 1698.49 22.45 1705.04 22.23 1711.59
21.71 1718.13 21.24 1724.68 20.9 1731.23 20.71 1737.77 20.57 1744.32 20.48
1750.87 20.34 1757.41 20.23 1763.96 20.16 1770.5 20.13 1777.05 20.16 1783.6
20.16 1790.14 20.02 1796.69 20.4 1803.24 20 1809.78 19.31 1816.33 18.73
1822.87 18.27 1829.42 17.98 1835.97 17.65 1842.51 17.03 1849.06 17.06

1855.61 17.64 1862.15 17.77 1868.7 17.64 1875.24 17.57 1881.79 17.86 1888.34 17.72 1901.43 16.82 1907.98 16.65 1914.52 16.86 1921.07 16.95 1927.62 17.01 1934.16 17.27 1940.71 17.3 1947.25 16.93 1953.8 16.06 1960.35 15.05 1966.89 13.96 1973.44 13.03 1979.99 13.63 1986.35 15.39 1992.72 16.25 1999.09 16.18 2005.46 16.16 2011.83 16.06 2024.57 15.82 2030.94 15.68 2037.31 15.56 2043.68 15.55 2050.04 15.57 2056.41 15.65 2062.78 15.82 2069.15 16.22 2075.52 16.67 2081.89 16.73 2088.26 16.67 2094.63 16.57 2101 16.51 2107.36 16.43 2113.73 16.28 2120.1 16.1 2126.47 15.78 2132.84 15.35 2139.21 14.21 2145.58 13.34 2151.95 12.67 2158.32 12.27 2164.69 12.75 2171.05 12.81 2177.42 12.99 2183.89 13.35 2190.36 13.27 2196.84 13.12 2203.31 13.06 2209.78 13.03 2216.25 13.11 2222.72 13.25 2235.66 14.03 2242.13 14.4 2255.07 14.78 2261.54 14.93 2268.02 15.13 2274.49 15.1 2280.96 15.1 2300 16.34 2300.05 12.06 2301.97 -3.65 2320.77 -9.63 2333.43 -10.96 2379.95 -9.19 2407.66 -4.85 2411.91 -3.45 2412.45 14.33 2442.73 14.04 2449.2 13.75 2455.67 13 2462.23 12.56 2468.79 12.42 2475.35 12.3 2481.91 12.23 2488.47 12.19 2495.03 12.13 2501.59 11.97 2508.16 11.78 2514.72 11.84 2521.28 12.12 2527.84 12.14 2534.4 12 2547.52 11.48 2554.08 11.2 2560.64 10.9 2573.76 10.25 2580.32 9.94 2586.88 9.78 2593.44 9.56 2606.57 9.39 2613.13 9.28 2626.25 8.88 2632.81 8.81 2639.37 8.83 2645.93 8.93 2652.49 9.01 2659.05 9.06 2665.61 9.29 2672.17 9.32 2678.73 9.31 2685.29 9.24 2691.85 9.2 2698.42 9.28 2704.98 9.58 2711.54 9.81 2718.1 10.14 2724.66 10.34 2731.22 10.34 2737.78 10.42 2744.34 10.38 2764.02 10.45 2770.58 10.45 2777.14 10.33 2783.7 10.32 2790.26 10.37 2796.83 10.39 2809.95 10.36 2816.51 11.56 2823.07 16.74 2829.63 20.25 2836.19 20.17 2842.75 20.22 2849.31 20.21 2855.87 20.28 2862.43 20.55 2868.99 20.86 2875.55 20.91 2882.11 20.9 2888.67 20.74 2895.24 20.46 2901.8 20.57 2908.36 20.64 2914.92 20.35 2921.48 20.4 2928.04 20.63 2934.6 20.45 2941.16 20.49 2947.72 20.81 2954.28 20.67 2960.84 19.98 2967.4 19.25 2973.96 18.84 2980.52 18.7 2987.09 18.61 2993.65 18.64 3000.21 18.69 3006.77 18.83 3013.33 19.08 3019.89 19.36 3026.45 19.39 3033.01 19.4 3039.57 19.44 3046.13 19.41 3052.69 19.4 3059.25 19.48

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val 0 .085 2300 .035 2412.45 .082

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2300 2412.45 143.56 141.23 144.64 .1 .3 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 2442 3059.25 14 T
Blocked Obstructions num= 1
 Sta L Sta R Elev
 2531.59 2581.5712.08772

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 5194.718

INPUT
Description: 5- Exit Plain St br
Station Elevation Data num= 363
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 37.84 6.51 37.14 13.02 36.94 19.53 36.91 32.55 37.14 39.06 37.08 45.58 37.33 52.09 37.63 58.6 37.74 65.11 37.76 71.62 37.84 84.64 37.97 91.15 37.76 97.66 37.61 104.17 37.81 110.68

37.98 117.19 38.01 130.22 37.9 136.73 37.87 143.24 37.88 149.75 37.79 156.26
37.89 162.77 38.15 169.28 38.23 175.79 38.19 182.3 37.83 188.81 37.98 195.32
38.02 201.84 38.13 208.35 38.15 214.86 38.35 221.37 38.66 227.88 38.75
234.39 38.91 240.9 39.09 247.41 39.25 253.92 39.33 260.43 39.29 266.94 39.59
273.45 40.15 286.48 40.27 292.99 40.32 306.01 40.63 312.52 40.84 319.03
40.76 325.54 41.09 332.05 41.37 338.56 41.82 345.07 42.36 351.58 42.64
358.09 42.86 364.61 43.42 371.12 43.45 377.63 42.97 384.14 42.79 390.65
42.64 397.16 42.71 403.67 42.98 410.18 43.28 416.69 43.49 423.2 43.67 429.71
43.78 436.22 43.78 442.73 43.9 455.76 44.07 468.78 44.07 475.29 44.13 481.8
44.35 488.31 44.49 494.82 44.44 501.33 44.46 507.84 44.5 514.35 44.58 520.86
44.86 527.38 44.98 533.89 44.96 540.4 44.98 546.91 45.13 553.42 45.16 559.93
45.03 566.44 44.74 572.95 44.5 579.46 44.51 585.97 44.75 592.48 44.69
598.99 44.76 612.02 45.28 618.53 45.52 625.04 45.61 631.55 45.74 638.06
45.85 644.57 45.83 651.08 45.9 657.59 46.04 664.1 46.01 670.61 45.86 677.12
45.64 690.15 45.4 696.66 45.45 709.68 45.64 716.19 45.57 722.7 45.45 729.21
45.56 742.32 45.89 748.88 45.84 755.43 45.63 761.99 45.39 768.54 45.11 775.1
45.08 788.21 44.88 794.76 44.84 801.32 44.72 807.87 44.54 814.43 44.39
820.98 44.46 827.54 43.46 834.09 41.56 840.65 40.16 847.2 39.39 853.76 39.14
860.31 38.94 873.42 38.7 879.98 38.49 886.53 38.32 893.09 38.22 906.2 38.24
912.75 38.39 919.31 38.5 925.86 38.48 932.42 38.64 938.97 38.67 952.08 38.93
958.64 39.17 965.19 39.26 971.75 39.39 978.3 39.63 984.86 39.96 991.41 40.23
997.97 40.46 1004.52 40.67 1011.08 40.7 1017.63 40.54 1024.19 40.96 1030.75
42.63 1037.3 43.66 1043.86 44.25 1050.41 44.49 1056.97 44.45 1063.52 45.23
1070.08 45.83 1076.63 45.77 1083.19 46.23 1089.74 46.37 1096.3 46.21 1102.85
46.52 1109.41 47.04 1115.96 47.08 1122.52 47.39 1129.07 47.77 1135.63 47.89
1142.18 48.49 1148.74 48.51 1155.29 48.31 1161.85 46.71 1168.4 45.64 1174.96
45.37 1181.51 45.67 1188.07 45.94 1194.62 46.99 1201.18 49.47 1207.73 50.17
1214.29 50.38 1220.84 50.51 1227.4 50.5 1233.95 50.53 1240.51 50.66 1247.06
50.54 1253.62 50.27 1266.73 49.63 1273.28 49.4 1286.39 48.8 1292.95 48.22
1299.5 47.78 1306.06 47.49 1312.61 47.26 1319.17 46.98 1325.72 46.79 1332.28
46.53 1338.83 46.32 1345.39 46.63 1351.94 46.62 1358.5 44.3 1365.05 38.5
1371.61 35.56 1378.16 32.06 1384.72 28.91 1391.27 26.01 1397.83 24.3 1404.38
22.36 1410.94 20.73 1417.49 21.08 1424.05 21.29 1430.6 20.32 1437.16 19.5
1443.71 19.14 1450.27 18.9 1456.81 18.52 1463.36 18.21 1469.9 17.68 1476.44
16.93 1482.99 16.16 1489.53 15.52 1496.07 15.12 1502.62 14.89 1509.16 14.75
1515.71 14.65 1522.25 14.37 1528.79 13.67 1535.34 13.07 1541.88 12.73
1548.42 11.86 1554.97 11.57 1561.51 11.05 1568.05 11.05 1574.6 11.14 1581.14
11.01 1587.68 11.02 1594.23 11.05 1600.77 11.04 1607.31 11.23 1613.86 11.59
1620.4 11.71 1626.94 11.85 1633.49 11.87 1640.03 11.8 1646.58 11.51 1653.12
11.52 1659.66 11.58 1672.75 11.63 1679.29 11.7 1685.84 11.85 1692.38 11.83
1698.92 11.87 1705.47 12.14 1712.01 12.14 1718.55 11.98 1725.1 11.68 1731.64
11.46 1738.18 11.35 1744.73 11 1751.27 10.73 1757.81 10.61 1764.36 10.53
1770.9 10.8 1777.45 10.97 1783.99 11.07 1790.53 11.32 1797.08 11.65 1803.62
11.94 1810.16 12.32 1816.71 13.7 1823.25 14.25 1836.34 14.59 1842.88 14.71
1849.42 14.68 1855.97 14.77 1862.51 14.81 1869.05 14.82 1875.6 14.6 1882.14
14.35 1888.68 14.08 1895.23 13.92 1965 14.39 1965.47 11.73 2078.62 11.58
2087.51 6.91 2092.77 -1.67 2108.92 -9.29 2141.12 -8.39 2159.37 -2.62 2164.92
-1.75 2175.5 -2.47 2187.89 -.9 2195 -1.01 2206.94 -3.41 2217.29 -5 2234.59 -
3.74 2237.81 11.46 2384.96 11.42 2391.51 11.58 2398.06 11.66 2404.61 11.8
2411.16 11.91 2417.71 11.78 2424.26 11.89 2430.81 11.84 2443.91 11.65
2450.46 11.48 2470.12 11.55 2476.67 11.54 2483.22 11.51 2489.77 11.66
2496.32 11.68 2502.87 11.82 2509.42 12.02 2515.97 12.17 2522.52 12.41
2529.08 12.76 2535.63 12.82 2542.18 12.66 2548.73 12.55 2555.28 12.63
2561.83 12.68 2568.38 12.76 2574.93 12.95 2581.48 13.2 2588.03 13.47 2594.59

13.52 2601.14 13.66 2607.69 13.84 2614.24 14.19 2620.79 15.01 2627.34 15.9
2633.89 16.41 2640.44 16.98 2646.99 19 2653.54 20.54 2660.09 20.64 2666.65
20.44 2673.2 20.3 2679.75 20.32 2686.3 20.38 2692.85 20.47 2699.4 20.59
2705.95 20.63 2712.5 20.63 2719.05 20.76 2725.6 21.04 2732.16 21.21 2738.71
21.31 2745.26 21.37 2751.81 21.73 2758.36 21.65 2764.91 22.57 2771.46 24.52
2778.01 24.9 2784.56 24.41 2791.11 24.14 2797.66 23.84 2804.22 23.71 2810.77
23.66 2823.87 23.79 2830.42 23.89 2836.97 23.86 2843.52 23.73 2850.07 23.52
2856.62 23.43 2863.17 23.36 2876.28 23.09 2882.83 23 2889.38 22.86 2895.93
22.79 2902.48 22.67

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 2078.62 .035 2237.81 .082

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2078.62
2237.81 1072.04 1090.64 1114.7 .1 .3
 CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 4104.082

INPUT
Description: 4
Station Elevation Data num= 195
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 35.1 6.54 34.86 13.09 35.12
32.71 36.52 39.26 37.08 52.34 37.43 58.89 37.47 71.97 37.15 91.6 36.07 98.14
35.55 111.23 33.47 117.77 32.99 130.86 32.49 137.4 31.63 150.48 29.36
157.03 27.84 163.57 26.78 176.66 25.69 183.2 25 196.28 24.16 209.37 23.44
222.45 22.16 235.54 21.24 268.25 19.58 274.8 19.11 314.05 17.93 340.22 17.6
346.77 17.39 353.31 17.44 372.94 17.2 386.02 16.89 399.11 16.85 418.74 16.42
425.28 16.51 464.54 16.29 484.17 16.02 490.71 15.81 510.34 15.56 516.88
15.25 529.96 15.32 536.51 15.67 549.59 15.96 569.22 15.33 575.76 15.28
588.85 14.91 595.39 14.56 601.94 14.39 608.48 14.08 634.65 13.27 647.73
12.71 660.82 11.68 667.36 11.02 673.91 10.08 680.45 9.57 686.99 9.45 700.08
9.55 706.62 9.71 713.16 9.69 719.71 9.47 739.33 8.41 758.96 7.16 785.13 5.03
798.22 2.31 804.76 1.12 811.21 .41 813.75 .05 825 -2.9 825.5 -2.88 826.13 -
2.9 826.5 -2.86 826.79 -2.86 827.1 -2.83 827.3 -2.99 827.48 -3.11 827.64 -
3.2 828.01 -3.31 828.24 -3.48 829.55 -3.6 831.66 -4.05 834.1 -4.44 836.34 -
4.58 838.23 -4.82 840.95 -5.36 843.29 -6.16 845.41 -6.73 847.48 -7.67 849.56
-8.4 851.67 -8.57 853.71 -9.31 855.95 -9.57 858.21 -10.01 860.64 -10.25
863.34 -10.49 865.85 -10.78 868.46 -10.95 871 -11.17 873.78 -11.17 876.48 -
11.19 879 -11.01 881.45 -11.08 884.18 -11.12 886.48 -10.46 889.29 -10.39
892.16 -10.59 895.4 -10.47 898.65 -10.42 902.09 -10.56 905.48 -10.29 908.78
-10.33 911.14 -10.05 913.57 -9.93 915.75 -9.61 917.54 -9.32 919.31 -8.63
920.82 -7.87 922.3 -7.15 923.73 -6.66 924.94 -5.75 926.47 -5.19 927.76 -4.64
929.03 -3.99 930.25 -3.89 931.21 -3.59 932.2 -3.04 933.72 -1.14 937.12 .53
940.17 2.04 946.71 5.12 953.24 6.39 959.78 7.84 966.31 8.27 979.38 8.65
985.92 8.62 992.45 6.91 998.99 6.25 1005.52 6.68 1018.59 7.09 1031.66 7.17
1038.2 6.9 1044.73 6.94 1051.27 7.18 1103.55 7.54 1149.29 8.31 1221.17 9.93
1286.52 10.47 1378.01 10.71 1417.22 11.32 1449.9 12.48 1521.78 11.87 1541.39
12.03 1554.46 11.92 1580.6 12.05 1587.13 12.43 1593.67 14.46 1600.2 18.29
1606.74 22.6 1613.27 26.07 1619.81 26.87 1626.34 26.67 1632.88 26.17 1645.95
25.72 1652.48 23.07 1659.02 17.45 1665.55 16.53 1672.09 16.39 1685.16 16.65

1698.23 16.64 1717.83 17.17 1737.44 17.43 1763.58 17.71 1770.11 17.69
1802.79 18.06 1815.86 18.35 1828.93 19.47 1835.46 19.78 1868.14 20.4 1913.88
20.41 1933.49 20.74 1959.63 21.87 1972.7 22.11 1979.23 22.02 2031.51 23.08
2044.58 23.14 2051.12 23.33 2057.65 23.97 2064.19 24.39 2070.72 24.62
2090.33 24.67 2103.4 26 2116.47 27.16 2123 27.35 2129.54 27.1 2136.07 26.67
2142.61 26.46 2149.14 26.68

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .082 713.16 .035 979.38 .082

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 713.16
979.38 1834.7 1846.57 1854.36 .1 .3 Blocked Obstructions num= 2
 Sta L Sta R Elev Sta L Sta R Elev
 934.72 1002.956.488922 1059.71 1524.9311.92179

CROSS SECTION

RIVER: Taunton River REACH: Main Stem RS: 2257.516

INPUT
Description: 3
Station Elevation Data num= 340
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 34.96 19.65 33.35 26.2 33.02
32.75 32.44 39.3 31.7 52.39 30.64 58.94 30.32 65.49 29.65 72.04 28.84 78.59
28.24 85.14 27.39 91.69 27.11 98.24 27.14 111.34 27.69 117.89 27.59 124.44
27.08 130.99 26.73 150.63 26.01 163.73 25.32 189.93 24.62 209.58 23.88
222.68 22.72 229.23 22.01 235.77 21.47 242.32 21.34 248.87 20.64 255.42
20.27 268.52 20.54 281.62 19.78 288.17 19.21 301.27 19.24 307.82 18.64
314.37 17.48 320.92 16.9 334.01 16.8 366.76 15.2 386.41 14.51 406.06 14.51
412.61 14.39 438.8 14.82 445.35 14.69 451.9 14.42 458.45 14.6 478.1 13.99
491.2 14.11 497.75 14.48 510.84 14.9 517.39 15.36 523.94 15.62 543.59 15.81
550.14 15.77 556.69 15.89 582.89 17.26 589.44 18.19 602.54 20.57 609.08 21.1
615.63 21.89 622.18 21.96 628.73 21.71 707.32 22.41 713.87 22.62 740.07
22.75 785.92 22.51 818.66 22.38 825.21 22.85 857.96 23.09 864.51 23.33
871.06 23.73 890.7 24.34 910.35 24.3 923.45 23.93 936.55 23.28 943.1 23.18
962.75 23.45 975.84 22.51 995.49 22.25 1008.59 23.13 1015.14 22.88 1021.69
22.42 1028.24 21.66 1041.34 19.42 1047.89 18.01 1067.54 12.85 1074.08 11.6
1080.63 11.12 1093.73 8.4 1100.28 7.59 1119.93 5.96 1126.48 5.53 1133.03
5.28 1139.58 5.24 1159.23 4.15 1165.78 2.78 1172.32 1.05 1174.74 .81
1178.87 .4 1185.42 -.01 1191.97 -.21 1200 -.92 1215.28 -1.32 1216.34 -1.41
1217.6 -1.52 1218.82 -1.64 1220.1 -1.77 1221.29 -1.98 1222.66 -2.21 1223.86
-2.48 1225.2 -2.94 1226.48 -3.64 1227.92 -4.46 1230.12 -5.2 1232.38 -5.85
1234.68 -6.48 1237.01 -6.94 1239.48 -7.27 1241.91 -7.72 1244.21 -7.9 1246.55
-7.95 1248.74 -8.03 1251.05 -7.97 1253.31 -7.94 1255.77 -8.02 1260.44 -8.14
1262.63 -8.17 1275.78 -8.17 1278.2 -8.31 1280.43 -8.25 1282.97 -8.34 1287.57
-8.47 1289.64 -8.62 1292.03 -8.9 1294.34 -9.01 1296.67 -9.18 1299.02 -9.37
1301.53 -9.41 1303.96 -9.57 1306.55 -9.85 1308.95 -10.02 1311.4 -10.27
1313.79 -10.4 1316.21 -10.57 1318.43 -10.74 1320.8 -10.93 1322.99 -11.15
1325.49 -11.33 1327.84 -11.55 1330.14 -11.64 1332.3 -11.72 1334.24 -11.46
1336.16 -11.21 1337.83 -10.8 1339.55 -10.28 1341.34 -9.57 1343.75 -7.19
1345.95 -5.67 1348.02 -4.18 1350.29 -3.85 1352.46 -3.31 1355.12 -2.51
1357.93 -1.92 1359.65 -1.69 1361.18 -1.55 1362.69 -.98 1375.35 .51 1377.72

1.25 1381.9 2.58 1388.45 5.38 1395 7.25 1401.55 9.97 1427.75 12.35 1434.3
12.81 1447.4 14.14 1473.59 15.31 1499.79 15.72 1512.89 15.6 1539.09 16.01
1552.19 16.18 1558.74 16.46 1565.28 16.38 1604.58 16.74 1630.78 16.49
1709.37 16.42 1715.92 16.31 1729.02 16.33 1735.57 16.24 1768.31 16.27
1781.41 16.16 1801.06 15.65 1814.16 14.96 1820.71 14.31 1827.26 13.28
1840.36 10.26 1846.91 9.41 1853.46 8.98 1886.2 9.2 1899.3 9.23 1912.4 9.79
1918.95 9.96 1932.05 9.93 1938.6 10.03 1945.15 9.88 1951.69 9.59 1964.79
9.59 1971.34 10.03 1977.89 10.04 1984.44 10.33 1990.99 10.3 1997.54 10.84
2004.09 10.8 2010.64 10.39 2017.19 10.22 2030.29 10.61 2043.39 10.54 2056.48
10.83 2069.58 10.75 2076.13 10.84 2082.68 10.48 2089.23 10.35 2102.33 10.61
2108.88 10.61 2115.43 10.47 2121.98 10.5 2128.53 10.83 2135.08 10.7 2141.62
10.95 2148.17 10.7 2154.72 10.71 2174.37 11.97 2180.92 12.21 2187.47 12.14
2194.02 11.93 2200.57 12.5 2207.12 12.58 2220.22 12.22 2226.76 12.27 2239.86
13.12 2246.41 13.23 2259.51 14.38 2272.61 14.87 2292.26 15.36 2298.81 15.86
2305.36 16.83 2318.45 16.63 2325 15.87 2331.55 16.52 2338.1 16.56 2344.65
16.45 2351.2 16.54 2357.75 17.32 2370.85 20.21 2377.4 20.55 2383.95 20.7
2410.14 20.43 2416.69 20.13 2429.79 19.88 2442.89 17.77 2449.44 17.48
2462.54 17.29 2469.09 17.48 2475.64 18.08 2482.19 19.21 2488.74 20.17
2495.28 20.82 2501.83 20.76 2528.03 21.08 2534.58 20.79 2554.23 19.29
2560.78 19.11 2567.33 19.78 2573.88 20.1 2586.97 20.13 2600.07 20.45 2606.62
20.41 2619.72 19.8 2626.27 19.18 2632.82 18.28 2639.37 17.23 2652.47 15.81
2665.57 15.01 2672.11 14.49 2685.21 13.68 2698.31 13.02 2711.41 12.57
2717.96 13.33 2724.51 13.85 2731.06 13.62 2744.16 12.66 2750.71 12.65
2757.25 13.57 2763.8 15.69 2770.35 17.09 2776.9 17.28 2790 17.13 2803.1
17.58 2809.65 17.7 2822.75 17.69 2829.3 17.46 2835.85 16.56 2842.4 15.27
2862.04 13.6 2901.34 13.22 2907.89 13.61 2914.44 13.86 2920.99 14.25 2927.54
14.43 2934.08 14.8 2940.63 14.98 2953.73 15.98 2966.83 17.25 2973.38 17.62
2979.93 17.28 2986.48 16.6 2993.03 16.44 2999.58 17.35 3025.77 20.22 3032.32
21.7 3038.87 23.37 3045.42 25.93 3051.97 27.96 3065.07 29.01 3071.62 29.97
3078.17 32.14 3084.72 34.81 3091.27 36.99 3097.82 40.7 3104.37 41.4 3110.91
41.47 3124.01 41.97 3130.56 42.09 3137.11 42.07 3163.31 42.8 3196.05 42.59
3202.6 42.45 3222.25 41.62 3241.9 41 3255 41.26 3261.55 41.04 3268.1 40.66
3274.65 39.87 3281.2 39.24

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .082 1008.59 .035 1473.59 .082
 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1008.59 1473.59 1820.11 1865.71 1922.42 .1 .3 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 1801 3281.2 15 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 391.8054

INPUT
Description: 2
Station Elevation Data num= 304
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 21.42 39.31 21.99 58.96
21.84 65.52 21.5 85.17 21.81 98.27 21.12 117.93 22.01 144.14 21.1 183.45
22.7 216.2 23.58 222.76 23.42 255.51 25.6 268.62 26.61 307.93 27.88 327.58

29.19 399.65 34.75 438.96 35.05 445.51 35.39 458.61 36.59 491.37 37.6
504.48 37.68 543.79 39.42 563.44 39.58 583.1 40.7 628.96 40.24 661.72 37.98
681.37 35.01 687.92 34.38 694.47 33.16 701.03 30.83 707.58 27.7 714.13 25.59
779.65 24.3 786.2 23.57 792.75 22 805.85 21.22 825.51 21.29 910.68 20.22
930.33 20.54 1002.4 19.28 1028.61 19.54 1035.16 19.87 1048.26 21.23 1061.37
21.85 1074.47 21.58 1126.88 18.1 1146.54 15.81 1185.85 13.95 1244.81 14.99
1251.36 15.35 1264.47 17.12 1323.43 17.67 1428.26 17.4 1454.47 17.94 1461.02
16.21 1467.57 13.93 1474.12 13.48 1480.67 13.44 1493.78 15.9 1539.64 14.33
1565.84 14.75 1624.81 15.45 1664.12 19.15 1696.88 20.06 1716.53 19.33
1742.74 16.68 1801.7 14.23 1913.08 14.58 1958.94 13.73 1985.15 13.96 1991.7
12.84 1998.25 8.74 2004.8 2.93 2020 -1.25 2022.62 -1.32 2023.16 -1.37 2023.8
-1.46 2024.53 -1.52 2025.41 -1.64 2026.35 -1.66 2027.52 -1.78 2028.84 -1.93
2030.29 -2.06 2031.63 -2.33 2033.06 -2.66 2034.41 -3.03 2035.85 -3.6 2037.95
-4.22 2040.47 -4.85 2042.7 -5.61 2045.08 -6.18 2047.39 -6.71 2049.72 -7.41
2051.86 -7.83 2054.25 -8.45 2056.36 -8.73 2058.6 -9.34 2060.73 -9.55 2062.95
-9.78 2064.88 -10.17 2067.08 -10.53 2069.19 -10.7 2071.49 -10.92 2073.72 -
11.22 2076.1 -11.49 2078.4 -11.84 2080.46 -12.01 2082.68 -12.2 2084.84 -
12.29 2087.18 -12.24 2089.53 -12.37 2091.93 -12.18 2096.84 -11.91 2099.24 -
11.75 2101.9 -11.41 2104.3 -11.25 2106.95 -10.91 2109.31 -10.67 2111.95 -
10.41 2114.44 -10.2 2117.06 -10.02 2122.25 -9.63 2124.85 -9.47 2127.56 -9.24
2130.03 -9.07 2132.45 -8.93 2134.97 -8.72 2137.67 -8.51 2140.17 -8.26
2145.24 -8.16 2147.83 -8.02 2150.38 -7.87 2153.09 -7.76 2155.66 -7.65 2158.2
-7.43 2160.65 -7.19 2163.21 -6.79 2165.51 -6.7 2168.1 -6.27 2170.53 -6.2
2173.06 -6.01 2175.42 -5.92 2177.98 -5.59 2180.48 -5.04 2183.15 -4.75
2186.04 -4.39 2188.7 -4.56 2191.22 -4.32 2193.67 -3.84 2196.14 -3.67 2198.36
-3.45 2200.65 -3.23 2203.03 -3.19 2205.47 -2.95 2207.68 -2.57 2210.09 -2.2
2211.7 -1.92 2213.07 -1.77 2214.33 -1.67 2215.45 -1.52 2216.63 -1.1 2239.39
6.58 2245.93 7.61 2272.1 6.19 2337.53 6.17 2363.7 5.84 2383.32 6.94 2429.12
11.2 2448.75 11.43 2468.38 11.32 2481.46 10.15 2520.72 10.11 2533.8 10.47
2599.23 10.25 2605.77 10.56 2618.83 10.03 2625.34 10.52 2651.39 10.09
2664.41 10.86 2683.95 11.59 2696.97 12.68 2723.02 16.24 2755.58 16.85
2781.63 19.24 2885.82 19.38 2898.85 18.69 2924.9 19 2944.43 20.03 3160.42
23.04 3180.09 24.3 3265.36 24.21 3285.04 25.03 3324.39 24.95 3330.95 25.5
3363.75 31.41 3376.87 32.17 3389.99 31.92 3396.55 31.2 3481.81 30.15 3501.49
35.42 3534.29 46.12 3540.85 46.81 3606.44 46.26 3698.27 37.02 3737.62 35.41
3757.3 32.93 3763.86 32.44 3776.98 32.59 3783.54 33.09 3790.09 33.17 3803.21
32.17 3855.69 33.45 3881.92 33.04 3940.96 33.45 3980.31 31.66 4013.11 31.78
4026.22 31.06 4045.9 31.9 4078.7 31.34 4091.82 29.28 4098.37 28.65 4104.93
28.55 4111.49 27.95 4137.73 27.53 4150.85 26.85 4163.97 25.4 4170.52 25.45
4190.2 23.78 4216.44 23.27 4229.56 23.39 4242.67 22.17 4255.79 22.17 4275.47
23.57 4282.03 23.44 4288.59 23.93 4301.71 26 4327.94 25.29 4341.06 26.24
4354.18 26.7 4380.42 29.76 4400.09 33.03 4413.21 35.76 4426.33 37.49 4446.01
37.99 4491.92 36.67 4531.27 36.66 4563.95 35.02 4576.99 34.59 4583.51 34.82
4616.11 33.03 4635.67 30.53 4642.19 30.13 4648.71 28.11 4655.23 24.76
4668.27 21.22 4674.79 20.39 4694.35 20.01 4707.39 20.86 4713.91 23.31
4720.43 23.91 4733.47 23.28 4739.99 24.18 4753.03 26.56 4759.55 27.01
4779.11 25.82 4785.63 26.5 4798.67 25.87 4818.23 27.67 4824.75 29.16 4831.27
31.21 4844.31 33.85 4863.87 35.32 4883.43 36.05 4889.95 37.16 4896.47 38.86
4909.51 44.58 4935.59 48.53 4942.11 49.09 4955.15 51.19 4961.67 51.56
4981.23 54.43 4987.75 54.91 5000.79 53.95 5007.31 52.98 5013.83 52.61
5039.91 52.73 5052.95 53.65 5065.99 53.61 5098.59 55.23 5111.63 56.63
5170.31 57.77 5228.99 56.68 5248.55 57.74 5268.11 59.02 5281.15 59.09
5307.23 57.97 5333.31 56.07 5352.87 55.22 5378.95 53.58 5457.19 56.33
5496.31 59.42 5515.87 59.05 5522.39 59.29 5535.43 59.14

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .082 1985.15 .035 2429.12 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1985.15 2429.12 619.37 384.58 298.08 .1 .3

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 7.228003

INPUT
Description: 1-DS Town Limits Taunton/Berkley Station Elevation Data num= 380
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 24.36 6.55 24.88 19.64 27.2 32.73 27.76 72 28.41 104.72 28.36 137.45 28.88 157.09 28.38 170.18 27.44 183.27 27.01 215.99 27.15 222.54 27.86 229.08 28.96 235.63 29.55 261.81 29.08 268.36 28.74 281.45 28.71 294.54 29.16 307.63 28.68 320.72 28.77 333.81 28.39 340.35 28.45 359.99 29.23 379.63 28.49 392.72 28.5 405.81 27.98 425.44 28.17 431.99 28.65 438.53 28.78 451.62 28.17 536.71 26.59 569.44 26.73 575.99 27.13 582.53 27.09 589.08 26.67 628.35 26.26 641.44 25.83 687.26 25.66 693.8 25.38 706.89 25.47 733.07 24.77 791.98 22.22 844.34 21.41 857.43 21.43 870.52 21.84 896.7 21.72 903.25 21.34 909.8 20.43 916.34 20.22 949.07 20.27 975.25 19.95 981.79 20.13 988.34 21.07 994.88 22.91 1001.43 25.8 1007.97 25.62 1021.07 19.45 1027.61 18.71 1079.97 17.4 1099.61 17.33 1191.24 15.25 1223.97 14.25 1263.24 13.86 1276.33 13.99 1322.15 13.33 1341.79 13.27 1361.42 12.29 1381.06 11.81 1413.78 12.57 1420.33 12.37 1439.97 12.46 1472.69 11.1 1479.24 11.05 1498.87 12.13 1511.96 10.65 1518.51 10.56 1531.6 11.18 1551.24 11.31 1570.87 12.64 1577.42 12.61 1597.05 11.89 1610.14 12.18 1623.23 13.24 1675.6 16.19 1708.32 16.54 1714.87 16.15 1734.5 16.36 1747.6 16.14 1773.78 16.48 1780.32 16.83 1793.41 18.07 1799.96 18.4 1819.59 18.63 1852.32 18.39 1865.41 18.78 1898.14 18.77 1911.23 16.33 1917.77 16.48 1930.86 17.37 1950.5 19.13 1976.68 22.67 1989.77 23.73 2002.86 24.27 2009.41 24.28 2048.68 22.5 2061.77 21.47 2081.41 19.19 2094.5 18.93 2100.99 19.48 2120.46 20.23 2133.44 21.75 2146.43 22.97 2185.37 28.55 2198.35 29.25 2217.83 29.97 2230.81 30.97 2243.79 30.82 2263.26 28.88 2282.74 27.74 2289.23 27.1 2308.7 23.16 2321.68 21.03 2328.17 19.68 2341.16 17.43 2347.65 16 2360.63 11.88 2367.12 9.08 2373.61 7.32 2379.88 3.46 2386.15 .42 2392.42 -.75 2398.25 -3.43 2400.04 -3.6 2401.8 -3.68 2403.36 -3.79 2405.12 -3.93 2407.23 -4.09 2409.29 -4.43 2411.46 -4.66 2413.47 -4.94 2417.39 -5.27 2419.24 -5.42 2421.03 -5.48 2422.98 -5.66 2424.9 -5.75 2427.09 -5.52 2429.12 -5.29 2431.27 -6.18 2433.28 -6.52 2435.28 -7.65 2437.22 -8.45 2439.47 -8.65 2441.48 -8.97 2443.68 -9.27 2445.72 -9.46 2447.94 -9.49 2449.98 -9.41 2454.06 -9.47 2456.2 -9.53 2458.18 -9.49 2460.33 -9.48 2462.4 -9.44 2464.68 -9.38 2466.8 -9.38 2468.97 -9.25 2470.95 -9.38 2473.13 -9.24 2475.21 -9.3 2477.46 -9.18 2479.69 -9.18 2484.13 -8.95 2486.35 -8.77 2488.43 -8.65 2490.58 -8.48 2492.48 -8.36 2494.57 -8.31 2496.6 -8.36 2498.61 -8.31 2500.57 -8.31 2502.94 -8.14 2505.25 -7.81 2507.91 -7.5 2510.53 -6.71 2513.5 -5.84 2516.02 -4.72 2518.65 -4.05 2521.08 -3.41 2523.04 -2.76 2524.87 -2.52 2526.09 -2.39 2527.06 -2.2 2528.32 .33 2537.64 1.35 2557.22 1.95 2570.27 3.77 2583.32 4.82 2596.37 4.53 2609.42 4.94 2635.52 7.95 2648.58 9.85 2661.63 10.95 2674.68 11.12 2713.83 10.18 2746.46 10.64 2766.04 12.24 2772.57 13.1 2824.71 15.24 2837.72 15.53 2870.25 15.1 2980.84 17.63 2987.35

17.97 3000.36 19.43 3019.87 20.13 3026.38 20.71 3045.89 20.83 3052.4 20.17
3071.92 20.46 3091.43 20.03 3110.95 20.11 3137.01 20.84 3163.21 20.97
3182.85 23.28 3189.4 23.79 3195.95 23.9 3202.5 24.33 3235.24 24.88 3313.82
24.61 3340.01 23.98 3385.85 24.9 3444.78 24.59 3477.53 23.56 3510.27 23
3543.01 23.68 3549.56 24.03 3575.75 27.59 3595.4 29.13 3608.49 29.82 3621.59
30.07 3660.88 30.11 3667.43 29.78 3673.98 29.98 3687.07 31.83 3693.62 33.49
3706.72 37.87 3713.27 40.43 3719.82 42.69 3726.36 45.41 3732.91 47.09
3739.46 47.43 3759.11 47.31 3824.59 45.68 3863.88 43.82 3870.43 43.27
3876.98 42.39 3909.72 39.9 3929.36 37.28 3935.91 36.68 3955.56 35.54 3981.75
35.61 4021.04 35.31 4047.23 34.04 4053.78 33.47 4086.52 32.02 4106.17 31.44
4112.72 31.51 4145.46 30.76 4171.65 30.54 4191.3 30.71 4197.85 30.33 4210.94
30.46 4230.59 29.44 4243.68 28.01 4269.88 26.41 4289.52 25.9 4296.07 26.03
4315.72 24.04 4322.26 23.79 4341.91 24.48 4355.01 24.34 4368.1 24.69 4381.2
24.03 4394.3 24.86 4407.39 24.19 4420.49 24 4440.13 24.5 4453.23 25.17
4466.33 26.38 4479.42 26.77 4485.97 27.24 4499.07 28.56 4518.71 28.82
4525.26 29.5 4538.36 32.15 4551.46 34.09 4558 34.8 4564.55 34.94 4577.65
34.08 4584.2 33.24 4590.75 31.84 4597.29 31.06 4623.49 30.71 4630.04 30.98
4636.58 31.7 4643.13 31.9 4669.33 31.38 4695.52 31.96 4715.16 31.87 4721.71
32.19 4728.24 32.94 4741.29 33.75 4773.93 34.35 4793.51 33.65 4819.62 30.59
4832.67 29.29 4858.78 23.96 4865.3 22.22 4871.83 20.9 4878.36 19.91 4884.88
19.49 4904.47 19.47 4917.52 19.8 4930.57 19.27 4937.1 18.36 4943.63 18.02
4963.21 17.7 4976.26 18.17 4982.79 18.69 5002.37 22.05 5041.53 25.65 5054.58
26.48 5080.69 26.93 5087.22 27.73 5093.75 29.17 5100.27 30.02 5113.33 27.09
5126.38 27.16 5152.49 28.98 5165.54 30.36 5191.65 31.11 5224.28 33.51
5230.81 34.33 5237.34 35.48 5250.39 39.21 5269.97 44.34 5283.02 48.45
5289.55 50 5296.08 52.69 5302.6 54.2 5315.66 54.61 5354.82 54.02 5374.4
54.01 5407.04 52.11 5433.14 49.25 5446.2 47.45 5452.72 46.92 5459.25 46.77
5465.78 46.19 5472.3 44.1 5478.83 41.17 5485.36 39.48 5498.41 37.99 5504.94
37.58 5517.99 37.58 5544.1 39.14 5570.21 41.75 5589.79 44.24 5596.31 45.77
5615.9 48.77 5628.95 49.89 5642 50.09 5648.53 50.48 5661.58 52.1 5674.64
54.05 5707.27 56.47 5720.33 56.8 5746.43 58.27 5759.49 57.52 5779.07 57.86
5785.59 57.7 5798.65 58.05

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 2243.79 .035 2661.63 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2243.79
2661.63 7.94 7.22 8.54 .1 .3

SUMMARY OF MANNING'S N VALUES

River:Taunton River

 Reach River Sta. n1 n2 n3

 Main Stem 128409 .09 .055 .095
 Main Stem 128319 .08 .055 .085
 Main Stem 128304 Bridge
 Main Stem 128253.8 .08 .055 .085
 Main Stem 128188.2 .08 .055 .095
 Main Stem 128020.6 .085 .055 .1

Main Stem 127981.3 Inl Struct
Main Stem 127955.6 .085 .055 .1
Main Stem 127856.6 .085 .055 .095
Main Stem 126368.5 .1 .0552 .1
Main Stem 125286.5 .085 .055 .09
Main Stem 122282.8 .085 .055 .1
Main Stem 121514.6 .09 .055 .095
Main Stem 120044.2 .085 .055 .095 Main Stem 118774.7 .09 .055 .095
Main Stem 117323 .095 .055 .095
Main Stem 116103.1 .095 .055 .095
Main Stem 114924.7 .09 .055 .09
Main Stem 114842.7 .09 .055 .09
Main Stem 114815.5 Bridge
Main Stem 114789.1 .09 .055 .09
Main Stem 114747.8 .09 .055 .09
Main Stem 113455.2 .095 .055 .095
Main Stem 111998.1 .082 .055 .095
Main Stem 109992 .09 .055 .095
Main Stem 109211 .095 .055 .095
Main Stem 107644.2 .095 .055 .085
Main Stem 107578.3 .095 .055 .085
Main Stem 107452 .09 .055 .085 Main Stem 105227.3 .095 .055 .095
Main Stem 103799.2 .095 .055 .087
Main Stem 102175.3 .095 .055 .095
Main Stem 100259.9 .095 .055 .09
Main Stem 99193.71 .095 .055 .085
Main Stem 98105.8 .095 .055 .095
Main Stem 96410.98 .095 .055 .085
Main Stem 94852.71 .09 .055 .085
Main Stem 94802.97 .095 .055 .085
Main Stem 94760.71 Bridge
Main Stem 94710.49 .095 .055 .085
Main Stem 94571.73 .093 .055 .09
Main Stem 93195.04 .095 .055 .095
Main Stem 91550.79 .093 .055 .095
Main Stem 91443.41 .093 .055 .095 Main Stem 91395.74 Bridge
Main Stem 91322.25 .1 .055 .095
Main Stem 91271.3 .095 .055 .09
Main Stem 88254.45 .09 .055 .085
Main Stem 87227.5 .0875 .055 .09
Main Stem 85437.3 .09 .055 .09
Main Stem 85336.28 .095 .055 .09
Main Stem 85311.66 Bridge
Main Stem 85275.49 .093 .055 .093
Main Stem 85115.27 .09 .055 .085
Main Stem 83789.77 .095 .055 .095
Main Stem 82693.23 .09 .055 .09
Main Stem 82591.6 .09 .055 .09
Main Stem 82538.7 Bridge
Main Stem 82492.84 .09 .04 .09 Main Stem 82380.46 .085 .04 .09
Main Stem 81081.69 .09 .04 .095
Main Stem 79104.25 .09 .04 .09
Main Stem 77992.66 .085 .04 .09
Main Stem 76590.96 .085 .04 .09

Main Stem 75535.01 .085 .04 .09
Main Stem 75444 .085 .04 .09
Main Stem 75397.22 Bridge
Main Stem 75358.33 .085 .04 .09
Main Stem 75305.77 .085 .04 .09
Main Stem 74463.91 .085 .04 .09
Main Stem 72692.7 .09 .04 .09
Main Stem 72597.39 .09 .04 .09
Main Stem 72569.03 Bridge
Main Stem 72532.91 .09 .04 .09 Main Stem 72473.31 .09 .04 .09
Main Stem 70873.35 .085 .04 .093
Main Stem 68837.21 .087 .04 .095
Main Stem 67190.06 .087 .04 .093
Main Stem 66257.14 .09 .04 .09
Main Stem 66204.38 .09 .04 .09
Main Stem 66018.66 Bridge
Main Stem 65986.86 .09 .04 .09
Main Stem 65920.69 .09 .04 .09
Main Stem 64419.25 .09 .04 .085
Main Stem 62424.45 .093 .04 .09
Main Stem 60313.49 .087 .04 .09
Main Stem 59146.26 .09 .04 .09
Main Stem 57813.5 .09 .04 .09
Main Stem 56325.92 .09 .04 .093 Main Stem 56277.45 .09 .04 .093
Main Stem 56238.98 Bridge
Main Stem 56196.91 .09 .04 .093
Main Stem 56103.86 .09 .04 .093
Main Stem 54709.44 .085 .04 .085
Main Stem 53262.06 .087 .04 .085
Main Stem 51999.64 .09 .04 .085
Main Stem 51896.9 .09 .04 .085
Main Stem 51859.01 Bridge
Main Stem 51829.71 .085 .04 .08
Main Stem 51762.02 .085 .04 .08
Main Stem 50118.29 .085 .04 .082
Main Stem 48750.75 .088 .04 .08
Main Stem 47008.56 .085 .04 .085
Main Stem 45364.46 .085 .04 .08 Main Stem 44274.65 .085 .04 .085
Main Stem 43383.23 .085 .04 .085
Main Stem 43336.08 .085 .04 .085
Main Stem 43308.41 Bridge
Main Stem 43283.2 .085 .04 .085
Main Stem 43197.27 .085 .04 .085
Main Stem 41409.68 .085 .04 .08
Main Stem 40055.61 .085 .04 .085
Main Stem 38675.88 .082 .04 .08
Main Stem 37031.44 .085 .04 .08
Main Stem 35740.65 .088 .04 .085
Main Stem 34107.76 .08 .04 .09
Main Stem 32854.69 .082 .04 .085
Main Stem 31159.54 .085 .04 .082
Main Stem 29546.01 .088 .04 .085 Main Stem 27670.12 .088 .04 .085
Main Stem 26713.37 .085 .04 .088
Main Stem 26633.6 .085 .04 .085

Main Stem 26591.05 Bridge
Main Stem 26515.04 .085 .04 .085
Main Stem 26420.44 .088 .04 .085
Main Stem 25460.34 .088 .04 .08
Main Stem 23401.31 .09 .04 .085
Main Stem 22166.63 .085 .04 .085
Main Stem 21230.68 .082 .04 .08
Main Stem 19261.59 .082 .04 .082
Main Stem 18077.71 .082 .04 .082
Main Stem 17999.3 .082 .04 .082
Main Stem 17978.26 Bridge
Main Stem 17950.46 .082 .04 .082 Main Stem 17849.81 .082 .04 .082
Main Stem 16913.12 .082 .04 .09
Main Stem 16096.81 .08 .04 .085
Main Stem 15968.76 .085 .04 .085
Main Stem 15933.16 Bridge
Main Stem 15896.56 .085 .035 .085
Main Stem 15761.84 .085 .035 .085
Main Stem 15003.16 .085 .035 .085
Main Stem 14261.13 .085 .035 .085
Main Stem 14191.78 .085 .035 .082
Main Stem 14174.03 Bridge
Main Stem 14148.05 .085 .035 .082
Main Stem 14030.31 .085 .035 .082
Main Stem 13251.71 .085 .035 .085
Main Stem 12616.64 .085 .035 .085 Main Stem 12526.87 .085 .035 .085
Main Stem 12498.05 Bridge
Main Stem 12469.43 .085 .035 .085
Main Stem 12426.64 .085 .035 .085
Main Stem 11592.12 .085 .035 .088
Main Stem 10955.06 .085 .035 .088
Main Stem 10871.64 .085 .035 .088
Main Stem 10832.75 Bridge
Main Stem 10793.7 .085 .035 .088
Main Stem 10661.72 .085 .035 .088
Main Stem 9696.133 .085 .035 .082
Main Stem 8397.759 .085 .035 .085
Main Stem 7193.258 .09 .035 .085
Main Stem 7110.866 .09 .035 .085
Main Stem 7100.789 Bridge Main Stem 7088.903 .09 .035 .085
Main Stem 7032.026 .085 .035 .085
Main Stem 5990.413 .09 .035 .09
Main Stem 5504.704 .085 .035 .085
Main Stem 5409.52 .085 .035 .085
Main Stem 5376.326 Bridge
Main Stem 5335.943 .085 .035 .082
Main Stem 5194.718 .085 .035 .082
Main Stem 4104.082 .082 .035 .082
Main Stem 2257.516 .082 .035 .082
Main Stem 391.8054 .082 .035 .085
Main Stem 7.228003 .085 .035 .09

SUMMARY OF REACH LENGTHS

River: Taunton River

Reach	River Sta.	Left	Channel	Right
Main Stem	128409	90.02	90.01	93.04
Main Stem	128319	65.53	65.15	67.23
Main Stem	128304	Bridge		
Main Stem	128253.8	56.21	65.62	70.36
Main Stem	128188.2	169.78	167.62	165.71
Main Stem	128020.6	64.55	64.95	68.4
Main Stem	127981.3	Inl Struct		
Main Stem	127955.6	95.96	99.03	158.54
Main Stem	127856.6	1443.78	1488.1	1605.74
Main Stem	126368.5	1117.96	1081.96	1026.32
Main Stem	125286.5	3030.3	3003.78	3022.24
Main Stem	122282.8	754.72	768.18	785.63
Main Stem	121514.6	1409.65	1470.4	1595.6
Main Stem	120044.2	1210.5	1269.44	1360.7
Main Stem	118774.7	1513.57	1451.76	1410.95
Main Stem	117323	1270.29	1219.85	1204.17
Main Stem	116103.1	1173.1	1178.45	1180.74
Main Stem	114924.7	78.71	81.96	87.88
Main Stem	114842.7	53.28	53.62	51.89
Main Stem	114815.5	Bridge		
Main Stem	114789.1	44.49	41.34	37.16
Main Stem	114747.8	1281.74	1292.52	1315.33
Main Stem	113455.2	1492.91	1457.13	1422.7
Main Stem	111998.1	2057.48	2006.07	1966.74
Main Stem	109992	808.34	781.04	811.8
Main Stem	109211	1561.57	1566.81	1580.91
Main Stem	107644.2	65.61	65.84	69.27
Main Stem	107578.3	123.92	126.38	129.99
Main Stem	107452	2317.83	2224.61	2187.27
Main Stem	105227.3	1458.48	1428.11	1397.47
Main Stem	103799.2	1511.12	1623.98	1750.94
Main Stem	102175.3	2000.77	1915.38	1882.93
Main Stem	100259.9	1027.78	1066.17	1112.6
Main Stem	99193.71	1067.1	1087.9	1112.89
Main Stem	98105.8	1679.58	1694.82	1701.02
Main Stem	96410.98	1563.06	1558.27	1560.01
Main Stem	94852.71	85.28	49.74	36.25
Main Stem	94802.97	97.12	92.48	89.62
Main Stem	94760.71	Bridge		
Main Stem	94710.49	111.72	138.76	147.03
Main Stem	94571.73	1383.91	1376.7	1373.13
Main Stem	93195.04	1691.41	1644.24	1589.83
Main Stem	91550.79	103.47	107.37	104.58
Main Stem	91443.41	115.34	121.17	129.47
Main Stem	91395.74	Bridge		
Main Stem	91322.25	49.58	50.95	49.51
Main Stem	91271.3	3090.08	3016.84	2959.28
Main Stem	88254.45	973.59	1026.95	1087.56

Main Stem 87227.5 1820.81 1790.19 1770.77
Main Stem 85437.3 103.69 101.02 107.47
Main Stem 85336.28 60.24 60.79 60.96
Main Stem 85311.66 Bridge
Main Stem 85275.49 159.18 160.23 161.81
Main Stem 85115.27 1317.95 1325.49 1349.87
Main Stem 83789.77 1097.27 1096.54 1095.28
Main Stem 82693.23 72.73 101.63 122.4
Main Stem 82591.6 94.57 98.76 101.32 Main Stem 82538.7 Bridge
Main Stem 82492.84 128.81 112.38 109.35
Main Stem 82380.46 1341.34 1298.77 1269.65
Main Stem 81081.69 1963.31 1977.44 1977.97
Main Stem 79104.25 1084.58 1111.59 1135.96
Main Stem 77992.66 1393.51 1401.69 1405.75
Main Stem 76590.96 982.05 1055.95 1121.6
Main Stem 75535.01 90.65 91.01 91.43
Main Stem 75444 83.92 85.68 87.62
Main Stem 75397.22 Bridge
Main Stem 75358.33 55.08 52.55 49.93
Main Stem 75305.77 864.05 841.86 823.45
Main Stem 74463.91 1832.03 1771.2 1714.64
Main Stem 72692.7 102.69 95.32 96.09
Main Stem 72597.39 67.7 64.48 66.6 Main Stem 72569.03 Bridge
Main Stem 72532.91 70.06 59.59 49.81
Main Stem 72473.31 1517.78 1599.96 1630.87
Main Stem 70873.35 2059.45 2036.14 2092.49
Main Stem 68837.21 1628.08 1647.15 1663.03
Main Stem 67190.06 997.16 932.92 890.31
Main Stem 66257.14 57.41 52.76 51.67
Main Stem 66204.38 221.18 217.52 217.92
Main Stem 66018.66 Bridge
Main Stem 65986.86 60.77 66.17 74.2
Main Stem 65920.69 1486.1 1501.44 1534.95
Main Stem 64419.25 1895.09 1994.8 2138.57
Main Stem 62424.45 2215.34 2110.96 2048.7
Main Stem 60313.49 1181.48 1167.23 1157.27
Main Stem 59146.26 1379 1332.76 1299.32 Main Stem 57813.5 1426.36 1487.57 1534.98
Main Stem 56325.92 58 48.47 42.98
Main Stem 56277.45 84.16 80.55 81.19
Main Stem 56238.98 Bridge
Main Stem 56196.91 110.85 93.05 75.7
Main Stem 56103.86 1404.65 1394.42 1387.7
Main Stem 54709.44 1402 1447.38 1492.06
Main Stem 53262.06 1383.55 1262.42 1156.9
Main Stem 51999.64 86.45 102.74 130.56
Main Stem 51896.9 72.49 67.2 64.58
Main Stem 51859.01 Bridge
Main Stem 51829.71 68.99 67.69 68.38
Main Stem 51762.02 1675.78 1643.73 1610.01
Main Stem 50118.29 1344.97 1367.54 1376.48
Main Stem 48750.75 1747.9 1742.19 1739.19 Main Stem 47008.56 1593.35 1644.1 1707.52
Main Stem 45364.46 1089.81 1089.81 1089.81

Main Stem 44274.65 891.42 891.42 891.42
Main Stem 43383.23 47.15 47.15 47.15
Main Stem 43336.08 52.88 52.88 52.88
Main Stem 43308.41 Bridge
Main Stem 43283.2 85.94 85.94 85.94
Main Stem 43197.27 1787.59 1787.59 1787.59
Main Stem 41409.68 1488.16 1354.06 1248.76
Main Stem 40055.61 1195.98 1379.74 1532.92
Main Stem 38675.88 1736.85 1644.44 1625.84
Main Stem 37031.44 1361.41 1290.79 1264.72
Main Stem 35740.65 1785.36 1632.89 1530.18
Main Stem 34107.76 1212.6 1253.07 1397.48
Main Stem 32854.69 1846.6 1695.15 1689.56 Main Stem 31159.54 1600.85 1613.53 1832.86
Main Stem 29546.01 1803.19 1875.89 1978.98
Main Stem 27670.12 918.95 956.75 981.98
Main Stem 26713.37 43.75 79.77 95.66
Main Stem 26633.6 137.27 118.57 119.67
Main Stem 26591.05 Bridge
Main Stem 26515.04 99.49 94.6 91.95
Main Stem 26420.44 990.69 960.09 928.97
Main Stem 25460.34 1917.46 2059.03 2182.8
Main Stem 23401.31 1321.59 1234.68 1184.64
Main Stem 22166.63 978.05 935.95 915.59
Main Stem 21230.68 1970.54 1969.09 1971.46
Main Stem 19261.59 1135.1 1183.89 1211.84
Main Stem 18077.71 80.62 78.41 79.01
Main Stem 17999.3 50.15 48.83 48.16 Main Stem 17978.26 Bridge
Main Stem 17950.46 90.54 100.66 105.81
Main Stem 17849.81 887.1 936.69 998.6
Main Stem 16913.12 882.21 816.31 764.31
Main Stem 16096.81 106.5 128.05 139.73
Main Stem 15968.76 71.69 72.2 74.47
Main Stem 15933.16 Bridge
Main Stem 15896.56 162.26 134.72 118.38
Main Stem 15761.84 770.87 758.69 764.06
Main Stem 15003.16 749.32 742.03 737.61
Main Stem 14261.13 78.25 69.35 66.1
Main Stem 14191.78 44.24 43.72 44.72
Main Stem 14174.03 Bridge
Main Stem 14148.05 99.87 117.75 129.37
Main Stem 14030.31 684.11 778.6 861.6 Main Stem 13251.71 602.45 635.08 678.37
Main Stem 12616.64 48.11 89.77 157.92
Main Stem 12526.87 48.42 57.44 51.66
Main Stem 12498.05 Bridge
Main Stem 12469.43 83.23 42.79 17.93
Main Stem 12426.64 810.43 834.52 1253.76
Main Stem 11592.12 680.73 637.06 583.23
Main Stem 10955.06 122 83.42 73.8
Main Stem 10871.64 69.68 77.94 70.04
Main Stem 10832.75 Bridge
Main Stem 10793.7 110.75 131.98 150.03
Main Stem 10661.72 1040.28 965.59 915.55

Main Stem 9696.133 1323.89 1298.37 1295.7
Main Stem 8397.759 1233.41 1204.5 1191.8
Main Stem 7193.258 86.6 82.39 79.32 Main Stem 7110.866 22.89 21.96 21.2
Main Stem 7100.789 Bridge
Main Stem 7088.903 57.75 56.88 56.46
Main Stem 7032.026 1208.71 1041.61 935.52
Main Stem 5990.413 373.51 485.71 679.74
Main Stem 5504.704 98.06 95.18 93.88
Main Stem 5409.52 81.29 73.58 68.36
Main Stem 5376.326 Bridge
Main Stem 5335.943 143.56 141.23 144.64
Main Stem 5194.718 1072.04 1090.64 1114.7
Main Stem 4104.082 1834.7 1846.57 1854.36
Main Stem 2257.516 1820.11 1865.71 1922.42
Main Stem 391.8054 619.37 384.58 298.08
Main Stem 7.228003 7.94 7.22 8.54

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Taunton River

Reach River Sta. Contr. Expan.

Main Stem 128409 .3 .5
Main Stem 128319 .5 .8
Main Stem 128304 Bridge
Main Stem 128253.8 .5 .8
Main Stem 128188.2 .3 .5
Main Stem 128020.6 .5 .8
Main Stem 127981.3 Inl Struct
Main Stem 127955.6 .5 .8
Main Stem 127856.6 .3 .5
Main Stem 126368.5 .3 .5
Main Stem 125286.5 .3 .5
Main Stem 122282.8 .3 .5
Main Stem 121514.6 .3 .5
Main Stem 120044.2 .3 .5
Main Stem 118774.7 .3 .5
Main Stem 117323 .3 .5
Main Stem 116103.1 .3 .5
Main Stem 114924.7 .3 .5
Main Stem 114842.7 .5 .8
Main Stem 114815.5 Bridge
Main Stem 114789.1 .5 .8
Main Stem 114747.8 .3 .5
Main Stem 113455.2 .3 .5
Main Stem 111998.1 .3 .5
Main Stem 109992 .3 .5
Main Stem 109211 .3 .5
Main Stem 107644.2 .3 .5
Main Stem 107578.3 .3 .5

Main Stem 107452 .3 .5
Main Stem 105227.3 .3 .5
Main Stem 103799.2 .3 .5
Main Stem 102175.3 .3 .5 Main Stem 100259.9 .3 .5
Main Stem 99193.71 .3 .5
Main Stem 98105.8 .3 .5
Main Stem 96410.98 .3 .5
Main Stem 94852.71 .3 .5
Main Stem 94802.97 .5 .8
Main Stem 94760.71 Bridge
Main Stem 94710.49 .5 .8
Main Stem 94571.73 .3 .5
Main Stem 93195.04 .3 .5
Main Stem 91550.79 .3 .5
Main Stem 91443.41 .5 .8
Main Stem 91395.74 Bridge
Main Stem 91322.25 .5 .8
Main Stem 91271.3 .3 .5
Main Stem 88254.45 .3 .5
Main Stem 87227.5 .3 .5
Main Stem 85437.3 .3 .5
Main Stem 85336.28 .5 .8 Main Stem 85311.66 Bridge
Main Stem 85275.49 .5 .8
Main Stem 85115.27 .3 .5
Main Stem 83789.77 .3 .5
Main Stem 82693.23 .3 .5
Main Stem 82591.6 .5 .8
Main Stem 82538.7 Bridge
Main Stem 82492.84 .5 .8
Main Stem 82380.46 .3 .5
Main Stem 81081.69 .3 .5
Main Stem 79104.25 .3 .4
Main Stem 77992.66 .3 .4
Main Stem 76590.96 .3 .4
Main Stem 75535.01 .3 .4
Main Stem 75444 .5 .4
Main Stem 75397.22 Bridge
Main Stem 75358.33 .3 .4
Main Stem 75305.77 .1 .3
Main Stem 74463.91 .1 .3 Main Stem 72692.7 .1 .3
Main Stem 72597.39 .3 .4
Main Stem 72569.03 Bridge
Main Stem 72532.91 .3 .4
Main Stem 72473.31 .1 .4
Main Stem 70873.35 .1 .4
Main Stem 68837.21 .1 .4
Main Stem 67190.06 .1 .4
Main Stem 66257.14 .1 .4
Main Stem 66204.38 .3 .4
Main Stem 66018.66 Bridge
Main Stem 65986.86 .5 .7
Main Stem 65920.69 .3 .5
Main Stem 64419.25 .3 .5
Main Stem 62424.45 .3 .5

Main Stem 60313.49 .3 .5
Main Stem 59146.26 .3 .5
Main Stem 57813.5 .3 .5
Main Stem 56325.92 .3 .5 Main Stem 56277.45 .5 .8
Main Stem 56238.98 Bridge
Main Stem 56196.91 .5 .8
Main Stem 56103.86 .3 .5
Main Stem 54709.44 .3 .5
Main Stem 53262.06 .3 .5
Main Stem 51999.64 .3 .5
Main Stem 51896.9 .5 .8
Main Stem 51859.01 Bridge
Main Stem 51829.71 .5 .8
Main Stem 51762.02 .3 .5
Main Stem 50118.29 .3 .5
Main Stem 48750.75 .3 .5
Main Stem 47008.56 .3 .5
Main Stem 45364.46 .3 .5
Main Stem 44274.65 .3 .5
Main Stem 43383.23 .3 .5
Main Stem 43336.08 .5 .8
Main Stem 43308.41 Bridge Main Stem 43283.2 .5 .8
Main Stem 43197.27 .3 .5
Main Stem 41409.68 .3 .5
Main Stem 40055.61 .3 .5
Main Stem 38675.88 .3 .5
Main Stem 37031.44 .3 .5
Main Stem 35740.65 .3 .5
Main Stem 34107.76 .3 .5
Main Stem 32854.69 .3 .5
Main Stem 31159.54 .3 .5
Main Stem 29546.01 .3 .5
Main Stem 27670.12 .3 .5
Main Stem 26713.37 .5 .5
Main Stem 26633.6 .6 .8
Main Stem 26591.05 Bridge
Main Stem 26515.04 .5 .8
Main Stem 26420.44 .3 .5
Main Stem 25460.34 .3 .5
Main Stem 23401.31 .3 .5 Main Stem 22166.63 .3 .5
Main Stem 21230.68 .3 .5
Main Stem 19261.59 .3 .5
Main Stem 18077.71 .3 .5
Main Stem 17999.3 .6 .8
Main Stem 17978.26 Bridge
Main Stem 17950.46 .5 .8
Main Stem 17849.81 .3 .5
Main Stem 16913.12 .3 .5
Main Stem 16096.81 .3 .5
Main Stem 15968.76 .5 .8
Main Stem 15933.16 Bridge
Main Stem 15896.56 .5 .8
Main Stem 15761.84 .3 .5
Main Stem 15003.16 .3 .5

```
Main Stem 14261.13 .3 .5
Main Stem 14191.78 .6 .8
Main Stem 14174.03 Bridge
Main Stem 14148.05 .5 .5   Main Stem 14030.31 .3 .5
Main Stem 13251.71 .3 .5
Main Stem 12616.64 .3 .5
Main Stem 12526.87 .6 .8
Main Stem 12498.05 Bridge
Main Stem 12469.43 .5 .5
Main Stem 12426.64 .3 .5
Main Stem 11592.12 .3 .5
Main Stem 10955.06 .3 .5
Main Stem 10871.64 .6 .5
Main Stem 10832.75 Bridge
Main Stem 10793.7 .5 .5
Main Stem 10661.72 .3 .5
Main Stem 9696.133 .3 .5
Main Stem 8397.759 .3 .5
Main Stem 7193.258 .3 .5
Main Stem 7110.866 .3 .5
Main Stem 7100.789 Bridge
Main Stem 7088.903 .1 .3   Main Stem 7032.026 .1 .3
Main Stem 5990.413 .1 .3
Main Stem 5504.704 .1 .3
Main Stem 5409.52 .1 .3
Main Stem 5376.326 Bridge
Main Stem 5335.943 .1 .3
Main Stem 5194.718 .1 .3
Main Stem 4104.082 .1 .3
Main Stem 2257.516 .1 .3
Main Stem 391.8054 .1 .3
Main Stem 7.228003 .1 .3
```

SECTION B-2

HECRAS REPORT – EXISTING CONDITIONS

```
 HEC-RAS HEC-RAS 6.4.1 June 2023
 U.S. Army Corps of Engineers
 Hydrologic Engineering Center
 609 Second Street
 Davis, California


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 X X X X X X X X X X
 X X XXXXXX XXXX X X X X XXXXX




PROJECT DATA
Project Title: Taunton_River
Project File : 10887 - Taunton_River.prj
Run Date and Time: 10/10/2024 4:59:00 PM

Project in English units
 Project Description:
CRS Info=<SpatialReference> <CoordinateSystem Code="2249"
Unit="US_survey_Foot" AcadCode="" /> <Registration OffsetX="0" OffsetY="0"
OffsetZ="0" ScaleX="1" ScaleY="1" ScaleZ="1" /></SpatialReference>




PLAN DATA

Plan Title: EXIST
Plan File : \\beta-inc.com\ma\Projects\10800s\10887 - Taunton, MA - Old
Colony Ave Bridge\Engineering\Hydraulics\HECRAS\10887 - Taunton_River.p04

 Geometry Title: Existing Conditions
 Geometry File : \\beta-inc.com\ma\Projects\10800s\10887 - Taunton, MA - Old
Colony Ave Bridge\Engineering\Hydraulics\HECRAS\10887 - Taunton_River.g04

 Flow Title : Taunton
 Flow File : \\beta-inc.com\ma\Projects\10800s\10887 - Taunton, MA - Old
Colony Ave Bridge\Engineering\Hydraulics\HECRAS\10887 - Taunton_River.f01

Plan Description:
Existing Conditions


Plan Summary Information: Number of: Cross Sections = 158 Multiple Openings =
0
 Culverts = 0 Inline Structures = 1
```

Bridges = 20 Lateral Structures = 0

Computational Information
Water surface calculation tolerance = 0.01
Critical depth calculation tolerance = 0.01
Maximum number of iterations = 40
Maximum difference tolerance = 0.3
Flow tolerance factor = 0.001

Computation Options
Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Subcritical Flow

FLOW DATA

Flow Title: Taunton
Flow File : \\beta-inc.com\ma\Projects\10800s\10887 - Taunton, MA - Old Colony Ave Bridge\Engineering\Hydraulics\HECRAS\10887 - Taunton_River.f01

Flow Data (cfs)
River Reach RS 10%AEP 4 AEP 2% AEP 1% AEP 0.2% AEP Taunton River Main Stem 128409 2280 3039 3590 4230 5720 Taunton River Main Stem 109992 2820 3584 4140 4780 6260 Taunton River Main Stem 88254.45 3660 4334 4830 5380 6690 Taunton River Main Stem 79104.25 3740 4459 4990 5570 6970 Taunton River Main Stem 74463.91 3860 4639 5210 5850 7370 Taunton River Main Stem 54709.44 3970 4812 5430 6120 7750 Taunton River Main Stem 35740.65 4080 4977 5630 6380 8120 Taunton River Main Stem 23401.31 4230 5220 5940 6770 8690 Taunton River Main Stem 9696.133 4890 6264 7260 8420 11100 Taunton River Main Stem 7.228003 4890 6264 7260 8420 11100

Boundary Conditions
River Reach Profile Upstream Downstream
Taunton River Main Stem 10%AEP Normal S = 0.0003 Taunton River Main Stem 4 AEP Normal S = 0.0003 Taunton River Main Stem 2% AEP Normal S = 0.0003 Taunton River Main Stem 1% AEP Normal S = 0.0003 Taunton River Main Stem 0.2% AEP Normal S = 0.0003

GEOMETRY DATA

Geometry Title: Existing Conditions
Geometry File : \\beta-inc.com\ma\Projects\10800s\10887 - Taunton, MA - Old Colony Ave Bridge\Engineering\Hydraulics\HECRAS\10887 - Taunton_River.g04

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 128409

INPUT
Description: 113 App Mill St Br
Station Elevation Data num= 84
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 35.87 13.05 35.86 26.1 35.53
65.24 35.34 78.29 35.25 84.82 35.4 123.97 34.94 130.49 35.01 137.01 35.25
143.54 33.2 150.06 32.76 169.64 32.41 202.26 30.93 221.83 29.72 228.36 29.45
241.41 29.21 267.5 29.23 274.03 29.07 293.6 29.13 300.13 28.98 306.65 27.99
313.17 27.51 319.7 26.88 326.22 25.81 333.03 24.02 338.49 23.04 340.24 22.22
341.38 20.18 348.62 15.99 359.34 12.87 373.14 12.14 388.24 11.87 406.61
11.19 421.81 12.59 430.87 17.73 442.83 17.06 444.63 20.68 457.44 21.82
463.24 22.52 476.29 23.7 482.81 24.5 489.34 25.1 495.86 25.52 508.91 26
515.43 26.09 521.96 25.97 541.53 26.37 554.58 26.06 561.11 25.12 567.63
24.71 580.68 24.44 587.2 24.2 593.73 24.1 606.78 24.65 613.3 25.51 639.4
27.22 645.92 27.54 672.02 30.1 678.55 30.86 685.07 31.17 691.59 31.31 704.64
32.21 724.22 33.09 737.27 34.11 743.79 34.38 750.32 34.89 756.84 35.59
763.36 36.53 769.89 36.98 789.46 37.88 795.99 38.32 809.04 38.88 822.08
39.89 828.61 40.5 835.13 40.62 841.66 41.32 854.71 43.3 861.23 43.41 867.76
44.21 880.8 47.11 887.33 48.24 893.85 49.09 906.9 50.18 919.95 50.7

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 300.13 .055 515.43 .095

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 300.13
515.43 90.02 90.01 93.04 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 541.53 919.95 26.37 F
Blocked Obstructions num= 3 Sta L Sta R Elev Sta L Sta R Elev Sta L Sta R
Elev
 31.92 73.2735.47613 86.21 138.4735.37749 172.65 219.3632.31081

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 128319

INPUT
Description: 112.7 US Face Mill St Br
Station Elevation Data num= 84
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 33.89 6.48 33.87 19.451
33.46 45.391 33.2 97.258 33.23 103.74 33.07 110.22 33.24 129.671 33.19
136.16 32.79 142.64 32.14 155.61 32.18 162.09 31.94 168.58 32.21 175.06
32.19 181.54 32.43 188.03 33.9 194.51 35.02 200.989 35.37 220.449 35.87
233.409 35.69 246.38 35.28 252.86 35.22 265.81 34.74 278.75 34.88 285.212
34.67 291.68 35.18 297.99 33.76 298.15 33.72 304.61 29.54 312.8 22.95 312.9
23.55 325.3 19.78 330.5 17.4 333.8 15.81 340.1 11.73 346.1 10.54 352.2 9.67
360.2 10.22 370.498 14.17 374.199 17.78 382.6 22.43 388.8 23.31 389.201
23.48 399.561 35.04 408.078 35.1 427.48 35.08 433.95 35.17 440.41 35.06
453.35 35.52 459.81 35.19 466.28 35.41 472.75 35.26 485.829 35.77 492.37
35.7 498.92 36.1 505.46 36.17 512 36.4 518.54 36.45 525.081 36.65 538.17

36.67 557.79 37.12 564.331 37.56 570.87 37.71 577.419 37.49 583.96 37.67
590.501 37.57 597.04 37.63 603.581 38.08 610.13 37.62 616.671 37.45 629.749
37.83 636.289 38.17 642.829 38.74 649.38 38.74 655.919 39.13 668.999 39.48
675.54 39.47 682.089 39.76 688.63 39.9 695.169 40.2 701.71 40.77 708.249
41.01 714.79 41.01 721.339 41.38

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .08 291.68 .055 399.561 .085
 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 291.68
399.561 65.53 65.15 67.23 .5 .8 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 307 36.5 T
 390 721.339 37 T

BRIDGE

RIVER: Taunton River
REACH: Main Stem RS: 128304

INPUT
Description: 112.5 Rte 104/Mill St/Plymouth St
Distance from Upstream XS = 5
Deck/Roadway Width = 50
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
 num= 14
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 99.999 34.4 233.999 36 237.001 35.18
 308 36.71 308.101 40.1 310 40.1
 310.1 36.57 31.64 387 37.11 32.18 387.1 40.6
 390 40.62 390.1 37.15 624 37.81   625 38.84 832 47.65

Upstream Bridge Cross Section Data
Station Elevation Data num= 84
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 33.89 6.48 33.87 19.451
33.46 45.391 33.2 97.258 33.23 103.74 33.07 110.22 33.24 129.671 33.19
136.16 32.79 142.64 32.14 155.61 32.18 162.09 31.94 168.58 32.21 175.06
32.19 181.54 32.43 188.03 33.9 194.51 35.02 200.989 35.37 220.449 35.87
233.409 35.69 246.38 35.28 252.86 35.22 265.81 34.74 278.75 34.88 285.212
34.67 291.68 35.18 297.99 33.76 298.15 33.72 304.61 29.54 312.8 22.95 312.9
23.55 325.3 19.78 330.5 17.4 333.8 15.81 340.1 11.73 346.1 10.54 352.2 9.67
360.2 10.22 370.498 14.17 374.199 17.78 382.6 22.43 388.8 23.31 389.201
23.48 399.561 35.04 408.078 35.1 427.48 35.08 433.95 35.17 440.41 35.06
453.35 35.52 459.81 35.19 466.28 35.41 472.75 35.26 485.829 35.77 492.37
35.7 498.92 36.1 505.46 36.17 512 36.4 518.54 36.45 525.081 36.65 538.17
36.67 557.79 37.12 564.331 37.56 570.87 37.71 577.419 37.49 583.96 37.67
590.501 37.57 597.04 37.63 603.581 38.08 610.13 37.62 616.671 37.45 629.749
37.83 636.289 38.17 642.829 38.74 649.38 38.74 655.919 39.13 668.999 39.48
675.54 39.47 682.089 39.76 688.63 39.9 695.169 40.2 701.71 40.77 708.249
41.01 714.79 41.01 721.339 41.38

Manning's n Values num= 3

```
 Sta n Val Sta n Val Sta n Val
 0 .08 291.68 .055 399.561 .085

Bank Sta: Left Right Coeff Contr. Expan.
 291.68 399.561 .5 .8
Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 307 36.5 T
 390 721.339 37 T
 Downstream Deck/Roadway Coordinates
 num= 14
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 99.999 34.4 233.999 36 237.001 35.18
 308 36.71 308.101 40.1 310 40.1
 310.1 36.57 31.64 387 37.11 32.18 387.1 40.6
 390 40.62 390.1 37.15 624 37.81
 625 38.84 832 47.65

Downstream Bridge Cross Section Data
Station Elevation Data num= 89
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  0 33.8 6.34 33.81 19.011 33.58
25.341 33.58 31.68 33.36  44.35 33.33 50.69 33.49 57.02 33.51 69.7 33.13
82.369 33.13  107.89 32.26 114.29 32.32 120.68 32.22 133.481 32.57 139.87
32.55  146.271 32.12 152.66 31.96 165.45 32.16 171.85 32.47 178.249 32.23
191.04 32.4 203.831 32.96 210.22 33.09 216.621 33.04 248.6 33.89  261.391
32.94 267.79 32.65 274.181 32.17 286.93 31.57 293.27 30.74  298.77 30.46
299.62 30.41 312.8 22.95 312.9 23.55 325.3 19.78  330.5 17.4 333.8 15.81
340.1 11.73 346.1 10.54 352.2 9.67  360.2 10.22 370.498 14.17 374.199 17.78
382.6 22.43 388.8 23.31  389.201 23.48 407.518 26.45 414.051 28.27 420.57
29.45 427.09 29.94  433.611 31.2 440.14 31.31 446.66 30.76 453.18 29.49 459.7
28.7  466.229 28.3 472.75 28.93 479.27 29.58 485.789 30.53 492.32 30.93
498.841 31.39 505.359 32.17 511.88 32.98 518.398 33.44 524.931 33.6  531.45
34.17 537.97 34.96 544.491 36.04 551.02 36.45 557.54 36.8  564.06 36.85
570.58 36.8 583.63 36.88 590.15 36.93 596.669 37.04  603.2 37.2 609.721 37.34
616.239 37.6 622.76 37.94 629.278 38.03  635.811 37.87 642.33 37.83 648.85
37.95 655.371 37.89 661.9 38.06  668.42 38.49 674.94 38.79 681.46 39.38
687.989 40.1

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .08 299.62 .055 433.611 .085

Bank Sta: Left Right Coeff Contr. Expan.
 299.62 433.611 .5 .8
Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 305.001 36 T
 390 687.989 37 T

Upstream Embankment side slope = 0 horiz. to 1.0 vertical Downstream
Embankment side slope = 0 horiz. to 1.0 vertical Maximum allowable
submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
```

```
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Bridge Coefficient Sets = 1
 Low Flow Methods and Data
 Energy
 W.S. Pro Method

 W.S.Pro Data
 Left Embankment
 El of the top of the embankment = 36.7
 El of the toe of the abutment = 22.9
 Right Embankment
 El of the top of the embankment = 36.7
 El of the toe of the abutment = 22.9
 Abutment Type = 4 Vert. abutments and sloping embankments with wingwalls
Slope of abutments = 4
 Top with of embankment = 50
 Centroid station of bridge opening =
 Wing Wall Type = Angular wing walls
 Width = 25
 Angle = 45
 Radius =
 Guide Banks Type = No Guide Bank present
 Length =
 Offset =
 Angle =
 Optional Contraction and expansion coefficients
 At approach Section
 At Guide Bank
 At upstream outside
 At upstream inside (BU)
 At downstream inside (BD)
 Piers are Continuous for the width of the bridge
 Use Geometric mean as Friction Slope Method

Selected Low Flow Methods = W.S.Pro Method

High Flow Method
 Energy Only

Additional Bridge Parameters
 Add Friction component to Momentum
 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION


RIVER: Taunton River
REACH: Main Stem RS: 128253.8
```

INPUT
Description: 112.3 DS FAce Mill St Br
Station Elevation Data num= 89
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 33.8 6.34 33.81 19.011 33.58
25.341 33.58 31.68 33.36 44.35 33.33 50.69 33.49 57.02 33.51 69.7 33.13
82.369 33.13 107.89 32.26 114.29 32.32 120.68 32.22 133.481 32.57 139.87
32.55 146.271 32.12 152.66 31.96 165.45 32.16 171.85 32.47 178.249 32.23
191.04 32.4 203.831 32.96 210.22 33.09 216.621 33.04 248.6 33.89 261.391
32.94 267.79 32.65 274.181 32.17 286.93 31.57 293.27 30.74 298.77 30.46
299.62 30.41 312.8 22.95 312.9 23.55 325.3 19.78 330.5 17.4 333.8 15.81
340.1 11.73 346.1 10.54 352.2 9.67 360.2 10.22 370.498 14.17 374.199 17.78
382.6 22.43 388.8 23.31 389.201 23.48 407.518 26.45 414.051 28.27 420.57
29.45 427.09 29.94 433.611 31.2 440.14 31.31 446.66 30.76 453.18 29.49 459.7
28.7 466.229 28.3 472.75 28.93 479.27 29.58 485.789 30.53 492.32 30.93
498.841 31.39 505.359 32.17 511.88 32.98 518.398 33.44 524.931 33.6 531.45
34.17 537.97 34.96 544.491 36.04 551.02 36.45 557.54 36.8 564.06 36.85
570.58 36.8 583.63 36.88 590.15 36.93 596.669 37.04 603.2 37.2 609.721 37.34
616.239 37.6 622.76 37.94 629.278 38.03 635.811 37.87 642.33 37.83 648.85
37.95 655.371 37.89 661.9 38.06 668.42 38.49 674.94 38.79 681.46 39.38
687.989 40.1

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .08 299.62 .055 433.611 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 299.62
433.611 56.21 65.62 70.36 .5 .8 Ineffective Flow num= 2
Sta L Sta R Elev Permanent
0 305.001 36 T
390 687.989 37 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 128188.2

INPUT
Description: 112 App weir/Exit Mill St Br Station Elevation Data num= 70
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 34.1 6.49 34.23 12.99 34.22
19.48 34.07 25.97 33.7 32.47 33.18 45.45 31.85 58.44 31.12 71.42 31.24 84.41
31.56 103.65 31.41 110.03 31.55 116.4 31.31 122.78 31.3 129.15 31.45 154.66
31.29 167.41 31.48 173.78 31.47 180.16 31.32 205.66 31.37 237.53 32.03
256.66 32.09 263.04 31.33 275.79 28.32 282.16 27.32 288.54 25.75 294.92
23.97 301.3 23.75 303.45 23.73 311.64 21.86 319.79 15.57 328.52 13.11 341.97
12.8 354.17 12.94 362.69 12.88 368.73 14.34 376.66 15.28 385.89 16.63 402.23
24.53 403.37 24.88 409.75 25.87 416.13 26.17 435.63 26.52 448.75 26.48
455.31 26.89 461.88 26.9 468.44 26.62 488.12 26.8 494.68 26.68 501.24 26.39
507.8 26.27 514.36 26.54 527.49 26.56 534.05 27.59 540.61 29.85 547.17 32.89
553.73 35.43 560.29 36.25 566.85 36.68 619.34 37.19 625.9 37.09 639.02 37.29
645.58 37.16 658.71 36.59 678.39 36.78 684.95 37.14 691.51 38.14 698.07
39.31 711.19 41.24 724.32 42.23

Manning's n Values num= 3

```
 Sta n Val Sta n Val Sta n Val
 0 .08 256.66 .055 409.75 .095

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  256.66
409.75 169.78 167.62 165.71 .3 .5

CROSS SECTION


RIVER: Taunton River
REACH: Main Stem RS: 128020.6

INPUT
Description: 111.7 us face weir
Station Elevation Data num= 90
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  0 34.24 12.88 34.27 25.77
34.07 38.65 33.96 51.53 34.24  64.42 34.04 70.86 33.43 77.3 31.03 90.18 31.27
103.07 31.15  109.51 30.84 115.95 30.69 122.39 30.82 167.48 29.69 173.92
29.45  180.36 28.88 186.92 28.44 200.04 27.93 213.15 27.79 226.27 27.47
232.83 27.43 239.38 27.77 245.94 28.55 259.06 31.37 265.61 31.58  278.73
31.53 285.29 31.07 298.4 30.98 324.63 31.2 328.16 31.18  331.19 31.16 337.75
26.6 344.31 23.78 350.86 19.99 358.52 12.97  371.97 12.66 384.17 12.8 392.69
12.74 398.73 14.2 406.66 15.14  416.44 19.92 423 22.2 424.52 22.34 429.56
22.8 436.11 22.6  442.67 22.63 449.23 24.24 455.79 26.13 462.35 27.31 468.9
27.75  475.46 27.75 482.02 27.93 495.13 27.81 514.81 27.16 521.36 26.7
527.92 25.26 534.48 24.83 541.04 25.06 547.6 24.61 560.71 23.52  567.27 23.49
573.83 23.3 580.38 23.27 586.94 24.29 593.5 26.14  600.06 26.94 606.61 28.44
613.17 32.29 619.73 35.23 626.29 36.13  639.4 37.08 645.96 37.38 652.52 37.52
665.63 37.44 672.19 37.53  704.98 36.59 724.65 35.34 744.33 35.42 750.88
35.28 757.44 36.23  764 38.88 770.56 40.97 777.12 42.71 783.67 43.87 790.23
45.34  796.79 45.49 803.35 45.38 809.9 45.47 816.46 45.94 823.02 46.74

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 331.19 .055 482.02 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  331.19
482.02 64.55 64.95 68.4 .5 .8 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 265.61 31.58 T
Blocked Obstructions num= 1
 Sta L Sta R Elev
 121.23 175.1530.79663

INLINE STRUCTURE


RIVER: Taunton River
REACH: Main Stem RS: 127981.3

INPUT
Description: 111.5
Distance from Upstream XS = 20 Deck/Roadway Width = 2
Weir Coefficient = 2.6
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```
 Weir Embankment Coordinates num = 8
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  292 30.64 332 31.21 332.1
15.58 345 16.42 406 16.87  416 17.9 417 28.21 519 25.86

Upstream Embankment side slope = 0 horiz. to 1.0 vertical Downstream
Embankment side slope = 0 horiz. to 1.0 vertical Maximum allowable
submergence for weir flow = .95
Elevation at which weir flow begins =
Weir crest shape = Broad Crested


CROSS SECTION


RIVER: Taunton River
REACH: Main Stem RS: 127955.6

INPUT
Description: 111.3 DS face weir
Station Elevation Data num= 92
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  0 33.51 6.42 33.47 19.26 33.66
32.1 33.25 51.36 33.15  70.63 32.45 83.47 31.51 89.89 31.17 102.73 30.85
141.25 30.66  173.36 30.41 179.78 30.47 186.2 30.38 192.62 29.78 199.04 28.96
205.46 28.38 224.89 27.28 231.39 27.16 257.41 27.24 263.91 26.93  289.93
26.41 296.43 25.88 302.93 24.22 309.44 23.45 315.94 22.97  322.44 23.13
328.95 24.32 335.45 26.52 341.96 27.79 348.46 28  367.97 29.11 374.48 28.75
380.98 27.71 383.34 27.12 387.48 26.07  393.99 22.45 400.49 18.67 406.99
17.12 426 17.4 434 14.4  442 13.6 450 12.3 458 14.5 466 17.3 478.54 17.11
485.04 17.32 491.54 18.31 498.05 18.64 504.55 18.82 504.7 18.84  511.05 19.72
524.06 22.44 543.57 27.23 550.08 27.76 556.58 27.53  569.59 26.31 576.09
25.48 582.6 22.68 589.1 20.13 595.6 19.58  602.11 20.13 608.61 20.19 615.11
20.82 621.62 22.2 628.12 24.24  634.63 25.82 641.13 26.32 647.63 26.43 654.14
26.76 667.14 28.24  673.65 29.2 680.15 30.9 686.66 32.98 693.16 34.32 699.66
35.29  706.17 36.11 712.67 36.71 725.68 37.45 738.69 37.87 758.2 37.84
777.71 37.39 784.21 37.08 790.72 36.61 797.22 36.59 803.72 36.78  810.23
36.61 816.73 36.81 829.74 38.66 836.24 39.43 849.25 41.46  862.26 43.09
881.77 45.04

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 367.97 .055 550.08 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  367.97
550.08 95.96 99.03 158.54 .5 .8 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 367.97 29.11 T
Blocked Obstructions num= 1
 Sta L Sta R Elev
 129.27 182.1430.76699

CROSS SECTION


RIVER: Taunton River  REACH: Main Stem RS: 127856.6
```

INPUT
Description: 111 exit weir
Station Elevation Data num= 92
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 33.41 6.5 33.56 13 33.54
19.5 33.93 25.99 33.86 32.49 33.24 45.49 32.88 51.99 32.85 58.49 32.64 64.99
32.72 71.48 33.08 77.98 32.54 84.48 32.25 97.48 31.88 103.98 31.5 116.97
29.91 129.97 28.82 136.47 28.68 155.97 28.99 168.96 29.32 194.96 29.61
201.45 29.6 214.45 29.3 253.44 29.48 266.44 29 272.94 28.89 298.93 27.42
305.43 27.14 318.43 26.36 324.93 26.12 337.92 25.85 363.92 25.9 376.92 26.16
383.41 26.08 389.91 26.19 403.01 25.63 409.55 25.12 416.1 24.44 422.65 23.96
429.19 23.71 435.74 23.64 442.29 24.09 448.83 24.87 455.38 24.91 461.93 22.3
468.47 20.48 475.02 18.37 475.69 18.24 481.57 17.1 544 14.4 552 13.6 560
12.3 568 14.5 612.5 17.08 651.78 17.07 658.33 17.08 664.87 17.17 666.5 17.34
671.42 17.83 677.97 18.69 684.51 19.99 704.15 24.37 710.7 25.26 717.24 25.79
723.79 27.2 730.34 28.87 736.88 30.39 743.43 31.08 749.98 30.76 756.52 30.28
769.62 31.72 776.16 32.04 782.71 32.1 795.8 33 808.9 34.31 815.44 35.27
821.99 35.45 828.54 35.94 835.08 37.06 841.63 38.52 854.72 43.41 861.27
43.85 867.82 43.61 880.91 43.44 894 42.94 900.55 42.48 913.64 41.98 920.19
42.03 939.83 42.72 946.38 43.17 966.02 45.01 979.11 46.45

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .085 455.38 .055 743.43 .095

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 455.38
743.43 1443.78 1488.1 1605.74 .3 .5 Ineffective Flow num= 1
Sta L Sta R Elev Permanent
0 194.96 29.61 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 126368.5

INPUT
Description: 110
Station Elevation Data num= 189
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 46.85 25.85 46.86 32.31
46.76 38.77 46.42 45.23 45.95 71.08 44.81 84 43.96 90.46 43.26 96.92 42.74
103.38 42.46 122.77 41.12 129.23 40.98 135.69 40.69 148.61 40.6 168 39.95
180.92 39.78 193.84 39.15 200.3 39.03 213.23 38.35 219.69 38.21 226.15 38.21
251.99 38.94 258.46 39.43 264.92 39.22 277.84 39.5 290.76 38.94 297.22 38.54
303.69 37.82 310.15 36.79 316.61 36 323.07 35.4 329.53 34.27 348.92 30.53
355.38 27.11 361.84 26.66 368.3 25.39 374.76 24.47 381.22 23.95 387.68 23.89
394.14 23.49 407.07 23.05 413.53 23.38 419.95 23.97 432.78 24.38 439.19
24.98 445.61 26.13 452.03 26.63 458.44 28.67 464.86 31.4 471.27 32.76
477.69 33.64 484.11 34.15 490.52 34.24 503.36 34.04 516.19 33.63 522.6 33.01
541.85 30.89 554.68 29.65 567.52 28 593.18 25.96 599.6 25.63 606.01 25.53
618.85 24.63 625.28 24.65 631.71 24.47 638.15 24.16 651.02 23.81 657.45
23.42 663.88 22.61 676 22.7 696 16.4 704 13.4 712 12.6 720 11.3 728 13.5
736 16.3 760 20 766.82 23.51 771 24.35 773.26 24.8 786.13 24.9 792.56 24.83
798.99 24.29 805.52 24.04 818.57 24.22 857.73 24.25 870.78 24.13 877.31
23.86 909.94 23.71 916.47 23.57 923 23.58 929.52 23.34 949.1 22.86 968.68

21.9 975.21 21.44 988.26 20.16 994.79 19.17 1001.31 19.13 1007.84 18.9
1020.89 18.98 1033.95 18.91 1040.47 19.48 1047 20.54 1053.53 21.43 1060.05
21.91 1066.58 22.71 1079.63 23.28 1092.69 24.16 1112.26 24.89 1138.37 25.59
1164.48 25.73 1171 26.03 1203.64 26.49 1210.16 26.4 1236.27 26.75 1255.85
26.56 1262.37 26.79 1268.9 26.88 1275.43 26.82 1281.93 26.94 1294.94 26.95
1314.46 26.5 1333.97 25.45 1346.98 24.69 1353.49 24.47 1359.99 24.45 1379.51
24.83 1386.01 24.69 1392.52 24.74 1418.54 25.75 1431.55 26.56 1438.05 26.86
1444.56 26.85 1451.06 26.61 1457.57 26.95 1464.07 27.04 1470.58 26.08
1477.09 24.76 1490.1 23.56 1496.6 23.77 1503.11 24.62 1509.61 25.16 1516.12
25 1529.13 29.22 1535.63 29.25 1542.14 29.56 1548.64 29.62 1561.65 28.62
1568.16 28.22 1574.66 28.05 1581.17 26.9 1587.67 26.31 1594.18 26.2 1600.68
25.9 1607.19 25.84 1613.69 27.22 1620.2 27.96 1633.21 30.07 1646.22 31.81
1659.23 32.95 1665.73 33.05 1672.24 33.34 1698.26 34.08 1724.28 34.25
1743.84 35.64 1750.39 35.88 1770.05 37.7 1776.6 38.17 1783.15 38.43 1789.7
39.18 1796.25 39.78 1809.35 40.61 1815.91 41.16 1822.46 41.45 1835.56 41.75
1842.11 42.26 1861.76 42.84 1874.87 43.77 1881.42 44.42 1887.97 45.34
1894.52 45.93 1901.07 46.13 1907.62 45.7 1914.17 45.63 1920.73 45.78 1927.28
45.72 1933.83 45.4 1940.38 45.26 1953.48 45.44

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .1 606.01 .0552 773.26 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 606.01
773.26 1117.96 1081.96 1026.32 .3 .5 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 490.52 34.24 F
 1548.64 1953.48 29.62 F

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 125286.5
 INPUT
Description: 109
Station Elevation Data num= 203
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 41.92 6.54 43.43 19.61 46.06
26.15 47.01 39.23 46.79 52.3 46.1 58.84 45 65.38 42.39 71.91 40.37 78.45
35.92 84.99 34.22 91.53 31.57 98.07 28.68 104.6 27.54 111.14 27.69 117.68
26.81 124.22 25.63 137.29 24.38 150.37 23.7 156.9 23.1 163.44 21.58 176.52
20 183.06 19.39 189.59 19.03 202.67 19.17 209.21 19.08 215.74 18.24 222.28
18.09 228.82 18.35 235.36 19.01 237.82 18.78 241.89 18.41 248.43 16.57
261.51 16.56 269 15.9 276 13.3 283 12.3 290 11.6 297 13.2 298 16.2 300.73
16.55 307.27 16.54 313.81 19.17 320.35 22.31 320.62 22.33 339.96 22.27 346.5
22.19 359.57 22.46 366.11 22.39 372.65 21.9 385.72 21.4 392.26 21.3 398.8
21.49 405.34 21.13 411.87 21.43 431.49 20.97 438.02 20.7 444.56 20.9 451.1
21.57 457.64 21.97 483.79 22.53 490.33 22.49 496.86 22.67 503.4 22.4 516.48
22.98 523.01 22.69 529.55 22.21 542.63 22.09 549.16 21.68 555.7 21.57
562.24 21.15 575.32 20.07 588.39 19.28 601.49 18.97 608.04 18.95 621.16
19.54 627.72 20.04 634.27 20.36 647.39 20.13 660.5 20.34 667.06 20.17 693.29
19.84 699.85 19.5 726.07 19.4 745.75 19.81 765.42 19.53 778.53 19.53 785.09
19.66 791.65 19.43 830.99 19.49 850.66 19.26 870.34 19.75 876.89 20.47
883.45 20.67 896.56 20.48 916.24 20.63 922.79 20.78 935.91 20.79 942.47

20.46 949.02 20.47 955.58 20.34 968.69 19.44 975.25 19.3 994.92 20.26
1001.48 19.67 1014.6 18.06 1027.71 17.52 1034.27 17.65 1040.83 18.23 1047.38
19.01 1053.94 19.1 1060.5 18.95 1067.05 19.02 1073.61 19.26 1080.17 19.15
1093.28 19.52 1099.84 19.85 1112.96 20.24 1119.51 20.63 1145.74 21.17
1158.86 21.15 1171.97 22.3 1185.09 23.61 1191.64 23.61 1204.76 23.28 1211.32
23.48 1224.43 23.23 1237.55 24.02 1250.66 24.07 1257.22 24.25 1270.33 25.34
1290 26.17 1296.56 26.61 1303.12 27.66 1309.68 29.04 1316.23 29.73 1322.79
30.11 1329.35 30.7 1335.9 31.12 1355.58 31.29 1375.25 32.1 1381.81 32.2
1388.36 32.67 1394.92 33.41 1401.48 33.4 1408.04 33.11 1414.59 33.24 1421.15
33.87 1427.71 33.88 1440.82 34.77 1447.38 34.86 1460.49 35.58 1473.61 35.17
1486.72 36.06 1493.28 36.31 1526.07 36.9 1532.62 37.14 1539.18 37.78 1545.74
37.79 1558.85 38.08 1565.41 37.91 1578.53 38.68 1585.08 38.94 1591.64 39.45
1598.2 40.21 1604.76 40.49 1611.31 40.96 1617.87 40.92 1624.43 41.17 1630.98
41.21 1637.54 41.62 1650.66 42.62 1657.21 42.97 1663.77 43.48 1670.33 43.67
1683.44 44.41 1716.23 45.47 1722.79 45.58 1729.34 45.99 1749.02 46.47
1762.13 47.08 1775.25 48.3 1794.92 49.56 1808.03 51.17 1821.15 52.42 1847.38
53.89 1886.72 54.41 1912.95 53.84 1919.51 53.61 1939.18 53.27 1958.85 53.34
1965.41 53.8 1978.52 56.02 1985.08 56.89 1998.19 58.38 2011.31 59.5 2017.87
59.93 2030.98 60.52 2037.54 60.7 2050.65 60.73 2057.21 60.56 2070.32 59.92
2076.88 59.81

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 237.82 .055 320.62 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 237.82
320.62 3030.3 3003.78 3022.24 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 122282.8

INPUT
Description: 108
Station Elevation Data num= 249 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 70.81 6.56 68.04 13.11 64.74 19.67 61.03 26.23 59.41 39.34 58.97 52.46
59.39 65.57 59.26 85.24 59.54 91.8 59.88 98.36 59.99 111.47 59.66 118.03
59.79 124.59 59.54 131.14 59.02 144.26 56.17 157.37 53.06 163.93 52.19
170.49 52.02 177.04 52.28 183.6 53.33 190.16 52.89 196.72 49.04 203.27 48
262.29 47.8 275.4 47.92 288.52 47.89 301.63 48.2 308.19 48.6 314.75 49.18
321.3 50.11 327.86 50.49 334.42 50.48 340.97 50.3 354.09 49.36 360.65 48.35
373.76 46.78 386.87 46.29 399.99 44.52 406.55 43.79 413.1 42.54 419.66 41.81
426.22 41.67 432.78 41.39 439.33 41.29 472.12 41.18 498.35 41.27 511.46
41.05 596.71 41.33 616.38 41.34 622.93 41.48 629.49 41.48 636.05 41.76
642.61 42.84 649.16 44.91 655.72 47.72 662.28 47 668.83 46.9 675.39 46.23
688.51 43.58 708.18 41.45 721.29 40.27 727.85 39.58 734.41 39.06 740.96
38.32 780.31 35.94 793.42 34.97 813.09 34.17 819.65 34.28 826.21 34.1
832.76 33.76 839.32 33.08 845.88 32.22 858.99 29.86 865.55 28.44 878.66
26.31 885.22 25.65 898.34 23.9 904.89 23.61 911.45 22.69 918.01 21.99 924.57
21.57 931.12 21.32 937.68 20.91 944.24 20.24 950.79 20.05 963.91 20.46
970.47 20.49 983.58 19.65 990.14 19.55 996.69 19.69 1022.92 21.06 1029.48
21.01 1036.04 21.14 1042.6 21.09 1049.15 19.99 1055.71 18.61 1062.27 17.92

1068.82 17.91 1075.38 18.8 1081.94 19.41 1088.5 19.34 1095.05 18.96 1101.61 19.58 1108.17 20.66 1114.72 20.98 1121.28 20.85 1134.4 20.9 1140.95 20.74 1154.07 21.06 1160.62 20.95 1173.73 20.48 1180.29 20.39 1186.84 20.58 1191.56 20.81 1193.4 20.9 1199.95 20.56 1213 21.2 1215 15.2 1223 14.7 1230 10.3 1237 11.2 1244 12.7 1245 15.2 1267 16.7 1270.68 19.52 1272.06 20.24 1278.62 21.4 1285.17 21.56 1298.29 21.52 1304.84 21.14 1311.4 21.05 1317.95 20.68 1337.57 20.83 1344.11 20.62 1350.64 20.26 1363.72 20.47 1376.8 20.91 1383.34 20.98 1389.88 21.47 1396.42 21.65 1402.95 22.08 1409.49 22.66 1422.57 24.13 1429.11 24.63 1435.65 24.83 1448.72 24.39 1455.26 23.94 1474.88 22.01 1481.42 21.57 1487.96 20.99 1501.03 19.42 1507.57 18.46 1514.11 18.3 1520.65 17.97 1540.26 18.22 1553.34 18.13 1566.42 18.31 1579.5 18.23 1586.04 18.29 1592.57 18.64 1599.11 19.21 1605.65 20.72 1612.19 22.41 1618.73 23.66 1625.27 24.67 1638.34 25.43 1644.88 25.59 1657.96 25.37 1690.65 25.03 1697.19 24.83 1703.73 24.91 1710.27 25.32 1742.96 27.92 1749.5 28.3 1756.04 28.32 1769.12 28.92 1775.65 29.11 1782.19 29.48 1795.27 29.9 1801.81 29.97 1808.35 29.86 1814.89 30.3 1821.43 30.13 1847.58 29.99 1860.66 30.2 1873.73 31.05 1886.81 30.96 1899.89 31.1 1906.43 31.51 1912.97 31.63 1919.5 31.52 1926.04 31.65 1939.12 32.26 1945.66 32.36 1952.2 32.71 1958.74 32.74 1991.43 31.67 1997.97 32.04 2004.51 31.83 2011.05 32.04 2024.12 32.8 2030.66 33.28 2037.2 34.08 2043.74 34.31 2050.28 34.08 2056.82 32.45 2063.35 31.05 2076.43 29 2082.97 28.61 2089.51 29.92 2096.05 31.78 2102.59 33.4 2109.12 34.59 2115.66 35.14 2122.2 35.2 2128.74 35.46 2135.28 36.2 2141.82 36.8 2148.36 37.16 2154.9 37.77 2161.43 38.53 2174.51 39.13 2181.05 39.33 2187.59 39.69 2194.13 40.26 2207.2 40.43 2213.74 40.4 2220.28 40.55 2226.82 40.84 2239.9 40.89 2259.51 41.66 2272.59 41.97 2285.67 42.53 2305.28 43.2 2318.36 43.34 2337.98 43.76 2377.21 45.12 2396.82 46.68 2403.36 46.93 2409.9 46.96 2416.44 46.84 2429.52 46.35 2468.75 46.32 2475.29 46.44 2481.83 46.75 2501.44 48.1 2514.52 48.82 2521.06 49.06

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 1213 .055 1278.62 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1213 1278.62 754.72 768.18 785.63 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 2043.74 2521.06 34.31 F

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 121514.6

INPUT
Description: 107
Station Elevation Data num= 297
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 37.96 6.54 38.55 13.08 38.83 19.62 38.8 26.16 39.24 32.7 41.4 39.23 43.89 45.77 45.37 52.31 44.16 58.85 44.18 65.39 46.43 71.93 48.45 78.47 46 85.01 42.11 91.55 41.21 98.09 43.66 104.63 43.54 111.17 43.98 117.7 43.78 124.24 43.84 130.78 41.63 137.32 40.22 143.86 40.61 150.4 40.01 156.94 40.57 163.48 42.73 170.02 45.55 176.56 47.74 183.1 49.24 189.64 50.26 196.17 50.31 202.71 48.24 209.25 45.25 215.79 42.76 222.33 40.72 228.87 38.4 235.41 38.02 241.95 37.72 248.49 37.76 255.03 38.03

261.57 38.89 268.1 41.69 274.64 42.2 281.18 42.07 287.72 41.71 294.26 41.05
300.8 42.11 307.34 42.04 313.88 41.6 320.42 41.46 326.96 41.68 333.5 42.02
340.04 41.86 346.57 41.12 353.11 40.56 359.65 39.69 366.19 37.84 372.73
36.28 379.27 35.28 385.81 34.76 392.35 34.55 398.89 34.37 405.43 33.91
411.97 34.6 418.51 35.81 425.04 34.31 431.58 33.83 438.12 33.73 451.2 33.47
457.74 33.5 464.28 33.48 470.82 33.37 477.36 33.09 483.9 32.94 490.44 32.91
496.98 33.06 503.51 33.11 510.05 33.09 516.59 32.9 523.13 32.93 529.67 32.92
542.75 33.24 549.29 32.91 555.83 33.08 562.37 33.53 568.91 33.73 575.45
34.49 581.98 33.5 588.52 32.45 595.06 32.47 601.6 32.04 608.14 32.01 614.68
31.69 621.22 31.6 627.76 31.46 634.3 31.19 640.84 31.12 647.38 31.07 653.92
31.06 660.45 31 666.99 30.9 673.55 30.95 680.1 30.92 686.66 30.73 693.21
30.51 699.77 30.71 706.32 29.35 712.88 26.83 719.43 26.66 732.54 26.67
739.1 27.3 745.65 29.49 752.21 30.26 765.32 30.28 771.87 29.48 778.43 26.59
784.98 26.16 791.54 26.55 798.09 26.63 804.65 26.6 811.2 26.59 817.76 26.24
824.31 25.99 837.42 25.66 850.53 25.27 857.08 25.27 863.64 24.98 870.19
24.88 876.75 24.9 883.3 25.25 889.86 25.18 896.41 24.73 902.97 24.26 916.08
23.95 922.63 23.37 929.19 22.81 935.74 22.76 942.3 22.44 948.85 22.44 955.41
22.35 961.96 22.43 968.52 22.49 975.07 22.24 981.63 22.17 988.18 22.15
994.74 22.09 1001.29 22.49 1007.85 23.18 1014.4 23.68 1020.96 24.05 1027.51
24.19 1040.62 23.77 1047.18 23.01 1053.73 22.46 1060.29 22.43 1066.84 22.47
1107 23 1112 14.7 1118 9.9 1124 9.4 1130 7.9 1136 9 1140 10.6 1143 14.6 1151
18.6 1171.12 20.33 1171.72 20.35 1178.27 20.64 1184.83 20.71 1197.94 19.89
1211.05 19.39 1230.71 19.19 1237.27 19.39 1243.82 19.77 1250.38 19.84
1256.93 19.59 1283.15 17.98 1296.26 17.87 1368.36 17.92 1394.58 18.06
1414.25 18.4 1420.8 18.76 1427.36 19.36 1440.47 20.92 1453.58 21.65 1479.8
22.03 1486.35 21.98 1499.46 22.35 1506.01 22.21 1525.68 21.14 1532.23 20.97
1538.79 21.17 1571.56 20.98 1584.67 20.66 1597.76 20.72 1604.3 20.39 1610.84
20.45 1623.91 20.02 1630.45 20.24 1636.99 20.31 1643.52 20.17 1663.13 20.3
1669.67 20.23 1682.75 19.53 1689.28 18.95 1695.82 18.93 1702.36 18.63
1708.89 18.06 1715.43 18.08 1721.97 18.32 1735.04 19.45 1748.11 20.04
1767.73 20.06 1774.26 19.81 1780.8 19.11 1787.34 18.79 1793.87 18.93 1800.41
20.28 1806.95 20.34 1826.56 19.5 1833.1 19.37 1846.17 18.35 1852.71 18.22
1878.85 18.37 1911.54 19.13 1918.08 19.13 1931.15 19.46 1937.69 19.78
1944.22 20.88 1950.76 22.59 1957.3 24.51 1963.84 25.84 1970.37 25.95 1976.91
26.65 1983.45 26.83 1989.98 26.17 1996.52 26.89 2003.06 28.73 2009.59 30.14
2016.13 30.63 2022.67 30.94 2042.28 31 2055.35 30.52 2068.43 30.39 2074.96
30 2081.5 29.22 2088.04 29.93 2094.57 31.75 2101.11 32.74 2107.65 33.23
2127.26 33.45 2146.87 34.25 2159.94 34.48 2173.02 35.03 2179.55 35.01
2192.63 35.68 2199.16 35.87 2212.24 36.69 2225.31 37.6 2231.85 37.95 2238.39
38.47 2251.46 38.68 2258 39.07 2277.61 40.52 2290.68 41.75 2303.75 43.31
2316.83 44.07 2323.36 44.85 2336.44 46.09 2342.98 46.87 2356.05 48.14
2369.12 48.73 2382.2 48.99 2401.81 48.7 2408.34 48.46 2434.49 48.37 2441.03
48.56 2447.57 48.99 2460.64 48.86 2480.25 49.13 2486.79 49.04 2493.32 49.23
2499.86 49.01 2512.93 49.67 2526.01 50.15 2532.54 50.71 2539.08 50.69
2545.62 50.89 2558.69 50.99 2565.23 51.54 2584.84 52.74 2591.38 53.04
2597.91 53.61 2610.99 55 2617.52 56.05 2624.06 56.53 2630.6 57.18

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 1107 .055 1184.83 .095
 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1107
1184.83 1409.65 1470.4 1595.6 .3 .5 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 765.32 30.28 T

2042.28 2630.6 31 F

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 120044.2

INPUT
Description: 106
Station Elevation Data num= 158
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 40.61 6.54 40.5 13.07 40.14
19.61 40.06 39.22 39.49 45.76 39.44 58.83 38.92 71.91 38.13 117.66 36.63
130.74 36.85 137.28 36.78 143.81 37.5 150.35 38.36 156.89 39.01 176.5 42.26
196.11 46.29 202.65 46.77 209.18 46.14 215.72 45.67 222.26 45.38 241.87
44.01 254.94 43.5 281.09 43.81 287.62 43.98 294.16 43.91 313.77 43.3 339.92
41.74 352.99 40.82 366.07 40.3 379.14 39.95 385.68 39.5 392.22 39.28 398.75
38.85 405.29 38.59 424.9 37.41 431.44 36.55 437.97 35.96 444.51 35.58 464.12
34.74 483.73 34.7 490.27 34.81 536.03 34.53 549.1 34.08 562.18 33.27 568.71
32.64 581.79 31.19 614.47 28.36 627.55 27.35 634.08 26.73 647.16 25.95
660.23 25.55 666.77 25.11 692.91 24.29 705.99 23.34 719.06 21.99 738.67
20.58 745.21 20.23 758.28 20.14 764.82 19.98 777.9 19.92 817.12 20.85 823.65
20.49 843.26 18.27 849.8 17.8 856.34 17.88 862.88 18.16 882.49 19.7 885.39
19.85 889.02 20.05 895.56 20.13 902.1 20.1 908.63 19.78 915.17 19.84 921.71
20.02 928.25 20.09 934.78 19.66 947.86 16.29 954.39 15.67 960.93 15.65 974
15.65 977 14.2 985 11.1 993 9.4 1001 7.2 1017 11.2 1018 14.3 1032.84 16.45
1039.37 18.22 1045.91 18.33 1052.45 17.97 1058.98 17.5 1065.52 17.31 1072.06
17.29 1078.59 18.55 1085.13 20.3 1089.47 21.05 1091.67 21.43 1104.74 21.84
1111.28 22.96 1117.82 24.81 1124.35 26.46 1130.89 28.29 1137.43 30.63
1143.96 35.23 1150.5 38.88 1157.04 41.31 1163.58 42.33 1170.11 42.63 1183.19
42.41 1209.33 43.49 1215.87 43.42 1222.41 43.49 1242.02 44.96 1255.09 46.63
1261.63 47.01 1268.17 47.77 1274.7 48.22 1287.78 48.58 1294.31 48.89 1313.93
50.49 1333.54 51.36 1346.61 51.41 1353.15 51.68 1359.68 51.72 1366.22 51.97
1379.29 52.93 1385.83 53.16 1392.37 52.98 1398.91 53.36 1411.98 53.79
1418.52 53.73 1425.05 53.84 1431.59 53.24 1444.66 52.63 1451.2 52.46 1477.35
52.74 1483.89 53.09 1503.5 55.43 1516.57 56.65 1523.11 57.15 1529.64 57.88
1536.18 58.17 1542.72 58.28 1549.26 59.01 1575.4 59.96 1581.94 60.55 1588.48
61.3 1595.01 61.85 1601.55 62.6 1608.09 63.59 1614.62 64.16 1621.16 64.55
1634.24 65.83 1640.77 65.99 1647.31 66.32 1660.38 66.63 1679.99 66.51
1699.61 68.05

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .085 928.25 .055 1039.37 .095

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 928.25
1039.37 1210.5 1269.44 1360.7 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 118774.7

INPUT
Description: 105
Station Elevation Data num= 399
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 57.23 6.55 57.41 13.1 57.63
19.65 57.78 26.2 57.96 32.75 58.09 39.3 58.11 45.85 58.36 52.41 58.82 58.96
59.08 65.51 58.92 72.06 58.26 78.61 57.33 85.16 56.44 91.71 55.68 98.26
55.06 104.81 54.57 111.36 54.08 117.91 53.58 124.46 53.64 131.01 53.69
137.56 53.66 144.11 53.61 150.66 53.64 157.22 53.68 163.77 53.71 170.32
53.76 176.87 53.79 183.42 53.86 189.97 53.99 196.52 54.27 203.07 54.4 209.62
54.2 216.17 53.56 222.72 52.99 229.27 52.57 235.82 52.35 242.37 52.19 248.92
51.92 255.48 52.24 262.03 51.97 268.58 51.73 275.13 51.66 281.68 51.5 288.23
51.34 294.78 51.18 301.33 50.91 307.88 50.34 314.43 49.95 320.98 49.59
327.53 49.24 334.08 48.94 340.63 48.54 347.18 48.35 353.74 48.2 360.29 47.89
366.84 47.51 373.39 47.27 379.94 47.22 386.49 47.51 393.04 47.76 399.59
47.75 406.14 47.43 412.69 46.94 419.24 46.6 425.79 46.37 432.34 46.08 438.89
45.87 445.44 45.99 452 46.23 458.55 46.44 465.1 46.45 471.65 46.09 478.2
45.5 484.75 45.09 491.3 44.5 497.85 43.67 504.4 43.05 510.95 42.67 517.5
42.71 524.05 42.71 530.6 42.58 537.15 41.8 543.7 41.22 550.26 41.52 556.81
41.64 563.36 41.83 569.91 41.56 576.46 41.78 583.01 41.69 589.56 41.75
596.11 41.16 602.66 41.44 609.21 41.58 615.76 41.6 622.31 41.7 628.86 41.8
635.41 41.59 641.96 41.61 648.52 41.8 655.07 41.73 661.62 41.7 668.17 41.87
674.72 42.09 681.27 42.28 687.82 42.35 694.37 42.24 700.92 42.05 707.47
41.97 714.02 42.04 720.57 42 727.12 41.93 733.67 41.82 740.22 41.59 746.77
41.19 753.33 40.69 759.88 40.19 766.43 39.75 772.98 39.41 779.53 39.25
786.08 39.25 792.63 39.26 799.18 39.22 805.73 39.23 812.28 39.31 818.83
39.45 825.38 39.7 831.93 40.06 838.48 40.43 845.03 40.85 851.59 41.22 858.14
41.33 864.69 41.54 871.24 41.64 877.79 41.65 884.34 42.21 890.89 42.69
897.44 43.26 903.99 43.43 910.54 43.66 917.09 42.37 923.64 41.16 930.19
40.23 936.74 39.42 943.29 38.83 949.85 40.81 956.4 43.26 962.95 43.45 969.5
43.1 976.05 42.29 982.6 41.85 989.15 41.64 995.7 41.54 1002.25 41.52 1008.8
41.4 1015.35 41.24 1021.9 41.27 1028.45 41.37 1035 41.55 1041.55 41.76
1048.11 41.9 1054.66 41.95 1061.21 41.9 1067.76 41.86 1074.31 41.9 1080.86
42.03 1087.41 42.15 1093.96 42.18 1100.51 42.36 1107.06 42.55 1113.61 42.63
1120.16 42.6 1126.71 42.8 1133.26 42.88 1139.81 42.76 1146.36 42.44 1152.92
42.18 1159.47 41.79 1166.02 41.69 1172.57 41.77 1179.12 41.99 1185.67 42.28
1192.22 42.49 1198.77 42.49 1205.32 42.45 1211.87 42.56 1218.42 42.88
1224.97 43 1231.52 42.91 1238.07 43.35 1244.62 43.4 1251.17 43.6 1257.73
43.63 1264.28 43.39 1270.83 43.47 1277.38 43.58 1283.93 43.62 1290.48 43.82
1297.03 43.91 1303.58 43.8 1310.13 43.93 1316.68 43.81 1323.23 43.74 1329.78
43.6 1336.33 43.87 1342.88 44.1 1349.43 44.3 1355.99 44.54 1362.54 45.11
1369.09 45.07 1375.64 44.78 1382.19 44.82 1388.74 44.94 1395.29 45 1401.84
44.99 1408.39 45.07 1414.94 45.31 1421.49 45.71 1428.04 45.98 1434.59 45.95
1441.14 46.04 1447.69 45.87 1454.24 45.65 1460.8 45.58 1467.35 45.57 1473.9
45.52 1480.45 45.45 1487 45.37 1493.55 45.55 1500.1 45.79 1506.65 45.8
1513.2 45.8 1519.75 46 1526.3 45.87 1532.85 45.69 1539.4 45.69 1545.95 46.1
1552.5 46.6 1559.05 46.76 1565.61 46.83 1572.16 46.81 1578.71 46.49 1585.26
46.26 1591.81 46.16 1598.36 46 1604.91 47.24 1611.46 47.37 1618.01 47.62
1624.56 46.81 1631.11 46.86 1637.66 47.18 1644.21 47.31 1650.76 47.28
1657.31 46.62 1663.86 45.55 1670.42 44.29 1676.97 42.93 1683.52 41.79
1690.07 40.63 1696.62 39.64 1703.17 38.55 1709.72 37.61 1716.27 36.8 1722.82
35.74 1729.37 35.32 1735.92 35.11 1742.47 34.93 1749.02 34.77 1755.57 34.69
1762.12 34.63 1768.67 34.52 1775.23 34.5 1781.78 34.66 1788.33 34.85 1794.88
35.13 1801.43 35.74 1807.98 36.59 1814.53 38.11 1821.08 39.19 1827.63 40.02
1839.64 39.01 1846.18 39.63 1852.73 39.65 1859.28 40.72 1865.82 42.06

1872.37 44.06 1878.92 46.22 1892.01 49.83 1898.55 52.08 1905.1 54.13 1911.65 55.46 1924.74 57.16 1937.83 57.13 1950.92 57.86 1957.47 58.9 1970.56 61.36 1977.11 62.34 1990.2 63.85 1996.75 64.39 2009.84 63.33 2016.39 62.54 2022.93 62.29 2029.48 62.31 2042.57 62.14 2062.21 62.48 2068.76 62.2 2075.3 61.25 2081.85 60.85 2088.4 59.51 2094.94 57.73 2108.03 54.73 2147.31 47.31 2153.86 45.84 2173.5 42.53 2206.23 37.91 2219.32 36.32 2225.87 35.64 2245.51 34.09 2252.05 33.79 2271.69 32.06 2297.87 28.89 2310.97 26.05 2317.51 24.87 2330.61 22.73 2350.24 20.91 2356.79 20.63 2363.34 20.55 2369.88 20.28 2376.43 19.82 2388.61 19.62 2389.52 19.61 2396.07 19.63 2402.61 19.44 2409.16 18.82 2415.71 16.83 2424 13.6 2431 11.8 2438 11 2445 9 2452 10.8 2459 11.6 2463 13.8 2487.09 18.83 2487.72 19.05 2494.26 20.32 2500.81 20.93 2507.35 21.3 2513.9 21.05 2520.45 21.07 2526.99 20.87 2533.54 20.39 2553.18 20.69 2566.27 21.37 2579.36 21.28 2585.91 20.46 2599 21.05 2605.55 21.16 2612.09 21 2625.19 21.21 2638.28 21.14 2644.83 21.36 2651.37 22.21 2657.92 23.43 2664.46 23.78 2671.01 24.58 2684.1 25.22 2690.65 25.87 2697.19 26.69 2723.38 29.52 2743.02 32.17 2756.11 33.44 2775.75 34.32 2795.39 34.75 2801.93 34.56 2808.48 34.93 2815.03 35.07 2834.67 36.41 2841.21 37.12 2860.85 38.32 2873.94 38.75 2887.04 38.52 2893.58 38.55 2906.67 38.38 2913.22 38.41 2919.77 38.07 2926.31 37.5 2932.86 37.18 2945.95 37.37 2952.5 37.31 2972.14 37.54 2985.23 37.28 2991.78 37.43 3017.96 37.27 3031.05 36.81 3035.78 36.77 3042.31 36.6 3048.84 36.7 3055.37 36.84 3061.9 37.03

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 2062.21 .055 2873.94 .095

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2062.21 2873.94 1513.57 1451.76 1410.95 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 117323

INPUT
Description: 104
Station Elevation Data num= 382
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 77.2 6.56 75.61 13.12 74.05 19.68 72.91 26.24 71.82 32.8 70.5 39.36 69.52 45.92 69.28 52.48 69.26 59.04 69.13 65.6 68.94 72.16 68.27 78.72 65.91 85.28 64.32 91.84 63.56 98.4 62.74 104.96 61.82 111.52 60.48 118.08 59.62 124.64 58.63 131.2 57.58 137.76 56.16 144.32 55.09 150.88 54.43 157.44 54.08 164 53.12 170.56 52.48 177.12 52.02 183.68 51.55 190.24 51.21 196.8 50.94 203.36 50.94 209.92 50.88 216.48 50.95 223.04 51.02 229.6 51.08 236.16 51.27 242.72 51.38 249.28 51.27 255.84 51.3 262.4 51.23 268.96 51.41 275.52 51.43 282.08 51.28 288.64 51.23 295.2 51.25 301.76 51.25 308.32 50.98 314.88 50.95 321.44 50.96 328 50.91 334.56 51.41 341.12 51.55 347.69 51.54 354.25 52.14 360.81 52.67 367.37 53.09 373.93 53.59 380.49 54.32 387.05 54.98 393.61 55.42 400.17 55.49 406.73 55.28 413.29 55.14 419.85 55.22 426.41 55.53 432.97 56.42 439.53 58.53 446.09 59.7 452.65 60.66 459.21 60.9 465.77 61.1 472.33 61.28 478.89 61.34 485.45 61.31 492.01 61.08 498.57 60.71 505.13 60.15 511.69 59.76 518.25 59.8 524.81 59.97 531.37 60.19 537.93 60.52 544.49 60.85 551.05 61.05 557.61 61.23 564.17 61.27 570.73 61.08 577.29 60.76 583.85 60.67 590.41 60.73 596.97 60.85

603.53 60.87 610.09 60.79 616.65 60.71 623.21 60.55 629.77 60.31 636.33
59.97 642.89 59.75 649.45 59.18 656.01 58.77 662.57 58.64 669.13 58.67
675.69 58.42 682.25 58.03 688.81 57.95 695.37 57.91 701.93 57.99 708.49
58.09 715.05 58.27 721.61 58.36 728.17 58.43 734.73 58.41 741.29 58.49
747.85 58.51 754.41 58.3 760.97 58 767.53 57.73 774.09 57.46 780.65 56.97
787.21 56.45 793.77 55.84 800.33 55.37 806.89 54.94 813.45 54.75 820.01
54.41 826.57 54.34 833.13 54.28 839.69 53.91 846.25 53.77 852.81 53.59
859.37 53.97 865.93 55.51 872.49 56.35 879.05 56.36 885.61 56.41 892.17
56.49 898.73 56.39 905.29 56.24 911.85 55.83 918.41 55.19 924.97 54.57
931.53 54.14 938.09 53.77 944.65 53.69 951.21 53.31 957.77 52.91 964.33
52.49 970.89 51.97 977.45 51.58 984.01 51.29 990.57 51.02 997.14 50.78
1003.7 50.66 1010.26 50.68 1016.82 50.86 1023.38 51.16 1029.94 51.24 1036.5
51.2 1043.06 51.16 1049.62 51.09 1056.18 50.86 1062.74 50.55 1069.3 50.06
1075.86 49.66 1082.42 49.24 1088.98 48.74 1095.54 47.87 1102.1 47.38 1108.66
47.26 1115.22 47.01 1121.78 47.57 1128.34 48.05 1134.9 47.28 1141.46 46.24
1148.02 45.62 1154.58 45.69 1161.14 45.76 1167.7 45.88 1174.26 45.92 1180.82
45.99 1187.38 46.2 1193.94 46.44 1200.5 46.76 1219.26 46.18 1225.81 45.67
1238.9 43.7 1245.44 43.09 1251.98 41.43 1258.53 40.24 1271.61 39.39 1278.16
38.44 1284.7 37.04 1291.25 36.13 1304.33 35.06 1317.42 34.55 1323.97 34.45
1330.51 34.87 1337.05 35.47 1343.6 35.74 1356.68 35.94 1369.77 36.87 1376.32
37.64 1389.4 38.83 1395.95 38.88 1402.49 39.14 1422.12 40.78 1428.67 41.5
1435.21 42.47 1448.3 42.79 1461.39 42.71 1467.93 42.92 1474.48 42.52 1494.11
40.39 1500.65 39.81 1507.19 38.92 1520.28 37.63 1526.83 37.11 1533.37 36.21
1539.91 35.77 1546.46 37.21 1553 38.32 1566.09 38.58 1572.63 38.55 1579.18
38.71 1592.27 39.31 1631.53 39.78 1651.16 39.64 1664.25 39.76 1670.79 39.57
1683.88 38.72 1690.42 38.47 1703.51 39.15 1710.06 38.91 1723.14 38.9 1729.69
38.67 1749.32 37.47 1788.58 36.13 1801.67 35.45 1808.21 34.85 1821.3 31.84
1834.39 29.64 1840.93 28.86 1854.02 27.75 1873.65 26.87 1886.74 26.62
1893.29 26.7 1899.83 26.6 1906.37 26.66 1912.92 26.99 1932.55 27.56 1958.72
27.5 1965.27 27.67 1971.81 27.65 1978.36 27.94 1984.9 27.88 1997.99 28.24
2004.53 28.54 2011.08 28.98 2037.25 28.88 2050.34 28.59 2056.88 28.89
2063.43 28.97 2069.97 29.26 2076.51 29.31 2083.06 29 2089.6 28.92 2102.69
28.12 2109.23 27.9 2122.32 27.74 2128.87 28.21 2135.41 28.25 2148.5 28.9
2155.04 29.06 2174.67 28.79 2187.76 28.92 2200.85 29.15 2207.39 29.07
2233.57 29.31 2240.11 29.05 2246.66 29.07 2253.2 28.95 2266.29 28.27 2272.83
28.13 2285.92 27.43 2305.55 26.87 2318.64 26.59 2325.18 26.68 2331.73 25.94
2331.92 25.87 2338.27 23.52 2342 20.6 2350 13.1 2360 10.4 2370 9.2 2380 8.1
2390 9 2400 10.2 2401 12.9 2409 18.4 2419 20 2424.92 20.27 2429.89 20.43
2449.52 19.54 2456.06 19.36 2462.6 19.89 2469.15 21.22 2475.69 21.45 2482.24
21.38 2495.32 21.49 2501.87 21.34 2508.41 21.02 2514.96 20.9 2534.59 19.59
2547.68 19.49 2560.76 18.61 2567.31 18.02 2573.85 17.71 2580.4 17.58 2586.94
17.61 2600.03 18.58 2606.57 19.2 2613.11 20.01 2619.66 20.62 2626.2 21.42
2632.75 21.98 2639.29 22.08 2652.38 21.78 2658.92 21.16 2665.47 20.33
2672.01 20.15 2678.55 20.23 2685.1 20.83 2704.73 25.29 2711.27 26.92 2717.82
28.14 2730.9 30.96 2737.45 32.2 2743.99 33.15 2757.08 33.5 2763.62 33.99
2770.17 33.92 2783.26 33.35 2809.43 33.98 2815.98 33.9 2822.52 34.12 2835.61
33.91 2842.15 33.61 2855.24 32.63 2861.78 32.55 2874.87 32.84 2887.96 32.57
2907.59 31.88 2914.13 31.74 2920.68 31.74 2933.77 32.16 2940.31 32.56
2946.85 32.8 2966.48 32.7 2973.03 32.85 2986.12 32.58 2992.66 32.7 3031.92
34.71 3051.56 35.15 3058.1 35.6 3064.64 35.91 3090.82 36.3 3097.36 36.49
3103.91 36.54 3110.45 36.44 3116.99 36.53 3123.54 36.41 3136.63 37.08 3162.8
37.75 3182.43 37.77 3188.98 38.08 3208.61 37.69 3215.15 37.82 3228.24 38.45
3240.24 38.93 3246.8 39.05 3253.36 39.09

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .095 2325.18 .055 2763.62 .095

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2325.18 2763.62 1270.29 1219.85 1204.17 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 116103.1

INPUT
Description: 103
Station Elevation Data num= 154
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 103.46 6.54 102.72 13.09 101.77 19.63 100.31 26.18 98.6 32.72 97.23 39.27 96.04 45.81 94.72 52.35 93.05 65.44 88.14 78.53 85.09 85.08 83.67 91.62 82.46 104.71 79.82 117.8 77.31 124.34 76.36 137.43 74.73 143.97 74.17 157.06 72.49 170.15 71.49 176.69 71.1 196.33 70.54 202.87 69.78 209.42 68.69 235.59 65.37 242.14 64.44 248.68 63.83 261.77 63.51 287.95 62.16 294.49 61.6 307.58 59.64 320.67 57.99 327.21 57.28 340.3 56.54 359.93 55.17 386.11 51.6 392.65 50.24 399.2 48.59 412.29 44.86 431.92 38.24 438.46 35.94 445.01 33.95 451.55 31.83 458.1 30.73 464.64 29.96 471.19 29.58 477.73 28.91 497.36 26.21 503.91 24.97 510.45 23.54 523.54 20.99 530.08 20.44 536.63 19.73 539.94 19.52 543.17 19.32 549.72 19.36 556.26 19.3 562.8 19.03 575 14.2 585 12.8 595 10.9 605 7.9 613 10.6 625 12.7 626 14.1 633 20.7 660.97 21.65 667.51 21.53 674.06 21.59 680.6 21.52 687.14 21.72 693.69 21.94 706.78 22.63 713.32 22.81 719.87 22.78 726.41 22.33 732.95 21.91 739.5 21.3 746.04 21.01 752.59 21.37 759.13 22.12 765.68 22.78 772.22 23.15 778.76 23.45 785.31 23.78 798.4 24.39 804.94 24.84 811.48 25.23 824.57 25.92 831.12 25.98 837.66 26.19 844.21 26.57 850.75 26.93 857.29 27.4 863.84 27.75 870.38 27.96 876.93 28.2 883.47 28.71 890.02 29.47 896.56 29.99 903.1 30.69 909.65 30.79 916.19 30.93 922.74 31.28 929.28 31.85 935.83 32.34 942.37 32.8 948.91 33.29 955.46 33.74 962 34.17 968.55 34.62 975.09 34.49 981.63 34.44 988.18 34.2 994.72 34.26 1001.27 34.66 1007.81 35.1 1020.9 35.5 1027.44 35.87 1033.99 36.01 1040.53 36.1 1047.08 36.32 1053.62 36.73 1060.17 37.39 1066.71 37.55 1073.25 38.12 1086.34 39.29 1092.89 39.78 1099.43 40.01 1105.98 40.27 1112.52 40.47 1119.06 40.35 1125.61 40.73 1132.15 41 1145.24 41.48 1151.79 41.69 1158.33 42.15 1164.87 42.51 1171.42 43.1 1177.96 43.65 1184.51 44.1 1197.6 45.23 1204.14 45.91 1210.68 46.35 1217.23 46.87 1223.77 47.69 1230.32 48.57 1236.86 49.13 1243.41 49.62 1256.49 50.41 1263.04 50.86 1269.58 51.18 1276.13 51.66 1282.67 51.91

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .095 562.8 .055 633 .095

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 562.8 633 1173.1 1178.45 1180.74 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 114924.7

INPUT
Description: 102 Approach Cherry St
Station Elevation Data num= 148 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 32.9 6.54 33.6 19.63 33.4 26.18 33.35 32.72 33.43 39.27 33.48 45.81 33.19
52.36 33 58.9 32.76 65.45 32.42 71.99 32.05 78.54 31.85 85.08 31.51 98.17
31.39 104.72 30.82 111.26 30.37 117.81 30.37 124.35 30.42 130.9 30.57 143.99
30.32 150.53 30.36 157.08 30.54 163.62 30.36 170.17 29.96 176.71 29.96
183.26 30.1 189.8 30.14 196.35 30.44 202.89 30.54 209.44 30.29 215.98 29.78
222.53 29.16 229.07 28.96 235.62 28.19 242.16 28.73 248.71 28.35 255.25
28.36 261.8 28.13 268.34 28.25 274.89 27.98 281.4 27.8 287.92 27.41 294.43
27.13 300.95 26.97 307.46 26.79 313.98 26.63 327.01 26.41 333.53 26.29
340.04 26.14 346.56 25.84 353.07 25.69 359.59 25.42 366.1 25.08 372.62 24.8
379.13 24.5 385.65 24.17 392.17 24.04 405.2 23.95 411.71 23.94 418.23 23.83
424.74 23.88 431.26 23.78 451.21 23.57 519.65 16.88 522.36 13.24 525.02
11.76 540.37 9.94 545.34 9.86 546.31 9.84 584.59 7.31 603.61 10.54 613.6
13.38 617.06 16.71 666.83 20.38 715.96 25.4 724.45 26.68 730.97 27.11 737.48
27.49 744 27.68 750.52 28.15 757.03 28.53 763.55 29.03 770.06 29.44 783.05
30.13 789.52 30.85 795.99 31.48 802.46 31.03 808.92 31.91 815.39 32.05
821.86 32.35 828.33 32.92 834.8 34.03 841.27 34.16 847.74 34.4 854.21 34.6
860.68 35.03 867.15 35.64 873.62 36.09 880.09 36.36 886.56 37.13 893.03
38.05 899.5 38.57 905.97 38.9 912.43 39.67 918.9 40.32 925.37 40.78 931.84
41.8 938.31 43.16 944.78 43.59 951.25 44.51 957.72 44.53 964.19 44.72 970.66
45.17 977.13 45.56 983.6 45.87 990.07 46.36 996.54 46.81 1003.01 47.08
1009.48 47.28 1015.95 47.64 1035.35 48.89 1041.82 49.35 1048.29 49.83
1054.76 50.45 1061.23 51.27 1067.7 52.14 1074.17 52.92 1080.64 53.63 1087.11
54.44 1093.58 55.28 1100.05 55.99 1106.52 56.85 1112.99 57.67 1119.46 58.6
1125.92 59.5 1132.39 60.3 1145.33 61.85 1151.8 62.95 1158.27 63.97 1164.74
64.66 1171.21 65.39 1177.68 66.17 1184.15 67.03 1190.62 67.74 1203.56 69.09
1210.03 69.47 1216.5 69.62 1222.97 69.66

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 451.21 .055 715.96 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 451.21
715.96 78.71 81.96 87.88 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 114842.7

INPUT
Description: 101.7 US Face Cherry St Station Elevation Data num= 164
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 33.71 5.324 33.71 10.657
33.53 15.982 33.02 21.306 32.97 37.288 33.67 42.612 33.76 53.269 32.82
63.927 32.87 74.576 32.48 79.908 31.98 85.233 31.83 95.89 31.95 101.214
31.53 127.845 31.04 133.178 31.07 138.502 30.94 143.827 31.01 159.808 30.85
170.466 30.32 175.79 30.2 186.447 30.2 191.772 30.02 207.753 28.93 213.078
28.91 218.411 28.69 223.735 28.22 229.059 27.92 239.717 27.69 245.041 27.26

250.366 26.31 255.698 25.92 261.023 25.37 266.347 25.35 282.329 24.8 287.653
24.49 292.986 23.85 303.635 23.71 308.968 23.54 319.617 24.16 330.274 24.11
335.598 24.42 340.931 24.46 346.256 24.11 351.58 23.62 362.237 23.6 372.886
23.22 378.219 23.42 383.543 23.78 388.868 23.78 404.85 23.44 410.182 23.67
415.507 23.45 420.831 23.94 436.813 23.92 447.47 23.5 452.794 23.79 456.374
24.49 458.119 24.83 463.452 25.49 475.002 23.84 483.177 22.29 490.926 20.7
498.97 18.11 506.523 15.04 512.888 11.11 517.721 9.87 522.922 10.51 526.109
9.34 528.812 8.96 533.727 9.12 535.775 9.16 538.724 9.2 541.664 9.47 544.613
9.48 548.766 10.59 553.657 13.74 560.39 16.97 567.14 20.49 573.259 22.36
579.001 23.53 580.934 25.18 600.766 27.35 606.042 27.87 611.325 28.36
616.609 29.03 621.892 29.46 627.167 30.03 632.451 30.46 637.734 30.61
643.018 31.01 648.293 31.45 653.618 31.7 658.934 31.88 664.259 32.41 674.899
32.61 680.224 33 685.54 33.18 690.865 33.32 696.189 33.51 701.505 33.53
706.83 33.87 712.146 34.28 717.471 34.76 722.787 35.2 728.112 35.59 733.436
35.74 738.752 35.82 744.077 36.21 749.393 36.68 754.718 37.04 760.034 37.3
765.358 37.72 770.683 38.78 775.999 39.25 781.324 39.53 786.64 39.64 791.964
40.49 797.281 40.97 802.605 41.54 807.93 41.63 813.246 42.11 818.57 42.98
829.211 43.94 834.528 44.64 839.852 45.19 845.177 45.58 850.493 46.11
855.817 46.7 861.134 47.17 866.458 47.52 871.783 47.92 877.099 48.43 882.423
48.85 887.74 49.23 893.064 49.63 898.38 50.12 903.705 50.75 914.346 52.62
919.67 53.4 924.986 54.09 930.311 54.88 935.627 55.75 940.952 56.64 946.276
57.58 956.917 59.4 962.233 60.34 967.558 61.26 972.874 62.12 978.199 63.1
983.523 63.89 988.839 64.39 994.164 64.98 999.48 65.731004.805 66.34 1010.121
66.741015.445 67.09 1020.77 67.411026.086 67.671031.411 67.77 1036.727
67.911042.052 68.181047.368 68.631052.692 68.33

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 463.452 .055 580.934 .09
 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
463.452 580.934 53.28 53.62 51.89 .5 .8 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 463.45 26.5 T
 6011052.692 29 T
Skew Angle = 35

BRIDGE

RIVER: Taunton River
REACH: Main Stem RS: 114815.5

INPUT
Description: 101.5 Childs Br/Cherry St

101.5 Cherry St/ Childs Br
Distance from Upstream XS = 12
Deck/Roadway Width = 35
Weir Coefficient = 2.6
Bridge Deck/Roadway Skew = 35
Upstream Deck/Roadway Coordinates
 num= 18
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 46.692 32.73 329.299 27.1 382.544 26.73

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 465.278 27.59 465.36 31.62 470.193 31.83
 470.275 27.4 25.18 484.938 28.51 25.18 498.864 28.63 25.3  581.598 30.02
26.71 594.704 30.27 26.71 595.524 30.31
 595.605 33.9 601.258 33.92 601.339 29.86
 695.46 34.52 798.673 41.75 953.493 56.54

Upstream Bridge Cross Section Data
Station Elevation Data num= 164
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  0 33.71 5.324 33.71 10.657
33.53 15.982 33.02 21.306 32.97  37.288 33.67 42.612 33.76 53.269 32.82
63.927 32.87 74.576 32.48  79.908 31.98 85.233 31.83 95.89 31.95 101.214
31.53 127.845 31.04  133.178 31.07 138.502 30.94 143.827 31.01 159.808 30.85
170.466 30.32  175.79 30.2 186.447 30.2 191.772 30.02 207.753 28.93 213.078
28.91  218.411 28.69 223.735 28.22 229.059 27.92 239.717 27.69 245.041 27.26
250.366 26.31 255.698 25.92 261.023 25.37 266.347 25.35 282.329 24.8  287.653
24.49 292.986 23.85 303.635 23.71 308.968 23.54 319.617 24.16  330.274 24.11
335.598 24.42 340.931 24.46 346.256 24.11 351.58 23.62  362.237 23.6 372.886
23.22 378.219 23.42 383.543 23.78 388.868 23.78  404.85 23.44 410.182 23.67
415.507 23.45 420.831 23.94 436.813 23.92  447.47 23.5 452.794 23.79 456.374
24.49 458.119 24.83 463.452 25.49  475.002 23.84 483.177 22.29 490.926 20.7
498.97 18.11 506.523 15.04  512.888 11.11 517.721 9.87 522.922 10.51 526.109
9.34 528.812 8.96  533.727 9.12 535.775 9.16 538.724 9.2 541.664 9.47 544.613
9.48  548.766 10.59 553.657 13.74 560.39 16.97 567.14 20.49 573.259 22.36
579.001 23.53 580.934 25.18 600.766 27.35 606.042 27.87 611.325 28.36
616.609 29.03 621.892 29.46 627.167 30.03 632.451 30.46 637.734 30.61
643.018 31.01 648.293 31.45 653.618 31.7 658.934 31.88 664.259 32.41  674.899
32.61 680.224 33 685.54 33.18 690.865 33.32 696.189 33.51  701.505 33.53
706.83 33.87 712.146 34.28 717.471 34.76 722.787 35.2  728.112 35.59 733.436
35.74 738.752 35.82 744.077 36.21 749.393 36.68  754.718 37.04 760.034 37.3
765.358 37.72 770.683 38.78 775.999 39.25  781.324 39.53 786.64 39.64 791.964
40.49 797.281 40.97 802.605 41.54  807.93 41.63 813.246 42.11 818.57 42.98
829.211 43.94 834.528 44.64  839.852 45.19 845.177 45.58 850.493 46.11
855.817 46.7 861.134 47.17  866.458 47.52 871.783 47.92 877.099 48.43 882.423
48.85 887.74 49.23  893.064 49.63 898.38 50.12 903.705 50.75 914.346 52.62
919.67 53.4  924.986 54.09 930.311 54.88 935.627 55.75 940.952 56.64 946.276
57.58  956.917 59.4 962.233 60.34 967.558 61.26 972.874 62.12 978.199 63.1
983.523 63.89 988.839 64.39 994.164 64.98 999.48 65.731004.805 66.34 1010.121
66.741015.445 67.09 1020.77 67.411026.086 67.671031.411 67.77 1036.727
67.911042.052 68.181047.368 68.631052.692 68.33

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 463.452 .055 580.934 .09

Bank Sta: Left Right Coeff Contr. Expan.
 463.452 580.934 .5 .8
Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 463.45 26.5 T
 6011052.692 29 T
Skew Angle = 35

Downstream Deck/Roadway Coordinates
 num= 18
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 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 97.479 32.73 380.087 27.1 433.331 26.73
 516.066 27.59 516.148 31.62 25.18 521.8 31.83 25.18
 521.882 27.4 25.18 535.725 28.51 25.18 549.651 28.63 25.3
 632.385 30.02 26.71 645.492 30.27 26.71 646.311 30.31   646.393 33.9 652.045
33.92 652.127 29.86
 746.247 34.52 850.28 41.75 1005.1 56.54

Downstream Bridge Cross Section Data
Station Elevation Data num= 162
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  0 32.85 10.649 32.58 15.973
32.71 26.631 32.28 47.929 32.44  53.253 32.3 79.884 32.71 85.208 32.54 95.857
31.87 101.19 32.02  106.514 31.71 111.839 31.01 117.163 30.52 122.488 30.25
133.137 30.03  138.469 31 143.794 31.75 149.118 31.59 159.767 30.56 165.092
30.31  170.416 29.81 175.741 30.2 207.696 30.4 213.02 30.54 223.678 30.08
229.002 29.69 239.651 29.27 244.976 28.77 250.3 28.48 260.957 28.75  266.282
28.64 271.606 28.1 276.931 27.36 282.255 26.89 287.58 26.64  292.904 26.13
298.237 25.98 303.561 25.68 314.21 25.53 319.535 25.7  324.859 25.27 330.184
25.14 335.508 25.16 346.165 26.03 351.49 25.81  362.139 25.73 367.463 26.01
372.788 25.7 383.445 25.63 388.77 25.89  394.094 26.68 399.419 26.73 404.743
26.57 410.059 26.81 420.692 26.85  426.008 26.97 431.324 26.92 436.641 27.14
441.957 26.94 463.222 27.05  468.539 27.32 473.855 27.18 489.804 27.69
505.753 27.66 509.357 27.49  513.51 27.4 520.055 23.84 528.23 22.29 535.979
20.7 544.023 18.11  551.576 15.04 557.941 11.11 562.774 9.87 567.975 10.51
571.162 9.34  573.865 8.96 578.78 9.12 580.828 9.16 583.777 9.2 586.718 9.47
589.667 9.48 593.82 10.59 598.71 13.74 605.443 16.97 612.193 20.49  618.312
22.36 624.055 23.53 625.988 25.18 638.529 28.73 643.976 29.82  649.293 30.21
654.609 30.38 659.925 30.77 665.242 30.71 670.558 30.79  675.874 31.16 681.19
31.14 686.564 31.29 691.938 31.65 697.311 32.05  702.685 32.36 708.059 32.52
713.432 32.82 718.806 33.06 724.18 33.5  729.553 33.61 734.927 33.86 740.3
34.01 745.674 34.63 751.048 35.15  761.795 35.8 767.169 36.42 772.542 36.72
777.916 37.04 783.29 37.79  788.663 38.36 794.037 38.49 799.411 38.93 804.784
39.16 810.158 39.33  815.531 39.64 820.905 39.92 826.279 40.32 831.652 40.94
837.026 41.5  842.4 41.73 847.773 41.94 869.268 43.68 874.641 44.14 880.015
44.73  885.389 45.59 890.762 46.42 901.51 48.15 906.883 48.77 912.257 49.3
917.63 50.13 923.004 50.78 928.378 51.27 933.751 52 939.125 53.06  944.499
53.72 949.872 53.97 955.246 54.34 960.62 54.81 965.993 55.39  971.367 55.8
976.741 56.12 982.114 56.66 987.488 56.99 992.862 57.44  998.235
58.121003.609 58.731008.982 59.21014.356 59.71 1019.73 60.28 1025.103
60.651030.477 611035.851 61.561041.224 62.181046.598 62.85 1051.971
63.311062.719 63.88
 Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 513.51 .055 638.529 .09

Bank Sta: Left Right Coeff Contr. Expan.
 513.51 638.529 .5 .8
Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 463 27 T
 6391062.719 30 T
Skew Angle = 35

Upstream Embankment side slope = 0 horiz. to 1.0 vertical Downstream
```

Embankment side slope = 0 horiz. to 1.0 vertical Maximum allowable submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Piers = 1

Pier Data
Pier Station Upstream= 534.906 Downstream= 577.502
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.6 9 1.6 21.7 4.3 21.8 4.3 25.9
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.6 9 1.6 21.7 4.3 21.8 4.3 25.9

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
 Energy
 W.S. Pro Method

 W.S.Pro Data
 Left Embankment
 El of the top of the embankment = 27.6
 El of the toe of the abutment = 11.1
 Right Embankment
 El of the top of the embankment = 27.6
 El of the toe of the abutment = 11.1
 Abutment Type = 3 Sloping abutments and sloping embankments Slope of abutments = 4
 Top with of embankment = 35
 Centroid station of bridge opening =
 Wing Wall Type = No wing walls present
 Width =
 Angle =
 Radius =   Guide Banks Type = No Guide Bank present
 Length =
 Offset =
 Angle =
 Optional Contraction and expansion coefficients
 At approach Section
 At Guide Bank
 At upstream outside
 At upstream inside (BU)
 At downstream inside (BD)
 Piers are Continuous for the width of the bridge
 Use Geometric mean as Friction Slope Method

Selected Low Flow Methods = W.S.Pro Method

High Flow Method

```
 Pressure and Weir flow
 Submerged Inlet Cd =
 Submerged Inlet + Outlet Cd = .8
 Max Low Cord =

Additional Bridge Parameters
 Add Friction component to Momentum
 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end  Criteria to check for pressure flow =
Upstream energy grade line

CROSS SECTION


RIVER: Taunton River
REACH: Main Stem RS: 114789.1

INPUT
Description: 101.3 DS FAce Cherry St
Station Elevation Data num= 162
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  0 32.85 10.649 32.58 15.973
32.71 26.631 32.28 47.929 32.44  53.253 32.3 79.884 32.71 85.208 32.54 95.857
31.87 101.19 32.02  106.514 31.71 111.839 31.01 117.163 30.52 122.488 30.25
133.137 30.03  138.469 31 143.794 31.75 149.118 31.59 159.767 30.56 165.092
30.31  170.416 29.81 175.741 30.2 207.696 30.4 213.02 30.54 223.678 30.08
229.002 29.69 239.651 29.27 244.976 28.77 250.3 28.48 260.957 28.75  266.282
28.64 271.606 28.1 276.931 27.36 282.255 26.89 287.58 26.64  292.904 26.13
298.237 25.98 303.561 25.68 314.21 25.53 319.535 25.7  324.859 25.27 330.184
25.14 335.508 25.16 346.165 26.03 351.49 25.81  362.139 25.73 367.463 26.01
372.788 25.7 383.445 25.63 388.77 25.89  394.094 26.68 399.419 26.73 404.743
26.57 410.059 26.81 420.692 26.85  426.008 26.97 431.324 26.92 436.641 27.14
441.957 26.94 463.222 27.05  468.539 27.32 473.855 27.18 489.804 27.69
505.753 27.66 509.357 27.49  513.51 27.4 520.055 23.84 528.23 22.29 535.979
20.7 544.023 18.11  551.576 15.04 557.941 11.11 562.774 9.87 567.975 10.51
571.162 9.34  573.865 8.96 578.78 9.12 580.828 9.16 583.777 9.2 586.718 9.47
589.667 9.48 593.82 10.59 598.71 13.74 605.443 16.97 612.193 20.49  618.312
22.36 624.055 23.53 625.988 25.18 638.529 28.73 643.976 29.82  649.293 30.21
654.609 30.38 659.925 30.77 665.242 30.71 670.558 30.79  675.874 31.16 681.19
31.14 686.564 31.29 691.938 31.65 697.311 32.05  702.685 32.36 708.059 32.52
713.432 32.82 718.806 33.06 724.18 33.5  729.553 33.61 734.927 33.86 740.3
34.01 745.674 34.63 751.048 35.15  761.795 35.8 767.169 36.42 772.542 36.72
777.916 37.04 783.29 37.79  788.663 38.36 794.037 38.49 799.411 38.93 804.784
39.16 810.158 39.33  815.531 39.64 820.905 39.92 826.279 40.32 831.652 40.94
837.026 41.5  842.4 41.73 847.773 41.94 869.268 43.68 874.641 44.14 880.015
44.73  885.389 45.59 890.762 46.42 901.51 48.15 906.883 48.77 912.257 49.3
917.63 50.13 923.004 50.78 928.378 51.27 933.751 52 939.125 53.06  944.499
53.72 949.872 53.97 955.246 54.34 960.62 54.81 965.993 55.39  971.367 55.8
976.741 56.12 982.114 56.66 987.488 56.99 992.862 57.44  998.235
58.121003.609 58.731008.982 59.21014.356 59.71 1019.73 60.28 1025.103
60.651030.477 611035.851 61.561041.224 62.181046.598 62.85 1051.971
63.311062.719 63.88
 Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
```

0 .09 513.51 .055 638.529 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 513.51 638.529 44.49 41.34 37.16 .5 .8 Ineffective Flow num= 2
Sta L Sta R Elev Permanent
0 463 27 T
6391062.719 30 T
Skew Angle = 35

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 114747.8

INPUT
Description: 101 Exit Cherry St Br
Station Elevation Data num= 200
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 33.54 6.53 33.38 13.06 33.16 19.59 33.06 32.65 32.79 39.18 32.75 45.71 32.77 52.24 32.72 58.77 32.58 65.3 32.36 71.83 32.17 78.36 32.08 84.89 31.94 91.42 31.74 104.48 32.01 111.01 31.81 117.54 31.65 124.06 31.07 130.59 30.55 137.12 31.04 143.65 31.32 156.71 31.25 163.24 31.48 169.77 31.52 176.3 31.53 182.83 31.49 189.36 31.6 195.89 31.83 202.42 31.79 208.95 31.86 215.48 31.97 222.01 32.03 228.54 32.05 235.07 31.86 241.6 31.75 248.13 31.96 261.19 32.11 267.72 32.61 274.25 32.75 280.78 32.77 293.84 32.38 300.37 32.25 306.9 31.91 313.43 31.44 319.96 30.7 326.49 30.6 333.02 30.46 339.55 31.22 346.08 31.76 352.61 31.38 359.14 30.77 365.67 30.52 372.19 30.44 378.72 30.34 385.25 30.28 391.78 30.43 398.31 30.35 404.84 30.16 411.37 30.36 417.9 30.27 424.43 29.96 430.96 29.86 437.49 29.46 444.02 29.18 450.55 28.86 457.08 28.57 463.61 28.17 470.14 27.92 476.67 27.82 483.2 27.48 489.73 27.41 496.26 27.21 502.79 26.92 509.32 26.52 515.85 25.75 522.38 24.73 528.91 24.22 535.44 24.42 541.97 24.6 548.5 24.61 555.03 24.56 561.56 24.39 568.09 24.24 574.62 23.87 581.15 23.59 587.68 23.98 594.21 24.13 600.74 24.2 607.27 24.04 613.8 23.74 620.33 23.49 626.85 23.48 633.38 23.51 639.91 23.34 646.44 23.28 652.97 23.39 659.5 23.41 666.03 23.21 672.56 23.37 679.09 23.59 685.62 23.5 692.15 23.47 698.68 23.51 705.21 23.66 711.74 23.72 718.27 23.7 724.8 23.62 731.33 23.34 737.86 21.74 744.39 21.04 750.92 20.97 757.45 20.98 763.98 21.18 770.51 20.86 776.95 20.86 825.49 22.31 861.79 12.44 870.96 6.32 895.86 -2.38 905.29 -.71 910.67 -.82 925.72 1.6 933.96 4.12 941.6 9.8 941.72 8.7 945.17 13.66 959.2 13.93 976.83 25.38 983.19 26.49 989.64 27.11 996.08 27.57 1002.53 28.14 1008.97 28.94 1015.5 29.47 1022.03 29.75 1028.56 30.21 1035.08 30.84 1041.61 31.45 1048.14 31.9 1054.66 32.39 1061.19 32.46 1067.72 32.68 1074.24 33.11 1080.77 33.34 1087.3 33.68 1093.82 33.94 1100.35 34.18 1106.88 34.21 1113.4 34.42 1119.93 34.99 1126.46 35.58 1139.51 36.63 1146.04 37 1159.09 37.67 1165.62 38.03 1172.15 38.51 1178.67 38.97 1185.2 39.22 1191.73 39.51 1198.25 40.09 1211.31 41.3 1217.83 41.97 1224.36 42.52 1230.89 43.16 1237.41 44 1243.94 44.55 1250.47 44.78 1256.99 45.13 1263.52 45.61 1270.05 46.37 1276.58 47.28 1283.1 48.12 1289.63 49.03 1296.16 50.22 1302.68 51.43 1309.21 51.88 1315.74 52.23 1322.26 53.01 1328.79 54.04 1335.32 54.97 1341.84 55.79 1348.37 56.57 1354.9 57.14 1361.42 57.47 1367.95 57.77 1374.48 57.96 1381.01 58.52 1387.53 59.13 1394.06 59.18 1400.59 59.55 1407.11 60.15 1413.64 60.65 1426.69 61.74 1433.22 62.04 1439.75 62.17 1446.27 62.44 1452.8 62.81 1459.33 63.29 1472.38 63.89 1478.91 64.21

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 825.49 .055 976.83 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 825.49 976.83 1281.74 1292.52 1315.33 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 705.21 27 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 113455.2

INPUT
Description: 100
Station Elevation Data num= 300
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 66.1 6.53 65.77 19.59 65.58 32.65 65.02 39.18 64.87 58.77 63.09 65.3 62.83 78.36 62.6 84.89 62.37 91.42 61.96 104.48 61.87 117.54 62.03 124.07 62.25 137.13 62.44 143.66 62.73 150.19 62.7 156.72 62.48 163.25 62.66 169.78 63.37 176.31 63.88 182.84 64.17 189.37 64.2 202.43 63.22 208.96 62.95 222.02 61.89 228.55 61.56 241.61 61.37 248.14 61.47 261.2 61.39 267.74 61.61 280.8 61.64 287.33 61.38 293.86 61.35 300.39 61.46 326.51 60.81 333.04 60.44 339.57 60.24 352.63 60.32 359.16 60.25 365.69 59.98 378.75 59.02 411.4 55.06 417.93 54.49 430.99 54.29 437.52 53.82 444.05 53.71 450.58 53.4 457.11 52.8 463.64 53.23 470.17 53.23 476.7 53.67 483.23 54.38 489.76 54.95 502.82 55.52 515.88 55.92 535.47 55.41 548.53 54.53 555.06 54.28 568.12 53.37 574.65 52.61 581.18 51.1 587.71 49.97 600.77 46.72 607.3 45.36 626.89 40.82 639.95 38.5 659.54 36.99 666.07 36.39 685.66 33.7 692.19 33.46 718.31 33.14 750.96 31.53 764.02 31.26 770.55 30.8 777.08 30.58 790.14 29.74 803.2 29.9 816.26 29.61 822.8 29.65 829.33 29.88 888.1 29.17 894.63 28.96 933.81 29.47 940.34 29.68 946.87 29.72 966.46 30.42 972.99 30.54 986.05 30.33 992.6 30.03 999.15 29.26 1012.25 28.11 1018.81 27.19 1031.91 25.6 1038.46 25.2 1045.01 25.52 1051.56 26.63 1058.12 27.11 1071.22 28.32 1084.32 28.81 1103.98 28.12 1117.08 27.32 1123.63 26.8 1130.18 26.43 1149.84 26.21 1169.49 25.42 1182.6 24.15 1189.15 23.73 1202.25 21.99 1208.8 21.32 1228.46 20.53 1235.01 20.17 1241.56 19.49 1248.11 19.15 1254.66 19.17 1267.77 20.11 1280.87 19.65 1287.42 19 1298.64 18.47 1300.52 18.4 1307.07 18.08 1313.63 16.93 1320.18 15.26 1332 11.9 1350 8.1 1362 9.8 1380 17 1393 21.1 1405.35 19.22 1411.9 19.08 1418.45 19.15 1425 19.1 1431.55 19.83 1438.11 20.92 1444.66 21.73 1451.21 21.97 1457.76 22.04 1464.31 21.76 1470.86 21.24 1477.42 20.75 1483.97 20.57 1490.52 20.21 1497.07 19.82 1503.62 19.61 1510.17 19.21 1516.72 18.79 1523.28 18.35 1529.83 18.1 1536.38 18.03 1542.93 18.05 1549.48 18.01 1556.03 17.95 1562.59 17.98 1569.14 18.27 1575.69 18.98 1582.24 19.67 1588.79 20.66 1595.34 21.7 1608.45 22.09 1615 21.9 1621.55 21.88 1628.1 21.69 1634.65 21.54 1641.2 21.41 1647.76 21.17 1654.31 21.03 1660.86 20.62 1667.41 20.27 1673.96 19.48 1680.51 19.28 1687.06 19.3 1693.62 19.72 1700.17 19.85 1706.72 20.3 1713.27 20.89 1719.82 21.36 1726.37 21.49 1732.93 21.86 1739.48 22.32 1746.03 23.06 1752.58 23.9 1772.23 26.59 1778.79 27.3 1785.34 27.77 1791.89 28.42 1798.44 29.27 1804.99 29.78 1811.51 30.49 1818.03 31.4 1824.55 32.51 1831.08 33.39 1844.12 34.97 1850.64 35.64 1863.68 35.99 1870.2 36.1 1876.72 36.41 1883.24 36.7 1889.76 37.02 1896.28 37.28 1902.8 37.44 1909.32 37.43 1915.84 37.25 1922.36 37.15

1928.88 37.13 1935.4 37.07 1941.92 37.03 1948.44 36.96 1954.96 36.99 1961.49 37.04 1968.01 36.94 1974.53 36.69 1981.05 36.57 1987.57 36.24 1994.09 36.06 2007.13 35.97 2013.65 35.89 2020.17 35.74 2026.69 35.37 2033.21 35.17 2039.73 35.18 2046.25 35.26 2052.77 35.37 2059.29 35.34 2065.81 35.33 2072.33 35.4 2078.85 35.61 2085.38 35.64 2091.9 35.76 2098.42 35.82 2104.94 35.79 2111.46 36.08 2117.98 36.23 2131.02 36.56 2137.54 36.71 2144.06 36.83 2150.58 36.85 2157.1 36.96 2163.62 37.28 2170.14 37.35 2176.66 37.36 2183.18 37.34 2189.7 37.08 2196.23 36.71 2202.75 36.54 2209.27 36.22 2215.79 35.79 2222.31 35.61 2228.83 35.56 2235.35 35.69 2241.87 35.92 2248.39 35.98 2254.91 35.85 2261.43 35.77 2267.95 35.55 2274.47 35.55 2280.99 35.43 2294.03 35.02 2300.55 34.89 2307.07 34.78 2313.6 34.78 2320.12 34.82 2326.64 34.91 2333.16 35.29 2339.68 35.37 2346.2 35.31 2352.72 35.05 2359.24 34.76 2365.76 34.44 2372.28 34.06 2378.8 33.6 2385.32 33.24 2391.84 33.22 2398.36 33.27 2404.88 33.14 2411.4 33.12 2417.92 33.3 2424.45 33.38 2430.97 33.48 2437.49 33.51 2444.01 33.31 2457.05 33.46 2463.57 33.51 2470.09 33.49 2476.61 33.36 2483.13 33.3 2489.65 33.3 2496.17 33.38 2502.69 33.34 2509.21 33.27 2515.73 33.31 2522.25 33.19 2528.77 33.25 2535.29 33.41 2541.82 33.32 2554.86 33.24 2561.38 33.24 2567.9 33.32 2574.42 33.42 2580.94 33.5 2587.46 33.41 2593.98 33.39

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .095 1267.77 .055 1393 .095

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1267.77 1393 1492.91 1457.13 1422.7 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 1084.32 28.81 F

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 111998.1

INPUT
Description: 99 US Winnetuxet Riv Trib
Station Elevation Data num= 405
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 41.4 6.55 40.99 19.66 39.95 26.21 39.55 39.32 39.36 45.87 39.08 52.42 38.57 58.98 38.4 65.53 37.9 72.08 38.16 78.63 38 85.19 38.73 104.85 38.39 111.4 38.52 117.95 38.42 124.5 38.17 131.06 37.43 137.61 37.2 144.16 37.62 150.72 37.32 157.27 36.85 163.82 37.21 176.93 36.36 183.48 36.07 190.03 36.23 196.59 35.98 203.14 35.87 216.24 36.74 222.8 36.66 229.35 36.44 235.9 35.73 242.46 35.39 262.11 35.63 268.67 35.81 288.33 35.9 301.43 35.34 307.98 34.89 314.54 34.75 321.09 35.01 327.64 35.5 340.75 35.22 347.3 34.61 353.85 34.66 366.96 35.15 373.51 34.72 380.06 34.57 393.17 34.55 399.72 35.06 406.28 35.39 412.83 35.4 419.38 35.61 432.49 35.22 439.04 35.43 445.59 35.29 452.15 35.38 458.7 35.31 478.36 35.84 491.46 35.9 498.02 36.03 511.12 35.68 517.67 36.09 537.33 36.44 543.89 36.27 556.99 36.7 570.1 36.74 589.76 37.11 596.31 37.09 602.86 36.87 615.97 36.05 622.52 35.74 642.18 35.19 648.73 35.28 668.39 35.1 681.5 35.2 733.92 33.98 773.23 32.79 779.79 32.51 832.21 31.48 845.32 31.37 858.42 31.08 884.63 31.01 891.19 30.86 930.5 30.85 956.71 31.11 989.48 30.93 1009.14 31.26 1028.8 31.31 1068.11 30.73 1087.77 30.74 1100.88 30.54 1113.98 30.83 1146.75

30.91 1179.51 30.55 1225.38 29.77 1238.49 29.29 1245.04 29.19 1251.59 29.23
1264.7 28.77 1284.36 29.13 1317.12 30.3 1336.78 30.75 1343.33 30.68 1382.65
31 1454.73 30.57 1461.29 30.64 1474.39 30.55 1480.94 30.66 1487.5 30.5
1500.6 30.63 1533.37 30.41 1566.13 30.69 1572.68 30.52 1631.66 30.37 1644.77
30.51 1684.08 30.63 1690.64 30.46 1710.3 30.73 1723.4 30.72 1762.72 31.31
1802.04 31.49 1828.25 30.81 1880.67 30.23 1893.78 30.18 1919.99 29.69
1933.09 29.6 1952.75 29.11 1972.41 28.9 2070.7 29.12 2090.36 29.01 2103.47
28.77 2116.57 28.88 2129.68 28.61 2169 28.42 2175.55 28.29 2182.1 28.37
2221.42 27.93 2227.97 27.71 2267.29 27.41 2280.4 26.75 2293.5 26.35 2300.06
26.26 2326.27 25.06 2352.48 24.97 2378.69 24.47 2418.01 22.57 2483.54 20.35
2503.2 19.39 2516.3 19.53 2522.85 19.48 2529.41 19.69 2555.62 18.99 2562.17
19.13 2575.28 19.88 2581.83 19.65 2588.38 19.11 2588.86 19.09 2594.94 18.78
2601.49 19.07 2608.04 19.24 2614.6 18.58 2621.15 18.44 2627.7 18.18 2634.25
17.69 2640.81 17.32 2663 17.2 2673 11.7 2690 8.7 2700 10.5 2705 19.1 2711
22.6 2719.44 22.11 2725.99 21.88 2739.1 21.19 2745.65 21.4 2752.21 21.81
2765.31 22.07 2771.86 22.17 2778.42 22.09 2784.97 21.8 2791.52 21.78 2798.08
21.84 2804.63 21.86 2811.18 21.75 2824.29 21.42 2830.84 21.28 2837.39 21.25
2843.95 21.24 2850.5 21.14 2857.05 20.95 2863.61 20.78 2870.16 20.86 2876.71
20.8 2883.26 20.78 2889.82 20.61 2902.92 20.63 2909.48 20.66 2916.03 20.81
2922.58 21.08 2929.13 21.63 2935.69 22.94 2942.24 26.19 2948.79 29.42
2955.35 30.16 2961.9 30.35 2968.45 30.33 2975.01 29.68 2981.56 29.56 2988.11
29.55 2994.66 29.49 3007.77 29.5 3014.32 29.36 3020.88 29.25 3027.43 29.26
3047.09 29.48 3053.64 29.19 3060.19 29.06 3066.75 29.31 3073.3 29.48 3079.85
29.32 3086.4 29.3 3092.96 29.24 3099.51 29.2 3106.06 29.32 3112.62 29.39
3119.17 29.43 3125.72 29.4 3132.27 29.41 3138.83 29.5 3145.38 29.57 3151.93
29.54 3158.49 29.62 3171.59 29.53 3178.15 29.59 3184.7 29.48 3191.25 29.3
3197.8 29.17 3204.36 29.17 3210.91 29.32 3217.46 29.39 3223.99 29.38 3243.59
29.3 3256.65 29.18 3263.18 29.13 3269.72 29.11 3276.25 29.14 3282.78 29.19
3315.44 29.33 3361.16 29.61 3374.22 29.71 3380.75 29.74 3387.28 29.73
3400.35 29.66 3406.88 29.6 3413.41 29.6 3426.47 29.79 3433.01 29.86 3439.54
30.24 3446.07 30.73 3452.6 30.88 3459.13 30.87 3465.66 30.92 3472.2 30.82
3478.73 30.14 3485.26 29.16 3491.79 27.68 3498.32 27.39 3504.85 27.42
3517.92 27.45 3524.45 27.45 3537.51 27.39 3570.17 27.28 3583.23 27.3 3589.76
27.35 3596.3 27.71 3602.83 28.25 3609.36 28.94 3615.89 30.27 3622.42 30.98
3628.95 31.05 3635.49 31.14 3642.02 31.16 3655.08 30.79 3661.61 30.96
3668.14 31.23 3674.67 31.26 3687.74 31.14 3694.27 31.15 3707.33 31.08
3713.86 30.85 3720.4 29.03 3726.93 28.83 3733.46 28.96 3739.99 29.05 3746.52
29.12 3753.05 29.11 3759.59 29.14 3766.12 29.22 3772.65 29.2 3779.18 29.13
3785.71 29.14 3792.24 29.18 3805.31 29.35 3811.84 29.37 3818.37 29.41 3824.9
29.38 3831.43 29.37 3837.96 29.46 3844.5 29.49 3851.03 29.41 3857.56 29.27
3864.09 29.24 3870.62 29.26 3877.15 29.3 3883.69 29.18 3890.22 29.24 3896.75
29.26 3903.28 29.24 3909.81 29.15 3916.34 29.15 3922.88 29.18 3929.41 29.25
3935.94 29.24 3942.47 29.2 3949 29.19 3962.07 29.46 3968.6 30 3975.13 30.57
3981.66 30.73 3994.72 31.02 4001.25 30.99 4007.79 31.01 4014.32 31.1 4020.85
31.06 4027.38 31.22 4033.91 31.28 4040.44 31.07 4046.98 31.06 4053.51 30.89
4060.04 30.97 4066.57 31.2 4073.1 31.06 4079.63 31.04 4086.17 30.8 4092.7
31.11 4099.23 31.15 4105.76 31.23 4112.29 31.24 4118.82 31.33 4125.35 31.37
4131.89 31.55 4138.42 31.6 4144.95 31.57 4151.48 31.52 4158.01 31.5 4164.54
31.58 4171.07 31.61 4177.61 31.61 4184.14 31.56 4190.67 31.55 4197.2 31.49
4203.73 31.54 4210.26 31.44 4216.79 31.56 4223.33 31.65 4229.86 31.51
4236.39 31.58 4242.92 31.6 4249.45 31.56 4255.98 31.63 4262.52 31.94 4269.05
31.81 4275.58 31.73 4282.11 31.69 4288.64 31.72 4301.7 31.7 4308.24 31.82
4314.77 31.82 4321.3 31.86 4327.83 31.97 4334.36 31.94 4340.89 31.8 4347.42
31.81 4353.96 31.79 4360.49 31.79 4367.02 31.75 4373.55 31.92 4380.08 32.02

4386.61 32.05 4393.14 32.11 4399.68 32.25 4406.21 32.26 4412.74 32.33
4419.27 32.16 4425.8 32.26 4432.33 32.33 4438.86 32.28 4445.4 32.27 4451.93
32.22 4464.99 32.29 4471.52 32.23 4478.05 32.07 4484.58 32.11 4491.12 32.36
4497.65 32.48 4504.18 32.37

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .082 2418.01 .055 2711 .095

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2418.01
2711 2057.48 2006.07 1966.74 .3 .5 Blocked Obstructions num= 1
 Sta L Sta R Elev
 2970.3 3664.9931.11488

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 109992

INPUT
Description: 98 DS Winnetuxet Riv Trib
Station Elevation Data num= 421
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 29.41 6.54 28.94 13.08 28.66
19.62 28.91 26.16 28.9 32.69 28.7 39.23 28.93 52.31 28.97 71.93 29.49 78.47
29.23 91.54 28.98 130.78 29.06 156.93 29.81 176.55 29.64 183.09 29.68
196.16 29.56 202.7 29.75 215.78 29.54 228.86 29.74 235.4 29.55 241.94 29.55
255.01 29.81 268.09 29.78 281.17 30.16 294.25 30.62 300.79 30.6 307.32 30.88
320.4 31.64 326.94 31.92 333.48 31.98 340.02 31.86 372.71 32.08 379.25 32.03
405.41 31.62 418.48 31.95 425.02 32.3 431.56 32.01 438.1 32.13 451.18 31.82
464.26 31.86 470.79 32.17 477.33 32.32 496.95 31.93 503.49 32.11 510.03
32.49 516.57 33.13 536.18 34.05 542.72 34.21 549.26 34.09 555.8 34.17
568.88 34.61 581.95 34.88 588.49 34.78 601.57 34.23 608.11 34.06 621.19
33.06 640.8 32.19 660.42 31.9 666.96 31.68 680.04 31.7 693.11 31.84 699.65
31.77 712.73 32.17 725.81 32.28 732.35 32.45 745.42 32.36 758.5 32.1 771.58
32.36 784.66 32.19 797.73 32.39 804.27 32.39 817.35 32.04 830.43 31.99
843.51 32.11 850.05 32.03 856.58 32.13 863.12 31.97 876.2 32.31 882.74 31.87
889.28 31.78 895.82 32.16 902.36 32.35 908.89 32.09 921.97 32.09 935.05
32.34 941.59 32.6 961.21 31.9 967.74 32.12 974.28 32.17 980.82 32.59 993.9
32.3 1006.98 32.37 1013.52 32.2 1026.59 32.2 1039.67 32.35 1046.21 32.11
1065.83 32.39 1078.9 32.16 1091.98 32.31 1105.06 32.11 1118.14 32.27 1124.68
32.53 1131.21 32.36 1137.75 32.35 1150.83 32.73 1170.45 32.8 1190.06 32.51
1196.6 32.56 1203.14 32.83 1222.76 32.76 1242.38 32.39 1248.91 32.11 1268.53
32.18 1281.61 32.4 1288.15 32.37 1294.69 32.56 1301.22 32.45 1307.76 32.12
1314.3 32 1320.84 32.3 1327.38 32.74 1333.92 32.94 1340.46 32.63 1353.54
32.61 1360.07 32.3 1366.61 33.07 1373.15 33.3 1386.23 34.83 1399.31 35.22
1412.39 35.06 1418.92 34.75 1438.54 34.28 1464.7 34.29 1484.31 34.79 1490.85
34.84 1503.93 34.59 1517.03 34.03 1530.14 34.15 1543.26 33.43 1556.38 33.28
1562.94 33.03 1569.5 32.97 1576.06 32.71 1589.17 32.4 1608.85 31.33 1615.41
30.81 1621.97 30.13 1628.53 29.18 1641.65 27.74 1654.76 25.98 1661.32 25.66
1700.68 23.09 1713.79 22.55 1720.35 22.04 1740.03 21.57 1753.15 21.74
1759.71 22.15 1785.94 22.89 1792.5 23.26 1805.62 24.32 1812.18 24.22 1818.74
24.31 1831.85 24.21 1844.97 23.66 1858.09 22.78 1884.33 22.44 1897.44 21.69
1910.56 20.39 1917.12 19.98 1923.68 20.02 1936.8 19.42 1943.36 19.44 1956.47

19.76 1963.03 19.47 1969.59 19.62 1982.71 20.31 1995.83 20.59 2008.94 20.99
2015.5 21.04 2022.06 20.91 2048.3 21.16 2054.86 20.69 2067.97 20.68 2074.53
20.81 2087.65 20.82 2100.77 21.08 2106.99 20.98 2108 21.1 2118 13 2135 8.5
2150 8.5 2165 8.3 2182 13 2196.87 18.41 2199.15 18.47 2212.27 17.96 2225.39
16.71 2231.95 17.11 2238.51 17.18 2251.62 16.35 2258.18 16.46 2284.42 16.32
2290.98 16.88 2304.1 19.26 2310.65 19.9 2330.33 20.19 2336.89 20.08 2343.45
19.75 2350.01 19.13 2356.57 18.31 2363.13 17.68 2369.69 17.26 2376.24 17.54
2382.8 17.96 2389.36 18.55 2395.92 18.26 2415.6 16.93 2428.72 16.14 2435.27
15.54 2441.83 15.15 2448.39 15.33 2454.95 15.35 2461.51 15.61 2474.63 16.76
2481.19 17.2 2487.75 16.73 2494.3 15.38 2500.86 14.85 2507.42 14.99 2513.98
15.49 2520.54 15.82 2533.66 15.62 2540.22 15.27 2553.33 15.13 2559.89 15.27
2566.45 15.25 2573.01 15.49 2579.57 16.55 2586.13 18.32 2592.69 19.75
2605.81 19.7 2625.48 20.14 2632.04 20.45 2664.84 20.23 2684.51 19.91 2697.63
19.39 2704.19 18.88 2717.31 18.13 2723.87 17.89 2736.98 17.93 2750.1 17.85
2763.22 18.21 2776.34 18.66 2789.46 20.02 2809.13 21.59 2822.25 22.45
2835.37 23.46 2848.49 23.86 2887.84 23.43 2920.63 23.73 2927.19 23.7 2940.31
23.06 2966.55 21.35 2979.66 20.91 2992.78 20.81 2999.34 20.62 3005.9 20.68
3012.46 20.6 3025.58 21.11 3045.25 20.88 3051.81 21.01 3058.37 21.39 3064.93
21.23 3071.49 20.79 3078.05 20.61 3091.17 21.1 3097.73 20.9 3110.84 20.95
3123.96 20.81 3130.52 21.17 3137.08 21.17 3143.64 21.35 3150.2 21.17 3163.31
21.26 3169.87 21.45 3176.43 22.05 3189.55 22.89 3196.11 23.41 3202.67 23.67
3209.23 23.54 3215.79 22.61 3222.34 22.22 3228.9 22.46 3235.46 24.1 3242.02
24.92 3255.14 27.09 3261.7 27.93 3274.82 28.31 3281.38 28.31 3301.05 27.84
3320.73 27.58 3340.41 26.91 3346.96 26.46 3353.52 26.16 3366.64 25.86
3379.76 26.26 3386.32 26.86 3399.44 27.59 3419.11 28.37 3438.79 28.06
3445.35 27.76 3458.47 27.74 3465.03 27.63 3478.14 27.7 3484.7 27.59 3517.5
28.81 3543.73 29.22 3550.29 29.23 3563.41 28.65 3576.53 27.32 3602.76 26.28
3622.44 25.84 3648.67 26.05 3661.79 26.05 3674.91 25.88 3688.03 25.99
3694.59 25.91 3701.15 26.01 3714.26 27.47 3720.82 27.92 3727.38 28.15
3733.94 28.56 3747.06 28.94 3753.62 28.93 3766.74 29.29 3773.29 29.01
3779.85 28.4 3786.41 28.22 3799.53 27.66 3812.65 27.44 3819.21 27.16 3825.77
27.52 3838.88 27.53 3845.44 27.68 3871.68 27.68 3884.8 27.44 3897.91 27.43
3904.47 27.73 3917.59 27.49 3924.15 27.59 3943.83 27.56 3950.39 27.78 3963.5
27.69 3970.06 27.82 3976.62 28.43 3989.74 29.08 4009.42 29.62 4022.53 29.39
4029.09 29.59 4035.65 29.59 4048.77 29.03 4055.33 28.9 4061.89 29.17 4075
29.16 4088.12 29.34 4094.68 29.03 4107.8 28.77 4120.92 28.82 4127.48 29.21
4134.03 29.28 4140.59 29.17 4160.27 29.48 4173.39 29.9 4199.62 30.01 4206.18
30.15 4212.74 30.15 4219.3 29.76 4232.42 29.5 4238.97 29.57 4252.09 30.41
4258.65 30.54 4278.33 30.63 4284.89 30.87 4291.44 30.96 4304.56 31.4 4317.68
31.62 4330.8 32.08 4337.36 31.98 4343.91 31.67 4357.03 31.54 4363.59 31.34
4370.15 31.29 4383.27 30.75 4389.83 30.18 4396.38 30.05 4409.5 30.47 4429.18
30.71 4442.3 30.44 4475.09 30.58 4501.32 30 4521 30.02 4527.56 29.83 4534.12
29.97 4560.35 30.07 4573.47 30.42 4580.03 30.24 4606.27 30.99 4612.82 31.26
4625.94 31.54 4639.06 32 4665.29 31.31 4684.97 31.43 4698.09 31.9 4704.65
31.95 4724.32 31.33 4730.88 31.39 4750.56 30.98 4776.79 31.1 4803.03 30.89
4816.15 30.87 4822.7 31

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val 0 .09 2106.99 .055 2330.33 .095

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2106.99
2330.33 808.34 781.04 811.8 .3 .5 Ineffective Flow num= 3
 Sta L Sta R Elev Permanent
 1620 1812 23.6 F

```
 2940 3300 23.6 F
 3320 5000 27.6 F

CROSS SECTION


RIVER: Taunton River
REACH: Main Stem RS: 109211

INPUT
Description: 97
Station Elevation Data num= 427
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  0 30.43 13.12 29.3 19.68 29.09
26.23 29.04 45.91 29.18  52.47 29.12 78.7 29.73 85.26 29.71 91.82 30 98.38
30.52  111.5 31.06 124.62 31.07 137.73 31.67 144.29 31.79 150.85 31.65
157.41 31.79 163.97 31.55 170.53 31.52 183.64 31.03 190.2 30.89  196.76 30.56
203.32 30.03 216.44 29.8 249.23 29.85 255.79 29.94  268.91 29.87 275.47 30.02
295.14 29.86 314.82 30.16 321.38 29.93  334.5 29.9 341.05 30 373.85 29.8
400.08 30.1 413.2 29.95  419.76 30.66 426.32 30.48 432.88 30.89 439.44 30.98
459.11 30.91  465.67 31.06 472.23 31.02 485.35 31.2 491.91 31.04 498.47 31.06
505.02 30.86 518.14 31.14 531.26 31.07 544.38 30.72 557.49 30.99  564.05 31.3
570.61 32.37 577.17 33.84 583.73 34.98 590.29 35.36  616.52 35.66 629.64
35.45 636.2 35.24 649.32 34.43 655.88 33.69  675.55 34.39 682.11 35.11 695.23
35.23 708.35 36.27 714.9 37.52  721.46 37.55 728.02 36.46 734.58 35.51 741.14
34.98 747.7 34.62  760.82 34.05 767.37 33.93 773.93 33.99 780.49 33.85 787.05
33.28  793.61 32.88 806.73 33.18 832.96 34.02 846.08 34.68 852.64 35.17
865.76 35.12 872.31 36.15 878.87 35.42 885.43 34.48 891.99 32.83  898.55
32.17 905.11 32.14 911.67 32.81 918.23 33.66 924.78 35.3  937.9 35.47 944.46
35.79 951.02 35.87 957.58 35.65 964.14 35.27  977.25 34.07 983.81 34 996.93
34.09 1003.49 34.24 1010.05 34.18  1036.28 33.02 1049.4 33.05 1055.96 33.43
1062.52 34.21 1075.64 33.86  1082.19 33.94 1088.75 31.7 1095.31 32.07 1101.87
33.11 1108.43 32.65  1114.99 31.34 1121.55 29.12 1128.1 28.38 1134.66 28.05
1908.59 28.05  1915.15 28.43 1928.27 29.95 1934.82 30.18 1941.38 30.03 1954.5
29.22  1967.62 28.87 1980.74 28.82 1987.29 28.68 1993.85 28.68 2006.97 28.37
2013.53 28.37 2020.09 28.08 2026.65 27.18 2033.21 26.6 2039.76 26.18  2052.88
26.1 2059.44 25.87 2072.56 24.96 2085.67 24.24 2098.79 23.91  2105.35 23.86
2118.47 23.23 2138.14 22.61 2151.26 22.12 2157.82 22  2184.06 20.61 2190.61
20.05 2203.73 19.47 2210.29 18.97 2216.85 18.71  2236.53 18.44 2243.08 18.12
2249.64 18.22 2262.76 17.84 2269.32 17.86  2275.88 17.63 2302.11 17.78
2308.67 17.94 2321.79 17.94 2334.91 18.18  2341.46 18.46 2348.02 18.97
2361.14 19.02 2393.93 19.75 2407.05 19.75  2433.29 20.34 2439.84 20.19 2446.4
19.86 2452.96 18.93 2459.52 18.57  2472.64 18.35 2485.76 17.9 2492.31 17.89
2518.55 18.39 2525.11 18.36  2531.67 17.88 2538.23 17.22 2544.78 16.81 2557.9
15.71 2564.46 15.47  2584.14 15.35 2597.25 15.38 2603.81 15.66 2610.37 16.57
2616.93 17.28  2630.05 17.94 2636.61 18.15 2643.16 18.63 2656.28 18.96
2662.84 18.97  2675.88 19.78 2682.35 19.87 2688.83 19.69 2695.31 19.7 2701.79
19.51  2714.74 19.73 2721.22 19.63 2747.13 19.99 2760.08 20.35 2766.56 19.34
2773.04 16.63 2779.4 14.42 2779.52 14.38 2798 13 2815 8.5  2830 8.5 2845 8.3
2862 13 2870.2 14.38 2876.68 14.39  2883.15 14.79 2889.63 16.64 2892.35 16.57
2896.11 16.47 2902.59 16.43  2909.06 16.76 2915.54 17.96 2922.02 19.61 2928.5
20.43 2941.45 22.43  2947.93 22.85 2954.41 22.62 2967.36 22.78 2980.32 23.18
2993.27 23.27  2999.75 23.49 3019.18 23.49 3025.66 23.33 3038.61 22.64
3051.57 22.35  3064.52 22.72 3071 22.71 3077.48 22.88 3090.43 23.61 3096.91
23.71  3103.39 24.1 3122.82 24.73 3148.97 25.74 3168.58 25.88 3181.65 25.71
```

3194.73 25.86 3214.34 26.39 3227.41 26.34 3253.56 26.61 3273.17 26.45
3279.71 26.68 3286.24 26.77 3292.78 26.69 3299.32 26.33 3325.46 25.56
3338.54 25.66 3351.61 25.53 3364.69 25.2 3371.22 25.26 3377.76 25.15 3384.3
24.74 3397.37 25.03 3416.98 26.06 3423.52 26.16 3436.59 26.59 3443.13 27.03
3449.67 27.33 3469.28 27.05 3475.81 27.13 3495.42 26.44 3515.03 25.29
3521.57 24.7 3534.65 24.69 3541.18 24.44 3547.72 24.37 3554.26 23.97 3560.79
23.71 3567.33 23.98 3573.87 24.08 3586.94 23.75 3593.48 23.97 3600.01 24.05
3613.09 25.28 3619.63 25.7 3632.7 27.17 3639.24 27.46 3652.31 28.28 3658.85
28.31 3684.99 27.37 3704.6 26.91 3724.22 25.93 3730.75 25.86 3737.29 25.94
3743.83 26.21 3756.9 26.38 3763.44 26.14 3769.97 26.09 3789.58 25.13 3802.66
24.66 3809.2 24.28 3815.73 24.24 3822.27 24.54 3828.81 25.12 3835.34 25.87
3841.88 26.49 3854.95 28.12 3861.49 29.06 3868.03 29.73 3881.1 30.55 3887.64
30.82 3900.71 30.73 3913.79 31 3926.86 30.4 3933.4 29.5 3939.93 28.41
3946.47 27.77 3953.01 27.29 3959.54 27.01 3972.62 27.05 3979.16 26.89
3992.23 25.87 3998.77 25.26 4011.84 24.99 4024.91 25.18 4031.45 25.12
4044.52 25.24 4051.06 25.07 4070.67 25.08 4077.21 25.21 4090.28 24.96
4103.36 25.58 4109.89 25.75 4122.97 26.56 4129.5 27.21 4136.04 27.39 4162.19
28.36 4168.72 28.31 4175.26 28.01 4181.8 27.9 4188.33 27.64 4201.41 27.69
4214.48 28.08 4221.02 28.17 4227.55 28.02 4247.16 26.36 4253.7 25.95 4266.77
25.66 4273.31 25.37 4286.39 25.21 4292.92 24.94 4306 24.95 4319.07 25.2
4325.61 25.2 4332.14 25.43 4345.22 25.54 4351.75 25.73 4358.29 26.19 4364.83
26.34 4371.36 26.9 4390.97 27.93 4404.05 28.5 4423.66 30.52 4430.19 30.98
4443.27 31.17 4462.88 30.99 4482.49 30.33 4489.02 29.91 4495.56 29.78 4502.1
29.15 4508.64 29.08 4515.17 29.18 4521.71 28.99 4528.25 28.95 4541.32 29.89
4547.86 29.81 4560.95 30.41 4567.5 30.46 4587.17 31.15 4593.73 31.26 4606.84
31.01 4613.4 30.78 4633.06 30.6 4639.62 30.69 4659.29 30.33 4672.4 30.78
4685.51 30.79 4692.07 30.45 4698.62 30.31 4718.29 30.73 4724.85 30.64
4737.96 30.18 4744.51 30.14 4764.18 29.53 4770.74 29.22 4777.29 29.24
4783.85 29.4 4790.4 29.37 4803.52 29.03 4816.63 29.27 4862.52 29.18 4869.08
29.27 4888.74 28.97 4895.3 29.15 4908.41 29.1 4921.52 29.4 4934.63 29.29
4947.75 29.59 4960.86 29.5 4967.41 29.11 5006.75 29.57 5019.86 30.08 5032.97
30.36 5046.08 30.28 5052.64 30.59 5059.2 30.68 5065.75 30.52 5072.31 30.52
5078.86 30.28 5085.42 30.19 5118.2 30.85 5137.87 30.96 5144.42 31.09 5150.98
31.04 5157.53 31.46 5170.65 31.81 5216.54 31.67 5223.09 31.37 5229.65 30.7
5236.21 31.16 5242.76 31.3 5255.87 31.03 5275.54 31.49 5288.65 31.2 5295.21
31.22 5301.76 31.47 5327.99 31.89 5341.1 31.96

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .095 2760.08 .055 2999.75 .095

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2760.08
2999.75 1561.57 1566.81 1580.91 .3 .5 Ineffective Flow num= 2
Sta L Sta R Elev Permanent
3292 3660 26.5 F
3660 4400 27.5 F

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 107644.2

INPUT

Description: 96
Station Elevation Data num= 189
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 38.96 150.66 38.83 157.21
40.75 163.76 46.07 170.31 45.71 176.86 43.74 189.96 38.52 196.51 37.83
222.71 38.16 327.52 36.31 340.62 35.67 419.22 33.81 432.32 33.92 445.42
32.27 451.98 31.91 458.53 32.13 471.63 30.52 478.18 30.25 484.73 30.81
497.83 32.89 517.48 34.25 530.58 34.38 543.68 33.57 556.78 34.26 589.53
34.48 602.63 34.25 615.73 36.27 635.39 36.05 648.49 36.83 661.59 36.78
674.69 35.37 681.24 34.21 700.89 32.37 707.44 32.35 727.09 33.62 753.29
33.48 766.39 34.68 812.24 34.74 818.79 34.39 825.34 33.62 831.9 34.07 838.45
33.66 845 34.18 851.55 33.52 858.1 31.56 864.65 30.24 871.2 29.95 877.75
30.63 890.85 33.08 903.95 33.41 917.05 34.14 969.45 33.79 989.1 32.96
1021.86 31.92 1041.51 30.47 1048.06 30.4 1054.61 30.83 1074.26 32.82 1093.91
33.45 1231.47 32.21 1238.02 30.93 1244.57 29.21 1251.12 28.83 1270.77 30.67
1303.52 30.34 1323.17 29.09 1355.93 29 1369.03 29.56 1375.58 29.11 1382.13
28.1 1388.68 27.93 1401.78 28.98 1421.43 28.03 1447.63 25.98 1526.24 24.75
1558.99 25.64 1565.54 25.1 1572.09 23.11 1578.64 19.98 1606.31 17.4 1615.81
11.2 1632.01 6.34 1643.89 5.4 1661.42 4.74 1682.29 10.77 1690 17.52 1722.75
18.75 1755.49 17.06 1768.58 16.1 1775.12 15.29 1807.84 15.36 1814.38 15.11
1820.93 15.39 1827.47 16.24 1840.56 16.99 1860.19 16.52 1866.73 17.03
1873.27 17.1 1899.45 15.53 1905.99 15.4 1919.08 16.35 1945.25 20.02 1951.79
21.4 1958.34 22.11 1984.51 20.63 2233.16 19.08 2265.87 19.55 2344.39 21.51
2547.24 21.96 2612.67 21.9 2625.76 22.52 2632.3 22.46 2651.93 20.72 2684.65
20.23 2704.28 20.85 2717.37 22.01 2743.54 22.29 2776.26 23.36 2789.34 23.3
2808.97 22.22 2867.86 23.21 2913.67 23.3 2920.21 22.86 2926.75 23.19 2939.84
22.48 2966.01 22.61 2985.64 22.01 3005.27 22.41 3018.36 21.96 3051.08 21.96
3090.34 21.94 3123.05 21.39 3129.6 20.82 3142.68 21.55 3168.86 21.09 3201.57
21.66 3208.12 21.36 3240.83 22.68 3299.72 23.29 3312.81 22.37 3319.35 22.5
3378.24 25.42 3410.96 26.28 3450.22 25.05 3456.77 24.56 3489.48 24.9 3496.03
25.34 3535.29 24.79 3548.37 24.23 3581.09 24.18 3587.63 24.53 3607.26 27.01
3613.81 27.34 3659.61 27.46 3679.27 28.22 3705.5 30.12 3797.31 31.61 3830.1
30.94 3836.66 30.51 3876.01 30.89 3882.57 30.69 3889.12 31.16 3974.38 31.85
4007.17 31.74 4020.29 31.95 4033.4 31.31 4138.33 32.05 4177.68 30.52 4223.58
30.73 4236.7 31.16 4243.26 30.78 4262.93 31.05 4276.05 30.06 4348.18 29.33
4387.53 29.78 4400.65 29.25 4413.76 29.75 4420.32 29.41 4426.88 29.82
4479.34 29.77 4492.46 29.34 4518.69 29.68 4551.48 30.42 4636.73 29.64
4676.08 29.9 4689.19 31.04 4735.1 31.5 4767.89 30.87 4833.47 30.88

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .095 1558.99 .055 1722.75 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1558.99
1722.75 65.61 65.84 69.27 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent 2470 3160 28.4 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 107578.3

INPUT
Description: 95 Auburn St constriction

Station Elevation Data num= 387
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 39.5 111.55 39.2 118.11
39.04 124.67 39.29 137.79 45.34 144.35 46.35 150.92 45.23 157.48 42.9 164.04
38.9 170.6 38.21 183.72 38.41 203.41 38.09 216.53 38.12 229.65 37.85 236.22
37.57 242.78 37.65 249.34 37.54 255.9 37.12 275.59 36.44 282.15 36.12
295.27 36.26 301.83 36.19 308.39 36.34 314.95 36.16 341.2 35.83 360.89 35.07
380.57 34.56 387.13 34.28 393.69 34.36 400.26 34.14 406.82 34.22 413.38
33.84 419.94 32.15 426.5 31.54 433.06 32.46 439.62 34.35 446.19 35.21 452.75
35.56 459.31 35.62 465.87 35.97 478.99 36.27 492.12 36.27 498.68 36.52
505.24 36.31 511.8 35.89 524.92 34.35 538.05 33.21 557.73 33.23 570.86 32.79
590.54 32.86 603.66 32.62 629.91 32.56 636.47 32.8 643.03 32.6 649.59 32.83
682.4 33.22 695.52 33.74 708.65 34.66 715.21 35.64 728.33 35.86 734.89 35.85
748.02 35.67 761.14 35.79 774.26 35.34 780.82 34.87 787.39 34.15 800.51
33.11 813.63 32.69 826.76 33.13 833.32 33.11 846.44 33.51 859.56 33.38
866.12 32.69 872.69 31.63 879.25 31.22 885.81 31.25 892.37 31.71 912.06
34.17 925.18 35.18 931.74 35.45 957.99 35.44 964.55 35.31 977.67 34.73
990.79 33.41 997.36 32.88 1003.92 32.53 1017.04 32.42 1043.29 32.67 1049.85
32.62 1056.41 32.95 1089.22 33.08 1108.9 33.44 1122.03 33.44 1128.59 33.07
1148.27 32.25 1174.52 31.82 1181.08 31.61 1187.64 31 1194.2 29.88 1200.76
29.64 1207.33 32.39 1213.89 33.11 1220.45 32.83 1227.01 32.08 1233.57 31.57
1240.13 31.2 1246.69 31.01 1266.38 30.84 1286.06 30.43 1292.63 29.98 1299.19
29.16 1305.75 27.64 1312.31 26.81 1318.87 26.53 1331.99 26.42 1351.68 25.85
1358.24 26 1364.8 26.71 1371.36 27.72 1377.93 28.26 1384.49 29.05 1391.05
29.1 1397.61 28.78 1404.17 28.61 1410.73 28.28 1423.86 27.09 1430.42 26.63
1436.98 26.92 1443.54 27.35 1456.66 28.71 1469.79 27.25 1482.91 24.34
1489.47 23.36 1496.03 23.45 1502.6 22.51 1509.16 21.27 1515.72 20.32 1522.28
20.5 1535.4 20 1541.96 20.19 1554.26 21.15 1575 21.91 1575.07 17.99 1593.13
10.66 1597.06 10.7 1602.01 8.81 1610.59 8.17 1614.02 8.4 1617.69 10.55
1618.84 11.16 1622.71 11.59 1625.58 11.88 1628.69 11.77 1630.73 11.6 1630.96
16.68 1637.19 17.87 1638.51 21.56 1656.08 23.92 1666.63 24.1 1673.2 24.07
1679.76 24.2 1692.88 24.17 1699.44 24.4 1706 24.33 1712.57 24.43 1725.69
24.19 1758.5 24.22 1765.05 23.95 1771.59 24.16 1778.14 24.2 1784.69 24.08
1797.79 24.2 1804.34 23.78 1810.89 23.75 1817.44 23.39 1823.99 22.79 1830.54
22.41 1837.08 22.7 1843.63 23.27 1850.18 21.7 1856.73 21.04 1863.28 21.12
1869.83 20.83 1876.38 20.72 1882.93 20.14 1889.48 19.7 1896.03 18.83 1902.58
19.08 1909.12 19.69 1915.67 20.9 1922.22 21.46 1941.87 21.45 1954.97 21.1
1968.07 20.93 1981.16 20.9 2013.91 21.2 2040.11 20.9 2072.85 19.73 2079.4
19.37 2092.5 19.12 2112.15 19.22 2131.79 19.75 2157.99 19.75 2184.18 19.45
2203.83 19.51 2223.48 20.01 2262.77 20.95 2275.87 21.15 2321.71 22.23
2347.91 22.32 2374.11 22.63 2387.2 23 2393.75 22.92 2400.3 23.1 2433.05
24.91 2439.6 25.39 2446.15 25.73 2459.24 26.84 2472.34 27.38 2491.99 27.61
2524.73 27.06 2544.38 26.64 2577.13 26.52 2609.87 25.57 2622.97 25.58
2642.62 25.79 2649.16 25.42 2688.46 25.25 2695.01 25.1 2708.11 25.09 2753.95
24.7 2773.6 24.71 2806.34 25.43 2852.18 25.97 2891.48 26.14 2898.03 26.06
2904.58 25.84 2911.12 25.96 2943.87 25.68 2956.97 25.32 2963.52 25.02
3035.56 23.78 3055.2 23.71 3074.85 23.36 3087.95 22.89 3107.59 22.35 3120.69
22.24 3133.79 22.43 3140.34 22.39 3153.44 21.89 3173.08 21.72 3179.63 21.82
3199.28 21.51 3205.83 21.52 3212.38 21.67 3225.48 21.45 3232.03 21.87
3238.58 21.45 3258.22 21.83 3271.32 21.62 3277.87 20.97 3290.97 22.36
3297.52 22.69 3304.07 22.88 3323.71 22.98 3330.26 23.22 3356.46 23.16
3363.01 23.27 3369.56 23.54 3382.65 23.73 3389.2 24.1 3402.3 24.39 3415.4
25.02 3428.5 25.27 3448.14 24.87 3454.69 24.6 3467.79 24.83 3480.89 24.7
3493.99 24.19 3500.54 24.24 3513.63 24.58 3533.28 24.22 3559.48 24.56
3572.57 25 3585.67 25.79 3598.77 26.01 3618.42 25.79 3624.97 25.62 3631.52

25.67 3638.06 25.94 3657.71 25.8 3664.26 26.03 3670.81 27.05 3677.36 27.65
3683.91 27.86 3690.46 28.3 3697.01 29.18 3703.55 29.77 3716.65 30.56 3723.2
30.83 3729.75 30.87 3749.33 31.55 3762.39 31.11 3768.92 31.23 3781.97 30.72
3788.5 30.31 3808.08 28.37 3814.61 28.14 3821.14 28.24 3827.67 28.04 3866.83
28.27 3873.36 28.17 3892.94 28.81 3906 29.52 3932.11 30.01 3945.17 30.03
3951.69 29.86 3964.75 30.05 3971.28 30.31 3977.8 30.75 3984.33 30.78 3990.86
30.35 3997.39 30.21 4010.44 30.73 4016.97 30.79 4043.08 31.33 4049.61 31.35
4062.67 31.09 4095.3 30.99 4101.83 30.88 4108.36 31.15 4127.94 31.55 4141
31.3 4154.05 31.3 4173.64 31.6 4199.75 31.14 4225.86 30.48 4238.92 30.4
4251.97 30.02 4278.08 29.49 4291.14 29.37 4304.19 29.56 4323.78 29.35
4343.36 29.57 4356.42 29.16 4376 29.46 4382.53 29.37 4402.11 29.39 4408.64
29.57 4421.7 29.55 4428.22 29.76 4434.75 29.79 4447.81 29.52 4454.33 29.88
4460.86 29.69 4473.92 29.55 4480.45 29.23 4493.5 29.68 4545.72 29.68 4558.78
29.48 4565.31 29.48 4578.36 29.9 4591.42 29.86 4604.48 29.6 4611 29.57
4624.06 29.95 4630.59 29.54 4650.17 29.99 4656.7 29.85 4682.81 29.99 4689.34
29.92 4695.86 30.13 4708.92 29.78 4721.98 30.23 4741.56 29.91 4761.14 30.41
4774.2 30.16 4793.78 30.5 4800.31 30.77 4806.84 30.82 4813.37 30.65 4819.89
30.79 4826.42 31.29 4832.95 31.55 4852.53 31.7 4865.59 31.58 4891.7 31.88

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .095 1575 .055 1656.08 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1575
1656.08 123.92 126.38 129.99 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 2386 3076 28.4 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 107452

INPUT
Description: 94
Station Elevation Data num= 169
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 35.05 13.11 34.38 19.66 34.7
26.21 34.13 39.32 34.82 45.87 34.57 58.98 34.96 72.08 34.54 85.19 33.57
117.95 33.39 131.06 34.1 144.17 33.62 157.27 33.77 176.93 33.19 196.59 33.81
216.25 34.06 235.91 34.79 262.12 33.28 281.78 32.91 314.55 34.87 353.86
32.63 386.63 32.36 458.71 36.88 484.92 36.8 517.69 36.62 530.8 35.92 550.45
35.77 576.67 36.63 602.88 35.28 622.54 33.69 635.64 32.13 661.86 32.21
694.62 33.85 720.83 34.53 733.94 34.4 747.05 34.88 779.81 34.32 799.47 34.27
806.02 34.63 812.58 35.44 819.13 35.44 838.79 34.37 858.45 34.97 878.11
33.82 884.66 33.76 891.21 33.12 897.77 31.95 904.32 31.3 910.87 31.25 969.85
33.54 1002.61 33.43 1022.27 32.74 1035.38 33.11 1041.93 32.98 1074.7 33.91
1100.91 32.54 1107.46 32.46 1120.57 33.1 1153.33 33.08 1186.1 29.69 1231.97
28.81 1258.18 26.57 1264.74 25.42 1290.95 18.3 1297.5 16.96 1310.61 15.77
1323.71 16.2 1336.82 17.07 1369.58 16.92 1376.14 17.21 1382.69 18.35 1415.45
19.26 1450.9 18.89 1451 9.69 1453.4 1.01 1479 -6.95 1484.8 -6.48 1541.4 -
1.66 1560.1 8.21 1567.3 15.97 1612.05 18.81 1625.15 18.62 1638.26 17.18
1644.81 15.79 1651.36 15.36 1716.83 15.82 1729.92 15.63 1736.46 16.24
1749.55 20.69 1756.09 21.16 1769.18 20.29 1782.27 17.58 1788.81 16.93

1834.61 16.73 1873.87 17.13 1880.41 17.44 1893.5 19.08 1900.04 19.53 1939.3 18.87 1985.11 18.69 2024.37 19.17 2057.08 21.44 2063.63 22.34 2076.71 22.75 2083.25 23.47 2089.8 24.78 2096.34 25.06 2109.43 24.6 2214.12 25.9 2318.81 28.08 2436.59 32.74 2495.48 33.17 2920.79 28.6 3110.54 22.4 3156.34 22.54 3182.52 21.73 3208.69 22.25 3221.78 21.87 3300.3 23.36 3333.01 23.83 3346.1 23.52 3372.27 25.1 3398.44 25.44 3404.99 25.97 3450.79 25.33 3476.96 25.73 3529.31 29.13 3548.94 29.3 3562.02 27.93 3575.11 27.55 3588.2 28.31 3601.28 28.36 3627.46 27.7 3673.26 28.86 3679.8 29.41 3686.35 29.43 3705.96 28.21 3745.17 28.83 3784.37 30.7 3810.51 30.91 3836.65 30.66 3843.18 30.33 3862.79 30.97 3888.93 30.85 3928.13 31.51 4000.01 30.81 4019.62 32.14 4052.29 31.77 4058.83 32.05 4098.03 30.59 4117.64 31.15 4150.31 29.7 4294.07 30.39 4346.34 29.62 4359.41 30.11 4379.02 29.53 4398.62 29.97 4411.69 29.76 4463.96 30.36 4477.03 29.95 4516.24 30.36 4633.86 29.95 4640.39 30.31 4660 29.81 4692.67 30.31 4699.2 29.98 4771.08 30.71 4784.15 31.13 4810.29 31.3

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 1450.9 .055 1612.05 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1450.9 1612.05 2317.83 2224.61 2187.27 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 2287 2977 28.4 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 105227.3

INPUT
Description: 93
Station Elevation Data num= 438
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 29.15 6.56 29.27 13.11 29.24 19.67 29.35 45.9 29.19 52.45 28.89 59.01 28.76 72.12 28.81 91.79 28.43 98.35 28.56 104.9 28.5 118.02 28.15 137.69 28.15 163.91 27.72 170.47 27.9 183.58 27.63 196.69 27.84 209.81 27.54 216.36 27.6 229.48 28.07 236.03 28.18 242.59 28.03 255.7 27.15 262.26 26.93 275.37 27.69 281.93 27.81 288.49 28.23 295.04 28.43 314.71 28.34 327.82 28.44 334.38 28 347.49 28.03 354.05 28.16 367.16 27.79 386.83 27.57 419.61 27.01 426.17 26.74 445.84 25.47 452.4 25.32 458.95 25.53 472.07 26.38 478.62 26.51 511.41 26.5 531.08 25.84 537.63 25.53 550.74 25.14 557.3 25.5 563.86 26.34 570.41 26.8 576.97 27.67 583.53 28.04 590.08 27.76 596.64 27.86 603.2 28.31 609.75 28.94 622.87 29.39 629.42 29.9 635.98 30.15 649.09 29.53 655.65 29.45 668.76 29.9 694.99 30.15 701.54 29.98 727.77 30.41 734.33 30.36 740.88 30.13 754 30.17 767.11 30.5 780.22 30.21 793.33 30.13 799.89 29.92 806.45 29.95 813 30.2 819.56 30.27 839.23 30.89 852.34 30.74 858.9 30.84 865.46 31.08 872.01 31.05 878.57 31.31 885.13 31.79 891.68 32.04 898.24 32.1 904.79 31.82 917.91 30.61 924.46 29.89 931.02 29.39 937.58 29.36 944.13 29.12 970.36 28.82 983.47 28.39 990.03 27.98 996.59 27.75 1003.14 27.79 1022.81 27.26 1029.37 27.37 1042.48 28.5 1062.15 29.4 1068.71 29.5 1081.82 28.83 1121.16 24.79 1127.71 23.94 1140.83 21.73 1147.38 21.4 1153.94 21.35 1160.5 21.54 1180.17 21.49 1186.72 21.81 1193.28 22.59 1199.84 23.11 1212.95 23.57 1226.06 24.6 1232.62 24.95 1252.29 26.33 1271.96 27.2 1311.3 27.19 1317.85 26.98 1324.41 26.96 1330.97 26.8 1337.52 27.13

1344.08 27.27 1383.42 26.43 1396.53 25.6 1409.64 24.36 1416.2 24.01 1422.76
23.92 1435.87 24.5 1442.42 24.64 1475.06 27.3 1481.57 27.71 1507.6 28.75
1514.11 28.84 1520.62 28.69 1527.13 27.25 1533.64 24.09 1540.15 20.78
1546.65 18.51 1553.16 17.28 1563.47 15.03 1585 8.6 1600 8.2 1615 9.2 1637
12.8 1640.85 16.07 1644.28 16.12 1650.79 15.95 1657.3 15.64 1663.8 15.97
1670.31 16.59 1676.82 16.95 1683.33 16.77 1689.84 16.38 1696.35 16.17
1702.85 16.11 1728.89 16.42 1761.43 17.33 1774.45 17.43 1800.48 17.02
1846.04 16.43 1852.55 16.54 1878.58 16.36 1891.6 16.41 1911.12 16.14 1930.65
16.16 1995.73 17.67 2060.81 18.22 2067.32 18.17 2080.34 18.39 2093.36 18.7
2099.86 18.63 2106.37 18.73 2145.42 18.42 2158.44 18.18 2164.95 17.93
2177.96 17.84 2197.49 17.3 2204 16.99 2249.78 16.36 2302.19 17.57 2321.85
17.29 2348.06 17.2 2374.27 16.99 2380.82 17.15 2393.92 17.21 2400.48 17.35
2413.58 17.88 2446.34 18.35 2452.89 18.3 2459.45 17.92 2466 17.27 2472.55
16.43 2479.1 17.13 2485.65 17.97 2492.21 18.96 2498.76 19.27 2511.86 18.97
2538.07 19.9 2564.28 20.58 2583.94 21.18 2616.7 22.86 2629.8 23.35 2636.35
23.78 2642.91 24.4 2695.32 26.97 2747.74 27.41 2800.16 27.28 2819.81 26.77
2826.37 26.47 2865.68 25.85 2878.78 25.41 2885.34 25.39 2891.89 25.2 2924.65
25.37 2944.31 25.72 2957.41 26.08 2963.96 26.1 2977.07 26.4 3029.48 26.57
3055.69 26.17 3068.8 26.2 3081.9 26.53 3088.45 27.69 3095.01 31.02 3101.56
34.19 3108.11 34.08 3114.66 30.77 3121.21 28.15 3127.77 26.83 3134.32 26.36
3140.87 26.08 3147.42 27.42 3153.98 28.39 3186.74 27.95 3212.95 27.98 3219.5
28.11 3258.81 27.76 3265.36 27.56 3285.02 27.57 3317.78 26.99 3324.33 27.13
3330.88 27 3350.54 26.92 3370.2 26.97 3376.75 27.16 3383.3 27.09 3402.96
26.64 3409.51 26.64 3416.06 26.29 3422.62 25.4 3429.17 24.16 3435.72 23.4
3448.82 22.46 3455.38 22.42 3461.93 22.24 3468.48 22.44 3494.69 22.76
3507.79 22.61 3520.9 22.13 3527.45 22 3534 22.02 3540.55 21.79 3547.11 21.39
3553.66 21.52 3573.31 22.35 3586.42 21.79 3599.52 21.9 3612.63 21.71 3619.18
22.08 3625.73 22.12 3638.84 21.77 3651.94 21.74 3658.49 22.04 3665.05 22.04
3678.15 21.53 3697.81 21.55 3710.91 22.14 3717.46 21.86 3737.12 21.58
3743.67 21.62 3756.78 21.36 3769.88 21.54 3782.98 22.04 3796.09 21.71
3809.19 21.99 3822.3 21.77 3848.51 22.3 3861.61 22.24 3868.16 22.35 3881.27
22.27 3887.82 22.46 3894.37 22.01 3900.92 21.93 3914.03 22.27 3920.58 22.34
3927.13 22.23 3946.79 22.58 3953.34 22.27 3973 21.87 3979.55 21.93 3992.65
21.65 3999.21 21.77 4005.76 22.06 4012.31 22.15 4018.86 22.4 4025.42 22.26
4031.97 22.38 4045.07 22.86 4051.62 23.21 4058.18 23.71 4064.73 24.07
4071.28 24.62 4077.83 24.72 4084.38 25.02 4090.94 25.5 4097.49 25.73 4110.59
25.86 4123.7 25.37 4143.35 25.55 4176.12 26.4 4189.22 26.64 4202.33 27.31
4208.88 27.13 4215.43 27.44 4221.98 27.55 4254.74 28.75 4261.3 28.8 4274.4
29.1 4294.06 28.97 4300.61 28.75 4313.71 28.7 4320.27 28.95 4333.37 28.83
4353.03 29.27 4359.58 29.21 4379.24 28.61 4385.79 28.55 4392.34 28 4398.89
27.85 4405.44 27.85 4425.1 27.46 4438.21 26.96 4444.76 27 4451.31 26.83
4470.97 25.96 4484.07 25.79 4490.62 25.46 4497.18 24.96 4503.73 24.61
4516.83 24.59 4523.38 24.69 4529.94 24.65 4536.49 24.41 4556.15 24.41 4575.8
25 4582.35 25.08 4595.46 24.91 4608.56 24.93 4615.12 24.73 4621.67 24.72
4628.22 25.09 4641.33 25.01 4660.98 25.27 4680.64 24.91 4687.19 24.99
4693.74 25.3 4700.3 25.13 4706.85 25.25 4713.4 25.15 4739.52 26.02 4746.04
26.4 4752.56 26.24 4772.12 26.91 4785.16 27.1 4804.73 28.31 4811.25 28.6
4817.77 28.48 4824.29 28.61 4837.33 28.58 4869.94 29.04 4882.98 29.41 4889.5
29.74 4902.54 30.17 4915.58 30.8 4928.62 32.01 4941.67 32.33 4948.19 32.29
4954.71 32.43 4961.23 32.72 4967.75 32.76 4980.79 33.36 5013.4 34.06 5026.44
34.26 5065.57 35.3 5072.09 35.3 5085.13 35.8 5098.17 36.06 5104.69 36.54
5117.73 37.02 5124.25 37.11 5130.78 37.35 5150.34 36.96 5156.86 36.98
5163.38 36.81 5169.9 36.99 5176.42 36.88 5195.99 37.43 5202.51 37.52 5215.55
38.2 5228.59 38.61 5235.11 39.15 5241.63 39.35 5261.2 40.4 5274.24 40.9

5287.28 41.83 5326.41 42.96 5365.53 44 5372.05 44.06 5385.1 43.76 5398.14 44.37 5404.66 44.91 5417.7 47.05 5424.22 47.99 5437.26 49.02 5443.78 50.8 5450.31 52.18 5456.83 52.54 5469.87 52.84 5482.91 53.6 5489.43 53.86 5495.95 54.41 5515.52 55.28 5522.04 55.46 5548.12 56.77 5554.64 57.81 5567.68 60.82 5580.73 61.67 5606.81 63.95 5652.46 66.11

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .095 1520.62 .055 1676.82 .095

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1520.62 1676.82 1458.48 1428.11 1397.47 .3 .5 Ineffective Flow num= 3
 Sta L Sta R Elev Permanent
 0 1068.71 29.5 T
 1068.71 1475.06 27.3 F
 4353 5000 29.27 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 103799.2

INPUT
Description: 92
Station Elevation Data num= 439
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 30.96 13.11 30.95 19.67 30.72 32.79 29.34 45.9 29.31 59.01 29.04 72.13 29.26 85.24 29.02 91.8 29.08 98.36 29.36 104.91 29.33 124.59 29.72 144.26 29.46 163.93 29.51 170.49 29.35 177.04 29.35 183.6 29.56 209.83 29.14 229.5 29.32 236.06 29.22 242.61 29.32 249.17 29.73 281.96 29.97 288.51 30.1 295.07 30.44 308.19 30.29 314.74 30.6 321.3 30.7 340.97 30.28 367.2 30.39 373.76 30.54 380.32 30.47 393.43 30.75 399.99 30.59 406.54 30.63 413.1 30.52 432.77 30.89 459 32.12 465.56 32.09 478.67 32.74 485.23 32.88 524.57 32.55 531.13 32.64 550.8 31.54 563.92 30.05 577.03 28.98 583.59 28.15 590.14 27.63 596.7 27.65 603.26 26.94 609.82 26.49 622.93 25.85 629.49 25.25 636.04 25.6 649.16 25.25 655.72 25.26 662.27 25.41 668.83 25.74 675.39 25.42 681.94 25.56 688.5 25.84 701.62 25.66 721.29 27.1 747.52 27.09 754.07 26.89 760.63 26.89 767.19 27.29 773.74 27.84 780.3 28.57 793.41 28.64 806.53 29.23 813.09 29.1 819.64 29.17 832.76 29.78 839.29 29.88 858.89 28.97 878.49 27.52 885.03 26.84 891.56 25.99 898.09 24.97 911.16 21.94 917.7 21.59 930.76 21.49 937.3 21.75 950.36 22.7 956.9 23.39 969.97 25.04 976.5 25.6 989.57 27.05 1002.63 28.17 1009.17 28.83 1035.3 29.55 1041.84 29.27 1061.44 27.66 1067.97 26.77 1081.04 24.78 1100.64 22.83 1107.17 22.4 1126.77 20.3 1133.31 19.13 1139.84 18.5 1152.91 17.88 1159.44 17.32 1172.51 17.03 1179.04 17.09 1198.65 16.88 1205.18 17.35 1211.71 18.34 1231.31 19.58 1237.85 19.74 1244.38 19.74 1250.92 19.35 1263.98 18.12 1270.52 17.63 1277.05 16.84 1283.58 16.82 1290.12 18.59 1296.65 19.78 1303.19 19.71 1309.72 19.79 1322.79 19.74 1329.32 19.14 1361.99 18.09 1388.12 18.07 1394.66 17.83 1401.19 18.01 1420.79 17.62 1427.33 17.79 1433.86 17.72 1440.39 17.41 1460 17.55 1466.53 17.76 1473.06 17.78 1486.13 18.35 1492.66 18.31 1499.2 18.13 1505.73 18.17 1518.8 17.87 1525.33 17.53 1531.87 17.73 1538.4 17.64 1558 17.7 1571.07 17.23 1584.14 17.34 1603.74 17.15 1610.27 17.37 1636.41 17.41 1662.54 16.79 1701.74 17.7 1734.41 17.68 1760.55 18.19 1773.61 18.2 1780.15 18.33 1793.22 18.1 1812.82 18.05 1878.15

19.41 1884.69 19.74 1897.76 19.71 1904.29 19.45 1910.82 18.28 1917.36 16.88
1923.89 16.37 1930.42 16.82 1936.96 17.78 1943.49 18.87 1950.03 19.51
1956.56 19.71 1982.69 19.14 1995.76 18.29 2002.3 18.28 2008.83 18.46 2021.9
18.51 2034.94 18.26 2047.97 17.48 2054.49 17.39 2061 17.63 2074.03 18.54
2093.57 18.84 2106.6 18.74 2113.12 18.48 2132.66 17.33 2139.17 16.62 2142.98
15.95 2158 12.8 2175 9.7 2190 7.2 2205 8.2 2222 12.3 2228.16 14.36 2230.38
14.55 2236.89 16.6 2249.92 16.83 2262.95 17.66 2269.46 18.9 2275.98 20.31
2289 24.87 2295.52 26.64 2302.03 27.34 2315.06 27.39 2328.09 27.74 2341.12
27.7 2367.18 27.35 2373.69 27.37 2380.21 27.56 2425.81 28.35 2451.86 29.12
2458.38 29.17 2490.95 28.05 2503.98 27.96 2510.49 27.71 2536.55 27.36
2556.09 27.34 2562.61 27.2 2569.12 26.88 2608.38 27.25 2654.18 27.09 2686.89
27.85 2699.98 28.76 2713.06 29.89 2719.6 30.09 2745.77 29.94 2758.86 29.44
2778.49 28.33 2791.57 27.76 2811.2 27.48 2824.29 27.82 2843.92 28.54 2850.46
28.6 2870.09 28.31 2883.17 27.83 2902.8 27.33 2915.89 27.36 2942.06 27.69
2948.6 27.99 2987.86 27.77 3014.03 27.25 3020.57 27.25 3033.65 26.74 3046.74
26.39 3053.28 26.34 3066.37 26.56 3072.91 26.46 3079.45 26.1 3086 26.7
3105.62 27.46 3112.17 27.59 3118.71 27.44 3144.88 27.82 3151.42 27.78
3164.51 27.37 3177.59 27.27 3190.68 27.64 3197.22 27.63 3203.76 27.47
3216.85 27.41 3256.11 27.1 3262.65 26.74 3282.28 24.77 3295.36 24.16 3308.45
23.73 3314.99 23.98 3321.53 24 3328.08 23.63 3334.62 24.2 3341.16 24.24
3347.7 23.95 3354.25 24.04 3360.79 23.89 3367.33 23.6 3373.88 23.46 3406.59
23.43 3419.67 22.99 3432.76 22.22 3439.3 21.69 3445.85 21.6 3452.39 21.65
3458.93 21.41 3465.47 21.57 3478.56 21.29 3517.82 21.19 3530.9 21.42 3570.16
21.17 3583.24 21.29 3596.33 21.13 3622.5 21.27 3629.04 21.17 3642.13 21.35
3655.21 21.07 3674.84 21.4 3687.93 21.25 3701.01 21.42 3707.55 21.61 3720.64
21.64 3727.18 21.54 3733.73 21.87 3753.35 21.37 3779.52 21.25 3799.15 21.38
3805.7 21.33 3812.24 21.44 3818.78 21.7 3825.32 21.75 3831.87 21.41 3838.41
21.3 3858.04 21.42 3864.58 21.36 3884.21 21.49 3897.29 22.04 3903.84 22.03
3916.92 21.55 3943.09 21.57 3949.64 21.76 3956.18 21.79 3962.72 21.59
3969.26 21.7 3995.43 21.48 4008.52 21.82 4015.06 21.64 4028.15 21.75 4034.69
21.94 4054.32 21.87 4067.4 21.73 4073.95 21.95 4093.57 22.01 4100.12 22.35
4113.2 23.49 4126.29 23.58 4139.37 23.43 4159 24.06 4178.63 24.07 4198.26
24.45 4211.34 24.8 4224.43 24.95 4230.97 25.23 4244.05 26 4250.6 26.09
4270.22 27.15 4289.85 27.86 4309.48 28.16 4342.19 28.21 4348.73 28.33
4381.44 27.63 4407.62 27.54 4433.79 27.88 4440.33 28.06 4446.87 28.03
4453.41 27.74 4466.5 28.35 4479.58 28.63 4505.75 29.45 4512.28 29.46 4518.82
29.75 4525.35 29.81 4544.96 30.36 4590.71 32.5 4597.25 32.54 4610.32 32.84
4623.39 32.88 4636.46 33.33 4649.53 33.46 4669.14 32.76 4695.28 32.6 4708.35
32.21 4721.42 32.41 4747.57 32.51 4760.64 32.71 4767.17 32.52 4773.71 32.49
4780.25 32.89 4793.32 32.53 4812.92 32.7 4819.46 32.96 4832.53 32.94 4858.67
33.46 4871.74 33.33 4878.28 33.4 4884.82 33.22 4891.35 33.22 4910.96 33.78
4917.49 33.66 4943.64 34.86 4956.71 35.03 4969.78 35.52 4976.32 35.64
4989.39 35.46 4995.92 35.64 5022.07 36.03 5028.6 35.95 5035.14 35.65 5048.21
36.16 5067.82 36.66 5074.35 37.01 5080.89 37.17 5087.42 37.66 5100.49 38.02
5107.03 38.33 5120.1 39.16 5139.71 39.55 5146.24 39.81 5159.32 39.93 5172.39
40.48 5198.53 40.86 5205.07 41.12 5211.6 41.53 5218.14 41.65 5231.21 43.3
5237.74 44.53 5244.28 46.05 5250.82 46.98 5263.89 47.81 5270.42 48.35
5290.03 49.15 5316.17 50.5 5322.71 50.65 5335.78 51.4 5355.39 52.25 5361.92
52.39 5368.46 53.15 5374.99 54.26 5381.53 55.56 5388.06 57.23 5401.14 60.18
5407.67 61.17 5414.21 61.61 5427.28 61.71 5446.89 62.8 5459.96 63.33 5473.03
63.4 5479.56 63.63 5486.1 63.62 5492.64 63.75 5512.24 64.46 5525.31 64.59
5544.92 65.04 5597.21 65.63 5610.28 65.54 5623.35 64.84 5629.89 63.84
5636.42 61.8

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .095 2106.6 .055 2302.03 .087

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2106.6 2302.03 1511.12 1623.98 1750.94 .3 .5 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 1040 29.1 F
 2376 3256 28.4 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 102175.3

INPUT
Description: 91
Station Elevation Data num= 350
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 28.53 13.09 27.86 32.72 28.08 39.27 27.79 58.9 28 78.54 27.44 98.17 27.4 111.26 27.67 163.62 27.31 183.25 28.11 202.89 28.01 209.43 28.29 235.61 28.18 255.25 28.46 261.79 28.79 274.88 28.49 307.61 29.11 327.24 29.96 346.87 31.34 359.96 32.64 366.51 32.96 392.69 33.05 399.23 33.26 418.87 32.07 438.5 31.55 458.14 31.42 477.77 31.76 490.86 31.62 497.4 31.86 503.95 31.78 556.31 32.62 562.85 32.54 582.49 32.88 602.12 32.52 615.21 31.8 628.3 31.73 634.84 30.84 647.93 30.37 654.48 29.87 680.66 28.99 687.2 29.06 700.29 29.91 706.84 30.08 713.38 31.26 726.47 32.61 752.65 33.87 772.29 34.3 785.38 34.22 791.92 34.41 811.55 33.59 818.1 33.61 837.73 32.61 857.37 32.47 870.46 32.71 890.09 32.09 909.73 32.04 955.54 30.46 962.08 30.42 981.72 29.16 1001.35 26.94 1007.9 26.72 1020.99 25.45 1027.53 25.52 1034.08 24.92 1047.17 24.61 1053.71 24.93 1060.26 25.85 1073.35 26.17 1092.98 25.02 1099.52 24.9 1112.61 25.17 1119.16 25.08 1132.25 24.2 1145.34 22.55 1158.43 21.6 1171.52 19.43 1178.06 17.79 1200 6.2 1240 6.2 1262 12.8 1265.32 13.89 1269.83 13.89 1282.95 18.4 1296.06 19.29 1302.61 19.48 1315.72 19 1328.83 19.29 1341.94 18.77 1355.05 19.01 1368.16 18.62 1400.94 19.85 1427.16 18.18 1433.72 17.98 1446.83 18.34 1479.6 18.67 1512.38 18.06 1532.04 18.16 1545.15 17.35 1551.71 17.82 1564.82 17.29 1571.37 17.35 1591.04 16.22 1597.6 16.12 1604.15 16.55 1617.26 16.24 1623.82 16.98 1630.37 16.95 1636.93 16.41 1656.59 16.24 1669.7 15.58 1689.34 16.23 1695.89 15.94 1708.98 16.35 1715.53 15.96 1728.62 15.8 1735.17 16.1 1774.45 16.71 1807.19 15.58 1853.02 15.77 1866.11 16.78 1872.66 16.83 1885.75 17.69 1898.84 18.07 1925.03 17.45 1951.22 19.19 1970.86 19.85 1977.41 20.29 1997.05 20.4 2010.14 19.41 2016.69 19.74 2036.33 19.54 2049.42 18.2 2055.97 17.76 2075.61 17.45 2095.25 17.75 2121.44 20.06 2134.53 20.39 2147.63 19.8 2160.72 19.6 2173.81 20.08 2180.36 20.81 2193.45 21.39 2226.19 21.63 2245.83 20.76 2258.92 19.7 2278.57 18.81 2298.21 18.26 2317.85 18.26 2337.49 17.8 2344.04 18.01 2357.13 18.98 2370.22 20.25 2396.41 21.45 2416.05 22.96 2435.69 24.12 2442.24 24.19 2455.33 23.94 2468.43 22.61 2481.52 19.92 2494.62 19.3 2507.71 19.5 2514.26 19.27 2533.9 19.67 2540.44 19.11 2546.99 19.25 2560.09 18.82 2573.18 19.77 2586.27 21.08 2592.82 21.98 2605.91 23.21 2619.01 23.77 2632.1 23.85 2638.65 23.59 2651.74 22.57 2664.84 22.1 2691.03 20.37 2723.76 19.15 2756.5 18.39 2763.04 18 2769.59 17.27 2789.23 16.1 2795.78 16.56 2815.42 16.31 2828.51 16.57 2854.7 18.34 2867.79 18.96 2893.98 19.42 2913.62 19.44 2920.17 19.92 2946.36 20.98 2959.45 21.74 2979.09 22.1 3005.28 23.24 3024.92 25.46 3044.56

26.57 3051.11 26.63 3057.66 26.22 3070.75 26.03 3077.3 25.66 3096.94 25.28
3136.22 27.87 3175.5 28.75 3188.6 28.82 3214.78 30.1 3221.33 30.06 3247.52
30.69 3267.16 30.08 3273.71 30.4 3306.44 29.52 3332.63 29.72 3345.72 29.41
3365.36 29.6 3391.55 28.97 3404.65 27.94 3417.74 27.66 3430.83 27.76 3450.47
27.2 3457.02 26.53 3502.85 26.19 3509.4 26.5 3522.49 26.5 3568.32 27.78
3574.87 27.57 3587.96 27.85 3614.15 27.36 3731.99 27.47 3738.54 27.8 3758.18
28.02 3777.82 28.72 3790.92 28.45 3797.46 28 3810.56 27.7 3843.29 27.69
3856.39 28.26 3862.93 28.1 3869.48 28.25 3895.69 27.81 3908.8 28.24 3928.46
27.93 3935.02 27.49 3948.12 28.06 3954.68 28.02 3961.23 28.31 3980.89 27.91
3987.45 28.09 4026.77 27.6 4033.33 27.91 4066.1 28.24 4072.65 28.91 4098.87
29.72 4105.42 29.46 4131.64 29.8 4164.41 29.69 4210.29 30.19 4243.06 30.03
4249.61 30.42 4269.27 30.49 4282.38 30.33 4308.6 31.07 4334.81 31.02 4367.58
31.93 4420.02 32.38 4426.57 32.22 4433.12 32.5 4465.9 32.64 4479 33.13
4492.11 32.88 4524.88 32.97 4531.44 32.79 4544.54 33.48 4564.21 33.44
4577.31 33.15 4603.53 33.93 4616.64 34.1 4629.75 33.52 4636.3 33.49 4655.96
34.05 4662.52 33.82 4688.73 34.65 4714.95 34.4 4728.06 33.72 4754.27 34.22
4767.38 34.64 4839.48 34.04 4885.36 34.25 4905.02 34.71 4937.79 34.88 4950.9
34.39 4970.56 34.81 5003.33 34.98 5016.44 34.7 5062.32 34.85 5075.42 34.61
5095.09 35.14 5140.97 35.22 5173.74 35.71 5186.84 36.53 5213.06 36.48
5219.61 36.08 5232.72 36.1 5245.83 36.74 5258.94 35.93 5272.05 38 5278.6
38.17 5285.16 37.96 5298.26 39.37 5311.37 39.73 5324.48 39.62 5337.59 40.47
5350.7 40.3 5357.25 39.62 5370.36 39.1 5409.68 40.33 5416.24 40.83 5422.79
40.89 5435.9 39.48 5449.01 39.27 5455.56 39.69 5475.22 39.8 5494.89 39.51
5501.44 39.95 5540.76 40.19 5619.41 39.14 5632.52 39.65 5671.85 39.85
5684.95 40.45 5730.83 41.33 5743.94 41.27 5770.16 41.88 5789.82 42.02
5802.93 42.56 5822.59 42.52 5855.36 43.03 5868.47 43.47 5888.13 43.16
5934.01 44.69 5947.12 44.71 5960.23 45.55 6006.1 46.81 6038.88 49.13 6045.43
50.14 6065.09 52.32 6071.65 53.4 6078.2 55.06 6084.75 56.14 6124.08 58.32
6143.74 58.39 6156.85 58.83 6202.73 64.12 6209.28 64.62

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .095 1112.61 .055 1302.61 .095

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1112.61
1302.61 2000.77 1915.38 1882.93 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 1073.35 26.17 F

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 100259.9

INPUT
Description: 90
Station Elevation Data num= 489
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 31.53 6.54 31.37 13.08 31.55
19.62 32.04 26.16 32.27 39.23 32.28 45.77 32.05 52.31 31.64 58.85 31.51
65.39 31.59 71.93 31.4 78.47 30.69 85.01 30.81 98.09 29.66 104.62 29.48
117.7 29.31 137.32 30.01 143.86 30.15 150.4 29.81 156.94 29.62 170.02 29.82
183.09 29.71 202.71 30.08 209.25 30.1 215.79 29.84 228.87 30.02 241.94 30.4
248.48 30.4 255.02 30.01 268.1 29.71 287.72 28.74 294.26 28.8 300.8 28.59

307.34 28.23 320.41 28.42 326.95 28.18 333.49 28.13 353.11 26.7 359.65 26.81
372.73 27.98 392.34 28.61 398.88 28.47 405.42 28.54 418.5 28.99 425.04 29.45
431.58 29.73 444.66 30.82 457.73 31.17 464.27 31.24 477.35 30.71 496.97
29.26 523.12 28.47 536.2 28.56 549.28 28 555.82 28.22 595.05 27.48 608.13
27.68 614.67 27.9 621.21 27.83 627.75 27.6 634.29 27.89 640.83 28.04 647.37
28.33 653.9 28.34 666.98 27.93 673.52 27.85 686.6 28.4 693.14 28.53 706.22
28.39 725.83 28.73 745.45 28.67 751.99 28.82 765.07 28.59 771.61 28.73
784.69 28.25 797.76 27.22 804.3 26.85 810.84 26.21 817.38 25.75 850.08 24.81
856.62 25.04 863.15 24.9 869.69 25.07 882.77 24.66 895.85 24.6 908.93 24.71
922.01 24.6 928.54 24.78 935.08 24.81 941.62 24.63 954.7 24.48 961.24 24.71
987.4 24.98 993.93 25.42 1007.01 26.65 1052.79 29.24 1059.33 29.37 1065.86
29.75 1072.4 30.33 1085.48 30.23 1098.56 29.61 1111.64 28.2 1124.72 27.78
1137.79 27.91 1150.87 27.56 1170.49 27.94 1190.11 27.88 1196.65 27.51
1209.72 27.82 1222.8 28.86 1255.5 29.57 1268.58 29.54 1288.19 29.05 1294.73
29 1307.81 28.05 1320.89 27.38 1340.51 26.95 1360.12 26.68 1366.66 26.74
1373.2 27.02 1399.36 26.98 1412.44 27.09 1432.05 28.03 1445.13 28.1 1451.67
27.69 1464.75 26.56 1484.37 25.91 1490.9 25.96 1503.98 25.8 1517.06 25.95
1523.6 25.54 1530.14 25.62 1536.68 25.55 1543.22 25.77 1549.76 26.45 1556.29
26.79 1562.83 27.78 1569.37 28.57 1582.45 29.55 1595.53 30.39 1602.07 30.64
1608.61 30.69 1621.69 30.23 1628.22 29.72 1641.3 28.95 1647.84 28.36 1654.38
27.56 1660.92 27.18 1667.46 26.63 1693.62 25.8 1706.69 25.78 1713.23 25.67
1752.47 25.66 1759.01 26.28 1772.08 26.94 1785.16 27.34 1791.7 28.02 1804.78
28.46 1817.86 29.1 1830.94 30.01 1850.55 29.97 1857.09 30.13 1876.71 30.24
1883.25 30.53 1896.33 30.55 1902.85 30.45 1909.38 30.17 1915.9 29.75 1928.95
29.73 1948.52 30.26 1955.04 30.33 1981.14 29.64 1994.19 29.09 2007.24 28.65
2020.29 28.84 2026.81 28.78 2059.43 28.98 2085.53 28.6 2098.58 28.6 2170.34
27.28 2176.87 26.89 2183.39 26.37 2196.44 25.68 2209.49 25.34 2216.01 24.9
2222.54 24.64 2229.06 24.16 2235.58 24.03 2242.11 23.52 2248.63 23.2 2281.25
23.12 2287.78 22.86 2313.87 22.55 2326.92 22.08 2333.45 21.61 2339.97 21.28
2353.02 21.14 2366.07 20.58 2392.16 20.19 2405.21 19.5 2411.74 19.52 2418.26
19.76 2431.31 19.88 2437.83 20.47 2450.88 20.9 2457.41 20.82 2463.93 20.98
2476.98 20.93 2496.55 20.43 2516.12 20.54 2529.17 19.95 2535.7 20.26 2548.74
21.46 2555.27 21.79 2568.32 21.89 2574.84 21.79 2601.06 19.53 2614.17 18.58
2627.28 18 2646.94 16.62 2653.49 16.36 2660.05 16.25 2673.16 16.88 2686.27
16.82 2692.82 16.69 2699.38 16.75 2719.04 17.82 2732.15 18.15 2738.7 18.43
2745.26 18.97 2758.37 19.46 2771.48 19.57 2778.03 19.24 2784.59 19.39
2791.14 19.69 2810.8 19.16 2823.91 19.2 2830.47 19.09 2837.02 18.73 2850.13
17.53 2855.88 16.84 2865 12.2 2885 6.5 2905 5.2 2925 6.2 2945 11.2 2947.74
16.01 2948.45 16.2 2955 16.34 2961.56 15.66 2968.11 15.49 2974.67 15.79
2981.22 15.85 2994.33 15.49 3000.89 15.56 3033.66 15.24 3046.77 15.38
3079.54 15 3092.65 15.18 3099.2 15.11 3105.76 14.74 3118.87 14.44 3131.98
15.77 3138.53 16.17 3145.09 16.21 3151.64 15.99 3164.75 13.93 3204.08 14.3
3217.19 14.66 3230.3 14.54 3243.4 15.49 3256.51 16.74 3263.07 17.23 3276.18
17.3 3282.73 17.61 3295.84 17.86 3302.4 17.84 3308.95 18.14 3315.5 18.21
3322.06 18.1 3341.72 18.14 3348.28 17.94 3354.83 17.95 3361.39 18.3 3381.05
18.79 3387.6 19.17 3407.27 19.82 3420.38 20.47 3426.93 20.92 3433.49 21.1
3446.6 21.23 3453.15 21.52 3459.7 21.61 3472.81 22.05 3485.92 22.84 3512.14
23.93 3518.7 24.53 3531.81 25.02 3551.47 23.8 3558.02 23.5 3584.24 23.51
3590.8 23.84 3617.01 24.26 3643.23 23.92 3649.79 23.98 3669.45 23.62 3695.67
24.77 3702.22 24.96 3708.78 25.3 3721.89 26.18 3728.44 26.33 3741.55 26.45
3754.66 26.7 3767.77 26.63 3787.43 27.37 3793.99 27.47 3800.54 27.35 3820.21
27.65 3846.42 27.7 3859.53 27.91 3866.09 27.88 3872.64 27.7 3885.75 28.29
3892.31 28.39 3898.85 28.3 3918.49 28.64 3925.04 28.66 3931.59 28.91 3944.68
28.91 3964.32 29.24 3970.87 29.17 3990.51 27.94 4003.61 27.57 4016.7 26.63

4023.25 26.83 4029.79 27.21 4036.34 27.04 4042.89 27.28 4055.98 28.02
4062.53 28.26 4095.26 27.41 4108.36 27.45 4128 27.89 4141.09 27.93 4167.28
28.34 4200.02 28.64 4206.57 28.8 4232.75 28.57 4245.85 29 4291.68 28.7
4304.77 28.84 4357.15 28.39 4389.89 28.57 4402.98 28.45 4455.36 29.24
4461.91 29.24 4468.45 29.51 4488.09 29.92 4494.64 30.16 4507.74 30.26
4520.83 30.18 4527.38 30.03 4547.02 29.91 4573.21 29.47 4612.49 29.58
4691.06 29.43 4710.7 29.84 4736.89 30.11 4756.53 30.43 4854.74 30.26 4861.28
30.45 4913.66 31.12 4926.75 31.27 4952.94 32.04 4966.04 31.96 4972.58 32.43
4979.13 32.64 4992.23 32.88 4998.77 33.25 5011.87 33.44 5018.42 33.82
5024.96 33.89 5031.51 33.72 5038.06 34.04 5057.7 34.44 5070.79 34.47 5083.89
34.08 5096.98 34.32 5103.53 34.05 5116.62 34.26 5136.26 34.34 5155.91 33.97
5169 33.61 5195.19 33.66 5208.28 33.86 5214.83 34.1 5227.92 33.65 5234.47
33.57 5260.66 34.1 5273.75 34.01 5280.3 33.71 5293.4 33.87 5299.94 33.82
5313.04 33.52 5326.13 33.66 5332.68 33.85 5352.32 33.74 5371.96 34.34
5378.51 34.31 5385.06 33.91 5398.15 34.2 5417.79 34.28 5430.89 34.13 5437.43
34.39 5443.98 34.21 5463.62 34.04 5476.72 34.62 5489.81 34.84 5496.36 35.07
5516 34.97 5535.64 35.37 5542.19 35.06 5555.28 35.33 5581.47 35.95 5601.11
35.66 5607.66 35.87 5633.85 35.62 5653.49 35.8 5666.58 36.13 5673.13 36.13
5686.23 36.68 5699.32 36.79 5705.87 36.74 5718.96 37.01 5725.51 37.27 5738.6
37.44 5745.15 37.3 5751.7 37.32 5764.79 37.8 5790.98 37.96 5797.53 38.13
5810.62 38.22 5823.72 38.47 5830.26 38.72 5849.91 38.96 5856.45 38.84 5863
39.03 5869.55 39.04 5902.28 40.35 5908.83 40.43 5915.38 40.65 5935.02 40.8
5941.57 40.62 5948.11 40.65 5961.21 41.21 5967.75 41.03 5974.3 41.12 5980.85
41.35 5993.94 41.54 6007.04 42.14 6013.58 42.03 6020.13 42.25 6026.68 42.73
6033.23 42.97 6046.32 42.87 6052.87 43 6065.96 43.53 6072.51 43.68 6085.6
43.43 6098.7 43.77 6111.79 44 6118.34 43.81 6144.53 44.04 6151.08 44.01
6157.62 43.75 6177.26 44.22 6196.91 44.18 6216.55 44.79 6229.64 44.89
6236.19 45.13 6249.28 45.26 6262.38 45.12 6268.92 44.95 6282.02 45.24
6295.11 45.06 6314.75 45.23 6327.85 44.98 6340.94 45.37 6347.49 45.4

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .095 2791.14 .055 2955 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2791.14
2955 1027.78 1066.17 1112.6 .3 .5 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 1052.79 29.24 F
 3964.32 6347.49 29.24 F
 CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 99193.71

INPUT
Description: 89
Station Elevation Data num= 495
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 29.06 13.12 29.46 19.68
29.39 26.24 29.79 32.8 30.25 39.36 30.48 52.48 30.19 59.04 29.88 65.6 29.16
72.16 28.64 78.73 28.74 85.29 28.82 98.41 28.29 104.97 28.17 111.53 28.07
118.09 27.67 124.65 27.31 131.21 27.02 137.77 26.94 144.33 26.92 150.89
26.92 157.45 26.86 164.01 26.88 170.57 26.72 177.13 26.62 183.69 26.71
190.25 27.04 196.81 26.97 203.37 27.08 209.93 26.98 216.49 26.95 223.05

27.24 229.62 27.29 236.18 27.2 242.74 27.14 249.3 27.03 255.86 27.05 262.42
27.24 268.98 27.49 275.54 27.46 282.1 27.19 288.66 27.13 295.22 26.89 301.78
26.88 308.34 26.53 314.9 26.22 321.46 26.07 328.02 26.33 334.58 26.33 341.14
25.85 347.7 25.56 354.26 25.36 360.82 25.44 367.38 25.61 373.95 25.56
380.51 25.48 387.07 25.42 393.63 25.38 400.19 25.43 406.75 25.36 413.31
25.52 419.87 25.3 426.43 25.11 432.99 25.18 439.55 25.22 446.11 25.24 452.67
25.29 459.23 25.39 465.79 25.31 472.35 25.11 485.47 24.74 492.03 24.81
498.59 24.68 505.15 24.74 511.71 24.76 518.28 24.76 524.84 24.59 531.4 24.56
537.96 24.61 544.52 24.64 551.08 24.64 557.64 24.66 564.2 24.91 570.76 25.09
577.32 24.72 583.88 24.65 590.44 25.04 597 25.41 603.56 25.2 610.12 25.58
616.68 25.91 623.24 26.36 629.8 26.53 636.36 26.21 642.92 25.93 649.48 25.83
656.04 25.51 662.61 25.22 669.17 25.06 675.73 24.92 682.29 24.7 688.85 24.52
695.41 24.5 701.97 24.42 708.53 24.29 715.09 24.26 721.65 24.41 728.21 24.14
734.77 24.02 741.33 23.71 747.89 23.65 754.45 23.63 761.01 23.72 767.57
23.93 774.13 23.99 780.69 23.98 787.25 24.03 793.81 24 800.37 24.01 806.93
23.97 813.5 24.23 820.06 24.34 826.62 24.26 833.18 23.71 839.74 23.57 846.3
23.67 852.86 23.65 859.42 23.68 865.98 23.84 872.54 24.05 879.1 24.12 892.22
23.9 898.78 23.98 905.34 24.44 911.9 24.45 918.46 23.73 925.02 23.48 931.58
23.67 938.14 23.99 944.7 24.2 951.27 24.25 957.83 24.02 964.39 24.11 970.95
24.22 977.51 24.3 984.07 24.26 990.63 24.06 997.19 24 1003.75 23.99 1016.87
24.36 1023.43 24.46 1029.99 24.82 1036.55 24.28 1043.11 23.96 1049.67 24.96
1056.23 25.13 1062.79 25.9 1069.35 26.12 1075.91 26.23 1082.47 26.28 1089.03
26.38 1095.59 26.31 1102.16 26.29 1108.72 26.34 1115.28 26.41 1121.84 26.28
1128.4 26.21 1134.96 26.17 1141.52 25.94 1148.08 26.05 1154.64 25.94 1167.76
25.75 1174.32 25.8 1180.88 25.8 1187.44 25.76 1194 25.74 1200.56 25.8
1207.12 25.82 1213.68 25.47 1220.24 25.41 1226.8 25.21 1233.36 25.14 1239.92
25.37 1246.48 25.56 1253.05 25.6 1259.61 25.5 1266.17 25.42 1272.73 25.4
1279.29 25.21 1285.85 25.27 1292.41 25.54 1298.97 25.5 1305.53 25.41 1312.09
25.17 1318.65 24.84 1325.21 24.35 1331.77 23.5 1338.33 22.71 1344.89 24.47
1351.45 24.52 1358.01 24.51 1371.13 24.14 1377.69 24.12 1384.25 23.97
1390.81 24.11 1397.37 24.29 1403.94 24.5 1410.5 24.57 1417.06 24.72 1436.74
25.34 1443.3 25.53 1449.86 25.49 1456.42 25.76 1462.98 25.98 1476.1 25.95
1482.66 26.35 1489.22 26.66 1495.78 26.57 1502.34 26.3 1508.9 26.17 1515.46
26.14 1522.02 26.39 1528.58 26.72 1535.14 27.23 1541.7 27.45 1548.26 27.23
1554.83 27.45 1561.39 27.55 1567.95 26.8 1574.51 26.65 1581.07 26.91 1594.19
26.58 1600.75 26.34 1607.31 25.98 1613.87 25.85 1620.43 25.78 1626.99 25.73
1633.55 26.01 1640.11 26.33 1646.67 26.55 1653.23 26.56 1659.79 26.6 1666.35
26.7 1672.91 26.68 1679.47 26.36 1686.03 26.57 1692.59 26.84 1699.15 26.89
1705.72 27.54 1712.28 28.15 1718.84 27.78 1725.4 27.16 1731.96 27.03 1738.52
27.03 1745.08 26.89 1751.64 27.21 1758.2 27.94 1764.76 28.51 1771.32 28.55
1777.88 28.29 1784.44 28.71 1791 29.48 1797.56 29.57 1804.12 29.53 1810.68
29.61 1817.24 29.62 1830.36 29.77 1843.48 29.71 1850.04 29.58 1856.61 29.42
1863.17 29.53 1876.29 29.6 1882.85 29.57 1889.41 29.4 1895.97 29.36 1902.53
29.28 1909.09 29.23 1915.65 29.06 1922.21 28.98 1928.77 29.07 1935.33 29.2
1941.89 29.2 1948.45 29.07 1955.01 29.09 1961.57 29.05 1968.13 29.04 1974.69
29.14 1981.25 29.14 1987.81 29.02 1994.37 28.99 2000.93 29.03 2007.49 28.97
2014.06 28.89 2020.62 28.84 2027.18 28.63 2040.3 28.66 2053.42 28.27 2059.98
28.12 2066.54 28.27 2073.1 28.24 2079.66 27.89 2086.22 27.74 2092.78 27.56
2099.34 27.25 2105.9 26.8 2112.46 26.41 2125.58 25.44 2132.14 25.05 2138.7
24.71 2145.26 24.55 2151.82 24.45 2158.39 24.37 2164.95 24.27 2171.51 24.06
2178.07 23.91 2184.63 23.71 2191.19 23.74 2197.75 23.87 2204.31 24.17
2210.87 24.42 2217.43 24.61 2223.99 24.39 2237.11 23.52 2243.67 23.17
2250.23 22.88 2256.79 22.43 2263.35 21.85 2269.91 21.06 2276.47 20.44
2283.03 20.17 2289.59 20.26 2296.16 20.28 2302.72 20.08 2309.28 20.08

2315.84 20.02 2322.4 19.76 2328.96 19.74 2335.52 19.59 2342.08 19.39 2348.64 19.24 2355.2 19.33 2361.76 19.13 2374.88 19.35 2381.44 19.56 2388 19.88 2394.56 20.04 2407.69 20.07 2414.25 19.89 2420.81 19.79 2427.37 19.36 2433.93 19.25 2440.49 19.26 2447.05 19.08 2453.61 19.05 2460.17 18.99 2466.73 19.39 2473.29 19.69 2479.85 19.67 2486.41 19.63 2492.97 20.03 2499.53 20.59 2506.1 19.64 2512.66 19.3 2525.78 19.51 2532.34 19.6 2538.9 19.67 2545.46 19.71 2552.02 19.56 2558.58 19.72 2565.14 19.92 2571.7 19.99 2578.26 20.35 2584.82 20.84 2591.38 20.71 2597.95 20.17 2604.51 19.66 2611.07 19.25 2617.63 19.12 2624.19 19.07 2630.75 19.33 2637.31 19.28 2643.87 19.36 2663.55 19.1 2670.11 18.93 2676.67 18.69 2683.23 18.29 2689.79 18.05 2696.36 17.95 2702.92 17.32 2709.48 17.36 2716.04 17.37 2722.6 17.02 2735.72 15.84 2742.28 15.7 2748.84 15.48 2755.4 15.44 2761.96 15.73 2768.52 16 2775.08 15.92 2781.64 15.87 2788.2 15.71 2794.77 15.6 2801.33 15.74 2807.89 15.5 2814.45 15.52 2821.01 15.47 2827.57 15.35 2834.13 15.27 2840.69 15.12 2847.25 15.47 2853.81 16.14 2860.37 16.55 2866.93 16.98 2873.49 17.48 2880.05 17.95 2886.61 18.48 2893.18 19.05 2899.74 19.55 2906.3 19.64 2912.86 19.42 2919.42 18.77 2925.98 18.76 2932.54 18.97 2939.1 18.08 2945.66 17.7 2952.22 18.02 2958.78 17.86 2965.34 16.96 2970 12.9 2990 8.1 3010 6.3 3030 8.6 3050 12 3068 18.7 3069.68 17.47 3083.44 19.32 3103.12 18.72 3175.28 20.64 3267.13 24.53 3313.06 23.81 3345.86 24.31 3372.1 25.5 3398.35 27.77 3411.47 27.99 3437.71 29.62 3457.39 30.11 3503.32 29.6 3621.41 31.49 3739.5 31.85 3811.67 33.19 3851.03 32.19 3929.76 32.18 3942.88 31.51 4047.86 31.32 4100.34 32.05 4159.39 31.72 4198.75 32.43 4277.48 31.94 4323.4 32.52 4362.77 32.08 4507.1 33.01 4520.22 33.54 4631.75 33.91 4671.12 34.48 4710.48 34.09 4776.09 34.48 4795.77 33.74 4835.13 34.09 4867.94 33.72 4940.1 33.78 5064.76 34.56 5071.32 33.51 5077.88 33.08 5091 33.61 5104.12 34.98 5176.29 36.23 5222.21 36.36 5241.9 37.22 5300.94 38.33 5307.5 38.09 5314.06 36.58 5320.62 35.83 5327.18 35.76 5340.3 36.86 5359.99 36.89 5373.11 38.46 5399.35 38.99 5438.71 38.93 5464.96 39.46 5484.64 39.19 5701.14 41.5 5819.23 44.46 5825.79 45.06 5852.04 45.4 5871.72 46.54

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .095 2906.3 .055 3267.13 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2906.3 3267.13 1067.1 1087.9 1112.89 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 1922.21 29 F

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 98105.8

INPUT Description: 88
Station Elevation Data num= 304
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 35.15 19.65 35.21 32.75 34.92 45.85 34.87 52.4 34.72 65.5 34.68 78.6 34.27 85.15 34.17 98.25 34.23 111.35 33.77 124.45 33.68 131 33.26 144.1 32.73 150.65 32.66 163.75 32.92 170.3 33.35 176.85 33.49 189.95 34.22 196.49 34.27 203.04 34.14 216.14 34.35 222.69 34.23 235.79 34.52 242.34 34.41 255.44 34.57 261.99 34.3 275.09 33.46 281.64 33.31 294.74 33.42 301.29 33.13 314.39 33.37 327.49 31.81 334.04

31.68 340.59 31.95 347.14 31.99 360.24 31.65 379.89 31.51 406.09 31.26
432.29 31.17 458.49 30.66 465.04 30.72 484.69 30.52 510.89 29.96 550.19
30.19 569.84 30.71 576.39 31.01 589.48 31.9 615.68 33.1 641.88 33.81 648.43
34.15 661.53 34.49 681.18 34.69 700.83 34.63 713.93 34.29 733.58 33.23
746.68 32.71 753.23 32.55 785.98 30.92 805.63 30.45 812.18 30.53 818.73
30.21 825.28 30.21 858.03 29.59 871.13 29.04 877.68 28.91 890.78 29.22
923.53 29 949.72 29.33 962.82 29.64 969.37 29.37 1021.77 29.35 1093.82 28.86
1113.47 28.79 1120.02 28.67 1133.12 28.7 1172.42 29.98 1178.97 29.71 1192.07
29.69 1198.62 29.34 1211.72 28.42 1231.37 27.48 1237.92 26.93 1244.47 26.71
1251.02 26.64 1264.12 26.94 1277.22 26.88 1296.87 26.34 1309.97 26.23
1316.52 26.03 1323.07 26.03 1336.16 25.69 1342.71 25.75 1355.81 26.12
1382.01 25.38 1388.56 25.53 1408.21 24.72 1414.76 24.93 1440.96 24.81
1447.51 24.25 1454.06 23.22 1460.61 22.8 1467.16 23.1 1473.71 23.26 1480.26
23.06 1486.81 22.64 1499.91 21.61 1526.11 21.12 1552.31 20.84 1558.86 20.5
1571.96 20.46 1578.51 20.67 1591.61 21.81 1598.16 22.26 1617.81 24.37
1624.36 24.66 1630.91 24.59 1637.46 24.1 1650.56 22.87 1676.76 21.24 1683.31
20.92 1696.41 21.06 1748.8 20.65 1768.45 21.06 1781.55 21.09 1801.2 20.66
1827.4 20.85 1833.95 21.03 1847.05 21.91 1853.6 22.46 1873.25 24.63 1879.8
25.25 1886.35 25.68 1892.9 25.94 1899.45 26.06 1912.55 26.78 1919.1 26.68
1925.65 25.78 1932.2 25.26 1938.75 24.6 1951.85 24.59 1958.4 24.84 1964.95
25.28 1971.5 25.92 1978.05 26.22 1984.6 26.11 1991.15 25.8 2010.8 23.61
2023.9 21.86 2043.55 19.54 2063.2 17.88 2069.75 17.17 2109.04 16.25 2115.59
16.34 2135.24 15.93 2148.34 16.25 2154.89 16.57 2161.44 16.49 2167.99 16.86
2174.54 17.68 2187.64 19.52 2194.19 20.22 2213.84 21.27 2226.94 21.32
2253.14 19.91 2259.69 19.39 2266.24 19.14 2272.79 19.12 2279.34 19.27
2285.89 19.66 2292.44 20.3 2298.99 20.54 2305.54 20.51 2312.09 19.63 2318.64
18.56 2331.74 16.85 2338.29 15.81 2344.84 15.32 2351.39 15.19 2357.94 15.34
2377.59 17.6 2384.14 18.11 2397.24 19.58 2403.79 20.49 2410.34 21 2416.84
21.08 2423.34 20.77 2429.84 20.21 2436.33 19.41 2442.83 18.08 2449.33 16.47
2455.83 15.39 2462.33 15 2488.33 14.64 2494.83 15.38 2507.83 16.08 2527.32
16.82 2533.82 17.35 2540.32 18.02 2546.82 18.23 2553.32 18.11 2559.82 17.69
2566.32 17.59 2572.82 17.7 2579.32 16.6 2581.67 15.97 2590 8.1 2610 7 2630 8
2667.02 16.19 2670.31 17.5 2676.8 18.77 2689.8 19.16 2702.8 19.82 2722.3
20.2 2741.8 21.08 2748.3 21.22 2780.79 23.1 2787.29 23.38 2793.79 23.91
2806.79 24.64 2813.29 24.89 2826.29 25.53 2852.28 26.25 2858.78 26.2 2871.78
26.41 2884.78 26.52 2897.78 26.86 2910.78 27.27 2917.28 27.32 2930.27 27.75
2943.28 27.68 2949.79 27.48 2956.31 27.04 2975.84 26.29 2982.35 26.62
2995.37 26.71 3008.39 27.15 3014.9 27.49 3040.95 27.87 3047.46 28.06 3060.48
28.91 3073.5 30.12 3080.01 30.83 3093.03 32.59 3099.54 33.12 3106.05 33.31
3119.07 33.28 3132.1 32.25 3145.12 30.89 3151.63 29.82 3158.14 28.92 3164.65
29.4 3171.16 29.37 3177.67 29.04 3184.18 29.16 3190.69 29.12 3203.71 29.28
3210.22 29.49 3223.25 29.28 3229.76 29.37 3236.27 29.61 3249.29 30.3 3275.33
31.01 3288.35 30.72 3294.86 30.77 3307.89 30.31 3327.42 30.11 3346.95 30.06
3359.97 31.09 3366.48 31.72 3379.5 32.4 3386.01 32.54 3399.04 32.32 3412.06
32.28 3425.08 31.91 3431.59 31.91 3444.61 32.16 3457.63 31.86 3470.65 31.27
3477.17 31.45 3483.68 31.79 3496.7 32.21 3509.72 32.1 3516.23 32.27 3529.25
31.9 3535.76 31.56 3548.78 31.14 3587.85 31.6 3607.38 32.1 3626.91 31.52
3659.47 31.65 3665.98 31.77 3672.49 31.72 3679 31.5 3685.51 31.89 3692.02
31.72 3698.53 31.83 3711.55 31.75 3718.06 31.57 3724.57 31.57 3731.08 31.19
3737.59 31.32 3744.11 31.71 3763.64 31.84

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .095 2546.82 .055 2676.8 .095

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2546.82
2676.8 1679.58 1694.82 1701.02 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 1978 26.22 F

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 96410.98

INPUT
Description: 87
Station Elevation Data num= 402
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 31.59 6.55 31.84 13.1 31.9
19.65 31.82 26.2 31.85 32.75 31.91 39.3 32.06 45.85 31.92 52.4 32.07 58.95
32.07 65.5 32.15 72.05 32.04 78.6 31.89 85.15 31.8 91.7 31.83 98.25 32.01
104.8 32.05 111.35 32.11 117.9 31.88 124.45 31.81 131 31.72 137.55 31.59
144.1 31.32 150.65 31.07 157.2 30.77 163.75 30.45 170.3 30.1 176.85 29.77
183.4 29.63 189.95 29.6 203.05 29.35 209.6 29.36 222.7 29.15 229.25 29.12
235.8 29.24 242.35 29.18 248.9 28.93 255.45 28.87 262 28.93 268.55 28.74
275.1 28.53 288.2 28.76 294.75 28.18 301.3 27.16 307.85 27.05 314.4 26.79
320.95 26.08 327.5 25.47 334.05 25.37 340.6 25.07 353.7 25.02 360.25 25.27
366.8 25.37 373.35 26.14 379.9 26.14 386.45 25.84 393 25.67 406.1 25.74
412.65 25.49 425.75 25.27 432.3 25.19 438.85 25.33 445.4 25.5 451.95 25.55
458.5 25.51 465.05 25.67 471.6 25.62 478.15 25.62 484.7 25.7 491.25 25.93
497.8 25.78 504.35 25.58 510.9 25.54 517.45 25.56 524 25.54 530.55 25.62
537.1 25.78 543.65 25.77 556.76 25.86 563.3 25.86 569.86 25.94 576.41 26.05
582.96 26.18 589.51 26.48 596.06 26.46 602.61 26.42 609.16 26.42 615.71 26.4
622.26 26.13 628.81 26.23 635.36 26.25 641.91 26.08 648.46 26.11 655.01
25.92 661.56 25.69 668.11 25.71 674.66 25.59 687.76 24.94 694.31 24.59
700.86 24.04 707.41 23.62 713.96 23.32 720.51 22.43 727.06 21.9 733.61 21.66
740.16 21.61 746.71 21.59 753.26 22.3 759.81 22.57 766.36 22.88 772.91 22.99
779.46 23.14 786.01 23.26 792.56 23.4 799.11 23.51 805.66 23.66 812.21 23.79
818.76 23.77 825.31 23.67 831.86 23.59 838.41 23.62 844.96 23.6 851.51 23.55
858.06 23.57 864.61 23.61 871.16 23.76 877.71 23.78 884.26 23.73 890.81 23.8
897.36 23.97 903.91 24.31 917.01 23.83 923.56 23.83 930.11 23.77 936.66
23.77 943.21 23.29 949.76 23.79 956.31 24.51 962.86 24.58 969.41 24.52
975.96 24.55 982.51 24.39 989.06 24.43 995.61 24.34 1002.16 24.14 1008.71
24.05 1015.26 23.89 1021.81 23.79 1028.36 23.61 1034.91 23.13 1041.46 22.71
1048.01 22.42 1054.56 22.31 1061.11 22.42 1067.66 22.97 1074.21 23.1 1080.76
23.28 1087.31 23.5 1093.86 23.55 1100.41 23.47 1106.96 23.33 1113.51 23.52
1120.06 23.62 1126.61 23.47 1133.16 23.21 1139.71 23.12 1152.81 22.87
1159.36 22.88 1165.91 22.64 1172.46 22.68 1185.56 22.69 1192.11 22.8 1198.66
22.75 1205.21 22.44 1211.76 22.26 1218.31 21.93 1224.86 21.8 1237.96 21.95
1244.51 22.09 1251.06 22.02 1270.71 21.26 1277.26 21.07 1283.81 20.65
1290.36 20.5 1296.91 20.12 1303.46 19.54 1310.01 19.6 1316.56 20.37 1323.11
21.09 1329.66 21.26 1336.21 21.24 1342.76 21.16 1349.31 21.13 1355.86 21.25
1362.41 21.46 1368.96 21.91 1375.51 22.68 1382.06 23.14 1388.61 23.3 1395.16
23.36 1401.71 23.21 1408.26 22.77 1421.36 21.82 1427.91 21.18 1434.46 20.87
1447.56 20.67 1454.11 20.6 1467.21 20.17 1473.76 19.8 1480.31 19.57 1486.86
19.64 1493.41 19.91 1499.96 20.02 1506.51 20.27 1513.06 20.76 1519.61 21.14
1532.71 21.95 1539.26 22.16 1545.81 22.04 1552.36 21.82 1558.91 21.48
1565.46 20.86 1572.01 20.15 1578.56 19.64 1585.12 19.5 1591.67 19.7 1598.21

20.24 1604.77 20.95 1611.32 21.81 1617.87 22.12 1624.42 22.11 1630.97 21.93
1637.52 21.23 1644.07 20.5 1650.62 19.83 1657.17 19.14 1663.72 18.48 1670.27
17.78 1676.82 17.17 1683.37 16.84 1689.92 16.55 1696.47 15.96 1703.02 15.51
1709.57 15.42 1722.67 15.42 1729.22 15.35 1735.77 15.17 1742.32 15.16
1748.87 15.27 1755.42 15.19 1768.52 14.72 1775.07 14.59 1781.62 14.59
1788.17 14.71 1794.72 15.22 1801.27 15.68 1807.82 15.65 1814.37 15.52
1820.92 15.56 1834.02 15.79 1840.57 15.86 1847.12 15.85 1853.67 15.79
1860.22 15.8 1866.77 16.04 1873.32 16.19 1879.87 16.46 1886.42 16.84 1899.52
17.08 1906.07 17.59 1912.62 18.24 1919.17 18.58 1925.72 18.75 1932.27 19.24
1938.82 19.89 1945.37 20.32 1951.92 20.77 1958.47 21.1 1965.02 21.08 1971.57
20.75 1978.12 20.27 1984.67 19.82 1991.22 19.39 1997.77 19.02 2004.32 18.76
2010.87 18.68 2017.42 18.76 2023.97 18.67 2030.52 18.23 2037.07 17.64
2043.62 17.31 2050.17 17.15 2056.72 16.93 2069.82 16.39 2076.37 16.21
2082.92 16.39 2089.47 16.87 2096.02 17.58 2102.57 18.46 2109.12 18.69
2115.67 17.87 2130 8.3 2150 7.9 2169 7.4 2190 9 2200 9.9 2217.06 17.66
2220.47 18.11 2227.02 18.44 2246.67 18.27 2253.22 18.42 2259.77 18.74
2266.32 19.37 2272.87 20.17 2279.42 21.26 2285.97 22.56 2292.52 23.41
2299.07 23.62 2305.62 23.46 2318.73 22.8 2331.83 22.69 2351.48 22.27 2371.13
21.57 2377.68 21.54 2384.23 21.9 2397.33 23.03 2410.43 23.77 2416.98 24.03
2423.53 24.44 2436.63 24.86 2443.18 25.29 2449.73 25.46 2456.28 25.49
2469.38 26.11 2495.58 26.51 2508.68 26.91 2515.23 27.01 2521.78 27.25
2574.18 27.74 2600.38 27.28 2606.93 27.3 2620.03 27 2626.58 26.97 2633.13
27.22 2646.23 27.45 2652.78 27.38 2692.08 27.77 2698.63 27.97 2711.73 27.96
2744.48 28.6 2764.13 28.73 2770.68 28.97 2783.79 29.15 2809.99 29.27 2823.09
29.56 2829.64 29.51 2842.74 29.66 2849.29 29.5 2862.39 29.61 2882.04 29.43
2895.14 29.72 2914.79 29.74 2921.34 29.63 2927.89 29.73 2934.44 29.64
2954.09 29.89 2960.64 30.2 2967.19 30.29 2980.29 30.2 2986.84 30.42 2993.39
30.5 3019.59 30.16 3032.69 29.81 3039.24 29.5 3052.34 29.2 3058.89 29.38
3065.44 28.77 3071.99 26.34 3078.54 23.61 3085.09 23.49 3098.19 28.4 3104.74
29.05 3111.29 29.5 3124.39 29.46 3130.94 29.02 3137.49 28.82 3150.59 28.75
3170.24 29.05 3189.89 28.8 3202.99 28.91 3209.54 29.11 3216.09 28.93 3229.19
29.13 3248.85 29.9 3268.5 30.16 3275.05 30.15 3281.6 30.37 3288.15 30.44
3294.7 30.73 3307.8 30.81 3320.9 31.21 3327.45 31.31

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .095 1958.47 .055 2292.52 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1958.47
2292.52 1563.06 1558.27 1560.01 .3 .5 Ineffective Flow num= 4
 Sta L Sta R Elev Permanent
 0 589.51 26.4 T 589.51 962.86 24.58 F
 2299 2420 23.62 F
 3019 3500 30.2 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 94852.71

INPUT
Description: 86 Approach Summer St
Station Elevation Data num= 67

Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 30.9 104.79 27.4 157.19
30.99 203.03 30.79 268.53 27.41 334.02 28.1 386.41 27.12 399.51 26.07 425.71
26.49 445.36 27.7 484.66 25.33 523.95 25.21 556.7 25.73 596 24.97 609.09
25.07 628.74 24.19 661.49 25.85 674.59 27.28 707.33 27.29 720.43 26.76
818.67 31.18 877.62 34.44 969.31 34.35 1303.38 33.99 1377.76 31.42 1515.52
27.32 1594.24 28.02 1640.16 27.7 1653.28 28.54 1732 26.91 1745.12 27.67
1758.24 29.8 1817.28 29.8 1836.96 29.13 1922.24 30.8 1968.16 31.09 1981.28
31.99 2060 31.36 2099.36 32.94 2289.61 34.66 2401.13 34.52 2512.65 29.05
2545.45 30.97 2683.21 30.2 2801.29 28.18 2932.49 25.78 2991.53 22.05 3075.8
17.41 3126.6 15.67 3150.8 15.79 3155.1 12.91 3172.7 5.19 3193 2.98 3207 3.85
3226.3 7.35 3259 10.7 3272.5 16.55 3309.4 16.52 3376 18.4 3447.6 19.1
3555.66 22.03 3692.97 24.31 4170.3 32.3 4183.38 34.16 4294.54 35.5 4529.94
41.36 4613.05 42.44

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .09 2932.49 .055 3692.97 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2932.49
3692.97 85.28 49.74 36.25 .3 .5 Ineffective Flow num= 2
Sta L Sta R Elev Permanent
0 2932 30 T
3555.66 4613.05 29 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 94802.97

INPUT Description: 85.7 US Face Summer St
Station Elevation Data num= 84
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 34.89 49.961 35.87 184.847
32.42 199.838 33.1 214.822 32.61 239.803 30.71 334.731 32.75 494.597 30.13
569.539 30.23 594.519 32.98 599.514 33.13 614.498 31.79 629.489 32.87
644.473 31.34 649.475 31.35 654.47 32.7 659.465 32.97 709.426 29.29 739.401
29.38 789.355 26.66 829.496 27.02 834.521 27.56 899.826 26.26 929.97 27.8
985.233 27.29 1020.402 24.431025.427 24.52 1045.52 23.011050.546
22.031120.876 22.46 1135.952 21.53 1151.02 22.821161.071 25.061281.646
32.811402.214 31.6 1422.315 30.321432.358 28.511442.408 27.661452.451
26.171462.501 25.94 1477.577 24.561507.713 25.41542.882 29.061598.145
29.891643.365 29.48 1668.483 28.761683.551 29.381753.889 30.161773.983
29.11879.482 29.7 1894.558 30.531990.007 29.792005.083 302165.845
32.072396.945 29.14 2447.183 24.282562.419 29.052567.781 26.922576.208
20.722576.973 20.28 2582.336 17.712590.762 16.822590.762 8.952594.593
6.972603.785 5.06 2613.744 3.82623.702 4.642633.661 4.232643.619 7.572649.748
10.03 2650.514 10.19 2651.28 17.712654.344 18.122668.899 22.32681.922 27.07
2783.675 22.032818.752 19.683039.212 24.313319.792 31.643324.802 31.44
3349.859 34.213394.948 34.833409.978 35.843725.634 43.34

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .0952562.419 .0552681.922 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
2562.4192681.922 97.12 92.48 89.62 .5 .8 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 02572.377 29 T
2672.7293725.634 27 T
Skew Angle = 40

BRIDGE

RIVER: Taunton River
REACH: Main Stem RS: 94760.71

INPUT
Description: 85.5 Summer St/ Woodward
Distance from Upstream XS = 23
Deck/Roadway Width = 35
Weir Coefficient = 2.6
Bridge Deck/Roadway Skew = 40
Upstream Deck/Roadway Coordinates
 num= 16
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord 2125.007 32.81
2306.56 29.66 2373.206 28.18 2449.044 27.48 2547.098 29.29 2550.928 32.12
2580.804 31.59 24.042664.302 29.97 23.442665.069 29.97 2730.948 29.04
2731.025 26.72 2808.319 24.68 2887.221 23.96 2986.041 24.86 3107.076 26.93
3261.051 31.16

Upstream Bridge Cross Section Data
Station Elevation Data num= 84
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 34.89 49.961 35.87 184.847
32.42 199.838 33.1 214.822 32.61 239.803 30.71 334.731 32.75 494.597 30.13
569.539 30.23 594.519 32.98 599.514 33.13 614.498 31.79 629.489 32.87
644.473 31.34 649.475 31.35 654.47 32.7 659.465 32.97 709.426 29.29 739.401
29.38 789.355 26.66 829.496 27.02 834.521 27.56 899.826 26.26 929.97 27.8
985.233 27.29 1020.402 24.431025.427 24.52 1045.52 23.011050.546
22.031120.876 22.46 1135.952 21.53 1151.02 22.821161.071 25.061281.646
32.811402.214 31.6 1422.315 30.321432.358 28.511442.408 27.661452.451
26.171462.501 25.94 1477.577 24.561507.713 25.41542.882 29.061598.145
29.891643.365 29.48 1668.483 28.761683.551 29.381753.889 30.161773.983
29.11879.482 29.7 1894.558 30.531990.007 29.792005.083 302165.845
32.072396.945 29.14 2447.183 24.282562.419 29.052567.781 26.922576.208
20.722576.973 20.28 2582.336 17.712590.762 16.822590.762 8.952594.593
6.972603.785 5.06 2613.744 3.82623.702 4.642633.661 4.232643.619 7.572649.748
10.03 2650.514 10.19 2651.28 17.712654.344 18.122668.899 22.32681.922 27.07
2783.675 22.032818.752 19.683039.212 24.313319.792 31.643324.802 31.44
3349.859 34.213394.948 34.833409.978 35.843725.634 43.34

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .0952562.419 .0552681.922 .085

Bank Sta: Left Right Coeff Contr. Expan.
 2562.4192681.922 .5 .8
Ineffective Flow num= 2

```
 Sta L Sta R Elev Permanent
 02572.377 29 T
2672.7293725.634 27 T
Skew Angle = 40

Downstream Deck/Roadway Coordinates
 num= 16
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord 1348.238 32.81
1529.791 29.66 1596.437 28.18  1672.275 27.48 1771.095 29.29 1774.159 32.12
1801.737 31.59 24.041889.066 29.97 23.441889.449 29.97
 1954 29.04 1954.179 26.72 2032.316 24.68  2110.452 23.96 2209.272 24.86
2331.073 26.93  2485.048 31.16

Downstream Bridge Cross Section Data
Station Elevation Data num= 424
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  0 27.83 10.043 27.6 15.068
27.62 25.111 28.04 50.222 27.93  60.265 28.09 65.29 27.97 70.308 28.07 90.401
27.63 100.444 27.89  110.487 27.42 125.555 27.45 130.58 27.3 140.623 26.58
155.691 26.07  165.734 25.29 170.759 25.04 180.802 24.22 205.913 21.91 210.93
21.58  220.981 21.68 225.998 21.37 231.024 21.68 241.067 22 251.109 22.78
256.135 23.05 271.203 22.75 281.246 22.31 296.314 22.56 306.357 21.77
311.382 22.1 316.399 22.85 321.425 22.83 326.442 22.97 331.467 22.93  341.51
23.67 346.536 24.45 351.553 24.76 356.578 25.64 361.604 25.98  366.621 26.02
371.646 25.83 376.664 25.81 381.689 26.39 386.715 26.54  406.8 26.66 416.843
27.36 421.868 27.57 431.911 27.59 436.936 27.18  441.954 26.39 446.979 26.31
457.022 25.5 462.047 25.26 477.108 25.52  482.133 25.28 492.176 25.6 497.201
26.39 502.226 27.39 507.244 27.94  512.269 29.05 522.312 29.21 542.398 28.5
547.423 28.04 562.491 27.27  572.534 26.55 587.602 24.96 592.62 24.99 597.645
24.7 602.67 24.91  607.688 24.8 617.731 25.71 622.756 25.8 632.799 25.79
637.824 26.28  657.91 27.23 662.935 27.31 672.978 27.05 683.021 26.22 688.046
26.08  693.071 26.34 698.089 26.89 703.114 26.92 708.131 26.38 713.157 25.53
723.2 25.53 733.242 27.57 738.268 28.26 748.31 28.58 753.336 28.6  773.421
29.56 778.447 29.56 788.49 29.79 793.515 29.63 798.532 29.61  803.558 29.74
808.575 30.07 813.6 30.25 823.643 30.39 833.686 30.26  838.711 30.32 843.737
30.24 848.754 29.85 853.78 28.85 858.797 27.32  863.822 27.19 868.848 28.24
873.865 27.71 878.891 28.1 883.908 28.1  888.933 28.74 898.976 28.58 904.001
29.16 909.027 29.25 914.044 29.75  919.069 29.82 924.087 29.23 929.112 29.45
939.155 29.35 944.18 29.59  969.291 29.75 974.309 29.47 984.359 29.38 989.377
29.621014.488 29.95 1019.513 30.281029.556 30.371039.599 30.011054.667
29.781059.692 30.11  1064.71 30.171079.778 29.541089.821 29.531094.846
29.821104.889 29.84 1109.914 29.541119.957 29.841124.982 29.86 1130
30.041135.025 30.01 1140.043 30.291145.068 29.621150.093 29.91155.111
29.781160.136 29.85 1165.154 29.721170.179 29.391180.222 29.341215.375
29.991220.401 29.89 1230.444 30.071240.486 30.551255.554 30.821275.648
31.741285.691 31.86 1295.734 31.661300.759 31.411305.776 31.551310.802
31.471315.827 31.6  1325.87 31.581330.887 31.761335.913 31.651350.981
32.21355.998 32.07 1366.049 32.271371.066 32.511376.092 32.061381.109
31.81386.134 31.82  1391.16 31.681396.177 31.71 1406.22 31.41426.313
31.651431.331 31.62 1451.424 30.681456.442 30.791461.467 30.541476.535
30.461481.553 30.26 1491.603 29.491501.646 29.241511.689 29.321516.714
29.731526.757 28.78 1531.782 28.9 1536.8 28.521546.843 28.411551.868
28.511561.911 28.22 1566.936 27.911576.979 27.911582.004 27.281592.047
26.931597.065 27.03  1602.09 26.451612.133 27.061622.176 25.761637.244
24.821642.269 24.83 1647.293 24.551652.312 24.511662.355 24.681672.405
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24.621677.423 24.23 1682.448 23.641687.466 23.381697.516 23.31712.584
22.231722.627 21.21  1732.67 20.891737.695 20.881747.738 19.961752.756
19.361757.781 19.58 1762.806 18.961767.824 18.93 1787 20.721798.672
20.281804.035 17.71 1812.461 16.821812.461 8.951820.888 2.671835.443
1.391849.997 2.46 1867.616 5.61872.213 10.191872.979 17.711876.043
18.121890.598 22.3  1928.54 20.171933.565 20.121938.583 20.781943.608
21.761948.625 22.4 1953.651 22.431958.676 21.91963.694 20.681968.719
19.551973.744 19.2 1978.762 19.671983.787 19.891988.805 20.04 1993.83
20.071998.855 20.07 2003.873 19.962008.898 19.982013.916 20.112018.941
20.412023.966 20.5 2028.984 20.52034.009 20.632039.034 20.582044.052
20.622049.077 20.37 2054.094 19.86 2059.12 19.452064.145 19.382069.164
19.462074.188 21.33 2079.205 23.532084.231 24.62089.256 24.832094.273
24.642099.299 24.34 2104.324 24.742109.343 25.072114.367 24.772119.385 24.02
2124.41 23.61 2129.435 23.682134.453 23.582139.478 23.252144.495
23.242149.521 23 2154.546 22.782159.564 22.832164.589 22.972169.614
23.152174.632 23.27 2179.657 23.372184.674 23.43 2189.7 23.662194.725
23.792199.743 24.18 2209.785 24.992214.811 25.362219.836 25.922224.854
25.972229.879 25.98 2234.904 27.142239.922 27.62244.947 27.762249.965 27.74
2254.99 27.78 2260.015 27.882265.032 27.882270.058 27.952275.074
27.582280.101 27.26 2290.144 26.192295.169 26.042300.194 26.192305.212
26.252310.237 26.44 2315.254 26.45 2320.28 26.322325.305 26.52330.323
26.522340.365 26.69 2345.391 26.822350.416 26.712355.434 26.552360.459
26.632370.501 27.34 2375.527 27.542380.544 27.632385.571 27.552390.595
27.642395.613 27.53 2400.638 28.052405.655 28.16 2410.68 28.142415.706
28.222420.723 28.48 2425.749 28.772435.792 28.852440.817 29.092445.834 29.15
2450.86 29.35 2455.885 29.722460.902 29.942465.928 30.032470.945 30.24
2475.97 30.54 2480.996 30.612486.013 30.962491.039 31.032496.064
30.972501.081 31.32 2506.107 31.632511.124 31.67 2516.15 31.92521.175
31.972526.192 32.21 2531.219 32.432536.235 32.6 2541.26 32.822546.286
33.022551.303 33.28 2556.329 33.592561.354 33.882566.371 34.342571.397 34.56
2581.44 35.2 2586.465 35.312591.482 35.442596.508 35.162601.525 352606.551
35.43 2611.576 35.982616.593 36.482621.619 36.932626.636 37.152631.661 36.98
2636.687 37.042641.704 37.192646.729 37.292656.771 37.662661.798 38 2671.841
38.492676.866 38.752681.883 38.92686.908 38.952691.926 39.23  2696.95
39.422701.977 39.632706.993 39.91 2712.02 40.12717.045 40.24 2722.062
40.562727.088 40.862732.105 40.87 2737.13 40.992742.156 41.26 2747.173
41.392752.198 41.612757.216 41.792762.241 41.922767.267 42 2777.309
42.362792.377 42.742797.395 42.85 2802.42 42.992807.447 42.94 2812.463
43.162822.506 43.452827.531 43.662832.556 43.772842.599 43.95 2847.625
44.112852.642 44.152857.667 44.062862.685 43.94 2867.71 43.87 2877.753
43.442882.778 43.392887.796 43.42892.821 43.562897.847 43.75 2902.864
43.732907.889 43.672912.915 43.642917.932 43.652922.957 43.84 2927.975 43.95
2933 43.922938.026 44.022943.043 44.192948.068 44.28 2953.086 44.352963.136
44.742968.154 44.862973.178 45.01

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .095 1787 .0551890.598 .085

Bank Sta: Left Right Coeff Contr. Expan.
 17871890.598 .5 .8
Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 1785 28 T
```

1911.2812973.178 24 T
Skew Angle = 40
 Upstream Embankment side slope = 0 horiz. to 1.0 vertical Downstream
Embankment side slope = 0 horiz. to 1.0 vertical Maximum allowable
submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
 Energy
 W.S. Pro Method

 W.S.Pro Data
 Left Embankment
 El of the top of the embankment = 30
 El of the toe of the abutment = 9
 Right Embankment
 El of the top of the embankment = 30
 El of the toe of the abutment = 9
 Abutment Type = 4 Vert. abutments and sloping embankments with wingwalls
Slope of abutments = 4
 Top with of embankment = 35 Centroid station of bridge opening =
 Wing Wall Type = Angular wing walls
 Width = 25
 Angle = 45
 Radius =
 Guide Banks Type = No Guide Bank present
 Length =
 Offset =
 Angle =
 Optional Contraction and expansion coefficients
 At approach Section
 At Guide Bank
 At upstream outside
 At upstream inside (BU)
 At downstream inside (BD)
 Piers are Continuous for the width of the bridge
 Use Geometric mean as Friction Slope Method

Selected Low Flow Methods = W.S.Pro Method

High Flow Method
 Pressure and Weir flow
 Submerged Inlet Cd =
 Submerged Inlet + Outlet Cd = .8
 Max Low Cord =

Additional Bridge Parameters Add Friction component to Momentum
 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth

inside the bridge at the upstream end
Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 94710.49

INPUT
Description: 85.3 DS FAce Summer St
Station Elevation Data num= 424
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 27.83 10.043 27.6 15.068
27.62 25.111 28.04 50.222 27.93 60.265 28.09 65.29 27.97 70.308 28.07 90.401
27.63 100.444 27.89 110.487 27.42 125.555 27.45 130.58 27.3 140.623 26.58
155.691 26.07 165.734 25.29 170.759 25.04 180.802 24.22 205.913 21.91 210.93
21.58 220.981 21.68 225.998 21.37 231.024 21.68 241.067 22 251.109 22.78
256.135 23.05 271.203 22.75 281.246 22.31 296.314 22.56 306.357 21.77
311.382 22.1 316.399 22.85 321.425 22.83 326.442 22.97 331.467 22.93 341.51
23.67 346.536 24.45 351.553 24.76 356.578 25.64 361.604 25.98 366.621 26.02
371.646 25.83 376.664 25.81 381.689 26.39 386.715 26.54 406.8 26.66 416.843
27.36 421.868 27.57 431.911 27.59 436.936 27.18 441.954 26.39 446.979 26.31
457.022 25.5 462.047 25.26 477.108 25.52 482.133 25.28 492.176 25.6 497.201
26.39 502.226 27.39 507.244 27.94 512.269 29.05 522.312 29.21 542.398 28.5
547.423 28.04 562.491 27.27 572.534 26.55 587.602 24.96 592.62 24.99 597.645
24.7 602.67 24.91 607.688 24.8 617.731 25.71 622.756 25.8 632.799 25.79
637.824 26.28 657.91 27.23 662.935 27.31 672.978 27.05 683.021 26.22 688.046
26.08 693.071 26.34 698.089 26.89 703.114 26.92 708.131 26.38 713.157 25.53
723.2 25.53 733.242 27.57 738.268 28.26 748.31 28.58 753.336 28.6 773.421
29.56 778.447 29.56 788.49 29.79 793.515 29.63 798.532 29.61 803.558 29.74
808.575 30.07 813.6 30.25 823.643 30.39 833.686 30.26 838.711 30.32 843.737
30.24 848.754 29.85 853.78 28.85 858.797 27.32 863.822 27.19 868.848 28.24
873.865 27.71 878.891 28.1 883.908 28.1 888.933 28.74 898.976 28.58 904.001
29.16 909.027 29.25 914.044 29.75 919.069 29.82 924.087 29.23 929.112 29.45
939.155 29.35 944.18 29.59 969.291 29.75 974.309 29.47 984.359 29.38 989.377
29.621014.488 29.95 1019.513 30.281029.556 30.371039.599 30.011054.667
29.781059.692 30.11 1064.71 30.171079.778 29.541089.821 29.531094.846
29.821104.889 29.84 1109.914 29.541119.957 29.841124.982 29.86 1130
30.041135.025 30.01 1140.043 30.291145.068 29.621150.093 29.91155.111
29.781160.136 29.85 1165.154 29.721170.179 29.391180.222 29.341215.375
29.991220.401 29.89 1230.444 30.071240.486 30.551255.554 30.821275.648
31.741285.691 31.86 1295.734 31.661300.759 31.411305.776 31.551310.802
31.471315.827 31.6 1325.87 31.581330.887 31.761335.913 31.651350.981
32.21355.998 32.07 1366.049 32.271371.066 32.511376.092 32.061381.109
31.81386.134 31.82 1391.16 31.681396.177 31.71 1406.22 31.41426.313
31.651431.331 31.62 1451.424 30.681456.442 30.791461.467 30.541476.535
30.461481.553 30.26 1491.603 29.491501.646 29.241511.689 29.321516.714
29.731526.757 28.78 1531.782 28.9 1536.8 28.521546.843 28.411551.868
28.511561.911 28.22 1566.936 27.911576.979 27.911582.004 27.281592.047
26.931597.065 27.03 1602.09 26.451612.133 27.061622.176 25.761637.244
24.821642.269 24.83 1647.293 24.551652.312 24.511662.355 24.681672.405
24.621677.423 24.23 1682.448 23.641687.466 23.381697.516 23.31712.584
22.231722.627 21.21 1732.67 20.891737.695 20.881747.738 19.961752.756
19.361757.781 19.58 1762.806 18.961767.824 18.93 1787 20.721798.672

20.281804.035 17.71 1812.461 16.821812.461 8.951820.888 2.671835.443
1.391849.997 2.46 1867.616 5.61872.213 10.191872.979 17.711876.043
18.121890.598 22.3 1928.54 20.171933.565 20.121938.583 20.781943.608
21.761948.625 22.4 1953.651 22.431958.676 21.91963.694 20.681968.719
19.551973.744 19.2 1978.762 19.671983.787 19.891988.805 20.04 1993.83
20.071998.855 20.07 2003.873 19.962008.898 19.982013.916 20.112018.941
20.412023.966 20.5 2028.984 20.52034.009 20.632039.034 20.582044.052
20.622049.077 20.37 2054.094 19.86 2059.12 19.452064.145 19.382069.164
19.462074.188 21.33 2079.205 23.532084.231 24.62089.256 24.832094.273
24.642099.299 24.34 2104.324 24.742109.343 25.072114.367 24.772119.385 24.02
2124.41 23.61 2129.435 23.682134.453 23.582139.478 23.252144.495
23.242149.521 23 2154.546 22.782159.564 22.832164.589 22.972169.614
23.152174.632 23.27 2179.657 23.372184.674 23.43 2189.7 23.662194.725
23.792199.743 24.18 2209.785 24.992214.811 25.362219.836 25.922224.854
25.972229.879 25.98 2234.904 27.142239.922 27.62244.947 27.762249.965 27.74
2254.99 27.78 2260.015 27.882265.032 27.882270.058 27.952275.074
27.582280.101 27.26 2290.144 26.192295.169 26.042300.194 26.192305.212
26.252310.237 26.44 2315.254 26.45 2320.28 26.322325.305 26.52330.323
26.522340.365 26.69 2345.391 26.822350.416 26.712355.434 26.552360.459
26.632370.501 27.34 2375.527 27.542380.544 27.632385.571 27.552390.595
27.642395.613 27.53 2400.638 28.052405.655 28.16 2410.68 28.142415.706
28.222420.723 28.48 2425.749 28.772435.792 28.852440.817 29.092445.834 29.15
2450.86 29.35 2455.885 29.722460.902 29.942465.928 30.032470.945 30.24
2475.97 30.54 2480.996 30.612486.013 30.962491.039 31.032496.064
30.972501.081 31.32 2506.107 31.632511.124 31.67 2516.15 31.92521.175
31.972526.192 32.21 2531.219 32.432536.235 32.6 2541.26 32.822546.286
33.022551.303 33.28 2556.329 33.592561.354 33.882566.371 34.342571.397 34.56
2581.44 35.2 2586.465 35.312591.482 35.442596.508 35.162601.525 352606.551
35.43 2611.576 35.982616.593 36.482621.619 36.932626.636 37.152631.661 36.98
2636.687 37.042641.704 37.192646.729 37.292656.771 37.662661.798 38 2671.841
38.492676.866 38.752681.883 38.92686.908 38.952691.926 39.23 2696.95
39.422701.977 39.632706.993 39.91 2712.02 40.12717.045 40.24 2722.062
40.562727.088 40.862732.105 40.87 2737.13 40.992742.156 41.26 2747.173
41.392752.198 41.612757.216 41.792762.241 41.922767.267 42 2777.309
42.362792.377 42.742797.395 42.85 2802.42 42.992807.447 42.94 2812.463
43.162822.506 43.452827.531 43.662832.556 43.772842.599 43.95 2847.625
44.112852.642 44.152857.667 44.062862.685 43.94 2867.71 43.87 2877.753
43.442882.778 43.392887.796 43.42892.821 43.562897.847 43.75 2902.864
43.732907.889 43.672912.915 43.642917.932 43.652922.957 43.84 2927.975 43.95
2933 43.922938.026 44.022943.043 44.192948.068 44.28 2953.086 44.352963.136
44.742968.154 44.862973.178 45.01

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .095 1787 .0551890.598 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
17871890.598 111.72 138.76 147.03 .5 .8 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent 0 1785 28 T
1911.2812973.178 24 T
Skew Angle = 40

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 94571.73

INPUT
Description: 85 Exit Summer St
Station Elevation Data num= 453
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 27.41 6.55 27.76 13.09 28.24
19.64 28.56 26.18 28.71 32.73 28.81 39.27 28.67 45.82 28.61 52.37 28.15
58.91 27.74 65.46 27.44 72 27.29 78.55 27.08 85.1 27.04 91.64 26.92 98.19
26.91 104.73 26.4 111.28 26.3 117.82 25.95 124.37 25.57 130.92 25.4 137.46
25.28 144.01 25.26 150.55 25.27 157.1 25.3 163.65 25.21 176.74 25.53 183.28
25.47 189.83 25.34 196.37 25.6 202.92 25.76 209.47 25.62 216.01 25.82 222.56
25.94 229.1 25.8 235.65 25.61 242.19 25.61 248.74 25.65 255.29 25.52 261.83
25.49 268.38 25.49 274.92 25.4 281.47 25.51 288.02 25.55 301.11 25.34
307.65 25.28 314.2 25.16 320.74 25.11 327.29 24.98 333.84 24.83 340.38 24.84
346.93 24.89 353.47 24.63 360.02 24.48 366.56 24.63 373.11 24.57 379.66
24.29 386.2 24.35 392.75 24.1 399.29 23.75 405.84 23.52 412.39 23.23 418.93
22.89 425.48 22.71 432.02 22.6 438.57 22.31 445.11 22.15 451.66 22.13 458.21
22.07 464.75 21.81 471.3 21.72 477.84 21.78 484.39 21.78 490.94 21.81 497.48
21.61 504.03 21.73 517.12 22.54 523.66 22.8 530.21 22.94 536.76 23.14 543.3
23.27 549.85 22.66 556.39 22.27 562.94 22.19 569.48 22.25 576.03 22.17
582.58 21.84 589.12 21.38 595.67 21.61 602.21 21.88 608.76 21.82 615.31
22.08 621.85 22.42 634.94 22.88 641.49 23.19 648.03 23.44 654.58 23.37
661.13 23.68 667.67 24.23 674.22 24.34 680.76 24.26 687.31 24.13 693.86
23.98 700.4 23.74 706.95 23.46 713.49 23.39 720.04 23.55 726.58 23.48 733.13
23.46 739.68 23.4 746.22 23.12 752.77 23.06 759.31 23.52 765.86 23.7 772.4
23.77 778.95 23.78 785.5 23.81 792.04 23.74 798.59 23.63 805.13 23.68
811.68 23.9 818.23 23.89 824.77 23.77 831.32 23.49 837.86 23.56 844.41 23.52
850.95 23.46 857.5 23.42 864.05 23.4 870.59 23.43 877.14 23.33 883.68 23.27
890.23 23.36 896.78 23.38 903.32 23.38 909.87 23.34 916.41 23.21 922.96
23.04 929.5 22.79 936.05 22.49 942.6 22.31 949.14 22.18 955.69 22.16 962.23
22.2 968.78 22.09 975.32 22.07 988.42 22.08 994.96 22.04 1001.51 22.32
1008.05 22.72 1014.6 23.14 1021.15 23.6 1027.69 24 1034.24 24.26 1047.33
24.95 1053.87 25.39 1060.42 25.63 1066.97 25.9 1073.51 26.2 1080.06 26.56
1086.6 27.21 1093.15 27.33 1099.69 27.27 1106.24 27.44 1112.79 27.66 1119.33
28.05 1125.88 28.37 1132.42 28.77 1145.52 29.74 1152.06 30.06 1158.61 30.51
1165.15 30.58 1171.7 31.09 1178.24 31.58 1184.79 31.87 1191.34 31.99 1197.88
32.06 1210.97 32.15 1217.52 32.23 1224.07 32.23 1230.61 31.96 1237.16 32.09
1243.7 32.2 1250.25 31.58 1256.79 30.36 1263.34 29.05 1269.89 28.29 1276.43
28.32 1282.98 27.7 1289.52 27.12 1296.07 27.24 1302.62 27.6 1309.16 27.85
1315.71 28.25 1322.25 28.55 1328.8 28.66 1335.34 28.6 1341.89 28.64 1348.44
28.77 1354.98 28.82 1361.53 28.81 1368.07 28.7 1374.62 28.32 1381.16 28.26
1387.71 28.17 1394.26 28.11 1400.8 28.18 1407.35 28.22 1413.89 28.38 1426.99
28.45 1433.53 28.74 1440.08 28.94 1446.62 29.06 1459.71 29.15 1466.26 29.07
1472.81 29.06 1479.35 28.95 1485.9 28.81 1498.99 28.41 1505.54 28.14 1512.08
28.02 1518.63 27.99 1525.17 27.99 1531.72 27.95 1538.26 27.88 1544.81 27.75
1551.36 27.65 1557.9 27.65 1564.45 27.58 1570.99 27.57 1577.54 27.7 1590.63
27.86 1603.72 27.97 1610.27 28.06 1616.81 28.21 1623.36 28.41 1629.91 28.65
1636.45 28.86 1643 28.97 1649.54 29.19 1656.09 29.37 1662.63 29.58 1669.18
29.66 1675.73 29.8 1682.27 29.9 1695.36 29.81 1708.46 29.92 1715 29.89
1721.55 29.83 1728.09 29.66 1734.64 29.61 1747.73 29.61 1754.28 29.57
1760.82 29.5 1773.91 29.57 1780.46 29.59 1793.55 29.86 1800.1 29.91 1806.64
30.05 1813.19 30.11 1819.73 30.03 1826.28 30.25 1832.83 30.4 1839.37 30.59
1845.92 30.72 1852.46 30.87 1859.01 31.05 1865.55 31.09 1872.1 31.2 1878.65

31.15 1891.74 31.2 1898.28 31.29 1904.83 31.43 1911.38 31.43 1917.92 31.34
1924.47 31.37 1931.01 31.27 1937.56 31.35 1944.1 31.3 1957.2 31.15 1963.74
31.06 1970.29 30.99 1976.83 30.89 1983.38 30.83 1989.93 30.94 1996.47 30.95
2003.02 30.78 2009.56 30.71 2022.65 30.63 2029.2 30.63 2035.75 30.6 2048.84
30.69 2055.38 30.85 2068.47 30.53 2075.02 30.58 2081.57 30.53 2088.11 30.55
2094.66 30.5 2101.2 30.52 2107.75 30.5 2120.84 30.39 2127.39 30.44 2133.93
30.37 2140.48 30.23 2147.02 30.04 2153.57 30.04 2160.12 30.26 2166.66 30.05
2173.21 29.78 2179.75 29.46 2192.84 28.96 2199.39 28.8 2205.94 28.76 2212.48
28.65 2219.03 28.67 2225.57 28.62 2232.12 28.5 2245.21 28.39 2251.76 28.28
2258.3 28.08 2264.85 28.18 2271.39 28.05 2277.94 27.9 2284.49 27.7 2291.03
27.26 2297.58 26.72 2304.12 26.63 2310.67 26.44 2317.21 25.93 2323.76 25.49
2330.31 25.1 2343.4 24.55 2349.82 24.3 2358.7 23.75 2405.3 21.05 2426.5
17.28 2430.2 13.53 2445.7 .37 2466.4 -6.48 2485 -4.97 2519.1 -2.55 2528.1
.57 2538.9 1.72 2560.6 14.59 2567.2 19.62 2596.5 18.88 2649.9 17.16 2700.7
16.13 2748.7 19.04 2769.1 19.35 2827.9 18.48 2875.7 21.13 2888.55 21.24
2895.11 21.21 2901.67 21.14 2908.23 21.26 2914.78 21.41 2921.34 21.49 2927.9
21.48 2934.46 21.57 2941.01 21.86 2947.57 22.21 2954.13 22.69 2960.69 23.37
2967.25 23.64 2973.8 23.83 2980.36 23.86 2986.92 23.93 2993.48 24.1 3000.03
24.12 3006.59 24.07 3013.15 23.8 3026.27 23.5 3032.82 23.47 3045.94 23.38
3052.5 23.57 3059.05 23.57 3065.61 23.38 3072.17 23.11 3078.73 22.89 3091.84
22.51 3098.4 22.39 3104.96 22.4 3111.52 22.29 3118.07 22.05 3124.63 22.04
3131.19 22.14 3137.75 22.08 3144.31 22.05 3150.86 22.23 3157.42 22.74
3163.98 22.88 3170.54 23.49 3177.09 24.7 3183.65 25.18 3196.77 25.24 3203.33
25.48 3209.88 25.79 3216.44 26.13 3223 26.6 3229.56 27.23 3236.11 27.58
3249.23 28.01 3255.79 28.27 3262.35 28.71 3268.9 28.81 3275.46 29.12 3282.02
29.21 3288.58 29.68 3295.13 30.03 3301.69 30.32 3308.25 30.78 3314.81 31.04
3321.37 31.36 3327.92 31.87 3334.48 32.12 3341.04 32.68 3347.6 32.86 3354.16
33.31 3360.71 33.61 3367.27 33.88 3373.83 34.33 3380.39 34.62 3386.94 35.13
3393.5 35.72 3400.06 36.5 3406.62 36.89 3413.18 37.4 3419.73 38.45 3426.29
38.91 3432.85 39.34 3439.41 39.86 3445.96 40.36 3452.52 40.88 3459.08 41.29
3465.64 41.52 3472.2 41.73 3478.75 41.92 3485.31 42.34 3491.87 42.6 3498.43
42.81 3504.98 42.98 3511.54 43.05 3518.1 43.03 3524.66 43.12 3531.22 43.33
3537.77 43.59 3544.33 43.75 3550.89 43.81 3557.45 43.92 3564 43.77 3570.56
43.52 3577.12 43.59

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .093 2405.3 .055 2567.2 .09
 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2405.3
2567.2 1383.91 1376.7 1373.13 .3 .5 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 1132 28.8 T
 3000 3577.12 28.8 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 93195.04

INPUT
Description: 84
Station Elevation Data num= 342
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 37.26 6.56 37.18 13.12 36.97

19.68 36.73 26.23 36.44 32.79 36.44 39.35 36.47 45.91 36.51 52.47 36.43
59.03 36.59 65.59 36.74 72.15 36.78 78.7 36.83 85.26 36.78 91.82 36.5 98.38
36.17 104.94 36.02 111.5 35.83 118.06 35.7 124.62 35.77 131.17 35.33 137.73
35.34 144.29 35.54 150.85 36.13 157.41 36.44 163.97 36.87 170.53 37.08
177.09 37.13 183.64 37.21 190.2 37.21 196.76 37.28 203.32 37.42 209.88 37.6
216.44 37.85 223 37.85 229.55 37.74 236.11 37.73 242.67 37.8 249.23 37.62
255.79 37.44 262.35 37.32 268.91 37.29 275.47 37.16 282.02 37.02 288.58
36.78 295.14 36.65 301.7 36.65 308.26 36.57 314.82 36.32 321.38 36.42
327.94 36.37 334.49 36.27 341.05 36.37 347.61 36.37 354.17 36.24 360.73
36.22 367.29 36.2 373.85 36.26 380.41 36.58 386.96 36.96 393.52 37.26 400.08
37.55 406.64 37.84 413.2 38.05 419.76 38.03 426.32 37.79 432.87 37.5 439.43
37.54 445.99 37.33 452.55 37.34 459.11 37.57 465.67 37.71 472.23 37.63
478.79 37.51 485.34 37.41 491.9 37.44 498.46 37.34 505.02 37.16 511.58 37.2
518.14 37.29 524.7 37.47 531.26 37.62 537.81 37.37 544.37 37.26 550.93 37.37
557.49 37.68 564.05 37.85 570.61 37.59 577.17 37.68 583.72 37.7 590.28 37.55
596.84 36.98 603.4 36.84 609.96 36.67 616.52 36.43 623.08 36.32 629.64 36.26
636.19 36.14 642.75 36.01 649.31 35.8 655.87 35.71 662.43 35.63 668.99 35.47
675.55 35.38 682.11 35.4 688.66 35.45 695.22 35.48 701.78 35.43 708.34 35.43
714.9 35.57 721.46 35.37 728.02 35.6 734.58 35.76 741.13 35.8 747.69 36.07
754.25 36.46 760.81 37.17 767.37 37.49 773.93 37.62 780.49 37.54 787.04
37.42 793.6 37.14 800.16 36.29 806.72 35.39 813.28 35.09 819.84 34.83 826.4
34.67 832.96 34.71 839.51 34.82 846.07 35 852.63 35.36 859.19 35.56 865.75
35.82 872.31 35.96 878.87 36.22 885.43 36.29 891.98 36.35 898.54 36.74 905.1
37.04 911.66 37.44 918.22 37.07 924.78 36.95 931.34 36.92 937.9 37.02 944.45
36.97 951.01 36.88 957.57 36.56 964.13 36.19 970.69 35.9 977.25 35.57
983.81 35.2 990.36 34.93 996.92 34.75 1003.48 34.68 1010.04 34.64 1016.6
34.65 1023.16 34.67 1029.72 34.66 1036.28 34.53 1042.83 34.46 1049.39 34.14
1055.95 33.53 1062.51 32.56 1069.07 31.14 1075.63 29.93 1082.19 29.67
1088.74 29.88 1095.3 30.08 1101.86 30.07 1108.42 30.09 1114.98 30.11 1121.54
30.06 1128.1 29.93 1134.66 29.68 1141.21 29.67 1147.77 29.81 1154.33 30.09
1160.89 30.26 1167.45 30.46 1174.01 30.62 1180.57 30.98 1187.12 31.19
1193.68 31.41 1200.24 31.64 1206.8 31.93 1213.36 32.32 1219.92 32.86 1226.48
33.48 1233.04 34.24 1239.59 34.76 1246.15 35.04 1252.71 35.24 1259.27 35.37
1265.83 35.46 1288.35 35.69 1426.04 35.73 1498.17 36.85 1504.73 36.34
1550.62 35.91 1576.85 36.67 1662.09 35.14 1780.11 37.72 1832.57 36.92
1845.68 36.31 1858.79 36.51 1878.46 34.63 1924.36 32.83 1970.26 32.17
2016.16 29.95 2094.84 29.13 2121.07 28.43 2127.62 28.69 2147.29 30.55
2186.63 30.6 2212.86 29.82 2225.97 28.76 2278.43 28.01 2291.54 28.62 2311.21
30.41 2330.88 31.06 2370.22 29.79 2448.9 27.58 2639.05 28.18 2665.28 28.79
2691.51 28.62 2698.06 28.28 2730.85 28.81 2743.96 27.96 2816.09 28.95
2848.87 28.13 2901.32 28.64 2920.99 29.43 2973.45 28.75 2986.56 28.66
3084.91 24.75 3130.81 24.79 3143.92 24.51 3150.48 24.75 3242.28 25.59
3261.95 25.25 3301.29 26.55 3314.4 26.63 3353.74 27.97 3399.64 27.68 3412.75
27.38 3432.42 25.84 3438.98 24.98 3445.54 23.29 3452.1 22.99 3471.77 23.13
3511.11 20.16 3642.24 20.09 3661.91 19.74 3668.47 20.07 3688.14 23.1 3701.25
25.5 3707.81 25.68 3714.37 27.35 3720.92 28.27 3734.04 27.86 3747.15 26.5
3766.82 25.77 3786.49 26.44 3799.61 28.24 3819.28 28.85 3825.83 28.37
3838.95 28.72 3845.5 28.45 3852.06 29.03 3891.4 28.13 3904.52 28.33 3950.41
26.52 3989.75 26.65 4015.98 25.81 4022.54 26.21 4035.65 25.56 4061.88 25.96
4081.55 26.58 4160.23 26.53 4350.23 26.39 4389.54 26.48 4422.29 25.84
4468.14 23.09 4527.09 23.49 4559.84 22.1 4572.94 20.9 4586.04 20.13 4625.34
16.39 4664.65 16.51 4671.2 16.85 4677.75 17.67 4684.3 18.35 4690 18.3 4700
12.3 4740 9 4765 9.8 4790 9 4815 8.8 4830 12.7 4841.5 15.49 4880.8 15.55
4887.35 16.34 4907 20.29 4913.55 21.17 4926.65 21.7 4972.51 17.27 4992.16

16.52 5018.36 16.53 5057.66 15.8 5077.31 16.48 5096.96 18.59 5110.06 19.59
5155.91 24.41 5175.56 25.84 5267.27 26.54 5313.12 27.9 5319.67 27.75 5332.77
26.54 5345.87 26.31 5398.27 28.99 5444.12 28.97 5470.32 29.25 5476.88 29.04
5575.13 30.89 5581.68 30.64 5601.29 31.91 5614.36 31.71 5842.99 33.99
5856.05 34.49 5875.65 34.69 5908.31 33.75 5960.57 33.94 5986.7 34.32 6050.05
34.06 6056.58 33.77 6063.12 33.68 6069.65 33.3 6076.18 33.06 6082.71 32.88
6089.24 32.68 6095.78 32.87 6102.31 32.76

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .095 4389.54 .055 5175.56 .095

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 4389.54
5175.56 1691.41 1644.24 1589.83 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 3852 28.3 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 91550.79

INPUT
Description: 83 Approach RR Br
Station Elevation Data num= 161
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 37.41 52.45 34.82 137.68
33.89 150.8 32.74 222.92 34.58 236.03 33.17 288.48 32.9 314.71 34.08 340.93
35.11 373.71 38.48 393.38 41.69 439.28 42.7 465.5 40.9 498.29 41.64 517.95
42.86 531.07 42.57 570.41 43.11 590.07 44.81 708.09 47.75 721.2 47.53
1140.81 57.28 1271.94 56.76 1376.84 52.67 1521.08 51.25 1625.99 48.66 1639.1
50.91 1645.66 51.24 1658.77 49.65 1744 46.85 1770.23 46.94 1829.24 43.65
2117.72 39.48 2275.07 37.69 2288.19 38.26 2301.3 36.9 2517.66 36.77 2543.89
35.84 2589.78 37.75 2642.23 37.99 2694.69 38.43 2747.14 35.56 2773.36 32.88
2930.72 31.5 3081.52 28.24 3278.21 27.36 3337.22 30.11 3481.46 27.18 3488.02
26.65 3514.24 26.3 3533.91 25.46 3547.02 25.52 3560.14 24.93 3566.69 24.09
3573.25 23.91 3579.81 22.69 3606.03 19.94 3619.15 19.27 3625.7 16.92 3638.81
16.89 3645.37 18.54 3651.93 19.19 3665.04 19.4 3671.6 21.69 3697.82 22.4
3710.94 23.94 3737.16 20.72 3763.39 20.09 3776.5 17.55 3783.06 16.88 3796.17
16.64 3809.28 14.64 4209.22 14.88 4215.78 15.39 4222.33 16.54 4235.45 20.32
4274.78 19.76 4386.24 23.67 4635.38 27.77 4661.6 28.83 4694.38 28.68 5146.48
31.79 5153 31.29 5158.06 31.64 5217.08 27.42 5223.64 26.37 5282.67 26.34
5308.91 26.99 5394.17 29.3 5433.52 26.57 5466.31 21.54 5580.19 16.87 5621.49
16.09 5725.9 19.36 5769.77 8.22 5781.51 6.88 5801.8 6.75 5824.05 4.6 5846.24
4.41 5853.69 4.11 5877.12 6.96 5895.61 12.56 5896.32 18.09 5911.99 18.42
5918.54 19.05 5964.37 17.13 5977.46 15.78 5997.1 14.91 6036.38 17.04 6049.48
16.37 6062.57 14.85 6114.94 15.12 6134.58 17.67 6167.32 19.82 6173.86 19.84
6239.33 17.08 6272.06 20.28 6317.89 21.14 6357.17 21.21 6389.91 22.27
6448.83 20.7 6468.47 21.65 6553.57 18.77 6599.4 19.61 6632.14 21.13 6736.88
22.13 6815.44 22.75 6848.18 22.95 6880.91 22.37 7110.05 22.87 7116.59 22.2
7201.7 22.89 7280.26 27.26 7332.63 25.95 7352.27 24.49 7430.84 24.88 7470.12
26.46 7489.76 26.33 7529.04 28.47 7581.41 27.42 7587.96 27.88 7594.5 27.72
7607.6 25.19 7620.69 25.54 7653.42 26.01 7666.52 27.33 7686.16 26.38 7692.7
26.64 7699.25 27.67 7738.53 27.48 7771.26 29.03 7849.82 28.45 7889.1 30.21

7895.65 29.95 7902.2 28.93 7934.93 26.24 7941.48 27.76 8013.49 29.43 8020.04
30.14 8039.68 28.96 8089.75 31.36 8096.3 31.17

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .093 5725.9 .055 5918.54 .095

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 5725.9
5918.54 103.47 107.37 104.58 .3 .5 Ineffective Flow num= 1 Sta L Sta R Elev
Permanent
 0 5000 28.3 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 91443.41

INPUT
Description: 82.7 US Face RR Br
Station Elevation Data num= 192
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 37.5 23.165 31.66 46.33
30.63 55.593 29.19 60.231 27.45 83.396 23.11 129.726 19.4 143.62 19.08
347.472 19.97 384.539 19.21 481.83 21.67 495.724 20.78 583.752 22.12 639.352
24.35 676.411 21.81 713.478 22.99 741.274 21.78 875.631 22.48 940.494 22.05
945.126 22.35 1019.252 21.61037.785 23.851051.687 24.491070.213 25.691172.143
25.5 1209.202 27.441213.841 28.211241.637 28.641283.335 26.38 1352.83 27.8
1408.422 27.031454.752 26.171510.345 21.811524.246 23.5 1542.78 23.38
1575.208 24.721755.895 27.21783.691 26.941802.224 26.241825.389 26.16
1885.613 22.541908.778 19.191918.041 18.25 1922.68 16.271927.311 15.11
1955.108 15.241978.273 17.732047.767 17.092080.195 16.572089.465 15.66
2094.097 14.682172.854 14.852205.282 16.572209.921 17.592214.552 17.83
2228.447 20.132233.086 21.392242.349 24.96 2256.25 27.682274.777 28.36
2284.047 27.712307.211 27.692330.376 28.482353.541 28.992358.173 28.54
2372.068 29.22376.706 30.32385.969 29.582390.601 30.012399.871 29.15 2404.502
29.472413.766 28.382423.036 29.162427.667 28.952432.299 30.26 2455.464
29.922464.727 29.26 2483.26 29.212487.891 28.362506.425 28.92 2534.228
29.362543.499 28.212580.579 27.952594.488 27.142603.758 28.99 2645.47
28.472668.649 29.98 2715 28.182733.541 28.422742.811 27.42 2798.432
27.162812.333 26.022821.604 24.012844.782 22.22909.674 20.35 2923.582
18.962932.854 18.782946.753 16.672960.663 16.222983.835 17.24 3053.365
19.843058.003 19.643062.635 19.383067.273 18.763071.905 18.34 3076.544
17.723079.401 16.613081.175 15.923085.814 14.133089.434 13.91 3090.276
12.233101.229 7.78 3109.41 8.223129.895 6.333137.362 5.25 3160.697
5.883165.583 5.73172.922 11.883174.315 14.023178.516 14.09 3183.154
15.323187.786 16.143201.695 15.173206.326 15.983215.596 15.73 3224.866
16.073229.504 15.493234.136 15.913243.407 15.673280.488 15.14 3285.126
15.853289.765 15.813294.396 15.083354.656 15.63387.098 16.74 3401.007
18.543419.547 19.573447.357 18.333465.898 20.833502.979 20.84 3512.249
19.163516.887 19.113526.158 20.593586.417 19.33618.858 22.94 3628.13
22.893642.038 21.453651.308 21.493660.579 20.833669.849 21.31 3693.028
23.573711.568 23.663730.108 25.143739.378 24.59 3744.01 22.84 3753.28
21.163767.189 20.42 3804.27 20.253818.179 21.974012.852 22.59 4031.393
23.354068.472 22.784082.382 23.444091.652 24.74124.101 25.83 4133.372

27.094156.542 26.834175.083 24.974221.441 25.834230.711 27.04 4258.521
26.594272.424 25.564295.603 26.784323.414 26.494365.133 29.06 4388.305
31.84406.845 31.194430.024 27.494485.645 29.164499.555 28.49 4508.824
27.374536.634 29.354629.336 30.414712.768 30.524726.676 29.46 4731.308
29.574740.584 27.934749.854 30.114754.487 30.134763.755 29.39 4782.297
31.134805.477 31.46

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .0933101.229 .0553187.786 .095

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
3053.3653187.786 115.34 121.17 129.47 .5 .8 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 03076.622 28 T
3187.6374805.477 28 T
Skew Angle = 45

BRIDGE

 RIVER: Taunton River
REACH: Main Stem RS: 91395.74

INPUT
Description: 82.5 RR Br
Distance from Upstream XS = 15
Deck/Roadway Width = 20
Weir Coefficient = 2.6
Bridge Deck/Roadway Skew = 45
Upstream Deck/Roadway Coordinates
 num= 7
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord 2466.388 28.63
3059.651 28.71 3081.571 29.36 3082.278 29.24 24.23182.688 29.24 24.23184.102
29.24 4375.577 29.36

Upstream Bridge Cross Section Data
Station Elevation Data num= 192
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 37.5 23.165 31.66 46.33
30.63 55.593 29.19 60.231 27.45 83.396 23.11 129.726 19.4 143.62 19.08
347.472 19.97 384.539 19.21 481.83 21.67 495.724 20.78 583.752 22.12 639.352
24.35 676.411 21.81 713.478 22.99 741.274 21.78 875.631 22.48 940.494 22.05
945.126 22.35 1019.252 21.61037.785 23.851051.687 24.491070.213 25.691172.143
25.5 1209.202 27.441213.841 28.211241.637 28.641283.335 26.38 1352.83 27.8
1408.422 27.031454.752 26.171510.345 21.811524.246 23.5 1542.78 23.38
1575.208 24.721755.895 27.21783.691 26.941802.224 26.241825.389 26.16
1885.613 22.541908.778 19.191918.041 18.25 1922.68 16.271927.311 15.11
1955.108 15.241978.273 17.732047.767 17.092080.195 16.572089.465 15.66
2094.097 14.682172.854 14.852205.282 16.572209.921 17.592214.552 17.83
2228.447 20.132233.086 21.392242.349 24.96 2256.25 27.682274.777 28.36
2284.047 27.712307.211 27.692330.376 28.482353.541 28.992358.173 28.54
2372.068 29.22376.706 30.32385.969 29.582390.601 30.012399.871 29.15 2404.502
29.472413.766 28.382423.036 29.162427.667 28.952432.299 30.26 2455.464
29.922464.727 29.26 2483.26 29.212487.891 28.362506.425 28.92 2534.228
29.362543.499 28.212580.579 27.952594.488 27.142603.758 28.99 2645.47

28.472668.649 29.98 2715 28.182733.541 28.422742.811 27.42 2798.432
27.162812.333 26.022821.604 24.012844.782 22.22909.674 20.35 2923.582
18.962932.854 18.782946.753 16.672960.663 16.222983.835 17.24 3053.365
19.843058.003 19.643062.635 19.383067.273 18.763071.905 18.34 3076.544
17.723079.401 16.613081.175 15.923085.814 14.133089.434 13.91 3090.276
12.233101.229 7.78 3109.41 8.223129.895 6.333137.362 5.25 3160.697
5.883165.583 5.73172.922 11.883174.315 14.023178.516 14.09 3183.154
15.323187.786 16.143201.695 15.173206.326 15.983215.596 15.73 3224.866
16.073229.504 15.493234.136 15.913243.407 15.673280.488 15.14 3285.126
15.853289.765 15.813294.396 15.083354.656 15.63387.098 16.74 3401.007
18.543419.547 19.573447.357 18.333465.898 20.833502.979 20.84 3512.249
19.163516.887 19.113526.158 20.593586.417 19.33618.858 22.94 3628.13
22.893642.038 21.453651.308 21.493660.579 20.833669.849 21.31 3693.028
23.573711.568 23.663730.108 25.143739.378 24.59 3744.01 22.84 3753.28
21.163767.189 20.42 3804.27 20.253818.179 21.974012.852 22.59 4031.393
23.354068.472 22.784082.382 23.444091.652 24.74124.101 25.83 4133.372
27.094156.542 26.834175.083 24.974221.441 25.834230.711 27.04 4258.521
26.594272.424 25.564295.603 26.784323.414 26.494365.133 29.06 4388.305
31.84406.845 31.194430.024 27.494485.645 29.164499.555 28.49 4508.824
27.374536.634 29.354629.336 30.414712.768 30.524726.676 29.46 4731.308
29.574740.584 27.934749.854 30.114754.487 30.134763.755 29.39 4782.297
31.134805.477 31.46

Manning's n Values num= 3 Sta n Val Sta n Val Sta n Val
 0 .0933101.229 .0553187.786 .095

Bank Sta: Left Right Coeff Contr. Expan.
 3053.3653187.786 .5 .8
Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 03076.622 28 T
3187.6374805.477 28 T
Skew Angle = 45

Downstream Deck/Roadway Coordinates
 num= 7
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord 2466.388 28.63
2988.233 28.71 3010.154 29.36 3010.861 29.24 24.2 3111.27 29.24 24.23112.684
29.24 4375.577 29.36

Downstream Bridge Cross Section Data
Station Elevation Data num= 244
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 42.28 9.27 39.98 18.547
37.25 32.455 35.12 41.726 34.4 60.274 34.2 64.912 33.21 69.543 31.52 78.821
29.85 88.091 27.37 92.73 26.46 106.639 25.24 115.909 22.94 129.825 20.92
157.642 18.9 162.275 18.25 185.46 17.76 194.73 17.16 227.186 17.25 241.094
17.5 296.737 17.32 306.008 17.72 319.916 17.86 324.555 18.25 361.643 17.5
370.92 17.61 384.828 18.49 389.467 19.16 412.647 20.01 431.194 19.99 440.464
19.57 468.281 19.53 486.829 20.27 500.738 19.5 593.468 20.42 612.015 19.76
621.285 18.55 658.38 17.23 681.566 18.62 709.384 19.39 737.201 22.99 741.841
23.1 751.109 24.16 783.566 26.02 802.114 26.16 811.384 25.75 825.293 24.54
843.839 23.43 857.75 23.26 867.018 22.56 885.566 22.65 890.205 22.29 899.475
22.76 922.66 22.5 950.479 23.6 978.296 26.481038.569 25.81 1052.48
25.511080.304 25.451126.669 24.98 1163.756 26.121173.034 25.891186.942 26.47

1214.76 271228.669 25.77 1247.216 26.271275.034 28.171302.851 28.521312.121
29.571363.125 30.39 1428.037 27.481455.855 24.661497.581 19.711534.676
17.931548.585 18.05 1557.855 19.321562.493 19.631576.403 19.391599.582
19.821650.585 24.82 1669.133 25.361729.406 25.041757.223 26.091785.042
25.741887.041 15.49 1914.86 14.571956.593 15.821970.501 14.462021.498
15.042100.319 14.56 2142.046 15.392151.322 16 2179.14 14.572183.779 15.63
2188.41 17.68 2202.319 26.242206.958 27.142225.505 26.472267.233 24.17
2271.87 23.54 2281.141 23.492290.418 22.482308.958 21.342318.235
21.582336.783 23.36 2341.414 24.582355.323 27.182373.871 29.092401.688
28.982420.236 27.47 2424.875 28.542438.783 27.52485.148 28.62531.514
31.012596.417 30.68 2605.696 30.242624.236 30.042642.782 28.252656.691
26.622679.878 25.07 2698.418 23.732712.334 23.532758.691 20.512763.331
20.572786.516 19.77 2800.425 19.452832.882 14.44 2865.33 14.052869.969
14.532902.425 14.18 2916.334 14.852925.612 16.12934.882 16.832976.608
18.852990.517 20.06 3018.724 13.913019.565 12.233030.518 7.783038.699
8.223059.184 6.33 3066.65 5.253089.986 5.883094.872 5.7 3102.21
11.883103.605 14.02 3138.889 24.663162.075 24.83194.531 24.433245.534
23.553366.082 24.95 3440.271 24.43449.543 24.993537.641 24.343565.456 24.16
3635.01 24.32 3648.918 24.953667.466 24.763672.096 23.353676.736
23.573681.375 24.49 3699.921 23.943723.101 24.343732.377 23.723755.557
24.053760.196 23.74 3769.468 24.193783.375 24.123797.291 23.33811.199 23.55
3815.83 22.81 3820.469 22.473829.747 24.193866.834 233876.112 23.253908.568
23.13 3917.838 23.473950.294 23.843954.934 24.213959.564 23.914019.844 24.81
4029.113 26.264061.572 29.684075.481 29.914089.389 29.214098.667 28.23
4103.305 28.234117.215 27.014140.393 26.94158.938 25.434172.849 25.69
4182.125 25.284186.758 25.424196.034 26.54205.306 26.494219.213 26.15
4242.399 27.19 4251.67 28.124260.949 27.784270.218 28.254284.125 28.01
4302.672 31.254330.499 31.834335.126 31.34 4349.04 30.954367.586 32.11
4376.861 31.624381.495 30.994390.771 30.644400.042 27.464404.681 26.34
4413.951 26.644418.589 25.644423.229 25.564437.138 27.284441.776 27.29
4446.409 27.974451.045 30.324460.313 30.284464.955 30.574478.864 32.37
4488.14 35.07 4497.41 36.524502.048 36.94515.958 36.284529.869 36.84 4543.774
35.384548.415 33.514557.685 32.154562.324 32.184566.961 31.59 4576.232 31.79
4585.51 31.364608.688 31.644617.966 32.34 4650.42 31.99 4659.688
32.644668.967 324678.237 32.634715.333 33.494733.882 32.84 4743.152
33.234757.061 32.714775.607 30.564780.248 30.58

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val 0 .12990.517 .0553138.889 .095

Bank Sta: Left Right Coeff Contr. Expan.
 2990.5173138.889 .5 .8
Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 02998.133 28 T
 31204780.248 28 T
Skew Angle = 45

Upstream Embankment side slope = 0 horiz. to 1.0 vertical Downstream
Embankment side slope = 0 horiz. to 1.0 vertical Maximum allowable
submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =

```
Weir crest shape = Broad Crested

Number of Piers = 3

Pier Data
Pier Station Upstream=3105.613 Downstream=3034.195
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 3 5.6 3 20.5 6.8 20.6 6.8 25.22 Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 3 5.6 3 20.5 6.8 20.6 6.8 25.22

Pier Data
Pier Station Upstream=3132.483 Downstream=3061.065
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 3 5.6 3 20.5 6.8 20.6 6.8 25.22
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 3 5.6 3 20.5 6.8 20.6 6.8 25.22

Pier Data
Pier Station Upstream= 3160.06 Downstream=3088.642
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 3 5.6 3 20.5 6.8 20.6 6.8 25.22
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 3 5.6 3 20.5 6.8 20.6 6.8 25.22

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data  Energy
 W.S. Pro Method

 W.S.Pro Data
 Left Embankment
 El of the top of the embankment = 28.6
 El of the toe of the abutment = 16.9
 Right Embankment
 El of the top of the embankment = 28.6
 El of the toe of the abutment = 16.9
 Abutment Type = 2 Vert. abutments and sloping embankments  Slope of
abutments =
 Top with of embankment = 20
 Centroid station of bridge opening =
 Wing Wall Type = No wing walls present
 Width =
 Angle =
 Radius =
 Guide Banks Type = No Guide Bank present
 Length =
 Offset =
 Angle =
```

```
 Optional Contraction and expansion coefficients
 At approach Section
 At Guide Bank  At upstream outside
 At upstream inside (BU)
 At downstream inside (BD)
 Piers are Continuous for the width of the bridge
 Use Geometric mean as Friction Slope Method

Selected Low Flow Methods = W.S.Pro Method

High Flow Method
 Pressure and Weir flow
 Submerged Inlet Cd =
 Submerged Inlet + Outlet Cd = .8
 Max Low Cord =

Additional Bridge Parameters
 Add Friction component to Momentum
 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION


RIVER: Taunton River
REACH: Main Stem RS: 91322.25

INPUT
Description: 82.3 - DS Face RR Br
Station Elevation Data num= 244
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  0 42.28 9.27 39.98 18.547
37.25 32.455 35.12 41.726 34.4  60.274 34.2 64.912 33.21 69.543 31.52 78.821
29.85 88.091 27.37  92.73 26.46 106.639 25.24 115.909 22.94 129.825 20.92
157.642 18.9  162.275 18.25 185.46 17.76 194.73 17.16 227.186 17.25 241.094
17.5  296.737 17.32 306.008 17.72 319.916 17.86 324.555 18.25 361.643 17.5
370.92 17.61 384.828 18.49 389.467 19.16 412.647 20.01 431.194 19.99  440.464
19.57 468.281 19.53 486.829 20.27 500.738 19.5 593.468 20.42  612.015 19.76
621.285 18.55 658.38 17.23 681.566 18.62 709.384 19.39  737.201 22.99 741.841
23.1 751.109 24.16 783.566 26.02 802.114 26.16  811.384 25.75 825.293 24.54
843.839 23.43 857.75 23.26 867.018 22.56  885.566 22.65 890.205 22.29 899.475
22.76 922.66 22.5 950.479 23.6  978.296 26.481038.569 25.81 1052.48
25.511080.304 25.451126.669 24.98 1163.756 26.121173.034 25.891186.942 26.47
1214.76 271228.669 25.77 1247.216 26.271275.034 28.171302.851 28.521312.121
29.571363.125 30.39 1428.037 27.481455.855 24.661497.581 19.711534.676
17.931548.585 18.05 1557.855 19.321562.493 19.631576.403 19.391599.582
19.821650.585 24.82 1669.133 25.361729.406 25.041757.223 26.091785.042
25.741887.041 15.49  1914.86 14.571956.593 15.821970.501 14.462021.498
15.042100.319 14.56 2142.046 15.392151.322 16 2179.14 14.572183.779 15.63
2188.41 17.68 2202.319 26.242206.958 27.142225.505 26.472267.233 24.17
2271.87 23.54 2281.141 23.492290.418 22.482308.958 21.342318.235
21.582336.783 23.36 2341.414 24.582355.323 27.182373.871 29.092401.688
28.982420.236 27.47 2424.875 28.542438.783 27.52485.148 28.62531.514
```

31.012596.417 30.68 2605.696 30.242624.236 30.042642.782 28.252656.691
26.622679.878 25.07 2698.418 23.732712.334 23.532758.691 20.512763.331
20.572786.516 19.77 2800.425 19.452832.882 14.44 2865.33 14.052869.969
14.532902.425 14.18 2916.334 14.852925.612 16.12934.882 16.832976.608
18.852990.517 20.06 3018.724 13.913019.565 12.233030.518 7.783038.699
8.223059.184 6.33 3066.65 5.253089.986 5.883094.872 5.7 3102.21
11.883103.605 14.02 3138.889 24.663162.075 24.83194.531 24.433245.534
23.553366.082 24.95 3440.271 24.43449.543 24.993537.641 24.343565.456 24.16
3635.01 24.32 3648.918 24.953667.466 24.763672.096 23.353676.736
23.573681.375 24.49 3699.921 23.943723.101 24.343732.377 23.723755.557
24.053760.196 23.74 3769.468 24.193783.375 24.123797.291 23.33811.199 23.55
3815.83 22.81 3820.469 22.473829.747 24.193866.834 233876.112 23.253908.568
23.13 3917.838 23.473950.294 23.843954.934 24.213959.564 23.914019.844 24.81
4029.113 26.264061.572 29.684075.481 29.914089.389 29.214098.667 28.23
4103.305 28.234117.215 27.014140.393 26.94158.938 25.434172.849 25.69
4182.125 25.284186.758 25.424196.034 26.54205.306 26.494219.213 26.15
4242.399 27.19 4251.67 28.124260.949 27.784270.218 28.254284.125 28.01
4302.672 31.254330.499 31.834335.126 31.34 4349.04 30.954367.586 32.11
4376.861 31.624381.495 30.994390.771 30.644400.042 27.464404.681 26.34
4413.951 26.644418.589 25.644423.229 25.564437.138 27.284441.776 27.29
4446.409 27.974451.045 30.324460.313 30.284464.955 30.574478.864 32.37
4488.14 35.07 4497.41 36.524502.048 36.94515.958 36.284529.869 36.84 4543.774
35.384548.415 33.514557.685 32.154562.324 32.184566.961 31.59 4576.232 31.79
4585.51 31.364608.688 31.644617.966 32.34 4650.42 31.99 4659.688
32.644668.967 324678.237 32.634715.333 33.494733.882 32.84 4743.152
33.234757.061 32.714775.607 30.564780.248 30.58

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .12990.517 .0553138.889 .095

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
2990.5173138.889 49.58 50.95 49.51 .5 .8 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 02998.133 28 T
 31204780.248 28 T
Skew Angle = 45

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 91271.3

INPUT
Description: 82 Exit RR Br
Station Elevation Data num= 233
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 35.84 137.39 36.97 235.53
38.52 268.24 39.96 477.6 37.88 503.77 39.47 700.05 41.48 732.76 42.52 752.39
41.88 765.47 42.22 791.64 41.06 804.73 41.4 824.35 45.92 830.9 46.44 837.44
47.61 843.98 47.86 857.07 45.86 876.69 46.05 896.32 43.8 902.86 45.82
909.41 46.62 915.95 48.59 922.49 51.3 929.03 52 942.12 49.31 961.75 52.51
968.29 54.32 974.83 54.7 1020.63 54.8 1072.97 50.63 1118.77 51.77 1151.48
48.16 1249.62 44.43 1269.24 43.08 1360.88 42.09 1367.43 41.38 1380.54 36.7

1387.1 35.99 1406.76 37.7 1420.57 37.49 1459.93 34.54 1479.61 30.97 1499.29 25.77 1512.41 24.32 1545.21 19.62 1558.33 18.22 1591.13 17.13 1715.78 17.45 1728.9 17.88 1781.38 17.47 1801.06 16.93 1814.18 17.68 1827.3 17.18 1879.78 17 1925.7 18.05 1945.39 18.22 1971.63 20.01 1991.31 20.75 2017.55 20.79 2030.67 20.07 2056.91 20.48 2122.51 23.45 2214.36 20.63 2266.84 17.9 2332.44 17.58 2352.12 19.65 2391.48 22.27 2424.28 23.86 2522.69 26.26 2614.53 25.89 2667.01 27.21 2706.37 26.37 2732.61 26.67 2804.78 25.3 2870.38 24.75 2896.62 25.22 2942.54 24.91 2975.34 25.5 2988.46 25.07 2995.02 25.31 3008.14 24.84 3027.82 25.57 3073.74 25.31 3126.23 27.85 3185.27 29.76 3237.75 30.6 3263.99 30.57 3336.15 28.39 3408.32 23.76 3421.44 22.11 3487.04 17.04 3513.28 17.24 3532.96 16.8 3565.76 17.96 3578.88 19.35 3592 19.97 3651.04 25.04 3677.29 25.23 3696.97 24.36 3703.53 23.22 3716.65 23.23 3736.33 22.07 3756.01 20.05 3762.57 20.41 3788.81 23.77 3815.05 24.93 3834.73 24.39 3867.53 22.24 3893.77 21.18 3920.01 17.92 3939.7 17 3979.06 17.48 4024.98 15.15 4051.22 15.24 4077.46 16.32 4103.7 15.54 4116.82 14.53 4169.3 14.16 4208.67 14.78 4293.95 14.55 4326.75 15.84 4346.43 14.81 4385.79 15.81 4392.35 16.63 4398.91 18.61 4412.03 23.8 4418.59 24.58 4444.83 23.47 4536.68 16.88 4543.24 17.5 4556.36 16.32 4569.48 15.91 4654.76 17.42 4707.24 21.58 4726.93 21.7 4759.73 19.97 4785.97 20.76 4805.65 20.6 4825.33 21.66 4884.37 28.18 4897.49 28.69 4930.29 28.72 4982.77 29.74 4989.34 29.29 5009.02 30.6 5041.82 30.06 5081.18 27.31 5113.98 23.95 5173.02 22.02 5192.7 20.32 5232.06 19.51 5258.31 17.96 5297.67 14.04 5310.79 13.78 5330.47 14.41 5389.51 13.78 5422.31 14.96 5435.43 16.19 5527.28 18.97 5553.52 20.45 5564.48 20.33 5574.58 14.69 5578.28 10.69 5593.29 3.27 5624.73 4.87 5649.74 2.5 5650.05 11.85 5653.66 15.81 5663.71 18.79 5684.72 20.02 5691.28 22.22 5697.84 23.65 5704.4 24.17 5724.08 23.49 5743.77 23.54 5789.69 24.69 5979.94 24.25 6084.9 25.04 6235.79 24.95 6281.71 23.68 6334.19 23.57 6386.67 25.14 6485.08 25.03 6537.56 27.17 6570.36 27.14 6629.35 28.52 6662.08 30 6681.73 29.61 6734.1 30.76 6858.49 31.74 6950.15 31.32 6969.79 30.3 6976.33 28.7 6995.98 28.84 7022.16 26.1 7028.71 25.03 7035.26 24.59 7054.9 25.36 7067.99 26.61 7081.08 28.57 7094.18 29.86 7153.1 28.9 7212.02 30.11 7251.3 28.92 7270.94 27.88 7284.04 28.89 7303.68 26.77 7329.87 27.9 7342.96 28 7356.05 28.97 7447.71 31.44 7467.35 31.02 7519.73 32.47 7526.27 33.05 7532.82 32.96 7559.01 35.07 7637.57 37.48 7650.66 37.35 7696.49 39.46 7716.13 40.8 7755.41 42.51 7768.51 43.62 7807.79 45.74 7840.52 49.06 7879.8 51.24 7925.63 55.73 7945.27 57.18 8030.38 65.88 8076.21 69.38 8180.96 72.68 8194.05 72.54 8207.15 73.19 8444.69 76.65

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .095 5553.52 .055 5704.4 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 5553.52 5704.4 3090.08 3016.84 2959.28 .3 .5 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 5435 28 T
 5980 8444.69 28 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 88254.45

INPUT

Description: 81 DS Nemasket River Trib
Station Elevation Data num= 388
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 50.83 26.2 50.37 39.3 50.41
78.59 50.08 117.89 49.03 130.99 49.26 157.19 49.21 170.29 48.53 189.93 48.71
255.43 47.69 261.98 47.9 268.53 47.88 275.08 47.6 281.63 47.6 294.73 47.15
307.83 47.2 327.47 46.53 347.12 46.27 386.42 45.27 406.07 44.94 419.17 44.32
432.27 43.24 445.36 42.63 465.01 41.01 497.76 39.87 517.41 38.36 530.51
36.73 537.06 36.09 550.16 35.5 556.71 35.48 563.26 35.7 569.8 35.7 582.9
36.19 602.55 35.89 628.75 34.91 648.4 34.34 654.95 34.33 674.6 33.63 746.64
32.3 753.19 32.36 772.84 31.84 812.14 31.39 844.88 30.68 864.53 30.94 877.63
30.55 897.28 30.51 903.83 30.34 910.38 29.95 975.87 29.74 988.97 29.35
1015.17 30.55 1021.72 30.63 1034.82 30.16 1080.66 31.23 1093.76 31.08
1106.86 30.65 1113.41 30.78 1133.06 30.19 1146.16 29.99 1152.71 29.6 1159.26
29.45 1165.81 29.64 1172.36 30.09 1178.91 30.09 1192.01 29.37 1205.1 29.59
1211.65 29.91 1224.75 29.86 1231.3 29.53 1237.85 30.47 1244.4 30.92 1250.95
30.94 1257.5 30.68 1264.05 30.02 1270.6 29.65 1277.15 29.69 1290.25 29.16
1342.64 29.36 1362.29 29.72 1368.84 30.19 1395.04 31.04 1408.14 31.16
1421.24 30.98 1447.43 31.45 1467.08 31.17 1493.28 31.52 1552.23 31.28
1558.78 31.47 1584.97 30.9 1604.62 30.02 1617.72 30.31 1637.37 29.66 1663.57
29.42 1670.12 29.86 1683.22 30.23 1696.31 29.64 1709.41 29.35 1722.51 27.51
1729.06 26.88 1735.61 26.67 1742.16 26.99 1748.71 27.73 1755.26 28.14
1761.81 28.02 1788.01 26.87 1794.56 27.08 1801.11 27.51 1807.66 27.62
1814.21 28.02 1820.76 28.18 1833.85 28.13 1840.4 28.4 1860.05 28.39 1879.7
28.86 1886.25 28.83 1892.8 28.59 1905.9 28.43 1912.45 28.52 1925.55 29.96
1932.1 30.83 1938.65 30.87 1945.19 31.23 1951.74 31.87 1958.29 31.14 1964.84
30.11 1977.94 29.22 1984.49 28.01 1991.04 27.59 1997.59 27.52 2036.89 24.86
2049.99 24.52 2063.09 23.61 2082.73 25.1 2095.83 26.51 2102.38 26.77 2108.93
26.81 2128.58 26.46 2135.13 25.46 2141.68 23.76 2148.23 22.91 2154.78 22.68
2159.27 22.35 2165.81 21.16 2172.36 20.76 2185.45 22.03 2191.99 22.18
2205.08 21.68 2218.17 21.82 2224.72 22.12 2231.26 22.1 2244.35 22.74 2250.89
23.23 2257.44 24.06 2270.53 27.33 2277.07 28.66 2283.62 29.34 2296.71 30.1
2316.34 30.44 2329.43 29.95 2335.98 29.28 2349.07 27.38 2355.61 26.84 2368.7
26.33 2388.33 26.43 2394.88 26.22 2407.97 26.38 2421.06 26.25 2447.24 26.56
2460.33 26.33 2466.87 26.6 2486.51 26.98 2499.59 27 2525.77 27.44 2538.86
27.87 2551.95 27.81 2571.59 27.99 2604.31 28.62 2610.86 28.6 2656.67 29.5
2669.76 30.03 2676.3 30.1 2682.85 30.4 2748.29 31.93 2794.11 32.45 2800.65
32.81 2846.47 34.26 2872.64 34.35 2905.37 34.76 2911.91 34.59 2925 34.97
2990.45 35.3 3003.54 35.5 3023.17 35.41 3036.26 35.69 3068.99 35.62 3088.62
35.8 3101.71 35.73 3114.8 35.89 3134.43 35.48 3180.22 34.89 3193.26 34.44
3206.29 33.72 3225.85 33.06 3238.89 32.31 3251.92 31.96 3271.48 30.82
3291.03 29.97 3304.07 29.59 3310.59 28.93 3323.62 28.14 3343.18 27.59
3362.74 26.66 3388.81 24.78 3395.33 24.18 3401.85 23.87 3414.88 23.66 3421.4
23.35 3427.92 22.34 3434.44 21.56 3447.47 20.45 3467.03 19.24 3480.07 18.03
3486.59 17.31 3493 16.8 3498 11.5 3530 5.8 3562 11.9 3578.45 19.09 3583.38
17.62 3590.88 16.9 3603.92 16.61 3616.95 16.79 3623.47 17.09 3636.51 17.17
3649.55 16.75 3656.06 16.82 3669.17 16.24 3675.72 16.16 3688.82 16.55
3695.37 17 3708.47 17.21 3728.12 16.97 3734.67 16.65 3747.77 16.32 3754.33
16.44 3760.88 16.79 3787.08 17.11 3806.73 16.95 3813.28 16.53 3819.83 15.61
3826.38 15.03 3846.04 15.3 3865.69 16.39 3878.79 16.54 3898.44 15.36 3904.99
15.31 3918.09 15.94 3931.2 16.14 3944.3 15.76 3950.85 15.85 3957.4 15.68
3970.5 14.9 3977.05 14.75 3996.7 14.93 4009.8 15.85 4016.35 15.8 4036.01
14.62 4042.56 14.62 4055.66 15.15 4062.21 16.84 4068.76 19.55 4075.31 22.85
4081.86 25.83 4088.41 27.13 4094.96 25.92 4101.51 24.27 4108.06 23.57
4114.62 23.21 4121.17 21.68 4127.72 20.74 4134.27 20.45 4140.82 19.72

4147.37 19.72 4153.92 20.12 4173.57 20.51 4186.67 21.04 4199.77 17.75
4212.88 12.45 4219.43 10.33 4225.98 8.56 4232.53 7.12 4245.63 3.49 4258.73
3.06 4271.83 1.16 4284.93 -1.67 4291.48 -2.74 4298.04 -3.08 4304.59 -4.14
4317.69 -6.58 4324.24 -8.41 4330.79 -9.85 4343.89 -10.15 4350.44 -9.8
4376.64 -10.37 4383.2 -10.19 4389.75 -9.7 4409.4 -7.02 4429.05 -3.81 4435.6
-1.74 4448.7 -2.34 4468.35 -.9 4474.91 .04 4481.46 1.57 4494.56 3.72 4507.66
4.78 4514.21 7.17 4520.76 9.16 4527.31 12.09 4540.41 13.84 4546.96 15.02
4553.51 16.42 4560.06 18.1 4566.62 20.39 4573.17 23.54 4579.72 22.59 4586.27
22.46 4612.47 22.79 4625.57 23.24 4632.12 23.83 4638.67 23.96 4645.22 24.51
4651.78 25.33 4658.33 26.44 4664.88 26.43 4671.43 25.57 4677.98 24.96
4684.53 23.78 4691.08 22.04 4704.18 18.15 4710.73 16.57 4717.28 10 5064.47
10 5071.02 15.66 5077.57 20.65 5084.12 24.06 5090.67 26.2 5097.23 26.71
5103.78 26.26 5110.33 26.02 5129.98 26.56 5149.63 26.17 5156.18 25.71
5162.73 24.51 5169.28 22.84 5175.83 21.98 5182.38 20.88 5188.94 17.32
5195.49 14.56 5202.04 14.74 5208.59 10 5496.82 10 5503.37 16.41 5509.92
20.29 5516.47 25.53 5523.02 30.19 5529.57 34.31 5536.12 36.11 5542.67 35.08
5549.22 34.77 5555.78 35.17 5562.33 35.17 5568.88 32.28 5575.43 29.63
5581.98 28.1 5595.08 27.21 5601.63 26.52 5608.18 26.07 5614.73 25.13 5627.44
26.16 5633.8 27.53 5646.51 28.67 5652.86 28.83 5678.29 28.23 5687.22 28.26
5693.57 28.75 5699.93 30.25 5706.28 30.05 5712.64 28.18

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 3467.03 .055 3578.45 .085
 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
3467.03 3578.45 973.59 1026.95 1087.56 .3 .5 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 3088 29 F
 4088 5712.64 27.13 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 87227.5

INPUT
Description: 80
Station Elevation Data num= 277
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 28.83 19.66 28.87 32.76
29.54 39.31 30.11 45.87 30.3 52.42 30.32 78.63 31.33 85.18 31.24 91.73 30.35
98.28 29.09 104.84 28.77 111.39 29.59 117.94 29.88 124.49 29.67 131.04 29.85
144.15 29.99 150.7 29.68 157.25 29.98 183.46 30.2 209.67 29.33 222.78 29.27
229.33 29.34 235.88 29.55 242.43 29.92 248.98 29.96 255.54 29.72 262.09
29.77 268.64 29.99 275.19 30 281.75 30.17 294.85 30.1 301.4 29.95 307.96
30.03 314.51 29.94 321.06 30.01 327.61 29.15 334.16 28.83 347.27 29.25
353.82 29.23 366.93 29.72 393.13 30.22 399.69 30.53 419.34 30.89 432.45
30.92 452.1 31.36 465.21 31.11 478.31 31.14 484.87 31.51 497.97 31.42 511.07
31.63 524.18 31.54 537.28 31.64 543.84 31.59 556.94 31.94 576.6 32.18
602.81 32.18 615.91 32.43 622.46 32.43 635.57 32.78 642.12 32.69 655.22
32.86 674.88 32.82 687.98 32.62 714.19 32.92 740.4 32.7 753.51 33.25 766.61
33.2 779.72 32.87 786.27 32.86 792.82 33.01 799.37 32.93 812.48 33.25 819.03
32.69 838.69 32.43 845.24 32.45 864.89 32.23 878 32.36 884.55 32.3 897.66
32.55 930.42 32.36 950.07 32.48 956.63 32.61 963.18 32.9 969.73 32.83 989.39

31.75 1048.32 29.68 1074.45 29.12 1087.51 28.63 1113.64 27.19 1120.18 26.92
1126.71 27.59 1133.24 30.05 1139.77 30.27 1146.31 29.83 1152.84 29.04
1159.37 30.06 1165.91 28.06 1172.44 25.82 1185.5 25.02 1192.04 25.38 1198.57
25.22 1205.1 25.31 1211.63 24.52 1218.17 25.25 1224.7 27.16 1231.23 26.4
1237.76 23.11 1244.3 21.85 1257.36 21.08 1263.9 20.59 1270.43 20.27 1290.03
20.13 1296.56 19.9 1309.62 19.24 1322.69 18.22 1329.22 17.85 1342.29 17.93
1348.82 17.66 1355.35 17.54 1368.42 17.78 1374.95 17.66 1388.02 16.7 1394.55
16.65 1407.61 18.02 1414.15 18.15 1427.21 17.61 1440.28 16.79 1453.34 15.61
1466.41 15.69 1486.01 16.5 1505.6 16.61 1525.2 16.38 1538.27 15.58 1544.8
15.84 1551.33 16.25 1557.86 16.36 1570.93 16.16 1584 17.03 1590.53 17.23
1603.59 17.08 1616.66 17.61 1623.19 17.75 1629.72 17.6 1639.86 16.94 1642.79
16.75 1649.32 16.37 1655.85 15.03 1663 16.8 1668 11.5 1700 5.8 1732 11.9
1744 18.9 1779.98 16.55 1793.04 15.07 1799.57 14.48 1812.64 13.91 1819.17
14.05 1825.7 14.36 1832.24 14.53 1838.77 14.33 1871.43 14.6 1891.03 14.52
1904.1 14.25 1910.63 14.84 1917.16 16.69 1923.69 19.65 1930.23 23.07 1936.76
24.24 1943.29 23.94 1949.82 23.11 1956.36 20.42 1962.89 17.25 1969.42 12.34
1975.95 9.14 1982.49 7.84 1989.02 6.72 1995.55 3.71 2002.09 -.43 2008.62 -
5.16 2015.15 -9.23 2021.68 -9.81 2028.22 -10.11 2047.81 -10.49 2073.94 -
10.41 2093.54 -10.06 2100.08 -10.09 2106.61 -9.86 2113.14 -8.29 2119.67 -
7.08 2126.21 -5.59 2132.74 -5.01 2139.27 -3.27 2145.8 -1.77 2152.34 -.44
2158.87 .37 2165.4 2.16 2171.93 4.46 2178.47 5.61 2185 6.53 2191.53 6.66
2198.06 8.13 2204.6 11.72 2211.13 17.66 2217.66 19.43 2224.2 19.17 2230.73
18.51 2237.26 17.56 2243.79 18.09 2250.33 19.4 2256.86 19.95 2263.39 20.31
2269.92 19.28 2276.46 18.9 2282.99 18.85 2289.52 19.36 2296.05 18.99 2302.59
16.42 2315.65 15.41 2328.72 15.1 2335.25 15.16 2341.78 15.06 2374.45 16.39
2380.98 18.48 2387.51 22.41 2394.04 22.72 2400.58 23.72 2407.11 21.79
2413.64 21.54 2420.18 22.04 2433.24 22.05 2439.77 22.29 2446.31 21.97
2452.84 22.1 2465.9 22.13 2472.44 22.32 2478.98 22.7 2485.52 22.24 2492.06
21.42 2498.6 21.26 2511.68 20.54 2518.22 18.42 2524.76 16.13 2531.3 15.32
2537.84 15.08 2544.38 15.07 2550.92 15.65 2564 16.11 2570.54 16.64 2577.08
18.96 2583.62 20.6 2590.16 21.04 2596.7 20.3 2616.32 16.63 2622.86 14.94
2629.4 0 2845.21 0 2851.75 14.59 2858.29 16.17 2864.83 19.77 2871.37 25.67
2877.91 30.36 2884.45 32.46 2890.99 32.93 2897.53 32.64 2904.07 33.01
2917.15 33.13 2936.77 33.84 2943.31 31.91 2949.85 29.6 2956.39 27.66 2962.93
26.28 2969.47 25.53 2976.01 25.28 2989.09 25.87 3002.17 25.82 3008.7 25.64
3034.86 25.77

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .0875 1663 .055 1744 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1663
1744 1820.81 1790.19 1770.77 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 1936 3034.86 24.24 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 85437.3

INPUT
Description: 79 Approach Titicut St

Station Elevation Data num= 381
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 30.23 19.66 30.06 32.77
29.56 52.43 29 65.54 28.37 72.09 28.22 91.75 27.22 98.31 27.08 104.86 26.32
111.41 25.91 124.52 26.04 131.08 25.9 144.18 25.79 150.74 25.62 163.84 25.62
170.4 25.52 176.95 25.57 190.06 24.32 196.61 24.03 209.72 24.38 216.27 24.32
222.83 23.88 229.38 24.11 235.94 24.04 255.6 23.33 262.15 23.32 268.7 23.08
275.26 22.7 288.37 22.8 301.47 22.73 308.03 22.56 314.58 22.9 327.69 22.94
334.24 22.71 340.8 23.05 347.35 23.11 360.46 23.68 380.12 23.9 386.67 24.09
406.33 24.2 412.89 24.46 419.44 24.41 426 24.11 432.55 23.19 445.66 23.48
452.21 22.76 458.76 21.51 465.32 20.4 471.87 19.58 484.98 19.43 511.19 19.88
517.75 19.61 524.3 19.58 530.86 19.41 543.96 19.4 550.52 19.16 557.07 19.2
583.29 20.06 596.39 19.07 602.95 18.84 622.61 18.48 635.72 18.79 655.38
20.13 661.93 20.48 681.59 19.72 720.92 19.43 734.02 19.61 740.58 19.54
753.68 19.13 760.24 18.76 766.79 18.25 773.35 18.19 779.9 17.4 786.45 17.04
799.56 15.74 825.78 14.8 832.33 14.81 845.44 15.49 851.99 15.52 871.65 15.86
878.21 16.59 884.76 17.45 891.31 17.84 896.2 17.14 903.13 16.84 909.99 16.37
918.26 13.93 936.91 14.42 939.09 9.63 957.78 6.63 962.96 5.24 972.96 4.71
987.88 3.1 1011.1 1.63 1037.68 1.86 1054.98 4.01 1060.55 8.76 1074.19 15.5
1094.48 15.87 1101.04 16.42 1107.59 16.46 1114.14 16.6 1120.7 16.36 1127.25
16.41 1133.8 16.42 1140.36 16.37 1146.91 16.43 1153.47 16.47 1160.02 16.54
1166.57 16.44 1173.13 16.31 1179.68 16.12 1186.24 15.78 1192.79 15.68
1199.34 15.52 1205.9 15.54 1212.45 15.74 1225.56 16 1232.11 16.03 1238.67
16.14 1245.22 16.04 1251.77 15.84 1258.33 15.93 1264.88 16.05 1277.99 16.7
1284.54 16.97 1291.1 17.32 1297.65 17.57 1310.76 17.61 1317.31 17.65 1323.86
17.48 1330.42 17.64 1336.97 17.66 1350.08 17.93 1356.63 17.87 1363.19 17.89
1369.74 17.87 1376.3 18.09 1382.85 18.21 1389.4 18.21 1395.96 18.14 1402.51
18.16 1409.06 18.4 1415.62 18.39 1422.17 18.42 1428.73 18.54 1435.28 18.97
1441.83 19.75 1448.39 21.49 1454.94 24.27 1461.49 24.86 1468.05 25.21 1474.6
25.32 1481.16 25.21 1487.71 24.92 1494.26 24.84 1507.37 24.96 1513.92 25.08
1520.48 25.23 1527.03 25.26 1533.59 25.08 1540.14 25.17 1546.69 25.07
1553.25 24.99 1559.8 24.94 1566.36 24.83 1572.91 25.16 1579.46 25.25 1586.02
25.05 1592.57 24.77 1599.12 25.27 1605.68 25.7 1612.23 25.46 1618.77 25.05
1625.31 24.6 1631.85 25.04 1638.39 25.85 1644.94 27.45 1651.48 28.71 1658.02
28.69 1664.56 28.34 1671.1 28.22 1677.64 28.06 1684.18 27.97 1690.72 27.71
1697.26 27.43 1703.8 26.7 1710.34 26.97 1716.88 27.86 1723.42 28.35 1736.51
28.48 1743.05 28.46 1749.59 28.57 1756.13 28.39 1762.67 27.52 1769.21 26.67
1775.75 25.9 1782.29 25.54 1788.83 25.71 1795.37 26 1801.91 26.55 1808.45
26.55 1815 27.06 1821.54 27.41 1828.08 27.45 1834.62 27.05 1841.16 26.38
1847.7 26.66 1854.24 26.76 1860.78 25.84 1867.32 25.51 1873.86 25.55 1880.4
25.69 1886.94 25.69 1893.48 25.71 1900.03 26.15 1906.57 26.63 1913.11 27.08
1919.65 27.3 1926.19 27.28 1932.73 27.49 1939.27 27.67 1945.81 27.76 1952.35
27.95 1958.89 27.85 1965.43 28.04 1971.97 28.17 1978.51 28.38 1985.06 28.65
1991.6 28.48 1998.14 28.36 2004.68 28.72 2011.22 28.65 2017.76 28.64 2024.3
28.69 2030.84 28.67 2037.38 28.21 2043.92 28.43 2050.46 28.58 2057 28.76
2063.54 28.91 2070.09 29.03 2076.63 29.06 2083.17 29.07 2089.71 29.17
2096.25 29.22 2102.79 29.34 2115.87 29.45 2122.41 29.45 2128.95 29.49
2135.49 29.49 2142.03 29.42 2148.57 29.42 2155.12 29.49 2161.66 29.59
2174.74 29.74 2181.28 29.75 2194.36 29.87 2200.9 29.89 2207.44 29.84 2213.98
29.85 2220.52 30.05 2227.06 30.23 2233.6 30.15 2240.15 30.25 2246.69 30.32
2253.23 30.32 2259.77 30.27 2266.31 30.28 2272.85 30.51 2285.93 30.15
2292.47 30.29 2299.01 30.53 2312.09 30.78 2318.64 30.83 2325.18 30.97
2331.72 31.29 2338.26 31.43 2344.8 31.41 2351.34 31.34 2357.88 31.45 2364.42
31.59 2370.96 31.67 2377.5 31.72 2384.04 31.83 2390.58 31.78 2397.12 31.75
2403.67 31.52 2410.21 31.16 2416.75 30.93 2423.29 30.98 2429.83 30.85

2436.37 30.67 2442.91 30.78 2449.45 30.65 2455.99 30.75 2462.53 30.82
2469.07 30.79 2475.61 30.51 2482.15 30.55 2488.7 30.57 2495.24 30.46 2501.78
30.46 2508.32 30.38 2514.86 30.4 2521.4 30.34 2527.94 30.3 2534.48 30.12
2541.02 30.1 2547.56 30.02 2554.1 30 2560.64 29.88 2567.18 29.7 2580.27
29.39 2586.81 29.33 2593.35 29.16 2599.89 29.06 2606.43 28.84 2612.97 28.57
2619.51 28.19 2632.59 27.6 2639.13 26.98 2645.67 26.33 2652.21 26.24 2658.76
26.25 2665.3 26.47 2671.84 26.66 2678.38 26.36 2684.92 26.5 2691.46 26.57
2698 26.62 2704.54 27.02 2711.08 27.07 2717.62 27.23 2724.16 27.69 2730.7
28.02 2737.24 27.88 2743.79 28.46 2750.33 29.28 2756.87 31.34 2763.41 33.31
2769.95 35.11 2776.49 36.95 2783.03 38.16 2789.57 38.78 2796.11 38.09
2802.65 37.82 2809.19 37.25 2815.73 37.54 2822.27 37.15 2828.82 34.17
2835.36 30.58 2841.9 27.76 2848.44 26.62 2854.98 27.5 2861.52 27.99 2868.06
27.94 2874.6 27.56 2881.14 27.33 2887.68 27.14 2894.22 27.05 2900.76 27.13
2907.3 27.16 2913.85 27.23 2920.39 27.51 2926.93 27.6 2933.47 27.59 2940.01
27.76 2946.55 27.91 2953.09 28.02 2959.63 28.22 2966.17 28.45 2972.71 28.8
2979.25 29.11 2992.33 29.68 2998.88 30 3005.42 30.13 3011.96 30.32 3018.5
30.4 3025.04 30.45 3031.58 30.56

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 891.31 .055 1114.14 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 891.31
1114.14 103.69 101.02 107.47 .3 .5 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 426 25.5 T
 1464 3031.58 25.5 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 85336.28

INPUT
Description: 78.7- US Face Titicut St
Station Elevation Data num= 278
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 30.5 10.005 29.95 14.999
29.87 40.003 30.21 55.009 29.74 65.006 28.84 80.013 27.17 90.01 26.54 95.012
25.93 115.014 25.42 120.016 25.02 125.019 24.89 130.02 24.3 135.016 24.05
140.018 24.3 145.019 24.17 150.022 24.59 160.02 24.78 165.021 24.52 170.023
23.91 175.026 24.05 180.028 24.54 185.022 24.89 190.025 25.82 200.03 26.53
220.031 26.35 230.028 26.03 235.03 26.09 240.033 25.99 245.034 25.75 250.037
25.69 255.032 25.38 265.036 25.35 270.038 25 275.041 24.23 280.035 22.99
285.037 21.59 290.04 21.03 295.042 20.76 300.045 19.99 305.039 20.23 310.041
19.86 320.046 19.91 330.043 20.38 335.045 20.35 340.047 20.15 350.044 20.16
355.046 20.68 360.048 21.93 365.051 21.72 370.053 21.16 375.047 21.17
385.052 21.39 390.055 21.72 395.057 23.34 400.051 25.21 410.056 26.12
425.055 26.64 435.059 26.57 450.058 26.97 455.061 26.77 465.066 26.82
485.067 26.57 495.064 26.08 510.071 25.68 525.07 24.95 540.076 22.79 545.072
22.16 550.073 21.8 555.076 21.15 560.078 19.02 565.08 17.9 570.075 17.97
575.077 18.23 590.084 18.7 595.079 19.13 615.08 18.86 640.083 19.54 645.086
19.48 650.088 19.75 655.09 20.26 660.093 21.52 675.092 22.6 685.097 23.03
690.091 23.12 691.777 22.87 715.616 12.43 718.557 11.78 721.56 11.33 725.276

11.24 732.224 10.78 738.866 10.72 744.013 10.09 749.966 9.83 754.967 10.86
761.18 10.96 766.749 11.24 772.127 11.43 777.642 12.8 779.772 11.89 797.621
22.19 800.111 22.86 805.112 22.76 810.108 22.41 815.11 22.22 820.111 21.89
825.114 22.18 835.112 20.16 845.108 19 850.111 19.03 855.105 18.7 865.102
18.31 870.104 17.93 880.101 17.59 885.095 17.79 895.1 17.56 900.094 17.75
905.097 17.46 910.091 17.72 915.093 17.54 930.093 17.5 935.087 18.06 940.089
16.55 950.086 16.72 955.082 16.7 965.078 16.91 970.081 17.32 980.077 17.51
990.074 16.971000.071 17.59 1005.073 18.031020.072 18.421030.069
18.961040.066 19.051045.061 18.88 1055.065 18.961060.059 18.861065.062
19.281070.057 19.41 1075.06 19.35 1080.054 19.11085.056 19.511090.051
19.711095.053 19.251100.055 19.74 1120.049 20.471130.046 20.991135.048
20.781145.045 20.731155.042 20.84 1160.036 21.241165.038 21.231170.034
21.471175.035 22.271185.033 22.82 1190.034 23.31 1195.03 23.481200.032
23.81210.029 24.211215.023 24.64 1220.025 24.851225.028 25.281230.022
25.271235.025 25.471250.016 24.79 1260.021 24.031265.015 24.011270.032
24.561280.068 24.741285.085 24.65 1290.104 24.71295.121 24.531300.139
24.611305.148 25.391315.183 26.43 1320.201 26.441325.218 26.161345.289
27.061350.306 26.891360.342 26.16 1365.359 25.621370.376 25.251375.387
25.121385.422 25.131390.439 25.28 1395.457 25.241415.527 25.791425.562 25.81
1430.58 25.931435.597 25.89 1475.731 26.881505.836 27.421520.882
27.451540.952 27.821545.969 27.77 1596.138 28.491601.155 28.78 1611.19
28.731616.208 28.821621.226 29.06 1656.34 28.71661.359 28.561666.376
28.581686.447 28.111691.464 27.89 1716.546 27.84 1726.58 27.91736.615
27.621741.632 27.741756.685 28.52 1761.703 29.06 1766.72 29.341771.738
29.771776.755 29.951781.773 30.43 1786.783 30.421791.801 30.671801.836
31.551806.854 31.681816.889 31.74 1821.906 31.921826.924 32.281841.976
32.31846.994 32.091867.057 32.19 1872.075 32.31892.145 31.71897.162
31.641912.215 32.031917.233 31.61 1922.243 30.931942.313 29.851947.331
30.021952.348 29.911957.366 29.55 1967.401 29.581982.454 29.992002.517 29.93
2037.64 29.9 2062.72 29.61 2067.738 29.062072.755 29.282077.773 29.1 2082.79
28.622087.808 28.42 2097.843 28.212102.861 27.692107.878 27.972117.913
28.142122.931 27.93 2137.976 28.52148.012 28.292153.029 28.082163.063 27.91
2173.1 27.37 2183.134 27.42 2198.18 26.622203.198 26.542213.233 26.68 2218.25
26.86 2223.268 27.382228.285 28.172233.303 28.25 2238.32 27.692243.338 27.8
2248.356 28.052253.373 28.162258.391 28.062263.401 27.762278.454 27.75
2288.489 28.322298.524 28.412308.559 29.242318.594 29.612328.629 29.67
2333.64 30.092343.675 30.532348.692 30.51

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .095 690.091 .055 800.111 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 690.091
800.111 60.24 60.79 60.96 .5 .8 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent 0 690 25 T
 8002348.692 22.86 T
Skew Angle = 40

BRIDGE

RIVER: Taunton River
REACH: Main Stem RS: 85311.66

INPUT
Description: 78.5 Titicut St
Distance from Upstream XS = 2
Deck/Roadway Width = 35
Weir Coefficient = 2.6
Bridge Deck/Roadway Skew = 40
Upstream Deck/Roadway Coordinates
num= 16
Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
218.322 27.89 395.279 27.05 540.827 25.33
671.055 25.7 711.578 26.24 711.655 29.68
714.72 29.69 714.72 26.24 21.65 779.068 26.54 21.96
779.068 30.04 782.131 30.01 782.131 26.54
853.374 25.39 909.295 24.47 1153.663 22.83 1306.106 24.65

Upstream Bridge Cross Section Data
Station Elevation Data num= 278 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 30.5 10.005 29.95 14.999 29.87 40.003 30.21 55.009 29.74 65.006 28.84
80.013 27.17 90.01 26.54 95.012 25.93 115.014 25.42 120.016 25.02 125.019
24.89 130.02 24.3 135.016 24.05 140.018 24.3 145.019 24.17 150.022 24.59
160.02 24.78 165.021 24.52 170.023 23.91 175.026 24.05 180.028 24.54 185.022
24.89 190.025 25.82 200.03 26.53 220.031 26.35 230.028 26.03 235.03 26.09
240.033 25.99 245.034 25.75 250.037 25.69 255.032 25.38 265.036 25.35
270.038 25 275.041 24.23 280.035 22.99 285.037 21.59 290.04 21.03 295.042
20.76 300.045 19.99 305.039 20.23 310.041 19.86 320.046 19.91 330.043 20.38
335.045 20.35 340.047 20.15 350.044 20.16 355.046 20.68 360.048 21.93
365.051 21.72 370.053 21.16 375.047 21.17 385.052 21.39 390.055 21.72
395.057 23.34 400.051 25.21 410.056 26.12 425.055 26.64 435.059 26.57
450.058 26.97 455.061 26.77 465.066 26.82 485.067 26.57 495.064 26.08
510.071 25.68 525.07 24.95 540.076 22.79 545.072 22.16 550.073 21.8 555.076
21.15 560.078 19.02 565.08 17.9 570.075 17.97 575.077 18.23 590.084 18.7
595.079 19.13 615.08 18.86 640.083 19.54 645.086 19.48 650.088 19.75 655.09
20.26 660.093 21.52 675.092 22.6 685.097 23.03 690.091 23.12 691.777 22.87
715.616 12.43 718.557 11.78 721.56 11.33 725.276 11.24 732.224 10.78 738.866
10.72 744.013 10.09 749.966 9.83 754.967 10.86 761.18 10.96 766.749 11.24
772.127 11.43 777.642 12.8 779.772 11.89 797.621 22.19 800.111 22.86 805.112
22.76 810.108 22.41 815.11 22.22 820.111 21.89 825.114 22.18 835.112 20.16
845.108 19 850.111 19.03 855.105 18.7 865.102 18.31 870.104 17.93 880.101
17.59 885.095 17.79 895.1 17.56 900.094 17.75 905.097 17.46 910.091 17.72
915.093 17.54 930.093 17.5 935.087 18.06 940.089 16.55 950.086 16.72 955.082
16.7 965.078 16.91 970.081 17.32 980.077 17.51 990.074 16.971000.071 17.59
1005.073 18.031020.072 18.421030.069 18.961040.066 19.051045.061 18.88
1055.065 18.961060.059 18.861065.062 19.281070.057 19.41 1075.06 19.35
1080.054 19.11085.056 19.511090.051 19.711095.053 19.251100.055 19.74
1120.049 20.471130.046 20.991135.048 20.781145.045 20.731155.042 20.84
1160.036 21.241165.038 21.231170.034 21.471175.035 22.271185.033 22.82
1190.034 23.31 1195.03 23.481200.032 23.81210.029 24.211215.023 24.64
1220.025 24.851225.028 25.281230.022 25.271235.025 25.471250.016 24.79
1260.021 24.031265.015 24.011270.032 24.561280.068 24.741285.085 24.65
1290.104 24.71295.121 24.531300.139 24.611305.148 25.391315.183 26.43
1320.201 26.441325.218 26.161345.289 27.061350.306 26.891360.342 26.16
1365.359 25.621370.376 25.251375.387 25.121385.422 25.131390.439 25.28
1395.457 25.241415.527 25.791425.562 25.81 1430.58 25.931435.597 25.89
1475.731 26.881505.836 27.421520.882 27.451540.952 27.821545.969 27.77

1596.138 28.491601.155 28.78 1611.19 28.731616.208 28.821621.226 29.06
1656.34 28.71661.359 28.561666.376 28.581686.447 28.111691.464 27.89 1716.546
27.84 1726.58 27.91736.615 27.621741.632 27.741756.685 28.52 1761.703 29.06
1766.72 29.341771.738 29.771776.755 29.951781.773 30.43 1786.783
30.421791.801 30.671801.836 31.551806.854 31.681816.889 31.74 1821.906
31.921826.924 32.281841.976 32.31846.994 32.091867.057 32.19 1872.075
32.31892.145 31.71897.162 31.641912.215 32.031917.233 31.61 1922.243
30.931942.313 29.851947.331 30.021952.348 29.911957.366 29.55 1967.401
29.581982.454 29.992002.517 29.93 2037.64 29.9 2062.72 29.61 2067.738
29.062072.755 29.282077.773 29.1 2082.79 28.622087.808 28.42 2097.843
28.212102.861 27.692107.878 27.972117.913 28.142122.931 27.93 2137.976
28.52148.012 28.292153.029 28.082163.063 27.91 2173.1 27.37 2183.134 27.42
2198.18 26.622203.198 26.542213.233 26.68 2218.25 26.86 2223.268
27.382228.285 28.172233.303 28.25 2238.32 27.692243.338 27.8 2248.356
28.052253.373 28.162258.391 28.062263.401 27.762278.454 27.75 2288.489
28.322298.524 28.412308.559 29.242318.594 29.612328.629 29.67 2333.64
30.092343.675 30.532348.692 30.51

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .095 690.091 .055 800.111 .09

Bank Sta: Left Right Coeff Contr. Expan.
 690.091 800.111 .5 .8
Ineffective Flow num= 2
 Sta L Sta R Elev Permanent 0 690 25 T
 8002348.692 22.86 T
Skew Angle = 40

Downstream Deck/Roadway Coordinates
 num= 16
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 248.965 27.89 425.92 27.05 571.47 25.33
 701.697 25.7 742.221 26.24 742.297 29.68
 745.361 29.69 745.361 26.24 21.65 809.709 26.54 21.96
 809.709 30.04 812.773 30.01 812.773 26.54
 884.015 25.39 939.936 24.47 1184.305 22.83
 1372 24.65

Downstream Bridge Cross Section Data
Station Elevation Data num= 224
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 31.14 25.057 30.17 45.104
28.81 50.115 28.56 60.135 27.32 65.144 26.83 75.172 26.41 85.191 26.27
90.202 25.65 95.219 25.41 100.229 26.28 105.239 26.54 115.259 26.64 130.297
26.28 135.306 26.29 145.334 26.11 160.364 26.1 165.373 26.36 170.392 26.37
185.421 27.01 195.441 27.1 210.479 27.73 215.488 27.74 225.516 27.37 250.574
27.01 255.583 27.07 265.603 26.81 280.641 26.03 295.67 24.85 300.68 24.9
325.737 26.83 340.774 27.2 365.832 27.24 370.842 27.55 385.88 27.54 400.909
27.79 405.919 28.44 410.936 29.36 415.947 29.79 420.956 29.84 430.976 29.47
435.994 29.47 451.024 28.29 456.034 28.59 466.062 28.41 476.082 27.68
486.109 26.65 496.129 26.19 501.138 25.81 516.176 24.11 531.206 23.14
541.233 22.89 556.264 21.96 561.273 21.83 566.291 21.42 571.301 20.56
576.311 20.3 591.34 20.29 596.358 20.12 601.368 20.19 611.388 19.81 631.435
19.84 636.445 20.22 641.455 20.08 651.483 21.06 656.492 22.28 666.512 21.97

671.537 21.17 676.563 20.68 681.588 19.88 686.613 18.61 691.638 18.08
696.656 18.22 701.682 18.87 711.732 19.65 716.758 19.58 720.817 19.07
746.878 10.21 751.88 9 755.733 6.54 760.276 6.75 764.658 5.98 767.086 8.24
770.595 5.98 773.996 6.24 778.814 7.53 783.993 8.35 788.988 8.58 794.878
9.05 800.455 10.1 804.738 11.68 829.495 17.96 832.315 18.99 837.34 19.49
842.358 20.18 847.383 20.65 857.434 20.75 862.459 20.57 867.484 19.89
872.509 19.52 877.527 19.33 887.577 18.46 892.603 18.52 902.653 16.96
907.679 16.59 922.747 16.19 927.772 15.67 937.822 15.34 942.847 14.96
947.866 14.89 952.89 14.67 957.916 14.75 962.94 14.64 972.992 14.8 988.059
15.64 993.085 15.47 998.11 15.151018.203 14.671028.253 14.951033.279 14.77
1038.305 14.771048.355 15.671053.372 16.271063.423 17.141068.448 17.45
1078.498 17.551088.542 17.221093.566 17.191098.592 17.411103.618 17.42
1113.668 18.421138.787 19.571148.837 19.621153.863 19.771163.905 19.57
1173.955 18.871189.031 17.451199.074 16.8 1204.1 16.591219.176 15.16 1224.2
15.071234.243 15.461249.319 16.571259.369 17.481264.387 17.58 1274.437
16.921284.487 16.771289.513 16.891294.539 17.251304.581 17.35 1309.607
17.631314.632 18.191319.657 18.571329.708 19.971344.776 22.61 1349.8
23.681354.826 24.261359.852 25.261364.876 25.371369.895 25.9 1374.919
26.111379.945 25.881395.021 24.31400.046 241420.139 24.02 1435.215
24.331455.308 24.031470.384 24.261475.402 24.541480.427 24.64 1490.478
25.081500.528 25.741535.697 26.891565.841 27.041575.891 26.79 1580.917
26.891590.967 26.851595.991 26.941636.202 26.721641.227 26.6 1661.329
26.861686.454 26.7 1701.53 26.91746.765 27.871751.791 27.63 1791.993
27.211802.043 27.341847.278 27.471852.303 27.571857.328 27.87 1872.404
27.711877.429 27.541912.606 28.011932.714 28.911957.841 29.39 1998.043
29.362013.119 28.712043.278 28.22048.304 27.962053.328 27.96 2068.404
27.512088.506 27.442098.556 26.972113.632 26.832118.656 26.55 2123.682
25.92128.708 26.012133.732 26.762143.782 27.082158.866 27.12 2168.917
26.832173.942 27.022183.992 27.22194.043 27.12199.068 27.5 2214.144
29.932219.169 30.232244.296 29.972259.372 302264.404 29.81 2269.429 29.8
2279.48 29.322284.505 29.29 2289.53 28.87

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .093 656.492 .055 857.434 .093

Bank Sta: Left Right Coeff Contr. Expan.
 656.492 857.434 .5 .8
Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 720 25 T
 829 2289.53 22.8 T
Skew Angle = 40

Upstream Embankment side slope = 0 horiz. to 1.0 vertical Downstream
Embankment side slope = 0 horiz. to 1.0 vertical Maximum allowable
submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
 Energy
 W.S. Pro Method

 W.S.Pro Data
 Left Embankment
 El of the top of the embankment = 26.2
 El of the toe of the abutment = 12.4
 Right Embankment
 El of the top of the embankment = 26.2
 El of the toe of the abutment = 12.4
 Abutment Type = 4 Vert. abutments and sloping embankments with wingwalls
Slope of abutments =
 Top with of embankment = 35
 Centroid station of bridge opening =
 Wing Wall Type = Angular wing walls Width = 16
 Angle = 45
 Radius =
 Guide Banks Type = No Guide Bank present
 Length =
 Offset =
 Angle =
 Optional Contraction and expansion coefficients
 At approach Section
 At Guide Bank
 At upstream outside
 At upstream inside (BU)
 At downstream inside (BD)
 Piers are Continuous for the width of the bridge
 Use Geometric mean as Friction Slope Method

Selected Low Flow Methods = W.S.Pro Method

High Flow Method
 Pressure and Weir flow
 Submerged Inlet Cd =
 Submerged Inlet + Outlet Cd = .8
 Max Low Cord =

Additional Bridge Parameters
 Add Friction component to Momentum
 Do not add Weight component to Momentum Class B flow critical depth
computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 85275.49

INPUT
Description: 78.3 DS FAce Titicut St

Station Elevation Data num= 224
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 31.14 25.057 30.17 45.104
28.81 50.115 28.56 60.135 27.32 65.144 26.83 75.172 26.41 85.191 26.27
90.202 25.65 95.219 25.41 100.229 26.28 105.239 26.54 115.259 26.64 130.297
26.28 135.306 26.29 145.334 26.11 160.364 26.1 165.373 26.36 170.392 26.37
185.421 27.01 195.441 27.1 210.479 27.73 215.488 27.74 225.516 27.37 250.574
27.01 255.583 27.07 265.603 26.81 280.641 26.03 295.67 24.85 300.68 24.9
325.737 26.83 340.774 27.2 365.832 27.24 370.842 27.55 385.88 27.54 400.909
27.79 405.919 28.44 410.936 29.36 415.947 29.79 420.956 29.84 430.976 29.47
435.994 29.47 451.024 28.29 456.034 28.59 466.062 28.41 476.082 27.68
486.109 26.65 496.129 26.19 501.138 25.81 516.176 24.11 531.206 23.14
541.233 22.89 556.264 21.96 561.273 21.83 566.291 21.42 571.301 20.56
576.311 20.3 591.34 20.29 596.358 20.12 601.368 20.19 611.388 19.81 631.435
19.84 636.445 20.22 641.455 20.08 651.483 21.06 656.492 22.28 666.512 21.97
671.537 21.17 676.563 20.68 681.588 19.88 686.613 18.61 691.638 18.08
696.656 18.22 701.682 18.87 711.732 19.65 716.758 19.58 720.817 19.07
746.878 10.21 751.88 9 755.733 6.54 760.276 6.75 764.658 5.98 767.086 8.24
770.595 5.98 773.996 6.24 778.814 7.53 783.993 8.35 788.988 8.58 794.878
9.05 800.455 10.1 804.738 11.68 829.495 17.96 832.315 18.99 837.34 19.49
842.358 20.18 847.383 20.65 857.434 20.75 862.459 20.57 867.484 19.89
872.509 19.52 877.527 19.33 887.577 18.46 892.603 18.52 902.653 16.96
907.679 16.59 922.747 16.19 927.772 15.67 937.822 15.34 942.847 14.96
947.866 14.89 952.89 14.67 957.916 14.75 962.94 14.64 972.992 14.8 988.059
15.64 993.085 15.47 998.11 15.151018.203 14.671028.253 14.951033.279 14.77
1038.305 14.771048.355 15.671053.372 16.271063.423 17.141068.448 17.45
1078.498 17.551088.542 17.221093.566 17.191098.592 17.411103.618 17.42
1113.668 18.421138.787 19.571148.837 19.621153.863 19.771163.905 19.57
1173.955 18.871189.031 17.451199.074 16.8 1204.1 16.591219.176 15.16 1224.2
15.071234.243 15.461249.319 16.571259.369 17.481264.387 17.58 1274.437
16.921284.487 16.771289.513 16.891294.539 17.251304.581 17.35 1309.607
17.631314.632 18.191319.657 18.571329.708 19.971344.776 22.61 1349.8
23.681354.826 24.261359.852 25.261364.876 25.371369.895 25.9 1374.919
26.111379.945 25.881395.021 24.31400.046 241420.139 24.02 1435.215
24.331455.308 24.031470.384 24.261475.402 24.541480.427 24.64 1490.478
25.081500.528 25.741535.697 26.891565.841 27.041575.891 26.79 1580.917
26.891590.967 26.851595.991 26.941636.202 26.721641.227 26.6 1661.329
26.861686.454 26.7 1701.53 26.91746.765 27.871751.791 27.63 1791.993
27.211802.043 27.341847.278 27.471852.303 27.571857.328 27.87 1872.404
27.711877.429 27.541912.606 28.011932.714 28.911957.841 29.39 1998.043
29.362013.119 28.712043.278 28.22048.304 27.962053.328 27.96 2068.404
27.512088.506 27.442098.556 26.972113.632 26.832118.656 26.55 2123.682
25.92128.708 26.012133.732 26.762143.782 27.082158.866 27.12 2168.917
26.832173.942 27.022183.992 27.22194.043 27.12199.068 27.5 2214.144
29.932219.169 30.232244.296 29.972259.372 302264.404 29.81 2269.429 29.8
2279.48 29.322284.505 29.29 2289.53 28.87

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .093 656.492 .055 857.434 .093

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 656.492
857.434 159.18 160.23 161.81 .5 .8 Ineffective Flow num= 2
Sta L Sta R Elev Permanent
0 720 25 T

829 2289.53 22.8 T
Skew Angle = 40

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 85115.27

INPUT
Description: 78 Exit Titicut St
Station Elevation Data num= 365
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 31.94 6.52 31.69 13.04 31.29
19.56 30.57 26.08 30.15 32.6 30.31 39.12 30.52 45.64 30.45 52.15 30.31 58.67
30.09 65.19 30.06 71.71 30.18 78.23 30.07 84.75 29.8 91.27 29.34 97.79
28.91 104.31 28.58 110.83 28.13 117.35 27.77 123.87 27.35 130.39 26.8 136.91
26.22 143.43 25.89 149.94 26.81 156.46 26.94 162.98 27.09 169.5 27.05 176.02
26.52 182.54 26.46 189.06 26.31 195.58 26.41 202.1 26.4 208.62 26.42 221.66
26.51 241.22 26.72 247.74 26.8 254.25 26.93 260.77 26.91 267.29 26.93 273.81
26.97 280.33 27.13 286.85 27.18 293.37 27.2 299.89 27.31 306.41 27.33
312.93 27.39 319.45 27.42 325.97 27.33 332.49 27.38 339.01 27.38 345.53
27.47 358.56 27.28 365.08 27.3 371.6 27.3 378.12 27.34 384.64 27.43 391.16
27.45 397.68 27.39 404.2 27.5 410.72 27.43 417.24 27.45 423.76 27.57 430.28
27.51 443.32 27.52 449.83 27.59 456.35 27.58 462.87 27.63 469.39 27.73
482.43 27.73 488.95 27.8 495.47 27.83 508.51 27.7 515.03 27.62 521.55 27.74
528.07 27.76 534.59 27.91 541.11 28.08 547.62 28.38 554.14 28.79 560.66
29.24 567.18 29.59 573.7 29.75 580.22 29.73 586.74 29.61 593.26 29.33
599.78 29.07 606.3 28.84 612.82 28.51 619.34 28.06 632.38 27.29 638.9 26.98
645.41 26.71 651.93 26.56 658.45 26.33 664.97 25.98 678.01 25.65 684.53
25.39 691.05 25.01 697.57 24.67 704.09 24.38 710.61 24.16 717.13 23.77
723.65 23.53 730.17 23.56 736.69 23.25 743.21 23.01 749.72 23.12 756.24 23
762.76 22.7 769.28 22.64 775.8 22.46 782.32 22.15 788.84 21.89 795.33 21.65
801.82 21.36 808.31 21.18 814.81 21.08 821.3 21.08 827.79 21.04 834.28 20.63
840.77 20.45 847.26 20.03 860.25 19.93 866.74 19.44 899.15 17.59 919.99
17.44 927.65 10.59 956 5.96 959.1 4.65 977.02 3.02 993.28 1.83 1003.03 -.61
1015.38 -2.22 1033.16 -3.31 1051.37 -2.53 1069.46 -.38 1074.78 3.47 1081.61
11.14 1085.01 17.06 1096.85 17.73 1117.81 17.21 1135 15.37 1172.27 16.2
1218.72 13.7 1268.73 15.41 1365 13.42 1391.39 15.53 1432.3 17.9 1438.82
18.71 1445.34 19.56 1451.86 19.86 1458.38 19.85 1464.9 19.59 1471.42 19.35
1477.94 19.22 1484.47 18.95 1490.99 18.51 1497.51 18 1504.03 17.72 1510.55
17.54 1517.07 17.32 1523.59 17.16 1530.11 17.03 1536.63 16.67 1543.16 16.37
1549.68 15.97 1556.2 15.53 1562.72 14.92 1569.24 14.91 1575.76 14.7 1582.28
14.44 1588.8 14.57 1595.33 14.94 1601.85 15.6 1608.37 16.19 1621.41 17
1627.93 17.35 1634.45 17.34 1640.97 16.96 1647.5 16.4 1654.02 16.15 1660.54
16.6 1667.06 17.2 1673.58 17.9 1680.1 18.15 1686.62 18.55 1693.14 18.66
1699.66 18.94 1706.19 19.2 1712.71 19.85 1719.23 20.66 1725.75 21.07 1732.27
21.28 1738.79 21.28 1745.31 21.23 1751.83 20.95 1758.36 20.98 1764.88 21.23
1771.4 21.55 1777.92 22.36 1784.44 23.78 1790.96 24.6 1797.48 24.65 1804
24.24 1810.52 23.98 1817.05 23.98 1823.57 24.25 1830.09 24.46 1836.61 24.65
1843.13 24.76 1849.65 24.84 1856.17 25.03 1862.69 25.17 1869.22 25.21
1875.74 25.18 1882.26 24.99 1895.3 24.56 1901.82 24.44 1908.34 24.43 1914.86
24.32 1927.91 24.43 1934.43 24.58 1940.95 24.58 1947.47 24.9 1953.99 25.09
1960.51 25.17 1967.03 25.35 1973.55 25.45 1980.08 25.46 1986.6 25.52 1993.12
25.55 1999.64 25.56 2006.16 25.53 2012.68 25.47 2019.2 25.43 2025.72 25.52

2032.25 25.41 2038.79 25.43 2045.33 25.26 2051.87 25.31 2058.41 25.26 2071.5
25.24 2078.04 25.22 2084.58 25.13 2091.12 25.12 2097.67 25.17 2104.21 25.15
2110.75 25.15 2117.29 25.21 2123.83 25.25 2130.38 25.23 2136.92 25.26
2143.46 25.35 2156.54 25.45 2163.09 25.64 2169.63 25.61 2176.17 25.64
2182.71 25.84 2195.8 25.67 2202.34 25.6 2208.88 25.58 2221.96 25.67 2228.5
25.68 2235.05 25.77 2241.59 25.81 2248.13 25.87 2254.67 25.97 2274.3 26.18
2280.84 26.39 2287.38 26.43 2293.92 26.44 2300.47 26.5 2307.01 26.5 2313.55
26.61 2320.09 26.66 2326.63 26.86 2333.18 26.98 2339.72 27.17 2346.26 27.31
2352.8 27.42 2359.34 27.72 2365.89 27.81 2372.43 27.85 2378.97 27.8 2385.51
27.84 2398.6 27.73 2405.14 27.79 2411.68 27.69 2418.22 27.56 2431.31 27.25
2437.85 27.26 2450.93 27.03 2457.47 26.84 2470.56 26.84 2477.1 26.8 2483.64
26.68 2490.18 26.66 2503.27 26.55 2516.35 26.3 2522.89 26.23 2529.44 26.08
2535.98 25.9 2542.52 25.85 2549.06 25.9 2555.6 25.86 2562.15 25.97 2568.69
25.91 2575.23 25.74 2581.77 25.68 2588.31 25.55 2594.86 25.49 2601.4 25.45
2607.94 25.33 2621.02 25.34 2627.57 25.3 2634.11 25.15 2640.65 25.05 2647.19
25.18 2653.73 25.29 2660.28 25.32 2666.82 25.2 2673.36 25.03 2679.9 24.96
2686.44 25.02 2692.99 25.16 2699.53 25.46 2706.07 25.3 2712.61 25.26 2719.15
25.33 2725.69 24.65 2732.24 23.95 2738.78 24.12 2745.32 24.7 2751.86 25.19
2758.4 25.24 2764.95 25.33 2771.49 25.5 2778.03 25.53 2784.57 25.64 2791.11
25.86 2797.66 25.81 2804.2 25.84 2810.74 25.79 2823.82 25.84 2830.37 26.06
2836.91 26.14 2843.45 26.28 2849.99 26.24 2856.53 26.15 2863.08 26.34
2869.62 26.58 2876.16 26.73 2882.7 26.74 2889.24 26.88 2895.79 26.93 2902.33
26.95 2908.87 26.94 2915.41 26.99 2921.95 26.98 2928.5 27.07 2935.04 27.2
2941.58 27.26 2948.12 27.12 2954.66 27.01 2961.21 26.84

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 919.99 .055 1096.85 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 919.99
1096.85 1317.95 1325.49 1349.87 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 1335 2961.21 25.4 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 83789.77

INPUT
Description: 77
Station Elevation Data num= 277
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 34.75 13.12 34.38 26.24
34.48 39.37 34.38 45.93 34.19 52.49 34.47 59.05 34.31 72.17 34.76 78.73
34.82 85.29 34.31 98.41 33.96 111.54 34.03 118.1 33.78 137.78 33.9 144.34
33.61 150.9 33.61 157.46 33.37 170.58 33.26 183.7 33.39 190.27 33.3 196.83
33.42 209.95 33.34 223.07 34.02 229.63 33.81 236.19 34.6 242.75 35.92 249.31
36.96 255.87 36.91 262.44 36.39 269 36.12 275.56 37.1 282.12 36.96 288.68
35.53 295.24 33.94 301.8 32.85 308.36 32.2 314.92 31.38 321.48 30.4 334.61
29.89 347.73 28.18 354.29 27.59 360.85 27.15 373.97 26.66 413.34 23.87 419.9
23.16 426.46 22.64 433.02 22.5 439.58 22.15 465.82 20.24 478.94 19.5 498.63
17.98 505.19 17.33 511.75 16.92 518.31 16.8 531.43 16.26 544.55 16.03 557.68
16.07 564.24 16.23 583.92 15.65 590.48 15.67 597.04 15.84 603.6 15.87 616.72

15.54 623.28 15.59 629.85 15.79 636.41 16.21 642.97 16.35 649.53 16.01
656.09 15.96 669.21 16.17 675.77 15.92 682.33 16.08 688.89 16.62 695.45
17.33 702.01 17.64 708.58 17.77 715.14 18.26 721.7 18.52 728.26 18.92 734.82
18.89 741.38 19.24 747.94 19.07 754.5 18.45 761.06 17.42 767.62 15.66
774.18 14.81 793.87 14.75 800.43 14.91 820.11 14.81 833.23 14.95 846.35 14.7
859.48 15.05 866.04 14.97 872.6 15.26 879.16 15.87 885.72 16.06 892.28 16.08
898.84 16.34 918.52 17.87 931.65 18.43 938.21 18.33 944.77 17.77 957.89
16.25 968.36 15.45 985 10.1 1015 7.9 1047 6.4 1075 6.1 1109 10.4 1115 18.5
1121.91 19.49 1128.47 19.79 1135.03 19.86 1141.59 19.81 1148.16 19.7 1154.72
19.5 1161.28 19.51 1167.84 19.55 1174.4 19.51 1180.96 19.32 1194.08 19.5
1200.64 19.78 1207.2 20.02 1213.76 20.24 1220.32 20.39 1233.45 20.24 1240.01
19.96 1246.57 19.65 1253.13 19.57 1259.69 19.53 1266.25 19.6 1272.81 19.62
1279.37 19.86 1285.93 20.22 1292.49 20.31 1299.06 20.68 1305.62 21.16
1312.18 21.47 1318.74 21.74 1325.3 22.19 1331.86 22.49 1338.42 22.58 1344.98
22.6 1351.54 22.6 1358.1 22.68 1364.66 22.46 1371.23 22.31 1377.79 21.93
1384.35 21.8 1390.91 21.19 1397.47 20.9 1404.03 20.73 1410.59 20.86 1417.15
20.7 1423.71 20.7 1430.27 20.96 1436.83 21.15 1443.4 21.37 1449.96 21.77
1456.52 21.87 1463.08 22.26 1476.2 23.16 1482.76 23.39 1489.32 23.65 1495.88
23.85 1502.44 24.03 1509 24.23 1515.56 24.65 1522.13 24.88 1528.69 25.19
1535.25 25.3 1541.81 25.29 1548.37 25.31 1554.93 25.07 1561.49 24.68 1568.05
24.47 1574.61 24.22 1581.17 23.75 1587.73 23.38 1594.3 23.23 1600.86 23.2
1607.42 23.34 1613.98 23.39 1620.54 23.57 1627.1 23.81 1633.66 23.89 1640.22
24.17 1646.78 24.48 1653.34 24.37 1659.9 24.29 1666.47 24.15 1673.03 23.91
1686.15 23.78 1692.71 23.65 1699.27 23.54 1712.39 23.13 1718.95 22.9 1725.51
22.59 1732.07 22.46 1738.64 22.47 1745.2 22.37 1751.76 22.47 1764.88 22.44
1778 22.86 1784.56 22.99 1791.12 22.71 1797.68 21.99 1804.24 20.79 1810.8
19.74 1817.37 18.88 1823.93 18.41 1830.49 17.42 1837.05 16.29 1843.61 16.46
1850.17 16.54 1856.73 16.42 1863.29 16.26 1869.85 17.59 1876.41 18.37
1882.97 19.1 1889.54 19.23 1896.1 19.09 1902.66 19.02 1909.22 18.61 1915.78
17.88 1922.34 17.05 1928.9 16.66 1935.46 17.22 1942.02 17.03 1948.58 16.73
1955.14 16.25 1961.71 16.88 1968.27 16.73 1974.83 16.88 1981.39 17.09
1987.95 17.27 1994.51 17.55 2001.07 17.72 2007.63 18.3 2014.19 18.41 2020.75
18.76 2027.31 19.23 2033.88 19.68 2040.44 20.17 2047 21.02 2053.56 22.63
2060.12 24.75 2066.68 26.14 2073.24 26.62 2079.8 26.59 2086.36 26.43 2092.92
25.98 2099.48 25.51 2106.05 24.82 2119.17 23.13 2125.73 22.44 2132.29 22.05
2138.85 21.9 2145.41 21.9 2151.97 22.43 2158.53 22.76 2165.09 22.96 2171.65
23.59 2178.22 24.39 2191.34 25.3 2197.9 25.95 2204.46 26.82 2211.02 27.58
2217.58 28.01 2224.14 28.35 2230.7 28.63 2243.83 28.88 2250.39 28.99 2256.95
29.06 2263.51 29.17 2270.07 29.37 2276.63 29.45

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .095 938.21 .055 1128.47 .095

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 938.21
1128.47 1097.27 1096.54 1095.28 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 1548.4 2276.63 25.3 F

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 82693.23

INPUT
Description: 76 Approach Bedford St
Station Elevation Data num= 305 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 41.32 6.56 41.09 13.12 41.08 19.68 41.17 26.24 41.19 32.8 41.19 39.36
41.29 45.92 41.12 52.48 40.91 65.6 40.56 72.16 40.47 78.72 40.33 85.28 40.24
91.84 40.13 98.4 39.97 111.52 39.57 118.08 39.36 124.64 39.17 131.2 38.86
137.76 38.46 144.32 38.33 150.88 38.32 157.44 38.13 164 37.81 170.56 37.63
177.12 37.37 183.68 36.97 190.24 36.52 196.8 36.16 203.36 36.1 209.92 36.01
216.48 35.89 223.04 35.71 229.6 35.49 236.16 35.25 242.72 34.91 249.28 34.67
255.84 34.45 262.4 34.25 268.96 33.96 275.51 33.6 282.07 33.41 288.63 33.36
295.19 33.4 301.75 33.19 308.31 33 314.87 32.78 321.43 32.52 327.99 32.2
334.55 31.63 341.11 30.97 347.67 30.7 354.23 30.52 360.79 30.51 367.35 30.36
373.91 29.93 380.47 29.89 387.03 29.7 393.59 29.73 400.15 29.7 406.71 29.62
413.27 29.66 419.83 29.62 426.39 29.41 432.95 29.37 439.51 29.42 446.07
29.31 452.63 29.09 459.19 28.8 465.75 28.76 472.31 28.56 485.43 28.3 491.99
28.24 498.55 28.1 505.11 28.02 511.67 27.85 518.23 27.41 524.79 27.17 531.35
26.83 537.91 26.26 544.47 25.57 551.03 24.9 557.59 24.43 564.15 24.06 570.71
23.52 577.27 22.92 583.83 22.6 590.39 22.53 596.95 22.24 603.51 22.03
610.07 21.94 616.63 21.53 629.75 21.36 636.31 21.15 642.87 20.86 649.43
20.33 655.99 20.11 662.55 20.09 669.11 20.04 675.67 20.06 682.23 20.04
688.79 19.63 695.35 18.98 701.91 18.53 708.47 18.39 715.03 18.32 721.59
18.14 728.15 17.85 734.71 17.58 760.95 16.65 767.51 16.51 774.07 16.4 780.63
16.22 793.75 16.39 800.31 16.4 806.87 16.54 813.43 16.53 819.99 16.14 826.55
15.9 833.1 15.75 839.66 15.69 852.78 15.52 859.34 15.51 865.9 15.72 872.46
15.69 879.02 15.48 885.58 15.82 892.14 16.47 898.7 17.61 905.26 17.73
911.82 17.61 924.94 17.48 931.5 17.34 938.06 16.8 944.62 16.35 951.18 15.78
957.74 15.16 964.3 15.07 1000.4 14.3 1041.6 16.79 1065.66 14.27 1073.16 7.12
1078.7 4.63 1093.06 2.96 1113.48 3.2 1131.73 4.04 1145.79 4.42 1170.48 5.98
1193.1 16.26 1216.79 15.76 1253.03 19.74 1303.8 17.74 1310.36 17.14 1316.92
16.31 1323.48 16 1336.59 15.87 1343.15 15.88 1349.71 15.71 1356.27 15.41
1362.83 15.32 1369.39 15.53 1375.94 15.7 1382.5 15.66 1389.06 15.6 1395.62
15.77 1402.18 15.98 1408.74 16.13 1415.3 16.19 1421.85 16.37 1428.41 16.79
1448.09 19.1 1454.65 19.78 1461.21 20.57 1467.76 21.19 1474.32 21.6 1480.88
21.61 1487.44 21.36 1494 21.07 1500.56 20.64 1507.12 20 1513.67 19.24
1520.23 18.37 1526.79 18.06 1533.35 17.63 1539.91 17.52 1546.47 18.05
1553.03 18.37 1559.58 18.44 1566.14 18.58 1572.7 18.56 1585.82 17.95 1592.38
17.78 1598.94 18.13 1605.49 18.39 1618.61 18.33 1625.17 18.48 1631.73 18.59
1638.29 18.53 1644.85 18.37 1651.4 18.13 1657.96 18.01 1664.52 18.09 1671.08
18.35 1677.64 18.73 1684.2 19.2 1690.76 19.94 1697.31 20.74 1703.87 21.15
1710.43 21.65 1716.99 21.91 1723.55 21.85 1730.11 21.91 1736.67 22.23
1743.22 22.62 1749.78 22.89 1756.34 23.28 1762.9 23.78 1769.46 23.86 1776.02
23.84 1782.58 23.86 1789.14 23.83 1795.69 23.61 1802.25 23.58 1808.81 23.53
1815.37 23.42 1821.93 23.75 1828.49 23.89 1835.05 23.8 1841.6 23.67 1848.16
23.6 1854.72 23.8 1861.28 24.42 1874.4 25.75 1880.96 26.37 1887.51 26.91
1894.07 27.59 1900.63 28.36 1907.19 28.67 1913.75 29.03 1920.31 29.12
1926.87 29.33 1933.42 29.4 1939.98 29.17 1953.1 28.84 1959.66 28.72 1966.22
28.5 1972.78 28.38 1979.33 27.93 1985.89 28.09 1992.45 28.16 1999.01 27.83
2005.57 27.9 2012.13 28.03 2018.69 28.11 2025.24 28.25 2031.8 28.12 2038.36
28.16 2044.92 28.14 2051.48 28.07 2058.04 27.98 2064.6 27.97 2071.15 28.01
2077.71 27.93 2084.27 27.71 2090.83 27.45 2097.39 27.27 2103.95 27.22
2110.51 27.19 2123.62 27.32 2130.18 27.27 2136.74 27.13 2143.3 27.06 2149.86
27.01 2156.42 26.92 2162.98 27.14 2169.53 27.21 2176.09 27.04 2182.65 26.85
2189.21 26.68 2195.77 26.46 2202.33 26.19 2208.89 25.88 2215.44 25.55 2222
26.36 2228.56 26.32 2235.12 26.42 2241.68 26.05 2248.24 26.04 2254.8 25.98

2261.35 26.19 2267.91 26.43 2274.47 26.51 2281.03 26.38 2287.59 26.42
2300.71 26.61 2307.26 26.59 2313.82 26.45 2320.38 26.46 2326.94 26.6 2333.5
26.66 2340.06 26.6 2346.62 26.61 2353.18 26.58 2359.73 26.6 2366.29 26.81

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 1041.6 .055 1253.03 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1041.6
1253.03 72.73 101.63 122.4 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 82591.6

INPUT
Description: 75.7 US FAce Bedford St
Station Elevation Data num= 350
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 41.35 5.936 41.17 11.873
41.08 17.809 41.17 23.736 41.13 29.673 40.96 41.545 40.87 47.481 40.73
53.418 40.64 59.354 40.6 65.29 40.51 71.218 40.39 77.154 40.3 83.09 40.16
89.027 39.93 94.963 39.75 100.899 39.74 106.836 39.68 112.763 39.5 118.699
39.23 124.635 39.1 130.572 39.02 136.508 38.82 142.444 38.5 148.381 38.23
154.317 37.94 160.244 37.62 166.181 37.37 172.117 37.47 178.053 37.39 183.99
37.19 189.926 36.77 195.862 36.51 201.789 36.33 207.726 36.03 213.662 35.62
219.598 35.24 225.535 34.98 231.471 34.8 237.407 34.54 243.344 34.33 249.271
34.27 255.207 34.16 261.144 34.1 267.08 34.34 273.016 34.56 278.952 34.12
284.889 33.66 290.816 33.4 296.752 33.12 302.689 32.62 308.625 31.89 314.561
31.74 320.498 31.84 326.434 31.62 332.37 31.54 338.298 31.51 344.234 30.88
350.17 30.51 356.106 30.21 362.043 30.12 373.915 30.24 379.843 29.76 385.779
29.49 397.652 29.8 403.588 29.82 409.524 29.61 415.461 29.13 421.397 29.06
427.324 29.21 433.26 28.86 439.197 28.49 445.133 28.39 451.069 28.25 457.006
28.08 462.942 27.83 468.869 27.6 474.806 27.41 480.742 27.15 486.678 26.81
492.615 26.35 498.551 25.82 504.487 25.48 510.423 25.25 516.351 25 522.287
24.95 528.223 25.11 534.16 24.91 546.032 24.86 551.969 24.08 557.896 23.69
563.832 23.51 569.768 23.31 575.705 22.74 581.641 22.12 587.578 22.41
593.514 22.3 599.45 22.01 605.377 21.83 611.314 21.77 617.25 21.67 623.186
21.36 629.123 20.94 635.059 20.47 640.995 19.89 646.922 20.06 652.859 19.98
658.795 20.05 664.732 20.2 670.668 19.74 676.604 18.77 682.54 19.82 688.468
20.28 694.404 20.34 700.34 20.36 706.277 20.98 712.213 20.69 718.149 20.79
724.086 20.92 730.022 20.65 735.949 20.49 741.885 20.4 747.822 20.39 753.758
20.72 759.694 18.9 765.631 17.94 771.567 18.09 777.494 18.37 783.431 18.81
789.367 19.2 795.303 19.34 801.24 19.74 813.112 20.67 819.039 20.98 830.912
21.47 836.848 22.2 842.785 22.48 848.721 22.32 854.657 22.34 860.594 22.47
866.521 22.68 872.457 22.73 878.394 22.8 884.33 22.85 890.266 22.85 896.202
22.77 902.139 22.66 908.066 22.5 919.939 22.85 925.875 23.17 931.811 23.52
937.748 24.01 943.684 24.17 949.62 24.02 955.547 24.05 997.183 21.54 997.555
16.131005.367 15.971008.141 9.761020.249 6.01 1035.212 3.84 1044.91
3.851071.283 4.351080.736 4.921097.294 5.73 1107.3 6.791117.541
12.081117.876 15.161126.522 15.391128.489 20.92 1157.346 22.671169.219
21.241175.146 20.621181.082 20.781187.019 20.87 1192.955 21.031198.891
20.951204.828 20.551210.764 20.31216.691 20.45 1222.627 20.361228.564 20.31

1234.5 20.51240.436 20.51246.373 20.31 1252.309 20.371258.245 20.511264.172
20.581270.109 20.61276.045 20.6 1281.991 20.771287.927 20.851293.872
21.051299.809 21.141305.754 21.34 1311.69 21.581317.636 21.361323.572
21.181329.517 21.221335.454 21.21 1341.399 21.021347.335 21.121353.281
21.561359.217 21.71365.162 21.68 1371.099 20.791377.044 18.921388.926
18.791394.862 18.861400.807 18.88 1406.744 19.181412.689 19.081418.625
19.11424.571 19.251430.507 19.21 1436.453 19.211442.389 19.121454.271
18.551460.216 18.461466.152 18.58 1472.098 19.141478.034 18.991483.979
19.561489.916 19.291495.861 19.31 1501.797 19.71507.743 19.811513.679
19.741519.624 19.751525.561 19.81 1531.506 20.251537.443 19.811543.388
20.111549.324 20.25 1555.27 20.59 1561.206 20.51567.151 20.871573.088
21.321579.033 20.31584.969 20.01 1590.915 20.121596.851 20.321602.796
20.581608.733 20.951614.678 20.92 1620.614 20.92 1626.56 20.731632.496
20.851638.441 20.751644.378 21.02 1650.323 21.321656.259 21.41662.205
20.811668.141 20.81674.087 21.07 1680.023 21.361685.968 21.431691.905 21.35
1697.85 21.341709.732 21.2 1715.668 21.711721.613 22.02 1727.55 22.221733.495
22.531739.431 22.64 1745.377 22.461751.313 22.371757.258 22.551763.195 22.6
1769.14 22.89 1775.076 23.431781.022 22.41786.958 21.131792.903 21.06 1798.84
21.08 1810.721 20.691816.667 20.551822.603 20.941828.548 21.491834.485 21.99
1840.43 22.041846.367 21.961852.312 22.241858.248 22.461864.193 22.58
1870.13 22.351876.075 21.911882.012 21.91887.957 21.831893.893 21.66 1899.839
21.361905.775 21.23 1911.72 21.381917.666 21.371923.602 21.89 1929.538
21.841935.484 21.7 1941.42 21.941947.365 22.281953.311 22.73 1959.247
22.841965.193 23.941971.129 23.841977.074 251983.011 25.64 1988.956
26.11994.892 26.242000.838 26.432006.774 26.542012.719 26.45 2018.656
26.632024.601 26.562036.483 26.72042.419 26.372048.365 25.35 2054.301
24.192060.246 22.552066.182 21.982072.128 22.042078.064 22.06 2084.01
22.492089.946 22.862095.891 22.722101.828 22.262107.773 22.28 2113.709
22.942119.655 23.232125.591 23.992131.536 24.292137.473 23.83 2149.354 23.03
2155.3 23.282161.236 23.52167.181 23.742173.118 24.36 2179.063 24.552184.999
24.292190.945 24.492196.881 24.392202.826 23.85 2208.763 23.352214.708
23.432220.645 24.01 2226.59 24.332232.526 23.92 2238.471 23.832244.408
24.062250.353 24.7 2256.29 25.512262.235 26.12

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 955.547 .0551157.346 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
955.5471157.346 94.57 98.76 101.32 .5 .8 Ineffective Flow num= 3
 Sta L Sta R Elev Permanent
 534 980 24 T
 1150 2000 22.8 T 2000 2262 26 T
Skew Angle = 25

BRIDGE

RIVER: Taunton River
REACH: Main Stem RS: 82538.7

INPUT
Description: 75.5 SR 18/28 Bedford St
Distance from Upstream XS = 8

Deck/Roadway Width = 50
Weir Coefficient = 2.6
Bridge Deck/Roadway Skew = 25
Upstream Deck/Roadway Coordinates
 num= 15
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 328.083 32.92 532.003 26.66 537.441 27.09
 644.385 24.9 972.468 25.56 975.187 26.19
 975.187 28.75 998.751 28.75 21.541130.166 28.43 20.92 1151.917 28.43
1151.917 25.21 1176.388 24.57 1376.682 23.56 1538.004 22.82 1866.088 25.18

Upstream Bridge Cross Section Data
Station Elevation Data num= 350
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 41.35 5.936 41.17 11.873
41.08 17.809 41.17 23.736 41.13 29.673 40.96 41.545 40.87 47.481 40.73
53.418 40.64 59.354 40.6 65.29 40.51 71.218 40.39 77.154 40.3 83.09 40.16
89.027 39.93 94.963 39.75 100.899 39.74 106.836 39.68 112.763 39.5 118.699
39.23 124.635 39.1 130.572 39.02 136.508 38.82 142.444 38.5 148.381 38.23
154.317 37.94 160.244 37.62 166.181 37.37 172.117 37.47 178.053 37.39 183.99
37.19 189.926 36.77 195.862 36.51 201.789 36.33 207.726 36.03 213.662 35.62
219.598 35.24 225.535 34.98 231.471 34.8 237.407 34.54 243.344 34.33 249.271
34.27 255.207 34.16 261.144 34.1 267.08 34.34 273.016 34.56 278.952 34.12
284.889 33.66 290.816 33.4 296.752 33.12 302.689 32.62 308.625 31.89 314.561
31.74 320.498 31.84 326.434 31.62 332.37 31.54 338.298 31.51 344.234 30.88
350.17 30.51 356.106 30.21 362.043 30.12 373.915 30.24 379.843 29.76 385.779
29.49 397.652 29.8 403.588 29.82 409.524 29.61 415.461 29.13 421.397 29.06
427.324 29.21 433.26 28.86 439.197 28.49 445.133 28.39 451.069 28.25 457.006
28.08 462.942 27.83 468.869 27.6 474.806 27.41 480.742 27.15 486.678 26.81
492.615 26.35 498.551 25.82 504.487 25.48 510.423 25.25 516.351 25 522.287
24.95 528.223 25.11 534.16 24.91 546.032 24.86 551.969 24.08 557.896 23.69
563.832 23.51 569.768 23.31 575.705 22.74 581.641 22.12 587.578 22.41
593.514 22.3 599.45 22.01 605.377 21.83 611.314 21.77 617.25 21.67 623.186
21.36 629.123 20.94 635.059 20.47 640.995 19.89 646.922 20.06 652.859 19.98
658.795 20.05 664.732 20.2 670.668 19.74 676.604 18.77 682.54 19.82 688.468
20.28 694.404 20.34 700.34 20.36 706.277 20.98 712.213 20.69 718.149 20.79
724.086 20.92 730.022 20.65 735.949 20.49 741.885 20.4 747.822 20.39 753.758
20.72 759.694 18.9 765.631 17.94 771.567 18.09 777.494 18.37 783.431 18.81
789.367 19.2 795.303 19.34 801.24 19.74 813.112 20.67 819.039 20.98 830.912
21.47 836.848 22.2 842.785 22.48 848.721 22.32 854.657 22.34 860.594 22.47
866.521 22.68 872.457 22.73 878.394 22.8 884.33 22.85 890.266 22.85 896.202
22.77 902.139 22.66 908.066 22.5 919.939 22.85 925.875 23.17 931.811 23.52
937.748 24.01 943.684 24.17 949.62 24.02 955.547 24.05 997.183 21.54 997.555
16.131005.367 15.971008.141 9.761020.249 6.01 1035.212 3.84 1044.91
3.851071.283 4.351080.736 4.921097.294 5.73 1107.3 6.791117.541
12.081117.876 15.161126.522 15.391128.489 20.92 1157.346 22.671169.219
21.241175.146 20.621181.082 20.781187.019 20.87 1192.955 21.031198.891
20.951204.828 20.551210.764 20.31216.691 20.45 1222.627 20.361228.564 20.31
1234.5 20.51240.436 20.51246.373 20.31 1252.309 20.371258.245 20.511264.172
20.581270.109 20.61276.045 20.6 1281.991 20.771287.927 20.851293.872
21.051299.809 21.141305.754 21.34 1311.69 21.581317.636 21.361323.572
21.181329.517 21.221335.454 21.21 1341.399 21.021347.335 21.121353.281
21.561359.217 21.71365.162 21.68 1371.099 20.791377.044 18.921388.926
18.791394.862 18.861400.807 18.88 1406.744 19.181412.689 19.081418.625
19.11424.571 19.251430.507 19.21 1436.453 19.211442.389 19.121454.271

18.551460.216 18.461466.152 18.58 1472.098 19.141478.034 18.991483.979
19.561489.916 19.291495.861 19.31 1501.797 19.71507.743 19.811513.679
19.741519.624 19.751525.561 19.81 1531.506 20.251537.443 19.811543.388
20.111549.324 20.25 1555.27 20.59 1561.206 20.51567.151 20.871573.088
21.321579.033 20.31584.969 20.01 1590.915 20.121596.851 20.321602.796
20.581608.733 20.951614.678 20.92 1620.614 20.92 1626.56 20.731632.496
20.851638.441 20.751644.378 21.02 1650.323 21.321656.259 21.41662.205
20.811668.141 20.81674.087 21.07 1680.023 21.361685.968 21.431691.905 21.35
1697.85 21.341709.732 21.2 1715.668 21.711721.613 22.02 1727.55 22.221733.495
22.531739.431 22.64 1745.377 22.461751.313 22.371757.258 22.551763.195 22.6
1769.14 22.89 1775.076 23.431781.022 22.41786.958 21.131792.903 21.06 1798.84
21.08 1810.721 20.691816.667 20.551822.603 20.941828.548 21.491834.485 21.99
1840.43 22.041846.367 21.961852.312 22.241858.248 22.461864.193 22.58
1870.13 22.351876.075 21.911882.012 21.91887.957 21.831893.893 21.66 1899.839
21.361905.775 21.23 1911.72 21.381917.666 21.371923.602 21.89 1929.538
21.841935.484 21.7 1941.42 21.941947.365 22.281953.311 22.73 1959.247
22.841965.193 23.941971.129 23.841977.074 251983.011 25.64 1988.956
26.11994.892 26.242000.838 26.432006.774 26.542012.719 26.45 2018.656
26.632024.601 26.562036.483 26.72042.419 26.372048.365 25.35 2054.301
24.192060.246 22.552066.182 21.982072.128 22.042078.064 22.06 2084.01
22.492089.946 22.862095.891 22.722101.828 22.262107.773 22.28 2113.709
22.942119.655 23.232125.591 23.992131.536 24.292137.473 23.83 2149.354 23.03
2155.3 23.282161.236 23.52167.181 23.742173.118 24.36 2179.063 24.552184.999
24.292190.945 24.492196.881 24.392202.826 23.85 2208.763 23.352214.708
23.432220.645 24.01 2226.59 24.332232.526 23.92 2238.471 23.832244.408
24.062250.353 24.7 2256.29 25.512262.235 26.12

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 955.547 .0551157.346 .09

Bank Sta: Left Right Coeff Contr. Expan. 955.5471157.346 .5 .8
Ineffective Flow num= 3
 Sta L Sta R Elev Permanent
 534 980 24 T
 1150 2000 22.8 T
 2000 2262 26 T
Skew Angle = 25

Downstream Deck/Roadway Coordinates
 num= 15
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 362.523 32.92 566.442 26.66 571.88 27.09
 678.825 24.9 1006.908 25.56 1009.627 26.19 1009.627 28.75 1033.191 28.75
21.541164.606 28.43 20.92 1186.357 28.43 1186.357 25.21 1210.827 24.57
1411.121 23.56 1572.444 22.82 1900.527 25.18

Downstream Bridge Cross Section Data
Station Elevation Data num= 477
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 44.26 5.927 44.02 11.864
44.43 17.791 43.86 23.727 42.97 35.591 42.74 41.518 42.61 53.382 42.24
59.318 41.99 65.245 41.69 71.181 41.55 83.045 41.15 88.972 40.91 94.899
40.87 100.836 40.81 106.763 41.43 112.699 42.95 118.627 43.6 124.563 43.79
130.49 43.65 136.427 43.57 142.354 43.21 148.29 43.1 154.217 43.06 160.154

42.71 172.017 42.31 183.872 42.15 189.808 42.06 195.735 41.87 201.672 41.49
207.599 41.04 219.462 40.11 225.399 39.61 231.326 39.05 237.262 38.37 243.19
37.29 249.126 36.5 255.053 36.35 260.989 36.16 266.917 36.19 272.844 36.34
284.708 36.36 290.644 36.16 296.571 35.85 302.507 35.59 308.435 35.24
314.371 35.04 320.298 35.23 326.235 35.09 332.162 34.47 338.098 33.55
344.025 32.93 349.962 32.44 355.889 32.23 361.816 31.91 367.753 31.65 373.68
31.43 379.616 31.27 385.543 30.98 391.48 30.41 397.407 30.12 403.343 29.7
409.27 29.48 415.207 29.52 421.134 29.6 427.07 29.51 432.998 29.05 438.925
28.67 444.861 28.37 450.788 28.19 456.725 28.1 462.652 27.97 474.516 27.82
480.452 27.85 486.379 28.19 492.315 28.36 498.243 28.49 504.179 28.46
510.106 28.09 516.043 27.59 521.97 27.45 527.897 27.47 533.833 27.63 539.761
27.86 545.697 28.13 551.624 27.78 557.561 27.35 563.488 27.01 569.424 26.72
575.351 26.12 581.288 25.41 587.215 24.74 593.151 24.34 599.079 24.19
605.015 24.02 610.942 23.6 616.869 23.35 622.806 23.18 628.733 22.86 634.669
22.35 640.596 21.91 646.533 21.6 652.46 21.27 658.396 21.13 664.324 21.01
670.26 20.8 682.124 20.54 688.051 20.4 693.978 20.22 699.914 19.88 711.778
19.33 717.705 19.09 723.641 18.98 735.505 18.63 741.432 18.32 747.369 17.93
753.296 17.68 759.232 17.47 765.159 17.41 771.096 17.17 777.023 16.73 782.95
16.56 788.887 16.41 794.814 16.24 800.75 16.31 806.677 16.17 812.614 16.11
818.541 16.29 824.477 16.01 830.405 16.03 836.341 15.98 842.268 15.7 848.204
15.58 854.132 15.36 860.059 15.45 865.995 15.65 871.922 16.13 877.859 17.05
883.786 17.04 889.722 17.7 895.65 17.81 901.586 17.79 907.513 16.66 969.749
25.551009.699 25.85 1033.436 21.541033.807 16.13 1041.62 15.971044.393
9.761056.501 6.01 1071.464 3.841081.162 3.851107.535 4.351116.988
4.921133.546 5.73 1143.552 6.791153.793 12.081154.129 15.161162.775
15.391164.741 20.92 1186.139 24.71221.884 18.851227.811 19.31233.748
19.281245.611 18.96 1251.539 18.531257.475 18.381263.402 18.481269.339
18.951275.266 19.2 1281.202 19.291287.129 19.571293.057 19.641298.993 19.34
1304.92 19.09 1316.784 18.5 1322.72 18.081328.647 17.811334.584 17.561340.511
17.52 1346.447 17.621352.374 17.651358.311 17.591364.238 17.731370.174 17.71
1376.102 17.961382.029 18.081387.965 18.421393.892 18.641399.829 18.95
1405.756 19.371411.692 19.63 1417.62 19.851423.556 20.11429.483 20.4 1435.419
20.671441.347 20.671447.283 20.93 1453.21 20.91459.137 21.03 1465.074
20.941471.001 20.621476.937 20.431482.865 20.551488.801 20.7 1494.728
20.811500.665 21.631506.592 22.291512.528 22.351518.455 22.37 1524.392
22.411530.319 22.161536.255 21.771542.182 21.51 1548.11 21.13 1554.046
20.941559.973 21.06 1565.91 21.111571.837 21.091577.773 21.33 1583.7
21.51589.637 21.541595.564 21.84 1601.5 22.451607.427 23.17 1613.364
23.671619.291 23.811625.227 23.851631.155 23.71637.082 23.35 1643.018
22.981648.946 22.921654.882 22.941660.809 22.761666.745 22.67 1672.673
22.011684.536 21.621690.473 21.48 1696.4 21.421708.263 21.57 1714.2
21.71720.127 21.641726.054 21.69 1731.99 21.471737.918 21.51 1743.854
21.851749.781 21.881755.718 21.721761.645 21.951767.581 22.24 1773.508
22.271785.372 231791.308 23.661797.236 23.811803.163 24.35 1809.099
24.471815.026 24.271820.963 23.9 1826.89 23.831832.826 23.73 1838.754 24.72
1844.69 25.431850.617 25.711856.553 25.871862.481 26.15 1868.417
26.411874.344 26.281880.281 25.561886.208 25.291892.135 25.49 1898.071
25.741903.999 26.011909.935 26.141915.862 26.331921.798 26.58 1927.726
26.481939.589 25.61945.526 24.991951.453 24.441957.389 24.45 1963.317
24.361969.253 24.18 1975.18 24.161981.107 24.211992.971 25.01 1998.907
24.962004.835 24.962010.771 24.892016.698 25.152022.634 25.9 2028.562
26.742040.425 27.752046.361 27.782052.289 27.522058.225 27.34 2064.152 27.26
2070.08 27.362076.016 27.422087.879 27.492099.743 27.72 2105.67
28.112111.606 27.712117.534 26.83 2123.47 27.572129.397 27.54 2135.334

```
27.742141.261 27.22147.197 27.012153.125 27.552159.052 27.4 2164.988
27.482170.916 27.192176.852 27.672182.779 27.522188.715 27.27 2194.643
27.222200.579 27.562206.506 27.642212.442 27.67 2218.37 27.6 2224.306
27.642230.233 27.622236.161 27.912242.097 27.922248.024 28.11 2259.888
28.362265.824 28.382271.751 28.422283.633 28.362289.569 28.26 2295.506
28.122301.451 27.952307.387 27.972313.323 27.712325.205 27.7 2331.141
27.792337.078 27.792343.023 27.652348.959 27.252354.896 27.21 2360.841
27.292366.778 27.52372.714 26.87 2378.65 27.312384.596 27.34 2390.532
27.242396.468 26.792402.414 26.61 2408.35 26.992414.286 27.16 2420.222
27.282426.168 26.812432.104 27.412438.041 27.752443.986 27.59 2449.922
27.582455.859 27.492461.795 27.442473.677 27.412479.613 27.35 2485.558
27.342491.495 27.422497.431 27.592503.367 27.592509.312 27.37 2515.249
26.662521.185 25.82 2527.13 25.542533.067 25.642539.003 25.71 2544.939
25.72550.885 25.672556.821 25.212562.758 24.872568.703 24.89 2574.639
25.022580.576 25.052586.512 25.022592.457 25.282598.394 25.56  2604.33
25.872610.266 26.32616.211 26.62622.148 26.492628.084 26.34 2639.966
25.992645.902 25.912651.839 25.972657.784 25.86 2663.72 25.97 2669.656
262681.538 25.572687.475 25.422693.411 24.882699.356 24.62 2705.292
24.512711.229 24.612717.174 24.862723.111 24.942729.047 24.88 2734.983
24.742746.865 24.262752.801 24.082758.747 24.072764.683 23.17 2770.619
23.12776.556 22.962782.501 22.912788.437 22.772794.374 22.77 2800.319
22.522806.255 22.212812.191 22.342818.128 22.052824.073 21.97  2830.01
22.082835.946 21.972841.891 22.342847.828 22.282853.764 22.11  2859.7
22.052865.646 22.142877.518 22.562883.464 22.53 2889.4 22.91 2895.336
23.022901.272 22.982907.218 23.192913.154 23.52919.091 23.54 2925.036
23.42930.972 23.362936.909 23.132942.845 22.74 2948.79 22.59 2954.727
22.272960.663 21.92966.608 21.472972.545 21.072978.481 21.12 2984.417
20.992990.363 20.892996.299 20.913002.235 20.883008.181 21.06 3014.117
21.133020.053 21.6 3025.99 22.213031.935 22.443037.871 22.47 3043.808
22.043049.753 21.183055.689 20.913067.562 20.983073.507 21.16 3079.444 21.29
3085.38 21.483091.325 21.63097.262 21.743109.134 21.79  3115.08 21.783121.016
21.53126.952 21.33132.898 21.573138.834 21.44 3144.771 21.543150.707
21.823156.652 21.633168.525 21.95 3174.47 20.2 3180.406 20.033186.343
20.233192.279 20.253198.224 20.363204.161 20.45 3210.097 20.523216.042 24.5

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .091009.699 .041186.139 .09
 Bank Sta: Left Right Coeff Contr. Expan.
 1009.6991186.139 .5 .8
Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 1009 25.5 T
 11863216.042 23.9 T
Skew Angle = 25

Upstream Embankment side slope = 0 horiz. to 1.0 vertical Downstream
Embankment side slope = 0 horiz. to 1.0 vertical Maximum allowable
submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested
```

```
Number of Piers = 1

Pier Data
Pier Station Upstream=1066.724 Downstream=1101.164
Upstream num= 2
 Width Elev Width Elev
 3 6 3 21
Downstream num= 2
 Width Elev Width Elev
 3 6 3 21

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
 Energy
 W.S. Pro Method

 W.S.Pro Data
 Left Embankment
 El of the top of the embankment = 25.5
 El of the toe of the abutment = 9
 Right Embankment
 El of the top of the embankment = 25.5
 El of the toe of the abutment = 9
 Abutment Type = 2 Vert. abutments and sloping embankments  Slope of
abutments =
 Top with of embankment = 50
 Centroid station of bridge opening =
 Wing Wall Type = No wing walls present
 Width =
 Angle =
 Radius =
 Guide Banks Type = No Guide Bank present
 Length =
 Offset =
 Angle =
 Optional Contraction and expansion coefficients
 At approach Section  At Guide Bank
 At upstream outside
 At upstream inside (BU)
 At downstream inside (BD)
 Piers are Continuous for the width of the bridge
 Use Geometric mean as Friction Slope Method

Selected Low Flow Methods = W.S.Pro Method

High Flow Method
 Pressure and Weir flow
 Submerged Inlet Cd =
 Submerged Inlet + Outlet Cd = .8
 Max Low Cord =

Additional Bridge Parameters
 Add Friction component to Momentum
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 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION


RIVER: Taunton River
REACH: Main Stem RS: 82492.84

INPUT
Description: 75.3 DS FAce Bedford St
Station Elevation Data num= 477  Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 44.26 5.927 44.02 11.864 44.43 17.791 43.86 23.727 42.97  35.591 42.74
41.518 42.61 53.382 42.24 59.318 41.99 65.245 41.69  71.181 41.55 83.045
41.15 88.972 40.91 94.899 40.87 100.836 40.81  106.763 41.43 112.699 42.95
118.627 43.6 124.563 43.79 130.49 43.65  136.427 43.57 142.354 43.21 148.29
43.1 154.217 43.06 160.154 42.71  172.017 42.31 183.872 42.15 189.808 42.06
195.735 41.87 201.672 41.49  207.599 41.04 219.462 40.11 225.399 39.61
231.326 39.05 237.262 38.37  243.19 37.29 249.126 36.5 255.053 36.35 260.989
36.16 266.917 36.19  272.844 36.34 284.708 36.36 290.644 36.16 296.571 35.85
302.507 35.59  308.435 35.24 314.371 35.04 320.298 35.23 326.235 35.09
332.162 34.47  338.098 33.55 344.025 32.93 349.962 32.44 355.889 32.23
361.816 31.91  367.753 31.65 373.68 31.43 379.616 31.27 385.543 30.98 391.48
30.41  397.407 30.12 403.343 29.7 409.27 29.48 415.207 29.52 421.134 29.6
427.07 29.51 432.998 29.05 438.925 28.67 444.861 28.37 450.788 28.19  456.725
28.1 462.652 27.97 474.516 27.82 480.452 27.85 486.379 28.19  492.315 28.36
498.243 28.49 504.179 28.46 510.106 28.09 516.043 27.59  521.97 27.45 527.897
27.47 533.833 27.63 539.761 27.86 545.697 28.13  551.624 27.78 557.561 27.35
563.488 27.01 569.424 26.72 575.351 26.12  581.288 25.41 587.215 24.74
593.151 24.34 599.079 24.19 605.015 24.02  610.942 23.6 616.869 23.35 622.806
23.18 628.733 22.86 634.669 22.35  640.596 21.91 646.533 21.6 652.46 21.27
658.396 21.13 664.324 21.01  670.26 20.8 682.124 20.54 688.051 20.4 693.978
20.22 699.914 19.88  711.778 19.33 717.705 19.09 723.641 18.98 735.505 18.63
741.432 18.32  747.369 17.93 753.296 17.68 759.232 17.47 765.159 17.41
771.096 17.17  777.023 16.73 782.95 16.56 788.887 16.41 794.814 16.24 800.75
16.31  806.677 16.17 812.614 16.11 818.541 16.29 824.477 16.01 830.405 16.03
836.341 15.98 842.268 15.7 848.204 15.58 854.132 15.36 860.059 15.45  865.995
15.65 871.922 16.13 877.859 17.05 883.786 17.04 889.722 17.7  895.65 17.81
901.586 17.79 907.513 16.66 969.749 25.551009.699 25.85 1033.436
21.541033.807 16.13 1041.62 15.971044.393 9.761056.501 6.01 1071.464
3.841081.162 3.851107.535 4.351116.988 4.921133.546 5.73 1143.552
6.791153.793 12.081154.129 15.161162.775 15.391164.741 20.92 1186.139
24.71221.884 18.851227.811 19.31233.748 19.281245.611 18.96 1251.539
18.531257.475 18.381263.402 18.481269.339 18.951275.266 19.2 1281.202
19.291287.129 19.571293.057 19.641298.993 19.34 1304.92 19.09 1316.784 18.5
1322.72 18.081328.647 17.811334.584 17.561340.511 17.52 1346.447
17.621352.374 17.651358.311 17.591364.238 17.731370.174 17.71 1376.102
17.961382.029 18.081387.965 18.421393.892 18.641399.829 18.95 1405.756
19.371411.692 19.63 1417.62 19.851423.556 20.11429.483 20.4 1435.419
20.671441.347 20.671447.283 20.93 1453.21 20.91459.137 21.03 1465.074
20.941471.001 20.621476.937 20.431482.865 20.551488.801 20.7 1494.728
20.811500.665 21.631506.592 22.291512.528 22.351518.455 22.37 1524.392
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22.411530.319 22.161536.255 21.771542.182 21.51 1548.11 21.13 1554.046
20.941559.973 21.06 1565.91 21.111571.837 21.091577.773 21.33 1583.7
21.51589.637 21.541595.564 21.84 1601.5 22.451607.427 23.17 1613.364
23.671619.291 23.811625.227 23.851631.155 23.71637.082 23.35 1643.018
22.981648.946 22.921654.882 22.941660.809 22.761666.745 22.67 1672.673
22.011684.536 21.621690.473 21.48 1696.4 21.421708.263 21.57 1714.2
21.71720.127 21.641726.054 21.69 1731.99 21.471737.918 21.51 1743.854
21.851749.781 21.881755.718 21.721761.645 21.951767.581 22.24 1773.508
22.271785.372 231791.308 23.661797.236 23.811803.163 24.35 1809.099
24.471815.026 24.271820.963 23.9 1826.89 23.831832.826 23.73 1838.754 24.72
1844.69 25.431850.617 25.711856.553 25.871862.481 26.15 1868.417
26.411874.344 26.281880.281 25.561886.208 25.291892.135 25.49 1898.071
25.741903.999 26.011909.935 26.141915.862 26.331921.798 26.58 1927.726
26.481939.589 25.61945.526 24.991951.453 24.441957.389 24.45 1963.317
24.361969.253 24.18 1975.18 24.161981.107 24.211992.971 25.01 1998.907
24.962004.835 24.962010.771 24.892016.698 25.152022.634 25.9 2028.562
26.742040.425 27.752046.361 27.782052.289 27.522058.225 27.34 2064.152 27.26
2070.08 27.362076.016 27.422087.879 27.492099.743 27.72 2105.67
28.112111.606 27.712117.534 26.83 2123.47 27.572129.397 27.54 2135.334
27.742141.261 27.22147.197 27.012153.125 27.552159.052 27.4 2164.988
27.482170.916 27.192176.852 27.672182.779 27.522188.715 27.27 2194.643
27.222200.579 27.562206.506 27.642212.442 27.67 2218.37 27.6 2224.306
27.642230.233 27.622236.161 27.912242.097 27.922248.024 28.11 2259.888
28.362265.824 28.382271.751 28.422283.633 28.362289.569 28.26 2295.506
28.122301.451 27.952307.387 27.972313.323 27.712325.205 27.7 2331.141
27.792337.078 27.792343.023 27.652348.959 27.252354.896 27.21 2360.841
27.292366.778 27.52372.714 26.87 2378.65 27.312384.596 27.34 2390.532
27.242396.468 26.792402.414 26.61 2408.35 26.992414.286 27.16 2420.222
27.282426.168 26.812432.104 27.412438.041 27.752443.986 27.59 2449.922
27.582455.859 27.492461.795 27.442473.677 27.412479.613 27.35 2485.558
27.342491.495 27.422497.431 27.592503.367 27.592509.312 27.37 2515.249
26.662521.185 25.82 2527.13 25.542533.067 25.642539.003 25.71 2544.939
25.72550.885 25.672556.821 25.212562.758 24.872568.703 24.89 2574.639
25.022580.576 25.052586.512 25.022592.457 25.282598.394 25.56 2604.33
25.872610.266 26.32616.211 26.62622.148 26.492628.084 26.34 2639.966
25.992645.902 25.912651.839 25.972657.784 25.86 2663.72 25.97 2669.656
262681.538 25.572687.475 25.422693.411 24.882699.356 24.62 2705.292
24.512711.229 24.612717.174 24.862723.111 24.942729.047 24.88 2734.983
24.742746.865 24.262752.801 24.082758.747 24.072764.683 23.17 2770.619
23.12776.556 22.962782.501 22.912788.437 22.772794.374 22.77 2800.319
22.522806.255 22.212812.191 22.342818.128 22.052824.073 21.97 2830.01
22.082835.946 21.972841.891 22.342847.828 22.282853.764 22.11 2859.7
22.052865.646 22.142877.518 22.562883.464 22.53 2889.4 22.91 2895.336
23.022901.272 22.982907.218 23.192913.154 23.52919.091 23.54 2925.036
23.42930.972 23.362936.909 23.132942.845 22.74 2948.79 22.59 2954.727
22.272960.663 21.92966.608 21.472972.545 21.072978.481 21.12 2984.417
20.992990.363 20.892996.299 20.913002.235 20.883008.181 21.06 3014.117
21.133020.053 21.6 3025.99 22.213031.935 22.443037.871 22.47 3043.808
22.043049.753 21.183055.689 20.913067.562 20.983073.507 21.16 3079.444 21.29
3085.38 21.483091.325 21.63097.262 21.743109.134 21.79 3115.08 21.783121.016
21.53126.952 21.33132.898 21.573138.834 21.44 3144.771 21.543150.707
21.823156.652 21.633168.525 21.95 3174.47 20.2 3180.406 20.033186.343
20.233192.279 20.253198.224 20.363204.161 20.45 3210.097 20.523216.042 24.5
 Manning's n Values num= 3

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 Sta n Val Sta n Val Sta n Val
 0 .091009.699 .041186.139 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1009.6991186.139 128.81 112.38 109.35 .5 .8 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 1009 25.5 T
 11863216.042 23.9 T
Skew Angle = 25

CROSS SECTION


RIVER: Taunton River
REACH: Main Stem RS: 82380.46

INPUT
Description: 75 Exit Bedford St
Station Elevation Data num= 332
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  0 54.96 6.55 54.85 13.09 54.29
19.64 54 26.19 53.8  32.74 53.42 39.29 52.93 45.83 52.55 52.38 52.11 58.93
51.73  65.48 51.6 72.02 51.38 78.57 50.96 85.12 50.7 91.66 50.48  98.21 50.19
104.76 49.93 111.31 49.57 117.85 49.33 124.4 49.26  130.95 48.94 137.5 48.69
144.04 48.49 150.59 48.25 157.14 47.97  163.69 47.65 170.23 47.4 176.78 47.1
183.33 46.85 189.88 46.63  196.42 46.35 202.97 46.16 209.52 45.9 216.07 45.72
222.61 45.48  235.71 45.09 242.26 44.88 248.8 44.8 255.35 44.66 268.45 44.05
274.99 43.73 281.54 43.45 288.09 43.39 294.64 43.26 301.18 43.21  307.73
43.04 314.28 42.9 320.83 42.79 327.37 42.49 333.92 42.34  340.47 42.13 347.02
41.75 353.56 41.54 360.11 41.3 373.21 40.89  379.75 40.64 386.3 40.31 392.85
40.04 399.4 39.81 405.94 39.56  412.49 39.26 419.04 39 425.59 38.61 432.13
38.18 438.68 37.83  445.23 37.61 451.78 37.31 458.32 37.08 464.87 36.81
471.42 36.48  477.97 36.03 484.51 35.74 491.06 35.38 497.61 34.97 504.16
34.66  510.7 34.46 517.25 34.29 530.35 34.06 536.89 33.8 549.99 33.19  556.54
33.01 563.08 32.8 576.18 31.95 582.73 31.63 589.27 31.38  602.37 31.23 608.92
30.9 615.46 30.39 622.01 30.06 628.56 29.86  635.11 29.55 641.65 29.14 648.2
28.88 654.75 28.84 661.3 28.56  667.84 28.22 674.39 27.9 680.94 27.64 694.03
27.15 700.58 26.82  713.68 26.35 720.22 26.05 726.77 25.78 739.87 25.59
759.51 24.78  766.06 24.67 772.6 24.51 779.15 24.28 785.7 24.31 792.25 24.22
798.79 24.17 805.34 23.83 811.89 23.6 818.44 23.44 824.98 23.32  831.53 22.8
838.08 22.22 844.63 21.83 851.17 21.53 857.72 21.26  864.27 21.06 870.82
20.76 877.36 20.61 883.91 20.59 890.46 20.42  897.01 20.19 903.55 20.05 910.1
19.88 916.65 19.45 923.2 18.87  929.74 18.31 936.29 18 942.84 17.58 949.39
17.05 955.93 16.73  1001.14 14.94 1066.06 13.83 1107.83 16.62 1159.8 6.51
1169.38 4.9  1184.93 3.62 1199.94 4.05 1209.63 3.96 1228.12 4.33 1244.36 5.18
1255.8 7.87 1277.03 14.02 1333.92 16.45 1340.46 17 1347 17.75  1353.55 18.25
1360.09 18.52 1366.64 18.71 1373.18 18.86 1379.73 18.83  1386.27 18.74
1392.81 18.91 1399.36 18.99 1405.9 18.9 1412.45 18.73  1418.99 18.66 1425.53
18.55 1432.08 18.42 1438.62 18.26 1445.17 18.15  1451.71 18.15 1458.26 18.13
1464.8 18.27 1471.34 18.57 1490.98 19.1  1497.52 19.26 1504.06 19.5 1517.15
19.91 1523.7 20.43 1536.79 21.6  1543.33 21.98 1549.87 22.21 1556.42 22.38
1562.96 22.51 1576.05 23.16  1582.59 23.2 1589.14 23.3 1595.68 23.38 1602.23
23.38 1608.77 23.35  1615.32 23.48 1621.86 23.41 1628.4 23.41 1634.95 23.54
1641.49 23.56  1648.04 23.5 1654.58 23.78 1661.12 23.96 1667.67 23.01 1674.21
23.06  1680.76 22.7 1687.3 22.28 1693.85 21.69 1700.39 21.84 1706.93 22.08
```

1713.48 22.24 1720.02 22.24 1726.57 22.19 1733.11 22 1746.2 21.45 1752.74 21.28 1759.29 21.37 1765.83 21.53 1772.38 21.6 1778.92 21.96 1785.46 21.98 1792.01 21.89 1805.1 21.86 1811.64 21.68 1818.18 21.7 1824.73 21.41 1831.27 21.45 1837.82 21.96 1844.36 21.97 1850.91 22.13 1857.45 21.76 1863.99 21.45 1870.54 21.65 1877.08 21.6 1883.63 21.66 1890.17 22.1 1896.72 22.31 1903.26 22.75 1909.8 23.43 1916.35 24.3 1922.89 24.98 1929.44 25.42 1935.98 25.41 1942.52 25.1 1949.07 25.31 1955.61 25.92 1962.16 25.86 1968.7 25.06 1975.25 24.43 1988.33 23.82 1994.88 23.73 2001.42 23.93 2007.97 23.76 2014.51 23.5 2021.05 23.5 2027.6 23.58 2034.14 23.68 2040.69 23.59 2047.23 23.87 2053.78 24.66 2060.32 25.16 2066.86 25.5 2073.41 25.63 2079.95 25.67 2086.5 25.51 2093.04 25.24 2099.58 24.58 2106.13 24.05 2112.67 23.93 2119.22 23.78 2125.76 23.57 2132.31 23.53 2138.85 23.55 2145.39 23.74 2151.94 24.37 2158.48 26.03 2165.03 27.77 2171.57 28.53 2178.11 28.53 2184.66 28.39 2191.2 28.62 2197.75 28.83 2204.29 29.11 2210.84 29.28 2217.38 29.29 2223.92 29.32 2237.01 29.23 2243.56 29.16 2250.1 29.07 2256.64 29.1 2263.19 29.62 2269.73 29.76 2276.28 29.71 2282.82 29.71 2289.37 29.44 2295.91 29.28 2302.45 29.14 2309 29.08 2315.54 29.12 2322.09 29.29 2328.63 29.19 2335.18 28.72 2341.72 28.52 2348.26 28.2 2354.81 27.91 2361.35 27.49 2367.9 27.3 2374.44 27.63 2380.98 28.24 2387.53 28.21 2394.07 28.69 2400.62 28.67 2407.16 28.1 2413.71 26.83 2420.25 25.92 2426.79 25.78 2433.34 25.67 2439.88 25.6 2446.43 25.45 2459.51 25.33 2466.06 25.4 2472.6 25.4 2479.15 25.56 2485.69 25.67 2492.24 25.8 2498.78 26.5 2505.32 27.31 2511.87 27.96 2518.41 28.65 2524.96 29.07 2531.5 29.19 2538.04 29.4 2544.59 29.63 2551.13 29.71 2557.68 29.66 2564.22 29.63 2570.76 29.44 2577.31 29.16 2583.85 29.08 2590.4 28.85 2596.94 28.52 2603.48 28.11

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 1107.83 .04 1379.73 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1107.83 1379.73 1341.34 1298.77 1269.65 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 1621.9 2603.48 24.2 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 81081.69

INPUT
Description: 74
Station Elevation Data num= 297
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 43.27 19.63 42.67 45.8 42.57 65.43 42.03 78.52 41.9 91.6 42.16 98.14 42.16 111.23 41.96 117.77 41.73 130.86 41.5 143.95 40.96 176.66 40.55 202.83 40.59 255.18 39.37 287.89 38.17 307.52 37.77 314.06 37.28 340.24 37.05 346.78 36.89 366.41 36.67 372.95 36.8 386.04 36.61 392.58 36.24 399.12 36.16 405.66 36.27 418.75 35.7 425.29 35.59 431.84 35.67 444.92 35.48 458.01 34.96 464.55 34.55 471.09 34.44 477.64 34.55 490.72 34.48 497.27 34.6 536.52 34.45 543.07 34.27 549.61 34.26 562.7 34.56 569.24 34.48 582.33 34.11 588.87 34.1 601.95 33.67 615.04 33.61 634.67 34 641.21 34.45 660.84 34.29 673.93 34.27 680.47 33.94 700.1 33.71 706.64 33.44 713.19 32.87 726.27 32.78 732.81 32.85 745.9 32.61 752.44 32.39 765.53

32.24 778.62 31.77 785.16 31.39 798.24 31.14 804.79 30.89 824.42 30.64
850.59 29.42 863.67 29.14 870.22 29.13 876.76 29.31 896.39 29.52 902.93
29.44 909.48 29.13 922.56 28.06 929.1 27.85 942.19 27.08 955.28 26.98 961.82
26.75 968.36 26.35 994.53 25.53 1001.08 25.5 1014.16 24.95 1020.71 24.98
1027.25 24.15 1033.79 23.56 1040.34 23.56 1046.88 23.84 1053.42 24.29
1066.51 24.27 1073.05 24.11 1105.77 22.37 1112.31 21.84 1125.39 22.11
1138.48 22.08 1177.74 21.12 1190.82 20.83 1203.91 20.24 1236.62 17.71
1243.17 17.11 1262.8 15.89 1282.43 15.64 1295.51 15.08 1302.05 14.91 1328.23
15.5 1334.77 15.82 1341.31 15.97 1347.85 15.92 1360.94 16.2 1367.48 16.23
1380.57 15.99 1387.11 15.29 1393.66 14.14 1400.2 13.39 1406.74 13.68 1413.28
13.49 1426.37 13.61 1432.91 13.52 1439.46 14 1446 14.68 1452.54 15.52
1459.09 16.07 1472.17 16.71 1478.71 16.82 1491.8 16.29 1492.52 16.23 1498.34
15.73 1504.89 15.09 1511.43 14.24 1517.97 13.27 1524 10.2 1545 4.7 1570 5.3
1595 5.2 1616 10.3 1622.66 12.08 1629.2 13.54 1635.75 17.72 1642.29 19.79
1648.83 20.73 1655.37 21.05 1661.92 21.05 1668.46 20.87 1675 20.35 1681.55
19.56 1688.09 18.83 1694.63 17.65 1701.17 17.24 1707.72 17.29 1714.26 17.37
1720.8 17.9 1727.35 18.74 1733.89 19.37 1740.43 19.69 1746.98 19.62 1760.06
18.9 1766.6 18.09 1773.15 17.66 1779.69 17.61 1786.23 17.41 1792.78 17.85
1799.32 17.71 1805.86 17.61 1812.41 17.85 1818.95 18.41 1825.49 19.05
1832.03 19.67 1838.58 19.92 1845.12 20 1851.66 20.15 1858.21 20.46 1864.75
20.46 1871.29 20.54 1877.83 20.85 1884.38 20.88 1890.92 21.28 1897.46 21.87
1904.01 22.3 1910.55 22.54 1917.09 22.89 1923.64 23.46 1930.18 24.06 1936.72
24.38 1943.26 24.43 1949.81 24.53 1956.35 24.72 1962.89 25.14 1969.44 25.4
1975.98 25.55 1982.52 25.45 1989.07 24.93 1995.61 24.13 2002.15 23.42
2008.69 22.62 2015.24 22.38 2021.78 22.29 2034.87 22.19 2041.41 22.16
2047.95 22.26 2054.49 22.43 2061.04 22.42 2067.58 22.16 2074.11 22.03
2080.64 22.45 2093.7 22.99 2100.23 23.22 2106.76 23.62 2113.29 23.83 2119.82
23.6 2126.35 23.58 2132.88 23.21 2139.42 23.17 2145.95 23.18 2152.48 23.05
2159.01 22.7 2165.54 22.71 2172.07 22.94 2178.6 23.14 2185.13 23.29 2191.66
23.6 2198.19 23.84 2204.72 24.5 2211.25 24.85 2217.78 25.69 2224.31 26.71
2237.37 28.33 2243.9 29.07 2250.43 29.87 2256.96 30.41 2263.49 30.79 2270.02
31.09 2276.55 31.11 2283.08 31.08 2289.61 31.12 2296.15 30.88 2302.68 30.81
2309.21 31.09 2315.74 31.17 2322.27 31.21 2328.8 31.27 2335.33 31.54 2341.86
31.5 2354.92 31.65 2361.45 31.75 2367.98 31.77 2374.51 31.61 2381.04 31.57
2387.57 31.43 2394.1 31.38 2400.63 30.22 2407.16 28.97 2413.69 27.64 2420.22
26.85 2426.75 27.48 2433.28 28.35 2439.81 28.51 2446.34 28.37 2452.88 27.92
2459.41 27.32 2465.94 26.55 2472.47 25.87 2485.53 23.8 2492.06 23.29 2498.59
22.93 2505.12 22.85 2511.65 23.46 2518.18 23.89 2524.71 24.34 2531.24 24.63
2537.77 25.07 2544.3 25.63 2550.83 25.99 2557.36 26.05 2563.89 26.02 2570.42
25.71 2576.95 25.57 2583.48 25.16 2590.01 25.1 2596.54 25.57 2603.07 26.23
2609.61 27.04 2616.14 27.73 2622.67 28.46 2635.73 30.03 2642.26 30.08
2648.79 30 2655.32 30.05 2661.85 30.08 2668.38 30.06 2674.91 29.99 2681.44
29.94 2687.97 29.92 2694.5 29.79 2701.03 29.71 2707.56 29.6 2714.09 29.58
2720.62 29.62 2733.68 29.75 2740.21 29.72 2746.74 29.85 2753.27 30.23
2759.81 30.66

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 1478.71 .04 1655.37 .095
 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1478.71 1655.37 1963.31 1977.44 1977.97 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 1969 2759.81 25.4 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 79104.25

INPUT
Description: 73
Station Elevation Data num= 387
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 29.82 6.56 29.71 19.68 29.52
26.24 29.48 32.8 29.49 39.36 29.56 45.92 29.67 52.48 29.83 59.04 30.03 72.15
30.48 78.71 30.63 85.27 30.65 91.83 30.57 98.39 30.35 104.95 30.21 111.51
30.22 118.07 30.35 131.19 30.1 137.75 30.3 144.31 29.93 150.87 27.64 157.43
25.7 163.99 25.56 177.11 26.55 183.67 27.08 190.23 27.29 196.79 27.43 203.35
27.54 209.91 27.61 216.46 27.58 229.58 27.89 236.14 28.11 242.7 28.28 249.26
28.36 255.82 28.39 262.38 28.9 268.94 29.37 275.5 29.72 282.06 30.03 288.62
30.81 295.18 31.33 301.74 32.06 308.3 32.53 314.86 32.54 327.98 32.43
334.54 32.47 341.1 32.33 347.66 31.3 354.22 29.28 360.77 27.21 367.33 25.73
373.89 23.83 387.01 23.04 393.57 22.82 400.13 22.45 406.69 22.65 413.25
23.16 419.81 23.85 426.37 24.17 432.93 24.24 439.49 24.79 446.05 24.42
452.61 25.52 459.17 27.22 465.73 28.59 472.29 29.42 478.85 29.72 491.97
29.29 498.53 29.2 505.08 29.33 511.64 29.31 518.2 29.03 524.76 28.63 531.32
28.15 537.88 27.93 544.44 28.15 551 28.03 557.56 27.56 564.12 26.81 570.68
26.25 577.24 25.99 590.36 25.32 596.92 25.44 603.48 25.46 610.04 25.06
616.6 24.99 623.16 25.07 629.72 25.03 642.84 24.85 649.39 24.97 655.95 25.13
662.51 25.05 669.07 25.01 675.63 24.91 682.19 24.54 688.75 24.46 695.31
24.45 701.87 24.08 708.43 22.59 714.99 22.25 721.55 22.48 728.11 23.14
734.67 23.23 741.23 22.46 747.79 21.25 754.35 20.57 760.91 20.18 767.47
20.28 774.03 20.93 780.59 21.7 787.15 22.16 793.7 22.01 800.26 20.93 806.82
18.21 813.38 17.91 819.94 18.27 826.5 18 833.06 18.05 839.62 17.98 846.18
18.59 852.74 19.34 859.3 19.69 865.86 19.71 872.42 19.6 878.98 19.51 885.54
19.23 892.1 19.25 898.66 19.84 905.22 20.63 911.78 20.91 918.34 20.98 931.46
21.7 938.01 21.68 944.57 21.55 951.13 21.5 957.69 21.75 964.25 22.07 977.37
22.5 983.93 22.76 990.49 23.34 997.05 23.79 1003.61 24.57 1010.17 25.17
1016.73 25.58 1023.29 25.72 1029.85 25.77 1036.41 25.88 1049.53 25.75
1062.65 25.85 1069.21 25.76 1075.77 25.71 1082.32 25.68 1088.88 25.68
1095.44 25.42 1102 25.39 1108.56 25.22 1115.12 25.38 1121.68 25.29 1128.24
25.41 1134.8 25.51 1141.36 25.73 1147.92 25.66 1154.48 25.64 1161.04 25.58
1167.6 25.39 1174.16 25.01 1180.72 24.68 1193.84 25.04 1200.4 25.17 1206.96
25.6 1213.52 25.76 1220.08 25.94 1226.64 26.06 1233.19 26 1239.75 26.01
1246.31 25.93 1252.87 25.96 1259.43 25.87 1272.55 25.58 1279.11 25.63
1285.67 25.76 1292.23 25.52 1298.79 25.33 1305.35 25.2 1311.91 24.93 1318.47
24.52 1325.03 24.21 1331.59 23.94 1338.15 23.84 1344.71 23.71 1351.27 23.52
1357.83 23.5 1370.95 23.53 1377.5 23.47 1384.06 23.38 1390.62 23.03 1397.18
22.88 1403.74 22.68 1410.3 22.67 1416.86 22.53 1423.42 22.41 1429.98 22.01
1436.54 21.69 1443.1 21.5 1449.66 21.51 1456.22 21.65 1462.78 21.99 1469.34
22.65 1475.89 23.47 1482.44 24.01 1489 24.59 1495.55 25.07 1502.1 25.26
1508.65 25.38 1515.2 25.43 1521.76 25.37 1528.31 25.14 1534.86 24.93 1547.96
23.89 1554.52 23.43 1561.07 22.92 1567.62 22.37 1574.17 22 1580.73 21.61
1587.28 21.15 1593.83 20.96 1600.38 20.79 1606.93 20.65 1613.49 20.4 1620.04
20.24 1626.59 19.77 1633.14 19.15 1639.69 18.73 1646.25 18.1 1652.8 17.62
1659.35 17.65 1665.9 17.83 1672.46 17.99 1679.01 18.55 1685.56 19.05 1692.11
19.64 1698.66 19.73 1705.22 19.97 1711.77 20.15 1718.32 20.3 1724.87 20.4
1731.42 20.42 1737.98 20.42 1751.08 20.36 1757.63 20.45 1770.74 20.52

1777.29 20.26 1783.84 20.18 1790.39 20.45 1796.95 20.47 1803.5 20.59 1810.05 20.51 1816.6 19.02 1823.15 16.17 1835 5.9 1845 3.8 1858 -1.6 1870 -2.8 1880 -2.2 1895 .2 1905 6.2 1918 10.7 1935.21 15.55 1941.09 16.09 1954.2 16.1 1967.3 15.72 1973.85 15.84 1986.96 16.51 1993.51 16.5 2006.61 15.64 2013.17 15.03 2019.72 14.65 2026.27 14.52 2032.82 14.61 2045.93 15.84 2052.48 16.13 2065.58 16.26 2104.9 14.95 2124.55 15.25 2131.1 15.21 2137.66 14.91 2144.21 14.89 2150.76 15.53 2163.86 18.04 2170.42 18.68 2183.52 19.53 2190.07 19.81 2196.62 19.8 2209.73 19.31 2216.28 18.87 2229.39 18.87 2275.25 17.57 2294.91 16.3 2308.01 15.94 2321.11 15.34 2327.67 15.17 2334.22 15.32 2347.32 15.16 2366.98 15.34 2380.08 15.15 2386.64 15.32 2399.74 15.1 2406.29 15.38 2419.4 15.32 2458.71 15.71 2478.36 15.57 2498.02 16.31 2511.12 17.48 2524.23 18.23 2537.33 18.71 2543.89 18.65 2550.44 18.41 2556.99 18.63 2570.09 19.75 2596.3 21.54 2609.41 22.27 2615.96 22.46 2622.51 22.4 2635.61 22.89 2648.72 23.09 2668.37 23.1 2681.48 23.43 2694.58 23.91 2720.79 23.91 2733.9 23.31 2740.45 23.15 2747 23.37 2753.55 23.31 2766.66 23 2773.21 23.17 2779.76 23.63 2786.31 23.49 2792.86 23.68 2799.42 24.26 2805.97 25.39 2812.52 26.16 2819.07 26.31 2825.62 27.01 2832.18 27.49 2838.73 28.37 2845.28 28.72 2851.83 28.55 2858.38 28.93 2864.94 29.14 2878.04 29.31 2884.59 29.13 2904.25 28.89 2910.8 28.66 2917.35 27.85 2923.91 28.37 2930.46 28.7 2937.01 28.62 2943.56 28.84 2950.11 29.38 2956.67 30.12 2963.22 30.65 2976.32 30.67 2982.87 30.23 2989.43 30.08 2995.98 29.67 3002.53 28.56 3009.08 27.96 3015.63 28.76 3022.19 29.1 3028.74 29.04 3035.29 28.44 3041.84 28.13 3074.6 28.36 3087.71 28.19 3100.81 28.91 3107.36 29.47 3127.02 30.13 3146.68 31.22 3159.78 32.04 3172.88 32.56 3199.09 32.99 3231.85 32.67 3258.06 33.1 3277.72 33.77 3297.37 34.89 3303.93 35.16 3317.03 35.35

Manning's n Values num= 3 Sta n Val Sta n Val Sta n Val
 0 .09 1810.05 .04 1941.09 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1810.05 1941.09 1084.58 1111.59 1135.96 .3 .4 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 1016 25.6 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 77992.66

INPUT
Description: 72
Station Elevation Data num= 359
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 26.51 13.1 26.76 19.65 27.05 26.2 27.32 32.75 27.13 39.3 26.67 45.85 26.69 58.95 26.98 65.5 27.43 72.05 27.75 78.6 28.31 85.15 28.9 91.71 29.45 98.26 29.83 104.81 29.95 111.36 30.2 117.91 30.31 124.46 30.26 131.01 30.04 137.56 29.63 144.11 29.46 150.66 29.39 157.21 29.37 163.76 29.26 170.31 29 176.86 28.86 183.41 28.79 189.96 28.7 196.51 28.69 203.06 28.57 209.61 28.58 216.16 28.63 222.71 28.64 229.26 28.69 235.81 28.86 242.36 29.07 248.91 29.19 255.46 29.22 262.01 29.09 268.57 29.06 275.12 28.87 281.67 28.94 288.22 29.14 294.77 29.29 301.32 29.41 307.87 29.4 314.42 29.23 320.97 29.26 327.52 29.03 334.07 28.94 340.62 28.91 347.17 28.75 353.72 28.67 360.27 28.57 373.37 28.28 379.92 28.26 386.47 28.28 393.02 28.22 406.12 28.21 412.67 28.23 419.22 28.32

425.77 28.51 432.32 28.47 445.43 28.35 458.53 28.54 465.08 28.67 471.63 28.69 478.18 28.8 484.73 28.81 491.28 28.71 497.83 28.78 504.38 28.67 510.93 28.58 530.58 27.76 537.13 27.78 543.68 27.63 550.23 27.27 556.78 26.95 563.33 26.89 569.88 26.79 576.43 26.6 582.98 26.56 589.53 26.6 596.08 26.45 602.63 26.53 609.18 26.51 615.73 26.67 622.29 26.68 628.84 26.72 635.39 26.91 641.94 27.01 648.49 26.94 655.04 27.17 661.59 27.2 668.14 27.48 674.69 27.7 681.24 27.79 694.34 28.26 700.89 28.34 707.44 28.32 713.99 28.37 720.54 28.61 727.09 28.64 733.64 28.52 740.19 28.33 746.74 28.07 753.29 27.87 759.84 27.7 766.39 27.42 772.94 27.22 779.49 26.93 792.59 26.28 799.15 26.14 805.7 25.81 812.25 25.62 825.35 25.5 831.9 25.56 838.45 25.53 845 25.4 851.55 25.31 864.65 24.76 871.2 24.68 877.75 24.67 884.3 24.53 890.85 24.43 897.4 24.48 903.95 24.16 917.05 23.56 923.6 23.56 930.15 23.43 936.7 23.13 943.25 22.87 949.8 22.77 956.35 22.77 962.9 22.59 969.46 22.34 976.01 22 982.56 22.22 989.11 22.36 995.66 22.41 1002.21 22.18 1008.76 21.23 1015.31 19.39 1021.86 17.93 1028.41 16.99 1034.96 16.42 1041.51 16.02 1048.06 15.81 1054.61 15.5 1061.16 15.58 1067.71 15.38 1074.26 15.24 1080.81 15.25 1087.36 15.33 1093.91 15.12 1100.46 15.12 1107.01 15.22 1113.56 15.18 1120.11 15.24 1126.66 15.19 1133.21 15.48 1139.76 15.94 1146.31 15.84 1152.86 15.54 1159.42 15.57 1165.97 15.82 1172.52 15.81 1179.07 15.78 1185.62 15.91 1192.17 16.08 1198.72 16.4 1205.27 16.52 1218.37 16.72 1224.92 16.88 1231.47 17.52 1238.02 17.98 1244.57 18.1 1251.12 18.35 1257.67 18.52 1264.22 18.37 1270.77 18.29 1277.31 17.98 1283.86 17.94 1290.4 17.84 1296.95 17.67 1303.49 17.62 1310.03 17.82 1316.58 18.13 1323.12 18.59 1329.67 18.97 1336.21 19 1342.75 19.1 1349.3 19.43 1355.84 19.53 1362.39 19.46 1368.93 19.57 1375.47 19.91 1382.02 20.28 1388.56 20.47 1395.11 20.73 1401.65 20.57 1408.19 20.13 1414.74 19.47 1421.28 17.93 1427.83 16.14 1434.37 14.74 1440.91 13.71 1447.46 13.52 1454 14.04 1460.55 14.85 1467.09 15.42 1473.63 15.53 1480.18 15.52 1486.72 15.32 1493.26 15.45 1499.81 15.69 1506.35 15.85 1512.9 16.13 1519.44 16.08 1525.98 16.05 1546 17.5 1564 9.9 1585 5.9 1610 4.2 1635 4.6 1656 9.7 1682 16.7 1696.13 16.08 1702.67 15.69 1709.22 15.79 1715.76 16.36 1728.85 18.01 1735.39 18.72 1741.93 19.47 1748.48 20.13 1755.02 20.59 1761.57 20.82 1768.11 20.74 1781.2 20.49 1787.74 20.41 1800.83 20.12 1807.37 20.04 1813.92 20.22 1827.01 21.28 1833.55 22.21 1840.09 23.11 1846.64 23.72 1853.18 24.54 1859.73 25.55 1866.27 26.94 1872.81 27.59 1879.36 28.18 1885.9 28.82 1892.45 29.29 1898.99 29.6 1905.53 29.72 1912.08 29.7 1918.62 29.65 1925.17 29.52 1931.71 29.53 1938.25 29.67 1951.34 29.28 1957.89 29.37 1964.43 29.39 1970.97 29.59 1977.52 30.08 1984.06 30.36 1990.6 30.7 1997.15 30.97 2003.69 31.07 2010.24 31.1 2016.78 31.39 2023.32 31.77 2029.87 32.31 2036.41 32.74 2049.5 33.57 2056.04 33.79 2062.59 33.96 2069.13 34.06 2075.65 34 2082.17 34.02 2088.68 33.93 2095.2 34.05 2101.72 34.23 2108.24 34.3 2114.75 34.08 2121.27 34.2 2127.79 34.3 2134.3 34.77 2140.82 34.97 2147.34 35.06 2153.86 35.02 2160.37 35 2173.41 35.15 2179.93 35.13 2192.96 34.75 2199.48 34.55 2205.99 34.33 2219.03 33.98 2225.55 33.95 2232.06 33.86 2238.58 34.09 2245.1 34.16 2251.62 33.79 2258.13 33.74 2264.65 33.87 2271.17 33.89 2277.68 33.85 2284.2 33.94 2290.72 33.86 2297.24 33.64 2303.75 33.47 2310.27 33.59 2316.79 33.78 2323.3 33.95 2329.82 34.05 2336.34 34.12 2342.86 34.16 2349.37 34.03 2362.41 34.06 2375.44 34.03 2381.96 34.57 2388.48 34.77 2394.99 34.85 2401.51 34.97 2408.03 35 2414.55 35.25 2427.58 35.47 2434.1 35.71 2447.13 36.02 2453.65 36.24 2460.17 36.58 2473.2 37.1 2479.72 37.32 2486.24 37.43 2492.75 37.48 2499.27 37.58 2505.79 37.77 2512.3 38.09 2518.82 38.18 2525.34 38.31 2531.86 38.32 2538.37 38.41 2544.89 38.53 2551.41 38.9 2557.93 39.23 2564.44 39.46 2570.96 39.66 2577.48 40 2583.99 40.43 2597.03 41.18 2603.55 41.64 2610.06 42.24 2616.58 42.6 2623.1 43 2629.62 43.21 2636.13 43.51 2642.65 43.47 2649.17 43.55

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 1546 .04 1682 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1546 1682 1393.51 1401.69 1405.75 .3 .4

CROSS SECTION

RIVER: Taunton River REACH: Main Stem RS: 76590.96

INPUT
Description: 71 875 ft US Snows Bk Trib
Station Elevation Data num= 138
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 26.53 6.51 26.4 13.01 26.17 19.52 25.92 26.02 25.6 32.53 25.27 39.03 24.99 45.54 24.48 52.04 24.08 58.55 23.8 65.06 23.47 71.56 23.17 78.07 22.91 84.57 22.65 91.08 22.48 97.58 22.39 104.09 22.27 110.59 22.05 117.1 21.99 123.61 22.05 130.11 21.92 136.62 21.7 143.12 21.72 149.63 22.01 156.13 22.39 162.64 22.85 166.21 23.14 192.42 23.7 218.63 23.51 225.18 23.37 231.73 23.37 244.84 23.74 251.39 23.81 271.04 24.54 303.81 25.24 330.01 25.03 356.22 24.16 369.33 23.61 388.98 23.22 402.09 23.12 408.64 23.24 415.19 23.09 434.85 23.27 441.4 23.18 447.95 22.87 467.61 22.28 474.16 21.99 487.27 20.9 500.37 19.57 513.48 18.64 526.58 17.1 539.68 15.93 552.79 15.09 559.34 14.92 572.45 14.78 585.55 15.1 618.31 17.51 637.97 18.38 644.52 18.48 664.18 18.12 677.28 18.4 683.83 17.95 690.39 16.17 694.36 14.81 709 9.2 735 4.9 760 3.5 811 9.2 811.7 13.96 814.88 14.56 821.43 15.05 834.53 16.43 847.64 16.57 867.29 16.51 873.85 16.34 880.4 15.69 886.95 14.86 893.5 14.26 900.06 13.99 913.16 13.78 932.82 13.92 945.92 14.84 959.03 15.27 965.58 15.77 972.13 16.51 978.68 16.91 1011.44 17.3 1018 17.53 1031.1 17.44 1037.65 17.7 1044.2 17.73 1063.86 18.86 1070.41 19.48 1076.97 20.58 1083.52 21.24 1090.07 21.39 1109.73 23.9 1116.28 25.16 1122.83 25.73 1129.38 25.95 1149.04 27.42 1162.14 28.85 1188.35 30.8 1201.46 31.3 1227.67 32.12 1234.22 32.21 1240.77 31.96 1247.32 31.95 1260.43 32.12 1266.98 32.43 1273.53 32.14 1280.08 32 1306.29 32.53 1325.95 33.1 1332.5 33.4 1352.16 34.02 1358.71 34.44 1391.47 35.55 1398.02 35.86 1404.58 36.51 1411.13 37.92 1424.23 38.17 1476.65 37.66 1502.86 37.63 1515.96 37.58 1529.07 37.72 1542.17 37.69 1555.28 38.2 1561.83 38.29 1568.38 38.06 1594.59 38.17 1601.14 38.04 1621.86 38.64 1628.4 38.76 1634.94 38.78 1641.49 38.73 1648.03 38.71 1654.58 38.75

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 677.28 .04 834.53 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 677.28 834.53 982.05 1055.95 1121.6 .3 .4

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 75535.01

INPUT
Description: 70- Approach Sturtevant Station Elevation Data num= 191
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 25.57 6.51 25.48 13.03 25.36
19.54 25.23 26.05 24.97 32.56 24.77 39.08 24.55 45.59 24.36 52.1 24.19 58.62
23.92 65.13 23.64 71.64 23.38 78.15 23.19 84.67 23.06 91.18 22.83 97.69
22.69 104.2 22.45 110.72 22.29 117.23 22.25 123.74 22.2 130.26 21.98 136.77
21.91 143.28 21.91 149.79 21.67 156.31 21.42 162.82 21.25 169.33 21.1 175.85
20.99 182.36 20.76 188.87 20.61 195.38 20.64 201.9 20.66 208.41 20.83 214.92
20.98 221.44 21.03 227.95 21.16 234.46 21.17 240.97 21.26 247.49 21.25 254
21.38 260.51 21.57 267.03 21.54 305 21.5 311.54 21.65 318.08 21.83 324.63
22.18 331.17 22.26 337.71 22.28 344.25 22.38 350.79 22.5 357.33 22.57 363.88
22.56 370.42 22.49 383.5 22.3 390.04 22.23 396.58 22.27 403.13 22.38 409.67
22.53 416.21 22.57 422.75 22.59 429.29 22.57 435.83 22.57 442.38 22.55
455.46 22.36 462 22.28 468.54 22.01 475.09 21.79 481.63 21.43 488.17 20.92
494.71 20.43 501.25 20.03 507.79 19.69 514.34 19.12 520.88 18.47 527.42
18.03 533.96 17.55 540.5 16.86 547.04 16.2 553.59 15.99 560.13 16 596.16
17.2 648.8 11.76 688.79 11.42 714.8 11.87 734.43 15.37 743.42 12.33 755.67
13.39 771.11 15.22 788.21 15.8 820.22 13.79 820.79 10.07 833.15 9.4 844.21
9.48 852.25 8.93 858.92 9.78 864.22 8.44 867.64 8.42 873.63 8.95 907.59
12.34 923.28 14.29 937.86 15.63 950.6 21.57 974.58 22.33 1023.69 22.92
1057.78 23.46 1132.61 24.33 1139.1 24.28 1145.59 23.9 1152.14 23.86 1158.69
23.75 1171.79 23.96 1178.34 24.03 1191.44 24.29 1197.99 24.62 1204.55 24.92
1211.1 25.36 1217.65 26.17 1224.2 27.25 1230.75 28.6 1237.3 29.87 1243.85
30.81 1250.4 31.44 1256.95 31.75 1263.5 31.85 1270.05 31.93 1276.6 31.82
1283.16 31.66 1289.71 31.56 1302.81 31.25 1309.36 31.19 1315.91 31.19
1322.46 31.13 1329.01 31.21 1335.56 31.45 1342.11 31.5 1348.66 31.46 1355.22
31.54 1361.77 31.72 1368.32 32 1374.87 32.42 1381.42 33.04 1387.97 33.79
1394.52 34.51 1401.07 35.1 1407.62 35.48 1414.17 35.89 1420.72 36.13 1427.28
36.32 1433.83 36.43 1440.38 36.64 1446.93 36.79 1453.48 36.86 1460.03 37.05
1466.58 37.18 1479.68 37.2 1486.23 37.14 1492.78 36.85 1499.33 36.49 1505.89
35.95 1512.44 35.06 1518.99 34.13 1525.54 34.75 1532.09 35.62 1538.64 36.73
1545.19 37.42 1551.74 37.6 1558.29 37.64 1564.84 37.71 1571.39 37.63 1577.95
37.72 1584.5 37.63 1591.05 37.61 1597.6 37.65 1604.15 37.76 1610.7 37.7
1617.25 37.75 1630.35 37.52 1636.9 37.21 1643.45 36.87 1650.01 36.62 1656.56
36.27 1663.11 36.06 1669.66 36.48 1676.21 37.41 1682.76 38.26 1689.31 38.82
1695.86 39.26 1701.64 39.58 1708.19 39.89 1714.74 40.12 1721.29 40.23

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .085 455.46 .04 974.58 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 455.46
974.58 90.65 91.01 91.43 .3 .4 Ineffective Flow num= 1
Sta L Sta R Elev Permanent
0 357.3 24 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 75444

INPUT
Description: 69.7 US FAce Sturtevant

Station Elevation Data num= 211
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 25.12 6.52 25.13 13.04 24.96
19.57 24.83 26.09 24.88 32.61 24.92 39.13 24.68 45.66 24.49 52.18 24.41 58.7
24.36 65.22 24.24 71.75 24.13 78.27 23.93 84.79 23.76 91.31 23.5 97.83
23.33 104.36 23.28 110.88 23.1 117.4 22.98 123.92 22.96 130.45 22.97 136.97
22.68 143.49 22.59 150.01 22.5 156.54 22.34 163.06 22.07 169.58 21.89 176.1
21.81 182.63 21.65 189.15 21.39 195.67 21.1 202.19 20.69 208.71 20.49 215.24
20.67 221.76 20.84 228.28 20.81 234.8 20.72 241.33 20.65 247.85 20.66 254.37
20.86 260.89 20.95 267.42 21.09 273.94 21.18 280.5 21.25 287.06 21.27
293.62 21.43 295.77 21.4 302.31 21.25 308.85 21.21 315.39 20.76 321.93 21.12
328.47 21.6 335.01 22.24 341.55 22.27 348.09 22.25 354.63 22.5 361.16 22.77
367.7 22.89 374.24 23.03 380.78 23.07 387.32 22.92 393.86 22.91 400.4 22.28
406.94 22.61 413.48 22.78 420.02 22.42 426.56 22.58 433.09 22.43 439.63
22.16 446.17 21.91 452.71 21.51 459.25 21.31 465.79 21.3 472.33 21.07 478.87
21.1 485.41 20.78 491.95 20.35 498.49 19.19 505.02 18.23 511.56 18.47 518.1
18.02 524.64 18.12 531.18 18.08 537.72 17.45 544.26 17.48 550.8 17.56 557.34
17.25 563.88 17.05 570.42 16.98 576.96 17.13 583.49 17.02 590.03 16.52
596.57 16.98 603.11 17.95 609.64 18.99 616.17 19.72 622.71 20.74 629.24
21.33 635.78 21.63 642.31 21.83 648.85 21.89 655.38 21.78 661.91 21.62
668.45 21.75 674.98 21.94 681.52 21.95 688.05 22.02 694.58 21.96 701.12
21.87 707.65 22.08 714.19 22.12 727.25 21.68 733.79 21.38 752.11 11.1 756.54
10.33 760.99 8.67 767.94 5.2 777.12 6.63 796.64 8.2 802.95 6.47 809.7 6.62
814.65 6.96 819.31 7.24 834.57 8.51 840.81 9.15 847.56 9.37 857.77 9.96
862.16 10.4 884.07 22.29 890.61 22.35 897.14 22.46 903.67 22.45 910.21 22.35
916.74 22.41 923.28 22.56 929.81 22.73 942.88 23.54 949.41 23.54 955.95
23.61 962.48 23.71 969.02 23.83 982.08 23.99 988.62 24.14 995.15 24.23
1001.69 24.25 1008.22 24.33 1014.75 24.36 1021.29 24.37 1027.82 24.27
1034.36 24.14 1040.89 24.03 1047.42 23.95 1053.96 24.09 1060.49 24.12
1067.03 24.18 1073.56 24.42 1080.09 24.53 1093.16 24.84 1099.7 24.9 1106.23
25.02 1112.76 25.4 1119.3 26.24 1125.83 27.23 1132.37 27.8 1138.9 28.29
1145.44 28.61 1151.97 28.66 1158.5 28.76 1165.04 28.84 1171.57 28.98 1178.11
29.17 1184.64 29.47 1191.17 29.74 1197.71 29.92 1210.78 30.36 1217.31 30.44
1223.84 30.29 1230.38 30.16 1236.91 30.35 1243.45 30.69 1249.98 31.18
1256.51 31.58 1263.05 31.91 1269.58 32.11 1276.12 32.23 1282.61 32.13 1289.1
32.36 1295.59 33.18 1302.08 34.05 1308.57 34.87 1315.06 35.78 1321.55 36.1
1328.04 36.19 1334.53 36.25 1341.02 36.53 1354 37.18 1366.99 37.52 1373.48
37.51 1386.46 37.42 1399.44 37.49 1405.93 37.43 1412.42 37.24 1418.91 36.9
1425.4 36.38 1431.89 35.88 1438.38 34.98 1444.87 34.32 1451.36 34.86 1456.63
35.7 1463.12 36.51 1469.61 36.97

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .085 714.19 .04 884.07 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 714.19
884.07 83.92 85.68 87.62 .5 .4 Ineffective Flow num= 2
Sta L Sta R Elev Permanent
0 715 24 T
880 1469.61 24.5 T

BRIDGE

RIVER: Taunton River

REACH: Main Stem RS: 75397.22

INPUT Description: 69.5 Sturtevant St/Plymouth St
Distance from Upstream XS = 36
Deck/Roadway Width = 35
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
 num= 24
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 0 25.1 184 25.08 270 23.6
 396 22.31 573 22.37 738 24.52
 744 25.05 744.1 28.99 749 29 21.16
 787 29.53 21.28 821 29.46 21.4 859 28.92 21.52
 864 28.92 21.52 864.1 24.87 869 24.87
 910 24.12 951 23.52 1040 24.16
 1098 25.22 1146 26.52 1205 29.2
 1228 30.08 1287 31.74 1338 32.62

Upstream Bridge Cross Section Data
Station Elevation Data num= 211 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 25.12 6.52 25.13 13.04 24.96 19.57 24.83 26.09 24.88 32.61 24.92 39.13
24.68 45.66 24.49 52.18 24.41 58.7 24.36 65.22 24.24 71.75 24.13 78.27 23.93
84.79 23.76 91.31 23.5 97.83 23.33 104.36 23.28 110.88 23.1 117.4 22.98
123.92 22.96 130.45 22.97 136.97 22.68 143.49 22.59 150.01 22.5 156.54 22.34
163.06 22.07 169.58 21.89 176.1 21.81 182.63 21.65 189.15 21.39 195.67 21.1
202.19 20.69 208.71 20.49 215.24 20.67 221.76 20.84 228.28 20.81 234.8 20.72
241.33 20.65 247.85 20.66 254.37 20.86 260.89 20.95 267.42 21.09 273.94
21.18 280.5 21.25 287.06 21.27 293.62 21.43 295.77 21.4 302.31 21.25 308.85
21.21 315.39 20.76 321.93 21.12 328.47 21.6 335.01 22.24 341.55 22.27 348.09
22.25 354.63 22.5 361.16 22.77 367.7 22.89 374.24 23.03 380.78 23.07 387.32
22.92 393.86 22.91 400.4 22.28 406.94 22.61 413.48 22.78 420.02 22.42 426.56
22.58 433.09 22.43 439.63 22.16 446.17 21.91 452.71 21.51 459.25 21.31
465.79 21.3 472.33 21.07 478.87 21.1 485.41 20.78 491.95 20.35 498.49 19.19
505.02 18.23 511.56 18.47 518.1 18.02 524.64 18.12 531.18 18.08 537.72 17.45
544.26 17.48 550.8 17.56 557.34 17.25 563.88 17.05 570.42 16.98 576.96 17.13
583.49 17.02 590.03 16.52 596.57 16.98 603.11 17.95 609.64 18.99 616.17
19.72 622.71 20.74 629.24 21.33 635.78 21.63 642.31 21.83 648.85 21.89
655.38 21.78 661.91 21.62 668.45 21.75 674.98 21.94 681.52 21.95 688.05
22.02 694.58 21.96 701.12 21.87 707.65 22.08 714.19 22.12 727.25 21.68
733.79 21.38 752.11 11.1 756.54 10.33 760.99 8.67 767.94 5.2 777.12 6.63
796.64 8.2 802.95 6.47 809.7 6.62 814.65 6.96 819.31 7.24 834.57 8.51 840.81
9.15 847.56 9.37 857.77 9.96 862.16 10.4 884.07 22.29 890.61 22.35 897.14
22.46 903.67 22.45 910.21 22.35 916.74 22.41 923.28 22.56 929.81 22.73
942.88 23.54 949.41 23.54 955.95 23.61 962.48 23.71 969.02 23.83 982.08
23.99 988.62 24.14 995.15 24.23 1001.69 24.25 1008.22 24.33 1014.75 24.36
1021.29 24.37 1027.82 24.27 1034.36 24.14 1040.89 24.03 1047.42 23.95
1053.96 24.09 1060.49 24.12 1067.03 24.18 1073.56 24.42 1080.09 24.53
1093.16 24.84 1099.7 24.9 1106.23 25.02 1112.76 25.4 1119.3 26.24 1125.83
27.23 1132.37 27.8 1138.9 28.29 1145.44 28.61 1151.97 28.66 1158.5 28.76
1165.04 28.84 1171.57 28.98 1178.11 29.17 1184.64 29.47 1191.17 29.74
1197.71 29.92 1210.78 30.36 1217.31 30.44 1223.84 30.29 1230.38 30.16
1236.91 30.35 1243.45 30.69 1249.98 31.18 1256.51 31.58 1263.05 31.91
1269.58 32.11 1276.12 32.23 1282.61 32.13 1289.1 32.36 1295.59 33.18 1302.08
34.05 1308.57 34.87 1315.06 35.78 1321.55 36.1 1328.04 36.19 1334.53 36.25

1341.02 36.53 1354 37.18 1366.99 37.52 1373.48 37.51 1386.46 37.42 1399.44 37.49 1405.93 37.43 1412.42 37.24 1418.91 36.9 1425.4 36.38 1431.89 35.88 1438.38 34.98 1444.87 34.32 1451.36 34.86 1456.63 35.7 1463.12 36.51 1469.61 36.97

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 714.19 .04 884.07 .09

Bank Sta: Left Right Coeff Contr. Expan.
 714.19 884.07 .5 .4
Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 715 24 T
 880 1469.61 24.5 T

Downstream Deck/Roadway Coordinates num= 24
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 -86 25.1 -85 25.08 2 23.6
 127 22.31 304 22.37 469 24.52
 475 25.05 475 28.99 480 29 21.16
 518 29.53 21.28 552 29.46 21.4 590 28.92 21.52
 595 28.9 21.52 595 24.87 600 24.87
 641 24.12 682 23.52 771 24.16
 829 25.22 877 26.52 936 29.2
 959 30.08 1018 31.74 1069 32.62

Downstream Bridge Cross Section Data
Station Elevation Data num= 164
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 23.89 6.54 23.57 13.07 23.04 19.61 22.53 32.69 22 39.23 21.79 45.76 21.72 52.3 21.76 58.84 21.57 65.38 21.54 71.91 21.48 78.45 21.51 84.99 21.74 98.06 22.31 104.6 22.42 111.14 22.5 117.68 22.69 124.21 23.26 130.75 24.13 137.29 25.06 143.83 25.4 150.36 25.62 156.9 25.69 163.44 25.55 169.97 25.14 176.51 24.03 183.05 22.66 189.59 21.98 196.13 21.32 202.66 21.04 222.27 20.34 228.81 20.2 235.35 20.24 241.89 20.3 248.43 20.16 254.96 19.7 261.5 19.12 268.04 18.73 274.58 18.66 281.11 18.39 287.65 18.35 294.19 18.2 300.73 18.08 313.8 18.39 320.36 18.43 326.92 18.63 333.48 18.62 340.04 18.69 346.6 19 353.16 19.11 359.72 18.93 366.28 18.55 372.84 17.94 379.4 17.51 385.96 17.38 392.52 16.95 399.08 16.44 405.64 16.56 412.2 16.87 418.76 18.34 425.32 19.69 431.88 19.14 438.44 18.88 445 19.16 451.56 19.17 482.11 11.1 486.54 10.33 490.99 8.67 497.94 5.2 507.12 6.63 526.64 8.2 532.95 6.47 539.7 6.62 544.65 6.96 549.31 7.24 564.57 8.51 570.81 9.15 577.56 9.37 587.77 9.96 592.16 10.4 608.99 19.09 615.55 19.35 622.11 18.81 628.67 18.59 635.23 19.07 641.79 20.4 648.35 21.33 654.91 21.28 661.47 21.85 668.03 22.08 674.59 22.1 681.15 22.93 687.71 23.84 694.27 24.57 700.83 24.46 707.39 23.65 713.95 22.99 720.51 22.57 727.07 22.34 733.63 22.41 746.75 23.2 753.31 23.46 759.87 23.47 766.43 23.26 772.99 23.43 779.55 23.72 786.11 23.74 792.67 23.66 799.23 24.07 805.79 25.06 812.35 25.74 818.91 26.07 825.47 26.34 832.03 26.55 838.59 26.72 845.15 26.87 851.71 26.99 858.27 26.85 864.83 27.04 871.39 27.41 877.95 27.17 884.51 26.8 891.07 26.56 897.63 26.51 904.19 26.65 917.31 26.24 930.43 26.17 936.99 26.32 943.55 26.83 950.11 28.14 956.67 29.66 963.23 30.58 969.79 31.17 976.35 31.67 982.88 32.04 989.42 32.2 995.96 32.3 1002.5 32.34 1009.03 32.45 1015.57 32.51 1022.11 32.4 1028.65 32.35 1035.18 32.35 1041.72 32.47 1048.26

32.47 1054.8 32.36 1067.87 32.33 1074.41 32.33 1080.95 32.46 1087.48 32.48 1094.02 32.47 1100.56 32.65 1107.09 32.85 1113.63 32.94 1120.17 33 1126.71 32.92 1139.78 32.73 1146.32 32.68 1152.86 32.69 1159.39 32.84 1165.93 33.11 1172.47 33.18 1179.01 33.08 1185.54 33.07

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 451.56 .04 608.99 .09

Bank Sta: Left Right Coeff Contr. Expan.
 451.56 608.99 .3 .4
Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 465 24 T
 610 1185.54 24 T

Upstream Embankment side slope = 0 horiz. to 1.0 vertical Downstream Embankment side slope = 0 horiz. to 1.0 vertical Maximum allowable submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Piers = 2

Pier Data
Pier Station Upstream= 785 Downstream= 517
Upstream num= 3
 Width Elev Width Elev Width Elev
 4 8 4 20.76 6 21.2
Downstream num= 3
 Width Elev Width Elev Width Elev
 4 8 4 20.76 6 21.2

Pier Data
Pier Station Upstream= 822 Downstream= 554
Upstream num= 3
 Width Elev Width Elev Width Elev
 4 8 4 20.76 6 21.2
Downstream num= 3
 Width Elev Width Elev Width Elev 4 8 4 20.76 6 21.2

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
 Energy
 W.S. Pro Method

 W.S.Pro Data
 Left Embankment
 El of the top of the embankment = 25.1
 El of the toe of the abutment = 11.1
 Right Embankment

```
 El of the top of the embankment = 25.1
 El of the toe of the abutment = 11.1
 Abutment Type = 4 Vert. abutments and sloping embankments with wingwalls
Slope of abutments =
 Top with of embankment = 35
 Centroid station of bridge opening =
 Wing Wall Type = Angular wing walls
 Width = 12
 Angle = 45
 Radius =
 Guide Banks Type = No Guide Bank present
 Length =
 Offset =   Angle =
 Optional Contraction and expansion coefficients
 At approach Section
 At Guide Bank
 At upstream outside
 At upstream inside (BU)
 At downstream inside (BD)
 Piers are Continuous for the width of the bridge
 Use Geometric mean as Friction Slope Method

Selected Low Flow Methods = W.S.Pro Method

High Flow Method
 Pressure and Weir flow
 Submerged Inlet Cd =
 Submerged Inlet + Outlet Cd = .8
 Max Low Cord =

Additional Bridge Parameters
 Add Friction component to Momentum
 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION


RIVER: Taunton River
REACH: Main Stem RS: 75358.33

INPUT Description: 69.3 DS Face Sturtevant
Station Elevation Data num= 164
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  0 23.89 6.54 23.57 13.07 23.04
19.61 22.53 32.69 22  39.23 21.79 45.76 21.72 52.3 21.76 58.84 21.57 65.38
21.54  71.91 21.48 78.45 21.51 84.99 21.74 98.06 22.31 104.6 22.42  111.14
22.5 117.68 22.69 124.21 23.26 130.75 24.13 137.29 25.06  143.83 25.4 150.36
25.62 156.9 25.69 163.44 25.55 169.97 25.14  176.51 24.03 183.05 22.66 189.59
21.98 196.13 21.32 202.66 21.04  222.27 20.34 228.81 20.2 235.35 20.24 241.89
20.3 248.43 20.16  254.96 19.7 261.5 19.12 268.04 18.73 274.58 18.66 281.11
18.39  287.65 18.35 294.19 18.2 300.73 18.08 313.8 18.39 320.36 18.43  326.92
18.63 333.48 18.62 340.04 18.69 346.6 19 353.16 19.11  359.72 18.93 366.28
```

18.55 372.84 17.94 379.4 17.51 385.96 17.38 392.52 16.95 399.08 16.44 405.64
16.56 412.2 16.87 418.76 18.34 425.32 19.69 431.88 19.14 438.44 18.88 445
19.16 451.56 19.17 482.11 11.1 486.54 10.33 490.99 8.67 497.94 5.2 507.12
6.63 526.64 8.2 532.95 6.47 539.7 6.62 544.65 6.96 549.31 7.24 564.57 8.51
570.81 9.15 577.56 9.37 587.77 9.96 592.16 10.4 608.99 19.09 615.55 19.35
622.11 18.81 628.67 18.59 635.23 19.07 641.79 20.4 648.35 21.33 654.91 21.28
661.47 21.85 668.03 22.08 674.59 22.1 681.15 22.93 687.71 23.84 694.27 24.57
700.83 24.46 707.39 23.65 713.95 22.99 720.51 22.57 727.07 22.34 733.63
22.41 746.75 23.2 753.31 23.46 759.87 23.47 766.43 23.26 772.99 23.43
779.55 23.72 786.11 23.74 792.67 23.66 799.23 24.07 805.79 25.06 812.35
25.74 818.91 26.07 825.47 26.34 832.03 26.55 838.59 26.72 845.15 26.87
851.71 26.99 858.27 26.85 864.83 27.04 871.39 27.41 877.95 27.17 884.51 26.8
891.07 26.56 897.63 26.51 904.19 26.65 917.31 26.24 930.43 26.17 936.99
26.32 943.55 26.83 950.11 28.14 956.67 29.66 963.23 30.58 969.79 31.17
976.35 31.67 982.88 32.04 989.42 32.2 995.96 32.3 1002.5 32.34 1009.03 32.45
1015.57 32.51 1022.11 32.4 1028.65 32.35 1035.18 32.35 1041.72 32.47 1048.26
32.47 1054.8 32.36 1067.87 32.33 1074.41 32.33 1080.95 32.46 1087.48 32.48
1094.02 32.47 1100.56 32.65 1107.09 32.85 1113.63 32.94 1120.17 33 1126.71
32.92 1139.78 32.73 1146.32 32.68 1152.86 32.69 1159.39 32.84 1165.93 33.11
1172.47 33.18 1179.01 33.08 1185.54 33.07

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val 0 .085 451.56 .04 608.99 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 451.56
608.99 55.08 52.55 49.93 .3 .4 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 465 24 T
 610 1185.54 24 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 75305.77

INPUT
Description: 69 Exit Sturtevant St
Station Elevation Data num= 106
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 25.7 13 23.18 19.5 22.31
25.99 22 32.49 21.83 45.49 21.28 64.98 20.99 77.98 21.19 90.98 22.14 97.48
23.01 103.97 23.64 110.47 23.88 116.97 24.28 136.47 26.38 142.96 26.89
149.46 27.25 155.96 27.29 168.96 26.83 181.95 25.99 207.95 22.82 227.44
21.07 246.94 20.3 253.44 20.19 259.94 19.93 272.93 18.96 292.45 18.01 325.01
17.14 331.52 17.14 344.55 17.63 357.57 17.92 364.08 18.28 370.59 18.38 377.1
17.76 383.61 16.31 390.13 15.19 396.64 14.99 409.66 15.34 429.2 16.64 435.71
16.53 442.22 15.24 448.73 13.33 455.24 11.95 459.73 11.56 462.56 11.12
467.83 6.63 479.3 3.76 509.45 3.76 519.8 4.04 537.58 5.31 564.99 8.64
570.38 12.24 578.91 15.46 579.31 14.91 585.47 16.31 591.98 16.35 605.01
15.92 611.52 15.99 637.56 15.49 650.59 15.96 657.1 16.73 663.61 18.13 670.12
19.01 676.63 19.55 696.17 19.78 715.7 20.3 722.21 20.84 735.24 20.55 741.75
20.65 748.26 21.06 754.77 21.09 767.79 21.99 774.31 22.34 780.82 22.88
793.84 24.72 806.86 24.63 813.37 25.22 819.89 26.01 826.4 26.54 852.28 26.93
858.71 26.46 865.14 26.21 884.43 26.41 890.86 26.35 910.15 26.78 916.57

27.31 923 28.93 929.43 30.68 942.29 31.63 948.72 31.72 955.15 31.28 961.58 30.99 968.01 30.83 974.44 30.85 980.87 31.16 987.3 31.87 993.73 32.33 1000.16 32.06 1006.59 31.6 1013.02 31.33 1019.45 31.21 1058.02 31.83 1083.74 31.56 1096.6 31.79 1115.89 31.22 1122.32 30.92 1135.18 31.31

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 435.71 .04 591.98 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 435.71 591.98 864.05 841.86 823.45 .1 .3 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 155 27 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 74463.91

INPUT
Description: 68
Station Elevation Data num= 84 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 33.9 26.2 34.76 39.3 34.99 45.85 35.23 72.05 35.5 111.35 35.73 117.9 35.69 137.54 36.18 163.74 36.22 203.04 36.69 216.14 36.61 229.24 36.36 235.79 36.1 248.89 35.73 268.54 34.62 281.64 34.41 294.74 34.39 307.84 34.47 320.94 34.33 340.59 34.35 366.78 33.26 373.33 33.14 392.98 33.17 399.53 33.55 412.63 33.81 419.18 34.04 432.28 34.25 438.83 33.71 445.38 31.44 451.93 28.46 465.03 25.88 471.58 24.69 478.13 23.8 484.68 22.74 491.23 21.84 497.78 21.26 510.88 20.66 517.43 20.57 523.98 20.84 530.53 20.8 543.63 20.37 550.18 20 556.73 19.9 563.28 19.47 569.83 18.48 576.38 17.22 582.93 14.07 589.48 11.26 595.11 10.94 620 5.8 645 4.3 670 6.3 695.73 11.22 700.82 12.47 707.37 15.57 713.92 16.32 720.47 15.93 733.57 14.84 740.12 14.89 759.77 16.32 766.32 16.61 772.87 16.44 779.42 15.43 785.97 15.22 799.07 15.09 805.62 15.17 812.17 15.49 825.27 16.58 844.91 19.03 851.46 19.58 871.11 20.73 890.76 21.29 903.86 21.48 916.96 21.81 930.06 21.86 969.36 22.69 995.56 23.45 1002.11 23.48 1106.9 25.75 1126.55 25.97 1139.65 26.24 1165.85 25.91 1192.05 26.13 1198.6 26.27

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 530.53 .04 871.11 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 530.53 871.11 1832.03 1771.2 1714.64 .1 .3

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 72692.7

INPUT
Description: 67- Approach Vernon St

Station Elevation Data num= 199 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 35.64 6.51 35.52 13.02 35.08 19.53 34.21 32.55 33.08 39.06 32.72 45.56
32.82 65.09 33.59 71.6 33.62 78.11 33.47 84.62 33.14 91.13 33.31 97.64 33.8
110.66 35.96 117.17 36.44 123.67 36.35 130.18 36.49 143.2 37.22 156.22 37.64
162.73 37.13 169.24 37.19 175.75 37.03 182.26 36.54 195.28 36.11 201.78 35.6
208.29 35.46 221.31 34.66 253.86 33.41 260.37 33.36 286.4 32.59 318.95 32.6
331.97 32.28 344.99 32.1 351.5 31.89 358.01 31.92 371.02 31.57 384.04 31.52
397.06 31.07 403.57 30.99 416.59 30.99 423.1 30.89 436.12 30.33 449.13 29.93
455.64 29.46 468.66 28.22 475.17 27.43 481.68 26.42 501.21 24.48 507.72
23.95 520.73 23.39 527.24 23.23 540.26 22.4 546.77 21.52 553.28 21.05 559.79
20.87 579.32 19.24 585.83 18.88 598.85 18.35 605.35 18.43 611.86 18.15
618.37 18.02 624.88 17.69 637.9 17.44 644.41 17.68 650.92 17.72 657.43 18.14
663.94 18.04 670.45 18.32 683.46 19.53 702.99 20.83 735.59 21.48 748.66
21.51 755.19 21.31 774.8 21.2 781.33 21.3 800.94 20.94 846.68 20.67 859.75
19.38 872.82 18.81 879.35 18.9 885.89 19.21 898.96 20.56 905.49 20.5 925.1
19.65 931.63 19.67 938.17 19.51 944.7 18.81 951.24 17.55 957.77 15.88 964.31
14.06 970.84 12.8 978.56 11.86 984.9 10.85 991 7.8 1003.8 7.7 1022.9 8.12
1033.7 7.6 1052.3 7.35 1065.8 6.97 1076.7 7.14 1088.2 7.24 1100 6.84 1105.8
7.1 1115 9.5 1124 14.02 1134.21 14.5 1140.74 16.08 1147.28 17.24 1153.81
17.64 1160.35 17.72 1166.88 17.74 1173.42 17.74 1179.95 17.72 1186.49 17.65
1193.02 17.49 1199.56 17.28 1206.09 17.1 1219.16 17 1225.7 17.06 1232.23
17.08 1238.77 16.79 1245.3 16.22 1251.84 15.82 1258.37 15.69 1264.91 15.59
1271.44 15.23 1277.97 14.81 1284.51 14.56 1291.04 14.52 1297.58 14.54
1304.11 14.62 1310.65 14.6 1317.2 14.38 1323.75 14.06 1330.3 14.1 1336.85
14.52 1343.4 15.94 1349.95 17.48 1356.5 18.16 1363.05 18.47 1369.6 18.96
1376.15 19.56 1382.7 20.05 1389.25 20.31 1395.8 20.54 1402.35 21.02 1408.9
21.62 1415.45 22.08 1422 22.05 1428.55 21.83 1435.1 21.73 1441.66 21.72
1448.21 21.86 1461.31 21.86 1467.86 21.67 1474.41 21.55 1480.96 21.46
1487.51 21.3 1494.06 21.23 1500.61 21.2 1507.16 21.03 1513.71 21.11 1520.26
21.14 1526.81 20.97 1533.36 21.03 1539.91 22.1 1546.46 23.4 1553.01 24.26
1559.56 24.75 1566.11 24.89 1572.66 24.66 1579.21 24.67 1585.76 24.75
1592.31 24.69 1598.86 24.58 1605.41 24.62 1611.96 24.58 1618.51 24.69
1625.06 24.77 1638.17 24.9 1644.72 25.24 1651.27 25.96 1657.82 25.88 1664.37
26.66 1670.92 27.6 1677.47 28.35 1690.57 30.78 1697.12 31.05 1703.67 31.38
1710.22 31.88 1723.32 33.15 1729.87 33.74 1736.42 34.35 1742.97 35.32
1749.52 35.76 1756.07 36.39 1762.62 36.69 1769.17 37.03 1775.72 37.22

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 905.49 .04 1160.35 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 905.49
1160.35 102.69 95.32 96.09 .1 .3 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 749 24.5 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 72597.39

INPUT
Description: 66.7 US FAce Vernon St

Station Elevation Data num= 170 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 32.98 12.31 32.81 18.456 32.86 30.766 32.57 43.076 32.59 49.23 32.45
61.531 32.59 67.686 32.96 86.151 33.37 110.762 33.12 123.072 33.28 129.217
33.03 141.527 32.91 147.682 32.71 166.138 32.4 172.293 31.99 184.603 30.31
190.758 29.78 203.058 28.94 209.213 28.42 227.678 26.1 233.833 25.57 246.134
24.91 270.754 22.56 283.054 21.7 289.209 21.38 295.364 21.32 313.82 20.22
338.44 18.4 344.595 18.38 356.895 18.84 363.05 19.31 381.515 20.17 393.816
21.12 406.126 21.77 424.581 22.1 449.164 22.1 486.037 21.36 541.338 20.9
553.629 21.01 565.92 21.52 572.066 21.56 578.202 21.03 584.348 20.79 596.639
21.54 602.785 21.76 615.076 23.33 627.367 23.37 633.513 23.24 639.658 22.8
645.804 22.15 651.949 21.71 664.231 22.09 670.377 22.13 676.522 22 682.668
21.45 694.959 21.44 701.105 21.23 707.25 20.53 713.396 19.13 719.541 18.24
725.687 18.16 731.833 18.26 737.969 18.81 744.114 18.93 750.26 20.8 750.636
20.77 756.406 20.36 772.07 11.24 780.264 8.69 795.074 8.51 800.383 8.54
806.284 7.98 816.865 8.04 828.696 6.92 840.395 7.49 859.321 8.29 860.27 10.2
864.367 10.65 872.796 16.58 872.974 19.88 879.308 19.75 885.454 22.36
891.599 23.25 897.735 23.9 903.881 24.27 910.026 24.28 916.172 24.32 922.318
24.2 934.609 24.05 940.754 24.3 946.9 24.91 953.046 24.73 959.191 24.61
965.337 24.68 971.482 24.97 977.619 25.55 983.764 25.22 989.91 25.69 996.055
25.96 1002.201 26.071008.347 26.331014.492 26.651020.657 25.451026.821 25.14
1032.985 24.53 1039.15 23.961045.323 23.631051.488 23.411057.652 23.93
1063.817 24.061069.981 24.461076.145 24.49 1082.31 25.31088.474 25.22
1094.639 23.571100.803 23.481106.977 23.73 1125.47 24.291137.799 24.56
1143.963 24.881150.127 25.221156.292 24.911162.456 24.67 1168.63 24.48
1174.794 24.711180.959 25.291187.123 25.841193.287 26.11199.452 26.12
1205.616 25.521211.781 25.091217.945 24.811224.109 24.861230.283 25.42
1236.448 26.241242.612 27.081248.776 27.91254.941 28.71261.105 29.39 1267.269
29.651273.434 29.111279.598 28.81285.763 28.021291.936 28.12 1298.101
28.451304.265 28.82 1310.43 29.161316.594 29.951322.758 31.2 1328.923
32.691335.087 33.431341.251 34.91347.416 35.73 1353.59 35.76 1359.754
35.831365.918 36.051372.083 36.161384.411 36.291390.576 36.38 1396.74
36.521409.078 36.91421.407 37.21427.572 37.321433.736 37.54 1439.9
37.631446.065 37.381452.229 371458.394 37.121464.558 36.91

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val 0 .09 750.26 .04 903.881 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 750.26
903.881 67.7 64.48 66.6 .3 .4 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 744.237 24.5 T
 878.6131464.558 25.6 T
Skew Angle = 20

BRIDGE

RIVER: Taunton River
REACH: Main Stem RS: 72569.03

INPUT
Description: 66.5 Vernon St/Pratts Br
Distance from Upstream XS = 7
Deck/Roadway Width = 35

```
Weir Coefficient = 2.6
Bridge Deck/Roadway Skew = 20
Upstream Deck/Roadway Coordinates
 num= 18
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 228.345 25.91 484.881 22.81 530.926 23.02
 744.237 24.99 767.729 25 767.823 27.73
 769.608 27.73 769.702 25.32 770.548 25.3 21.15  863.578 25.4 21.6 866.397
25.96 21.6 866.491 27.51
 868.276 27.51 868.37 26 874.854 26.04  1032.722 26.63 1157.701 27.85 1400 28

Upstream Bridge Cross Section Data
Station Elevation Data num= 170
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  0 32.98 12.31 32.81 18.456
32.86 30.766 32.57 43.076 32.59  49.23 32.45 61.531 32.59 67.686 32.96 86.151
33.37 110.762 33.12  123.072 33.28 129.217 33.03 141.527 32.91 147.682 32.71
166.138 32.4  172.293 31.99 184.603 30.31 190.758 29.78 203.058 28.94 209.213
28.42  227.678 26.1 233.833 25.57 246.134 24.91 270.754 22.56 283.054 21.7
289.209 21.38 295.364 21.32 313.82 20.22 338.44 18.4 344.595 18.38  356.895
18.84 363.05 19.31 381.515 20.17 393.816 21.12 406.126 21.77  424.581 22.1
449.164 22.1 486.037 21.36 541.338 20.9 553.629 21.01  565.92 21.52 572.066
21.56 578.202 21.03 584.348 20.79 596.639 21.54  602.785 21.76 615.076 23.33
627.367 23.37 633.513 23.24 639.658 22.8  645.804 22.15 651.949 21.71 664.231
22.09 670.377 22.13 676.522 22  682.668 21.45 694.959 21.44 701.105 21.23
707.25 20.53 713.396 19.13  719.541 18.24 725.687 18.16 731.833 18.26 737.969
18.81 744.114 18.93  750.26 20.8 750.636 20.77 756.406 20.36 772.07 11.24
780.264 8.69  795.074 8.51 800.383 8.54 806.284 7.98 816.865 8.04 828.696
6.92  840.395 7.49 859.321 8.29 860.27 10.2 864.367 10.65 872.796 16.58
872.974 19.88 879.308 19.75 885.454 22.36 891.599 23.25 897.735 23.9  903.881
24.27 910.026 24.28 916.172 24.32 922.318 24.2 934.609 24.05  940.754 24.3
946.9 24.91 953.046 24.73 959.191 24.61 965.337 24.68  971.482 24.97 977.619
25.55 983.764 25.22 989.91 25.69 996.055 25.96 1002.201 26.071008.347
26.331014.492 26.651020.657 25.451026.821 25.14 1032.985 24.53 1039.15
23.961045.323 23.631051.488 23.411057.652 23.93 1063.817 24.061069.981
24.461076.145 24.49 1082.31 25.31088.474 25.22 1094.639 23.571100.803
23.481106.977 23.73 1125.47 24.291137.799 24.56 1143.963 24.881150.127
25.221156.292 24.911162.456 24.67 1168.63 24.48 1174.794 24.711180.959
25.291187.123 25.841193.287 26.11199.452 26.12 1205.616 25.521211.781
25.091217.945 24.811224.109 24.861230.283 25.42 1236.448 26.241242.612
27.081248.776 27.91254.941 28.71261.105 29.39 1267.269 29.651273.434
29.111279.598 28.81285.763 28.021291.936 28.12 1298.101 28.451304.265 28.82
1310.43 29.161316.594 29.951322.758 31.2 1328.923 32.691335.087 33.431341.251
34.91347.416 35.73 1353.59 35.76 1359.754 35.831365.918 36.051372.083
36.161384.411 36.291390.576 36.38  1396.74 36.521409.078 36.91421.407
37.21427.572 37.321433.736 37.54  1439.9 37.631446.065 37.381452.229
371458.394 37.121464.558 36.91

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 750.26 .04 903.881 .09

Bank Sta: Left Right Coeff Contr. Expan.
 750.26 903.881 .3 .4
Ineffective Flow num= 2
```

```
 Sta L Sta R Elev Permanent
 0 744.237 24.5 T
 878.6131464.558 25.6 T
Skew Angle = 20

Downstream Deck/Roadway Coordinates
 num= 17
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 257.476 25.91 514.012 22.81 645.569 23.02
 773.367 24.99 796.859 25 796.953 27.73
 798.739 27.73 798.833 25.32 799.678 25.3 21.15  892.708 25.4 21.6 895.527
25.96 21.6 895.621 27.51
 897.406 27.51 897.5 26 903.984 26.04  1061.853 26.63 1186.832 27.85

Downstream Bridge Cross Section Data
Station Elevation Data num= 211
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  0 34.89 6.089 34.81 12.178
34.66 30.455 34.05 36.545 33.81  42.634 33.66 48.723 33.72 54.822 33.69
60.911 33.59 67 33.45  73.089 33.25 79.179 33.09 85.277 33.04 91.366 32.89
97.456 32.68  103.545 32.51 109.634 32.16 115.723 31.77 121.822 31.16 127.911
30.64  134 30.23 140.089 30.07 146.179 30.03 152.277 29.83 158.366 29.57
164.456 29.22 170.545 28.83 176.634 28.48 182.723 28.11 194.911 27.32  201
26.81 207.089 26.27 213.179 25.88 219.277 25.51 225.366 25.12  231.456 24.88
237.545 24.36 243.634 23.95 255.822 23.32 261.911 23.03  268 22.89 274.09
22.69 280.179 22.24 286.277 22.16 292.367 22.17  298.456 21.92 304.545 21.78
310.634 21.99 316.733 22.46 322.822 22.69  328.911 22.67 335 22.41 341.09
22.11 347.179 21.93 353.277 21.61  359.367 21.37 365.456 21.4 377.634 21.59
383.723 21.7 389.822 21.74  395.911 21.71 408.09 21.96 414.179 22.07 420.278
22.13 426.367 22.26  438.545 22.31 444.653 22.45 450.752 22.51 456.86 22.53
462.958 22.47  469.066 22.24 481.273 21.93 487.372 21.88 493.48 21.8 499.578
22.02  505.686 22.26 511.785 22.19 517.893 21.81 530.099 21.18 536.198 20.99
542.306 21.02 548.405 21.01 554.513 20.92 560.611 21.05 566.719 21.23
572.818 21.29 578.926 21.53 585.024 21.83 591.132 21.89 597.231 21.75
603.339 21.43 609.438 21.22 615.546 21.22 621.644 21.29 627.752 21.54
633.851 21.96 639.959 22.01 646.057 22.24 652.165 22.67 658.264 22.99
664.372 23.22 670.471 23.32 676.579 23.47 682.677 23.64 688.785 23.61
700.992 23.02 707.09 22.97 713.198 23.24 719.297 24.07 725.405 24.2  731.504
22.81 779.945 18.72 780.152 16.67 800.261 11.24 808.455 8.69  823.265 8.51
828.574 8.54 834.475 7.98 845.056 8.04 856.887 6.92  868.586 7.49 887.511
8.29 888.461 10.2 892.558 10.65 900.987 16.58  901.165 19.88 914.612 18.66
920.711 18.51 926.819 17.76 932.917 17.11  939.025 16.93 945.124 16.47
951.232 15.67 957.331 15.21 963.439 16.04  969.537 15.4 975.645 15.13 981.744
15.39 987.852 15.31 993.95 15.86 1006.148 22.731012.246 24.771018.335
25.491024.434 26.021030.523 26.47 1036.622 26.49 1048.81 26.781060.998
27.031067.087 27.391073.185 27.66 1079.275 27.711085.364 27.821091.462
27.91097.552 28 1103.65 28.2 1109.739 28.331121.927 28.341128.026
28.481140.214 28.611152.401 28.87 1164.589 29.181170.678 29.311182.866
29.431188.965 29.681195.054 30.04 1201.153 30.351207.242 30.77 1219.43
31.81225.528 32.131237.716 32.44 1243.805 32.521249.904 32.571255.993
32.731262.092 33.021268.181 33.25  1274.27 33.291280.369 33.241286.458
33.31292.557 33.281298.646 33.07 1304.744 33.191310.834 33.621316.932
33.981323.021 34.27 1329.12 34.6 1335.209 34.911341.308 34.931347.397
35.041353.496 35.281365.683 35.63 1371.773 35.741377.871 35.821383.961
35.841396.148 35.671402.247 35.72 1408.336 36.051414.435 36.21420.524
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36.481432.712 36.54 1438.81 36.43  1444.9 36.211450.989 36.381457.087
36.461463.177 36.851469.275 37.32 1475.364 37.261481.463 37.31487.552
37.731493.651 38.13 1499.74 37.85 1505.839 37.55

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 725.405 .04 901.165 .09
 Bank Sta: Left Right Coeff Contr. Expan.
 725.405 901.165 .3 .4
Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 779.945 24.5 T
 911.5021505.839 26 T
Skew Angle = 20

Upstream Embankment side slope = 0 horiz. to 1.0 vertical Downstream
Embankment side slope = 0 horiz. to 1.0 vertical Maximum allowable
submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
 Energy
 W.S. Pro Method

 W.S.Pro Data
 Left Embankment
 El of the top of the embankment = 25.3
 El of the toe of the abutment = 11.2
 Right Embankment
 El of the top of the embankment = 25.3  El of the toe of the abutment = 11.2
 Abutment Type = 4 Vert. abutments and sloping embankments with wingwalls
Slope of abutments =
 Top with of embankment = 35
 Centroid station of bridge opening =
 Wing Wall Type = Angular wing walls
 Width = 20
 Angle = 45
 Radius =
 Guide Banks Type = No Guide Bank present
 Length =
 Offset =
 Angle =
 Optional Contraction and expansion coefficients
 At approach Section
 At Guide Bank
 At upstream outside
 At upstream inside (BU)
 At downstream inside (BD)
 Piers are Continuous for the width of the bridge
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 Use Geometric mean as Friction Slope Method

Selected Low Flow Methods = W.S.Pro Method

High Flow Method
 Pressure and Weir flow
 Submerged Inlet Cd =
 Submerged Inlet + Outlet Cd = .8
 Max Low Cord =

Additional Bridge Parameters
 Add Friction component to Momentum
 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION


RIVER: Taunton River
REACH: Main Stem RS: 72532.91

INPUT
Description: 66.3 DS FAce Vernon St
Station Elevation Data num= 211
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  0 34.89 6.089 34.81 12.178
34.66 30.455 34.05 36.545 33.81  42.634 33.66 48.723 33.72 54.822 33.69
60.911 33.59 67 33.45  73.089 33.25 79.179 33.09 85.277 33.04 91.366 32.89
97.456 32.68  103.545 32.51 109.634 32.16 115.723 31.77 121.822 31.16 127.911
30.64  134 30.23 140.089 30.07 146.179 30.03 152.277 29.83 158.366 29.57
164.456 29.22 170.545 28.83 176.634 28.48 182.723 28.11 194.911 27.32  201
26.81 207.089 26.27 213.179 25.88 219.277 25.51 225.366 25.12  231.456 24.88
237.545 24.36 243.634 23.95 255.822 23.32 261.911 23.03  268 22.89 274.09
22.69 280.179 22.24 286.277 22.16 292.367 22.17  298.456 21.92 304.545 21.78
310.634 21.99 316.733 22.46 322.822 22.69  328.911 22.67 335 22.41 341.09
22.11 347.179 21.93 353.277 21.61  359.367 21.37 365.456 21.4 377.634 21.59
383.723 21.7 389.822 21.74  395.911 21.71 408.09 21.96 414.179 22.07 420.278
22.13 426.367 22.26  438.545 22.31 444.653 22.45 450.752 22.51 456.86 22.53
462.958 22.47  469.066 22.24 481.273 21.93 487.372 21.88 493.48 21.8 499.578
22.02  505.686 22.26 511.785 22.19 517.893 21.81 530.099 21.18 536.198 20.99
542.306 21.02 548.405 21.01 554.513 20.92 560.611 21.05 566.719 21.23
572.818 21.29 578.926 21.53 585.024 21.83 591.132 21.89 597.231 21.75
603.339 21.43 609.438 21.22 615.546 21.22 621.644 21.29 627.752 21.54
633.851 21.96 639.959 22.01 646.057 22.24 652.165 22.67 658.264 22.99
664.372 23.22 670.471 23.32 676.579 23.47 682.677 23.64 688.785 23.61
700.992 23.02 707.09 22.97 713.198 23.24 719.297 24.07 725.405 24.2  731.504
22.81 779.945 18.72 780.152 16.67 800.261 11.24 808.455 8.69  823.265 8.51
828.574 8.54 834.475 7.98 845.056 8.04 856.887 6.92  868.586 7.49 887.511
8.29 888.461 10.2 892.558 10.65 900.987 16.58  901.165 19.88 914.612 18.66
920.711 18.51 926.819 17.76 932.917 17.11  939.025 16.93 945.124 16.47
951.232 15.67 957.331 15.21 963.439 16.04  969.537 15.4 975.645 15.13 981.744
15.39 987.852 15.31 993.95 15.86 1006.148 22.731012.246 24.771018.335
25.491024.434 26.021030.523 26.47 1036.622 26.49 1048.81 26.781060.998
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27.031067.087 27.391073.185 27.66 1079.275 27.711085.364 27.821091.462
27.91097.552 28 1103.65 28.2 1109.739 28.331121.927 28.341128.026
28.481140.214 28.611152.401 28.87 1164.589 29.181170.678 29.311182.866
29.431188.965 29.681195.054 30.04 1201.153 30.351207.242 30.77 1219.43
31.81225.528 32.131237.716 32.44 1243.805 32.521249.904 32.571255.993
32.731262.092 33.021268.181 33.25 1274.27 33.291280.369 33.241286.458
33.31292.557 33.281298.646 33.07 1304.744 33.191310.834 33.621316.932
33.981323.021 34.27 1329.12 34.6 1335.209 34.911341.308 34.931347.397
35.041353.496 35.281365.683 35.63 1371.773 35.741377.871 35.821383.961
35.841396.148 35.671402.247 35.72 1408.336 36.051414.435 36.21420.524
36.481432.712 36.54 1438.81 36.43 1444.9 36.211450.989 36.381457.087
36.461463.177 36.851469.275 37.32 1475.364 37.261481.463 37.31487.552
37.731493.651 38.13 1499.74 37.85 1505.839 37.55

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 725.405 .04 901.165 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 725.405
901.165 70.06 59.59 49.81 .3 .4 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 779.945 24.5 T
 911.5021505.839 26 T
Skew Angle = 20

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 72473.31

INPUT
Description: 66 Exit Vernon St
Station Elevation Data num= 229
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 34.89 6.52 34.82 13.04 34.66
26.08 34.38 32.6 34.25 45.64 34.14 58.68 34.07 71.72 34.03 78.24 34 84.76
34.01 91.28 33.94 97.8 33.82 104.32 33.74 110.84 33.5 117.36 31.31 123.88
30.76 130.4 30.48 136.91 30.4 143.43 30.07 156.47 29.02 162.99 28.55 169.51
28.02 176.03 27.34 182.55 26.63 189.07 26.16 202.11 25.27 208.63 24.72
215.15 24.27 221.67 23.79 228.19 23.41 241.23 22.78 247.75 22.44 254.27
22.13 260.79 21.9 267.31 21.37 273.83 21.06 280.35 20.81 286.87 20.53 299.91
20.24 306.43 20.24 312.95 20.31 325.99 20.5 332.51 20.64 339.03 20.72 345.55
20.87 352.07 20.73 358.59 21.4 365.11 22.35 371.63 22.34 378.15 21.95
384.67 21.87 391.19 21.98 397.71 22.03 404.22 22.42 410.74 22.57 417.26
22.81 430.3 23.12 436.82 23.3 443.34 23.46 456.38 24.15 462.9 24.16 469.42
24.04 482.46 23.93 488.98 23.83 495.5 23.67 502.02 23.53 508.57 23.2 515.12
23.29 521.66 23.01 528.21 22.85 534.76 22.67 547.85 22.12 554.4 21.69 560.95
21.42 567.5 21.03 574.04 20.66 580.59 20.52 587.14 20.55 593.69 20.39 600.23
20.33 613.33 20.36 619.88 20.08 626.42 19.91 632.97 19.8 639.52 19.76
646.06 19.8 652.61 19.79 659.16 19.75 665.71 20.15 672.25 20.72 678.8 21.73
685.35 22.64 691.9 23.41 698.44 23.8 704.99 24.07 711.54 24.19 718.09 24.36
724.63 24.34 731.18 24.43 737.73 24.6 744.28 24.65 750.82 24.5 757.37 24.32
763.92 24.1 777.01 22.89 783.56 22.5 790.11 22.17 796.66 21.91 803.2 21.86
809.75 21.14 816.3 17.73 830.39 11.32 851.35 12.33 882.88 9.63 886.95 7.75

897.37 6.84 910.58 6.18 914.82 6.56 925.8 5.97 937.82 5.99 948.13 6.63
972.41 7.47 979.03 7.74 981.24 10.95 1021.63 12.14 1094.25 13.57 1117.48
24.42 1124.03 25.46 1130.57 26.29 1137.12 26.81 1150.22 27.05 1156.76 27.19
1163.31 27.28 1169.86 27.32 1176.41 27.29 1182.95 27.35 1189.5 27.58 1202.6
28.31 1209.14 28.59 1222.24 29.01 1228.78 29.16 1235.33 29.24 1241.88 29.34
1254.97 29.8 1261.52 29.93 1268.07 30.08 1274.62 30.1 1281.16 30.25 1287.71
30.63 1294.26 31.06 1300.81 31.45 1313.9 32.31 1320.45 32.67 1327 32.98
1333.54 33.24 1340.09 33.46 1346.64 33.61 1353.19 33.82 1359.73 34.06
1366.28 34.23 1372.83 34.28 1379.37 34.28 1385.92 34.31 1392.47 34.29
1399.02 34.17 1405.56 34.1 1412.11 34.17 1418.66 34.4 1431.6 35.15 1438.07
35.3 1444.54 35.37 1451.01 35.51 1457.48 35.69 1463.95 35.77 1470.42 35.77
1483.36 35.89 1489.83 35.97 1496.3 36.02 1502.77 36 1509.24 35.86 1515.71
35.68 1528.65 35.68 1535.12 35.65 1541.59 35.73 1548.06 35.89 1554.53 35.99
1561 36 1567.47 35.89 1573.94 36.16 1580.41 36.53 1586.88 36.83 1593.35
37.05 1612.76 37.48 1619.23 37.57 1625.7 37.56 1638.64 37.38 1645.11 37.4
1651.58 37.47 1658.05 37.43 1664.52 37.46 1670.99 37.33 1677.46 37.41
1683.93 37.72 1690.4 37.5 1696.87 36.05 1703.34 35.5 1709.81 35.39 1716.28
35.34 1722.75 35.34 1729.22 35.31 1735.69 35.3 1748.63 35.35 1761.57 35.44
1768.04 35.51 1774.51 34.79 1780.98 34.29 1787.45 34.72 1793.92 35.27
1800.39 35.46 1806.86 35.42 1813.33 34.81 1819.8 33.96 1826.27 33.38 1832.74
32.98 1839.21 32.83 1845.68 32.64 1852.15 32.43 1858.62 32.26 1865.09 32.57

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 744.28 .04 1137.12 .09
 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 744.28
1137.12 1517.78 1599.96 1630.87 .1 .4 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 734 24 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 70873.35

INPUT
Description: 65
Station Elevation Data num= 324
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 34.29 19.66 34.5 32.77 34.98
39.32 34.85 45.88 34.56 52.43 33.57 78.65 33.16 85.2 32.82 91.75 32.72
157.29 32.77 170.4 33.08 183.51 33.71 196.62 34.03 203.17 34.32 209.72 34.45
222.83 35.11 229.39 35.21 255.6 34.84 268.71 34.82 275.26 34.71 281.82 34.84
294.93 34.7 301.48 34.44 308.03 33.92 321.14 33.56 327.69 33.55 340.8 33.3
367.02 32.1 386.68 30.79 412.9 28.79 426 28.13 439.11 27.23 458.77 25.64
478.43 24.43 491.54 23.29 504.65 22.48 517.76 21.96 524.31 21.46 530.87 21.1
537.42 20.59 557.08 19.71 576.74 18.42 589.85 17.32 609.51 16.41 616.07
16.22 635.73 16.41 648.84 16.41 655.39 16.73 694.71 17.18 701.27 17.77
707.82 18.69 720.93 19.54 734.04 20.95 740.59 21.9 747.14 22.57 760.25 23.19
766.81 24.25 773.36 26.56 779.91 26.86 786.47 26.6 793.02 26.63 806.13 27.2
832.34 27.58 838.9 27.55 858.56 27.12 897.88 26.78 910.99 26.99 950.31 26.66
956.87 26.74 969.98 26.64 989.64 26.71 1002.75 26.49 1015.85 26.39 1028.96
26.61 1055.18 26.65 1081.39 26.39 1094.45 26.12 1107.5 25.6 1133.62 24.95
1146.67 24.33 1153.2 24.22 1166.26 23.8 1192.37 22.65 1205.43 22.49 1218.48

22.06 1231.54 21.49 1238.07 21.08 1244.59 21.59 1251.12 21.46 1257.65 21.57
1264.18 21.17 1270.71 20.93 1277.23 20.96 1283.76 20.76 1290.29 20.41
1296.82 19.92 1329.46 18.81 1342.51 18.08 1349.04 17.86 1381.68 18.23
1388.21 18.42 1394.74 18.42 1401.27 18.16 1407.79 18.16 1414.32 17.97
1420.85 17.94 1427.38 18.06 1440.43 17.76 1446.96 17.36 1479.6 17.12 1492.66
16.89 1525.3 15.54 1538.35 15.3 1544.88 15.32 1551.41 15.56 1564.47 16.39
1570.99 16.95 1590.58 18.95 1597.11 19.42 1610.16 19.7 1623.22 19.62 1629.75
19.42 1636.28 19.44 1642.8 19.61 1649.33 19.62 1655.86 19.35 1662.39 18.86
1668.92 18.22 1675.44 17.45 1681.97 16.26 1695.03 12.48 1701.56 11.69
1714.61 11.67 1727.67 12 1734.2 13.28 1740.72 13.62 1747.25 14.25 1760.31
14.8 1766.84 14.85 1779.89 14.61 1792.95 14.82 1806 14.77 1812.53 14.86
1819.06 14.67 1825.59 14.06 1832.12 13.66 1845.17 12.49 1858.23 11.99
1871.28 11.79 1877.81 11.58 1884.34 11.62 1897.4 12.17 1910.45 12.96 1923.51
13.33 1930.04 13.73 1936.57 13.66 1943.09 13.93 1949.62 14.39 1962.68 14.81
1982.26 14.86 2001.85 14.68 2008.37 14.31 2021.43 14.13 2027.96 13.6 2047.54
13.12 2054.07 12.85 2073.65 12.43 2086.71 12.72 2106.29 12.28 2112.82 12.25
2119.35 12.36 2125.88 12.69 2138.93 12.89 2145.46 13.39 2165.05 14.34
2171.57 14.81 2178.1 15.09 2184.63 15.15 2197.69 14.76 2204.21 14.68 2217.27
15.09 2249.91 14.79 2262.97 13.95 2269.49 13.9 2282.55 13.45 2295.61 13.36
2302.13 13.6 2315.19 13.21 2328.24 12.4 2341.33 12.59 2347.9 12.58 2367.58
12.9 2393.83 15.3 2400.39 15.6 2426.64 15.56 2433.2 15.09 2452.88 15.62 2466
15.5 2479.13 15.91 2492.25 16.09 2498.81 16.28 2518.5 15.95 2519.86 15.97
2525.06 16.05 2545 13.7 2555 7.2 2575 4.5 2600 4 2625 4.7 2645 7.5 2656.29
18.13 2662.85 22.78 2669.41 27.53 2675.98 29.91 2682.54 31.29 2689.1 32.28
2695.66 33.38 2702.22 35.17 2708.78 36.23 2715.34 37.01 2721.91 37.67
2728.47 38.74 2741.59 38.55 2748.15 38.55 2754.71 39 2761.28 39.77 2767.84
40.23 2780.96 40.59 2787.52 41.08 2794.08 41.48 2800.65 41.9 2807.21 42.28
2813.77 42.53 2820.33 42.65 2826.89 42.81 2833.45 43.11 2840.01 43.43
2846.58 43.61 2853.14 44.06 2859.7 44.06 2866.26 43.82 2872.82 43.5 2879.38
44.29 2885.95 44.77 2892.51 45.13 2899.07 45.47 2905.63 45.77 2912.19 45.93
2918.75 46.17 2925.32 46.44 2931.88 46.63 2938.44 46.87 2945 47.04 2951.56
47.26 2958.12 47.75 2964.68 48.17 2971.25 48.52 2977.81 49.38 2984.37 50.7
2990.93 52.37 2997.49 53.89 3004.05 54.99 3010.62 56.34 3017.18 57.33
3023.74 58.64 3030.3 59.62 3036.86 60.73 3043.42 61.73 3049.99 62.67 3056.55
63.37 3063.11 63.83 3069.67 63.85 3076.23 63.7 3082.79 63.15 3089.35 62.12
3095.92 60.75 3102.48 59.4 3109.04 58.17 3115.6 57.19 3122.16 56.45 3128.72
56.05 3135.29 54.96 3141.85 54.16 3148.41 53.98 3154.97 53.92 3161.53 54.24
3168.09 54.01 3174.66 54.27 3181.22 54.24 3187.78 53.99 3194.34 53.71 3200.9
53.7 3207.46 53.9 3214.02 54.49 3220.59 55.51 3227.15 56.86 3233.71 57.59
3240.27 58.39 3246.83 59.12 3253.39 60.29 3259.96 61.54 3266.52 62.09
3273.08 63.1 3279.64 63.32 3286.2 63.78 3292.76 63.93 3305.89 63.63 3312.45
63.33 3319.01 63.05 3325.57 62.84 3332.13 62.52 3338.69 61.85 3345.26 60.98
3351.82 60.14 3358.38 59.47 3364.94 59.14 3371.5 58.62 3378.06 58.48 3391.19
58.55 3397.75 58.8 3404.31 58.52 3417.43 58.22 3424 58.28 3430.56 58.06

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val 0 .085 2519.86 .04 2728.47 .093

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2519.86
2728.47 2059.45 2036.14 2092.49 .1 .4 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 832 27.5 F

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 68837.21

INPUT
Description: 64
Station Elevation Data num= 417
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 36.39 6.55 36.12 13.1 35.95
19.65 35.8 26.19 35.38 32.74 34.89 39.29 34.57 45.87 34.05 52.42 33.45 58.98
33.24 65.53 33.21 72.08 33.13 78.64 33.12 85.19 33.13 91.74 33.09 98.29 33
104.85 32.88 111.4 32.81 117.95 32.67 124.51 32.59 131.06 32.4 137.61 32.16
144.16 32.09 150.72 31.94 157.27 31.81 163.82 31.78 170.38 31.82 176.93
31.81 183.48 31.97 196.59 32.09 203.14 32.16 209.69 32.27 222.8 32.64 229.35
32.89 235.91 33.17 242.46 33.48 249.01 33.86 255.56 34.16 268.67 34.53
275.22 34.63 281.78 34.56 288.33 34.52 294.88 34.4 301.43 34.3 307.99 34.18
314.54 34.02 321.09 33.93 327.65 33.82 334.2 33.68 340.75 33.66 347.3 33.6
353.86 33.51 360.41 33.29 373.52 32.73 386.62 31.76 393.18 31.25 399.73
30.68 406.28 30.06 412.83 29.38 419.39 28.88 425.94 28.54 432.49 28.36
439.05 28.21 445.6 27.99 452.15 27.65 458.7 27.38 465.26 27.26 471.81 27.23
478.36 27.3 484.92 27.16 491.47 27.24 498.02 27.17 504.57 26.85 511.13 26.8
517.68 26.78 524.23 26.52 530.79 26.2 537.34 25.9 543.89 25.29 550.45 24.04
563.55 21.63 570.1 20.6 576.66 19.83 583.21 19.04 596.32 18.07 602.87 17.29
609.42 16.81 615.97 16.69 622.53 16.55 629.08 16.26 635.63 16.04 642.19
16.64 655.29 16.69 661.84 16.85 668.4 17.21 674.95 17.37 681.5 17.8 688.06
18.04 694.61 18.16 701.16 18.39 707.72 18.45 720.82 19.54 727.37 20.21
733.93 20.72 740.48 21.12 747.03 21.26 753.59 21.24 766.69 21.08 773.24
21.02 779.8 20.79 786.35 20.42 792.9 20.34 799.46 20.28 806.01 20.32 812.56
20.44 819.11 20.68 825.67 20.99 832.22 21.54 838.77 22.05 845.33 22.59
851.88 23.11 858.43 23.72 864.99 24.43 871.54 25.1 878.09 25.63 891.2 26.36
897.75 26.48 904.3 26.39 910.86 26.47 917.41 26.51 923.96 26.59 930.51 26.6
937.07 26.58 943.62 26.32 950.17 26.24 956.73 26.22 963.28 26.51 969.83
26.52 976.38 26.34 982.94 26.41 989.49 26.38 996.04 26.29 1002.6 26.38
1009.15 26.53 1015.7 26.47 1022.26 26.57 1028.81 26.33 1035.36 26.42 1041.91
26.39 1055.02 26.09 1061.57 26.24 1068.13 26.19 1074.68 26.39 1081.23 26.36
1087.78 26.35 1094.34 26.42 1100.89 26.18 1107.44 26.24 1114 26.22 1120.55
26.28 1127.1 26.17 1133.66 25.86 1140.21 25.51 1146.76 25.9 1153.31 26.11
1159.87 26.23 1166.42 26.2 1172.97 26 1179.53 26.26 1192.63 25.71 1199.19
25.42 1205.74 25.09 1212.29 24.63 1218.84 24.1 1225.4 23.63 1231.95 24.1
1238.5 24.01 1245.06 23.25 1251.61 22.85 1258.16 22.76 1264.71 22.69 1271.27
22.72 1277.82 22.72 1284.37 22.51 1290.93 22.2 1297.48 21.95 1310.59 21.7
1317.14 21.41 1323.69 21.5 1330.24 21.26 1336.8 20.78 1343.35 20.51 1349.9
20.2 1356.46 19.78 1363.01 19.16 1376.12 18.02 1382.67 17.28 1389.22 17.06
1395.77 16.99 1402.33 16.49 1408.88 16.22 1415.43 15.2 1421.99 14.76 1428.54
14.78 1435.09 14.56 1441.65 14.85 1448.2 15.02 1454.75 15.21 1461.3 15.58
1467.86 15.81 1474.41 15.95 1480.96 15.91 1487.52 16.26 1494.07 16.7 1500.62
16.77 1507.18 16.78 1513.73 16.71 1520.28 16.36 1526.83 16.22 1533.39 16.01
1539.94 15.43 1546.49 14.87 1553.05 14.28 1559.6 13.98 1566.15 13.57 1572.7
13.46 1579.26 13.22 1585.81 13.19 1592.36 13.5 1598.92 13.71 1605.47 14.26
1612.02 14.99 1618.58 15.67 1625.13 16.13 1631.68 16.74 1638.23 17 1644.79
17.29 1651.34 17.14 1657.89 17.4 1664.45 17.56 1671 17.53 1677.55 17.75
1684.11 17.58 1690.66 18.02 1697.21 18.41 1703.76 18.53 1710.32 18.46
1716.87 18.53 1723.42 18.66 1729.98 18.75 1736.53 18.78 1743.08 18.78
1749.63 18.96 1756.19 18.72 1769.29 18.94 1782.4 19.37 1788.95 19.2 1795.51
19.4 1802.06 19.7 1808.61 19.74 1815.16 19.81 1821.72 20.11 1828.27 20.21
1841.38 20.7 1847.93 20.77 1854.48 20.54 1861.04 20.39 1867.59 20.13 1874.14

19.37 1880.69 18.7 1887.25 18.1 1893.8 17.65 1900.35 17.12 1906.91 16.34
1913.46 15.67 1920.01 15.06 1926.57 14.86 1933.12 15.01 1946.22 14.96
1952.78 14.98 1959.33 15.09 1965.88 15.32 1972.44 15.76 1978.99 16.08
1985.54 16.24 1992.1 16.42 1998.65 16.47 2005.2 16.82 2011.75 16.5 2018.31
15.55 2024.86 14.27 2031.41 13.77 2050 14.1 2083 13.7 2090 6.6 2110 2.9
2130 3.1 2150 3.9 2170 7.1 2182.13 22.14 2188.68 27.54 2195.24 31.46 2201.79
33.64 2208.34 34.57 2214.9 35.39 2221.45 35.82 2228 35.88 2241.11 35.73
2247.66 35.59 2254.21 35.32 2260.77 35.59 2267.32 35.59 2273.87 35.52
2280.43 35.59 2286.98 35.59 2293.53 35.83 2300.08 35.89 2306.64 36.14
2311.62 36.25 2318.15 36.11 2324.68 36.14 2331.21 36.2 2337.74 36.09 2344.26
36.12 2350.79 36.36 2357.32 36.9 2363.85 37.32 2370.38 37.44 2376.91 37.61
2383.44 37.83 2389.97 38.12 2396.5 38.59 2403.03 39 2409.56 39.2 2416.09
39.47 2422.61 39.83 2429.14 40.04 2435.67 40.2 2442.2 40.35 2448.73 40.41
2455.26 40.42 2461.79 40.54 2468.32 40.72 2474.85 40.88 2481.38 40.93
2487.91 40.87 2494.44 40.95 2500.96 41.06 2507.49 41.04 2514.02 40.82
2520.55 40.79 2527.08 41.03 2533.61 41.12 2540.14 41.17 2546.67 41.25 2553.2
41.43 2559.73 41.61 2566.26 41.74 2572.79 41.98 2579.32 42.09 2585.84 42.09
2592.37 42.18 2598.9 42.08 2605.43 42.28 2611.96 42.33 2618.49 42.28 2625.02
42.54 2631.55 42.66 2638.08 42.59 2644.61 42.77 2651.14 42.75 2657.67 42.78
2664.2 42.75 2670.72 42.9 2677.25 43.47 2683.78 43.62 2690.31 43.79 2696.84
43.83 2703.37 43.98 2709.9 44.02 2716.43 44.23 2722.96 44.65 2729.49 45.05
2736.02 45.45 2742.55 45.61 2749.07 46 2755.6 46.36 2762.13 46.6 2768.66
46.93 2775.19 47.35 2781.72 47.77 2788.25 48.21 2794.78 48.63 2801.31 49.03
2807.84 49.45 2814.37 50.2 2820.9 51.03 2827.42 51.63 2833.95 52.09 2840.48
52.63 2847.01 52.93 2853.54 53.38 2860.07 53.64 2866.6 54.13 2873.13 54.59
2879.66 54.81 2886.19 54.95 2892.72 54.76 2899.25 54.47 2905.77 54.66 2912.3
55.84 2918.83 57.45 2925.36 59.75 2931.89 61.09 2938.42 62.25 2944.95 62.54
2951.48 62.57

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .087 2083 .04 2221.45 .095

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2083
2221.45 1628.08 1647.15 1663.03 .1 .4 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 1000 26.4 F

CROSS SECTION

RIVER: Taunton River REACH: Main Stem RS: 67190.06

INPUT
Description: 63
Station Elevation Data num= 374
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 40.46 6.54 39.81 13.08 39.82
19.61 39.9 26.15 39.75 32.69 39.75 39.23 39.85 45.77 39.9 52.3 39.78 58.84
39.75 65.38 40.12 78.46 40.69 84.99 41.08 91.53 41 98.07 41.24 104.61 41.45
111.14 40.72 124.22 39.03 130.76 38.67 137.3 38.75 143.83 38.77 150.37 39.27
156.91 39.63 163.45 39.74 176.52 39.31 183.06 39.22 189.6 39.24 196.14 39.34
202.68 39.51 209.21 39.37 222.29 38 228.83 37.51 235.37 37.04 241.9 36.6
248.44 36.21 254.98 35.93 261.52 35.62 268.06 35.42 281.13 35.21 287.67 35
294.21 34.6 300.75 34.37 307.28 34.27 313.82 33.97 326.9 33.32 333.43 33.16

339.97 33.16 346.51 33.18 353.05 33.12 359.59 32.99 366.12 32.88 379.2 32.76
385.74 32.71 392.28 32.54 398.81 32.46 405.35 32.26 411.89 32.36 418.43
32.65 424.97 33.1 431.5 33.35 438.04 33.57 444.58 33.5 451.12 32.95 457.66
32.8 464.19 32.78 470.73 32.73 477.27 32.78 490.35 32.76 496.88 32.84 503.42
32.97 509.96 32.94 516.5 32.8 523.04 32.78 529.57 32.86 536.11 32.88 542.65
33.02 555.72 33.86 562.26 34.17 568.8 34.53 575.34 34.69 581.88 34.68 588.41
34.73 594.95 34.68 601.49 35.03 608.03 35.4 614.57 35.39 621.1 35.45 627.64
35.55 634.18 35.53 640.72 35.46 647.26 35.34 653.79 35.18 660.33 35.14
666.87 35.03 673.41 34.76 679.95 34.55 686.48 34.01 693.02 33.55 699.56
33.39 706.1 33.2 712.64 32.95 719.17 32.57 725.68 32.5 738.69 32.83 745.2
32.94 751.71 32.85 758.21 32.68 764.72 32.84 771.23 32.9 777.73 32.67
784.24 32.05 790.74 30.59 797.25 29.68 803.76 29.34 810.26 29.18 816.77
28.99 823.28 28.82 829.78 28.25 836.29 27.94 842.8 27.58 855.81 27.61 862.32
27.36 868.82 26.94 875.33 26.86 881.83 26.89 888.34 26.83 894.85 26.69
907.86 26.35 914.37 26.04 920.87 25.75 927.38 25.8 933.89 25.5 940.39 25.1
946.9 24.92 959.91 24.72 972.92 24.59 979.43 24.63 985.94 24.65 992.44 24.58
998.95 24.43 1005.46 24.31 1011.96 24.61 1024.98 25.02 1031.48 25.21 1037.99
25.31 1044.49 25.39 1051 25.5 1057.51 25.47 1064.01 25.15 1070.52 25.06
1077.03 24.7 1083.53 24.28 1090.04 24.16 1096.55 24.06 1103.05 24.09 1109.56
24.47 1116.07 24.8 1122.57 25.17 1129.08 25.58 1135.59 26.04 1142.09 26.29
1148.6 26.48 1155.1 26.81 1161.61 27.02 1168.12 27.4 1174.62 27.46 1181.13
27.41 1187.64 27.48 1194.14 27.57 1200.65 27.5 1207.16 27.25 1213.66 27.03
1220.17 26.79 1226.68 26.53 1233.18 25.86 1239.69 25.05 1246.2 24.27 1252.7
23.34 1259.21 22.53 1265.71 21.56 1272.22 20.42 1278.73 19.58 1285.26 18.67
1291.8 18.15 1298.33 18.05 1304.86 18.12 1311.4 18.26 1317.93 18.19 1324.47
18.33 1331 18.58 1337.53 18.92 1344.07 18.9 1350.6 18.67 1357.14 18.73
1363.67 18.81 1370.21 19.24 1376.74 19.35 1383.27 18.87 1389.81 18 1396.34
8.57 1408 7 1425 3.1 1450 2.2 1475 4 1492 7.2 1493.21 11.12 1494.35 11.55
1500.89 12.9 1513.96 13.15 1520.49 13.74 1527.02 15.37 1533.56 15.9 1540.09
15.56 1546.63 15 1553.16 13.95 1559.69 13.24 1566.23 12.75 1579.3 12.69
1585.83 12.48 1592.36 12.87 1598.9 13.73 1611.97 15.21 1618.5 15.72 1631.57
15.39 1638.1 15.05 1644.64 15.15 1657.71 15.15 1670.71 14.81 1690.13 15.51
1703.08 15.62 1716.03 15.38 1735.45 15.31 1748.39 14.95 1754.87 14.46
1761.34 13.84 1767.82 13.39 1793.71 12.38 1800.18 12.26 1813.13 12.77 1819.6
12.79 1826.08 12.99 1832.55 13.02 1845.5 12.72 1864.92 12.43 1871.39 12.82
1877.86 13.92 1884.34 15.52 1890.81 17.41 1903.76 18.55 1923.18 18.05
1929.65 17.68 1942.6 17.6 1949.07 17.32 1955.55 17.92 1968.49 18.52 1974.97
18.64 1981.44 18.93 1994.39 19.05 2000.86 18.84 2007.33 18.46 2026.75 18.18
2033.23 17.85 2046.18 16.69 2052.65 16.34 2072.07 16.06 2085.02 16.86
2091.49 16.97 2104.44 17.99 2117.38 19.16 2123.86 19.52 2136.97 19.84
2150.09 20.66 2163.21 21.93 2169.77 21.85 2176.33 21.91 2182.89 22.34 2196
23.74 2209.12 25.01 2228.8 27.84 2261.59 31.88 2268.15 32.56 2274.71 33.44
2281.27 34.74 2300.94 40.19 2314.06 43.5 2320.62 45.3 2333.74 48.31 2340.3
49.97 2353.42 52.31 2359.97 53.61 2366.53 54.27 2379.65 56.01 2386.21 56.48
2419 59.38 2425.56 59.69 2438.68 59.98 2458.36 61.12 2471.47 60.48 2478.03
60.27 2497.71 60.35 2510.83 60.95 2517.39 61.36 2523.94 61.96 2550.18 63.94
2556.74 64.17 2563.3 64.25 2589.53 63.5 2596.09 63.21 2609.21 62.07 2628.88
59.59 2635.44 58.59 2648.56 56.18 2655.12 54.72 2661.68 52.81 2720.71 38.65
2727.27 37.38 2740.38 35.21 2753.5 34.06 2766.62 32.29 2773.18 31.67 2779.74
30.87 2786.3 30.25 2792.85 29.97 2805.97 28.33 2812.53 27.74 2819.09 27.47
2825.65 27.75 2832.21 27.42 2845.32 26.01 2858.44 25.74 2878.12 26.1 2884.68
26.09 2904.35 26.54 2937.15 28.15 2963.38 29 2969.94 28.83 2976.5 28.89
2983.06 29.23 2989.62 29.78 2996.18 30.05 3002.74 29.91 3015.85 31.05
3024.23 31.61 3030.75 31.96 3037.2 32.43 3043.64 32.91 3050.08 33.31 3056.53

33.98 3062.97 34.67 3069.41 34.76 3075.86 35.33 3082.3 36.04 3088.75 36.46
3095.19 36.27 3101.63 36.63 3108.08 37.18 3114.52 37.46 3120.96 37.32
3127.41 36.9 3133.85 36.59 3140.29 36.59 3146.74 36.78 3153.18 36.63 3159.63
37.32 3166.07 38.67 3172.51 40.31 3178.96 42.23 3185.4 43.93 3191.84 45.52
3198.29 47.22 3204.73 48.88 3211.18 50.28 3217.62 51.75 3224.06 53.11

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .087 1376.74 .04 1533.56 .093

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1376.74
1533.56 997.16 932.92 890.31 .1 .4 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 1994 3224.06 19 F

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 66257.14

INPUT
Description: 62 Approach 495
Station Elevation Data num= 324 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 32.88 6.55 32.71 13.1 32.8 19.64 33.04 26.19 32.86 32.74 32.9 39.29 32.9
45.84 33.07 52.39 33.12 65.48 32.86 72.03 33.15 78.58 33.38 85.13 33.42
98.22 33.46 104.77 33.35 111.32 33.15 117.87 33.08 130.97 33.33 137.51 33.18
144.06 33.05 150.61 32.8 157.16 32.76 163.71 32.57 176.8 32.27 183.35 32.14
189.9 32.04 196.45 31.96 203 32.04 209.54 32.14 216.09 32.14 222.64 32.23
229.19 32.35 235.74 32.33 242.29 32.43 248.83 32.51 255.38 32.51 268.48
32.64 275.03 32.77 281.58 32.64 288.12 32.76 294.67 32.86 301.22 33.27
307.77 33.43 314.32 33.38 320.87 33.11 333.96 33.41 340.51 33.5 347.06 33.35
353.61 33.17 360.16 33.14 366.7 33.16 373.25 32.91 386.35 31.98 399.44 31.71
405.99 31.65 412.54 31.56 419.09 31.49 425.64 31.4 432.19 31.21 445.28 31.34
451.83 31.24 458.38 31.44 464.93 31.45 471.48 31.18 478.02 31.21 484.57
30.95 491.12 31.06 497.67 31.11 504.22 31 510.77 30.54 523.86 29.34 530.41
29.36 536.96 28.56 543.51 28 550.06 27.75 556.6 27.22 563.15 26.71 569.7
26.31 576.25 26.06 582.8 26.13 589.34 26.26 595.89 26.5 602.44 27.04 608.99
26.95 615.54 27.21 622.09 27.21 628.63 27.3 635.18 27.95 641.73 29.38 648.28
30.38 654.83 31.4 661.38 32.22 667.92 32.48 674.47 32.5 681.02 32.47 687.57
32.26 694.12 32.23 700.67 32.15 713.76 32.12 720.31 32.21 726.86 31.98
733.41 31.8 739.96 31.65 746.5 31.84 753.05 31.86 759.6 31.74 766.15 31.51
772.7 31.4 779.24 31.38 785.79 31.43 792.34 31.19 805.44 30.49 811.99 30.46
818.53 30.22 825.08 30.04 838.18 30 844.73 30 851.28 30.07 857.82 29.88
870.92 29.66 877.47 29.4 884.02 29.34 890.57 29.22 897.11 29.14 903.66 29.31
910.21 29.02 916.76 28.75 929.86 28.33 936.4 28.07 942.95 27.62 949.5 26.71
956.05 25.66 962.6 25.32 969.15 25.21 975.69 25.36 982.24 25.07 988.79 24.4
995.34 24.23 1001.89 24.31 1008.44 23.69 1014.98 22.69 1021.53 22.3 1028.08
22.25 1034.63 21.76 1041.18 19.24 1057.66 9.83 1058.6 6.74 1062.21 5.77
1073.02 2.46 1094.79 -.34 1115.31 -.94 1130.91 3.91 1140.47 5.64 1146.53 8
1154.42 11.85 1159.05 12.86 1165.59 14.86 1172.14 16.43 1178.69 16.92
1204.88 16.83 1217.98 16.33 1224.53 16.23 1244.17 15.05 1257.27 13.87
1270.37 13.03 1276.91 12.72 1283.46 12.21 1296.56 11.96 1309.66 11.03 1316.2
10.73 1322.75 10.19 1329.3 10.01 1342.4 9.99 1348.95 10.68 1355.49 11.02

1362.04 11.1 1375.14 10.71 1381.69 10.78 1388.24 11.09 1401.33 11 1407.88
11.24 1414.43 11.32 1434.07 12.01 1440.62 12.36 1453.72 13.89 1466.82 14.44
1473.36 14.56 1479.91 14.43 1486.46 14.54 1493.01 14.49 1499.56 14.29
1512.65 13.42 1519.2 12.79 1525.75 12.52 1532.3 12.62 1538.85 12.95 1545.39
13.76 1551.94 14.38 1565.04 14.43 1571.59 14.77 1578.14 14.91 1591.23 15.68
1597.78 16.36 1604.33 16.9 1610.88 16.14 1617.43 16.1 1637.07 16.48 1643.62
16.24 1650.17 16.98 1669.81 17.29 1682.91 17.22 1702.55 17.47 1709.1 17.42
1715.65 17.58 1722.2 17.92 1728.75 17.76 1735.29 17.75 1748.39 18.18 1787.68
19.82 1794.23 19.93 1807.33 20.58 1813.87 21.01 1826.97 21.39 1833.52 21.28
1840.07 20.85 1846.62 21.29 1853.16 22.53 1859.71 23.07 1872.81 24.67
1885.91 25.77 1892.45 26.54 1905.55 28.65 1918.65 30.27 1931.74 31.25
1938.29 32.12 1944.84 33.22 1951.39 33.32 1957.94 33.96 1964.49 35.11
1971.03 36.84 1977.58 37.41 1984.13 37.7 2036.52 44.28 2049.61 45.32 2056.16
46.14 2075.81 47.98 2102 51.04 2115.09 52.69 2121.64 53.37 2134.74 55.09
2141.29 56.22 2147.83 57.11 2154.38 57.64 2167.48 57.9 2174.03 58.44 2180.58
59.28 2193.67 59.43 2206.77 59.09 2226.41 59.25 2232.96 59.1 2252.61 59.24
2265.7 61.81 2272.25 62.65 2278.8 61.86 2285.35 61.21 2291.89 61.11 2298.44
61.73 2304.99 62.52 2311.54 63.1 2318.09 63.21 2324.64 63.71 2331.18 63.34
2344.28 62.84 2363.92 61.64 2370.47 61.12 2377.02 61.01 2390.12 60.28
2403.21 60.1 2409.76 59.84 2422.86 59.64 2429.41 59.28 2455.6 58.82 2462.15
58.8 2475.24 57.99 2488.34 57.87 2501.44 57.39 2514.53 57.49 2534.18 56.22
2540.72 55.57 2547.27 54.46 2553.82 54.15 2560.37 53.22 2566.92 52.74
2573.47 53.83 2580.01 52.47 2586.56 50.97 2593.11 49.68 2599.66 48.68 2619.3
44.62 2625.85 43.13 2638.95 41.27 2645.5 39.99 2652.04 38.9 2658.59 38.09
2665.14 37.14 2671.69 36.85 2678.24 36.76 2684.78 36.46 2697.88 36.35
2704.43 36.14 2710.98 36.23 2717.53 36.6 2724.07 36.57 2730.62 36.72 2737.17
37.06 2743.72 37.09 2756.81 37.56 2763.36 38.05 2769.91 38.05 2776.46 38.2
2796.1 39.49 2809.2 39.93 2822.3 40.12 2828.84 40.38

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 1034.63 .04 1178.69 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1034.63
1178.69 57.41 52.76 51.67 .1 .4 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 1500 2828.84 29.5 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 66204.38

INPUT Description: 61.7 US Face 495
Station Elevation Data num= 321
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 43.4 12.216 42.98 42.765
42.81 48.883 42.87 54.991 42.7 73.324 42.63 79.432 42.74 85.54 42.33 103.874
41.97 109.982 42.12 116.09 41.97 122.198 40.19 128.306 39.67 134.423 39.48
140.531 39.57 152.747 39.34 158.855 38.92 164.972 38.75 171.08 38.73 177.188
38.97 183.296 38.32 189.404 38.04 226.071 37.81 232.179 36.48 238.287 35.89
262.729 36.18 268.837 36.35 274.945 36.19 281.062 36.24 287.17 36.62 299.386
36.45 305.503 36.49 317.719 37.01 336.053 36.9 342.161 36.61 366.602 36.58
378.818 36.23 391.034 36.16 415.476 36.37 421.584 36.01 427.701 35.02

433.809 34.72 439.917 34.62 446.025 34.67 452.143 34.57 458.251 34.33
470.467 34.3 476.575 34.09 482.692 34.32 494.908 34.04 513.241 33.92 519.349
33.32 525.457 33.02 531.565 33.29 537.673 33.27 549.899 33.79 556.007 34.19
568.232 33.65 574.34 33.5 586.556 33.58 592.664 33.47 611.045 33.5 629.519
33.25 635.674 33.36 647.993 33.25 654.148 33.3 660.303 33.2 666.468 33.44
672.623 32.86 691.097 32.28 709.571 32.27 715.726 32.03 721.881 31.57
734.201 31.11 740.356 31.14 746.52 30.99 752.675 31.01 758.83 31.18 771.149
31.12 777.304 30.69 789.624 30.43 795.779 30.12 801.934 29.99 814.253 29.49
820.408 28.85 826.563 28.4 832.727 27.71 845.037 27.3 851.202 26.61 857.357
26.26 869.676 26.21 881.986 25.8 900.46 25.76 906.615 26.18 912.78 26.46
918.935 26.25 925.09 25.18 931.254 24.45 943.564 23.89 949.719 23.03 955.883
21.27 962.039 19.34 968.193 16.89 971.924 15.33 988.641 5.98 993.405
4.141015.817 -.791029.349 -1.131047.701 -.711057.427 3.67 1064.174
8.591085.599 9.46 1095.71 15.391097.514 16.151103.669 18.08 1109.824
20.031115.979 21.541122.143 22.581128.298 23.251134.453 23.41 1140.618
231146.773 21.471152.928 21.261159.092 21.191165.247 21.08 1171.402
21.191177.557 21.21 1183.72 21.151189.876 21.581196.031 21.72 1202.196
20.831208.351 20.771214.506 21.051220.661 21.541226.825 22.35 1232.98
22.681239.135 22.731245.298 22.911251.454 23.371257.609 23.18 1263.774
23.311276.084 23.861282.239 24.411288.403 24.521294.558 22.87 1300.713
22.71306.878 22.81313.033 23.021319.188 23.441325.352 23.54 1331.507
23.551337.662 23.941343.817 23.931349.981 23.851356.136 23.86 1362.291
24.211368.457 24.53 1374.61 24.551380.766 24.91386.922 25.17 1393.085 25.22
1399.24 25.41405.395 25.621411.559 25.291417.714 25.87 1423.869 25.941430.034
25.541436.189 25.51448.499 25.671454.663 25.82 1460.818 25.681466.973
25.291473.137 24.871479.292 25.051485.447 25.25 1491.612 25.11497.767
25.331503.922 25.631516.241 26.181522.396 26.23 1528.551 26.31534.714 26.7
1540.87 27.281547.025 27.23 1553.18 27.42 1559.345 27.46 1565.5 27.351571.655
28.261577.819 27.321583.974 26.21 1590.129 26.291596.293 26.861602.448
26.481608.603 26.331620.923 27.95 1627.078 27.571633.233 27.791639.397
28.451645.552 28.51651.707 29.1 1657.871 29.491664.026 29.961670.182
30.11682.501 30.061688.656 30.73 1694.811 31.011700.975 30.76 1707.13
31.171713.285 31.02 1719.44 31.25 1725.604 31.68 1731.76 31.811744.079
32.641750.234 33.041756.389 33.67 1762.553 33.821768.708 34.381774.863
34.571781.018 34.141787.183 34.28 1793.338 34.611799.493 34.741805.657
35.131811.812 35.51817.967 35.82 1824.131 36.421830.286 36.961836.441
37.31842.596 37.551854.916 38.36 1861.071 38.94 1873.39 40.511879.545 41.21
1885.7 41.811891.864 42.12 1898.019 42.321910.339 42.911916.494 42.871922.649
42.761928.813 42.79 1934.968 43.021941.123 43.131947.278 43.131953.443
42.931959.598 43.12 1965.751 43.211984.227 43.711990.391 43.571996.546
43.572002.701 43.48 2015.021 43.62021.174 43.442027.329 43.342033.495 43.55
2039.65 43.6 2045.805 43.512051.969 43.722058.124 43.722064.279 43.462070.445
43.53 2076.6 43.412088.918 43.562095.073 43.732101.228 44.762107.392 44.93
2113.547 452119.702 44.832125.857 44.952132.022 45.022138.177 45.35 2144.332
46.912150.496 47.022156.651 46.912162.806 46.46 2168.97 46.42 2175.125 46.47
2181.28 46.352187.445 46.46 2193.6 46.372199.755 46.39 2205.91 46.392212.074
46.362218.229 46.492224.384 46.652230.548 46.65 2236.703 46.722242.858
46.832249.023 46.762255.178 46.752261.333 46.91 2267.497 47.132273.652
47.072279.807 47.062285.962 47.152292.125 46.9 2298.281 46.732304.438
46.72310.601 46.492316.756 46.42322.911 46.25 2329.075 46.22 2335.23
46.32341.385 46.46 2347.55 46.492353.705 46.57 2359.86 46.582366.015
46.522372.179 46.572384.489 46.62390.653 46.53 2396.808 46.622402.963
46.672415.282 46.72421.438 46.432427.602 46.12 2433.757 45.452439.912
45.122446.067 44.572452.231 44.692458.386 44.65 2464.541 44.8

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 918.935 .041134.453 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
918.9351134.453 221.18 217.52 217.92 .3 .4 Skew Angle = 20

BRIDGE

RIVER: Taunton River
REACH: Main Stem RS: 66018.66

INPUT
Description: 61.5 I-495/ SR 25/ Star Mem Hwy Distance from Upstream XS = 22
Deck/Roadway Width = 175
Weir Coefficient = 2.6
Bridge Deck/Roadway Skew = 20
Upstream Deck/Roadway Coordinates
 num= 9
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 744.237 33.83 909.622 31.45 949.09 34.85 27.42 1029.903 34.19 26.681102.259
33.81 26.241138.907 29.58
 1193.41 29.65 1249.791 29.89 1487.533 32.57

Upstream Bridge Cross Section Data
Station Elevation Data num= 321
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 43.4 12.216 42.98 42.765
42.81 48.883 42.87 54.991 42.7 73.324 42.63 79.432 42.74 85.54 42.33 103.874
41.97 109.982 42.12 116.09 41.97 122.198 40.19 128.306 39.67 134.423 39.48
140.531 39.57 152.747 39.34 158.855 38.92 164.972 38.75 171.08 38.73 177.188
38.97 183.296 38.32 189.404 38.04 226.071 37.81 232.179 36.48 238.287 35.89
262.729 36.18 268.837 36.35 274.945 36.19 281.062 36.24 287.17 36.62 299.386
36.45 305.503 36.49 317.719 37.01 336.053 36.9 342.161 36.61 366.602 36.58
378.818 36.23 391.034 36.16 415.476 36.37 421.584 36.01 427.701 35.02
433.809 34.72 439.917 34.62 446.025 34.67 452.143 34.57 458.251 34.33
470.467 34.3 476.575 34.09 482.692 34.32 494.908 34.04 513.241 33.92 519.349
33.32 525.457 33.02 531.565 33.29 537.673 33.27 549.899 33.79 556.007 34.19
568.232 33.65 574.34 33.5 586.556 33.58 592.664 33.47 611.045 33.5 629.519
33.25 635.674 33.36 647.993 33.25 654.148 33.3 660.303 33.2 666.468 33.44
672.623 32.86 691.097 32.28 709.571 32.27 715.726 32.03 721.881 31.57
734.201 31.11 740.356 31.14 746.52 30.99 752.675 31.01 758.83 31.18 771.149
31.12 777.304 30.69 789.624 30.43 795.779 30.12 801.934 29.99 814.253 29.49
820.408 28.85 826.563 28.4 832.727 27.71 845.037 27.3 851.202 26.61 857.357
26.26 869.676 26.21 881.986 25.8 900.46 25.76 906.615 26.18 912.78 26.46
918.935 26.25 925.09 25.18 931.254 24.45 943.564 23.89 949.719 23.03 955.883
21.27 962.039 19.34 968.193 16.89 971.924 15.33 988.641 5.98 993.405
4.141015.817 -.791029.349 -1.131047.701 -.711057.427 3.67 1064.174
8.591085.599 9.46 1095.71 15.391097.514 16.151103.669 18.08 1109.824
20.031115.979 21.541122.143 22.581128.298 23.251134.453 23.41 1140.618
231146.773 21.471152.928 21.261159.092 21.191165.247 21.08 1171.402
21.191177.557 21.21 1183.72 21.151189.876 21.581196.031 21.72 1202.196
20.831208.351 20.771214.506 21.051220.661 21.541226.825 22.35 1232.98
22.681239.135 22.731245.298 22.911251.454 23.371257.609 23.18 1263.774

23.311276.084 23.861282.239 24.411288.403 24.521294.558 22.87 1300.713
22.71306.878 22.81313.033 23.021319.188 23.441325.352 23.54 1331.507
23.551337.662 23.941343.817 23.931349.981 23.851356.136 23.86 1362.291
24.211368.457 24.53 1374.61 24.551380.766 24.91386.922 25.17 1393.085 25.22
1399.24 25.41405.395 25.621411.559 25.291417.714 25.87 1423.869 25.941430.034
25.541436.189 25.51448.499 25.671454.663 25.82 1460.818 25.681466.973
25.291473.137 24.871479.292 25.051485.447 25.25 1491.612 25.11497.767
25.331503.922 25.631516.241 26.181522.396 26.23 1528.551 26.31534.714 26.7
1540.87 27.281547.025 27.23 1553.18 27.42 1559.345 27.46 1565.5 27.351571.655
28.261577.819 27.321583.974 26.21 1590.129 26.291596.293 26.861602.448
26.481608.603 26.331620.923 27.95 1627.078 27.571633.233 27.791639.397
28.451645.552 28.51651.707 29.1 1657.871 29.491664.026 29.961670.182
30.11682.501 30.061688.656 30.73 1694.811 31.011700.975 30.76 1707.13
31.171713.285 31.02 1719.44 31.25 1725.604 31.68 1731.76 31.811744.079
32.641750.234 33.041756.389 33.67 1762.553 33.821768.708 34.381774.863
34.571781.018 34.141787.183 34.28 1793.338 34.611799.493 34.741805.657
35.131811.812 35.51817.967 35.82 1824.131 36.421830.286 36.961836.441
37.31842.596 37.551854.916 38.36 1861.071 38.94 1873.39 40.511879.545 41.21
1885.7 41.811891.864 42.12 1898.019 42.321910.339 42.911916.494 42.871922.649
42.761928.813 42.79 1934.968 43.021941.123 43.131947.278 43.131953.443
42.931959.598 43.12 1965.751 43.211984.227 43.711990.391 43.571996.546
43.572002.701 43.48 2015.021 43.62021.174 43.442027.329 43.342033.495 43.55
2039.65 43.6 2045.805 43.512051.969 43.722058.124 43.722064.279 43.462070.445
43.53 2076.6 43.412088.918 43.562095.073 43.732101.228 44.762107.392 44.93
2113.547 452119.702 44.832125.857 44.952132.022 45.022138.177 45.35 2144.332
46.912150.496 47.022156.651 46.912162.806 46.46 2168.97 46.42 2175.125 46.47
2181.28 46.352187.445 46.46 2193.6 46.372199.755 46.39 2205.91 46.392212.074
46.362218.229 46.492224.384 46.652230.548 46.65 2236.703 46.722242.858
46.832249.023 46.762255.178 46.752261.333 46.91 2267.497 47.132273.652
47.072279.807 47.062285.962 47.152292.125 46.9 2298.281 46.732304.438
46.72310.601 46.492316.756 46.42322.911 46.25 2329.075 46.22 2335.23
46.32341.385 46.46 2347.55 46.492353.705 46.57 2359.86 46.582366.015
46.522372.179 46.572384.489 46.62390.653 46.53 2396.808 46.622402.963
46.672415.282 46.72421.438 46.432427.602 46.12 2433.757 45.452439.912
45.122446.067 44.572452.231 44.692458.386 44.65 2464.541 44.8
 Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 918.935 .041134.453 .09

Bank Sta: Left Right Coeff Contr. Expan.
 918.9351134.453 .3 .4
Skew Angle = 20

Downstream Deck/Roadway Coordinates
 num= 9
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 800.618 33.83 966.004 31.45 1005.471 34.85 27.42 1086.285 34.19
26.681158.641 33.81 26.241195.289 29.58 1249.791 29.65 1306.173 29.89
1543.915 32.57

Downstream Bridge Cross Section Data
Station Elevation Data num= 320
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 29.52 6.136 29.57 12.263
29.59 24.535 29.66 30.662 29.88 36.798 30.29 42.935 30.34 49.061 30.26

55.198 30.32 61.334 30.42 67.47 31.1 73.597 31.67 79.733 31.46 85.869 31.45
91.996 31.61 98.132 31.65 104.268 31.73 110.395 31.56 116.531 31.98 122.667
32.23 128.794 31.81 141.067 32.08 147.203 32.14 153.33 32.54 159.466 32.45
165.602 32.32 177.865 32.53 184.001 32.35 190.128 32.3 196.264 32.55 202.4
32.78 208.527 32.67 214.663 32.67 220.8 32.65 226.926 32.27 233.063 32.49
239.199 32.49 245.335 32.71 251.462 32.63 257.598 32.69 263.734 32.67
269.861 32.46 275.997 32.47 282.133 32.45 288.26 32.22 294.396 32.15 300.533
32.22 306.659 32.36 312.795 32.56 318.932 32.54 325.058 32.37 331.195 32.06
337.331 32.42 343.467 32.64 349.594 33.22 355.73 33.57 361.866 34.39 367.993
36.29 374.129 37.64 380.265 37.8 386.392 38.13 392.528 38.1 398.665 38.27
404.791 38.47 410.928 38.7 417.064 38.47 423.191 38.16 429.327 38.29 435.463
38.49 447.726 38.6 453.862 38.51 459.998 38.25 466.125 38.24 472.261 38.33
478.398 38.28 484.524 38.14 490.661 38.21 496.797 38.31 502.923 38.18 509.06
38.14 515.196 38.21 521.323 38.19 527.459 37.91 533.595 37.7 539.731 37.64
545.858 37.52 558.13 37.38 564.257 37.21 570.393 37.1 576.53 36.82 582.656
36.66 588.793 36.42 594.929 36.12 607.192 36.33 613.328 36.09 619.455 35.74
625.591 35.46 631.727 35.24 637.863 35.13 650.126 34.83 656.263 34.64
662.389 35.67 668.526 36.5 674.662 37.58 680.789 37.12 686.925 37.01 693.061
37.04 699.188 36.64 705.324 36.04 711.46 35.96 717.587 35.76 723.723 35.39
729.859 35.23 735.995 35.2 742.122 35 748.258 34.97 754.395 34.88 760.521
34.81 772.794 33.57 778.921 33.62 785.057 33.63 791.193 33.21 797.32 33.26
803.456 32.87 809.592 32.51 815.719 32.19 821.855 32.03 827.991 31.5 834.128
31.18 840.254 30.9 846.391 30.72 852.527 30.48 858.654 30.08 864.79 29.71
870.926 29.23 877.053 28.42 883.189 28.02 889.325 27.55 895.452 27.28
901.588 26.92 907.724 26.31 913.851 26.15 919.987 26.15 926.123 26.23 932.25
25.7 938.385 25.52 944.523 25.55 950.659 25.37 956.786 25.08 962.941 28.11
969.105 29.16 975.26 28.79 981.415 28.63 987.57 27.99 993.734 26.14 999.889
24.091006.044 22.11016.522 17.581025.374 12.181031.519 10.78 1035.551
5.841043.256 2.81063.102 .71079.857 -.71098.322 .78 1110.012 5.411119.991
8.181130.929 9.1 1137.78 11.571141.501 13.14 1147.665 15.55 1153.82
18.251159.975 20.19 1166.13 21.61172.295 22.58 1178.45 22.711184.605
23.011203.079 23.131209.234 23.331215.389 23.69 1221.552 23.081227.708
22.881233.863 22.991240.017 24.811246.183 24.52 1252.338 23.831258.493
23.341270.803 23.541276.967 23.361283.122 23.97 1289.277 25.691295.432
25.761301.596 25.991326.226 26.41332.381 25.96 1338.536 26.4 1369.32
25.781375.484 25.79 1381.64 25.661387.793 25.11 1393.949 25.041400.114
25.121412.424 24.771424.734 24.081430.898 24.58 1437.053 24.421449.363
24.981455.526 24.711467.838 24.591486.312 25.35 1492.467 25.461504.786
24.811510.941 24.781517.096 25.361523.251 27.37 1529.415 27.55 1547.88
27.331554.045 27.79 1560.2 27.8 1572.51 27.31 1578.665 26.931584.829
26.691590.984 27.161597.139 27.161603.294 27.69 1609.458 28.521615.615
28.121621.768 28.391627.923 28.381640.243 28.71 1652.553 28.81664.872
29.21683.347 29.41695.656 29.841707.966 29.92 1720.286 30.321732.596 31.3
1738.76 32.09 1751.07 34.381757.225 35.17 1763.39 34.671769.545 35.27 1775.7
36.291788.019 36.811800.329 37.16 1806.484 37.491818.803 38.371824.958
38.651831.113 38.791849.588 39.9 1855.743 39.931868.062 40.441880.372
40.741892.691 41.331898.846 41.34 1911.156 41.961923.476 42.361929.631 42.45
1941.95 42.141960.415 41.84 1966.579 41.921978.889 42.391991.209
43.091997.364 43.232009.673 43.76 2015.829 43.752021.993 43.952028.148
43.872040.458 44.142046.621 43.72 2052.777 43.542071.252 43.412077.407
43.482083.562 43.82089.717 43.6 2108.191 44.162114.346 44.53 2120.51 44.72
2132.82 44.812138.975 44.52 2145.14 44.552151.295 44.87 2157.45
45.342188.234 45.782194.389 45.97 2200.553 45.822206.708 46.022219.018
45.782237.493 46.562255.967 45.89 2268.277 46.47 2274.44 46.382292.906

45.292305.226 45.142311.381 45.4 2329.855 47.232342.165 47.82354.485
48.92360.638 48.92366.793 48.3 2372.949 48.282379.114 48.482391.424
48.372397.579 48.552409.898 48.6 2428.372 49.242434.527 49.672440.682
49.872446.836 50.232453.002 50.74 2465.312 51.542471.467 51.82489.941
51.972496.096 51.822502.251 52.05 2508.415 51.972520.725 50.77 2526.88
50.372533.045 49.8 2551.51 50.09

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 981.415 .04 1178.45 .09

Bank Sta: Left Right Coeff Contr. Expan.
 981.415 1178.45 .5 .7
Skew Angle = 20

Upstream Embankment side slope = 0 horiz. to 1.0 vertical Downstream
Embankment side slope = 0 horiz. to 1.0 vertical Maximum allowable
submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Piers = 2

Pier Data
Pier Station Upstream= 992.315 Downstream=1053.395
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev 3.2 .1 3.2 6.9 3.2 22.5 3.2 30
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 3.2 .1 3.2 6.9 3.2 22.5 3.2 30

Pier Data
Pier Station Upstream=1059.034 Downstream=1112.596
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 3.2 .1 3.2 6.9 3.2 22.5 3.2 26.5
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 3.2 .1 3.2 6.9 3.2 22.5 3.2 26.5

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
 Energy
 W.S. Pro Method

 W.S.Pro Data
 Left Embankment
 El of the top of the embankment = 32
 El of the toe of the abutment = 6
 Right Embankment
 El of the top of the embankment = 32

```
 El of the toe of the abutment = 6  Abutment Type = 3 Sloping abutments and
sloping embankments  Slope of abutments = 4
 Top with of embankment = 175
 Centroid station of bridge opening =
 Wing Wall Type = No wing walls present
 Width =
 Angle =
 Radius =
 Guide Banks Type = No Guide Bank present
 Length =
 Offset =
 Angle =
 Optional Contraction and expansion coefficients
 At approach Section
 At Guide Bank
 At upstream outside
 At upstream inside (BU)
 At downstream inside (BD)
 Piers are Continuous for the width of the bridge
 Use Geometric mean as Friction Slope Method

Selected Low Flow Methods = W.S.Pro Method

High Flow Method
 Energy Only

Additional Bridge Parameters  Add Friction component to Momentum
 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION


RIVER: Taunton River
REACH: Main Stem RS: 65986.86

INPUT
Description: 61.3 DS Face 495
Station Elevation Data num= 320
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  0 29.52 6.136 29.57 12.263
29.59 24.535 29.66 30.662 29.88  36.798 30.29 42.935 30.34 49.061 30.26
55.198 30.32 61.334 30.42  67.47 31.1 73.597 31.67 79.733 31.46 85.869 31.45
91.996 31.61  98.132 31.65 104.268 31.73 110.395 31.56 116.531 31.98 122.667
32.23  128.794 31.81 141.067 32.08 147.203 32.14 153.33 32.54 159.466 32.45
165.602 32.32 177.865 32.53 184.001 32.35 190.128 32.3 196.264 32.55  202.4
32.78 208.527 32.67 214.663 32.67 220.8 32.65 226.926 32.27  233.063 32.49
239.199 32.49 245.335 32.71 251.462 32.63 257.598 32.69  263.734 32.67
269.861 32.46 275.997 32.47 282.133 32.45 288.26 32.22  294.396 32.15 300.533
32.22 306.659 32.36 312.795 32.56 318.932 32.54  325.058 32.37 331.195 32.06
337.331 32.42 343.467 32.64 349.594 33.22  355.73 33.57 361.866 34.39 367.993
36.29 374.129 37.64 380.265 37.8  386.392 38.13 392.528 38.1 398.665 38.27
404.791 38.47 410.928 38.7  417.064 38.47 423.191 38.16 429.327 38.29 435.463
```

38.49 447.726 38.6 453.862 38.51 459.998 38.25 466.125 38.24 472.261 38.33
478.398 38.28 484.524 38.14 490.661 38.21 496.797 38.31 502.923 38.18 509.06
38.14 515.196 38.21 521.323 38.19 527.459 37.91 533.595 37.7 539.731 37.64
545.858 37.52 558.13 37.38 564.257 37.21 570.393 37.1 576.53 36.82 582.656
36.66 588.793 36.42 594.929 36.12 607.192 36.33 613.328 36.09 619.455 35.74
625.591 35.46 631.727 35.24 637.863 35.13 650.126 34.83 656.263 34.64
662.389 35.67 668.526 36.5 674.662 37.58 680.789 37.12 686.925 37.01 693.061
37.04 699.188 36.64 705.324 36.04 711.46 35.96 717.587 35.76 723.723 35.39
729.859 35.23 735.995 35.2 742.122 35 748.258 34.97 754.395 34.88 760.521
34.81 772.794 33.57 778.921 33.62 785.057 33.63 791.193 33.21 797.32 33.26
803.456 32.87 809.592 32.51 815.719 32.19 821.855 32.03 827.991 31.5 834.128
31.18 840.254 30.9 846.391 30.72 852.527 30.48 858.654 30.08 864.79 29.71
870.926 29.23 877.053 28.42 883.189 28.02 889.325 27.55 895.452 27.28
901.588 26.92 907.724 26.31 913.851 26.15 919.987 26.15 926.123 26.23 932.25
25.7 938.385 25.52 944.523 25.55 950.659 25.37 956.786 25.08 962.941 28.11
969.105 29.16 975.26 28.79 981.415 28.63 987.57 27.99 993.734 26.14 999.889
24.091006.044 22.11016.522 17.581025.374 12.181031.519 10.78 1035.551
5.841043.256 2.81063.102 .71079.857 -.71098.322 .78 1110.012 5.411119.991
8.181130.929 9.1 1137.78 11.571141.501 13.14 1147.665 15.55 1153.82
18.251159.975 20.19 1166.13 21.61172.295 22.58 1178.45 22.711184.605
23.011203.079 23.131209.234 23.331215.389 23.69 1221.552 23.081227.708
22.881233.863 22.991240.017 24.811246.183 24.52 1252.338 23.831258.493
23.341270.803 23.541276.967 23.361283.122 23.97 1289.277 25.691295.432
25.761301.596 25.991326.226 26.41332.381 25.96 1338.536 26.4 1369.32
25.781375.484 25.79 1381.64 25.661387.793 25.11 1393.949 25.041400.114
25.121412.424 24.771424.734 24.081430.898 24.58 1437.053 24.421449.363
24.981455.526 24.711467.838 24.591486.312 25.35 1492.467 25.461504.786
24.811510.941 24.781517.096 25.361523.251 27.37 1529.415 27.55 1547.88
27.331554.045 27.79 1560.2 27.8 1572.51 27.31 1578.665 26.931584.829
26.691590.984 27.161597.139 27.161603.294 27.69 1609.458 28.521615.615
28.121621.768 28.391627.923 28.381640.243 28.71 1652.553 28.81664.872
29.21683.347 29.41695.656 29.841707.966 29.92 1720.286 30.321732.596 31.3
1738.76 32.09 1751.07 34.381757.225 35.17 1763.39 34.671769.545 35.27 1775.7
36.291788.019 36.811800.329 37.16 1806.484 37.491818.803 38.371824.958
38.651831.113 38.791849.588 39.9 1855.743 39.931868.062 40.441880.372
40.741892.691 41.331898.846 41.34 1911.156 41.961923.476 42.361929.631 42.45
1941.95 42.141960.415 41.84 1966.579 41.921978.889 42.391991.209
43.091997.364 43.232009.673 43.76 2015.829 43.752021.993 43.952028.148
43.872040.458 44.142046.621 43.72 2052.777 43.542071.252 43.412077.407
43.482083.562 43.82089.717 43.6 2108.191 44.162114.346 44.53 2120.51 44.72
2132.82 44.812138.975 44.52 2145.14 44.552151.295 44.87 2157.45
45.342188.234 45.782194.389 45.97 2200.553 45.822206.708 46.022219.018
45.782237.493 46.562255.967 45.89 2268.277 46.47 2274.44 46.382292.906
45.292305.226 45.142311.381 45.4 2329.855 47.232342.165 47.82354.485
48.92360.638 48.92366.793 48.3 2372.949 48.282379.114 48.482391.424
48.372397.579 48.552409.898 48.6 2428.372 49.242434.527 49.672440.682
49.872446.836 50.232453.002 50.74 2465.312 51.542471.467 51.82489.941
51.972496.096 51.822502.251 52.05 2508.415 51.972520.725 50.77 2526.88
50.372533.045 49.8 2551.51 50.09

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val 0 .09 981.415 .04 1178.45 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 981.415

1178.45 60.77 66.17 74.2 .5 .7 Skew Angle = 20

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 65920.69

INPUT
Description: 61 Exit 495
Station Elevation Data num= 221
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 31.14 19.65 31.17 26.2 31.36
32.75 31.72 78.6 31.9 85.15 31.83 91.7 31.59 124.44 31.5 137.54 31.8 150.64
31.8 157.19 31.95 163.74 31.94 170.29 31.78 196.49 31.96 209.59 31.97
229.24 32.5 235.79 32.89 242.34 32.54 255.44 31.49 261.99 31.87 275.09 31.75
288.18 31.24 301.28 31.02 307.83 31.06 314.38 30.68 340.58 29.86 353.68
29.06 360.23 29.02 373.33 29.4 379.88 29.73 392.98 30.12 399.53 30.21 412.63
30.02 445.38 30.32 458.48 30.24 465.02 30.08 484.67 30.06 497.77 29.27
510.87 28.84 517.42 28.51 523.97 28 530.52 28.04 543.62 27.43 550.17 27.32
576.37 27.44 582.92 27.28 589.47 26.9 609.12 26.08 615.67 26 622.22 26.28
628.77 26.24 648.42 25.24 668.06 24.75 681.16 24.13 694.26 23.89 713.91
23.16 727.01 23.39 733.56 23.24 785.96 21.12 805.61 21.09 825.26 20.33
838.36 19.41 864.55 18.01 877.65 17.61 890.75 16.77 903.85 14.99 916.95 13.9
930.02 13.98 943.06 13.46 956.1 14.3 962.62 14.25 969.14 14.02 982.18 13.83
988.7 14.06 995.22 14.06 1001.74 14.38 1008.26 14.94 1014.78 15.33 1021.3
15.11 1027.82 15.03 1034.34 15.13 1053.9 16.14 1060.42 16.22 1066.94 15.71
1073.46 14.45 1079.98 11.16 1081.05 10.73 1082.27 7.26 1092.91 .4 1107.2
-.43 1123.95 -2.05 1137.61 -1.24 1152.42 -.93 1164.7 3.04 1174.49 6.25 1187
10.48 1190.83 11.26 1203.87 13.38 1210.39 14.26 1216.91 14.63 1223.43 14.77
1229.95 15.07 1242.99 15.04 1249.51 14.62 1256.03 14.57 1262.55 15.69
1269.07 17.97 1275.59 19.23 1282.11 19.68 1288.63 19.57 1295.15 18.94
1308.22 18.11 1327.87 18.47 1340.97 16.97 1347.52 16.5 1367.18 15.81 1380.28
15.65 1386.83 15.88 1393.38 16.5 1399.93 16.88 1406.48 17.07 1413.03 17.78
1426.14 18.6 1432.69 18.79 1445.79 18.45 1452.34 18.64 1465.44 20.95 1471.99
21.64 1478.54 21.93 1491.64 21.49 1498.2 20.24 1504.75 20.09 1511.3 19.67
1517.85 19.77 1530.95 20.53 1537.5 20.06 1544.05 19.98 1557.15 21.16 1563.7
21.47 1583.36 21.69 1589.91 22.66 1596.46 23.44 1603.01 23.93 1616.11 24.38
1642.32 23.97 1655.42 24.13 1681.62 23.32 1694.72 23.73 1701.27 24.05
1714.38 25.31 1720.93 26.81 1727.48 27.87 1734.03 29.14 1740.58 30.25
1747.13 31.21 1753.68 31.64 1760.23 33.2 1773.33 35.2 1786.44 36.52 1792.99
37.44 1799.54 37.95 1812.64 38.32 1819.19 38.37 1838.84 38.92 1845.39 38.84
1865.05 39.22 1878.15 39.71 1891.25 41.07 1897.8 40.76 1904.35 39.72 1910.9
39.35 1924 39.61 1950.21 39.26 1969.86 39.82 1982.96 39.27 1996.06 39.16
2002.62 39.36 2015.72 39.49 2048.47 39.42 2055.02 39.52 2061.57 39.91
2068.12 40.07 2081.23 40.04 2100.88 40.5 2107.43 40.48 2113.98 40.09 2120.53
39.9 2140.18 40.15 2146.73 40 2153.28 39.67 2199.14 38.75 2212.24 38.77
2218.79 38.96 2225.34 39.76 2238.45 42.08 2251.55 45.2 2258.1 45.98 2277.75
46.83 2284.3 47.3 2297.4 47.16 2317.06 49.09 2323.61 50.24 2330.16 49.75
2336.71 49.08 2343.26 48.85 2362.91 49.12 2376.01 49.17 2389.12 48.77
2395.67 48.84 2408.77 48.66 2415.32 49.24 2421.87 48.93 2428.42 48.76
2434.97 48.75 2441.52 49.07 2461.18 48.95 2467.73 48.76 2474.28 48.77
2480.83 49.44 2487.38 49.84 2493.93 50.05

Manning's n Values num= 3

```
 Sta n Val Sta n Val Sta n Val
 0 .09 1060.42 .04 1282.11 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  1060.42
1282.11 1486.1 1501.44 1534.95 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 1282 2493.93 29.5 T

CROSS SECTION


RIVER: Taunton River
REACH: Main Stem RS: 64419.25

INPUT
Description: 60
Station Elevation Data num= 202
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  0 25.23 13.03 24.69 19.55
24.58 39.1 24.71 52.13 24.36  58.65 24.32 65.16 24.44 71.68 24.14 84.71 23.94
91.23 23.47  97.75 23.22 104.26 23.46 110.78 23.84 117.29 24 169.43 23.65
182.46 24.02 188.97 24.35 202.01 24.46 215.04 24.84 234.59 25.68  241.11
26.08 247.62 26.11 254.14 25.96 260.65 25.48 267.17 24.26  273.69 24.11
364.92 24.13 371.43 24.21 377.95 24.71 384.46 25.43  390.98 25.96 397.5 26.15
423.56 25.71 430.08 25.43 443.11 25.09  449.63 24.81 456.14 24.68 462.66
24.29 475.69 24.04 501.76 22.85  527.82 21.19 547.37 20.39 560.41 20.12
566.92 19.85 573.44 19.74  579.96 19.83 592.99 19.32 606.02 19.15 612.54
18.95 619.05 18.53  625.57 18.26 645.12 17.88 651.64 17.63 658.15 17.03
664.67 16.78  671.18 16.34 710.28 15.77 723.32 15.79 729.83 15.91 736.35
15.86  742.86 15.33 755.9 15.52 762.41 15.39 768.93 16.01 788.48 17.32
801.51 17.46 814.54 17.29 834.13 16.73 840.69 16.73 847.24 16.96  860.35
17.04 866.91 17.32 880.02 17.25 886.57 16.94 893.13 17.09  919.35 17.11
932.46 16.85 939.01 16.87 965.23 17.54 971.78 17.62  984.89 18.18 991.45
18.02 1011.11 16.92 1017.67 16.39 1024.22 16.05  1030.78 16.25 1037.33 16.31
1050.44 15.84 1057 15.33 1063.55 14.54  1070.11 13.44 1076.66 12.52 1083.22
12.1 1089.77 12.11 1102.88 11.59  1109.44 11.69 1122.55 12.43 1129.1 12.25
1135.66 11.78 1148.76 11.35  1155.32 11.32 1168.43 11.71 1181.54 12.51
1194.65 14.06 1207.76 15.1  1214.31 15.43 1233.98 15.46 1247.09 16.2 1253.64
16.4 1266.75 16.36  1273.31 16.24 1279.86 15.45 1286.42 13.36 1292.97 11.1
1299.53 8.11  1301.73 8.11 1304 6.6 1325 3.3 1350 1.2 1375 1.1  1396 7.1
1403.54 11.73 1404.4 11.85 1410.96 13.04 1417.51 16.02  1424.07 17.99 1430.62
18.96 1437.18 19.15 1443.73 18.7 1450.29 18.54  1463.4 19.23 1469.95 19.29
1476.51 19.57 1483.06 19.59 1496.17 20.58  1502.73 20.58 1515.84 19.78
1522.39 19.66 1528.95 20.8 1535.5 22.34  1542.06 22.8 1555.16 22.86 1587.94
22.45 1601.05 22.66 1607.6 22.54  1614.16 22.21 1620.71 22.06 1640.38 21.97
1679.71 21.33 1686.26 21.35  1699.37 22.21 1712.48 23.33 1725.59 24.76 1738.7
25.69 1745.26 25.96  1804.25 26.46 1810.8 26.34 1817.36 26.37 1823.91 26.25
1830.47 26.35  1837.02 26.23 1843.58 26.37 1850.13 26.13 1856.69 25.24
1863.24 24.88  1876.35 24.71 1889.46 24.19 1915.68 24.28 1935.32 24.5 1954.91
24.3  1967.97 24.41 1987.56 24.4 2000.61 24.12 2033.26 24.2 2046.32 23.99
2059.38 24.2 2078.97 24.02 2111.62 23.86 2124.67 23.93 2157.32 23.55  2203.03
23.87 2229.15 24.8 2255.26 25 2294.44 25.88 2307.5 25.91  2340.15 26.42
2353.2 26.79 2372.79 27.93 2392.38 28.11 2398.91 28.04  2411.97 28.72 2425.03
29.71 2444.62 30.32 2477.26 30.89 2483.79 30.88  2503.38 31.76 2509.91 31.96
2516.44 32.39 2522.97 32.58 2536.03 32.37  2542.56 32.64 2562.15 32.62
```

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 1273.31 .04 1437.18 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1273.31 1437.18 1895.09 1994.8 2138.57 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 62424.45

INPUT
Description: 59
Station Elevation Data num= 351
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 27.99 6.56 27.54 32.8 26.7 45.92 25.99 52.48 25.52 59.04 25.48 65.6 25.97 72.16 27 78.72 27.44 85.28 27.65 104.97 27.77 118.09 26.87 124.65 26.63 131.21 25.94 137.77 24.86 144.33 24.07 150.89 23.75 157.45 23.59 164.01 24.01 170.57 24.28 183.69 24.54 196.81 25.28 216.49 25.45 223.05 25.23 236.17 24.57 249.29 24.3 268.97 23.64 282.1 23.5 288.66 23.31 295.22 23.33 308.34 23.56 328.02 23.19 347.7 22.52 354.26 22.64 360.82 22.33 367.38 22.37 380.5 22.11 393.62 21.38 400.18 21.5 413.3 20.41 426.42 19.94 439.54 19.86 446.1 19.72 452.66 19.2 459.22 18.3 472.34 15.74 478.91 15.39 485.47 15.19 492.03 14.72 498.59 14.63 505.15 14.94 524.83 15.05 531.39 15.21 537.95 15.6 551.07 15.28 564.19 14.59 570.75 14.41 583.87 14.5 590.43 14.29 610.11 14.14 623.23 14.18 636.35 13.86 649.47 13.96 656.03 14.12 662.59 14.42 675.72 15.85 682.28 16.25 695.4 16.52 701.96 16.54 708.52 16.41 715.08 16.52 728.2 15.99 741.32 16.09 747.88 15.86 761 14.61 774.12 14.66 780.68 14.52 787.24 14.21 793.8 13.63 800.36 12.89 806.92 12 813.48 11.26 820.04 10.87 826.6 10.33 833.16 10.32 839.72 11.9 846.28 12.02 852.85 11.76 859.41 11.23 865.97 10.85 872.53 10.76 879.09 11.01 885.65 11.06 898.77 10.95 905.33 10.71 918.45 10.51 925.01 10.24 938.13 10.44 957.81 10.4 964.37 10.68 970.93 11.21 977.49 11.58 984.05 11.74 997.17 11.69 1003.73 11.92 1016.85 11.45 1023.41 11.69 1029.97 12.19 1036.54 12.3 1043.1 12.09 1049.66 12.15 1056.22 12.02 1062.78 12.14 1069.34 11.95 1075.9 11.57 1082.46 11.44 1089.02 11.5 1102.14 11.44 1108.7 11.67 1115.23 12.12 1121.77 12.85 1128.3 13.16 1134.83 13.31 1141.37 13.16 1147.9 12.73 1154.44 12.69 1160.97 12.19 1167.5 11.55 1180.57 10.79 1187.11 10.72 1200.17 11.17 1232.84 11.76 1239.38 11.32 1245.91 11.09 1252.45 11.52 1258.98 11.6 1265.51 11.32 1272.05 10.78 1278.58 10.5 1304.72 10.68 1311.25 10.96 1317.78 11.64 1324.32 11.97 1330.85 12.14 1343.92 12.21 1356.99 12.65 1370.06 13.48 1376.59 13.23 1383.12 12.68 1396.19 12.05 1402.73 11.55 1409.26 11.92 1415.79 12.56 1422.33 12.45 1428.86 11.99 1435.4 11.18 1448.46 9.78 1455 9.48 1461.53 9.49 1474.6 9.1 1481.13 9.27 1487.67 9.61 1494.2 10.27 1507.27 11 1513.8 11.53 1539.94 12.92 1546.47 13.02 1553.01 12.76 1566.07 12.42 1572.61 11.91 1579.14 12.02 1585.68 11.89 1592.21 11.92 1598.74 12.12 1605.28 12.48 1618.35 13.48 1624.88 13.69 1631.41 13.68 1637.95 13.51 1639.32 13.35 1644.48 12.75 1651.02 12.06 1657.55 11.76 1670.62 11.55 1677.15 10.45 1683.69 9.17 1692 6.3 1710 1.7 1725 .3 1740 1.6 1758 6.8 1781.7 15.19 1788.23 16.67 1792.5 16.43 1794.76 16.31 1801.3 16.06 1807.83 15.53 1814.36 15.31 1820.9 15.6 1827.43 15.62 1833.97 15.42 1847.03 15.32 1860.1 14.89 1873.17 14.76 1879.7 14.55 1886.23 14.14 1892.76 13.97 1905.83 13.93 1912.36 14.42 1931.96 15.19 1938.49 15.33 1945.02 15.22 1964.62 15.48

1971.15 15.46 1984.21 15.9 2003.81 16.09 2010.34 16.29 2016.88 16.26 2023.41 16.48 2062.6 16.89 2075.67 17.22 2082.2 17.61 2095.26 18 2101.79 17.9 2121.39 18.14 2127.92 18.37 2140.99 18.55 2147.52 18.87 2154.05 19.43 2180.18 20.79 2199.78 21.21 2219.37 21.36 2271.63 22.61 2284.7 22.66 2317.36 23.48 2330.42 24.41 2343.49 24.61 2356.55 24.09 2376.15 23.78 2395.74 24.17 2402.28 24.48 2415.34 24.65 2421.87 24.57 2448 24.56 2480.66 25.2 2487.2 24.71 2500.26 24.74 2519.86 24.05 2526.39 24.02 2532.92 24.16 2545.99 23.86 2552.52 23.81 2565.58 23.27 2572.11 24.11 2591.71 24.45 2598.24 24.68 2611.31 24.34 2617.84 24.31 2637.44 23.9 2663.62 24.07 2670.17 23.68 2676.71 23.53 2702.9 23.69 2709.45 23.89 2729.08 24.9 2735.63 25.12 2748.72 25.16 2761.82 25.58 2781.46 25.01 2807.64 24.82 2814.19 24.94 2820.73 24.68 2827.28 24.16 2840.37 24.14 2853.47 25.92 2879.65 26.88 2892.74 26.37 2899.29 26.23 2905.84 25.94 2918.93 24.95 2925.47 24.34 2938.57 23.65 2945.11 23.69 2951.66 25.34 2958.21 26.41 2977.85 26.87 2984.39 26.76 2997.48 26.32 3004.03 26.2 3023.67 26.48 3036.76 26.34 3043.31 26.99 3049.85 28.02 3069.49 31.7 3076.04 32.68 3082.59 33.13 3095.68 33.32 3115.32 33.17 3134.96 32.54 3141.5 32.17 3154.6 30.88 3161.14 30.09 3167.69 29.47 3174.24 29.2 3206.97 29.24 3213.51 29.63 3239.7 32.38 3252.79 33.41 3265.88 34.15 3272.43 34.41 3278.98 34.51 3285.52 34.42 3292.07 34.16 3298.62 33.72 3305.16 33.48 3318.25 33.72 3324.8 33.7 3337.89 33.86 3350.99 33.44 3357.53 33.38 3370.62 33.68 3383.72 34.26 3390.26 34.41 3403.36 34.36 3409.9 34.55 3423 34.57 3429.54 34.47 3436.09 34.54 3455.73 34.11 3462.27 33.75 3468.82 33.56 3488.46 33.64 3495.01 33.89 3508.1 35.01 3514.64 35.32 3521.19 35.45 3534.28 35.41 3547.38 35.1 3560.47 34.43 3573.56 34.43 3593.2 33.97 3599.75 33.91 3606.29 33.99 3619.39 34.68 3625.93 34.77 3639.02 33.02 3645.57 32.25 3652.12 31.74 3658.66 32.11 3671.76 31.7 3691.39 31.5

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .093 1631.41 .04 1792.5 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1631.41 1792.5 2215.34 2110.96 2048.7 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 60313.49

INPUT
Description: 58 Station Elevation Data num= 209
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 50.49 6.56 50.2 19.67 49.91 39.34 49.12 85.23 45.95 98.35 44.53 104.9 43.93 124.57 42.94 131.13 42.75 144.24 41.68 150.8 41.59 170.46 40.92 177.02 40.47 190.13 40.65 196.69 40.09 203.25 39.38 209.8 38.82 216.36 38.53 229.47 38.47 236.03 38.29 249.14 38.18 262.25 37.19 275.37 36.66 288.48 35.32 301.59 34.67 314.7 33.53 340.93 32.09 354.04 31 360.6 30.98 380.27 28.73 386.82 28.14 393.38 27.92 399.94 27.42 406.49 26.6 413.05 25.26 432.72 22.43 439.27 21.01 445.83 19.83 458.94 18.46 478.61 18.19 485.17 18.27 498.28 16.99 511.39 15.38 517.95 14.73 531.06 13.7 544.18 12.12 550.43 10.33 560 6.8 585 4.1 610 2 635 3.2 660 6.9 662.06 8.08 662.19 8.09 668.75 10.13 675.3 12.76 681.86 14.55 688.42 15.17 708.08 14.97 714.64 14.66 727.75 13.78 734.31 13.06 753.98 12.11 760.54 12.02 780.2 12.65 786.76 13.19 799.87 13.54 806.43 14.08 826.1 15.01 839.21 15 852.32 14.56

865.44 14.61 878.55 14.35 898.22 14.37 904.77 14.49 911.33 14.23 924.44 13.04 931 12.33 944.11 12.15 957.22 12.2 963.78 12.1 970.34 12.22 976.89 12.66 983.45 14.68 990.01 16.06 996.56 16.74 1009.68 17.28 1029.34 17.35 1049.01 17.64 1081.8 17.53 1088.35 17.65 1140.8 16.28 1153.91 16.11 1173.58 15.35 1199.81 14.11 1219.48 13.53 1239.15 13.38 1258.82 13.63 1278.48 14.44 1285.04 15.19 1298.15 16.24 1317.82 16.94 1330.94 17.7 1337.49 17.87 1363.72 17.51 1370.27 17.75 1383.39 17.78 1429.28 18.58 1442.39 19.09 1501.4 20.54 1553.85 20.84 1560.41 20.74 1573.52 21.08 1586.63 21.16 1606.3 21.86 1612.86 22.21 1619.41 22.09 1632.53 22.66 1658.75 22.61 1665.31 22.76 1671.87 22.32 1678.42 22.5 1691.53 23.22 1698.09 23.36 1711.2 24.14 1717.76 24.18 1743.98 24.65 1757.1 24.57 1776.77 25 1789.88 25.11 1796.44 25.04 1802.97 24.47 1809.5 24.15 1816.04 24.26 1822.57 24.01 1848.71 24.51 1861.78 26.04 1868.31 25.86 1881.38 24.3 1887.92 23.86 1894.45 23.83 1907.52 24.04 1920.59 24.4 1927.12 24.41 1953.26 23.89 1966.33 24.01 1972.87 23.57 1985.93 23.21 1999 23.27 2031.68 24.19 2038.21 23.85 2064.35 24.25 2090.49 24.13 2097.02 24.48 2103.55 24.64 2116.62 24.33 2129.69 24.96 2136.23 24.78 2142.76 24.45 2155.83 24.17 2168.9 23.42 2175.43 23.39 2214.64 24.41 2221.18 24.48 2234.24 24.08 2240.78 24.15 2253.85 24.97 2260.38 25.22 2273.45 25.12 2286.52 25.72 2293.05 25.8 2299.59 25.7 2306.12 26.16 2312.66 26.94 2319.19 27.96 2325.73 28.48 2338.8 28.92 2345.33 29.02 2358.4 28.78 2423.74 29.26 2436.81 29.09 2476.02 29.71 2482.55 29.72 2495.62 29.46 2515.23 28.59 2534.83 27.41 2567.5 27.19 2600.18 27.82 2619.78 27.82 2626.31 27.95 2645.92 28.08 2672.05 28.42 2685.12 28.8 2711.26 29.23 2717.8 29.46 2724.33 29.83 2730.87 29.94 2737.4 29.35 2743.93 28.97 2763.54 28.83 2770.07 28.89 2783.14 28.81 2815.81 29.58 2828.88 29.59 2848.49 30.03 2861.56 30.84 2868.09 31.1 2907.3 31.09 2913.83 31

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .087 485.17 .04 688.42 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 485.17 688.42 1181.48 1167.23 1157.27 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 59146.26

INPUT
Description: 57 Station Elevation Data num= 352
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 30.38 6.55 30.37 13.09 30.15 19.64 29.5 72 28.42 78.55 28.6 91.64 29.19 117.82 29.27 130.91 29.45 144 29.25 157.09 29.38 163.64 29.32 176.73 29.57 189.82 29.56 196.37 29.45 209.46 28.97 229.1 28.71 248.73 29.28 281.46 29.59 294.55 30 301.1 30.06 327.28 29.11 333.83 28.97 340.37 29.17 346.92 29.23 353.46 28.98 366.55 28.95 379.65 28.58 392.74 28.1 412.37 27.88 432.01 26.97 438.56 26.96 471.28 27.72 490.92 27.8 497.47 27.66 504.01 27.05 510.56 26.58 523.65 26.32 543.29 26.49 556.38 26.26 569.47 25.56 582.56 25.96 595.65 25.8 602.2 25.4 608.74 24.84 615.29 24.5 621.83 24.45 628.38 24.22 634.93 23.35 641.47 21.81 648.02 19.61 661.11 13.71 667.65 11.97 672.5 11.36 676 12.1 687 5.9 705 2.8 730 1.4 755 2.9 773 6.2 780 11.2 788.42 11.88 798.57 11.67 805.11 11.9 818.2 13 824.75 13.19 831.29 13.7 837.84 14.61 844.39 15.06 850.93 14.98 864.02

14.28 870.57 14.31 896.75 12.78 909.84 12.35 922.93 11.62 929.48 11.88
936.02 12.31 942.57 12.48 955.66 12.3 975.3 12.25 988.39 11.9 994.93 11.61
1001.48 11.17 1008.03 11.01 1021.12 11.15 1027.66 11.07 1040.75 11.35
1060.39 11.31 1073.48 11.38 1080.03 11.22 1086.57 11.25 1099.66 11.64
1125.85 11.2 1132.39 11.39 1158.58 10.98 1165.12 11.09 1171.67 11.42 1178.21
12.19 1184.76 14.1 1191.3 15.65 1197.85 16.39 1204.39 16.29 1210.94 15.9
1217.49 15.36 1224.03 15.3 1237.12 15.97 1250.21 16.13 1256.76 16.33 1269.85
16.47 1276.4 16.77 1282.94 16.71 1289.49 15.93 1296.03 15.57 1309.12 15.66
1315.67 15.83 1335.31 15.57 1348.4 14.58 1354.94 14.31 1368.03 14.56 1374.58
14.88 1381.13 14.98 1387.67 14.54 1394.22 13.56 1400.76 13.2 1407.31 13.11
1413.85 12.6 1420.4 12.5 1433.49 12.53 1440.04 12.66 1446.58 12.99 1459.67
12.94 1479.31 13.39 1485.86 13.69 1492.4 14.53 1498.95 14.6 1505.49 14.91
1512.04 14.55 1518.58 13.9 1525.13 13.71 1538.22 13.77 1557.86 13.54 1564.4
13.73 1570.95 13.56 1577.49 13.15 1584.04 13.09 1590.59 13.25 1597.13 13.65
1610.22 15.13 1636.41 16.91 1649.5 18.34 1656.04 18.91 1669.13 20.3 1675.68
20.89 1688.77 21.37 1701.86 21.58 1708.41 21.84 1721.5 21.94 1734.59 22.27
1747.68 22.08 1754.23 21.6 1760.77 20.87 1773.86 20.5 1780.41 21.75 1786.95
22.25 1806.59 22.94 1813.14 22.39 1826.23 21.65 1832.77 21.16 1845.87 20.48
1852.41 20.25 1865.5 20.13 1872.05 20.3 1878.59 20.15 1891.68 20.31 1898.23
20.28 1911.32 21.48 1917.87 22.35 1924.41 22.76 1930.96 22.69 1937.5 22.46
1944.05 22.08 1950.6 21.5 1957.14 20.68 1976.78 20.67 1983.32 20.53 1989.87
20.24 2002.96 19.9 2009.51 20.06 2022.6 20.07 2029.14 20.3 2035.69 20.29
2042.23 20.57 2048.78 20.46 2055.33 20.5 2068.42 21.28 2074.96 21.95 2081.51
22.87 2088.05 23.34 2101.14 23.97 2120.79 23.97 2133.88 23.64 2140.43 23.81
2160.07 24.92 2166.62 25.07 2179.71 25.18 2186.26 25.35 2199.35 25.02
2212.45 24.33 2225.54 24.11 2238.63 23.58 2251.73 23.33 2258.28 23.56
2271.37 24.81 2277.92 25.03 2284.46 24.94 2297.56 25.17 2304.11 24.53
2310.65 24.59 2323.75 25.13 2330.29 25.24 2336.84 25.52 2343.39 25.29
2369.58 25.34 2376.12 25.5 2389.22 25.42 2402.31 24.5 2408.86 24.15 2421.95
24.67 2435.05 24.3 2448.14 24.1 2454.69 23.5 2461.24 23.19 2467.78 23.15
2474.33 22.79 2480.88 23.28 2487.43 23.5 2500.52 23.01 2507.07 23.14 2513.61
23 2526.71 23.11 2533.26 23.35 2539.8 23.4 2552.9 23.06 2559.44 23.04
2572.54 22.77 2585.63 23.06 2592.18 23.46 2624.92 24.09 2644.56 24.03 2651.1
24.21 2657.65 24.59 2664.2 24.78 2670.75 24.63 2683.84 24.93 2690.39 25.25
2696.93 25.36 2703.48 25.62 2710.03 25.58 2723.12 26.12 2729.67 26.51
2742.76 26.71 2755.86 27.48 2762.41 27.56 2782.05 27.56 2788.59 27.78
2827.88 27.21 2834.42 27.28 2847.52 27.66 2867.16 27.67 2873.71 27.55 2886.8
27.55 2899.9 27.79 2906.44 28.05 2912.99 28.07 2919.54 28.25 2926.08 28.07
2945.73 28.42 2952.27 28.63 2958.82 28.67 2965.37 28.46 2991.55 28.6 2998.1
29.06 3011.2 29.01 3024.29 29.13 3043.93 29.74 3050.48 30.13 3063.57 30.53
3070.12 30.41 3076.67 30.03 3083.21 29.85 3102.86 29.63 3122.5 29.82 3129.04
29.76 3135.59 29.52 3142.14 29.46 3155.23 29.77 3161.78 29.49 3174.87 29.97
3181.42 29.9 3201.06 30.38 3207.61 30.31 3214.16 30.38 3227.25 30.75 3240.35
30.84 3246.89 31.14 3259.99 31.34 3266.53 31.54 3273.08 31.58 3299.27 31.5
3305.82 31.74 3312.36 31.72 3325.46 32.02 3332.01 31.56 3345.1 31.63 3351.65
31.8 3358.19 31.55 3390.93 31.72 3397.48 32.33 3404.02 32.61 3410.57 32.64
3423.67 32.14 3430.21 32.22 3436.76 32.55 3449.85 32.55 3476.04 33.17
3508.78 33.53 3521.87 33.82 3534.97 33.93 3561.16 33.75 3580.8 33.99 3587.34
34.27 3593.89 34.27 3600.44 33.91 3606.99 34.04 3613.53 34.44 3620.08 34.59
3633.17 34.49 3646.27 34.67 3652.82 34.98 3659.36 35.1 3672.46 35.6 3685.55
35.9 3698.65 35.9 3711.74 35.52 3731.38 35.46 3737.93 35.71 3764.12 35.8
3777.21 35.69 3783.76 35.53 3790.31 35.19 3796.85 34.99 3809.95 35.17

Manning's n Values num= 3 Sta n Val Sta n Val Sta n Val

0 .09 628.38 .04 844.39 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 628.38 844.39 1379 1332.76 1299.32 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 57813.5

INPUT
Description: 56
Station Elevation Data num= 496
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 43.13 6.54 43.26 32.72 39.61 78.54 36.66 91.62 35.41 183.25 34.94 222.52 35.22 229.06 34.56 242.15 35.1 268.33 34.86 281.42 34.12 294.51 34.02 320.69 34.71 333.77 34.16 346.86 34.39 353.41 34.03 373.04 34.42 386.13 35.15 471.21 36.13 503.93 35.41 517.02 35.64 536.66 35.25 647.91 35.54 706.82 36.44 726.45 37.27 765.72 36.22 778.81 35.19 804.98 35.11 831.19 34.52 837.75 33.91 890.24 32.38 903.36 32.57 923.04 31.64 995.2 31.1 1093.6 28.7 1211.68 29.31 1251.05 27.9 1277.29 27.79 1329.77 28.38 1369.13 29.42 1401.93 30.88 1474.09 30.68 1500.33 30.07 1520.01 29.06 1592.17 27.17 1618.42 27.51 1690.58 29.28 1697.14 30.01 1729.94 29.18 1769.3 27.32 1808.66 27.05 1828.34 25.78 1854.58 23.59 1874.26 22.67 1900.5 20.87 1907.06 20.76 1913.62 19.75 1920.18 18.28 1926.74 16.16 1933.3 13.62 1939.86 11.97 1946.42 11.1 1952.98 11.28 1972.67 10.35 1998.91 9.78 2012.03 10.08 2025.15 9.77 2038.27 10.05 2057.95 9.81 2071.07 10.47 2090.75 10.26 2110.43 9.1 2123.55 9.51 2136.67 8.92 2143.23 8.98 2156.35 10.17 2176.03 10.44 2189.15 9.71 2208.83 10.76 2215.4 10.74 2241.64 11.97 2254.76 13.65 2258.7 13.87 2266 13 2271 6.1 2305 .2 2306 -2.5 2355 -.5 2369 5.8 2387 16.1 2430 16.2 2461 16.2 2489 10.4 2510.61 10.24 2517.17 10.49 2523.73 11.01 2530.29 11.1 2536.85 11.21 2543.41 11.43 2549.97 11.51 2556.53 11.77 2563.09 12.47 2569.65 13 2576.21 13.03 2582.77 12.92 2595.89 12.24 2609.01 11.27 2615.57 10.96 2622.13 10.93 2628.69 11.21 2635.25 11.43 2641.81 11.71 2648.38 11.97 2654.94 12.15 2661.5 12.18 2668.06 12.18 2674.62 12.06 2687.74 11.69 2694.3 11.55 2700.86 11.44 2707.42 11.41 2713.98 10.92 2720.54 10.81 2733.66 10.78 2740.22 10.85 2746.78 10.85 2753.34 10.78 2759.9 10.74 2766.45 10.87 2773.01 11.04 2779.57 10.89 2786.12 10.99 2792.68 11.04 2799.23 10.98 2805.79 10.99 2812.35 10.87 2818.9 11.04 2825.46 11.11 2832.02 11.03 2838.57 11.08 2845.13 11.3 2851.68 11.4 2858.24 11.61 2864.8 11.66 2871.35 11.58 2877.91 11.54 2884.47 11.53 2891.02 11.68 2904.14 12.87 2910.69 13.14 2917.25 13.61 2923.8 13.82 2930.36 13.73 2936.92 13.59 2943.47 13.28 2950.03 13.46 2956.59 13.68 2963.14 13.67 2969.7 13.82 2976.26 14.17 2982.81 14.17 2989.37 14.34 2995.92 14.79 3002.48 15.54 3009.04 16.31 3015.59 16.96 3022.15 17.69 3028.71 18.25 3035.26 18.43 3041.82 18.4 3048.37 18.61 3054.93 18.5 3061.49 18.34 3068.04 18.34 3074.6 18.19 3081.16 18.31 3087.71 18.3 3094.27 18.07 3100.83 18.16 3107.38 17.95 3113.94 17.54 3120.49 17.66 3127.05 17.82 3133.61 17.61 3146.72 17.43 3153.28 17.37 3159.83 17.58 3166.39 17.91 3172.94 17.64 3179.5 17.39 3186.06 17.29 3192.61 17.64 3199.17 17.53 3205.73 17.31 3212.28 16.87 3218.84 16.54 3225.4 16.6 3231.95 16.47 3238.51 16.21 3245.06 16.18 3251.62 16.42 3258.18 16.45 3264.73 16.42 3271.29 16.23 3277.85 16.07 3284.4 15.73 3290.96 15.53 3297.52 15.4 3304.07 15.39 3310.63 15.35 3317.18 15.24 3323.74 15.74 3330.3 15.72 3336.85 15.88 3343.41 16.07 3349.97 16.01 3363.08 16.02 3369.63 16.21

3376.19 16.27 3382.75 16.45 3389.3 16.75 3395.86 17.28 3402.42 17.79 3408.97
17.94 3415.53 18.07 3422.09 18.65 3428.64 19.25 3435.2 19.37 3441.75 19.32
3448.31 19.41 3454.87 19.68 3461.42 20.1 3467.98 20.35 3474.54 20.77 3481.09
21.12 3487.65 21.38 3494.2 21.41 3500.76 21.61 3507.32 21.99 3513.87 22.3
3520.43 22.56 3526.99 22.47 3533.54 22.6 3540.1 22.59 3553.21 23.68 3559.77
24.02 3572.88 24.29 3579.44 24.51 3585.99 24.54 3592.55 24.81 3599.11 24.9
3605.66 25.01 3612.22 25.09 3618.78 24.97 3625.31 25.02 3631.85 25.2 3638.39
25.42 3644.93 25.49 3651.47 25.41 3658 25.25 3664.54 24.98 3671.08 24.84
3677.62 24.66 3684.16 24.45 3690.7 24.35 3697.23 24.49 3703.77 24.33 3716.85
24.12 3723.39 24.06 3729.93 24.33 3736.46 24.22 3743 24.27 3749.54 24.07
3756.08 23.93 3762.62 23.92 3769.16 23.8 3782.23 23.62 3788.77 23.44 3795.31
23.47 3801.85 23.67 3808.39 23.78 3814.92 23.74 3821.46 23.76 3828 23.76
3834.54 24.16 3841.08 24.21 3847.62 24.05 3854.15 24.08 3860.69 24.43
3867.23 24.8 3873.77 25.13 3880.31 25.21 3886.85 25.43 3893.38 25.58 3899.92
25.77 3906.46 25.87 3913 26.1 3919.54 26.46 3926.08 26.69 3932.61 26.67
3939.15 26.7 3945.69 26.68 3952.23 26.57 3958.77 26.68 3965.31 26.65 3971.84
26.73 3978.38 26.87 3984.92 26.99 3991.46 26.88 3998 26.75 4011.07 26.62
4017.61 26.77 4024.15 26.9 4030.69 26.75 4037.23 26.64 4043.77 26.74 4050.3
26.94 4056.84 26.96 4063.38 26.7 4069.92 26.52 4076.46 26.62 4083 26.81
4089.53 26.72 4096.07 26.47 4102.61 26.12 4109.15 26.27 4115.69 26.22
4122.22 26.23 4128.76 26.17 4135.3 26.03 4141.84 25.64 4148.38 25.2 4154.92
24.53 4161.45 24.3 4167.99 24.22 4174.53 24.05 4181.07 23.8 4187.61 23.77
4194.14 23.96 4200.68 24.38 4207.22 24.56 4213.76 24.63 4220.3 24.68 4226.84
24.56 4233.37 24.57 4239.91 24.63 4252.99 24.56 4259.53 24.16 4266.06 23.98
4272.6 24.14 4279.14 24.27 4285.68 24.17 4298.76 23.94 4305.29 23.91 4311.83
23.9 4318.37 23.96 4324.91 24.1 4331.45 24.1 4337.98 24.13 4344.52 24.07
4351.06 23.99 4357.6 24.16 4364.14 24.18 4370.68 24.26 4377.21 24.38 4383.75
24.21 4390.29 24.07 4396.83 24.12 4403.37 23.94 4409.91 24.17 4416.44 23.98
4436.06 24.11 4442.6 24.02 4455.67 24.09 4468.75 23.96 4475.29 23.97 4481.83
24.05 4494.9 24.13 4501.44 23.93 4507.98 23.95 4514.52 23.95 4521.05 24.16
4527.59 24.07 4540.67 24.09 4547.21 24.07 4560.28 24.22 4566.82 24.27 4579.9
24.15 4586.44 24.14 4592.98 24.33 4599.51 24.2 4606.05 23.99 4612.59 24.03
4619.13 24.09 4625.67 24 4632.2 23.89 4645.28 23.98 4651.82 23.93 4658.36
23.92 4664.9 23.81 4677.97 23.92 4684.51 24.08 4691.05 24.04 4697.59 24.16
4704.12 24.04 4710.66 24.07 4717.2 24.03 4736.82 23.8 4743.35 23.89 4749.89
24.04 4756.43 24.23 4762.97 24.46 4769.51 24.33 4776.04 24.17 4782.58 24.22
4789.12 23.99 4795.66 24.21 4802.2 24.27 4808.74 24.16 4815.27 24.42 4821.81
24.39 4828.35 24.08 4834.89 24.05 4841.43 24.06 4847.96 24.09 4854.5 24.22
4861.04 24.44 4867.58 24.57 4874.12 24.55 4880.66 24.37 4887.19 24.17
4893.73 24.05 4900.27 24.1 4906.81 24.1 4913.35 24.05 4919.89 24.22 4926.42
24.3 4932.96 24.57 4939.5 24.65 4946.04 24.55 4952.58 24.38 4959.11 24.57
4965.65 24.58 4972.19 24.42 4978.73 24.46 4985.27 24.45 4991.81 24.68
5004.88 24.91 5011.42 25.17 5017.96 25.32 5024.5 25.26 5031.03 25.35 5037.57
25.7 5044.11 26.08 5050.65 26.37 5057.19 26.58 5063.73 26.73 5070.26 26.71
5076.8 27.16 5083.34 27.57 5089.88 27.94 5096.42 28.24 5102.96 28.43 5109.49
28.54 5116.03 28.77 5122.57 29.14 5129.11 29.53 5135.65 29.81 5142.18 30.23
5148.72 30.91 5155.26 31.71 5161.8 32.7 5168.34 34.3 5174.88 36.06 5181.41
38.6 5187.95 42.26 5194.49 43.85 5201.03 44.95 5207.57 45.67 5214.1 45.96
5220.64 46.13 5227.18 46.19 5233.72 46.19 5240.26 46.21 5246.8 46.17 5253.33
46.18 5259.87 46.29 5272.95 46.28 5279.49 46.31 5286.02 46.41 5292.56 46.61
5299.1 46.97 5312.18 48.12 5318.72 48.63 5325.25 48.93 5331.79 49.21

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

0 .09 2258.7 .04 2387 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2258.7 2387 1426.36 1487.57 1534.98 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 56325.92

INPUT
Description: 55 Approach Harding St Rte 44
Station Elevation Data num= 497
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 29.47 209.09 27.29 287.5 24.67 300.57 23.27 326.7 25.58 457.39 27.66 692.61 26.64 731.82 28.15 823.29 25.55 901.7 25.5 1012.78 19.85 1032.39 17.2 1078.12 14.36 1156.53 13.26 1176.14 11.94 1247.88 14.89 1261.21 11.57 1267.1 10.04 1273.17 8.85 1278.45 4.78 1287.16 3.55 1302.31 2.55 1313.27 2.08 1325.95 1.84 1337.09 2.07 1348.96 2.56 1356.07 2.82 1369.08 2.98 1382.73 3.18 1388.22 3.31 1391.74 4.5 1393.71 5.56 1400.02 9.46 1408.14 11.16 1414.64 12.72 1421.15 13.73 1427.65 14.06 1434.16 14 1440.66 13.27 1447.17 12.96 1453.67 12.71 1460.18 12.61 1466.68 12.54 1473.19 12.51 1479.69 12.98 1486.2 14.39 1492.7 15.58 1499.21 16.38 1505.71 17.08 1518.72 17.57 1525.23 17.78 1531.73 17.85 1544.74 18.23 1551.25 18.09 1557.75 18.14 1570.76 18.58 1577.27 18.68 1583.77 18.9 1590.28 19.07 1596.78 19.09 1603.29 19.28 1609.79 19.53 1616.3 19.98 1622.8 20.2 1629.31 20.76 1635.81 20.96 1642.32 21.14 1648.82 20.99 1655.33 20.81 1661.83 20.56 1668.34 20.07 1674.84 19.48 1681.35 18.44 1687.85 18.14 1694.36 17.93 1700.86 17.06 1707.37 15.53 1713.87 14.08 1720.38 12.95 1726.88 12.26 1733.39 11.73 1739.89 11.28 1746.4 11.25 1752.9 11.26 1759.41 11.29 1772.42 11.28 1791.93 11.31 1804.94 11.34 1817.95 11.32 1830.96 11.23 1837.47 11.14 1843.97 11.07 1850.48 11.18 1856.98 12.07 1863.49 14.13 1869.99 17.2 1876.5 18.66 1883 19.6 1889.51 20.65 1896.01 22.74 1902.52 24.35 1909.02 25.34 1915.53 26.07 1922.03 26.34 1928.54 26.57 1941.55 26.69 1954.56 26.88 1961.06 26.93 1967.57 26.94 1974.07 27.02 1980.58 27.19 1987.08 27.5 1993.59 27.83 2000.09 27.82 2006.6 27.57 2013.1 27.54 2019.61 27.56 2026.11 27.65 2032.62 27.7 2039.12 27.53 2045.63 26.45 2052.13 26.12 2058.64 25.89 2065.14 25.89 2071.69 25.84 2078.24 25.65 2091.33 25.75 2097.88 25.82 2104.43 25.54 2110.98 25.41 2117.52 25.38 2124.07 25.86 2130.62 26 2137.16 26.08 2143.71 25.86 2150.26 25.44 2156.81 24.77 2163.35 24.33 2169.9 24.36 2176.45 24.29 2183 24.1 2189.54 24.06 2196.09 23.74 2202.64 23.4 2209.19 23.22 2215.73 23.27 2222.28 23.03 2228.83 23.23 2235.38 23.32 2241.92 23.77 2248.47 24.41 2255.02 25.2 2261.57 25.36 2268.11 25.73 2274.66 25.47 2281.21 24.08 2287.75 24.12 2294.3 25.47 2300.85 25.75 2307.4 25.59 2313.94 25.24 2320.49 24.85 2327.04 24.91 2333.59 25.31 2340.13 25.37 2346.68 25.48 2353.23 25.24 2359.78 25.18 2366.32 24.77 2372.87 24.46 2379.42 24.47 2385.96 24.7 2392.51 24.77 2399.06 24.67 2405.61 25.02 2412.15 24.66 2418.7 24.32 2425.25 24.3 2431.8 24.97 2438.34 25.04 2444.89 25.17 2451.44 25.18 2457.99 25.27 2471.08 25.15 2477.63 25.28 2484.18 25.04 2490.72 25.06 2497.27 24.89 2503.82 24.64 2510.37 24.61 2516.91 24.74 2523.46 24.85 2530.01 24.78 2536.55 25 2543.1 25.02 2549.65 25.07 2556.2 25 2562.74 25.25 2569.29 25.35 2582.39 25.3 2588.93 25.47 2595.48 25.7 2602.03 25.7 2608.58 25.47 2615.12 25.49 2621.67 25.73 2628.22 25.87 2634.77 25.53 2641.31 25.63 2654.41 25.56 2660.96 25.8 2667.5 26.25 2674.05 26.65 2680.6

26.87 2687.14 26.93 2693.69 26.61 2700.24 26.78 2706.79 27.08 2713.33 27.29
2719.88 27.2 2726.43 27.04 2732.98 27.14 2739.52 27.3 2746.07 26.87 2752.62
26.91 2759.17 27.21 2765.71 27.42 2772.26 27.55 2778.81 27.66 2785.36 27.71
2791.9 27.78 2798.45 28.22 2805 29.25 2811.54 30.18 2818.09 30.41 2824.64
30.27 2837.73 29.1 2844.28 28.95 2850.83 29 2863.92 29 2870.47 29.21 2877.02
29.67 2883.57 29.93 2890.11 30.22 2896.66 30.42 2903.21 30.5 2909.76 30.99
2916.3 31.34 2922.85 31.54 2929.4 31.8 2935.95 32.13 2942.49 32.31 2949.04
32.18 2955.59 31.94 2962.13 31.93 2968.68 31.7 2975.23 31.64 2981.78 31.55
2988.32 31.69 2994.87 31.91 3001.42 32.22 3007.97 32.65 3014.51 33.28
3021.06 34.11 3027.61 35.02 3034.16 35.8 3040.7 36.5 3047.25 37.52 3053.8
38.76 3060.35 40.03 3066.89 41.85 3073.44 44.1 3079.99 45.64 3086.53 46.28
3093.08 46.65 3099.63 46.87 3106.18 46.92 3112.72 46.95 3132.37 47.12
3138.91 47.19 3145.46 47.4 3152.01 47.71 3158.56 47.86 3165.1 48.05 3171.65
48.28 3178.2 48.4 3184.75 48.58 3191.29 48.84 3197.84 49.04 3204.39 49.13
3210.93 49.13 3217.48 49.05 3224.03 48.89 3230.58 48.66 3237.12 48.53
3250.22 48.31 3256.77 48.31 3263.31 48.34 3269.86 48.41 3276.41 48.44
3282.96 48.43 3289.5 48.52 3302.6 48.92 3309.15 49.11 3315.69 49.2 3322.24
49.21 3328.79 49.2 3335.34 49.04 3341.88 49.01 3348.43 49 3354.98 48.89
3361.53 49.02 3368.07 49.45 3374.62 50.06 3381.17 51.1 3387.71 52.32 3394.26
53.39 3400.81 54.19 3407.36 54.6 3413.9 54.76 3420.45 54.97 3427 55.44
3433.55 55.87 3440.09 55.87 3446.64 55.76 3453.19 55.74 3459.74 55.57
3466.28 55.5 3472.83 55.54 3492.47 55.8 3499.02 55.86 3505.57 55.63 3512.12
55.14 3518.66 54.82 3525.21 54.83 3531.76 54.98 3538.3 54.98 3544.85 55.03
3551.4 55.01 3557.95 54.95 3564.49 54.84 3571.04 54.69 3577.59 54.63 3584.14
54.67 3590.68 54.82 3597.23 54.99 3603.78 55.04 3616.87 54.91 3623.42 54.81
3636.51 54.74 3643.06 54.88 3649.61 55.04 3662.7 55.03 3669.25 55.01 3675.8
55.02 3688.89 54.95 3695.44 55.56 3701.99 56.04 3708.54 56.38 3715.08 56.33
3734.73 55.9 3741.27 55.72 3747.82 55.73 3754.37 55.82 3760.91 55.97 3774.01
55.75 3780.56 55.85 3787.1 56.04 3793.65 56.4 3800.2 56.71 3806.75 56.9
3813.29 56.97 3819.84 57.08 3826.39 57.07 3832.94 56.99 3839.48 57.36
3846.03 59.14 3852.58 61.74 3859.13 64.12 3865.67 65.7 3872.22 66.26 3878.77
66.58 3885.32 66.55 3891.86 66.09 3898.41 65.77 3904.96 65.88 3911.5 65.67
3918.05 65.34 3924.6 65.06 3931.15 64.95 3937.69 64.75 3944.24 64.4 3950.79
63.86 3957.34 63.47 3963.88 63.02 3976.98 62.45 3983.53 62.09 3990.07 61.61
3996.62 61.28 4003.17 60.72 4009.72 59.57 4016.26 56.84 4022.81 54.97
4029.36 51.65 4035.91 48.71 4042.45 47.23 4049 46.15 4055.55 45.13 4062.09
44.7 4068.64 44.22 4075.19 43.57 4081.74 42.73 4088.28 42.11 4094.83 42.04
4101.38 42.04 4107.93 42.14 4114.47 42.42 4121.02 42.27 4127.57 42.25
4134.12 42.31 4140.66 42.39 4147.21 42.41 4153.76 42.37 4160.31 42.3 4173.4
42.06 4186.49 42.76 4193.04 43.44 4199.59 43.81 4206.14 43.76 4212.68 43.92
4219.23 44.2 4225.78 44.46 4232.33 44.8 4238.87 45.11 4245.42 45.14 4251.97
45.29 4258.52 45.06 4265.06 45.05 4271.61 45.37 4278.16 45.42 4284.71 45.28
4291.25 45.88 4297.8 46.36 4304.35 46.82 4310.89 47.61 4317.44 47.9 4323.99
47.84 4330.54 47.9 4337.08 47.94 4343.63 48.06 4350.18 47.99 4356.73 47.95
4363.27 48.1 4369.82 48.31 4376.37 48.24 4382.92 48.26 4389.46 48.41 4396.01
48.52 4402.56 49.28 4409.1 49.54 4415.65 49.52 4422.2 48.91 4428.75 47.19
4435.29 45.92 4441.84 45.33 4448.39 45.83 4454.94 48.33 4461.48 50.99
4468.03 52.45 4474.58 53.17 4481.13 53.24 4487.67 53.16 4494.22 53.26
4500.77 53.3 4513.86 53.61 4520.41 53.8 4526.96 54.09 4533.5 54.17 4546.6
54.28 4553.15 54.5 4559.69 54.93 4572.79 55.1 4579.34 55.3 4585.88 55.01
4592.43 55.05 4598.98 55.12 4605.53 55.31 4612.07 55.55 4618.62 55.64
4625.17 55.83 4631.72 56.06 4638.26 56.41 4644.81 56.84 4651.36 56.91 4657.9
56.8 4664.45 56.64 4671 56.71

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 1247.88 .04 1421.15 .093

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1247.88 1421.15 58 48.47 42.98 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 1640 4671 21.1 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 56277.45

INPUT
Description: 54.7 US Face Harding St- Rte 44
Station Elevation Data num= 447
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 29.34 6.155 29.21 12.301 29.15 18.456 29.29 24.601 29.15 30.756 28.88 36.902 28.91 43.057 29.15 49.202 29.3 55.357 29.26 61.512 28.99 67.658 28.82 73.813 28.89 79.958 29.09 86.113 29.17 92.259 29.03 98.414 28.29 104.569 27.7 110.715 27.65 116.87 28.09 123.015 27.69 129.17 27.41 135.316 27.23 141.471 27.18 153.771 26.83 159.926 26.73 166.072 26.61 172.227 26.08 178.372 26.49 184.527 26.96 190.673 27.18 196.828 27.03 202.974 27.1 209.129 27.01 215.284 27.12 221.429 27.41 227.584 27.81 233.73 28 239.885 27.99 252.185 28.09 258.34 28.13 264.486 28.3 270.641 28.21 276.786 28.02 282.941 28.08 295.242 28.47 301.388 28.56 307.543 28.27 313.698 28.39 319.843 28.47 325.998 28.27 332.144 27.89 338.299 27.97 344.444 28.39 356.754 28.78 362.9 28.91 375.2 28.64 381.355 28.71 387.501 28.92 393.656 29.18 399.802 29.37 405.957 29.47 412.112 29.46 418.257 29.42 424.412 29.35 430.558 29.23 436.713 29.23 442.858 29.32 449.013 29.34 461.314 29.26 467.469 29.34 473.614 29.32 479.769 29.46 485.915 29.54 492.07 29.5 498.216 29.34 504.371 29.24 510.526 29.24 516.671 29.36 522.826 29.3 528.972 29.02 535.127 29.1 541.272 29.11 547.427 28.87 553.573 28.59 559.728 28.5 565.883 28.44 572.029 28.27 578.183 28.18 584.329 27.9 590.484 27.87 596.63 27.77 602.785 27.82 608.93 28.08 615.085 28.27 621.24 28.29 627.386 28.55 633.541 28.06 639.686 27.76 645.841 27.54 651.987 27.59 658.142 27.77 670.442 27.18 676.597 27.03 682.743 27.01 688.898 26.91 695.044 26.9 707.344 26.71 713.499 26.54 719.654 26.3 725.8 26.4 731.955 26.35 738.1 26.02 744.255 25.94 750.401 25.82 756.556 25.63 762.711 25.48 768.857 25.23 781.157 25.2 787.312 25.34 793.458 25.46 799.613 25.45 805.758 25.13 811.913 25.11 818.068 25.33 824.214 25.5 830.369 25.61 836.514 25.56 848.815 25.73 854.97 25.9 861.125 25.86 867.271 25.48 873.425 25.12 879.571 24.98 885.726 24.96 891.872 25.05 898.027 25.18 904.172 24.8 910.327 24.63 916.482 24.9 922.628 25.03 928.783 24.87 934.928 24.74 941.083 24.9 947.229 24.81 953.384 24.05 959.539 22.8 965.685 20.75 971.839 19.02 977.985 17.78 984.14 17.32 996.441 18.431002.586 18.771008.741 18.851014.896 18.61 1021.042 18.591027.197 18.961033.342 18.771045.643 18.041051.798 17.88 1057.943 18.161064.099 18.411070.253 18.421076.399 18.411082.554 18.76 1088.7 19.171094.855 19.18 1101 19.351107.155 19.441113.301 19.46 1119.456 19.531125.611 19.371131.756 17.971137.911 16.971156.546 5.68 1157.495 5.731165.191 4.31173.404 4.08 1181.41 2.951185.093 2.27 1202.074 .521207.928 2.091215.342 2.781223.085 2.231227.624 .64 1242.076 1.141246.061 2.311251.548 3.171258.305 3.81266.424 4.68 1269.816 5.631269.938 5.481270.399 22.91

1272.25 22.31322.429 20.63 1334.739 20.761340.885 20.8 1347.04 20.731353.186
20.8 1359.34 20.82 1365.486 20.81371.641 20.631377.787 19.351383.942
18.111390.097 18.11 1396.242 18.321402.397 18.331408.543 18.31414.698
18.431420.844 18.63 1426.998 18.61433.144 18.511439.299 18.541445.454 18.72
1451.6 18.82 1457.755 19.08 1463.9 19.361470.055 19.391476.201 19.251482.356
19.5 1488.511 20.051494.656 20.291500.811 20.061506.957 19.761513.112 19.71
1519.257 18.891525.412 18.731537.713 19.041543.868 19.041550.014 18.3
1556.169 18.341562.314 19.011568.469 18.421574.615 17.78 1580.77 18.08
1586.915 18.44 1593.07 17.511599.225 17.561611.526 17.21617.671 17.53
1636.127 17.341642.282 17.371648.428 17.291654.583 17.571660.728 17.63
1666.883 17.911673.029 18.071679.184 18.051685.329 18.241691.484 18.38
1697.639 18.71703.785 18.94 1709.94 18.831716.085 18.61 1722.24 18.66
1728.386 18.981734.541 19.521740.687 20.331746.842 21.211752.997 22 1759.142
22.561765.297 22.981771.443 23.341777.598 23.621796.053 24.23 1802.199
24.41808.354 24.661814.499 24.721820.654 24.38 1826.8 24.1 1832.955
24.071839.101 24.021845.256 24.511851.411 25.441857.556 25.79 1863.711
25.891869.857 26.221876.012 26.531882.157 26.441888.312 25.97 1894.467
25.781900.613 25.911906.768 26.061912.914 26.131919.068 26.18 1931.331
25.891937.468 25.551943.594 25.151949.731 24.951955.867 24.91 1961.994 24.8
1968.13 24.921974.266 25.261980.393 25.441992.665 25.73 2004.928
25.792011.064 25.872017.191 25.932023.327 25.812029.464 25.84 2035.59
25.832041.727 25.842047.863 25.77 2053.99 25.772060.126 26.05 2066.262
25.922072.389 25.712078.525 25.372084.661 25.472090.788 25.53 2096.924 25.71
2103.06 26.242109.187 26.172115.323 26.32121.459 26.22 2127.586 26.092133.722
25.872139.859 25.962145.985 25.882152.122 25.85 2158.258 25.962164.385
262170.521 25.912176.657 25.642182.784 25.48 2188.92 25.662195.056
25.272201.183 24.752207.319 24.862213.455 25.51 2219.582 25.532225.719
26.092231.855 25.962244.117 26.172250.254 26.32 2256.38 26.182262.517
26.282268.653 26.24 2274.78 26.42280.916 26.59 2287.052 26.682299.315
26.952305.451 27.12311.578 27.32317.714 26.92 2323.85 26.892329.977
26.62336.114 26.8 2342.25 26.872348.376 26.76 2354.513 27.082360.649
26.462366.776 26.442372.912 26.672379.048 26.84 2385.175 26.622391.311
27.62397.447 27.772403.574 27.3 2409.71 27.42 2415.846 26.952421.973
26.992428.109 27.82434.246 27.732440.372 27.4 2446.509 27.522452.645
27.872458.771 28.352464.908 28.52471.044 28.36 2477.171 28.992483.307
30.382489.443 31.52 2495.57 32.252501.706 31.82 2507.842 30.772513.969
29.962520.105 29.682526.241 29.652532.368 29.73 2538.504 29.482544.641
29.512550.767 29.512556.904 29.99 2563.04 30.29 2569.167 30.122575.303
29.812581.439 30.042587.566 30.032593.702 30.11 2599.838 30.082605.965
30.392612.101 30.62624.364 30.85 2630.5 31.29 2636.637 31.492642.763
31.582648.899 31.382655.036 29.722661.162 28.95 2667.299 29.052673.435
29.422679.562 29.642685.698 29.672691.834 29.86 2697.961 30.332704.097
30.712710.233 30.82 2716.36 31.132722.496 31.35 2728.632 31.422734.759
31.712740.896 32.252747.032 32.762759.294 33.49 2765.431 33.952771.558
34.352777.694 34.64 2783.83 34.362789.957 34.23 2802.229 34.822808.356
34.742814.492 33.722820.628 32.822826.755 34.33 2832.891 382839.028
41.772845.154 44.062851.291 44.892857.427 45.19 2863.553 45.77 2869.69
46.162881.953 46.272888.089 46.32894.225 46.36 2900.352 46.372906.488
46.42912.624 46.462918.751 46.562924.887 46.77 2931.023 47.03 2937.15
47.232949.423 47.562955.549 47.682967.822 48.04 2980.085 48.152986.221 48.11

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .091125.611 .041270.399 .093

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1125.6111270.399 84.16 80.55 81.19 .5 .8 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 01118.234 23 T
Skew Angle = 20

BRIDGE

RIVER: Taunton River
REACH: Main Stem RS: 56238.98

INPUT
Description: 54.5 Harding St/Rte 44/ Cape Hwy
Distance from Upstream XS = 20
Deck/Roadway Width = 50
Weir Coefficient = 2.6
Bridge Deck/Roadway Skew = 20
Upstream Deck/Roadway Coordinates
 num= 26
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 642.75 27.74 970.702 25.17 1123.872 23.8 1152.063 23.96 1152.063 27.7
1155.822 27.7 1155.916 25.67 18.141164.279 25.6 18.821177.435 25.53 18.87
1186.832 25.46 18.09 1193.41 25.39 18.051207.505 25.32 18.54
 1221.6 25.25 18.281231.937 25.18 17.71235.696 25.11 17.55 1246.032 25.04
18.251257.309 24.97 18.241269.525 24.9 17.5 1269.619 26.67 1273.283 26.71
1273.377 23.12
 1314.63 22.6 1441.489 21.77 1594.658 21.73 1731.854 22.85 1800 22.85

Upstream Bridge Cross Section Data
Station Elevation Data num= 447
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 29.34 6.155 29.21 12.301
29.15 18.456 29.29 24.601 29.15 30.756 28.88 36.902 28.91 43.057 29.15
49.202 29.3 55.357 29.26 61.512 28.99 67.658 28.82 73.813 28.89 79.958 29.09
86.113 29.17 92.259 29.03 98.414 28.29 104.569 27.7 110.715 27.65 116.87
28.09 123.015 27.69 129.17 27.41 135.316 27.23 141.471 27.18 153.771 26.83
159.926 26.73 166.072 26.61 172.227 26.08 178.372 26.49 184.527 26.96
190.673 27.18 196.828 27.03 202.974 27.1 209.129 27.01 215.284 27.12 221.429
27.41 227.584 27.81 233.73 28 239.885 27.99 252.185 28.09 258.34 28.13
264.486 28.3 270.641 28.21 276.786 28.02 282.941 28.08 295.242 28.47 301.388
28.56 307.543 28.27 313.698 28.39 319.843 28.47 325.998 28.27 332.144 27.89
338.299 27.97 344.444 28.39 356.754 28.78 362.9 28.91 375.2 28.64 381.355
28.71 387.501 28.92 393.656 29.18 399.802 29.37 405.957 29.47 412.112 29.46
418.257 29.42 424.412 29.35 430.558 29.23 436.713 29.23 442.858 29.32
449.013 29.34 461.314 29.26 467.469 29.34 473.614 29.32 479.769 29.46
485.915 29.54 492.07 29.5 498.216 29.34 504.371 29.24 510.526 29.24 516.671
29.36 522.826 29.3 528.972 29.02 535.127 29.1 541.272 29.11 547.427 28.87
553.573 28.59 559.728 28.5 565.883 28.44 572.029 28.27 578.183 28.18 584.329
27.9 590.484 27.87 596.63 27.77 602.785 27.82 608.93 28.08 615.085 28.27
621.24 28.29 627.386 28.55 633.541 28.06 639.686 27.76 645.841 27.54 651.987
27.59 658.142 27.77 670.442 27.18 676.597 27.03 682.743 27.01 688.898 26.91
695.044 26.9 707.344 26.71 713.499 26.54 719.654 26.3 725.8 26.4 731.955
26.35 738.1 26.02 744.255 25.94 750.401 25.82 756.556 25.63 762.711 25.48
768.857 25.23 781.157 25.2 787.312 25.34 793.458 25.46 799.613 25.45 805.758

25.13 811.913 25.11 818.068 25.33 824.214 25.5 830.369 25.61 836.514 25.56
848.815 25.73 854.97 25.9 861.125 25.86 867.271 25.48 873.425 25.12 879.571
24.98 885.726 24.96 891.872 25.05 898.027 25.18 904.172 24.8 910.327 24.63
916.482 24.9 922.628 25.03 928.783 24.87 934.928 24.74 941.083 24.9 947.229
24.81 953.384 24.05 959.539 22.8 965.685 20.75 971.839 19.02 977.985 17.78
984.14 17.32 996.441 18.431002.586 18.771008.741 18.851014.896 18.61 1021.042
18.591027.197 18.961033.342 18.771045.643 18.041051.798 17.88 1057.943
18.161064.099 18.411070.253 18.421076.399 18.411082.554 18.76 1088.7
19.171094.855 19.18 1101 19.351107.155 19.441113.301 19.46 1119.456
19.531125.611 19.371131.756 17.971137.911 16.971156.546 5.68 1157.495
5.731165.191 4.31173.404 4.08 1181.41 2.951185.093 2.27 1202.074 .521207.928
2.091215.342 2.781223.085 2.231227.624 .64 1242.076 1.141246.061 2.311251.548
3.171258.305 3.81266.424 4.68 1269.816 5.631269.938 5.481270.399 22.91
1272.25 22.31322.429 20.63 1334.739 20.761340.885 20.8 1347.04 20.731353.186
20.8 1359.34 20.82 1365.486 20.81371.641 20.631377.787 19.351383.942
18.111390.097 18.11 1396.242 18.321402.397 18.331408.543 18.31414.698
18.431420.844 18.63 1426.998 18.61433.144 18.511439.299 18.541445.454 18.72
1451.6 18.82 1457.755 19.08 1463.9 19.361470.055 19.391476.201 19.251482.356
19.5 1488.511 20.051494.656 20.291500.811 20.061506.957 19.761513.112 19.71
1519.257 18.891525.412 18.731537.713 19.041543.868 19.041550.014 18.3
1556.169 18.341562.314 19.011568.469 18.421574.615 17.78 1580.77 18.08
1586.915 18.44 1593.07 17.511599.225 17.561611.526 17.21617.671 17.53
1636.127 17.341642.282 17.371648.428 17.291654.583 17.571660.728 17.63
1666.883 17.911673.029 18.071679.184 18.051685.329 18.241691.484 18.38
1697.639 18.71703.785 18.94 1709.94 18.831716.085 18.61 1722.24 18.66
1728.386 18.981734.541 19.521740.687 20.331746.842 21.211752.997 22 1759.142
22.561765.297 22.981771.443 23.341777.598 23.621796.053 24.23 1802.199
24.41808.354 24.661814.499 24.721820.654 24.38 1826.8 24.1 1832.955
24.071839.101 24.021845.256 24.511851.411 25.441857.556 25.79 1863.711
25.891869.857 26.221876.012 26.531882.157 26.441888.312 25.97 1894.467
25.781900.613 25.911906.768 26.061912.914 26.131919.068 26.18 1931.331
25.891937.468 25.551943.594 25.151949.731 24.951955.867 24.91 1961.994 24.8
1968.13 24.921974.266 25.261980.393 25.441992.665 25.73 2004.928
25.792011.064 25.872017.191 25.932023.327 25.812029.464 25.84 2035.59
25.832041.727 25.842047.863 25.77 2053.99 25.772060.126 26.05 2066.262
25.922072.389 25.712078.525 25.372084.661 25.472090.788 25.53 2096.924 25.71
2103.06 26.242109.187 26.172115.323 26.32121.459 26.22 2127.586 26.092133.722
25.872139.859 25.962145.985 25.882152.122 25.85 2158.258 25.962164.385
262170.521 25.912176.657 25.642182.784 25.48 2188.92 25.662195.056
25.272201.183 24.752207.319 24.862213.455 25.51 2219.582 25.532225.719
26.092231.855 25.962244.117 26.172250.254 26.32 2256.38 26.182262.517
26.282268.653 26.24 2274.78 26.42280.916 26.59 2287.052 26.682299.315
26.952305.451 27.12311.578 27.32317.714 26.92 2323.85 26.892329.977
26.62336.114 26.8 2342.25 26.872348.376 26.76 2354.513 27.082360.649
26.462366.776 26.442372.912 26.672379.048 26.84 2385.175 26.622391.311
27.62397.447 27.772403.574 27.3 2409.71 27.42 2415.846 26.952421.973
26.992428.109 27.82434.246 27.732440.372 27.4 2446.509 27.522452.645
27.872458.771 28.352464.908 28.52471.044 28.36 2477.171 28.992483.307
30.382489.443 31.52 2495.57 32.252501.706 31.82 2507.842 30.772513.969
29.962520.105 29.682526.241 29.652532.368 29.73 2538.504 29.482544.641
29.512550.767 29.512556.904 29.99 2563.04 30.29 2569.167 30.122575.303
29.812581.439 30.042587.566 30.032593.702 30.11 2599.838 30.082605.965
30.392612.101 30.62624.364 30.85 2630.5 31.29 2636.637 31.492642.763
31.582648.899 31.382655.036 29.722661.162 28.95 2667.299 29.052673.435

29.422679.562 29.642685.698 29.672691.834 29.86 2697.961 30.332704.097
30.712710.233 30.82 2716.36 31.132722.496 31.35 2728.632 31.422734.759
31.712740.896 32.252747.032 32.762759.294 33.49 2765.431 33.952771.558
34.352777.694 34.64 2783.83 34.362789.957 34.23 2802.229 34.822808.356
34.742814.492 33.722820.628 32.822826.755 34.33 2832.891 382839.028
41.772845.154 44.062851.291 44.892857.427 45.19 2863.553 45.77 2869.69
46.162881.953 46.272888.089 46.32894.225 46.36 2900.352 46.372906.488
46.42912.624 46.462918.751 46.562924.887 46.77 2931.023 47.03 2937.15
47.232949.423 47.562955.549 47.682967.822 48.04 2980.085 48.152986.221 48.11

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .091125.611 .041270.399 .093

Bank Sta: Left Right Coeff Contr. Expan.
 1125.6111270.399 .5 .8 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 01118.234 23 T
Skew Angle = 20

Downstream Deck/Roadway Coordinates
 num= 26
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 653.086 27.74 981.039 25.17 1134.209 23.8
 1162.4 23.96 1162.4 27.7 1166.159 27.7 1166.252 25.67 18.141174.616 25.6
18.821187.771 25.53 18.87 1197.168 25.46 18.091203.746 25.39 18.051217.842
25.32 18.54 1231.937 25.25 18.281242.274 25.18 17.71246.032 25.11 17.55
1256.369 25.04 18.251267.645 24.97 18.241279.861 24.9 17.5 1279.955 26.67
1283.62 26.71 1283.714 23.12 1324.967 22.6 1451.825 21.77 1604.995 21.73
 1742.19 22.85 1800 22.85

Downstream Bridge Cross Section Data
Station Elevation Data num= 281 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 29.39 6.155 29.56 12.301 29.42 18.456 29.55 30.766 29.35 43.066 29.5
49.221 29.42 61.522 28.94 67.677 29.05 79.987 28.42 92.287 28.35 98.442
28.44 104.597 28.37 110.743 27.97 116.898 27.72 123.053 27.76 129.208 28.07
135.353 28.04 141.508 26.47 147.663 25.99 153.818 27.05 159.964 27.72
172.274 28.23 178.429 28.89 184.574 29.3 190.729 29.2 196.884 28.57 203.039
28.72 209.185 28.63 215.34 28.32 246.105 28.71 252.251 28.65 264.561 29.09
289.172 29.11 295.327 29.03 301.472 29.09 332.238 30.57 338.393 30.69
363.003 30.38 369.158 30.22 387.614 30.25 399.914 30.02 436.835 30.36
492.202 30.23 498.357 29.9 510.667 29.66 516.812 29.44 522.967 29.56 541.423
29.36 553.733 28.89 566.033 29 590.644 28.48 596.799 28.17 633.719 27.09
639.865 27 646.02 27.13 707.542 26.67 726.006 27.1 738.307 26.88 750.617
26.86 762.918 27.14 769.073 27.05 781.373 26.45 805.984 25.92 818.294 25.95
842.904 26.67 849.059 26.7 873.67 25.84 879.815 25.85 885.97 25.59 898.28
24.59 904.426 24.38 910.581 24.43 922.882 23.49 929.036 22.8 935.192 21.68
941.346 21.54 947.492 20.88 953.647 20.58 972.103 20.37 978.258 20.11
984.413 20.24 996.713 19.471002.868 19.351015.178 18.76 1021.324
19.031027.479 18.811033.634 18.921039.789 19.641045.934 20.02 1052.089
19.791058.244 19.261064.399 19.63 1076.7 19.591082.855 19.46 1101.31
19.521113.611 19.831119.766 19.781132.076 18.991138.221 20.24 1144.376
20.751150.531 18.961156.687 15.761162.832 12.751168.893 9.39 1169.917
6.511173.375 5.921190.356 3.471213.397 1.241220.943 1.83 1228.573

2.121238.383 .811258.878 1.551265.428 3.1 1273.96 3.32 1282.671 5.46 1287.83
8.25 1292.04 9.951298.195 12.62 1304.34 15.54 1310.495 17.88 1316.65
18.131322.805 18.021335.106 18.321341.261 18.15 1353.562 18.681359.716
20.471378.172 20.421384.327 20.051390.482 19.99 1396.637 19.761427.393
19.311433.548 19.491439.703 19.531458.159 20.3 1464.314 20.121470.459
20.11476.614 20.661488.924 20.94 1495.07 20.5 1501.225 20.21 1507.38
20.431513.535 20.44 1519.68 20.31 1531.99 19.84 1538.145 19.731544.291
19.31556.601 19.591562.756 19.411568.901 19.53 1575.056 19.511581.211
19.11587.366 18.961593.512 18.971605.822 19.36 1618.122 19.461630.432
19.841661.189 19.771673.499 20.31679.654 20.39 1691.954 19.73 1710.41 19.65
1735.02 20.29 1747.33 21.091753.485 21.14 1759.631 21.471765.786
21.651771.941 22.121778.086 22.251784.241 23.65 1796.551 23.761821.162
24.611839.617 24.751864.228 25.21882.684 25.22 1888.839 25.381894.994
25.371901.139 25.531925.769 25.551938.088 25.7 1968.872 25.831975.027
25.961981.192 25.881993.501 25.951999.656 26.51 2005.821 26.74 2030.45
26.662036.605 26.77 2055.08 26.762079.709 26.51 2092.028 26.662110.503
26.492122.813 26.262128.977 26.392135.132 26.23 2141.287 26.42153.606
27.022172.081 27.382178.236 27.68 2196.71 27.74 2202.865 27.65 2209.02
28.432215.185 28.622221.339 28.662227.494 28.85 2258.288 292270.598
29.412276.762 29.362289.073 29.612301.392 28.92 2313.702 28.812326.021 29.05
2338.34 28.85 2350.65 29.062356.805 28.77 2381.444 29.142393.754
29.722406.073 30.992412.229 31.462418.384 32.59 2424.548 33.142430.703
32.912443.022 31.72449.177 32.072455.332 31.86 2461.487 32.012473.807
31.932486.126 31.512492.281 31.422498.436 31.47 2504.591 31.722510.755 31.83
2516.91 31.46 2529.23 31.172547.704 31.7 2566.169 31.622572.333 31.752584.643
31.552603.118 30.782609.273 30.37 2615.437 30.312621.592 30.092627.747
30.922633.911 32.752640.066 33.28 2646.221 33.362658.541 32.922664.696
33.32670.851 33.42677.015 33.3 2683.17 33.56 2695.49 33.652701.645
33.852726.274 33.682744.748 34.19 2750.903 34.532757.058 34.092775.532
34.782781.697 35.212787.852 35.25 2800.171 35.592806.326 34.772812.481
33.122818.636 32.642824.801 34.08 2830.956 37.092843.275 40.05 2849.43
41.032855.585 41.452867.904 43.45 2874.059 43.92886.379 44.082898.688
44.682904.853 44.852917.163 44.85 2923.318 45.072929.482 45.152935.637
45.472941.792 46.062954.112 47.59 2960.267 48.25

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .091144.376 .041310.495 .093

Bank Sta: Left Right Coeff Contr. Expan.
 1144.3761310.495 .5 .8 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 01118.234 23 T
 13102960.267 23 T
Skew Angle = 20

Upstream Embankment side slope = 0 horiz. to 1.0 vertical Downstream
Embankment side slope = 0 horiz. to 1.0 vertical Maximum allowable
submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Piers = 2

Pier Data
Pier Station Upstream=1189.651 Downstream=1199.987
Upstream num= 6
 Width Elev Width Elev Width Elev Width Elev Width Elev Width Elev 11 .8 11 5 3.5 5.1 3
8 2 18 3 18.1
Downstream num= 6
 Width Elev Width Elev Width Elev Width Elev Width Elev Width Elev 11 .8 11 5 3.5 5.1 3
8 2 18 3 18.1

Pier Data
Pier Station Upstream=1232.877 Downstream=1243.213
Upstream num= 6
 Width Elev Width Elev Width Elev Width Elev Width Elev Width Elev 11 .8 11 5 3.5 5.1 3
8 2 18 3 18.1
Downstream num= 6
 Width Elev Width Elev Width Elev Width Elev Width Elev Width Elev 11 .8 11 5 3.5 5.1 3
8 2 18 3 18.1

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
 Energy
 W.S. Pro Method

 W.S.Pro Data
 Left Embankment
 El of the top of the embankment = 24
 El of the toe of the abutment = 5.7
 Right Embankment
 El of the top of the embankment = 24
 El of the toe of the abutment = 5.7 Abutment Type = 4 Vert. abutments and
sloping embankments with wingwalls Slope of abutments =
 Top with of embankment = 50
 Centroid station of bridge opening =
 Wing Wall Type = Angular wing walls
 Width = 22
 Angle = 45
 Radius =
 Guide Banks Type = No Guide Bank present
 Length =
 Offset =
 Angle =
 Optional Contraction and expansion coefficients
 At approach Section
 At Guide Bank
 At upstream outside
 At upstream inside (BU)
 At downstream inside (BD)
 Piers are Continuous for the width of the bridge
 Use Geometric mean as Friction Slope Method

Selected Low Flow Methods = W.S.Pro Method

High Flow Method
 Pressure and Weir flow Submerged Inlet Cd =
 Submerged Inlet + Outlet Cd = .8
 Max Low Cord =

Additional Bridge Parameters
 Add Friction component to Momentum
 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 56196.91

INPUT
Description: 54.3 DS FAce Harding St Rte 44
Station Elevation Data num= 281
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 29.39 6.155 29.56 12.301
29.42 18.456 29.55 30.766 29.35 43.066 29.5 49.221 29.42 61.522 28.94 67.677
29.05 79.987 28.42 92.287 28.35 98.442 28.44 104.597 28.37 110.743 27.97
116.898 27.72 123.053 27.76 129.208 28.07 135.353 28.04 141.508 26.47
147.663 25.99 153.818 27.05 159.964 27.72 172.274 28.23 178.429 28.89
184.574 29.3 190.729 29.2 196.884 28.57 203.039 28.72 209.185 28.63 215.34
28.32 246.105 28.71 252.251 28.65 264.561 29.09 289.172 29.11 295.327 29.03
301.472 29.09 332.238 30.57 338.393 30.69 363.003 30.38 369.158 30.22
387.614 30.25 399.914 30.02 436.835 30.36 492.202 30.23 498.357 29.9 510.667
29.66 516.812 29.44 522.967 29.56 541.423 29.36 553.733 28.89 566.033 29
590.644 28.48 596.799 28.17 633.719 27.09 639.865 27 646.02 27.13 707.542
26.67 726.006 27.1 738.307 26.88 750.617 26.86 762.918 27.14 769.073 27.05
781.373 26.45 805.984 25.92 818.294 25.95 842.904 26.67 849.059 26.7 873.67
25.84 879.815 25.85 885.97 25.59 898.28 24.59 904.426 24.38 910.581 24.43
922.882 23.49 929.036 22.8 935.192 21.68 941.346 21.54 947.492 20.88 953.647
20.58 972.103 20.37 978.258 20.11 984.413 20.24 996.713 19.471002.868
19.351015.178 18.76 1021.324 19.031027.479 18.811033.634 18.921039.789
19.641045.934 20.02 1052.089 19.791058.244 19.261064.399 19.63 1076.7
19.591082.855 19.46 1101.31 19.521113.611 19.831119.766 19.781132.076
18.991138.221 20.24 1144.376 20.751150.531 18.961156.687 15.761162.832
12.751168.893 9.39 1169.917 6.511173.375 5.921190.356 3.471213.397
1.241220.943 1.83 1228.573 2.121238.383 .811258.878 1.551265.428 3.1 1273.96
3.32 1282.671 5.46 1287.83 8.25 1292.04 9.951298.195 12.62 1304.34 15.54
1310.495 17.88 1316.65 18.131322.805 18.021335.106 18.321341.261 18.15
1353.562 18.681359.716 20.471378.172 20.421384.327 20.051390.482 19.99
1396.637 19.761427.393 19.311433.548 19.491439.703 19.531458.159 20.3
1464.314 20.121470.459 20.11476.614 20.661488.924 20.94 1495.07 20.5 1501.225
20.21 1507.38 20.431513.535 20.44 1519.68 20.31 1531.99 19.84 1538.145
19.731544.291 19.31556.601 19.591562.756 19.411568.901 19.53 1575.056
19.511581.211 19.11587.366 18.961593.512 18.971605.822 19.36 1618.122
19.461630.432 19.841661.189 19.771673.499 20.31679.654 20.39 1691.954 19.73
1710.41 19.65 1735.02 20.29 1747.33 21.091753.485 21.14 1759.631
21.471765.786 21.651771.941 22.121778.086 22.251784.241 23.65 1796.551

23.761821.162 24.611839.617 24.751864.228 25.21882.684 25.22 1888.839
25.381894.994 25.371901.139 25.531925.769 25.551938.088 25.7 1968.872
25.831975.027 25.961981.192 25.881993.501 25.951999.656 26.51 2005.821 26.74
2030.45 26.662036.605 26.77 2055.08 26.762079.709 26.51 2092.028
26.662110.503 26.492122.813 26.262128.977 26.392135.132 26.23 2141.287
26.42153.606 27.022172.081 27.382178.236 27.68 2196.71 27.74 2202.865 27.65
2209.02 28.432215.185 28.622221.339 28.662227.494 28.85 2258.288 292270.598
29.412276.762 29.362289.073 29.612301.392 28.92 2313.702 28.812326.021 29.05
2338.34 28.85 2350.65 29.062356.805 28.77 2381.444 29.142393.754
29.722406.073 30.992412.229 31.462418.384 32.59 2424.548 33.142430.703
32.912443.022 31.72449.177 32.072455.332 31.86 2461.487 32.012473.807
31.932486.126 31.512492.281 31.422498.436 31.47 2504.591 31.722510.755 31.83
2516.91 31.46 2529.23 31.172547.704 31.7 2566.169 31.622572.333 31.752584.643
31.552603.118 30.782609.273 30.37 2615.437 30.312621.592 30.092627.747
30.922633.911 32.752640.066 33.28 2646.221 33.362658.541 32.922664.696
33.32670.851 33.42677.015 33.3 2683.17 33.56 2695.49 33.652701.645
33.852726.274 33.682744.748 34.19 2750.903 34.532757.058 34.092775.532
34.782781.697 35.212787.852 35.25 2800.171 35.592806.326 34.772812.481
33.122818.636 32.642824.801 34.08 2830.956 37.092843.275 40.05 2849.43
41.032855.585 41.452867.904 43.45 2874.059 43.92886.379 44.082898.688
44.682904.853 44.852917.163 44.85 2923.318 45.072929.482 45.152935.637
45.472941.792 46.062954.112 47.59 2960.267 48.25

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .091144.376 .041310.495 .093

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1144.3761310.495 110.85 93.05 75.7 .5 .8 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 01118.234 23 T
 13102960.267 23 T
Skew Angle = 20

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 56103.86

INPUT Description: 54 Exit Harding St Rte 44
Station Elevation Data num= 386
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 28.27 6.54 28.26 13.07 28.27
19.61 28.32 26.15 28.4 32.68 28.44 39.22 28.68 45.76 28.95 58.83 29.04 65.37
29.18 71.9 29.34 78.44 29.37 84.98 29.34 91.51 29.38 98.05 29.83 104.59
30.14 111.13 30.19 124.2 29.89 130.74 29.83 137.27 29.83 143.81 29.96 150.35
29.97 156.88 29.91 163.42 30.07 169.96 30.14 176.49 30.12 183.03 30.24
189.57 30.39 196.1 30.56 209.18 30.4 215.71 30.61 228.79 30.48 235.32 30.34
241.86 30.45 248.4 30.59 254.93 30.47 261.47 30.58 268.01 30.61 274.54 30.6
281.08 30.77 287.62 30.78 294.15 30.57 300.69 30.42 313.77 30.17 320.3 30.29
326.84 30.29 333.38 30.14 339.91 30.13 346.45 30.14 352.99 30.07 359.52
29.83 366.06 29.76 372.6 29.85 379.13 29.99 385.67 29.89 392.21 29.53 398.74
29.41 405.28 29.41 411.82 29.31 418.35 29.12 424.89 29.07 431.43 28.88
437.96 28.76 444.5 28.53 451.04 28.58 464.11 28.61 470.65 28.72 477.18 28.79

483.72 28.68 490.26 28.7 496.8 28.69 503.33 28.59 509.87 28.75 522.94 28.78
529.48 28.69 536.02 28.48 542.55 28.45 549.09 28.28 555.63 28.13 562.16
28.27 568.7 28.37 575.24 28.21 581.77 28.1 588.31 28.34 594.85 28.34 601.38
27.58 607.92 26.4 614.46 25.47 620.99 25.26 627.53 25.22 634.07 25.33 640.6
25.41 653.68 25.34 666.75 25.31 699.43 25.35 712.51 25.35 725.58 25.32
738.66 25.23 751.73 25.07 758.27 25 764.8 24.95 771.34 24.93 777.88 24.89
784.41 24.7 790.95 24.33 797.49 23 804.02 22.05 810.56 22.16 817.1 22.86
823.63 23.62 830.17 23.87 836.71 23.66 843.24 23.34 849.78 23.04 856.32
22.09 862.85 20.44 869.39 18.9 875.93 17.32 882.46 16.45 889 16.22 895.54
15.96 902.08 14.86 908.61 14.32 915.15 13.66 921.69 13.81 928.22 13.6 934.76
13.7 941.3 13.58 947.83 13.39 954.37 13.36 960.91 13.41 967.44 13.38 973.98
13.06 980.52 12.76 987.05 12.6 993.59 12.53 1000.13 12.74 1006.66 13.08
1055.36 14.35 1087.33 10.17 1177.61 12.89 1193.55 9.09 1198.38 3.46 1214.37
2.87 1234.25 2.01 1250.52 1.17 1262.83 .63 1272.4 1.28 1279.49 .8 1288.91
1.26 1298.05 1.66 1309.47 4.54 1313.32 8.87 1366.33 11.88 1398.96 17.27
1438.36 17.51 1444.92 17.45 1451.48 17.64 1458.04 17.76 1464.6 18.07 1477.71
19.01 1484.27 19.29 1490.83 19.38 1497.39 19.53 1503.95 19.89 1510.51 19.83
1517.07 19.37 1523.63 19.46 1530.18 19.46 1543.3 19.17 1549.86 18.66 1556.42
18.48 1562.98 18.12 1569.54 17.93 1576.1 18.01 1582.65 18.12 1589.21 18.34
1595.77 18.64 1602.33 18.59 1608.89 18 1615.45 17.48 1622.01 16.72 1628.57
16.37 1635.12 15.88 1641.68 15.2 1648.24 15 1654.8 14.95 1661.36 14.76
1667.92 15.28 1674.48 15.59 1681.03 15.44 1687.59 15.14 1694.15 15.33
1700.71 15.54 1707.27 15.62 1713.83 15.35 1720.39 15.33 1726.95 15.02 1733.5
15.59 1740.06 16.4 1746.62 16.13 1753.18 15.18 1759.74 14.79 1766.3 14.86
1772.86 15.1 1779.42 15.21 1785.97 15.23 1792.53 15.17 1799.09 15.04 1805.65
14.62 1812.21 14.7 1818.77 15.61 1825.33 16.71 1838.44 17.8 1851.56 18.53
1858.12 19.07 1864.68 19.48 1871.24 20 1877.8 20.27 1884.35 20.79 1890.91
21.17 1897.47 21.44 1904.03 21.68 1910.59 22.03 1917.15 22.29 1923.71 22.26
1930.27 22.13 1943.38 21.69 1949.94 21.03 1956.5 20.53 1963.06 20.21 1969.62
20.08 1976.18 20.02 1982.74 19.94 1989.29 20.06 1995.85 20.53 2002.41 21.12
2008.97 21.69 2015.53 21.91 2022.09 21.77 2028.65 21.93 2035.2 22.12 2041.76
22.16 2048.32 22.24 2054.88 22.45 2061.44 22.72 2068 22.96 2074.56 23.12
2081.12 23.32 2087.67 23.56 2094.23 23.77 2100.79 23.82 2107.35 24.01
2113.91 24.15 2120.47 24.36 2127.03 24.73 2133.58 25.05 2140.14 25.57
2153.26 25.98 2159.82 26.27 2166.38 26.43 2179.5 26.5 2192.61 26.66 2199.17
26.77 2205.73 26.82 2212.29 26.73 2218.85 26.75 2225.41 26.73 2245.08 26.56
2251.64 26.61 2258.2 26.56 2264.76 26.48 2271.32 26.36 2277.88 26.13 2284.43
26.04 2290.99 26.03 2297.55 25.96 2304.11 25.93 2310.67 26 2317.23 25.94
2323.79 25.83 2330.34 25.7 2336.9 25.54 2343.46 25.28 2350.02 25.1 2356.58
25.11 2363.14 25.42 2369.7 25.77 2376.26 25.91 2382.81 25.99 2389.37 26.11
2395.93 26.19 2402.49 26.29 2409.05 26.3 2415.61 26.34 2422.17 26.51 2428.72
26.76 2435.28 26.75 2441.84 26.71 2448.4 26.89 2454.96 27.09 2461.52 27.2
2468.08 27.34 2481.19 27.57 2487.75 27.78 2494.31 27.93 2500.87 27.89
2507.43 27.77 2513.99 27.8 2520.55 27.93 2527.1 28.08 2533.66 28.16 2540.22
28.09 2546.78 28.07 2553.34 28.02 2559.9 28.13 2566.46 28.57 2573.02 28.94
2579.57 28.98 2586.13 28.88 2592.69 28.45 2599.25 28.17 2605.81 28.18
2612.37 28.13 2618.93 28.02 2625.48 28.02 2632.04 28.08 2638.6 28.16 2645.16
28.49 2651.72 28.91 2658.28 29.17 2664.84 29.28 2671.4 29.29 2684.51 29.06
2691.07 29.01 2697.63 28.58 2704.19 28.19 2710.75 28.17 2717.31 28.18
2723.86 27.85 2730.42 28.14 2736.98 28.46 2743.54 28.41 2750.1 28.15 2763.22
28.04 2769.78 27.93 2776.33 27.67 2782.89 27.48 2789.45 27.8 2796.01 27.75
2802.57 27.48 2809.13 27.59 2815.69 27.82 2822.24 28 2828.8 28.01 2841.92
27.69 2848.48 27.72 2855.04 27.95 2861.6 28.21 2868.16 28.93 2874.71 29.73
2881.27 30.34 2887.83 30.69 2900.95 31.23 2907.51 31.45 2914.07 31.73

2920.62 32.29 2927.18 33.33 2933.74 35.26 2940.3 38.07 2946.86 40.7 2953.42
42.48 2959.98 43.53 2966.54 43.98 2973.09 44.21 2979.65 44.49 2986.21 44.72
2992.77 44.85 2999.33 45.05 3012.45 45.59 3019 46.69 3025.56 48.48 3032.12
50.69 3038.68 52.6 3045.24 53.19 3051.8 53.36

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 1177.61 .04 1398.96 .093

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1177.61
1398.96 1404.65 1394.42 1387.7 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 1504 3051.8 19.9 T
 CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 54709.44

INPUT
Description: 53
Station Elevation Data num= 245
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 54.31 6.56 53.82 13.12 53.15
26.24 52.53 45.93 51.98 59.05 50.79 72.17 50.59 78.73 50.22 85.29 49.64
104.98 46.75 137.78 43.05 144.34 42.41 150.9 41.97 164.03 41.52 177.15 40.63
190.27 39.27 196.83 38.31 203.39 37.04 209.95 36.07 229.64 34.07 236.2 33.66
249.32 33.28 275.56 32 282.13 31.54 295.25 31.01 308.37 30.34 314.93 30.12
328.05 29.93 347.74 28.81 373.98 27.96 380.54 27.86 387.1 27.49 393.66 26.96
400.22 26.69 406.79 26.6 413.35 25.95 433.03 24.7 439.59 24.46 446.15 23.92
459.27 23.42 472.4 23.27 485.52 23.4 498.64 22.97 505.2 22.94 538.01 22.37
551.13 22.47 564.25 22.29 570.81 22.3 577.37 22.46 583.93 22.44 590.5 22.11
597.06 20.95 603.62 19.96 610.18 19.23 616.74 19.08 728.28 19.08 734.84
19.86 741.4 20.9 747.96 21.6 767.64 21.31 780.77 21.44 787.33 21.26 800.45
20.57 820.13 19.94 826.69 19.87 859.5 20.74 879.18 20.73 885.74 20.97 898.87
20.73 918.55 20.04 944.79 19.62 1003.84 19.08 1023.53 18.26 1049.77 17.84
1082.58 16.73 1089.14 16.28 1095.7 16.51 1102.26 16.16 1115.38 14.81 1128.5
14.28 1161.31 12.26 1167.87 11.7 1207.24 11.03 1226.92 11.15 1238.36 10.82
1240.04 10.76 1246.6 9.44 1253.16 7.18 1259.72 6.37 1265 2.68 1265.67 2.45
1266.54 2.04 1267.35 1.63 1268.46 1.22 1269.24 .97 1269.81 .83 1270.58 .74
1271.6 .54 1272.79 .4 1274.25 .27 1275.85 .18 1279.5 .04 1281.57 .07 1283.35
.12 1285.16 .2 1286.84 .39 1288.46 .51 1290 .58 1291.73 .79 1293.43 .39
1295.54 .64 1297.53 .05 1299.63 .19 1301.63 .08 1303.73 .18 1305.6 .08
1307.89 .15 1309.91 .05 1312.17 .05 1314.26 -.03 1316.66 .01 1319 -.33
1321.42 -.27 1323.54 -.06 1325.73 -.01 1327.74 .1 1329.7 .23 1331.56 .43
1333.48 .6 1335.26 .89 1337.12 1.18 1338.8 1.4 1340.56 1.6 1342.29 1.7
1343.89 1.66 1345.58 1.55 1347.44 1.42 1349.31 1.28 1351.23 1.29 1352.99 3
1358.14 6.88 1364.7 9.6 1367.96 10.49 1371.26 11.4 1377.82 12.74 1384.38
12.96 1390.94 12.91 1404.07 12.31 1410.63 12.34 1417.19 12.74 1430.31 14.09
1436.87 15.08 1443.43 15.85 1449.99 16.15 1476.24 16.02 1495.92 16.72
1515.61 16.65 1535.29 16.88 1541.85 17.13 1548.41 17.04 1554.97 17.14
1561.53 17.4 1568.09 17.35 1574.65 16.76 1581.22 17.83 1587.78 18.48 1594.34
18.77 1607.46 19.12 1614.02 19.18 1633.7 18.78 1640.27 18.83 1659.95 18.59
1666.51 18.35 1673.07 17.85 1679.63 17.62 1686.19 17.22 1705.88 15.47
1712.44 14.76 1719 14.29 1725.56 14.19 1732.12 13.88 1758.36 13.77 1764.93

13.84 1771.49 14.16 1784.61 13.96 1791.17 14.21 1797.73 14.26 1804.29 14.06
1810.85 14.06 1817.41 14.45 1830.54 14.71 1843.66 14.68 1869.9 15.41 1889.59
16.91 1896.15 17.02 1902.71 17.51 1909.27 18.46 1915.83 19.08 1948.64 20.65
1974.88 21.26 1988 21.98 2001.12 23 2007.68 23.37 2014.25 23.51 2020.81
23.98 2047.05 24.15 2053.61 24.09 2066.73 24.45 2079.86 24.19 2099.54 24.39
2106.1 24.25 2119.22 24.56 2125.78 24.56 2138.91 25.06 2145.47 25.08 2158.59
24.81 2171.71 24.94 2178.27 25.22 2184.84 25.33 2191.4 25.18 2211.08 25.37
2224.2 26.22 2230.76 27.36 2237.32 27.79 2243.88 27.75 2250.45 27.42 2257.01
27.57 2270.13 28.21 2276.69 28.26 2289.81 28.01 2302.94 28.22 2316.06 28.21
2322.62 28.31 2335.74 28.2 2355.42 28.43 2375.11 28.15 2381.67 28.27 2394.79
28.83 2447.28 29.66 2460.4 30.12 2466.96 30.51 2473.52 30.76 2480.08 30.82
2493.21 31.34 2499.77 31.5

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 1240.04 .04 1377.82 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1240.04
1377.82 1402 1447.38 1492.06 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 741 20.9 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 53262.06

INPUT
Description: 52
Station Elevation Data num= 230
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 56.56 13.09 52.88 26.17
49.61 32.71 48.2 39.26 46.65 52.34 43.12 65.43 39.85 71.97 38.4 78.51 37.6
85.05 36.23 91.6 34.6 104.68 31.8 111.22 30.73 117.77 30.02 124.31 29.55
150.48 28.11 163.56 27.48 170.11 26.85 183.19 25.93 215.91 24.38 222.45
23.75 228.99 22.55 235.53 21.14 242.08 20.16 340.22 20.16 346.76 20.27
359.84 21.08 392.56 21.69 405.64 21.47 412.18 21.67 425.27 21.72 438.35 22.1
444.9 21.91 457.98 22.09 464.52 22.32 497.24 22.89 510.32 22.81 529.95 22.24
549.58 21.53 556.12 21.45 575.75 20.69 582.29 20.26 595.38 19.73 608.46
19.48 634.63 19.33 647.72 19.48 673.89 19.48 772.03 18.93 778.57 18.97
785.11 18.87 798.2 19.37 811.28 19.16 824.37 19.61 837.45 19.01 850.54 18.83
870.17 19.12 876.71 19.31 883.25 19.35 889.79 18.92 896.34 18.01 902.88
17.82 915.96 18.29 922.51 18.92 929.05 19.27 942.13 19.31 955.22 19.58
961.76 19.84 968.31 19.85 981.39 18.42 987.93 18.43 994.48 18.69 1001.02
19.17 1007.56 19.88 1014.1 20.32 1020.65 20.47 1033.73 20.3 1053.36 20.35
1059.9 20.51 1072.99 20.53 1079.53 20.69 1086.07 20.65 1105.7 20.92 1118.79
21.77 1125.33 21.23 1131.87 21.35 1151.5 21.02 1158.04 21.06 1184.21 20.79
1190.75 20.48 1197.3 20.02 1203.84 19.73 1216.92 20.08 1223.47 19.82 1230.01
19.71 1236.55 20.93 1243.09 22.63 1249.64 23.92 1256.18 24.57 1269.27 25.28
1288.89 25.24 1301.98 25.01 1321.61 24.89 1334.69 24.03 1367.39 22.85
1373.92 22.47 1380.44 21.96 1419.61 21.34 1426.13 21.06 1432.66 20.5 1445.72
19.72 1452.24 19.11 1465.3 16.79 1478.35 15.33 1497.93 13.7 1504.46 13.33
1517.52 12.28 1524.04 11.6 1530.57 10.66 1537.1 10.48 1550.15 11.56 1556.68
12.21 1569.73 12.91 1582.79 14.01 1602.37 14.75 1608.9 14.6 1615.43 14.14

1628.48 12.8 1641.53 11.29 1648.06 11.12 1661.12 11.6 1687.23 13.04 1693.26 13.13 1693.75 13.13 1700.28 12.92 1706.81 12.38 1713.33 11.57 1719.86 10.19 1726.39 7.8 1732 3.11 1733.34 2.82 1735.01 2.36 1736.79 1.68 1738.45 1.06 1741.04 .7 1743.34 .51 1745.57 .28 1747.65 .13 1749.92 .13 1752.28 .1 1754.93 .05 1757.44 .08 1760.14 .15 1762.53 .18 1765.04 .09 1767.28 0 1769.67 .02 1771.83 .02 1773.98 .04 1775.96 .1 1778.15 .22 1780.12 .36 1782.06 .42 1783.79 .54 1785.68 .56 1787.29 .94 1789.06 .86 1790.77 .94 1792.62 1.09 1794.24 1.1 1795.96 1.31 1797.46 1.15 1799.03 1.25 1800.27 1.31 1801.31 1.33 1802.42 1.42 1803.33 1.59 1804.24 1.58 1805.22 1.71 1806.53 2.08 1808.23 1.94 1809.74 2.1 1812.08 2.56 1814.74 2.53 1816.47 2.44 1817.99 2.67 1820.21 2.25 1823.81 2.93 1830.83 8.02 1832.32 8.74 1837.35 11.17 1843.88 11.37 1856.93 11.1 1863.46 11.27 1876.52 12.11 1883.04 12.63 1902.63 13.64 1915.68 14.55 1967.9 16.55 1974.43 16.89 1980.95 17.05 2000.53 18.07 2033.17 18.9 2046.23 19.66 2059.28 20 2078.86 20.08 2085.39 19.94 2137.2 20.46 2188.95 21.23 2208.35 21.88 2221.29 22.12 2240.69 22.74 2247.16 22.79 2253.63 23 2260.1 23.06 2279.51 22.7 2318.32 22.51 2324.79 22.22 2331.26 22.18 2370.07 23.54 2389.47 24.53 2415.35 26.6 2434.75 27.69 2473.57 30.53 2480.03 31.18 2492.97 32.34 2499.44 33.46 2505.91 34.02 2518.85 34.04 2531.78 33.73 2538.25 33.42

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .087 1693.26 .04 1915.68 .085
 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1693.26 1915.68 1383.55 1262.42 1156.9 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 1014 20.3 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 51999.64

INPUT
Description: 51 Approach Church St
Station Elevation Data num= 261
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 20.23 6.56 20.75 13.12 20.83 19.68 20.6 26.24 20.49 32.8 20.4 39.36 20.29 45.92 20.34 59.04 20.09 65.6 20.12 72.16 19.85 78.72 19.71 85.28 19.89 91.84 19.85 98.41 19.6 104.97 19.09 111.53 18.82 124.65 18.69 131.21 18.46 137.77 18.34 150.89 18.19 157.45 17.94 164.01 17.77 170.57 17.63 177.13 17.63 183.69 17.72 190.25 17.78 196.81 17.71 203.37 17.56 209.93 17.36 216.49 17.23 223.05 17.18 229.61 17.04 236.17 16.74 242.73 16.78 249.29 16.7 255.85 16.67 268.97 16.26 275.53 15.92 282.09 15.45 288.65 15.28 295.21 15.41 301.78 15.32 308.34 15.36 314.9 15.73 321.46 15.89 328.02 16.24 334.58 16.71 341.14 16.96 347.7 17.54 360.82 18.45 367.38 19.31 373.94 20 380.5 20.38 387.06 20.44 393.62 20.6 400.18 20.56 406.74 20.57 413.3 20.63 419.86 20.62 426.42 20.55 432.98 20.52 439.54 20.58 446.1 20.59 452.66 20.62 459.22 20.87 465.78 21.16 472.34 21.41 478.9 21.4 485.46 21.49 492.03 21.82 498.59 22.3 505.15 22.76 511.71 23.07 518.27 23.57 524.83 23.99 531.39 24.61 537.95 25.1 544.51 25.53 551.07 25.36 557.63 25.6 564.19 25.79 570.75 25.79 577.31 25.66 583.87 25.6 590.43 25.68 596.99 25.74 603.55 25.74 610.11 25.55 616.67 25.38 623.23 25.14 629.79 25.14 636.35 25.33 642.91 25.25 649.47 25.25 656.03 25.46 669.15

25.61 675.71 25.72 688.83 26.12 695.39 26.35 701.96 26.82 708.52 27.33
715.08 27.76 721.64 27.99 728.2 28.39 734.76 28.48 741.32 28.69 747.88 28.96
754.44 28.94 761 28.8 767.56 28.68 774.12 28.58 780.68 28.33 787.24 28.26
800.36 28.58 806.92 28.72 820.04 28.94 826.6 28.9 833.16 28.71 839.72 28.4
846.28 28.14 852.84 27.9 859.4 27.87 872.52 28.12 879.08 28.26 885.64 28.2
892.2 28.12 905.33 27.87 911.89 27.79 918.45 27.67 931.57 27.16 938.13 27.04
944.69 26.98 951.25 26.83 957.81 26.52 964.37 26.55 970.93 26.4 977.49 26.62
984.05 26.33 990.61 25.81 997.17 24.92 1003.73 24.7 1010.29 24.73 1016.85
24.5 1023.41 24.51 1029.97 24.35 1036.53 23.98 1043.09 23.45 1049.65 22.78
1062.77 21.41 1069.33 20.32 1075.89 19.42 1082.45 18.97 1089.01 18.35
1095.57 17.71 1102.14 17.14 1108.7 16.68 1115.26 16.31 1121.82 16.08 1146.82
14.81 1174.39 14.89 1195.35 13.57 1209.63 10.51 1215.33 5.51 1231.3 4.16
1242.8 2.86 1252.07 1.33 1259.46 1.18 1263.14 2.79 1273.05 2.99 1303.69 2.35
1316.2 2.34 1321.48 3.85 1326.85 8.36 1336.58 9.31 1343.03 9.66 1349.47 9.97
1355.92 10.22 1362.37 10.44 1368.81 10.6 1375.26 10.55 1381.7 10.58 1388.15
10.73 1394.59 10.81 1401.04 10.87 1407.48 10.95 1413.93 11.09 1420.37 11.27
1426.82 11.41 1433.27 11.5 1439.71 11.65 1446.16 11.84 1452.71 12.07 1459.26
12.34 1472.36 12.5 1478.91 12.63 1485.46 12.8 1492.02 12.89 1498.57 13.16
1505.12 13.35 1511.67 13.56 1518.22 13.89 1531.32 14.38 1537.87 14.61
1544.43 14.86 1550.98 14.99 1564.08 15.32 1570.63 15.52 1577.18 16.12
1583.73 17.1 1590.28 17.67 1596.84 17.94 1603.39 18.73 1609.94 19.71 1616.49
20.64 1623.04 21.16 1629.59 21.55 1636.14 21.73 1642.69 21.81 1649.25 22.44
1655.8 21.64 1662.35 20.46 1668.9 20.15 1675.45 20.26 1682 20.67 1688.55
21.3 1695.1 22.17 1701.66 22.76 1708.21 23.08 1714.76 23.22 1721.31 23.23
1727.86 23.27 1734.41 23.39 1740.96 23.4 1747.51 23.48 1760.62 23.49 1767.17
23.53 1773.72 23.62 1780.27 23.73 1786.82 23.7 1793.37 23.74 1799.92 23.9
1806.48 24.12 1813.03 24.32 1826.13 24.93 1832.68 25.38 1839.23 25.69
1845.78 25.83 1852.33 26.09 1858.89 26.23 1871.99 26.6 1878.54 26.64 1885.09
26.71 1891.64 26.86 1904.74 27.11 1911.3 27.26 1917.85 27.37 1924.4 27.5
1930.95 27.65 1937.5 27.76 1944.05 27.95

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 1174.39 .04 1368.81 .085
 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1174.39 1368.81 86.45 102.74 130.56 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 373 20 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 51896.9

INPUT
Description: 50.7 US Face Church St
Station Elevation Data num= 168
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 19.79 12.272 19.6 42.963
19.32 61.371 19.56 85.916 19.24 92.052 18.59 116.597 18.44 135.015 18.71
141.151 18.98 147.287 19.11 159.56 18.79 202.523 18.38 208.659 18.18 220.931
17.12 227.067 16.86 233.204 16.92 239.34 17.15 245.476 17.23 251.612 17.7
257.748 17.79 276.157 18.46 282.302 18.92 288.439 19.18 300.711 20.01
306.847 19.84 312.983 20.03 319.12 20.46 349.801 21.09 362.082 21.51 368.219

21.55 380.491 22.26 386.627 22.4 392.763 22.77 398.9 23.36 411.172 24.27
423.444 24.84 429.58 25.23 447.998 25.71 484.816 26.31 497.088 26.72 509.36
26.34 533.915 26.17 540.051 26.24 558.459 25.99 570.732 26.34 583.004 27.05
589.14 27.27 607.558 28.43 619.831 28.33 638.239 28.84 650.512 28.88 675.056
29.5 724.155 30.58 736.428 31.55 742.564 31.79 748.7 31.56 754.836 31.14
767.118 30.76 791.663 29.53 803.935 29.27 810.071 28.98 822.344 28.85
840.762 28.1 859.17 27.07 871.443 26.7 883.715 26.58 895.987 26.01 902.124
26.21 908.26 26.1 926.678 25.07 945.086 24.65 963.495 24.81 969.631 25.02
981.904 24.77 988.04 25.12 994.176 25.051000.322 25.231006.458 24.77 1018.73
24.971024.866 24.8 1031.003 24.781043.275 25.141049.411 25.451073.956
24.831079.322 24.93 1080.102 24.941086.238 24.361092.374 23.451106.901
4.091108.114 3.09 1116.665 2.851124.615 2.851130.488 1.11132.724 .331133.749
1.74 1134.284 -.131139.744 -.271146.679 -.741155.089 -1.791164.899 -1.4
1173.845 -.17 1183.28 -.481193.757 .631200.382 2.011207.693 4.71 1227.38
20.51233.525 20.691239.661 20.81245.797 21.02 1258.07 21.33 1264.206
21.451270.229 21.721276.262 21.731282.286 21.521288.309 20.95 1294.342
21.081300.365 21.371306.389 21.221312.422 21.281318.445 21.51 1324.469
21.761330.501 20.661336.525 20.211342.548 20.21348.581 20.12 1360.628
20.071366.661 20.11372.684 20.451378.708 20.86 1384.74 21.13 1390.764
21.351396.787 21.85 1402.82 22.231414.876 22.43 1420.9 22.49 1426.923
22.751432.947 22.91 1438.97 23.181445.003 23.291451.026 23.42 1457.05
23.481463.073 23.621469.097 23.73 1475.12 23.791481.143 23.87 1487.176
24.011499.223 24.231505.247 24.38 1511.27 24.55 1529.35 24.79 1535.373 24.82
1547.42 25.041559.467 25.57 1565.49 25.741571.523 25.83 1577.547 26.1 1583.57
26.191589.593 26.451595.617 26.73 1601.64 26.93 1607.664 27.041613.697 27.39
1619.72 27.511625.743 27.61631.767 27.72 1637.79 27.91643.814 28.111649.837
28.14

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .091079.322 .04 1227.38 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1079.322 1227.38 72.49 67.2 64.58 .5 .8 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 300 20 T
Skew Angle = 20

BRIDGE

RIVER: Taunton River
REACH: Main Stem RS: 51859.01

INPUT
Description: 50.5 Church St
Distance from Upstream XS = 6
Deck/Roadway Width = 53 Weir Coefficient = 2.6
Bridge Deck/Roadway Skew = 20
Upstream Deck/Roadway Coordinates
 num= 19
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 428.5 27.4 724.503 28.26 804.377 27.59
 918.08 26.04 1060.913 25.02 1100.38 25

```
 1100.38 28.25 1103.199 28.25 1103.199 25.62 18.39 1153.943 25.12
18.081207.505 24.76 17.281207.505 28.27  1209.384 28.25 1210.324 28.19
1210.324 23.12  1297.715 22.75 1406.72 22.34 1547.674 24.79
 1681.11 29.1

Upstream Bridge Cross Section Data
Station Elevation Data num= 168
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  0 19.79 12.272 19.6 42.963
19.32 61.371 19.56 85.916 19.24  92.052 18.59 116.597 18.44 135.015 18.71
141.151 18.98 147.287 19.11  159.56 18.79 202.523 18.38 208.659 18.18 220.931
17.12 227.067 16.86  233.204 16.92 239.34 17.15 245.476 17.23 251.612 17.7
257.748 17.79  276.157 18.46 282.302 18.92 288.439 19.18 300.711 20.01
306.847 19.84  312.983 20.03 319.12 20.46 349.801 21.09 362.082 21.51 368.219
21.55  380.491 22.26 386.627 22.4 392.763 22.77 398.9 23.36 411.172 24.27
423.444 24.84 429.58 25.23 447.998 25.71 484.816 26.31 497.088 26.72  509.36
26.34 533.915 26.17 540.051 26.24 558.459 25.99 570.732 26.34  583.004 27.05
589.14 27.27 607.558 28.43 619.831 28.33 638.239 28.84  650.512 28.88 675.056
29.5 724.155 30.58 736.428 31.55 742.564 31.79  748.7 31.56 754.836 31.14
767.118 30.76 791.663 29.53 803.935 29.27  810.071 28.98 822.344 28.85
840.762 28.1 859.17 27.07 871.443 26.7  883.715 26.58 895.987 26.01 902.124
26.21 908.26 26.1 926.678 25.07  945.086 24.65 963.495 24.81 969.631 25.02
981.904 24.77 988.04 25.12  994.176 25.051000.322 25.231006.458 24.77 1018.73
24.971024.866 24.8 1031.003 24.781043.275 25.141049.411 25.451073.956
24.831079.322 24.93 1080.102 24.941086.238 24.361092.374 23.451106.901
4.091108.114 3.09 1116.665 2.851124.615 2.851130.488 1.11132.724 .331133.749
1.74 1134.284 -.131139.744 -.271146.679 -.741155.089 -1.791164.899 -1.4
1173.845 -.17 1183.28 -.481193.757 .631200.382 2.011207.693 4.71  1227.38
20.51233.525 20.691239.661 20.81245.797 21.02 1258.07 21.33 1264.206
21.451270.229 21.721276.262 21.731282.286 21.521288.309 20.95 1294.342
21.081300.365 21.371306.389 21.221312.422 21.281318.445 21.51 1324.469
21.761330.501 20.661336.525 20.211342.548 20.21348.581 20.12 1360.628
20.071366.661 20.11372.684 20.451378.708 20.86 1384.74 21.13 1390.764
21.351396.787 21.85 1402.82 22.231414.876 22.43 1420.9 22.49 1426.923
22.751432.947 22.91 1438.97 23.181445.003 23.291451.026 23.42  1457.05
23.481463.073 23.621469.097 23.73 1475.12 23.791481.143 23.87 1487.176
24.011499.223 24.231505.247 24.38 1511.27 24.55 1529.35 24.79 1535.373 24.82
1547.42 25.041559.467 25.57 1565.49 25.741571.523 25.83 1577.547 26.1 1583.57
26.191589.593 26.451595.617 26.73 1601.64 26.93 1607.664 27.041613.697 27.39
1619.72 27.511625.743 27.61631.767 27.72  1637.79 27.91643.814 28.111649.837
28.14

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .091079.322 .04 1227.38 .085

Bank Sta: Left Right Coeff Contr. Expan.
 1079.322 1227.38 .5 .8
Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 300 20 T
Skew Angle = 20
 Downstream Deck/Roadway Coordinates
 num= 19
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
```

457.63 27.4 753.633 28.26 833.507 27.59
947.21 26.04 1090.043 25.02 1129.51 25
1129.51 28.25 1132.33 28.25 1132.33 25.62 18.39 1183.073 25.12 18.081236.635
24.76 17.281236.635 28.27 1238.515 28.25 1239.455 28.19 1239.455 23.12
1326.846 22.75 1435.85 22.34 1576.804 24.79 1710.241 29.1

Downstream Bridge Cross Section Data
Station Elevation Data num= 244
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 23.49 6.164 23.79 12.329
23.96 18.493 24.43 24.658 24.5 30.822 24.61 36.986 24.53 43.151 24.26 49.315
24.18 55.479 24.13 67.808 23.92 73.973 23.75 80.137 23.55 86.301 23.29
92.466 22.97 98.63 22.73 104.795 22.36 110.959 21.33 117.123 20.23 123.288
19.77 129.452 19.9 141.781 20.09 147.936 20.24 154.1 20.16 160.265 19.92
166.429 19.78 172.593 19.53 178.758 19.2 184.922 19.03 191.087 18.72 197.251
18.61 203.415 18.57 209.58 18.5 215.744 18.41 221.908 18.65 228.073 18.58
234.237 18.6 240.402 18.85 246.566 19.06 252.73 18.89 258.895 19.05 271.223
18.9 277.388 19.19 283.552 19.36 289.717 19.55 295.881 19.81 302.045 19.92
308.21 19.95 314.374 20.29 320.539 20.68 326.703 21.05 332.867 21.3 339.032
21.68 345.196 22.01 351.36 22.16 357.525 22.5 363.689 22.93 369.854 23.42
376.018 23.68 388.347 24.78 394.511 25.02 400.676 25.28 406.84 25.38 413.004
25.74 419.169 26.19 425.333 26.55 431.488 26.68 437.652 26.74 443.817 26.9
449.981 26.88 456.146 27.01 462.31 27.11 474.639 27.39 480.803 27.22 486.967
27.38 493.132 27.47 499.296 27.5 505.461 27.61 511.625 27.62 517.789 27.65
530.118 27.8 536.283 27.81 548.611 27.8 554.776 27.75 560.94 27.83 567.104
27.83 573.269 27.9 585.598 27.93 591.762 28.07 597.926 28 604.091 28.04
610.255 28.13 616.42 28.1 622.584 28.24 628.748 28.32 634.913 28.16 641.077
28.21 647.242 28.33 653.406 28.32 659.57 28.49 665.735 28.46 671.899 28.49
678.063 28.67 684.228 28.66 690.392 28.77 696.557 28.64 702.721 28.62
708.885 28.52 715.05 28.76 721.214 28.88 727.378 28.93 733.543 28.9 739.707
28.96 745.862 29.21 752.027 29.41 758.191 29.52 764.355 29.6 770.52 29.78
776.684 29.93 782.849 30.01 789.013 30.18 801.342 30.67 807.506 30.78 813.67
30.95 819.835 30.91 825.999 30.9 832.164 30.85 838.328 30.72 844.492 30.65
850.657 30.54 862.985 30.71 869.15 30.34 875.314 30.02 881.479 28.92 887.643
27.66 893.807 27.31 899.972 27.24 906.136 27.19 918.465 27.02 924.629 26.97
930.794 26.9 943.122 26.58 955.451 26.3 961.616 26.18 967.78 26.12 980.109
25.79 986.273 25.66 992.438 25.62 998.602 25.411004.766 25.27 1010.931
25.421017.095 25.42 1023.26 25.31029.424 25.161035.588 25.16 1041.753
25.11047.917 24.841054.081 24.931060.236 24.741066.401 24.65 1072.565
24.421078.729 24.381084.894 24.091091.058 23.831097.223 23.75 1103.387 23.81
1132.33 25.521132.743 4.561148.107 2.451165.106 .79 1179.192 .361186.982
.791199.236 1.81210.503 .651220.642 1.33 1233.046 3.841233.083 21.041245.168
23.491251.332 23.391257.497 23.22 1263.661 23.211269.825 23.48 1275.99
23.561282.154 23.451288.319 23.21 1294.483 23.331300.647 23.311306.812
22.761312.976 22.331319.141 22.19 1325.305 22.141331.469 22.231337.634
22.281343.798 22.541349.962 22.73 1356.117 22.561362.282 22.411368.446 22.44
1374.61 22.521380.775 22.47 1386.939 22.471393.104 22.341399.268 22.11405.432
22.111411.597 22.04 1417.761 21.991423.926 22.181430.034 22.411436.151
22.571442.259 22.66 1448.367 22.841454.475 23.111460.583 23.421466.691
23.631472.799 23.71 1478.907 23.831485.015 24.011491.132 24.26 1497.24
24.41503.348 24.5 1509.456 24.651515.564 24.881521.672 25.05 1527.78
25.291533.888 25.76 1540.006 25.921546.114 26.041552.222 26.1 1558.33
25.841564.438 25.42 1570.546 25.41576.654 25.771582.762 26.73 1588.87
27.111594.987 27.21 1601.095 27.461607.203 27.751613.311 28.121625.527
28.391631.635 28.67 1637.743 28.921643.861 29.041649.969 29.321656.077 29.37

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 1132.33 .041245.168 .08

Bank Sta: Left Right Coeff Contr. Expan. 1132.331245.168 .5 .8
Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 320 20 T
Skew Angle = 20

Upstream Embankment side slope = 0 horiz. to 1.0 vertical Downstream Embankment side slope = 0 horiz. to 1.0 vertical Maximum allowable submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
 Energy
 W.S. Pro Method

 W.S.Pro Data
 Left Embankment
 El of the top of the embankment = 25
 El of the toe of the abutment = 4.5
 Right Embankment
 El of the top of the embankment = 25
 El of the toe of the abutment = 4.5 Abutment Type = 4 Vert. abutments and sloping embankments with wingwalls Slope of abutments =
 Top with of embankment = 53
 Centroid station of bridge opening =
 Wing Wall Type = Angular wing walls
 Width = 5
 Angle = 45
 Radius =
 Guide Banks Type = No Guide Bank present
 Length =
 Offset =
 Angle =
 Optional Contraction and expansion coefficients
 At approach Section
 At Guide Bank
 At upstream outside
 At upstream inside (BU)
 At downstream inside (BD)
 Piers are Continuous for the width of the bridge
 Use Geometric mean as Friction Slope Method

Selected Low Flow Methods = W.S.Pro Method

High Flow Method

Pressure and Weir flow Submerged Inlet Cd =
Submerged Inlet + Outlet Cd = .8
Max Low Cord =

Additional Bridge Parameters
Add Friction component to Momentum
Do not add Weight component to Momentum
Class B flow critical depth computations use critical depth
inside the bridge at the upstream end
Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 51829.71

INPUT
Description: 50.3 DS Face Church St
Station Elevation Data num= 244
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 23.49 6.164 23.79 12.329
23.96 18.493 24.43 24.658 24.5 30.822 24.61 36.986 24.53 43.151 24.26 49.315
24.18 55.479 24.13 67.808 23.92 73.973 23.75 80.137 23.55 86.301 23.29
92.466 22.97 98.63 22.73 104.795 22.36 110.959 21.33 117.123 20.23 123.288
19.77 129.452 19.9 141.781 20.09 147.936 20.24 154.1 20.16 160.265 19.92
166.429 19.78 172.593 19.53 178.758 19.2 184.922 19.03 191.087 18.72 197.251
18.61 203.415 18.57 209.58 18.5 215.744 18.41 221.908 18.65 228.073 18.58
234.237 18.6 240.402 18.85 246.566 19.06 252.73 18.89 258.895 19.05 271.223
18.9 277.388 19.19 283.552 19.36 289.717 19.55 295.881 19.81 302.045 19.92
308.21 19.95 314.374 20.29 320.539 20.68 326.703 21.05 332.867 21.3 339.032
21.68 345.196 22.01 351.36 22.16 357.525 22.5 363.689 22.93 369.854 23.42
376.018 23.68 388.347 24.78 394.511 25.02 400.676 25.28 406.84 25.38 413.004
25.74 419.169 26.19 425.333 26.55 431.488 26.68 437.652 26.74 443.817 26.9
449.981 26.88 456.146 27.01 462.31 27.11 474.639 27.39 480.803 27.22 486.967
27.38 493.132 27.47 499.296 27.5 505.461 27.61 511.625 27.62 517.789 27.65
530.118 27.8 536.283 27.81 548.611 27.8 554.776 27.75 560.94 27.83 567.104
27.83 573.269 27.9 585.598 27.93 591.762 28.07 597.926 28 604.091 28.04
610.255 28.13 616.42 28.1 622.584 28.24 628.748 28.32 634.913 28.16 641.077
28.21 647.242 28.33 653.406 28.32 659.57 28.49 665.735 28.46 671.899 28.49
678.063 28.67 684.228 28.66 690.392 28.77 696.557 28.64 702.721 28.62
708.885 28.52 715.05 28.76 721.214 28.88 727.378 28.93 733.543 28.9 739.707
28.96 745.862 29.21 752.027 29.41 758.191 29.52 764.355 29.6 770.52 29.78
776.684 29.93 782.849 30.01 789.013 30.18 801.342 30.67 807.506 30.78 813.67
30.95 819.835 30.91 825.999 30.9 832.164 30.85 838.328 30.72 844.492 30.65
850.657 30.54 862.985 30.71 869.15 30.34 875.314 30.02 881.479 28.92 887.643
27.66 893.807 27.31 899.972 27.24 906.136 27.19 918.465 27.02 924.629 26.97
930.794 26.9 943.122 26.58 955.451 26.3 961.616 26.18 967.78 26.12 980.109
25.79 986.273 25.66 992.438 25.62 998.602 25.411004.766 25.27 1010.931
25.421017.095 25.42 1023.26 25.31029.424 25.161035.588 25.16 1041.753
25.11047.917 24.841054.081 24.931060.236 24.741066.401 24.65 1072.565
24.421078.729 24.381084.894 24.091091.058 23.831097.223 23.75 1103.387 23.81
1132.33 25.521132.743 4.561148.107 2.451165.106 .79 1179.192 .361186.982
.791199.236 1.81210.503 .651220.642 1.33 1233.046 3.841233.083 21.041245.168
23.491251.332 23.391257.497 23.22 1263.661 23.211269.825 23.48 1275.99

23.561282.154 23.451288.319 23.21 1294.483 23.331300.647 23.311306.812
22.761312.976 22.331319.141 22.19 1325.305 22.141331.469 22.231337.634
22.281343.798 22.541349.962 22.73 1356.117 22.561362.282 22.411368.446 22.44
1374.61 22.521380.775 22.47 1386.939 22.471393.104 22.341399.268 22.11405.432
22.111411.597 22.04 1417.761 21.991423.926 22.181430.034 22.411436.151
22.571442.259 22.66 1448.367 22.841454.475 23.111460.583 23.421466.691
23.631472.799 23.71 1478.907 23.831485.015 24.011491.132 24.26 1497.24
24.41503.348 24.5 1509.456 24.651515.564 24.881521.672 25.05 1527.78
25.291533.888 25.76 1540.006 25.921546.114 26.041552.222 26.1 1558.33
25.841564.438 25.42 1570.546 25.41576.654 25.771582.762 26.73 1588.87
27.111594.987 27.21 1601.095 27.461607.203 27.751613.311 28.121625.527
28.391631.635 28.67 1637.743 28.921643.861 29.041649.969 29.321656.077 29.37

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 1132.33 .041245.168 .08
 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1132.331245.168 68.99 67.69 68.38 .5 .8 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 320 20 T
Skew Angle = 20

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 51762.02

INPUT
Description: 50 Exit Church St
Station Elevation Data num= 157
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 25.27 13.11 25.29 32.77
25.22 52.43 25.51 72.09 25.31 98.31 24.61 111.42 23.84 124.52 23.42 131.08
22.87 144.19 21.01 150.74 20.61 157.29 20.52 163.85 20.7 176.95 21.4 183.51
21.46 196.62 20.55 203.17 20.38 209.72 20.56 216.28 21.02 222.83 21.83
235.94 23.72 249.05 24.87 262.15 25.5 281.82 25.29 308.03 25.44 321.14 25.26
334.25 25.25 347.36 25.04 360.46 25.07 386.68 25.53 393.23 25.53 419.45
25.19 426 25.19 445.66 24.91 452.22 24.91 471.88 24.64 478.43 24.68 491.54
24.46 498.09 24.47 517.76 25.04 530.86 24.87 550.53 25.24 609.51 28.16
635.73 28.88 642.28 29.17 661.94 29.27 668.49 29.59 681.6 29.78 694.71 30.55
701.26 31.12 707.82 31.52 714.37 31.56 727.48 31.1 734.03 31.05 747.14 31.4
773.36 31.87 806.13 32.94 832.34 33.17 865.11 33.87 897.88 33.78 904.43
33.49 910.99 32.69 917.54 31.42 924.1 31.25 930.65 31.34 943.76 31.29 950.31
31.01 969.97 28.88 976.53 28.26 989.63 26.62 1022.4 21.43 1035.51 19.55
1042.07 18.75 1048.62 18.47 1055.17 18.33 1061.73 17.5 1068.28 16.34 1081.39
15.47 1094.5 14.98 1120.71 14.56 1127.27 14.35 1153.48 12.09 1160.04 11.79
1179.7 10.45 1186.25 9.6 1192.8 9.25 1193.99 9.21 1215.13 8.29 1223.96 3.75
1228.38 2.93 1238.2 2.31 1245.13 2.04 1251.81 3.19 1262.56 3.16 1270.33 3.9
1277.49 3.87 1288.91 3.32 1299.85 3.12 1305.63 2.05 1312.18 3.45 1320.97
5.03 1322.43 8.36 1369.71 15.97 1376.21 17.11 1382.72 17.8 1389.22 18.33
1395.73 18.67 1402.23 18.79 1408.73 19.07 1421.74 19.77 1428.25 20.1 1434.75
20.27 1441.26 20.4 1447.76 20.55 1460.77 20.94 1467.27 21.22 1473.78 21.61
1480.28 21.86 1486.79 21.98 1493.29 22.25 1499.79 22.59 1506.3 22.88 1512.8
22.99 1519.31 23 1525.81 23.26 1532.31 23.47 1538.82 23.57 1545.32 23.73

1551.83 23.99 1558.33 24.13 1564.84 24.23 1571.34 24.4 1577.84 24.65 1584.35 25.02 1590.85 25.42 1597.36 25.61 1603.86 25.75 1610.36 25.93 1616.87 26.38 1623.37 26.94 1629.88 27.52 1636.38 27.98 1642.89 28.12 1649.39 28.12 1662.4 28.25 1675.41 28.27 1681.91 28.44 1688.41 28.64 1701.42 28.71 1707.93 28.56 1714.43 28.6 1720.94 29.45 1727.44 30.24 1733.94 30.43 1740.45 30.54 1746.95 30.97 1753.46 31.07

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 1120.71 .04 1389.22 .08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1120.71 1389.22 1675.78 1643.73 1610.01 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 50118.29

INPUT
Description: 49
Station Elevation Data num= 159
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 23.45 6.56 23.3 19.67 22.81 52.44 22.61 65.55 23 72.11 22.88 78.66 23.4 85.22 23.52 91.77 23.18 98.33 23.12 104.88 23.2 111.44 23.54 137.66 23.44 157.32 23.64 170.43 24.18 203.21 24.54 209.76 24.7 222.87 24.62 229.43 24.47 242.54 24.8 255.65 24.61 262.21 24.7 268.76 24.64 281.87 24.77 288.43 25.12 321.2 25.12 334.31 25.26 367.09 24.49 380.2 23.82 399.86 23.78 406.42 23.93 419.53 23.73 439.19 22.95 445.75 22.92 458.86 22.36 478.53 21.25 491.64 20.76 511.3 19.8 517.86 19.2 524.41 18.4 530.97 17.75 557.19 15.88 570.3 15.2 589.96 14.54 596.52 14.71 609.63 14.35 629.29 14.9 648.96 13.64 655.51 13.12 662.07 12.09 668.62 10.56 672.5 9.55 675.18 8.85 681.74 6.33 690 2.06 690.42 1.98 690.81 1.99 691.19 1.93 691.48 1.83 691.83 1.78 692.18 1.7 692.62 1.94 693.09 1.46 693.7 1.35 694.46 1.26 695.41 1.17 696.41 .97 697.76 1.01 699.83 1.11 701.97 1.31 704.23 1.13 705.85 1.38 708.61 1.26 710.41 1.43 712.29 1.7 717.25 1.65 718.83 1.55 720.43 1.4 727.16 1.36 728.42 1.31 729.57 1.27 729.57 2.43 735.28 1.78 736.44 1.28 737.78 1.27 739.38 1.28 740.82 1.33 742.31 1.44 742.31 1.2 745.14 1.22 746.39 1.32 748.12 1.36 749.86 1.32 751.76 1.26 756.56 1.4 758.3 1.34 759.91 1.34 761.6 1.37 763.07 1.37 764.67 1.43 766.14 1.45 767.7 1.6 769.16 1.82 770.69 1.94 772.12 1.82 773.58 1.86 774.99 1.89 776.51 1.91 777.88 1.96 779.42 2.08 780.9 2.23 782.39 2.25 783.68 2.19 784.98 2.25 789.08 2.37 790.11 2.41 791.04 2.49 792.18 2.78 799.73 5.17 806.28 5.96 808.69 6.58 812.84 7.64 819.39 9.64 825.95 10.41 832.5 10.56 839.06 10.43 845.61 10.46 858.72 10.87 865.28 11.71 871.83 13 878.39 13.88 884.94 14.58 898.05 15.51 904.61 16.4 917.72 17.22 924.28 17.43 957.05 17.59 963.61 17.8 976.72 18.75 983.27 19.05 989.83 19.76 1002.94 20.91 1009.49 21.34 1022.6 21.53 1029.16 21.79 1081.6 22.64 1101.26 22.82 1107.82 23.22 1114.37 23.13 1140.6 23.54 1153.71 23.94 1160.26 23.94 1173.37 24.46 1199.59 24.89 1212.7 24.93 1278.25 26.29 1291.36 26.52 1317.58 26.65 1343.81 27.16

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 629.29 .04 924.28 .082

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 629.29
924.28 1344.97 1367.54 1376.48 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 48750.75

INPUT
Description: 48
Station Elevation Data num= 403
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 24.73 6.55 24.63 13.11 24.55
19.66 24.75 26.21 24.49 32.76 24.55 39.32 24.71 45.87 24.74 52.42 24.72
58.98 24.7 65.53 24.62 85.19 24.61 98.29 24.79 104.85 24.61 117.95 24.74
131.06 24.63 144.16 24.68 157.27 24.93 163.82 24.72 190.03 24.51 196.59
24.35 209.69 24.55 216.25 24.54 222.8 24.2 229.35 23.68 235.9 23.41 262.12
23.35 275.22 24.17 281.77 24.39 288.33 24.88 294.88 25.51 301.43 25.38
314.54 24.61 321.09 24.71 334.2 24.61 347.3 25.3 353.86 25.41 366.96 24.78
380.07 24.97 386.62 24.93 393.17 25.04 399.73 25.32 406.28 25.4 432.49 25.15
452.15 25.14 465.25 24.62 478.36 23.46 484.91 21.58 491.47 19.56 511.12
15.02 517.68 13.92 524.23 13.55 530.78 13.46 543.89 12.97 550.44 12.87 557
13 570.1 13.51 602.87 12.83 615.97 13.06 622.52 13.47 629.08 13.57 642.18
13.31 661.84 13.32 701.16 13.67 707.71 13.61 720.82 13.34 733.92 13.72
747.03 13.48 753.58 13.55 760.14 13.34 806.01 14.13 812.56 13.97 819.11
14.08 825.66 14.37 832.22 14.48 838.77 14.77 851.88 14.78 864.98 15.53
878.09 15.84 891.19 15.53 897.75 15.03 904.3 14.37 910.85 13.43 923.96 12.2
937.06 11.78 943.62 11.03 947.09 10.14 950.17 9.36 956.72 6.88 963.28 5.03
970 1.75 970.78 1.73 971.59 1.66 972.25 1.62 972.95 1.59 973.91 1.58 974.99
1.51 975.74 1.43 976.83 1.38 977.98 1.33 979.59 1.29 981.1 1.22 983.02 1.25
992.52 1.02 994.08 .91 995.85 .89 995.85 .95 999.13 .84 1000.83 .59 1002.68
.48 1004.44 -.07 1012.35 -.02 1015.25 -.11 1015.25 .09 1024.94 -.03 1027.97
-.13 1030.7 -.25 1033.1 -.38 1035.4 -.44 1037.52 -.48 1039.51 -.4 1041.46
-.3 1043.57 -.21 1045.86 -.21 1048.41 -.2 1050.7 -.26 1052.96 -.07 1055.02
-.17 1056.94 -.33 1059.38 -.14 1061.37 .3 1063.31 .56 1064.04 5.2 1068.19
5.63 1074.74 7.15 1081.3 8.28 1087.86 8.99 1107.53 9.84 1120.64 9.89 1127.2
10.69 1140.31 13.51 1146.87 14.73 1153.43 15.57 1159.98 15.78 1179.65 15.58
1212.44 16.01 1238.67 15.92 1251.78 15.97 1278.01 15.55 1291.12 15.53
1297.68 15.74 1310.79 15.87 1323.91 16.45 1337.02 16.76 1350.13 17.38
1382.92 18.09 1402.59 18.13 1461.6 17.19 1474.72 17.14 1487.83 17.39 1500.94
17.36 1514.06 17.67 1533.73 17.65 1559.96 17.36 1566.51 17.45 1579.63 17.36
1612.41 17.63 1618.97 17.55 1645.2 17.65 1658.31 17.61 1671.42 17.48 1677.98
17.54 1684.94 17.44 1691.5 17.45 1698.05 17.27 1704.6 17.11 1711.16 16.93
1717.71 16.97 1724.27 17.04 1730.82 16.89 1737.38 16.75 1743.93 16.62
1750.48 16.27 1757.04 16.32 1763.59 16.29 1770.15 16.07 1776.7 16.21 1783.25
16.05 1789.81 15.92 1796.36 15.89 1802.92 15.97 1809.47 15.82 1816.03 15.62
1822.58 15.72 1829.13 15.84 1835.69 15.84 1842.24 15.89 1848.8 15.9 1855.35
16 1861.91 15.95 1868.46 16.21 1875.01 16.58 1881.57 17.99 1888.12 18.83
1894.68 19.23 1901.23 19.28 1907.78 19.49 1914.34 19.66 1920.89 20.04
1927.45 20.4 1934 20.74 1940.56 21.15 1947.11 21.53 1953.66 22.01 1960.22
22.48 1966.77 22.98 1973.33 23.33 1979.88 23.74 1986.43 24.11 1992.99 24.38
1999.54 24.69 2006.1 25.22 2012.65 25.4 2019.21 25.48 2025.76 25.56 2032.31
25.89 2038.87 25.94 2045.42 25.93 2051.98 25.85 2058.53 25.87 2065.09 25.69
2071.64 25.76 2078.19 25.92 2084.75 25.93 2091.3 25.97 2097.86 26.09 2104.41

26.04 2110.96 26.07 2117.52 26.25 2124.07 26.3 2130.63 26.18 2137.18 25.96
2143.74 25.34 2150.29 24.53 2156.84 23.98 2163.4 23.52 2169.95 23.2 2176.51
23.37 2183.06 23.32 2189.62 23.46 2196.17 23.31 2202.72 23.43 2209.28 23.76
2215.83 23.77 2222.39 23.76 2228.94 23.78 2235.49 23.95 2242.05 24.09 2248.6
23.93 2255.16 23.43 2261.71 22.68 2268.27 22.2 2274.82 22.45 2281.37 22.63
2287.93 22.65 2294.48 23.19 2301.04 23.38 2307.59 23.4 2314.15 23.21 2320.7
22.85 2327.25 22.58 2333.81 22.23 2340.36 21.81 2346.92 21.51 2353.47 20.6
2360.02 18.99 2366.58 18.09 2373.13 17.73 2379.69 17.53 2386.24 17.53 2392.8
17.49 2399.35 17.3 2405.9 17.45 2412.46 17.83 2419.01 17.82 2425.57 17.84
2432.12 18.14 2438.68 18.44 2445.23 18.66 2451.78 18.8 2458.34 18.96 2464.89
19 2471.45 18.89 2478 18.81 2484.55 18.74 2491.11 18.64 2497.66 18.64
2504.22 18.65 2510.77 18.73 2517.33 18.79 2523.88 18.73 2530.43 18.84
2536.99 19.14 2543.54 19.49 2550.1 19.9 2556.65 20.5 2563.21 21.07 2569.76
21.38 2576.31 21.58 2582.87 22.02 2589.42 22.72 2595.98 23.89 2602.53 25.32
2609.08 26.58 2615.64 27.68 2622.19 28.53 2628.75 29.09 2635.3 29.55 2641.86
30.02 2648.41 30.49 2654.96 30.88 2661.52 31.03 2668.07 31.03 2674.63 31.12
2681.18 31.18 2687.74 31.18 2694.29 31.13 2700.84 31.06 2707.4 30.91 2713.95
30.79 2720.51 30.67 2727.06 30.32 2733.61 29.79 2740.17 29.15 2746.72 28.61
2753.28 28.39 2759.83 28.18 2766.39 28.06 2772.94 28.17 2779.49 28.15
2786.05 28.15 2792.6 28.41 2799.16 28.74 2805.71 28.85 2812.27 28.95 2818.82
29.02 2825.37 29.03 2831.93 28.98 2838.48 28.91 2845.04 28.73 2851.59 28.37
2858.14 27.92 2864.7 27.36 2871.25 26.79 2877.81 26.5 2884.36 26.41 2890.92
26.26 2897.47 26.31 2904.02 26.65 2910.58 26.77 2917.13 26.46 2923.69 25.61
2930.24 24.66 2936.8 24.37 2943.35 24.48 2949.9 24.21 2956.46 23.85 2963.01
24.68 2969.57 24.44 2976.12 24.25 2982.67 24.19 2989.23 24.33 2995.78 24.2
3002.34 24.11 3008.89 23.99 3015.45 23.82 3022 23.82 3028.55 23.59 3035.11
23.31 3041.66 23.12 3048.22 23.2 3054.77 23.41 3061.33 23.66 3067.88 23.69
3074.43 23.73 3080.99 23.81 3087.54 23.97 3094.1 24.13 3100.65 23.9 3107.2
23.72 3113.76 23.88 3120.31 23.91 3126.87 23.9 3133.42 23.97 3139.98 24.12
3146.53 24.29 3153.08 24.35 3159.64 24.4 3166.19 24.5 3172.75 24.64 3179.3
24.78 3185.85 25.27 3192.41 26.17

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .088 878.09 .04 1159.98 .08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 878.09
1159.98 1747.9 1742.19 1739.19 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 1403 3192.41 18.13 F

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 47008.56

INPUT
Description: 47
Station Elevation Data num= 157
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 22.35 19.61 23.42 39.23
22.11 411.89 21.91 509.96 22.24 575.34 24.98 653.8 24.79 974.16 22.94
1026.46 20.6 1098.38 20.41 1111.46 20.93 1137.61 20.71 1150.68 22.17 1281.44
21.45 1359.9 19 1431.81 19.33 1464.49 18.28 1536.38 10.95 1555.99 11.28

1562.53 10.51 1565.97 9.52 1569.06 8.64 1575.6 5.69 1593.04 2.11 1594 2.05
1595.04 2 1596 1.96 1597.09 1.91 1598.26 1.89 1599.56 1.85 1600.77 1.83
1602.06 1.8 1603.17 1.68 1604.54 1.62 1605.81 1.58 1607.19 1.59 1608.42 1.56
1609.92 1.55 1611.14 1.49 1611.14 1.74 1613.6 1.51 1614.77 1.41 1615.9 1.36
1617.2 1.35 1618.32 1.26 1619.5 1.28 1620.62 1.23 1621.84 1.2 1622.93 1.43
1624.19 1.37 1625.42 1.14 1626.76 1.1 1628.03 1.13 1629.44 1.02 1630.78 1.05
1632.14 1.23 1633.32 1.17 1634.55 1.05 1635.72 .95 1636.96 .9 1639.29 .81
1641.91 1.08 1642.75 1.07 1643.84 .81 1644.84 .93 1646.24 .45 1647.9 .15
1650.88 -.03 1653.84 -.11 1656.61 -.24 1659.26 -.33 1662.04 -.39 1664.51
-.37 1667.23 -.37 1669.64 -.31 1674.11 -.51 1680.96 -1.01 1681.41 -.5
1683.45 -.4 1685.38 -.06 1687.91 4.48 1693.24 4.98 1699.78 7.16 1706.32 8.28
1712.85 8.7 1719.39 9.29 1725.92 10.04 1732.46 10.43 1738.99 10.6 1745.53
10.83 1752.07 10.95 1758.6 11.18 1765.14 11.72 1771.67 12.42 1778.21 13.11
1784.75 13.58 1791.28 13.75 1797.82 13.99 1830.5 11.56 1837.03 10.27 1843.57
9.69 1908.93 9.81 1928.53 12.65 1935.07 14.42 1948.14 15.19 1993.89 23.11
2000.43 23.22 2039.64 26.97 2150.75 32.86 2157.29 33.56 2163.82 33.05
2222.64 34.79 2242.25 35.85 2425.25 38.68 2457.93 37.32 2503.68 36.85
2557.35 31.44 2577 30.21 2603.19 31.25 2622.84 30.51 2681.77 21.22 2753.81
23.64 2780 22.24 2786.55 21.25 2812.74 13.66 2819.29 12.78 2871.68 13
2884.78 13.45 2897.88 12.5 2917.52 12.85 2937.17 14.19 2976.46 13.2 3015.75
10.73 3081.24 10.41 3087.79 10.87 3094.33 10.72 3100.88 9.93 3159.82 10.81
3172.92 10.38 3231.85 13.83 3271.15 13.77 3310.44 17.87 3421.76 23.3 3565.83
23 3670.61 19.75 3736.09 21.8 3742.64 22.62 3749.19 24.99 3755.74 26.26
3775.39 27.73 3788.48 27.37 3808.13 24.53 3821.23 20.66 3827.77 20.72
3847.42 23.87 3893.26 25.1 3958.75 31.19

Manning's n Values num= 3 Sta n Val Sta n Val Sta n Val
 0 .085 1431.81 .04 1797.82 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1431.81
1797.82 1593.35 1644.1 1707.52 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 45364.46

INPUT
Description: 46
Station Elevation Data num= 399
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 24.22 13.09 24.02 26.19
24.06 32.73 23.94 52.37 24.09 65.46 23.47 78.56 23.32 85.1 22.84 91.65 22.66
104.74 22.54 130.93 23.34 144.02 23.19 150.56 22.98 157.11 23.2 176.75 23.06
196.39 22.68 202.93 22.8 209.48 23.1 216.03 23.15 222.57 22.86 255.3 22.84
281.49 22.29 288.04 22.25 294.58 21.69 307.68 21.49 314.22 21.01 320.77
20.86 340.41 21.07 353.5 20.94 360.05 21.03 373.14 20.74 392.78 20.76 399.32
20.65 405.87 20.81 425.51 20.8 438.6 21.18 445.15 21.2 458.24 20.82 471.33
20.83 477.88 21.16 484.42 21.26 497.52 21.17 510.61 20.75 517.16 20.4 530.25
20.16 543.34 20.49 556.43 20.55 562.98 20.32 569.53 20.75 576.07 20.55
582.62 19.83 595.71 19.29 608.8 18.96 615.35 19.3 621.9 19.29 634.99 19.83
654.63 19.59 674.27 19.98 700.45 19.91 713.54 19.96 726.64 19.8 739.73 19.1
752.82 19.09 759.37 18.97 765.91 18.99 772.46 18.61 779.01 18.78 792.1 18.2
798.65 18.01 811.74 18.1 818.28 18.28 824.83 18.15 851.02 17.12 864.11 17.12

870.66 17.23 883.75 16.61 890.29 16.03 896.84 16.05 903.39 16.6 909.93 16.26
923.03 16.16 936.12 15.76 942.66 15.88 949.21 15.79 968.85 15.9 975.4 15.72
988.49 16.11 995.03 16.02 1001.58 16.09 1021.22 15.77 1027.77 16 1034.31
16.9 1040.86 18 1053.95 18.66 1067.04 19.08 1073.59 19.11 1099.77 20 1119.41
20.45 1132.51 20.33 1145.6 20.65 1165.24 20.73 1178.33 20.52 1184.88 20.53
1191.42 20.79 1204.52 20.91 1211.06 21.19 1230.7 21.32 1250.34 20.81 1263.43
20.18 1276.52 19.95 1283.07 19.53 1296.16 19.43 1302.71 19.82 1328.89 20.33
1335.44 20.56 1348.53 20.65 1361.63 21.17 1374.72 21.49 1381.27 22.13
1387.81 22.14 1394.36 22.29 1400.9 22.19 1407.45 21.72 1414 20.93 1427.09
18.99 1440.18 17.38 1446.73 16.94 1453.27 16.84 1459.82 16.58 1466.37 16.59
1479.46 16.04 1486.01 15.5 1492.55 15.11 1499.1 15.09 1505.64 15.39 1525.28
15.58 1531.83 15.75 1538.38 15.78 1571.11 15.35 1584.2 16.65 1590.75 16.93
1597.29 16.69 1603.84 17.85 1610.38 18.86 1616.93 19.33 1630.02 18.47
1636.57 17.76 1649.66 15.52 1656.21 14.2 1662.76 13.51 1675.85 11.43 1688.94
11.06 1695.49 11.09 1702.03 10.94 1708.58 11.12 1754.4 11.28 1767.5 10.74
1780.59 11.18 1787.13 11.12 1819.87 11.41 1826.41 11.33 1832.96 11.4 1846.05
10.92 1852.6 10.21 1865.69 9.74 1878.78 9.09 1898.42 9.23 1918.06 8.74
1937.7 8.66 1950.79 8.76 1976.97 8.6 1996.6 8.21 2016.24 8.24 2022.78 8
2042.42 7.96 2048.96 8.07 2075.14 7.87 2088.23 8.02 2101.32 7.92 2114.41
7.67 2120.96 7.76 2140.59 7.71 2153.68 8.14 2160.23 8.48 2166.77 9.31
2173.32 10.43 2179.86 11.07 2199.5 12.27 2206.04 12.89 2212.59 13.73 2225.68
14.05 2251.86 13.58 2264.95 12.83 2271.49 12.3 2284.58 12.17 2291.13 12.25
2297.67 11.92 2317.3 11.8 2350.03 11.32 2356.57 11.49 2369.66 11.49 2376.21
11.7 2395.84 11.79 2415.48 11.46 2422.02 11.16 2428.57 11 2435.11 10.42
2448.2 9.64 2454.75 9.62 2467.84 10.54 2474.38 11.8 2487.47 13.15 2500.56
14.2 2513.65 14.79 2526.74 14.76 2539.83 14.17 2546.38 12.78 2552.92 11.55
2559.47 10.67 2572.56 9.26 2579.1 8.11 2585.65 5.56 2586.56 5.35 2600 .52
2600.61 .42 2601.19 .4 2601.87 .42 2602.29 .4 2602.73 .37 2603.1 .37
2603.86 .49 2604.65 .47 2605.77 .23 2607.03 .2 2608.55 .19 2609.98 .17
2611.55 .13 2613.01 .03 2614.55 -.11 2615.91 -.13 2617.33 -.2 2618.58 -.2
2619.89 -.24 2621.04 -.37 2622.28 -.31 2624.56 -.54 2625.64 -.66 2626.9 -.75
2628.25 -.84 2630.51 -.87 2632.68 -.94 2634.81 -.94 2637.07 -.89 2639.38
-.87 2641.62 -.92 2643.07 -1.01 2645.32 -1.02 2647.52 -1.01 2649.67 -1.02
2651.76 -1.01 2653.71 -1.02 2655.48 -1.01 2657.1 -1.02 2658.74 -.94 2660.51
-.85 2662.65 -.65 2664.94 -.58 2666.54 -.32 2668.07 -.15 2669.66 -.05
2671.15 .09 2672.78 .21 2674.22 .39 2675.71 .43 2677.07 .58 2678.48 .56
2678.48 .67 2680.85 .63 2681.93 .64 2692.83 7.87 2696.91 9.56 2703.46 11.34
2710 12.18 2716.55 12 2723.09 11.46 2736.18 9.62 2742.73 8.86 2749.27 8.27
2755.82 7.92 2782 7.59 2801.63 7.14 2821.27 6.9 2847.44 7.31 2853.99 6.5
2860.53 6.94 2867.08 7.75 2880.17 8.08 2886.71 8.98 2893.26 10.36 2899.8
11.57 2906.35 12.23 2919.44 13.31 2932.53 13.53 2945.62 13.26 2958.71 12.62
2971.8 12.39 2984.89 12.68 2991.43 12.64 2997.98 12.37 3004.52 12.39 3017.61
12.81 3024.16 13.14 3037.25 14.26 3063.43 15.43 3076.52 16.16 3089.61 16.07
3115.79 15.47 3128.88 15.62 3148.51 16.4 3161.6 16 3168.15 16.11 3187.78
17.07 3207.42 17.15 3220.51 17.32 3240.14 18.14 3253.23 19.22 3259.78 20.05
3272.87 23.03 3279.41 23.57 3285.96 23.68 3292.5 23.65 3305.59 24.02 3318.68
24.8 3351.41 26.23 3377.58 26.8 3403.76 27.05 3416.85 27.09 3423.4 27.36
3475.76 27.61 3495.39 27.23 3501.94 26.94 3515.03 26.81 3521.57 26.96
3547.75 27.06 3560.84 26.89 3573.93 27.05 3587.02 27.61 3606.66 28.86
3632.84 29.98 3652.47 30.15 3665.56 30.54 3672.11 30.48 3691.74 30.94
3704.83 31.41 3731.01 31.9 3750.65 33.01 3783.37 33.9 3789.92 34.17 3803.01
34.33 3816.1 34.18 3881.55 35.22 3888.09 35.14 3914.27 35.82 3920.81 36.23
3927.36 36.85 3946.99 38.92 3953.54 39.37 3966.63 41.38 3973.17 41.36
3979.72 41.06 3986.26 40.41 3992.81 39.61 3999.35 39.39 4012.44 39.88

4018.99 40.33 4025.53 41.66 4032.08 44.38 4038.62 45.27 4045.17 42.66
4051.71 40.25 4058.26 40.19 4064.8 41.01 4071.35 41.33 4077.89 41.45 4084.44
40.7 4104.07 40.8 4123.71 41.04 4130.25 41.49 4156.43 42.43 4162.98 42.57
4176.07 42.64 4208.79 43.75 4221.88 44.35 4228.42 44.89 4234.97 45.64
4241.51 46.16 4248.06 46.38 4254.6 46.38 4261.15 46.11

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 2526.74 .04 2716.55 .08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2526.74
2716.55 1089.81 1089.81 1089.81 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 1119 20.4 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 44274.65

INPUT
Description: 45
Station Elevation Data num= 491
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 22.9 2.82 23.22 13.9 23.9
19.32 24.32 21.76 24.42 26.82 24.38 56.1 24.38 56.1 24.08 61.32 24.1 67.8
23.35 73.32 22.86 82.32 22.24 96.25 22.03 115.32 21.52 119.43 21.47 125.82
21.51 133.69 21.65 152.82 21.77 157.64 21.6 163.32 21.56 169.62 21.36 178.32
21 182.55 20.9 187.05 20.67 197.57 20.31 205.09 20.44 208.55 20.2 214.32
20.19 220.11 20.68 221.62 21.14 225.02 21.25 229.32 20.79 232.32 20.34
236.64 20.04 247.48 19.89 257.96 19.97 266.95 19.61 280.22 19.24 287.73
19.11 293.74 18.93 302.88 18.99 314.86 18.76 320.79 18.93 331.33 18.96
332.81 18.83 337.32 18.83 340.32 18.71 346.34 18.69 350.85 19.43 352.3 19.85
355.29 20.22 358.28 20.33 359.86 20.19 362.78 19.45 368.77 19.05 371.76
19.18 374.75 19.51 377.89 19.52 380.74 20.05 383.74 19.69 386.91 19.54
389.92 19.68 392.72 20.44 395.72 20.55 397.43 20.03 398.71 19.14 400.21
18.48 401.71 18.33 404.82 18.97 407.7 19.31 415.46 19.18 419.97 19.49 422.67
19.8 425.66 19.87 433.32 19.62 442.51 19.67 448.52 19.82 454.11 19.83 457.32
20 460.1 19.88 466.32 19.84 469.32 19.92 472.56 19.84 478.07 19.89 487.05
19.86 494.54 20.03 502.03 19.69 505.32 19.44 514.32 19.45 528.98 19.1
532.32 19.08 536.82 19.23 542.46 18.93 547.7 18.88 555.93 18.96 562.73 18.76
566.82 18.78 568.32 18.38 572.82 18.27 578.82 18.3 587.38 18.14 591.28 17.88
597.29 17.81 601.32 17.55 610.81 17.31 611.33 17.35 620.32 17 629.82 16.96
632.82 17.12 637.86 17.03 644.82 17.23 651.38 17.04 661.9 17.11 666.41 17.05
672.42 16.72 680.82 16.46 689.19 16.42 695.82 16.26 704.82 15.78 719.14
15.88 722.82 15.87 725.82 16.15 728.12 15.81 732.53 16.07 735.53 16.45
742.32 16.48 745.32 16.72 749.82 16.57 760.32 16.65 763.32 16.78 770.82 16.9
773.82 16.79 778.32 16.88 793.32 16.88 796.32 17.05 801.49 16.94 805.99
17.02 816.47 17.09 818.18 17.29 821.82 17.36 824.19 16.66 827.82 16.21
833.82 16.01 842.82 14.89 847.91 14.5 850.91 13.99 853.9 13.69 857.25 13.57
859.32 13.33 865.88 12.32 884.82 10.78 894.82 10.57 902.82 9.61 906.31 9.52
908.82 9.68 913.32 9.43 916.32 9.66 922.78 9.68 925.32 9.56 926.82 9.79
930.88 9.96 933.89 10.28 939.9 10.31 943.74 10.52 949.73 9.65 952.32 9.52
954.22 9.62 960.21 10.19 966.2 10.59 973.69 10.91 979.32 11.07 988.32 11.19

990.99 11.09 1004.52 11.13 1009.32 11.05 1017.11 10.74 1023.1 10.78 1028.56
10.52 1033.07 10.42 1039.08 10.05 1042.56 9.75 1045.56 9.18 1049.6 9.06
1053.04 9.23 1058.82 9.23 1065.02 9.79 1071.01 9.97 1075.14 10.27 1082.65
10.53 1094.68 10.47 1105.2 10.7 1111.21 10.74 1114.43 11.02 1117.22 11.09
1126.23 12.98 1127.91 13.52 1133.82 14.92 1135.4 15.08 1138.25 16.25 1141.39
17.28 1142.88 17.53 1145.77 17.68 1150.37 17.68 1154.86 17.21 1157.86 16.38
1160.79 15.89 1163.8 15.7 1168.31 15.58 1174.33 15.74 1177.32 16.04 1181.81
16.3 1186.31 16.19 1190.8 16.26 1198.36 16.25 1202.87 15.96 1214.76 15.43
1223.74 15.2 1235.72 15.01 1241.94 15.06 1249.45 15.38 1250.69 15.29 1262.82
15.24 1273.15 14.98 1278 15.01 1290.03 14.68 1297.54 14.62 1306.32 14.31
1313.82 14.17 1317.07 13.96 1327.32 14.02 1337.54 13.84 1342.03 13.62
1348.02 13.54 1360 13.1 1365.16 12.75 1372.11 12.66 1389.97 12.8 1399 12.42
1405.44 12.23 1414.74 7.97 1422.79 4.6 1448.4 .66 1449.55 .51 1454.82 .5
1461.96 .87 1474.12 1.25 1475.71 1.22 1477.8 .71 1485.58 .64 1490.89 3.48
1515.83 4.26 1532.02 6.61 1541.27 8.07 1556.63 9.24 1561.04 9.54 1565.63
9.19 1566.52 9.12 1571.03 8.95 1576.32 8.53 1579.32 8.2 1583.82 8.24 1586.82
8.12 1590.56 7.76 1600.32 7.32 1607.06 7.11 1613.1 7.11 1616.11 6.98 1619.82
7.08 1628.13 6.8 1634.14 7.03 1642.99 7.19 1651.98 7.69 1654.32 7.92 1661.19
8.05 1666.32 8.46 1672.94 8.89 1684.92 10.2 1691.82 10.67 1697.25 11.15
1702.32 11.09 1706.27 11.2 1710.37 11.15 1712.82 10.94 1717.86 11 1722.35
10.62 1724.82 10.58 1727.31 10.97 1729.32 11.52 1738.32 11.93 1742.33 12.32
1751.82 12.62 1756.32 12.98 1762.78 13.19 1763.37 13.44 1764.87 13.07
1768.32 12.75 1773.89 12.84 1784.82 12.6 1788.92 12.71 1793.82 12.96 1804.7
13.24 1810.69 13.32 1813.69 13.45 1820.82 13.56 1830.16 14.11 1834 14.18
1838.82 14.14 1843.63 13.95 1844.52 14.09 1849.03 14.16 1852.32 14.44
1856.82 14.53 1861.32 15.09 1874.82 15.06 1876.57 15.15 1882.08 15 1885.56
15.04 1888.55 14.87 1889.6 15.17 1893.05 15.23 1896.04 15.92 1903.12 15.93
1908.02 16.32 1913.82 16.49 1919.65 16.8 1927.16 16.62 1930.17 16.93 1933.47
16.93 1937.96 16.76 1945.45 17.17 1946.7 17.31 1952.71 17.42 1958.93 17.62
1960.22 17.5 1966.23 17.86 1967.91 17.83 1975.25 17.99 1979.76 18.33 1984.38
18.44 1990.28 18.69 1994.79 19.1 1997.86 19.2 2002.3 19.56 2005.34 20.12
2008.31 21.58 2011.32 22.45 2015.82 24.22 2018.82 25.15 2020.32 25.43
2026.31 25.67 2030.85 25.64 2033.79 25.77 2038.29 25.67 2041.28 25.72
2053.39 25.67 2060.75 25.75 2071.42 25.69 2086.49 25.47 2089.85 25.53
2101.23 26.55 2109.99 27.25 2114.46 27.54 2123.41 27.9 2140.19 28.02 2146.9
27.89 2152.5 28.01 2156.97 27.8 2165.92 27.65 2169.28 27.67 2171.51 27.53
2179.34 27.44 2190.53 27.52 2208.6 27.89 2213.5 28.04 2216.85 27.95 2220.73
28.25 2226.33 28.25 2228.62 28.12 2233.61 28.36 2238.63 28.44 2252.09 28.92
2262.19 29.5 2275.34 29.62 2291.21 29.57 2295.85 29.32 2304.63 29.53 2306.87
29.67 2312.05 29.58 2320.74 29.79 2327.44 29.83 2338.75 30.09 2346.74 30.09
2346.74 30.23 2352.58 30.31 2362.81 30.34 2366.16 30.3 2370.64 30.18 2376.03
30.29 2377.71 30.46 2381.06 31.32 2384.06 31.84 2386.09 32.67 2394.13 32
2396.14 31.64 2404.52 30.81 2413.15 30.31 2416.5 29.94 2418.74 29.89 2422.1
29.55 2426.3 29.34 2431.33 29.24 2440.57 29.46 2444.74 29.46 2450.06 29.67
2456.46 29.67 2462.37 29.75 2465.72 30.13 2468.19 30.04 2479.15 29.98
2485.86 30.05 2486.98 29.9 2489.98 30.07 2495 29.82 2499.28 30.06 2506 30.06
2508.23 30.32 2510.47 31.83 2512.71 32 2514.95 32.39 2518.46 32.78 2526.13
33.38 2533.54 33.61 2552.98 33.78 2567.52 33.81 2570.88 33.93 2576.44 33.88
2576.44 34.42 2590.44 34.42 2590.44 34.03 2599.96 33.84 2607.27 33.76
2630.17 33.7 2641.36 33.94 2654.78 33.93 2659.1 33.99 2663.73 34.24 2669.32
34.27 2674.92 34.43 2679.53 34.26 2689.38 34.59 2699.14 35.15 2705.12 35.42
2714.51 35.97 2723.28 36.08 2725.26 36.25 2730.01 36.32 2752.24 36.32
2753.57 36.23 2763.1 36.47 2765.53 36.32 2771.48 36.36 2776.51 36.51 2782.31
36.84 2786.56 37.33 2792.38 38.15 2796.62 38.9 2799.97 38.94 2801.33 42.43

2802.44 42.27 2802.59 43.13 2803.56 43.07 2815.05 43.47 2823.7 43.61 2830.41 43.61 2840.48 43.45 2850.55 42.85 2868 41.94 2871.8 41.86 2879.63 41.97 2890.82 41.91 2895.29 42.2 2901.66 42.41 2917.26 42.57 2934.45 42.58 2938.68 42.65 2954.12 42.65 2966.89 42.56 2974.72 42.66 2981.43 42.65 2993.74 42.78 2999.81 42.8
 Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 1405.44 .04 1565.63 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1405.44 1565.63 298.21 298.21 298.21 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 1146 20 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 43977

INPUT
Description:
Station Elevation Data num= 490
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 18.53 2.87 18.59 5.87 18.56 13.38 18.63 16.64 18.63 20.98 18.55 25.32 18.64 30.14 18.54 34 18.55 38.9 18.49 43.4 18.71 46.4 18.68 52.41 18.71 56.66 18.78 60.03 18.69 63.14 18.41 66.03 18.31 70.71 18.44 74.49 18.74 79.43 18.93 82.43 19.11 85.43 19.16 88.43 18.9 90.99 18.79 93.29 18.79 97.44 19.1 105.03 19.41 106.59 19.75 107.75 19.79 109.71 20.13 110.65 20.56 113.54 20.79 114.98 20.79 117.88 20.63 123.66 19.93 128.96 20.07 130.89 20.19 133.78 20.6 134.68 21 138.12 21.44 139.57 21.5 144.04 21.48 146.8 21.89 148.25 21.75 150.28 21.79 151.14 21.64 154.03 21.71 157.48 22.11 167.45 22.21 174.28 22.57 175.25 22.67 179.93 22.79 185.85 22.79 188.74 22.72 192.41 22.72 196.51 22.59 199.51 22.6 201.01 22.53 205.52 22.06 208.52 22.08 210.43 22.02 212.7 21.77 216.22 21.27 219.11 21.25 222 21.36 225.18 21.24 231.03 20.6 234.04 20.12 238.54 19.52 242.25 18.94 245.14 18.61 252.05 18.1 255.05 17.73 259.6 17.41 264.19 17.25 269.72 17.39 271.17 17 277.57 16.45 280.57 15.81 282.07 15.26 283.57 14.92 286.57 14.44 291.08 14.21 294.08 13.91 298.51 13.71 303.2 13.62 307.32 13.7 311.66 13.7 314.12 13.78 318.1 14.08 323.48 14.1 328.6 14.07 333.35 13.93 336.25 13.91 339.08 14 342.2 13.99 346.37 13.82 349.62 13.82 351.57 13.69 355.62 13.2 359.37 12.22 361.63 11.78 363.13 10.51 364.63 9.83 368.73 9.51 370.64 9.46 372.14 9.3 375.14 9.2 376.74 9.79 378.09 10.47 379.65 10.3 381.08 9.75 385.42 9.3 389.76 9.51 392.65 9.81 396.15 10 402.16 10.16 407.11 9.95 414.34 9.8 424.46 9.79 429.18 10.11 434.26 10.13 441.19 10.7 442.69 10.7 447.19 10.43 450.19 10.39 454.83 10.54 459.17 10.43 462.2 10.46 466.4 10.73 470.74 10.76 475.08 10.88 476.53 11.04 481.07 11.3 484.72 11.98 486.22 12.34 490.72 14.3 492.43 14.97 496.77 16.17 499.66 16.65 504 18.17 505.73 18.46 508.73 18.67 514.74 18.54 518.46 18.11 522.24 17.39 523.75 17.29 527.88 17.24 534.37 17.31 538.81 17.29 541.6 17.22 727.2 17.22 732.5 17.4 733.94 17.32 736.97 16.93 742.12 16.45 742.12 15.8 743.12 15.8 750.57 15.53 767.39 14.79 771.6 14.67 791.53 5.19 792.1 4.97 795.73 2.96 798.91 2.54 802.52 1.95 806.16 1.45 817.3 -.48 822.32 -.51 833.82 -1.53 836.81 -1.84 840.37 -2.08 853.16 -1.56 871.35 -.8 880.09 -.58 886.03 1.33 888.24 2.47 889.79 2.46 891.99 3.54 892.53 3.49 896.6 4.85 905.17 6.99 914.93 11.33

924.09 14.63 930.62 14.39 956.25 13.7 959.18 13.67 959.18 14.27 962.32 13.85
964.11 13.71 967.41 13.59 971.28 13.59 975.32 13.5 978.88 13.49 985.22 13.6
989.16 13.54 991.06 13.44 997.69 13.64 1001.16 13.85 1004.58 13.98 1012.09
13.98 1015.51 14.07 1018.7 14.03 1019 14.1 1024.11 14.01 1029.85 14.02
1033.2 14.09 1036.05 13.97 1039.42 14.23 1040.64 14.48 1041.73 14.34 1044.57
14.24 1045.15 14.42 1047.41 14.38 1048.15 14.21 1053.09 14.2 1053.77 14.08
1056.96 13.92 1060.14 14.1 1066.52 13.77 1070.14 13.71 1074.49 13.74 1078.2
13.82 1081.21 14.04 1084.06 14.02 1087.25 14.1 1091.46 13.93 1093.62 14.01
1097.74 14.05 1103.19 13.97 1105.66 14.02 1109.93 13.99 1114.35 14.16
1117.27 14.04 1121.29 14.06 1124.78 13.93 1128.39 14.01 1130.79 13.99
1133.48 14.15 1135.07 14.15 1138.26 14.01 1139.76 14.21 1142.6 14.33 1145.81
14.2 1150.32 14.24 1153.33 14.05 1156.81 14.18 1158.98 14.16 1162.49 13.91
1165.36 13.9 1171.02 13.98 1174.36 13.9 1179.54 14.24 1184.88 14.44 1189.27
14.38 1194.06 14.65 1196.9 14.73 1199.9 14.54 1202.91 14.5 1206.54 14.54
1211.92 14.77 1213.43 14.9 1216.48 15.4 1217.97 15.49 1219.56 15.39 1222.16
15.43 1223.94 16 1226.95 15.77 1228.45 15.48 1230.72 15.34 1233.53 15.6
1235.5 15.9 1237.79 15.83 1240.63 15.48 1241.88 15.22 1243.49 15.15 1246.32
14.55 1249.16 14.31 1255.5 14.14 1257 14.22 1265.79 14.2 1268.98 14.27
1273.53 14.19 1281.04 14.22 1285.54 14.49 1288.11 14.57 1296.08 14.65
1299.07 14.53 1302.07 14.25 1305.65 14.24 1314.09 13.97 1316.81 13.98
1323.18 13.92 1327.61 13.96 1332.98 14.11 1341.51 14 1343.91 14.11 1350.03
14.1 1353.47 14.17 1355.72 14.3 1359.17 14.19 1368.18 14.62 1372.6 14.63
1377.39 14.78 1378.45 14.88 1382.71 14.8 1386.21 14.84 1388.39 15.04 1391.73
15.07 1398.23 15.59 1404.02 15.73 1406.08 15.98 1409.27 16.12 1409.7 16.23
1415.39 16.41 1417.24 16.36 1420.77 16.51 1423.77 16.73 1428.17 16.82
1432.74 17.07 1434.4 17.27 1439.12 17.53 1444.23 17.51 1448.56 17.55 1452
17.71 1455.72 17.66 1460.32 17.7 1464.29 17.79 1469 17.7 1471.13 17.77
1475.92 18.07 1480.7 18.11 1484.73 17.86 1489.45 18.09 1495.05 18.02 1501.02
18.09 1503.41 18.06 1505.81 17.93 1506.28 18.02 1510.88 17.99 1516.19 17.83
1520.91 18.19 1527.33 18.26 1530.35 18.17 1534.5 18.4 1538.09 18.47 1541.36
18.67 1546.46 18.57 1551.24 18.6 1553.63 18.57 1557.22 18.64 1558.41 18.59
1560.8 18.69 1564.95 18.54 1568.33 18.71 1569.17 18.94 1575.15 18.94 1577.53
18.83 1580.68 18.85 1585.4 19.02 1593.27 18.88 1596.67 18.99 1602.81 19.07
1605.85 19 1608.63 19.04 1612 19.28 1616.6 19.52 1621.78 19.53 1625.79 19.65
1631.34 19.9 1634.16 20.11 1638.52 20.29 1643.3 20.81 1646.89 20.74 1651.46
20.97 1657.76 21.22 1660.26 21.43 1662.56 21.51 1670.8 21.95 1676.63 22.19
1679.17 22.45 1681.56 22.97 1685.15 22.62 1687.84 22.69 1692.19 22.95
1697.03 23 1705.47 23.23 1707.86 23.37 1711.23 23.44 1717.72 23.68 1723.41
23.94 1728.19 24.04 1732.97 24.06 1735.36 24.21 1736.56 24.42 1740.14 24.61
1743.73 24.69 1747.59 24.65 1750.9 24.77 1754.49 25.06 1756.79 25.16 1763.68
25.18 1768.84 25.36 1774.15 25.5 1780.44 25.85 1781.91 26 1785.58 26.13
1790.36 26.44 1793.95 26.44 1798.73 26.55 1802.46 26.78 1805.9 26.82 1808.29
26.72 1809.65 26.78 1811.94 27.09 1813.48 27.19 1816.66 27.14 1817.86 27.03
1822.91 26.83 1825.03 26.88 1827.42 27.15 1832.35 27.11 1835.79 27.16
1839.52 27.51 1844.12 27.43 1850.14 27.17 1854.92 27.09 1858.51 27.08
1863.81 27.17 1865.38 27.24 1872.86 27.86 1876.61 28.06 1879.54 28.58
1882.42 29.31 1883.62 29.72 1885.83 30.03 1887.4 29.8 1888.98 35.58 1891.99
35.85 1894.38 35.97 1898.41 36.01 1901.57 36.7 1903.13 36.83 1906.17 36.83
1908.72 36.6 1911.12 36.52 1928.3 36.56 1936.41 36.47 1942.2 36.5 1948.18
36.61 1958.18 36.55 1963.72 36.58 1968.5 36.44 1976.87 36.3 1983.35 35.98
1988.83 36.1 1994.81 36.19 2001.98 35.95 2006.19 35.9 2016.16 35.6 2021.14
35.58 2027.98 35.5 2038.4 35.62 2047.84 35.82 2061.76 36.27 2064.75 36.3
2068.94 36.48 2073.72 36.8 2077.73 36.97 2085.43 37.15 2096.43 37.62 2101.52
37.89 2113.17 38.31 2119.9 38.61 2124.91 38.75 2130.79 39.05 2140.59 39.42

2142.89 39.53 2150.24 39.64 2154.8 39.82 2157.95 40.35 2159.8 40.18 2162.19 40.52 2204.38 40.52 2204.38 39.76 2216.43 39.63 2221.97 39.63 2225.49 39.55 2235.12 39.55 2239.11 39.61

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .08 771.6 .04 924.09 .08
 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 771.6 924.09 360.52 360.52 360.52 .1 .3 Blocked Obstructions num= 1
 Sta L Sta R Elev
 541.6 727.2 26.1

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 43616

INPUT
Description:
Station Elevation Data num= 490
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 21.24 2.64 21.29 10.66 21.23 13.67 21.28 22.98 21.26 29.72 21.29 41.11 21.15 47.19 21.24 53.25 21.18 63.56 21.17 69.97 21.35 71.88 21.35 79.59 21.2 86 21.12 89.34 21.12 93.97 21.21 100.43 21.27 106.73 21.23 116.12 21.38 123.11 21.63 127.76 21.66 132.63 22.04 140.35 22.34 143.71 22.28 150.12 22.29 155.7 22.58 159.2 22.88 159.74 23.14 163.85 23.95 166.27 24.7 168.65 24.85 169.68 24.75 170.84 24.12 172 23.92 174.33 23.78 178.2 23.78 178.2 23.61 181.51 23.53 183.65 23.58 188.59 23.45 191.79 23.89 194.12 24.02 197.62 24.1 199.81 24.34 203.02 24.46 209.26 24.91 213.92 24.92 217.41 24.8 224.39 24.88 234.87 24.88 243.02 24.8 246.3 25.07 249.5 25.14 252.33 25.12 258.16 25.21 259.32 25.4 261.65 26.28 266.3 26.33 268.98 25.84 269.8 25.34 271.95 25.14 275.62 25.16 278.36 25.45 290.75 25.46 295.41 25.31 298.9 25.26 302.42 25.05 304.72 24.67 307.05 24.43 311.71 24.08 317.53 23.84 321.64 23.44 326.84 23.15 334.46 22.52 339.65 21.83 343.58 20.94 345.47 20.65 348.89 19.82 351.3 19.48 355.95 18.68 360.61 18.12 362.93 17.7 368.13 17 374.68 16.18 378.93 15.81 382.73 15.39 387.32 15.07 393.2 14.83 400.18 14.6 406.6 14.46 414.61 14.47 418.82 14.79 421.46 14.9 429.04 15.46 431.62 15.39 434.22 15.43 439.77 15.27 443.47 15.3 448.28 15.5 453.74 15.52 459.35 15.36 461.89 15.37 465.39 15.57 469.12 15.59 475.53 16.29 477.03 16.67 479.36 17.74 481.68 18.33 483.54 18.49 486.75 18.58 489.83 18.51 494.76 18.55 498.02 18.46 501.18 18.87 504.38 19.2 510.8 19.28 512.4 19.21 517.77 18.58 518.81 18.35 521.27 18.17 530.03 17.8 539.1 17.6 544.55 17.55 555.03 17.37 558.88 17.39 565.3 17.3 575.12 17.25 584.53 17.23 588.79 17.18 596.94 17.01 603.42 16.93 609.75 16.98 616.28 16.88 619.06 16.88 631.72 16.75 635.83 16.64 650.26 16.43 657.48 16.39 664.63 16.26 665.88 16.19 673.4 16.05 678.47 16.04 681.51 16.1 690.74 15.94 698.39 15.87 701.51 15.76 706.51 15.82 708.12 15.71 710.41 15.35 714.66 12.39 731.18 2.6 743.78 -.41 745.55 -.7 752.64 -1.29 755.01 -1.34 756.66 -.96 758.48 -.87 761.31 -.97 766.62 -1.25 769.18 -1.15 771.36 -1.21 778.54 -1.03 790.21 -1.02 792.75 -.94 799.26 -.22 803.99 .19 807.54 .43 809.62 .76 818.14 2.51 827.68 10.67 833.44 13.9 834.47 13.9 835.35 14.18 837.55 15.4 840.06 15.73 843.04 15.59 846.32 14.85 850.08 14.44 852.59 14.04 855.35 13.77 858.4 13.7 862.92 13.4 867.44 13.43 868.82 13.57 878.59 12.86 884.16 12.91 885.41 12.77 891.51 12.33 893.93 12.25 899.51 11.95 902.3 11.92 905 11.99

908.06 11.82 913.17 11.33 915.58 11.35 916.25 11.23 920.43 11.07 923.22
11.11 924.6 11.03 927.87 11.04 931.59 10.83 936.65 10.87 938.15 11.03 939.96
11.45 941.35 11.59 942.57 12.03 944.2 12.4 947.47 12.58 949.72 12.5 952.37
12.63 952.51 12.8 955.3 12.73 957.71 12.51 960.72 12.5 963.8 12.59 976.22
12.41 982.05 12.53 985.99 12.7 989.31 12.59 996.83 12.64 999.94 12.44
1001.36 12.44 1004.63 12.25 1005.52 12.09 1009.7 11.91 1011.88 11.97 1020.96
12.05 1023.92 12.18 1025.86 12.39 1033.41 12.56 1035.66 12.88 1037.46 12.96
1038.92 12.85 1040.56 12.52 1047.09 12.2 1050.15 11.96 1051.55 11.37 1054.34
11.24 1058.52 10.79 1061.31 10.04 1069.05 8.8 1071.08 8.72 1074.85 8.8
1082.6 8.85 1085.02 8.95 1087.92 9.28 1093.13 9.54 1096.09 9.49 1099.15 9.62
1108.74 9.57 1109.15 9.92 1110.13 9.92 1110.78 9.47 1115.87 9.7 1118.5 9.91
1122.68 9.88 1125.48 10.08 1127.74 10.14 1128.75 10.31 1130.74 10.37 1132.02
10.21 1135.24 10.02 1136.92 9.63 1139.77 9.76 1142.21 10.1 1145.08 10.13
1147.79 9.99 1151.61 9.68 1154.88 9.62 1160.35 9.75 1166.86 9.81 1171.5
10.12 1174.29 10.12 1176.11 10.26 1178.89 10.19 1184.28 10.47 1189.18 10.54
1195.22 10.37 1197.34 10.41 1200.8 10.15 1203.59 10.03 1208.99 10.1 1213.67
10.44 1214.75 10.68 1216.94 10.58 1217.53 10.81 1220.21 10.69 1220.32 10.21
1221.72 10.34 1221.84 9.91 1223.11 10.1 1223.47 10.55 1225.11 10.81 1227.3
11.51 1228.69 12.16 1231.64 12.53 1234.56 12.72 1238.17 12.73 1243.59 12.59
1246.83 12.69 1248.22 12.65 1252.41 12.18 1254.12 12.28 1258.64 12.28
1259.38 12.42 1261.65 12.34 1264.3 12.11 1267.67 12.07 1269.2 11.93 1270.54
11.37 1274.72 11.09 1277.51 10.83 1280.3 10.37 1281.7 10.41 1284.22 10.9
1288.8 11.3 1291.74 11.44 1293.25 11.86 1295.65 11.82 1297.76 11.54 1302.27
11.72 1306.77 11.78 1310.99 11.95 1317.96 11.63 1321.46 11.58 1326.36 11.86
1331.91 11.94 1336.16 12.2 1337.49 12.37 1342.7 12.63 1347.26 12.66 1350.86
12.56 1354.13 12.06 1357.95 11.86 1365.39 11.96 1369.98 11.59 1373.73 11.37
1380.51 11.16 1384.92 11.12 1393.32 11.43 1398.57 11.45 1404.45 11.54
1410.61 11.81 1414.21 11.85 1415.6 12.24 1418.13 12.66 1419.79 12.72 1421.09
13.87 1422.58 13.95 1423.97 14.34 1426.76 14.55 1430.17 14.34 1431.67 14.37
1436.19 15.04 1437.69 15.16 1440.7 15.17 1443.5 15.28 1448.85 15.19 1451.87
15.41 1453.75 15.45 1456.05 15.35 1457.02 15.43 1460.29 15.37 1461.63 15.19
1467.21 14.99 1472.3 15.07 1476.98 15.76 1481.16 15.6 1486.42 15.63 1491.32
15.75 1493.36 15.61 1497.85 15.56 1501.11 15.39 1506.27 15.34 1509.91 15.48
1514.43 15.4 1519.08 15.52 1521.61 16.12 1523.46 15.99 1530.51 16.2 1535.49
16.01 1542.54 16.24 1551.74 16.4 1556.64 16.39 1564.08 16.72 1566.25 16.7
1569.71 16.83 1573.22 16.74 1576.24 16.82 1582.14 16.86 1592.57 16.63
1595.84 16.62 1601.7 16.44 1612.17 16.3 1613.8 16.32 1620.34 16.77 1621.26
16.89 1623.44 16.88 1626.23 16.65 1630.14 16.52 1635.04 16.61 1639.94 16.63
1644.36 16.42 1649.84 16.73 1662.49 16.72 1666.68 17.01 1669.41 17.3 1672.6
17.44 1675.42 17.47 1680.63 17.84 1687.6 18.14 1691.79 18.52 1700.15 18.86
1704.01 19.19 1707.02 19.21 1709.92 19.35 1713.43 19.4 1715.06 19.32 1718.29
18.98 1722.07 18.84 1725.26 19.06 1728.09 18.76 1731.1 18.77 1737.11 19.11
1741.19 19.18 1746.09 19.41 1749.36 19.49 1753.67 19.7 1755.17 19.99 1758.18
20.23 1759.68 20.24 1762.92 20.53 1767.32 20.62 1771.29 20.87 1772.69 21.19
1774.73 21.25 1777.74 21.55 1783.85 21.79 1786.92 22.05 1792.21 22.26
1795.79 22.56 1799.19 22.94 1801.81 23.08 1806.33 23.85 1809.79 24.73
1811.42 24.97 1811.74 25.26 1814.53 26.19 1817.32 26.02 1817.95 26.23
1819.87 26.12 1824.48 26.41 1827.09 26.22 1831.27 26.2 1834.28 26.29 1835.46
26.22 1838.24 26.37 1839.18 26.27 1843.82 26.35 1845.45 26.1 1848.01 26.13
1855.98 25.99 1862.05 26.09 1865.31 26.25 1872.53 26.49 1876.75 26.81
1880.09 27.34 1882.88 27.61 1891.45 27.71 1895.43 27.92 1896.34 28.15
1897.98 28.11 1902.88 28.17 1907.14 28.1 1910.15 28.32 1911.65 28.59 1917.67
30.54 1922.18 31.63 1925.19 32.07 1929.71 32.49 1934.49 32.68 1940.07 32.74
1946.26 32.99 1949.27 33.01 1955.14 33.14 1960.04 32.86 1962.81 32.83

1971.47 33.16 1979.64 33.52 1985.38 33.72

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .08 706.51 .04 840.06 .08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 706.51 840.06 232.69 232.69 232.69 .1 .3

CROSS SECTION

RIVER: Taunton River REACH: Main Stem RS: 43383.23

INPUT
Description: 44 Approach Old Col Ave
Station Elevation Data num= 491
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 24.15 2.21 24.18 9.15 24.44 12.43 25.03 14.93 25.16 19.01 24.97 20.62 25.05 22.24 24.6 32.9 24.6 32.9 23.59 41.44 23.57 47.32 23.3 49.64 23.24 52.86 22.99 56.58 22.82 62.36 22.36 66.02 22.2 70.91 22.12 78.65 21.86 80.87 21.85 85.1 21.92 88.33 21.88 94.83 21.93 100.53 21.69 106.06 21.62 110.78 21.52 117.89 21.53 136.69 21.1 141.02 20.87 146.36 20.75 149.58 20.79 153.74 20.91 157.64 21.15 161.84 21.5 167.31 21.84 172.52 22 176.88 22.19 179.19 22.38 183.43 23.42 184.98 23.62 187.29 23.55 189.88 23.61 211.7 23.61 215.67 23.59 217.28 23.65 220.84 23.66 223.15 23.87 225.34 23.97 226.96 24.17 230.18 23.81 235.87 23.76 237.03 23.66 238.36 24.08 239.34 23.97 241.66 24.03 243.07 24.2 245.13 24.15 251.13 23.88 252.75 23.76 254.44 23.75 259.19 23.97 264.79 24.06 269.42 24.17 275.57 24.36 280.99 24.83 285.61 25.03 286.2 25.23 287.93 25.49 291.31 25.8 296.27 25.92 299.5 25.8 304.33 26.09 307.69 25.93 312.22 25.86 324.6 25.86 324.6 26.47 328.73 26.47 333.04 26.35 334.96 26.17 337.67 26.11 344.56 25.84 347.85 25.84 353.86 25.69 357.52 25.39 359.14 25.35 365.43 25.55 367.74 25.66 373.23 26.14 377 26.37 381.63 26.74 383.32 26.81 387.41 26.86 392.99 27.05 397.83 27.32 402.45 27.43 416.5 27.43 416.5 27.91 420.39 27.93 423.62 27.88 427.07 27.55 427.9 27.42 430.06 27.32 433.68 27.32 436.51 27.2 443.02 27.18 444.09 27.13 448.72 27.1 452.63 27.24 454.5 27.46 455.85 27.96 456.81 28.1 460.28 28.14 461.44 27.98 465.53 27.19 467.44 26.88 470.36 26.54 472.26 26.6 473.01 26.78 476.81 26.5 478.42 26.43 481.65 26.52 486.48 26.57 491.32 26.69 497.3 26.53 503.08 26.24 507.44 25.56 511.18 25.09 514.65 24.54 520.1 24.06 525.17 23.76 532.98 23.55 537.08 23.5 540.1 23.53 544.73 23.38 547.74 23.46 554.19 23.11 557.41 23.32 559.02 23.34 562.24 23.21 567.08 23.29 569.02 22.72 571.33 22.21 573.26 21.48 578.27 19.69 579.98 19.42 583.2 19.34 585.21 19.5 587.53 19.79 592.87 19.88 595.62 19.96 599.32 19.96 605.77 19.6 608.35 19.49 609.51 19.57 612.22 19.45 614.91 19.4 620.28 19.4 629.17 19.54 631.56 19.61 638.42 19.61 644.21 19.55 660.57 19.85 663.63 19.77 722.7 19.77 722.7 16.14 729.81 16.03 735.18 16 740.82 16.06 742.35 18.19 747.31 18.05 749.89 18.05 753.02 17.95 757.54 17.91 763.15 17.72 764.17 17.83 767.96 17.69 777.8 17.46 778.57 17.46 786.33 12.46 797.4 5.57 798.28 4.99 799.58 4.53 803.67 3.57 808.1 2.31 819.86 -1.39 821.56 -1.29 829.52 -1.16 830.65 -1.37 834.41 -1.59 836.77 -1.4 840.39 -1.26 844.37 -1.33 847.04 -1.47 851.75 -1.46 854.8 -1.33 858.48 -1.32 859.04 -1.21 861.66 -1.26 862.89 -.95 864.78 -1.38 867 -1.35 868.61 -.87 872.07 -.91 873.31 -.79 874.7 -.51 884.47 1.14 888.19 2.56 889 3.26 894 5.36 897.7 7.13 899.58 7.67 914.01 14.04 915.02 14.04 915.02 14.44 919.14 14.29 920.64 14.5 924 15.17 925.4 15.33 929.6

16.15 931.17 16.27 932.67 19.44 934.18 20.89 937.87 21.03 940.8 21.03 945
21.29 949.25 21.4 952 21.56 956.74 21.97 959 21.97 960.3 21.87 961.8 21.75
963.87 21.51 968.75 21.25 972 20.85 973 20.83 975.79 20.6 978.59 20.51
979.99 20.36 982.31 19.91 985.32 19.54 988.39 19.25 991.5 19.24 995.39 19.15
1000.36 18.73 1003.37 18.6 1009.38 18.12 1011 18.06 1015.4 18.14 1016.91
18.09 1021.42 17.5 1026.19 17.23 1028.99 17.2 1033.45 17.3 1035.38 16.82
1035.99 16.49 1037.97 16.04 1041.59 14.57 1044.39 13.1 1045.13 13.01 1047.19
12.16 1048.59 11.78 1050.01 11.25 1051.39 11.03 1053.26 10.99 1055.59 11.06
1057.52 10.66 1059.76 10.82 1063.54 10.45 1066.54 10.44 1071.14 10.21
1073.79 10.14 1075.19 10.22 1080.08 10.18 1084.59 10.37 1087.6 10.37 1092.27
10.53 1097.14 10.5 1101.78 10.54 1105.98 10.65 1110.14 10.53 1113.39 10.51
1119.98 10.53 1125.21 10.73 1129.64 11.02 1134.52 11 1137.24 11.1 1140.25
11.54 1143.78 11.65 1146.26 11.79 1152.18 11.89 1155.65 11.69 1158.9 11.65
1164.31 11.81 1168.98 12.11 1173.34 12.1 1180.86 12.17 1183.87 12.43 1185.78
12.78 1191.4 13.97 1193.03 14.17 1197.41 14.55 1199.53 14.61 1202.58 14.61
1207.66 14.79 1212.38 14.79 1215.18 15.18 1219.37 15.6 1221.47 15.64 1222.17
15.52 1224.48 15.61 1228.99 15.52 1233.51 15.53 1236.91 15.41 1241.78 15.31
1245.54 15.35 1249.91 15.24 1253.16 15.27 1256.41 15.23 1261.29 15.23
1266.97 15.36 1271.99 15.59 1273.97 15.61 1275.37 15.41 1276.77 15.08
1278.63 14.78 1280.97 14.61 1284.65 14.49 1287.97 14.59 1296.37 14.29
1301.92 14.33 1304.2 14.39 1307.57 14.39 1308.97 14.46 1313.29 15.07 1317.37
15.41 1319.24 15.51 1323.75 15.89 1329.55 15.46 1331.37 15.39 1334.42 15.37
1338.8 15.42 1343.96 15.58 1347.82 15.57 1352.33 15.67 1355.34 15.81 1359.36
16.18 1362.16 16.55 1370.56 17.78 1371.8 18.02 1374.76 18.37 1377.9 18.66
1379.41 18.72 1383.18 18.75 1390.16 18.69 1394.55 18.73 1398.56 18.63
1404.16 18.79 1409.49 18.86 1416.76 18.91 1420.96 18.97 1425.16 18.97
1436.36 18.82 1439.57 18.68 1445.59 18.33 1450.36 17.92 1454.69 17.63
1459.13 17.46 1462.14 17.45 1468.15 17.36 1471.35 17.42 1475.55 17.61
1478.68 17.71 1483.95 18 1487.71 18.17 1495.15 18.36 1499.74 18.39 1509.15
18.58 1521.32 18.99 1527.35 19.1 1531.55 19.1 1538.55 18.99 1544.15 18.78
1553.95 18.58 1565.15 18.28 1574.9 17.85 1580.54 17.74 1585.48 17.74 1589.58
17.81 1595.09 17.8 1605.74 17.9 1615.29 17.86 1618.83 17.88 1623.08 17.85
1629.54 17.87 1633.74 17.83 1639.63 17.97 1643.54 18 1647.15 17.96 1651.94
18.04 1660.33 18.31 1666.02 18.46 1672.58 18.59 1677.5 18.83 1683.97 19.08
1687.78 19.26 1699.82 19.55 1708.67 19.45 1711.95 19.35 1717.35 19.11
1722.91 18.83 1736.55 18.09 1740.99 17.89 1756.28 17.41 1758.52 17.37
1763.03 17.38 1766.02 17.51 1768.8 17.43 1773.57 17.58 1779.59 17.69 1787.39
17.8 1788.62 17.89 1790.12 19.27 1793.13 19.34 1794.64 19.44 1797.65 19.79
1799.15 19.84 1804.95 19.84 1812 20.05 1821.64 20.17 1825.12 20.19 1830.76
20.17 1834.15 20.12 1836.6 20.03 1842.5 19.89 1851.83 19.44 1854.84 19.42
1860.86 19.64 1864.75 19.87 1875.87 20.35 1880.88 20.48 1884.94 20.7 1889.78
20.78 1893.64 20.95 1896.73 21.02 1903.68 21.25 1907.52 21.29 1913.42 21.4
1919.56 21.67 1924.07 21.69 1927.32 21.83 1933.11 22.16 1937.62 22.31
1944.01 22.65 1949.77 22.86 1956.33 23.06 1959.3 23.21 1961.7 23.44 1966.17
23.76 1973.74 24.13 1976.75 24.12 1981.27 23.75 1984.28 23.73 1988.51 23.93
1990.3 24.11 1992.68 24.67 1994.81 25.31 1996.32 25.63 1997.82 25.69 2001.02
25.22 2002.41 25.15 2006.58 25.75 2012.87 25.72 2015.88 25.78 2023.27 25.85
2030.22 26 2033.42 26.14 2035.78 26.36 2037.17 26.4 2045.99 25.98 2052.01
25.94 2062.2 26.09 2067.06 26.21 2071.57 26.61 2074.58 26.68 2079.34 26.89
2080.6 27.02 2083.06 27.06 2102.52 27.06 2102.52 29.11 2108.86 28.95 2110.31
28.84

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

0 .085 778.57 .04 960.3 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 778.57 960.3 47.15 47.15 47.15 .8 .8 Ineffective Flow num= 1
Sta L Sta R Elev Permanent
960.3 2110.31 22 T
Blocked Obstructions num= 1
Sta L Sta R Elev
655 748 30

CROSS SECTION

RIVER: Taunton River REACH: Main Stem RS: 43336.08

INPUT
Description: 43.7 US Face Old Col Ave
Station Elevation Data num= 490
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 24.29 1.33 24.36 2.95 24.39 3.51 24.43 4.66 24.38 6.19 24.51 8.12 24.48 9.27 24.53 11.57 24.48 12.87 24.4 13.87 24.22 15.02 24.22 15.9 24.26 16.85 24.24 17.98 24.15 18.48 24.04 20.71 23.92 21.93 23.7 24 23.52 25.39 23.44 27.69 23.45 33.71 23.45 36.77 23.37 40.19 23.3 42.65 23.32 44.96 23.28 48.72 23.27 51.86 23.34 53.02 23.39 54.76 23.4 56.68 23.32 59.92 23.14 65.68 22.92 67.72 22.91 73.74 22.71 76.6 22.6 80.58 22.47 82.95 22.43 83.46 22.44 85.53 22.39 88.55 22.35 94.46 22.35 97.91 22.34 99.83 22.31 104.96 22.3 107.12 22.34 108.27 22.33 110.58 22.41 115.18 22.47 116.19 22.52 117.48 22.53 120.42 22.62 121.15 22.63 126.01 22.54 127.84 22.54 129.84 22.61 132.56 22.74 135.72 22.84 137.05 22.83 139.36 22.87 140.75 22.84 142.81 22.74 144.32 22.6 145.44 22.46 147.42 22.27 148.68 22.18 150.29 22.1 152.02 22.14 153.17 22.2 155.47 22.27 157.78 22.3 159.84 22.28 161.23 22.29 162.38 22.27 165.3 22.28 166.99 22.31 170.44 22.22 171.34 22.22 172.96 22.26 175.05 22.35 176.21 22.43 178.5 22.47 178.94 22.51 182.68 22.63 185.92 22.68 190.77 22.74 193.46 22.71 198.07 22.7 200.77 22.67 203.83 22.62 205.35 22.63 207.28 22.68 210.73 22.73 211.68 22.76 214.19 22.96 214.41 23.08 215.06 23.16 215.34 23.32 216.68 23.77 217.64 23.88 218.79 23.89 219.86 23.7 221.09 23.82 222.25 23.82 222.59 23.74 223.16 23.73 241.9 23.73 241.9 24.13 245.27 24.2 246.42 24.17 247.15 24.21 251.03 24.27 253.92 24.38 254.48 24.29 255.85 23.98 256.78 23.73 257.16 23.7 258.78 23.67 260.79 23.68 262.02 23.72 265.26 23.76 265.99 23.84 266.24 23.97 267.14 24.13 268.29 24.72 268.5 24.77 268.97 24.71 269.45 24.77 270.6 24.6 271.7 24.71 272.9 24.77 275.77 24.85 277.15 24.99 277.9 24.99 277.9 25.09 279.75 25.32 281.45 25.26 282.11 25.2 282.61 25.23 283.74 25.21 286.31 25.21 287.72 25.23 289.02 25.21 290.17 25.27 290.8 25.22 292.47 25.31 294.4 25.36 296.25 25.32 297.08 25.27 298.23 25.31 298.98 25.24 300.53 25.2 301.68 25.22 301.71 25.17 304.12 25.17 305.13 25.26 307.44 25.29 310.89 25.43 313.19 25.45 314.34 25.48 316.65 25.46 318.95 25.53 320.31 25.52 322.4 25.58 323.53 25.66 325.17 25.71 327.01 25.73 331.54 25.65 333.91 25.57 336.22 25.46 338.12 25.39 339.9 25.35 342.63 25.26 348.09 25.02 349.45 24.91 350.03 24.81 350.81 24.61 351.45 24.5 352.33 24.41 353.49 24.18 353.54 24.26 354.31 24.16 361.54 24.35 362.7 24.4 366.15 24.45 369.6 24.63 370.5 24.74 370.75 24.86 371.37 25.33 371.91 25.68 372.12 26.07 372.64 26.26 373.06 27.07 375.37 27.28 376.98 27.54 378.81 27.68 381.84 27.73 383.32 27.74 387.3 27.71 391.29 27.6 393.78 27.57 397.19 27.6 399.54 27.59 404.14 27.68 406.13 27.7 409.36 27.66 411.2 27.58 413.35 27.35 414.5 27.28 417.95 26.89 420.26 26.51 422.56 25.92

423.71 25.58 424.47 25.45 424.86 25.46 426.01 25.27 427.2 25.16 428.79 25.09
434.07 24.95 437.53 24.91 438.68 24.92 443.07 24.85 446.3 24.86 447.89 24.88
454.79 24.88 455.95 24.94 459.56 25.29 462.67 25.53 465.4 25.71 467.66 25.82
470.85 25.87 473.58 25.88 476.67 25.83 480.12 25.68 481.77 25.66 485.47
25.65 488.18 25.6 490.32 25.53 491.63 25.42 492.78 25.27 495.18 25.01 496.8
24.87 498.54 24.67 500.04 24.56 501.99 24.37 503.28 24.22 505.45 24.09
506.32 24.02 508.14 23.93 509.75 23.96 511.77 24.09 513.51 24.23 516.23
24.54 517.85 24.68 519.47 24.7 521.57 24.64 523.87 24.42 526.17 24.34 527.32
24.25 529.18 24.17 532.42 24.09 535.38 24.1 536.53 24.12 539.06 24.1 539.98
24.07 543.44 24.03 545.38 23.97 549.97 23.88 553.8 23.78 555.42 23.75 558.4
23.62 560.71 23.6 560.88 23.62 563.19 23.67 565.31 23.65 566.43 23.59 569.66
23.59 572.22 23.64 576.14 23.65 579.38 23.43 579.98 23.26 580.28 23.11 581
22.93 582.49 22.33 583.73 21.88 584.24 21.76 585.86 21.46 587.19 21.32
588.34 21.16 590.64 20.8 592.33 20.48 593.95 20.3 595.57 20.19 599.08 20.1
600.43 20.05 602.05 20.02 605.29 20.2 606.76 20.24 608.52 20.32 609.99 20.36
611.76 20.34 614.81 20.24 619.29 20.21 619.29 20.52 620.37 20.52 678.32
19.76 686.81 19.31 690.94 19.23 691.1 19.11 692.71 19.2 700.17 18.91 713.6
18.7 717.93 18.66 721.39 18.57 728.31 18.56 729.31 18.87 729.71 18.66 731.59
18.19 733.27 17.86 734.46 17.78 738.14 17.72 738.84 17.73 744.87 17.67
749.87 17.61 751.44 18.31 751.56 18.32 759.93 18.53 761.35 18.54 769.35
18.73 773.48 18.75 776.35 18.67 782.31 18.76 790.53 18.92 791.94 19.06
793.27 19.07 794.33 18.81 802.85 14.13 802.96 14.03 803.96 13.98 808.44
11.28 813.94 8.15 815.37 7.44 821.04 3.78 824.84 3.15 844.58 .41 847.05 0
848.45 -.35 851.11 -.78 852.95 -.74 855.53 -.35 856.98 -.53 866.68 -.33
868.04 -.79 869.71 -1.29 872.45 -1.47 875.33 -1.19 880.81 -.95 883.35 -.77
897.42 2.9 897.9 2.86 898.5 2.92 899.54 3.19 902.29 5.09 904.72 6.63 916.11
12.72 916.78 12.72 917.33 13.22 917.44 16.58 917.84 18.73 918.27 18.76
919.22 18.74 920.56 18.66 922.43 18.24 923.64 18.29 925.48 18.13 929.27
18.05 930.66 18 935.06 17.94 945.01 17.67 952.75 17.65 958.29 17.25 958.44
17.25 958.79 17.75 965.93 17.51 967.7 17.46 978.79 17.1 983.8 17.07 994.52
17.02 1002.79 16.93 1004.89 16.92 1010.78 16.82 1020.11 16.61 1062.51 16.04
1065.19 16.03 1066.76 16.05 1067.98 15.98 1319.66 15.5 1332.26 15.73 1335.61
15.64 1339.92 15.75 1343.93 15.84 1376.88 16.6 1393.47 16.77 1399.55 17.06
1412.32 17.02 1460.19 17.09 1461.19 17.09 1461.19 17.15 1462.25 17.15 1468.9
17.05 1471.28 16.99 1474.46 16.98 1477.3 16.94 1480.66 16.96 1483.94 17.03
1484.19 17.02 1487.22 17.12 1490.85 17.2 1493.78 17.14 1498.09 17.17 1502.26
17.17 1507.4 17.21 1508.55 17.23 1515.11 17.24 1517.94 17.22 1519.44 17.23
1520.33 17.26 1523.96 17.28 1525.89 17.26 1529.88 17.33 1532.84 17.36 1537.5
17.39 1539.79 17.45 1543.01 17.49 1543.53 17.48 1546.75 17.54 1548.14 17.55
1552.31 17.62 1554.06 17.63 1557.77 17.59 1559.41 17.56 1562.04 17.57
1563.43 17.55 1567.48 17.46 1569.26 17.44 1571.77 17.45 1574.18 17.41
1576.64 17.34 1578.14 17.28 1581.15 17.22 1582.39 17.21 1585.68 17.14
1587.31 17.09 1590.18 17.07 1594.7 17.17 1598.18 17.15 1602.08 17.2 1605.13
17.17 1606.74 17.18 1607.91 17.23 1610.69 17.27 1614.27 17.26 1617.28 17.29
1622.08 17.29 1624.59 17.25 1626.69 17.24 1630.82 17.27 1633.25 17.27
1637.11 17.3 1639.81 17.35 1644.37 17.36 1648.88 17.46 1650.39 17.48 1654.9
17.48 1655.18 17.47 1660.92 17.43 1663.93 17.42 1666.94 17.45 1671.86 17.54
1677.42 17.61 1678.81 17.64 1681.59 17.66 1683.5 17.66 1688.02 17.73 1689.93
17.73 1691.32 17.75 1695.6 17.75 1702.44 17.79 1706.61 17.79 1710.35 17.81

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 802.96 .04 917.84 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 802.96 917.84 52.87 52.87 52.87 .5 .8 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 800 20.9 T
 927 1710.35 20 T

BRIDGE

RIVER: Taunton River
REACH: Main Stem RS: 43308.41

INPUT
Description: 43.5 Old Colony Ave/South St Distance from Upstream XS = 17.42
Deck/Roadway Width = 35
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
 num= 42
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 0 17.72 706.24 17.72 724.79 17.72
 783.93 17.72 793 17.72 800.01 17.72
 806.7 17.94 807.04 17.94 809.65 17.91
 815 17.83 815 17.83 14.35 815.77 17.85 14.35
 817.17 17.85 14.35 824.78 17.82 14.35 827.39 17.8 14.35
 831.99 17.8 14.35 835.49 17.79 14.35 837.58 17.77 14.35
 843.91 17.76 14.35 847.41 17.75 14.35 850.13 17.73 14.35
 854.42 17.72 14.35 857.51 17.72 14.35 863.29 17.7 14.35
 867.43 17.69 14.35 870.75 17.67 14.35 874.87 17.65 14.35
 877.3 17.64 14.35 883.23 17.62 14.35 887.04 17.61 14.35 887.49 17.61 14.35 894.71 17.6 14.35 897.36 17.59 14.35
 900.75 17.59 14.35 902.11 17.58 14.35 902.11 17.58
 907.03 17.57 912 17.57 919.16 17.57
 922.81 17.57 954.51 17.57 1712.86 17.57

Upstream Bridge Cross Section Data
Station Elevation Data num= 490
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 24.29 1.33 24.36 2.95 24.39 3.51 24.43 4.66 24.38 6.19 24.51 8.12 24.48 9.27 24.53 11.57 24.48 12.87 24.4 13.87 24.22 15.02 24.22 15.9 24.26 16.85 24.24 17.98 24.15 18.48 24.04 20.71 23.92 21.93 23.7 24 23.52 25.39 23.44 27.69 23.45 33.71 23.45 36.77 23.37 40.19 23.3 42.65 23.32 44.96 23.28 48.72 23.27 51.86 23.34 53.02 23.39 54.76 23.4 56.68 23.32 59.92 23.14 65.68 22.92 67.72 22.91 73.74 22.71 76.6 22.6 80.58 22.47 82.95 22.43 83.46 22.44 85.53 22.39 88.55 22.35 94.46 22.35 97.91 22.34 99.83 22.31 104.96 22.3 107.12 22.34 108.27 22.33 110.58 22.41 115.18 22.47 116.19 22.52 117.48 22.53 120.42 22.62 121.15 22.63 126.01 22.54 127.84 22.54 129.84 22.61 132.56 22.74 135.72 22.84 137.05 22.83 139.36 22.87 140.75 22.84 142.81 22.74 144.32 22.6 145.44 22.46 147.42 22.27 148.68 22.18 150.29 22.1 152.02 22.14 153.17 22.2 155.47 22.27 157.78 22.3 159.84 22.28 161.23 22.29 162.38 22.27 165.3 22.28 166.99 22.31 170.44 22.22 171.34 22.22 172.96 22.26 175.05 22.35 176.21 22.43 178.5 22.47 178.94 22.51 182.68 22.63 185.92 22.68 190.77 22.74 193.46 22.71 198.07 22.7 200.77 22.67 203.83 22.62 205.35 22.63 207.28 22.68 210.73 22.73 211.68 22.76 214.19 22.96 214.41 23.08 215.06 23.16 215.34 23.32 216.68 23.77 217.64 23.88 218.79 23.89 219.86 23.7 221.09 23.82 222.25 23.82 222.59 23.74 223.16 23.73

241.9 23.73 241.9 24.13 245.27 24.2 246.42 24.17 247.15 24.21 251.03 24.27
253.92 24.38 254.48 24.29 255.85 23.98 256.78 23.73 257.16 23.7 258.78 23.67
260.79 23.68 262.02 23.72 265.26 23.76 265.99 23.84 266.24 23.97 267.14
24.13 268.29 24.72 268.5 24.77 268.97 24.71 269.45 24.77 270.6 24.6 271.7
24.71 272.9 24.77 275.77 24.85 277.15 24.99 277.9 24.99 277.9 25.09 279.75
25.32 281.45 25.26 282.11 25.2 282.61 25.23 283.74 25.21 286.31 25.21 287.72
25.23 289.02 25.21 290.17 25.27 290.8 25.22 292.47 25.31 294.4 25.36 296.25
25.32 297.08 25.27 298.23 25.31 298.98 25.24 300.53 25.2 301.68 25.22 301.71
25.17 304.12 25.17 305.13 25.26 307.44 25.29 310.89 25.43 313.19 25.45
314.34 25.48 316.65 25.46 318.95 25.53 320.31 25.52 322.4 25.58 323.53 25.66
325.17 25.71 327.01 25.73 331.54 25.65 333.91 25.57 336.22 25.46 338.12
25.39 339.9 25.35 342.63 25.26 348.09 25.02 349.45 24.91 350.03 24.81 350.81
24.61 351.45 24.5 352.33 24.41 353.49 24.18 353.54 24.26 354.31 24.16 361.54
24.35 362.7 24.4 366.15 24.45 369.6 24.63 370.5 24.74 370.75 24.86 371.37
25.33 371.91 25.68 372.12 26.07 372.64 26.26 373.06 27.07 375.37 27.28
376.98 27.54 378.81 27.68 381.84 27.73 383.32 27.74 387.3 27.71 391.29 27.6
393.78 27.57 397.19 27.6 399.54 27.59 404.14 27.68 406.13 27.7 409.36 27.66
411.2 27.58 413.35 27.35 414.5 27.28 417.95 26.89 420.26 26.51 422.56 25.92
423.71 25.58 424.47 25.45 424.86 25.46 426.01 25.27 427.2 25.16 428.79 25.09
434.07 24.95 437.53 24.91 438.68 24.92 443.07 24.85 446.3 24.86 447.89 24.88
454.79 24.88 455.95 24.94 459.56 25.29 462.67 25.53 465.4 25.71 467.66 25.82
470.85 25.87 473.58 25.88 476.67 25.83 480.12 25.68 481.77 25.66 485.47
25.65 488.18 25.6 490.32 25.53 491.63 25.42 492.78 25.27 495.18 25.01 496.8
24.87 498.54 24.67 500.04 24.56 501.99 24.37 503.28 24.22 505.45 24.09
506.32 24.02 508.14 23.93 509.75 23.96 511.77 24.09 513.51 24.23 516.23
24.54 517.85 24.68 519.47 24.7 521.57 24.64 523.87 24.42 526.17 24.34 527.32
24.25 529.18 24.17 532.42 24.09 535.38 24.1 536.53 24.12 539.06 24.1 539.98
24.07 543.44 24.03 545.38 23.97 549.97 23.88 553.8 23.78 555.42 23.75 558.4
23.62 560.71 23.6 560.88 23.62 563.19 23.67 565.31 23.65 566.43 23.59 569.66
23.59 572.22 23.64 576.14 23.65 579.38 23.43 579.98 23.26 580.28 23.11 581
22.93 582.49 22.33 583.73 21.88 584.24 21.76 585.86 21.46 587.19 21.32
588.34 21.16 590.64 20.8 592.33 20.48 593.95 20.3 595.57 20.19 599.08 20.1
600.43 20.05 602.05 20.02 605.29 20.2 606.76 20.24 608.52 20.32 609.99 20.36
611.76 20.34 614.81 20.24 619.29 20.21 619.29 20.52 620.37 20.52 678.32
19.76 686.81 19.31 690.94 19.23 691.1 19.11 692.71 19.2 700.17 18.91 713.6
18.7 717.93 18.66 721.39 18.57 728.31 18.56 729.31 18.87 729.71 18.66 731.59
18.19 733.27 17.86 734.46 17.78 738.14 17.72 738.84 17.73 744.87 17.67
749.87 17.61 751.44 18.31 751.56 18.32 759.93 18.53 761.35 18.54 769.35
18.73 773.48 18.75 776.35 18.67 782.31 18.76 790.53 18.92 791.94 19.06
793.27 19.07 794.33 18.81 802.85 14.13 802.96 14.03 803.96 13.98 808.44
11.28 813.94 8.15 815.37 7.44 821.04 3.78 824.84 3.15 844.58 .41 847.05 0
848.45 -.35 851.11 -.78 852.95 -.74 855.53 -.35 856.98 -.53 866.68 -.33
868.04 -.79 869.71 -1.29 872.45 -1.47 875.33 -1.19 880.81 -.95 883.35 -.77
897.42 2.9 897.9 2.86 898.5 2.92 899.54 3.19 902.29 5.09 904.72 6.63 916.11
12.72 916.78 12.72 917.33 13.22 917.44 16.58 917.84 18.73 918.27 18.76
919.22 18.74 920.56 18.66 922.43 18.24 923.64 18.29 925.48 18.13 929.27
18.05 930.66 18 935.06 17.94 945.01 17.67 952.75 17.65 958.29 17.25 958.44
17.25 958.79 17.75 965.93 17.51 967.7 17.46 978.79 17.1 983.8 17.07 994.52
17.02 1002.79 16.93 1004.89 16.92 1010.78 16.82 1020.11 16.61 1062.51 16.04
1065.19 16.03 1066.76 16.05 1067.98 15.98 1319.66 15.5 1332.26 15.73 1335.61
15.64 1339.92 15.75 1343.93 15.84 1376.88 16.6 1393.47 16.77 1399.55 17.06
1412.32 17.02 1460.19 17.09 1461.19 17.09 1461.19 17.15 1462.25 17.15 1468.9
17.05 1471.28 16.99 1474.46 16.98 1477.3 16.94 1480.66 16.96 1483.94 17.03
1484.19 17.02 1487.22 17.12 1490.85 17.2 1493.78 17.14 1498.09 17.17 1502.26

17.17 1507.4 17.21 1508.55 17.23 1515.11 17.24 1517.94 17.22 1519.44 17.23
1520.33 17.26 1523.96 17.28 1525.89 17.26 1529.88 17.33 1532.84 17.36 1537.5
17.39 1539.79 17.45 1543.01 17.49 1543.53 17.48 1546.75 17.54 1548.14 17.55
1552.31 17.62 1554.06 17.63 1557.77 17.59 1559.41 17.56 1562.04 17.57
1563.43 17.55 1567.48 17.46 1569.26 17.44 1571.77 17.45 1574.18 17.41
1576.64 17.34 1578.14 17.28 1581.15 17.22 1582.39 17.21 1585.68 17.14
1587.31 17.09 1590.18 17.07 1594.7 17.17 1598.18 17.15 1602.08 17.2 1605.13
17.17 1606.74 17.18 1607.91 17.23 1610.69 17.27 1614.27 17.26 1617.28 17.29
1622.08 17.29 1624.59 17.25 1626.69 17.24 1630.82 17.27 1633.25 17.27
1637.11 17.3 1639.81 17.35 1644.37 17.36 1648.88 17.46 1650.39 17.48 1654.9
17.48 1655.18 17.47 1660.92 17.43 1663.93 17.42 1666.94 17.45 1671.86 17.54
1677.42 17.61 1678.81 17.64 1681.59 17.66 1683.5 17.66 1688.02 17.73 1689.93
17.73 1691.32 17.75 1695.6 17.75 1702.44 17.79 1706.61 17.79 1710.35 17.81

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .045 802.96 .032 917.84 .045

Bank Sta: Left Right Coeff Contr. Expan.
 802.96 917.84 .5 .8
Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 800 20.9 T 927 1710.35 20 T

Downstream Deck/Roadway Coordinates
 num= 42
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 13.86 17.72 739 17.72 757.55 17.72
 816.69 17.72 825 17.72 832.77 17.72
 839.46 17.94 839.8 17.94 842.41 17.91
 847.76 17.83 848.53 17.85 849.93 17.85
 849.93 17.85 854.02 17.82 14.35 860.15 17.8 14.35
 864.75 17.8 14.35 868.25 17.79 14.35 870.34 17.77 14.35
 876.67 17.76 14.35 880.17 17.75 14.35 882.89 17.73 14.35
 887.18 17.72 14.35 890.27 17.72 14.35 896.05 17.7 14.35
 900.19 17.69 14.35 903.51 17.67 14.35 907.63 17.65 14.35
 910.06 17.64 14.35 915.99 17.62 14.35 919.8 17.61 14.35
 920.25 17.61 14.35 927.47 17.6 14.35 930.12 17.59 14.35 933.51 17.59 14.35
936.49 17.58 14.35 939.79 17.57 14.35
 941.39 17.57 14.35 941.39 17.57 951.92 17.57
 955.57 17.57 987.27 17.57 1745.62 17.57

Downstream Bridge Cross Section Data
Station Elevation Data num= 490
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 23.76 1.38 23.8 4.6 23.98
5.48 23.99 6.64 23.93 7.7 23.76 9.44 23.6 11.05 23.55 12.66 23.56 14.73
23.62 19.12 23.63 22.82 23.56 24.05 23.46 25.57 23.41 26.29 23.5 26.55
23.43 27.45 23.49 28.79 23.42 38.5 23.42 38.5 24.17 41.69 24.12 43.64 24.11
44.79 24.08 47.86 24.09 51.37 24.18 54.04 24.07 56.2 24 59.83 24 61.04 23.98
63.84 23.98 70.23 23.91 71.83 23.91 75.55 23.86 77.16 23.78 78.78 23.76
80.64 23.81 82 23.89 83.62 23.94 85.35 23.91 88.73 23.81 89.89 23.73 91.68
23.5 93.29 23.32 95.67 23.1 97.98 22.95 99.74 22.92 101.36 22.93 102.97
22.98 106.46 23.18 109.12 23.26 112.64 23.31 115.33 23.43 118.8 23.5 121.11
23.61 122.27 23.64 123.93 23.73 127.16 23.83 130.3 23.96 131.52 23.98 135.22

24.19 138.48 24.3 140.77 24.48 141.08 24.48 144.89 24.75 147.7 25.04 149.73
25.19 151.34 25.23 156.18 25.01 158.11 24.87 159.27 24.72 162.39 24.48
165.86 24.25 170.38 24.05 173.05 23.79 175.71 23.55 177.77 23.43 180.37
23.37 185.21 23.35 186.82 23.39 189.33 23.5 191.61 23.57 193.27 23.59 197.02
23.55 198.58 23.51 200.89 23.49 206.17 23.54 208.99 23.6 211.3 23.72 212.46
23.71 213.61 23.84 215.66 23.96 217.08 23.96 218.24 23.92 219.39 23.93
222.86 24.04 223.65 23.98 225.18 24.01 227.13 23.96 241 23.96 241 24.08
242.3 24.07 244.73 24 245.99 24.01 247.15 23.94 247.63 23.97 249.71 23.92
251.77 23.99 254.08 23.99 256.16 23.97 259.86 23.97 262.18 23.99 264.49
24.03 266.8 24.03 270.27 23.95 274.26 23.92 277.43 23.92 279.52 23.94 281.96
23.94 283.57 23.97 286.46 23.96 287.62 24.06 288.77 24.2 290.02 24.55 291.64
25.08 292.24 25.2 292.91 25.14 293.4 25.2 294.55 25.14 294.86 25.05 295.57
25 295.71 24.91 296.87 24.84 299.7 24.45 301.49 24.39 304.54 24.47 307.76
24.46 309.37 24.49 315.37 24.5 319.05 24.48 322.2 24.54 323.89 24.55 326.93
24.48 328.09 24.42 328.72 24.32 329.24 24.32 330.19 24.44 334.64 24.54
337.34 24.54 340.01 24.49 346.46 24.5 350.99 24.62 352.91 24.63 354.17 24.67
356.83 24.84 359.49 24.91 360.46 25.18 360.98 25.11 362.59 25.12 379.7 25.12
379.7 24.81 380.8 24.82 382.43 24.89 384.74 24.9 391.46 24.77 395.15 24.76
396.45 24.74 398.06 24.83 399.68 25.04 400.93 25.27 402.09 25.53 402.9 25.67
404.4 25.8 406.71 25.92 409.35 26 415.43 26.1 420.46 26.15 422.25 26.14
425.48 26.05 427.53 26.06 428.64 26.14 430.31 26.44 431.93 26.51 433.31
26.45 434.47 26.36 437.93 26.18 439.4 26.14 443.72 25.98 447.18 25.93 450.65
25.82 452.97 25.8 456.12 25.7 457.59 25.73 459.9 25.71 460.95 25.75 462.57
25.75 464.53 25.78 465.69 25.77 466.84 25.8 470.31 25.79 472.62 25.74
474.03 25.68 476.09 25.63 478.4 25.64 480.72 25.62 485.34 25.52 490.01 25.48
493.2 25.4 495.75 25.31 498.11 25.27 501.53 25.14 504.49 25.09 507.72 25.08
509.62 25.05 511.94 25.05 513.09 25.02 517.39 24.98 520.62 24.97 527.07
24.82 532.75 24.62 536.74 24.5 539.69 24.33 543.28 24.19 544.31 24.17 546.63
24.05 549.64 23.76 551.24 23.41 552.41 23.25 552.87 23.13 553.89 23 553.89
23.24 554.97 23.24 555.47 22.74 576.45 22.25 576.95 22.59 653.9 20.79 662.3
20.34 697.34 19.33 699.2 19.25 701.53 19.22 702.27 19.25 705.06 19.3 705.63
19.29 709.07 19.44 713.14 19.57 716.09 19.65 718.64 19.38 726.63 19.08
728.24 19.1 728.73 19.27 731.45 19.15 734.47 19.39 741.11 19.52 742.72 19.3
746.16 19.09 749.88 19.08 753.99 19.05 766.39 19.13 770.02 19.17 771.25
19.13 774.29 18.91 776.74 18.93 781.66 18.95 785.49 19.07 788.88 19.21
795.47 19.14 804.05 19.13 807.35 18.66810.7569 18.19 812.69 17.92 814.15
17.57 838.35 11.72 838.45 11.65 841.61 11.59 844.03 10.89 845.09 9.83 848.3
7.98 855.07 5.99 858.03 5.24 862.25 5.18 869.33 2.7 871.88 2.17 896.22 2.17
896.22 -.77 900.69 -1.14 905.68 -1.67 908.22 -1.81 913.77 -.83 919.21 -1.06
926.64 -1.29 931.4 -.81 936.23 -.73 940.43 1.39 946.17 2.59 946.23 2.34
948.96 2.89 952.5464 4.19 954.57 4.92 956.94 6.43 958.04 6.79 958.05 7.14
958.7 10.73 959.26 15.61 961.99 15.17 965.24 14.73 967.1 14.74 969.41 15.04
970.29 14.97 973.63 14.51 983.95 16.6 991.96 16.4 994.75 16.59 1004.68 17.62
1008.64 17.66 1009.53 17.51 1015.75 17.57 1020.42 17.44 1032.74 17.07
1039.31 17.26 1042.76 16.99 1052.19 16.89 1059 16.71 1065.13 16.9 1067.41
16.63 1071.42 17.07 1072.73 17.06 1085.98 16.92 1091.53 16.92 1094.5 16.65
1102.05 16.69 1105.09 16.58 1107.6 16.56 1113.28 16.49 1117.74 16.37 1123.63
16.33 1126.51 16.43 1132.45 15.72 1140.29 15.15 1144.3 15.8 1144.85 15.75
1145.6 15.79 1157.04 14.71 1161.54 15.33 1165.24 15.31 1169.04 15.12 1170.7
14.84 1180.23 15.15 1183.31 15.1 1185.57 14.97 1187.79 15.1 1194.27 15.64
1198.3 15.57 1199.68 15.62 1200.76 15.48 1219.76 15.46 1224.77 15.58 1227.93
15.53 1232.27 15.6 1233.14 15.54 1235.67 15.68 1242.31 15.53 1261.19 14.74
1262.01 14.73 1263.38 14.78 1275.82 14.95 1275.94 14.84 1276.89 14.76
1277.74 14.78 1288.4 14.95 1289.8 14.95 1291.52 15.22 1302.78 15.83 1307.58

15.86 1326.3 16.05 1330.55 15.51 1331.54 15.42 1338.66 15.56 1346.75 15.71
1366.8 15.88 1369.27 15.98 1381.47 16.72 1382.87 16.8 1390.71 16.72 1399.61
16.87 1430.98 17.07 1431.98 17.07 1431.98 17.36 1434.01 17.37 1436.05 17.42
1439.21 17.43 1440.51 17.46 1442.07 17.46 1444.81 17.5 1448.64 17.51 1449.01
17.48 1451.09 17.46 1452.6 17.51 1456 17.56 1458.4 17.54 1460.2 17.46
1464.63 17.37 1466.14 17.36 1471.4 17.24 1474.65 17.18 1476.66 17.11 1484.41
17.14 1487.19 17.09 1489.29 17.08 1493.21 17.02 1494.71 17.02 1499.04 17.14
1503.92 17.16 1507.17 17.24 1508.79 17.23 1514.27 17.16 1516.18 17.21
1517.58 17.22 1520.17 17.18 1523.43 17.22 1529.31 17.36 1532.98 17.36
1533.18 17.34 1535.78 17.36 1536.43 17.39 1539.98 17.46 1541.31 17.56
1542.94 17.56 1544.17 17.45 1544.56 17.49 1545.57 17.37 1549.77 17.37
1552.57 17.45 1556.39 17.62 1560.97 17.61 1563.77 17.57 1565.7 17.51 1569.37
17.43 1573.82 17.36 1577.08 17.36 1578.95 17.34 1582.01 17.36 1584.76 17.33
1587.97 17.32 1593.33 17.33 1596.59 17.27 1598.5 17.25 1604.35 17.27 1605.75
17.24 1609.03 17.23 1614.15 17.26 1615.55 17.24 1618.35 17.24 1620.97 17.22
1625.85 17.23 1630.95 17.32 1633.1 17.39 1636.11 17.43 1638.86 17.43 1640.48
17.39 1644.94 17.32 1648.14 17.3 1652.65 17.31 1655.66 17.33 1658.36 17.33
1663.13 17.27 1666.49 17.26 1669.74 17.19 1672.93 17.16 1677.13 17.15
1681.13 17.07 1684.13 17.03 1685.53 16.99 1690.26 16.78 1691.76 16.73
1694.77 16.72 1698.12 16.85 1700.63 16.92 1705.12 17.07 1708.31 17.16
1711.32 17.23 1713.52 17.3 1717.72 17.41 1720.14 17.45 1723.39 17.47 1727.86
17.62 1729.9 17.63 1733.11 17.67 1735.91 17.73 1738.71 17.77 1741.28 17.84
1747.47 17.94

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 812.69 .04 954.57 .085

Bank Sta: Left Right Coeff Contr. Expan.
 812.69 954.57 .5 .8
Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 834 20.9 T
 964 1747.47 20 T
Blocked Obstructions num= 1
 Sta L Sta R Elev 766.68 828.6519.14989

Upstream Embankment side slope = 0 horiz. to 1.0 vertical Downstream
Embankment side slope = 0 horiz. to 1.0 vertical Maximum allowable
submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Piers = 1

Pier Data
Pier Station Upstream= 858.49 Downstream= 897.72
Upstream num= 2
 Width Elev Width Elev
 3 8 2.9 15
Downstream num= 2
 Width Elev Width Elev

```
 3 8 2.9 15

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
 Energy
 W.S. Pro Method

 W.S.Pro Data
 Left Embankment
 El of the top of the embankment = 19
 El of the toe of the abutment = 6  Right Embankment
 El of the top of the embankment = 19
 El of the toe of the abutment = 6
 Abutment Type = 1 Vert. abutments and vert. embankments with or without
wingwalls  Slope of abutments =
 Top with of embankment = 35
 Centroid station of bridge opening =
 Wing Wall Type = No wing walls present
 Width =
 Angle =
 Radius =
 Guide Banks Type = No Guide Bank present
 Length =
 Offset =
 Angle =
 Optional Contraction and expansion coefficients
 At approach Section
 At Guide Bank
 At upstream outside
 At upstream inside (BU)
 At downstream inside (BD)
 Piers are Continuous for the width of the bridge  Use Geometric mean as
Friction Slope Method

Selected Low Flow Methods = Energy

High Flow Method
 Pressure and Weir flow
 Submerged Inlet Cd =
 Submerged Inlet + Outlet Cd = .8
 Max Low Cord =

Additional Bridge Parameters
 Add Friction component to Momentum
 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION


RIVER: Taunton River
```

REACH: Main Stem RS: 43283.2

INPUT
Description: 43.3 DS FAce Old Col Ave
Station Elevation Data num= 490
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 23.76 1.38 23.8 4.6 23.98
5.48 23.99 6.64 23.93 7.7 23.76 9.44 23.6 11.05 23.55 12.66 23.56 14.73
23.62 19.12 23.63 22.82 23.56 24.05 23.46 25.57 23.41 26.29 23.5 26.55
23.43 27.45 23.49 28.79 23.42 38.5 23.42 38.5 24.17 41.69 24.12 43.64 24.11
44.79 24.08 47.86 24.09 51.37 24.18 54.04 24.07 56.2 24 59.83 24 61.04 23.98
63.84 23.98 70.23 23.91 71.83 23.91 75.55 23.86 77.16 23.78 78.78 23.76
80.64 23.81 82 23.89 83.62 23.94 85.35 23.91 88.73 23.81 89.89 23.73 91.68
23.5 93.29 23.32 95.67 23.1 97.98 22.95 99.74 22.92 101.36 22.93 102.97
22.98 106.46 23.18 109.12 23.26 112.64 23.31 115.33 23.43 118.8 23.5 121.11
23.61 122.27 23.64 123.93 23.73 127.16 23.83 130.3 23.96 131.52 23.98 135.22
24.19 138.48 24.3 140.77 24.48 141.08 24.48 144.89 24.75 147.7 25.04 149.73
25.19 151.34 25.23 156.18 25.01 158.11 24.87 159.27 24.72 162.39 24.48
165.86 24.25 170.38 24.05 173.05 23.79 175.71 23.55 177.77 23.43 180.37
23.37 185.21 23.35 186.82 23.39 189.33 23.5 191.61 23.57 193.27 23.59 197.02
23.55 198.58 23.51 200.89 23.49 206.17 23.54 208.99 23.6 211.3 23.72 212.46
23.71 213.61 23.84 215.66 23.96 217.08 23.96 218.24 23.92 219.39 23.93
222.86 24.04 223.65 23.98 225.18 24.01 227.13 23.96 241 23.96 241 24.08
242.3 24.07 244.73 24 245.99 24.01 247.15 23.94 247.63 23.97 249.71 23.92
251.77 23.99 254.08 23.99 256.16 23.97 259.86 23.97 262.18 23.99 264.49
24.03 266.8 24.03 270.27 23.95 274.26 23.92 277.43 23.92 279.52 23.94 281.96
23.94 283.57 23.97 286.46 23.96 287.62 24.06 288.77 24.2 290.02 24.55 291.64
25.08 292.24 25.2 292.91 25.14 293.4 25.2 294.55 25.14 294.86 25.05 295.57
25 295.71 24.91 296.87 24.84 299.7 24.45 301.49 24.39 304.54 24.47 307.76
24.46 309.37 24.49 315.37 24.5 319.05 24.48 322.2 24.54 323.89 24.55 326.93
24.48 328.09 24.42 328.72 24.32 329.24 24.32 330.19 24.44 334.64 24.54
337.34 24.54 340.01 24.49 346.46 24.5 350.99 24.62 352.91 24.63 354.17 24.67
356.83 24.84 359.49 24.91 360.46 25.18 360.98 25.11 362.59 25.12 379.7 25.12
379.7 24.81 380.8 24.82 382.43 24.89 384.74 24.9 391.46 24.77 395.15 24.76
396.45 24.74 398.06 24.83 399.68 25.04 400.93 25.27 402.09 25.53 402.9 25.67
404.4 25.8 406.71 25.92 409.35 26 415.43 26.1 420.46 26.15 422.25 26.14
425.48 26.05 427.53 26.06 428.64 26.14 430.31 26.44 431.93 26.51 433.31
26.45 434.47 26.36 437.93 26.18 439.4 26.14 443.72 25.98 447.18 25.93 450.65
25.82 452.97 25.8 456.12 25.7 457.59 25.73 459.9 25.71 460.95 25.75 462.57
25.75 464.53 25.78 465.69 25.77 466.84 25.8 470.31 25.79 472.62 25.74
474.03 25.68 476.09 25.63 478.4 25.64 480.72 25.62 485.34 25.52 490.01 25.48
493.2 25.4 495.75 25.31 498.11 25.27 501.53 25.14 504.49 25.09 507.72 25.08
509.62 25.05 511.94 25.05 513.09 25.02 517.39 24.98 520.62 24.97 527.07
24.82 532.75 24.62 536.74 24.5 539.69 24.33 543.28 24.19 544.31 24.17 546.63
24.05 549.64 23.76 551.24 23.41 552.41 23.25 552.87 23.13 553.89 23.24
553.89 23 554.97 23.24 555.47 22.74 576.45 22.25 576.95 22.59 653.9 20.79
662.3 20.34 697.34 19.33 699.2 19.25 701.53 19.22 702.27 19.25 705.06 19.3
705.63 19.29 709.07 19.44 713.14 19.57 716.09 19.65 718.64 19.38 726.63
19.08 728.24 19.1 728.73 19.27 731.45 19.15 734.47 19.39 741.11 19.52 742.72
19.3 746.16 19.09 749.88 19.08 753.99 19.05 766.39 19.13 770.02 19.17 771.25
19.13 774.29 18.91 776.74 18.93 781.66 18.95 785.49 19.07 788.88 19.21
795.47 19.14 804.05 19.13 807.35 18.66810.7569 18.19 812.69 17.92 814.15
17.57 838.35 11.72 838.45 11.65 841.61 11.59 844.03 10.89 845.09 9.83 848.3
7.98 855.07 5.99 858.03 5.24 862.25 5.18 869.33 2.7 871.88 2.17 896.22 2.17
896.23 -.77 900.69 -1.14 905.68 -1.67 908.22 -1.81 913.77 -.83 919.21 -1.06

926.64 -1.29 931.4 -.81 936.23 -.73 940.43 1.39 946.17 2.59 946.23 2.34
948.96 2.89 952.5464 4.19 954.57 4.92 956.94 6.43 958.04 6.79 958.05 7.14
958.7 10.73 959.26 15.61 961.99 15.17 965.24 14.73 967.1 14.74 969.41 15.04
970.29 14.97 973.63 14.51 983.95 16.6 991.96 16.4 994.75 16.59 1004.68 17.62
1008.64 17.66 1009.53 17.51 1015.75 17.57 1020.42 17.44 1032.74 17.07
1039.31 17.26 1042.76 16.99 1052.19 16.89 1059 16.71 1065.13 16.9 1067.41
16.63 1071.42 17.07 1072.73 17.06 1085.98 16.92 1091.53 16.92 1094.5 16.65
1102.05 16.69 1105.09 16.58 1107.6 16.56 1113.28 16.49 1117.74 16.37 1123.63
16.33 1126.51 16.43 1132.45 15.72 1140.29 15.15 1144.3 15.8 1144.85 15.75
1145.6 15.79 1157.04 14.71 1161.54 15.33 1165.24 15.31 1169.04 15.12 1170.7
14.84 1180.23 15.15 1183.31 15.1 1185.57 14.97 1187.79 15.1 1194.27 15.64
1198.3 15.57 1199.68 15.62 1200.76 15.48 1219.76 15.46 1224.77 15.58 1227.93
15.53 1232.27 15.6 1233.14 15.54 1235.67 15.68 1242.31 15.53 1261.19 14.74
1262.01 14.73 1263.38 14.78 1275.82 14.95 1275.94 14.84 1276.89 14.76
1277.74 14.78 1288.4 14.95 1289.8 14.95 1291.52 15.22 1302.78 15.83 1307.58
15.86 1326.3 16.05 1330.55 15.51 1331.54 15.42 1338.66 15.56 1346.75 15.71
1366.8 15.88 1369.27 15.98 1381.47 16.72 1382.87 16.8 1390.71 16.72 1399.61
16.87 1430.98 17.07 1431.98 17.07 1431.98 17.36 1434.01 17.37 1436.05 17.42
1439.21 17.43 1440.51 17.46 1442.07 17.46 1444.81 17.5 1448.64 17.51 1449.01
17.48 1451.09 17.46 1452.6 17.51 1456 17.56 1458.4 17.54 1460.2 17.46
1464.63 17.37 1466.14 17.36 1471.4 17.24 1474.65 17.18 1476.66 17.11 1484.41
17.14 1487.19 17.09 1489.29 17.08 1493.21 17.02 1494.71 17.02 1499.04 17.14
1503.92 17.16 1507.17 17.24 1508.79 17.23 1514.27 17.16 1516.18 17.21
1517.58 17.22 1520.17 17.18 1523.43 17.22 1529.31 17.36 1532.98 17.36
1533.18 17.34 1535.78 17.36 1536.43 17.39 1539.98 17.46 1541.31 17.56
1542.94 17.56 1544.17 17.45 1544.56 17.49 1545.57 17.37 1549.77 17.37
1552.57 17.45 1556.39 17.62 1560.97 17.61 1563.77 17.57 1565.7 17.51 1569.37
17.43 1573.82 17.36 1577.08 17.36 1578.95 17.34 1582.01 17.36 1584.76 17.33
1587.97 17.32 1593.33 17.33 1596.59 17.27 1598.5 17.25 1604.35 17.27 1605.75
17.24 1609.03 17.23 1614.15 17.26 1615.55 17.24 1618.35 17.24 1620.97 17.22
1625.85 17.23 1630.95 17.32 1633.1 17.39 1636.11 17.43 1638.86 17.43 1640.48
17.39 1644.94 17.32 1648.14 17.3 1652.65 17.31 1655.66 17.33 1658.36 17.33
1663.13 17.27 1666.49 17.26 1669.74 17.19 1672.93 17.16 1677.13 17.15
1681.13 17.07 1684.13 17.03 1685.53 16.99 1690.26 16.78 1691.76 16.73
1694.77 16.72 1698.12 16.85 1700.63 16.92 1705.12 17.07 1708.31 17.16
1711.32 17.23 1713.52 17.3 1717.72 17.41 1720.14 17.45 1723.39 17.47 1727.86
17.62 1729.9 17.63 1733.11 17.67 1735.91 17.73 1738.71 17.77 1741.28 17.84
1747.47 17.94

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085810.7569 .04952.5464 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
810.7569952.5464 85.94 85.94 85.94 .5 .8 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 834 20.9 T
 964 1747.47 20 T
Blocked Obstructions num= 1
 Sta L Sta R Elev
 766.68 828.6519.14989

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 43197.27

INPUT
Description: 43 Exit Old Col Ave
Station Elevation Data num= 492
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 22.26 1.72 22.33 4.48 22.59
6.44 22.58 7.72 22.53 10.5 22.68 12.22 22.75 13.51 22.55 15.01 22.5 16.91
22.4 18.41 22.29 21.22 21.99 22.53 21.89 24.22 21.79 25.89 21.77 28.72
21.88 30.22 21.88 33.37 21.77 37.57 21.67 40.85 21.5 42.09 21.39 43.84 21.35
46.83 21.26 49.61 21.2 54.12 21.27 55.81 21.4 57.3 21.49 60.14 21.74 61.79
21.76 63.14 21.5 64.78 21.35 66.15 21.2 67.78 21.12 70.77 21.1 72.26 21
73.67 20.95 76.68 20.9 78.18 20.86 79.74 20.88 82.7 21 84.23 21.02 85.73
20.99 87.21 20.93 88.71 20.9 90.22 20.9 93.21 21.03 96.2 20.99 97.74 21.01
100.69 21.1 102.22 21.11 103.75 21.25 105.18 21.34 106.76 21.55 108.27 21.66
109.77 21.71 112.78 21.68 114.28 21.63 115.65 21.5 117.29 21.44 118.64 21.42
120.13 21.47 123.31 21.64 124.62 21.64 127.82 21.77 129.32 21.76 132.33
21.59 135.22 21.52 141.08 21.47 145.57 21.46 147.22 21.5 148.56 21.51 150.05
21.58 151.88 21.61 153.39 21.67 156.04 21.64 157.9 21.71 159.22 21.85 160.91
21.95 162.22 22.07 165.01 22.12 168.43 22.07 171.22 22.08 172.72 22.12
175.48 22.23 176.98 22.32 179.97 22.44 182.96 22.47 185.96 22.45 187.45
22.42 189.22 22.42 190.99 22.52 192.22 22.64 195.22 22.85 197.01 22.92
199.42 22.92 200.92 22.9 202.72 22.9 206.03 22.98 209.04 23.12 211.72 23.35
213.22 23.51 214.72 23.64 216.56 23.89 218.87 24.3 219.57 24.44 221.07 24.65
221.86 24.81 223.36 24.98 224.08 25.02 226.35 25.03 232.72 24.78 235.72
24.73 237.22 24.77 238.72 24.92 239.81 24.94 243.22 25.22 244.72 25.28
246.22 25.39 247.29 25.57 250.28 26.13 252.66 26.32 254.16 26.49 257.17
26.64 260.75 26.71 265.24 26.78 267.7 26.73 270.22 26.74 273.22 26.65 274.72
26.56 277.21 26.58 279.22 26.64 280.72 26.52 282.74 26.54 284.69 26.6 285.22
26.65 286.72 26.62 288.22 26.63 290.5 26.59 294.9 26.36 299.5 26.3 299.5
26.6 317.5 26.6 317.5 26.08 319 26.04 320.59 26.04 324.22 26.14 324.85 26.13
325.08 26.21 327.86 26.19 328.07 26.11 330.22 26.06 331.72 26.06 333.22
26.13 334.06 26.13 334.72 26.08 336.89 26.07 337.05 26.01 337.72 26.01
339.89 25.91 341.54 25.86 342.9 25.76 345.22 25.68 346.72 25.6 349.72 25.38
351.22 25.29 353.5 25.23 356.5 25.23 358.72 25.2 360.22 25.13 362.46 25.07
364.72 25.06 366.22 25.12 367.72 25.3 369.22 25.54 369.96 25.56 369.98 25.62
370.72 25.64 372.22 25.13 372.95 25.12 372.98 24.99 373.72 24.98 375.22 24.9
375.94 24.64 375.99 24.47 377.44 23.96 377.5 23.98 378.93 23.51 379 23.57
380.43 23.14 380.5 23.2 381.22 22.99 383.42 22.59 383.51 22.47 384.92 22.19
387.22 21.85 391.03 21.56 392.54 21.52 397.05 21.28 398.38 21.22 402.22
21.13 404.37 21.03 405.86 20.88 406.72 20.75 408.22 20.3 409.72 19.71
411.22 19.33 412.72 19.07 414.22 19.13 415.72 19.57 417.22 19.89 418.72 20.1
421.11 20.2 423.81 20.29 424.12 20.28 426.22 20.33 428.64 20.44 432.22 20.51
435.78 20.78 436.72 20.82 440.27 20.76 441.76 20.71 443.26 20.6 443.68 20.61
446.68 20.23 447.22 20.21 448.72 20.07 451.72 19.91 453.22 18.97 455.23
18.88 455.71 18.83 457.21 18.76 461.21 18.62 463.23 18.58 465.7 18.58 467.74
18.55 469.72 18.5 471.22 18.44 472.72 18.43 475.26 18.31 477.22 18.31
478.27 18.34 480.66 18.53 481.72 18.64 482.78 18.7 484.29 18.71 486.22 18.81
487.29 19.02 489.22 19.32 492.22 19.26 493.72 19.26 495.22 19.16 496.72
19.24 499 19.22 499 19.27 511.17 19.55 570.15 19.37 596.36 18.71 609.47
18.04 616.02 17.57 622.58 16.93 648.79 13.49 655.34 12.97 661.9 11.82 667
11.86 667 12.18 669.29 12.21 670.64 12.11 671.44 12.16 673.64 12.29 675.13
12.41 677.86 12.56 677.86 9.82 678.86 9.82 692.33 13.48 694.98 13.42 700.19
13.24 702.63 13.11 704.89 9.24 707.17 6.07 711.41 3.35 728.75 1.25 734.35

```
.01 739.11 .81 742.79 -.77 745.13 -1.81  762.1 .57 787.86 3.43 789.66 4.2
794.58 7.79 798.82 9.86  798.89 7 828.16 7.3 836.22 8.04 839.79 7.48 839.92
7.49  839.93 12 840 12 841.79 12 845.51 12.14 860.45 13.26  877.58 13.86
909.62 12.52 919.75 12.81 925.76 12.25 937.43 11.1  938.24 10.96 939.44 11.46
943.37 8.89 946.13 7.37 948.14 7.22  955 7.2 988.79 7.36 990.14 7.82 1005.96
12.81 1010.85 12.58  1116.72 15.73 1137.21 16.19 1146.02 16.3 1150.18 16.4
1154.43 16.33  1157.86 16.25 1160.71 16.23 1167.17 17 1171.11 17.33 1172.99
17.34  1178.27 16.94 1179.27 16.95 1182.26 17.07 1186.69 17.11 1189.74 17.09
1192.73 16.86 1194.21 17.07 1195.72 17.19 1197.22 17.18 1200.23 17.25
1201.71 17.3 1206.2 17.4 1213.68 17.47 1216.77 17.47 1218.28 17.49  1221.29
17.49 1224.15 17.53 1227.3 17.55 1230.13 17.62 1236.11 17.71  1242.1 17.76
1245.09 17.74 1248.36 17.74 1251.07 17.7 1254.38 17.7  1255.56 17.68 1258.89
17.71 1261.55 17.69 1263.4 17.69 1267.91 17.59  1269.42 17.6 1270.52 17.53
1272.42 17.75 1273.51 17.78 1276.51 18  1278.44 17.95 1279.5 18 1279.95 17.98
1280.99 18.05 1282.95 17.87  1287.22 17.83 1288.97 17.9 1290.47 18 1291.72
18.13 1294.72 18.22  1297.99 18.34 1298.94 18.39 1301.94 18.49 1304.01 18.53
1308.52 18.55  1309.42 18.53 1312.72 18.55 1316.04 18.55 1319.05 18.57
1325.07 18.49  1325.87 18.5 1329.58 18.5 1331.86 18.53 1334.09 18.52 1334.85
18.49  1338.6 18.48 1341.61 18.52 1342.72 18.55 1344.62 18.55 1345.72 18.59
1346.81 18.69 1350.64 18.85 1351.3 18.92 1352.8 18.99 1354.72 19.15  1356.22
19.06 1358.78 19.1 1359.66 19.09 1360.28 19.04 1362.22 19.05  1363.72 19.09
1367.18 19.12 1371.22 19.14 1376.21 19.14 1378.23 19.12  1380.22 19.12
1385.23 19.2 1387.72 19.2 1391.25 19.28 1394.26 19.25  1397.26 19.24 1399.72
19.2 1401.78 19.01 1403.66 18.91 1404.78 18.89  1405.16 18.94 1406.29 18.92
1407.22 18.86 1410.22 18.73 1413.22 18.66  1416.22 18.66 1417.72 18.6 1421.33
18.3 1423.72 18.13 1425.84 18.04  1426.1 18.01 1428.22 17.94 1430.35 17.83
1430.59 17.84 1432.72 17.69  1434.22 17.54 1436.37 17.42 1437.22 17.35
1439.38 17.26 1442.56 17.17  1446.22 16.98 1450.72 16.58 1453.03 16.44
1455.92 16.21 1458.22 15.99  1459.72 15.89 1461.22 15.74 1463.5 15.55 1464.95
15.38 1465 15.4  1467.96 15.06 1469.46 14.87 1469.48 14.9 1471.72 14.66
1473.22 14.46  1474.72 14.32 1476.98 14.07 1478.46 13.89 1479.95 13.76 1483
13.44  1485.22 13.25 1486.72 13.16 1488.93 13.15 1489.72 13.17 1491.22 13.15
1493.42 12.99 1494.22 12.89 1495.72 12.86 1496.53 12.92 1497.91 13.08
1499.54 13.24 1501.05 13.33 1503.22 13.41 1506.22 13.48 1507.72 13.5  1511.37
13.66 1513.72 13.79 1515.86 13.98 1518.22 14.15 1520.6 14.43  1525.11 14.73
1525.72 14.75 1529.62 14.98 1530.82 15.09 1532.31 15.18  1532.63 15.24
1533.81 15.31 1534.72 15.32 1535.3 15.4 1535.64 15.38  1537.72 15.66 1539.79
15.84 1540.15 15.89 1543.72 16.17 1545.22 16.23  1545.78 16.29 1546.61 16.3

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 671.44 .04 840 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  671.44
840 810.65 810.65 810.65 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 1383 1546.61 19.2 T
Blocked Obstructions num= 1
 Sta L Sta R Elev
 513.33 648.3 30

CROSS SECTION
```

RIVER: Taunton River
REACH: Main Stem RS: 42387

INPUT
Description:
Station Elevation Data num= 490
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 22.27 1.96 22.23 7.98 22.27
10.5 22.34 14.32 22.39 18.87 22.5 22.15 22.48 25.01 22.55 28.13 22.53 32.03
22.6 33.12 22.56 38.15 22.58 40.38 22.63 46.95 22.69 48.86 22.69 52.67
22.77 54.21 22.77 57.01 22.84 59.52 22.86 63.65 22.85 67.06 22.91 72.09
23.06 74.61 23.11 80.33 23.15 83.41 23.26 84.94 23.37 89.55 23.42 92.63
23.59 97.24 23.55 100.31 23.65 103.38 23.81 107.99 23.75 111.08 23.81 117.01
24.06 121.12 24.34 123.63 24.54 124.84 24.68 127.4 24.8 128.66 25 129.92
25.01 132.58 24.86 137.19 24.9 138.75 25.02 143.34 25.97 145 26.21 146.41
26.3 152.58 26.3 157.17 26.2 161.78 26.19 166.41 26.21 170.14 26.17 178.94
26.23 181.75 26.21 189 26.08 197.12 26.13 200.19 26.22 202.82 26.25 205.94
26.35 209.41 26.5 212.49 26.78 217.91 26.79 218.63 26.74 221.75 26.7 230.93
26.53 233.61 26.53 240.53 26.36 241.51 26.3 244.76 26.3 249.33 26.17 252.44
26.14 254.36 26.08 257.05 25.94 260.65 25.87 261.28 25.78 266.93 25.39
271.96 25.22 275.49 25.05 278.25 24.83 280.1 24.77 285.79 24.73 287.78 24.58
290.82 24.47 294.59 24.08 298.36 23.85 300.08 23.82 304.45 23.81 306.22
23.77 310.93 23.75 313.91 23.65 318.59 23.54 320.05 23.46 323.13 23.42
324.66 21.2 326.2 20.91 329.27 20.08 331.04 19.55 332.3 19.04 335.42 18.55
337.33 18.42 339.84 18.01 342.35 17.83 344.87 17.74 348.64 17.4 350.79 17.4
353.67 17.81 356.18 18.4 358.47 18.75 360.09 18.83 363.08 18.91 364.62 18.91
367.5 18.78 368.75 18.64 370.76 18.5 372.52 18.17 373.78 18 376.29 18.08
378.45 18.23 381.83 18.31 384.59 18.43 386.13 18.8 389.2 19.16 390.74 19.13
392.64 19.33 393.81 19.63 397.7 19.63 397.7 19.29 400.18 19.28 402.69 18.9
403.57 18.89 405.21 18.75 406.11 18.76 407.64 18.51 410.72 18.1 412.75 17.95
414.01 17.94 415.26 17.83 418.4 17.24 419.94 17.14 424.55 17.09 429.09 16.95
432.86 16.91 436.63 16.84 444.52 16.61 447.72 16.47 454.2 16.39 455.6 16.33
458.96 16.3 461.07 16.24 463.91 16.11 467.74 16 474.41 15.87 476.08 15.8
484.78 15.68 489.83 15.53 490.39 15.49 493.07 15.48 496.01 15.38 498.25
15.35 504.42 15.35 507.76 15.31 511.09 15.23 515.74 15.19 518.46 15.22
522.95 15.22 526.1 15.13 528.56 15.11 531.1 15.03 533.05 15.09 536.1 15.12
542.03 15.09 542.77 15.12 546.1 15.07 552.77 15.04 554.25 15.01 558.87 15.14
559.99 15.28 562.24 15.34 564.56 15.58 567.78 15.62 574.45 15.53 577.78
15.51 580.2 15.44 582.78 15.29 584.69 15.12 585.81 15.08 588.61 14.82 591.42
14.79 595.91 14.82 598.16 14.76 600.4 14.6 601.53 14.74 603.2 14.69 612.66
14.66 616.1 14.49 617.24 14.52 619.4 14.48 622.64 14.49 627.8 14.37 630.71
14.34 632.8 14.36 637.45 14.27 641.14 14.26 646.14 14.18 651.79 14.17 656.53
14.14 659.9 14.01 666.15 13.93 670 13.93 672.82 13.97 676.15 13.88 678.98
13.94 680.1 14.03 680.95 13.96 685.72 13.92 688.24 13.95 690.21 13.92 692.45
13.8 693.57 13.83 696.16 13.76 699.49 13.83 702.55 14.02 704.5 14.03 705.92
13.97 708.17 13.97 711.17 14.02 712.66 14.13 716.02 14.02 721.17 14.16 725
14.15 731.17 14.31 735.11 14.3 737.35 14.32 739.78 14.39 746.18 14.45 751.18
14.97 754.19 15.15 756.44 15.1 759.8 14.89 761.19 14.84 764.29 14.89 769.91
14.9 776.19 15.03 780.01 15 782.86 15.01 788.99 14.95 790.11 14.98 798.19
15.08 802.87 15.17 806.2 15.19 810.32 15.14 812.87 15.18 817.87 15.1 822.88
15.09 827.88 15.11 830.52 15.18 832.88 15.33 841.75 15.34 849.72 15.41
851.22 15.44 854.55 15.42 855.22 15.45 857.89 15.77 859.11 16.12 860.03
16.27 861.22 16.29 863.46 15.95 865.32 15.46 866.45 15.23 869.56 15 876.55
14.67 877.9 14.63 881.79 14.39 884.41 14.32 887.73 14.11 887.73 14.69
890.67 14.61 908.27 14.21 937.41 13.22 949.55 3.67 952.53 2.15 959.58 1.66

963.02 1.52 963.79 1.37 964.65 1.41 965.82 .72 969.67 .55 973.56 -.17 980.79
.14 982.84 .11 990.34 1.03 1019.73 .44 1025.5 .2 1026.51 .49 1028.82 .13
1030.54 .39 1032.19 .56 1033.38 .59 1034.26 .71 1034.96 .68 1046.13 1.44
1050.75 4.35 1055.95 5.61 1064.84 10.54 1086.02 11.81 1098.34 11.94 1099.45
11.94 1099.45 11.36 1104.42 11.45 1105.55 11.57 1108.54 11.66 1108.91 11.71
1111.32 11.76 1113.4 11.88 1114.27 11.86 1116.77 11.95 1119.66 11.95 1122.38
12 1122.99 11.93 1125.75 12.21 1126.87 12.41 1129.12 12.71 1131.22 12.88
1132.49 13.09 1134.66 13.34 1136.98 14.1 1138.32 14.44 1141.33 15.5 1143.71
16.59 1144.66 17.24 1145.96 18.33 1146.33 18.56 1147.08 19.33 1147.41 19.19
1148 19.67 1148.62 20.94 1149.33 22.77 1149.67 23.2 1151.33 23.76 1152.69
24.51 1153.82 25.3 1154.67 25.73 1156.34 26.04 1158.31 26.51 1159.67 26.63
1161.67 27.05 1163.01 27.17 1166.16 27.74 1168.01 27.93 1171.34 28.17 1174.8
28.24 1180.31 28.21 1183.51 28.28 1184.84 28.47 1188.73 28.88 1189.9 28.89
1192.61 29.11 1194.55 29.19 1197.36 29.16 1198.41 29.09 1201.62 29.03
1204.27 29.24 1206.95 29.3 1208.15 29.54 1210.1 29.77 1211.21 29.74 1212.04
29.83 1213.34 29.84 1218.67 30.09 1219.81 30.39 1221.75 30.51 1224.37 30.56
1226.13 30.37 1226.73 30.41 1229.09 30.25 1230.4 29.95 1232.53 29.75 1233.59
29.7 1235.35 29.74 1236.79 29.71 1237.85 29.76 1241.18 29.8 1245.07 30.01
1247.01 30.24 1248.95 30.29 1250.89 30.44 1252.84 30.43 1253.84 30.54
1254.78 30.9 1255.97 31 1261.3 31.25 1263.43 31.3 1265.56 31.46 1270.32
31.61 1273.02 31.78 1275.15 31.97 1277.28 32.24 1278.66 32.3 1281.02 32.48
1285.74 32.54 1290.07 32.49 1293.27 32.5 1297.55 32.61 1299.91 32.52 1304.63
32.29 1306.06 32.17 1306.99 32.21 1310.32 32.19 1311.38 32.15 1312.45 32.35
1313.52 32.17 1314.58 32.49 1315.65 32.33 1316.95 32.33 1317.78 32.24
1319.91 32.23 1322.77 32.11 1324.17 32.2 1326.66 32.18 1330.59 32.28 1331.63
32.34 1334.83 32.38 1338.03 32.53 1343.35 32.66 1345.48 32.8 1349.97 33.01
1352.94 33.06 1355.8 33.17 1358.92 33.23 1364.67 33.19 1365.73 33.29 1368.36
33.39 1373.08 33.48 1378.52 33.49 1380.65 33.6 1382.78 33.62 1384.88 33.52
1388.11 33.63 1395.57 33.81 1396.6 33.78 1397.7 33.94 1400.9 34.11 1405.16
34.19 1408.49 34.15 1410.49 34.23 1411.55 34.17 1412.62 34.35 1413.69 34.28
1419.01 34.44 1429.13 34.57 1436.06 34.71 1439.34 34.88 1442.46 34.98
1446.25 34.97 1449.92 35.08 1456.82 35.16 1459.51 35.24 1465.9 35.32 1468.48
35.31 1471.23 35.38 1474.58 35.37 1480.82 35.55 1485.08 35.63 1487.9 35.74
1491.48 35.75 1493.73 35.8 1497.62 35.83 1503.45 35.83 1507.62 35.75 1509.27
35.68 1511.73 35.65 1515.1 35.66 1518.12 35.53 1522.38 35.56 1524.15 35.6
1529.84 35.59 1531.97 35.63 1534.1 35.73 1538.31 35.82 1541.56 36 1544.76
36.1 1551.15 36.12 1552.01 36.07 1557.84 36.14 1561.73 36.04 1565.01 35.82
1570.34 35.29 1572.47 34.98 1575.33 34.75 1579.21 34.36 1581.75 34.22

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .08 937.41 .04 1064.84 .08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 937.41
1064.84 976.94 976.94 976.94 .1 .3

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 41409.68

INPUT
Description: 42

Station Elevation Data num= 357
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 20.98 19.66 21.93 26.21
22.14 39.32 22.32 45.87 22.61 52.42 22.64 58.97 22.96 78.63 23.36 85.19
23.29 91.74 23.58 104.84 23.79 117.95 23.6 131.05 23.66 137.61 23.8 157.27
23.72 170.37 24.21 183.48 24.18 203.14 25.02 242.45 25.83 255.56 25.78
268.66 25.46 294.87 24.36 301.43 24.39 314.53 23.61 321.08 23.42 334.19
23.35 340.74 23.51 347.3 23.88 353.85 23.9 366.95 23.32 373.51 23.46 393.16
23.56 412.82 23.91 425.93 23.95 432.48 23.83 439.03 23.94 465.25 23.69 484.9
23.85 491.46 23.77 498.01 23.97 504.56 23.68 517.67 23.91 524.22 23.89
543.88 24.07 556.98 24.56 570.09 24.55 583.19 24.28 602.85 24.31 609.41
24.43 648.72 24.12 655.27 24.17 661.83 24.41 668.38 24.08 674.93 24.27
688.04 24.24 701.14 24.44 714.25 24.29 727.36 23.61 733.91 23.71 740.46
23.65 747.01 23.78 753.57 23.53 760.12 23.67 766.67 24.13 773.22 24.78
779.78 25.12 805.99 25.19 812.54 25.33 825.65 25.38 851.86 25.93 871.52
25.69 884.62 25.4 891.17 25.4 897.73 25.26 904.28 25.59 910.83 25.66 930.49
25.51 943.6 24.98 956.7 24.92 963.25 24.78 969.81 24.43 989.46 24.19 996.02
24.42 1002.57 24.22 1015.68 24.11 1022.23 23.91 1028.78 24.06 1035.33 24.01
1054.99 24.65 1074.65 26.15 1081.2 26.31 1087.76 26.12 1094.31 25.22 1100.86
23.02 1107.42 22.08 1113.97 22.44 1133.63 22.49 1140.18 22.68 1159.84 22.43
1166.39 22.56 1172.94 24.12 1179.5 24.87 1186.05 24.16 1192.6 22.61 1199.15
22.85 1205.71 23.23 1212.26 23.07 1218.81 22.32 1225.37 22.13 1231.92 22.53
1238.47 22.42 1245.02 22.02 1258.13 21.63 1271.24 21.73 1284.34 21.66
1323.57 22.09 1336.6 22.32 1349.62 22.21 1369.16 22.42 1382.18 22.45 1408.22
22.94 1421.25 22.59 1460.32 23.54 1479.85 23.82 1492.87 23.7 1499.38 23.48
1505.9 23.57 1512.41 23.43 1544.96 24.26 1577.52 24.58 1584.03 24.5 1597.06
24.71 1603.57 24.58 1610.08 24.62 1623.1 24.46 1629.61 24.2 1636.13 24.2
1649.15 24.59 1681.71 25.02 1688.22 24.81 1694.73 24.46 1701.24 24.6 1707.75
24.9 1714.26 25.04 1727.29 24.58 1733.8 24.16 1740.31 23.95 1746.82 23.38
1753.33 23.09 1759.84 22.61 1766.35 21.58 1772.87 20.38 1779.38 19.54
1785.89 19.2 1792.4 19.07 1805.42 17.5 1811.94 15.7 1818.45 14.39 1824.96
14.03 1831.47 13.99 1844.49 14.74 1857.52 16.38 1864.03 16.97 1870.54 16.86
1877.05 16.26 1890.07 15.42 1896.58 14.44 1903.1 12.78 1909.61 11.28 1916.12
10.54 1929.14 10.46 1935.65 10.22 1942.16 9.73 1948.68 9.48 1955.19 9.56
1961.7 9.4 1981.23 8.47 2000.77 6.07 2013.79 5.85 2020.3 6.28 2026.81 6.44
2033.33 6.74 2039.84 7.21 2046.35 7.49 2052.86 7.62 2059.37 7.6 2078.91 6.85
2085.42 6.78 2104.95 7.89 2111.46 7.78 2131 7.17 2150.64 7.08 2163.73 7.49
2170.28 7.52 2176.83 7.69 2183.37 7.62 2196.47 7.86 2203.02 8.27 2216.11
9.42 2222.66 9.44 2229.2 9.3 2235.75 9.32 2235.82 9.31 2242.3 8.02 2248.85
5.09 2256.52 -1.05 2261.84 -1.73 2263.54 -2.09 2265.07 -2.68 2267.58 -3.01
2270.02 -3.07 2272.47 -3.14 2274.9 -3.04 2277.44 -3.1 2280.01 -3.01 2282.56
-2.83 2285.35 -3.01 2287.65 -2.96 2290.37 -2.93 2292.88 -3.02 2295.15 -2.87
2297.21 -2.89 2299.28 -3.01 2301.22 -2.89 2304.79 -3.16 2306.46 -3.23
2308.08 -3.24 2309.95 -3.35 2311.9 -3.47 2314.24 -3.42 2316.58 -3.42 2318.87
-3.36 2320.96 -3.28 2323 -3.19 2325.3 -3.07 2327.59 -2.96 2329.64 -2.85
2331.89 -2.71 2334.02 -2.48 2336.18 -2.31 2338.09 -2.25 2339.87 -2.16
2341.44 -.15 2347.72 -.27 2359.03 5.16 2360.15 5.56 2366.7 9.1 2373.24 10.45
2379.79 10.01 2386.34 9.26 2399.43 9.12 2412.53 9.24 2432.17 8.54 2445.26
7.88 2464.9 7.63 2478 6.85 2484.54 7.62 2491.09 7.47 2497.64 7.15 2517.28
7.33 2523.83 7.28 2530.36 7.41 2536.9 7.34 2543.43 7.1 2549.97 6.55 2556.5
6.16 2569.58 6.11 2576.11 5.9 2589.18 5.96 2602.25 6.43 2608.79 6.54 2621.86
6.25 2628.39 6.49 2634.93 7.67 2648 9.78 2654.54 11.17 2661.07 11.22 2674.14
11.12 2706.82 11.3 2719.89 11.12 2739.5 11.58 2765.64 11.58 2778.71 11.44
2791.78 11.57 2811.39 11.42 2830.99 11.01 2889.81 10.46 2896.34 10.5 2909.42
10.41 2935.56 10.65 2974.77 10.81 3000.91 10.74 3033.59 10.96 3105.48 10.92

3125.08 11.06 3138.15 11.47 3164.3 11.53 3177.37 11.8 3190.44 12.29 3210.04 12.68 3223.11 13.34 3236.18 14.47 3255.79 14.77 3281.93 15.6 3301.54 16.73 3308.07 17.22 3314.61 17.52 3321.14 18.22 3327.68 18.59 3334.21 18.36 3340.75 18.41 3347.29 18.6 3353.82 18.58 3360.36 18.13 3366.89 17.55 3373.43 17.31 3379.96 17.31 3386.5 16.93 3393.03 16.09 3412.64 15.81 3425.71 15.92 3445.32 17.24 3451.85 17.4 3458.39 17.7 3491.06 19.83 3504.13 20.4 3510.67 20.87 3536.81 21.81 3543.35 22.46 3549.88 24.34 3556.42 26.54 3562.95 27.3 3569.49 26.57 3582.56 24.38 3589.09 23.98 3595.63 24.32 3608.7 25.84 3615.24 26.43 3621.77 27.29 3628.31 28.38 3634.84 29.17 3641.38 30.37 3647.91 32.95 3654.45 33.51 3660.98 31.87 3667.52 32.17 3674.05 34.49 3680.59 33.72 3687.13 31.85 3693.66 31.03 3700.2 31.13 3713.27 32.33 3726.34 32.7 3732.87 33.06 3739.41 33.25 3745.94 33.27 3765.55 34.4

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 2235.82 .04 2373.24 .08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2235.82 2373.24 1488.16 1354.06 1248.76 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 40055.61

INPUT Description: 41
Station Elevation Data num= 362
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 47.87 19.64 47.58 39.28 46.86 45.83 46.74 58.92 46.78 65.47 46.26 78.56 45.92 91.66 45.83 104.75 45.47 117.84 45.26 130.94 45.43 137.48 45.06 150.58 44.78 157.13 44.79 170.22 45.43 183.31 45.48 202.95 45.22 209.5 45.04 222.59 44.06 229.14 43.26 235.69 42.71 248.78 42.54 261.88 42.85 268.42 43.17 274.97 43.15 294.61 42.38 314.25 40.67 320.8 40.3 327.34 39.47 333.89 38.85 346.98 38.21 360.08 38.23 366.62 37.78 373.17 37.47 392.81 37.19 399.36 36.76 405.91 36.55 412.45 36.05 451.73 35.2 458.28 35.16 471.37 34.75 491.02 34.65 523.75 33.73 536.84 34.41 543.39 34.38 556.48 33.61 576.12 33.03 595.77 32.71 608.86 32.71 635.05 32.22 641.59 32.39 648.14 32.38 654.69 32.21 667.78 32.4 680.87 32.26 693.97 32.45 700.52 32.39 707.06 32.04 713.61 32.03 726.7 32.83 752.89 33.33 759.44 33.3 765.98 33.05 779.08 31.92 785.62 31.51 798.72 31.49 805.27 31.2 818.36 30.96 824.91 31.02 831.45 30.89 838 30.59 851.09 29.61 857.64 29.52 870.73 30.03 877.28 30.08 883.83 29.08 890.37 28.56 910.02 28.04 929.66 27.86 942.75 27.82 949.3 27.56 962.39 28.03 975.48 27.6 982.03 27.03 1040.95 26.06 1054.05 25.99 1073.69 26.1 1080.23 26.37 1126.06 26.39 1132.61 26.51 1152.25 26.51 1198.08 27.02 1224.26 27.07 1237.36 26.67 1250.45 26.69 1296.28 26.3 1302.83 26.38 1315.92 26.09 1342.11 25.73 1348.65 25.75 1361.75 25.35 1374.84 25.35 1381.39 25.48 1387.94 25.94 1394.48 26.18 1401.03 26.04 1407.58 25.67 1414.12 25.55 1420.67 25.89 1427.22 26.08 1433.76 25.83 1440.31 25.44 1446.86 24.9 1459.95 24.74 1473.05 24.93 1518.87 25.1 1531.97 25.38 1551.61 25.36 1558.15 25.59 1571.25 25.64 1610.53 25.55 1636.72 25.62 1682.54 25.77 1741.47 25.46 1780.75 25.71 1787.29 25.65 1806.94 24.73 1820.03 23.92 1826.58 23.87 1833.12 23.14 1839.67 21.55 1846.22 20.46 1852.76 18.65 1865.86 14.54 1872.4 12.38 1878.95 10.51 1885.5 9.14 1892.04 8.48 1905.14 7.92 1911.68 8.22 1924.78 8.19 1931.33 8.35

1937.87 8.72 1944.42 9.33 1957.51 9.74 1964.06 10.22 1970.61 10.56 1996.79
10.22 2003.34 10.24 2009.89 9.85 2016.43 9.31 2042.62 7.96 2055.72 6.65
2062.26 6.23 2068.81 6.3 2081.9 7.34 2101.54 8.53 2108.09 8.78 2114.64 8.76
2121.19 8.54 2127.73 8.08 2140.83 7.64 2147.37 7.31 2153.92 7.14 2160.47
7.18 2186.65 8.24 2193.2 8.39 2199.75 8.26 2225.94 8.55 2232.48 8.77
2245.58 9.42 2252.12 9.58 2297.95 8.63 2311.05 8.63 2343.78 9.51 2369.97
9.86 2376.52 10.32 2383.06 10.28 2389.61 10.44 2396.16 10.08 2402.7 9.56
2409.25 9.27 2428.89 9.21 2435.44 9.1 2441.99 8.71 2448.53 8 2455.08 7.64
2468.15 7.9 2474.68 7.91 2487.74 8.21 2494.26 7.91 2507.32 6.86 2513.85 7.21
2520.38 8.07 2526.9 8.79 2533.43 8.38 2537.8 6.7 2539.96 5.88 2546.49 3.05
2560 -1.16 2560.71 -1.33 2561.67 -1.58 2562.57 -1.73 2563.71 -1.8 2564.74 -
2.22 2566.38 -2.7 2568.01 -3.11 2569.6 -3.35 2571.04 -3.47 2572.45 -3.47
2573.97 -3.45 2575.36 -3.36 2576.9 -3.24 2578.4 -3.2 2580.18 -3.14 2581.95 -
3.13 2585.96 -3.03 2588.18 -2.97 2592.41 -2.91 2594.44 -2.77 2599.13 -2.59
2601.56 -2.59 2603.58 -2.61 2606.1 -2.74 2608.34 -2.78 2610.56 -2.85 2612.64
-2.69 2614.78 -2.57 2616.59 -2.59 2618.67 -2.76 2620.64 -2.69 2623.07 -2.93
2625.5 -3.06 2627.91 -3.05 2630.24 -3.09 2632.73 -3.12 2634.69 -2.96 2636.9
-2.21 2638.95 -.69 2641.31 -.16 2657.46 3.24 2663.99 5.69 2666.53 6.09
2670.51 6.71 2677.04 6.94 2683.57 6.86 2690.1 6.92 2696.63 6.78 2703.18 6.91
2709.74 6.72 2716.3 6.81 2722.86 7.04 2729.42 6.95 2735.97 7.6 2742.53 8.07
2749.09 8.29 2762.21 8.04 2775.32 6.87 2781.88 6.59 2788.44 6.52 2801.56 6.7
2834.35 6.27 2847.46 6.67 2854.02 7.11 2860.58 6.85 2867.14 6.96 2873.69
7.38 2880.25 8.14 2893.37 9.28 2899.93 10.33 2906.48 11.6 2913.04 12.38
2926.16 12.98 2939.27 13.12 2958.95 13.15 2972.07 12.96 2985.18 12.36
2991.74 12.19 3011.41 11.93 3017.97 12.04 3031.09 11.72 3044.2 11.63 3057.32
10.87 3076.99 10.91 3103.23 10.79 3129.46 11.01 3136.02 10.82 3142.58 10.45
3149.13 10.38 3168.81 9.5 3201.6 9.78 3214.71 9.97 3234.39 9.69 3240.95 9.89
3254.06 9.85 3260.62 9.65 3280.3 9.29 3299.97 9.48 3306.53 9.64 3326.2 9.68
3339.32 9.97 3358.99 10.09 3385.22 10.01 3391.78 9.79 3398.34 9.9 3404.9 9.7
3411.46 9.65 3418.01 10.07 3431.13 10.5 3444.25 10.38 3457.36 10.69 3463.92
10.7 3483.6 10.16 3516.39 10.26 3536.06 10.28 3542.62 10.48 3549.18 10.54
3555.73 10.45 3562.29 10.51 3575.41 11 3601.64 12.33 3608.2 12.42 3614.76
12.88 3627.87 14.34 3640.99 15.01 3647.55 15.59 3654.11 15.94 3660.66 16.43
3673.78 17.06 3680.34 16.89 3686.9 17.13 3719.69 17.38 3732.8 17.31 3745.92
17.56 3778.71 17.31 3785.27 17.15 3791.83 17.16 3798.38 16.95 3804.94 16.52
3811.5 16.23 3837.73 16.19 3844.29 16.09 3857.41 15.6 3863.96 15.51 3896.75
16.21 3929.54 16.3 3942.66 16.95 3962.34 17.34 3968.89 17.57 3982.01 18.31
4001.68 18.96 4047.59 20.85 4054.15 21.36 4067.26 21.67 4073.82 22.13
4086.94 22.35 4113.17 23.36 4126.29 23.62 4145.96 24.67 4172.19 25.56
4178.75 25.62 4185.31 25.38

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 2526.9 .04 2677.04 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2526.9
2677.04 1195.98 1379.74 1532.92 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 38675.88

INPUT
Description: 40
Station Elevation Data num= 497
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 32.52 6.55 32.36 19.66 32.57
26.21 32.42 32.76 31.94 72.07 30.91 91.73 30.94 111.38 30.5 124.49 30.51
157.25 29.55 275.19 27.47 307.95 27.63 360.36 26.96 366.91 27.2 393.12 29.12
406.23 27.57 432.43 25.94 445.54 25.44 517.61 25.31 589.68 25.9 629 25.31
661.76 25.73 694.52 25.77 727.28 24.91 733.83 25.03 740.38 25.5 746.93 25.31
753.48 24.21 760.04 21.5 779.69 10.59 786.24 7.43 792.8 5.49 799.35 4.92
805.9 4.81 812.45 5 832.11 4.95 838.66 5.24 864.87 4.98 877.97 4.74 891.08
5.38 910.73 5.38 923.84 6.06 936.94 6.04 963.15 6.7 976.25 6.49 1009.01
6.88 1022.12 6.73 1035.22 5.94 1041.77 5.12 1048.33 4.95 1054.88 4.4 1067.98
4.03 1074.53 4.19 1081.09 3.96 1113.85 3.95 1120.4 4.17 1146.61 4.27 1172.81
3.95 1179.37 4.12 1185.92 3.97 1192.47 4.13 1205.57 3.9 1225.23 4.39 1238.33
3.97 1264.54 4.22 1277.65 3.84 1284.2 4.54 1297.3 5.05 1316.96 5.31 1330.06
5.81 1356.27 5.22 1389.03 5.63 1415.24 4.79 1434.89 5.5 1448 6.55 1454.55
6.34 1480.76 6.69 1493.87 7.18 1506.98 6.52 1526.65 5.91 1539.76 6.78
1546.32 6.99 1565.98 6.29 1592.2 7.56 1605.31 7.86 1611.87 7.56 1624.98 5.44
1630.37 4.79 1631.53 4.65 1638.09 4.52 1644.64 3.6 1655 .02 1658.75 -.06
1661.34 -.1 1662.85 -.37 1664.31 -.76 1667.25 -1 1668.97 -1.32 1670.59 -2.29
1674.61 -2.39 1676.76 -2.86 1678.68 -3.22 1680.48 -3.27 1682.15 -3.45
1683.85 -3.37 1685.34 -2.92 1686.71 -3.14 1688.17 -3.26 1689.71 -3.59
1691.29 -4.15 1693.14 -4.36 1695.04 -4.55 1696.95 -4.78 1698.74 -4.66
1700.61 -4.88 1702.29 -4.9 1704.07 -4.58 1705.64 -4.62 1707.24 -4.64 1708.72
-4.51 1710.24 -4.54 1711.62 -4.46 1713.21 -4.45 1714.93 -4.49 1716.71 -4.5
1718.42 -4.49 1720.09 -4.46 1721.48 -4.26 1723.08 -4.05 1724.51 -3.51
1726.02 -3.78 1727.37 -3.41 1728.91 -3.27 1730.4 -2.93 1732.08 -2.29 1733.82
-1.46 1735.89 -1.32 1737.25 -.92 1749.53 5.34 1756.09 8.89 1762.64 8.85
1769.2 8.41 1775.75 7.66 1782.31 7.57 1788.86 7.54 1795.42 7.66 1801.97 7.73
1808.53 7.71 1815.08 7.72 1821.64 7.68 1828.19 7.69 1834.75 7.78 1841.3 7.76
1847.86 7.54 1854.41 7.36 1860.97 7.22 1874.08 7.11 1880.64 7.04 1887.19
6.91 1893.75 6.71 1900.3 6.57 1906.86 6.33 1913.41 6.53 1926.53 6.83 1939.65
6.99 1946.21 7.18 1952.77 7.66 1959.33 8.07 1965.89 8.01 1972.45 7.89
1979.01 7.63 1985.57 7.75 1992.13 7.85 1998.69 7.99 2005.25 8.17 2011.81
8.19 2018.37 8.31 2024.93 8.33 2031.49 8.28 2038.05 8.21 2044.61 8.2 2051.17
8.14 2057.73 8.06 2064.29 8.03 2070.85 8.15 2077.4 8.17 2083.96 8.33 2090.52
8.43 2097.08 8.51 2110.2 8.75 2116.76 8.74 2123.32 8.76 2129.88 8.89 2136.44
8.87 2143 9.01 2149.56 9.21 2156.12 9.37 2162.68 9.48 2169.24 9.47 2175.8
9.42 2182.36 9.4 2188.92 9.45 2195.48 9.42 2202.04 9.5 2208.6 9.76 2215.16
9.97 2221.72 10 2234.84 10.19 2241.4 10.16 2247.96 10.21 2254.52 10.22
2261.08 10.21 2267.64 10.28 2274.2 10.44 2280.76 10.4 2293.88 10.28 2300.44
10.25 2307 10.17 2313.56 10.05 2320.12 9.79 2326.68 9.74 2333.24 9.6 2339.79
9.62 2346.35 9.55 2352.91 9.42 2359.47 9.25 2366.03 9.55 2372.59 10.07
2379.15 10.39 2385.71 10.65 2392.27 11.1 2398.83 11.45 2405.39 11.76 2411.95
11.94 2418.51 12.03 2425.07 12.01 2431.63 11.97 2438.19 11.99 2444.75 11.94
2451.31 11.78 2464.43 11.63 2470.99 11.62 2477.55 11.7 2484.11 11.74 2490.67
11.61 2497.23 11.52 2503.79 11.54 2510.35 11.53 2516.91 11.38 2523.47 11.5
2530.03 11.35 2536.59 11.32 2543.15 11.44 2549.71 11.35 2562.83 11.26
2569.39 11.17 2575.95 11.1 2582.51 10.91 2589.07 10.87 2608.75 10.69 2615.3
10.66 2621.86 10.6 2628.42 10.61 2634.98 10.53 2641.54 10.49 2648.1 10.34
2654.66 10.23 2661.22 10.37 2667.78 10.1 2674.34 10.05 2680.9 9.74 2694.02
9.09 2700.58 8.71 2713.7 8.16 2720.26 7.9 2726.82 7.86 2733.33 7.69 2739.84
7.64 2746.35 7.35 2752.87 7.21 2759.38 7.4 2765.89 7.51 2778.91 7.06 2785.42
7.3 2791.93 7.18 2798.44 6.85 2804.95 6.84 2811.47 6.94 2817.98 7.07 2824.49

7.24 2831 7.21 2837.51 7.05 2844.02 7.31 2850.53 7.48 2857.04 7.55 2863.55
7.54 2870.07 7.47 2876.58 7.36 2883.09 7.27 2889.6 7.49 2896.11 7.59 2902.62
7.46 2909.13 7.35 2915.64 7.35 2922.15 7.22 2928.67 7.33 2935.18 7.46
2941.69 7.31 2948.2 7.6 2954.71 7.87 2961.22 8.19 2967.73 8.07 2980.75 8.59
2987.27 8.83 2993.78 9.11 3000.29 9.13 3006.8 9.23 3013.31 9.51 3019.82 9.28
3032.84 9.04 3039.35 8.65 3045.87 8.11 3052.38 7.77 3058.89 7.83 3065.4 7.71
3071.91 7.56 3078.42 7.51 3084.93 7.44 3097.95 7.79 3104.47 7.84 3110.98
7.75 3117.49 7.83 3124 7.83 3130.51 7.72 3137.02 7.73 3143.53 7.91 3150.04
8.27 3156.55 8.38 3163.07 8.76 3176.09 9.63 3189.11 10.55 3195.62 10.97
3202.13 11.52 3221.67 12.75 3228.18 13.09 3234.69 13.57 3247.71 14.1 3254.22
14.29 3260.73 14.41 3267.24 14.57 3273.76 14.69 3280.27 14.67 3286.78 14.68
3293.29 14.59 3299.8 14.47 3306.31 14.25 3312.82 14.25 3319.33 14.22 3325.84
14.01 3332.36 14.16 3338.87 14.28 3345.38 14.27 3351.89 14.41 3358.4 14.7
3364.91 14.95 3371.42 15.14 3377.93 15.36 3384.44 15.49 3390.96 15.71
3397.47 15.76 3403.99 15.67 3410.5 15.63 3417.02 15.61 3423.53 15.47 3430.05
15.42 3436.56 15.51 3443.08 15.46 3449.59 15.35 3456.11 15.36 3462.62 15.24
3469.14 15.15 3475.65 15.04 3482.17 14.79 3495.2 14.57 3501.71 14.33 3508.23
14.06 3514.74 14.1 3521.26 13.99 3527.77 13.86 3534.29 13.93 3547.32 13.71
3553.83 13.66 3560.35 13.65 3566.86 13.54 3573.38 13.34 3579.89 13.19
3586.41 13.23 3592.93 13.15 3599.44 13.05 3605.96 12.91 3612.47 12.64
3618.99 12.51 3625.5 12.51 3632.02 12.48 3638.53 12.39 3645.05 12.39 3651.56
12.19 3658.08 11.97 3664.59 11.87 3671.11 11.87 3677.62 12.1 3684.14 12.23
3690.65 12.46 3697.17 12.6 3703.68 12.96 3710.2 13.11 3716.71 13.45 3723.23
13.9 3729.74 14.08 3736.26 14.16 3749.29 14.44 3755.8 14.61 3762.32 14.54
3768.83 14.63 3775.35 14.56 3781.86 14.55 3794.9 14.72 3801.41 14.96 3807.93
15.07 3814.44 15.16 3827.47 15.28 3833.99 15.23 3840.5 15.21 3847.02 15.23
3853.53 15.28 3860.05 15.39 3866.56 15.47 3873.08 15.73 3886.11 15.86
3892.62 15.94 3899.14 16.05 3912.17 16.1 3918.68 16.11 3925.2 16.7 3931.71
17.05 3938.23 17.1 3944.74 17.2 3951.26 17.32 3957.77 17.32 3964.29 17.5
3970.8 17.56 3977.32 17.47 3990.35 17.4 3996.86 17.42 4003.38 17.35 4009.9
17.37 4016.41 17.46 4022.93 17.58 4029.44 17.76 4035.96 18.13 4042.47 18.37
4048.99 18.56 4055.5 18.83 4062.02 18.87 4068.53 18.97 4081.56 19.24 4088.08
19.44 4094.59 19.59 4101.11 19.84 4107.62 19.99 4120.65 20.74 4127.17 20.89
4133.68 21.07 4140.2 21.48 4146.71 21.86 4153.23 22.08 4159.74 21.85 4166.26
21.6 4172.77 21.86 4179.29 21.77 4185.8 21.61 4192.32 21.55 4198.83 21.62
4205.35 21.63 4211.86 21.76 4218.38 21.97 4224.9 22.07 4231.41 22.25 4237.93
22.46 4244.44 22.82 4250.96 23.13 4257.47 23.61 4263.99 24.16 4270.5 24.58
4277.02 24.95 4283.53 25.55 4290.05 26.08
 Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .082 1605.31 .04 1762.64 .08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1605.31
1762.64 1736.85 1644.44 1625.84 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 37031.44

INPUT
Description: 39 500 ft US Cotley Riv Trib
Station Elevation Data num= 196

Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 30.36 26.21 30.12 52.42 30.73 85.19 29.37 190.03 28.25 216.24 26.74 235.9 25.08 249.01 25 262.11 24.53 281.77 22.62 307.98 19.26 327.64 15.28 334.19 14.89 347.3 12.89 353.85 11.26 360.4 10.05 366.96 9.39 380.06 11.4 386.61 12.03 393.17 13.6 399.72 13.63 406.27 12.74 419.38 8.76 439.04 6.76 478.35 6.33 498.01 5.17 530.77 5.24 556.99 5.89 563.54 5.75 576.64 4.37 602.85 3.8 635.62 4.98 655.28 4.86 674.94 3.92 688.04 4.28 701.15 3.88 760.12 4.43 786.33 3.06 799.44 4.04 812.54 4.42 819.1 4.99 832.2 4.5 845.31 5.11 871.52 4.5 891.18 4.87 897.73 4.58 904.28 3.6 910.84 3.15 976.36 2.61 989.47 3.68 1068.1 3.05 1087.76 3.64 1100.87 3.03 1120.52 2.88 1133.63 3.72 1140.18 3.71 1146.73 5.07 1153.29 5.74 1192.6 5.51 1199.16 3.92 1205.71 3.08 1297.45 3.48 1323.66 4.05 1343.32 3.23 1356.42 3.62 1362.97 4.54 1369.53 6.58 1376.08 7.61 1395.74 5.78 1474.37 5.67 1500.58 6.93 1533.35 5.63 1572.66 6.9 1631.64 5.41 1644.74 5.83 1664.4 7.33 1749.59 7.58 1769.24 6.96 1842.42 7.66 1847.44 7.46 1853.9 6.77 1860.37 5.97 1866.83 5.48 1873.3 4.88 1879.76 3.71 1890 -.94 1890.62 -1 1891.34 -1.08 1891.91 -1.3 1892.57 -1.39 1892.98 -1.44 1893.54 -1.47 1894.27 -1.74 1895.38 -2.02 1896.93 -2.33 1898.8 -2.97 1901 -4.12 1905.57 -5.28 1907.3 -5.45 1909.17 -5.62 1911.17 -5.78 1913.75 -6.02 1916.24 -6.33 1918.97 -6.69 1921.25 -7.33 1923.71 -7.83 1926 -8.46 1928.4 -8.97 1930.69 -9.2 1932.96 -9.51 1935.08 -9.54 1937.34 -9.41 1939.41 -9.15 1941.84 -9 1944.27 -8.38 1946.46 -7.99 1948.35 -7.34 1950.27 -6.9 1951.95 -6.48 1953.45 -6.16 1954.54 -5.72 1955.5 -5.49 1956.38 -5.11 1957.55 -4.86 1959.06 -4.43 1960.92 -4.05 1962.65 -3.6 1964.72 -2.75 1966.66 -2.22 1968.72 -1.95 1970.17 -1.73 1971.33 -1.48 1973.68 -.87 1975.66 -.51 1978.17 -.64 1993.81 6.89 1996.13 7.97 2002.6 8.29 2041.72 6.83 2048.27 6.34 2094.11 6.32 2107.21 6.04 2113.76 7.27 2126.86 11.64 2133.41 12.63 2146.5 13.26 2153.05 13.04 2166.15 11 2192.35 11.06 2205.44 11.45 2251.29 10.87 2316.78 10.72 2388.81 9.21 2408.46 9.22 2447.75 7.31 2460.85 7.38 2480.5 6.46 2552.54 7.15 2565.63 7.77 2624.57 7.55 2644.22 7.62 2650.77 7.35 2683.51 7.54 2696.61 7.77 2716.26 7.3 2749 8.97 2768.65 8.6 2794.84 7.47 2840.69 8.47 2853.78 8.4 2919.27 10.9 2932.37 12.16 2971.66 14.12 3004.41 14.41 3187.78 13.38 3286.01 11.55 3423.54 13 3443.18 13.01 3489.03 14.03 3521.77 13.53 3547.97 14.42 3574.16 15.89 3639.65 16.12 3659.3 15.75 3678.94 16.25 3698.59 15.56 3764.08 17.31 3816.47 18.37 3868.86 18.28 3895.06 20.04 3934.35 21.05 3960.55 20.2 3999.84 20.67 4006.39 21.35 4078.43 24.33 4104.62 26.7

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .085 1842.42 .04 2002.6 .08
Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1842.42 2002.6 1361.41 1290.79 1264.72 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 35740.65

INPUT
Description: 38
Station Elevation Data num= 481
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 41.08 6.53 43.39 13.07 45.74 19.6 46.46 26.14 47.03 32.67 46.77 39.21 46.7 45.74 46.69 52.28 46.73 58.81 46.62 65.34 46.54 71.88 46.35 78.41 46.36 84.95 46.02 91.48 44.58 98.02

42.72 104.55 40.81 111.09 38.78 117.62 38.34 124.15 37.32 130.69 34.84
137.22 32.4 143.76 30.18 150.29 28.26 156.83 28.13 163.36 28.21 169.9 28.43
176.43 28.79 182.97 29.2 189.5 29.53 196.03 29.81 215.64 30.76 222.17 31.12
228.71 31.33 235.24 31.61 241.78 32.2 248.31 32.96 261.38 34.44 267.91 35.35
274.45 36.68 280.98 36.67 287.52 36.61 294.05 36.63 300.59 36.48 307.12
36.51 320.19 36.49 326.72 36.52 333.26 36.88 339.79 37.22 346.33 37.77
352.86 38.74 359.4 40.27 365.93 40.69 372.46 40.77 379 40.92 385.53 41.09
392.07 41.35 398.6 41.44 405.14 41.44 411.67 41.74 418.21 42.42 424.74 43.08
431.27 43.69 444.34 44.56 450.88 45.01 463.95 45.64 470.48 45.8 477.02 45.99
483.55 46.29 490.08 46.31 496.62 46.38 503.15 46.52 509.69 46.61 516.22
46.57 522.76 46.51 535.83 46.53 542.36 46.37 548.89 46.18 555.43 46.13 568.5
46.09 575.03 46.04 581.57 45.95 588.1 45.76 594.64 45.35 601.17 44.57 607.7
42.14 614.24 39.86 620.77 39.4 627.31 39.28 633.84 39.02 640.38 38.81 653.45
38.31 659.98 38.07 666.52 37.98 673.05 37.87 692.65 37.76 699.19 37.74
705.72 37.82 712.26 37.83 718.79 37.74 725.33 37.57 731.86 37.38 738.39
37.02 744.93 36.73 751.46 36.29 758 36.06 764.53 35.37 771.07 33.42 777.6
30.95 784.14 29.66 790.67 29.43 797.2 29.58 803.74 29.6 810.27 30.28 816.81
31.26 823.34 31.76 829.88 31.71 836.41 31.7 842.95 31.46 849.48 31.36
856.01 31.4 869.08 31.09 875.62 30.9 882.15 30.89 888.69 30.9 901.76 31.03
908.29 31 914.82 31.09 921.36 31.53 927.89 31.75 934.43 31.79 947.5 31.97
954.03 32.13 960.57 32.12 967.1 32.14 980.17 31.75 986.7 31.52 999.77 30.81
1006.31 30.37 1012.84 30.19 1019.38 29.97 1025.91 29.69 1032.44 29.55
1038.98 29.07 1045.51 28.7 1052.05 28.48 1058.58 28.42 1065.12 28.33 1071.65
28.43 1078.19 28.3 1084.72 28.05 1091.25 27.86 1097.79 27.64 1104.32 27.53
1110.86 27.39 1117.39 27.19 1123.93 26.92 1130.46 27.37 1137 27.56 1143.53
27.48 1150.06 27.46 1156.6 27.56 1163.13 27.52 1169.67 27.25 1176.2 27.32
1182.74 27.59 1189.27 28.06 1195.81 28.29 1202.34 28.21 1208.87 28.04
1215.41 28.31 1221.94 28.92 1228.48 29.09 1241.55 29.13 1248.08 29.16
1254.62 29.57 1261.15 29.67 1267.69 29.57 1274.22 29.7 1280.75 29.7 1287.29
29.68 1293.82 29.57 1300.36 29.62 1306.89 29.32 1313.43 29.12 1319.96 28.94
1326.49 28.86 1333.03 28.59 1339.56 28.3 1346.1 28.35 1352.63 27.85 1359.17
27.58 1365.7 27.4 1372.24 27.38 1378.77 27.38 1385.3 27.33 1391.84 27.11
1398.37 27.02 1404.91 27 1411.44 26.9 1417.98 26.76 1424.51 26.58 1431.05
26.32 1437.58 26.02 1444.12 26.21 1450.65 26.16 1457.18 25.95 1463.72 25.83
1470.25 25.73 1476.79 25.38 1483.32 25.14 1489.86 25.04 1496.38 25.04
1502.91 25 1509.43 24.89 1515.96 24.62 1522.49 24.74 1529.01 24.67 1535.54
24.45 1542.06 24.37 1548.59 24.27 1555.11 24.4 1561.64 24.61 1568.17 24.31
1574.69 24.2 1581.22 24 1587.74 23.96 1594.27 24.28 1600.8 24.47 1607.32
24.49 1613.85 24.31 1620.37 23.97 1633.42 23.32 1639.95 22.79 1646.48 22.39
1653 21.63 1659.53 20.66 1666.05 19.57 1672.58 18.53 1679.11 17.58 1685.63
17.05 1692.16 16.48 1698.68 15.86 1705.21 15.16 1711.73 14.82 1718.26 14.14
1724.79 13.41 1737.84 12.63 1744.36 12.83 1750.89 13.08 1757.42 12.98
1763.94 10.62 1770.47 5.86 1780 -1.14 1780.66 -1.22 1781.2 -1.43 1782 -1.4
1782.91 -1.55 1783.95 -1.65 1784.67 -1.9 1785.25 -2 1785.87 -2.22 1786.63 -
2.42 1787.26 -2.87 1788.43 -3.73 1790.71 -4.39 1792.98 -5.13 1795.19 -5.48
1797.36 -5.25 1799.46 -5.39 1801.81 -5.57 1804.12 -5.12 1806.74 -4.78
1809.13 -4.6 1811.43 -4.6 1813.94 -4.42 1816.49 -4.34 1818.85 -4.2 1821.34 -
4.26 1823.68 -4.24 1826.1 -4.34 1828.51 -4.32 1830.97 -4.46 1833.24 -4.55
1835.71 -4.72 1838.12 -4.73 1840.62 -4.87 1843.02 -4.97 1845.65 -4.96
1848.21 -4.81 1850.64 -4.81 1852.81 -4.76 1855.07 -4.64 1856.99 -4.74
1858.96 -4.57 1860.74 -4.32 1862.49 -4.27 1864 -3.89 1865.44 -3.77 1866.57 -
3.59 1867.61 -3.33 1868.39 -3.19 1869.17 -2.98 1869.83 -2.68 1870.59 -2.32
1887.93 5.45 1890.4 6.08 1894.46 7.12 1900.98 7.34 1914.04 6.26 1953.19 5.48
1959.72 5.81 2018.45 6.65 2024.98 6.93 2070.66 7.32 2090.23 7.03 2129.39

7.53 2175.07 7.62 2194.65 8.26 2207.75 8.17 2247.05 6.93 2253.6 6.95 2266.7
6.21 2292.91 6.27 2312.56 6.69 2338.76 6.25 2345.31 5.95 2351.86 6.09
2397.72 5.51 2410.82 5.15 2430.47 5.68 2443.57 6.25 2450.12 6.17 2463.22
6.77 2482.88 6.39 2495.98 6.53 2509.08 6.11 2522.18 5.32 2535.28 5.15
2561.49 5.97 2581.14 5 2594.24 4.73 2607.34 5.18 2646.64 5.67 2659.75 7.64
2672.85 8.66 2692.5 8.1 2725.25 8.56 2751.45 8.55 2758.01 8.17 2797.31 7.03
2816.96 7.27 2830.06 6.95 2836.61 7.02 2849.72 6.17 2856.27 6.05 2869.37
6.47 2875.92 6.32 2882.47 5.84 2889.02 5.96 2902.12 7.14 2908.67 7.37
2921.77 6.08 2934.87 5.49 2954.53 5.11 2967.63 5.24 2974.18 4.97 2980.73
5.55 2993.83 7.44 3000.38 7.85 3033.13 8.32 3039.68 7.82 3046.24 6.59
3052.79 4.99 3072.44 4.2 3098.64 4.36 3111.74 5.18 3137.95 5.46 3144.5 6.28
3157.6 8.34 3164.15 9.09 3170.7 9.27 3203.45 8.86 3216.55 9.1 3236.21 8.87
3255.86 9.22 3268.96 8.99 3282.06 8.37 3301.71 7.92 3314.81 7.99 3347.57
7.39 3354.12 8.31 3386.87 8.81 3413.07 7.63 3426.17 7.81 3439.28 7.3 3465.48
7.33 3491.68 6.68 3504.78 6.95 3530.99 6.56 3557.19 7.69 3570.29 7.59
3589.94 7.04 3609.59 6.99 3622.7 7.58 3629.25 7.54 3635.8 7.86 3655.45 8.14
3675.1 9.28 3701.3 10.04 3720.96 10.15 3753.71 12.48 3760.26 11.86 3773.36
8.73 3779.91 8.78 3786.46 10.07 3793.01 12.62 3799.56 13.83 3806.11 14.66
3812.67 15.06 3819.22 14.91 3832.32 14.15 3838.87 14.15 3851.97 13.65
3858.52 13.68 3871.62 13.24 3910.93 13.62 3937.13 12.84 3943.68 12.36
3963.33 12.46 3982.98 11.92 4041.94 12.14 4055.04 12.55 4087.79 12.57
4107.45 13.23 4133.65 13.45 4166.4 13.26 4199.16 11.13 4205.71 10.9 4231.91
10.83 4251.56 12.06 4271.21 12.12 4297.42 11.41 4317.07 11.79 4349.82 13.45
4382.58 13.48 4415.33 12.75 4441.53 12.36 4461.18 13.12 4467.74 13.16
4474.29 13.51 4480.84 13.54 4493.94 13.1 4520.14 14.16 4526.69 14.22 4546.34
13.52 4559.44 14.3 4585.65 14.65 4611.85 13.89 4631.5 15.3 4664.26 15.69
4690.46 15.52 4716.66 15.88 4742.86 15.53 4762.52 15.69 4788.72 16.28
4814.92 15.86 4834.57 16 4841.12 16.39 4880.43 17.54 4900.08 17.53 4952.49
18.76 4959.04 18.57 4985.24 19.65 4991.79 20.45 5004.89 20.63 5011.44 20.24
5017.99 20.51 5024.54 21.39 5031.1 21.74 5050.75 21.57

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .088 1607.32 .04 1894.46 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1607.32
1894.46 1785.36 1632.89 1530.18 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 34107.76

INPUT
Description: 37
Station Elevation Data num= 499
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 24.64 360.62 19.68 406.52
23.9 661.51 23.33 686.2 12.7 687.25 12.13 693.68 5.4 700 -1.08 700.45 -1.25
700.85 -1.5 701.42 -1.62 701.98 -1.84 702.33 -2.1 702.62 -2.24 703.35 -2.35
704.28 -2.81 705.63 -3.83 708.31 -4.91 711.03 -5.93 713.31 -6.71 716.1 -7.14
718.64 -7.51 721.01 -7.69 723.53 -7.63 726.11 -8.19 728.78 -8.2 731.64 -8.54
734.05 -8.56 736.6 -8.45 739.04 -8.25 741.38 -8.07 743.66 -7.66 745.87 -7.41
748.18 -7 750.75 -6.73 752.97 -6.33 756.13 -6.1 758.72 -5.66 761.27 -5.15

763.83 -4.96 766.37 -4.91 768.72 -5.02 770.97 -4.94 773.08 -4.54 775.4 -4.4
777.28 -4.25 779.14 -4.15 780.64 -3.86 782.15 -2.98 783.44 -3.18 803.08 2.33
809.52 2.09 815.95 2.1 822.39 2.16 828.82 2.54 841.69 2.83 854.68 2.92
861.23 2.9 867.78 3.12 874.33 3.24 880.89 3.41 887.44 3.43 893.99 3.4 907.1
3.7 913.65 3.76 920.2 3.36 926.75 2.82 933.3 1.9 939.86 1.57 966.07 1.57
972.62 2.31 979.17 4.62 985.72 7.6 992.27 9.93 998.83 11.21 1005.38 12.63
1011.93 14.18 1018.48 16.03 1025.03 18.5 1031.59 20.65 1038.14 21.71 1044.69
21.54 1051.24 20.35 1057.8 18.81 1064.35 17.5 1070.9 16.22 1077.45 15.06
1084 13.51 1090.56 12.08 1097.11 10.58 1103.66 8.14 1110.21 6.12 1116.77
5.17 1123.32 4.74 1129.87 4.55 1136.42 4.55 1142.97 4.64 1149.53 4.55
1156.08 4.31 1162.63 4.27 1169.18 4.4 1175.73 4.55 1188.84 4.64 1195.39 4.41
1201.94 3.82 1208.5 3.52 1215.05 4.11 1221.6 4.48 1228.15 4.59 1234.7 4.67
1241.26 4.77 1247.81 5.06 1254.36 5.1 1260.91 4.95 1267.47 5.12 1274.02 5.24
1280.57 4.86 1287.12 4.72 1300.23 4.57 1306.78 4.42 1313.33 4.51 1332.99
4.47 1339.54 4.42 1346.09 4.43 1352.64 4.33 1359.2 4.01 1372.3 3.13 1378.85
3.23 1385.4 3.4 1391.96 3.4 1398.51 3.55 1405.06 4.22 1411.61 3.99 1418.17
3.78 1424.72 3.66 1431.27 3.67 1437.82 3.37 1444.37 3.35 1450.93 3.46
1457.48 3.61 1464.03 3.49 1470.58 3.54 1477.14 3.56 1490.24 3.27 1496.79
3.31 1503.34 3.65 1509.9 3.72 1516.45 4.34 1523 4.98 1529.55 5.25 1536.11
5.43 1542.66 5.18 1549.21 5.28 1555.76 5.31 1562.31 5.57 1568.87 5.96
1575.42 6.33 1581.97 6.52 1588.52 6.67 1595.07 6.61 1614.73 6.83 1621.28
6.97 1627.84 7.16 1634.39 7 1640.94 5.48 1647.49 2.44 1654.04 1.55 1745.77
1.55 1752.33 1.56 1758.88 2.63 1765.43 3.89 1771.98 4.47 1778.54 5.73
1785.09 8.27 1791.64 10.52 1798.19 11.55 1804.74 11.62 1811.3 11.3 1817.85
11.03 1824.4 10.79 1830.95 10.71 1837.51 10.72 1850.61 10.69 1857.16 10.66
1870.27 10.48 1876.82 10.44 1883.37 10.37 1889.92 10.22 1903.03 10.19
1909.58 10.16 1916.13 10.28 1922.68 10.43 1935.79 10.55 1942.34 10.51
1948.89 10.6 1955.44 10.74 1962 10.71 1968.55 10.49 1975.1 10.31 1981.65
10.03 1988.21 9.79 1994.76 9.27 2001.31 8.82 2007.86 8.46 2014.41 8.31
2020.97 8.21 2027.52 8.04 2034.07 7.92 2040.62 7.78 2047.18 7.67 2053.73
7.66 2066.83 7.52 2073.38 7.48 2079.94 7.41 2086.49 7.46 2093.04 7.38
2106.14 7.08 2112.7 6.94 2119.25 6.84 2125.8 6.78 2132.35 6.66 2138.91 6.64
2145.46 6.72 2152.01 6.77 2158.56 6.88 2165.11 7.01 2171.67 7.18 2178.22
7.37 2184.77 7.33 2191.32 7.03 2197.88 6.76 2204.43 6.67 2210.98 6.7 2217.53
7.59 2224.08 7.73 2237.19 7.45 2243.74 7.12 2250.29 6.89 2263.4 6.7 2269.95
6.59 2283.05 6.53 2289.61 6.67 2296.16 6.64 2302.71 6.65 2309.26 6.85
2315.81 6.85 2322.37 7.08 2328.92 7.16 2335.47 7.31 2342.02 7.55 2348.58 7.7
2355.13 7.74 2361.68 7.75 2368.23 7.62 2374.79 8.14 2381.34 8.39 2387.89
8.45 2394.44 8.39 2400.99 8.47 2407.55 8.42 2414.1 8.56 2420.65 8.83 2427.2
8.58 2433.75 8.24 2440.31 8.34 2446.86 8.48 2453.41 8.41 2459.96 8.48
2466.52 8.59 2473.07 8.52 2479.62 8.27 2486.17 8.1 2492.72 8.01 2499.28 7.81
2505.83 7.65 2512.38 7.38 2518.93 7.05 2525.49 6.59 2532.04 6.43 2538.59
6.57 2545.14 6.64 2551.69 6.54 2558.25 6.49 2564.8 6.52 2571.35 6.57
2584.46 6.43 2591.01 6.42 2597.56 6.46 2604.11 6.54 2610.66 6.57 2617.22
6.72 2623.77 6.83 2630.32 6.76 2636.87 6.75 2643.43 6.92 2649.98 6.95
2656.53 7 2663.08 7.28 2669.63 7.54 2676.19 7.64 2682.74 7.56 2689.29 7.7
2695.84 8.09 2702.4 8.44 2708.95 8.65 2722.05 8.92 2728.6 8.92 2735.16 8.88
2741.71 8.89 2748.26 8.92 2754.81 9.04 2761.36 9.07 2767.92 8.8 2774.47 8.27
2781.02 7.88 2787.57 7.65 2794.13 7.51 2807.23 7.62 2813.78 7.6 2820.33 7.9
2826.89 8.33 2839.99 9.6 2846.54 9.7 2853.1 9.5 2859.65 9.85 2866.2 9.82
2872.75 9.73 2879.3 9.45 2885.86 9.06 2892.41 8.56 2898.96 8.17 2905.51 7.63
2912.07 7.65 2918.62 7.52 2925.17 7.5 2931.72 7.54 2938.27 7.39 2951.38 7.76
2957.93 7.9 2964.48 7.8 2971.03 7.91 2977.59 8.19 2984.14 8.22 2990.69 8.6
2997.24 8.96 3003.8 9.26 3010.35 9.53 3016.9 9.75 3023.45 10.19 3030 10.96

3036.56 11.09 3043.11 10.73 3049.66 11.24 3056.21 11.46 3062.77 10.91
3069.32 10.33 3075.87 10.2 3082.42 9.77 3088.97 9.77 3095.53 9.98 3102.08
9.94 3108.63 10.46 3115.18 11.25 3121.74 11.83 3128.29 12.09 3134.84 12.49
3141.39 13.16 3147.94 13.6 3161.05 14.35 3167.6 14.48 3174.15 14.5 3180.7
14.23 3187.26 14.18 3193.81 13.9 3200.36 13.68 3206.91 13.59 3213.47 13.52
3220.02 13.01 3226.57 12.74 3233.12 13.05 3239.67 13.05 3246.23 12.91
3252.78 12.5 3259.33 12.46 3265.88 13.06 3272.43 13.35 3278.99 13.28 3285.54
13.05 3292.09 13 3298.64 12.98 3305.2 12.92 3318.3 12.6 3324.85 12.93 3331.4
13.12 3337.96 13.09 3344.51 13.13 3351.06 13.23 3357.61 13.24 3364.17 13.27
3370.72 13.1 3377.27 12.77 3383.82 12.53 3390.37 12.75 3396.93 13.14 3403.48
13.38 3410.03 13.57 3416.58 13.6 3423.13 13.37 3429.69 13.36 3436.24 13.54
3442.79 13.36 3449.34 13.23 3462.45 13.14 3469 13 3475.55 12.81 3482.1 12.49
3488.66 12.26 3495.21 12.15 3508.31 11.99 3514.87 11.96 3521.42 12.09
3527.97 12.07 3534.52 12.03 3541.07 12.15 3547.63 12.13 3554.18 12 3560.73
11.99 3567.28 12.01 3573.84 12.05 3580.39 12.17 3586.94 12.24 3593.49 12.35
3606.6 12.52 3613.15 12.76 3619.7 12.79 3626.25 12.84 3632.8 13.11 3639.36
13.29 3645.91 13.16 3652.46 13.13 3659.01 13.02 3665.57 13.07 3672.12 13.04
3678.67 13.09 3685.22 13.25 3691.77 13.32 3698.33 13.37 3704.88 13.33
3711.43 13.24 3724.54 12.89 3731.09 12.99 3737.64 13.3 3744.19 13.35 3750.74
13.17 3757.3 12.8 3763.85 12.97 3770.4 13.38 3776.95 13.66 3783.51 14.2
3796.61 14.1 3803.16 14.13 3809.71 14.26 3816.27 14.44 3822.82 14.64 3829.37
14.74 3835.92 14.96 3842.47 15.14 3849.03 14.99 3855.58 14.58 3862.13 14.64
3875.24 14.67 3881.79 14.89 3888.34 14.66 3901.44 15.04 3908 15.25 3914.55
15.22 3921.1 15.48 3927.65 15.86 3934.21 16.09 3940.76 16.12 3947.31 16.31
3953.86 16.43 3960.41 16.8 3966.97 16.99 3973.52 17.09 3986.62 16.96 3993.18
17.12 3999.73 17.95 4006.28 18.7 4012.83 19.2 4019.38 19.54 4032.49 19.62
4039.04 19.49 4045.59 19.4 4052.15 19.12 4058.7 18.59 4065.25 18.03 4071.8
17.97 4084.91 18.26

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .08 661.51 .04 1038.14 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 661.51
1038.14 1212.6 1253.07 1397.48 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 1621 4084.91 6.9 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 32854.69

INPUT
Description: 36
Station Elevation Data num= 349
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 22.49 6.55 22.23 13.1 22.15
39.29 22.9 52.39 22.61 58.94 22.83 65.49 23.29 72.04 23.58 78.58 23.7 104.78
23.44 130.97 23.78 163.72 23.59 170.27 23.38 176.81 23.02 189.91 22.6
209.56 22.67 216.11 22.39 222.65 22.25 235.75 21.53 255.4 21.2 261.95 20.85
275.04 20.64 281.59 20.8 288.14 20.77 301.24 21.41 314.34 21.5 327.43 22
333.98 22.52 347.08 22.6 392.92 21.58 412.57 20.82 432.21 20.36 445.31 19.84
451.86 19.82 458.41 19.98 478.05 20.06 484.6 20.25 510.8 21.34 530.44 22.58

543.54 23.04 595.93 23.47 615.57 23.23 622.12 23.26 641.77 23.01 654.87 22.08 661.41 21.74 681.06 21.16 694.16 21.47 700.71 21.37 707.26 20.29 720.35 15.85 726.9 13.25 733.45 10.25 740 8.88 753.1 7.14 759.64 6.69 766.19 6.53 779.29 6.76 785.84 6.7 798.94 6.95 805.49 6.64 812.03 6.07 825.13 5.8 831.68 6.05 838.23 6.02 844.78 5.51 851.33 5.83 864.42 7.06 870.97 7.49 877.52 7.68 890.62 7.59 923.36 6.35 929.91 6.24 936.46 6.82 943.01 7.13 949.56 7.06 956.1 7.21 969.2 7.03 975.75 6.53 982.3 6.43 988.85 6.15 995.4 6.07 1008.49 5.43 1015.04 5.31 1028.14 5.94 1034.69 6.11 1047.79 6.77 1060.88 7.02 1073.98 6.85 1080.53 7.05 1087.08 7.54 1093.63 7.61 1100.17 7.41 1106.72 7.37 1113.27 7.49 1146.02 6.99 1152.56 7.26 1159.11 7.35 1172.21 7.03 1178.76 6.69 1185.24 6.68 1191.72 6.53 1204.68 6.8 1215.75 6.86 1217.64 6.89 1224.12 7.17 1230.6 7.25 1237.08 5.71 1243.56 3.38 1300 -3.36 1301 -3.88 1301.75 -4.3 1302.23 -4.54 1303.13 -4.81 1305.04 -5.29 1307.37 -6.15 1309.97 -6.85 1312.3 -7.39 1314.8 -7.81 1317.17 -8.29 1319.97 -8.71 1325.55 -9.32 1328.29 -9.63 1331.36 -9.61 1334 -9.66 1336.79 -9.6 1339.46 -9.61 1342.06 -9.46 1344.6 -9.29 1347.41 -9.17 1350.23 -9.02 1353.37 -8.82 1356.24 -8.61 1359.11 -8.53 1361.58 -8.43 1364.05 -8.25 1366.44 -8.02 1368.83 -7.6 1370.89 -7.31 1373.07 -6.98 1377.46 -6.2 1379.79 -5.78 1381.83 -5.39 1384.11 -5 1386.57 -4.64 1389.38 -4.27 1392.04 -3.87 1394.84 -3.31 1397.42 -2.96 1402.03 -2.5 1404.35 -2.25 1406.41 -2.04 1408.42 -1.83 1409.85 -1.64 1411.13 -1.5 1412.45 -1.38 1413.68 -1.2 1414.98 -1.08 1416.1 -.99 1417.3 -.89 1418.26 -.79 1419.33 -.71 1420.22 -.52 1468.42 1.45 1470.38 1.45 1476.86 2.77 1483.42 5.66 1489.98 7.28 1503.09 8.68 1516.21 8.96 1535.88 8.85 1548.99 9.07 1588.34 9.16 1601.45 9.09 1614.56 9.17 1621.12 9.09 1640.79 9.46 1673.58 9.21 1686.69 8.92 1706.37 9.11 1726.04 8.73 1745.71 8.24 1765.38 7.95 1791.61 8.03 1817.84 8.89 1844.07 8.67 1870.3 8.67 1876.86 8.55 1896.53 7.6 1922.76 7.27 1942.43 7.18 1962.1 7.32 1975.21 7.08 1981.77 6.74 1994.89 5.3 2001.44 5.15 2008 5.37 2014.56 6.13 2021.12 7.03 2027.67 7.34 2040.79 7.11 2060.46 7.21 2073.57 7.45 2139.15 6.7 2158.82 5.9 2165.38 5.73 2171.93 5.9 2178.49 6.24 2198.16 6.54 2204.72 6.39 2224.39 6.69 2237.51 7.06 2250.62 7.09 2263.74 7.39 2270.29 7.15 2276.85 7.31 2296.52 6.87 2329.31 6.84 2335.87 7.02 2342.42 7.06 2348.98 7.66 2355.54 8.45 2362.09 9.01 2368.65 9.14 2375.21 9.43 2408 9.62 2414.55 9.94 2427.67 10.02 2434.22 9.88 2447.34 8.51 2453.9 8.25 2460.45 9.06 2467.01 9.59 2480.13 10.13 2493.24 10.28 2499.8 9.88 2506.36 9.64 2519.47 8.67 2526.03 8.51 2539.14 8.46 2545.7 8.19 2552.26 8.36 2565.37 8.15 2578.49 8.42 2585.04 8.32 2591.6 8.41 2598.16 8.33 2604.71 8.83 2611.27 9.58 2630.94 10.93 2637.5 11.72 2650.62 12.71 2657.17 13.04 2670.29 13.23 2689.96 13.01 2703.07 12.05 2709.63 11.29 2716.19 10.27 2742.42 9.05 2748.98 9.08 2755.53 9.32 2762.09 9 2768.65 9.21 2781.76 10.09 2788.32 10.15 2794.88 11.06 2801.43 11.38 2807.99 11.44 2821.11 12.02 2840.78 11.64 2847.33 11.04 2867.01 10.3 2873.56 9.96 2880.12 10.15 2886.68 10.61 2899.79 10.98 2919.47 10.64 2932.58 11.14 2945.69 10.84 2952.25 11.2 2958.81 10.93 2965.37 11.22 2991.6 11.53 3004.71 12.11 3017.82 12.14 3024.38 12.59 3030.94 13.49 3037.5 13.92 3050.61 13.64 3057.17 13.81 3063.73 13.7 3070.28 13.31 3083.4 14.38 3116.18 15.99 3129.3 16.43 3135.86 16.35 3142.41 16.49 3148.97 16.3 3168.64 16.27 3194.87 15.71 3207.99 16.34 3214.54 16.82 3234.22 16.14 3253.89 16.26 3260.44 16.06 3267 16.19 3273.56 16.73 3280.12 16.78 3286.67 17.54 3293.23 17.91 3299.79 17.99 3312.9 18.6 3319.46 18.51 3326.02 18.16 3332.57 18.24 3345.69 18.7 3365.36 18.57 3371.92 18.69 3398.15 18.9 3404.71 18.15 3411.26 17.86 3417.82 17.77 3430.93 18.35 3437.49 18.41 3444.05 18.65 3450.61 18.62 3463.72 18.16 3470.28 18.06 3476.84 18.1 3483.39 17.87 3489.95 18.17 3496.51 18.62 3503.06 18.35 3509.62 18.44 3522.74 19.26 3542.41 19.29 3555.52 19.84 3568.64 19.84 3575.2 19.99 3581.75 20.33 3588.31 20.33 3601.42 20.02 3607.98 20.28 3627.65

20.66 3640.77 21.27 3653.88 21.53 3660.44 21.39 3673.55 22.38 3680.11 22.73

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .082 1230.6 .04 1503.09 .085
 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1230.6 1503.09 1846.6 1695.15 1689.56 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 31159.54

INPUT
Description: 35
Station Elevation Data num= 311
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 20.95 6.55 19.39 13.1 18.29 19.65 17.89 26.2 17.95 32.75 18.16 39.3 18.16 45.85 18.02 58.95 18.36 85.15 19.67 91.7 19.88 104.8 19.8 117.9 19.32 124.45 19.32 131 19.61 137.55 19.65 150.65 19.11 157.2 19 170.3 19.28 176.85 19.59 183.4 19.59 189.95 19.87 196.5 19.67 203.05 19.67 209.6 19.82 216.15 19.74 229.25 19.3 235.8 19.31 248.9 20 268.55 19.75 281.65 19.2 294.75 19.11 347.15 17.63 353.7 17.6 373.35 17.12 379.9 17.15 386.45 17.38 393 17.47 406.1 17.31 412.65 17.12 432.3 17.4 451.95 17.88 458.5 17.8 465.05 18.1 478.15 18.31 491.25 19.09 504.35 19.45 517.45 19.55 524 19.76 537.1 19.86 543.66 20.13 556.76 19.99 563.31 20.03 569.86 20.26 576.41 19.85 582.96 18.13 589.51 15.41 596.06 11.99 602.61 8.71 609.16 6.78 615.71 5.49 622.26 4.75 628.81 4.37 641.91 4.08 648.46 3.32 655.01 2.7 681.21 2.3 687.76 2.36 700.86 2.27 727.06 2.4 746.71 2.21 786.01 2.46 792.56 2.86 805.66 3.88 812.21 4.96 825.25 6.68 831.74 6.42 838.23 4.98 842.57 3.82 844.72 3.25 851.21 2.84 857.7 1.97 864.19 1.28 870 -1.54 870.33 -1.55 870.7 -1.52 871 -1.43 871.28 -1.45 871.64 -1.52 871.82 -1.43 871.88 -1.52 872.41 -2.55 873.56 -3.16 874.86 -4.13 877.45 -4.92 879.68 -5.67 881.76 -6.3 884.07 -6.84 886.17 -7.39 888.47 -7.56 890.61 -7.61 892.85 -7.75 895.17 -7.64 897.7 -7.61 899.94 -7.46 902.06 -7.16 904.32 -6.97 906.77 -7.08 909.18 -6.77 911.65 -6.94 913.99 -6.97 916.27 -6.86 918.34 -6.63 920.51 -6.31 922.57 -6.03 924.69 -5.65 927 -5.34 929.74 -5.08 932.26 -4.91 934.6 -4.69 937.13 -4.23 939.48 -3.85 941.57 -3.02 943.49 -2.35 945.55 -2.17 946.83 -1.98 947.96 -2.05 949.15 -2.01 950.4 -1.99 951.76 -1.89 952.98 -1.71 954.27 -1.59 955.38 -1.4 956.54 -1.18 957.53 -.96 968.02 4.7 973.48 5.16 974.51 5.25 981 5.2 993.98 7.56 1000.47 7.71 1006.96 7.48 1013.45 7.07 1026.43 6.85 1045.9 6.76 1058.88 6.32 1065.37 5.7 1084.84 4.41 1097.82 4.51 1104.31 4.26 1110.8 4.44 1117.29 4.31 1136.76 4.51 1149.73 5.2 1156.22 5.22 1162.71 5.48 1169.2 5.46 1175.69 5.27 1182.18 5.45 1188.67 5.32 1195.16 5.37 1201.65 5.58 1208.14 6.07 1221.12 6.67 1227.61 6.38 1234.1 5.59 1247.08 5.55 1253.64 5.08 1260.2 5.05 1266.76 4.86 1273.32 4.15 1279.88 3.62 1286.44 3.71 1293 3.98 1299.57 4.04 1306.13 4.28 1338.93 4.61 1345.49 4.8 1352.05 4.84 1371.73 4.63 1397.97 4.76 1404.53 4.9 1424.22 5.72 1437.34 6.48 1443.9 6.59 1457.02 6.55 1470.14 6.01 1476.7 6.05 1483.26 6.36 1496.38 7.25 1522.62 7.59 1535.74 7.57 1548.87 7.83 1555.43 7.86 1561.99 8.04 1568.55 8.03 1581.67 7.77 1594.79 7.3 1660.39 7.72 1666.96 7.63 1686.64 8.01 1693.2 7.94 1699.76 7.72 1726 7.66 1739.12 7.26 1778.48 7.28 1791.61 7.14 1798.17 6.94 1824.41 7.35 1837.53 7.27 1844.09 7.35 1850.65 7.27 1870.33 7.27 1876.89 7.4 1896.57 7.41 1903.13 7.25 1935.94 7.68 1955.62 8.04 1968.74 8.61

1988.42 8.28 2021.22 8.93 2054.03 8.52 2086.83 7.38 2126.19 5.52 2145.87
5.21 2159 4.79 2178.68 4.54 2211.48 4.79 2224.6 5.3 2237.72 5.5 2250.84 6
2263.96 6.79 2270.52 6.89 2277.08 6.81 2283.65 7.16 2303.33 7.62 2316.45
8.37 2329.57 8.67 2342.69 8.78 2355.81 8.78 2362.37 8.98 2368.93 8.9 2375.49
9.07 2382.05 9.49 2395.17 9.82 2401.73 10.1 2427.98 9.82 2441.1 9.88 2447.66
9.7 2467.34 7.99 2473.9 7.65 2487.02 7.78 2493.58 7.65 2500.14 7.66 2506.7
7.83 2519.82 8.77 2532.94 9.35 2539.51 9.45 2552.63 8.58 2559.19 8.4
2565.75 8.38 2572.31 8.5 2578.87 8.48 2585.43 8.26 2591.99 8.29 2618.23 9.44
2624.79 9.9 2631.35 10.59 2644.47 11.74 2677.28 13.11 2683.84 13.55 2696.96
14.79 2716.64 16.04 2742.88 17.38 2756 17.88 2775.68 19.43 2788.8 19.95
2821.61 20.46 2841.29 21.44 2847.85 21.62 2854.41 22.08 2867.53 22.43
2874.09 22.85 2880.65 23.07 2906.89 23.21 2926.58 23.04 2952.82 23.35
2959.38 23.15 2979.06 23.02 2985.62 22.87 2992.18 22.58 3005.3 22.49 3011.86
22.92 3038.1 23.57 3044.66 23.38 3064.35 23.32 3070.91 23.19 3077.47 22.92
3084.03 22.9 3090.59 22.3 3097.15 20.4 3110.27 20.58 3116.83 20.43 3123.39
19.14 3129.95 20.16 3136.51 20.79 3143.07 21.27 3149.63 21.96 3156.19 22.32
3169.31 22.3 3175.88 21.98

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 825.25 .04 993.98 .082

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 825.25
993.98 1600.85 1613.53 1832.86 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 29546.01

INPUT
Description: 34 Station Elevation Data num= 298
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 22.98 6.52 22.86 19.56 23.4
26.08 23.81 32.6 23.75 39.12 23.45 52.17 23.49 84.77 22.2 91.29 22.13 97.81
22.24 110.85 22.68 123.89 22.76 143.46 22.46 149.98 22.54 176.06 21.84
182.58 21.81 202.14 22.25 221.71 22.18 234.75 21.89 241.27 21.54 247.79
21.03 254.31 20.26 267.35 18.43 273.87 18 280.39 18.26 293.43 19.85 299.95
20.49 313 21.33 326.04 21.79 332.56 21.86 345.6 21.53 352.12 20.92 371.68
18.51 378.2 18.02 384.72 17.38 397.77 16.94 404.29 16.91 410.81 17.02 417.33
16.84 430.37 17.22 436.89 17.72 443.41 17.85 449.93 18.14 456.45 18.08
462.97 17.58 469.49 16.75 476.01 15.68 482.53 14.3 489.06 13.08 495.58 11.52
502.1 10.38 508.62 9.89 515.14 10.09 521.66 9.84 528.18 9.82 541.22 10.27
547.74 10.39 554.26 10.07 560.78 9.94 567.3 10.06 573.83 11.09 580.35 11.47
593.39 11.92 619.47 11.94 625.99 12.12 632.51 11.78 639.03 11.64 645.55
11.68 652.07 11.57 658.59 11.71 671.64 11.72 684.68 12.07 691.2 12.06 704.24
11.81 717.28 11.73 730.32 11.43 743.36 11.38 762.93 10.33 775.97 10.23
782.49 9.99 808.57 10.59 821.61 10.36 834.65 10.48 854.22 10.1 867.26 10.42
886.82 10.24 899.86 10.31 912.9 10.02 919.42 10.01 925.95 10.16 932.47 10.45
938.99 10.91 952.03 11.52 971.59 12.69 978.13 12.78 991.21 13.14 1004.29
13.2 1017.36 12.97 1030.44 12.96 1036.98 12.81 1043.52 12.47 1050.06 12.32
1056.6 12.02 1063.14 11.87 1069.68 11.46 1076.22 10.91 1082.75 10.53 1108.91
10.04 1141.61 10.73 1148.14 10.65 1161.22 10.88 1167.76 11.3 1180.84 11.85
1200.46 12.01 1213.54 11.74 1220.07 11.17 1233.15 10.35 1239.69 9.52 1252.77

8.7 1259.31 8.41 1265.85 8.33 1278.93 7.25 1285.46 6.59 1292 6.39 1298.54
6.65 1311.62 7.66 1318.16 7.85 1331.24 7.09 1344.32 5.98 1350.85 5.73
1357.39 5.9 1363.93 6.44 1370.47 6.73 1377.01 6.78 1383.55 6.63 1390.09 6.65
1403.17 5.53 1409.71 5.23 1416.24 6.03 1422.78 6.46 1429.32 6.36 1435.86 5.7
1442.4 4.88 1448.94 4.83 1462.02 6.22 1468.56 6.81 1475.1 7.21 1481.63 7.19
1488.17 6.79 1494.71 6.67 1501.25 6.73 1520.87 6.43 1533.95 6.01 1547.03 6
1553.56 6.42 1560.1 6.68 1573.18 6.43 1586.26 6.52 1592.8 6.92 1599.34 7.05
1611.52 6.52 1612.42 6.48 1618.95 6.93 1625.49 5.27 1631.91 2.87 1638.33
1.49 1650 -.76 1656.01 -.87 1657.41 -1.05 1658.79 -1.41 1660.28 -1.67
1661.73 -2.03 1663.38 -2.35 1664.87 -2.96 1667.11 -3.25 1669.2 -3.49 1671.82
-3.8 1674.41 -3.94 1676.97 -4.23 1679.73 -4.56 1682.54 -4.79 1685.27 -4.94
1688.14 -5.17 1691.12 -5.38 1694.06 -5.63 1697.38 -5.95 1700.28 -6.42
1703.19 -6.95 1705.96 -7.53 1708.82 -8.12 1711.78 -8.58 1714.83 -8.96
1717.71 -9.25 1720.63 -9.5 1723.54 -9.73 1726.52 -9.77 1729.06 -9.72 1731.61
-9.77 1734.24 -9.61 1737.21 -9.51 1740.37 -9.15 1743.26 -8.76 1745.94 -8.21
1748.61 -7.59 1750.7 -6.68 1752.88 -5.99 1754.79 -5.1 1756.76 -4.3 1758.47 -
3.65 1760.1 -3.2 1761.58 -2.71 1763.39 -2.41 1765.5 -2.09 1767.43 -1.84
1768.71 -1.57 1769.92 -1.36 1770.97 -1.12 1772.01 -.83 1805.21 2.9 1811.63
4.47 1818.04 5.88 1822.22 6.34 1824.46 6.6 1830.88 6.8 1850.53 6.94 1857.07
6.83 1863.62 6.58 1870.17 6.52 1889.81 5.66 1922.55 5.84 1929.1 5.79 1955.29
6.32 1968.39 6.4 1974.94 6.05 1988.03 6.5 1994.58 6.49 2020.77 7.34 2040.42
7.4 2053.52 7.76 2079.71 8.06 2086.26 8.7 2092.8 8.87 2099.35 8.59 2105.9
8.12 2112.45 8.22 2119 7.97 2125.54 8.3 2145.19 8.37 2151.74 8.56 2184.48
8.56 2197.57 8.31 2210.67 8.84 2236.86 8.97 2243.41 8.75 2249.96 8.68
2256.5 8.85 2276.15 8.75 2315.44 8.76 2321.98 8.97 2335.08 10.36 2341.63
11.42 2348.18 12.25 2367.82 13.6 2380.92 13.73 2387.46 14.01 2394.01 14.09
2413.66 14.64 2420.2 15.25 2433.3 15.8 2446.4 16.11 2485.69 17.77 2492.23
18.15 2498.78 18.26 2524.97 19.62 2538.07 19.99 2551.17 20.56 2557.71 21.13
2564.26 21.98 2570.81 22.42 2583.91 22.66 2590.45 23.02 2597 23.56 2603.55
24.48 2610.1 24.83 2616.65 25.41 2623.19 25.83 2629.74 25.88 2655.93 25.71
2669.03 25.43 2688.67 25.46 2708.32 24.91 2721.41 24.96 2727.96 25.09
2767.25 24.59 2780.35 24.93 2793.44 25.85 2806.54 26.36 2832.73 26.53

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .088 1618.95 .04 1822.22 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1618.95
1822.22 1803.19 1875.89 1978.98 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 27670.12

INPUT
Description: 33
Station Elevation Data num= 225
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 22.42 6.56 22.27 13.11 21.73
19.67 20.95 26.22 20.61 59 20.77 65.55 20.54 72.11 20.1 85.22 18.76 104.89
17.01 111.44 16.52 118 16.32 131.11 16.49 150.77 17.45 157.33 17.49 163.88
17.26 176.99 16.44 190.11 15.21 196.66 14.86 203.22 14.28 209.77 13.86
222.88 13.45 235.99 13.35 255.66 13.6 268.77 14.01 288.44 15.34 294.99 15.67

301.55 15.8 308.1 15.64 314.66 15.21 321.21 14.54 327.77 13.54 334.32 12.06
340.88 10.2 347.43 9.24 353.99 8.42 360.54 8.08 380.21 7.96 399.88 8.34
406.43 9.49 412.99 10.36 426.1 11.25 432.65 11.59 439.21 11.76 452.32 11.76
465.43 11.95 485.1 11.47 491.65 11.42 498.21 11.22 504.76 11.18 524.43 10.66
544.09 8.8 550.65 8.3 557.2 8.2 570.32 7.56 629.31 7.16 648.98 7.33 655.53
7.81 662.09 8.5 668.65 9.58 675.2 10.17 681.76 10.94 694.87 10.78 707.98
11.01 714.53 10.37 721.09 7.88 727.48 1.71 729.4 1.48 740 -1.63 740.46 -1.82
740.93 -2.06 741.47 -2.24 741.95 -2.63 742.36 -2.84 744.01 -3.17 746.08 -
3.85 748.76 -4.57 751.39 -5.33 753.78 -6.12 756.23 -6.85 758.35 -7.45 760.33
-7.93 762.12 -7.98 763.78 -8.12 765.47 -8.14 767.26 -8.12 769.28 -8 771.56 -
7.83 773.87 -7.55 775.92 -7.39 778.08 -7.32 780.06 -7.17 782.12 -7.16 784.02
-7.09 786.37 -7.02 788.45 -6.88 792.8 -6.63 794.92 -6.58 797.14 -6.44 799.45
-6.41 801.79 -6.35 804.57 -6.23 807.05 -6.21 809.62 -5.99 811.8 -5.58
814.03 -5.13 816 -4.25 817.91 -1.54 820.74 -1 822.18 -.38 836.15 1.65 837.15
1.73 842.54 2.17 855.46 4.88 861.99 5.38 868.51 5.41 875.04 4.6 881.57 4.12
888.09 4.61 894.62 5.29 901.15 5.64 907.67 5.79 920.73 7.37 927.25 7.42
933.78 7.15 940.3 6.57 953.36 6.31 979.46 6.29 992.52 5.96 1005.57 5.84
1012.1 5.59 1018.62 5.79 1025.15 6.25 1031.68 6.41 1051.26 6.33 1057.78 5.87
1064.31 5.25 1077.36 4.82 1083.89 5.01 1090.42 5.6 1096.94 7.63 1103.47 8.55
1110 9.02 1116.52 9.64 1129.58 10.36 1136.1 10.54 1142.63 10.42 1149.16
10.52 1155.68 10.48 1181.79 9.95 1188.32 9.92 1194.84 10.17 1220.95 10.83
1227.47 11.21 1240.53 12.37 1247.05 12.6 1260.11 13.57 1273.16 14.13 1286.21
15.52 1292.74 15.59 1299.27 16.1 1305.79 16.74 1318.85 17.8 1331.9 19.06
1338.43 19.39 1344.95 19.97 1351.48 20.71 1364.53 22.52 1371.06 22.99
1377.59 23.92 1384.11 25.28 1390.64 26.24 1403.69 26.91 1410.22 26.93
1416.75 27.27 1423.27 27.39 1429.8 27.72 1442.85 28.07 1449.38 27.96 1455.91
26.9 1462.43 24.73 1468.96 23.74 1475.49 24.64 1482.01 25.3 1488.54 25.83
1514.65 27.24 1540.75 27.69 1547.28 28.1 1553.8 28.19 1573.38 29.26 1592.96
29.35 1599.49 29.88 1606.02 30.09 1612.54 30.1 1619.07 30.36 1625.6 30.81
1632.12 30.71 1645.18 29.98 1651.7 29.97 1677.81 30.5 1684.34 30.76 1723.5
31.58 1730.02 31.46 1743.08 32.29 1749.6 31.88 1756.13 32.16 1769.18 32.3
1775.71 32.57 1788.76 32.54 1808.34 32.87 1821.4 33.92 1834.45 34.31 1840.98
34.69 1847.5 35.21 1854.03 35.56 1867.08 36.86 1873.61 36.98 1880.13 37.25
1886.66 37.72 1893.19 37.95 1906.24 38.84 1912.77 39.13 1919.29 39.69
1925.82 40.44 1964.98 42.55

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .088 707.98 .04 861.99 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 707.98
861.99 918.95 956.75 981.98 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 26713.37

INPUT
Description: 32 Approach Am Vets HWY (Rte 24)
Station Elevation Data num= 312
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 19.83 6.56 19.43 13.12 19.29
19.67 19.33 26.23 19.32 32.79 19.15 39.35 18.82 45.9 18.85 52.46 19 59.02

19.25 65.58 19.45 72.13 19.39 78.69 19.38 85.25 18.96 91.81 18.42 98.36
17.76 104.92 17 111.48 16.39 118.04 16.27 124.59 16.27 131.15 16.06 137.71
15.95 144.27 16.08 150.83 16.16 157.38 16.3 163.94 16.38 170.5 16.48 177.06
16.5 183.61 16.41 190.17 16.16 196.73 15.97 203.29 16.02 209.84 15.92 216.4
15.68 222.96 15.78 229.52 15.72 236.07 15.48 242.63 15.36 249.19 15.22
255.75 15.12 262.31 15.11 268.86 15.08 275.42 15 281.98 14.78 288.54 14.71
295.09 14.52 301.65 14.46 308.21 14.36 314.77 13.84 321.32 13.56 327.88
12.75 334.44 12.14 341 11.39 347.55 10.26 354.11 9.08 360.67 8.41 367.23
8.01 373.78 7.75 380.34 7.69 386.9 7.89 393.46 8.11 400.01 8.01 406.57 7.83
413.13 7.81 426.25 7.65 432.8 7.66 439.36 7.51 445.92 7.14 452.48 7.45
459.03 7.66 465.59 7.44 472.15 7.15 478.71 7.17 485.26 7.26 491.82 7.23
498.38 7.29 504.94 7.24 511.49 6.91 518.05 7.13 524.61 6.94 531.17 6.87
537.72 7.14 544.28 7.28 550.84 7.32 557.4 7.01 563.96 6.97 570.51 7.26
577.07 7.51 583.63 7.7 590.19 7.75 603.3 7.58 616.42 7.73 622.97 8.01 629.53
8.07 636.09 8 642.65 7.56 649.2 7.34 655.76 7.32 662.32 7.2 668.88 6.98
675.43 6.86 681.99 7.04 688.55 7.11 695.11 7.13 701.67 7.18 708.22 7.03
714.78 7.25 721.34 7.49 727.9 7.34 734.45 7.42 741.01 7.64 747.57 7.66
754.13 7.88 760.68 8.06 767.24 8.01 780.36 8.11 786.91 7.76 793.47 7.43
800.03 7.23 806.59 7.58 813.14 7.78 819.7 7.85 826.26 8.17 832.82 8.35
839.37 8.49 845.93 8.51 852.49 8.59 859.05 9.1 865.61 9.52 872.16 9.65
878.72 9.91 885.28 9.77 891.84 9.22 898.39 8.6 904.95 8.02 911.51 7.81
918.07 8.17 924.62 8.69 931.18 8.92 937.74 9.01 944.3 9.32 950.85 9.44
957.41 9.49 963.97 9.76 970.53 10.08 977.08 10.47 983.64 10.95 990.2 11.06
996.76 11.06 1003.32 11.17 1016.43 12.12 1022.99 12.25 1029.55 12.86 1036.1
12.77 1042.66 12.82 1055.78 13.01 1062.33 13.19 1068.89 13.39 1075.45 13.66
1082.01 13.98 1095.12 14.34 1101.68 14.06 1114.8 13.26 1121.35 12.8 1127.91
12.49 1134.47 12.2 1141.03 11.82 1147.58 11.5 1154.14 11.22 1160.7 10.83
1167.26 10.38 1173.81 9.6 1180.37 8.94 1186.93 8.52 1193.49 8.16 1206.6 7.93
1213.16 7.94 1232.83 8.17 1239.39 8.23 1245.95 8.1 1252.51 8.09 1259.06 8.18
1265.62 8.15 1272.18 8.43 1278.74 7.93 1285.29 7.58 1291.85 7.37 1298.41
7.31 1304.97 7.48 1311.52 7.61 1318.08 7.78 1324.64 7.77 1331.2 7.85 1344.31
8.1 1350.87 8.11 1357.43 8.15 1363.99 8.03 1370.54 8.09 1377.1 7.99 1383.66
8.07 1390.22 7.94 1396.77 7.93 1403.33 8.04 1409.89 8.3 1416.45 8.46 1423
8.69 1429.56 8.52 1436.12 8.58 1442.68 8.6 1449.23 8.26 1455.79 8.15 1462.25
7.94 1468.71 7.43 1475.16 7.51 1481.62 6.96 1515.74 5.39 1517.69 1 1536.34 -
5.39 1561.94 -8.6 1583.07 -9.75 1583.41 -9.8 1601.44 -6.22 1621.31 -1.2
1636.36 2 1637.5 5 1643.1 5.4 1649.53 8.05 1761.63 14.64 1775.07 15.13
1781.61 15.28 1788.14 15.54 1794.67 15.62 1801.2 15.35 1807.74 14.71 1814.27
14.27 1820.8 14.99 1827.34 16.15 1833.87 18.37 1840.4 19.49 1846.94 17.81
1853.47 14.29 1860 8.71 1866.54 5.22 1873.07 4.27 1879.6 4.97 1886.14 5.89
1892.67 8.26 1899.2 8.11 1905.73 8.09 1912.27 8.19 1918.8 8.54 1925.33 8.67
1931.87 8.67 1938.4 8.84 1944.93 8.83 1951.47 8.76 1964.53 9.29 1971.07 9.61
1977.6 9.66 1984.13 9.87 1990.67 9.91 1997.2 9.91 2003.73 9.99 2010.27 10.34
2016.8 10.94 2023.33 11.37 2029.86 12.1 2036.4 12.61 2042.93 13 2049.46
13.69 2056 14.6 2062.53 17.61 2069.06 18.61 2075.6 18.26 2082.13 16.65
2088.66 16.06 2101.73 15.76 2108.26 15.55 2114.79 15.64 2121.33 15.77
2127.86 15.84 2134.39 15.82 2140.93 15.49 2147.46 15.14 2153.99 14.9 2167.06
14.77 2173.59 14.8 2180.12 14.64 2186.66 14.53 2193.19 14.6 2199.72 14.77
2206.26 14.82 2212.79 14.78 2225.85 14.82 2238.92 14.65 2245.45 14.37
2251.99 14.26 2258.52 14.2 2265.05 14.22 2271.59 14.42 2278.12 14.98 2284.65
15.75 2291.18 16.65 2297.72 17.32 2304.25 17.47 2310.78 17.77 2317.32 17.67
2323.85 17.05 2330.38 18.54 2336.92 20.59 2343.45 23.14 2349.98 25.15

Manning's n Values num= 3

Sta n Val Sta n Val Sta n Val
0 .085 1442.68 .04 1649.53 .088

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1442.68 1649.53 43.75 79.77 95.66 .5 .5 Ineffective Flow num= 2
Sta L Sta R Elev Permanent
0 1095 14.3 T
1840 2349.98 19.5 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 26633.6

INPUT
Description: 31.7 US Face Am Vets HWY (Rte 24)
Station Elevation Data num= 315
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 23.76 4.639 23.71 9.27 23.68 13.909 23.62 18.54 23.58 23.179 23.57 27.811 23.46 32.449 22.74 37.081 22.91 46.351 22.68 50.989 22.71 55.621 22.5 60.26 22.51 64.891 22.36 69.53 22.25 74.161 22.11 78.8 21.79 83.432 21.49 88.07 21.42 92.702 21.33 97.34 21.51 101.972 21.54 106.61 21.63 111.242 21.79 115.881 21.89 120.512 21.86 125.151 21.75 129.782 21.73 134.421 21.84 139.053 21.82 143.691 21.69 148.323 21.72 152.961 21.7 157.593 21.7 162.232 21.68 171.502 21.77 176.133 21.72 180.772 21.64 185.403 21.51 190.042 21.67 194.674 21.56 199.312 21.59 203.944 21.56 208.582 21.18 213.214 20.78 217.853 20.7 222.484 20.72 227.123 20.6 231.754 20.42 236.393 20.36 241.024 19.86 245.663 19.3 250.295 18.77 254.933 18.19 259.565 17.71 264.203 17.53 268.835 17.37 273.474 17.15 278.105 16.66 282.744 16.67 287.375 16.83 292.014 16.9 296.645 16.86 301.284 16.73 305.916 16.93 310.554 16.92 319.824 16.76 324.456 16.85 329.095 17.02 333.726 17.05 338.365 16.81 342.996 16.84 347.635 16.9 352.266 16.93 356.905 16.89 366.175 17.12 375.445 17.21 380.084 16.34 384.723 14.66 389.361 14.48 393.993 14.69 398.631 14.45 403.27 14.49 407.909 14.34 412.547 14.41 417.179 14.56 421.817 14.62 426.456 14.6 431.095 14.74 440.365 14.98 445.004 14.91 449.642 14.39 454.281 14.08 458.919 13.81 463.551 13.99 468.19 14.06 472.828 14.24 477.467 14.28 482.105 14.58 486.737 14.97 491.376 15.11 496.014 14.85 500.653 14.78 505.291 15.09 509.923 14.87 514.562 14.94 519.2 15.05 523.839 14.98 528.47 15.12 537.748 15.57 542.386 15.35 547.025 15.36 551.656 15 556.295 14.66 560.934 12.19 565.572 12.44 570.211 12.97 574.842 13.39 579.481 13.89 584.12 13.98 588.758 13.9 593.397 13.98 598.028 14.02 602.667 14.25 607.306 14.02 611.944 14.06 616.583 14.56 621.215 14.73 625.853 14.94 630.492 14.97 635.13 14.89 639.762 15.07 644.401 15.09 649.039 15.01 653.678 15.14 658.316 15.24 662.948 15.25 667.587 15.43 672.225 16 676.864 15.68 681.502 15.62 686.134 15.83 690.773 15.96 695.411 16.25 700.05 16.11 704.688 16.43 709.32 16.48 713.959 16.55 718.597 16.65 723.236 16.83 727.875 17.06 732.506 15.53 737.145 15.38 741.783 15.48 746.422 15.44 751.061 15.51 755.692 15.79 760.331 16.11 769.608 16.22 778.878 16.16 783.517 16.22 788.155 16.43 792.794 16.29 797.425 16.37 802.064 16.29 806.703 16.31 811.341 16.56 815.98 16.65 820.612 16.66 825.25 16.26 829.889 15.79 834.527 15.73 839.166 15.73 843.798 15.7 848.436 15.58 853.075 15.66 857.713 15.65 866.984 15.71 871.622 15.66 876.261 15.87 880.899 15.7 885.538 15.67 890.17 15.76 894.808 15.76 899.447 15.68 904.085 15.62 913.356 14.13 917.994 14.31 922.633 14.31 927.272 14.48 931.91 14.81 936.542 14.37 941.18 14.45 945.819 14.55 950.458

14.48 955.096 14.62 959.728 14.72 964.366 14.77 969.005 15.04 973.644 14.98
978.282 15.09 982.914 15.09 992.191 15.76 996.83 15.961001.468 16.22 1006.1
16.41010.738 16.561015.377 16.821020.016 16.831024.654 16.91 1029.286
16.891033.924 16.951038.563 17.241043.202 17.18 1047.84 17.67 1052.472 17.49
1057.11 17.581061.749 17.831066.388 17.811071.026 18.14 1075.658
18.141080.297 18.041084.935 17.231089.574 17.281094.212 17.55 1106.629
13.441112.632 10.711125.134 4.55 1130.72 3.961131.816 2.3 1142.706 -
3.171147.182 -2.571160.688 -7.84 1171.45 -8.461190.718 -11.29 1206.437 -
6.481225.579 -.891242.266 3.091247.237 5.521251.876 8.17 1256.507
10.691261.146 14.81265.785 16.611270.423 18.051275.062 19.28 1279.694
20.121284.332 20.81288.971 21.281293.609 21.191298.248 21.33 1302.88
21.311307.518 21.221312.157 21.441316.795 21.461321.434 21.56 1326.066
21.551330.704 21.691339.981 21.9 1344.62 21.991349.252 21.91 1353.89
22.021363.168 22.151367.806 22.161372.438 22.151377.076 22.31 1381.715
22.231386.354 22.261390.992 22.351395.624 22.411400.262 22.37 1404.901
22.381414.178 22.531428.087 22.561432.726 22.681437.364 22.69 1441.996
22.621446.634 23.041451.273 231455.912 23.21 1460.55 23.13 1465.182 23.36
1469.82 23.271474.459 23.341479.098 23.341483.736 23.4 1488.368 23.551493.006
23.541497.645 23.551502.284 23.611506.915 23.73 1511.554 23.681516.193
23.851520.831 23.67 1525.47 23.861530.101 23.89 1534.74 23.831539.379
23.861548.656 23.981553.287 24.071557.926 24.13 1562.565 24.211567.203
24.261571.842 24.391576.473 24.451581.112 24.56 1585.751 24.571590.389
24.511595.021 24.571599.659 24.71604.298 24.7 1608.937 24.751613.575
24.931622.845 25.081627.484 25.251632.123 25.13

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .0851094.212 .041288.971 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1094.2121288.971 137.27 118.57 119.67 .6 .8 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 1071 18.14 T
Skew Angle = 45

BRIDGE

RIVER: Taunton River
REACH: Main Stem RS: 26591.05

INPUT
Description: 31.5 Rte 24/ Am Vets Mem Hwy
Distance from Upstream XS = 2
Deck/Roadway Width = 105
Weir Coefficient = 2.6
Bridge Deck/Roadway Skew = 45
Upstream Deck/Roadway Coordinates
 num= 13
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 0 17 998.435 17.06 1050.054 18.11 1100.965 18.88 1107.329 19.25 14.95
1129.25 19.61 15.46 1143.392 19.98 13.031227.537 20.34 13.931233.901 20.71
16.61
 1263.6 21.07 16.91 1268.55 21.43 1330.068 21.7 1370.373 22.47

Upstream Bridge Cross Section Data
Station Elevation Data num= 315
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 23.76 4.639 23.71 9.27 23.68
13.909 23.62 18.54 23.58 23.179 23.57 27.811 23.46 32.449 22.74 37.081 22.91
46.351 22.68 50.989 22.71 55.621 22.5 60.26 22.51 64.891 22.36 69.53 22.25
74.161 22.11 78.8 21.79 83.432 21.49 88.07 21.42 92.702 21.33 97.34 21.51
101.972 21.54 106.61 21.63 111.242 21.79 115.881 21.89 120.512 21.86 125.151
21.75 129.782 21.73 134.421 21.84 139.053 21.82 143.691 21.69 148.323 21.72
152.961 21.7 157.593 21.7 162.232 21.68 171.502 21.77 176.133 21.72 180.772
21.64 185.403 21.51 190.042 21.67 194.674 21.56 199.312 21.59 203.944 21.56
208.582 21.18 213.214 20.78 217.853 20.7 222.484 20.72 227.123 20.6 231.754
20.42 236.393 20.36 241.024 19.86 245.663 19.3 250.295 18.77 254.933 18.19
259.565 17.71 264.203 17.53 268.835 17.37 273.474 17.15 278.105 16.66
282.744 16.67 287.375 16.83 292.014 16.9 296.645 16.86 301.284 16.73 305.916
16.93 310.554 16.92 319.824 16.76 324.456 16.85 329.095 17.02 333.726 17.05
338.365 16.81 342.996 16.84 347.635 16.9 352.266 16.93 356.905 16.89 366.175
17.12 375.445 17.21 380.084 16.34 384.723 14.66 389.361 14.48 393.993 14.69
398.631 14.45 403.27 14.49 407.909 14.34 412.547 14.41 417.179 14.56 421.817
14.62 426.456 14.6 431.095 14.74 440.365 14.98 445.004 14.91 449.642 14.39
454.281 14.08 458.919 13.81 463.551 13.99 468.19 14.06 472.828 14.24 477.467
14.28 482.105 14.58 486.737 14.97 491.376 15.11 496.014 14.85 500.653 14.78
505.291 15.09 509.923 14.87 514.562 14.94 519.2 15.05 523.839 14.98 528.47
15.12 537.748 15.57 542.386 15.35 547.025 15.36 551.656 15 556.295 14.66
560.934 12.19 565.572 12.44 570.211 12.97 574.842 13.39 579.481 13.89 584.12
13.98 588.758 13.9 593.397 13.98 598.028 14.02 602.667 14.25 607.306 14.02
611.944 14.06 616.583 14.56 621.215 14.73 625.853 14.94 630.492 14.97 635.13
14.89 639.762 15.07 644.401 15.09 649.039 15.01 653.678 15.14 658.316 15.24
662.948 15.25 667.587 15.43 672.225 16 676.864 15.68 681.502 15.62 686.134
15.83 690.773 15.96 695.411 16.25 700.05 16.11 704.688 16.43 709.32 16.48
713.959 16.55 718.597 16.65 723.236 16.83 727.875 17.06 732.506 15.53
737.145 15.38 741.783 15.48 746.422 15.44 751.061 15.51 755.692 15.79
760.331 16.11 769.608 16.22 778.878 16.16 783.517 16.22 788.155 16.43
792.794 16.29 797.425 16.37 802.064 16.29 806.703 16.31 811.341 16.56 815.98
16.65 820.612 16.66 825.25 16.26 829.889 15.79 834.527 15.73 839.166 15.73
843.798 15.7 848.436 15.58 853.075 15.66 857.713 15.65 866.984 15.71 871.622
15.66 876.261 15.87 880.899 15.7 885.538 15.67 890.17 15.76 894.808 15.76
899.447 15.68 904.085 15.62 913.356 14.13 917.994 14.31 922.633 14.31
927.272 14.48 931.91 14.81 936.542 14.37 941.18 14.45 945.819 14.55 950.458
14.48 955.096 14.62 959.728 14.72 964.366 14.77 969.005 15.04 973.644 14.98
978.282 15.09 982.914 15.09 992.191 15.76 996.83 15.961001.468 16.22 1006.1
16.41010.738 16.561015.377 16.821020.016 16.831024.654 16.91 1029.286
16.891033.924 16.951038.563 17.241043.202 17.18 1047.84 17.67 1052.472 17.49
1057.11 17.581061.749 17.831066.388 17.811071.026 18.14 1075.658
18.141080.297 18.041084.935 17.231089.574 17.281094.212 17.55 1106.629
13.441112.632 10.711125.134 4.55 1130.72 3.961131.816 2.3 1142.706 -
3.171147.182 -2.571160.688 -7.84 1171.45 -8.461190.718 -11.29 1206.437 -
6.481225.579 -.891242.266 3.091247.237 5.521251.876 8.17 1256.507
10.691261.146 14.81265.785 16.611270.423 18.051275.062 19.28 1279.694
20.121284.332 20.81288.971 21.281293.609 21.191298.248 21.33 1302.88
21.311307.518 21.221312.157 21.441316.795 21.461321.434 21.56 1326.066
21.551330.704 21.691339.981 21.9 1344.62 21.991349.252 21.91 1353.89
22.021363.168 22.151367.806 22.161372.438 22.151377.076 22.31 1381.715
22.231386.354 22.261390.992 22.351395.624 22.411400.262 22.37 1404.901
22.381414.178 22.531428.087 22.561432.726 22.681437.364 22.69 1441.996

22.621446.634 23.041451.273 231455.912 23.21 1460.55 23.13 1465.182 23.36
1469.82 23.271474.459 23.341479.098 23.341483.736 23.4 1488.368 23.551493.006
23.541497.645 23.551502.284 23.611506.915 23.73 1511.554 23.681516.193
23.851520.831 23.67 1525.47 23.861530.101 23.89 1534.74 23.831539.379
23.861548.656 23.981553.287 24.071557.926 24.13 1562.565 24.211567.203
24.261571.842 24.391576.473 24.451581.112 24.56 1585.751 24.571590.389
24.511595.021 24.571599.659 24.71604.298 24.7 1608.937 24.751613.575
24.931622.845 25.081627.484 25.251632.123 25.13

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .0851094.212 .041288.971 .085

Bank Sta: Left Right Coeff Contr. Expan.
 1094.2121288.971 .6 .8
Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 1071 18.14 T
Skew Angle = 45
 Downstream Deck/Roadway Coordinates
 num= 13
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 0 17 1005.506 17.06 1057.125 18.11 1108.036 18.88 1117.936 19.25
14.951139.856 19.61 15.46 1153.998 19.98 13.031238.144 20.34 13.931244.508
20.71 16.61 1274.206 21.07 16.911275.621 21.43 1337.139 21.7 1377.444 22.47

Downstream Bridge Cross Section Data
Station Elevation Data num= 317
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 16.93 4.603 16.73 9.214
16.85 13.817 16.95 18.42 17 23.023 17.56 27.634 17.92 32.237 17.99 36.84
17.56 41.444 16.57 46.054 15.99 50.657 15.6 55.26 15.5 59.864 15.47 64.474
15.19 69.077 15.24 73.681 15.53 78.284 15.25 82.894 14.86 87.497 15.13
92.101 15.44 96.711 15.51 101.314 15.63 105.918 16.06 110.521 16.25 115.131
16.35 119.734 16.3 124.338 16.36 128.941 16.68 133.551 16.98 138.155 17.31
142.758 17.33 147.361 17 151.971 16.85 156.575 16.72 161.178 16.62 165.781
16.33 170.392 16.02 174.995 15.73 179.598 15.41 184.208 15.43 188.812 15.39
193.415 14.99 198.018 14.51 202.629 13.97 207.232 14.03 211.835 13.89
216.438 14.09 221.049 14.39 225.652 14.57 230.255 14.84 234.858 15.15
239.469 15.43 244.072 15.79 248.675 15.76 253.279 15.63 257.889 15.53
262.492 15.48 267.095 15.18 271.706 14.42 276.309 13.62 280.912 13.06
285.551 12.31 290.19 11.33 294.821 10.48 299.46 10.85 304.098 10.6 308.737
10.62 313.376 11.93 318.014 12.9 322.646 12.88 327.284 12.51 336.562 12.14
341.2 12.07 345.832 11.97 350.47 11.76 355.109 11.88 359.748 11.7 364.386
11.56 369.018 11.88 373.656 12.05 382.934 11.8 387.572 11.91 392.211 11.87
396.842 12.06 401.481 12.18 406.12 11.92 410.758 12.06 415.397 11.88 420.029
12 424.667 12.14 429.306 12.15 433.944 12.11 438.583 12.3 443.215 11.79
447.853 11.64 452.492 11.58 457.13 11.37 461.769 11.59 471.039 11.36 475.678
11.2 480.316 11.17 484.955 11.33 489.594 11.53 494.225 13.39 498.864 12.89
503.502 12.56 508.141 12.58 512.78 12.39 522.05 12.4 526.688 12.58 531.327
12.5 535.966 12.34 540.604 12.56 545.236 12.26 549.875 12.22 554.513 12.02
559.152 12.04 563.79 12.04 568.422 11.84 573.061 11.72 577.699 11.8 582.338
11.7 586.976 11.53 591.615 11.8 596.247 11.58 600.885 11.38 605.524 11.26
610.162 11.17 614.801 11.22 619.433 11.85 624.071 12.34 628.71 12.42 633.348
12.24 637.987 11.76 642.619 11.85 647.257 11.99 651.896 11.94 656.534 12.02

661.173 11.74 665.812 12.91 670.443 13.68 675.082 13.45 679.721 13.01
684.359 13.03 688.998 12.99 693.629 12.79 698.268 12.87 702.907 12.62
707.545 12.83 712.184 12.95 716.815 12.88 721.454 12.63 726.093 12.5 730.731
12.62 735.37 12.64 740.008 12.69 744.64 12.65 749.279 12.71 753.917 12.9
758.556 13.02 763.194 13.21 767.826 13.14 772.465 13.2 777.103 13.31 781.742
13.49 786.38 13.48 791.012 13.67 795.651 13.55 800.289 13.78 804.928 14.06
809.567 14.01 814.198 14.05 818.837 14.38 823.475 14.54 828.114 14.5 832.753
14.48 837.391 14.41 842.023 14.39 846.661 14.56 851.3 14.39 855.939 14.18
860.577 14.07 865.209 14.13 869.847 14.27 874.486 14.36 879.125 14.23
883.763 14.36 888.395 14.19 893.033 14.17 897.672 13.86 902.311 13.89
906.949 13.88 911.581 13.61 916.219 13.02 920.858 12.54 925.497 12.3 930.135
12.27 939.406 12.13 944.044 11.89 948.683 11.97 953.321 12 957.96 11.78
962.592 11.63 967.23 11.55 971.869 11.84 976.507 11.92 981.146 12.15 985.778
12.27 990.416 12.24 995.055 12.38 999.693 11.961004.332 12.051008.971
11.771013.602 11.32 1018.241 12.561022.879 13.651027.518 13.431036.788
13.511041.427 13.45 1050.704 13.641055.343 13.881059.974 13.991064.613
13.881069.251 13.93 1073.89 14.131078.529 14.31 1083.16 14.391087.799
14.561092.438 14.82 1097.076 14.311101.715 14.091106.346 13.931110.985
13.371120.771 13.44 1126.775 10.711139.276 4.551144.862 3.961145.958
2.31156.848 -3.17 1161.324 -2.57 1174.83 -7.841185.592 -8.46 1204.86 -
11.291220.579 -6.48 1239.721 -.891256.408 3.091259.378 10.191264.017
12.811268.656 15.89 1273.294 18.421277.926 19.981282.564 20.481287.203
20.951291.842 21.14 1296.48 21.281301.112 21.46 1305.75 21.671310.389
21.81315.028 21.59 1319.666 21.781324.305 21.791328.937 21.731333.575
21.71338.214 21.63 1342.852 21.581347.491 21.291352.122 21.281356.761 21.37
1361.4 21.24 1370.677 21.281375.308 21.291379.947 21.321384.586 21.421389.224
21.36 1393.863 21.241398.495 20.941403.133 21.211407.772 21.2 1412.41 21.08
1417.049 20.991421.688 20.881426.319 20.941430.958 20.721435.596 20.85
1440.235 20.851444.874 20.991449.505 20.941454.144 20.781458.782 20.92
1463.421 20.96 1468.06 20.951472.691 20.84 1477.33 20.821481.969 20.86
1486.607 20.871491.246 20.861495.884 20.921500.516 21.021505.155 20.93
1509.793 20.871514.432 21.3 1519.07 21.491523.702 21.59 1528.34 21.37
1532.979 21.031537.618 20.831542.256 20.951546.895 21.131551.527 21.98
1556.165 22.331560.804 22.421570.081 22.271574.713 22.11579.351 22.3 1583.99
22.31588.628 22.32

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .0851120.771 .041282.564 .085
 Bank Sta: Left Right Coeff Contr. Expan.
 1120.7711282.564 .5 .8
Ineffective Flow num= 3
 Sta L Sta R Elev Permanent
 0 138 17 F
 138 243 16 F
 243 1092 14.8 F
Skew Angle = 45

Upstream Embankment side slope = 0 horiz. to 1.0 vertical Downstream
Embankment side slope = 0 horiz. to 1.0 vertical Maximum allowable
submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =

```
Weir crest shape = Broad Crested

Number of Piers = 2

Pier Data
Pier Station Upstream=1137.735 Downstream=1150.463
Upstream num= 3
 Width Elev Width Elev Width Elev
 7 .85 7 3.9 7 16.8
Downstream num= 3  Width Elev Width Elev Width Elev
 7 .85 7 3.9 7 16.8

Pier Data
Pier Station Upstream= 1231.78 Downstream=1244.508
Upstream num= 3
 Width Elev Width Elev Width Elev
 7 .85 7 3.9 7 16.8
Downstream num= 3
 Width Elev Width Elev Width Elev
 7 .85 7 3.9 7 16.8

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
 Energy
 W.S. Pro Method

 W.S.Pro Data
 Left Embankment
 El of the top of the embankment = 20
 El of the toe of the abutment = 0
 Right Embankment
 El of the top of the embankment = 20
 El of the toe of the abutment = 0
 Abutment Type = 3 Sloping abutments and sloping embankments  Slope of
abutments = 4
 Top with of embankment = 105
 Centroid station of bridge opening =   Wing Wall Type = Angular wing walls
 Width = 25
 Angle = 45
 Radius =
 Guide Banks Type = No Guide Bank present
 Length =
 Offset =
 Angle =
 Optional Contraction and expansion coefficients
 At approach Section
 At Guide Bank
 At upstream outside
 At upstream inside (BU)
 At downstream inside (BD)
 Piers are Continuous for the width of the bridge
 Use Geometric mean as Friction Slope Method
```

Selected Low Flow Methods = W.S.Pro Method

High Flow Method
 Pressure and Weir flow
 Submerged Inlet Cd =
 Submerged Inlet + Outlet Cd = .8
 Max Low Cord =

Additional Bridge Parameters
 Add Friction component to Momentum Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 26515.04

INPUT
Description: 31.3 DS Face Am Vets HWY (Rte 24)
Station Elevation Data num= 317
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 16.93 4.603 16.73 9.214
16.85 13.817 16.95 18.42 17 23.023 17.56 27.634 17.92 32.237 17.99 36.84
17.56 41.444 16.57 46.054 15.99 50.657 15.6 55.26 15.5 59.864 15.47 64.474
15.19 69.077 15.24 73.681 15.53 78.284 15.25 82.894 14.86 87.497 15.13
92.101 15.44 96.711 15.51 101.314 15.63 105.918 16.06 110.521 16.25 115.131
16.35 119.734 16.3 124.338 16.36 128.941 16.68 133.551 16.98 138.155 17.31
142.758 17.33 147.361 17 151.971 16.85 156.575 16.72 161.178 16.62 165.781
16.33 170.392 16.02 174.995 15.73 179.598 15.41 184.208 15.43 188.812 15.39
193.415 14.99 198.018 14.51 202.629 13.97 207.232 14.03 211.835 13.89
216.438 14.09 221.049 14.39 225.652 14.57 230.255 14.84 234.858 15.15
239.469 15.43 244.072 15.79 248.675 15.76 253.279 15.63 257.889 15.53
262.492 15.48 267.095 15.18 271.706 14.42 276.309 13.62 280.912 13.06
285.551 12.31 290.19 11.33 294.821 10.48 299.46 10.85 304.098 10.6 308.737
10.62 313.376 11.93 318.014 12.9 322.646 12.88 327.284 12.51 336.562 12.14
341.2 12.07 345.832 11.97 350.47 11.76 355.109 11.88 359.748 11.7 364.386
11.56 369.018 11.88 373.656 12.05 382.934 11.8 387.572 11.91 392.211 11.87
396.842 12.06 401.481 12.18 406.12 11.92 410.758 12.06 415.397 11.88 420.029
12 424.667 12.14 429.306 12.15 433.944 12.11 438.583 12.3 443.215 11.79
447.853 11.64 452.492 11.58 457.13 11.37 461.769 11.59 471.039 11.36 475.678
11.2 480.316 11.17 484.955 11.33 489.594 11.53 494.225 13.39 498.864 12.89
503.502 12.56 508.141 12.58 512.78 12.39 522.05 12.4 526.688 12.58 531.327
12.5 535.966 12.34 540.604 12.56 545.236 12.26 549.875 12.22 554.513 12.02
559.152 12.04 563.79 12.04 568.422 11.84 573.061 11.72 577.699 11.8 582.338
11.7 586.976 11.53 591.615 11.8 596.247 11.58 600.885 11.38 605.524 11.26
610.162 11.17 614.801 11.22 619.433 11.85 624.071 12.34 628.71 12.42 633.348
12.24 637.987 11.76 642.619 11.85 647.257 11.99 651.896 11.94 656.534 12.02
661.173 11.74 665.812 12.91 670.443 13.68 675.082 13.45 679.721 13.01
684.359 13.03 688.998 12.99 693.629 12.79 698.268 12.87 702.907 12.62
707.545 12.83 712.184 12.95 716.815 12.88 721.454 12.63 726.093 12.5 730.731
12.62 735.37 12.64 740.008 12.69 744.64 12.65 749.279 12.71 753.917 12.9
758.556 13.02 763.194 13.21 767.826 13.14 772.465 13.2 777.103 13.31 781.742

13.49 786.38 13.48 791.012 13.67 795.651 13.55 800.289 13.78 804.928 14.06
809.567 14.01 814.198 14.05 818.837 14.38 823.475 14.54 828.114 14.5 832.753
14.48 837.391 14.41 842.023 14.39 846.661 14.56 851.3 14.39 855.939 14.18
860.577 14.07 865.209 14.13 869.847 14.27 874.486 14.36 879.125 14.23
883.763 14.36 888.395 14.19 893.033 14.17 897.672 13.86 902.311 13.89
906.949 13.88 911.581 13.61 916.219 13.02 920.858 12.54 925.497 12.3 930.135
12.27 939.406 12.13 944.044 11.89 948.683 11.97 953.321 12 957.96 11.78
962.592 11.63 967.23 11.55 971.869 11.84 976.507 11.92 981.146 12.15 985.778
12.27 990.416 12.24 995.055 12.38 999.693 11.961004.332 12.051008.971
11.771013.602 11.32 1018.241 12.561022.879 13.651027.518 13.431036.788
13.511041.427 13.45 1050.704 13.641055.343 13.881059.974 13.991064.613
13.881069.251 13.93 1073.89 14.131078.529 14.31 1083.16 14.391087.799
14.561092.438 14.82 1097.076 14.311101.715 14.091106.346 13.931110.985
13.371120.771 13.44 1126.775 10.711139.276 4.551144.862 3.961145.958
2.31156.848 -3.17 1161.324 -2.57 1174.83 -7.841185.592 -8.46 1204.86 -
11.291220.579 -6.48 1239.721 -.891256.408 3.091259.378 10.191264.017
12.811268.656 15.89 1273.294 18.421277.926 19.981282.564 20.481287.203
20.951291.842 21.14 1296.48 21.281301.112 21.46 1305.75 21.671310.389
21.81315.028 21.59 1319.666 21.781324.305 21.791328.937 21.731333.575
21.71338.214 21.63 1342.852 21.581347.491 21.291352.122 21.281356.761 21.37
1361.4 21.24 1370.677 21.281375.308 21.291379.947 21.321384.586 21.421389.224
21.36 1393.863 21.241398.495 20.941403.133 21.211407.772 21.2 1412.41 21.08
1417.049 20.991421.688 20.881426.319 20.941430.958 20.721435.596 20.85
1440.235 20.851444.874 20.991449.505 20.941454.144 20.781458.782 20.92
1463.421 20.96 1468.06 20.951472.691 20.84 1477.33 20.821481.969 20.86
1486.607 20.871491.246 20.861495.884 20.921500.516 21.021505.155 20.93
1509.793 20.871514.432 21.3 1519.07 21.491523.702 21.59 1528.34 21.37
1532.979 21.031537.618 20.831542.256 20.951546.895 21.131551.527 21.98
1556.165 22.331560.804 22.421570.081 22.271574.713 22.11579.351 22.3 1583.99
22.31588.628 22.32

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .0851120.771 .041282.564 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1120.7711282.564 99.49 94.6 91.95 .5 .8 Ineffective Flow num= 3
 Sta L Sta R Elev Permanent
 0 138 17 F
 138 243 16 F
 243 1092 14.8 F
Skew Angle = 45

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 26420.44

INPUT
Description: 31- Exit Am Vets HWY (Rte 24)
Station Elevation Data num= 260
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 16.58 6.56 16.58 13.12 16.65
19.68 16.5 26.24 16.43 32.81 16.31 39.37 16.32 52.49 16.61 59.05 16.67 65.61

16.55 72.17 16.53 78.73 16.54 85.29 16.51 91.85 16 98.42 15.77 104.98 15.23
111.54 14.53 118.1 14.25 124.66 14.56 131.22 15.05 137.78 15.36 144.34 15.35
150.9 15.36 157.47 15.23 170.59 15.43 177.15 15.7 183.71 15.82 190.27 15.7
196.83 15.91 203.39 16.17 209.95 16.41 216.52 16.53 223.08 16.52 229.64
16.69 236.2 16.71 242.76 16.89 249.32 16.81 255.88 16.67 262.44 16.64 269
16.57 275.56 16.44 282.13 16.26 288.69 15.89 301.81 14.68 308.37 14.19
314.93 13.07 321.49 11.86 328.05 10.69 334.61 9.8 341.18 9.36 347.74 9.14
354.3 8.76 360.86 8.89 367.42 8.74 380.54 8.83 387.1 9.03 393.66 9.28 400.23
9.56 406.79 10.35 413.35 11.51 419.91 12.58 426.47 13.08 439.59 12.95 446.15
12.85 452.71 12.58 459.27 11.84 465.84 10.83 472.4 9.84 478.96 9.07 485.52
8.57 492.08 8.28 498.64 7.9 505.2 7.68 511.76 7.49 518.32 7.45 524.89 7.47
531.45 7.55 538.01 7.43 544.57 7.39 551.13 7.57 557.69 7.35 564.25 7.25
570.81 7.17 577.37 7.31 583.94 7.38 590.5 7.39 597.06 7.46 603.62 7.4 610.18
7.52 616.74 7.51 623.3 7.69 636.42 7.86 642.98 8.08 649.55 8.61 656.11 8.82
662.67 9.13 669.23 9.26 675.79 9.19 682.35 9.2 688.91 9.11 695.47 9.1 702.03
9.05 708.6 8.77 715.16 8.36 721.72 8.31 728.28 8.22 734.84 7.97 741.4 7.59
747.96 7.43 754.52 7.43 761.08 7.52 767.64 7.5 774.21 7.59 780.77 7.25
787.33 7.2 800.45 7.31 807.01 7.29 813.57 7.17 820.13 7.01 826.69 6.75
833.26 6.57 839.82 6.69 846.38 6.84 852.94 7.56 859.5 7.84 872.62 8.13
879.18 8.17 885.74 7.99 892.3 7.91 898.87 8 905.43 7.92 911.99 7.72 918.55
7.13 925.11 7.05 938.23 7.38 944.79 7.23 951.35 7.28 957.92 7.06 964.48 6.74
971.04 6.67 984.16 6.8 990.72 6.72 997.28 7.11 1003.84 7.65 1010.4 7.42
1016.97 7.04 1023.53 7.18 1030.09 7.3 1036.65 7.44 1043.21 7.56 1049.77 7.77
1056.33 8.17 1062.89 8.68 1069.45 8.93 1076.01 9.1 1082.58 9.19 1089.14 9.46
1095.7 9.77 1102.26 10.03 1108.82 10.32 1115.38 10.49 1121.94 10.7 1128.5
10.88 1135.06 11.1 1141.63 11 1148.19 11.42 1154.75 11.58 1161.31 11.69
1174.43 11.64 1180.99 11.81 1187.55 12.12 1194.11 12.5 1200.67 12.94 1207.24
13.11 1213.8 13.35 1220.36 13.33 1226.92 13.34 1240.04 13.29 1246.6 13.19
1253.16 13.01 1259.72 12.76 1266.29 12.53 1272.85 12.12 1279.41 11.96
1285.97 11.78 1292.53 11.77 1299.09 11.88 1305.65 12.15 1318.77 12.82
1325.34 12.91 1331.9 12.93 1338.46 12.86 1345.02 12.59 1351.58 12.12 1403.41
7.12 1474.33 8.92 1495.55 5.74 1542.67 4.32 1569.41 4.13 1582.63 5.03
1598.15 3.98 1672.87 5.26 1684.67 4.17 1687.57 3.11 1707.63 -5.25 1719.18 -
7.6 1736.56 -8.88 1760.93 -8.32 1766.03 -9.03 1785.84 .78 1788.07 4.75
1800.36 4.68 1832.57 21.6 1881.87 22.76 1928.95 22.85 1935.51 22.72 1942.08
22.46 1948.64 22.09 1955.2 21.65 1961.76 21.15 1968.32 20.86 1974.88 20.59
1981.44 19.99 1988 19.8 1994.56 19.43 2001.12 19.38 2007.69 19.3 2014.25
19.38 2020.81 19.58 2027.37 19.66 2040.49 19.65 2047.05 19.63 2053.61 19.54
2060.17 19.61 2066.74 19.3 2073.3 18.91 2079.86 18.81 2086.42 18.67 2092.98
18.81 2099.54 19.2 2112.66 19.77 2119.22 19.66 2132.35 20.22 2138.91 20.36
2145.47 20.53 2152.03 20.83 2158.59 20.93 2165.15 20.8 2171.71 20.77 2178.27
20.53 2184.83 20.43 2191.4 20.54 2197.96 20.78 2204.52 21.14 2211.08 21.62
2217.64 21.96 2224.2 22.06 2230.76 22.26 2237.32 22.31 2243.88 22.67

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val 0 .088 1672.87 .04 1832.57 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1672.87
1832.57 990.69 960.09 928.97 .3 .5 Ineffective Flow num= 3
 Sta L Sta R Elev Permanent
 0 242 16.9 F
 242 426 13 F
 426 1214 13 F

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 25460.34

INPUT
Description: 30
Station Elevation Data num= 345
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 24.35 13.11 24.16 26.22
23.51 32.77 23.39 52.44 22.35 58.99 21.72 65.55 21.45 78.66 20.47 98.32
19.78 111.43 19.15 131.09 17.74 137.65 17.56 150.76 16.54 176.98 15.63
190.09 16.01 203.2 15.7 209.75 15.82 216.31 16.3 229.41 17.64 235.97 17.87
242.52 17.68 255.63 17.02 268.74 15.92 275.3 15.12 281.85 14.59 288.41 14.51
294.96 14.27 308.07 14.38 314.63 14.24 321.18 13.92 347.4 13.98 360.51 14.12
367.06 13.95 380.17 14.15 399.84 14.04 412.95 13.67 432.61 13.73 439.16
13.56 465.38 14.42 471.94 15.05 491.6 15.54 498.16 15.42 511.27 16.59 517.82
16.87 524.38 17.52 530.93 17.78 544.04 17.33 563.7 16.08 576.81 14.92 583.37
14.14 603.03 11.25 609.59 10.05 622.7 9.16 629.25 8.94 635.81 9.08 642.36
8.92 655.47 9.23 675.13 9.14 688.24 8.82 701.35 9.22 714.46 8.9 727.57 9.74
753.79 9.86 760.35 9.44 766.9 8.82 780.01 8.88 786.57 9.52 793.12 9.98
799.67 10.11 812.78 9.76 819.34 9.7 825.89 9.05 839 8.15 858.67 7.34 865.22
6.88 898 6.69 904.55 6.74 911.1 6.64 924.21 6.78 930.77 6.62 950.43 6.62
963.54 6.87 970.1 6.64 976.65 6.78 983.21 6.69 989.76 6.39 1015.98 6.54
1022.53 6.38 1042.2 6.6 1068.42 6.4 1094.64 6.63 1114.3 6.59 1120.86 6.84
1133.96 6.62 1140.52 6.67 1166.74 7.4 1173.29 7.36 1179.85 7.68 1192.96 7.87
1212.62 8.79 1225.73 9.53 1258.5 10.27 1284.72 9.25 1297.83 9.49 1304.39
9.47 1310.94 9.71 1330.61 9.85 1350.27 10.91 1356.82 10.88 1363.38 11.01
1376.49 10.92 1389.6 11 1396.15 11.26 1402.71 11.35 1415.82 10.99 1442.04
9.3 1455.15 8.83 1481.36 8.53 1487.92 8.22 1494.47 8.3 1501.03 8.1 1507.58
8.53 1520.69 8.81 1527.25 8.8 1540.36 9.32 1546.91 9.38 1553.47 9.72 1560.02
9.87 1566.57 9.8 1579.68 10.16 1592.79 10.36 1605.9 10.81 1612.46 10.73
1632.12 10.07 1651.79 9.72 1664.9 9.26 1684.56 9.03 1697.67 9.16 1717.33
8.98 1730.44 9.1 1737 9.34 1750.11 10.16 1769.77 10.62 1782.88 10.69 1789.43
10.6 1809.1 10.04 1815.65 10.04 1822.21 10.18 1841.87 11.34 1861.54 12.93
1868.09 13.35 1894.31 12.63 1900.86 12.03 1913.97 11.35 1927.08 10.39
1933.64 10.19 1940.19 10.19 1959.86 10.92 1986.08 11.18 1992.63 11.13
1999.18 10.94 2018.85 9.59 2031.96 8.91 2038.51 8.92 2045.07 9.32 2058.18
9.45 2064.73 9.4 2071.29 9.52 2084.4 9.33 2097.51 9.51 2104.06 9.46 2117.13
8.79 2123.65 8.1 2136.69 6.31 2143.2 5.21 2149.72 4.8 2156.24 4.79 2175.79
5.09 2201.86 4.73 2214.9 4.87 2221.41 4.78 2227.93 4.86 2247.48 4.68 2260.52
4.78 2273.56 5.13 2280.07 5.66 2286.59 5.88 2293.11 5.52 2299.63 5.01
2312.66 4.67 2325.7 4.92 2332.21 5.18 2338.73 5.01 2351.77 5.04 2358.28 5.37
2364.8 6.3 2371.32 6.67 2384.35 6.79 2390.87 7.41 2397.39 7.85 2410.43 8.32
2423.46 8.11 2443.01 8.31 2449.53 8.65 2456.05 8.85 2462.57 8.9 2469.08 8.51
2475.6 8.88 2482.12 8.62 2488.64 8.64 2501.67 9 2508.19 8.95 2540.78 7.2
2547.29 7.29 2560.33 7.96 2561.89 7.98 2566.85 8.02 2573.37 5.26 2579.88
1.51 2585 -4.01 2586.46 -4.44 2588.21 -4.88 2589.89 -5.45 2592.04 -5.83
2594.17 -6.33 2596.35 -6.66 2598.37 -6.67 2600.48 -6.55 2602.24 -6.55
2604.42 -6.47 2606.44 -6.48 2608.55 -6.53 2610.58 -6.59 2612.91 -6.72
2617.15 -6.72 2619.3 -6.81 2621.63 -6.84 2623.73 -6.95 2625.85 -6.93 2627.82
-7.03 2629.94 -6.98 2635.86 -6.98 2637.71 -7.01 2639.61 -7.08 2641.64 -7.13
2643.57 -7.32 2647.48 -7.63 2651.26 -7.94 2653.16 -7.95 2654.98 -8.09
2656.91 -8.13 2658.46 -7.96 2660.23 -7.89 2661.93 -7.72 2663.77 -7.37

2665.59 -6.94 2667.57 -6.4 2669.53 -5.08 2671.44 -4.61 2673.33 -3.66 2675.14 -2.5 2676.8 -1 2680.65 1.2 2684.25 1.75 2690.77 4.12 2697.3 4.57 2703.86 4.85 2710.42 5.43 2716.98 6.61 2723.54 8.15 2736.66 11.72 2743.22 14.18 2749.79 16.47 2756.35 19.94 2762.91 22.2 2769.47 22.76 2776.03 22.97 2815.4 23.09 2835.06 23.03 2848.16 23.27 2861.25 24.03 2867.8 24.69 2874.35 24.95 2907.08 25.35 2920.18 25.19 2926.73 25.22 2933.27 25.04 2939.82 24.67 2946.37 24.49 2952.91 24.56 2979.1 24.01 2998.74 23.37 3011.84 23.29 3038.03 22.71 3051.12 22.54 3057.67 22.27 3064.22 22.14 3070.76 21.79 3077.31 21.94 3083.86 21.7 3123.14 21.2 3129.69 21 3142.78 20.89 3149.33 20.66 3155.88 20.69 3162.43 20.45 3188.61 20.02 3195.16 20.06 3221.35 19.81 3247.54 20.56 3254.09 20.6 3267.18 20.94 3313.01 21.53 3326.11 21.43 3358.84 21.48 3371.94 21.18 3378.48 21.34 3391.58 21.08 3417.77 20.98 3424.31 21.1 3437.41 21.57 3463.6 21.28 3470.14 21.09 3476.69 20.68 3483.24 20.76 3496.33 20.67 3509.43 21.15 3515.98 21.25 3522.52 21.5 3529.07 21.98 3535.62 23.04 3542.16 24.88 3548.71 27.27 3555.26 29.26 3561.81 30.15 3568.35 30.47 3574.9 30.02 3607.64 30.33 3646.92 30.2 3653.47 30.06 3660.01 30.38 3673.11 31.41 3692.75 30.78 3705.84 30.81 3712.39 30.68

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .088 2561.89 .04 2776.03 .08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2561.89 2776.03 1917.46 2059.03 2182.8 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 23401.31

INPUT
Description: 29- 1000 Ft DS Dam Lot Trib
Station Elevation Data num= 308
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 19.76 13.09 19.43 52.36 19.36 65.45 19.1 71.99 19.09 78.54 18.88 91.63 17.79 98.17 17.04 130.9 16.13 157.08 16.27 163.62 16.5 176.71 16.21 183.26 16.27 189.8 15.77 202.89 15.91 222.53 16.38 235.62 16.45 248.71 16.07 261.8 15.33 274.89 15.27 281.43 15.46 294.52 16.26 307.61 16.83 327.25 17.23 333.79 17.27 353.43 16.63 359.97 16.29 366.52 15.8 373.06 15.14 379.61 13.99 392.7 11.33 399.24 10.16 412.33 9.63 425.42 8.78 445.06 8.07 458.15 8.52 464.69 9.43 471.24 9.93 490.87 9.33 497.42 9.37 503.96 9.18 510.51 8.81 530.14 7.97 536.69 7.9 543.23 7.51 575.96 7.23 582.5 7.02 595.59 7.18 602.14 7.11 608.68 7.29 621.77 7.19 628.32 7.35 641.41 7.27 654.5 6.73 667.59 6.7 687.22 6.44 693.77 6.26 700.31 6.37 706.86 6.3 713.4 6.45 733.04 6.28 746.13 6.38 752.67 6.13 759.22 6.15 778.85 6.67 785.4 7.03 791.94 7.25 811.58 7.48 824.67 7.5 837.76 7.81 850.85 8.85 857.39 9.21 863.94 9.39 870.48 9.4 883.57 8.93 890.12 8.91 903.21 9.58 916.3 10.58 922.84 10.64 929.39 10.17 949.02 7.65 955.57 7.34 962.11 7.36 968.66 7.69 981.75 9.4 988.29 9.56 994.83 9.47 1007.93 8.76 1021.01 7.14 1027.56 7.22 1034.1 7.58 1040.65 7.54 1047.19 7.18 1053.74 7.02 1060.28 7.06 1066.83 7.34 1079.92 7.48 1093.01 7.09 1106.1 7.32 1119.19 7.87 1132.28 7.74 1145.37 7.17 1158.46 7 1165 7.52 1178.09 8.01 1184.64 7.8 1191.18 7.36 1197.73 7.36 1210.82 8.5 1243.54 9.42 1256.63 10.14 1276.27 10.85 1295.9 10.67 1308.99 9.97 1315.54 9.79 1335.17 10.34 1367.9 10.06

1380.99 10.24 1387.53 10.43 1394.08 10.38 1413.71 9.6 1426.8 9.33 1433.35 9.09 1452.98 9.21 1459.53 9.37 1472.62 9.95 1479.16 9.97 1505.34 9.24 1511.89 9.19 1531.52 8.27 1538.07 8.24 1544.61 8.37 1564.25 8.36 1570.79 8.12 1596.97 6.24 1610.06 4.8 1616.61 4.47 1623.15 4.49 1636.24 4.21 1642.79 4.3 1662.42 4.29 1668.97 4.13 1675.51 4.35 1682.05 4.28 1688.6 4.39 1695.15 4.65 1701.69 4.75 1721.32 4.58 1727.87 4.84 1734.41 4.87 1740.96 4.64 1760.59 4.49 1773.68 4.18 1806.41 4.34 1826.04 4.12 1858.77 4.4 1871.86 4.41 1878.4 4.6 1884.94 5.25 1891.47 6.16 1898 6.69 1904.54 6.88 1924.14 6.92 1930.67 6.59 1943.74 5.66 1950.28 5.6 1956.81 5.99 1963.34 6.77 1969.88 7.17 1982.94 7.2 1996.01 7.65 2002.55 7.74 2015.61 7.52 2022.15 7.23 2028.68 7.09 2035.21 7.55 2041.75 7.71 2054.82 7.26 2061.35 6.73 2067.88 5.5 2074.42 4.92 2080.95 5.74 2087.49 6.32 2100.55 7.25 2107.09 6.96 2113.62 5.88 2120.16 5.88 2126.69 6.48 2133.22 6.41 2139.76 6.16 2146.29 6.48 2152.82 7.01 2159.36 7.4 2185.49 6.16 2191.58 6.32 2192.03 6.33 2198.56 6.1 2205.1 4.26 2211.63 1.88 2220 -1.34 2220.17 -1.77 2220.31 -2.09 2220.4 -1.84 2220.47 -2.23 2220.49 -2.31 2220.79 -2.32 2221.4 -2.49 2221.97 -3.11 2223.69 -3.64 2225.91 -3.75 2228.18 -3.91 2230.17 -4.37 2232.39 -4.41 2234.49 -4.81 2236.64 -5.03 2238.51 -5.16 2240.42 -5.34 2242.1 -5.73 2244.11 -6.08 2245.99 -6.44 2248.08 -6.94 2250.2 -7.46 2252.39 -7.72 2256.55 -8.56 2258.56 -8.82 2260.67 -8.98 2262.8 -9.43 2264.86 -9.48 2266.93 -8.77 2269.17 -8.53 2270.94 -8.21 2272.98 -7.65 2276.78 -6.73 2279.06 -6.41 2283.93 -5.79 2286.72 -5.69 2289.2 -5.35 2291.94 -5.02 2294.46 -4.71 2297.03 -4.29 2299.07 -3.76 2301.08 -3.11 2302.78 -2.24 2304.38 -1.49 2305.73 -.99 2307.43 1.83 2309.64 2.45 2316.17 5.2 2322.71 6.45 2329.24 7.19 2335.77 8.23 2342.31 9.53 2348.84 11.64 2355.38 15.18 2361.91 18.22 2368.44 19.94 2374.98 20.6 2381.51 20.07 2394.58 17.69 2401.11 17.48 2486.05 18 2518.72 18.34 2538.33 18.25 2577.53 18.53 2584.06 19.38 2590.6 20.37 2597.13 20.32 2610.2 19.03 2623.27 18.11 2636.33 18.01 2655.94 17.57 2662.47 17.57 2682.07 17.1 2695.14 17.09 2714.76 16.71 2721.3 15.94 2727.85 15.96 2740.93 16.97 2767.1 17.38 2780.19 18.08 2799.82 17.99 2806.36 18.26 2852.16 19.01 2911.05 19.24 2917.59 19.15 2937.22 18.19 2969.94 17.14 2983.02 16.42 3002.65 15.8 3009.2 15.36 3015.74 14.44 3022.28 14.75 3041.91 15.01 3074.63 14.4 3087.71 14.86 3094.26 14.78 3100.8 14.48 3113.89 13.51 3120.43 12.65 3126.97 11.98 3133.51 9.89 3140.06 9.15 3146.6 8.85 3179.32 8.5 3198.94 9.31 3212.03 10.63 3218.57 11.05 3231.66 16

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 2198.56 .04 2374.98 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2198.56 2374.98 1321.59 1234.68 1184.64 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 2911 3231.66 19 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 22166.63

INPUT
Description: 28
Station Elevation Data num= 326

Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 17.92 13.12 18.12 19.68
18.15 26.24 18.2 32.8 18.18 45.92 18.27 52.48 18.33 59.04 18.47 72.16 18.66
78.72 18.82 85.28 19.13 91.84 19.21 98.39 19.54 104.95 20.07 111.51 20.5
118.07 20.85 124.63 21.16 131.19 21.33 137.75 21.41 144.31 21.66 150.87
21.64 157.43 21.11 163.99 21.08 170.55 21.19 177.11 21.39 183.67 21.53
190.23 21.65 196.79 21.9 203.35 22.1 209.91 22.53 216.47 22.82 223.03 22.79
229.59 22.58 249.27 21.61 255.83 21.34 262.39 21.12 268.95 21.05 275.51
20.91 282.07 20.8 288.62 20.92 295.18 20.92 301.74 20.89 308.3 20.79 314.86
20.59 321.42 20.49 327.98 20.3 334.54 20.08 341.1 19.9 347.66 19.74 354.22
19.53 360.78 19.49 367.34 19.43 373.9 19.46 380.46 19.54 387.02 19.52
393.58 19.19 400.14 18.97 406.7 18.78 419.82 18.47 432.94 18.24 439.5 18.1
446.06 18.09 452.62 17.92 459.18 18.08 465.74 18.09 472.3 17.75 478.85 17.71
485.41 17.77 491.97 17.46 498.53 17.28 505.09 16.95 511.65 16.75 518.21
16.63 524.77 16.22 531.33 15.93 537.89 15.75 544.45 15.28 551.01 15.48
557.57 15.48 564.13 15.28 570.69 15.34 577.25 15.35 583.81 15.63 590.37 15.4
596.93 15.25 603.49 14.94 610.05 14.86 616.61 14.8 623.17 14.93 629.73 14.91
636.29 14.84 642.85 14.96 649.41 15.12 655.97 15.19 662.52 14.94 669.08
14.97 675.64 14.8 682.2 14.83 688.76 15.26 695.32 15.53 701.88 15.61 715 16
721.56 16.18 728.12 16.29 734.68 16.37 741.24 16.58 747.8 16.74 754.36 17.04
760.92 16.77 767.48 16.68 774.04 16.43 780.6 16.11 806.84 15.49 813.4 15.38
819.96 15.41 826.52 15.07 833.08 14.52 839.64 14.05 846.2 13.56 852.75 13.18
859.31 12.89 865.87 12.37 872.43 12.08 878.99 11.94 885.55 11.83 892.11
11.43 898.67 11.17 905.23 11.08 911.79 10.83 918.35 10.7 924.91 10.45 931.47
10.44 938.03 10.5 944.59 10.61 951.15 10.58 964.27 10.45 970.83 10.06 977.1
6.04 983.37 2.07 990 -.72 995.16 -.81 996.24 -.91 997.38 -1.18 998.67 -1.55
999.88 -1.79 1002.25 -2.21 1003.56 -2.51 1004.76 -2.89 1006.45 -3.02 1007.96
-3.32 1009.16 -3.45 1010.19 -3.41 1011.23 -3.46 1012.42 -3.51 1013.94 -3.57
1015.82 -3.77 1018.15 -4.06 1020.43 -4.86 1024.85 -6.17 1029.72 -7.23
1032.25 -7.68 1034.76 -8.12 1037.29 -8.43 1039.58 -8.84 1041.82 -8.98
1043.75 -9.05 1045.63 -9.08 1047.18 -9.25 1048.84 -9.31 1050.4 -9.17 1052.31
-9.23 1054.44 -9.28 1057.01 -9.2 1059.24 -9.12 1061.74 -9.1 1064.1 -8.68
1066.6 -8.47 1068.84 -8.22 1071.23 -7.56 1073.37 -7.25 1075.46 -7.03 1077.27
-6.31 1078.97 -5.8 1080.4 -5.34 1081.82 -4.8 1082.98 -4.07 1084.03 -3.68
1084.79 -3.01 1085.37 -2.15 1085.84 -1.94 1094.08 4.04 1096.27 5.29 1102.78
6.64 1109.29 7.73 1115.79 7.84 1128.81 6.38 1141.83 6.4 1148.34 6.58 1161.36
6.43 1180.88 6.52 1193.9 6.36 1219.94 6.9 1232.96 6.79 1239.46 6.97 1245.97
6.88 1252.48 6.54 1272.01 6.07 1278.52 6.21 1291.54 6.04 1298.05 6.34
1304.55 6.42 1311.06 6.36 1324.08 5.65 1363.14 4.77 1376.15 4.73 1389.17
4.24 1421.72 4.31 1434.73 4.59 1447.75 4.7 1454.26 5.92 1460.77 8 1473.79
11.48 1480.3 12.52 1486.81 12.23 1493.31 11.77 1506.33 11.9 1512.84 11.42
1525.86 11.77 1532.37 11.75 1538.88 12.22 1545.39 12.47 1558.4 12.53 1564.91
12.7 1577.93 12.66 1597.46 13.72 1603.97 13.83 1610.48 13.77 1623.49 15.03
1630 15.02 1636.51 14.82 1649.53 14.73 1662.55 14.35 1675.57 14.56 1688.58
15.01 1695.09 15.08 1701.6 15.34 1708.11 15.37 1714.62 15.61 1721.13 16.03
1734.15 16.62 1740.66 17.58 1753.67 18.3 1760.18 19.03 1773.2 19.46 1779.71
19.5 1786.22 19.75 1805.75 21.32 1812.25 21.34 1818.76 21.99 1825.27 23.02
1831.78 23.48 1844.8 23.07 1851.31 23 1870.84 23.45 1877.34 23.76 1883.85
23.81 1890.4 23.68 1903.49 23.1 1929.66 22.76 1936.21 22.44 1942.75 22.33
1949.3 22.97 1955.84 23.03 1962.38 22.94 1968.93 23.03 1982.02 23.5 2001.65
23.57 2008.19 23.1 2014.74 22.78 2027.83 22.79 2034.37 22.93 2040.92 22.91
2054 22.34 2060.55 22.25 2067.09 22 2073.64 21.47 2086.73 21.6 2112.9 21.54
2119.45 21.62 2145.63 21.33 2152.17 21.42 2171.8 21.32 2217.61 22.02 2224.16
21.88 2256.88 21.9 2276.51 22.17 2302.69 21.41 2309.23 21.58 2315.78 22.06
2328.87 22.12 2335.41 21.63 2341.96 21.38 2355.04 21.35 2368.13 21.18

2387.77 21.05 2400.85 20.71 2407.4 20.8 2427.03 20.78 2453.21 20.9 2472.84 20.55 2479.39 20.58 2518.65 20 2538.29 19.4 2544.83 19.1 2551.37 19.08 2571.01 18.57 2590.64 17.7 2616.82 17.34 2623.36 16.97 2629.91 16.12 2636.45 14.9 2643 14.13 2649.54 13.92 2656.08 13.98 2662.63 14.19 2675.72 16

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 964.27 .04 1115.79 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 964.27 1115.79 978.05 935.95 915.59 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 2590 2675.72 17.7 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 21230.68

INPUT
Description: 27 - 5 ft US Forge River Trib
Station Elevation Data num= 269
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 27.52 26.22 27.7 39.32 27.69 52.43 27.25 78.65 25.61 98.31 25.08 111.42 24.36 117.97 23.85 124.53 23.2 131.08 22.83 137.64 22.61 163.85 22.49 170.41 22.55 183.51 22.22 190.07 21.91 203.18 22.72 209.73 22.66 216.28 22.14 222.84 20.37 235.95 18.22 242.5 17.85 255.61 17.77 262.16 18.1 275.27 19.21 281.82 19.6 288.38 19.69 294.93 19.22 301.49 18.61 308.04 17.62 314.59 17.25 327.7 17.41 340.81 17.19 347.37 17.2 353.92 17.39 386.69 17.25 393.24 17.1 406.35 17.48 412.91 17.82 419.46 17.77 426.01 17.53 445.68 17.79 452.23 18.17 471.89 20.34 478.45 20.9 517.77 23.36 530.88 23.79 550.54 24.82 557.09 24.91 563.65 24.79 576.76 24.06 583.31 23.56 589.86 22.86 596.42 22.41 616.08 22.56 622.64 22.38 629.19 22.49 642.3 23.09 661.96 24.34 675.07 24.64 681.62 24.64 714.39 23.99 727.5 23.12 740.61 22.09 760.27 20.96 766.82 20.23 773.38 19.71 779.93 19.41 786.49 18.87 799.59 17.03 812.7 16.15 819.26 15.87 832.37 14.95 838.92 14.73 845.47 14.33 852.03 13.72 858.58 12.9 871.69 11.93 878.24 11.71 891.35 11.57 897.91 11.28 911.01 11.05 924.12 11.26 937.23 10.49 950.34 9.38 970 8.34 976.55 7.85 983.11 7.75 989.66 7.83 995.65 7.41 996.22 7.37 1002.51 6.27 1008.81 4.7 1015.1 2.34 1021.39 .67 1030 -4.34 1031.85 -4.87 1033.27 -4.82 1033.37 -4.83 1033.93 -5.08 1034.43 -5.18 1036 -5.53 1037.96 -5.64 1039.68 -5.83 1041.43 -5.83 1042.9 -6.03 1044.42 -6.17 1046.27 -6.17 1048.99 -6.19 1051.5 -6.33 1056.76 -6.45 1059.36 -6.45 1061.99 -6.47 1065 -6.52 1067.86 -6.5 1070.85 -6.44 1073.48 -6.14 1076.16 -5.8 1078.85 -5.49 1084.58 -5.17 1087.33 -5.06 1089.96 -4.98 1092.9 -4.98 1095.64 -5.05 1098.82 -5.15 1101.76 -5.18 1104.94 -5.23 1107.88 -5.15 1110.34 -5.1 1112.83 -4.99 1115.85 -4.95 1118.54 -4.75 1121.36 -4.5 1123.66 -4.06 1126.09 -3.43 1128.14 -2.64 1130.21 -2.06 1132.02 -1.49 1133.12 -.84 1135.29 .67 1141.79 1.48 1148.29 3.16 1154.78 3.89 1161.28 4.1 1167.77 4.36 1174.27 4.43 1180.77 4.41 1187.26 4.36 1193.76 4.14 1200.26 4.23 1206.75 4.64 1213.25 4.9 1219.74 5.25 1226.24 5.39 1232.74 5.59 1239.23 5.88 1245.73 6.33 1252.23 6.52 1265.22 7 1271.71 7.21 1278.21 7.44 1284.71 7.89 1291.2 9.17 1297.7 11.51 1304.19 15.43 1310.69 16.28 1317.19 16.66 1323.68 16.62 1330.18 16.41 1336.68 16.29 1343.17 16.31 1349.67 16.13 1356.16 16.3 1362.66 16.43 1369.16 16.42 1375.65 16.6 1382.15

16.84 1388.64 17.35 1395.14 17.59 1401.64 17.66 1408.13 17.7 1414.63 17.69
1421.13 17.59 1427.62 17.34 1434.12 17.3 1440.61 17.18 1447.11 17.08 1453.61
17.01 1460.1 17.01 1466.6 17.11 1473.1 17.02 1486.09 17.26 1492.58 17.37
1499.08 17.38 1505.58 17.43 1512.07 17.5 1518.57 17.54 1525.06 17.65 1538.06
17.64 1544.55 17.66 1551.05 17.52 1557.55 17.62 1564.04 17.62 1570.54 17.67
1577.03 17.74 1583.53 17.69 1596.52 17.8 1603.02 17.96 1622.51 18.36 1629.05
18.43 1635.59 18.54 1642.14 18.62 1648.68 18.76 1655.22 18.81 1661.77 18.83
1668.31 18.92 1674.85 19.06 1687.94 19.13 1694.48 19.19 1701.03 19.19
1707.57 19.23 1714.11 19.15 1727.2 19.1 1746.83 19.11 1753.37 19.16 1759.92
19.07 1766.46 18.95 1773 19.09 1779.55 19.33 1786.09 19.41 1792.63 19.55
1799.18 19.59 1805.72 19.72 1812.26 19.82 1818.8 20 1825.35 20.1 1831.89
20.32 1838.43 20.47 1844.98 20.45 1851.52 20.45 1864.61 20.62 1871.15 20.67
1877.69 20.68 1903.87 20.67 1969.3 20.82 1982.39 20.81 1995.47 20.77 2015.1
20.73 2021.65 20.7 2028.19 20.69 2034.73 20.62 2041.28 20.6 2047.82 20.25
2054.36 20 2060.91 19.56 2067.45 19.08 2073.99 18.55 2080.54 17.9 2087.08
17.22 2093.62 16.81 2100.17 16.31 2106.71 15.78 2113.25 15.18 2119.79 15
2126.34 14.48 2132.88 13.9 2139.42 13.52 2145.97 13.53 2152.51 13.79 2159.05
16

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .082 989.66 .04 1317.19 .08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 989.66
1317.19 1970.54 1969.09 1971.46 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 2080 2159.05 17.9 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 19261.59

INPUT
Description: 26 Station Elevation Data num= 185
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 22.45 91.78 22.29 144.23
22.33 157.34 22.21 177.01 22.31 183.57 22.23 196.68 22.3 203.24 22.22 216.35
22.32 222.9 22.23 255.68 22.38 327.8 22.67 340.91 22.36 360.58 20.95 367.13
20.37 373.69 19.95 393.36 17.94 399.91 17.62 413.03 17.55 426.14 17.87
432.69 18.18 439.25 18.3 452.36 18.22 458.92 18.06 465.47 17.75 472.03 17.22
485.14 16.62 491.7 16.21 504.81 15.62 524.48 15.29 531.03 15.35 550.7 14.24
563.81 13.43 570.37 12.9 596.59 12.39 609.71 11.82 622.82 11.49 629.37 11.13
635.93 11 642.49 11.04 649.04 10.85 662.15 11.01 688.38 10.76 694.93 10.9
708.05 10.6 740.83 10.38 747.38 10.24 753.94 10.29 760.49 10.11 780.16 10.39
819.5 11.3 832.61 11.4 845.72 11.18 865.39 11.52 871.95 11.3 885.06 11.17
891.61 10.25 898.17 6.06 901.26 4 904.73 1.69 915 -1.23 915.5 -1.28 915.75 -
1.46 916.24 -1.49 916.44 -1.7 917.04 -1.61 917.48 -1.91 918.66 -1.93 919.76
-2.3 921.23 -2.71 922.79 -3.19 924.42 -3.77 926.79 -4.49 931.51 -5.33 934.07
-5.71 936.43 -5.92 938.96 -6.04 941.32 -6.28 946.22 -6.51 948.83 -6.5
951.22 -6.53 953.69 -6.51 956.08 -6.45 958.64 -6.44 960.98 -6.41 963.4 -6.33
968.44 -6.1 970.81 -5.97 973.25 -5.72 975.53 -5.67 977.94 -5.52 980.4 -5.55
982.68 -5.56 985.19 -5.61 987.51 -5.8 989.86 -5.93 992.01 -6.13 994.38 -6.25
996.55 -6.17 998.42 -6.02 1000.43 -5.63 1002.16 -5.28 1003.85 -4.65 1005.39

-4.29 1006.99 -3.77 1008.48 -3.25 1010.13 -2.62 1011.66 -1.63 1013.42 -1.16
1022.73 1.18 1023.65 1.55 1029.29 3.83 1035.85 5.81 1042.4 5.97 1048.96 6.38
1068.62 6.86 1075.18 6.72 1081.74 6.87 1101.4 6.47 1114.52 6.53 1121.07 6.69
1160.41 7.12 1173.52 7.12 1180.08 7.3 1193.19 7.31 1212.86 7.66 1225.97 8.08
1232.52 8.5 1239.08 9.13 1252.19 10.13 1258.75 11.04 1265.3 11.65 1271.86
12.65 1278.42 13.36 1291.53 14.34 1298.08 14.38 1311.2 14.65 1343.98 16.06
1357.09 16.37 1383.31 17.2 1416.09 17.73 1468.54 17.48 1488.21 17.87 1501.32
17.95 1507.87 17.73 1514.43 17.75 1534.1 18.18 1547.21 18.23 1553.77 17.91
1573.43 17.94 1579.99 18.11 1586.55 18.77 1593.1 19.59 1599.66 20.68 1606.21
23.62 1612.77 24.42 1625.88 24.47 1645.55 24.81 1658.66 25.67 1671.77 25.93
1678.33 25.65 1698 25.85 1717.67 26.28 1724.22 26.32 1763.56 27.03 1770.11
27.31 1776.67 27.31 1809.45 28.01 1829.12 28.27 1835.67 28.45 1861.9 28.54
1881.56 28.93 1894.68 29.33 1927.46 28.96 2006.13 27.54 2143.8 25.62 2170.03
25.69 2183.14 25.53 2196.25 25.66 2202.81 25.86 2209.36 26.79 2215.92 27.53
2222.48 27.83 2229.03 27.81 2242.14 28.08

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .082 871.95 .04 1291.53 .082

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 871.95
1291.53 1135.1 1183.89 1211.84 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 18077.71

INPUT
Description: 25 App Trestle Br
Station Elevation Data num= 198
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 18.73 6.56 18.62 13.12 18.58
19.68 18.52 26.24 18.42 32.8 18.29 39.36 18.2 52.48 17.91 59.03 17.69 65.59
17.49 78.71 17.21 85.27 17.03 91.83 17.04 98.39 17.02 104.95 16.8 111.51
16.54 118.07 16.2 124.63 15.95 131.19 15.78 137.75 15.57 144.31 15.23 157.43
14.88 163.99 14.76 170.54 14.75 177.1 14.67 183.66 14.77 190.22 14.75 196.78
14.63 209.9 14.73 216.46 14.68 223.02 14.57 229.58 14.37 236.14 14.27 242.7
14.45 249.26 14.53 255.82 14.43 262.38 14.4 268.94 14.39 275.49 14.32 282.05
14.31 288.61 14.27 301.73 14.04 308.29 13.91 314.85 13.8 321.41 13.79
327.97 13.7 334.53 13.46 341.09 13.27 347.65 13.12 354.21 13.06 360.77 12.91
367.33 12.85 373.89 12.74 380.45 12.59 387 12.46 393.56 12.28 413.24 12.11
426.36 11.92 439.48 11.66 446.04 11.58 459.16 11.33 465.72 11.39 472.28
11.31 478.84 11.14 491.96 11 505.07 10.75 511.63 10.69 518.19 10.66 524.75
10.52 531.31 10.4 537.87 10.2 544.43 10.09 550.99 10.01 557.55 9.91 564.11
9.93 570.67 9.9 577.23 9.79 583.79 9.75 590.35 9.54 596.91 9.45 603.46 9.32
610.02 9.05 623.14 8.56 629.7 8.53 636.26 8.64 642.82 8.88 649.38 8.98
655.94 9.2 662.5 9.28 669.06 9.45 675.62 9.46 682.18 9.55 688.74 9.62 695.3
9.66 701.86 9.8 708.42 9.64 714.97 9.44 721.53 9.42 728.09 9.43 734.65 9.49
741.21 9.5 747.77 9.66 754.33 9.67 767.45 9.82 774.01 9.73 787.13 9.72
793.69 9.69 800.25 9.62 806.81 9.58 813.37 9.46 826.48 9.52 833.04 9.45
839.6 9.57 846.16 9.58 852.72 9.52 859.28 9.63 865.84 9.66 872.4 9.67 878.96
9.64 885.52 9.66 892.08 9.65 898.64 9.69 905.2 9.62 911.76 9.58 918.32 9.56
924.87 9.52 931.43 9.54 937.99 9.58 951.11 9.5 957.67 9.39 964.23 9.35

970.79 9.28 977.35 9.06 983.91 8.93 990.47 8.74 997.03 8.76 1003.59 8.88
1010.15 7.83 1016.71 6.64 1023.27 6.04 1029.82 5.47 1036.38 4.73 1042.94
3.72 1049.5 4.16 1056.06 4.42 1062.62 4.46 1069.18 4.46 1082.3 4.15 1088.86
3.93 1095.42 4.26 1101.98 4.55 1179.84 8.31 1204.75 7.18 1269.14 10.73
1306.31 9.88 1307.02 6.5 1313.49 5.94 1319.44 .89 1353.11 -6.32 1384.09 -
7.81 1413.85 -5.93 1436.19 .77 1443.77 9.09 1493.04 10.17 1563.65 10.29
1633.29 12.45 1639.85 12.78 1646.41 13.09 1652.97 13.31 1659.53 13.51
1666.09 13.82 1672.65 14.11 1679.21 14.31 1685.76 14.33 1692.32 14.22
1705.44 14.25 1731.68 14.25 1757.92 14.19 1764.48 14.2 1771.04 14.23 1777.6
14.17 1784.16 14.05 1790.72 14.05 1797.27 14.24 1803.83 14.4 1810.39 14.71
1816.95 14.95 1823.51 15.28 1830.07 15.57 1836.63 15.82 1843.19 16.11
1849.75 16.28 1856.31 16.6 1869.43 17.07 1875.99 17.25 1882.55 17.56 1889.11
17.92 1895.67 18.12

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .082 1269.14 .04 1443.77 .082

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1269.14
1443.77 80.62 78.41 79.01 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 17999.3

INPUT
Description: 24.7 US Face Trestle Br
Station Elevation Data num= 161
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 18.6 6.317 18.59 12.634
18.74 25.269 18.32 31.586 18.36 44.23 18.11 50.547 18.22 63.181 17.44 75.816
18.47 82.133 18.63 94.767 18.51 126.362 17.04 132.68 16.86 164.265 15.26
170.583 15.12 183.217 14.32 195.851 14.01 208.495 14.04 221.129 13.86
240.081 13.06 252.715 13.13 271.667 12.62 277.984 12.27 284.301 12.1 303.262
12.21 315.896 12.13 328.531 12.27 347.482 11.74 398.029 11.41 410.663 11.05
442.249 10.73 454.883 10.45 486.479 10.33 505.43 10.57 537.016 10.61 562.294
10.75 606.514 10.6 631.793 9.93 669.696 9.72 688.647 9.88 707.599 9.36
713.925 9.44 720.243 9.33 739.194 9.41 745.511 9.25 758.146 9.12 777.097
8.67 783.414 8.41 802.375 8.09 833.961 8.18 840.278 8.02 846.595 8.06 859.23
8.6 871.864 8.76 878.191 8.96 890.825 8.24 903.459 8.27 909.777 8.12 935.045
8 941.362 8.23 953.997 8.32 960.314 8.01 966.641 7.38 972.958 6.1 979.275
5.06 985.592 4.16 991.909 3.471004.544 3.131010.861 3.211029.812 4.41
1042.446 4.551048.773 4.84 1055.09 4.371067.725 3.91080.359 4.03 1099.31
4.641105.628 5.191111.945 5.911118.262 6.841124.589 7.53 1137.223
7.661168.809 7.771194.077 8.61206.721 9.161213.039 9.18 1231.99 8.681238.307
9.121244.624 10.811250.942 11.991257.259 12.18 1269.893 12.04 1274.22
11.41279.861 12.211287.734 12.631293.462 13 1304.512 12.441304.531 -
1.251318.759 -5.881341.285 -7.51364.689 -7.98 1395.512 .681395.802
12.351398.796 13.261440.476 11.561446.793 11.29 1453.12 11.061459.437
10.961465.754 10.841472.071 10.821478.388 10.77 1484.705 10.571491.022 10.62
1497.34 11.121503.657 11.761509.974 12 1516.291 11.971522.608 12.021528.925
12.211535.252 12.381541.569 12.62 1547.886 12.891554.204 13.031560.521
13.351566.838 13.741573.155 13.99 1579.472 13.671585.789 13.131592.107

12.321598.424 10.91604.741 10.29 1611.058 10.461617.385 10.581623.702
10.531636.336 10.851642.653 10.98 1648.971 11.091655.288 10.961661.605
10.891667.922 10.761674.239 11.18 1680.556 11.971686.874 13.121693.191
13.871699.517 14.11705.835 14.29 1712.152 14.511718.469 14.671724.786
14.911731.103 14.99 1737.42 15.32 1743.738 15.471750.055 15.731756.372
15.841762.689 15.991769.006 16.27 1775.323 16.51 1781.65 16.711787.967
17.111794.284 17.891800.602 18.98 1806.919 19.27

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .0821293.462 .041398.796 .082

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1293.4621398.796 50.15 48.83 48.16 .6 .8 Ineffective Flow num= 3
 Sta L Sta R Elev Permanent
 209 1293.46 13 F
 1398 1573.16 13.26 T
 1573.16 1699.52 14.1 T
Skew Angle = 15

BRIDGE

RIVER: Taunton River
REACH: Main Stem RS: 17978.26

INPUT
Description: 24.5 Closed Trestle Br Distance from Upstream XS = 5
Deck/Roadway Width = 30
Weir Coefficient = 2.6
Bridge Deck/Roadway Skew = 15
Upstream Deck/Roadway Coordinates
 num= 3
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 1293 13.85 12.451394.797 13.15 12.351436.332 11.34

Upstream Bridge Cross Section Data
Station Elevation Data num= 161
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 18.6 6.317 18.59 12.634
18.74 25.269 18.32 31.586 18.36 44.23 18.11 50.547 18.22 63.181 17.44 75.816
18.47 82.133 18.63 94.767 18.51 126.362 17.04 132.68 16.86 164.265 15.26
170.583 15.12 183.217 14.32 195.851 14.01 208.495 14.04 221.129 13.86
240.081 13.06 252.715 13.13 271.667 12.62 277.984 12.27 284.301 12.1 303.262
12.21 315.896 12.13 328.531 12.27 347.482 11.74 398.029 11.41 410.663 11.05
442.249 10.73 454.883 10.45 486.479 10.33 505.43 10.57 537.016 10.61 562.294
10.75 606.514 10.6 631.793 9.93 669.696 9.72 688.647 9.88 707.599 9.36
713.925 9.44 720.243 9.33 739.194 9.41 745.511 9.25 758.146 9.12 777.097
8.67 783.414 8.41 802.375 8.09 833.961 8.18 840.278 8.02 846.595 8.06 859.23
8.6 871.864 8.76 878.191 8.96 890.825 8.24 903.459 8.27 909.777 8.12 935.045
8 941.362 8.23 953.997 8.32 960.314 8.01 966.641 7.38 972.958 6.1 979.275
5.06 985.592 4.16 991.909 3.471004.544 3.131010.861 3.211029.812 4.41
1042.446 4.551048.773 4.84 1055.09 4.371067.725 3.91080.359 4.03 1099.31
4.641105.628 5.191111.945 5.911118.262 6.841124.589 7.53 1137.223
7.661168.809 7.771194.077 8.61206.721 9.161213.039 9.18 1231.99 8.681238.307

9.121244.624 10.811250.942 11.991257.259 12.18 1269.893 12.04 1274.22
11.41279.861 12.211287.734 12.631293.462 13 1304.512 12.441304.531 -
1.251318.759 -5.881341.285 -7.51364.689 -7.98 1395.512 .681395.802
12.351398.796 13.261440.476 11.561446.793 11.29 1453.12 11.061459.437
10.961465.754 10.841472.071 10.821478.388 10.77 1484.705 10.571491.022 10.62
1497.34 11.121503.657 11.761509.974 12 1516.291 11.971522.608 12.021528.925
12.211535.252 12.381541.569 12.62 1547.886 12.891554.204 13.031560.521
13.351566.838 13.741573.155 13.99 1579.472 13.671585.789 13.131592.107
12.321598.424 10.91604.741 10.29 1611.058 10.461617.385 10.581623.702
10.531636.336 10.851642.653 10.98 1648.971 11.091655.288 10.961661.605
10.891667.922 10.761674.239 11.18 1680.556 11.971686.874 13.121693.191
13.871699.517 14.11705.835 14.29 1712.152 14.511718.469 14.671724.786
14.911731.103 14.99 1737.42 15.32 1743.738 15.471750.055 15.731756.372
15.841762.689 15.991769.006 16.27 1775.323 16.51 1781.65 16.711787.967
17.111794.284 17.891800.602 18.98 1806.919 19.27

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .0821293.462 .041398.796 .082

Bank Sta: Left Right Coeff Contr. Expan.
 1293.4621398.796 .6 .8
Ineffective Flow num= 3
 Sta L Sta R Elev Permanent
 209 1293.46 13 F
 1398 1573.16 13.26 T
 1573.16 1699.52 14.1 T
Skew Angle = 15

Downstream Deck/Roadway Coordinates
 num= 3
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord 1328.148 13.85
12.451436.332 13.15 12.351465.309 11.34

Downstream Bridge Cross Section Data
Station Elevation Data num= 272
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 18.87 6.327 18.77 12.663
18.74 18.99 18.65 25.327 18.65 31.653 18.48 37.99 18.42 44.317 18.38 50.653
18.45 56.98 18.49 63.316 18.35 69.643 18.89 75.97 19.31 82.307 19.16 88.633
18.84 94.97 18.57 101.297 18.24 107.633 17.78 113.96 17.25 120.296 16.74
126.623 16.27 132.96 15.95 139.286 15.55 145.613 15.11 151.95 14.77 158.277
14.64 170.94 14.48 177.276 14.08 183.603 13.83 189.94 13.69 196.266 13.64
202.603 13.8 208.93 13.82 215.257 13.67 227.92 13.19 234.256 13.05 246.92
12.68 253.246 12.63 259.583 12.53 265.91 12.52 278.573 12.43 284.9 12.43
291.236 12.36 303.9 12.33 310.226 12.44 316.563 12.52 322.89 12.66 329.226
12.87 335.553 12.85 348.216 12.32 354.553 12.24 360.88 12.2 367.206 12.14
373.543 12.05 379.87 11.98 386.206 11.94 392.533 11.84 398.869 11.76 405.196
11.6 411.533 11.38 417.86 11.31 424.196 11.26 430.523 11.13 436.85 11.02
443.186 10.99 449.513 10.94 455.849 10.79 462.176 10.66 468.513 10.59
474.839 10.58 481.176 10.71 487.503 10.76 493.839 10.78 506.493 10.93
519.156 11 538.156 11.26 544.483 11.31 550.819 11.31 557.146 11.35 563.482
11.34 569.809 11.23 582.473 11.22 588.799 11.16 595.136 11.13 607.799 11.1
614.126 11.02 620.462 10.97 626.789 10.87 639.453 10.75 645.779 10.73
652.116 10.79 658.443 10.79 664.779 10.71 671.106 10.68 677.442 10.67

683.769 10.68 690.106 10.8 696.432 10.77 702.769 10.7 709.096 10.65 715.423
10.49 721.759 10.39 734.422 10.33 740.749 10.4 753.412 10.41 759.749 10.36
766.076 10.16 778.739 10.32 785.066 9.99 791.402 9.53 797.729 9.46 804.066
8.67 810.392 6.79 816.729 6.24 823.056 6.41 829.392 6.35 835.719 6.03
842.055 5.67 848.382 5.85 854.709 6.14 861.046 6.33 867.372 6.58 873.709
6.79 880.036 7.34 886.372 7.8 892.699 7.77 899.035 6.79 905.362 5.89 911.699
5.42 918.026 4.87 924.352 4.61 930.689 4.46 937.016 4.2 943.352 4.14 949.679
3.52 956.015 3.52 962.342 3.36 968.679 3.26 975.006 3.35 981.342 3.21
994.005 3.981000.332 4.271006.659 4.271012.995 4.091019.322 3.94 1025.659
3.061031.985 3.421038.322 3.851044.649 4.081057.312 4.35 1063.649
4.881069.975 4.721076.302 4.581082.639 4.471088.965 3.99 1095.302
3.681101.629 3.681107.965 4.141114.292 4.651120.629 4.35 1126.955
5.181133.292 6.261139.619 6.61145.945 7.131152.282 7.4 1158.609 7.711164.945
7.891171.272 8.211177.609 8.351190.272 8.77 1196.599 8.971202.935
8.811209.262 8.951215.589 9.181221.925 9.27 1228.252 9.521234.588
9.561240.915 9.451247.252 9.31253.579 9.28 1259.915 9.241266.242 9.461272.578
9.91278.905 10.661285.232 10.73 1294.341 10.81 1298.33 11.27 1302.85
11.691308.839 12.211316.711 12.63 1322.439 13 1333.49 12.441333.509 -
1.251347.737 -5.881370.262 -7.5 1393.667 -7.981424.489 .681424.779
12.351427.774 13.261462.508 11.54 1468.845 11.331475.172 11.241481.508
11.171487.835 11.021500.498 10.83 1506.825 11.151519.488 12.131525.825
12.561532.151 12.771538.488 12.93 1551.151 13.191557.478 13.481563.815
13.81570.141 13.951576.468 14.13 1582.805 14.421589.131 14.611595.468
14.611608.131 14.421620.795 14.26 1639.785 14.11646.111 14.011652.448
13.91658.775 13.811684.101 13.51 1709.428 13.371715.755 12.891722.091
12.511728.418 13.131734.754 14.15 1741.081 15.121747.418 15.951753.745
16.361760.081 16.541766.408 16.54 1772.744 16.641779.071 16.931785.398
17.21791.734 17.411798.061 17.48 1804.398 17.671810.724 18.021817.061
18.351823.388 18.641829.647 18.36 1842.165 17.691848.415 17.481854.674
17.421860.933 17.221867.193 16.96 1873.452 16.661879.701 16.51 1885.96 16.52
1892.22 16.371898.479 16.02 1904.729 15.341910.988 14.451917.247
13.621923.506 12.841929.765 12.82 1936.015 13.261942.274 13.341954.792
13.411967.301 13.521979.819 13.69 1992.338 13.842004.847 14.042017.365
14.142029.874 14.272042.392 14.46 2054.901 14.672186.305 15.5

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .0821322.439 .041427.774 .082

Bank Sta: Left Right Coeff Contr. Expan.
 1322.4391427.774 .5 .8
Ineffective Flow num= 3
 Sta L Sta R Elev Permanent
 329.2 1322.4 13 T
 1427.7 1582.8 13.26 T
 1582.8 2054.9 14.6 T
Skew Angle = 15
 Upstream Embankment side slope = 0 horiz. to 1.0 vertical Downstream
Embankment side slope = 0 horiz. to 1.0 vertical Maximum allowable
submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
 Energy
 W.S. Pro Method

 W.S.Pro Data
 Left Embankment
 El of the top of the embankment = 13.8
 El of the toe of the abutment = -5.88
 Right Embankment
 El of the top of the embankment = 13.8
 El of the toe of the abutment = -5.88
 Abutment Type = 1 Vert. abutments and vert. embankments with or without wingwalls Slope of abutments =
 Top with of embankment = 30 Centroid station of bridge opening =
 Wing Wall Type = Angular wing walls
 Width = 35
 Angle = 20
 Radius =
 Guide Banks Type = No Guide Bank present
 Length =
 Offset =
 Angle =
 Optional Contraction and expansion coefficients
 At upstream inside (BU)
 Piers are Continuous for the width of the bridge
 Use Geometric mean as Friction Slope Method

Selected Low Flow Methods = W.S.Pro Method

High Flow Method
 Energy Only

Additional Bridge Parameters
 Add Friction component to Momentum
 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line
 CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 17950.46

INPUT
Description: 24.3 DS Face Trestle Br
Station Elevation Data num= 272
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 18.87 6.327 18.77 12.663 18.74 18.99 18.65 25.327 18.65 31.653 18.48 37.99 18.42 44.317 18.38 50.653 18.45 56.98 18.49 63.316 18.35 69.643 18.89 75.97 19.31 82.307 19.16 88.633 18.84 94.97 18.57 101.297 18.24 107.633 17.78 113.96 17.25 120.296 16.74 126.623 16.27 132.96 15.95 139.286 15.55 145.613 15.11 151.95 14.77 158.277

14.64 170.94 14.48 177.276 14.08 183.603 13.83 189.94 13.69 196.266 13.64
202.603 13.8 208.93 13.82 215.257 13.67 227.92 13.19 234.256 13.05 246.92
12.68 253.246 12.63 259.583 12.53 265.91 12.52 278.573 12.43 284.9 12.43
291.236 12.36 303.9 12.33 310.226 12.44 316.563 12.52 322.89 12.66 329.226
12.87 335.553 12.85 348.216 12.32 354.553 12.24 360.88 12.2 367.206 12.14
373.543 12.05 379.87 11.98 386.206 11.94 392.533 11.84 398.869 11.76 405.196
11.6 411.533 11.38 417.86 11.31 424.196 11.26 430.523 11.13 436.85 11.02
443.186 10.99 449.513 10.94 455.849 10.79 462.176 10.66 468.513 10.59
474.839 10.58 481.176 10.71 487.503 10.76 493.839 10.78 506.493 10.93
519.156 11 538.156 11.26 544.483 11.31 550.819 11.31 557.146 11.35 563.482
11.34 569.809 11.23 582.473 11.22 588.799 11.16 595.136 11.13 607.799 11.1
614.126 11.02 620.462 10.97 626.789 10.87 639.453 10.75 645.779 10.73
652.116 10.79 658.443 10.79 664.779 10.71 671.106 10.68 677.442 10.67
683.769 10.68 690.106 10.8 696.432 10.77 702.769 10.7 709.096 10.65 715.423
10.49 721.759 10.39 734.422 10.33 740.749 10.4 753.412 10.41 759.749 10.36
766.076 10.16 778.739 10.32 785.066 9.99 791.402 9.53 797.729 9.46 804.066
8.67 810.392 6.79 816.729 6.24 823.056 6.41 829.392 6.35 835.719 6.03
842.055 5.67 848.382 5.85 854.709 6.14 861.046 6.33 867.372 6.58 873.709
6.79 880.036 7.34 886.372 7.8 892.699 7.77 899.035 6.79 905.362 5.89 911.699
5.42 918.026 4.87 924.352 4.61 930.689 4.46 937.016 4.2 943.352 4.14 949.679
3.52 956.015 3.52 962.342 3.36 968.679 3.26 975.006 3.35 981.342 3.21
994.005 3.981000.332 4.271006.659 4.271012.995 4.091019.322 3.94 1025.659
3.061031.985 3.421038.322 3.851044.649 4.081057.312 4.35 1063.649
4.881069.975 4.721076.302 4.581082.639 4.471088.965 3.99 1095.302
3.681101.629 3.681107.965 4.141114.292 4.651120.629 4.35 1126.955
5.181133.292 6.261139.619 6.61145.945 7.131152.282 7.4 1158.609 7.711164.945
7.891171.272 8.211177.609 8.351190.272 8.77 1196.599 8.971202.935
8.811209.262 8.951215.589 9.181221.925 9.27 1228.252 9.521234.588
9.561240.915 9.451247.252 9.31253.579 9.28 1259.915 9.241266.242 9.461272.578
9.91278.905 10.661285.232 10.73 1294.341 10.81 1298.33 11.27 1302.85
11.691308.839 12.211316.711 12.63 1322.439 13 1333.49 12.441333.509 -
1.251347.737 -5.881370.262 -7.5 1393.667 -7.981424.489 .681424.779
12.351427.774 13.261462.508 11.54 1468.845 11.331475.172 11.241481.508
11.171487.835 11.021500.498 10.83 1506.825 11.151519.488 12.131525.825
12.561532.151 12.771538.488 12.93 1551.151 13.191557.478 13.481563.815
13.81570.141 13.951576.468 14.13 1582.805 14.421589.131 14.611595.468
14.611608.131 14.421620.795 14.26 1639.785 14.11646.111 14.011652.448
13.91658.775 13.811684.101 13.51 1709.428 13.371715.755 12.891722.091
12.511728.418 13.131734.754 14.15 1741.081 15.121747.418 15.951753.745
16.361760.081 16.541766.408 16.54 1772.744 16.641779.071 16.931785.398
17.21791.734 17.411798.061 17.48 1804.398 17.671810.724 18.021817.061
18.351823.388 18.641829.647 18.36 1842.165 17.691848.415 17.481854.674
17.421860.933 17.221867.193 16.96 1873.452 16.661879.701 16.51 1885.96 16.52
1892.22 16.371898.479 16.02 1904.729 15.341910.988 14.451917.247
13.621923.506 12.841929.765 12.82 1936.015 13.261942.274 13.341954.792
13.411967.301 13.521979.819 13.69 1992.338 13.842004.847 14.042017.365
14.142029.874 14.272042.392 14.46 2054.901 14.672186.305 15.5

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .0821322.439 .041427.774 .082

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1322.4391427.774 90.54 100.66 105.81 .5 .8 Ineffective Flow num= 3

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 Sta L Sta R Elev Permanent
 329.2 1322.4 13 T
 1427.7 1582.8 13.26 T
 1582.8 2054.9 14.6 T
Skew Angle = 15

CROSS SECTION


RIVER: Taunton River
REACH: Main Stem RS: 17849.81

INPUT
Description: 24 Exit Trestle Br
Station Elevation Data num= 208
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  0 19.31 26.18 19.33 32.73
19.31 45.82 19.23 52.37 19.21  58.92 19.31 65.46 19.52 72.01 19.63 78.55
19.38 85.1 18.96  98.19 17.88 104.74 17.55 111.28 17.19 117.83 16.74 130.92
15.65  137.47 15.2 144.02 14.84 150.56 14.51 157.11 14.22 163.65 14.03  170.2
13.81 176.75 13.5 183.29 13.12 189.84 13 196.38 13.19  202.93 13.58 209.48
13.88 216.02 13.78 235.66 13.18 242.21 13.04  248.75 12.97 261.85 12.89
268.39 12.86 274.94 12.92 281.48 12.94  288.03 12.88 294.58 12.9 301.12 13.07
307.67 13.22 314.22 13.24  320.76 13.42 327.31 13.42 333.85 13.12 340.4 12.91
353.49 12.71  360.04 12.66 366.58 12.59 373.13 12.58 379.68 12.51 386.22 12.4
392.77 12.33 399.32 12.28 405.86 12.15 418.95 11.98 425.5 11.88  438.59 11.79
445.14 11.71 451.68 11.59 458.23 11.63 471.32 11.51  477.87 11.53 484.42 11.7
490.96 11.74 497.51 11.81 504.05 11.77  510.6 11.78 517.15 11.77 523.69 11.84
530.24 11.99 536.78 11.98  543.33 12.05 549.88 12.01 562.97 11.85 569.52 11.8
576.06 11.73  582.61 11.74 595.7 11.79 602.25 11.8 615.34 11.68 621.88 11.66
634.98 11.67 641.52 11.58 648.07 11.45 654.62 11.47 661.16 11.36  667.71
11.42 674.25 11.36 680.8 11.4 693.89 11.33 700.44 11.19  706.98 11.17 713.53
11.18 720.08 11.11 726.62 11.13 733.17 11.21  739.72 11.18 746.26 11.04
752.81 10.88 759.35 10.93 765.9 10.93  772.45 10.83 778.99 10.8 785.54 10.79
792.09 10.87 798.63 10.68  805.18 10.74 811.72 10.71 818.27 10.81 824.82
10.88 831.36 10.38  837.91 10.29 844.45 9.37 851 7.93 857.55 7.1 864.09 5.9
870.64 5.81 877.19 6.55 883.73 6.96 890.28 6.93 896.82 6.94  903.37 6.5
909.92 5.67 916.46 5.18 923.01 5.03 929.55 4.72  936.1 4.8 942.65 4.9 949.19
5.08 955.74 4.94 962.29 4.71  968.83 4.65 975.38 4.75 981.92 4.71 988.47 4.24
995.02 4.12  1001.56 3.85 1008.11 3.82 1014.65 3.81 1021.2 3.97 1027.75 3.95
1034.29 4.03 1040.84 3.98 1047.39 3.9 1053.93 3.47 1060.48 3.32  1067.02 3.64
1073.57 3.82 1086.66 3.59 1099.76 3.4 1106.3 3.53  1112.85 3.76 1119.39 4.1
1132.49 4.13 1139.03 4.12 1152.12 4.88  1158.67 5.3 1165.22 6.59 1171.76 7.38
1178.31 7.4 1184.86 7.35  1191.4 7.36 1197.95 7.49 1204.49 7.72 1211.04 7.75
1217.59 7.94  1224.13 8.2 1230.68 8.24 1237.23 8.22 1243.77 8.27 1250.32 8.2
1256.88 8.29 1263.44 8.43 1270 8.49 1276.56 8.69 1291.2 8.68  1339.54 6.53
1374.16 5.55 1379.52 1.74 1410.91 -6.63 1433.27 -7.73  1454.85 -8.3 1472.27 -
4.98 1483.19 .61 1487.95 5.55 1498.67 10.79  1547.22 11.17 1722.6 15.71
1735.72 15.76 1742.28 15.75 1748.84 15.68  1761.96 15.73 1768.52 15.77
1775.08 15.72 1781.64 15.72 1788.2 15.89  1794.76 15.97 1801.32 15.96 1814.44
15.97 1821 16.05 1827.56 16.07  1834.12 16.11 1840.67 16.3 1847.23 16.33
1853.79 16.22 1860.35 16.2  1866.91 16.25 1873.47 16.27 1886.59 16.27

Manning's n Values num= 3  Sta n Val Sta n Val Sta n Val
 0 .082 1291.2 .04 1498.67 .082
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Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1291.2
1498.67 887.1 936.69 998.6 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 16913.12

INPUT
Description: 23
Station Elevation Data num= 456
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 19.4 78.43 19.25 111.1 19.25
117.64 19.03 150.32 18.69 163.39 18.79 189.53 18.27 196.07 18.35 202.6 18.23
209.14 17.59 228.74 17.05 235.28 17.14 254.88 16.16 274.49 14.75 307.17
13.64 359.45 12.29 372.52 11.73 405.2 11.03 424.81 10.33 450.95 9.89 457.48
9.87 477.09 10.28 483.63 10.55 490.16 10.41 503.23 9.2 509.77 8.88 529.38
8.45 562.05 8.59 575.12 8.49 594.73 8.68 614.34 8.36 640.48 8.52 653.55 8.27
666.62 8.19 699.3 7.6 745.05 7.64 771.19 7.84 777.72 8.07 784.26 8.49 790.79
8.71 797.33 8.68 816.94 9.39 823.47 8.64 830.01 7.68 836.49 6.59 849.46
5.05 855.94 4.44 862.43 3.98 875.4 3.5 894.85 3.23 901.33 3.31 933.76 2.87
940.24 2.89 953.21 3.1 959.69 3 966.18 3.1 972.66 3.39 985.63 3.63 992.11
3.95 998.6 4.52 1005.08 5.28 1011.57 5.66 1031.02 5.84 1043.99 6.29 1050.47
6.25 1063.44 5.64 1069.92 5.73 1082.89 5.12 1102.35 5.3 1108.83 5.18 1121.8
5.61 1141.25 5.56 1147.73 5.71 1154.22 6.05 1160.7 5.8 1167.19 5.78 1173.67
5.56 1180.16 5.47 1186.64 5.56 1199.61 5.24 1212.58 4.23 1215.2 4.09 1219.06
3.87 1225.55 3.93 1232.03 4.2 1238.54 3.19 1250 -.96 1250.62 -1.13 1252.35 -
1.49 1254.47 -1.7 1256.24 -1.54 1257.64 -2.08 1258.8 -3.18 1260.28 -4.39
1262.36 -5.49 1264.56 -6.31 1266.7 -7.12 1268.91 -7.64 1271.03 -7.99 1273.46
-8.06 1275.8 -8.11 1278.4 -8.23 1280.73 -8.24 1283.12 -8.18 1285.25 -8.2
1287.5 -8.13 1289.54 -8.05 1291.39 -7.94 1293.1 -7.97 1295.08 -7.94 1296.78
-7.77 1298.56 -7.77 1300.16 -7.61 1301.79 -7.6 1303.31 -7.45 1304.84 -7.38
1306.2 -7.16 1307.65 -7.07 1309.06 -7 1310.52 -6.85 1311.97 -6.66 1313.89 -
6.62 1315.88 -6.47 1318.09 -6.19 1320.33 -6.01 1322.53 -5.68 1324.52 -5.43
1328.31 -4.79 1329.88 -4.32 1331.38 -3.78 1332.58 -3.18 1333.73 -2.69
1334.42 -2.25 1342.71 3.21 1349.23 9.58 1355.74 10.87 1362.26 10.7 1368.78
10.64 1375.3 10.6 1388.33 10.31 1394.85 10.23 1401.37 10.42 1407.88 9.94
1414.4 9.62 1420.92 9.58 1427.44 9.61 1433.96 9.59 1440.47 9.36 1446.99 9.17
1453.51 9.21 1460.03 9.72 1466.54 10.05 1473.06 10.29 1479.58 10.5 1486.1
10.67 1492.61 10.88 1505.65 11.69 1512.17 11.18 1518.68 10.88 1525.2 10.71
1531.72 10.48 1538.24 10.11 1544.75 9.89 1551.27 9.78 1557.79 9.78 1564.31
9.73 1570.83 9.82 1577.34 10.28 1583.86 10.39 1590.38 10.48 1596.9 10.72
1603.41 10.8 1609.93 10.6 1616.45 10.44 1622.97 9.97 1629.48 9.52 1636 8.98
1642.52 8.58 1649.04 7.82 1655.55 7.34 1662.07 6.45 1668.59 5.53 1675.11
5.15 1681.63 5.49 1688.14 5.48 1694.66 5.74 1701.18 5.89 1707.7 6.58 1714.21
7.71 1720.73 8.22 1727.26 8.48 1733.79 8.49 1740.32 7.74 1746.85 6.35
1753.38 5.46 1759.91 5.63 1766.44 5.84 1772.97 6.14 1779.5 6.82 1786.03 7.55
1792.57 7.94 1799.1 8 1812.16 8.06 1818.69 8.44 1825.22 9.16 1838.28 9.35
1844.81 9.32 1851.34 8.96 1857.87 9.41 1864.4 10.05 1870.93 10.93 1877.46
11.9 1883.99 12.98 1890.52 14.17 1897.05 15.25 1903.58 15.71 1910.11 15.78
1916.64 15.72 1923.17 15.45 1929.7 15.44 1936.23 15.5 1942.76 15.79 1949.29
16.29 1955.82 16.59 1962.35 16.73 1968.88 17.06 1975.41 17.43 1988.48 17.87
1995.01 18.01 2001.54 18.1 2008.07 18.22 2014.6 18.29 2027.66 18.22 2034.19
18.02 2040.72 17.6 2047.25 17.3 2053.78 17.15 2060.31 16.97 2066.84 16.84

2073.37 16.76 2079.9 16.64 2086.43 16.7 2092.96 16.82 2099.49 16.91 2106.02
17.03 2112.55 17.21 2119.08 17.43 2132.14 17.74 2138.67 17.7 2145.2 17.56
2151.73 17.4 2158.26 17.2 2164.8 17.04 2171.33 17.28 2177.87 17.26 2184.4
16.88 2190.94 16.43 2197.47 16.46 2204.01 16.2 2210.54 16.25 2217.07 16.43
2223.61 16.51 2230.14 16.33 2236.68 16.12 2243.21 16 2249.75 16.1 2256.28
16.27 2269.35 16.3 2275.88 16.39 2282.42 16.9 2288.95 17.18 2302.02 17.45
2308.56 17.45 2321.62 17.24 2328.16 17.09 2334.69 16.89 2341.23 16.66
2347.76 16.39 2354.3 16.07 2360.83 15.46 2367.36 15.19 2373.9 14.34 2380.43
12.97 2386.97 9.92 2393.5 9.21 2400.04 9.21 2406.57 9.39 2413.11 9.48
2419.64 9.27 2426.17 9.39 2432.71 9.66 2439.24 9.71 2445.78 9.84 2452.31
9.95 2458.85 9.65 2465.38 9.11 2471.92 9.17 2478.45 9.93 2491.52 9.6 2498.05
9.83 2504.59 9.69 2511.12 9.6 2517.66 9.82 2524.19 10.01 2530.73 10.15
2537.26 11.2 2543.79 12.86 2550.33 14.35 2556.86 15.3 2563.4 15.65 2569.93
15.67 2576.47 15.71 2583 15.52 2589.54 15.42 2596.07 15.35 2602.6 15.43
2609.14 15.55 2615.67 15.56 2622.21 15.59 2628.74 15.48 2635.28 15.46
2641.81 15.42 2648.34 15.4 2654.88 15.31 2661.41 15.12 2667.95 14.95 2674.48
14.84 2681.02 14.88 2687.55 14.84 2694.09 14.74 2707.15 14.7 2713.69 14.64
2720.22 14.51 2726.76 14.48 2733.29 14.48 2739.83 14.5 2746.36 14.61 2752.9
14.63 2759.43 14.69 2765.96 14.69 2772.5 15.03 2785.57 15.16 2798.64 15.34
2805.17 15.45 2811.7 15.65 2824.77 15.67 2831.31 15.73 2844.38 15.88 2850.91
15.94 2863.98 16.01 2870.51 15.99 2877.05 15.94 2883.58 15.85 2890.1 15.72
2896.62 15.67 2903.14 15.64 2909.65 15.59 2916.17 15.49 2922.69 15.49
2929.21 15.71 2935.73 15.75 2942.24 15.76 2948.76 15.81 2955.28 16.14 2961.8
16.49 2968.31 16.45 2974.83 16.43 2987.87 16.46 3007.42 16.58 3013.94 16.61
3020.46 16.61 3026.98 16.52 3033.49 16.38 3046.53 16.35 3066.08 16.21 3072.6
16.19 3092.15 16.25 3098.67 16.37 3105.19 16.57 3111.71 16.72 3118.22 16.79
3124.74 16.82 3131.26 16.79 3137.78 16.89 3144.3 17.03 3157.33 17.43 3163.85
17.29 3170.37 17.35 3176.88 17.59 3183.4 18.62 3189.92 19.49 3196.44 19.82
3202.96 19.98 3209.47 20.03 3215.99 20.06 3222.51 20.13 3229.03 20.1 3235.54
20.12 3242.06 20.08 3248.58 20.12 3261.62 20.36 3268.13 20.45 3281.17 20.81
3287.69 20.98 3294.21 21.09 3300.72 21.06 3307.24 21.06 3313.76 21.14
3320.28 21.2 3333.31 21.26 3339.83 21.3 3346.35 21.37 3352.87 21.48 3359.38
21.57 3385.45 21.73 3391.97 21.76 3398.49 21.77 3405.01 21.76 3411.53 21.73
3424.56 21.62 3431.08 21.77 3437.6 21.85 3444.11 21.87 3457.15 21.78 3463.67
21.79 3470.19 21.63 3476.7 21.76 3496.26 21.69 3502.77 21.91 3509.29 21.9
3515.81 21.97 3522.33 21.97 3528.85 22.1 3535.36 22.1 3541.88 21.94 3548.4
21.87 3554.92 21.86 3561.44 21.75 3567.95 21.46 3574.47 21.6 3580.99 22
3587.51 22.17 3594.02 22.11 3600.54 21.98 3607.06 21.78 3613.58 21.91 3620.1
21.87 3626.61 22.07 3633.13 22.08 3639.65 21.62 3652.68 21.59 3659.2 21.56
3665.72 21.4 3672.24 21.29 3678.76 21.24 3685.27 21.21

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .082 816.94 .04 1355.74 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 816.94
1355.74 882.21 816.31 764.31 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 2300 3685.27 17.4 T

CROSS SECTION

RIVER: Taunton River

REACH: Main Stem RS: 16096.81

INPUT
Description: 22 - App GorOwPkwy
Station Elevation Data num= 443
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 19.13 12.95 19.94 19.43
20.31 25.91 20.58 32.38 21.16 38.86 21.65 45.34 21.95 51.81 22.11 58.29
21.99 64.76 21.25 71.24 20.48 77.72 19.87 84.19 19.29 90.67 19.01 97.15
18.91 103.62 18.85 110.1 18.67 116.58 18.57 123.05 18.52 129.53 18.5 136.01
18.83 142.48 19.36 148.96 19.64 155.44 19.61 161.91 19.67 174.86 19.66
181.34 19.67 187.82 19.85 194.29 19.18 200.77 17.5 207.25 15.57 213.72 14.65
220.2 14.68 226.68 14.61 233.15 14.45 239.63 14.24 246.11 13.96 252.58 13.63
259.06 13.41 265.54 12.94 272.01 12.38 278.49 11.55 284.96 11.44 291.44
11.25 297.92 10.86 304.39 10.24 310.87 10.04 330.3 9.64 343.25 9.08 349.73
8.88 356.21 8.79 362.68 8.68 369.16 8.62 375.64 8.6 382.11 8.43 395.06 8.31
401.54 8.11 408.02 7.87 414.49 7.84 420.97 7.68 427.45 7.49 433.92 7.36
440.4 7.16 446.88 6.99 453.35 6.93 459.83 6.69 466.31 6.5 472.78 6.11 485.74
5.28 492.22 4.39 498.7 4.27 505.18 3.97 511.66 3.74 518.14 3.85 524.62 4.04
531.11 4.09 537.59 3.99 544.07 3.79 550.55 3.75 557.03 3.83 569.99 3.8
576.47 3.89 582.95 3.88 589.43 3.76 602.4 3.85 615.36 3.88 621.84 3.82
628.32 3.79 634.8 3.82 647.76 4.17 654.24 4.64 660.72 6.29 667.2 8.57 673.69
10.2 680.17 10.45 686.65 10 693.13 9.46 699.61 8.71 706.09 8.08 712.57 7.84
725.53 7.61 732.01 7.42 738.49 7.28 744.98 7.07 751.46 7 764.42 7.21 770.9
6.81 777.38 6.24 783.72 6.54 790.06 6.86 796.4 6.84 802.74 6.78 809.09 5.97
811.36 6.17 812.5 2.53 828.11 -1.03 853.59 -8.07 878.23 -7.1 899.9 -4.86
912.8 -4.05 932.23 -.89 985.03 3.1 1224.32 5.35 1259.85 11.56 1315.71 11.32
1328.83 11.1 1335.39 11.29 1341.95 11.55 1348.51 10.79 1355.07 9.72 1361.63
9.22 1368.19 9.18 1374.75 9.04 1381.31 9.08 1387.87 9.24 1394.43 9.5 1400.99
9.68 1407.55 9.8 1414.11 9.8 1420.67 9.77 1427.23 9.82 1433.79 10.13 1440.35
10.4 1446.91 10.55 1453.47 10.67 1460.03 10.91 1466.59 11.05 1473.15 11.22
1479.71 11.37 1486.27 11.59 1492.83 11.79 1499.39 12.16 1505.95 12.43
1512.51 12.63 1519.07 13.07 1525.63 13.54 1532.19 13.79 1538.75 14.06
1545.31 14.21 1551.87 14.39 1558.43 14.37 1564.99 14.26 1571.55 14.34
1584.66 14.54 1591.22 14.53 1597.78 14.46 1604.34 14.31 1610.9 14.26 1617.46
14.16 1630.58 13.93 1637.14 13.95 1643.7 14 1650.26 13.85 1656.82 13.75
1663.38 13.67 1676.5 12.53 1683.06 12.19 1689.62 12.25 1702.74 12.51 1709.3
12.71 1715.86 12.83 1722.42 12.84 1728.98 12.75 1735.54 12.59 1742.1 11.81
1748.66 10.27 1755.22 9.69 1768.34 9.91 1774.9 9.92 1781.46 9.72 1788.02
9.05 1801.14 8.29 1807.7 7.94 1820.82 7.79 1827.38 7.73 1833.94 7.72 1840.5
7.67 1847.06 7.67 1853.61 7.45 1860.17 7.57 1866.73 7.74 1873.29 7.63
1879.85 7.67 1886.41 7.5 1892.97 7.49 1906.09 7.33 1912.65 7.24 1919.21 7.25
1925.77 7.38 1932.33 7.82 1938.89 8.22 1945.45 8.47 1952.01 8.5 1958.57 8.7
1965.13 9.14 1971.69 9.52 1978.25 9.78 1984.81 9.89 1991.37 10.07 1997.93
10.07 2004.49 10.2 2017.61 10.37 2024.17 10.75 2030.73 10.94 2037.29 10.74
2043.85 10.57 2050.41 10.69 2056.97 10.85 2063.53 11.07 2070.09 11.13
2076.65 11.1 2083.21 11.14 2089.77 11.12 2102.89 11.44 2109.45 11.56 2116
11.54 2122.56 11.6 2135.68 11.8 2142.24 11.63 2148.8 11.39 2155.36 11.32
2161.92 11.29 2168.48 11.01 2175.04 10.84 2181.6 10.96 2188.16 11.03 2194.72
11.23 2201.28 11.68 2207.84 10.88 2214.4 10.91 2220.96 10.41 2227.52 10.07
2234.08 10.07 2240.64 9.69 2247.2 9.82 2253.76 10.71 2260.32 11.75 2266.88
12.65 2273.44 13.03 2280 13.34 2286.56 13.51 2293.12 13.74 2299.68 13.81
2306.24 14.01 2319.36 14.28 2325.92 13.97 2332.48 13.98 2339.04 13.97 2345.6
13.82 2352.15 13.79 2358.71 13.93 2365.27 13.97 2371.83 14.03 2378.39 14.29
2384.95 14.38 2391.51 14.23 2404.63 14.1 2411.19 14.09 2417.75 13.97 2424.31

13.93 2430.87 13.71 2437.43 14.05 2443.99 14.12 2450.55 14.04 2463.67 14.19
2470.23 14.11 2483.35 14.01 2489.91 13.79 2496.47 13.61 2503.03 13.52
2509.59 13.39 2516.15 13.52 2522.71 13.55 2529.27 13.63 2535.83 13.59
2542.39 13.65 2548.95 13.57 2555.51 13.47 2562.07 13.35 2568.63 13.34
2575.19 13.41 2581.75 13.38 2588.3 13.29 2594.86 13.22 2607.98 12.97 2614.54
12.87 2621.1 12.67 2627.66 12.56 2634.22 12.4 2647.34 12.43 2653.9 12.5
2667.02 12.49 2693.26 12.79 2699.82 12.8 2706.38 12.88 2712.94 12.84 2719.5
12.82 2726.06 12.85 2739.18 12.38 2745.74 12.18 2752.3 12.19 2758.86 12.18
2765.42 12.24 2771.98 12.19 2778.54 12.24 2785.1 12.37 2791.66 12.39 2798.22
12.61 2804.78 12.89 2811.34 13.25 2817.9 13.28 2824.46 13.12 2831.02 13.18
2837.58 13.09 2844.14 13.14 2850.7 12.86 2857.26 12.61 2863.82 12.6 2870.38
12.64 2876.94 12.66 2883.5 12.66 2890.06 12.75 2896.62 12.88 2903.18 12.94
2909.74 13.07 2922.86 13.37 2929.42 13.47 2935.98 13.49 2942.54 13.49 2949.1
13.55 2955.66 13.55 2962.22 13.67 2968.78 13.84 2975.34 13.8 2981.9 13.74
2988.46 13.66 2995.02 13.71 3008.14 13.85 3014.7 13.86 3021.26 13.69 3027.82
13.43 3034.38 13.48 3040.94 13.62 3047.49 13.59 3054.05 13.52 3060.61 13.52
3067.17 13.67 3073.73 13.76 3080.29 13.69 3086.85 13.57 3093.41 13.73
3099.97 13.92 3106.53 13.91 3113.09 13.96 3119.65 14.1 3126.21 14.43 3132.77
15 3139.33 15.31 3145.89 15.38 3152.45 15.24 3159.01 15.05 3165.57 14.8
3172.13 14.82 3178.69 14.81 3185.25 14.69 3191.81 14.72 3198.37 14.82
3204.93 14.9 3211.49 15.02 3218.05 15.02 3224.61 15.11 3231.17 15.23 3237.73
15.28 3244.29 15.87 3250.85 17.3 3257.41 18.75 3263.97 19.03 3270.53 19.18
3277.09 19.11 3283.65 18.93 3296.77 18.64 3303.33 18.56 3309.89 18.51
3316.45 17.86 3323.01 16.08 3329.57 14.86 3336.13 15.05 3342.69 15.55
3349.25 16.08 3355.81 17.1 3362.37 17.45 3368.93 17.43 3375.49 17.27 3382.05
17.18 3388.61 16.82 3395.17 16.54 3401.73 15.86 3408.29 14.84 3414.85 14.39
3421.41 14.74 3427.97 15.25 3441.09 16.21 3447.65 16.14 3454.21 16.27
3460.77 16.14 3467.33 15.82 3473.89 15.53 3480.45 17.16 3487.01 19.18
3493.57 19.9 3500.12 20.05 3506.68 20.17 3513.24 20.34 3519.8 20.48 3526.36
18.87 3532.92 17.71 3539.48 17.75 3546.04 17.64 3552.6 17.22 3559.16 16.72
3565.72 16.35 3572.28 16.38 3578.84 16.26

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .08 680.17 .04 1259.85 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 680.17
1259.85 106.5 128.05 139.73 .3 .5 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 673 10.2 T
 1545 3578.84 14.2 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 15968.76

INPUT
Description: 21.7 -US Face GorOwPkwy
Station Elevation Data num= 492
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 21.56 13.11 21.49 19.67
21.56 26.22 21.48 32.78 21.11 39.33 20.48 45.89 19.56 52.45 18.78 59 18.05
65.56 17.41 72.11 16.93 78.67 16.56 85.22 16.36 91.78 16.22 98.34 15.89

104.89 15.68 111.45 15.8 118 16.12 124.56 16.25 131.11 16.33 137.67 16.69
144.23 16.99 150.78 17.18 157.34 18.06 163.89 19.92 170.45 21.89 177 22.64
183.56 22.99 190.11 23 196.67 22.95 203.23 22.95 209.78 22.87 216.34 22.85
229.45 23.33 236 23.41 242.56 23.29 249.12 23.31 255.67 23.6 262.23 23.56
268.78 22.67 275.34 22.91 288.45 22.87 295.01 23.12 301.56 23.13 308.12
23.29 314.67 23.61 321.23 23.85 327.78 23.79 334.34 23.75 340.9 23.94
360.56 23.69 367.12 23.66 373.67 23.54 380.23 23.44 386.79 23.4 393.34 23.23
399.9 23.11 406.45 23.1 413.01 23.01 419.56 22.96 432.68 22.93 439.23 22.84
445.79 22.82 452.34 22.78 458.9 22.7 465.45 22.59 472.01 22.43 478.56 22.29
485.12 22.39 491.68 22.81 498.23 22.85 504.79 22.79 511.34 22.79 517.9 22.72
524.45 22.68 531.01 22.57 537.57 22.4 544.12 22.33 550.68 22.46 557.23 22.56
563.79 22.51 570.34 22.3 576.9 22.17 583.46 21.77 590.01 21.67 596.57 21.65
603.08 21.91 609.59 21.67 616.1 21.67 622.61 21.85 629.13 21.71 635.64 21.8
642.15 22.03 648.66 21.89 655.17 21.91 661.68 21.87 668.2 21.78 674.71 21.81
681.22 22.01 687.73 21.79 694.24 21.78 700.76 21.75 713.78 21.6 720.29 21.42
726.8 21.13 733.31 20.71 739.83 20.56 746.34 20.23 752.85 20.48 759.36 21.21
765.87 21.12 772.38 20.68 778.9 20.44 798.78 11.26 804.26 9.9 814.14 3.79
816.39 1.54 820.83 .07 830.49 -1.96 841.67 -5.82 857.23 -6.8 876.24 -8.13
882.69 -5.49 884.65 -6.24 885.77 -5.45 905.83 -3 925.98 -3.48 946.52 -1
954.71 1.12 961.23 4.3 967.74 6.96 974.25 9.6 980.76 12.13 987.3 14.18
993.84 15.37 1000.38 15.82 1006.91 15.76 1013.45 15.21 1019.99 14.53 1026.53
14.95 1033.06 15.07 1039.6 14.52 1046.14 14.65 1052.68 15.22 1059.22 14.98
1065.75 15 1072.29 15.36 1078.83 14.88 1085.37 14.66 1091.91 14.78 1098.44
14.31 1104.98 13.72 1111.52 13.35 1118.06 13.14 1124.6 12.91 1131.13 12.5
1137.67 12.11 1144.21 11.86 1150.75 11.59 1157.29 11.24 1170.36 11 1176.9
11.05 1183.44 11.04 1189.97 10.98 1196.51 10.88 1203.05 10.95 1209.59 11.14
1216.13 11.25 1222.66 11.01 1235.74 10.69 1242.28 10.85 1248.82 10.86
1255.35 10.85 1261.89 10.88 1268.43 10.72 1274.97 10.62 1288.04 10.33
1294.58 10.28 1307.66 10.23 1320.73 10.32 1327.27 10.61 1333.81 10.94
1340.35 11.16 1346.88 11.16 1353.42 11.11 1359.96 11.28 1373.04 11.37
1379.57 11.61 1386.11 11.96 1392.65 12.33 1399.19 12.49 1412.26 13.07 1418.8
13.12 1425.34 13.34 1431.88 13.65 1438.42 13.86 1444.95 14.22 1458.03 14.36
1464.57 14.5 1477.64 14.51 1484.18 14.54 1497.26 14.76 1503.79 14.72 1516.87
14.27 1523.41 14.22 1529.95 14.58 1536.48 14.72 1543.02 14.76 1549.56 14.93
1556.1 14.89 1569.17 15.4 1575.71 15.41 1588.79 15.33 1595.33 15.31 1601.86
15.38 1608.4 15.26 1614.94 15.03 1621.48 15.25 1628.02 14.99 1634.55 15.18
1641.09 15.21 1647.63 15.22 1660.7 15.28 1667.24 15.34 1673.78 15.44 1680.32
15.49 1693.39 15.68 1699.93 15.8 1706.47 15.76 1713.01 15.93 1719.55 16.06
1726.08 16.05 1732.62 15.99 1739.16 16.06 1745.7 16.18 1752.24 16.15 1758.77
16.02 1765.31 15.97 1771.85 15.97 1778.39 16.06 1784.92 16.09 1791.46 16.25
1798 17.04 1804.54 17.39 1811.08 17.31 1817.61 17.39 1824.15 17.6 1830.69
17.58 1837.23 17.49 1850.3 16.92 1856.84 17.12 1863.38 17.37 1869.92 17.33
1876.46 17.48 1882.99 17.54 1889.53 17.55 1896.07 17.61 1902.61 17.43
1909.15 17.48 1915.68 17.49 1928.76 17.29 1935.3 17.34 1941.83 17.37 1948.37
17.33 1954.91 17.23 1961.45 17.1 1974.52 17.21 1981.06 17.36 1987.6 17.69
1994.14 17.9 2000.68 18.03 2007.21 18.34 2013.75 18.62 2020.29 18.93 2026.83
19.22 2033.37 19.36 2039.9 19.34 2046.44 19.2 2052.98 19.14 2059.52 19.14
2066.05 18.92 2072.59 18.58 2079.13 18.57 2085.67 18.62 2092.21 18.53
2098.74 18.47 2111.82 18.41 2118.36 18.42 2124.9 18.34 2131.43 18.34 2137.97
18.51 2144.51 18.36 2151.05 18.13 2157.59 17.84 2164.12 17.7 2170.66 17.8
2177.2 17.73 2183.74 17.72 2190.27 17.76 2196.81 17.83 2203.35 17.82 2216.43
17.47 2222.96 17.45 2229.5 17.49 2236.04 17.46 2242.58 17.51 2249.12 17.54
2255.65 17.49 2262.19 17.53 2268.73 17.49 2275.27 17.54 2281.81 17.42
2288.34 17.05 2294.88 16.74 2301.42 16.67 2314.49 16.71 2321.03 16.75

2327.57 16.84 2334.11 16.9 2340.65 16.81 2353.72 16.86 2360.26 16.82 2373.34 16.5 2379.87 16.46 2386.41 16.49 2392.95 16.3 2399.49 15.99 2406.03 15.74 2412.56 15.56 2419.1 15.42 2432.18 15.36 2438.71 15.39 2445.25 15.52 2451.79 15.71 2458.33 15.76 2464.87 15.93 2471.4 15.93 2484.48 15.68 2497.56 15.64 2504.09 15.52 2510.63 15.22 2517.17 15.56 2523.71 15.44 2530.25 15.44 2536.78 15.52 2543.32 15.55 2549.86 15.56 2556.4 15.59 2562.93 15.73 2576.01 15.92 2582.55 15.87 2595.62 15.94 2602.16 15.72 2608.7 15.59 2615.24 15.91 2621.78 15.98 2634.85 16.18 2641.38 16.31 2647.91 16.38 2654.43 16.37 2660.96 16.1 2674.02 16.15 2680.55 16 2687.07 15.58 2693.6 15.25 2700.13 15.08 2713.18 14.71 2719.71 14.62 2726.24 14.64 2732.77 14.6 2745.82 14.37 2752.35 14.24 2758.88 14.02 2765.4 13.9 2771.93 14.13 2778.46 14.34 2784.99 14.31 2798.04 14.08 2804.57 14.07 2817.63 14.01 2824.15 14.07 2830.68 14.23 2837.21 14.42 2843.74 14.51 2850.26 14.65 2856.79 14.68 2863.32 14.78 2876.38 14.67 2882.9 14.72 2889.43 14.84 2895.96 14.84 2902.49 14.96 2909.01 14.8 2915.54 14.78 2922.07 14.62 2928.6 14.92 2935.12 14.78 2941.65 14.95 2948.18 14.73 2954.71 14.69 2961.23 14.88 2967.76 14.89 2974.29 15.31 2980.82 15.43 2987.34 15.49 2993.87 15.52 3000.4 15.73 3006.93 15.96 3013.46 16.34 3019.98 16.67 3026.51 16.82 3033.04 17.09 3039.57 17.39 3046.09 17.5 3052.62 17.57 3059.15 17.89 3065.68 18.11 3072.2 18.42 3085.26 18.89 3091.79 17.65 3098.32 17.17 3104.84 17.62 3117.9 18.04 3124.43 18.27 3130.95 18.67 3137.48 19.15 3144.01 19.57 3150.54 19.96 3157.06 20.04 3163.59 19.95 3170.12 20.03 3176.65 20.13 3183.17 20.17 3189.7 20.33 3196.23 20.47 3202.76 20.47 3209.29 20.43 3215.81 20.46 3222.34 20.51 3228.87 20.39 3235.4 20.12 3241.92 20.08 3248.45 20.13 3261.51 20.36 3268.03 20.37 3274.56 20.36 3281.09 20.51 3287.62 20.8 3294.15 21.01 3300.67 21.16 3307.2 21.07 3313.73 21.01 3320.26 21.1 3326.78 21.47 3333.31 21.55 3339.84 21.74 3346.37 21.71 3352.89 21.83 3359.42 22.15 3365.95 22.25 3372.48 21.89 3379 21.85 3385.53 21.95 3392.06 22.07 3398.59 22.45 3405.11 22.77 3411.64 22.73 3418.17 22.61 3424.7 22.66 3431.23 22.84 3437.75 23.11 3444.28 23.27 3457.34 23.3 3470.39 23.41 3476.92 23.59 3483.45 23.64 3489.97 23.91 3496.5 24.09 3509.56 24.09 3516.09 24.07 3522.61 24.19 3529.14 24.26 3535.67 24.24 3542.2 24.27 3548.72 24.16 3561.78 24.03 3568.31 23.92 3574.83 23.95 3581.36 24 3587.89 24.03 3594.42 24.02 3600.94 24.05
 Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 778.9 .04 1000.38 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 778.9 1000.38 71.69 72.2 74.47 .5 .8 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 1051.7 3600.94 15.1 T

BRIDGE

RIVER: Taunton River
REACH: Main Stem RS: 15933.16

INPUT
Description: 21.5 Hon Gordon Owen Pkwy
Distance from Upstream XS = 8
Deck/Roadway Width = 60
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates

num= 12
Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
0 23.89 272 23.89 587 21.32
785 20.92 15.19 885 20.33 14.44 957 19.45 13.69
1002 17.81 13.69 1100 13.31 1206 10.72 1326 10.81 1526 14.47 1691 15.47

Upstream Bridge Cross Section Data
Station Elevation Data num= 492
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 21.56 13.11 21.49 19.67
21.56 26.22 21.48 32.78 21.11 39.33 20.48 45.89 19.56 52.45 18.78 59 18.05
65.56 17.41 72.11 16.93 78.67 16.56 85.22 16.36 91.78 16.22 98.34 15.89
104.89 15.68 111.45 15.8 118 16.12 124.56 16.25 131.11 16.33 137.67 16.69
144.23 16.99 150.78 17.18 157.34 18.06 163.89 19.92 170.45 21.89 177 22.64
183.56 22.99 190.11 23 196.67 22.95 203.23 22.95 209.78 22.87 216.34 22.85
229.45 23.33 236 23.41 242.56 23.29 249.12 23.31 255.67 23.6 262.23 23.56
268.78 22.67 275.34 22.91 288.45 22.87 295.01 23.12 301.56 23.13 308.12
23.29 314.67 23.61 321.23 23.85 327.78 23.79 334.34 23.75 340.9 23.94
360.56 23.69 367.12 23.66 373.67 23.54 380.23 23.44 386.79 23.4 393.34 23.23
399.9 23.11 406.45 23.1 413.01 23.01 419.56 22.96 432.68 22.93 439.23 22.84
445.79 22.82 452.34 22.78 458.9 22.7 465.45 22.59 472.01 22.43 478.56 22.29
485.12 22.39 491.68 22.81 498.23 22.85 504.79 22.79 511.34 22.79 517.9 22.72
524.45 22.68 531.01 22.57 537.57 22.4 544.12 22.33 550.68 22.46 557.23 22.56
563.79 22.51 570.34 22.3 576.9 22.17 583.46 21.77 590.01 21.67 596.57 21.65
603.08 21.91 609.59 21.67 616.1 21.67 622.61 21.85 629.13 21.71 635.64 21.8
642.15 22.03 648.66 21.89 655.17 21.91 661.68 21.87 668.2 21.78 674.71 21.81
681.22 22.01 687.73 21.79 694.24 21.78 700.76 21.75 713.78 21.6 720.29 21.42
726.8 21.13 733.31 20.71 739.83 20.56 746.34 20.23 752.85 20.48 759.36 21.21
765.87 21.12 772.38 20.68 778.9 20.44 798.78 11.26 804.26 9.9 814.14 3.79
816.39 1.54 820.83 .07 830.49 -1.96 841.67 -5.82 857.23 -6.8 876.24 -8.13
882.69 -5.49 884.65 -6.24 885.77 -5.45 905.83 -3 925.98 -3.48 946.52 -1
954.71 1.12 961.23 4.3 967.74 6.96 974.25 9.6 980.76 12.13 987.3 14.18
993.84 15.37 1000.38 15.82 1006.91 15.76 1013.45 15.21 1019.99 14.53 1026.53
14.95 1033.06 15.07 1039.6 14.52 1046.14 14.65 1052.68 15.22 1059.22 14.98
1065.75 15 1072.29 15.36 1078.83 14.88 1085.37 14.66 1091.91 14.78 1098.44
14.31 1104.98 13.72 1111.52 13.35 1118.06 13.14 1124.6 12.91 1131.13 12.5
1137.67 12.11 1144.21 11.86 1150.75 11.59 1157.29 11.24 1170.36 11 1176.9
11.05 1183.44 11.04 1189.97 10.98 1196.51 10.88 1203.05 10.95 1209.59 11.14
1216.13 11.25 1222.66 11.01 1235.74 10.69 1242.28 10.85 1248.82 10.86
1255.35 10.85 1261.89 10.88 1268.43 10.72 1274.97 10.62 1288.04 10.33
1294.58 10.28 1307.66 10.23 1320.73 10.32 1327.27 10.61 1333.81 10.94
1340.35 11.16 1346.88 11.16 1353.42 11.11 1359.96 11.28 1373.04 11.37
1379.57 11.61 1386.11 11.96 1392.65 12.33 1399.19 12.49 1412.26 13.07 1418.8
13.12 1425.34 13.34 1431.88 13.65 1438.42 13.86 1444.95 14.22 1458.03 14.36
1464.57 14.5 1477.64 14.51 1484.18 14.54 1497.26 14.76 1503.79 14.72 1516.87
14.27 1523.41 14.22 1529.95 14.58 1536.48 14.72 1543.02 14.76 1549.56 14.93
1556.1 14.89 1569.17 15.4 1575.71 15.41 1588.79 15.33 1595.33 15.31 1601.86
15.38 1608.4 15.26 1614.94 15.03 1621.48 15.25 1628.02 14.99 1634.55 15.18
1641.09 15.21 1647.63 15.22 1660.7 15.28 1667.24 15.34 1673.78 15.44 1680.32
15.49 1693.39 15.68 1699.93 15.8 1706.47 15.76 1713.01 15.93 1719.55 16.06
1726.08 16.05 1732.62 15.99 1739.16 16.06 1745.7 16.18 1752.24 16.15 1758.77
16.02 1765.31 15.97 1771.85 15.97 1778.39 16.06 1784.92 16.09 1791.46 16.25
1798 17.04 1804.54 17.39 1811.08 17.31 1817.61 17.39 1824.15 17.6 1830.69
17.58 1837.23 17.49 1850.3 16.92 1856.84 17.12 1863.38 17.37 1869.92 17.33
1876.46 17.48 1882.99 17.54 1889.53 17.55 1896.07 17.61 1902.61 17.43

1909.15 17.48 1915.68 17.49 1928.76 17.29 1935.3 17.34 1941.83 17.37 1948.37
17.33 1954.91 17.23 1961.45 17.1 1974.52 17.21 1981.06 17.36 1987.6 17.69
1994.14 17.9 2000.68 18.03 2007.21 18.34 2013.75 18.62 2020.29 18.93 2026.83
19.22 2033.37 19.36 2039.9 19.34 2046.44 19.2 2052.98 19.14 2059.52 19.14
2066.05 18.92 2072.59 18.58 2079.13 18.57 2085.67 18.62 2092.21 18.53
2098.74 18.47 2111.82 18.41 2118.36 18.42 2124.9 18.34 2131.43 18.34 2137.97
18.51 2144.51 18.36 2151.05 18.13 2157.59 17.84 2164.12 17.7 2170.66 17.8
2177.2 17.73 2183.74 17.72 2190.27 17.76 2196.81 17.83 2203.35 17.82 2216.43
17.47 2222.96 17.45 2229.5 17.49 2236.04 17.46 2242.58 17.51 2249.12 17.54
2255.65 17.49 2262.19 17.53 2268.73 17.49 2275.27 17.54 2281.81 17.42
2288.34 17.05 2294.88 16.74 2301.42 16.67 2314.49 16.71 2321.03 16.75
2327.57 16.84 2334.11 16.9 2340.65 16.81 2353.72 16.86 2360.26 16.82 2373.34
16.5 2379.87 16.46 2386.41 16.49 2392.95 16.3 2399.49 15.99 2406.03 15.74
2412.56 15.56 2419.1 15.42 2432.18 15.36 2438.71 15.39 2445.25 15.52 2451.79
15.71 2458.33 15.76 2464.87 15.93 2471.4 15.93 2484.48 15.68 2497.56 15.64
2504.09 15.52 2510.63 15.22 2517.17 15.56 2523.71 15.44 2530.25 15.44
2536.78 15.52 2543.32 15.55 2549.86 15.56 2556.4 15.59 2562.93 15.73 2576.01
15.92 2582.55 15.87 2595.62 15.94 2602.16 15.72 2608.7 15.59 2615.24 15.91
2621.78 15.98 2634.85 16.18 2641.38 16.31 2647.91 16.38 2654.43 16.37
2660.96 16.1 2674.02 16.15 2680.55 16 2687.07 15.58 2693.6 15.25 2700.13
15.08 2713.18 14.71 2719.71 14.62 2726.24 14.64 2732.77 14.6 2745.82 14.37
2752.35 14.24 2758.88 14.02 2765.4 13.9 2771.93 14.13 2778.46 14.34 2784.99
14.31 2798.04 14.08 2804.57 14.07 2817.63 14.01 2824.15 14.07 2830.68 14.23
2837.21 14.42 2843.74 14.51 2850.26 14.65 2856.79 14.68 2863.32 14.78
2876.38 14.67 2882.9 14.72 2889.43 14.84 2895.96 14.84 2902.49 14.96 2909.01
14.8 2915.54 14.78 2922.07 14.62 2928.6 14.92 2935.12 14.78 2941.65 14.95
2948.18 14.73 2954.71 14.69 2961.23 14.88 2967.76 14.89 2974.29 15.31
2980.82 15.43 2987.34 15.49 2993.87 15.52 3000.4 15.73 3006.93 15.96 3013.46
16.34 3019.98 16.67 3026.51 16.82 3033.04 17.09 3039.57 17.39 3046.09 17.5
3052.62 17.57 3059.15 17.89 3065.68 18.11 3072.2 18.42 3085.26 18.89 3091.79
17.65 3098.32 17.17 3104.84 17.62 3117.9 18.04 3124.43 18.27 3130.95 18.67
3137.48 19.15 3144.01 19.57 3150.54 19.96 3157.06 20.04 3163.59 19.95
3170.12 20.03 3176.65 20.13 3183.17 20.17 3189.7 20.33 3196.23 20.47 3202.76
20.47 3209.29 20.43 3215.81 20.46 3222.34 20.51 3228.87 20.39 3235.4 20.12
3241.92 20.08 3248.45 20.13 3261.51 20.36 3268.03 20.37 3274.56 20.36
3281.09 20.51 3287.62 20.8 3294.15 21.01 3300.67 21.16 3307.2 21.07 3313.73
21.01 3320.26 21.1 3326.78 21.47 3333.31 21.55 3339.84 21.74 3346.37 21.71
3352.89 21.83 3359.42 22.15 3365.95 22.25 3372.48 21.89 3379 21.85 3385.53
21.95 3392.06 22.07 3398.59 22.45 3405.11 22.77 3411.64 22.73 3418.17 22.61
3424.7 22.66 3431.23 22.84 3437.75 23.11 3444.28 23.27 3457.34 23.3 3470.39
23.41 3476.92 23.59 3483.45 23.64 3489.97 23.91 3496.5 24.09 3509.56 24.09
3516.09 24.07 3522.61 24.19 3529.14 24.26 3535.67 24.24 3542.2 24.27 3548.72
24.16 3561.78 24.03 3568.31 23.92 3574.83 23.95 3581.36 24 3587.89 24.03
3594.42 24.02 3600.94 24.05

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 778.9 .04 1000.38 .085

Bank Sta: Left Right Coeff Contr. Expan.
 778.9 1000.38 .5 .8
Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 1051.7 3600.94 15.1 T

Downstream Deck/Roadway Coordinates
 num= 12
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 0 23.89 266 23.89 580 21.32 778 20.92 15.19 878 20.33 14.44 950 19.45
13.69
 995 17.81 1093 13.31 1199 10.72
 1319 10.81 1519 14.47 1685 15.47

Downstream Bridge Cross Section Data
Station Elevation Data num= 99
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 20.57 13.06 20.8 19.59 21.35
130.62 21.07 156.74 19.97 202.46 18.98 235.12 17.82 320.02 17.61 333.08
18.13 457.73 16.38 470.85 16.59 483.97 18.97 549.57 20.2 562.69 21.02 575.68
20.94 588.68 20.18 601.67 20.08 627.66 19.44 686.14 18.49 692.64 18.7
705.63 18.27 712.13 20.47 725.12 19.99 731.62 20.55 757.5 19.94 778.78 11.26
784.26 9.9 794.14 3.79 796.39 1.54 800.83 .07 810.49 -1.96 821.67 -5.82
837.23 -6.8 856.24 -8.13 862.69 -5.49 864.65 -6.24 865.77 -5.45 885.83 -3
905.98 -3.48 926.52 -1 942.82 3.67 949.21 6.85 955.6 10.12 961.99 13.22
968.38 15.67 974.77 16.93 994.09 17.04 1013.71 16.45 1020.25 15.75 1033.33
15.53 1052.95 13.99 1085.65 13.2 1151.04 10.66 1229.52 10.46 1281.84 9.84
1340.7 12.04 1360.32 13.38 1419.17 15.78 1451.87 15.08 1471.49 15.38 1582.67
17.85 1595.75 17.15 1602.29 16.43 1608.83 16.23 1634.99 17.62 1667.68 18.29
1713.46 17.83 1739.62 17.05 1837.72 18.89 1857.34 18.17 1883.5 15.91 1909.65
15.18 1961.97 15.77 2020.83 14.9 2027.37 14.49 2105.85 14.28 2118.93 18.69
2151.62 19.51 2210.48 17.93 2282.42 18.75 2354.35 18.05 2360.89 17.75
2380.51 18.25 2511.31 16.77 2524.39 17.45 2746.59 17.68 2955.65 18.3 2968.72
17.62 3001.38 18.57 3086.31 18.56 3177.78 21.49 3230.04 23.04 3262.71 23.29
3275.77 23.08 3314.97 24.11 3334.57 25.94 3393.37 26.76 3543.63 26.2 3576.3
25.95

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 757.5 .035 974.77 .085

Bank Sta: Left Right Coeff Contr. Expan.
 757.5 974.77 .5 .8
Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 994 3576.3 17 T

Upstream Embankment side slope = 0 horiz. to 1.0 vertical Downstream
Embankment side slope = 0 horiz. to 1.0 vertical Maximum allowable
submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Piers = 1

Pier Data
Pier Station Upstream= 871 Downstream= 883
Upstream num= 4 Width Elev Width Elev Width Elev Width Elev
 1.6 3.2 1.6 6 1.3 10 1.3 14.5

Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.6 3.2 1.6 6 1.3 10 1.3 14.5

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
 Energy
 W.S. Pro Method

 W.S.Pro Data
 Left Embankment
 El of the top of the embankment = 20.3
 El of the toe of the abutment = -1
 Right Embankment
 El of the top of the embankment = 17.8
 El of the toe of the abutment = -1
 Abutment Type = 2 Vert. abutments and sloping embankments Slope of abutments =
 Top with of embankment = 60
 Centroid station of bridge opening =
 Wing Wall Type = No wing walls present
 Width =   Angle =
 Radius =
 Guide Banks Type = No Guide Bank present
 Length =
 Offset =
 Angle =

Selected Low Flow Methods = W.S.Pro Method

High Flow Method
 Energy Only

Additional Bridge Parameters
 Add Friction component to Momentum
 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 15896.56

INPUT
Description: 21.3 - DS Face GorOwPkwy
Station Elevation Data num= 99
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 20.57 13.06 20.8 19.59 21.35 130.62 21.07 156.74 19.97 202.46 18.98 235.12 17.82 320.02 17.61 333.08 18.13 457.73 16.38 470.85 16.59 483.97 18.97 549.57 20.2 562.69 21.02 575.68 20.94 588.68 20.18 601.67 20.08 627.66 19.44 686.14 18.49 692.64 18.7

705.63 18.27 712.13 20.47 725.12 19.99 731.62 20.55 757.5 19.94 778.78 11.26
784.26 9.9 794.14 3.79 796.39 1.54 800.83 .07 810.49 -1.96 821.67 -5.82
837.23 -6.8 856.24 -8.13 862.69 -5.49 864.65 -6.24 865.77 -5.45 885.83 -3
905.98 -3.48 926.52 -1 942.82 3.67 949.21 6.85 955.6 10.12 961.99 13.22
968.38 15.67 974.77 16.93 994.09 17.04 1013.71 16.45 1020.25 15.75 1033.33
15.53 1052.95 13.99 1085.65 13.2 1151.04 10.66 1229.52 10.46 1281.84 9.84
1340.7 12.04 1360.32 13.38 1419.17 15.78 1451.87 15.08 1471.49 15.38 1582.67
17.85 1595.75 17.15 1602.29 16.43 1608.83 16.23 1634.99 17.62 1667.68 18.29
1713.46 17.83 1739.62 17.05 1837.72 18.89 1857.34 18.17 1883.5 15.91 1909.65
15.18 1961.97 15.77 2020.83 14.9 2027.37 14.49 2105.85 14.28 2118.93 18.69
2151.62 19.51 2210.48 17.93 2282.42 18.75 2354.35 18.05 2360.89 17.75
2380.51 18.25 2511.31 16.77 2524.39 17.45 2746.59 17.68 2955.65 18.3 2968.72
17.62 3001.38 18.57 3086.31 18.56 3177.78 21.49 3230.04 23.04 3262.71 23.29
3275.77 23.08 3314.97 24.11 3334.57 25.94 3393.37 26.76 3543.63 26.2 3576.3
25.95

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 757.5 .035 974.77 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 757.5
974.77 162.26 134.72 118.38 .5 .8 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent 994 3576.3 17 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 15761.84

INPUT
Description: 21 Exit GorOwPkwy
Station Elevation Data num= 353
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 21.7 6.55 21.29 13.1 21.04
19.65 20.82 26.2 20.62 39.3 20.27 45.85 20.26 52.4 20.36 58.94 20.43 65.49
20.57 78.59 21.05 85.14 21.07 91.69 21.03 98.24 21.09 111.34 21.17 137.54
21.27 203.03 21.3 209.58 21.29 222.68 21.32 229.23 21.28 235.78 21.14 248.88
20.75 255.43 20.59 261.97 20.45 268.52 20.08 275.07 19.64 281.62 19.35
288.17 19.13 294.72 19.06 301.27 19.03 307.82 18.79 314.37 18.6 320.92 18.45
434.54 15.43 668.24 11.27 896.01 8.54 901.01 1.61 935.32 -1.49 952.06 -6.57
978.62 -5.64 994.78 -4.62 1012.02 -5.53 1025.12 -6.83 1047.31 .44 1063.44
1.98 1070.61 6.65 1105.64 6.75 1138.68 5.62 1184.64 4.61 1250.1 9.14
1257.37 10.37 1339.24 9.74 1449.3 15.16 1455.86 15.44 1462.42 16.1 1468.98
16.25 1482.1 16.32 1495.23 16.21 1501.79 16.04 1508.35 15.97 1514.91 15.84
1521.47 15.83 1528.03 16.03 1534.59 16.01 1541.15 15.84 1547.71 15.58
1554.27 15.45 1560.83 15.67 1567.4 15.99 1573.96 16.13 1580.52 16.21 1587.08
16.37 1593.64 16.7 1600.2 17.01 1606.76 17.22 1613.32 17.51 1619.88 17.74
1626.44 17.53 1633.01 17.58 1639.57 17.35 1652.69 16.92 1659.25 16.58
1665.81 16.16 1672.37 15.82 1678.93 15.73 1685.49 15.72 1698.61 15.76
1705.18 15.7 1711.74 15.88 1718.3 15.75 1724.86 15.75 1737.98 15.5 1744.54
15.5 1751.1 15.65 1757.66 15.54 1764.22 15.45 1770.79 15.88 1777.35 15.65
1783.91 15.34 1790.47 15 1797.03 14.68 1803.59 14.81 1810.15 14.75 1816.71
14.66 1823.27 14.72 1829.83 14.82 1836.39 14.84 1849.52 15.01 1862.64 15
1869.2 15.11 1875.76 15.3 1882.32 15.37 1888.88 15.5 1895.44 15.61 1902 15.5

1915.13 14.97 1921.69 14.84 1928.25 14.77 1934.81 14.58 1941.37 14.31
1947.93 14.22 1954.49 14.04 1961.05 14.1 1967.61 13.76 1974.17 13.23 1980.74
12.87 1987.3 12.89 1993.86 12.98 2000.42 13.19 2006.98 13.38 2013.54 13.59
2020.1 14 2026.66 14.01 2033.22 13.75 2039.78 13.52 2046.35 13.45 2052.91
13.23 2059.47 13.08 2066.03 13.27 2072.59 13.32 2079.15 13.11 2085.71 13.25
2092.27 13.37 2098.83 13.31 2105.39 13.01 2111.95 12.89 2118.51 12.96
2131.64 13.01 2138.2 13.15 2144.76 13.22 2151.32 13.18 2157.88 13.16 2164.44
13.12 2171 13.12 2177.56 13.01 2184.12 12.94 2190.68 12.97 2197.25 13.06
2203.81 13.07 2210.37 13.1 2216.93 13.17 2230.05 12.94 2236.61 13.01 2243.17
13.11 2249.73 13.24 2256.29 13.5 2262.85 13.66 2269.41 13.69 2282.54 13.87
2289.1 13.59 2295.66 13.48 2302.22 13.66 2308.78 13.9 2315.34 14.12 2321.9
14.36 2328.46 14.65 2335.02 14.97 2341.58 14.97 2348.14 15.38 2354.71 15.36
2361.27 15.67 2367.83 15.85 2374.39 15.99 2380.95 16.16 2387.51 16.1 2394.07
16.21 2400.63 16.4 2407.19 16.57 2413.75 16.92 2420.31 17.24 2426.88 17.48
2433.44 17.64 2440 17.4 2446.56 17.07 2453.12 16.84 2459.68 16.72 2466.24
16.69 2472.8 16.76 2479.36 16.77 2485.92 16.81 2492.48 16.79 2499.04 16.93
2505.61 16.94 2512.17 16.92 2518.73 16.76 2531.85 16.68 2538.41 16.71
2544.97 16.77 2551.53 16.66 2558.09 16.39 2564.65 16.23 2577.77 16.29
2584.34 16.17 2597.46 16.12 2617.14 16.11 2630.26 16.06 2649.94 16.06
2656.51 16.08 2663.07 15.98 2669.63 15.96 2682.75 15.85 2702.43 16 2708.99
15.97 2715.55 15.82 2722.08 15.69 2728.6 15.69 2735.13 15.64 2741.65 15.61
2748.18 15.65 2754.7 15.85 2761.23 16 2767.75 16.06 2774.28 16.18 2780.8
16.44 2787.33 16.73 2793.85 16.85 2800.38 16.74 2806.9 16.71 2813.43 16.98
2819.95 17.03 2826.48 17.12 2833 17.26 2839.53 17.42 2846.05 17.13 2852.58
17.1 2859.1 17.17 2865.63 17.07 2872.15 17.05 2878.68 16.94 2885.2 16.91
2891.73 16.73 2898.25 16.8 2904.78 16.7 2911.3 16.84 2917.83 16.85 2924.35
16.93 2930.88 16.98 2937.4 17.12 2943.93 17.14 2950.45 17.2 2956.98 17.36
2963.5 17.03 2970.03 17.42 2976.55 17.09 2983.08 16.56 2996.13 15.25 3002.65
15.08 3009.18 15.08 3015.7 14.93 3028.75 14.67 3041.8 14.49 3048.33 14.48
3054.85 14.55 3061.38 14.47 3067.91 14.44 3074.43 14.58 3080.95 14.68
3087.48 14.58 3094 14.58 3100.53 14.71 3107.06 14.89 3113.58 15.15 3120.11
15.71 3126.63 17.13 3133.16 18.34 3139.68 19.11 3146.21 20.28 3152.73 21.64
3159.26 22.84 3165.78 23.44 3172.31 23.63 3178.83 23.77 3185.36 23.84
3191.88 23.86 3204.93 23.73 3211.46 23.69 3217.98 23.71 3224.51 23.83
3231.03 23.92 3237.56 23.92 3244.08 24.08 3250.61 24.34 3257.13 24.2 3263.66
23.95 3270.18 23.93 3276.71 24.05 3283.23 24.26 3289.76 24.45 3296.28 24.53
3302.81 24.51 3309.33 24.62 3315.86 24.85 3328.91 24.97 3335.43 25 3341.96
25.11 3348.48 24.93 3355.01 25.18 3361.53 25.24 3368.06 24.95 3374.58 25.22
3381.11 25.17 3387.63 25.14 3394.16 25.24 3400.68 25.25 3407.21 25.45
3413.73 25.61 3420.26 26.09 3426.78 26.29 3433.31 26.45 3439.83 26.57
3446.36 26.72 3452.88 26.84 3459.41 27.17 3465.93 27.36 3472.46 27.46
3485.51 27.75 3492.03 27.88 3498.56 27.98 3511.61 28.26 3518.13 28.31
3524.66 28.31 3531.18 28.44 3537.71 28.53 3544.23 28.45 3550.76 28.48
3557.28 28.44 3563.81 28.48 3576.86 28.63 3583.38 28.64 3589.91 28.55
3596.43 28.63 3602.96 28.67 3609.48 28.64

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .085 896.01 .035 1070.61 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 896.01
1070.61 770.87 758.69 764.06 .3 .5 Ineffective Flow num= 1
Sta L Sta R Elev Permanent
1650 3609.48 17.2 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 15003.16

INPUT
Description: 20
Station Elevation Data num= 476
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 23.41 6.54 23.49 19.61 22.9
58.84 22.9 65.37 22.82 84.99 23.17 91.52 23.47 98.06 23.51 104.6 23.73
117.67 24.73 150.36 25.29 156.9 25.61 196.12 25.55 215.73 24.96 235.34 24.86
241.88 24.72 261.49 23.26 274.57 22.07 287.64 20.44 294.18 20.34 307.26
19.21 313.79 18.78 320.33 18.09 333.41 17.24 346.48 16.78 353.02 16.81
372.63 15.99 379.17 15.81 411.85 14.19 418.39 14.02 431.47 14.85 444.54
14.18 457.62 13.79 483.76 11.76 490.3 11.37 496.84 11.14 503.38 10.72 509.91
10.15 529.53 8.76 549.14 8.4 555.68 8.19 568.75 8.13 575.29 7.96 581.82 7.57
588.36 7.49 594.9 8.04 601.44 8.07 607.97 7.91 634.12 7.83 647.2 7.94
660.27 7.77 679.89 7.98 686.42 7.89 692.96 8.22 699.5 8.28 712.57 8.06
725.65 8.13 738.72 7.91 751.8 7.35 758.33 7.3 771.41 7.73 791.02 8.18 830.24
8.93 843.32 9.45 882.54 10.77 895.62 10.72 902.16 10.82 921.77 10.49 928.3
10.17 934.84 10.07 947.92 9.49 954.45 9.38 960.99 9.62 980.6 10.68 993.68
11.06 1000.22 11.41 1006.75 11.53 1013.29 11.29 1019.83 10.87 1032.9 10.48
1052.51 8.96 1059.05 8.03 1065.59 6.61 1072.13 4.49 1072.97 4.17 1078.58
2.03 1090 -.84 1095.6 -1.12 1096.58 -1.29 1097.84 -1.6 1099.12 -2 1100.8 -
2.55 1102.25 -3.36 1104.34 -4.26 1107.39 -5.33 1112.74 -6.71 1115.3 -7.26
1117.28 -7.56 1119.52 -7.94 1124.46 -8 1126.95 -7.93 1129.61 -7.68 1134.73 -
7.45 1137.33 -7.21 1139.88 -7.04 1142.39 -6.9 1144.89 -6.73 1147.38 -6.6
1149.94 -6.57 1152.32 -6.57 1154.6 -6.46 1156.68 -6.46 1158.89 -6.51 1161.01
-6.47 1163.2 -6.42 1165.31 -6.36 1167.39 -6.31 1169.21 -6.15 1171.06 -6.06
1172.65 -6.09 1174.2 -5.98 1175.63 -5.93 1177.43 -5.84 1179.18 -5.73 1181.2
-5.53 1183.23 -5.22 1185.47 -4.84 1187.51 -4.24 1189.45 -3.68 1191.07 -3.08
1192.79 -2.35 1194.34 -1.81 1195.32 -1.07 1201.7 1.96 1208.26 4.89 1214.82
5.38 1221.38 5.16 1227.95 5.14 1234.51 5.38 1241.07 5.31 1247.63 5.44
1254.19 5.3 1260.75 5.1 1267.32 4.78 1273.88 4.99 1280.44 4.82 1287 4.53
1293.56 4.5 1300.12 4.4 1306.69 4.45 1313.25 4.43 1319.81 4.31 1326.37 4.69
1332.93 4.38 1339.49 4.27 1346.06 4.44 1352.62 4.98 1359.18 5.23 1365.74
5.24 1372.3 6.35 1378.86 8.69 1385.43 10.59 1391.99 11.92 1398.55 12.39
1405.11 11.35 1411.67 11.1 1418.23 10.98 1424.79 10.9 1437.92 10.68 1444.48
10.99 1451.04 11.25 1457.6 11.44 1464.16 11.42 1470.73 11.24 1477.29 11.18
1490.41 11.3 1496.97 11.4 1510.1 11.99 1516.66 12.23 1523.22 12.45 1536.34
13.04 1542.9 13.41 1549.47 13.76 1556.03 14.06 1562.59 14.41 1569.15 14.67
1575.71 14.84 1582.27 15.22 1588.84 15.79 1595.4 16 1608.52 16.51 1615.08
16.65 1621.64 16.83 1634.77 16.98 1641.33 17.17 1647.89 17.3 1654.45 17.03
1661.01 17.01 1667.57 16.89 1674.14 16.79 1687.26 16.77 1713.51 16.74
1726.63 16.77 1733.19 16.55 1739.75 16.01 1746.31 15.31 1759.44 14.14 1766
14.11 1772.56 13.92 1779.12 13.66 1785.68 13.44 1792.25 13.53 1798.81 13.45
1805.37 13.52 1811.93 13.5 1818.49 13.61 1825.05 13.84 1831.62 13.96 1838.18
14.02 1844.74 13.84 1851.3 13.82 1857.86 13.82 1864.42 13.53 1870.99 13.54
1877.55 13.3 1890.67 12.95 1897.23 13.02 1903.79 13 1910.35 13.02 1916.92
13.01 1923.48 12.93 1930.04 12.81 1936.6 12.75 1943.16 12.82 1949.72 12.85
1956.29 12.76 1962.85 12.59 1969.41 12.49 1975.97 12.58 1982.53 12.38
1989.09 12.11 2002.22 11.92 2008.78 11.92 2021.9 11.88 2028.46 11.95 2035.03
11.89 2041.59 11.87 2067.83 11.7 2074.4 11.69 2087.52 11.73 2094.08 11.78

2100.64 11.79 2107.2 11.82 2113.77 11.93 2120.33 12.07 2126.89 12.29 2133.45
12.48 2140.01 13.15 2146.57 13.77 2153.14 13.86 2159.7 13.91 2166.26 14.11
2172.82 14.28 2179.38 14.36 2185.94 14.46 2199.07 14.59 2205.63 14.58
2212.19 14.55 2218.75 14.61 2225.31 14.37 2231.87 14.27 2238.44 13.97 2245
13.59 2251.56 13.55 2258.12 13.19 2264.68 13.13 2277.81 13.47 2284.37 13.48
2290.93 13.83 2297.49 13.78 2304.05 14.09 2310.61 14.23 2317.18 14.43
2323.74 14.5 2336.86 14.15 2343.42 14.1 2349.98 14.11 2356.55 14.44 2363.11
14.54 2369.67 14.77 2376.23 14.94 2382.79 14.92 2395.92 15.04 2402.48 14.8
2409.04 14.75 2415.6 14.76 2422.16 14.75 2428.72 14.51 2435.29 14.42 2441.85
14.55 2448.41 14.53 2454.97 14.57 2461.53 14.48 2468.09 14.2 2474.66 14.31
2481.22 14.27 2487.78 14.31 2494.34 14.44 2500.9 14.55 2507.46 14.99 2514.02
16.2 2520.59 16.3 2527.15 15.92 2533.71 15.91 2540.27 16.4 2546.83 16.7
2553.39 16.12 2559.96 15.78 2566.52 15.81 2579.64 16.02 2586.2 16 2599.33
15.88 2605.89 15.93 2612.45 16.18 2619.01 16.3 2625.57 16.26 2632.13 16.14
2638.7 16.24 2645.26 16.4 2651.82 16.38 2658.38 16.42 2664.94 16.56 2671.5
16.58 2678.07 16.71 2684.63 16.66 2691.19 16.58 2704.31 16.5 2710.87 16.6
2717.44 16.43 2724 16.43 2730.56 16.46 2737.12 16.45 2743.68 16.46 2750.24
16.56 2756.8 16.56 2763.37 16.35 2769.93 16.37 2783.05 16.32 2789.61 16.25
2796.17 16.25 2802.74 16.37 2809.3 16.29 2815.86 16.23 2822.42 16.34 2828.98
16.3 2835.54 16.23 2842.11 16.23 2848.67 16.19 2861.79 16 2874.91 15.92
2881.48 15.85 2888.04 15.7 2894.6 15.64 2901.16 15.73 2914.28 15.79 2920.85
15.71 2927.41 15.8 2933.97 15.82 2940.53 15.72 2947.09 15.69 2953.65 15.72
2960.22 16.01 2966.78 16.24 2973.34 16.23 2979.9 16.08 2986.46 16.57 2993.02
17.39 2999.59 19.14 3006.15 22.24 3012.71 22.37 3019.27 19.67 3025.83 16.93
3032.39 15.5 3038.95 15.2 3045.52 15.31 3052.08 14.78 3058.64 14.08 3065.2
14.07 3071.76 14.2 3078.32 14.19 3084.89 14.14 3091.45 14.29 3098.01 14.24
3117.69 14.41 3124.26 14.5 3137.38 14.3 3143.94 14.28 3150.5 14.19 3157.06
14.29 3163.63 14.36 3170.19 14.4 3183.31 14.44 3196.43 14.47 3203 14.5
3209.56 14.68 3216.12 14.68 3222.68 14.58 3229.24 14.67 3235.8 14.58 3242.31
14.58 3248.82 14.64 3255.33 14.62 3261.84 14.58 3268.35 14.58 3274.86 14.67
3281.37 14.88 3287.88 15.35 3294.39 16.34 3307.41 21.71 3313.92 23.47
3320.43 24.21 3326.94 24.27 3333.45 23.91 3339.96 23.58 3346.47 23.38
3352.98 23.26 3359.49 23.08 3366 22.84 3372.51 22.97 3379.02 23.08 3385.53
23.01 3392.04 23.01 3398.55 23.15 3405.06 23.41 3411.57 23.71 3418.08 23.99
3424.59 24.24 3431.1 24.41 3437.61 24.48 3444.12 24.62 3457.14 24.87 3463.65
24.91 3470.16 24.73 3476.67 24.67 3483.18 25.05 3489.69 25.26 3496.2 25.07
3502.71 25.01 3509.22 24.98 3515.73 25.02 3522.24 24.99 3528.75 24.83
3535.26 24.88 3541.77 25.07 3548.28 25.21 3554.79 25.33 3561.3 25.32 3567.81
25.41 3574.32 25.89 3580.83 26.08 3587.34 26.17 3593.85 26.08 3600.36 26.11
3613.38 26.29 3619.89 26.42 3626.4 26.33 3632.91 26.26 3639.42 26.24 3645.93
26.19 3652.44 26.18 3658.95 26.25 3698.01 27.08 3711.03 27.34 3717.54 27.45
3724.05 27.52 3730.56 27.55

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 1006.75 .035 1398.55 .085
 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1006.75 1398.55 749.32 742.03 737.61 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 3012 3730.56 22 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 14261.13

INPUT
Description: 19 Approach RR Br
Station Elevation Data num= 121
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 23.58 32.8 23.06 78.72 24.08 124.64 26.95 150.88 26.91 190.24 27.31 255.84 24.57 275.53 23.4 282.09 22.71 295.21 19.36 308.33 18.48 406.73 13.18 432.97 12.63 472.33 9.51 505.13 7.75 524.81 7.59 557.61 8.43 583.85 7.65 675.69 7.74 741.29 9.01 787.22 11.02 806.9 10.86 859.38 8.88 970.9 8.91 997.14 10.24 1010.26 10 1016.82 10.21 1023.38 9.95 1036.5 6.77 1043.06 5.54 1056.18 4.2 1069.3 3.86 1134.9 4.57 1161.14 4.78 1213.62 5.62 1272.67 3.65 1305.47 3.34 1449.73 4.74 1482.24 6.71 1527.76 6.47 1537.58 6.98 1606.13 5.76 1652.08 5.3 1654.17 2.05 1667.89 -.84 1699.29 -7.38 1713.7 -10.22 1736.02 -11.33 1750.35 -11.98 1762.16 .14 1768.2 3.68 1794.82 14.93 1845.18 14.52 1858.28 14.93 1877.92 14.25 1891.02 14.55 1982.72 12.14 2008.92 12.47 2041.67 13.26 2048.22 12.78 2061.32 13.04 2080.97 12.51 2120.26 12.86 2126.81 12.54 2316.75 14.51 2369.15 13.51 2395.35 14.72 2401.9 14.2 2415 12.47 2434.64 12.35 2487.04 13.27 2526.34 15 2644.23 15.74 2683.53 14.76 2781.77 15.35 2834.17 16.57 2906.22 17.54 2932.42 16.9 2965.16 17.02 3011.01 15.96 3017.56 16.32 3024.11 16.11 3037.21 16.47 3050.31 15.85 3069.96 16.01 3207.5 14.89 3227.15 15.36 3233.7 15.24 3240.25 15.57 3266.45 15.07 3273 16.08 3279.55 14.98 3325.39 14.49 3358.14 15.24 3377.79 14.84 3403.99 16.47 3410.54 16.27 3449.84 17.84 3456.39 17.57 3462.94 18.04 3469.48 17.35 3476.03 17.56 3482.58 16.88 3508.78 16.62 3515.33 15.75 3521.88 15.9 3528.43 16.58 3534.98 16.83 3548.08 16.55 3561.18 16.76 3574.28 17.55 3593.93 17.28 3613.58 18.36 3620.13 19.45 3626.68 19.93 3659.42 19.87 3672.52 20.6 3724.92 21.2 3836.26 23.02 3862.46 23.83 3908.31 23.98

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .085 1652.08 .035 1794.82 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1652.08 1794.82 78.25 69.35 66.1 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 14191.78

INPUT
Description: 18.7 - US Face RR Br
Station Elevation Data num= 110 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 31.38 78.42 28.3 111.09 28.3 137.23 27.94 156.84 28.1 241.79 23.74 261.39 21.19 326.74 18.25 365.95 16.29 372.49 16.2 392.09 15.04 411.7 12.76 483.58 8.24 503.18 8.21 529.32 6.42 542.39 7.13 620.81 6.63 712.3 8.63 744.97 10.16 784.18 10.79 823.39 8.96 927.95 9.1 947.55 9.39 954.09 9.1 973.69 8.93 993.3 10.26 1006.37 10.2 1032.51 8.48 1058.65 4.84 1078.25 3.57 1189.34 4.45 1208.95 5.78 1228.55 5.55 1241.62 4.38 1261.23 3.82 1293.9 3.89 1333.11 3.68 1418.06 3.36 1450.74 4.47 1463.81 5.47 1483.41 5.2 1489.95 4.65 1496.48 5.34 1503.02 7.47 1509.55 10.58 1529.23 11.42 1535.79 10.64 1542.35 9.29 1575.15

7.11 1607.95 11.4 1621.07 10.42 1627.63 11.13 1634.19 11.13 1647.31 9.71
1653.87 10.74 1660.43 10.52 1666.99 10.91 1680.11 10.77 1693.23 11.81
1719.47 11.65 1740 13.96 1753.45 13.89 1753.69 13.75 1754.08 2.65 1759.81
.53 1763.3 -1.58 1769.05 -3.33 1772.95 -5.41 1779.66 -6.96 1783.33 -7.36
1790.85 -6.94 1794.65 -5.3 1799.89 -5.32 1803.29 -5.31 1809.58 -4.97 1813.69
-2.69 1821.52 -7.23 1825.23 -9.32 1829.72 -10.03 1841.06 -11.09 1846.96 -9.3
1850.3 -7.08 1857.36 -4.21 1861.19 -2.77 1870.09 .46 1870.37 13.32 1870.58
13.39 1890.45 12.9 1896.64 14.94 1994.78 15.57 2053.67 15.02 2197.61 14.35
2230.33 14.39 2269.59 13.93 2295.76 14.82 2335.02 14.77 2374.27 15.62
2400.45 15.36 2406.99 14.81 2433.16 14.51 2583.65 14.94 2590.19 14.73
2629.45 15.31 2806.11 16.08 2812.65 15.82 3022.02 17.35 3192.14 18.46
3859.52 22.79 3872.61 22.4 4049.26 24.1

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val 0 .085 1753.45 .035 1896.64 .082

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1753.45
1896.64 44.24 43.72 44.72 .6 .8 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 1500 1753 13.89 T

BRIDGE

RIVER: Taunton River
REACH: Main Stem RS: 14174.03

INPUT
Description: 18.5 RR
Distance from Upstream XS = 5
Deck/Roadway Width = 20
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
 num= 18
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 1289 13.55 1507 14.6 1744 15.04
 1753 16.76 12.55 1759 16.76 12.55 1762 16.76 12.53
 1812 16.76 12.62 1821 16.76 12.7 1821.5 16.76 10.88
 1825 16.76 10.88 1850 16.86 10.87 1850.1 16.86 12.65 1856 16.86 12.67 1867
16.86 12.69 1870 14.93
 1954 14.56 2085 15.16 2271 15.21

Upstream Bridge Cross Section Data
Station Elevation Data num= 110
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 31.38 78.42 28.3 111.09 28.3
137.23 27.94 156.84 28.1 241.79 23.74 261.39 21.19 326.74 18.25 365.95 16.29
372.49 16.2 392.09 15.04 411.7 12.76 483.58 8.24 503.18 8.21 529.32 6.42
542.39 7.13 620.81 6.63 712.3 8.63 744.97 10.16 784.18 10.79 823.39 8.96
927.95 9.1 947.55 9.39 954.09 9.1 973.69 8.93 993.3 10.26 1006.37 10.2
1032.51 8.48 1058.65 4.84 1078.25 3.57 1189.34 4.45 1208.95 5.78 1228.55
5.55 1241.62 4.38 1261.23 3.82 1293.9 3.89 1333.11 3.68 1418.06 3.36 1450.74
4.47 1463.81 5.47 1483.41 5.2 1489.95 4.65 1496.48 5.34 1503.02 7.47 1509.55
10.58 1529.23 11.42 1535.79 10.64 1542.35 9.29 1575.15 7.11 1607.95 11.4
1621.07 10.42 1627.63 11.13 1634.19 11.13 1647.31 9.71 1653.87 10.74 1660.43

10.52 1666.99 10.91 1680.11 10.77 1693.23 11.81 1719.47 11.65 1740 13.96
1753.45 13.89 1753.69 13.75 1754.08 2.65 1759.81 .53 1763.3 -1.58 1769.05 -
3.33 1772.95 -5.41 1779.66 -6.96 1783.33 -7.36 1790.85 -6.94 1794.65 -5.3
1799.89 -5.32 1803.29 -5.31 1809.58 -4.97 1813.69 -2.69 1821.52 -7.23
1825.23 -9.32 1829.72 -10.03 1841.06 -11.09 1846.96 -9.3 1850.3 -7.08
1857.36 -4.21 1861.19 -2.77 1870.09 .46 1870.37 13.32 1870.58 13.39 1890.45
12.9 1896.64 14.94 1994.78 15.57 2053.67 15.02 2197.61 14.35 2230.33 14.39
2269.59 13.93 2295.76 14.82 2335.02 14.77 2374.27 15.62 2400.45 15.36
2406.99 14.81 2433.16 14.51 2583.65 14.94 2590.19 14.73 2629.45 15.31
2806.11 16.08 2812.65 15.82 3022.02 17.35 3192.14 18.46 3859.52 22.79
3872.61 22.4 4049.26 24.1

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 1753.45 .035 1896.64 .082

Bank Sta: Left Right Coeff Contr. Expan.
 1753.45 1896.64 .6 .8
Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 1500 1753 13.89 T

Downstream Deck/Roadway Coordinates
 num= 18
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 1374 13.55 1592 14.6 1829 15.04
 1838 16.76 12.55 1844 16.76 12.55 1847 16.76 12.53
 1897 16.76 12.62 1906 16.76 12.7 1906.1 16.76 10.88
 1910 16.76 10.88 1935 16.86 10.87 1935.1 16.86 12.65
 1941 16.86 12.67 1952 16.86 12.69 1955 14.93   2039 14.56 2170 15.16 2356
15.21

Downstream Bridge Cross Section Data
Station Elevation Data num= 493
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 32.67 19.62 32.01 26.16
31.57 39.25 31.04 52.33 30.21 65.41 28.88 71.95 28.4 85.03 27.93 104.66
26.38 124.28 26.33 130.82 26.16 137.36 25.76 150.44 25.84 163.52 26.11
176.61 25.96 189.69 25.37 196.23 24.96 222.39 22.77 228.93 22.33 235.48
21.63 242.02 20.69 248.56 19.93 268.18 19.8 300.89 18.46 327.05 17.87
359.75 16.57 372.84 16.4 392.46 14.85 418.62 12.36 438.25 11.11 444.79 10.97
451.33 10.62 464.41 9.55 484.03 8.37 490.57 8.18 497.12 7.85 503.66 7.69
510.2 7.73 529.82 7.43 542.9 6.03 549.44 6.25 555.98 6.7 562.53 6.94 569.07
6.56 575.61 6.49 595.23 6.77 608.31 6.5 614.85 6.77 634.48 7.23 647.56 7.71
660.64 7.78 673.72 8.06 693.35 8.63 699.89 8.99 712.97 9.33 739.13 10.51
758.76 10.7 765.3 10.57 798 10.45 817.63 8.98 837.25 8.56 843.79 8.51 850.33
8.6 869.95 8.36 896.12 8.71 915.74 8.72 922.28 8.94 928.82 8.92 948.45 9.43
961.53 9.52 974.61 9.37 981.15 9 987.69 9.16 994.23 9.74 1000.77 10.04
1007.31 9.94 1013.86 10.3 1026.94 10.68 1033.48 10.51 1040.02 10.15 1046.56
9.61 1059.64 7.01 1072.72 4.54 1079.27 4.06 1085.81 3.78 1098.89 3.55
1125.05 3.92 1131.59 3.8 1144.67 3.88 1151.22 4.06 1157.76 3.9 1170.84 4.04
1183.92 3.76 1190.46 3.9 1197 4.37 1203.54 5.1 1216.63 6.19 1223.17 6.43
1229.71 6.4 1236.25 5.7 1242.79 4.8 1249.33 4.54 1255.87 4.54 1288.58 3.4
1301.66 3.67 1314.74 3.55 1321.28 3.34 1334.36 3.32 1340.9 3.17 1353.99 3.69
1360.53 3.41 1373.61 3.72 1393.23 3.65 1399.77 3.42 1406.31 3.34 1412.85

3.44 1425.94 4.04 1445.56 4.2 1452.1 4.88 1458.64 7.69 1465.18 10.82 1471.72
12.95 1484.81 13.44 1491.35 13.47 1497.89 13.29 1504.43 12.05 1510.97 9.44
1517.51 5.42 1524.05 4.35 1537.11 4.73 1550.14 4.64 1556.66 4.39 1563.17
5.46 1569.69 4.87 1576.21 4.69 1582.72 5.08 1589.24 4.91 1595.76 4.58
1608.79 4.94 1615.31 4.58 1628.34 4.87 1634.86 5.51 1654.41 6.38 1660.92
5.67 1667.44 5.49 1680.47 6.17 1686.99 6.67 1700.02 7.24 1706.54 7.05
1713.06 6.7 1719.57 6.79 1726.09 7.27 1732.61 7.37 1745.64 6.4 1752.16 6.19
1758.67 6.73 1765.19 6.96 1771.7 6.48 1778.22 6.74 1784.74 7.39 1797.77 7.14
1804.29 6.79 1810.8 6.6 1817.32 6.94 1823.85 6.82 1830.37 5.99 1830.9 5.87
1836.9 4.46 1839.08 2.65 1844.81 .53 1848.3 -1.58 1854.05 -3.33 1857.95 -
5.41 1864.66 -6.96 1868.33 -7.36 1875.85 -6.94 1879.65 -5.3 1884.89 -5.32
1888.29 -5.31 1894.58 -4.97 1898.69 -2.69 1906.52 -7.23 1910.23 -9.32
1914.72 -10.03 1926.06 -11.09 1931.96 -9.3 1935.3 -7.08 1942.36 -4.21
1946.19 -2.77 1955.09 .46 1955.37 13.32 1955.58 13.39 1980.45 13.83 1987.01
14.72 1993.57 14.86 2006.69 15.19 2013.25 15.22 2019.81 15.19 2026.37 14.9
2032.93 14.84 2039.49 15.03 2046.05 15.35 2052.61 15.58 2059.17 15.4 2065.73
14.8 2072.29 14.41 2078.85 14.62 2085.41 15.15 2091.97 15.44 2098.53 15.26
2105.1 15.15 2118.22 15.22 2124.78 15.2 2131.34 15.21 2137.9 15.38 2144.46
15.64 2151.02 15.74 2157.58 15.81 2164.14 15.86 2170.7 15.89 2177.26 15.89
2183.82 15.78 2196.94 15.48 2203.5 15.37 2210.06 15.29 2216.62 15.25 2223.18
15.24 2236.3 15.33 2242.86 15.41 2249.42 15.52 2255.98 15.65 2262.54 15.75
2269.1 15.78 2275.66 15.75 2288.78 15.64 2295.34 15.56 2301.9 15.6 2308.46
15.56 2315.02 15.42 2328.14 15.33 2334.7 15.26 2347.82 15.16 2354.38 15.14
2360.94 15.17 2367.5 15.07 2374.06 15.06 2380.62 15.07 2387.18 14.98 2393.74
14.96 2400.3 14.84 2406.86 14.8 2413.42 14.81 2419.98 14.89 2426.54 14.77
2433.1 14.86 2439.66 14.86 2446.22 14.76 2452.78 14.76 2459.34 14.85 2465.9
14.97 2472.46 15.02 2479.02 15.02 2485.58 15.16 2492.15 15.24 2498.71 15.12
2505.27 15.34 2511.83 15.4 2518.39 15.32 2524.95 15.11 2531.51 14.95 2538.07
14.9 2557.75 14.61 2570.87 14.82 2577.43 14.71 2590.55 14.82 2597.11 14.86
2610.23 15.04 2616.79 15.24 2623.35 15.36 2629.91 15.41 2636.47 15.48
2643.03 15.25 2649.59 15.6 2656.15 15.74 2662.71 15.83 2669.27 15.9 2675.83
15.95 2688.95 15.96 2695.51 15.99 2702.07 16.05 2708.63 16.15 2715.19 16.31
2721.75 16.57 2728.31 16.85 2734.87 16.8 2741.43 16.86 2747.99 17 2754.55
17.06 2761.11 17.06 2767.67 16.89 2774.23 16.69 2780.79 16.45 2787.35 16.27
2793.91 16.35 2800.47 16.35 2807.03 16.31 2813.59 16.37 2826.71 16.4 2833.27
16.5 2852.95 16.64 2859.51 16.76 2866.07 16.76 2872.63 16.8 2879.19 16.69
2885.75 16.68 2898.88 16.77 2905.44 16.76 2918.56 16.69 2925.12 16.64
2931.68 16.7 2938.24 16.62 2951.36 16.71 2957.92 16.62 2964.48 16.68 2971.04
16.7 2977.6 16.66 2984.16 16.57 2990.72 16.64 3003.84 16.7 3010.4 16.63
3016.96 16.67 3023.52 16.74 3030.08 16.72 3043.2 16.71 3056.32 16.65 3062.88
16.69 3069.44 16.75 3076 16.69 3082.56 16.73 3089.12 16.71 3102.24 16.59
3108.8 16.65 3115.36 16.54 3121.92 16.59 3128.48 16.73 3135.04 17.15 3141.6
17.37 3148.16 19.29 3154.72 19.88 3161.28 17.85 3167.84 17.75 3180.96 18.16
3187.52 18.12 3194.08 17.95 3200.64 17.66 3207.2 17.7 3213.76 17.89 3220.32
18.03 3226.88 18.33 3233.44 18.76 3240 19.03 3246.56 19.41 3253.12 19.65
3259.68 19.6 3266.24 19.65 3272.8 19.92 3279.36 20.07 3285.92 20.08 3292.48
20.04 3299.04 19.74 3305.61 19.02 3312.17 17.24 3318.73 15.12 3325.29 14.36
3331.85 14.3 3338.41 14.34 3344.97 14.7 3351.53 15.23 3358.09 15.42 3364.65
15.33 3371.21 15.37 3377.77 15.72 3384.33 16.84 3390.89 16.49 3397.45 14.71
3404.01 14.49 3410.57 14.23 3417.13 14.8 3423.69 14.8 3430.25 14.97 3436.81
15.08 3443.37 15.06 3449.93 14.65 3456.49 13.71 3463.05 13.1 3469.61 13.09
3476.17 13.16 3482.73 13.27 3489.29 13.13 3495.85 13.1 3502.41 13.13 3508.97
13.18 3515.53 13.31 3522.09 13.37 3528.65 13.45 3535.21 13.48 3541.77 13.44
3548.33 13.22 3554.89 13.12 3561.45 13.07 3568.01 13.05 3574.57 13.23

3581.13 13.27 3587.69 13.27 3594.25 13.23 3600.81 13.35 3607.37 13.4 3620.49 13.9 3633.61 13.59 3640.17 13.56 3646.73 13.59 3653.29 13.38 3659.85 13.27 3666.41 13.41 3679.53 13.76 3686.09 13.57 3692.65 13.62 3699.22 13.62 3705.78 13.77 3712.34 13.68 3718.9 13.88 3725.46 13.95 3732.02 13.64 3738.58 13.59 3745.14 13.68 3751.7 13.8 3758.26 13.83 3764.82 13.76 3771.38 13.86 3784.5 13.92 3791.06 14.01 3797.62 14.07 3804.18 14.22 3810.74 14.42 3817.3 14.42 3823.86 14.36 3836.98 14.3 3843.54 14.38 3850.1 14.38 3863.22 14.59 3869.78 14.75 3876.34 14.76 3882.9 14.84 3889.46 14.72 3896.02 15.05 3902.58 15.07 3909.14 15.26 3915.7 15.32 3922.26 15.36 3928.82 15.36 3935.38 15.63 3941.94 15.71 3948.5 15.62 3955.06 15.86 3961.62 15.97 3968.18 15.81 3974.74 16.01 3981.3 16.06 3987.86 16 3994.42 16.05 4000.98 16.17 4007.54 16.32 4027.22 16.59 4033.78 16.63 4040.34 16.74 4046.9 16.95 4060.02 17.1 4066.58 17.23 4073.14 17.41 4079.7 17.27 4086.26 17.79 4092.82 18.07 4099.39 18.09 4105.95 18.28 4112.51 18.15 4119.07 18.1 4125.63 18.14 4132.19 18.44 4138.75 18.63 4145.31 18.87 4158.43 19.24 4164.99 19.29 4171.55 19.1

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 1817.32 .035 1955.37 .082

Bank Sta: Left Right Coeff Contr. Expan.
 1817.32 1955.37 .5 .5

Upstream Embankment side slope = 0 horiz. to 1.0 vertical Downstream Embankment side slope = 0 horiz. to 1.0 vertical Maximum allowable submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Piers = 21

Pier Data
Pier Station Upstream= 1759 Downstream= 1844
Upstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14
Downstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14

Pier Data
Pier Station Upstream= 1762 Downstream= 1847
Upstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14
Downstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14

Pier Data
Pier Station Upstream= 1768 Downstream= 1853
Upstream num= 2

```
 Width Elev Width Elev
 .8 -12 .8 14
Downstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14

Pier Data
Pier Station Upstream= 1772 Downstream= 1857 Upstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14
Downstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14

Pier Data
Pier Station Upstream= 1778 Downstream= 1863
Upstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14
Downstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14

Pier Data
Pier Station Upstream= 1782 Downstream= 1867
Upstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14
Downstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14

Pier Data
Pier Station Upstream= 1790 Downstream= 1875
Upstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14
Downstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14

Pier Data Pier Station Upstream= 1793 Downstream= 1878
Upstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14
Downstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14

Pier Data
Pier Station Upstream= 1799 Downstream= 1884
Upstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14
```

```
Downstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14

Pier Data
Pier Station Upstream= 1802 Downstream= 1887
Upstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14
Downstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14

Pier Data
Pier Station Upstream= 1808 Downstream= 1893
Upstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14
Downstream num= 2
 Width Elev Width Elev  .8 -12 .8 14

Pier Data
Pier Station Upstream= 1813 Downstream= 1898
Upstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14
Downstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14

Pier Data
Pier Station Upstream= 1820 Downstream= 1905
Upstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14
Downstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14

Pier Data
Pier Station Upstream= 1820 Downstream= 1905
Upstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14
Downstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14

Pier Data
Pier Station Upstream= 1824 Downstream= 1909
Upstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14
Downstream num= 2  Width Elev Width Elev
```

```
 .8 -12 .8 14

Pier Data
Pier Station Upstream= 1829 Downstream= 1914
Upstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14
Downstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14

Pier Data
Pier Station Upstream= 1840 Downstream= 1925
Upstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14
Downstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14

Pier Data
Pier Station Upstream= 1846 Downstream= 1931
Upstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14
Downstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14

Pier Data
Pier Station Upstream= 1849 Downstream= 1934
Upstream num= 2
 Width Elev Width Elev  .8 -12 .8 14
Downstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14

Pier Data
Pier Station Upstream= 1856 Downstream= 1941
Upstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14
Downstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14

Pier Data
Pier Station Upstream= 1860 Downstream= 1945
Upstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14
Downstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14
```

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
 Energy
 W.S. Pro Method

 W.S.Pro Data
 Left Embankment
 El of the top of the embankment = 15
 El of the toe of the abutment = 2.6
 Right Embankment
 El of the top of the embankment = 15
 El of the toe of the abutment = 2.6
 Abutment Type = 3 Sloping abutments and sloping embankments Slope of abutments = 4
 Top with of embankment = 17
 Centroid station of bridge opening =
 Wing Wall Type = No wing walls present
 Width =
 Angle =
 Radius =
 Guide Banks Type = No Guide Bank present
 Length =
 Offset =
 Angle =

Selected Low Flow Methods = W.S.Pro Method

High Flow Method
 Energy Only

Additional Bridge Parameters
 Add Friction component to Momentum
 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line
 CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 14148.05

INPUT
Description: 18.3 DS Face RR Br
Station Elevation Data num= 493
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 32.67 19.62 32.01 26.16 31.57 39.25 31.04 52.33 30.21 65.41 28.88 71.95 28.4 85.03 27.93 104.66 26.38 124.28 26.33 130.82 26.16 137.36 25.76 150.44 25.84 163.52 26.11 176.61 25.96 189.69 25.37 196.23 24.96 222.39 22.77 228.93 22.33 235.48 21.63 242.02 20.69 248.56 19.93 268.18 19.8 300.89 18.46 327.05 17.87 359.75 16.57 372.84 16.4 392.46 14.85 418.62 12.36 438.25 11.11 444.79 10.97 451.33 10.62 464.41 9.55 484.03 8.37 490.57 8.18 497.12 7.85 503.66 7.69 510.2 7.73 529.82 7.43 542.9 6.03 549.44 6.25 555.98 6.7 562.53 6.94 569.07

6.56 575.61 6.49 595.23 6.77 608.31 6.5 614.85 6.77 634.48 7.23 647.56 7.71
660.64 7.78 673.72 8.06 693.35 8.63 699.89 8.99 712.97 9.33 739.13 10.51
758.76 10.7 765.3 10.57 798 10.45 817.63 8.98 837.25 8.56 843.79 8.51 850.33
8.6 869.95 8.36 896.12 8.71 915.74 8.72 922.28 8.94 928.82 8.92 948.45 9.43
961.53 9.52 974.61 9.37 981.15 9 987.69 9.16 994.23 9.74 1000.77 10.04
1007.31 9.94 1013.86 10.3 1026.94 10.68 1033.48 10.51 1040.02 10.15 1046.56
9.61 1059.64 7.01 1072.72 4.54 1079.27 4.06 1085.81 3.78 1098.89 3.55
1125.05 3.92 1131.59 3.8 1144.67 3.88 1151.22 4.06 1157.76 3.9 1170.84 4.04
1183.92 3.76 1190.46 3.9 1197 4.37 1203.54 5.1 1216.63 6.19 1223.17 6.43
1229.71 6.4 1236.25 5.7 1242.79 4.8 1249.33 4.54 1255.87 4.54 1288.58 3.4
1301.66 3.67 1314.74 3.55 1321.28 3.34 1334.36 3.32 1340.9 3.17 1353.99 3.69
1360.53 3.41 1373.61 3.72 1393.23 3.65 1399.77 3.42 1406.31 3.34 1412.85
3.44 1425.94 4.04 1445.56 4.2 1452.1 4.88 1458.64 7.69 1465.18 10.82 1471.72
12.95 1484.81 13.44 1491.35 13.47 1497.89 13.29 1504.43 12.05 1510.97 9.44
1517.51 5.42 1524.05 4.35 1537.11 4.73 1550.14 4.64 1556.66 4.39 1563.17
5.46 1569.69 4.87 1576.21 4.69 1582.72 5.08 1589.24 4.91 1595.76 4.58
1608.79 4.94 1615.31 4.58 1628.34 4.87 1634.86 5.51 1654.41 6.38 1660.92
5.67 1667.44 5.49 1680.47 6.17 1686.99 6.67 1700.02 7.24 1706.54 7.05
1713.06 6.7 1719.57 6.79 1726.09 7.27 1732.61 7.37 1745.64 6.4 1752.16 6.19
1758.67 6.73 1765.19 6.96 1771.7 6.48 1778.22 6.74 1784.74 7.39 1797.77 7.14
1804.29 6.79 1810.8 6.6 1817.32 6.94 1823.85 6.82 1830.37 5.99 1830.9 5.87
1836.9 4.46 1839.08 2.65 1844.81 .53 1848.3 -1.58 1854.05 -3.33 1857.95 -
5.41 1864.66 -6.96 1868.33 -7.36 1875.85 -6.94 1879.65 -5.3 1884.89 -5.32
1888.29 -5.31 1894.58 -4.97 1898.69 -2.69 1906.52 -7.23 1910.23 -9.32
1914.72 -10.03 1926.06 -11.09 1931.96 -9.3 1935.3 -7.08 1942.36 -4.21
1946.19 -2.77 1955.09 .46 1955.37 13.32 1955.58 13.39 1980.45 13.83 1987.01
14.72 1993.57 14.86 2006.69 15.19 2013.25 15.22 2019.81 15.19 2026.37 14.9
2032.93 14.84 2039.49 15.03 2046.05 15.35 2052.61 15.58 2059.17 15.4 2065.73
14.8 2072.29 14.41 2078.85 14.62 2085.41 15.15 2091.97 15.44 2098.53 15.26
2105.1 15.15 2118.22 15.22 2124.78 15.2 2131.34 15.21 2137.9 15.38 2144.46
15.64 2151.02 15.74 2157.58 15.81 2164.14 15.86 2170.7 15.89 2177.26 15.89
2183.82 15.78 2196.94 15.48 2203.5 15.37 2210.06 15.29 2216.62 15.25 2223.18
15.24 2236.3 15.33 2242.86 15.41 2249.42 15.52 2255.98 15.65 2262.54 15.75
2269.1 15.78 2275.66 15.75 2288.78 15.64 2295.34 15.56 2301.9 15.6 2308.46
15.56 2315.02 15.42 2328.14 15.33 2334.7 15.26 2347.82 15.16 2354.38 15.14
2360.94 15.17 2367.5 15.07 2374.06 15.06 2380.62 15.07 2387.18 14.98 2393.74
14.96 2400.3 14.84 2406.86 14.8 2413.42 14.81 2419.98 14.89 2426.54 14.77
2433.1 14.86 2439.66 14.86 2446.22 14.76 2452.78 14.76 2459.34 14.85 2465.9
14.97 2472.46 15.02 2479.02 15.02 2485.58 15.16 2492.15 15.24 2498.71 15.12
2505.27 15.34 2511.83 15.4 2518.39 15.32 2524.95 15.11 2531.51 14.95 2538.07
14.9 2557.75 14.61 2570.87 14.82 2577.43 14.71 2590.55 14.82 2597.11 14.86
2610.23 15.04 2616.79 15.24 2623.35 15.36 2629.91 15.41 2636.47 15.48
2643.03 15.25 2649.59 15.6 2656.15 15.74 2662.71 15.83 2669.27 15.9 2675.83
15.95 2688.95 15.96 2695.51 15.99 2702.07 16.05 2708.63 16.15 2715.19 16.31
2721.75 16.57 2728.31 16.85 2734.87 16.8 2741.43 16.86 2747.99 17 2754.55
17.06 2761.11 17.06 2767.67 16.89 2774.23 16.69 2780.79 16.45 2787.35 16.27
2793.91 16.35 2800.47 16.35 2807.03 16.31 2813.59 16.37 2826.71 16.4 2833.27
16.5 2852.95 16.64 2859.51 16.76 2866.07 16.76 2872.63 16.8 2879.19 16.69
2885.75 16.68 2898.88 16.77 2905.44 16.76 2918.56 16.69 2925.12 16.64
2931.68 16.7 2938.24 16.62 2951.36 16.71 2957.92 16.62 2964.48 16.68 2971.04
16.7 2977.6 16.66 2984.16 16.57 2990.72 16.64 3003.84 16.7 3010.4 16.63
3016.96 16.67 3023.52 16.74 3030.08 16.72 3043.2 16.71 3056.32 16.65 3062.88
16.69 3069.44 16.75 3076 16.69 3082.56 16.73 3089.12 16.71 3102.24 16.59
3108.8 16.65 3115.36 16.54 3121.92 16.59 3128.48 16.73 3135.04 17.15 3141.6

17.37 3148.16 19.29 3154.72 19.88 3161.28 17.85 3167.84 17.75 3180.96 18.16
3187.52 18.12 3194.08 17.95 3200.64 17.66 3207.2 17.7 3213.76 17.89 3220.32
18.03 3226.88 18.33 3233.44 18.76 3240 19.03 3246.56 19.41 3253.12 19.65
3259.68 19.6 3266.24 19.65 3272.8 19.92 3279.36 20.07 3285.92 20.08 3292.48
20.04 3299.04 19.74 3305.61 19.02 3312.17 17.24 3318.73 15.12 3325.29 14.36
3331.85 14.3 3338.41 14.34 3344.97 14.7 3351.53 15.23 3358.09 15.42 3364.65
15.33 3371.21 15.37 3377.77 15.72 3384.33 16.84 3390.89 16.49 3397.45 14.71
3404.01 14.49 3410.57 14.23 3417.13 14.8 3423.69 14.8 3430.25 14.97 3436.81
15.08 3443.37 15.06 3449.93 14.65 3456.49 13.71 3463.05 13.1 3469.61 13.09
3476.17 13.16 3482.73 13.27 3489.29 13.13 3495.85 13.1 3502.41 13.13 3508.97
13.18 3515.53 13.31 3522.09 13.37 3528.65 13.45 3535.21 13.48 3541.77 13.44
3548.33 13.22 3554.89 13.12 3561.45 13.07 3568.01 13.05 3574.57 13.23
3581.13 13.27 3587.69 13.27 3594.25 13.23 3600.81 13.35 3607.37 13.4 3620.49
13.9 3633.61 13.59 3640.17 13.56 3646.73 13.59 3653.29 13.38 3659.85 13.27
3666.41 13.41 3679.53 13.76 3686.09 13.57 3692.65 13.62 3699.22 13.62
3705.78 13.77 3712.34 13.68 3718.9 13.88 3725.46 13.95 3732.02 13.64 3738.58
13.59 3745.14 13.68 3751.7 13.8 3758.26 13.83 3764.82 13.76 3771.38 13.86
3784.5 13.92 3791.06 14.01 3797.62 14.07 3804.18 14.22 3810.74 14.42 3817.3
14.42 3823.86 14.36 3836.98 14.3 3843.54 14.38 3850.1 14.38 3863.22 14.59
3869.78 14.75 3876.34 14.76 3882.9 14.84 3889.46 14.72 3896.02 15.05 3902.58
15.07 3909.14 15.26 3915.7 15.32 3922.26 15.36 3928.82 15.36 3935.38 15.63
3941.94 15.71 3948.5 15.62 3955.06 15.86 3961.62 15.97 3968.18 15.81 3974.74
16.01 3981.3 16.06 3987.86 16 3994.42 16.05 4000.98 16.17 4007.54 16.32
4027.22 16.59 4033.78 16.63 4040.34 16.74 4046.9 16.95 4060.02 17.1 4066.58
17.23 4073.14 17.41 4079.7 17.27 4086.26 17.79 4092.82 18.07 4099.39 18.09
4105.95 18.28 4112.51 18.15 4119.07 18.1 4125.63 18.14 4132.19 18.44 4138.75
18.63 4145.31 18.87 4158.43 19.24 4164.99 19.29 4171.55 19.1

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 1817.32 .035 1955.37 .082

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1817.32
1955.37 99.87 117.75 129.37 .5 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 14030.31

INPUT
Description: 18 Exit RR Br
Station Elevation Data num= 491
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
  0 32.79 6.56 32.79 13.12 32.61 19.68 32.47 26.24 32.25 32.81 31.81 39.37
31.4 45.93 30.86 52.49 30.42 59.05 29.72 65.61 28.95 72.17 28.38 78.73 27.73
85.3 27.57 91.86 27.49 98.42 27.18 111.54 26.42 118.1 26.07 124.66 26.1
131.22 25.94 137.78 25.75 144.35 25.51 150.91 25.36 157.47 25.34 164.03
25.25 170.59 25 183.71 24.83 190.27 24.82 196.84 24.28 203.4 23.65 209.96
23.48 216.52 22.94 223.08 22.5 229.64 22.02 236.2 21.02 242.76 20.09 249.32
19.61 255.89 19.63 262.45 19.41 275.57 18.8 282.13 18.57 288.69 18.38 295.25
18.16 301.81 17.99 308.38 17.76 314.94 17.63 321.5 17.54 328.06 17.43 334.62
17.17 341.18 17.03 347.74 16.83 354.3 16.69 360.86 16.7 367.43 16.62 373.99

16.36 380.55 15.9 387.11 15.47 393.67 14.86 400.23 14.2 406.79 13.72 413.35
13.18 419.92 12.66 426.48 12.2 433.04 11.78 439.6 11.5 446.16 11.05 452.72
10.72 459.28 10.17 465.84 9.68 472.4 9.14 478.97 9 485.53 8.69 492.09 8.16
498.65 7.78 505.21 7.63 511.77 7.52 518.33 7.28 524.89 7.31 531.46 7.09
538.02 7.02 551.14 6.48 557.7 6.64 564.26 6.64 570.82 6.59 577.38 6.36
583.94 6.53 590.51 6.74 597.07 6.66 603.63 6.65 610.19 6.78 616.75 6.76
623.31 7.06 629.87 7.21 636.43 7.38 643 7.58 649.56 7.66 662.68 7.97 669.24
8.01 675.8 8.37 682.36 8.63 688.92 8.86 695.48 9.01 702.05 9.29 708.61 9.47
715.17 9.69 721.73 10.04 728.29 10.26 734.85 10.51 741.41 10.91 747.97 10.84
754.54 10.7 761.1 10.58 767.66 10.41 774.22 10.32 780.78 10.29 787.34 10.2
793.9 10.06 807.02 9.41 813.59 9.1 820.15 8.74 826.71 8.54 833.27 8.53
846.39 8.6 852.95 8.59 859.51 8.6 866.08 8.55 872.64 8.54 879.2 8.72 885.76
8.76 892.32 8.77 905.44 8.88 912 8.85 918.57 8.92 925.13 9.13 931.69 9.08
938.25 9.25 944.81 9.36 951.37 9.55 957.93 9.56 964.49 9.53 977.62 9.3
984.18 9 990.74 9.08 997.3 9.58 1003.86 10.03 1016.98 10.16 1023.54 10.15
1030.11 10.21 1036.67 10.22 1043.23 9.67 1049.79 8.8 1056.35 7.74 1062.91
6.76 1069.47 5.72 1076.03 4.91 1082.59 4.22 1089.16 3.82 1095.72 3.71
1108.84 3.45 1115.4 3.24 1121.96 3.43 1128.52 3.47 1135.08 3.42 1141.64 3.42
1148.21 3.38 1154.77 3.44 1161.33 3.53 1167.89 3.49 1174.45 3.57 1181.01
3.82 1187.57 3.77 1194.13 3.79 1200.69 3.95 1207.26 4.06 1213.82 3.98
1233.5 4.22 1240.06 4.06 1253.18 4.11 1259.74 3.9 1266.31 3.87 1272.87 3.64
1279.43 3.53 1285.99 3.55 1292.55 3.65 1299.11 3.7 1305.67 3.63 1312.23 3.69
1318.8 3.55 1325.36 3.57 1331.92 3.77 1338.48 3.9 1345.04 3.87 1351.6 3.75
1358.16 3.85 1364.72 3.97 1371.28 4.12 1377.85 4.15 1384.41 3.95 1390.97
3.88 1397.53 4.05 1404.09 6.48 1410.65 7.48 1417.21 9.55 1423.77 11.13
1430.33 12.19 1436.9 12.8 1443.46 12.89 1450.02 12.79 1456.58 12.57 1463.14
10.98 1469.7 8.49 1476.26 5.97 1482.82 5.1 1489.38 5.08 1495.95 5.68
1502.51 5.42 1509.07 4.53 1515.63 4.08 1522.19 4.26 1528.75 4.37 1535.31
4.53 1541.84 4.34 1548.36 4.43 1561.41 5.37 1567.94 5.88 1574.46 6.18
1580.99 6.37 1587.51 6.65 1594.04 6.96 1600.56 7.06 1607.09 7.09 1613.61
7.06 1620.14 7 1626.66 7.28 1633.19 7.51 1639.72 7.27 1646.24 7.27 1652.77
7.09 1659.29 7.2 1665.82 7.23 1672.34 7.17 1678.87 7.23 1685.39 7.34 1698.44
8 1704.97 7.89 1711.49 7.95 1724.54 8.11 1731.07 8.13 1802.71 7.13 1869.98
5.86 1872.42 2.65 1886.07 -2.67 1907.09 -4.65 1948.08 -11.39 1969.32 -1.61
1978.62 10.39 2023.63 10.62 2225.71 12.58 2231.25 12.93 2244.32 13.22
2250.86 13.15 2263.93 12.88 2270.46 12.77 2277 12.8 2283.53 12.68 2290.07
12.4 2296.6 12.18 2303.13 12.03 2309.67 12.2 2316.2 12.34 2322.74 12.44
2329.27 12.47 2335.81 12.35 2342.34 12.08 2348.88 12.09 2355.41 12.03
2361.95 11.75 2368.48 11.67 2375.02 11.76 2381.55 11.97 2388.09 12.01
2394.63 12 2401.16 12.02 2407.7 12 2414.23 12.12 2420.77 12.13 2427.31 12.18
2433.84 12.38 2440.38 12.42 2446.91 12.27 2453.45 12.35 2459.99 12.54
2466.52 12.93 2473.06 13.02 2486.13 12.88 2492.67 12.77 2499.2 11.76 2505.74
9.99 2512.27 9.31 2518.81 9.74 2525.35 10.21 2531.88 10.32 2538.42 10.29
2544.95 10.52 2551.49 10.94 2558.03 11.26 2564.56 11.48 2571.1 11.82 2577.63
12.3 2584.17 12.56 2590.71 12.37 2597.24 12.06 2603.78 11.95 2610.31 12.06
2616.85 12.28 2623.39 12.63 2629.92 13.03 2636.46 13.17 2642.99 13.11
2656.06 12.92 2662.6 12.95 2669.14 12.87 2682.21 12.53 2688.74 12.62 2695.28
12.67 2708.35 12.86 2721.42 12.84 2727.96 12.77 2734.5 12.57 2741.03 12.48
2747.57 12.53 2754.1 12.46 2760.64 12.15 2767.18 10.24 2773.71 8.02 2780.25
7.19 2786.78 8.2 2793.32 9.4 2799.86 9.86 2806.39 10.4 2812.93 10.85 2819.46
11.02 2826 11.04 2832.54 11.24 2845.61 11.7 2852.14 11.94 2858.68 12.15
2865.22 12.11 2871.75 11.99 2878.29 11.95 2891.36 11.78 2897.9 11.66 2904.43
11.6 2910.97 11.74 2917.5 11.85 2924.04 11.99 2930.57 12.18 2937.11 12.41
2943.65 12.76 2950.18 13.07 2956.72 13.52 2963.25 14.11 2969.79 14.45

2976.33 14.56 2989.4 14.7 2995.93 14.78 3002.47 14.7 3009.01 14.33 3015.54 14.18 3028.61 14.39 3035.15 14.44 3041.69 14.42 3048.22 14.58 3054.76 14.68 3061.29 14.65 3067.83 14.88 3074.37 14.82 3080.9 14.9 3093.97 14.87 3100.51 15.11 3107.05 15.19 3113.58 15.22 3120.12 15.39 3126.65 15.42 3133.19 15.42 3139.73 15.49 3146.26 15.49 3152.8 15.45 3165.87 15.52 3172.41 15.51 3178.94 15.67 3185.48 15.81 3192.01 15.87 3198.55 16.01 3205.08 16.31 3211.62 16.34 3218.16 16.52 3224.69 18.15 3231.23 20.02 3237.76 21.65 3244.3 23 3250.84 21.44 3257.37 19.28 3263.91 17.73 3270.44 17.19 3276.98 16.82 3283.52 16.87 3290.05 16.98 3296.59 16.66 3303.12 16.49 3309.66 16.97 3316.2 17.29 3322.73 17.22 3329.27 17.54 3335.8 17.83 3342.34 17.91 3348.88 18.05 3355.41 18.44 3361.95 19.49 3368.48 20.6 3375.02 21.21 3381.56 21.31 3388.09 21.2 3401.16 21.04 3407.7 20.92 3414.24 20.56 3420.77 20.06 3427.31 19.95 3433.84 20.17 3440.38 20.37 3446.92 20.62 3459.99 20.96 3466.52 21.04 3473.06 21.29 3479.59 21.41 3486.13 21.46 3492.67 21.57 3499.2 21.49 3505.74 21.81 3512.27 22.61 3518.81 23.19 3525.35 23.8 3531.88 24.39 3538.42 24.56 3544.95 24.88 3551.49 25.32 3558.03 25.8 3564.56 26.42 3571.1 27.07 3577.63 27.67 3584.17 28.18 3590.71 28.51 3597.24 28.69 3603.78 28.8 3610.31 28.86 3623.39 28.93 3629.92 28.79 3636.46 28.48 3642.99 28.3 3649.53 28.22 3656.07 28.22 3662.6 28.17 3669.14 28.15 3675.67 28.3 3682.21 28.58 3688.75 28.78 3695.28 29.38 3701.82 29.75 3708.35 29.9 3714.89 29.91 3721.43 29.88 3727.96 29.81 3734.5 29.61 3741.03 29.59 3747.57 29.69 3754.1 29.72 3760.64 29.72 3773.71 29.65 3780.25 29.67 3786.78 29.62 3793.32 29.3 3799.86 29.11 3806.39 28.87 3819.46 28.53 3826 28.5 3832.54 28.39 3845.61 27.91 3852.14 27.8 3858.68 27.44 3865.22 27 3871.75 26.53

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 1869.98 .035 1978.62 .082

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1869.98 1978.62 684.11 778.6 861.6 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 2244 3871.75 13.22 F

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 13251.71

INPUT
Description: 17
Station Elevation Data num= 312
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 32.57 26.15 31.62 45.75 31.23 52.29 30.9 58.83 30.18 78.44 28.7 84.97 28.5 104.58 28.32 111.12 28.35 124.19 27.81 150.34 25.88 163.41 25.32 169.95 24.74 183.02 24.02 196.09 23.54 215.7 22.28 222.24 22.17 235.31 21.2 241.85 20.82 248.38 20.88 254.92 20.72 267.99 19.31 274.53 18.76 307.21 17.37 346.43 16.83 352.96 16.83 359.5 17 372.57 16.73 385.65 16.15 411.79 14.21 437.94 12.51 444.47 11.93 457.55 11.16 470.62 10.07 477.16 9.68 483.69 9.08 490.23 8.78 509.84 8.41 522.91 7.82 529.45 7.25 535.98 7.13 549.06 6.74 555.59 6.39 562.13 6.52 568.66 6.92 575.2 6.79 581.74 6.47 594.81 6.37 601.35 6.51 607.88 6.86 620.96 7.16 627.49 7.21 640.56 7.79 653.64 8.45 660.17 8.53 666.71 8.92 699.39 10.1 719 10.46 725.54 10.39 738.61 10.66 751.68 10.69 764.76 10.4 771.29 10.01 784.36

9.6 790.9 9.53 797.44 9.3 817.05 8.93 823.58 8.63 830.12 8.49 856.26 8.98
895.48 9.18 908.56 9.14 915.09 9.02 941.24 9.17 954.31 9.52 967.38 9.55
980.46 9.23 986.99 8.83 993.53 8.61 1013.14 9.56 1019.67 9.64 1032.75 9.52
1045.82 9.02 1052.35 8.48 1071.96 6.31 1078.5 5.38 1085.04 4.81 1098.11 4.26
1104.65 3.71 1117.72 3.43 1130.79 3.48 1143.86 3.06 1163.47 3.58 1170.01
3.34 1183.08 3.45 1189.62 3.85 1202.69 4.4 1209.23 4.84 1222.3 5.92 1228.84
6.28 1235.37 6.46 1248.45 6.33 1254.98 5.82 1261.52 4.89 1281.13 4.13
1294.2 4.13 1300.74 4.46 1313.81 4.11 1320.34 4.27 1326.88 8.52 1333.42
11.27 1339.95 12.53 1346.49 12.7 1353.03 12.6 1359.56 12.33 1366.1 11.9
1372.64 10.41 1379.17 7.19 1385.71 4.91 1392.24 4.09 1398.78 4.2 1411.85
4.05 1424.93 3.59 1431.46 3.83 1438 4.31 1444.54 5.16 1451.07 5.58 1457.61
5.52 1470.68 4.32 1477.22 3.88 1483.75 3.62 1490.29 3.72 1503.36 4.93 1509.9
5.29 1516.44 5.38 1536.04 4.83 1542.58 4.75 1562.19 5.07 1568.73 5.3 1575.26
5.71 1621.02 6.66 1634.09 6.64 1640.63 6.34 1660.23 4.91 1673.3 3.73
1679.84 3.64 1686.37 4.07 1692.9 4.78 1699.44 5.31 1712.51 6.1 1719.04 6.27
1732.11 6.82 1738.64 7.25 1745.17 7.44 1751.71 7.27 1758.24 6.87 1764.78
6.06 1771.31 5.44 1777.84 5.38 1790.91 5.73 1797.45 6.17 1803.98 6.25
1810.51 5.95 1817.05 5.16 1823.58 4.69 1830.11 4.92 1836.65 4.97 1842.91
3.05 1843.18 2.97 1855 -2.51 1855.23 -2.5 1855.41 -2.28 1855.5 -2.32 1855.56
-2.37 1855.64 -2.76 1855.76 -2.93 1855.83 -2.94 1855.96 -2.97 1856.08 -3.05
1857.17 -3.05 1858.58 -3.19 1859.98 -3.63 1861.49 -4.2 1863.1 -4.87 1864.75
-5.25 1866.93 -5.86 1869.15 -6.5 1871.37 -6.93 1873.3 -7.49 1875.27 -8.01
1876.97 -8.23 1878.57 -8.6 1880.15 -8.84 1881.58 -8.96 1883.18 -9.13 1884.84
-9.37 1886.94 -9.52 1889 -9.86 1891.09 -10.04 1892.95 -10.26 1894.9 -10.52
1896.79 -10.86 1898.64 -11.11 1900.24 -11.11 1901.87 -11.13 1903.22 -11.08
1904.55 -11.01 1905.74 -10.97 1907.04 -10.81 1908.44 -10.45 1910.02 -10.16
1911.86 -9.77 1913.65 -9.34 1915.5 -8.61 1917.12 -7.74 1918.68 -6.74 1920.05
-6.07 1921.51 -4.51 1922.72 -4.31 1923.81 -3.7 1924.78 -2.59 1925.83 -2.12
1926.74 -1.76 1934.66 4.61 1936.87 5.75 1941.19 7.99 1954.26 10.4 1960.79
11.91 1967.32 13.17 1973.86 13.96 1986.93 14.7 1993.46 15.35 2006.53 16.21
2013.06 16.45 2019.6 16.93 2026.13 17.99 2032.66 18.16 2045.73 18.11 2052.26
17.84 2058.8 17.32 2065.33 17.03 2078.4 17.62 2091.47 17.97 2098 19 2104.53
21.5 2111.07 23.53 2117.6 25.06 2143.74 26.6 2156.81 27.04 2169.87 27.17
2189.5 28.11 2196.05 27.78 2202.59 27.03 2209.13 26.52 2215.68 26.18 2228.76
25.82 2248.39 24.5 2254.94 24.34 2261.48 24.41 2268.02 24.15 2281.11 24.71
2307.29 25 2313.83 25.28 2320.37 26.43 2326.92 28.25 2333.46 29.13 2346.55
29.23 2366.18 29.48 2385.81 30.05 2411.98 30.22 2418.53 30.08 2425.07 29.62
2438.16 28.17 2444.7 27.71 2451.24 27.96 2477.42 28.31 2483.96 28.55 2490.5
28.93 2523.22 29.8 2601.74 29.89 2621.37 29.73 2641 29.76 2660.63 29.69
2667.18 29.85 2680.26 29.96 2719.53 29.39 2732.61 29.5 2752.24 30.02 2758.79
29.74 2765.33 29.78 2771.87 29.46 2804.59 28.85 2824.22 28.3 2843.85 28.6
2850.4 28.61 2863.48 29.21 2883.11 29.53 2902.74 29.45 2968.18 30.42 2981.27
30.49 3000.9 29.84 3033.61 29.72 3053.24 30.34 3066.33 30.96 3112.14 31.74
3118.68 32.02 3131.77 32.15 3144.85 32.4 3157.94 32.41 3171.03 32.87 3177.57
33.4 3190.66 33.53
 Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 1803.98 .035 2026.13 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1803.98
2026.13 602.45 635.08 678.37 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 12616.64

INPUT
Description: 16 Approach RR Br
Station Elevation Data num= 262
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 32.63 6.54 32.58 13.08 32.49 19.62 31.93 26.16 31.5 32.7 31.39 39.24 31.42 45.78 31.39 58.85 31.52 65.39 31.42 71.93 31.47 78.47 31.12 85.01 30.88 98.09 30.57 104.63 30.11 111.17 29.87 117.71 29.68 124.25 29.39 130.79 29.08 137.33 28.69 143.87 28.32 156.94 27.51 163.48 27.09 170.02 26.72 176.56 26.43 183.1 26.09 189.64 25.78 196.18 25.36 202.72 25.17 209.26 24.63 215.8 24.01 222.34 23.24 228.88 22.56 241.96 21.24 248.5 20.67 255.03 19.96 268.11 19.35 274.65 18.61 281.19 18.07 287.73 17.43 294.27 17.26 300.81 17 307.35 16.87 313.89 16.84 320.43 16.74 326.97 16.49 333.51 16.26 340.05 16.29 346.59 16.38 353.13 16.21 359.66 16.02 366.2 15.96 372.74 15.76 379.28 15.64 385.82 15.63 392.36 15.27 398.9 15.23 405.44 14.91 411.98 14.45 418.52 14.54 425.06 14.95 431.6 14.81 438.14 14.1 444.68 13.6 457.75 12.67 464.29 11.85 470.83 11.21 477.37 10.77 483.91 10.51 490.45 10.15 496.99 9.6 503.53 9.2 510.07 8.82 516.61 8.26 523.15 7.79 529.69 7.18 536.23 7.03 542.77 6.22 549.31 5.77 555.85 6.19 562.38 6.32 568.92 6.36 575.46 6.54 588.54 6.86 595.08 7.1 601.62 7.38 608.16 7.45 614.7 7.3 621.24 7.42 627.78 7.85 634.32 8.4 640.86 8.76 647.4 9.08 653.94 9.44 660.47 9.77 667.01 9.87 673.55 10.19 680.09 10.39 686.63 10.51 693.17 10.59 706.25 10.9 712.79 11.03 719.33 11.12 725.87 11.18 732.41 11.01 745.49 10.86 752.03 10.63 771.64 9.61 778.18 9.59 784.72 9.46 791.26 9.1 797.8 8.9 804.34 8.9 810.88 8.8 817.42 8.34 823.96 8.04 830.5 7.67 837.04 7.67 850.12 7.8 856.66 7.93 863.19 8.04 869.73 7.99 876.27 7.99 889.35 8.24 895.89 8.34 902.43 8.57 908.97 8.76 915.51 8.89 922.05 8.92 928.59 8.84 935.13 8.91 941.67 8.54 948.21 8.35 954.75 8.09 961.29 7.93 967.82 7.93 974.36 7.83 980.9 7.59 987.44 7.45 993.98 7.46 1000.52 7.64 1007.06 7.72 1013.6 7.6 1020.14 7.45 1026.68 7.19 1033.22 7.06 1039.76 7.21 1046.3 7.18 1052.84 7.55 1059.38 7.95 1065.91 8.03 1072.45 7.9 1078.99 7.49 1085.53 7.17 1092.07 6.49 1098.61 5.7 1105.15 5.39 1111.69 5.38 1118.23 5.24 1124.77 4.6 1131.31 4.51 1137.85 4.6 1150.93 4.65 1157.47 4.39 1164.01 3.97 1170.54 4.16 1183.62 4.67 1190.16 4.62 1196.7 4.96 1203.24 5.34 1209.78 5.11 1234.91 4.35 1264.02 3.13 1265.09 1.53 1286.92 -.7 1397.53 -7.34 1409.57 -9.2 1420.3 -9.58 1432.59 -8.07 1444.06 -4.83 1453.35 -2.03 1489.73 .98 1492.64 6.05 1515.17 6.73 1521.65 6.46 1528.13 6.11 1534.61 5.93 1541.09 6.04 1547.57 6.11 1554.04 6.14 1560.52 6.03 1567 6.05 1573.48 6.36 1579.96 6.47 1586.44 6.37 1592.92 6.18 1599.4 6.02 1605.88 6.04 1612.43 6.12 1618.97 5.95 1625.52 5.67 1638.61 5.27 1645.16 4.9 1651.7 4.78 1658.25 4.81 1664.8 4.61 1671.34 4.44 1677.89 4.48 1684.43 4.56 1690.98 4.76 1697.52 5.37 1710.62 7.56 1717.16 8.17 1723.71 8.59 1730.25 9.12 1743.34 10.13 1749.89 10.99 1756.44 11.69 1762.98 11.99 1769.53 12.63 1776.07 13.07 1782.62 13.58 1789.17 14.32 1795.71 15.09 1802.26 15.6 1815.35 17.27 1821.89 17.97 1828.44 18.64 1834.99 19.23 1841.53 19.76 1854.62 21.91 1867.71 23.94 1874.26 24.44 1880.81 25.07 1887.35 25.65 1893.9 26.16 1900.44 26.92 1906.99 26.85 1913.53 26.71 1920.08 26.77 1926.63 26.88 1933.17 27.24 1939.72 27.53 1946.26 27.71 1952.81 27.71 1959.36 27.66 1965.9 27.59 1972.45 27.47 1985.54 26.9 1992.08 26.92 1998.63 27 2005.18 26.94 2011.72 26.86 2018.27 27.2 2024.81 27.76 2031.36 28.07 2044.45 28.2 2051 28.38 2057.54 28.48 2064.09 28.54 2070.63 28.57 2077.18 28.72

Manning's n Values num= 3 Sta n Val Sta n Val Sta n Val
0 .085 1203.24 .035 1492.64 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1203.24
1492.64 48.11 89.77 157.92 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 12526.87

INPUT
Description: 15.7 - US Face RR Br
Station Elevation Data num= 238
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 32.29 13.888 31.74 32.4
31.51 46.28 31.07 55.536 31.03 78.68 29.92 83.304 29.99 92.56 29.51 97.192
29.12 115.704 27.11 124.96 26.52 129.584 26.05 134.216 25.86 157.352 24.48
166.608 23.53 171.24 23.29 180.496 22.12 185.121 22.67 189.752 21.86 194.377
20.74 199.008 19.99 203.633 19.5 212.889 18.06 217.52 17.77 222.152 17.3
226.776 17.25 231.408 16.9 254.544 16.69 259.176 16.79 268.432 16.55 273.056
16.62 282.312 16.42 291.568 15.77 296.2 15.55 328.593 12.67 337.849 12.03
342.48 11.39 356.361 10.16 360.992 9.16 370.248 7.99 384.129 7.19 388.76 6.8
393.385 6.2 398.016 5.33 402.641 5.9 411.904 6.01 425.784 6.63 439.672 7.6
444.296 7.79 453.552 8.72 458.184 9.32 467.44 9.91 476.696 10.97 485.952
11.54 490.577 11.41 499.833 11.69 509.089 11.72 513.72 11.19 518.345 9.69
522.976 7.7 527.601 7.8 532.232 8.43 536.857 8.72 541.488 8.84 550.744 7.76
555.369 7.36 564.625 7.18 569.256 6.97 573.881 7.3 583.137 7.31 597.024 8.12
601.649 8.25 610.905 8.32 620.161 8.66 624.792 8.54 629.424 8.72 638.68 8.71
647.936 9.08 652.561 9.1 666.448 8.63 671.073 8.37 684.96 8.39 689.585 8.2
698.841 8.31 703.472 8.5 708.097 8.39 721.984 7.6 735.865 7.31 745.121 7.44
754.377 7.04 763.633 6.98 777.52 6.26 786.777 5.6 805.289 5.01 809.913 4.76
823.801 4.35 828.425 4.06 833.057 4.42 842.313 4.33 846.944 4.43 851.569
4.94 856.2 5.03 865.456 4.59 870.081 4.94 874.712 7.01 879.337 10.7 883.968
13.1 888.593 14.33 893.224 14.41 897.849 13.78 902.48 12.38 907.105 9.55
911.673 9.78 920.809 8.98 925.377 9.25 925.879 9.26 929.944 9.33 934.519
9.14 939.087 9.39 943.655 10.15 954.594 7.63 954.644 13.43 971.77 12.93
971.932 12.51 972.088 -.25 976.09 -1.49 982.85 -4.23 994.496 -4.951006.199 -
9.031013.093 -10.71 1021.593 -13.621027.066 -3.931042.254 -2.311056.686 -
1.221070.666 .23 1084.659 1.341090.458 1.91091.992 .87 1092.65 12.071103.079
12.52 1108.114 12.861112.739 11.381117.363 9.41121.995 6.571126.619 5.39
1131.244 5.571135.868 5.83 1140.5 5.911145.124 5.851149.749 5.77 1154.38
5.931159.005 5.991163.629 5.741172.885 5.33 1177.51 5.14 1182.134
5.291186.766 5.35 1191.39 5.671196.015 5.821205.271 5.27 1209.895 5.02
1214.52 4.871219.151 4.79 1228.4 4.881233.032 4.62 1237.656 4.561242.281
4.871246.905 4.841251.536 4.71256.161 4.69 1260.786 4.761265.417 4.861270.042
4.891274.666 4.89 1279.29 5.02 1283.922 5.31288.547 5.671293.171 5.961297.802
6.221302.427 6.62 1307.052 7.221311.676 7.781316.308 8.311320.932
8.821325.557 9.39 1330.188 9.991334.812 10.891339.437 12.091344.062
13.21348.693 14.01 1353.318 14.671357.942 15.811362.573 17.091367.198
17.681371.823 18.29 1376.447 19.091381.078 20.561385.703 21.211390.327
21.671394.959 22.73 1399.583 23.661404.208 24.41408.833 24.861413.464
25.111418.089 25.26 1422.713 25.441427.344 25.81431.969 26.331436.594
26.831441.218 27.21 1445.849 27.571450.474 27.74 1459.73 27.821464.354
27.921468.979 28.09 1473.603 28.061478.235 27.861482.859 27.631487.484
27.421492.115 27.17 1496.74 27.361501.365 27.421505.989 27.32 1510.62
27.481515.245 27.82 1519.869 27.881524.501 28.051529.125 28.11 1533.75

28.091538.375 28.16 1543.006 28.02 1547.63 27.961552.255 27.671556.879
27.651561.511 27.53 1566.135 27.56 1570.76 27.441575.391 27.43

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 971.77 .035 1092.65 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 971.77
1092.65 48.42 57.44 51.66 .6 .8 Skew Angle = 45

BRIDGE

RIVER: Taunton River
REACH: Main Stem RS: 12498.05

INPUT
Description: 15.5 RR
Distance from Upstream XS = 2
Deck/Roadway Width = 15 Weir Coefficient = 2.6
Bridge Deck/Roadway Skew = 45
Upstream Deck/Roadway Coordinates
 num= 17
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 756.604 13.53 821.658 14 890.247 14.5
 955.301 13.43 958.837 15.87 969.443 15.87 11.69
 969.443 15.87 12.61001.263 15.87 11.681001.263 15.87 9.29 1026.012 15.87
9.371026.012 15.87 11.681088.944 15.87 12.54 1089.651 15.87 12.561093.187
15.87 1095.308 14.53 1205.617 13.66 1361.888 12.21

Upstream Bridge Cross Section Data
Station Elevation Data num= 238
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 32.29 13.888 31.74 32.4
31.51 46.28 31.07 55.536 31.03 78.68 29.92 83.304 29.99 92.56 29.51 97.192
29.12 115.704 27.11 124.96 26.52 129.584 26.05 134.216 25.86 157.352 24.48
166.608 23.53 171.24 23.29 180.496 22.12 185.121 22.67 189.752 21.86 194.377
20.74 199.008 19.99 203.633 19.5 212.889 18.06 217.52 17.77 222.152 17.3
226.776 17.25 231.408 16.9 254.544 16.69 259.176 16.79 268.432 16.55 273.056
16.62 282.312 16.42 291.568 15.77 296.2 15.55 328.593 12.67 337.849 12.03
342.48 11.39 356.361 10.16 360.992 9.16 370.248 7.99 384.129 7.19 388.76 6.8
393.385 6.2 398.016 5.33 402.641 5.9 411.904 6.01 425.784 6.63 439.672 7.6
444.296 7.79 453.552 8.72 458.184 9.32 467.44 9.91 476.696 10.97 485.952
11.54 490.577 11.41 499.833 11.69 509.089 11.72 513.72 11.19 518.345 9.69
522.976 7.7 527.601 7.8 532.232 8.43 536.857 8.72 541.488 8.84 550.744 7.76
555.369 7.36 564.625 7.18 569.256 6.97 573.881 7.3 583.137 7.31 597.024 8.12
601.649 8.25 610.905 8.32 620.161 8.66 624.792 8.54 629.424 8.72 638.68 8.71
647.936 9.08 652.561 9.1 666.448 8.63 671.073 8.37 684.96 8.39 689.585 8.2
698.841 8.31 703.472 8.5 708.097 8.39 721.984 7.6 735.865 7.31 745.121 7.44
754.377 7.04 763.633 6.98 777.52 6.26 786.777 5.6 805.289 5.01 809.913 4.76
823.801 4.35 828.425 4.06 833.057 4.42 842.313 4.33 846.944 4.43 851.569
4.94 856.2 5.03 865.456 4.59 870.081 4.94 874.712 7.01 879.337 10.7 883.968
13.1 888.593 14.33 893.224 14.41 897.849 13.78 902.48 12.38 907.105 9.55
911.673 9.78 920.809 8.98 925.377 9.25 925.879 9.26 929.944 9.33 934.519
9.14 939.087 9.39 943.655 10.15 954.594 7.63 954.644 13.43 971.77 12.93

971.932 12.51 972.088 -.25 976.09 -1.49 982.85 -4.23 994.496 -4.951006.199 -
9.031013.093 -10.71 1021.593 -13.621027.066 -3.931042.254 -2.311056.686 -
1.221070.666 .23 1084.659 1.341090.458 1.91091.992 .87 1092.65 12.071103.079
12.52 1108.114 12.861112.739 11.381117.363 9.41121.995 6.571126.619 5.39
1131.244 5.571135.868 5.83 1140.5 5.911145.124 5.851149.749 5.77 1154.38
5.931159.005 5.991163.629 5.741172.885 5.33 1177.51 5.14 1182.134
5.291186.766 5.35 1191.39 5.671196.015 5.821205.271 5.27 1209.895 5.02
1214.52 4.871219.151 4.79 1228.4 4.881233.032 4.62 1237.656 4.561242.281
4.871246.905 4.841251.536 4.71256.161 4.69 1260.786 4.761265.417 4.861270.042
4.891274.666 4.89 1279.29 5.02 1283.922 5.31288.547 5.671293.171 5.961297.802
6.221302.427 6.62 1307.052 7.221311.676 7.781316.308 8.311320.932
8.821325.557 9.39 1330.188 9.991334.812 10.891339.437 12.091344.062
13.21348.693 14.01 1353.318 14.671357.942 15.811362.573 17.091367.198
17.681371.823 18.29 1376.447 19.091381.078 20.561385.703 21.211390.327
21.671394.959 22.73 1399.583 23.661404.208 24.41408.833 24.861413.464
25.111418.089 25.26 1422.713 25.441427.344 25.81431.969 26.331436.594
26.831441.218 27.21 1445.849 27.571450.474 27.74 1459.73 27.821464.354
27.921468.979 28.09 1473.603 28.061478.235 27.861482.859 27.631487.484
27.421492.115 27.17 1496.74 27.361501.365 27.421505.989 27.32 1510.62
27.481515.245 27.82 1519.869 27.881524.501 28.051529.125 28.11 1533.75
28.091538.375 28.16 1543.006 28.02 1547.63 27.961552.255 27.671556.879
27.651561.511 27.53 1566.135 27.56 1570.76 27.441575.391 27.43

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 971.77 .035 1092.65 .085

Bank Sta: Left Right Coeff Contr. Expan. 971.77 1092.65 .6 .8
Skew Angle = 45

Downstream Deck/Roadway Coordinates
 num= 17
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 705.693 13.53 770.746 14 839.336 14.5
 904.39 13.43 907.925 15.87 918.532 15.87 11.69
 918.532 15.87 12.6 950.352 15.87 11.68 950.352 15.87 9.29
 975.1 15.87 9.37 975.1 15.87 11.681038.033 15.87 12.54
 1038.74 15.87 12.561042.275 15.87 12.561044.397 14.53 1154.705 13.66
1310.976 12.21

Downstream Bridge Cross Section Data
Station Elevation Data num= 229
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 30.39 13.866 29.54 27.733
29.3 36.975 29.22 55.465 28.71 78.574 28.34 87.816 27.8 97.057 27.69 106.299
27.27 115.548 27.32 120.166 26.85 124.79 25.95 129.415 25.32 134.032 24.84
152.523 24.02 157.14 23.58 166.389 23.17 189.498 21.34 194.115 20.86 217.23
19.5 221.848 19.12 226.472 18.92 231.09 18.53 240.339 18.06 244.956 18.03
249.58 17.83 258.822 17.84 277.313 17 286.555 16.79 305.039 16.74 314.288
17.55 323.53 17.34 332.772 16.72 337.396 15.98 342.013 14.61 360.504 10.91
365.129 10.19 374.371 8.01 378.995 7.24 383.612 7.03 392.854 6.17 402.103
4.68 406.721 5.25 411.345 5.61 415.97 5.71 420.587 6 425.212 6.59 448.32
8.85 457.562 7.64 462.186 7.66 466.804 7.47 471.428 6.82 476.053 6.42
485.294 6.43 489.919 6.33 494.536 6.38 499.161 6.27 517.645 6.41 531.511
6.35 536.135 6.47 545.377 7.02 550.002 6.99 554.619 7.28 559.244 7.38

563.868 7.29 573.11 6.83 577.734 6.9 582.352 7.11 586.976 7.54 591.594 7.67
600.843 8.28 614.709 8.74 619.327 8.7 623.951 8.89 633.193 8.92 642.435 9.16
656.301 9.06 679.409 7.92 684.034 7.87 693.276 8.14 711.767 8.03 721.008
7.67 725.633 7.59 734.875 6.85 744.117 6.67 757.983 6.5 767.225 5.93 776.474
4.92 785.716 4.87 794.958 4.63 808.824 4.77 818.066 5.08 827.315 4.89
831.932 4.44 836.557 4.21 841.181 4.34 845.799 4.26 850.423 4.58 855.041
4.66 864.29 3.13 868.907 2.96 873.531 4.8 878.156 8.74 882.766 8.52 887.384
8.77 888.826 8.77 892.001 8.77 896.618 9.01 905.097 7.63 905.146 13.43
922.272 12.93 922.435 12.51 922.59 -.25 926.593 -1.49 933.353 -4.23 944.999
-4.95 956.701 -9.03 963.596 -10.71 972.095 -13.62 977.568 -3.93 992.757 -
2.311007.189 -1.221021.168 .231035.162 1.34 1040.96 1.9 1042.495 .871043.152
12.071043.272 11.71043.308 14.721076.676 14.3 1081.308 14.411085.932
14.371090.557 13.641095.188 11.671104.437 7.02 1109.062 5.971113.693
5.731118.318 5.681122.942 5.441127.574 5.3 1132.198 5.261136.823 5.141141.447
5.071146.079 5.141150.703 5.28 1155.328 5.291159.959 5.321164.584
5.431169.208 5.33 1173.84 5.08 1178.464 4.951183.089 4.881187.713
4.931192.345 5.051196.969 4.98 1201.594 4.781206.225 4.62 1210.85
4.581215.474 4.511220.099 4.49 1224.73 4.661229.355 4.671233.979
4.651238.611 4.741243.235 4.78 1247.86 4.921252.484 5.021257.116 5.07
1261.74 5.331270.996 5.29 1275.621 5.411280.245 5.721284.877 6.331289.501
7.31294.126 8.55 1298.75 10.211303.382 12.371308.006 14.381312.631
15.891317.262 16.69 1321.887 17.451326.511 18.091331.143 18.711335.767
19.31340.392 19.75 1345.016 20.161349.648 20.491354.272 20.841358.897
21.291363.528 21.77 1368.153 22.331372.777 22.931377.401 23.51382.033
23.941386.658 24.18 1391.282 24.391395.914 24.721405.163 25.291409.787
25.61414.419 25.83 1419.043 25.961423.668 26.181428.299 26.491432.924
26.871437.548 27.28 1446.804 27.661451.428 27.661456.053 27.631465.309
27.511469.934 27.68 1479.189 27.161483.814 27.081488.438 26.54 1493.07
26.91497.695 26.99 1502.319 26.971506.951 27.031511.575 27.45 1516.2
28.041520.824 29.08 1525.456 29.1 1530.08 28.771534.704 28.461539.336
28.211543.961 28.02 1548.585 27.98 1553.21 281557.841 281562.465 28.2

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 922.272 .0351043.308 .085

Bank Sta: Left Right Coeff Contr. Expan.
 922.2721043.308 .5 .5
Skew Angle = 45

Upstream Embankment side slope = 0 horiz. to 1.0 vertical Downstream
Embankment side slope = 0 horiz. to 1.0 vertical Maximum allowable
submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Piers = 28

Pier Data
Pier Station Upstream= 973.686 Downstream= 924.189
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev

```
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream= 978.636 Downstream= 927.724
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream= 980.757 Downstream= 929.845
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream= 985 Downstream= 934.088
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream= 987.121 Downstream= 936.209
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev  1.1 -5.14 1.1 10.6 1 10.7 1
12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream= 992.778 Downstream= 941.866
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream= 995.606 Downstream= 944.695
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
```

```
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream= 999.849 Downstream= 948.937
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream= 1001.97 Downstream= 951.059
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream=1003.385 Downstream= 952.473
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7 Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream=1023.183 Downstream= 972.272
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream=1024.598 Downstream= 973.686
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream=1035.911 Downstream= 985 Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
```

```
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream=1040.861 Downstream= 989.949
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream= 1043.69 Downstream= 992.778
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4  Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream=1047.225 Downstream= 996.313
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream=1050.054 Downstream= 999.142
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream=1055.003 Downstream=1004.092
Upstream num= 4  Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream=1057.125 Downstream=1006.213
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
```

Pier Data
Pier Station Upstream=1061.367 Downstream=1010.456
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream=1064.196 Downstream=1013.284
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream=1069.145 Downstream=1018.234
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream=1071.267 Downstream=1020.355
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream=1076.217 Downstream=1025.305
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream=1078.338 Downstream=1027.426
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

```
Pier Data
Pier Station Upstream=1083.288 Downstream=1032.376
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream=1084.702 Downstream= 1033.79
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream=1088.237 Downstream= 1038.74
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7 Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
 Energy
 W.S. Pro Method

 W.S.Pro Data
 Left Embankment
 El of the top of the embankment = 13.4
 El of the toe of the abutment = -0.2
 Right Embankment
 El of the top of the embankment = 13.4
 El of the toe of the abutment = -0.2
 Abutment Type = 3 Sloping abutments and sloping embankments  Slope of
abutments = 4
 Top with of embankment = 15
 Centroid station of bridge opening =
 Wing Wall Type = No wing walls present
 Width =
 Angle =
 Radius =
 Guide Banks Type = No Guide Bank present  Length =
 Offset =
 Angle =

Selected Low Flow Methods = W.S.Pro Method

High Flow Method
```

Energy Only

Additional Bridge Parameters
Add Friction component to Momentum
Do not add Weight component to Momentum
Class B flow critical depth computations use critical depth
inside the bridge at the upstream end
Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 12469.43

INPUT
Description: 15.3 -DS Face RR Br
Station Elevation Data num= 229
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 30.39 13.866 29.54 27.733
29.3 36.975 29.22 55.465 28.71 78.574 28.34 87.816 27.8 97.057 27.69 106.299
27.27 115.548 27.32 120.166 26.85 124.79 25.95 129.415 25.32 134.032 24.84
152.523 24.02 157.14 23.58 166.389 23.17 189.498 21.34 194.115 20.86 217.23
19.5 221.848 19.12 226.472 18.92 231.09 18.53 240.339 18.06 244.956 18.03
249.58 17.83 258.822 17.84 277.313 17 286.555 16.79 305.039 16.74 314.288
17.55 323.53 17.34 332.772 16.72 337.396 15.98 342.013 14.61 360.504 10.91
365.129 10.19 374.371 8.01 378.995 7.24 383.612 7.03 392.854 6.17 402.103
4.68 406.721 5.25 411.345 5.61 415.97 5.71 420.587 6 425.212 6.59 448.32
8.85 457.562 7.64 462.186 7.66 466.804 7.47 471.428 6.82 476.053 6.42
485.294 6.43 489.919 6.33 494.536 6.38 499.161 6.27 517.645 6.41 531.511
6.35 536.135 6.47 545.377 7.02 550.002 6.99 554.619 7.28 559.244 7.38
563.868 7.29 573.11 6.83 577.734 6.9 582.352 7.11 586.976 7.54 591.594 7.67
600.843 8.28 614.709 8.74 619.327 8.7 623.951 8.89 633.193 8.92 642.435 9.16
656.301 9.06 679.409 7.92 684.034 7.87 693.276 8.14 711.767 8.03 721.008
7.67 725.633 7.59 734.875 6.85 744.117 6.67 757.983 6.5 767.225 5.93 776.474
4.92 785.716 4.87 794.958 4.63 808.824 4.77 818.066 5.08 827.315 4.89
831.932 4.44 836.557 4.21 841.181 4.34 845.799 4.26 850.423 4.58 855.041
4.66 864.29 3.13 868.907 2.96 873.531 4.8 878.156 8.74 882.766 8.52 887.384
8.77 888.826 8.77 892.001 8.77 896.618 9.01 905.097 7.63 905.146 13.43
922.272 12.93 922.435 12.51 922.59 -.25 926.593 -1.49 933.353 -4.23 944.999
-4.95 956.701 -9.03 963.596 -10.71 972.095 -13.62 977.568 -3.93 992.757 -
2.311007.189 -1.221021.168 .231035.162 1.34 1040.96 1.9 1042.495 .871043.152
12.071043.272 11.71043.308 14.721076.676 14.3 1081.308 14.411085.932
14.371090.557 13.641095.188 11.671104.437 7.02 1109.062 5.971113.693
5.731118.318 5.681122.942 5.441127.574 5.3 1132.198 5.261136.823 5.141141.447
5.071146.079 5.141150.703 5.28 1155.328 5.291159.959 5.321164.584
5.431169.208 5.33 1173.84 5.08 1178.464 4.951183.089 4.881187.713
4.931192.345 5.051196.969 4.98 1201.594 4.781206.225 4.62 1210.85
4.581215.474 4.511220.099 4.49 1224.73 4.661229.355 4.671233.979
4.651238.611 4.741243.235 4.78 1247.86 4.921252.484 5.021257.116 5.07
1261.74 5.331270.996 5.29 1275.621 5.411280.245 5.721284.877 6.331289.501
7.31294.126 8.55 1298.75 10.211303.382 12.371308.006 14.381312.631
15.891317.262 16.69 1321.887 17.451326.511 18.091331.143 18.711335.767
19.31340.392 19.75 1345.016 20.161349.648 20.491354.272 20.841358.897
21.291363.528 21.77 1368.153 22.331372.777 22.931377.401 23.51382.033

23.941386.658 24.18 1391.282 24.391395.914 24.721405.163 25.291409.787
25.61414.419 25.83 1419.043 25.961423.668 26.181428.299 26.491432.924
26.871437.548 27.28 1446.804 27.661451.428 27.661456.053 27.631465.309
27.511469.934 27.68 1479.189 27.161483.814 27.081488.438 26.54 1493.07
26.91497.695 26.99 1502.319 26.971506.951 27.031511.575 27.45 1516.2
28.041520.824 29.08 1525.456 29.1 1530.08 28.771534.704 28.461539.336
28.211543.961 28.02 1548.585 27.98 1553.21 281557.841 281562.465 28.2

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 922.272 .0351043.308 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
922.2721043.308 83.23 42.79 17.93 .5 .5 Skew Angle = 45

CROSS SECTION

RIVER: Taunton River REACH: Main Stem RS: 12426.64

INPUT
Description: 15 - Exit RR Br
Station Elevation Data num= 207
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 30.29 6.53 30.35 13.06 30.38
19.59 30.26 26.11 30.06 32.64 29.81 39.17 29.48 45.7 29.06 52.23 28.79 58.76
28.7 65.29 28.68 71.81 28.63 78.34 28.67 84.87 28.58 91.4 28.32 97.93 28.22
104.46 28.14 110.99 27.95 117.51 28.2 124.04 28.25 130.57 28.09 137.1 27.82
143.63 27.74 150.16 27.53 156.69 27.44 163.21 27.06 176.27 26.81 182.8 26.53
189.33 26.02 195.86 25.46 208.91 24.69 215.44 24.35 221.97 24.07 228.5 23.93
235.03 23.57 241.56 22.92 248.08 22.43 254.61 22.12 261.14 21.72 267.67 21.4
274.2 21.24 280.73 20.87 287.26 20.44 293.78 19.96 300.31 19.63 306.84 19.5
313.37 19.28 319.9 19.02 326.43 19.02 332.96 19.08 339.48 18.78 346.01 18.38
359.07 17.97 372.13 17.42 378.66 17.17 385.18 17 391.71 17.04 398.24 16.83
411.3 17.04 417.83 17.38 424.36 17.68 430.88 17.82 437.41 17.71 443.94 17.95
450.47 18.22 457 18.12 463.53 18.08 470.06 17.88 476.58 17.48 483.11 16.75
489.64 15.83 496.17 14.61 502.7 13.74 509.23 12.58 522.28 10.06 528.81 8.96
535.34 7.95 548.4 6.22 554.93 5.72 561.45 5.36 567.98 4.8 574.51 4.86 581.04
5.09 587.57 5.4 594.1 6.23 600.63 8.26 607.15 9.33 613.68 8.78 620.21 8.02
626.74 7.35 633.27 7.34 639.8 7.51 646.33 7.58 652.85 7.48 659.38 6.95
665.91 6.47 672.44 6.38 678.97 6.36 685.5 6.38 692.03 6.28 698.55 6.12
705.08 6.03 711.61 6.12 718.14 6.47 724.67 6.46 731.2 6.39 737.73 6.48
744.25 6.95 750.78 7.48 757.31 7.47 763.84 7.54 913.11 3.61 1041.67 4.59
1121.32 4.87 1201.45 4.07 1203.35 1.71 1205.25 .24 1217.38 -5.61 1240.17 -
8.55 1277.46 -20.01 1284.43 -22.69 1303.24 -15.82 1315.73 -9.67 1364.17 .79
1367.47 4.01 1417.05 3.29 1472.54 3.18 1539.23 5.15 1545.78 5 1552.34 4.98
1558.9 4.89 1565.45 4.86 1572.01 4.78 1578.57 4.68 1585.12 4.67 1591.68 4.52
1598.24 4.34 1604.79 4.35 1611.35 4.34 1617.91 4.16 1624.46 4.03 1631.02
4.05 1637.58 4.11 1644.13 4.15 1650.69 4.09 1657.25 4.06 1663.8 4.17 1670.36
4.01 1676.92 4.2 1683.48 4.15 1690.03 4.5 1696.59 4.76 1703.15 4.88 1709.7
4.95 1716.26 5.16 1722.82 5.29 1729.37 5.65 1735.93 6.33 1742.49 7.67
1749.04 9.85 1755.6 12.23 1762.16 14.08 1768.71 15.27 1775.27 15.75 1781.83
16.04 1788.38 16.61 1794.94 17.22 1808.05 18.26 1821.17 19.44 1827.72 20.11
1840.84 21.22 1847.39 21.67 1853.95 22.24 1860.51 22.89 1867.06 23.37
1873.62 23.82 1880.18 24.4 1886.73 24.85 1893.29 25.32 1899.85 25.7 1906.4

26.05 1912.96 26.27 1919.52 26.44 1926.07 26.51 1939.19 26.54 1945.74 26.57 1958.86 26.72 1985.09 27.2 1991.64 27.26 1998.2 26.97 2004.76 26.79 2011.31 26.88 2017.87 26.87 2024.43 26.73 2030.98 26.54 2037.54 26.4 2044.1 26.47 2050.65 26.42 2057.21 26.35 2063.77 26.61 2076.88 27.42 2083.44 27.97 2089.99 28.34 2096.55 28.57 2103.11 28.76 2116.22 29.09 2122.78 29.24

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 1201.45 .035 1367.47 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1201.45 1367.47 810.43 834.52 1253.76 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 11592.12

INPUT Description: 14
Station Elevation Data num= 322
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 32.7 6.53 32.87 13.06 33.06 19.59 33.09 26.12 32.94 32.65 32.53 39.17 32.21 45.7 31.99 52.23 31.85 58.76 31.6 65.29 31.18 71.82 30.91 78.35 30.48 84.88 29.99 91.41 29.36 97.94 28.75 104.46 28.39 110.99 28.17 117.52 27.84 124.05 27.18 130.58 26.67 137.11 26.45 143.64 25.94 150.17 24.98 156.7 23.98 163.23 22.92 169.75 22.26 176.28 21.67 182.81 21.15 189.34 20.71 195.87 20.41 208.93 20.13 215.46 20.01 221.99 19.74 228.52 19.56 235.04 19.65 241.57 19.63 248.1 19.58 254.63 19.48 261.16 19.15 267.69 18.95 274.22 18.95 280.75 19.23 287.28 19.39 293.81 19.26 300.34 19.19 313.39 18.88 326.45 18.51 332.98 18.35 339.51 18.35 346.04 18.45 352.57 18.49 359.1 18.4 372.15 18.43 378.68 18.23 385.21 18.11 391.74 18.44 398.27 18.65 411.33 18.99 417.86 19.2 424.39 19.24 430.92 19.15 437.44 19.17 443.97 18.93 450.5 18.71 457.03 18.55 463.56 18.47 470.09 18.78 476.62 18.45 483.15 17.65 489.68 16.58 496.21 15.77 502.73 15.22 509.26 14.7 515.79 13.84 522.32 12.82 528.85 11.46 541.91 7.93 548.44 6.85 554.97 6.08 561.5 5.49 568.02 4.86 574.55 4.41 581.08 4 587.61 3.94 594.14 4.23 600.67 4.4 607.2 4.43 613.73 4.85 620.26 5.64 626.79 6.79 633.31 7.37 639.84 7.33 646.37 7.27 659.43 7.02 665.96 7.12 672.49 7.19 679.02 7.21 685.55 7.18 692.08 7.02 698.61 7.1 705.13 7.3 711.66 7.28 718.19 7.05 724.72 6.77 731.25 6.44 737.78 6.06 750.84 5.47 757.37 5.21 763.9 5.05 770.42 5.28 783.48 6.47 790.01 7.02 796.54 7.76 803.07 8.53 809.6 8.85 822.66 8.92 829.19 9.06 835.71 9.27 842.24 9.31 848.77 9.09 855.3 8.65 861.83 8.11 868.36 7.63 874.89 7.34 881.42 7.41 894.48 7.69 901 7.8 907.53 7.86 914.06 7.82 920.59 7.65 927.12 7.84 933.65 8.05 940.18 8.03 953.15 7.95 959.6 7.56 966.05 7.24 972.49 6.81 985.38 5.64 991.83 5.18 998.27 4.49 1004.72 3.99 1011.16 3.85 1017.61 3.79 1024.06 3.85 1030.5 4.01 1036.95 4.28 1043.39 4.5 1049.84 4.47 1056.28 4.29 1062.73 4.24 1069.18 4.44 1075.62 4.46 1082.07 4.57 1088.51 4.66 1094.96 4.43 1101.4 4.76 1107.85 5.11 1114.3 5.31 1120.74 5.56 1127.19 5.52 1133.63 4.87 1140.08 3.24 1146.52 2.15 1153.06 .79 1165 -1.26 1165.05 -1.25 1165.49 -1.55 1168.05 -4.02 1168.64 -3.63 1169.27 -3.87 1169.82 -4.62 1170.38 -4.91 1171.34 -4.97 1172.91 -5.66 1175 -6.14 1177.08 -7.08 1179.23 -7.34 1181.08 -7.57 1183 -7.69 1184.76 -7.75 1186.69 -7.86 1188.64 -7.88 1190.93 -7.92 1192.98 -8.05 1195.19 -8.05 1197.03 -8.31 1199.24 -8.39 1201.37 -8.62 1205.92 -8.7 1208.27 -8.64 1210.54 -8.59 1213.11

-8.35 1215.52 -8.19 1217.89 -8.05 1220.17 -7.86 1222.41 -7.71 1224.3 -7.6 1226.1 -7.51 1227.61 -7.41 1229.1 -7.22 1230.31 -7.08 1231.53 -7.1 1232.6 -7.02 1233.71 -6.96 1234.69 -6.9 1235.69 -6.79 1236.59 -6.87 1237.54 -6.82 1238.4 -6.7 1239.37 -6.72 1240.26 -6.6 1241.29 -6.54 1242.23 -6.24 1243.36 -6.01 1244.63 -5.36 1245.94 -4.85 1247.2 -4.3 1248.6 -3.74 1249.84 -3.1 1251.21 -2.54 1252.55 -2.28 1253.33 -1.92 1254.01 -1.68 1254.7 -1.46 1255.27 -.91 1270.42 2.42 1276.8 5.19 1283.18 6.25 1286.15 6.53 1289.55 6.86 1295.93 7.37 1302.31 8.33 1308.69 11.15 1315.06 13.33 1321.44 15.25 1327.82 18.11 1340.57 21.99 1346.95 23.54 1353.33 24.05 1359.71 24.69 1372.46 25.64 1378.84 26.24 1391.83 26.4 1398.32 26.31 1411.3 25.34 1417.8 24.67 1424.29 24.36 1437.27 24.55 1456.75 25.27 1469.74 25.49 1476.23 25.82 1489.21 25.9 1495.71 26.06 1502.2 25.93 1508.69 25.35 1515.18 23.04 1528.17 15.1 1534.66 11.59 1541.16 9.8 1547.65 9.89 1554.14 9.18 1560.63 10.08 1567.13 11.55 1573.62 12.63 1580.11 12.96 1586.6 14.84 1593.1 17.55 1599.59 19.76 1606.08 21.46 1612.57 21.99 1619.07 21.66 1625.56 20.92 1632.05 19.74 1638.54 17.16 1645.04 15.23 1651.53 14.82 1671.01 15.48 1683.99 16.23 1690.48 16.91 1703.47 19.76 1709.96 22.39 1716.45 23.16 1722.95 23.57 1729.44 23.78 1735.9 22.35 1742.36 20.32 1748.82 18.08 1768.2 18.03 1787.59 18.97 1800.51 19.39 1813.43 20.12 1819.89 20.1 1832.81 20.34 1839.27 20.2 1845.73 20.56 1858.65 21.76 1865.11 22.74 1871.58 23.16 1878.04 23.36 1890.96 23.25 1897.42 23.77 1903.88 24.83 1929.72 26.13 1936.18 26.36 1942.64 27.89 1949.1 28.76 1955.56 29.31 1974.95 29.56 1981.41 29.53 2007.25 28.64 2026.63 28.32 2039.55 27.8 2046.01 27.25 2052.48 27.1 2065.4 27.39 2078.32 27.16 2084.78 27.32 2091.24 27.67 2097.7 28.16 2104.16 28.44 2110.62 28.56

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 1127.19 .035 1378.84 .088

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1127.19 1378.84 680.73 637.06 583.23 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 1515 2110.62 23 T

CROSS SECTION

RIVER: Taunton River REACH: Main Stem RS: 10955.06

INPUT
Description: 13 - Approach County St (Rte 140) Br
Station Elevation Data num= 178
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 27.18 13.01 27.4 19.52 27.3 26.03 27.28 32.53 27.29 39.04 27.36 85.43 26.59 298.37 16.17 447.49 15.67 606.13 13.97 681.58 16.52 700.61 16.55 703.41 15.25 704.03 -2.21 718.35 -4.16 736.89 -5.23 749.83 -2.62 752.75 10.85 757.07 10.83 759.04 -4.05 768.77 -6.13 777.69 -6.22 787.46 -4.58 800.53 -1.82 804.74 16.7 893.09 14.19 954.9 15.35 975.18 24.27 978.31 18.48 978.54 21.97 1078.67 20.98 1091.78 21.29 1098.33 21.28 1104.88 21.78 1111.44 22.9 1117.99 23.48 1124.54 23.56 1131.1 23.26 1137.65 23.41 1163.87 24.11 1170.42 24.39 1176.97 24.49 1183.53 24.43 1190.08 24.24 1196.64 24.22 1203.19 24.26 1209.74 24.16 1216.3 24.48 1222.85 25.85 1229.4 27.63 1235.96 28.29 1249.07 28.34 1262.17 28.07 1275.28 27.48 1281.83 27.35 1288.39 27.33 1301.5 27.34 1308.05 27.37 1314.6 27.13 1327.71 26.75 1334.26 26.45 1340.82 26.41 1347.37 26.44 1353.92 26.55

1360.46 26.74 1367.01 26.78 1373.55 26.75 1380.1 26.86 1386.64 27.22 1393.19 28.28 1399.73 28.47 1406.28 28.59 1412.82 28.53 1432.46 28.15 1439.01 27.96 1445.55 27.4 1452.1 27.08 1458.64 27.11 1471.73 27.03 1478.28 27.05 1484.82 27.09 1491.37 27.11 1504.46 27.06 1511 27.07 1517.55 27.1 1524.1 27.22 1530.64 27.19 1537.19 27.13 1543.73 27.3 1550.28 27.4 1556.82 25.52 1563.37 21.64 1569.91 15.39 1576.46 10.42 1583 9.64 1589.55 9.69 1596.09 11.1 1602.64 14.52 1609.18 17.77 1615.73 18.5 1622.27 18.41 1628.82 18.74 1635.37 19.9 1641.91 21.86 1648.46 23.56 1655 24.18 1661.55 24.49 1668.09 24.29 1674.64 23.48 1681.18 21.72 1687.73 19.06 1694.27 17.53 1700.82 17.29 1707.36 17.64 1713.91 18.11 1720.45 18.43 1727 19.02 1733.55 20.47 1740.09 23.24 1746.64 24.3 1753.18 24.72 1759.73 25.12 1766.27 25.24 1772.82 25.13 1779.33 24.63 1785.84 23.1 1792.34 19.63 1798.85 18.79 1805.36 19.22 1811.87 19.5 1818.38 19.95 1824.89 20.34 1831.4 20.65 1844.42 21.1 1850.93 21.18 1857.43 21.44 1863.94 21.82 1870.45 22.15 1876.96 22.44 1889.98 22.93 1896.49 23.24 1903 23.43 1909.51 23.3 1916.02 23.71 1922.52 24.02 1929.03 24.21 1935.54 24.67 1942.05 25.03 1948.56 25 1955.07 25.77 1961.58 26.14 1974.6 26.4 1981.11 26.82 1987.61 28.47 1994.12 29.38 2013.65 29.39 2020.16 29.38 2026.67 29.47 2033.18 29.34 2039.69 29.04 2046.2 28.76 2059.21 28.68 2065.72 28.49 2072.23 27.84 2078.74 27.1 2085.25 26.88 2091.76 27.16 2098.27 27.33 2104.78 27.27 2111.29 27.25 2117.79 27.19 2124.3 27.42 2130.81 27.73 2137.32 28.15 2143.83 28.12 2150.34 28.12 2156.85 28.09 2163.36 28.29

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 700.61 .035 804.74 .088

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 700.61 804.74 122 83.42 73.8 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 1400 2163.36 28 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 10871.64

INPUT
Description: 12.7 - US Face County St (rte140) Br
Station Elevation Data num= 348
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 22.12 5.918 22.22 11.827 22.26 17.746 22.32 23.655 22.31 29.573 22.34 35.482 22.28 41.4 22.2 47.309 22.19 53.227 22.03 59.146 21.71 65.055 21.52 70.973 21.56 76.882 21.75 82.8 21.97 94.628 22.48 100.537 22.77 106.455 22.98 112.373 23.02 118.282 23.04 124.2 23.04 130.11 22.96 141.937 22.91 147.855 22.91 153.773 23.11 159.682 23.12 165.601 22.97 177.428 23.06 183.337 23.03 195.164 22.94 201.083 22.92 207.001 22.96 212.91 22.95 218.828 22.82 224.737 22.81 236.564 22.86 248.392 23.08 254.31 23.16 260.228 23.16 266.137 23.12 272.055 23.17 277.965 23.26 283.883 23.25 289.792 23.2 301.619 23.49 307.537 23.5 313.456 23.77 319.365 24.47 325.283 24.89 331.192 25.01 337.11 25.05 343.019 25.04 354.856 24.94 366.683 25.25 372.592 25.22 378.51 25.14 384.42 24.91 390.338 24.35 396.247 23.74 402.165 23.31 408.083 22.8 413.992 22.54 419.911 22.44 425.82 22.32 431.738 22.23 437.647 22.36 443.565 22.34 449.474 22.45 455.392 22.49 461.311 22.6 467.22 22.54 473.138 22.44 479.047 22.62 490.874 22.09 496.793

22.16 502.702 21.9 508.62 21.85 514.538 21.78 520.447 21.51 526.365 21.6
532.275 21.61 538.193 21.6 544.102 21.11 550.02 20.66 555.929 20.54 561.847
20.25 567.766 20.46 573.675 20.24 579.593 20.13 585.502 20.25 591.42 20.26
597.329 20.13 603.248 19.84 609.166 18.73 615.075 17.9 620.993 17.6 626.902
17.55 632.82 17.09 638.729 16.67 644.648 16.58 650.557 16.51 662.393 16.14
668.302 15.98 674.221 15.77 680.13 15.62 691.957 15.43 697.875 15.48 703.784
15.47 709.702 15.54 715.621 15.78 721.53 16 733.357 15.97 739.275 15.97
745.184 15.91 751.103 16.28 757.021 16.63 762.93 16.65 768.848 17.38 774.757
18.44 780.675 18.64 786.585 18.49 792.503 18.25 798.412 17.94 810.248 17.7
816.157 17.36 822.076 15.75 827.985 14.16 833.903 13.84 839.812 13.38 845.73
13.06 851.639 13.42 857.558 13.82 863.476 14.15 875.285 14.2 881.194 14.25
887.094 14.37 892.994 14.71 898.894 15.11 904.803 15.2 910.703 15.38 916.603
15.67 922.504 15.67 928.413 15.17 940.213 14.34 969.749 16.77 976.447 17.36
996.893 17.7 996.93 -1.091009.591 -5.331025.478 -4.39 1034.043 .511041.511 -
4.991054.063 -5.261058.368 -6.03 1062.99 17.87 1128.906 15.841134.716
15.451140.525 15.121146.343 14.871152.153 14.48 1157.962 14.621163.772
15.311169.581 15.461175.391 14.92 1181.2 14.47 1187.009 14.341192.819
14.071198.628 13.951204.438 14.031210.247 14.06 1216.057 14.131221.866
14.291227.685 14.281233.494 14.391239.303 14.61 1250.922 14.781256.859
14.851268.731 14.741274.667 14.791280.604 14.65 1286.54 14.571298.413
15.021304.349 15.231310.276 15.361316.213 15.45 1322.149 15.661328.085
15.831334.022 16.121339.958 16.331345.894 16.49 1351.831 16.741357.767
17.041363.703 17.62 1369.64 19.191375.576 21.34 1381.512 21.651387.448
21.581399.321 21.931405.257 22.15 1417.13 22.65 1423.066 22.941429.003
23.271434.939 23.491440.875 23.631446.812 23.64 1452.748 23.681458.684
23.671464.621 23.641470.557 23.81482.421 23.95 1488.357 24.13 1494.23
24.241500.103 24.391505.975 24.61511.848 24.79 1517.721 24.921523.594
25.221529.467 25.82 1535.34 26.121541.213 26.38 1547.086 27.071552.958
27.461558.831 27.481570.577 27.43 1576.45 27.49 1582.323 27.431588.196
27.41594.059 27.391599.932 27.411605.805 27.29 1611.678 27.241617.551
27.161623.424 27.131629.297 27.2 1635.17 27.43 1641.042 27.731664.697
28.151670.624 28.311676.543 28.21 1682.47 28.25 1688.397 28.171694.324
28.181700.252 28.161712.106 28.21718.033 28.11 1723.961 28.081729.888
281735.815 28.031741.733 27.971747.661 27.85 1753.588 28.031759.515
27.911765.442 28.03 1771.37 28.181777.297 28.18 1783.224 28.131789.151
28.231801.006 28.181806.924 28.071812.851 28.17 1818.779 27.141824.706
19.841830.633 11.63 1836.56 9.511842.488 9.79 1848.415 12.821860.269
25.851866.188 27.871872.115 27.771878.042 27.02 1883.969 25.971889.896
25.131895.824 24.581901.751 24.511907.678 24.93 1913.605 25.561919.533 26.01
1925.46 25.051931.378 23.911937.306 22.97 1943.233 22.31 1949.16
22.071955.087 22.221961.015 22.611966.942 23.19 1972.869 23.91978.796
24.721984.723 25.651990.651 25.761996.569 25.95 2002.496 26.162008.423
26.262014.351 26.212020.278 26.482026.196 26.1 2032.123 25.462038.042 25.06
2043.96 25.162055.805 25.212061.733 25.28 2067.651 25.182073.578
25.282079.496 25.362091.342 25.69 2097.26 26.01 2103.187 26.152109.105
26.142115.032 26.12120.951 25.942126.878 25.63 2132.796 25.722138.723
25.942144.642 26.272150.569 26.482162.405 26.41 2174.25 26.442180.178
26.52186.096 26.642197.941 26.462203.869 27.32 2209.787 28.372221.632
28.382227.551 28.42233.478 28.342245.323 28.42 2251.241 28.422257.169
28.462263.087 28.482269.014 28.382274.932 27.51 2280.85 26.942286.778
26.722292.696 26.812298.623 26.872304.542 26.95 2310.469 26.942316.387
272322.314 27.012334.159 27.192345.996 27.25 2351.923 27.142357.842
27.182363.769 27.282369.687 27.262375.614 27.33 2381.532 27.522387.459
27.62393.378 27.52

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 996.893 .035 1062.99 .088

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 996.893
1062.99 69.68 77.94 70.04 .6 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 18002393.378 28 T
Skew Angle = 25

BRIDGE

RIVER: Taunton River
REACH: Main Stem RS: 10832.75

INPUT
Description:
Distance from Upstream XS = 5
Deck/Roadway Width = 55
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
 num= 21
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 270.99 23 402.4 23.21 626.26 17.21
 708.73 15.41 886.37 15.12 941.65 16.96
 992.41 17.7 12.53 1041.35 17.9 12.29 1043.16 17.93 12.29
 1075.79 17.8 12.29 1087.57 17.61 1102.07 17.5
 1159.17 16 1224.42 13.49 1252.52 14.16
 1316.87 15.27 1382.12 20.62 1433.78 24.08
 1456.44 25.34 1513.53 26.75 1547 26.75
 Upstream Bridge Cross Section Data
Station Elevation Data num= 348
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 22.12 5.918 22.22 11.827
22.26 17.746 22.32 23.655 22.31 29.573 22.34 35.482 22.28 41.4 22.2 47.309
22.19 53.227 22.03 59.146 21.71 65.055 21.52 70.973 21.56 76.882 21.75 82.8
21.97 94.628 22.48 100.537 22.77 106.455 22.98 112.373 23.02 118.282 23.04
124.2 23.04 130.11 22.96 141.937 22.91 147.855 22.91 153.773 23.11 159.682
23.12 165.601 22.97 177.428 23.06 183.337 23.03 195.164 22.94 201.083 22.92
207.001 22.96 212.91 22.95 218.828 22.82 224.737 22.81 236.564 22.86 248.392
23.08 254.31 23.16 260.228 23.16 266.137 23.12 272.055 23.17 277.965 23.26
283.883 23.25 289.792 23.2 301.619 23.49 307.537 23.5 313.456 23.77 319.365
24.47 325.283 24.89 331.192 25.01 337.11 25.05 343.019 25.04 354.856 24.94
366.683 25.25 372.592 25.22 378.51 25.14 384.42 24.91 390.338 24.35 396.247
23.74 402.165 23.31 408.083 22.8 413.992 22.54 419.911 22.44 425.82 22.32
431.738 22.23 437.647 22.36 443.565 22.34 449.474 22.45 455.392 22.49
461.311 22.6 467.22 22.54 473.138 22.44 479.047 22.62 490.874 22.09 496.793
22.16 502.702 21.9 508.62 21.85 514.538 21.78 520.447 21.51 526.365 21.6
532.275 21.61 538.193 21.6 544.102 21.11 550.02 20.66 555.929 20.54 561.847
20.25 567.766 20.46 573.675 20.24 579.593 20.13 585.502 20.25 591.42 20.26
597.329 20.13 603.248 19.84 609.166 18.73 615.075 17.9 620.993 17.6 626.902
17.55 632.82 17.09 638.729 16.67 644.648 16.58 650.557 16.51 662.393 16.14
668.302 15.98 674.221 15.77 680.13 15.62 691.957 15.43 697.875 15.48 703.784
15.47 709.702 15.54 715.621 15.78 721.53 16 733.357 15.97 739.275 15.97

745.184 15.91 751.103 16.28 757.021 16.63 762.93 16.65 768.848 17.38 774.757
18.44 780.675 18.64 786.585 18.49 792.503 18.25 798.412 17.94 810.248 17.7
816.157 17.36 822.076 15.75 827.985 14.16 833.903 13.84 839.812 13.38 845.73
13.06 851.639 13.42 857.558 13.82 863.476 14.15 875.285 14.2 881.194 14.25
887.094 14.37 892.994 14.71 898.894 15.11 904.803 15.2 910.703 15.38 916.603
15.67 922.504 15.67 928.413 15.17 940.213 14.34 969.749 16.77 976.447 17.36
996.893 17.7 996.93 -1.091009.591 -5.331025.478 -4.39 1034.043 .511041.511 -
4.991054.063 -5.261058.368 -6.03 1062.99 17.87 1128.906 15.841134.716
15.451140.525 15.121146.343 14.871152.153 14.48 1157.962 14.621163.772
15.311169.581 15.461175.391 14.92 1181.2 14.47 1187.009 14.341192.819
14.071198.628 13.951204.438 14.031210.247 14.06 1216.057 14.131221.866
14.291227.685 14.281233.494 14.391239.303 14.61 1250.922 14.781256.859
14.851268.731 14.741274.667 14.791280.604 14.65 1286.54 14.571298.413
15.021304.349 15.231310.276 15.361316.213 15.45 1322.149 15.661328.085
15.831334.022 16.121339.958 16.331345.894 16.49 1351.831 16.741357.767
17.041363.703 17.62 1369.64 19.191375.576 21.34 1381.512 21.651387.448
21.581399.321 21.931405.257 22.15 1417.13 22.65 1423.066 22.941429.003
23.271434.939 23.491440.875 23.631446.812 23.64 1452.748 23.681458.684
23.671464.621 23.641470.557 23.81482.421 23.95 1488.357 24.13 1494.23
24.241500.103 24.391505.975 24.61511.848 24.79 1517.721 24.921523.594
25.221529.467 25.82 1535.34 26.121541.213 26.38 1547.086 27.071552.958
27.461558.831 27.481570.577 27.43 1576.45 27.49 1582.323 27.431588.196
27.41594.059 27.391599.932 27.411605.805 27.29 1611.678 27.241617.551
27.161623.424 27.131629.297 27.2 1635.17 27.43 1641.042 27.731664.697
28.151670.624 28.311676.543 28.21 1682.47 28.25 1688.397 28.171694.324
28.181700.252 28.161712.106 28.21718.033 28.11 1723.961 28.081729.888
281735.815 28.031741.733 27.971747.661 27.85 1753.588 28.031759.515
27.911765.442 28.03 1771.37 28.181777.297 28.18 1783.224 28.131789.151
28.231801.006 28.181806.924 28.071812.851 28.17 1818.779 27.141824.706
19.841830.633 11.63 1836.56 9.511842.488 9.79 1848.415 12.821860.269
25.851866.188 27.871872.115 27.771878.042 27.02 1883.969 25.971889.896
25.131895.824 24.581901.751 24.511907.678 24.93 1913.605 25.561919.533 26.01
1925.46 25.051931.378 23.911937.306 22.97 1943.233 22.31 1949.16
22.071955.087 22.221961.015 22.611966.942 23.19 1972.869 23.91978.796
24.721984.723 25.651990.651 25.761996.569 25.95 2002.496 26.162008.423
26.262014.351 26.212020.278 26.482026.196 26.1 2032.123 25.462038.042 25.06
2043.96 25.162055.805 25.212061.733 25.28 2067.651 25.182073.578
25.282079.496 25.362091.342 25.69 2097.26 26.01 2103.187 26.152109.105
26.142115.032 26.12120.951 25.942126.878 25.63 2132.796 25.722138.723
25.942144.642 26.272150.569 26.482162.405 26.41 2174.25 26.442180.178
26.52186.096 26.642197.941 26.462203.869 27.32 2209.787 28.372221.632
28.382227.551 28.42233.478 28.342245.323 28.42 2251.241 28.422257.169
28.462263.087 28.482269.014 28.382274.932 27.51 2280.85 26.942286.778
26.722292.696 26.812298.623 26.872304.542 26.95 2310.469 26.942316.387
272322.314 27.012334.159 27.192345.996 27.25 2351.923 27.142357.842
27.182363.769 27.282369.687 27.262375.614 27.33 2381.532 27.522387.459
27.62393.378 27.52

Manning's n Values num= 3 Sta n Val Sta n Val Sta n Val
 0 .085 996.893 .035 1062.99 .088

Bank Sta: Left Right Coeff Contr. Expan.
 996.893 1062.99 .6 .5
Ineffective Flow num= 1

```
 Sta L Sta R Elev Permanent
 18002393.378 28 T
Skew Angle = 25

Downstream Deck/Roadway Coordinates
 num= 21
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 270.99 25.35 402.4 23.21 626.26 17.21
 708.73 15.41 886.37 15.12 941.65 16.96
 992.41 17.7 12.53 1041.35 17.9 12.29 1043.16 17.93 12.29
 1075.79 17.8 12.29 1087.57 17.61 1102.07 17.5
 1159.17 16 1224.42 13.49 1252.52 14.16
 1316.87 15.27 1382.12 20.62 1433.78 24.08
 1456.44 25.34 1513.53 26.75 1725 26.75

Downstream Bridge Cross Section Data Station Elevation Data num= 379
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  0 22.57 5.927 22.65 11.855
22.7 17.782 22.67 23.709 22.79  29.636 22.86 35.564 22.87 41.491 22.89 47.418
22.83 53.345 22.81  59.282 22.85 65.209 22.82 71.136 22.81 77.063 22.88
82.991 22.95  88.918 22.99 94.845 22.99 100.772 23.05 106.7 23.15 112.627
23.18  118.554 23.11 124.481 23.29 130.409 23.38 136.336 23.43 142.263 23.48
148.19 23.62 154.118 23.75 160.045 23.8 165.972 23.77 171.908 23.67  177.836
23.55 183.763 23.62 189.69 23.7 195.617 24.01 201.545 24.51  207.472 24.86
213.399 24.87 219.326 24.78 225.254 24.82 231.181 24.87  237.108 24.86
243.036 24.85 248.963 24.93 254.89 24.64 260.817 24.72  266.745 24.75 272.672
24.85 278.599 24.8 284.535 24.82 290.463 24.9  296.39 24.83 302.317 24.91
308.244 25.04 314.172 25.31 320.099 25.68  326.026 26.28 331.953 26.39
337.881 26.41 343.808 26.43 349.735 26.34  355.662 26.06 361.59 25.86 367.517
25.7 373.444 25.61 379.371 25.38  385.299 25.1 391.226 24.67 397.162 24.14
403.089 23.91 409.017 23.54  414.944 23.5 420.871 23.41 426.798 23.24 432.726
23.08 438.653 22.59  444.58 22.36 450.507 21.93 456.435 21.4 462.362 21.25
468.289 21.26  474.216 21.22 480.144 21.09 486.071 21.26 491.998 21.61
497.926 21.7  503.853 21.97 509.78 21.9 515.716 20.86 521.644 20.44 527.571
19.9  533.498 19.65 539.425 19.69 545.353 19.53 557.207 19.23 569.062 18.9
574.989 18.8 580.916 18.65 586.843 18.32 592.771 18.32 598.698 18.2  604.625
17.82 610.552 17.63 616.48 17.61 622.407 17.42 640.198 17.31  652.052 17.26
663.907 17.11 669.834 16.94 675.761 16.62 681.688 16.45  687.616 16.35
693.543 16.39 699.47 16.58 705.398 16.71 711.325 16.78  717.252 16.88 729.107
16.97 735.034 17 740.97 17.01 746.897 16.98  752.825 16.95 758.752 17.11
764.679 17.2 770.606 17.14 776.534 17.11  782.461 17.07 788.388 17 794.315
16.9 800.243 16.65 806.17 16.1  812.097 15.5 818.024 15.01 823.952 14.75
829.879 14.68 835.806 14.5  841.733 14.26 847.661 14.13 853.597 14.11 859.524
13.99 865.451 13.74  871.379 13.34 877.306 12.87 883.233 12.44 889.16 11.97
895.088 11.83  901.015 11.72 906.942 11.6 912.869 11.59 918.797 11.77 924.724
12.06  930.651 12.9 936.578 13.39 945.225 15.11 951.098 14.73 978.812 16.77
985.51 17.361005.956 17.71005.993 -1.091018.654 -5.331034.541 -4.39 1043.106
.511050.574 -4.991063.126 -5.261067.431 -6.031072.053 17.87 1125.843
15.981131.679 16.021137.525 16.181143.371 16.481149.207 16.12 1155.053
16.081160.899 15.911166.735 15.811172.581 15.831178.427 15.66 1184.263
15.531190.109 15.511195.946 15.461201.791 15.811207.637 15.83 1213.474
15.441219.319 15.451225.165 15.061231.002 14.681236.847 14.38 1242.693 14.24
1248.53 14.131254.375 13.951260.212 13.871266.058 13.91 1271.903
14.051283.586 14.271289.431 14.321301.114 14.411306.986 14.32 1312.868
14.221324.623 14.361330.505 14.42 1342.26 14.451348.133 14.41 1359.888
```

14.561371.642 14.931377.525 15.121383.406 15.351389.279 15.5 1395.161
15.421406.916 161418.671 171424.544 17.231430.426 17.44 1436.299 17.75
1442.18 18.091448.062 18.491453.935 18.7 1465.69 19.22 1471.572 20.351477.445
20.761483.327 20.78 1489.2 20.671495.082 20.73 1506.836 21.211512.709
21.561524.473 21.71530.346 22.021542.101 22.59 1547.983 22.71553.856
22.711559.738 22.79 1565.61 22.871577.365 23.07 1583.247 23.181600.884
23.741606.757 24.21612.639 24.31618.512 24.34 1630.267 24.541636.148
24.731642.021 24.641647.903 24.571653.776 24.45 1665.54 25.121671.413
25.211677.295 25.141683.168 25.11 1689.05 25.09 1694.922 25.11700.804
25.121706.677 25.011712.559 24.791718.432 24.79 1724.323 25.471730.205
26.851736.087 26.831741.969 26.81747.851 26.24 1753.733 25.881759.615
25.681765.497 25.511771.379 25.09 1777.27 24.64 1783.152 24.371789.033
24.511794.915 24.621800.797 24.831806.679 24.95 1812.561 25.251818.443
25.781824.334 26.141830.216 26.081836.098 25.93 1841.98 25.781847.862
25.651853.744 25.531859.626 25.411865.508 25.35 1871.399 25.21877.281
24.181883.163 21.191889.045 15.461894.927 9.73 1900.808 9.5 1906.69
10.591912.572 14.451918.454 19.371924.345 23.96 1930.227 26.171936.109
26.171941.991 26.231947.873 26.481953.755 26.29 1959.637 26.031965.519 25.85
1971.41 25.791977.292 25.791983.174 25.76 1989.056 25.641994.938
25.572000.819 25.532006.701 25.432012.583 25.34 2018.474 25.112024.356
25.092030.238 25.09 2036.12 24.962042.002 24.9 2047.884 24.642053.766
24.512059.648 24.352065.539 24.192071.421 23.93 2077.303 23.722083.185
23.432089.067 23.262094.949 23.072100.831 22.95 2106.712 22.92112.604
22.782118.485 22.92124.358 23.482130.231 24.02 2136.104 24.272141.977 24.2
2147.85 24.352153.723 24.572159.596 24.8 2165.469 24.842171.341 24.822177.214
24.792183.087 24.68 2188.96 24.54 2194.842 24.262200.715 24.072206.588 24.68
2212.46 24.222218.333 24.2 2224.206 24.042230.079 23.912235.952 23.962241.825
24.172247.698 24.29 2253.571 24.582259.444 24.822265.316 252271.189
25.12277.071 25.13 2282.944 25.062288.817 24.99 2294.69 24.932300.562
24.872306.436 24.82 2312.309 24.582318.181 24.552324.054 24.582329.927 24.46
2335.8 24.1 2341.673 24.042347.546 24.262353.427 23.882359.301 23.522365.173
24.02 2371.046 25.122376.919 25.752382.792 26.162388.665 26.572394.538 26.91
2400.411 26.982406.283 27.052412.156 27.042418.029 26.732423.902 26.61
2429.775 26.412435.657 26.45 2441.53 26.532447.403 26.652453.275 26.75
2459.148 26.952465.021 27.122470.894 27.42476.767 27.52

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .0851005.956 .0351072.053 .088

Bank Sta: Left Right Coeff Contr. Expan.
 1005.9561072.053 .5 .5
Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 18502476.767 25 T
Skew Angle = 25

Upstream Embankment side slope = 0 horiz. to 1.0 vertical Downstream
Embankment side slope = 0 horiz. to 1.0 vertical Maximum allowable
submergence for weir flow = .98 Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
 Energy
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
 Pressure and Weir flow
 Submerged Inlet Cd =
 Submerged Inlet + Outlet Cd = .8
 Max Low Cord =

Additional Bridge Parameters
 Add Friction component to Momentum
 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 10793.7

INPUT Description: 12.3- DS Face County St (Rte140) Br
Station Elevation Data num= 379
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 22.57 5.927 22.65 11.855
22.7 17.782 22.67 23.709 22.79 29.636 22.86 35.564 22.87 41.491 22.89 47.418
22.83 53.345 22.81 59.282 22.85 65.209 22.82 71.136 22.81 77.063 22.88
82.991 22.95 88.918 22.99 94.845 22.99 100.772 23.05 106.7 23.15 112.627
23.18 118.554 23.11 124.481 23.29 130.409 23.38 136.336 23.43 142.263 23.48
148.19 23.62 154.118 23.75 160.045 23.8 165.972 23.77 171.908 23.67 177.836
23.55 183.763 23.62 189.69 23.7 195.617 24.01 201.545 24.51 207.472 24.86
213.399 24.87 219.326 24.78 225.254 24.82 231.181 24.87 237.108 24.86
243.036 24.85 248.963 24.93 254.89 24.64 260.817 24.72 266.745 24.75 272.672
24.85 278.599 24.8 284.535 24.82 290.463 24.9 296.39 24.83 302.317 24.91
308.244 25.04 314.172 25.31 320.099 25.68 326.026 26.28 331.953 26.39
337.881 26.41 343.808 26.43 349.735 26.34 355.662 26.06 361.59 25.86 367.517
25.7 373.444 25.61 379.371 25.38 385.299 25.1 391.226 24.67 397.162 24.14
403.089 23.91 409.017 23.54 414.944 23.5 420.871 23.41 426.798 23.24 432.726
23.08 438.653 22.59 444.58 22.36 450.507 21.93 456.435 21.4 462.362 21.25
468.289 21.26 474.216 21.22 480.144 21.09 486.071 21.26 491.998 21.61
497.926 21.7 503.853 21.97 509.78 21.9 515.716 20.86 521.644 20.44 527.571
19.9 533.498 19.65 539.425 19.69 545.353 19.53 557.207 19.23 569.062 18.9
574.989 18.8 580.916 18.65 586.843 18.32 592.771 18.32 598.698 18.2 604.625
17.82 610.552 17.63 616.48 17.61 622.407 17.42 640.198 17.31 652.052 17.26
663.907 17.11 669.834 16.94 675.761 16.62 681.688 16.45 687.616 16.35
693.543 16.39 699.47 16.58 705.398 16.71 711.325 16.78 717.252 16.88 729.107
16.97 735.034 17 740.97 17.01 746.897 16.98 752.825 16.95 758.752 17.11
764.679 17.2 770.606 17.14 776.534 17.11 782.461 17.07 788.388 17 794.315
16.9 800.243 16.65 806.17 16.1 812.097 15.5 818.024 15.01 823.952 14.75
829.879 14.68 835.806 14.5 841.733 14.26 847.661 14.13 853.597 14.11 859.524
13.99 865.451 13.74 871.379 13.34 877.306 12.87 883.233 12.44 889.16 11.97

895.088 11.83 901.015 11.72 906.942 11.6 912.869 11.59 918.797 11.77 924.724
12.06 930.651 12.9 936.578 13.39 945.225 15.11 951.098 14.73 978.812 16.77
985.51 17.361005.956 17.71005.993 -1.091018.654 -5.331034.541 -4.39 1043.106
.511050.574 -4.991063.126 -5.261067.431 -6.031072.053 17.87 1125.843
15.981131.679 16.021137.525 16.181143.371 16.481149.207 16.12 1155.053
16.081160.899 15.911166.735 15.811172.581 15.831178.427 15.66 1184.263
15.531190.109 15.511195.946 15.461201.791 15.811207.637 15.83 1213.474
15.441219.319 15.451225.165 15.061231.002 14.681236.847 14.38 1242.693 14.24
1248.53 14.131254.375 13.951260.212 13.871266.058 13.91 1271.903
14.051283.586 14.271289.431 14.321301.114 14.411306.986 14.32 1312.868
14.221324.623 14.361330.505 14.42 1342.26 14.451348.133 14.41 1359.888
14.561371.642 14.931377.525 15.121383.406 15.351389.279 15.5 1395.161
15.421406.916 161418.671 171424.544 17.231430.426 17.44 1436.299 17.75
1442.18 18.091448.062 18.491453.935 18.7 1465.69 19.22 1471.572 20.351477.445
20.761483.327 20.78 1489.2 20.671495.082 20.73 1506.836 21.211512.709
21.561524.473 21.71530.346 22.021542.101 22.59 1547.983 22.71553.856
22.711559.738 22.79 1565.61 22.871577.365 23.07 1583.247 23.181600.884
23.741606.757 24.21612.639 24.31618.512 24.34 1630.267 24.541636.148
24.731642.021 24.641647.903 24.571653.776 24.45 1665.54 25.121671.413
25.211677.295 25.141683.168 25.11 1689.05 25.09 1694.922 25.11700.804
25.121706.677 25.011712.559 24.791718.432 24.79 1724.323 25.471730.205
26.851736.087 26.831741.969 26.81747.851 26.24 1753.733 25.881759.615
25.681765.497 25.511771.379 25.09 1777.27 24.64 1783.152 24.371789.033
24.511794.915 24.621800.797 24.831806.679 24.95 1812.561 25.251818.443
25.781824.334 26.141830.216 26.081836.098 25.93 1841.98 25.781847.862
25.651853.744 25.531859.626 25.411865.508 25.35 1871.399 25.21877.281
24.181883.163 21.191889.045 15.461894.927 9.73 1900.808 9.5 1906.69
10.591912.572 14.451918.454 19.371924.345 23.96 1930.227 26.171936.109
26.171941.991 26.231947.873 26.481953.755 26.29 1959.637 26.031965.519 25.85
1971.41 25.791977.292 25.791983.174 25.76 1989.056 25.641994.938
25.572000.819 25.532006.701 25.432012.583 25.34 2018.474 25.112024.356
25.092030.238 25.09 2036.12 24.962042.002 24.9 2047.884 24.642053.766
24.512059.648 24.352065.539 24.192071.421 23.93 2077.303 23.722083.185
23.432089.067 23.262094.949 23.072100.831 22.95 2106.712 22.92112.604
22.782118.485 22.92124.358 23.482130.231 24.02 2136.104 24.272141.977 24.2
2147.85 24.352153.723 24.572159.596 24.8 2165.469 24.842171.341 24.822177.214
24.792183.087 24.68 2188.96 24.54 2194.842 24.262200.715 24.072206.588 24.68
2212.46 24.222218.333 24.2 2224.206 24.042230.079 23.912235.952 23.962241.825
24.172247.698 24.29 2253.571 24.582259.444 24.822265.316 252271.189
25.12277.071 25.13 2282.944 25.062288.817 24.99 2294.69 24.932300.562
24.872306.436 24.82 2312.309 24.582318.181 24.552324.054 24.582329.927 24.46
2335.8 24.1 2341.673 24.042347.546 24.262353.427 23.882359.301 23.522365.173
24.02 2371.046 25.122376.919 25.752382.792 26.162388.665 26.572394.538 26.91
2400.411 26.982406.283 27.052412.156 27.042418.029 26.732423.902 26.61
2429.775 26.412435.657 26.45 2441.53 26.532447.403 26.652453.275 26.75
2459.148 26.952465.021 27.122470.894 27.42476.767 27.52

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .0851005.956 .0351072.053 .088

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1005.9561072.053 110.75 131.98 150.03 .5 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent

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 18502476.767 25 T
Skew Angle = 25

CROSS SECTION


RIVER: Taunton River
REACH: Main Stem RS: 10661.72

INPUT Description: 12- Exit County St (Rte 140) Br
Station Elevation Data num= 368
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  0 22.51 6.53 22.64 13.07 22.54
19.6 22.41 26.14 22.37  32.67 22.64 39.21 23.02 45.74 23.19 52.28 23.08 65.35
23.11  71.88 22.75 78.42 22.28 84.95 21.77 91.49 21.47 98.02 21.35  104.56
21.16 111.09 20.99 117.63 20.6 124.16 20.34 130.7 20.86  137.23 21.84 143.76
22.49 150.3 22.68 163.37 22.52 169.9 22.12  176.44 21.62 182.97 20.86 189.51
20.3 196.04 20.13 202.58 20.11  209.11 20.04 215.65 20 222.18 20 228.72 20.23
235.25 20.58  241.79 20.86 248.32 21.22 254.86 21.55 261.39 21.71 267.93
21.93  280.99 21.92 287.53 22 294.06 22.05 300.6 21.98 307.13 21.85  313.67
21.79 320.2 21.67 333.27 21.55 339.81 21.43 346.34 21.23  352.88 20.66 359.41
19.91 365.95 19.33 372.48 19.02 379.02 18.9  385.55 18.89 392.09 18.94 398.62
19.02 405.16 19.22 411.69 19.58  418.22 19.97 424.76 20.3 431.29 20.66 437.83
21.07 444.36 21.45  450.9 21.64 457.43 21.65 463.97 21.57 470.5 21.45 477.04
21.36  483.57 21.17 490.11 21.11 496.64 21.33 503.18 21.52 509.71 21.64
516.25 21.74 522.78 21.87 529.32 22.08 535.85 22.39 542.39 22.49  548.92
22.47 555.46 22.33 561.99 21.77 568.52 21.4 575.06 21.28  581.59 20.95 588.13
20.78 594.66 20.64 601.2 20.53 607.73 20.59  614.27 20.73 620.8 20.82 627.34
20.86 633.87 20.79 640.41 20.69  646.94 20.64 653.48 20.61 660.01 20.55
666.55 20.61 673.08 20.79  679.62 20.94 686.15 21.03 692.69 21.04 705.75
21.22 712.29 21.32  725.36 21.67 731.89 21.86 738.43 22.01 744.96 22.18 751.5
22.41  758.03 22.6 764.57 22.71 771.1 22.84 777.64 23.03 784.17 23.19  790.71
23.43 797.24 23.6 803.78 23.69 810.31 23.68 816.85 23.53  823.38 23.41 829.92
23.33 836.45 23.15 842.99 22.9 849.52 22.82  856.05 22.83 862.59 22.79 869.12
22.81 875.66 22.86 882.19 22.87  888.73 22.86 895.26 22.98 901.8 23.29 908.33
23.58 914.87 23.9  921.4 24.14 927.94 24.29 934.47 24.56 941.01 24.65 947.54
24.56  954.08 24.7 960.61 24.78 967.15 24.76 973.68 24.76 980.22 24.83
986.75 24.84 993.29 24.72 999.82 24.77 1006.35 24.92 1012.89 24.91  1019.42
24.94 1025.96 24.94 1032.49 25.17 1039.03 25.55 1045.56 25.97  1052.1 26.16
1058.63 26.08 1071.7 25.8 1084.77 25.65 1097.84 25.39  1104.38 25.36 1110.91
25.38 1117.45 25.44 1123.98 25.44 1137.05 25.37  1143.58 25.29 1150.12 25.23
1156.65 25.19 1163.19 25.25 1169.72 25.14  1176.26 24.77 1182.79 23.62
1189.33 23.04 1195.86 24.38 1202.4 24.38  1208.93 23.95 1215.47 23.76 1222
23.64 1235.07 23.45 1241.61 23.48  1248.14 23.38 1254.68 23.1 1261.21 22.91
1267.74 22.78 1280.81 22.31  1287.35 22.25 1293.88 22.08 1300.42 21.85
1306.95 21.72 1313.49 21.85  1320.02 21.75 1339.06 21.92 1342.07 20.28
1472.56 19.77 1586.79 19.53  1625.79 17.65 1671.94 18.44 1711.72 16.56
1815.56 5.22 1817.54 2.37  1835.16 -.21 1836.63 .45 1848.07 -4.27 1860.2 -
5.36 1882.27 -8.58  1904.26 -7.66 1926.37 -8.42 1959.41 -4.06 1972.09 -.45
1972.89 .12  1979.26 1.38 1982.44 4.69 1986.89 5.25 2011.22 5.11 2068.44 3.88
2076.75 -1.17 2117.63 -.74 2139.51 10.4 2146.45 11.68 2174.91 11.66  2184.6
11.25 2221.65 12.08 2228.21 12.19 2234.77 12.18 2241.33 12.07  2247.89 11.82
2254.45 11.66 2261 11.66 2274.12 11.89 2280.68 11.78  2287.24 11.56 2293.8
11.61 2300.36 11.77 2306.92 11.65 2313.48 11.57  2320.04 11.7 2326.6 11.76
2333.16 11.46 2339.71 11.32 2346.27 11.24  2352.83 11.21 2359.39 11.12
```

2365.95 11.05 2372.51 10.96 2379.07 10.82 2385.63 10.55 2392.19 10.37
2405.31 10.11 2418.43 9.82 2424.98 9.71 2438.1 9.45 2444.66 9.28 2451.22
9.44 2457.78 9.33 2464.34 9.1 2470.9 8.56 2477.46 8.09 2484.02 7.47 2490.58
7.06 2497.14 6.96 2503.7 6.97 2510.25 6.9 2516.81 6.68 2523.37 6.38 2529.93
5.93 2536.49 5.84 2543.05 5.82 2549.61 5.88 2556.17 5.89 2562.73 5.69
2569.29 5.72 2575.85 6.01 2582.41 6.33 2588.96 6.54 2602.08 7.03 2608.64 7.2
2615.2 7.24 2621.76 7.25 2628.32 7.19 2634.88 6.94 2641.44 6.74 2654.56 6.52
2661.12 6.57 2667.68 6.41 2674.23 6.13 2680.79 6.15 2687.35 6.38 2693.91
6.81 2700.47 7.42 2707.03 8.52 2713.59 10.73 2720.15 13.67 2726.71 17.3
2733.27 19.32 2739.83 20.41 2746.39 20.62 2752.95 20.5 2759.5 20.55 2766.06
20.71 2772.62 20.89 2779.18 21.09 2785.74 21.11 2792.3 21.23 2798.86 21.37
2805.42 21.46 2811.98 21.72 2818.54 21.78 2825.1 22.33 2831.66 22.51 2838.22
22.49 2844.77 22.65 2851.33 22.89 2857.89 23.01 2871.01 23.33 2877.57 23.47
2890.69 23.48 2903.81 23.46 2910.37 23.41 2916.93 23.31 2923.48 23.3 2936.6
23.43 2962.84 23.39 2982.52 23.39 2989.08 23.4 2995.64 23.37 3002.2 23.2
3008.75 22.92 3015.31 22.61 3021.87 22.51 3028.43 22.52 3048.11 22.77
3054.67 22.92 3061.23 23.25 3067.79 23.62 3074.35 23.73 3080.91 23.71
3087.46 23.76 3094.02 23.6 3100.58 22.17 3107.14 20.11 3113.7 16.83 3120.26
12.37 3126.82 11.02 3133.38 11.05 3139.94 11.24 3146.5 11.72 3153.06 15.16
3159.62 19.6 3166.18 22.1 3172.73 23.54 3179.29 23.94 3185.85 24.03 3192.41
24.03 3198.97 24.12 3205.53 24.28 3212.09 24.47 3218.65 24.62 3225.21 24.89
3238.33 25.34 3244.89 25.4 3251.44 25.42 3258 25.39 3264.56 25.32 3271.12
25.27 3284.24 25.24 3290.8 25.26 3297.36 25.4 3303.92 25.94

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 1671.94 .035 2146.45 .088

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1671.94
2146.45 1040.28 965.59 915.55 .3 .5 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 2235 2740 12.18 F
 2740 3500 24 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 9696.133

INPUT
Description: 11- 600 ft DS Mill River Trib
Station Elevation Data num= 400
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 30.26 13.11 30.24 39.32
29.88 45.88 29.64 65.54 29.75 72.09 29.91 85.2 30.69 91.75 30.81 98.31 30.68
104.86 30.32 117.97 29.15 124.52 28.99 131.08 29.22 137.63 29.67 150.74
29.99 157.29 30.32 163.85 30.49 170.4 30.51 190.06 30.15 203.17 30.05
216.28 28.32 222.83 28 255.6 27.65 262.15 27.69 275.26 28.97 281.82 29.01
288.37 28.76 294.92 28.35 308.03 27.26 321.14 26.6 334.25 26.26 340.8 26.27
347.35 26.09 367.02 26.2 373.57 26.08 386.68 26.52 393.23 26.61 399.79 26.56
406.34 26.68 419.45 26.52 439.11 26.53 445.66 26.8 458.77 26.82 471.88 27.3
530.86 27.5 537.42 27.43 543.97 27.54 576.74 26.94 583.29 26.69 589.85 26.83
602.96 26.81 616.06 26.87 622.62 26.44 629.17 25.53 642.28 24.73 648.83
24.52 661.94 24.33 675.05 23.95 681.6 23.63 688.16 24.21 694.71 25.23 701.26

25.63 707.82 25.63 740.59 27.32 773.36 27.93 793.02 27.47 799.57 26.9 806.13
26.81 812.68 26.93 819.23 26.87 825.79 26.99 832.34 26.93 845.45 25.83 852
25.39 865.11 25.06 891.33 23.81 897.88 23.59 924.1 23.17 937.2 22.52 950.31
22.6 956.86 21.93 963.42 21.03 976.53 20.03 989.63 19.65 996.19 19.33
1002.74 18.79 1009.3 18.08 1015.85 17.61 1028.96 17.95 1042.06 16.57 1061.73
15.53 1094.5 14.88 1114.16 14.25 1153.48 13.88 1179.7 13.28 1212.47 13.51
1225.57 13.45 1238.68 13.72 1264.9 13.68 1284.56 14.05 1330.43 14.05 1343.54
13.97 1363.2 14.26 1376.31 14.62 1389.42 14.54 1395.97 14.78 1402.53 14.66
1409.08 14.23 1428.74 11.98 1441.85 10.7 1454.96 10.1 1468.07 8.92 1474.62
9.12 1481.17 9.55 1487.73 10.27 1494.28 10.8 1500.84 11.19 1527.05 11.42
1540.16 11.01 1553.27 10.95 1566.37 10.75 1572.93 10.4 1586.04 9.95 1592.59
9.56 1599.14 9.03 1618.8 8.96 1625.36 8.68 1631.91 7.78 1638.47 7.72 1645.02
8.49 1651.57 8.86 1664.68 9.34 1677.79 8.96 1684.34 8.93 1697.45 8.64
1704.01 8.34 1723.67 8.22 1730.22 8.08 1749.88 8.03 1762.99 7.58 1776.1 7.6
1782.65 7.5 1789.21 7.63 1802.31 8.32 1808.87 8.11 1815.42 8.04 1848.19 8.75
1867.85 8.42 1874.41 8.76 1880.96 9.29 1887.51 9.22 1894.07 8.91 1900.62
8.75 1907.18 8.75 1913.73 8.58 1926.84 8.81 1939.94 7.93 1966.16 6.59
1972.71 6.41 1992.38 6.5 2005.48 6.64 2018.59 6.34 2025.14 5.88 2038.25 4.42
2044.81 4.47 2051.36 4.89 2071.02 5.04 2077.58 5.28 2084.13 4.8 2090.68 3.25
2097.24 2.36 2234.87 2.36 2241.42 2.5 2247.98 2.93 2261.08 4.06 2267.64 4.27
2287.3 3.88 2293.85 3.9 2306.96 4.14 2320.07 3.7 2359.39 4.16 2365.95 4.34
2372.5 4.67 2379.05 4.66 2385.61 4.32 2398.72 3.98 2405.27 3.62 2411.82 3.58
2418.38 3.8 2424.93 4.47 2431.49 4.39 2438.04 4.14 2464.26 4.24 2497.03 4.77
2516.69 5.67 2523.24 6.2 2536.35 6.04 2542.9 6.15 2556.01 5.8 2562.56 5.8
2575.67 5.4 2582.23 5.3 2588.78 5.49 2608.44 5.16 2621.55 5.8 2628.1 5.55
2634.66 5.64 2647.76 5.38 2667.43 5.51 2673.98 5.43 2700.2 7.01 2706.75 6.63
2739.52 7.26 2746.07 7.47 2759.18 7.58 2778.84 7 2785.4 7.17 2791.95 7.15
2798.5 6.87 2805.06 6.85 2818.17 6.6 2831.27 6.75 2837.83 7.18 2850.94 7.36
2857.49 7.13 2877.15 7.21 2883.71 7.12 2896.81 7.52 2903.37 7.82 2909.92
8.44 2916.47 9.86 2923.03 10.04 2929.58 9.47 2942.69 9.47 2949.24 9.15
2955.8 8.45 2962.35 7.58 2975.46 6.42 2982.01 5.94 2988.57 5.61 2995.12 5.02
3014.78 5.12 3034.44 4.94 3047.55 4.55 3054.11 4.68 3067.21 5.59 3073.77 5.9
3083.18 6.07 3086.88 6.1 3093.43 6.02 3099.98 5.25 3106.54 2.42 3120 -1.22
3122.59 -1.25 3122.94 -1.27 3123.29 -1.3 3123.67 -1.32 3124.35 -1.4 3124.68
-1.43 3124.98 -1.45 3125.24 -1.48 3125.51 -1.48 3125.75 -1.49 3126.07 -1.55
3126.79 -1.64 3127.89 -1.88 3129.01 -2.53 3130.39 -3.29 3131.68 -4.27
3133.75 -5.14 3135.69 -5.75 3137.67 -6.27 3139.91 -6.83 3142.13 -7.16
3144.32 -7.48 3146.38 -7.75 3149 -7.97 3151.52 -8.06 3154.02 -8.14 3156.43 -
8.29 3158.89 -8.32 3161.1 -8.31 3163.53 -8.23 3166 -8.28 3168.59 -8.38
3171.06 -8.4 3173.82 -8.46 3176.38 -8.5 3178.95 -8.59 3181.45 -8.74 3184.26
-8.82 3186.76 -8.88 3189.25 -8.93 3191.61 -8.95 3194.28 -8.84 3196.58 -8.81
3199.21 -8.45 3201.58 -8.54 3204.04 -8.56 3206.24 -8.54 3208.58 -8.56
3210.63 -8.6 3212.86 -8.56 3215.38 -8.56 3218.33 -8.42 3221.03 -7.93 3223.61
-8.05 3226.03 -7.56 3228.39 -7.56 3230.33 -7.39 3232.36 -7.01 3234.22 -6.57
3236.03 -6.18 3237.55 -5.52 3239.07 -4.83 3240.39 -4.29 3241.52 -3.46
3242.46 -2.06 3243.67 -1.9 3244.04 -1.9 3244.45 -1.77 3244.84 -1.64 3245.25
-1.56 3245.63 -1.47 3246 -1.41 3246.29 -1.14 3263.86 7.38 3270.37 9.48
3276.88 9.61 3289.9 9.43 3302.91 9.52 3315.93 9.83 3322.44 9.93 3328.95 9.89
3335.46 10.04 3341.96 10.16 3348.47 10.12 3354.98 10.29 3361.49 10.48 3368
10.64 3374.51 10.82 3381.01 10.94 3387.52 11.08 3394.03 11.24 3400.54 11.49
3407.05 11.87 3413.56 12.13 3420.06 12.34 3426.57 12.7 3439.59 13.1 3446.1
13.33 3452.61 13.54 3465.62 13.76 3472.13 13.84 3478.64 13.89 3485.15 13.88
3491.66 13.83 3498.17 14.02 3504.67 14.32 3511.18 14.47 3524.2 14.62 3537.22
14.58 3543.72 14.5 3550.23 14.49 3556.74 14.39 3563.25 14.4 3569.76 14.58

3582.78 14.48 3589.28 14.62 3602.3 14.61 3608.81 14.63 3615.32 14.74 3621.83 14.87 3628.33 14.76 3634.84 14.74 3647.86 14.79 3654.37 14.91 3660.88 15.14 3667.38 15.19 3680.4 15.52 3686.91 15.51 3693.42 15.7 3699.93 15.7 3706.44 15.76 3719.45 16 3725.96 16.14 3732.47 16.08 3738.98 16.31 3745.49 16.36 3751.99 16.51 3758.5 16.69 3771.52 16.92 3778.03 16.89 3784.54 17.09 3797.55 17.29 3817.08 17.81 3823.59 18.03 3830.1 18.1 3836.6 18.29 3843.11 18.46

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 3083.18 .035 3276.88 .082

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 3083.18 3276.88 1323.89 1298.37 1295.7 .3 .5 Ineffective Flow num= 1 Sta L Sta R Elev Permanent
 0 2516 5.66 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 8397.759

INPUT
Description: 10
Station Elevation Data num= 319
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 22.85 19.68 22.76 26.24 22.99 39.36 22.48 52.47 22.28 65.59 22.31 78.71 22.57 91.83 22.22 111.51 22.3 124.63 22.62 137.75 23.23 144.3 23.22 150.86 22.75 170.54 22.34 177.1 22.3 183.66 22.71 196.78 22.64 203.34 22.8 229.58 22.94 249.25 22.32 255.81 22.24 268.93 22.58 295.17 22.68 308.29 22.64 321.41 22.95 327.96 22.88 334.52 23.14 380.44 23.55 400.12 23.39 419.8 23.81 459.15 23.71 465.71 23.89 472.27 23.86 478.83 24.14 485.39 23.93 498.51 24.44 505.07 24.39 511.63 24.54 518.18 24.35 524.74 23.98 531.3 23.91 550.98 23.92 564.1 24.29 577.22 24 590.34 24.51 636.25 25.2 649.37 25.62 655.93 26.05 662.49 26.73 669.05 28.07 675.61 28.56 688.73 28.59 701.84 28.2 721.52 28 728.08 27.67 760.88 27.15 767.44 27.19 780.56 26.13 787.12 25.48 800.23 25.47 813.35 25.33 833.03 25.78 872.39 24.64 878.95 24.33 885.51 24.2 892.06 23.89 905.18 23.05 911.74 22.85 918.3 22.47 924.86 22.41 944.54 21.76 951.1 21.44 970.78 20.92 990.45 20.89 1003.57 20.54 1010.13 20.54 1016.69 20.77 1088.84 20.06 1095.4 19.68 1128.2 19.19 1147.88 19.11 1161 18.87 1180.67 18.66 1187.23 18.46 1193.79 18.58 1239.71 17.99 1252.83 17.77 1272.5 17.84 1279.06 18.06 1292.18 19.78 1298.74 20.25 1305.3 20.19 1311.86 20.51 1344.66 20.63 1384.01 20.29 1390.57 20.37 1397.13 20.13 1403.69 19.62 1410.25 19.45 1429.93 19.45 1449.61 19.15 1456.16 18.93 1462.72 18.49 1469.28 17.83 1475.84 17.01 1482.4 16.04 1488.96 14.85 1502.08 12.9 1508.64 12.11 1521.76 11.32 1534.88 10.9 1554.55 10.71 1567.67 10.34 1574.23 9.91 1580.79 9.17 1600.47 8.02 1607.03 7.8 1639.83 7.44 1646.38 7.52 1685.74 6.69 1698.86 6.58 1705.42 6.22 1711.98 5.11 1718.54 3.03 1725.1 1.35 2131.77 1.35 2138.33 1.65 2144.89 2.81 2151.45 5.2 2158.01 8.34 2164.57 9.67 2171.13 9.77 2177.69 8.56 2184.25 8.19 2190.81 8.49 2203.93 8.78 2236.72 8.78 2249.84 7.49 2256.4 7.37 2269.52 7.73 2276.08 8.01 2282.64 8.14 2289.2 8.07 2295.76 8.2 2302.32 7.8 2308.87 6.82 2321.99 6.75 2328.55 7.03 2335.11 8.72 2341.67 8.99 2348.23 8.9 2361.35 7.85 2367.91 7.78 2381.03 8.02 2381.54 8.02 2387.59 8.01 2394.15 5.49 2400.7 2.06 2407.26 .29 2420 -1.44 2420.83 -1.59 2421.84 -1.76 2422.84 -2.04 2424.01 -

2.29 2425.15 -2.68 2426.3 -3.07 2427.37 -3.36 2429.07 -3.62 2430.68 -3.78
2432.17 -4.2 2434 -4.4 2435.71 -4.79 2437.6 -5.31 2439.39 -5.86 2441.32 -
6.23 2443.12 -6.63 2445.07 -7.53 2447 -7.88 2449.14 -8.28 2453.26 -8.59
2455.23 -8.81 2457.38 -8.89 2459.33 -9.02 2461.48 -9.01 2463.39 -8.97
2465.31 -8.89 2467.32 -8.84 2469.41 -8.7 2471.43 -8.47 2473.54 -8.36 2475.48
-8.3 2477.53 -8.11 2479.57 -8.03 2481.72 -7.96 2483.71 -7.8 2485.95 -7.8
2487.94 -7.66 2490.18 -7.58 2492.31 -7.29 2494.63 -7.02 2496.8 -6.72 2499.01
-6.63 2501.14 -6.51 2503.53 -6.38 2505.73 -6.19 2507.85 -5.9 2509.96 -5.77
2512.17 -5.65 2514.29 -5.54 2516.58 -5.41 2518.58 -5.34 2520.83 -5.19
2525.02 -5.01 2526.99 -4.88 2529.15 -4.81 2531.19 -4.69 2533.35 -4.59 2535.2
-4.57 2537.43 -4.5 2539.68 -4.31 2542.42 -4.09 2545.04 -3.75 2547.77 -3.31
2550.39 -3.07 2553.31 -3.02 2556.48 -2.49 2559.54 -2 2561.69 -1.83 2563.52 -
1.67 2565.32 -1.53 2566.78 -1.01 2575.96 .42 2580.97 1.5 2587.52 4.34
2594.06 4.29 2600.6 4.05 2613.69 4 2620.23 3.68 2626.78 3.66 2633.32 3.85
2639.86 4.36 2646.41 5.18 2659.49 7.21 2672.58 7.14 2685.67 6.48 2698.75
6.22 2711.84 4.91 2738.01 3.52 2751.1 3.09 2757.64 2.98 2764.19 3.31 2803.44
3.48 2816.53 3.2 2829.62 3.41 2836.16 3.69 2842.7 4.34 2849.25 4.8 2855.79
5.09 2875.42 5.1 2888.51 4.8 2895.05 4.36 2908.14 3.97 2934.31 3.73 2953.94
3.89 2967.02 3.68 3006.28 3.65 3012.83 3.78 3019.37 4.47 3039 5.13 3052.09
6.22 3058.63 6.5 3071.72 8.13 3078.26 9.08 3084.8 9.85 3097.89 10.77
3143.69 13.1 3163.32 14.43 3169.86 15.09 3176.41 15.42 3189.49 15.51 3196.04
15.72 3202.58 15.72 3215.67 16.27 3241.84 16 3261.47 15.8 3274.56 15.37
3300.73 15.35 3313.82 15.5 3339.99 15.48 3353.08 15.32 3392.33 15.34 3398.88
15.43 3405.42 15.37 3411.96 15.46 3418.51 15.33 3438.14 15.33 3444.68 15.11
3457.77 15.14 3464.31 15.01 3510.11 15.24 3536.29 15.13 3542.83 15.43
3549.37 15.25 3555.92 15.69 3569 16.13 3575.55 16.48 3608.26 16.47 3627.89
16.02 3634.43 16.08 3640.98 16 3647.52 16.14 3667.15 16.01 3680.24 16.07
3686.78 15.93 3706.41 16.13 3712.95 16.36 3719.5 16.44 3726.04 16.68 3745.67
17.06

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 2341.67 .035 2659.49 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2341.67
2659.49 1233.41 1204.5 1191.8 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent 0 2163.6 9.48 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 7193.258

INPUT
Description: 9- Approach RR Br
Station Elevation Data num= 188
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 19.77 215.94 19.11 229.03
19.89 248.66 19.52 261.75 19.67 274.84 18.71 287.93 15.92 301.01 14.13
307.56 12.84 320.64 12.1 327.19 13.2 340.28 13.5 366.45 13.07 372.99 13.63
379.54 12.7 405.71 13.56 418.8 13.05 425.35 13.69 431.89 15.5 444.98 15.61
458.06 15.12 471.15 15.46 490.78 14.82 543.13 14.69 549.68 14.41 569.31
15.08 602.03 15.13 608.57 15.76 615.11 15.8 628.2 14.63 641.29 15.44 680.55
16.06 713.27 15.94 726.36 16.32 752.53 14.47 772.17 15.52 778.71 14.46

785.25 13.96 791.8 13.89 804.88 12.24 817.97 9.76 850.69 10.38 870.32 12.15
896.5 11.49 922.67 9.27 981.57 9.6 994.65 9.28 1001.2 9.9 1033.92 10.01
1060.09 8.45 1066.63 8.71 1073.18 8 1092.81 8.65 1112.44 8 1125.53 6.57
1132.07 6.47 1145.16 8.73 1158.25 9.26 1164.79 10.74 1190.97 12.66 1217.14
9.7 1230.23 8.98 1243.32 7.3 1249.86 6.85 1269.49 8.38 1276.04 7.82 1282.58
6.73 1289.12 6.54 1295.67 7.21 1308.75 9.52 1315.3 9 1321.84 9.72 1334.93
9.62 1354.56 7.34 1387.28 7.78 1393.82 5.83 1400.37 4.44 1406.91 3.75
1433.08 2.88 1439.63 2.93 1446.17 2.31 1452.72 .67 1472.35 -.85 1596.68 -.98
1603.22 -.45 1616.31 3.66 1622.85 4.45 1649.03 4.68 1662.12 5.3 1668.66 4.95
1675.2 5.25 1688.29 4.35 1694.83 2.42 1734.1 3.32 1740.64 3.8 1747.19 3.47
1766.82 4.29 1779.9 3.02 1786.45 3.28 1792.99 2.9 1799.53 2.12 1845.34 3.52
1864.97 4.71 1871.52 4.68 1878.06 4.07 1891.15 3.56 1904.23 3.52 1917.32
5.07 1923.87 4.1 1930.41 .9 1936.95 1.89 1950.04 5.42 1963.13 5.99 1969.67
5.43 1982.76 5.13 1989.3 4.15 1995.85 3.77 2022.02 5.33 2028.57 4.89 2041.65
5.97 2061.29 6.3 2067.83 5.92 2074.37 4.99 2080.92 4.54 2087.46 5.1 2094
4.91 2107.09 3.55 2120.18 2.93 2126.72 1.41 2146.36 3.2 2159.44 1.38 2165.99
1.26 2179.07 1.99 2192.16 3.57 2218.74 1.13 2295.02 1.13 2329.25 .16 2359.85
-.25 2375.28 .4 2400.41 -2.77 2423.16 -11.21 2446.97 -12.12 2463.06 -8.69
2494.08 -9.46 2521.15 -2.01 2539.53 .89 2566.75 8.04 2655.64 7.79 2704.83
10.94 2935.12 13.62 2941.64 13.03 3281.02 13.15 3339.85 13.86 3352.92 15.16
3359.45 15 3365.99 14.3 3450.95 12.38 3490.17 12.79 3529.38 12.02 3535.92
11.29 3542.45 11.54 3548.99 13.14 3555.52 15.27 3575.13 19.15 3588.2 22.09
3601.27 22.8 3660.1 19.09 3679.7 17.03 3692.77 17.47 3725.41 14.48 3731.9
14.72 3738.4 14.49 3751.38 16.01 3913.69 17.83 3933.17 17.04 3939.66 16.42
3946.16 15.18 3952.65 14.68 3991.6 16.06 4004.59 15.89 4011.08 16.11 4017.57
17.89 4024.07 18.91 4030.56 18.85 4037.05 16.39 4043.54 15.97 4127.95 16.31
4186.38 16.86

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 2192.16 .035 2566.75 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2192.16
2566.75 86.6 82.39 79.32 .3 .5 Blocked Obstructions num= 1
 Sta L Sta R Elev
 2786.11 2878.0312.79738

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 7110.866

INPUT
Description: 8.7- US Face RR Br Station Elevation Data num= 430
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 20.18 13.1 19.95 19.66 20.5
32.76 20.61 39.309 20.9 45.87 20.69 58.97 20.79 65.521 20.72 78.63 20.27
85.179 20.24 91.73 19.93 111.391 20.42 117.94 20.36 137.6 20.58 150.71 20.52
163.81 20.8 176.92 21.35 183.47 21.4 190.019 21.19 209.68 21.15 222.78 21.62
242.44 21.34 268.65 21.7 288.31 21.13 307.97 20.28 314.52 20.47 321.07 20.47
327.62 20.15 347.28 20.27 353.831 20.48 360.39 20.05 366.94 19.09 380.04
19.09 393.15 19.55 412.81 19.52 419.36 19.14 425.91 19.14 432.459 19.64
445.571 19.17 465.23 18.98 471.78 19.79 478.329 20.27 484.88 20.3 491.441
19.89 497.99 19.97 504.54 20.2 517.65 20.44 524.199 20.43 530.75 20.19

537.299 20.23 543.86 20.71 556.96 20.64 563.51 20.42 570.069 19.99 583.169
20.17 589.72 19.97 609.38 19.84 615.93 19.7 622.49 19.29 629.039 19.13
635.59 19.49 648.7 19.84 661.8 19.83 668.35 20.07 674.909 19.93 681.46 19.5
688.011 18.72 694.56 18.08 701.12 15.55 707.67 12.62 714.22 11.96 720.77
13.8 727.33 16.59 733.881 16.89 740.43 16.93 746.981 17.86 753.54 17.81
760.09 17.62 773.19 16.79 779.751 17.1 786.3 17.66 799.4 17.25 805.96 17.26
812.51 17.92 819.06 17.83 825.609 17.27 832.17 17.35 838.721 17.2 851.82
17.63 858.38 16.33 864.93 15.43 871.479 16.02 878.03 15.51 884.591 15.24
891.14 15.39 897.69 15.03 904.24 15.32 910.8 16.78 917.349 16.91 923.9 16.49
930.449 16.35 937.01 16.51 943.56 16.87 950.11 17.44 956.66 17.13 963.219 17
969.77 17.3 982.87 17.03 989.43 17.54 1002.53 17.39 1009.08 17.751022.189
17.27 1028.74 17.611035.291 17.47 1041.85 16.65 1048.4 17.13 1054.95
16.31068.059 15.75 1074.61 16.631081.161 16.76 1087.71 17.38 1094.27 16.89
1107.37 17.051113.919 16.611127.031 17.26 1140.13 17.52 1146.69 17.38
1153.24 17.54 1166.34 16.151172.901 15.69 1179.45 14.71 1186 14.64 1199.11
15.92 1205.66 16.08 1212.21 16.42 1231.87 16.77 1244.97 16.73 1258.08
17.141264.629 17.82 1271.18 17.78 1277.741 17.31 1284.29 15.53 1290.84 9.09
1297.39 8.46 1303.95 10.48 1310.499 13.89 1317.05 16.31323.601 16.88 1330.16
17.61 1336.71 17.55 1343.26 16.991356.369 16.65 1362.92 16.911369.471 16.95
1376.02 16.44 1382.58 15.64 1389.13 15.53 1395.68 16.16 1435 16.56 1441.55
16.53 1454.65 16.761461.209 16.58 1467.76 16.181474.311 16.42 1480.86 16.22
1487.42 16.271493.969 16.55 1500.52 16.241507.069 16.23 1513.63 16.52
1520.181 16.41 1539.84 16.47 1546.39 16.391552.939 16.56 1559.49 16.31
1566.051 16.21 1572.6 16.281579.151 16.051598.809 15.93 1605.36 15.32
1611.909 15.27 1618.47 16.03 1631.57 16.321657.781 15.91 1677.44 15.99
1683.99 16.3 1690.54 16.31703.649 15.881716.751 15.9 1723.31 15.75 1742.96
15.88 1756.07 15.621762.619 15.6 1769.17 15.3 1788.83 15.55 1801.94
15.221808.491 15.41 1821.59 15.1 1834.7 15.08 1847.8 15.2 1854.359 15.36
1860.91 15.371867.461 15.15 1893.67 15.361900.219 15.15 1913.33 15.39
1926.43 15.23 1939.54 15.17 1952.64 15.371959.201 15.16 1972.3 15.13 1978.85
14.91 2011.62 14.932037.829 14.82050.929 15.1 2064.04 15.06 2070.59
15.382083.689 15.24 2090.25 14.992096.799 14.97 2109.901 14.72 2129.56 14.65
2136.11 14.78 2149.22 14.72155.771 14.52 2181.98 14.39 2188.53 14.49 2214.74
14.41 2227.85 14.52234.399 14.34 2240.95 13.882247.499 13.86 2254.05 14.37
2286.82 14.312306.471 14.47 2313.03 14.692339.239 14.54 2345.79 14.68
2358.89 14.65 2372 14.83 2391.65 14.572398.211 14.912404.519 15.092410.839
14.69 2413.75 14.07 2417.439 8.57 2421 11.21 2421 10.11 2441 9.33 2442 -.97
2483 -12.29 2489 -16.31 2499 -18.82 2513 -17.59 2525 -12.23 2538.209 9.37
2544.57 12.99 2550.93 13.72 2556.11 14.54 2562.63 14.93 2582.18 14.66
2595.22 14.78 2621.29 14.532653.879 14.46 2660.39 14.62 2666.91
14.422673.429 14.74 2679.95 14.41 2686.46 14.442692.979 14.22 2706.02
14.452719.051 14.2 2738.61 14.26 2751.64 14.19 2758.16 13.29 2771.19 13.14
2777.71 13.36 2784.23 13.1 2790.75 13.772797.261 13.78 2803.78 14.03 2810.3
13.752816.819 13.72 2823.34 13.43 2829.85 13.31 2836.369 13 2842.89
13.62855.919 13.66 2862.44 13.84 2868.96 13.59 2888.51 13.52 2895.03
13.862901.551 14.34 2908.07 14.45 2927.62 14.16 2934.14 14.232940.651 13.92
2947.17 14.01 2953.69 13.82960.211 14.06 2973.24 13.61 2986.28 13.62999.311
13.83 3005.83 14.393018.871 15.09 3031.9 14.883038.419 14.61 3044.94 14.48
3051.45 14.63 3077.53 14.15 3116.63 13.923123.149 13.72 3129.67 13.88
3136.18 13.79 3155.74 14.31 3168.77 14.19 3175.29 13.98 3181.85 13.44
3194.96 12.973201.519 12.86 3221.19 13.33 3227.74 12.68 3234.3 12.73247.411
12.52 3260.53 12.83 3267.079 12.68 3280.2 12.8 3286.76 12.72 3293.31
12.453299.871 12.48 3312.981 12.91 3319.54 12.993332.649 12.59 3339.21 12.74
3345.77 12.68 3358.88 12.953365.439 12.713378.551 12.5 3385.11 12.17 3391.66

12.21 3398.219 12.08 3404.78 12.183411.331 12.47 3417.89 12.57 3424.45 12.89
3431 12.62 3437.56 12.493444.121 12.05 3450.67 12.65 3457.23 12.93 3463.79
12.98 3470.34 13.223476.901 13.6 3483.46 13.51 3490.01 13.19 3496.569
12.663509.681 12.15 3516.24 11.65 3522.8 11.53529.349 12.22 3535.91
12.413542.471 13.35 3549.02 13.49 3555.58 14.2 3581.81 14.55 3588.37 14.28
3601.48 153608.041 15.51 3647.38 15.93 3653.93 15.83 3667.05 15.91 3686.72
15.83 3699.83 16.743706.389 17.45 3712.94 17.94 3719.5 18.583726.059 18.71
3732.61 18.483739.169 18.763758.839 18.28 3798.129 17.863811.189 17.97
3817.72 17.84 3824.26 18.263830.791 19.03 3837.32 19.293843.849 18.23
3850.38 18 3856.91 17.97 3863.44 18.31 3883.04 18.79 3889.57 18.69 3896.1
18.29 3902.63 18.12 3915.69 18.17 3928.76 18.46 3948.35 18.11 3961.41 18.27
3967.94 18.25 3974.48 18.07 3981.01 18.283987.539 18.21 3994.07 18.28
4007.13 18.774020.191 18.87 4033.261 18.644046.319 16.584052.851 16.42
4059.38 17.164065.909 18.2 4078.979 19.57 4092.04 19.554098.569 19.724111.629
20.27 4118.16 20.68 4124.701 20.71 4131.23 21.03 4137.76 21.154144.291
21.614157.349 22.01 4163.88 21.91 4170.41 22.14176.951 21.83 4183.48
22.044190.009 21.54 4196.54 20.74203.069 20.2 4209.6 19.92 4229.2
19.74235.729 19.47

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .092404.519 .035 2562.63 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
2404.519 2562.63 22.89 21.96 21.2 .3 .5

BRIDGE

RIVER: Taunton River
REACH: Main Stem RS: 7100.789

INPUT
Description: 8.5 RR
Distance from Upstream XS = 4
Deck/Roadway Width = 15
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
 num= 14
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 1865 15.82 1998 15.34 2371 14.76   2421 15.05 2421 15.02 11.21 2480 15.1
11.22
 2481 15.11 11.22 2481 16.89 11.23 2517 16.81 11.23
 2517 15 11.23 2546 14.89 11.24 2603 14.54
 2813 14.33 3023 14.19

Upstream Bridge Cross Section Data
Station Elevation Data num= 430
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 20.18 13.1 19.95 19.66 20.5
32.76 20.61 39.309 20.9 45.87 20.69 58.97 20.79 65.521 20.72 78.63 20.27
85.179 20.24 91.73 19.93 111.391 20.42 117.94 20.36 137.6 20.58 150.71 20.52
163.81 20.8 176.92 21.35 183.47 21.4 190.019 21.19 209.68 21.15 222.78 21.62
242.44 21.34 268.65 21.7 288.31 21.13 307.97 20.28 314.52 20.47 321.07 20.47
327.62 20.15 347.28 20.27 353.831 20.48 360.39 20.05 366.94 19.09 380.04

19.09 393.15 19.55 412.81 19.52 419.36 19.14 425.91 19.14 432.459 19.64
445.571 19.17 465.23 18.98 471.78 19.79 478.329 20.27 484.88 20.3 491.441
19.89 497.99 19.97 504.54 20.2 517.65 20.44 524.199 20.43 530.75 20.19
537.299 20.23 543.86 20.71 556.96 20.64 563.51 20.42 570.069 19.99 583.169
20.17 589.72 19.97 609.38 19.84 615.93 19.7 622.49 19.29 629.039 19.13
635.59 19.49 648.7 19.84 661.8 19.83 668.35 20.07 674.909 19.93 681.46 19.5
688.011 18.72 694.56 18.08 701.12 15.55 707.67 12.62 714.22 11.96 720.77
13.8 727.33 16.59 733.881 16.89 740.43 16.93 746.981 17.86 753.54 17.81
760.09 17.62 773.19 16.79 779.751 17.1 786.3 17.66 799.4 17.25 805.96 17.26
812.51 17.92 819.06 17.83 825.609 17.27 832.17 17.35 838.721 17.2 851.82
17.63 858.38 16.33 864.93 15.43 871.479 16.02 878.03 15.51 884.591 15.24
891.14 15.39 897.69 15.03 904.24 15.32 910.8 16.78 917.349 16.91 923.9 16.49
930.449 16.35 937.01 16.51 943.56 16.87 950.11 17.44 956.66 17.13 963.219 17
969.77 17.3 982.87 17.03 989.43 17.54 1002.53 17.39 1009.08 17.751022.189
17.27 1028.74 17.611035.291 17.47 1041.85 16.65 1048.4 17.13 1054.95
16.31068.059 15.75 1074.61 16.631081.161 16.76 1087.71 17.38 1094.27 16.89
1107.37 17.051113.919 16.611127.031 17.26 1140.13 17.52 1146.69 17.38
1153.24 17.54 1166.34 16.151172.901 15.69 1179.45 14.71 1186 14.64 1199.11
15.92 1205.66 16.08 1212.21 16.42 1231.87 16.77 1244.97 16.73 1258.08
17.141264.629 17.82 1271.18 17.78 1277.741 17.31 1284.29 15.53 1290.84 9.09
1297.39 8.46 1303.95 10.48 1310.499 13.89 1317.05 16.31323.601 16.88 1330.16
17.61 1336.71 17.55 1343.26 16.991356.369 16.65 1362.92 16.911369.471 16.95
1376.02 16.44 1382.58 15.64 1389.13 15.53 1395.68 16.16 1435 16.56 1441.55
16.53 1454.65 16.761461.209 16.58 1467.76 16.181474.311 16.42 1480.86 16.22
1487.42 16.271493.969 16.55 1500.52 16.241507.069 16.23 1513.63 16.52
1520.181 16.41 1539.84 16.47 1546.39 16.391552.939 16.56 1559.49 16.31
1566.051 16.21 1572.6 16.281579.151 16.051598.809 15.93 1605.36 15.32
1611.909 15.27 1618.47 16.03 1631.57 16.321657.781 15.91 1677.44 15.99
1683.99 16.3 1690.54 16.31703.649 15.881716.751 15.9 1723.31 15.75 1742.96
15.88 1756.07 15.621762.619 15.6 1769.17 15.3 1788.83 15.55 1801.94
15.221808.491 15.41 1821.59 15.1 1834.7 15.08 1847.8 15.2 1854.359 15.36
1860.91 15.371867.461 15.15 1893.67 15.361900.219 15.15 1913.33 15.39
1926.43 15.23 1939.54 15.17 1952.64 15.371959.201 15.16 1972.3 15.13 1978.85
14.91 2011.62 14.932037.829 14.82050.929 15.1 2064.04 15.06 2070.59
15.382083.689 15.24 2090.25 14.992096.799 14.97 2109.901 14.72 2129.56 14.65
2136.11 14.78 2149.22 14.72155.771 14.52 2181.98 14.39 2188.53 14.49 2214.74
14.41 2227.85 14.52234.399 14.34 2240.95 13.882247.499 13.86 2254.05 14.37
2286.82 14.312306.471 14.47 2313.03 14.692339.239 14.54 2345.79 14.68
2358.89 14.65 2372 14.83 2391.65 14.572398.211 14.912404.519 15.092410.839
14.69 2413.75 14.07 2417.439 8.57 2421 11.21 2421 10.11 2441 9.33 2442 -.97
2483 -12.29 2489 -16.31 2499 -18.82 2513 -17.59 2525 -12.23 2538.209 9.37
2544.57 12.99 2550.93 13.72 2556.11 14.54 2562.63 14.93 2582.18 14.66
2595.22 14.78 2621.29 14.532653.879 14.46 2660.39 14.62 2666.91
14.422673.429 14.74 2679.95 14.41 2686.46 14.442692.979 14.22 2706.02
14.452719.051 14.2 2738.61 14.26 2751.64 14.19 2758.16 13.29 2771.19 13.14
2777.71 13.36 2784.23 13.1 2790.75 13.772797.261 13.78 2803.78 14.03 2810.3
13.752816.819 13.72 2823.34 13.43 2829.85 13.31 2836.369 13 2842.89
13.62855.919 13.66 2862.44 13.84 2868.96 13.59 2888.51 13.52 2895.03
13.862901.551 14.34 2908.07 14.45 2927.62 14.16 2934.14 14.232940.651 13.92
2947.17 14.01 2953.69 13.82960.211 14.06 2973.24 13.61 2986.28 13.62999.311
13.83 3005.83 14.393018.871 15.09 3031.9 14.883038.419 14.61 3044.94 14.48
3051.45 14.63 3077.53 14.15 3116.63 13.923123.149 13.72 3129.67 13.88
3136.18 13.79 3155.74 14.31 3168.77 14.19 3175.29 13.98 3181.85 13.44
3194.96 12.973201.519 12.86 3221.19 13.33 3227.74 12.68 3234.3 12.73247.411

12.52 3260.53 12.83 3267.079 12.68 3280.2 12.8 3286.76 12.72 3293.31
12.453299.871 12.48 3312.981 12.91 3319.54 12.993332.649 12.59 3339.21 12.74
3345.77 12.68 3358.88 12.953365.439 12.713378.551 12.5 3385.11 12.17 3391.66
12.21 3398.219 12.08 3404.78 12.183411.331 12.47 3417.89 12.57 3424.45 12.89
3431 12.62 3437.56 12.493444.121 12.05 3450.67 12.65 3457.23 12.93 3463.79
12.98 3470.34 13.223476.901 13.6 3483.46 13.51 3490.01 13.19 3496.569
12.663509.681 12.15 3516.24 11.65 3522.8 11.53529.349 12.22 3535.91
12.413542.471 13.35 3549.02 13.49 3555.58 14.2 3581.81 14.55 3588.37 14.28
3601.48 153608.041 15.51 3647.38 15.93 3653.93 15.83 3667.05 15.91 3686.72
15.83 3699.83 16.743706.389 17.45 3712.94 17.94 3719.5 18.583726.059 18.71
3732.61 18.483739.169 18.763758.839 18.28 3798.129 17.863811.189 17.97
3817.72 17.84 3824.26 18.263830.791 19.03 3837.32 19.293843.849 18.23
3850.38 18 3856.91 17.97 3863.44 18.31 3883.04 18.79 3889.57 18.69 3896.1
18.29 3902.63 18.12 3915.69 18.17 3928.76 18.46 3948.35 18.11 3961.41 18.27
3967.94 18.25 3974.48 18.07 3981.01 18.283987.539 18.21 3994.07 18.28
4007.13 18.774020.191 18.87 4033.261 18.644046.319 16.584052.851 16.42
4059.38 17.164065.909 18.2 4078.979 19.57 4092.04 19.554098.569 19.724111.629
20.27 4118.16 20.68 4124.701 20.71 4131.23 21.03 4137.76 21.154144.291
21.614157.349 22.01 4163.88 21.91 4170.41 22.14176.951 21.83 4183.48
22.044190.009 21.54 4196.54 20.74203.069 20.2 4209.6 19.92 4229.2
19.74235.729 19.47

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .092404.519 .035 2562.63 .085

Bank Sta: Left Right Coeff Contr. Expan.
 2404.519 2562.63 .3 .5

Downstream Deck/Roadway Coordinates
 num= 14
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 1851 15.82 1984 15.34 2357 14.76   2407 15.05 2407 15.02 11.21 2466 15.1
11.22
 2467 15.11 11.22 2467 16.89 11.23 2503 16.81 11.23
 2503 15 11.23 2532 14.89 11.24 2589 14.54
 2799 14.33 3009 14.19

Downstream Bridge Cross Section Data
Station Elevation Data num= 409
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 21.17 6.551 21.57 13.11
21.74 19.66 21.74 26.22 21.91 32.77 21.94 72.099 21.29 85.211 21.16 91.76
21.22 98.32 21.62 104.87 21.27 117.979 21.37 124.54 21.32 144.2 21.66 150.75
21.53 157.31 21.75 163.861 21.76 170.42 21.39 176.97 21.48 183.53 21.71
203.19 21.57 209.75 21.72 216.3 22.15 222.85 22.06 235.96 21.5 249.07 21.58
255.63 21.75 262.18 21.78 268.74 21.36 275.289 20.8 281.85 20.86 294.95
20.58 327.73 20.24 347.39 20.24 353.949 20.1 380.16 20.24 386.72 19.95
419.49 19.33 426.05 19.1 432.599 19.34 445.711 18.7 452.26 18.1 458.82 18
465.37 17.23 471.93 16.74 478.479 16.94 491.591 15.88 504.7 15.12 511.25
14.63 524.361 14.08 530.92 13.94 544.03 13.18 550.58 12.93 557.139 13.6
563.69 13.44 576.8 12.73 583.35 13.12 589.909 15.15 596.46 15.37 609.57
14.89 622.68 15.44 629.24 16.37 635.789 16.6 655.45 15.69 668.56 15.63
688.23 15.08 694.78 15.34 701.34 15.33 707.89 15.46 721 15.19 740.66 15.07
747.22 14.43 760.331 14.82 766.88 14.24 779.99 14.66 786.54 14.99 793.099

15.49 799.65 15.23 819.32 13.68 832.43 13.61 838.979 13.38 845.53 12.83
858.64 13.27 871.75 12.12 878.31 12.22 884.859 13.85 891.42 14.5 897.97
14.25 904.53 13.83 911.08 14.43 917.629 14.8 924.19 14.72 937.3 15.14 943.85
13.68 950.409 13.14 956.96 13.57 963.521 13.49 970.07 14.52 976.63 15.86
989.73 15.31 996.289 15.56 1002.84 15.21009.401 16.12 1022.51 15.05 1029.06
15.3 1042.169 14.76 1048.73 14.71055.281 15.68 1061.83 16 1068.39 15.84
1074.939 15.5 1081.5 15.641107.719 13.69 1114.27 13.57 1127.38 13.72 1133.94
14.23 1147.04 13.971153.599 13.63 1160.15 13.741166.711 13.63 1173.26 13.23
1179.82 13.78 1186.37 15.191199.479 15.89 1206.04 15.41 1212.591 15.46
1219.14 15.89 1232.25 16.01 1238.81 15.46 1251.92 15.57 1258.47 16.04
1265.03 15.65 1271.58 13.021278.139 9.36 1284.69 8.09 1297.8 13.71 1304.35
14.38 1310.91 13.361324.021 14.64 1330.57 14.78 1337.13 14.47 1343.68 14.37
1350.24 14.43 1363.34 13.58 1376.45 13.3 1383.01 12.93 1389.56 13 1396.12
12.73 1409.23 12.48 1422.34 12.1 1428.89 12.31435.449 12.16 1442
12.621448.551 12.53 1455.11 12.27 1468.219 12.31 1474.77 12.21481.329 13.1
1487.88 14.39 1507.55 14.42 1514.099 14 1520.65 13.941527.211 14.23 1533.76
14.09 1540.32 14.23 1546.87 13.971573.091 14.06 1579.65 13.74 1586.2 13.75
1599.31 14.31 1612.42 14.28 1632.08 15.631638.639 15.87 1645.19 15.53 1658.3
15.53 1671.409 15.091684.519 14.5 1691.07 13.95 1710.74 12.78 1723.85 12.81
1730.401 12.31 1743.51 12.04 1750.06 12.14 1769.73 11.331776.281 11.43
1782.84 13.341795.949 13.36 1802.5 13.551809.061 13.36 1815.61 13.53 1841.829
13.21 1848.38 12.99 1854.94 13.01 1861.49 12.82 1868.05 12.42 1874.599 12.37
1881.16 12.671887.709 12.4 1900.82 12.75 1907.37 12.5 1913.93 12.421920.479
12.081933.591 12.43 1940.15 12.32 1946.7 12.39 1953.259 12.68 1959.81 12.05
1972.92 11.93 1979.48 11.21 1986.03 11.19 1992.58 11.331999.139 11.16
2005.69 12.04 2012.25 13.31 2018.8 12.97 2025.36 12.952031.909 13.09 2038.47
12.52 2064.68 12.152077.789 12.47 2084.35 13.62 2097.46 13.862110.569 13.83
2117.12 13.49 2130.23 13.67 2149.89 13.28 2182.66 13.212189.219 12.9 2215.44
12.8 2221.99 12.96 2228.55 12.82235.099 12.15 2241.65 11.752248.209 11.89
2254.76 11.52 2274.43 11.33 2287.54 11.532294.091 11.11 2300.65 11.6 2307.2
11.61 2313.75 11.42 2320.31 11.562326.861 11.4 2339.97 11.57 2346.53 11.76
2353.08 13.122359.639 13.56 2366.19 13.732372.741 14.372392.009 14.37
2398.37 14.492402.429 13.15 2404.72 12.38 2407 11.21 2407 10.11 2427 9.33
2428 -.97 2469 -12.29 2475 -16.31 2485 -18.82 2499 -17.59 2511 -12.23 2532
-.15 2533 11.24 2550.93 13.72 2557.28 14.19 2582.89 13.732589.419 13.39
2615.56 13.28 2628.63 13.43 2635.159 13.34 2641.7 13.65 2661.3 13.51 2667.84
13.91 2674.37 13.88 2680.899 13.62693.969 13.75 2700.51 14.03 2713.58 14.13
2765.85 13.96 2772.39 13.752798.529 13.47 2831.2 13.4 2837.73 13.52844.271
13.35 2850.8 13.542870.409 13.51 2890.01 13.792903.081 13.82916.149 14.1
2935.75 14.34 2942.29 14.322961.889 14.75 2988.03 14.712994.561 14.79 3001.1
14.733007.629 14.443020.699 14.283066.441 14.37 3118.72 14.38 3125.249 14.53
3144.86 14.393151.389 14.51 3164.46 14.4 3177.53 14.45 3184.059 14.29 3190.6
13.84 3203.67 14.02 3216.74 14.613229.811 14.07 3249.41 14.09 3262.38 13.82
3268.87 14.6 3275.35 14.82 3281.84 15.18 3294.809 14.99 3307.79 15.13 3327.25
14.98 3333.73 14.56 3346.7 14.85 3353.189 14.553372.649 14.27 3379.14 14.35
3385.62 14.82 3392.11 15.05 3405.08 14.83 3411.57 14.91 3418.05 15.13
3437.51 15.18 3456.97 15.91 3482.919 15.323489.399 15.353495.889 15.55
3502.38 15.59 3508.86 15.39 3515.35 15.47 3521.83 15.31 3534.81 15.63
3541.29 15.65 3547.78 15.41 3554.27 15.543560.749 15.443567.239 15.11
3606.16 15.04 3612.64 15.22 3619.13 15.543632.099 15.393645.071 15.86
3651.56 15.7 3658.05 15.89 3664.53 15.68 3671.02 16 3677.51 16.153690.479
15.983696.971 16.03 3703.451 15.72 3709.94 15.13 3716.42 15.05 3729.4 14.57
3735.88 14.16 3742.369 14.13748.859 13.483761.831 12.58 3768.31 12.38 3774.8
12.41 3781.29 13.81 3787.77 15.76 3794.26 15.64 3807.21 16.12 3826.6 16.19

3833.06 16.073852.451 16.743858.909 16.723865.369 16.83 3884.76 18.42
3891.22 18.72 3917.07 18.673929.991 18.863942.919 18.323949.379 18.23
3955.839 18.523962.309 18.54 3981.69 18.87 3988.15 18.78 3994.62 18.85
4001.08 18.764026.929 19.034033.389 18.64039.849 18.31 4052.78 17.21 4059.24
17.32 4065.7 18.21 4072.16 17.96 4078.63 17.19 4085.09 15.94 4091.55 14.88
4104.48 12.99 4110.94 12.654117.399 12.13 4130.33 11.76 4143.25 11.9 4156.18
11.83 4162.64 12.57 4169.1 13.51 4175.56 14.32 4182.03 14.794194.951
15.444220.799 15.51 4227.26 15.61

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 2398.37 .035 2557.28 .085

Bank Sta: Left Right Coeff Contr. Expan.
 2398.37 2557.28 .1 .3

Upstream Embankment side slope = 0 horiz. to 1.0 vertical Downstream
Embankment side slope = 0 horiz. to 1.0 vertical Maximum allowable
submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Piers = 5

Pier Data
Pier Station Upstream= 2457 Downstream= 2443 Upstream num= 2
 Width Elev Width Elev
 2 -20 2 13
Downstream num= 2
 Width Elev Width Elev
 2 -20 2 13

Pier Data
Pier Station Upstream= 2480 Downstream= 2466
Upstream num= 2
 Width Elev Width Elev
 2 -20 2 13
Downstream num= 2
 Width Elev Width Elev
 2 -20 2 13

Pier Data
Pier Station Upstream= 2484 Downstream= 2470
Upstream num= 2
 Width Elev Width Elev
 4 -20 4 13
Downstream num= 2
 Width Elev Width Elev
 4 -20 4 13

Pier Data
Pier Station Upstream= 2514 Downstream= 2500

```
Upstream num= 2
 Width Elev Width Elev
 4 -20 4 13
Downstream num= 2
 Width Elev Width Elev
 4 -20 4 13

Pier Data Pier Station Upstream= 2518 Downstream= 2504
Upstream num= 2
 Width Elev Width Elev
 2 -20 2 13
Downstream num= 2
 Width Elev Width Elev
 2 -20 2 13

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
 Energy
 W.S. Pro Method

 W.S.Pro Data
 Left Embankment
 El of the top of the embankment = 15
 El of the toe of the abutment = 0
 Right Embankment
 El of the top of the embankment = 15
 El of the toe of the abutment = 0
 Abutment Type = 2 Vert. abutments and sloping embankments  Slope of
abutments =
 Top with of embankment = 15
 Centroid station of bridge opening =
 Wing Wall Type = No wing walls present
 Width =
 Angle =
 Radius =   Guide Banks Type = No Guide Bank present
 Length =
 Offset =
 Angle =

Selected Low Flow Methods = W.S.Pro Method

High Flow Method
 Energy Only

Additional Bridge Parameters
 Add Friction component to Momentum
 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION
```

RIVER: Taunton River
REACH: Main Stem RS: 7088.903

INPUT
Description: 8.3- DS Face RR Br
Station Elevation Data num= 409
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 21.17 6.551 21.57 13.11
21.74 19.66 21.74 26.22 21.91 32.77 21.94 72.099 21.29 85.211 21.16 91.76
21.22 98.32 21.62 104.87 21.27 117.979 21.37 124.54 21.32 144.2 21.66 150.75
21.53 157.31 21.75 163.861 21.76 170.42 21.39 176.97 21.48 183.53 21.71
203.19 21.57 209.75 21.72 216.3 22.15 222.85 22.06 235.96 21.5 249.07 21.58
255.63 21.75 262.18 21.78 268.74 21.36 275.289 20.8 281.85 20.86 294.95
20.58 327.73 20.24 347.39 20.24 353.949 20.1 380.16 20.24 386.72 19.95
419.49 19.33 426.05 19.1 432.599 19.34 445.711 18.7 452.26 18.1 458.82 18
465.37 17.23 471.93 16.74 478.479 16.94 491.591 15.88 504.7 15.12 511.25
14.63 524.361 14.08 530.92 13.94 544.03 13.18 550.58 12.93 557.139 13.6
563.69 13.44 576.8 12.73 583.35 13.12 589.909 15.15 596.46 15.37 609.57
14.89 622.68 15.44 629.24 16.37 635.789 16.6 655.45 15.69 668.56 15.63
688.23 15.08 694.78 15.34 701.34 15.33 707.89 15.46 721 15.19 740.66 15.07
747.22 14.43 760.331 14.82 766.88 14.24 779.99 14.66 786.54 14.99 793.099
15.49 799.65 15.23 819.32 13.68 832.43 13.61 838.979 13.38 845.53 12.83
858.64 13.27 871.75 12.12 878.31 12.22 884.859 13.85 891.42 14.5 897.97
14.25 904.53 13.83 911.08 14.43 917.629 14.8 924.19 14.72 937.3 15.14 943.85
13.68 950.409 13.14 956.96 13.57 963.521 13.49 970.07 14.52 976.63 15.86
989.73 15.31 996.289 15.56 1002.84 15.21009.401 16.12 1022.51 15.05 1029.06
15.3 1042.169 14.76 1048.73 14.71055.281 15.68 1061.83 16 1068.39 15.84
1074.939 15.5 1081.5 15.641107.719 13.69 1114.27 13.57 1127.38 13.72 1133.94
14.23 1147.04 13.971153.599 13.63 1160.15 13.741166.711 13.63 1173.26 13.23
1179.82 13.78 1186.37 15.191199.479 15.89 1206.04 15.41 1212.591 15.46
1219.14 15.89 1232.25 16.01 1238.81 15.46 1251.92 15.57 1258.47 16.04
1265.03 15.65 1271.58 13.021278.139 9.36 1284.69 8.09 1297.8 13.71 1304.35
14.38 1310.91 13.361324.021 14.64 1330.57 14.78 1337.13 14.47 1343.68 14.37
1350.24 14.43 1363.34 13.58 1376.45 13.3 1383.01 12.93 1389.56 13 1396.12
12.73 1409.23 12.48 1422.34 12.1 1428.89 12.31435.449 12.16 1442
12.621448.551 12.53 1455.11 12.27 1468.219 12.31 1474.77 12.21481.329 13.1
1487.88 14.39 1507.55 14.42 1514.099 14 1520.65 13.941527.211 14.23 1533.76
14.09 1540.32 14.23 1546.87 13.971573.091 14.06 1579.65 13.74 1586.2 13.75
1599.31 14.31 1612.42 14.28 1632.08 15.631638.639 15.87 1645.19 15.53 1658.3
15.53 1671.409 15.091684.519 14.5 1691.07 13.95 1710.74 12.78 1723.85 12.81
1730.401 12.31 1743.51 12.04 1750.06 12.14 1769.73 11.331776.281 11.43
1782.84 13.341795.949 13.36 1802.5 13.551809.061 13.36 1815.61 13.53 1841.829
13.21 1848.38 12.99 1854.94 13.01 1861.49 12.82 1868.05 12.42 1874.599 12.37
1881.16 12.671887.709 12.4 1900.82 12.75 1907.37 12.5 1913.93 12.421920.479
12.081933.591 12.43 1940.15 12.32 1946.7 12.39 1953.259 12.68 1959.81 12.05
1972.92 11.93 1979.48 11.21 1986.03 11.19 1992.58 11.331999.139 11.16
2005.69 12.04 2012.25 13.31 2018.8 12.97 2025.36 12.952031.909 13.09 2038.47
12.52 2064.68 12.152077.789 12.47 2084.35 13.62 2097.46 13.862110.569 13.83
2117.12 13.49 2130.23 13.67 2149.89 13.28 2182.66 13.212189.219 12.9 2215.44
12.8 2221.99 12.96 2228.55 12.82235.099 12.15 2241.65 11.752248.209 11.89
2254.76 11.52 2274.43 11.33 2287.54 11.532294.091 11.11 2300.65 11.6 2307.2
11.61 2313.75 11.42 2320.31 11.562326.861 11.4 2339.97 11.57 2346.53 11.76
2353.08 13.122359.639 13.56 2366.19 13.732372.741 14.372392.009 14.37
2398.37 14.492402.429 13.15 2404.72 12.38 2407 11.21 2407 10.11 2427 9.33
2428 -.97 2469 -12.29 2475 -16.31 2485 -18.82 2499 -17.59 2511 -12.23 2532

-.15 2533 11.24 2550.93 13.72 2557.28 14.19 2582.89 13.732589.419 13.39
2615.56 13.28 2628.63 13.43 2635.159 13.34 2641.7 13.65 2661.3 13.51 2667.84
13.91 2674.37 13.88 2680.899 13.62693.969 13.75 2700.51 14.03 2713.58 14.13
2765.85 13.96 2772.39 13.752798.529 13.47 2831.2 13.4 2837.73 13.52844.271
13.35 2850.8 13.542870.409 13.51 2890.01 13.792903.081 13.82916.149 14.1
2935.75 14.34 2942.29 14.322961.889 14.75 2988.03 14.712994.561 14.79 3001.1
14.733007.629 14.443020.699 14.283066.441 14.37 3118.72 14.38 3125.249 14.53
3144.86 14.393151.389 14.51 3164.46 14.4 3177.53 14.45 3184.059 14.29 3190.6
13.84 3203.67 14.02 3216.74 14.613229.811 14.07 3249.41 14.09 3262.38 13.82
3268.87 14.6 3275.35 14.82 3281.84 15.18 3294.809 14.99 3307.79 15.13 3327.25
14.98 3333.73 14.56 3346.7 14.85 3353.189 14.553372.649 14.27 3379.14 14.35
3385.62 14.82 3392.11 15.05 3405.08 14.83 3411.57 14.91 3418.05 15.13
3437.51 15.18 3456.97 15.91 3482.919 15.323489.399 15.353495.889 15.55
3502.38 15.59 3508.86 15.39 3515.35 15.47 3521.83 15.31 3534.81 15.63
3541.29 15.65 3547.78 15.41 3554.27 15.543560.749 15.443567.239 15.11
3606.16 15.04 3612.64 15.22 3619.13 15.543632.099 15.393645.071 15.86
3651.56 15.7 3658.05 15.89 3664.53 15.68 3671.02 16 3677.51 16.153690.479
15.983696.971 16.03 3703.451 15.72 3709.94 15.13 3716.42 15.05 3729.4 14.57
3735.88 14.16 3742.369 14.13748.859 13.483761.831 12.58 3768.31 12.38 3774.8
12.41 3781.29 13.81 3787.77 15.76 3794.26 15.64 3807.21 16.12 3826.6 16.19
3833.06 16.073852.451 16.743858.909 16.723865.369 16.83 3884.76 18.42
3891.22 18.72 3917.07 18.673929.991 18.863942.919 18.323949.379 18.23
3955.839 18.523962.309 18.54 3981.69 18.87 3988.15 18.78 3994.62 18.85
4001.08 18.764026.929 19.034033.389 18.64039.849 18.31 4052.78 17.21 4059.24
17.32 4065.7 18.21 4072.16 17.96 4078.63 17.19 4085.09 15.94 4091.55 14.88
4104.48 12.99 4110.94 12.654117.399 12.13 4130.33 11.76 4143.25 11.9 4156.18
11.83 4162.64 12.57 4169.1 13.51 4175.56 14.32 4182.03 14.794194.951
15.444220.799 15.51 4227.26 15.61

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 2398.37 .035 2557.28 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2398.37
2557.28 57.75 56.88 56.46 .1 .3

CROSS SECTION

RIVER: Taunton River REACH: Main Stem RS: 7032.026

INPUT
Description: 8- Exit RR Br
Station Elevation Data num= 416
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 23.05 6.55 24.26 13.1 23.03
19.65 20.87 26.21 19.81 32.76 19.5 39.31 19.44 45.86 19.3 52.41 19.35 58.96
20.33 65.52 21.18 72.07 21.93 78.62 22.28 85.17 22.5 98.27 22.79 104.82
22.82 111.38 22.74 117.93 22.9 124.48 22.94 131.03 23.04 144.13 22.81 150.69
22.73 157.24 22.63 163.79 22.63 170.34 22.4 176.89 22.06 183.44 21.7 196.55
21.11 203.1 20.78 209.65 20.63 216.2 20.59 222.75 20.57 229.3 20.46 235.86
20.22 242.41 20.29 248.96 20.2 255.51 19.99 268.61 19.73 281.72 19.98 288.27
19.82 294.82 19.62 301.37 19.63 307.92 19.7 314.47 19.72 321.03 19.71
327.58 19.93 334.13 19.98 340.68 19.84 347.23 19.65 353.78 19.63 360.34
19.41 366.89 19.08 373.44 18.68 379.99 18.21 386.54 18 399.64 17.54 406.2

17.23 412.75 16.95 419.3 16.81 425.85 16.32 432.4 15.77 438.95 15.59 445.51
15.11 452.06 14.49 458.61 13.81 465.16 13.04 471.71 12.51 478.26 12.4 484.81
12.16 491.37 11.87 497.92 11.56 504.47 11.48 511.02 10.84 517.57 10.35
524.12 10.15 530.68 9.93 537.23 9.87 550.33 9.83 556.88 9.73 563.43 9.7
569.98 9.69 576.54 9.74 583.09 9.72 589.64 9.77 596.19 9.66 602.74 9.62
609.29 9.71 615.85 9.73 622.4 9.79 628.95 9.92 635.5 10.15 642.05 10.27
648.6 10.23 655.16 10.04 661.71 9.81 668.26 9.38 674.81 9.52 681.36 9.51
687.91 9.41 694.46 9.64 701.02 9.58 707.57 8.95 714.12 7.14 720.67 5.93
727.22 5.91 1192.38 5.91 1198.93 6.56 1205.49 7.32 1212.04 6.92 1218.59 6.94
1225.14 7.43 1231.69 8.01 1238.24 8.44 1244.79 8.82 1251.35 9.67 1257.9
11.15 1264.45 11.73 1271 11.02 1277.55 10.44 1284.1 10.02 1290.66 9.76
1297.21 8.95 1303.76 8.78 1310.31 8.86 1316.86 8.57 1323.41 7.96 1329.96 7.3
1343.07 7.19 1349.62 7.01 1356.17 6.71 1362.72 7.1 1369.27 7.18 1382.38 7.27
1388.93 7.21 1395.48 7.06 1402.03 7.44 1408.58 7.51 1415.13 7.2 1421.69 6.91
1428.24 6.56 1441.34 6.51 1447.89 6.4 1454.44 6.38 1460.99 6.7 1467.55 6.91
1474.1 7.21 1480.65 7.33 1487.2 7.12 1500.3 6.95 1506.86 7.11 1513.41 7.23
1519.96 7.27 1526.51 7.37 1533.06 7.42 1546.16 7.34 1552.72 7.19 1559.27 7.3
1565.82 7.36 1572.37 7.39 1578.92 7.6 1585.47 7.75 1592.03 7.76 1598.58 7.7
1605.13 7.6 1618.23 7.56 1624.78 7.6 1631.33 7.54 1637.89 6.53 1644.44 5.71
1650.99 5.85 1657.54 5.86 1664.09 5.91 1670.64 5.99 1677.19 5.99 1683.75
5.92 1690.3 6.42 1696.85 6.54 1703.4 6.93 1709.95 7.7 1716.5 9 1723.06 9.78
1729.61 10.53 1736.16 11.63 1742.71 11.94 1749.26 11.89 1755.81 11.46
1762.36 10.44 1768.92 9.02 1775.47 7.57 1782.02 6.65 1788.57 6.29 1795.12
6.16 1808.23 5.76 1814.78 5.66 1821.33 5.64 1827.88 5.39 1834.43 5.23
1840.98 4.98 1854.09 4.83 1860.64 4.78 1867.19 4.75 1873.74 4.47 1880.29
4.31 1893.4 4.12 1899.95 4.41 1906.5 4.52 1913.05 4.48 1919.6 4.15 1926.15
3.9 1932.7 3.73 1939.26 3.69 1945.81 3.73 1952.36 3.83 1958.91 3.83 1972.01
3.69 1978.56 3.57 1985.12 3.47 1991.67 3.4 1998.22 3.41 2004.77 3.29
2011.32 3.3 2017.87 3.41 2024.43 3.46 2030.98 3.65 2037.53 3.67 2044.08 3.92
2050.63 3.75 2057.18 3.61 2063.73 3.35 2070.29 3.43 2076.84 3.37 2083.39
3.64 2208.08 2.88 2343.94 3.23 2364.33 7.96 2371.19 1.69 2379.02 .13 2396.94
-12.6 2406.72 -14.01 2420.7 -17.95 2442.46 -20.19 2461.27 -20.88 2476.74 -
16.17 2491.29 -9.07 2497.23 -4.15 2502.98 6.11 2504.02 6.22 2529.89 12.74
2571.59 11.49 2946.27 14 2952.82 13.91 2959.38 13.65 2965.94 13.24 2972.49
13.15 2979.05 13.15 2985.61 13.12 2992.17 13.24 2998.72 13.33 3005.28 13.39
3011.84 13.31 3018.39 13.29 3031.51 13.31 3038.07 13.38 3044.62 13.55
3057.74 13.56 3064.29 13.77 3077.41 13.63 3090.52 13.7 3097.08 13.67 3103.64
13.59 3110.19 13.61 3116.75 13.61 3123.31 13.53 3129.86 13.01 3136.42 13.05
3142.98 13.15 3149.54 13.06 3156.09 12.62 3162.65 12.64 3169.21 12.59
3175.76 12.62 3182.32 12.43 3188.88 12.02 3195.44 11.83 3201.99 11.97
3208.55 12.33 3215.11 12.72 3221.66 13.03 3228.22 13.26 3234.78 13.37
3247.89 13.63 3254.45 13.73 3261.01 13.76 3267.56 13.74 3280.68 13.83
3287.23 13.76 3300.32 14.17 3306.87 14.43 3313.42 14.77 3319.97 14.99
3326.52 14.88 3339.62 14.39 3346.17 14.23 3352.72 14.14 3359.27 13.95
3365.82 13.9 3372.37 13.77 3378.91 13.69 3385.46 13.5 3392.01 13.43 3398.56
13.61 3405.11 13.84 3411.66 14.04 3418.21 14.34 3424.76 14.29 3431.31 14.08
3437.86 13.64 3444.41 13 3450.96 12.52 3457.5 12.22 3464.05 12.04 3470.6
11.73 3477.15 11.16 3483.7 10.69 3490.25 10.13 3496.8 10.16 3503.35 10.25
3509.9 10.23 3516.45 10.19 3523 10.1 3529.54 10.03 3536.09 9.99 3542.64
10.08 3549.19 10.2 3555.74 10.18 3562.29 9.91 3575.39 10.17 3581.94 10.4
3588.49 10.6 3595.04 10.72 3601.59 10.7 3608.13 10.65 3614.68 10.39 3621.23
10.36 3627.78 10.26 3634.33 10.32 3640.88 10.25 3647.43 10.03 3660.53 10.15
3667.08 10.15 3680.18 9.92 3686.72 9.89 3693.27 10.04 3699.82 9.89 3706.37
9.66 3712.92 9.71 3719.47 9.69 3726.02 9.86 3732.57 9.99 3739.12 12.73

3745.67 15.62 3752.22 16.67 3758.76 16.77 3765.31 16.81 3771.86 16.81
3784.96 16.92 3791.51 17.06 3798.06 17.61 3804.61 18.22 3811.16 18.59
3817.71 18.35 3824.26 18.65 3830.8 18.81 3837.35 18.53 3843.9 18.33 3850.45
18.29 3857 18.19 3863.55 18.04 3870.1 17.59 3876.65 16.78 3883.2 14.96
3889.75 13.07 3896.3 11.31 3902.85 10.54 3909.39 10.74 3915.94 10.96 3922.49
12.09 3929.04 12.72 3935.59 13.81 3942.14 14.37 3948.69 14.59 3955.24 14.9
3961.79 15.13 3968.34 14.95 3974.89 14.88 3981.44 14.83 3987.98 14.68
3994.53 14.8 4001.08 14.97 4007.63 14.97 4014.18 14.91 4020.73 15.15 4027.28
15.29 4033.83 15.32 4046.93 15.41 4066.57 15.44 4073.12 15.46 4086.22 15.45
4099.32 15.47 4132.06 15.53 4138.61 15.51 4151.71 15.4 4171.36 15.17 4184.46
15.06 4197.56 15.05 4204.1 15.07

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 2364.33 .035 2529.89 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2364.33
2529.89 1208.71 1041.61 935.52 .1 .3 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 1251 9.67 T
 3424 4204.1 14.3 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 5990.413

INPUT
Description: 7
Station Elevation Data num= 206
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 23.22 26.08 24.85 156.48
24.77 182.56 24.09 195.6 24.58 215.15 23.64 241.23 24.41 254.27 24.13 267.31
23.16 312.95 22.29 325.99 22.68 339.03 22.19 423.79 21.96 436.83 21.25
502.03 20.44 521.59 21.17 573.75 20.97 586.79 20.54 593.31 19.67 599.83
18.33 710.66 17.34 769.34 18.08 886.73 17.47 932.49 17.75 971.72 17.38
991.33 18.11 1017.48 17.92 1030.55 18.56 1056.7 18.59 1082.85 19.57 1122.08
18.89 1135.15 17.85 1167.84 17.81 1200.52 18.63 1207.06 18.19 1220.14 18.3
1226.67 17.68 1239.75 17.8 1259.36 17.5 1285.51 18.34 1292.05 18.86 1344.35
19.81 1363.96 19.6 1475.09 22.84 1514.32 22.65 1625.45 24.97 1645.06 24.02
1658.14 22.6 1690.82 22.57 1710.46 20.98 1736.68 19.61 1782.58 19.13 1789.14
18.78 1795.7 17.56 1808.81 12.91 1815.37 11.89 1821.93 11.79 1848.15 13.43
1874.38 13.36 1880.94 13.76 1894.05 16 1907.17 16.65 1926.84 16.56 1933.39
15.67 1939.95 16.12 1953.07 15.87 1959.62 15.03 1966.18 15.19 1985.85 17.52
1998.96 18.66 2012.08 19.28 2018.64 19.04 2025.19 17.28 2031.75 17.64
2051.42 20.93 2071.09 21.96 2084.2 21.35 2090.76 20.55 2110.43 15.56 2116.99
14.32 2123.55 13.6 2136.66 13.3 2189.11 13.13 2215.33 12.09 2221.88 12.15
2300.54 11.44 2326.76 10.77 2333.31 11.09 2384.5 9.54 2390.89 8.26 2397.29
5.93 2403.69 2.01 2420 -1.01 2420.9 -1.16 2422.67 -1.46 2422.87 -1.25
2423.27 -1.2 2423.9 -1.34 2424.56 -1.49 2425.33 -1.64 2426.19 -1.7 2427.17 -
1.99 2428.25 -2.21 2429.47 -2.71 2430.61 -3.19 2432.03 -3.66 2434.39 -4.41
2436.83 -5.27 2439.29 -6.1 2442 -6.83 2444.54 -7.28 2447.29 -7.84 2449.88 -
8.1 2452.31 -8.26 2454.84 -8.46 2457.06 -8.57 2459.42 -8.63 2461.45 -8.75
2463.76 -8.96 2466.3 -8.91 2469.13 -9.1 2471.69 -8.95 2474.36 -9.43 2476.97

-9.32 2479.72 -9.27 2482.34 -9.17 2485.22 -8.96 2487.86 -8.61 2490.42 -8.34
2492.88 -8.04 2495.06 -7.61 2497.29 -7.22 2499.32 -7.05 2501.44 -6.77
2503.21 -6.52 2505.32 -6.16 2507.24 -5.86 2508.99 -5.42 2510.58 -5.18
2512.33 -4.81 2513.96 -4.59 2515.81 -4.19 2517.88 -3.76 2520.36 -3.45
2522.71 -2.85 2525.25 -2.51 2527.8 -2.3 2529.49 -2.02 2531.03 -1.89 2532.66
-1.83 2534.11 -1.76 2535.66 -1.62 2536.89 -1.48 2538.22 -1.39 2539.31 -1.28
2540.31 -1.14 2543.95 4.79 2550.21 7.62 2556.47 9.27 2562.73 9.46 2575.24
9.02 2587.76 8.18 2637.82 9.37 2714.81 9.63 2747.45 10.26 2845.37 10.51
2858.43 10.76 2871.49 10.29 2897.6 11.6 3028.46 10.74 3192.3 10.41 3343.02
11.76 3349.57 10.86 3356.13 9.51 3369.23 8.27 3382.34 7.61 3408.55 7.78
3415.11 8.11 3460.98 7.33 3513.41 8.34 3533.07 9.23 3605.15 8.2 3631.37 9.07
3716.56 8.05 3723.11 7.23 3775.54 8.72 3782.09 9.85 3788.65 11.53 3795.2
13.72 3801.75 15.25 3814.86 15.45 3834.52 17.14 3841.07 17.26 3847.63 16.39
3854.18 14.99 3860.73 13.07 3867.28 11.9 3919.71 13.13 3985.24 10.65 4004.9
10.55 4018.01 11.33 4024.56 11.32 4031.12 11.99 4044.22 15.65 4050.78 16.57
4057.33 16.06

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 2333.31 .035 2556.47 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2333.31
2556.47 373.51 485.71 679.74 .1 .3 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 2897 4057.33 11.6 T
Blocked Obstructions num= 1
 Sta L Sta R Elev
 2896.5 3167.111.55081

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 5504.704

INPUT
Description: 6- Approach Plain St Br
Station Elevation Data num= 421 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 24.78 6.56 25.23 13.11 25.58 19.67 25.61 26.22 25.55 32.78 25.64 39.33
25.66 45.89 25.9 52.45 26.03 59 26.29 72.11 26.55 78.67 26.66 85.22 26.89
91.78 27.21 98.34 27.35 104.89 27.69 111.45 27.9 118 27.97 124.56 28.19
131.11 28.33 137.67 28.57 144.23 28.64 150.78 28.53 157.34 28.21 163.89
28.06 170.45 27.95 177 28.13 183.56 28.26 190.12 28.35 196.67 28.4 203.23
28.55 209.78 28.82 216.34 28.76 222.89 28.59 229.45 28.52 236 28.41 242.56
28.35 249.12 28.48 255.67 28.65 262.23 28.71 268.78 28.57 275.34 28.2 281.89
27.87 288.45 27.64 295.01 27.6 301.56 27.42 308.12 27.2 314.67 26.9 321.23
26.64 327.78 26.58 334.34 26.47 340.9 26.22 347.45 26.07 354.01 25.83 360.56
25.76 367.12 25.56 373.67 25.24 380.23 25.11 386.79 24.92 393.34 24.82
399.9 24.79 406.45 24.66 413.01 24.14 419.56 24.01 426.12 23.94 432.68 23.82
439.23 24.13 445.79 24.25 452.34 24.24 458.9 24.16 465.45 24.14 472.01 24.01
478.56 23.82 485.12 23.82 491.68 23.96 498.23 24.08 504.79 24 511.34 24.35
517.9 25.42 524.45 25.3 537.57 24.89 544.12 23.96 550.68 23.35 557.23 22.59
563.79 22.05 570.34 21.64 576.9 21.46 583.46 21.24 590.01 21.21 596.57 21.29
603.12 21.17 609.68 21.1 616.23 21.1 629.35 20.87 635.9 20.8 642.46 20.86

649.01 20.96 662.12 21.45 668.68 21.55 675.24 21.53 681.79 21.25 688.35
21.21 694.9 20.58 701.46 20.06 708.01 20.27 714.57 20.26 721.13 20.27 734.24
20.45 740.79 20.53 753.9 20.73 760.46 20.76 767.02 20.85 780.13 20.34 786.68
20.2 793.24 20.18 799.79 20.27 812.91 20.31 819.46 20.36 826.02 20.3 832.57
20.18 839.13 20.17 845.68 20.07 852.24 19.63 858.8 19.64 871.91 19.75
878.46 19.79 885.02 19.73 891.57 19.72 898.13 19.75 904.69 19.88 911.24
19.82 924.35 19.97 930.91 20.26 937.46 20.37 944.02 20.58 950.57 20.73
957.13 20.79 963.69 20.54 970.24 20.52 983.35 20.94 989.91 20.95 996.46
20.88 1003.02 20.95 1009.58 21 1016.13 21 1022.69 20.98 1029.24 21.03 1035.8
21.06 1042.35 21.41 1048.91 21.86 1055.47 21.91 1062.02 22.08 1068.58 22.33
1075.13 22.63 1081.69 22.77 1088.24 22.84 1094.8 22.83 1101.36 22.65 1107.91
22.28 1114.47 21.81 1121.02 21.26 1127.58 20.83 1134.13 20.86 1140.69 21.15
1147.25 21.47 1153.8 21.57 1166.91 21.67 1173.47 21.78 1180.02 21.7 1186.58
21.5 1193.14 21.59 1199.69 21.65 1206.25 21.5 1212.8 21.45 1219.36 21.34
1225.91 21.03 1232.47 20.83 1245.58 20.85 1252.14 20.93 1258.69 20.94
1265.25 20.86 1271.8 20.81 1278.36 20.93 1284.92 21.1 1298.03 21.12 1304.58
21.29 1311.14 21.55 1317.69 21.79 1324.25 21.87 1330.81 21.89 1343.92 22.15
1350.47 22.32 1357.03 22.45 1363.58 22.64 1370.14 23.04 1376.7 23.27 1383.25
23.3 1389.81 23.38 1396.36 23.53 1402.92 23.66 1409.47 23.56 1422.59 23.57
1429.14 23.67 1435.7 23.79 1442.25 23.88 1448.81 24 1455.36 23.9 1468.47
24.01 1475.03 23.94 1481.59 23.9 1488.14 23.71 1494.7 23.55 1501.25 23.79
1507.81 24.49 1514.36 24.93 1520.92 25.07 1527.48 25.11 1534.03 25.27
1540.59 25.46 1547.14 25.57 1553.7 25.72 1560.25 25.9 1566.81 25.99 1573.37
25.97 1579.92 25.91 1586.48 25.9 1599.59 25.73 1606.14 25.74 1612.7 25.71
1625.81 25.5 1632.37 25.26 1638.92 25.07 1645.48 24.81 1652.03 24.63 1658.59
24.52 1665.15 24.59 1671.7 24.7 1684.81 24.01 1691.37 23.79 1697.92 23.37
1704.44 23.14 1717.48 23.2 1724 23.22 1730.52 23.16 1737.04 22.74 1743.56
21.76 1750.08 21.29 1756.6 20.94 1763.12 20.36 1769.64 20.2 1776.16 20
1782.68 19.85 1789.2 19.42 1795.72 18.65 1802.24 17.36 1808.76 16.13 1815.28
15.84 1821.8 15.97 1828.32 16.71 1834.84 17.59 1841.36 18.52 1847.88 18.64
1854.4 18.83 1860.92 18.95 1867.44 19.09 1873.96 19.14 1886.99 19.53 1900.03
19.8 1906.55 19.92 1913.07 19.92 1919.59 20.2 1926.11 20.45 1932.63 20.57
1939.15 20.41 1945.67 20.32 1952.19 20.34 1958.71 20.54 1965.23 21.14
1971.75 21.95 1978.27 22.69 1984.79 22.85 1991.31 22.98 1997.83 23.34
2004.35 23.44 2010.87 23.22 2017.39 22.97 2023.91 23.32 2030.43 23.47
2036.95 23.64 2043.47 23.42 2049.99 23.3 2056.5 23.14 2063.02 22.93 2069.54
22.85 2076.06 22.5 2082.58 21.46 2089.1 19.25 2095.62 18.89 2102.14 18.88
2108.66 18.48 2115.18 17.65 2121.7 17.19 2128.22 16.84 2134.74 16.42 2147.78
15.17 2154.3 15.05 2167.37 14.48 2173.91 14.13 2180.45 13.95 2193.53 13.74
2200.06 13.7 2206.6 13.52 2213.14 13.22 2219.68 12.78 2226.21 12.43 2239.29
12.19 2245.83 12.23 2252.37 12.32 2258.9 12.19 2265.44 11.85 2271.98 11.66
2278.52 11.71 2291.59 11.54 2298.13 11.33 2311.21 11.2 2317.74 11.29 2324.28
11.36 2330.82 11.4 2337.36 11.59 2343.9 11.92 2350.43 12.2 2356.97 12.43
2370.05 12.24 2376.58 12.28 2383.12 12.36 2389.66 12.53 2555.27 11.7 2571.37
6.39 2572.07 -3.74 2580.16 -6.2 2608.37 -10.12 2625.36 -10.88 2644.33 -9.87
2650.91 -10.66 2670.95 -9.1 2674.87 -6.86 2681.57 11.72 2722.61 11.83
2781.61 11.44 2788.1 11.47 2801.07 11.23 2820.54 10.83 2827.03 10.81 2833.52
10.75 2840.01 10.61 2846.5 10.56 2852.99 10.7 2859.48 10.86 2865.97 10.92
2872.46 10.81 2878.95 10.43 2885.43 10.13 2891.92 10.03 2898.41 9.87 2904.9
9.74 2911.39 9.98 2917.88 10.3 2924.37 10.54 2930.86 10.69 2937.35 11.01
2943.84 10.79 2956.82 10.45 2963.31 10.19 2969.79 10.24 2976.28 9.84 2982.77
9.76 2989.26 9.73 2995.75 9.67 3002.24 9.72 3008.73 9.62 3015.22 9.64
3021.71 9.75 3028.2 9.65 3034.69 9.76 3041.18 9.83 3047.67 9.69 3054.15 9.6
3060.64 9.59 3073.62 9.95 3086.6 10.01 3093.09 10.13 3099.58 10.17 3106.07

10.16 3112.56 10.46 3119.05 14.98 3125.54 20.67 3132.03 20.75 3138.51 20.51
3145 19.74 3151.49 19.46 3157.98 19.44 3164.47 19.45 3170.96 19.57 3177.45
18.89 3183.94 17.62 3190.43 17.4 3196.92 18.14 3203.41 17.77 3209.9 17.61
3216.39 17.55 3222.87 17.74 3229.36 18.01 3235.85 17.72 3242.34 17.41
3248.83 17.3 3255.32 17.5 3261.81 18.17 3268.3 18.97 3274.79 19.02 3281.28
19.23 3287.77 19.18

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 2555.27 .035 2681.57 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2555.27
2681.57 98.06 95.18 93.88 .1 .3 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 2722 3287.77 11.6 T
Blocked Obstructions num= 1
 Sta L Sta R Elev
 2791.49 2855.8811.40867

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 5409.52

INPUT
Description: 5.7- US Face Plain St Br
Station Elevation Data num= 429
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 29.95 6.52 30.1 13.05 30.45
19.57 31.19 26.09 31.36 32.62 31.23 39.14 31.05 45.66 30.89 52.19 30.46
58.71 30.14 65.23 30.03 71.75 30.11 78.28 30.08 84.8 30.07 91.32 30.28
97.85 30.47 104.37 30.57 110.89 30.3 117.42 29.89 123.94 29.63 130.46 29.82
136.99 29.94 143.51 30.17 150.03 30.43 156.56 30.52 169.6 30.6 182.65 30.65
195.7 30.48 202.22 30.58 208.74 30.74 215.27 30.96 221.79 31.06 228.31 31.07
234.83 31.01 241.36 31.14 247.88 30.34 254.4 29.99 260.93 30.33 267.45 30.48
273.97 30.49 287.02 30.4 293.54 30.09 300.07 29.34 306.59 28.8 313.11 29.18
319.64 29.77 326.16 30.04 332.68 30.68 339.21 30.92 345.73 30.9 352.25 30.78
358.78 30.35 365.3 29.8 371.82 30.06 378.34 30.87 384.87 31.63 391.39 31.84
397.91 32.26 404.44 32.43 410.96 32.23 430.53 30.92 437.05 30.45 443.58
30.23 450.1 30.54 456.62 31.05 463.15 30.9 469.67 30.39 476.19 29.92 482.72
29.67 489.24 29.58 495.76 29.65 502.29 29.91 508.81 30.46 515.33 31.27
521.85 32.23 528.38 32.82 534.9 32.97 541.42 33.06 547.95 32.41 554.47 32.31
560.99 32.43 574.04 32.86 580.56 32.8 587.09 32.57 600.13 32.78 619.7 32.19
626.23 32.05 632.75 31.27 639.27 30.46 645.8 29.73 652.32 29.4 658.84 29.13
665.36 28.83 671.89 28.7 678.41 29.34 684.93 31.05 691.46 31.69 697.98 31.97
704.5 32.2 711.03 32.1 717.55 31.82 724.07 31.51 730.6 31.17 737.12 30.76
743.64 30.45 750.17 30.58 756.69 30.85 763.21 31.14 769.74 31.5 776.26 31.89
782.78 31.76 789.31 32.29 795.83 32.5 802.35 32.69 808.88 32.85 815.4 32.95
821.92 32.86 828.44 32.72 834.97 32.7 841.49 32.64 848.01 32.56 854.54 32.74
861.06 32.98 867.58 33.45 874.11 33.94 880.63 34.2 887.15 34.09 893.68 34.53
900.2 34.86 906.72 35.06 913.25 34.97 926.25 35.02 945.76 35.36 952.27 35.25
958.77 35.28 965.28 35.34 971.78 35.55 978.28 35.52 984.79 35.29 991.29 35.2
997.79 34.7 1004.3 33.79 1010.8 32.8 1017.31 31.72 1023.81 31.15 1030.31
30.61 1036.82 30.36 1043.32 31.67 1049.82 33.52 1056.33 34.4 1062.83 33.97

1082.34 32.57 1088.85 32.08 1095.35 31.78 1101.85 31.67 1108.36 31.89
1114.86 32.19 1127.87 32.32 1134.37 32.44 1147.38 32.48 1153.88 32.41
1160.39 32.22 1166.89 31.79 1179.9 32.23 1186.4 32.43 1192.91 32.58 1199.41
32.52 1205.91 32.65 1212.42 32.66 1218.92 32.69 1225.43 32.7 1231.93 32.81
1238.43 33.03 1244.94 33.4 1251.44 33.82 1257.94 33.85 1270.95 33.81 1277.46
33.83 1290.46 33.76 1296.97 33.66 1309.97 33.51 1316.48 33.23 1322.98 32.65
1329.48 32.04 1335.99 31.57 1342.49 31.39 1349 31.15 1355.5 31.25 1362 31.28
1375.01 31.43 1381.52 31.52 1388.02 31.69 1394.52 31.81 1401.03 31.85
1407.53 31.83 1414.03 31.76 1420.54 31.52 1427.04 31.2 1433.54 31.29 1440.05
31.29 1446.55 31.27 1453.06 31.18 1459.56 30.99 1466.06 30.68 1472.57 30.67
1479.07 30.57 1485.57 30.41 1492.08 30.17 1498.58 29.97 1505.09 29.97
1511.59 30 1518.09 30.01 1524.6 30.21 1531.1 30.63 1537.6 30.62 1544.11
30.41 1550.61 30.31 1557.12 30.42 1563.62 30.35 1570.12 29.97 1576.63 29.73
1583.13 29.64 1589.63 29.41 1596.14 28.66 1602.64 28.28 1609.15 28.26
1615.65 28 1622.15 28.17 1628.66 28.23 1635.16 28.27 1641.71 28.23 1648.27
28.1 1654.82 27.9 1661.38 27.58 1667.93 26.89 1674.48 26.22 1681.04 25.93
1687.59 25.76 1694.14 25.16 1700.7 24.76 1707.25 24.72 1713.8 24.25 1720.36
24 1726.91 24.26 1733.47 24.54 1740.02 24.92 1746.57 24.95 1753.13 24.85
1759.68 24.87 1766.23 24.94 1772.79 24.46 1779.34 24.13 1785.89 24.48
1792.45 24.97 1805.56 25.14 1818.66 25.41 1825.22 25.21 1831.77 24.06
1838.32 23.96 1844.88 23.75 1851.43 23.88 1857.98 24.15 1864.54 24.57
1871.09 24.77 1877.65 24.76 1884.2 24.62 1890.75 24.35 1897.31 24.19 1903.86
24.12 1910.41 24.08 1923.52 24.35 1930.07 24.52 1936.63 24.74 1943.18 24.77
1962.84 24.54 1969.4 24.13 1975.95 22.67 1982.5 21.37 1995.61 20.92 2015.27
20.41 2021.82 20.2 2028.38 19.71 2034.93 19.56 2041.49 19.24 2048.04 18.64
2054.59 18.09 2061.13 17.65 2067.66 17.47 2074.19 17.62 2080.72 17.68
2087.26 17.54 2106.86 17.23 2113.39 17.15 2119.92 16.84 2126.45 16.17
2132.99 15.13 2139.52 14.62 2146.05 14.65 2159.12 14.85 2172.18 15.02
2178.72 15.12 2185.25 14.81 2191.78 14.47 2204.85 14.46 2217.91 14.21
2224.45 14.13 2230.98 13.97 2237.51 13.87 2244.04 13.85 2250.58 13.9 2257.11
13.81 2263.64 13.65 2270.17 13.59 2276.71 13.56 2283.24 13.59 2289.77 13.71
2296.31 13.78 2302.84 14.02 2315.84 14.12 2322.31 14.33 2328.78 14.48
2335.25 14.67 2341.72 14.77 2348.19 14.9 2354.66 14.97 2361.13 15.13 2367.6
15.11 2374.07 15.19 2380.54 15.37 2387.01 15.25 2393.47 15.25 2399.94 15.4
2406.41 15.5 2412.88 15.39 2419.35 15.26 2425.82 14.58 2432.29 11.87 2438.76
4.39 2441.97 -3.65 2460.77 -9.63 2473.43 -10.96 2519.95 -9.19 2547.66 -4.85
2551.91 -3.45 2552.45 14.33 2568.15 13.28 2574.62 13.83 2581.09 13.58
2587.56 13.43 2594.03 12.93 2600.5 12.63 2606.97 12.44 2613.44 12.29 2619.91
12.2 2626.38 12.18 2632.85 12.09 2639.32 11.98 2645.87 11.7 2652.43 11.72
2658.99 12.02 2665.55 12.13 2672.11 11.9 2678.67 11.57 2691.79 11.05 2698.34
10.77 2704.9 10.52 2711.46 10.25 2718.02 9.94 2724.58 9.51 2731.14 9.32
2737.7 9.18 2744.25 9.07 2750.81 8.99 2757.37 8.84 2763.93 8.79 2770.49 8.69
2777.05 8.91 2783.61 9.21 2790.17 9.15 2796.72 9.14 2803.28 9.27 2809.84
9.31 2816.4 9.39 2822.96 9.42 2829.52 9.52 2855.75 9.55 2862.31 9.73 2875.43
10.24 2881.99 10.27 2888.55 10.15 2895.11 10.28 2901.66 10.33 2908.22 10.28
2914.78 10.26 2934.46 10.38 2947.57 10.36 2954.13 10.36 2960.69 10.81
2967.25 12.12 2973.81 11.64 2980.37 12.35 2986.93 17.36 2993.49 20.71
3000.04 20.87 3006.6 20.86 3013.16 20.93 3019.72 20.91 3026.28 21.07 3032.84
20.74 3039.4 20.38 3045.96 20.35 3052.51 20.26 3059.07 20.4 3065.63 19.79
3072.19 19.35 3078.75 19.81 3085.31 20.06 3091.87 19.81 3098.43 18.68
3104.98 18.04 3111.54 18.21 3118.1 18.45 3124.66 18.53 3131.22 18.75 3137.78
18.99 3150.89 19.09 3157.45 19.29 3164.01 19.57 3170.57 19.73

Manning's n Values num= 3

```
 Sta n Val Sta n Val Sta n Val
 0 .085 2419.35 .035 2552.45 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  2419.35
2552.45 81.29 73.58 68.36 .1 .3 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 2630 3170.57 11.6 T
Blocked Obstructions num= 1
 Sta L Sta R Elev
 2662.35 272512.09707

BRIDGE


RIVER: Taunton River
REACH: Main Stem RS: 5376.326

INPUT
Description: 5.5 Plain St
Distance from Upstream XS = 4
Deck/Roadway Width = 58
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
 num= 14
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 2126 14 2300 14 2410 14   2410 19.95 2425 19.95 2425 16.34 12.06
 2490 15.34 11.64 2552 14.33 10.13 2552 17.95 10.13
 2567 17.95 2567 13.1 2649 13.1
 2722 12.55 2981 12.55

Upstream Bridge Cross Section Data
Station Elevation Data num= 429
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  0 29.95 6.52 30.1 13.05 30.45
19.57 31.19 26.09 31.36  32.62 31.23 39.14 31.05 45.66 30.89 52.19 30.46
58.71 30.14  65.23 30.03 71.75 30.11 78.28 30.08 84.8 30.07 91.32 30.28
97.85 30.47 104.37 30.57 110.89 30.3 117.42 29.89 123.94 29.63  130.46 29.82
136.99 29.94 143.51 30.17 150.03 30.43 156.56 30.52  169.6 30.6 182.65 30.65
195.7 30.48 202.22 30.58 208.74 30.74  215.27 30.96 221.79 31.06 228.31 31.07
234.83 31.01 241.36 31.14  247.88 30.34 254.4 29.99 260.93 30.33 267.45 30.48
273.97 30.49  287.02 30.4 293.54 30.09 300.07 29.34 306.59 28.8 313.11 29.18
319.64 29.77 326.16 30.04 332.68 30.68 339.21 30.92 345.73 30.9  352.25 30.78
358.78 30.35 365.3 29.8 371.82 30.06 378.34 30.87  384.87 31.63 391.39 31.84
397.91 32.26 404.44 32.43 410.96 32.23  430.53 30.92 437.05 30.45 443.58
30.23 450.1 30.54 456.62 31.05  463.15 30.9 469.67 30.39 476.19 29.92 482.72
29.67 489.24 29.58  495.76 29.65 502.29 29.91 508.81 30.46 515.33 31.27
521.85 32.23  528.38 32.82 534.9 32.97 541.42 33.06 547.95 32.41 554.47 32.31
560.99 32.43 574.04 32.86 580.56 32.8 587.09 32.57 600.13 32.78  619.7 32.19
626.23 32.05 632.75 31.27 639.27 30.46 645.8 29.73  652.32 29.4 658.84 29.13
665.36 28.83 671.89 28.7 678.41 29.34  684.93 31.05 691.46 31.69 697.98 31.97
704.5 32.2 711.03 32.1  717.55 31.82 724.07 31.51 730.6 31.17 737.12 30.76
743.64 30.45  750.17 30.58 756.69 30.85 763.21 31.14 769.74 31.5 776.26 31.89
782.78 31.76 789.31 32.29 795.83 32.5 802.35 32.69 808.88 32.85  815.4 32.95
821.92 32.86 828.44 32.72 834.97 32.7 841.49 32.64  848.01 32.56 854.54 32.74
861.06 32.98 867.58 33.45 874.11 33.94  880.63 34.2 887.15 34.09 893.68 34.53
```

900.2 34.86 906.72 35.06 913.25 34.97 926.25 35.02 945.76 35.36 952.27 35.25
958.77 35.28 965.28 35.34 971.78 35.55 978.28 35.52 984.79 35.29 991.29 35.2
997.79 34.7 1004.3 33.79 1010.8 32.8 1017.31 31.72 1023.81 31.15 1030.31
30.61 1036.82 30.36 1043.32 31.67 1049.82 33.52 1056.33 34.4 1062.83 33.97
1082.34 32.57 1088.85 32.08 1095.35 31.78 1101.85 31.67 1108.36 31.89
1114.86 32.19 1127.87 32.32 1134.37 32.44 1147.38 32.48 1153.88 32.41
1160.39 32.22 1166.89 31.79 1179.9 32.23 1186.4 32.43 1192.91 32.58 1199.41
32.52 1205.91 32.65 1212.42 32.66 1218.92 32.69 1225.43 32.7 1231.93 32.81
1238.43 33.03 1244.94 33.4 1251.44 33.82 1257.94 33.85 1270.95 33.81 1277.46
33.83 1290.46 33.76 1296.97 33.66 1309.97 33.51 1316.48 33.23 1322.98 32.65
1329.48 32.04 1335.99 31.57 1342.49 31.39 1349 31.15 1355.5 31.25 1362 31.28
1375.01 31.43 1381.52 31.52 1388.02 31.69 1394.52 31.81 1401.03 31.85
1407.53 31.83 1414.03 31.76 1420.54 31.52 1427.04 31.2 1433.54 31.29 1440.05
31.29 1446.55 31.27 1453.06 31.18 1459.56 30.99 1466.06 30.68 1472.57 30.67
1479.07 30.57 1485.57 30.41 1492.08 30.17 1498.58 29.97 1505.09 29.97
1511.59 30 1518.09 30.01 1524.6 30.21 1531.1 30.63 1537.6 30.62 1544.11
30.41 1550.61 30.31 1557.12 30.42 1563.62 30.35 1570.12 29.97 1576.63 29.73
1583.13 29.64 1589.63 29.41 1596.14 28.66 1602.64 28.28 1609.15 28.26
1615.65 28 1622.15 28.17 1628.66 28.23 1635.16 28.27 1641.71 28.23 1648.27
28.1 1654.82 27.9 1661.38 27.58 1667.93 26.89 1674.48 26.22 1681.04 25.93
1687.59 25.76 1694.14 25.16 1700.7 24.76 1707.25 24.72 1713.8 24.25 1720.36
24 1726.91 24.26 1733.47 24.54 1740.02 24.92 1746.57 24.95 1753.13 24.85
1759.68 24.87 1766.23 24.94 1772.79 24.46 1779.34 24.13 1785.89 24.48
1792.45 24.97 1805.56 25.14 1818.66 25.41 1825.22 25.21 1831.77 24.06
1838.32 23.96 1844.88 23.75 1851.43 23.88 1857.98 24.15 1864.54 24.57
1871.09 24.77 1877.65 24.76 1884.2 24.62 1890.75 24.35 1897.31 24.19 1903.86
24.12 1910.41 24.08 1923.52 24.35 1930.07 24.52 1936.63 24.74 1943.18 24.77
1962.84 24.54 1969.4 24.13 1975.95 22.67 1982.5 21.37 1995.61 20.92 2015.27
20.41 2021.82 20.2 2028.38 19.71 2034.93 19.56 2041.49 19.24 2048.04 18.64
2054.59 18.09 2061.13 17.65 2067.66 17.47 2074.19 17.62 2080.72 17.68
2087.26 17.54 2106.86 17.23 2113.39 17.15 2119.92 16.84 2126.45 16.17
2132.99 15.13 2139.52 14.62 2146.05 14.65 2159.12 14.85 2172.18 15.02
2178.72 15.12 2185.25 14.81 2191.78 14.47 2204.85 14.46 2217.91 14.21
2224.45 14.13 2230.98 13.97 2237.51 13.87 2244.04 13.85 2250.58 13.9 2257.11
13.81 2263.64 13.65 2270.17 13.59 2276.71 13.56 2283.24 13.59 2289.77 13.71
2296.31 13.78 2302.84 14.02 2315.84 14.12 2322.31 14.33 2328.78 14.48
2335.25 14.67 2341.72 14.77 2348.19 14.9 2354.66 14.97 2361.13 15.13 2367.6
15.11 2374.07 15.19 2380.54 15.37 2387.01 15.25 2393.47 15.25 2399.94 15.4
2406.41 15.5 2412.88 15.39 2419.35 15.26 2425.82 14.58 2432.29 11.87 2438.76
4.39 2441.97 -3.65 2460.77 -9.63 2473.43 -10.96 2519.95 -9.19 2547.66 -4.85
2551.91 -3.45 2552.45 14.33 2568.15 13.28 2574.62 13.83 2581.09 13.58
2587.56 13.43 2594.03 12.93 2600.5 12.63 2606.97 12.44 2613.44 12.29 2619.91
12.2 2626.38 12.18 2632.85 12.09 2639.32 11.98 2645.87 11.7 2652.43 11.72
2658.99 12.02 2665.55 12.13 2672.11 11.9 2678.67 11.57 2691.79 11.05 2698.34
10.77 2704.9 10.52 2711.46 10.25 2718.02 9.94 2724.58 9.51 2731.14 9.32
2737.7 9.18 2744.25 9.07 2750.81 8.99 2757.37 8.84 2763.93 8.79 2770.49 8.69
2777.05 8.91 2783.61 9.21 2790.17 9.15 2796.72 9.14 2803.28 9.27 2809.84
9.31 2816.4 9.39 2822.96 9.42 2829.52 9.52 2855.75 9.55 2862.31 9.73 2875.43
10.24 2881.99 10.27 2888.55 10.15 2895.11 10.28 2901.66 10.33 2908.22 10.28
2914.78 10.26 2934.46 10.38 2947.57 10.36 2954.13 10.36 2960.69 10.81
2967.25 12.12 2973.81 11.64 2980.37 12.35 2986.93 17.36 2993.49 20.71
3000.04 20.87 3006.6 20.86 3013.16 20.93 3019.72 20.91 3026.28 21.07 3032.84
20.74 3039.4 20.38 3045.96 20.35 3052.51 20.26 3059.07 20.4 3065.63 19.79
3072.19 19.35 3078.75 19.81 3085.31 20.06 3091.87 19.81 3098.43 18.68

3104.98 18.04 3111.54 18.21 3118.1 18.45 3124.66 18.53 3131.22 18.75 3137.78 18.99 3150.89 19.09 3157.45 19.29 3164.01 19.57 3170.57 19.73

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 2419.35 .035 2552.45 .085

Bank Sta: Left Right Coeff Contr. Expan.
 2419.35 2552.45 .1 .3
Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 2630 3170.57 11.6 T
Blocked Obstructions num= 1
 Sta L Sta R Elev
 2662.35 272512.09707
 Downstream Deck/Roadway Coordinates
 num= 14
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 2126 14 2175 14 2285 14
 2285 19.95 2300 19.95 2300 16.23 11.92
 2365 15.48 11.15 2412 14.73 10.5 2412 17.95 10.5
 2427 17.95 2427 13.1 2510 13.1
 2582 12.55 2981 12.55

Downstream Bridge Cross Section Data
Station Elevation Data num= 429
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 33.95 6.51 34.25 13.02 34.92 19.52 35.01 26.03 35.37 32.54 35.43 39.05 35.4 45.55 35.17 52.06 35.06 58.57 35.13 65.08 35.13 71.58 35.04 78.09 34.66 84.6 34.03 91.11 33.96 97.61 33.82 104.12 33.79 110.63 34.31 117.14 34.8 123.64 34.91 130.15 35.06 136.66 35.41 143.17 35.16 149.67 34.12 156.18 33.87 162.69 34.3 169.2 34.89 175.71 35.11 188.72 35.15 195.23 35.2 201.74 35.16 208.24 35.17 214.75 35.22 221.26 35.24 227.77 35.24 234.27 35.09 240.78 34.8 247.29 34.39 253.8 34.27 260.3 34.31 266.81 34.11 273.32 33.52 279.83 33.25 286.33 33.9 292.84 34.33 299.35 34.44 305.86 34.43 312.36 34.37 318.87 34.14 325.38 33.82 331.89 33.82 338.4 33.74 344.9 33.8 351.41 33.96 357.92 33.89 364.43 33.72 370.93 34.01 377.44 34.26 383.95 34.4 390.46 34.33 396.96 34.37 409.98 34.55 416.49 34.5 422.99 34.32 429.5 34.33 436.01 34.37 442.52 34.36 449.02 34.48 455.53 34.91 462.04 35.27 468.55 35.31 475.06 35.38 481.56 35.28 488.07 34.9 494.58 35.03 501.09 35.22 507.59 35.53 514.1 35.74 520.61 35.62 527.12 35.02 533.62 34.67 540.13 35.01 546.64 35.81 553.15 36 559.65 36.08 566.16 36.11 572.67 36.05 579.18 35.9 585.68 35.71 592.19 35.94 598.7 37.51 605.21 38.83 611.71 39.46 618.22 39.68 624.73 39.67 631.24 39.57 637.74 39.43 644.25 39.18 650.76 38.47 657.27 38.18 670.28 38.09 676.79 38.41 683.3 38.62 689.81 38.56 696.31 38.34 702.82 38 709.33 37.79 715.84 38.38 722.34 38.99 728.85 39.21 735.36 39.23 741.87 39.18 748.37 39.03 754.88 38.82 761.39 38.5 767.9 38.6 774.4 38.87 780.96 39.06 787.52 39.89 794.07 40.63 800.63 40.86 807.18 40.88 813.74 40.84 820.29 40.67 826.85 39.92 833.41 39.51 839.96 39.26 846.52 39.32 853.07 39.65 866.19 40.16 872.74 40.26 879.3 38.69 885.85 37.59 892.41 37.46 898.96 37.2 905.52 38.59 912.08 40.08 918.63 40.99 925.19 41.02 931.74 40.97 938.3 40.62 944.85 40.42 951.41 40.25 957.97 40.06 964.52 39.75 971.08 39.67 977.63 39.39 984.19 39.06 990.75 38.85 997.3 38.71 1003.86 38.66 1010.41 38.01 1016.97 36.23 1023.52 36.25 1030.08 36.83 1036.64 37.17 1043.19 37.29 1056.3 37.37 1062.86 37.34 1069.41 37.17 1075.97 37.02 1082.53

36.93 1089.08 36.9 1095.64 36.68 1102.19 35.9 1108.75 35.69 1115.31 35.5
1121.86 35.35 1128.42 34.91 1134.97 34.68 1141.53 34.42 1148.08 34.14
1154.64 33.81 1161.2 33.67 1174.31 33.79 1180.86 33.86 1187.42 33.97 1200.53
34.22 1207.09 34.32 1220.2 34.47 1226.75 34.61 1233.31 34.7 1239.86 34.37
1246.42 34.25 1252.98 34.23 1259.53 34.32 1266.09 34.75 1272.64 35.08 1279.2
35.66 1285.76 35.98 1292.31 35.95 1305.42 36.34 1318.53 36.7 1325.09 36.74
1331.65 36.71 1338.2 36.61 1344.76 36.21 1351.31 35.09 1357.87 34.14 1364.42
33.9 1370.98 33.93 1377.54 33.99 1384.09 34 1390.65 33.99 1397.2 33.91
1403.76 33.53 1416.87 32.96 1423.43 32.97 1429.98 33.32 1436.54 33.79
1443.09 34.21 1449.65 34.53 1456.21 34.78 1469.32 35.14 1475.87 34.78
1482.43 34.03 1488.98 32.11 1495.54 29.87 1502.1 27.85 1508.65 27.33 1515.2
26.79 1534.84 24.47 1541.38 23.67 1547.93 22.77 1554.48 22.18 1561.02 22.03
1567.57 21.76 1574.11 21.01 1580.66 20.5 1587.21 20.65 1593.75 20.63 1606.85
18.68 1613.39 17.98 1619.94 17.42 1626.49 17.03 1633.03 16.88 1639.58 17.59
1646.12 18.53 1652.67 19.16 1659.22 20.17 1665.76 21.02 1672.31 21.72
1678.86 21.75 1685.4 22.3 1691.95 22.42 1698.49 22.45 1705.04 22.23 1711.59
21.71 1718.13 21.24 1724.68 20.9 1731.23 20.71 1737.77 20.57 1744.32 20.48
1750.87 20.34 1757.41 20.23 1763.96 20.16 1770.5 20.13 1777.05 20.16 1783.6
20.16 1790.14 20.02 1796.69 20.4 1803.24 20 1809.78 19.31 1816.33 18.73
1822.87 18.27 1829.42 17.98 1835.97 17.65 1842.51 17.03 1849.06 17.06
1855.61 17.64 1862.15 17.77 1868.7 17.64 1875.24 17.57 1881.79 17.86 1888.34
17.72 1901.43 16.82 1907.98 16.65 1914.52 16.86 1921.07 16.95 1927.62 17.01
1934.16 17.27 1940.71 17.3 1947.25 16.93 1953.8 16.06 1960.35 15.05 1966.89
13.96 1973.44 13.03 1979.99 13.63 1986.35 15.39 1992.72 16.25 1999.09 16.18
2005.46 16.16 2011.83 16.06 2024.57 15.82 2030.94 15.68 2037.31 15.56
2043.68 15.55 2050.04 15.57 2056.41 15.65 2062.78 15.82 2069.15 16.22
2075.52 16.67 2081.89 16.73 2088.26 16.67 2094.63 16.57 2101 16.51 2107.36
16.43 2113.73 16.28 2120.1 16.1 2126.47 15.78 2132.84 15.35 2139.21 14.21
2145.58 13.34 2151.95 12.67 2158.32 12.27 2164.69 12.75 2171.05 12.81
2177.42 12.99 2183.89 13.35 2190.36 13.27 2196.84 13.12 2203.31 13.06
2209.78 13.03 2216.25 13.11 2222.72 13.25 2235.66 14.03 2242.13 14.4 2255.07
14.78 2261.54 14.93 2268.02 15.13 2274.49 15.1 2280.96 15.1 2300 16.34
2300.05 12.06 2301.97 -3.65 2320.77 -9.63 2333.43 -10.96 2379.95 -9.19
2407.66 -4.85 2411.91 -3.45 2412.45 14.33 2442.73 14.04 2449.2 13.75 2455.67
13 2462.23 12.56 2468.79 12.42 2475.35 12.3 2481.91 12.23 2488.47 12.19
2495.03 12.13 2501.59 11.97 2508.16 11.78 2514.72 11.84 2521.28 12.12
2527.84 12.14 2534.4 12 2547.52 11.48 2554.08 11.2 2560.64 10.9 2573.76
10.25 2580.32 9.94 2586.88 9.78 2593.44 9.56 2606.57 9.39 2613.13 9.28
2626.25 8.88 2632.81 8.81 2639.37 8.83 2645.93 8.93 2652.49 9.01 2659.05
9.06 2665.61 9.29 2672.17 9.32 2678.73 9.31 2685.29 9.24 2691.85 9.2 2698.42
9.28 2704.98 9.58 2711.54 9.81 2718.1 10.14 2724.66 10.34 2731.22 10.34
2737.78 10.42 2744.34 10.38 2764.02 10.45 2770.58 10.45 2777.14 10.33 2783.7
10.32 2790.26 10.37 2796.83 10.39 2809.95 10.36 2816.51 11.56 2823.07 16.74
2829.63 20.25 2836.19 20.17 2842.75 20.22 2849.31 20.21 2855.87 20.28
2862.43 20.55 2868.99 20.86 2875.55 20.91 2882.11 20.9 2888.67 20.74 2895.24
20.46 2901.8 20.57 2908.36 20.64 2914.92 20.35 2921.48 20.4 2928.04 20.63
2934.6 20.45 2941.16 20.49 2947.72 20.81 2954.28 20.67 2960.84 19.98 2967.4
19.25 2973.96 18.84 2980.52 18.7 2987.09 18.61 2993.65 18.64 3000.21 18.69
3006.77 18.83 3013.33 19.08 3019.89 19.36 3026.45 19.39 3033.01 19.4 3039.57
19.44 3046.13 19.41 3052.69 19.4 3059.25 19.48

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 2300 .035 2412.45 .082

```
Bank Sta: Left Right Coeff Contr. Expan.  2300 2412.45 .1 .3
Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 2442 3059.25 14 T
Blocked Obstructions num= 1
 Sta L Sta R Elev
 2531.59 2581.5712.08772

Upstream Embankment side slope = 0 horiz. to 1.0 vertical Downstream
Embankment side slope = 0 horiz. to 1.0 vertical Maximum allowable
submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Piers = 1

Pier Data
Pier Station Upstream= 2500 Downstream= 2350
Upstream num= 2
 Width Elev Width Elev
 2.9 -7 2.6 13
Downstream num= 2
 Width Elev Width Elev
 2.9 -7 2.6 13

Number of Bridge Coefficient Sets = 1
 Low Flow Methods and Data
 Energy
 W.S. Pro Method

 W.S.Pro Data
 Left Embankment
 El of the top of the embankment = 14
 El of the toe of the abutment = -5
 Right Embankment
 El of the top of the embankment = 14
 El of the toe of the abutment = -5
 Abutment Type = 1 Vert. abutments and vert. embankments with or without
wingwalls  Slope of abutments =
 Top with of embankment = 58
 Centroid station of bridge opening =
 Wing Wall Type = No wing walls present
 Width =
 Angle =
 Radius =
 Guide Banks Type = Straight
 Length = 100
 Offset = 100
 Angle = 100

Selected Low Flow Methods = W.S.Pro Method
```

High Flow Method Pressure and Weir flow
 Submerged Inlet Cd =
 Submerged Inlet + Outlet Cd = .8
 Max Low Cord =

Additional Bridge Parameters
 Add Friction component to Momentum
 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 5335.943

INPUT
Description: 5.3- DS Face Plain St Br
Station Elevation Data num= 429
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 33.95 6.51 34.25 13.02 34.92
19.52 35.01 26.03 35.37 32.54 35.43 39.05 35.4 45.55 35.17 52.06 35.06 58.57
35.13 65.08 35.13 71.58 35.04 78.09 34.66 84.6 34.03 91.11 33.96 97.61
33.82 104.12 33.79 110.63 34.31 117.14 34.8 123.64 34.91 130.15 35.06 136.66
35.41 143.17 35.16 149.67 34.12 156.18 33.87 162.69 34.3 169.2 34.89 175.71
35.11 188.72 35.15 195.23 35.2 201.74 35.16 208.24 35.17 214.75 35.22 221.26
35.24 227.77 35.24 234.27 35.09 240.78 34.8 247.29 34.39 253.8 34.27 260.3
34.31 266.81 34.11 273.32 33.52 279.83 33.25 286.33 33.9 292.84 34.33
299.35 34.44 305.86 34.43 312.36 34.37 318.87 34.14 325.38 33.82 331.89
33.82 338.4 33.74 344.9 33.8 351.41 33.96 357.92 33.89 364.43 33.72 370.93
34.01 377.44 34.26 383.95 34.4 390.46 34.33 396.96 34.37 409.98 34.55 416.49
34.5 422.99 34.32 429.5 34.33 436.01 34.37 442.52 34.36 449.02 34.48 455.53
34.91 462.04 35.27 468.55 35.31 475.06 35.38 481.56 35.28 488.07 34.9 494.58
35.03 501.09 35.22 507.59 35.53 514.1 35.74 520.61 35.62 527.12 35.02
533.62 34.67 540.13 35.01 546.64 35.81 553.15 36 559.65 36.08 566.16 36.11
572.67 36.05 579.18 35.9 585.68 35.71 592.19 35.94 598.7 37.51 605.21 38.83
611.71 39.46 618.22 39.68 624.73 39.67 631.24 39.57 637.74 39.43 644.25
39.18 650.76 38.47 657.27 38.18 670.28 38.09 676.79 38.41 683.3 38.62 689.81
38.56 696.31 38.34 702.82 38 709.33 37.79 715.84 38.38 722.34 38.99 728.85
39.21 735.36 39.23 741.87 39.18 748.37 39.03 754.88 38.82 761.39 38.5 767.9
38.6 774.4 38.87 780.96 39.06 787.52 39.89 794.07 40.63 800.63 40.86 807.18
40.88 813.74 40.84 820.29 40.67 826.85 39.92 833.41 39.51 839.96 39.26
846.52 39.32 853.07 39.65 866.19 40.16 872.74 40.26 879.3 38.69 885.85 37.59
892.41 37.46 898.96 37.2 905.52 38.59 912.08 40.08 918.63 40.99 925.19 41.02
931.74 40.97 938.3 40.62 944.85 40.42 951.41 40.25 957.97 40.06 964.52 39.75
971.08 39.67 977.63 39.39 984.19 39.06 990.75 38.85 997.3 38.71 1003.86
38.66 1010.41 38.01 1016.97 36.23 1023.52 36.25 1030.08 36.83 1036.64 37.17
1043.19 37.29 1056.3 37.37 1062.86 37.34 1069.41 37.17 1075.97 37.02 1082.53
36.93 1089.08 36.9 1095.64 36.68 1102.19 35.9 1108.75 35.69 1115.31 35.5
1121.86 35.35 1128.42 34.91 1134.97 34.68 1141.53 34.42 1148.08 34.14
1154.64 33.81 1161.2 33.67 1174.31 33.79 1180.86 33.86 1187.42 33.97 1200.53
34.22 1207.09 34.32 1220.2 34.47 1226.75 34.61 1233.31 34.7 1239.86 34.37
1246.42 34.25 1252.98 34.23 1259.53 34.32 1266.09 34.75 1272.64 35.08 1279.2

35.66 1285.76 35.98 1292.31 35.95 1305.42 36.34 1318.53 36.7 1325.09 36.74
1331.65 36.71 1338.2 36.61 1344.76 36.21 1351.31 35.09 1357.87 34.14 1364.42
33.9 1370.98 33.93 1377.54 33.99 1384.09 34 1390.65 33.99 1397.2 33.91
1403.76 33.53 1416.87 32.96 1423.43 32.97 1429.98 33.32 1436.54 33.79
1443.09 34.21 1449.65 34.53 1456.21 34.78 1469.32 35.14 1475.87 34.78
1482.43 34.03 1488.98 32.11 1495.54 29.87 1502.1 27.85 1508.65 27.33 1515.2
26.79 1534.84 24.47 1541.38 23.67 1547.93 22.77 1554.48 22.18 1561.02 22.03
1567.57 21.76 1574.11 21.01 1580.66 20.5 1587.21 20.65 1593.75 20.63 1606.85
18.68 1613.39 17.98 1619.94 17.42 1626.49 17.03 1633.03 16.88 1639.58 17.59
1646.12 18.53 1652.67 19.16 1659.22 20.17 1665.76 21.02 1672.31 21.72
1678.86 21.75 1685.4 22.3 1691.95 22.42 1698.49 22.45 1705.04 22.23 1711.59
21.71 1718.13 21.24 1724.68 20.9 1731.23 20.71 1737.77 20.57 1744.32 20.48
1750.87 20.34 1757.41 20.23 1763.96 20.16 1770.5 20.13 1777.05 20.16 1783.6
20.16 1790.14 20.02 1796.69 20.4 1803.24 20 1809.78 19.31 1816.33 18.73
1822.87 18.27 1829.42 17.98 1835.97 17.65 1842.51 17.03 1849.06 17.06
1855.61 17.64 1862.15 17.77 1868.7 17.64 1875.24 17.57 1881.79 17.86 1888.34
17.72 1901.43 16.82 1907.98 16.65 1914.52 16.86 1921.07 16.95 1927.62 17.01
1934.16 17.27 1940.71 17.3 1947.25 16.93 1953.8 16.06 1960.35 15.05 1966.89
13.96 1973.44 13.03 1979.99 13.63 1986.35 15.39 1992.72 16.25 1999.09 16.18
2005.46 16.16 2011.83 16.06 2024.57 15.82 2030.94 15.68 2037.31 15.56
2043.68 15.55 2050.04 15.57 2056.41 15.65 2062.78 15.82 2069.15 16.22
2075.52 16.67 2081.89 16.73 2088.26 16.67 2094.63 16.57 2101 16.51 2107.36
16.43 2113.73 16.28 2120.1 16.1 2126.47 15.78 2132.84 15.35 2139.21 14.21
2145.58 13.34 2151.95 12.67 2158.32 12.27 2164.69 12.75 2171.05 12.81
2177.42 12.99 2183.89 13.35 2190.36 13.27 2196.84 13.12 2203.31 13.06
2209.78 13.03 2216.25 13.11 2222.72 13.25 2235.66 14.03 2242.13 14.4 2255.07
14.78 2261.54 14.93 2268.02 15.13 2274.49 15.1 2280.96 15.1 2300 16.34
2300.05 12.06 2301.97 -3.65 2320.77 -9.63 2333.43 -10.96 2379.95 -9.19
2407.66 -4.85 2411.91 -3.45 2412.45 14.33 2442.73 14.04 2449.2 13.75 2455.67
13 2462.23 12.56 2468.79 12.42 2475.35 12.3 2481.91 12.23 2488.47 12.19
2495.03 12.13 2501.59 11.97 2508.16 11.78 2514.72 11.84 2521.28 12.12
2527.84 12.14 2534.4 12 2547.52 11.48 2554.08 11.2 2560.64 10.9 2573.76
10.25 2580.32 9.94 2586.88 9.78 2593.44 9.56 2606.57 9.39 2613.13 9.28
2626.25 8.88 2632.81 8.81 2639.37 8.83 2645.93 8.93 2652.49 9.01 2659.05
9.06 2665.61 9.29 2672.17 9.32 2678.73 9.31 2685.29 9.24 2691.85 9.2 2698.42
9.28 2704.98 9.58 2711.54 9.81 2718.1 10.14 2724.66 10.34 2731.22 10.34
2737.78 10.42 2744.34 10.38 2764.02 10.45 2770.58 10.45 2777.14 10.33 2783.7
10.32 2790.26 10.37 2796.83 10.39 2809.95 10.36 2816.51 11.56 2823.07 16.74
2829.63 20.25 2836.19 20.17 2842.75 20.22 2849.31 20.21 2855.87 20.28
2862.43 20.55 2868.99 20.86 2875.55 20.91 2882.11 20.9 2888.67 20.74 2895.24
20.46 2901.8 20.57 2908.36 20.64 2914.92 20.35 2921.48 20.4 2928.04 20.63
2934.6 20.45 2941.16 20.49 2947.72 20.81 2954.28 20.67 2960.84 19.98 2967.4
19.25 2973.96 18.84 2980.52 18.7 2987.09 18.61 2993.65 18.64 3000.21 18.69
3006.77 18.83 3013.33 19.08 3019.89 19.36 3026.45 19.39 3033.01 19.4 3039.57
19.44 3046.13 19.41 3052.69 19.4 3059.25 19.48

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val 0 .085 2300 .035 2412.45 .082

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2300
2412.45 143.56 141.23 144.64 .1 .3 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 2442 3059.25 14 T
Blocked Obstructions num= 1

```
 Sta L Sta R Elev
 2531.59 2581.5712.08772

CROSS SECTION


RIVER: Taunton River
REACH: Main Stem RS: 5194.718

INPUT
Description: 5- Exit Plain St br
Station Elevation Data num= 363
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  0 37.84 6.51 37.14 13.02 36.94
19.53 36.91 32.55 37.14  39.06 37.08 45.58 37.33 52.09 37.63 58.6 37.74 65.11
37.76  71.62 37.84 84.64 37.97 91.15 37.76 97.66 37.61 104.17 37.81  110.68
37.98 117.19 38.01 130.22 37.9 136.73 37.87 143.24 37.88  149.75 37.79 156.26
37.89 162.77 38.15 169.28 38.23 175.79 38.19  182.3 37.83 188.81 37.98 195.32
38.02 201.84 38.13 208.35 38.15  214.86 38.35 221.37 38.66 227.88 38.75
234.39 38.91 240.9 39.09  247.41 39.25 253.92 39.33 260.43 39.29 266.94 39.59
273.45 40.15  286.48 40.27 292.99 40.32 306.01 40.63 312.52 40.84 319.03
40.76  325.54 41.09 332.05 41.37 338.56 41.82 345.07 42.36 351.58 42.64
358.09 42.86 364.61 43.42 371.12 43.45 377.63 42.97 384.14 42.79  390.65
42.64 397.16 42.71 403.67 42.98 410.18 43.28 416.69 43.49  423.2 43.67 429.71
43.78 436.22 43.78 442.73 43.9 455.76 44.07  468.78 44.07 475.29 44.13 481.8
44.35 488.31 44.49 494.82 44.44  501.33 44.46 507.84 44.5 514.35 44.58 520.86
44.86 527.38 44.98  533.89 44.96 540.4 44.98 546.91 45.13 553.42 45.16 559.93
45.03  566.44 44.74 572.95 44.5 579.46 44.51 585.97 44.75 592.48 44.69
598.99 44.76 612.02 45.28 618.53 45.52 625.04 45.61 631.55 45.74  638.06
45.85 644.57 45.83 651.08 45.9 657.59 46.04 664.1 46.01  670.61 45.86 677.12
45.64 690.15 45.4 696.66 45.45 709.68 45.64  716.19 45.57 722.7 45.45 729.21
45.56 742.32 45.89 748.88 45.84  755.43 45.63 761.99 45.39 768.54 45.11 775.1
45.08 788.21 44.88  794.76 44.84 801.32 44.72 807.87 44.54 814.43 44.39
820.98 44.46  827.54 43.46 834.09 41.56 840.65 40.16 847.2 39.39 853.76 39.14
860.31 38.94 873.42 38.7 879.98 38.49 886.53 38.32 893.09 38.22  906.2 38.24
912.75 38.39 919.31 38.5 925.86 38.48 932.42 38.64  938.97 38.67 952.08 38.93
958.64 39.17 965.19 39.26 971.75 39.39  978.3 39.63 984.86 39.96 991.41 40.23
997.97 40.46 1004.52 40.67  1011.08 40.7 1017.63 40.54 1024.19 40.96 1030.75
42.63 1037.3 43.66  1043.86 44.25 1050.41 44.49 1056.97 44.45 1063.52 45.23
1070.08 45.83  1076.63 45.77 1083.19 46.23 1089.74 46.37 1096.3 46.21 1102.85
46.52  1109.41 47.04 1115.96 47.08 1122.52 47.39 1129.07 47.77 1135.63 47.89
1142.18 48.49 1148.74 48.51 1155.29 48.31 1161.85 46.71 1168.4 45.64  1174.96
45.37 1181.51 45.67 1188.07 45.94 1194.62 46.99 1201.18 49.47  1207.73 50.17
1214.29 50.38 1220.84 50.51 1227.4 50.5 1233.95 50.53  1240.51 50.66 1247.06
50.54 1253.62 50.27 1266.73 49.63 1273.28 49.4  1286.39 48.8 1292.95 48.22
1299.5 47.78 1306.06 47.49 1312.61 47.26  1319.17 46.98 1325.72 46.79 1332.28
46.53 1338.83 46.32 1345.39 46.63  1351.94 46.62 1358.5 44.3 1365.05 38.5
1371.61 35.56 1378.16 32.06  1384.72 28.91 1391.27 26.01 1397.83 24.3 1404.38
22.36 1410.94 20.73  1417.49 21.08 1424.05 21.29 1430.6 20.32 1437.16 19.5
1443.71 19.14  1450.27 18.9 1456.81 18.52 1463.36 18.21 1469.9 17.68 1476.44
16.93  1482.99 16.16 1489.53 15.52 1496.07 15.12 1502.62 14.89 1509.16 14.75
1515.71 14.65 1522.25 14.37 1528.79 13.67 1535.34 13.07 1541.88 12.73
1548.42 11.86 1554.97 11.57 1561.51 11.05 1568.05 11.05 1574.6 11.14  1581.14
11.01 1587.68 11.02 1594.23 11.05 1600.77 11.04 1607.31 11.23  1613.86 11.59
1620.4 11.71 1626.94 11.85 1633.49 11.87 1640.03 11.8  1646.58 11.51 1653.12
```

11.52 1659.66 11.58 1672.75 11.63 1679.29 11.7 1685.84 11.85 1692.38 11.83 1698.92 11.87 1705.47 12.14 1712.01 12.14 1718.55 11.98 1725.1 11.68 1731.64 11.46 1738.18 11.35 1744.73 11 1751.27 10.73 1757.81 10.61 1764.36 10.53 1770.9 10.8 1777.45 10.97 1783.99 11.07 1790.53 11.32 1797.08 11.65 1803.62 11.94 1810.16 12.32 1816.71 13.7 1823.25 14.25 1836.34 14.59 1842.88 14.71 1849.42 14.68 1855.97 14.77 1862.51 14.81 1869.05 14.82 1875.6 14.6 1882.14 14.35 1888.68 14.08 1895.23 13.92 1965 14.39 1965.47 11.73 2078.62 11.58 2087.51 6.91 2092.77 -1.67 2108.92 -9.29 2141.12 -8.39 2159.37 -2.62 2164.92 -1.75 2175.5 -2.47 2187.89 -.9 2195 -1.01 2206.94 -3.41 2217.29 -5 2234.59 -3.74 2237.81 11.46 2384.96 11.42 2391.51 11.58 2398.06 11.66 2404.61 11.8 2411.16 11.91 2417.71 11.78 2424.26 11.89 2430.81 11.84 2443.91 11.65 2450.46 11.48 2470.12 11.55 2476.67 11.54 2483.22 11.51 2489.77 11.66 2496.32 11.68 2502.87 11.82 2509.42 12.02 2515.97 12.17 2522.52 12.41 2529.08 12.76 2535.63 12.82 2542.18 12.66 2548.73 12.55 2555.28 12.63 2561.83 12.68 2568.38 12.76 2574.93 12.95 2581.48 13.2 2588.03 13.47 2594.59 13.52 2601.14 13.66 2607.69 13.84 2614.24 14.19 2620.79 15.01 2627.34 15.9 2633.89 16.41 2640.44 16.98 2646.99 19 2653.54 20.54 2660.09 20.64 2666.65 20.44 2673.2 20.3 2679.75 20.32 2686.3 20.38 2692.85 20.47 2699.4 20.59 2705.95 20.63 2712.5 20.63 2719.05 20.76 2725.6 21.04 2732.16 21.21 2738.71 21.31 2745.26 21.37 2751.81 21.73 2758.36 21.65 2764.91 22.57 2771.46 24.52 2778.01 24.9 2784.56 24.41 2791.11 24.14 2797.66 23.84 2804.22 23.71 2810.77 23.66 2823.87 23.79 2830.42 23.89 2836.97 23.86 2843.52 23.73 2850.07 23.52 2856.62 23.43 2863.17 23.36 2876.28 23.09 2882.83 23 2889.38 22.86 2895.93 22.79 2902.48 22.67

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 2078.62 .035 2237.81 .082

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2078.62 2237.81 1072.04 1090.64 1114.7 .1 .3
 CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 4104.082

INPUT
Description: 4
Station Elevation Data num= 195
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 35.1 6.54 34.86 13.09 35.12 32.71 36.52 39.26 37.08 52.34 37.43 58.89 37.47 71.97 37.15 91.6 36.07 98.14 35.55 111.23 33.47 117.77 32.99 130.86 32.49 137.4 31.63 150.48 29.36 157.03 27.84 163.57 26.78 176.66 25.69 183.2 25 196.28 24.16 209.37 23.44 222.45 22.16 235.54 21.24 268.25 19.58 274.8 19.11 314.05 17.93 340.22 17.6 346.77 17.39 353.31 17.44 372.94 17.2 386.02 16.89 399.11 16.85 418.74 16.42 425.28 16.51 464.54 16.29 484.17 16.02 490.71 15.81 510.34 15.56 516.88 15.25 529.96 15.32 536.51 15.67 549.59 15.96 569.22 15.33 575.76 15.28 588.85 14.91 595.39 14.56 601.94 14.39 608.48 14.08 634.65 13.27 647.73 12.71 660.82 11.68 667.36 11.02 673.91 10.08 680.45 9.57 686.99 9.45 700.08 9.55 706.62 9.71 713.16 9.69 719.71 9.47 739.33 8.41 758.96 7.16 785.13 5.03 798.22 2.31 804.76 1.12 811.21 .41 813.75 .05 825 -2.9 825.5 -2.88 826.13 -2.9 826.5 -2.86 826.79 -2.86 827.1 -2.83 827.3 -2.99 827.48 -3.11 827.64 -3.2 828.01 -3.31 828.24 -3.48 829.55 -3.6 831.66 -4.05 834.1 -4.44 836.34 -

4.58 838.23 -4.82 840.95 -5.36 843.29 -6.16 845.41 -6.73 847.48 -7.67 849.56 -8.4 851.67 -8.57 853.71 -9.31 855.95 -9.57 858.21 -10.01 860.64 -10.25 863.34 -10.49 865.85 -10.78 868.46 -10.95 871 -11.17 873.78 -11.17 876.48 -11.19 879 -11.01 881.45 -11.08 884.18 -11.12 886.48 -10.46 889.29 -10.39 892.16 -10.59 895.4 -10.47 898.65 -10.42 902.09 -10.56 905.48 -10.29 908.78 -10.33 911.14 -10.05 913.57 -9.93 915.75 -9.61 917.54 -9.32 919.31 -8.63 920.82 -7.87 922.3 -7.15 923.73 -6.66 924.94 -5.75 926.47 -5.19 927.76 -4.64 929.03 -3.99 930.25 -3.89 931.21 -3.59 932.2 -3.04 933.72 -1.14 937.12 .53 940.17 2.04 946.71 5.12 953.24 6.39 959.78 7.84 966.31 8.27 979.38 8.65 985.92 8.62 992.45 6.91 998.99 6.25 1005.52 6.68 1018.59 7.09 1031.66 7.17 1038.2 6.9 1044.73 6.94 1051.27 7.18 1103.55 7.54 1149.29 8.31 1221.17 9.93 1286.52 10.47 1378.01 10.71 1417.22 11.32 1449.9 12.48 1521.78 11.87 1541.39 12.03 1554.46 11.92 1580.6 12.05 1587.13 12.43 1593.67 14.46 1600.2 18.29 1606.74 22.6 1613.27 26.07 1619.81 26.87 1626.34 26.67 1632.88 26.17 1645.95 25.72 1652.48 23.07 1659.02 17.45 1665.55 16.53 1672.09 16.39 1685.16 16.65 1698.23 16.64 1717.83 17.17 1737.44 17.43 1763.58 17.71 1770.11 17.69 1802.79 18.06 1815.86 18.35 1828.93 19.47 1835.46 19.78 1868.14 20.4 1913.88 20.41 1933.49 20.74 1959.63 21.87 1972.7 22.11 1979.23 22.02 2031.51 23.08 2044.58 23.14 2051.12 23.33 2057.65 23.97 2064.19 24.39 2070.72 24.62 2090.33 24.67 2103.4 26 2116.47 27.16 2123 27.35 2129.54 27.1 2136.07 26.67 2142.61 26.46 2149.14 26.68

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .082 713.16 .035 979.38 .082

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 713.16 979.38 1834.7 1846.57 1854.36 .1 .3 Blocked Obstructions num= 2
 Sta L Sta R Elev Sta L Sta R Elev
 934.72 1002.956.488922 1059.71 1524.9311.92179

CROSS SECTION

RIVER: Taunton River REACH: Main Stem RS: 2257.516

INPUT
Description: 3
Station Elevation Data num= 340
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 34.96 19.65 33.35 26.2 33.02 32.75 32.44 39.3 31.7 52.39 30.64 58.94 30.32 65.49 29.65 72.04 28.84 78.59 28.24 85.14 27.39 91.69 27.11 98.24 27.14 111.34 27.69 117.89 27.59 124.44 27.08 130.99 26.73 150.63 26.01 163.73 25.32 189.93 24.62 209.58 23.88 222.68 22.72 229.23 22.01 235.77 21.47 242.32 21.34 248.87 20.64 255.42 20.27 268.52 20.54 281.62 19.78 288.17 19.21 301.27 19.24 307.82 18.64 314.37 17.48 320.92 16.9 334.01 16.8 366.76 15.2 386.41 14.51 406.06 14.51 412.61 14.39 438.8 14.82 445.35 14.69 451.9 14.42 458.45 14.6 478.1 13.99 491.2 14.11 497.75 14.48 510.84 14.9 517.39 15.36 523.94 15.62 543.59 15.81 550.14 15.77 556.69 15.89 582.89 17.26 589.44 18.19 602.54 20.57 609.08 21.1 615.63 21.89 622.18 21.96 628.73 21.71 707.32 22.41 713.87 22.62 740.07 22.75 785.92 22.51 818.66 22.38 825.21 22.85 857.96 23.09 864.51 23.33 871.06 23.73 890.7 24.34 910.35 24.3 923.45 23.93 936.55 23.28 943.1 23.18 962.75 23.45 975.84 22.51 995.49 22.25 1008.59 23.13 1015.14 22.88 1021.69 22.42 1028.24 21.66 1041.34 19.42 1047.89 18.01 1067.54 12.85 1074.08 11.6

1080.63 11.12 1093.73 8.4 1100.28 7.59 1119.93 5.96 1126.48 5.53 1133.03
5.28 1139.58 5.24 1159.23 4.15 1165.78 2.78 1172.32 1.05 1174.74 .81
1178.87 .4 1185.42 -.01 1191.97 -.21 1200 -.92 1215.28 -1.32 1216.34 -1.41
1217.6 -1.52 1218.82 -1.64 1220.1 -1.77 1221.29 -1.98 1222.66 -2.21 1223.86
-2.48 1225.2 -2.94 1226.48 -3.64 1227.92 -4.46 1230.12 -5.2 1232.38 -5.85
1234.68 -6.48 1237.01 -6.94 1239.48 -7.27 1241.91 -7.72 1244.21 -7.9 1246.55
-7.95 1248.74 -8.03 1251.05 -7.97 1253.31 -7.94 1255.77 -8.02 1260.44 -8.14
1262.63 -8.17 1275.78 -8.17 1278.2 -8.31 1280.43 -8.25 1282.97 -8.34 1287.57
-8.47 1289.64 -8.62 1292.03 -8.9 1294.34 -9.01 1296.67 -9.18 1299.02 -9.37
1301.53 -9.41 1303.96 -9.57 1306.55 -9.85 1308.95 -10.02 1311.4 -10.27
1313.79 -10.4 1316.21 -10.57 1318.43 -10.74 1320.8 -10.93 1322.99 -11.15
1325.49 -11.33 1327.84 -11.55 1330.14 -11.64 1332.3 -11.72 1334.24 -11.46
1336.16 -11.21 1337.83 -10.8 1339.55 -10.28 1341.34 -9.57 1343.75 -7.19
1345.95 -5.67 1348.02 -4.18 1350.29 -3.85 1352.46 -3.31 1355.12 -2.51
1357.93 -1.92 1359.65 -1.69 1361.18 -1.55 1362.69 -.98 1375.35 .51 1377.72
1.25 1381.9 2.58 1388.45 5.38 1395 7.25 1401.55 9.97 1427.75 12.35 1434.3
12.81 1447.4 14.14 1473.59 15.31 1499.79 15.72 1512.89 15.6 1539.09 16.01
1552.19 16.18 1558.74 16.46 1565.28 16.38 1604.58 16.74 1630.78 16.49
1709.37 16.42 1715.92 16.31 1729.02 16.33 1735.57 16.24 1768.31 16.27
1781.41 16.16 1801.06 15.65 1814.16 14.96 1820.71 14.31 1827.26 13.28
1840.36 10.26 1846.91 9.41 1853.46 8.98 1886.2 9.2 1899.3 9.23 1912.4 9.79
1918.95 9.96 1932.05 9.93 1938.6 10.03 1945.15 9.88 1951.69 9.59 1964.79
9.59 1971.34 10.03 1977.89 10.04 1984.44 10.33 1990.99 10.3 1997.54 10.84
2004.09 10.8 2010.64 10.39 2017.19 10.22 2030.29 10.61 2043.39 10.54 2056.48
10.83 2069.58 10.75 2076.13 10.84 2082.68 10.48 2089.23 10.35 2102.33 10.61
2108.88 10.61 2115.43 10.47 2121.98 10.5 2128.53 10.83 2135.08 10.7 2141.62
10.95 2148.17 10.7 2154.72 10.71 2174.37 11.97 2180.92 12.21 2187.47 12.14
2194.02 11.93 2200.57 12.5 2207.12 12.58 2220.22 12.22 2226.76 12.27 2239.86
13.12 2246.41 13.23 2259.51 14.38 2272.61 14.87 2292.26 15.36 2298.81 15.86
2305.36 16.83 2318.45 16.63 2325 15.87 2331.55 16.52 2338.1 16.56 2344.65
16.45 2351.2 16.54 2357.75 17.32 2370.85 20.21 2377.4 20.55 2383.95 20.7
2410.14 20.43 2416.69 20.13 2429.79 19.88 2442.89 17.77 2449.44 17.48
2462.54 17.29 2469.09 17.48 2475.64 18.08 2482.19 19.21 2488.74 20.17
2495.28 20.82 2501.83 20.76 2528.03 21.08 2534.58 20.79 2554.23 19.29
2560.78 19.11 2567.33 19.78 2573.88 20.1 2586.97 20.13 2600.07 20.45 2606.62
20.41 2619.72 19.8 2626.27 19.18 2632.82 18.28 2639.37 17.23 2652.47 15.81
2665.57 15.01 2672.11 14.49 2685.21 13.68 2698.31 13.02 2711.41 12.57
2717.96 13.33 2724.51 13.85 2731.06 13.62 2744.16 12.66 2750.71 12.65
2757.25 13.57 2763.8 15.69 2770.35 17.09 2776.9 17.28 2790 17.13 2803.1
17.58 2809.65 17.7 2822.75 17.69 2829.3 17.46 2835.85 16.56 2842.4 15.27
2862.04 13.6 2901.34 13.22 2907.89 13.61 2914.44 13.86 2920.99 14.25 2927.54
14.43 2934.08 14.8 2940.63 14.98 2953.73 15.98 2966.83 17.25 2973.38 17.62
2979.93 17.28 2986.48 16.6 2993.03 16.44 2999.58 17.35 3025.77 20.22 3032.32
21.7 3038.87 23.37 3045.42 25.93 3051.97 27.96 3065.07 29.01 3071.62 29.97
3078.17 32.14 3084.72 34.81 3091.27 36.99 3097.82 40.7 3104.37 41.4 3110.91
41.47 3124.01 41.97 3130.56 42.09 3137.11 42.07 3163.31 42.8 3196.05 42.59
3202.6 42.45 3222.25 41.62 3241.9 41 3255 41.26 3261.55 41.04 3268.1 40.66
3274.65 39.87 3281.2 39.24

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .082 1008.59 .035 1473.59 .082
 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1008.59 1473.59 1820.11 1865.71 1922.42 .1 .3 Ineffective Flow num= 1

```
 Sta L Sta R Elev Permanent
 1801 3281.2 15 T

CROSS SECTION


RIVER: Taunton River
REACH: Main Stem RS: 391.8054

INPUT
Description: 2
Station Elevation Data num= 304
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  0 21.42 39.31 21.99 58.96
21.84 65.52 21.5 85.17 21.81  98.27 21.12 117.93 22.01 144.14 21.1 183.45
22.7 216.2 23.58  222.76 23.42 255.51 25.6 268.62 26.61 307.93 27.88 327.58
29.19  399.65 34.75 438.96 35.05 445.51 35.39 458.61 36.59 491.37 37.6
504.48 37.68 543.79 39.42 563.44 39.58 583.1 40.7 628.96 40.24  661.72 37.98
681.37 35.01 687.92 34.38 694.47 33.16 701.03 30.83  707.58 27.7 714.13 25.59
779.65 24.3 786.2 23.57 792.75 22  805.85 21.22 825.51 21.29 910.68 20.22
930.33 20.54 1002.4 19.28  1028.61 19.54 1035.16 19.87 1048.26 21.23 1061.37
21.85 1074.47 21.58  1126.88 18.1 1146.54 15.81 1185.85 13.95 1244.81 14.99
1251.36 15.35  1264.47 17.12 1323.43 17.67 1428.26 17.4 1454.47 17.94 1461.02
16.21  1467.57 13.93 1474.12 13.48 1480.67 13.44 1493.78 15.9 1539.64 14.33
1565.84 14.75 1624.81 15.45 1664.12 19.15 1696.88 20.06 1716.53 19.33
1742.74 16.68 1801.7 14.23 1913.08 14.58 1958.94 13.73 1985.15 13.96  1991.7
12.84 1998.25 8.74 2004.8 2.93 2020 -1.25 2022.62 -1.32  2023.16 -1.37 2023.8
-1.46 2024.53 -1.52 2025.41 -1.64 2026.35 -1.66  2027.52 -1.78 2028.84 -1.93
2030.29 -2.06 2031.63 -2.33 2033.06 -2.66  2034.41 -3.03 2035.85 -3.6 2037.95
-4.22 2040.47 -4.85 2042.7 -5.61  2045.08 -6.18 2047.39 -6.71 2049.72 -7.41
2051.86 -7.83 2054.25 -8.45  2056.36 -8.73 2058.6 -9.34 2060.73 -9.55 2062.95
-9.78 2064.88 -10.17  2067.08 -10.53 2069.19 -10.7 2071.49 -10.92 2073.72 -
11.22 2076.1 -11.49  2078.4 -11.84 2080.46 -12.01 2082.68 -12.2 2084.84 -
12.29 2087.18 -12.24  2089.53 -12.37 2091.93 -12.18 2096.84 -11.91 2099.24 -
11.75 2101.9 -11.41  2104.3 -11.25 2106.95 -10.91 2109.31 -10.67 2111.95 -
10.41 2114.44 -10.2  2117.06 -10.02 2122.25 -9.63 2124.85 -9.47 2127.56 -9.24
2130.03 -9.07  2132.45 -8.93 2134.97 -8.72 2137.67 -8.51 2140.17 -8.26
2145.24 -8.16  2147.83 -8.02 2150.38 -7.87 2153.09 -7.76 2155.66 -7.65 2158.2
-7.43  2160.65 -7.19 2163.21 -6.79 2165.51 -6.7 2168.1 -6.27 2170.53 -6.2
2173.06 -6.01 2175.42 -5.92 2177.98 -5.59 2180.48 -5.04 2183.15 -4.75
2186.04 -4.39 2188.7 -4.56 2191.22 -4.32 2193.67 -3.84 2196.14 -3.67  2198.36
-3.45 2200.65 -3.23 2203.03 -3.19 2205.47 -2.95 2207.68 -2.57  2210.09 -2.2
2211.7 -1.92 2213.07 -1.77 2214.33 -1.67 2215.45 -1.52  2216.63 -1.1 2239.39
6.58 2245.93 7.61 2272.1 6.19 2337.53 6.17  2363.7 5.84 2383.32 6.94 2429.12
11.2 2448.75 11.43 2468.38 11.32  2481.46 10.15 2520.72 10.11 2533.8 10.47
2599.23 10.25 2605.77 10.56  2618.83 10.03 2625.34 10.52 2651.39 10.09
2664.41 10.86 2683.95 11.59  2696.97 12.68 2723.02 16.24 2755.58 16.85
2781.63 19.24 2885.82 19.38  2898.85 18.69 2924.9 19 2944.43 20.03 3160.42
23.04 3180.09 24.3  3265.36 24.21 3285.04 25.03 3324.39 24.95 3330.95 25.5
3363.75 31.41  3376.87 32.17 3389.99 31.92 3396.55 31.2 3481.81 30.15 3501.49
35.42  3534.29 46.12 3540.85 46.81 3606.44 46.26 3698.27 37.02 3737.62 35.41
3757.3 32.93 3763.86 32.44 3776.98 32.59 3783.54 33.09 3790.09 33.17  3803.21
32.17 3855.69 33.45 3881.92 33.04 3940.96 33.45 3980.31 31.66  4013.11 31.78
4026.22 31.06 4045.9 31.9 4078.7 31.34 4091.82 29.28  4098.37 28.65 4104.93
28.55 4111.49 27.95 4137.73 27.53 4150.85 26.85  4163.97 25.4 4170.52 25.45
```

4190.2 23.78 4216.44 23.27 4229.56 23.39 4242.67 22.17 4255.79 22.17 4275.47 23.57 4282.03 23.44 4288.59 23.93 4301.71 26 4327.94 25.29 4341.06 26.24 4354.18 26.7 4380.42 29.76 4400.09 33.03 4413.21 35.76 4426.33 37.49 4446.01 37.99 4491.92 36.67 4531.27 36.66 4563.95 35.02 4576.99 34.59 4583.51 34.82 4616.11 33.03 4635.67 30.53 4642.19 30.13 4648.71 28.11 4655.23 24.76 4668.27 21.22 4674.79 20.39 4694.35 20.01 4707.39 20.86 4713.91 23.31 4720.43 23.91 4733.47 23.28 4739.99 24.18 4753.03 26.56 4759.55 27.01 4779.11 25.82 4785.63 26.5 4798.67 25.87 4818.23 27.67 4824.75 29.16 4831.27 31.21 4844.31 33.85 4863.87 35.32 4883.43 36.05 4889.95 37.16 4896.47 38.86 4909.51 44.58 4935.59 48.53 4942.11 49.09 4955.15 51.19 4961.67 51.56 4981.23 54.43 4987.75 54.91 5000.79 53.95 5007.31 52.98 5013.83 52.61 5039.91 52.73 5052.95 53.65 5065.99 53.61 5098.59 55.23 5111.63 56.63 5170.31 57.77 5228.99 56.68 5248.55 57.74 5268.11 59.02 5281.15 59.09 5307.23 57.97 5333.31 56.07 5352.87 55.22 5378.95 53.58 5457.19 56.33 5496.31 59.42 5515.87 59.05 5522.39 59.29 5535.43 59.14

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .082 1985.15 .035 2429.12 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1985.15 2429.12 619.37 384.58 298.08 .1 .3

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 7.228003

INPUT
Description: 1-DS Town Limits Taunton/Berkley Station Elevation Data num= 380
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 24.36 6.55 24.88 19.64 27.2 32.73 27.76 72 28.41 104.72 28.36 137.45 28.88 157.09 28.38 170.18 27.44 183.27 27.01 215.99 27.15 222.54 27.86 229.08 28.96 235.63 29.55 261.81 29.08 268.36 28.74 281.45 28.71 294.54 29.16 307.63 28.68 320.72 28.77 333.81 28.39 340.35 28.45 359.99 29.23 379.63 28.49 392.72 28.5 405.81 27.98 425.44 28.17 431.99 28.65 438.53 28.78 451.62 28.17 536.71 26.59 569.44 26.73 575.99 27.13 582.53 27.09 589.08 26.67 628.35 26.26 641.44 25.83 687.26 25.66 693.8 25.38 706.89 25.47 733.07 24.77 791.98 22.22 844.34 21.41 857.43 21.43 870.52 21.84 896.7 21.72 903.25 21.34 909.8 20.43 916.34 20.22 949.07 20.27 975.25 19.95 981.79 20.13 988.34 21.07 994.88 22.91 1001.43 25.8 1007.97 25.62 1021.07 19.45 1027.61 18.71 1079.97 17.4 1099.61 17.33 1191.24 15.25 1223.97 14.25 1263.24 13.86 1276.33 13.99 1322.15 13.33 1341.79 13.27 1361.42 12.29 1381.06 11.81 1413.78 12.57 1420.33 12.37 1439.97 12.46 1472.69 11.1 1479.24 11.05 1498.87 12.13 1511.96 10.65 1518.51 10.56 1531.6 11.18 1551.24 11.31 1570.87 12.64 1577.42 12.61 1597.05 11.89 1610.14 12.18 1623.23 13.24 1675.6 16.19 1708.32 16.54 1714.87 16.15 1734.5 16.36 1747.6 16.14 1773.78 16.48 1780.32 16.83 1793.41 18.07 1799.96 18.4 1819.59 18.63 1852.32 18.39 1865.41 18.78 1898.14 18.77 1911.23 16.33 1917.77 16.48 1930.86 17.37 1950.5 19.13 1976.68 22.67 1989.77 23.73 2002.86 24.27 2009.41 24.28 2048.68 22.5 2061.77 21.47 2081.41 19.19 2094.5 18.93 2100.99 19.48 2120.46 20.23 2133.44 21.75 2146.43 22.97 2185.37 28.55 2198.35 29.25 2217.83 29.97 2230.81 30.97 2243.79 30.82 2263.26 28.88 2282.74 27.74 2289.23 27.1 2308.7 23.16 2321.68 21.03 2328.17 19.68 2341.16

17.43 2347.65 16 2360.63 11.88 2367.12 9.08 2373.61 7.32 2379.88 3.46
2386.15 .42 2392.42 -.75 2398.25 -3.43 2400.04 -3.6 2401.8 -3.68 2403.36 -
3.79 2405.12 -3.93 2407.23 -4.09 2409.29 -4.43 2411.46 -4.66 2413.47 -4.94
2417.39 -5.27 2419.24 -5.42 2421.03 -5.48 2422.98 -5.66 2424.9 -5.75 2427.09
-5.52 2429.12 -5.29 2431.27 -6.18 2433.28 -6.52 2435.28 -7.65 2437.22 -8.45
2439.47 -8.65 2441.48 -8.97 2443.68 -9.27 2445.72 -9.46 2447.94 -9.49
2449.98 -9.41 2454.06 -9.47 2456.2 -9.53 2458.18 -9.49 2460.33 -9.48 2462.4
-9.44 2464.68 -9.38 2466.8 -9.38 2468.97 -9.25 2470.95 -9.38 2473.13 -9.24
2475.21 -9.3 2477.46 -9.18 2479.69 -9.18 2484.13 -8.95 2486.35 -8.77 2488.43
-8.65 2490.58 -8.48 2492.48 -8.36 2494.57 -8.31 2496.6 -8.36 2498.61 -8.31
2500.57 -8.31 2502.94 -8.14 2505.25 -7.81 2507.91 -7.5 2510.53 -6.71 2513.5
-5.84 2516.02 -4.72 2518.65 -4.05 2521.08 -3.41 2523.04 -2.76 2524.87 -2.52
2526.09 -2.39 2527.06 -2.2 2528.32 .33 2537.64 1.35 2557.22 1.95 2570.27
3.77 2583.32 4.82 2596.37 4.53 2609.42 4.94 2635.52 7.95 2648.58 9.85
2661.63 10.95 2674.68 11.12 2713.83 10.18 2746.46 10.64 2766.04 12.24
2772.57 13.1 2824.71 15.24 2837.72 15.53 2870.25 15.1 2980.84 17.63 2987.35
17.97 3000.36 19.43 3019.87 20.13 3026.38 20.71 3045.89 20.83 3052.4 20.17
3071.92 20.46 3091.43 20.03 3110.95 20.11 3137.01 20.84 3163.21 20.97
3182.85 23.28 3189.4 23.79 3195.95 23.9 3202.5 24.33 3235.24 24.88 3313.82
24.61 3340.01 23.98 3385.85 24.9 3444.78 24.59 3477.53 23.56 3510.27 23
3543.01 23.68 3549.56 24.03 3575.75 27.59 3595.4 29.13 3608.49 29.82 3621.59
30.07 3660.88 30.11 3667.43 29.78 3673.98 29.98 3687.07 31.83 3693.62 33.49
3706.72 37.87 3713.27 40.43 3719.82 42.69 3726.36 45.41 3732.91 47.09
3739.46 47.43 3759.11 47.31 3824.59 45.68 3863.88 43.82 3870.43 43.27
3876.98 42.39 3909.72 39.9 3929.36 37.28 3935.91 36.68 3955.56 35.54 3981.75
35.61 4021.04 35.31 4047.23 34.04 4053.78 33.47 4086.52 32.02 4106.17 31.44
4112.72 31.51 4145.46 30.76 4171.65 30.54 4191.3 30.71 4197.85 30.33 4210.94
30.46 4230.59 29.44 4243.68 28.01 4269.88 26.41 4289.52 25.9 4296.07 26.03
4315.72 24.04 4322.26 23.79 4341.91 24.48 4355.01 24.34 4368.1 24.69 4381.2
24.03 4394.3 24.86 4407.39 24.19 4420.49 24 4440.13 24.5 4453.23 25.17
4466.33 26.38 4479.42 26.77 4485.97 27.24 4499.07 28.56 4518.71 28.82
4525.26 29.5 4538.36 32.15 4551.46 34.09 4558 34.8 4564.55 34.94 4577.65
34.08 4584.2 33.24 4590.75 31.84 4597.29 31.06 4623.49 30.71 4630.04 30.98
4636.58 31.7 4643.13 31.9 4669.33 31.38 4695.52 31.96 4715.16 31.87 4721.71
32.19 4728.24 32.94 4741.29 33.75 4773.93 34.35 4793.51 33.65 4819.62 30.59
4832.67 29.29 4858.78 23.96 4865.3 22.22 4871.83 20.9 4878.36 19.91 4884.88
19.49 4904.47 19.47 4917.52 19.8 4930.57 19.27 4937.1 18.36 4943.63 18.02
4963.21 17.7 4976.26 18.17 4982.79 18.69 5002.37 22.05 5041.53 25.65 5054.58
26.48 5080.69 26.93 5087.22 27.73 5093.75 29.17 5100.27 30.02 5113.33 27.09
5126.38 27.16 5152.49 28.98 5165.54 30.36 5191.65 31.11 5224.28 33.51
5230.81 34.33 5237.34 35.48 5250.39 39.21 5269.97 44.34 5283.02 48.45
5289.55 50 5296.08 52.69 5302.6 54.2 5315.66 54.61 5354.82 54.02 5374.4
54.01 5407.04 52.11 5433.14 49.25 5446.2 47.45 5452.72 46.92 5459.25 46.77
5465.78 46.19 5472.3 44.1 5478.83 41.17 5485.36 39.48 5498.41 37.99 5504.94
37.58 5517.99 37.58 5544.1 39.14 5570.21 41.75 5589.79 44.24 5596.31 45.77
5615.9 48.77 5628.95 49.89 5642 50.09 5648.53 50.48 5661.58 52.1 5674.64
54.05 5707.27 56.47 5720.33 56.8 5746.43 58.27 5759.49 57.52 5779.07 57.86
5785.59 57.7 5798.65 58.05

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 2243.79 .035 2661.63 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2243.79

2661.63 7.94 7.22 8.54 .1 .3

SUMMARY OF MANNING'S N VALUES

River:Taunton River

Reach	River Sta.	n1	n2	n3
Main Stem	128409	.09	.055	.095
Main Stem	128319	.08	.055	.085
Main Stem	128304	Bridge		
Main Stem	128253.8	.08	.055	.085
Main Stem	128188.2	.08	.055	.095
Main Stem	128020.6	.085	.055	.1
Main Stem	127981.3	Inl Struct		
Main Stem	127955.6	.085	.055	.1
Main Stem	127856.6	.085	.055	.095
Main Stem	126368.5	.1	.0552	.1
Main Stem	125286.5	.085	.055	.09
Main Stem	122282.8	.085	.055	.1
Main Stem	121514.6	.09	.055	.095
Main Stem	120044.2	.085	.055	.095
Main Stem	118774.7	.09	.055	.095
Main Stem	117323	.095	.055	.095
Main Stem	116103.1	.095	.055	.095
Main Stem	114924.7	.09	.055	.09
Main Stem	114842.7	.09	.055	.09
Main Stem	114815.5	Bridge		
Main Stem	114789.1	.09	.055	.09
Main Stem	114747.8	.09	.055	.09
Main Stem	113455.2	.095	.055	.095
Main Stem	111998.1	.082	.055	.095
Main Stem	109992	.09	.055	.095
Main Stem	109211	.095	.055	.095
Main Stem	107644.2	.095	.055	.085
Main Stem	107578.3	.095	.055	.085
Main Stem	107452	.09	.055	.085
Main Stem	105227.3	.095	.055	.095
Main Stem	103799.2	.095	.055	.087
Main Stem	102175.3	.095	.055	.095
Main Stem	100259.9	.095	.055	.09
Main Stem	99193.71	.095	.055	.085
Main Stem	98105.8	.095	.055	.095
Main Stem	96410.98	.095	.055	.085
Main Stem	94852.71	.09	.055	.085
Main Stem	94802.97	.095	.055	.085
Main Stem	94760.71	Bridge		
Main Stem	94710.49	.095	.055	.085
Main Stem	94571.73	.093	.055	.09
Main Stem	93195.04	.095	.055	.095
Main Stem	91550.79	.093	.055	.095
Main Stem	91443.41	.093	.055	.095
Main Stem	91395.74	Bridge		
Main Stem	91322.25	.1	.055	.095
Main Stem	91271.3	.095	.055	.09

Main Stem 88254.45 .09 .055 .085
Main Stem 87227.5 .0875 .055 .09
Main Stem 85437.3 .09 .055 .09
Main Stem 85336.28 .095 .055 .09
Main Stem 85311.66 Bridge
Main Stem 85275.49 .093 .055 .093
Main Stem 85115.27 .09 .055 .085
Main Stem 83789.77 .095 .055 .095
Main Stem 82693.23 .09 .055 .09
Main Stem 82591.6 .09 .055 .09
Main Stem 82538.7 Bridge
Main Stem 82492.84 .09 .04 .09 Main Stem 82380.46 .085 .04 .09
Main Stem 81081.69 .09 .04 .095
Main Stem 79104.25 .09 .04 .09
Main Stem 77992.66 .085 .04 .09
Main Stem 76590.96 .085 .04 .09
Main Stem 75535.01 .085 .04 .09
Main Stem 75444 .085 .04 .09
Main Stem 75397.22 Bridge
Main Stem 75358.33 .085 .04 .09
Main Stem 75305.77 .085 .04 .09
Main Stem 74463.91 .085 .04 .09
Main Stem 72692.7 .09 .04 .09
Main Stem 72597.39 .09 .04 .09
Main Stem 72569.03 Bridge
Main Stem 72532.91 .09 .04 .09 Main Stem 72473.31 .09 .04 .09
Main Stem 70873.35 .085 .04 .093
Main Stem 68837.21 .087 .04 .095
Main Stem 67190.06 .087 .04 .093
Main Stem 66257.14 .09 .04 .09
Main Stem 66204.38 .09 .04 .09
Main Stem 66018.66 Bridge
Main Stem 65986.86 .09 .04 .09
Main Stem 65920.69 .09 .04 .09
Main Stem 64419.25 .09 .04 .085
Main Stem 62424.45 .093 .04 .09
Main Stem 60313.49 .087 .04 .09
Main Stem 59146.26 .09 .04 .09
Main Stem 57813.5 .09 .04 .09
Main Stem 56325.92 .09 .04 .093 Main Stem 56277.45 .09 .04 .093
Main Stem 56238.98 Bridge
Main Stem 56196.91 .09 .04 .093
Main Stem 56103.86 .09 .04 .093
Main Stem 54709.44 .085 .04 .085
Main Stem 53262.06 .087 .04 .085
Main Stem 51999.64 .09 .04 .085
Main Stem 51896.9 .09 .04 .085
Main Stem 51859.01 Bridge
Main Stem 51829.71 .085 .04 .08
Main Stem 51762.02 .085 .04 .08
Main Stem 50118.29 .085 .04 .082
Main Stem 48750.75 .088 .04 .08
Main Stem 47008.56 .085 .04 .085
Main Stem 45364.46 .085 .04 .08 Main Stem 44274.65 .085 .04 .085

Main Stem 43977 .08 .04 .08
Main Stem 43616 .08 .04 .08
Main Stem 43383.23 .085 .04 .085
Main Stem 43336.08 .085 .04 .085
Main Stem 43308.41 Bridge
Main Stem 43283.2 .085 .04 .085
Main Stem 43197.27 .085 .04 .085
Main Stem 42387 .08 .04 .08
Main Stem 41409.68 .085 .04 .08
Main Stem 40055.61 .085 .04 .085
Main Stem 38675.88 .082 .04 .08
Main Stem 37031.44 .085 .04 .08
Main Stem 35740.65 .088 .04 .085
Main Stem 34107.76 .08 .04 .09 Main Stem 32854.69 .082 .04 .085
Main Stem 31159.54 .085 .04 .082
Main Stem 29546.01 .088 .04 .085
Main Stem 27670.12 .088 .04 .085
Main Stem 26713.37 .085 .04 .088
Main Stem 26633.6 .085 .04 .085
Main Stem 26591.05 Bridge
Main Stem 26515.04 .085 .04 .085
Main Stem 26420.44 .088 .04 .085
Main Stem 25460.34 .088 .04 .08
Main Stem 23401.31 .09 .04 .085
Main Stem 22166.63 .085 .04 .085
Main Stem 21230.68 .082 .04 .08
Main Stem 19261.59 .082 .04 .082
Main Stem 18077.71 .082 .04 .082 Main Stem 17999.3 .082 .04 .082
Main Stem 17978.26 Bridge
Main Stem 17950.46 .082 .04 .082
Main Stem 17849.81 .082 .04 .082
Main Stem 16913.12 .082 .04 .09
Main Stem 16096.81 .08 .04 .085
Main Stem 15968.76 .085 .04 .085
Main Stem 15933.16 Bridge
Main Stem 15896.56 .085 .035 .085
Main Stem 15761.84 .085 .035 .085
Main Stem 15003.16 .085 .035 .085
Main Stem 14261.13 .085 .035 .085
Main Stem 14191.78 .085 .035 .082
Main Stem 14174.03 Bridge
Main Stem 14148.05 .085 .035 .082 Main Stem 14030.31 .085 .035 .082
Main Stem 13251.71 .085 .035 .085
Main Stem 12616.64 .085 .035 .085
Main Stem 12526.87 .085 .035 .085
Main Stem 12498.05 Bridge
Main Stem 12469.43 .085 .035 .085
Main Stem 12426.64 .085 .035 .085
Main Stem 11592.12 .085 .035 .088
Main Stem 10955.06 .085 .035 .088
Main Stem 10871.64 .085 .035 .088
Main Stem 10832.75 Bridge
Main Stem 10793.7 .085 .035 .088
Main Stem 10661.72 .085 .035 .088

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 Main Stem 9696.133 .085 .035 .082
 Main Stem 8397.759 .085 .035 .085   Main Stem 7193.258 .09 .035 .085
 Main Stem 7110.866 .09 .035 .085
 Main Stem 7100.789 Bridge
 Main Stem 7088.903 .09 .035 .085
 Main Stem 7032.026 .085 .035 .085
 Main Stem 5990.413 .09 .035 .09
 Main Stem 5504.704 .085 .035 .085
 Main Stem 5409.52 .085 .035 .085
 Main Stem 5376.326 Bridge
 Main Stem 5335.943 .085 .035 .082
 Main Stem 5194.718 .085 .035 .082
 Main Stem 4104.082 .082 .035 .082
 Main Stem 2257.516 .082 .035 .082
 Main Stem 391.8054 .082 .035 .085
 Main Stem 7.228003 .085 .035 .09
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SUMMARY OF REACH LENGTHS

River: Taunton River

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 Reach River Sta. Left Channel Right

 Main Stem 128409 90.02 90.01 93.04
 Main Stem 128319 65.53 65.15 67.23
 Main Stem 128304 Bridge
 Main Stem 128253.8 56.21 65.62 70.36
 Main Stem 128188.2 169.78 167.62 165.71
 Main Stem 128020.6 64.55 64.95 68.4
 Main Stem 127981.3 Inl Struct
 Main Stem 127955.6 95.96 99.03 158.54
 Main Stem 127856.6 1443.78 1488.1 1605.74   Main Stem 126368.5 1117.96
1081.96 1026.32
 Main Stem 125286.5 3030.3 3003.78 3022.24
 Main Stem 122282.8 754.72 768.18 785.63
 Main Stem 121514.6 1409.65 1470.4 1595.6
 Main Stem 120044.2 1210.5 1269.44 1360.7
 Main Stem 118774.7 1513.57 1451.76 1410.95
 Main Stem 117323 1270.29 1219.85 1204.17
 Main Stem 116103.1 1173.1 1178.45 1180.74
 Main Stem 114924.7 78.71 81.96 87.88
 Main Stem 114842.7 53.28 53.62 51.89
 Main Stem 114815.5 Bridge
 Main Stem 114789.1 44.49 41.34 37.16
 Main Stem 114747.8 1281.74 1292.52 1315.33
 Main Stem 113455.2 1492.91 1457.13 1422.7
 Main Stem 111998.1 2057.48 2006.07 1966.74   Main Stem 109992 808.34 781.04
811.8
 Main Stem 109211 1561.57 1566.81 1580.91
 Main Stem 107644.2 65.61 65.84 69.27
 Main Stem 107578.3 123.92 126.38 129.99
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Main Stem 107452 2317.83 2224.61 2187.27
Main Stem 105227.3 1458.48 1428.11 1397.47
Main Stem 103799.2 1511.12 1623.98 1750.94
Main Stem 102175.3 2000.77 1915.38 1882.93
Main Stem 100259.9 1027.78 1066.17 1112.6
Main Stem 99193.71 1067.1 1087.9 1112.89
Main Stem 98105.8 1679.58 1694.82 1701.02
Main Stem 96410.98 1563.06 1558.27 1560.01
Main Stem 94852.71 85.28 49.74 36.25
Main Stem 94802.97 97.12 92.48 89.62
Main Stem 94760.71 Bridge Main Stem 94710.49 111.72 138.76 147.03
Main Stem 94571.73 1383.91 1376.7 1373.13
Main Stem 93195.04 1691.41 1644.24 1589.83
Main Stem 91550.79 103.47 107.37 104.58
Main Stem 91443.41 115.34 121.17 129.47
Main Stem 91395.74 Bridge
Main Stem 91322.25 49.58 50.95 49.51
Main Stem 91271.3 3090.08 3016.84 2959.28
Main Stem 88254.45 973.59 1026.95 1087.56
Main Stem 87227.5 1820.81 1790.19 1770.77
Main Stem 85437.3 103.69 101.02 107.47
Main Stem 85336.28 60.24 60.79 60.96
Main Stem 85311.66 Bridge
Main Stem 85275.49 159.18 160.23 161.81
Main Stem 85115.27 1317.95 1325.49 1349.87 Main Stem 83789.77 1097.27 1096.54 1095.28
Main Stem 82693.23 72.73 101.63 122.4
Main Stem 82591.6 94.57 98.76 101.32
Main Stem 82538.7 Bridge
Main Stem 82492.84 128.81 112.38 109.35
Main Stem 82380.46 1341.34 1298.77 1269.65
Main Stem 81081.69 1963.31 1977.44 1977.97
Main Stem 79104.25 1084.58 1111.59 1135.96
Main Stem 77992.66 1393.51 1401.69 1405.75
Main Stem 76590.96 982.05 1055.95 1121.6
Main Stem 75535.01 90.65 91.01 91.43
Main Stem 75444 83.92 85.68 87.62
Main Stem 75397.22 Bridge
Main Stem 75358.33 55.08 52.55 49.93
Main Stem 75305.77 864.05 841.86 823.45 Main Stem 74463.91 1832.03 1771.2 1714.64
Main Stem 72692.7 102.69 95.32 96.09
Main Stem 72597.39 67.7 64.48 66.6
Main Stem 72569.03 Bridge
Main Stem 72532.91 70.06 59.59 49.81
Main Stem 72473.31 1517.78 1599.96 1630.87
Main Stem 70873.35 2059.45 2036.14 2092.49
Main Stem 68837.21 1628.08 1647.15 1663.03
Main Stem 67190.06 997.16 932.92 890.31
Main Stem 66257.14 57.41 52.76 51.67
Main Stem 66204.38 221.18 217.52 217.92
Main Stem 66018.66 Bridge
Main Stem 65986.86 60.77 66.17 74.2
Main Stem 65920.69 1486.1 1501.44 1534.95

Main Stem 64419.25 1895.09 1994.8 2138.57 Main Stem 62424.45 2215.34 2110.96 2048.7
Main Stem 60313.49 1181.48 1167.23 1157.27
Main Stem 59146.26 1379 1332.76 1299.32
Main Stem 57813.5 1426.36 1487.57 1534.98
Main Stem 56325.92 58 48.47 42.98
Main Stem 56277.45 84.16 80.55 81.19
Main Stem 56238.98 Bridge
Main Stem 56196.91 110.85 93.05 75.7
Main Stem 56103.86 1404.65 1394.42 1387.7
Main Stem 54709.44 1402 1447.38 1492.06
Main Stem 53262.06 1383.55 1262.42 1156.9
Main Stem 51999.64 86.45 102.74 130.56
Main Stem 51896.9 72.49 67.2 64.58
Main Stem 51859.01 Bridge
Main Stem 51829.71 68.99 67.69 68.38 Main Stem 51762.02 1675.78 1643.73 1610.01
Main Stem 50118.29 1344.97 1367.54 1376.48
Main Stem 48750.75 1747.9 1742.19 1739.19
Main Stem 47008.56 1593.35 1644.1 1707.52
Main Stem 45364.46 1089.81 1089.81 1089.81
Main Stem 44274.65 298.21 298.21 298.21
Main Stem 43977 360.52 360.52 360.52
Main Stem 43616 232.69 232.69 232.69
Main Stem 43383.23 47.15 47.15 47.15
Main Stem 43336.08 52.87 52.87 52.87
Main Stem 43308.41 Bridge
Main Stem 43283.2 85.94 85.94 85.94
Main Stem 43197.27 810.65 810.65 810.65
Main Stem 42387 976.94 976.94 976.94
Main Stem 41409.68 1488.16 1354.06 1248.76 Main Stem 40055.61 1195.98 1379.74 1532.92
Main Stem 38675.88 1736.85 1644.44 1625.84
Main Stem 37031.44 1361.41 1290.79 1264.72
Main Stem 35740.65 1785.36 1632.89 1530.18
Main Stem 34107.76 1212.6 1253.07 1397.48
Main Stem 32854.69 1846.6 1695.15 1689.56
Main Stem 31159.54 1600.85 1613.53 1832.86
Main Stem 29546.01 1803.19 1875.89 1978.98
Main Stem 27670.12 918.95 956.75 981.98
Main Stem 26713.37 43.75 79.77 95.66
Main Stem 26633.6 137.27 118.57 119.67
Main Stem 26591.05 Bridge
Main Stem 26515.04 99.49 94.6 91.95
Main Stem 26420.44 990.69 960.09 928.97
Main Stem 25460.34 1917.46 2059.03 2182.8 Main Stem 23401.31 1321.59 1234.68 1184.64
Main Stem 22166.63 978.05 935.95 915.59
Main Stem 21230.68 1970.54 1969.09 1971.46
Main Stem 19261.59 1135.1 1183.89 1211.84
Main Stem 18077.71 80.62 78.41 79.01
Main Stem 17999.3 50.15 48.83 48.16
Main Stem 17978.26 Bridge
Main Stem 17950.46 90.54 100.66 105.81

Main Stem 17849.81 887.1 936.69 998.6
Main Stem 16913.12 882.21 816.31 764.31
Main Stem 16096.81 106.5 128.05 139.73
Main Stem 15968.76 71.69 72.2 74.47
Main Stem 15933.16 Bridge
Main Stem 15896.56 162.26 134.72 118.38
Main Stem 15761.84 770.87 758.69 764.06 Main Stem 15003.16 749.32 742.03 737.61
Main Stem 14261.13 78.25 69.35 66.1
Main Stem 14191.78 44.24 43.72 44.72
Main Stem 14174.03 Bridge
Main Stem 14148.05 99.87 117.75 129.37
Main Stem 14030.31 684.11 778.6 861.6
Main Stem 13251.71 602.45 635.08 678.37
Main Stem 12616.64 48.11 89.77 157.92
Main Stem 12526.87 48.42 57.44 51.66
Main Stem 12498.05 Bridge
Main Stem 12469.43 83.23 42.79 17.93
Main Stem 12426.64 810.43 834.52 1253.76
Main Stem 11592.12 680.73 637.06 583.23
Main Stem 10955.06 122 83.42 73.8
Main Stem 10871.64 69.68 77.94 70.04 Main Stem 10832.75 Bridge
Main Stem 10793.7 110.75 131.98 150.03
Main Stem 10661.72 1040.28 965.59 915.55
Main Stem 9696.133 1323.89 1298.37 1295.7
Main Stem 8397.759 1233.41 1204.5 1191.8
Main Stem 7193.258 86.6 82.39 79.32
Main Stem 7110.866 22.89 21.96 21.2
Main Stem 7100.789 Bridge
Main Stem 7088.903 57.75 56.88 56.46
Main Stem 7032.026 1208.71 1041.61 935.52
Main Stem 5990.413 373.51 485.71 679.74
Main Stem 5504.704 98.06 95.18 93.88
Main Stem 5409.52 81.29 73.58 68.36
Main Stem 5376.326 Bridge
Main Stem 5335.943 143.56 141.23 144.64 Main Stem 5194.718 1072.04 1090.64 1114.7
Main Stem 4104.082 1834.7 1846.57 1854.36
Main Stem 2257.516 1820.11 1865.71 1922.42
Main Stem 391.8054 619.37 384.58 298.08
Main Stem 7.228003 7.94 7.22 8.54

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Taunton River

Reach	River Sta.	Contr.	Expan.
Main Stem	128409	.3	.5
Main Stem	128319	.5	.8
Main Stem	128304	Bridge	

Main Stem 128253.8 .5 .8
Main Stem 128188.2 .3 .5 Main Stem 128020.6 .5 .8
Main Stem 127981.3 Inl Struct
Main Stem 127955.6 .5 .8
Main Stem 127856.6 .3 .5
Main Stem 126368.5 .3 .5
Main Stem 125286.5 .3 .5
Main Stem 122282.8 .3 .5
Main Stem 121514.6 .3 .5
Main Stem 120044.2 .3 .5
Main Stem 118774.7 .3 .5
Main Stem 117323 .3 .5
Main Stem 116103.1 .3 .5
Main Stem 114924.7 .3 .5
Main Stem 114842.7 .5 .8
Main Stem 114815.5 Bridge
Main Stem 114789.1 .5 .8
Main Stem 114747.8 .3 .5
Main Stem 113455.2 .3 .5
Main Stem 111998.1 .3 .5 Main Stem 109992 .3 .5
Main Stem 109211 .3 .5
Main Stem 107644.2 .3 .5
Main Stem 107578.3 .3 .5
Main Stem 107452 .3 .5
Main Stem 105227.3 .3 .5
Main Stem 103799.2 .3 .5
Main Stem 102175.3 .3 .5
Main Stem 100259.9 .3 .5
Main Stem 99193.71 .3 .5
Main Stem 98105.8 .3 .5
Main Stem 96410.98 .3 .5
Main Stem 94852.71 .3 .5
Main Stem 94802.97 .5 .8
Main Stem 94760.71 Bridge
Main Stem 94710.49 .5 .8
Main Stem 94571.73 .3 .5
Main Stem 93195.04 .3 .5
Main Stem 91550.79 .3 .5 Main Stem 91443.41 .5 .8
Main Stem 91395.74 Bridge
Main Stem 91322.25 .5 .8
Main Stem 91271.3 .3 .5
Main Stem 88254.45 .3 .5
Main Stem 87227.5 .3 .5
Main Stem 85437.3 .3 .5
Main Stem 85336.28 .5 .8
Main Stem 85311.66 Bridge
Main Stem 85275.49 .5 .8
Main Stem 85115.27 .3 .5
Main Stem 83789.77 .3 .5
Main Stem 82693.23 .3 .5
Main Stem 82591.6 .5 .8
Main Stem 82538.7 Bridge
Main Stem 82492.84 .5 .8
Main Stem 82380.46 .3 .5

Main Stem 81081.69 .3 .5
Main Stem 79104.25 .3 .4 Main Stem 77992.66 .3 .4
Main Stem 76590.96 .3 .4
Main Stem 75535.01 .3 .4
Main Stem 75444 .5 .4
Main Stem 75397.22 Bridge
Main Stem 75358.33 .3 .4
Main Stem 75305.77 .1 .3
Main Stem 74463.91 .1 .3
Main Stem 72692.7 .1 .3
Main Stem 72597.39 .3 .4
Main Stem 72569.03 Bridge
Main Stem 72532.91 .3 .4
Main Stem 72473.31 .1 .4
Main Stem 70873.35 .1 .4
Main Stem 68837.21 .1 .4
Main Stem 67190.06 .1 .4
Main Stem 66257.14 .1 .4
Main Stem 66204.38 .3 .4
Main Stem 66018.66 Bridge Main Stem 65986.86 .5 .7
Main Stem 65920.69 .3 .5
Main Stem 64419.25 .3 .5
Main Stem 62424.45 .3 .5
Main Stem 60313.49 .3 .5
Main Stem 59146.26 .3 .5
Main Stem 57813.5 .3 .5
Main Stem 56325.92 .3 .5
Main Stem 56277.45 .5 .8
Main Stem 56238.98 Bridge
Main Stem 56196.91 .5 .8
Main Stem 56103.86 .3 .5
Main Stem 54709.44 .3 .5
Main Stem 53262.06 .3 .5
Main Stem 51999.64 .3 .5
Main Stem 51896.9 .5 .8
Main Stem 51859.01 Bridge
Main Stem 51829.71 .5 .8
Main Stem 51762.02 .3 .5 Main Stem 50118.29 .3 .5
Main Stem 48750.75 .3 .5
Main Stem 47008.56 .3 .5
Main Stem 45364.46 .3 .5
Main Stem 44274.65 .3 .5
Main Stem 43977 .1 .3
Main Stem 43616 .1 .3
Main Stem 43383.23 .8 .8
Main Stem 43336.08 .5 .8
Main Stem 43308.41 Bridge
Main Stem 43283.2 .5 .8
Main Stem 43197.27 .3 .5
Main Stem 42387 .1 .3
Main Stem 41409.68 .3 .5
Main Stem 40055.61 .3 .5
Main Stem 38675.88 .3 .5
Main Stem 37031.44 .3 .5

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Main Stem 35740.65 .3 .5
Main Stem 34107.76 .3 .5   Main Stem 32854.69 .3 .5
Main Stem 31159.54 .3 .5
Main Stem 29546.01 .3 .5
Main Stem 27670.12 .3 .5
Main Stem 26713.37 .5 .5
Main Stem 26633.6 .6 .8
Main Stem 26591.05 Bridge
Main Stem 26515.04 .5 .8
Main Stem 26420.44 .3 .5
Main Stem 25460.34 .3 .5
Main Stem 23401.31 .3 .5
Main Stem 22166.63 .3 .5
Main Stem 21230.68 .3 .5
Main Stem 19261.59 .3 .5
Main Stem 18077.71 .3 .5
Main Stem 17999.3 .6 .8
Main Stem 17978.26 Bridge
Main Stem 17950.46 .5 .8
Main Stem 17849.81 .3 .5   Main Stem 16913.12 .3 .5
Main Stem 16096.81 .3 .5
Main Stem 15968.76 .5 .8
Main Stem 15933.16 Bridge
Main Stem 15896.56 .5 .8
Main Stem 15761.84 .3 .5
Main Stem 15003.16 .3 .5
Main Stem 14261.13 .3 .5
Main Stem 14191.78 .6 .8
Main Stem 14174.03 Bridge
Main Stem 14148.05 .5 .5
Main Stem 14030.31 .3 .5
Main Stem 13251.71 .3 .5
Main Stem 12616.64 .3 .5
Main Stem 12526.87 .6 .8
Main Stem 12498.05 Bridge
Main Stem 12469.43 .5 .5
Main Stem 12426.64 .3 .5
Main Stem 11592.12 .3 .5   Main Stem 10955.06 .3 .5
Main Stem 10871.64 .6 .5
Main Stem 10832.75 Bridge
Main Stem 10793.7 .5 .5
Main Stem 10661.72 .3 .5
Main Stem 9696.133 .3 .5
Main Stem 8397.759 .3 .5
Main Stem 7193.258 .3 .5
Main Stem 7110.866 .3 .5
Main Stem 7100.789 Bridge
Main Stem 7088.903 .1 .3
Main Stem 7032.026 .1 .3
Main Stem 5990.413 .1 .3
Main Stem 5504.704 .1 .3
Main Stem 5409.52 .1 .3
Main Stem 5376.326 Bridge
Main Stem 5335.943 .1 .3
```

```
Main Stem 5194.718 .1 .3
Main Stem 4104.082 .1 .3   Main Stem 2257.516 .1 .3
Main Stem 391.8054 .1 .3
Main Stem 7.228003 .1 .3
```

SECTION B-3

HECRAS REPORT – PROPOSED CONDITIONS

```
 HEC-RAS HEC-RAS 6.4.1 June 2023
 U.S. Army Corps of Engineers
 Hydrologic Engineering Center
 609 Second Street
 Davis, California


 X X XXXXXX XXXX XXXX XX XXXX
 X X X X X X X X X X
 X X X X X X X X X
 XXXXXXX XXXX X XXX XXXX XXXXXX XXXX
 X X X X X X X X X
 X X X X X X X X X X
 X X XXXXXX XXXX X X X X XXXXX




PROJECT DATA
Project Title: Taunton_River
Project File : 10887 - Taunton_River.prj
Run Date and Time: 10/10/2024 4:59:04 PM

Project in English units
 Project Description:
CRS Info=<SpatialReference> <CoordinateSystem Code="2249"
Unit="US_survey_Foot" AcadCode="" /> <Registration OffsetX="0" OffsetY="0"
OffsetZ="0" ScaleX="1" ScaleY="1" ScaleZ="1" /></SpatialReference>




PLAN DATA

Plan Title: PROP
Plan File : \\beta-inc.com\ma\Projects\10800s\10887 - Taunton, MA - Old
Colony Ave Bridge\Engineering\Hydraulics\HECRAS\10887 - Taunton_River.p01

 Geometry Title: Proposed Conditions
 Geometry File : \\beta-inc.com\ma\Projects\10800s\10887 - Taunton, MA - Old
Colony Ave Bridge\Engineering\Hydraulics\HECRAS\10887 - Taunton_River.g05

 Flow Title : Taunton
 Flow File : \\beta-inc.com\ma\Projects\10800s\10887 - Taunton, MA - Old
Colony Ave Bridge\Engineering\Hydraulics\HECRAS\10887 - Taunton_River.f01

Plan Description:
Proposed Conditions


Plan Summary Information: Number of: Cross Sections = 158 Multiple Openings =
0
 Culverts = 0 Inline Structures = 1
```

Bridges = 20 Lateral Structures = 0

Computational Information
Water surface calculation tolerance = 0.01
Critical depth calculation tolerance = 0.01
Maximum number of iterations = 40
Maximum difference tolerance = 0.3
Flow tolerance factor = 0.001

Computation Options
Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Subcritical Flow

FLOW DATA

Flow Title: Taunton
Flow File : \\beta-inc.com\ma\Projects\10800s\10887 - Taunton, MA - Old Colony Ave Bridge\Engineering\Hydraulics\HECRAS\10887 - Taunton_River.f01

Flow Data (cfs)
River Reach RS 10%AEP 4 AEP 2% AEP 1% AEP 0.2% AEP Taunton River Main Stem 128409 2280 3039 3590 4230 5720 Taunton River Main Stem 109992 2820 3584 4140 4780 6260 Taunton River Main Stem 88254.45 3660 4334 4830 5380 6690 Taunton River Main Stem 79104.25 3740 4459 4990 5570 6970 Taunton River Main Stem 74463.91 3860 4639 5210 5850 7370 Taunton River Main Stem 54709.44 3970 4812 5430 6120 7750 Taunton River Main Stem 35740.65 4080 4977 5630 6380 8120 Taunton River Main Stem 23401.31 4230 5220 5940 6770 8690 Taunton River Main Stem 9696.133 4890 6264 7260 8420 11100 Taunton River Main Stem 7.228003 4890 6264 7260 8420 11100

Boundary Conditions
River Reach Profile Upstream Downstream
Taunton River Main Stem 10%AEP Normal S = 0.0003 Taunton River Main Stem 4 AEP Normal S = 0.0003 Taunton River Main Stem 2% AEP Normal S = 0.0003 Taunton River Main Stem 1% AEP Normal S = 0.0003 Taunton River Main Stem 0.2% AEP Normal S = 0.0003

GEOMETRY DATA

Geometry Title: Proposed Conditions
Geometry File : \\beta-inc.com\ma\Projects\10800s\10887 - Taunton, MA - Old Colony Ave Bridge\Engineering\Hydraulics\HECRAS\10887 - Taunton_River.g05

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 128409

INPUT
Description: 113 App Mill St Br
Station Elevation Data num= 84
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 35.87 13.05 35.86 26.1 35.53
65.24 35.34 78.29 35.25 84.82 35.4 123.97 34.94 130.49 35.01 137.01 35.25
143.54 33.2 150.06 32.76 169.64 32.41 202.26 30.93 221.83 29.72 228.36 29.45
241.41 29.21 267.5 29.23 274.03 29.07 293.6 29.13 300.13 28.98 306.65 27.99
313.17 27.51 319.7 26.88 326.22 25.81 333.03 24.02 338.49 23.04 340.24 22.22
341.38 20.18 348.62 15.99 359.34 12.87 373.14 12.14 388.24 11.87 406.61
11.19 421.81 12.59 430.87 17.73 442.83 17.06 444.63 20.68 457.44 21.82
463.24 22.52 476.29 23.7 482.81 24.5 489.34 25.1 495.86 25.52 508.91 26
515.43 26.09 521.96 25.97 541.53 26.37 554.58 26.06 561.11 25.12 567.63
24.71 580.68 24.44 587.2 24.2 593.73 24.1 606.78 24.65 613.3 25.51 639.4
27.22 645.92 27.54 672.02 30.1 678.55 30.86 685.07 31.17 691.59 31.31 704.64
32.21 724.22 33.09 737.27 34.11 743.79 34.38 750.32 34.89 756.84 35.59
763.36 36.53 769.89 36.98 789.46 37.88 795.99 38.32 809.04 38.88 822.08
39.89 828.61 40.5 835.13 40.62 841.66 41.32 854.71 43.3 861.23 43.41 867.76
44.21 880.8 47.11 887.33 48.24 893.85 49.09 906.9 50.18 919.95 50.7

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 300.13 .055 515.43 .095

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 300.13
515.43 90.02 90.01 93.04 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 541.53 919.95 26.37 F
Blocked Obstructions num= 3 Sta L Sta R Elev Sta L Sta R Elev Sta L Sta R
Elev
 31.92 73.2735.47613 86.21 138.4735.37749 172.65 219.3632.31081

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 128319

INPUT
Description: 112.7 US Face Mill St Br
Station Elevation Data num= 84
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 33.89 6.48 33.87 19.451
33.46 45.391 33.2 97.258 33.23 103.74 33.07 110.22 33.24 129.671 33.19
136.16 32.79 142.64 32.14 155.61 32.18 162.09 31.94 168.58 32.21 175.06
32.19 181.54 32.43 188.03 33.9 194.51 35.02 200.989 35.37 220.449 35.87
233.409 35.69 246.38 35.28 252.86 35.22 265.81 34.74 278.75 34.88 285.212
34.67 291.68 35.18 297.99 33.76 298.15 33.72 304.61 29.54 312.8 22.95 312.9
23.55 325.3 19.78 330.5 17.4 333.8 15.81 340.1 11.73 346.1 10.54 352.2 9.67
360.2 10.22 370.498 14.17 374.199 17.78 382.6 22.43 388.8 23.31 389.201
23.48 399.561 35.04 408.078 35.1 427.48 35.08 433.95 35.17 440.41 35.06
453.35 35.52 459.81 35.19 466.28 35.41 472.75 35.26 485.829 35.77 492.37
35.7 498.92 36.1 505.46 36.17 512 36.4 518.54 36.45 525.081 36.65 538.17

36.67 557.79 37.12 564.331 37.56 570.87 37.71 577.419 37.49 583.96 37.67
590.501 37.57 597.04 37.63 603.581 38.08 610.13 37.62 616.671 37.45 629.749
37.83 636.289 38.17 642.829 38.74 649.38 38.74 655.919 39.13 668.999 39.48
675.54 39.47 682.089 39.76 688.63 39.9 695.169 40.2 701.71 40.77 708.249
41.01 714.79 41.01 721.339 41.38

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .08 291.68 .055 399.561 .085
 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 291.68
399.561 65.53 65.15 67.23 .5 .8 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 307 36.5 T
 390 721.339 37 T

BRIDGE

RIVER: Taunton River
REACH: Main Stem RS: 128304

INPUT
Description: 112.5 Rte 104/Mill St/Plymouth St
Distance from Upstream XS = 5
Deck/Roadway Width = 50
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
 num= 14
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 99.999 34.4 233.999 36 237.001 35.18
 308 36.71 308.101 40.1 310 40.1
 310.1 36.57 31.64 387 37.11 32.18 387.1 40.6
 390 40.62 390.1 37.15 624 37.81   625 38.84 832 47.65

Upstream Bridge Cross Section Data
Station Elevation Data num= 84
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 33.89 6.48 33.87 19.451
33.46 45.391 33.2 97.258 33.23 103.74 33.07 110.22 33.24 129.671 33.19
136.16 32.79 142.64 32.14 155.61 32.18 162.09 31.94 168.58 32.21 175.06
32.19 181.54 32.43 188.03 33.9 194.51 35.02 200.989 35.37 220.449 35.87
233.409 35.69 246.38 35.28 252.86 35.22 265.81 34.74 278.75 34.88 285.212
34.67 291.68 35.18 297.99 33.76 298.15 33.72 304.61 29.54 312.8 22.95 312.9
23.55 325.3 19.78 330.5 17.4 333.8 15.81 340.1 11.73 346.1 10.54 352.2 9.67
360.2 10.22 370.498 14.17 374.199 17.78 382.6 22.43 388.8 23.31 389.201
23.48 399.561 35.04 408.078 35.1 427.48 35.08 433.95 35.17 440.41 35.06
453.35 35.52 459.81 35.19 466.28 35.41 472.75 35.26 485.829 35.77 492.37
35.7 498.92 36.1 505.46 36.17 512 36.4 518.54 36.45 525.081 36.65 538.17
36.67 557.79 37.12 564.331 37.56 570.87 37.71 577.419 37.49 583.96 37.67
590.501 37.57 597.04 37.63 603.581 38.08 610.13 37.62 616.671 37.45 629.749
37.83 636.289 38.17 642.829 38.74 649.38 38.74 655.919 39.13 668.999 39.48
675.54 39.47 682.089 39.76 688.63 39.9 695.169 40.2 701.71 40.77 708.249
41.01 714.79 41.01 721.339 41.38

Manning's n Values num= 3

```
 Sta n Val Sta n Val Sta n Val
 0 .08 291.68 .055 399.561 .085

Bank Sta: Left Right Coeff Contr. Expan.
 291.68 399.561 .5 .8
Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 307 36.5 T
 390 721.339 37 T
 Downstream Deck/Roadway Coordinates
 num= 14
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 99.999 34.4 233.999 36 237.001 35.18
 308 36.71 308.101 40.1 310 40.1
 310.1 36.57 31.64 387 37.11 32.18 387.1 40.6
 390 40.62 390.1 37.15 624 37.81
 625 38.84 832 47.65

Downstream Bridge Cross Section Data
Station Elevation Data num= 89
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  0 33.8 6.34 33.81 19.011 33.58
25.341 33.58 31.68 33.36  44.35 33.33 50.69 33.49 57.02 33.51 69.7 33.13
82.369 33.13  107.89 32.26 114.29 32.32 120.68 32.22 133.481 32.57 139.87
32.55  146.271 32.12 152.66 31.96 165.45 32.16 171.85 32.47 178.249 32.23
191.04 32.4 203.831 32.96 210.22 33.09 216.621 33.04 248.6 33.89  261.391
32.94 267.79 32.65 274.181 32.17 286.93 31.57 293.27 30.74  298.77 30.46
299.62 30.41 312.8 22.95 312.9 23.55 325.3 19.78  330.5 17.4 333.8 15.81
340.1 11.73 346.1 10.54 352.2 9.67  360.2 10.22 370.498 14.17 374.199 17.78
382.6 22.43 388.8 23.31  389.201 23.48 407.518 26.45 414.051 28.27 420.57
29.45 427.09 29.94  433.611 31.2 440.14 31.31 446.66 30.76 453.18 29.49 459.7
28.7  466.229 28.3 472.75 28.93 479.27 29.58 485.789 30.53 492.32 30.93
498.841 31.39 505.359 32.17 511.88 32.98 518.398 33.44 524.931 33.6  531.45
34.17 537.97 34.96 544.491 36.04 551.02 36.45 557.54 36.8  564.06 36.85
570.58 36.8 583.63 36.88 590.15 36.93 596.669 37.04  603.2 37.2 609.721 37.34
616.239 37.6 622.76 37.94 629.278 38.03  635.811 37.87 642.33 37.83 648.85
37.95 655.371 37.89 661.9 38.06  668.42 38.49 674.94 38.79 681.46 39.38
687.989 40.1

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .08 299.62 .055 433.611 .085

Bank Sta: Left Right Coeff Contr. Expan.
 299.62 433.611 .5 .8
Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 305.001 36 T
 390 687.989 37 T

Upstream Embankment side slope = 0 horiz. to 1.0 vertical Downstream
Embankment side slope = 0 horiz. to 1.0 vertical Maximum allowable
submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
```

Spillway height used in design =
Weir crest shape = Broad Crested

Number of Bridge Coefficient Sets = 1
 Low Flow Methods and Data
 Energy
 W.S. Pro Method

 W.S.Pro Data
 Left Embankment
 El of the top of the embankment = 36.7
 El of the toe of the abutment = 22.9
 Right Embankment
 El of the top of the embankment = 36.7
 El of the toe of the abutment = 22.9
 Abutment Type = 4 Vert. abutments and sloping embankments with wingwalls
Slope of abutments = 4
 Top with of embankment = 50
 Centroid station of bridge opening =
 Wing Wall Type = Angular wing walls
 Width = 25
 Angle = 45
 Radius =
 Guide Banks Type = No Guide Bank present
 Length =
 Offset =
 Angle =
 Optional Contraction and expansion coefficients
 At approach Section
 At Guide Bank
 At upstream outside
 At upstream inside (BU)
 At downstream inside (BD)
 Piers are Continuous for the width of the bridge
 Use Geometric mean as Friction Slope Method

Selected Low Flow Methods = W.S.Pro Method

High Flow Method
 Energy Only

Additional Bridge Parameters
 Add Friction component to Momentum
 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 128253.8

INPUT
Description: 112.3 DS FAce Mill St Br
Station Elevation Data num= 89
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 33.8 6.34 33.81 19.011 33.58
25.341 33.58 31.68 33.36 44.35 33.33 50.69 33.49 57.02 33.51 69.7 33.13
82.369 33.13 107.89 32.26 114.29 32.32 120.68 32.22 133.481 32.57 139.87
32.55 146.271 32.12 152.66 31.96 165.45 32.16 171.85 32.47 178.249 32.23
191.04 32.4 203.831 32.96 210.22 33.09 216.621 33.04 248.6 33.89 261.391
32.94 267.79 32.65 274.181 32.17 286.93 31.57 293.27 30.74 298.77 30.46
299.62 30.41 312.8 22.95 312.9 23.55 325.3 19.78 330.5 17.4 333.8 15.81
340.1 11.73 346.1 10.54 352.2 9.67 360.2 10.22 370.498 14.17 374.199 17.78
382.6 22.43 388.8 23.31 389.201 23.48 407.518 26.45 414.051 28.27 420.57
29.45 427.09 29.94 433.611 31.2 440.14 31.31 446.66 30.76 453.18 29.49 459.7
28.7 466.229 28.3 472.75 28.93 479.27 29.58 485.789 30.53 492.32 30.93
498.841 31.39 505.359 32.17 511.88 32.98 518.398 33.44 524.931 33.6 531.45
34.17 537.97 34.96 544.491 36.04 551.02 36.45 557.54 36.8 564.06 36.85
570.58 36.8 583.63 36.88 590.15 36.93 596.669 37.04 603.2 37.2 609.721 37.34
616.239 37.6 622.76 37.94 629.278 38.03 635.811 37.87 642.33 37.83 648.85
37.95 655.371 37.89 661.9 38.06 668.42 38.49 674.94 38.79 681.46 39.38
687.989 40.1

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .08 299.62 .055 433.611 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 299.62
433.611 56.21 65.62 70.36 .5 .8 Ineffective Flow num= 2
Sta L Sta R Elev Permanent
0 305.001 36 T
390 687.989 37 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 128188.2

INPUT
Description: 112 App weir/Exit Mill St Br Station Elevation Data num= 70
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 34.1 6.49 34.23 12.99 34.22
19.48 34.07 25.97 33.7 32.47 33.18 45.45 31.85 58.44 31.12 71.42 31.24 84.41
31.56 103.65 31.41 110.03 31.55 116.4 31.31 122.78 31.3 129.15 31.45 154.66
31.29 167.41 31.48 173.78 31.47 180.16 31.32 205.66 31.37 237.53 32.03
256.66 32.09 263.04 31.33 275.79 28.32 282.16 27.32 288.54 25.75 294.92
23.97 301.3 23.75 303.45 23.73 311.64 21.86 319.79 15.57 328.52 13.11 341.97
12.8 354.17 12.94 362.69 12.88 368.73 14.34 376.66 15.28 385.89 16.63 402.23
24.53 403.37 24.88 409.75 25.87 416.13 26.17 435.63 26.52 448.75 26.48
455.31 26.89 461.88 26.9 468.44 26.62 488.12 26.8 494.68 26.68 501.24 26.39
507.8 26.27 514.36 26.54 527.49 26.56 534.05 27.59 540.61 29.85 547.17 32.89
553.73 35.43 560.29 36.25 566.85 36.68 619.34 37.19 625.9 37.09 639.02 37.29
645.58 37.16 658.71 36.59 678.39 36.78 684.95 37.14 691.51 38.14 698.07
39.31 711.19 41.24 724.32 42.23

Manning's n Values num= 3

```
 Sta n Val Sta n Val Sta n Val
 0 .08 256.66 .055 409.75 .095

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  256.66
409.75 169.78 167.62 165.71 .3 .5

CROSS SECTION


RIVER: Taunton River
REACH: Main Stem RS: 128020.6

INPUT
Description: 111.7 us face weir
Station Elevation Data num= 90
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  0 34.24 12.88 34.27 25.77
34.07 38.65 33.96 51.53 34.24  64.42 34.04 70.86 33.43 77.3 31.03 90.18 31.27
103.07 31.15  109.51 30.84 115.95 30.69 122.39 30.82 167.48 29.69 173.92
29.45  180.36 28.88 186.92 28.44 200.04 27.93 213.15 27.79 226.27 27.47
232.83 27.43 239.38 27.77 245.94 28.55 259.06 31.37 265.61 31.58  278.73
31.53 285.29 31.07 298.4 30.98 324.63 31.2 328.16 31.18  331.19 31.16 337.75
26.6 344.31 23.78 350.86 19.99 358.52 12.97  371.97 12.66 384.17 12.8 392.69
12.74 398.73 14.2 406.66 15.14  416.44 19.92 423 22.2 424.52 22.34 429.56
22.8 436.11 22.6  442.67 22.63 449.23 24.24 455.79 26.13 462.35 27.31 468.9
27.75  475.46 27.75 482.02 27.93 495.13 27.81 514.81 27.16 521.36 26.7
527.92 25.26 534.48 24.83 541.04 25.06 547.6 24.61 560.71 23.52  567.27 23.49
573.83 23.3 580.38 23.27 586.94 24.29 593.5 26.14  600.06 26.94 606.61 28.44
613.17 32.29 619.73 35.23 626.29 36.13  639.4 37.08 645.96 37.38 652.52 37.52
665.63 37.44 672.19 37.53  704.98 36.59 724.65 35.34 744.33 35.42 750.88
35.28 757.44 36.23  764 38.88 770.56 40.97 777.12 42.71 783.67 43.87 790.23
45.34  796.79 45.49 803.35 45.38 809.9 45.47 816.46 45.94 823.02 46.74

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 331.19 .055 482.02 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  331.19
482.02 64.55 64.95 68.4 .5 .8 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 265.61 31.58 T
Blocked Obstructions num= 1
 Sta L Sta R Elev
 121.23 175.1530.79663

INLINE STRUCTURE


RIVER: Taunton River
REACH: Main Stem RS: 127981.3

INPUT
Description: 111.5
Distance from Upstream XS = 20 Deck/Roadway Width = 2
Weir Coefficient = 2.6
```

Weir Embankment Coordinates num = 8
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 292 30.64 332 31.21 332.1 15.58 345 16.42 406 16.87 416 17.9 417 28.21 519 25.86

Upstream Embankment side slope = 0 horiz. to 1.0 vertical Downstream Embankment side slope = 0 horiz. to 1.0 vertical Maximum allowable submergence for weir flow = .95
Elevation at which weir flow begins =
Weir crest shape = Broad Crested

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 127955.6

INPUT
Description: 111.3 DS face weir
Station Elevation Data num= 92
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 33.51 6.42 33.47 19.26 33.66 32.1 33.25 51.36 33.15 70.63 32.45 83.47 31.51 89.89 31.17 102.73 30.85 141.25 30.66 173.36 30.41 179.78 30.47 186.2 30.38 192.62 29.78 199.04 28.96 205.46 28.38 224.89 27.28 231.39 27.16 257.41 27.24 263.91 26.93 289.93 26.41 296.43 25.88 302.93 24.22 309.44 23.45 315.94 22.97 322.44 23.13 328.95 24.32 335.45 26.52 341.96 27.79 348.46 28 367.97 29.11 374.48 28.75 380.98 27.71 383.34 27.12 387.48 26.07 393.99 22.45 400.49 18.67 406.99 17.12 426 17.4 434 14.4 442 13.6 450 12.3 458 14.5 466 17.3 478.54 17.11 485.04 17.32 491.54 18.31 498.05 18.64 504.55 18.82 504.7 18.84 511.05 19.72 524.06 22.44 543.57 27.23 550.08 27.76 556.58 27.53 569.59 26.31 576.09 25.48 582.6 22.68 589.1 20.13 595.6 19.58 602.11 20.13 608.61 20.19 615.11 20.82 621.62 22.2 628.12 24.24 634.63 25.82 641.13 26.32 647.63 26.43 654.14 26.76 667.14 28.24 673.65 29.2 680.15 30.9 686.66 32.98 693.16 34.32 699.66 35.29 706.17 36.11 712.67 36.71 725.68 37.45 738.69 37.87 758.2 37.84 777.71 37.39 784.21 37.08 790.72 36.61 797.22 36.59 803.72 36.78 810.23 36.61 816.73 36.81 829.74 38.66 836.24 39.43 849.25 41.46 862.26 43.09 881.77 45.04

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .085 367.97 .055 550.08 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 367.97 550.08 95.96 99.03 158.54 .5 .8 Ineffective Flow num= 1
Sta L Sta R Elev Permanent
0 367.97 29.11 T
Blocked Obstructions num= 1
Sta L Sta R Elev
129.27 182.1430.76699

CROSS SECTION

RIVER: Taunton River REACH: Main Stem RS: 127856.6

INPUT
Description: 111 exit weir
Station Elevation Data num= 92
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 33.41 6.5 33.56 13 33.54
19.5 33.93 25.99 33.86 32.49 33.24 45.49 32.88 51.99 32.85 58.49 32.64 64.99
32.72 71.48 33.08 77.98 32.54 84.48 32.25 97.48 31.88 103.98 31.5 116.97
29.91 129.97 28.82 136.47 28.68 155.97 28.99 168.96 29.32 194.96 29.61
201.45 29.6 214.45 29.3 253.44 29.48 266.44 29 272.94 28.89 298.93 27.42
305.43 27.14 318.43 26.36 324.93 26.12 337.92 25.85 363.92 25.9 376.92 26.16
383.41 26.08 389.91 26.19 403.01 25.63 409.55 25.12 416.1 24.44 422.65 23.96
429.19 23.71 435.74 23.64 442.29 24.09 448.83 24.87 455.38 24.91 461.93 22.3
468.47 20.48 475.02 18.37 475.69 18.24 481.57 17.1 544 14.4 552 13.6 560
12.3 568 14.5 612.5 17.08 651.78 17.07 658.33 17.08 664.87 17.17 666.5 17.34
671.42 17.83 677.97 18.69 684.51 19.99 704.15 24.37 710.7 25.26 717.24 25.79
723.79 27.2 730.34 28.87 736.88 30.39 743.43 31.08 749.98 30.76 756.52 30.28
769.62 31.72 776.16 32.04 782.71 32.1 795.8 33 808.9 34.31 815.44 35.27
821.99 35.45 828.54 35.94 835.08 37.06 841.63 38.52 854.72 43.41 861.27
43.85 867.82 43.61 880.91 43.44 894 42.94 900.55 42.48 913.64 41.98 920.19
42.03 939.83 42.72 946.38 43.17 966.02 45.01 979.11 46.45

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 455.38 .055 743.43 .095

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 455.38
743.43 1443.78 1488.1 1605.74 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 194.96 29.61 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 126368.5

INPUT
Description: 110
Station Elevation Data num= 189
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 46.85 25.85 46.86 32.31
46.76 38.77 46.42 45.23 45.95 71.08 44.81 84 43.96 90.46 43.26 96.92 42.74
103.38 42.46 122.77 41.12 129.23 40.98 135.69 40.69 148.61 40.6 168 39.95
180.92 39.78 193.84 39.15 200.3 39.03 213.23 38.35 219.69 38.21 226.15 38.21
251.99 38.94 258.46 39.43 264.92 39.22 277.84 39.5 290.76 38.94 297.22 38.54
303.69 37.82 310.15 36.79 316.61 36 323.07 35.4 329.53 34.27 348.92 30.53
355.38 27.11 361.84 26.66 368.3 25.39 374.76 24.47 381.22 23.95 387.68 23.89
394.14 23.49 407.07 23.05 413.53 23.38 419.95 23.97 432.78 24.38 439.19
24.98 445.61 26.13 452.03 26.63 458.44 28.67 464.86 31.4 471.27 32.76
477.69 33.64 484.11 34.15 490.52 34.24 503.36 34.04 516.19 33.63 522.6 33.01
541.85 30.89 554.68 29.65 567.52 28 593.18 25.96 599.6 25.63 606.01 25.53
618.85 24.63 625.28 24.65 631.71 24.47 638.15 24.16 651.02 23.81 657.45
23.42 663.88 22.61 676 22.7 696 16.4 704 13.4 712 12.6 720 11.3 728 13.5
736 16.3 760 20 766.82 23.51 771 24.35 773.26 24.8 786.13 24.9 792.56 24.83
798.99 24.29 805.52 24.04 818.57 24.22 857.73 24.25 870.78 24.13 877.31
23.86 909.94 23.71 916.47 23.57 923 23.58 929.52 23.34 949.1 22.86 968.68

21.9 975.21 21.44 988.26 20.16 994.79 19.17 1001.31 19.13 1007.84 18.9
1020.89 18.98 1033.95 18.91 1040.47 19.48 1047 20.54 1053.53 21.43 1060.05
21.91 1066.58 22.71 1079.63 23.28 1092.69 24.16 1112.26 24.89 1138.37 25.59
1164.48 25.73 1171 26.03 1203.64 26.49 1210.16 26.4 1236.27 26.75 1255.85
26.56 1262.37 26.79 1268.9 26.88 1275.43 26.82 1281.93 26.94 1294.94 26.95
1314.46 26.5 1333.97 25.45 1346.98 24.69 1353.49 24.47 1359.99 24.45 1379.51
24.83 1386.01 24.69 1392.52 24.74 1418.54 25.75 1431.55 26.56 1438.05 26.86
1444.56 26.85 1451.06 26.61 1457.57 26.95 1464.07 27.04 1470.58 26.08
1477.09 24.76 1490.1 23.56 1496.6 23.77 1503.11 24.62 1509.61 25.16 1516.12
25 1529.13 29.22 1535.63 29.25 1542.14 29.56 1548.64 29.62 1561.65 28.62
1568.16 28.22 1574.66 28.05 1581.17 26.9 1587.67 26.31 1594.18 26.2 1600.68
25.9 1607.19 25.84 1613.69 27.22 1620.2 27.96 1633.21 30.07 1646.22 31.81
1659.23 32.95 1665.73 33.05 1672.24 33.34 1698.26 34.08 1724.28 34.25
1743.84 35.64 1750.39 35.88 1770.05 37.7 1776.6 38.17 1783.15 38.43 1789.7
39.18 1796.25 39.78 1809.35 40.61 1815.91 41.16 1822.46 41.45 1835.56 41.75
1842.11 42.26 1861.76 42.84 1874.87 43.77 1881.42 44.42 1887.97 45.34
1894.52 45.93 1901.07 46.13 1907.62 45.7 1914.17 45.63 1920.73 45.78 1927.28
45.72 1933.83 45.4 1940.38 45.26 1953.48 45.44

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .1 606.01 .0552 773.26 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 606.01
773.26 1117.96 1081.96 1026.32 .3 .5 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 490.52 34.24 F
 1548.64 1953.48 29.62 F

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 125286.5
 INPUT
Description: 109
Station Elevation Data num= 203
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 41.92 6.54 43.43 19.61 46.06
26.15 47.01 39.23 46.79 52.3 46.1 58.84 45 65.38 42.39 71.91 40.37 78.45
35.92 84.99 34.22 91.53 31.57 98.07 28.68 104.6 27.54 111.14 27.69 117.68
26.81 124.22 25.63 137.29 24.38 150.37 23.7 156.9 23.1 163.44 21.58 176.52
20 183.06 19.39 189.59 19.03 202.67 19.17 209.21 19.08 215.74 18.24 222.28
18.09 228.82 18.35 235.36 19.01 237.82 18.78 241.89 18.41 248.43 16.57
261.51 16.56 269 15.9 276 13.3 283 12.3 290 11.6 297 13.2 298 16.2 300.73
16.55 307.27 16.54 313.81 19.17 320.35 22.31 320.62 22.33 339.96 22.27 346.5
22.19 359.57 22.46 366.11 22.39 372.65 21.9 385.72 21.4 392.26 21.3 398.8
21.49 405.34 21.13 411.87 21.43 431.49 20.97 438.02 20.7 444.56 20.9 451.1
21.57 457.64 21.97 483.79 22.53 490.33 22.49 496.86 22.67 503.4 22.4 516.48
22.98 523.01 22.69 529.55 22.21 542.63 22.09 549.16 21.68 555.7 21.57
562.24 21.15 575.32 20.07 588.39 19.28 601.49 18.97 608.04 18.95 621.16
19.54 627.72 20.04 634.27 20.36 647.39 20.13 660.5 20.34 667.06 20.17 693.29
19.84 699.85 19.5 726.07 19.4 745.75 19.81 765.42 19.53 778.53 19.53 785.09
19.66 791.65 19.43 830.99 19.49 850.66 19.26 870.34 19.75 876.89 20.47
883.45 20.67 896.56 20.48 916.24 20.63 922.79 20.78 935.91 20.79 942.47

20.46 949.02 20.47 955.58 20.34 968.69 19.44 975.25 19.3 994.92 20.26
1001.48 19.67 1014.6 18.06 1027.71 17.52 1034.27 17.65 1040.83 18.23 1047.38
19.01 1053.94 19.1 1060.5 18.95 1067.05 19.02 1073.61 19.26 1080.17 19.15
1093.28 19.52 1099.84 19.85 1112.96 20.24 1119.51 20.63 1145.74 21.17
1158.86 21.15 1171.97 22.3 1185.09 23.61 1191.64 23.61 1204.76 23.28 1211.32
23.48 1224.43 23.23 1237.55 24.02 1250.66 24.07 1257.22 24.25 1270.33 25.34
1290 26.17 1296.56 26.61 1303.12 27.66 1309.68 29.04 1316.23 29.73 1322.79
30.11 1329.35 30.7 1335.9 31.12 1355.58 31.29 1375.25 32.1 1381.81 32.2
1388.36 32.67 1394.92 33.41 1401.48 33.4 1408.04 33.11 1414.59 33.24 1421.15
33.87 1427.71 33.88 1440.82 34.77 1447.38 34.86 1460.49 35.58 1473.61 35.17
1486.72 36.06 1493.28 36.31 1526.07 36.9 1532.62 37.14 1539.18 37.78 1545.74
37.79 1558.85 38.08 1565.41 37.91 1578.53 38.68 1585.08 38.94 1591.64 39.45
1598.2 40.21 1604.76 40.49 1611.31 40.96 1617.87 40.92 1624.43 41.17 1630.98
41.21 1637.54 41.62 1650.66 42.62 1657.21 42.97 1663.77 43.48 1670.33 43.67
1683.44 44.41 1716.23 45.47 1722.79 45.58 1729.34 45.99 1749.02 46.47
1762.13 47.08 1775.25 48.3 1794.92 49.56 1808.03 51.17 1821.15 52.42 1847.38
53.89 1886.72 54.41 1912.95 53.84 1919.51 53.61 1939.18 53.27 1958.85 53.34
1965.41 53.8 1978.52 56.02 1985.08 56.89 1998.19 58.38 2011.31 59.5 2017.87
59.93 2030.98 60.52 2037.54 60.7 2050.65 60.73 2057.21 60.56 2070.32 59.92
2076.88 59.81

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 237.82 .055 320.62 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 237.82
320.62 3030.3 3003.78 3022.24 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 122282.8

INPUT
Description: 108
Station Elevation Data num= 249 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 70.81 6.56 68.04 13.11 64.74 19.67 61.03 26.23 59.41 39.34 58.97 52.46
59.39 65.57 59.26 85.24 59.54 91.8 59.88 98.36 59.99 111.47 59.66 118.03
59.79 124.59 59.54 131.14 59.02 144.26 56.17 157.37 53.06 163.93 52.19
170.49 52.02 177.04 52.28 183.6 53.33 190.16 52.89 196.72 49.04 203.27 48
262.29 47.8 275.4 47.92 288.52 47.89 301.63 48.2 308.19 48.6 314.75 49.18
321.3 50.11 327.86 50.49 334.42 50.48 340.97 50.3 354.09 49.36 360.65 48.35
373.76 46.78 386.87 46.29 399.99 44.52 406.55 43.79 413.1 42.54 419.66 41.81
426.22 41.67 432.78 41.39 439.33 41.29 472.12 41.18 498.35 41.27 511.46
41.05 596.71 41.33 616.38 41.34 622.93 41.48 629.49 41.48 636.05 41.76
642.61 42.84 649.16 44.91 655.72 47.72 662.28 47 668.83 46.9 675.39 46.23
688.51 43.58 708.18 41.45 721.29 40.27 727.85 39.58 734.41 39.06 740.96
38.32 780.31 35.94 793.42 34.97 813.09 34.17 819.65 34.28 826.21 34.1
832.76 33.76 839.32 33.08 845.88 32.22 858.99 29.86 865.55 28.44 878.66
26.31 885.22 25.65 898.34 23.9 904.89 23.61 911.45 22.69 918.01 21.99 924.57
21.57 931.12 21.32 937.68 20.91 944.24 20.24 950.79 20.05 963.91 20.46
970.47 20.49 983.58 19.65 990.14 19.55 996.69 19.69 1022.92 21.06 1029.48
21.01 1036.04 21.14 1042.6 21.09 1049.15 19.99 1055.71 18.61 1062.27 17.92

1068.82 17.91 1075.38 18.8 1081.94 19.41 1088.5 19.34 1095.05 18.96 1101.61 19.58 1108.17 20.66 1114.72 20.98 1121.28 20.85 1134.4 20.9 1140.95 20.74 1154.07 21.06 1160.62 20.95 1173.73 20.48 1180.29 20.39 1186.84 20.58 1191.56 20.81 1193.4 20.9 1199.95 20.56 1213 21.2 1215 15.2 1223 14.7 1230 10.3 1237 11.2 1244 12.7 1245 15.2 1267 16.7 1270.68 19.52 1272.06 20.24 1278.62 21.4 1285.17 21.56 1298.29 21.52 1304.84 21.14 1311.4 21.05 1317.95 20.68 1337.57 20.83 1344.11 20.62 1350.64 20.26 1363.72 20.47 1376.8 20.91 1383.34 20.98 1389.88 21.47 1396.42 21.65 1402.95 22.08 1409.49 22.66 1422.57 24.13 1429.11 24.63 1435.65 24.83 1448.72 24.39 1455.26 23.94 1474.88 22.01 1481.42 21.57 1487.96 20.99 1501.03 19.42 1507.57 18.46 1514.11 18.3 1520.65 17.97 1540.26 18.22 1553.34 18.13 1566.42 18.31 1579.5 18.23 1586.04 18.29 1592.57 18.64 1599.11 19.21 1605.65 20.72 1612.19 22.41 1618.73 23.66 1625.27 24.67 1638.34 25.43 1644.88 25.59 1657.96 25.37 1690.65 25.03 1697.19 24.83 1703.73 24.91 1710.27 25.32 1742.96 27.92 1749.5 28.3 1756.04 28.32 1769.12 28.92 1775.65 29.11 1782.19 29.48 1795.27 29.9 1801.81 29.97 1808.35 29.86 1814.89 30.3 1821.43 30.13 1847.58 29.99 1860.66 30.2 1873.73 31.05 1886.81 30.96 1899.89 31.1 1906.43 31.51 1912.97 31.63 1919.5 31.52 1926.04 31.65 1939.12 32.26 1945.66 32.36 1952.2 32.71 1958.74 32.74 1991.43 31.67 1997.97 32.04 2004.51 31.83 2011.05 32.04 2024.12 32.8 2030.66 33.28 2037.2 34.08 2043.74 34.31 2050.28 34.08 2056.82 32.45 2063.35 31.05 2076.43 29 2082.97 28.61 2089.51 29.92 2096.05 31.78 2102.59 33.4 2109.12 34.59 2115.66 35.14 2122.2 35.2 2128.74 35.46 2135.28 36.2 2141.82 36.8 2148.36 37.16 2154.9 37.77 2161.43 38.53 2174.51 39.13 2181.05 39.33 2187.59 39.69 2194.13 40.26 2207.2 40.43 2213.74 40.4 2220.28 40.55 2226.82 40.84 2239.9 40.89 2259.51 41.66 2272.59 41.97 2285.67 42.53 2305.28 43.2 2318.36 43.34 2337.98 43.76 2377.21 45.12 2396.82 46.68 2403.36 46.93 2409.9 46.96 2416.44 46.84 2429.52 46.35 2468.75 46.32 2475.29 46.44 2481.83 46.75 2501.44 48.1 2514.52 48.82 2521.06 49.06

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 1213 .055 1278.62 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1213 1278.62 754.72 768.18 785.63 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 2043.74 2521.06 34.31 F

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 121514.6

INPUT
Description: 107
Station Elevation Data num= 297
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 37.96 6.54 38.55 13.08 38.83 19.62 38.8 26.16 39.24 32.7 41.4 39.23 43.89 45.77 45.37 52.31 44.16 58.85 44.18 65.39 46.43 71.93 48.45 78.47 46 85.01 42.11 91.55 41.21 98.09 43.66 104.63 43.54 111.17 43.98 117.7 43.78 124.24 43.84 130.78 41.63 137.32 40.22 143.86 40.61 150.4 40.01 156.94 40.57 163.48 42.73 170.02 45.55 176.56 47.74 183.1 49.24 189.64 50.26 196.17 50.31 202.71 48.24 209.25 45.25 215.79 42.76 222.33 40.72 228.87 38.4 235.41 38.02 241.95 37.72 248.49 37.76 255.03 38.03

261.57 38.89 268.1 41.69 274.64 42.2 281.18 42.07 287.72 41.71 294.26 41.05
300.8 42.11 307.34 42.04 313.88 41.6 320.42 41.46 326.96 41.68 333.5 42.02
340.04 41.86 346.57 41.12 353.11 40.56 359.65 39.69 366.19 37.84 372.73
36.28 379.27 35.28 385.81 34.76 392.35 34.55 398.89 34.37 405.43 33.91
411.97 34.6 418.51 35.81 425.04 34.31 431.58 33.83 438.12 33.73 451.2 33.47
457.74 33.5 464.28 33.48 470.82 33.37 477.36 33.09 483.9 32.94 490.44 32.91
496.98 33.06 503.51 33.11 510.05 33.09 516.59 32.9 523.13 32.93 529.67 32.92
542.75 33.24 549.29 32.91 555.83 33.08 562.37 33.53 568.91 33.73 575.45
34.49 581.98 33.5 588.52 32.45 595.06 32.47 601.6 32.04 608.14 32.01 614.68
31.69 621.22 31.6 627.76 31.46 634.3 31.19 640.84 31.12 647.38 31.07 653.92
31.06 660.45 31 666.99 30.9 673.55 30.95 680.1 30.92 686.66 30.73 693.21
30.51 699.77 30.71 706.32 29.35 712.88 26.83 719.43 26.66 732.54 26.67
739.1 27.3 745.65 29.49 752.21 30.26 765.32 30.28 771.87 29.48 778.43 26.59
784.98 26.16 791.54 26.55 798.09 26.63 804.65 26.6 811.2 26.59 817.76 26.24
824.31 25.99 837.42 25.66 850.53 25.27 857.08 25.27 863.64 24.98 870.19
24.88 876.75 24.9 883.3 25.25 889.86 25.18 896.41 24.73 902.97 24.26 916.08
23.95 922.63 23.37 929.19 22.81 935.74 22.76 942.3 22.44 948.85 22.44 955.41
22.35 961.96 22.43 968.52 22.49 975.07 22.24 981.63 22.17 988.18 22.15
994.74 22.09 1001.29 22.49 1007.85 23.18 1014.4 23.68 1020.96 24.05 1027.51
24.19 1040.62 23.77 1047.18 23.01 1053.73 22.46 1060.29 22.43 1066.84 22.47
1107 23 1112 14.7 1118 9.9 1124 9.4 1130 7.9 1136 9 1140 10.6 1143 14.6 1151
18.6 1171.12 20.33 1171.72 20.35 1178.27 20.64 1184.83 20.71 1197.94 19.89
1211.05 19.39 1230.71 19.19 1237.27 19.39 1243.82 19.77 1250.38 19.84
1256.93 19.59 1283.15 17.98 1296.26 17.87 1368.36 17.92 1394.58 18.06
1414.25 18.4 1420.8 18.76 1427.36 19.36 1440.47 20.92 1453.58 21.65 1479.8
22.03 1486.35 21.98 1499.46 22.35 1506.01 22.21 1525.68 21.14 1532.23 20.97
1538.79 21.17 1571.56 20.98 1584.67 20.66 1597.76 20.72 1604.3 20.39 1610.84
20.45 1623.91 20.02 1630.45 20.24 1636.99 20.31 1643.52 20.17 1663.13 20.3
1669.67 20.23 1682.75 19.53 1689.28 18.95 1695.82 18.93 1702.36 18.63
1708.89 18.06 1715.43 18.08 1721.97 18.32 1735.04 19.45 1748.11 20.04
1767.73 20.06 1774.26 19.81 1780.8 19.11 1787.34 18.79 1793.87 18.93 1800.41
20.28 1806.95 20.34 1826.56 19.5 1833.1 19.37 1846.17 18.35 1852.71 18.22
1878.85 18.37 1911.54 19.13 1918.08 19.13 1931.15 19.46 1937.69 19.78
1944.22 20.88 1950.76 22.59 1957.3 24.51 1963.84 25.84 1970.37 25.95 1976.91
26.65 1983.45 26.83 1989.98 26.17 1996.52 26.89 2003.06 28.73 2009.59 30.14
2016.13 30.63 2022.67 30.94 2042.28 31 2055.35 30.52 2068.43 30.39 2074.96
30 2081.5 29.22 2088.04 29.93 2094.57 31.75 2101.11 32.74 2107.65 33.23
2127.26 33.45 2146.87 34.25 2159.94 34.48 2173.02 35.03 2179.55 35.01
2192.63 35.68 2199.16 35.87 2212.24 36.69 2225.31 37.6 2231.85 37.95 2238.39
38.47 2251.46 38.68 2258 39.07 2277.61 40.52 2290.68 41.75 2303.75 43.31
2316.83 44.07 2323.36 44.85 2336.44 46.09 2342.98 46.87 2356.05 48.14
2369.12 48.73 2382.2 48.99 2401.81 48.7 2408.34 48.46 2434.49 48.37 2441.03
48.56 2447.57 48.99 2460.64 48.86 2480.25 49.13 2486.79 49.04 2493.32 49.23
2499.86 49.01 2512.93 49.67 2526.01 50.15 2532.54 50.71 2539.08 50.69
2545.62 50.89 2558.69 50.99 2565.23 51.54 2584.84 52.74 2591.38 53.04
2597.91 53.61 2610.99 55 2617.52 56.05 2624.06 56.53 2630.6 57.18

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 1107 .055 1184.83 .095
 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1107
1184.83 1409.65 1470.4 1595.6 .3 .5 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 765.32 30.28 T

2042.28 2630.6 31 F

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 120044.2

INPUT
Description: 106
Station Elevation Data num= 158
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 40.61 6.54 40.5 13.07 40.14
19.61 40.06 39.22 39.49 45.76 39.44 58.83 38.92 71.91 38.13 117.66 36.63
130.74 36.85 137.28 36.78 143.81 37.5 150.35 38.36 156.89 39.01 176.5 42.26
196.11 46.29 202.65 46.77 209.18 46.14 215.72 45.67 222.26 45.38 241.87
44.01 254.94 43.5 281.09 43.81 287.62 43.98 294.16 43.91 313.77 43.3 339.92
41.74 352.99 40.82 366.07 40.3 379.14 39.95 385.68 39.5 392.22 39.28 398.75
38.85 405.29 38.59 424.9 37.41 431.44 36.55 437.97 35.96 444.51 35.58 464.12
34.74 483.73 34.7 490.27 34.81 536.03 34.53 549.1 34.08 562.18 33.27 568.71
32.64 581.79 31.19 614.47 28.36 627.55 27.35 634.08 26.73 647.16 25.95
660.23 25.55 666.77 25.11 692.91 24.29 705.99 23.34 719.06 21.99 738.67
20.58 745.21 20.23 758.28 20.14 764.82 19.98 777.9 19.92 817.12 20.85 823.65
20.49 843.26 18.27 849.8 17.8 856.34 17.88 862.88 18.16 882.49 19.7 885.39
19.85 889.02 20.05 895.56 20.13 902.1 20.1 908.63 19.78 915.17 19.84 921.71
20.02 928.25 20.09 934.78 19.66 947.86 16.29 954.39 15.67 960.93 15.65 974
15.65 977 14.2 985 11.1 993 9.4 1001 7.2 1017 11.2 1018 14.3 1032.84 16.45
1039.37 18.22 1045.91 18.33 1052.45 17.97 1058.98 17.5 1065.52 17.31 1072.06
17.29 1078.59 18.55 1085.13 20.3 1089.47 21.05 1091.67 21.43 1104.74 21.84
1111.28 22.96 1117.82 24.81 1124.35 26.46 1130.89 28.29 1137.43 30.63
1143.96 35.23 1150.5 38.88 1157.04 41.31 1163.58 42.33 1170.11 42.63 1183.19
42.41 1209.33 43.49 1215.87 43.42 1222.41 43.49 1242.02 44.96 1255.09 46.63
1261.63 47.01 1268.17 47.77 1274.7 48.22 1287.78 48.58 1294.31 48.89 1313.93
50.49 1333.54 51.36 1346.61 51.41 1353.15 51.68 1359.68 51.72 1366.22 51.97
1379.29 52.93 1385.83 53.16 1392.37 52.98 1398.91 53.36 1411.98 53.79
1418.52 53.73 1425.05 53.84 1431.59 53.24 1444.66 52.63 1451.2 52.46 1477.35
52.74 1483.89 53.09 1503.5 55.43 1516.57 56.65 1523.11 57.15 1529.64 57.88
1536.18 58.17 1542.72 58.28 1549.26 59.01 1575.4 59.96 1581.94 60.55 1588.48
61.3 1595.01 61.85 1601.55 62.6 1608.09 63.59 1614.62 64.16 1621.16 64.55
1634.24 65.83 1640.77 65.99 1647.31 66.32 1660.38 66.63 1679.99 66.51
1699.61 68.05

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .085 928.25 .055 1039.37 .095

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 928.25
1039.37 1210.5 1269.44 1360.7 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 118774.7

INPUT
Description: 105
Station Elevation Data num= 399
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 57.23 6.55 57.41 13.1 57.63
19.65 57.78 26.2 57.96 32.75 58.09 39.3 58.11 45.85 58.36 52.41 58.82 58.96
59.08 65.51 58.92 72.06 58.26 78.61 57.33 85.16 56.44 91.71 55.68 98.26
55.06 104.81 54.57 111.36 54.08 117.91 53.58 124.46 53.64 131.01 53.69
137.56 53.66 144.11 53.61 150.66 53.64 157.22 53.68 163.77 53.71 170.32
53.76 176.87 53.79 183.42 53.86 189.97 53.99 196.52 54.27 203.07 54.4 209.62
54.2 216.17 53.56 222.72 52.99 229.27 52.57 235.82 52.35 242.37 52.19 248.92
51.92 255.48 52.24 262.03 51.97 268.58 51.73 275.13 51.66 281.68 51.5 288.23
51.34 294.78 51.18 301.33 50.91 307.88 50.34 314.43 49.95 320.98 49.59
327.53 49.24 334.08 48.94 340.63 48.54 347.18 48.35 353.74 48.2 360.29 47.89
366.84 47.51 373.39 47.27 379.94 47.22 386.49 47.51 393.04 47.76 399.59
47.75 406.14 47.43 412.69 46.94 419.24 46.6 425.79 46.37 432.34 46.08 438.89
45.87 445.44 45.99 452 46.23 458.55 46.44 465.1 46.45 471.65 46.09 478.2
45.5 484.75 45.09 491.3 44.5 497.85 43.67 504.4 43.05 510.95 42.67 517.5
42.71 524.05 42.71 530.6 42.58 537.15 41.8 543.7 41.22 550.26 41.52 556.81
41.64 563.36 41.83 569.91 41.56 576.46 41.78 583.01 41.69 589.56 41.75
596.11 41.16 602.66 41.44 609.21 41.58 615.76 41.6 622.31 41.7 628.86 41.8
635.41 41.59 641.96 41.61 648.52 41.8 655.07 41.73 661.62 41.7 668.17 41.87
674.72 42.09 681.27 42.28 687.82 42.35 694.37 42.24 700.92 42.05 707.47
41.97 714.02 42.04 720.57 42 727.12 41.93 733.67 41.82 740.22 41.59 746.77
41.19 753.33 40.69 759.88 40.19 766.43 39.75 772.98 39.41 779.53 39.25
786.08 39.25 792.63 39.26 799.18 39.22 805.73 39.23 812.28 39.31 818.83
39.45 825.38 39.7 831.93 40.06 838.48 40.43 845.03 40.85 851.59 41.22 858.14
41.33 864.69 41.54 871.24 41.64 877.79 41.65 884.34 42.21 890.89 42.69
897.44 43.26 903.99 43.43 910.54 43.66 917.09 42.37 923.64 41.16 930.19
40.23 936.74 39.42 943.29 38.83 949.85 40.81 956.4 43.26 962.95 43.45 969.5
43.1 976.05 42.29 982.6 41.85 989.15 41.64 995.7 41.54 1002.25 41.52 1008.8
41.4 1015.35 41.24 1021.9 41.27 1028.45 41.37 1035 41.55 1041.55 41.76
1048.11 41.9 1054.66 41.95 1061.21 41.9 1067.76 41.86 1074.31 41.9 1080.86
42.03 1087.41 42.15 1093.96 42.18 1100.51 42.36 1107.06 42.55 1113.61 42.63
1120.16 42.6 1126.71 42.8 1133.26 42.88 1139.81 42.76 1146.36 42.44 1152.92
42.18 1159.47 41.79 1166.02 41.69 1172.57 41.77 1179.12 41.99 1185.67 42.28
1192.22 42.49 1198.77 42.49 1205.32 42.45 1211.87 42.56 1218.42 42.88
1224.97 43 1231.52 42.91 1238.07 43.35 1244.62 43.4 1251.17 43.6 1257.73
43.63 1264.28 43.39 1270.83 43.47 1277.38 43.58 1283.93 43.62 1290.48 43.82
1297.03 43.91 1303.58 43.8 1310.13 43.93 1316.68 43.81 1323.23 43.74 1329.78
43.6 1336.33 43.87 1342.88 44.1 1349.43 44.3 1355.99 44.54 1362.54 45.11
1369.09 45.07 1375.64 44.78 1382.19 44.82 1388.74 44.94 1395.29 45 1401.84
44.99 1408.39 45.07 1414.94 45.31 1421.49 45.71 1428.04 45.98 1434.59 45.95
1441.14 46.04 1447.69 45.87 1454.24 45.65 1460.8 45.58 1467.35 45.57 1473.9
45.52 1480.45 45.45 1487 45.37 1493.55 45.55 1500.1 45.79 1506.65 45.8
1513.2 45.8 1519.75 46 1526.3 45.87 1532.85 45.69 1539.4 45.69 1545.95 46.1
1552.5 46.6 1559.05 46.76 1565.61 46.83 1572.16 46.81 1578.71 46.49 1585.26
46.26 1591.81 46.16 1598.36 46 1604.91 47.24 1611.46 47.37 1618.01 47.62
1624.56 46.81 1631.11 46.86 1637.66 47.18 1644.21 47.31 1650.76 47.28
1657.31 46.62 1663.86 45.55 1670.42 44.29 1676.97 42.93 1683.52 41.79
1690.07 40.63 1696.62 39.64 1703.17 38.55 1709.72 37.61 1716.27 36.8 1722.82
35.74 1729.37 35.32 1735.92 35.11 1742.47 34.93 1749.02 34.77 1755.57 34.69
1762.12 34.63 1768.67 34.52 1775.23 34.5 1781.78 34.66 1788.33 34.85 1794.88
35.13 1801.43 35.74 1807.98 36.59 1814.53 38.11 1821.08 39.19 1827.63 40.02
1839.64 39.01 1846.18 39.63 1852.73 39.65 1859.28 40.72 1865.82 42.06

1872.37 44.06 1878.92 46.22 1892.01 49.83 1898.55 52.08 1905.1 54.13 1911.65 55.46 1924.74 57.16 1937.83 57.13 1950.92 57.86 1957.47 58.9 1970.56 61.36 1977.11 62.34 1990.2 63.85 1996.75 64.39 2009.84 63.33 2016.39 62.54 2022.93 62.29 2029.48 62.31 2042.57 62.14 2062.21 62.48 2068.76 62.2 2075.3 61.25 2081.85 60.85 2088.4 59.51 2094.94 57.73 2108.03 54.73 2147.31 47.31 2153.86 45.84 2173.5 42.53 2206.23 37.91 2219.32 36.32 2225.87 35.64 2245.51 34.09 2252.05 33.79 2271.69 32.06 2297.87 28.89 2310.97 26.05 2317.51 24.87 2330.61 22.73 2350.24 20.91 2356.79 20.63 2363.34 20.55 2369.88 20.28 2376.43 19.82 2388.61 19.62 2389.52 19.61 2396.07 19.63 2402.61 19.44 2409.16 18.82 2415.71 16.83 2424 13.6 2431 11.8 2438 11 2445 9 2452 10.8 2459 11.6 2463 13.8 2487.09 18.83 2487.72 19.05 2494.26 20.32 2500.81 20.93 2507.35 21.3 2513.9 21.05 2520.45 21.07 2526.99 20.87 2533.54 20.39 2553.18 20.69 2566.27 21.37 2579.36 21.28 2585.91 20.46 2599 21.05 2605.55 21.16 2612.09 21 2625.19 21.21 2638.28 21.14 2644.83 21.36 2651.37 22.21 2657.92 23.43 2664.46 23.78 2671.01 24.58 2684.1 25.22 2690.65 25.87 2697.19 26.69 2723.38 29.52 2743.02 32.17 2756.11 33.44 2775.75 34.32 2795.39 34.75 2801.93 34.56 2808.48 34.93 2815.03 35.07 2834.67 36.41 2841.21 37.12 2860.85 38.32 2873.94 38.75 2887.04 38.52 2893.58 38.55 2906.67 38.38 2913.22 38.41 2919.77 38.07 2926.31 37.5 2932.86 37.18 2945.95 37.37 2952.5 37.31 2972.14 37.54 2985.23 37.28 2991.78 37.43 3017.96 37.27 3031.05 36.81 3035.78 36.77 3042.31 36.6 3048.84 36.7 3055.37 36.84 3061.9 37.03

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 2062.21 .055 2873.94 .095

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2062.21 2873.94 1513.57 1451.76 1410.95 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 117323

INPUT
Description: 104
Station Elevation Data num= 382
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 77.2 6.56 75.61 13.12 74.05 19.68 72.91 26.24 71.82 32.8 70.5 39.36 69.52 45.92 69.28 52.48 69.26 59.04 69.13 65.6 68.94 72.16 68.27 78.72 65.91 85.28 64.32 91.84 63.56 98.4 62.74 104.96 61.82 111.52 60.48 118.08 59.62 124.64 58.63 131.2 57.58 137.76 56.16 144.32 55.09 150.88 54.43 157.44 54.08 164 53.12 170.56 52.48 177.12 52.02 183.68 51.55 190.24 51.21 196.8 50.94 203.36 50.94 209.92 50.88 216.48 50.95 223.04 51.02 229.6 51.08 236.16 51.27 242.72 51.38 249.28 51.27 255.84 51.3 262.4 51.23 268.96 51.41 275.52 51.43 282.08 51.28 288.64 51.23 295.2 51.25 301.76 51.25 308.32 50.98 314.88 50.95 321.44 50.96 328 50.91 334.56 51.41 341.12 51.55 347.69 51.54 354.25 52.14 360.81 52.67 367.37 53.09 373.93 53.59 380.49 54.32 387.05 54.98 393.61 55.42 400.17 55.49 406.73 55.28 413.29 55.14 419.85 55.22 426.41 55.53 432.97 56.42 439.53 58.53 446.09 59.7 452.65 60.66 459.21 60.9 465.77 61.1 472.33 61.28 478.89 61.34 485.45 61.31 492.01 61.08 498.57 60.71 505.13 60.15 511.69 59.76 518.25 59.8 524.81 59.97 531.37 60.19 537.93 60.52 544.49 60.85 551.05 61.05 557.61 61.23 564.17 61.27 570.73 61.08 577.29 60.76 583.85 60.67 590.41 60.73 596.97 60.85

603.53 60.87 610.09 60.79 616.65 60.71 623.21 60.55 629.77 60.31 636.33
59.97 642.89 59.75 649.45 59.18 656.01 58.77 662.57 58.64 669.13 58.67
675.69 58.42 682.25 58.03 688.81 57.95 695.37 57.91 701.93 57.99 708.49
58.09 715.05 58.27 721.61 58.36 728.17 58.43 734.73 58.41 741.29 58.49
747.85 58.51 754.41 58.3 760.97 58 767.53 57.73 774.09 57.46 780.65 56.97
787.21 56.45 793.77 55.84 800.33 55.37 806.89 54.94 813.45 54.75 820.01
54.41 826.57 54.34 833.13 54.28 839.69 53.91 846.25 53.77 852.81 53.59
859.37 53.97 865.93 55.51 872.49 56.35 879.05 56.36 885.61 56.41 892.17
56.49 898.73 56.39 905.29 56.24 911.85 55.83 918.41 55.19 924.97 54.57
931.53 54.14 938.09 53.77 944.65 53.69 951.21 53.31 957.77 52.91 964.33
52.49 970.89 51.97 977.45 51.58 984.01 51.29 990.57 51.02 997.14 50.78
1003.7 50.66 1010.26 50.68 1016.82 50.86 1023.38 51.16 1029.94 51.24 1036.5
51.2 1043.06 51.16 1049.62 51.09 1056.18 50.86 1062.74 50.55 1069.3 50.06
1075.86 49.66 1082.42 49.24 1088.98 48.74 1095.54 47.87 1102.1 47.38 1108.66
47.26 1115.22 47.01 1121.78 47.57 1128.34 48.05 1134.9 47.28 1141.46 46.24
1148.02 45.62 1154.58 45.69 1161.14 45.76 1167.7 45.88 1174.26 45.92 1180.82
45.99 1187.38 46.2 1193.94 46.44 1200.5 46.76 1219.26 46.18 1225.81 45.67
1238.9 43.7 1245.44 43.09 1251.98 41.43 1258.53 40.24 1271.61 39.39 1278.16
38.44 1284.7 37.04 1291.25 36.13 1304.33 35.06 1317.42 34.55 1323.97 34.45
1330.51 34.87 1337.05 35.47 1343.6 35.74 1356.68 35.94 1369.77 36.87 1376.32
37.64 1389.4 38.83 1395.95 38.88 1402.49 39.14 1422.12 40.78 1428.67 41.5
1435.21 42.47 1448.3 42.79 1461.39 42.71 1467.93 42.92 1474.48 42.52 1494.11
40.39 1500.65 39.81 1507.19 38.92 1520.28 37.63 1526.83 37.11 1533.37 36.21
1539.91 35.77 1546.46 37.21 1553 38.32 1566.09 38.58 1572.63 38.55 1579.18
38.71 1592.27 39.31 1631.53 39.78 1651.16 39.64 1664.25 39.76 1670.79 39.57
1683.88 38.72 1690.42 38.47 1703.51 39.15 1710.06 38.91 1723.14 38.9 1729.69
38.67 1749.32 37.47 1788.58 36.13 1801.67 35.45 1808.21 34.85 1821.3 31.84
1834.39 29.64 1840.93 28.86 1854.02 27.75 1873.65 26.87 1886.74 26.62
1893.29 26.7 1899.83 26.6 1906.37 26.66 1912.92 26.99 1932.55 27.56 1958.72
27.5 1965.27 27.67 1971.81 27.65 1978.36 27.94 1984.9 27.88 1997.99 28.24
2004.53 28.54 2011.08 28.98 2037.25 28.88 2050.34 28.59 2056.88 28.89
2063.43 28.97 2069.97 29.26 2076.51 29.31 2083.06 29 2089.6 28.92 2102.69
28.12 2109.23 27.9 2122.32 27.74 2128.87 28.21 2135.41 28.25 2148.5 28.9
2155.04 29.06 2174.67 28.79 2187.76 28.92 2200.85 29.15 2207.39 29.07
2233.57 29.31 2240.11 29.05 2246.66 29.07 2253.2 28.95 2266.29 28.27 2272.83
28.13 2285.92 27.43 2305.55 26.87 2318.64 26.59 2325.18 26.68 2331.73 25.94
2331.92 25.87 2338.27 23.52 2342 20.6 2350 13.1 2360 10.4 2370 9.2 2380 8.1
2390 9 2400 10.2 2401 12.9 2409 18.4 2419 20 2424.92 20.27 2429.89 20.43
2449.52 19.54 2456.06 19.36 2462.6 19.89 2469.15 21.22 2475.69 21.45 2482.24
21.38 2495.32 21.49 2501.87 21.34 2508.41 21.02 2514.96 20.9 2534.59 19.59
2547.68 19.49 2560.76 18.61 2567.31 18.02 2573.85 17.71 2580.4 17.58 2586.94
17.61 2600.03 18.58 2606.57 19.2 2613.11 20.01 2619.66 20.62 2626.2 21.42
2632.75 21.98 2639.29 22.08 2652.38 21.78 2658.92 21.16 2665.47 20.33
2672.01 20.15 2678.55 20.23 2685.1 20.83 2704.73 25.29 2711.27 26.92 2717.82
28.14 2730.9 30.96 2737.45 32.2 2743.99 33.15 2757.08 33.5 2763.62 33.99
2770.17 33.92 2783.26 33.35 2809.43 33.98 2815.98 33.9 2822.52 34.12 2835.61
33.91 2842.15 33.61 2855.24 32.63 2861.78 32.55 2874.87 32.84 2887.96 32.57
2907.59 31.88 2914.13 31.74 2920.68 31.74 2933.77 32.16 2940.31 32.56
2946.85 32.8 2966.48 32.7 2973.03 32.85 2986.12 32.58 2992.66 32.7 3031.92
34.71 3051.56 35.15 3058.1 35.6 3064.64 35.91 3090.82 36.3 3097.36 36.49
3103.91 36.54 3110.45 36.44 3116.99 36.53 3123.54 36.41 3136.63 37.08 3162.8
37.75 3182.43 37.77 3188.98 38.08 3208.61 37.69 3215.15 37.82 3228.24 38.45
3240.24 38.93 3246.8 39.05 3253.36 39.09

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .095 2325.18 .055 2763.62 .095

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2325.18 2763.62 1270.29 1219.85 1204.17 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 116103.1

INPUT
Description: 103
Station Elevation Data num= 154
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 103.46 6.54 102.72 13.09 101.77 19.63 100.31 26.18 98.6 32.72 97.23 39.27 96.04 45.81 94.72 52.35 93.05 65.44 88.14 78.53 85.09 85.08 83.67 91.62 82.46 104.71 79.82 117.8 77.31 124.34 76.36 137.43 74.73 143.97 74.17 157.06 72.49 170.15 71.49 176.69 71.1 196.33 70.54 202.87 69.78 209.42 68.69 235.59 65.37 242.14 64.44 248.68 63.83 261.77 63.51 287.95 62.16 294.49 61.6 307.58 59.64 320.67 57.99 327.21 57.28 340.3 56.54 359.93 55.17 386.11 51.6 392.65 50.24 399.2 48.59 412.29 44.86 431.92 38.24 438.46 35.94 445.01 33.95 451.55 31.83 458.1 30.73 464.64 29.96 471.19 29.58 477.73 28.91 497.36 26.21 503.91 24.97 510.45 23.54 523.54 20.99 530.08 20.44 536.63 19.73 539.94 19.52 543.17 19.32 549.72 19.36 556.26 19.3 562.8 19.03 575 14.2 585 12.8 595 10.9 605 7.9 613 10.6 625 12.7 626 14.1 633 20.7 660.97 21.65 667.51 21.53 674.06 21.59 680.6 21.52 687.14 21.72 693.69 21.94 706.78 22.63 713.32 22.81 719.87 22.78 726.41 22.33 732.95 21.91 739.5 21.3 746.04 21.01 752.59 21.37 759.13 22.12 765.68 22.78 772.22 23.15 778.76 23.45 785.31 23.78 798.4 24.39 804.94 24.84 811.48 25.23 824.57 25.92 831.12 25.98 837.66 26.19 844.21 26.57 850.75 26.93 857.29 27.4 863.84 27.75 870.38 27.96 876.93 28.2 883.47 28.71 890.02 29.47 896.56 29.99 903.1 30.69 909.65 30.79 916.19 30.93 922.74 31.28 929.28 31.85 935.83 32.34 942.37 32.8 948.91 33.29 955.46 33.74 962 34.17 968.55 34.62 975.09 34.49 981.63 34.44 988.18 34.2 994.72 34.26 1001.27 34.66 1007.81 35.1 1020.9 35.5 1027.44 35.87 1033.99 36.01 1040.53 36.1 1047.08 36.32 1053.62 36.73 1060.17 37.39 1066.71 37.55 1073.25 38.12 1086.34 39.29 1092.89 39.78 1099.43 40.01 1105.98 40.27 1112.52 40.47 1119.06 40.35 1125.61 40.73 1132.15 41 1145.24 41.48 1151.79 41.69 1158.33 42.15 1164.87 42.51 1171.42 43.1 1177.96 43.65 1184.51 44.1 1197.6 45.23 1204.14 45.91 1210.68 46.35 1217.23 46.87 1223.77 47.69 1230.32 48.57 1236.86 49.13 1243.41 49.62 1256.49 50.41 1263.04 50.86 1269.58 51.18 1276.13 51.66 1282.67 51.91

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .095 562.8 .055 633 .095

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 562.8 633 1173.1 1178.45 1180.74 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 114924.7

INPUT
Description: 102 Approach Cherry St
Station Elevation Data num= 148 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 32.9 6.54 33.6 19.63 33.4 26.18 33.35 32.72 33.43 39.27 33.48 45.81 33.19
52.36 33 58.9 32.76 65.45 32.42 71.99 32.05 78.54 31.85 85.08 31.51 98.17
31.39 104.72 30.82 111.26 30.37 117.81 30.37 124.35 30.42 130.9 30.57 143.99
30.32 150.53 30.36 157.08 30.54 163.62 30.36 170.17 29.96 176.71 29.96
183.26 30.1 189.8 30.14 196.35 30.44 202.89 30.54 209.44 30.29 215.98 29.78
222.53 29.16 229.07 28.96 235.62 28.19 242.16 28.73 248.71 28.35 255.25
28.36 261.8 28.13 268.34 28.25 274.89 27.98 281.4 27.8 287.92 27.41 294.43
27.13 300.95 26.97 307.46 26.79 313.98 26.63 327.01 26.41 333.53 26.29
340.04 26.14 346.56 25.84 353.07 25.69 359.59 25.42 366.1 25.08 372.62 24.8
379.13 24.5 385.65 24.17 392.17 24.04 405.2 23.95 411.71 23.94 418.23 23.83
424.74 23.88 431.26 23.78 451.21 23.57 519.65 16.88 522.36 13.24 525.02
11.76 540.37 9.94 545.34 9.86 546.31 9.84 584.59 7.31 603.61 10.54 613.6
13.38 617.06 16.71 666.83 20.38 715.96 25.4 724.45 26.68 730.97 27.11 737.48
27.49 744 27.68 750.52 28.15 757.03 28.53 763.55 29.03 770.06 29.44 783.05
30.13 789.52 30.85 795.99 31.48 802.46 31.03 808.92 31.91 815.39 32.05
821.86 32.35 828.33 32.92 834.8 34.03 841.27 34.16 847.74 34.4 854.21 34.6
860.68 35.03 867.15 35.64 873.62 36.09 880.09 36.36 886.56 37.13 893.03
38.05 899.5 38.57 905.97 38.9 912.43 39.67 918.9 40.32 925.37 40.78 931.84
41.8 938.31 43.16 944.78 43.59 951.25 44.51 957.72 44.53 964.19 44.72 970.66
45.17 977.13 45.56 983.6 45.87 990.07 46.36 996.54 46.81 1003.01 47.08
1009.48 47.28 1015.95 47.64 1035.35 48.89 1041.82 49.35 1048.29 49.83
1054.76 50.45 1061.23 51.27 1067.7 52.14 1074.17 52.92 1080.64 53.63 1087.11
54.44 1093.58 55.28 1100.05 55.99 1106.52 56.85 1112.99 57.67 1119.46 58.6
1125.92 59.5 1132.39 60.3 1145.33 61.85 1151.8 62.95 1158.27 63.97 1164.74
64.66 1171.21 65.39 1177.68 66.17 1184.15 67.03 1190.62 67.74 1203.56 69.09
1210.03 69.47 1216.5 69.62 1222.97 69.66

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 451.21 .055 715.96 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 451.21
715.96 78.71 81.96 87.88 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 114842.7

INPUT
Description: 101.7 US Face Cherry St Station Elevation Data num= 164
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 33.71 5.324 33.71 10.657
33.53 15.982 33.02 21.306 32.97 37.288 33.67 42.612 33.76 53.269 32.82
63.927 32.87 74.576 32.48 79.908 31.98 85.233 31.83 95.89 31.95 101.214
31.53 127.845 31.04 133.178 31.07 138.502 30.94 143.827 31.01 159.808 30.85
170.466 30.32 175.79 30.2 186.447 30.2 191.772 30.02 207.753 28.93 213.078
28.91 218.411 28.69 223.735 28.22 229.059 27.92 239.717 27.69 245.041 27.26

250.366 26.31 255.698 25.92 261.023 25.37 266.347 25.35 282.329 24.8 287.653
24.49 292.986 23.85 303.635 23.71 308.968 23.54 319.617 24.16 330.274 24.11
335.598 24.42 340.931 24.46 346.256 24.11 351.58 23.62 362.237 23.6 372.886
23.22 378.219 23.42 383.543 23.78 388.868 23.78 404.85 23.44 410.182 23.67
415.507 23.45 420.831 23.94 436.813 23.92 447.47 23.5 452.794 23.79 456.374
24.49 458.119 24.83 463.452 25.49 475.002 23.84 483.177 22.29 490.926 20.7
498.97 18.11 506.523 15.04 512.888 11.11 517.721 9.87 522.922 10.51 526.109
9.34 528.812 8.96 533.727 9.12 535.775 9.16 538.724 9.2 541.664 9.47 544.613
9.48 548.766 10.59 553.657 13.74 560.39 16.97 567.14 20.49 573.259 22.36
579.001 23.53 580.934 25.18 600.766 27.35 606.042 27.87 611.325 28.36
616.609 29.03 621.892 29.46 627.167 30.03 632.451 30.46 637.734 30.61
643.018 31.01 648.293 31.45 653.618 31.7 658.934 31.88 664.259 32.41 674.899
32.61 680.224 33 685.54 33.18 690.865 33.32 696.189 33.51 701.505 33.53
706.83 33.87 712.146 34.28 717.471 34.76 722.787 35.2 728.112 35.59 733.436
35.74 738.752 35.82 744.077 36.21 749.393 36.68 754.718 37.04 760.034 37.3
765.358 37.72 770.683 38.78 775.999 39.25 781.324 39.53 786.64 39.64 791.964
40.49 797.281 40.97 802.605 41.54 807.93 41.63 813.246 42.11 818.57 42.98
829.211 43.94 834.528 44.64 839.852 45.19 845.177 45.58 850.493 46.11
855.817 46.7 861.134 47.17 866.458 47.52 871.783 47.92 877.099 48.43 882.423
48.85 887.74 49.23 893.064 49.63 898.38 50.12 903.705 50.75 914.346 52.62
919.67 53.4 924.986 54.09 930.311 54.88 935.627 55.75 940.952 56.64 946.276
57.58 956.917 59.4 962.233 60.34 967.558 61.26 972.874 62.12 978.199 63.1
983.523 63.89 988.839 64.39 994.164 64.98 999.48 65.731004.805 66.34 1010.121
66.741015.445 67.09 1020.77 67.411026.086 67.671031.411 67.77 1036.727
67.911042.052 68.181047.368 68.631052.692 68.33

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 463.452 .055 580.934 .09
 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
463.452 580.934 53.28 53.62 51.89 .5 .8 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 463.45 26.5 T
 6011052.692 29 T
Skew Angle = 35

BRIDGE

RIVER: Taunton River
REACH: Main Stem RS: 114815.5

INPUT
Description: 101.5 Childs Br/Cherry St

101.5 Cherry St/ Childs Br
Distance from Upstream XS = 12
Deck/Roadway Width = 35
Weir Coefficient = 2.6
Bridge Deck/Roadway Skew = 35
Upstream Deck/Roadway Coordinates
 num= 18
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 46.692 32.73 329.299 27.1 382.544 26.73

```
 465.278 27.59 465.36 31.62 470.193 31.83
 470.275 27.4 25.18 484.938 28.51 25.18 498.864 28.63 25.3  581.598 30.02
26.71 594.704 30.27 26.71 595.524 30.31
 595.605 33.9 601.258 33.92 601.339 29.86
 695.46 34.52 798.673 41.75 953.493 56.54

Upstream Bridge Cross Section Data
Station Elevation Data num= 164
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  0 33.71 5.324 33.71 10.657
33.53 15.982 33.02 21.306 32.97  37.288 33.67 42.612 33.76 53.269 32.82
63.927 32.87 74.576 32.48  79.908 31.98 85.233 31.83 95.89 31.95 101.214
31.53 127.845 31.04  133.178 31.07 138.502 30.94 143.827 31.01 159.808 30.85
170.466 30.32  175.79 30.2 186.447 30.2 191.772 30.02 207.753 28.93 213.078
28.91  218.411 28.69 223.735 28.22 229.059 27.92 239.717 27.69 245.041 27.26
250.366 26.31 255.698 25.92 261.023 25.37 266.347 25.35 282.329 24.8  287.653
24.49 292.986 23.85 303.635 23.71 308.968 23.54 319.617 24.16  330.274 24.11
335.598 24.42 340.931 24.46 346.256 24.11 351.58 23.62  362.237 23.6 372.886
23.22 378.219 23.42 383.543 23.78 388.868 23.78  404.85 23.44 410.182 23.67
415.507 23.45 420.831 23.94 436.813 23.92  447.47 23.5 452.794 23.79 456.374
24.49 458.119 24.83 463.452 25.49  475.002 23.84 483.177 22.29 490.926 20.7
498.97 18.11 506.523 15.04  512.888 11.11 517.721 9.87 522.922 10.51 526.109
9.34 528.812 8.96  533.727 9.12 535.775 9.16 538.724 9.2 541.664 9.47 544.613
9.48  548.766 10.59 553.657 13.74 560.39 16.97 567.14 20.49 573.259 22.36
579.001 23.53 580.934 25.18 600.766 27.35 606.042 27.87 611.325 28.36
616.609 29.03 621.892 29.46 627.167 30.03 632.451 30.46 637.734 30.61
643.018 31.01 648.293 31.45 653.618 31.7 658.934 31.88 664.259 32.41  674.899
32.61 680.224 33 685.54 33.18 690.865 33.32 696.189 33.51  701.505 33.53
706.83 33.87 712.146 34.28 717.471 34.76 722.787 35.2  728.112 35.59 733.436
35.74 738.752 35.82 744.077 36.21 749.393 36.68  754.718 37.04 760.034 37.3
765.358 37.72 770.683 38.78 775.999 39.25  781.324 39.53 786.64 39.64 791.964
40.49 797.281 40.97 802.605 41.54  807.93 41.63 813.246 42.11 818.57 42.98
829.211 43.94 834.528 44.64  839.852 45.19 845.177 45.58 850.493 46.11
855.817 46.7 861.134 47.17  866.458 47.52 871.783 47.92 877.099 48.43 882.423
48.85 887.74 49.23  893.064 49.63 898.38 50.12 903.705 50.75 914.346 52.62
919.67 53.4  924.986 54.09 930.311 54.88 935.627 55.75 940.952 56.64 946.276
57.58  956.917 59.4 962.233 60.34 967.558 61.26 972.874 62.12 978.199 63.1
983.523 63.89 988.839 64.39 994.164 64.98 999.48 65.731004.805 66.34 1010.121
66.741015.445 67.09 1020.77 67.411026.086 67.671031.411 67.77 1036.727
67.911042.052 68.181047.368 68.631052.692 68.33

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 463.452 .055 580.934 .09

Bank Sta: Left Right Coeff Contr. Expan.
 463.452 580.934 .5 .8
Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 463.45 26.5 T
 6011052.692 29 T
Skew Angle = 35

Downstream Deck/Roadway Coordinates
 num= 18
```

```
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 97.479 32.73 380.087 27.1 433.331 26.73
 516.066 27.59 516.148 31.62 25.18 521.8 31.83 25.18
 521.882 27.4 25.18 535.725 28.51 25.18 549.651 28.63 25.3
 632.385 30.02 26.71 645.492 30.27 26.71 646.311 30.31   646.393 33.9 652.045
33.92 652.127 29.86
 746.247 34.52 850.28 41.75 1005.1 56.54

Downstream Bridge Cross Section Data
Station Elevation Data num= 162
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  0 32.85 10.649 32.58 15.973
32.71 26.631 32.28 47.929 32.44  53.253 32.3 79.884 32.71 85.208 32.54 95.857
31.87 101.19 32.02  106.514 31.71 111.839 31.01 117.163 30.52 122.488 30.25
133.137 30.03  138.469 31 143.794 31.75 149.118 31.59 159.767 30.56 165.092
30.31  170.416 29.81 175.741 30.2 207.696 30.4 213.02 30.54 223.678 30.08
229.002 29.69 239.651 29.27 244.976 28.77 250.3 28.48 260.957 28.75  266.282
28.64 271.606 28.1 276.931 27.36 282.255 26.89 287.58 26.64  292.904 26.13
298.237 25.98 303.561 25.68 314.21 25.53 319.535 25.7  324.859 25.27 330.184
25.14 335.508 25.16 346.165 26.03 351.49 25.81  362.139 25.73 367.463 26.01
372.788 25.7 383.445 25.63 388.77 25.89  394.094 26.68 399.419 26.73 404.743
26.57 410.059 26.81 420.692 26.85  426.008 26.97 431.324 26.92 436.641 27.14
441.957 26.94 463.222 27.05  468.539 27.32 473.855 27.18 489.804 27.69
505.753 27.66 509.357 27.49  513.51 27.4 520.055 23.84 528.23 22.29 535.979
20.7 544.023 18.11  551.576 15.04 557.941 11.11 562.774 9.87 567.975 10.51
571.162 9.34  573.865 8.96 578.78 9.12 580.828 9.16 583.777 9.2 586.718 9.47
589.667 9.48 593.82 10.59 598.71 13.74 605.443 16.97 612.193 20.49  618.312
22.36 624.055 23.53 625.988 25.18 638.529 28.73 643.976 29.82  649.293 30.21
654.609 30.38 659.925 30.77 665.242 30.71 670.558 30.79  675.874 31.16 681.19
31.14 686.564 31.29 691.938 31.65 697.311 32.05  702.685 32.36 708.059 32.52
713.432 32.82 718.806 33.06 724.18 33.5  729.553 33.61 734.927 33.86 740.3
34.01 745.674 34.63 751.048 35.15  761.795 35.8 767.169 36.42 772.542 36.72
777.916 37.04 783.29 37.79  788.663 38.36 794.037 38.49 799.411 38.93 804.784
39.16 810.158 39.33  815.531 39.64 820.905 39.92 826.279 40.32 831.652 40.94
837.026 41.5  842.4 41.73 847.773 41.94 869.268 43.68 874.641 44.14 880.015
44.73  885.389 45.59 890.762 46.42 901.51 48.15 906.883 48.77 912.257 49.3
917.63 50.13 923.004 50.78 928.378 51.27 933.751 52 939.125 53.06  944.499
53.72 949.872 53.97 955.246 54.34 960.62 54.81 965.993 55.39  971.367 55.8
976.741 56.12 982.114 56.66 987.488 56.99 992.862 57.44  998.235
58.121003.609 58.731008.982 59.21014.356 59.71 1019.73 60.28 1025.103
60.651030.477 611035.851 61.561041.224 62.181046.598 62.85 1051.971
63.311062.719 63.88
 Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 513.51 .055 638.529 .09

Bank Sta: Left Right Coeff Contr. Expan.
 513.51 638.529 .5 .8
Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 463 27 T
 6391062.719 30 T
Skew Angle = 35

Upstream Embankment side slope = 0 horiz. to 1.0 vertical Downstream
```

Embankment side slope = 0 horiz. to 1.0 vertical Maximum allowable submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Piers = 1

Pier Data
Pier Station Upstream= 534.906 Downstream= 577.502
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.6 9 1.6 21.7 4.3 21.8 4.3 25.9
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.6 9 1.6 21.7 4.3 21.8 4.3 25.9

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
 Energy
 W.S. Pro Method

 W.S.Pro Data
 Left Embankment
 El of the top of the embankment = 27.6
 El of the toe of the abutment = 11.1
 Right Embankment
 El of the top of the embankment = 27.6
 El of the toe of the abutment = 11.1
 Abutment Type = 3 Sloping abutments and sloping embankments Slope of abutments = 4
 Top with of embankment = 35
 Centroid station of bridge opening =
 Wing Wall Type = No wing walls present
 Width =
 Angle =
 Radius =   Guide Banks Type = No Guide Bank present
 Length =
 Offset =
 Angle =
 Optional Contraction and expansion coefficients
 At approach Section
 At Guide Bank
 At upstream outside
 At upstream inside (BU)
 At downstream inside (BD)
 Piers are Continuous for the width of the bridge
 Use Geometric mean as Friction Slope Method

Selected Low Flow Methods = W.S.Pro Method

High Flow Method

```
 Pressure and Weir flow
 Submerged Inlet Cd =
 Submerged Inlet + Outlet Cd = .8
 Max Low Cord =

Additional Bridge Parameters
 Add Friction component to Momentum
 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end  Criteria to check for pressure flow =
Upstream energy grade line

CROSS SECTION


RIVER: Taunton River
REACH: Main Stem RS: 114789.1

INPUT
Description: 101.3 DS FAce Cherry St
Station Elevation Data num= 162
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  0 32.85 10.649 32.58 15.973
32.71 26.631 32.28 47.929 32.44  53.253 32.3 79.884 32.71 85.208 32.54 95.857
31.87 101.19 32.02  106.514 31.71 111.839 31.01 117.163 30.52 122.488 30.25
133.137 30.03  138.469 31 143.794 31.75 149.118 31.59 159.767 30.56 165.092
30.31  170.416 29.81 175.741 30.2 207.696 30.4 213.02 30.54 223.678 30.08
229.002 29.69 239.651 29.27 244.976 28.77 250.3 28.48 260.957 28.75  266.282
28.64 271.606 28.1 276.931 27.36 282.255 26.89 287.58 26.64  292.904 26.13
298.237 25.98 303.561 25.68 314.21 25.53 319.535 25.7  324.859 25.27 330.184
25.14 335.508 25.16 346.165 26.03 351.49 25.81  362.139 25.73 367.463 26.01
372.788 25.7 383.445 25.63 388.77 25.89  394.094 26.68 399.419 26.73 404.743
26.57 410.059 26.81 420.692 26.85  426.008 26.97 431.324 26.92 436.641 27.14
441.957 26.94 463.222 27.05  468.539 27.32 473.855 27.18 489.804 27.69
505.753 27.66 509.357 27.49  513.51 27.4 520.055 23.84 528.23 22.29 535.979
20.7 544.023 18.11  551.576 15.04 557.941 11.11 562.774 9.87 567.975 10.51
571.162 9.34  573.865 8.96 578.78 9.12 580.828 9.16 583.777 9.2 586.718 9.47
589.667 9.48 593.82 10.59 598.71 13.74 605.443 16.97 612.193 20.49  618.312
22.36 624.055 23.53 625.988 25.18 638.529 28.73 643.976 29.82  649.293 30.21
654.609 30.38 659.925 30.77 665.242 30.71 670.558 30.79  675.874 31.16 681.19
31.14 686.564 31.29 691.938 31.65 697.311 32.05  702.685 32.36 708.059 32.52
713.432 32.82 718.806 33.06 724.18 33.5  729.553 33.61 734.927 33.86 740.3
34.01 745.674 34.63 751.048 35.15  761.795 35.8 767.169 36.42 772.542 36.72
777.916 37.04 783.29 37.79  788.663 38.36 794.037 38.49 799.411 38.93 804.784
39.16 810.158 39.33  815.531 39.64 820.905 39.92 826.279 40.32 831.652 40.94
837.026 41.5  842.4 41.73 847.773 41.94 869.268 43.68 874.641 44.14 880.015
44.73  885.389 45.59 890.762 46.42 901.51 48.15 906.883 48.77 912.257 49.3
917.63 50.13 923.004 50.78 928.378 51.27 933.751 52 939.125 53.06  944.499
53.72 949.872 53.97 955.246 54.34 960.62 54.81 965.993 55.39  971.367 55.8
976.741 56.12 982.114 56.66 987.488 56.99 992.862 57.44  998.235
58.121003.609 58.731008.982 59.21014.356 59.71 1019.73 60.28 1025.103
60.651030.477 611035.851 61.561041.224 62.181046.598 62.85 1051.971
63.311062.719 63.88
 Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
```

0 .09 513.51 .055 638.529 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 513.51 638.529 44.49 41.34 37.16 .5 .8 Ineffective Flow num= 2
Sta L Sta R Elev Permanent
0 463 27 T
6391062.719 30 T
Skew Angle = 35

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 114747.8

INPUT
Description: 101 Exit Cherry St Br
Station Elevation Data num= 200
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 33.54 6.53 33.38 13.06 33.16 19.59 33.06 32.65 32.79 39.18 32.75 45.71 32.77 52.24 32.72 58.77 32.58 65.3 32.36 71.83 32.17 78.36 32.08 84.89 31.94 91.42 31.74 104.48 32.01 111.01 31.81 117.54 31.65 124.06 31.07 130.59 30.55 137.12 31.04 143.65 31.32 156.71 31.25 163.24 31.48 169.77 31.52 176.3 31.53 182.83 31.49 189.36 31.6 195.89 31.83 202.42 31.79 208.95 31.86 215.48 31.97 222.01 32.03 228.54 32.05 235.07 31.86 241.6 31.75 248.13 31.96 261.19 32.11 267.72 32.61 274.25 32.75 280.78 32.77 293.84 32.38 300.37 32.25 306.9 31.91 313.43 31.44 319.96 30.7 326.49 30.6 333.02 30.46 339.55 31.22 346.08 31.76 352.61 31.38 359.14 30.77 365.67 30.52 372.19 30.44 378.72 30.34 385.25 30.28 391.78 30.43 398.31 30.35 404.84 30.16 411.37 30.36 417.9 30.27 424.43 29.96 430.96 29.86 437.49 29.46 444.02 29.18 450.55 28.86 457.08 28.57 463.61 28.17 470.14 27.92 476.67 27.82 483.2 27.48 489.73 27.41 496.26 27.21 502.79 26.92 509.32 26.52 515.85 25.75 522.38 24.73 528.91 24.22 535.44 24.42 541.97 24.6 548.5 24.61 555.03 24.56 561.56 24.39 568.09 24.24 574.62 23.87 581.15 23.59 587.68 23.98 594.21 24.13 600.74 24.2 607.27 24.04 613.8 23.74 620.33 23.49 626.85 23.48 633.38 23.51 639.91 23.34 646.44 23.28 652.97 23.39 659.5 23.41 666.03 23.21 672.56 23.37 679.09 23.59 685.62 23.5 692.15 23.47 698.68 23.51 705.21 23.66 711.74 23.72 718.27 23.7 724.8 23.62 731.33 23.34 737.86 21.74 744.39 21.04 750.92 20.97 757.45 20.98 763.98 21.18 770.51 20.86 776.95 20.86 825.49 22.31 861.79 12.44 870.96 6.32 895.86 -2.38 905.29 -.71 910.67 -.82 925.72 1.6 933.96 4.12 941.6 9.8 941.72 8.7 945.17 13.66 959.2 13.93 976.83 25.38 983.19 26.49 989.64 27.11 996.08 27.57 1002.53 28.14 1008.97 28.94 1015.5 29.47 1022.03 29.75 1028.56 30.21 1035.08 30.84 1041.61 31.45 1048.14 31.9 1054.66 32.39 1061.19 32.46 1067.72 32.68 1074.24 33.11 1080.77 33.34 1087.3 33.68 1093.82 33.94 1100.35 34.18 1106.88 34.21 1113.4 34.42 1119.93 34.99 1126.46 35.58 1139.51 36.63 1146.04 37 1159.09 37.67 1165.62 38.03 1172.15 38.51 1178.67 38.97 1185.2 39.22 1191.73 39.51 1198.25 40.09 1211.31 41.3 1217.83 41.97 1224.36 42.52 1230.89 43.16 1237.41 44 1243.94 44.55 1250.47 44.78 1256.99 45.13 1263.52 45.61 1270.05 46.37 1276.58 47.28 1283.1 48.12 1289.63 49.03 1296.16 50.22 1302.68 51.43 1309.21 51.88 1315.74 52.23 1322.26 53.01 1328.79 54.04 1335.32 54.97 1341.84 55.79 1348.37 56.57 1354.9 57.14 1361.42 57.47 1367.95 57.77 1374.48 57.96 1381.01 58.52 1387.53 59.13 1394.06 59.18 1400.59 59.55 1407.11 60.15 1413.64 60.65 1426.69 61.74 1433.22 62.04 1439.75 62.17 1446.27 62.44 1452.8 62.81 1459.33 63.29 1472.38 63.89 1478.91 64.21

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 825.49 .055 976.83 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 825.49 976.83 1281.74 1292.52 1315.33 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 705.21 27 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 113455.2

INPUT
Description: 100
Station Elevation Data num= 300
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 66.1 6.53 65.77 19.59 65.58 32.65 65.02 39.18 64.87 58.77 63.09 65.3 62.83 78.36 62.6 84.89 62.37 91.42 61.96 104.48 61.87 117.54 62.03 124.07 62.25 137.13 62.44 143.66 62.73 150.19 62.7 156.72 62.48 163.25 62.66 169.78 63.37 176.31 63.88 182.84 64.17 189.37 64.2 202.43 63.22 208.96 62.95 222.02 61.89 228.55 61.56 241.61 61.37 248.14 61.47 261.2 61.39 267.74 61.61 280.8 61.64 287.33 61.38 293.86 61.35 300.39 61.46 326.51 60.81 333.04 60.44 339.57 60.24 352.63 60.32 359.16 60.25 365.69 59.98 378.75 59.02 411.4 55.06 417.93 54.49 430.99 54.29 437.52 53.82 444.05 53.71 450.58 53.4 457.11 52.8 463.64 53.23 470.17 53.23 476.7 53.67 483.23 54.38 489.76 54.95 502.82 55.52 515.88 55.92 535.47 55.41 548.53 54.53 555.06 54.28 568.12 53.37 574.65 52.61 581.18 51.1 587.71 49.97 600.77 46.72 607.3 45.36 626.89 40.82 639.95 38.5 659.54 36.99 666.07 36.39 685.66 33.7 692.19 33.46 718.31 33.14 750.96 31.53 764.02 31.26 770.55 30.8 777.08 30.58 790.14 29.74 803.2 29.9 816.26 29.61 822.8 29.65 829.33 29.88 888.1 29.17 894.63 28.96 933.81 29.47 940.34 29.68 946.87 29.72 966.46 30.42 972.99 30.54 986.05 30.33 992.6 30.03 999.15 29.26 1012.25 28.11 1018.81 27.19 1031.91 25.6 1038.46 25.2 1045.01 25.52 1051.56 26.63 1058.12 27.11 1071.22 28.32 1084.32 28.81 1103.98 28.12 1117.08 27.32 1123.63 26.8 1130.18 26.43 1149.84 26.21 1169.49 25.42 1182.6 24.15 1189.15 23.73 1202.25 21.99 1208.8 21.32 1228.46 20.53 1235.01 20.17 1241.56 19.49 1248.11 19.15 1254.66 19.17 1267.77 20.11 1280.87 19.65 1287.42 19 1298.64 18.47 1300.52 18.4 1307.07 18.08 1313.63 16.93 1320.18 15.26 1332 11.9 1350 8.1 1362 9.8 1380 17 1393 21.1 1405.35 19.22 1411.9 19.08 1418.45 19.15 1425 19.1 1431.55 19.83 1438.11 20.92 1444.66 21.73 1451.21 21.97 1457.76 22.04 1464.31 21.76 1470.86 21.24 1477.42 20.75 1483.97 20.57 1490.52 20.21 1497.07 19.82 1503.62 19.61 1510.17 19.21 1516.72 18.79 1523.28 18.35 1529.83 18.1 1536.38 18.03 1542.93 18.05 1549.48 18.01 1556.03 17.95 1562.59 17.98 1569.14 18.27 1575.69 18.98 1582.24 19.67 1588.79 20.66 1595.34 21.7 1608.45 22.09 1615 21.9 1621.55 21.88 1628.1 21.69 1634.65 21.54 1641.2 21.41 1647.76 21.17 1654.31 21.03 1660.86 20.62 1667.41 20.27 1673.96 19.48 1680.51 19.28 1687.06 19.3 1693.62 19.72 1700.17 19.85 1706.72 20.3 1713.27 20.89 1719.82 21.36 1726.37 21.49 1732.93 21.86 1739.48 22.32 1746.03 23.06 1752.58 23.9 1772.23 26.59 1778.79 27.3 1785.34 27.77 1791.89 28.42 1798.44 29.27 1804.99 29.78 1811.51 30.49 1818.03 31.4 1824.55 32.51 1831.08 33.39 1844.12 34.97 1850.64 35.64 1863.68 35.99 1870.2 36.1 1876.72 36.41 1883.24 36.7 1889.76 37.02 1896.28 37.28 1902.8 37.44 1909.32 37.43 1915.84 37.25 1922.36 37.15

1928.88 37.13 1935.4 37.07 1941.92 37.03 1948.44 36.96 1954.96 36.99 1961.49 37.04 1968.01 36.94 1974.53 36.69 1981.05 36.57 1987.57 36.24 1994.09 36.06 2007.13 35.97 2013.65 35.89 2020.17 35.74 2026.69 35.37 2033.21 35.17 2039.73 35.18 2046.25 35.26 2052.77 35.37 2059.29 35.34 2065.81 35.33 2072.33 35.4 2078.85 35.61 2085.38 35.64 2091.9 35.76 2098.42 35.82 2104.94 35.79 2111.46 36.08 2117.98 36.23 2131.02 36.56 2137.54 36.71 2144.06 36.83 2150.58 36.85 2157.1 36.96 2163.62 37.28 2170.14 37.35 2176.66 37.36 2183.18 37.34 2189.7 37.08 2196.23 36.71 2202.75 36.54 2209.27 36.22 2215.79 35.79 2222.31 35.61 2228.83 35.56 2235.35 35.69 2241.87 35.92 2248.39 35.98 2254.91 35.85 2261.43 35.77 2267.95 35.55 2274.47 35.55 2280.99 35.43 2294.03 35.02 2300.55 34.89 2307.07 34.78 2313.6 34.78 2320.12 34.82 2326.64 34.91 2333.16 35.29 2339.68 35.37 2346.2 35.31 2352.72 35.05 2359.24 34.76 2365.76 34.44 2372.28 34.06 2378.8 33.6 2385.32 33.24 2391.84 33.22 2398.36 33.27 2404.88 33.14 2411.4 33.12 2417.92 33.3 2424.45 33.38 2430.97 33.48 2437.49 33.51 2444.01 33.31 2457.05 33.46 2463.57 33.51 2470.09 33.49 2476.61 33.36 2483.13 33.3 2489.65 33.3 2496.17 33.38 2502.69 33.34 2509.21 33.27 2515.73 33.31 2522.25 33.19 2528.77 33.25 2535.29 33.41 2541.82 33.32 2554.86 33.24 2561.38 33.24 2567.9 33.32 2574.42 33.42 2580.94 33.5 2587.46 33.41 2593.98 33.39

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .095 1267.77 .055 1393 .095

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1267.77 1393 1492.91 1457.13 1422.7 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 1084.32 28.81 F

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 111998.1

INPUT
Description: 99 US Winnetuxet Riv Trib
Station Elevation Data num= 405
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 41.4 6.55 40.99 19.66 39.95 26.21 39.55 39.32 39.36 45.87 39.08 52.42 38.57 58.98 38.4 65.53 37.9 72.08 38.16 78.63 38 85.19 38.73 104.85 38.39 111.4 38.52 117.95 38.42 124.5 38.17 131.06 37.43 137.61 37.2 144.16 37.62 150.72 37.32 157.27 36.85 163.82 37.21 176.93 36.36 183.48 36.07 190.03 36.23 196.59 35.98 203.14 35.87 216.24 36.74 222.8 36.66 229.35 36.44 235.9 35.73 242.46 35.39 262.11 35.63 268.67 35.81 288.33 35.9 301.43 35.34 307.98 34.89 314.54 34.75 321.09 35.01 327.64 35.5 340.75 35.22 347.3 34.61 353.85 34.66 366.96 35.15 373.51 34.72 380.06 34.57 393.17 34.55 399.72 35.06 406.28 35.39 412.83 35.4 419.38 35.61 432.49 35.22 439.04 35.43 445.59 35.29 452.15 35.38 458.7 35.31 478.36 35.84 491.46 35.9 498.02 36.03 511.12 35.68 517.67 36.09 537.33 36.44 543.89 36.27 556.99 36.7 570.1 36.74 589.76 37.11 596.31 37.09 602.86 36.87 615.97 36.05 622.52 35.74 642.18 35.19 648.73 35.28 668.39 35.1 681.5 35.2 733.92 33.98 773.23 32.79 779.79 32.51 832.21 31.48 845.32 31.37 858.42 31.08 884.63 31.01 891.19 30.86 930.5 30.85 956.71 31.11 989.48 30.93 1009.14 31.26 1028.8 31.31 1068.11 30.73 1087.77 30.74 1100.88 30.54 1113.98 30.83 1146.75

30.91 1179.51 30.55 1225.38 29.77 1238.49 29.29 1245.04 29.19 1251.59 29.23
1264.7 28.77 1284.36 29.13 1317.12 30.3 1336.78 30.75 1343.33 30.68 1382.65
31 1454.73 30.57 1461.29 30.64 1474.39 30.55 1480.94 30.66 1487.5 30.5
1500.6 30.63 1533.37 30.41 1566.13 30.69 1572.68 30.52 1631.66 30.37 1644.77
30.51 1684.08 30.63 1690.64 30.46 1710.3 30.73 1723.4 30.72 1762.72 31.31
1802.04 31.49 1828.25 30.81 1880.67 30.23 1893.78 30.18 1919.99 29.69
1933.09 29.6 1952.75 29.11 1972.41 28.9 2070.7 29.12 2090.36 29.01 2103.47
28.77 2116.57 28.88 2129.68 28.61 2169 28.42 2175.55 28.29 2182.1 28.37
2221.42 27.93 2227.97 27.71 2267.29 27.41 2280.4 26.75 2293.5 26.35 2300.06
26.26 2326.27 25.06 2352.48 24.97 2378.69 24.47 2418.01 22.57 2483.54 20.35
2503.2 19.39 2516.3 19.53 2522.85 19.48 2529.41 19.69 2555.62 18.99 2562.17
19.13 2575.28 19.88 2581.83 19.65 2588.38 19.11 2588.86 19.09 2594.94 18.78
2601.49 19.07 2608.04 19.24 2614.6 18.58 2621.15 18.44 2627.7 18.18 2634.25
17.69 2640.81 17.32 2663 17.2 2673 11.7 2690 8.7 2700 10.5 2705 19.1 2711
22.6 2719.44 22.11 2725.99 21.88 2739.1 21.19 2745.65 21.4 2752.21 21.81
2765.31 22.07 2771.86 22.17 2778.42 22.09 2784.97 21.8 2791.52 21.78 2798.08
21.84 2804.63 21.86 2811.18 21.75 2824.29 21.42 2830.84 21.28 2837.39 21.25
2843.95 21.24 2850.5 21.14 2857.05 20.95 2863.61 20.78 2870.16 20.86 2876.71
20.8 2883.26 20.78 2889.82 20.61 2902.92 20.63 2909.48 20.66 2916.03 20.81
2922.58 21.08 2929.13 21.63 2935.69 22.94 2942.24 26.19 2948.79 29.42
2955.35 30.16 2961.9 30.35 2968.45 30.33 2975.01 29.68 2981.56 29.56 2988.11
29.55 2994.66 29.49 3007.77 29.5 3014.32 29.36 3020.88 29.25 3027.43 29.26
3047.09 29.48 3053.64 29.19 3060.19 29.06 3066.75 29.31 3073.3 29.48 3079.85
29.32 3086.4 29.3 3092.96 29.24 3099.51 29.2 3106.06 29.32 3112.62 29.39
3119.17 29.43 3125.72 29.4 3132.27 29.41 3138.83 29.5 3145.38 29.57 3151.93
29.54 3158.49 29.62 3171.59 29.53 3178.15 29.59 3184.7 29.48 3191.25 29.3
3197.8 29.17 3204.36 29.17 3210.91 29.32 3217.46 29.39 3223.99 29.38 3243.59
29.3 3256.65 29.18 3263.18 29.13 3269.72 29.11 3276.25 29.14 3282.78 29.19
3315.44 29.33 3361.16 29.61 3374.22 29.71 3380.75 29.74 3387.28 29.73
3400.35 29.66 3406.88 29.6 3413.41 29.6 3426.47 29.79 3433.01 29.86 3439.54
30.24 3446.07 30.73 3452.6 30.88 3459.13 30.87 3465.66 30.92 3472.2 30.82
3478.73 30.14 3485.26 29.16 3491.79 27.68 3498.32 27.39 3504.85 27.42
3517.92 27.45 3524.45 27.45 3537.51 27.39 3570.17 27.28 3583.23 27.3 3589.76
27.35 3596.3 27.71 3602.83 28.25 3609.36 28.94 3615.89 30.27 3622.42 30.98
3628.95 31.05 3635.49 31.14 3642.02 31.16 3655.08 30.79 3661.61 30.96
3668.14 31.23 3674.67 31.26 3687.74 31.14 3694.27 31.15 3707.33 31.08
3713.86 30.85 3720.4 29.03 3726.93 28.83 3733.46 28.96 3739.99 29.05 3746.52
29.12 3753.05 29.11 3759.59 29.14 3766.12 29.22 3772.65 29.2 3779.18 29.13
3785.71 29.14 3792.24 29.18 3805.31 29.35 3811.84 29.37 3818.37 29.41 3824.9
29.38 3831.43 29.37 3837.96 29.46 3844.5 29.49 3851.03 29.41 3857.56 29.27
3864.09 29.24 3870.62 29.26 3877.15 29.3 3883.69 29.18 3890.22 29.24 3896.75
29.26 3903.28 29.24 3909.81 29.15 3916.34 29.15 3922.88 29.18 3929.41 29.25
3935.94 29.24 3942.47 29.2 3949 29.19 3962.07 29.46 3968.6 30 3975.13 30.57
3981.66 30.73 3994.72 31.02 4001.25 30.99 4007.79 31.01 4014.32 31.1 4020.85
31.06 4027.38 31.22 4033.91 31.28 4040.44 31.07 4046.98 31.06 4053.51 30.89
4060.04 30.97 4066.57 31.2 4073.1 31.06 4079.63 31.04 4086.17 30.8 4092.7
31.11 4099.23 31.15 4105.76 31.23 4112.29 31.24 4118.82 31.33 4125.35 31.37
4131.89 31.55 4138.42 31.6 4144.95 31.57 4151.48 31.52 4158.01 31.5 4164.54
31.58 4171.07 31.61 4177.61 31.61 4184.14 31.56 4190.67 31.55 4197.2 31.49
4203.73 31.54 4210.26 31.44 4216.79 31.56 4223.33 31.65 4229.86 31.51
4236.39 31.58 4242.92 31.6 4249.45 31.56 4255.98 31.63 4262.52 31.94 4269.05
31.81 4275.58 31.73 4282.11 31.69 4288.64 31.72 4301.7 31.7 4308.24 31.82
4314.77 31.82 4321.3 31.86 4327.83 31.97 4334.36 31.94 4340.89 31.8 4347.42
31.81 4353.96 31.79 4360.49 31.79 4367.02 31.75 4373.55 31.92 4380.08 32.02

4386.61 32.05 4393.14 32.11 4399.68 32.25 4406.21 32.26 4412.74 32.33
4419.27 32.16 4425.8 32.26 4432.33 32.33 4438.86 32.28 4445.4 32.27 4451.93
32.22 4464.99 32.29 4471.52 32.23 4478.05 32.07 4484.58 32.11 4491.12 32.36
4497.65 32.48 4504.18 32.37

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .082 2418.01 .055 2711 .095

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2418.01
2711 2057.48 2006.07 1966.74 .3 .5 Blocked Obstructions num= 1
 Sta L Sta R Elev
 2970.3 3664.9931.11488

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 109992

INPUT
Description: 98 DS Winnetuxet Riv Trib
Station Elevation Data num= 421
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 29.41 6.54 28.94 13.08 28.66
19.62 28.91 26.16 28.9 32.69 28.7 39.23 28.93 52.31 28.97 71.93 29.49 78.47
29.23 91.54 28.98 130.78 29.06 156.93 29.81 176.55 29.64 183.09 29.68
196.16 29.56 202.7 29.75 215.78 29.54 228.86 29.74 235.4 29.55 241.94 29.55
255.01 29.81 268.09 29.78 281.17 30.16 294.25 30.62 300.79 30.6 307.32 30.88
320.4 31.64 326.94 31.92 333.48 31.98 340.02 31.86 372.71 32.08 379.25 32.03
405.41 31.62 418.48 31.95 425.02 32.3 431.56 32.01 438.1 32.13 451.18 31.82
464.26 31.86 470.79 32.17 477.33 32.32 496.95 31.93 503.49 32.11 510.03
32.49 516.57 33.13 536.18 34.05 542.72 34.21 549.26 34.09 555.8 34.17
568.88 34.61 581.95 34.88 588.49 34.78 601.57 34.23 608.11 34.06 621.19
33.06 640.8 32.19 660.42 31.9 666.96 31.68 680.04 31.7 693.11 31.84 699.65
31.77 712.73 32.17 725.81 32.28 732.35 32.45 745.42 32.36 758.5 32.1 771.58
32.36 784.66 32.19 797.73 32.39 804.27 32.39 817.35 32.04 830.43 31.99
843.51 32.11 850.05 32.03 856.58 32.13 863.12 31.97 876.2 32.31 882.74 31.87
889.28 31.78 895.82 32.16 902.36 32.35 908.89 32.09 921.97 32.09 935.05
32.34 941.59 32.6 961.21 31.9 967.74 32.12 974.28 32.17 980.82 32.59 993.9
32.3 1006.98 32.37 1013.52 32.2 1026.59 32.2 1039.67 32.35 1046.21 32.11
1065.83 32.39 1078.9 32.16 1091.98 32.31 1105.06 32.11 1118.14 32.27 1124.68
32.53 1131.21 32.36 1137.75 32.35 1150.83 32.73 1170.45 32.8 1190.06 32.51
1196.6 32.56 1203.14 32.83 1222.76 32.76 1242.38 32.39 1248.91 32.11 1268.53
32.18 1281.61 32.4 1288.15 32.37 1294.69 32.56 1301.22 32.45 1307.76 32.12
1314.3 32 1320.84 32.3 1327.38 32.74 1333.92 32.94 1340.46 32.63 1353.54
32.61 1360.07 32.3 1366.61 33.07 1373.15 33.3 1386.23 34.83 1399.31 35.22
1412.39 35.06 1418.92 34.75 1438.54 34.28 1464.7 34.29 1484.31 34.79 1490.85
34.84 1503.93 34.59 1517.03 34.03 1530.14 34.15 1543.26 33.43 1556.38 33.28
1562.94 33.03 1569.5 32.97 1576.06 32.71 1589.17 32.4 1608.85 31.33 1615.41
30.81 1621.97 30.13 1628.53 29.18 1641.65 27.74 1654.76 25.98 1661.32 25.66
1700.68 23.09 1713.79 22.55 1720.35 22.04 1740.03 21.57 1753.15 21.74
1759.71 22.15 1785.94 22.89 1792.5 23.26 1805.62 24.32 1812.18 24.22 1818.74
24.31 1831.85 24.21 1844.97 23.66 1858.09 22.78 1884.33 22.44 1897.44 21.69
1910.56 20.39 1917.12 19.98 1923.68 20.02 1936.8 19.42 1943.36 19.44 1956.47

19.76 1963.03 19.47 1969.59 19.62 1982.71 20.31 1995.83 20.59 2008.94 20.99
2015.5 21.04 2022.06 20.91 2048.3 21.16 2054.86 20.69 2067.97 20.68 2074.53
20.81 2087.65 20.82 2100.77 21.08 2106.99 20.98 2108 21.1 2118 13 2135 8.5
2150 8.5 2165 8.3 2182 13 2196.87 18.41 2199.15 18.47 2212.27 17.96 2225.39
16.71 2231.95 17.11 2238.51 17.18 2251.62 16.35 2258.18 16.46 2284.42 16.32
2290.98 16.88 2304.1 19.26 2310.65 19.9 2330.33 20.19 2336.89 20.08 2343.45
19.75 2350.01 19.13 2356.57 18.31 2363.13 17.68 2369.69 17.26 2376.24 17.54
2382.8 17.96 2389.36 18.55 2395.92 18.26 2415.6 16.93 2428.72 16.14 2435.27
15.54 2441.83 15.15 2448.39 15.33 2454.95 15.35 2461.51 15.61 2474.63 16.76
2481.19 17.2 2487.75 16.73 2494.3 15.38 2500.86 14.85 2507.42 14.99 2513.98
15.49 2520.54 15.82 2533.66 15.62 2540.22 15.27 2553.33 15.13 2559.89 15.27
2566.45 15.25 2573.01 15.49 2579.57 16.55 2586.13 18.32 2592.69 19.75
2605.81 19.7 2625.48 20.14 2632.04 20.45 2664.84 20.23 2684.51 19.91 2697.63
19.39 2704.19 18.88 2717.31 18.13 2723.87 17.89 2736.98 17.93 2750.1 17.85
2763.22 18.21 2776.34 18.66 2789.46 20.02 2809.13 21.59 2822.25 22.45
2835.37 23.46 2848.49 23.86 2887.84 23.43 2920.63 23.73 2927.19 23.7 2940.31
23.06 2966.55 21.35 2979.66 20.91 2992.78 20.81 2999.34 20.62 3005.9 20.68
3012.46 20.6 3025.58 21.11 3045.25 20.88 3051.81 21.01 3058.37 21.39 3064.93
21.23 3071.49 20.79 3078.05 20.61 3091.17 21.1 3097.73 20.9 3110.84 20.95
3123.96 20.81 3130.52 21.17 3137.08 21.17 3143.64 21.35 3150.2 21.17 3163.31
21.26 3169.87 21.45 3176.43 22.05 3189.55 22.89 3196.11 23.41 3202.67 23.67
3209.23 23.54 3215.79 22.61 3222.34 22.22 3228.9 22.46 3235.46 24.1 3242.02
24.92 3255.14 27.09 3261.7 27.93 3274.82 28.31 3281.38 28.31 3301.05 27.84
3320.73 27.58 3340.41 26.91 3346.96 26.46 3353.52 26.16 3366.64 25.86
3379.76 26.26 3386.32 26.86 3399.44 27.59 3419.11 28.37 3438.79 28.06
3445.35 27.76 3458.47 27.74 3465.03 27.63 3478.14 27.7 3484.7 27.59 3517.5
28.81 3543.73 29.22 3550.29 29.23 3563.41 28.65 3576.53 27.32 3602.76 26.28
3622.44 25.84 3648.67 26.05 3661.79 26.05 3674.91 25.88 3688.03 25.99
3694.59 25.91 3701.15 26.01 3714.26 27.47 3720.82 27.92 3727.38 28.15
3733.94 28.56 3747.06 28.94 3753.62 28.93 3766.74 29.29 3773.29 29.01
3779.85 28.4 3786.41 28.22 3799.53 27.66 3812.65 27.44 3819.21 27.16 3825.77
27.52 3838.88 27.53 3845.44 27.68 3871.68 27.68 3884.8 27.44 3897.91 27.43
3904.47 27.73 3917.59 27.49 3924.15 27.59 3943.83 27.56 3950.39 27.78 3963.5
27.69 3970.06 27.82 3976.62 28.43 3989.74 29.08 4009.42 29.62 4022.53 29.39
4029.09 29.59 4035.65 29.59 4048.77 29.03 4055.33 28.9 4061.89 29.17 4075
29.16 4088.12 29.34 4094.68 29.03 4107.8 28.77 4120.92 28.82 4127.48 29.21
4134.03 29.28 4140.59 29.17 4160.27 29.48 4173.39 29.9 4199.62 30.01 4206.18
30.15 4212.74 30.15 4219.3 29.76 4232.42 29.5 4238.97 29.57 4252.09 30.41
4258.65 30.54 4278.33 30.63 4284.89 30.87 4291.44 30.96 4304.56 31.4 4317.68
31.62 4330.8 32.08 4337.36 31.98 4343.91 31.67 4357.03 31.54 4363.59 31.34
4370.15 31.29 4383.27 30.75 4389.83 30.18 4396.38 30.05 4409.5 30.47 4429.18
30.71 4442.3 30.44 4475.09 30.58 4501.32 30 4521 30.02 4527.56 29.83 4534.12
29.97 4560.35 30.07 4573.47 30.42 4580.03 30.24 4606.27 30.99 4612.82 31.26
4625.94 31.54 4639.06 32 4665.29 31.31 4684.97 31.43 4698.09 31.9 4704.65
31.95 4724.32 31.33 4730.88 31.39 4750.56 30.98 4776.79 31.1 4803.03 30.89
4816.15 30.87 4822.7 31

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val 0 .09 2106.99 .055 2330.33 .095

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2106.99
2330.33 808.34 781.04 811.8 .3 .5 Ineffective Flow num= 3
 Sta L Sta R Elev Permanent
 1620 1812 23.6 F

```
 2940 3300 23.6 F
 3320 5000 27.6 F

CROSS SECTION


RIVER: Taunton River
REACH: Main Stem RS: 109211

INPUT
Description: 97
Station Elevation Data num= 427
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  0 30.43 13.12 29.3 19.68 29.09
26.23 29.04 45.91 29.18  52.47 29.12 78.7 29.73 85.26 29.71 91.82 30 98.38
30.52  111.5 31.06 124.62 31.07 137.73 31.67 144.29 31.79 150.85 31.65
157.41 31.79 163.97 31.55 170.53 31.52 183.64 31.03 190.2 30.89  196.76 30.56
203.32 30.03 216.44 29.8 249.23 29.85 255.79 29.94  268.91 29.87 275.47 30.02
295.14 29.86 314.82 30.16 321.38 29.93  334.5 29.9 341.05 30 373.85 29.8
400.08 30.1 413.2 29.95  419.76 30.66 426.32 30.48 432.88 30.89 439.44 30.98
459.11 30.91  465.67 31.06 472.23 31.02 485.35 31.2 491.91 31.04 498.47 31.06
505.02 30.86 518.14 31.14 531.26 31.07 544.38 30.72 557.49 30.99  564.05 31.3
570.61 32.37 577.17 33.84 583.73 34.98 590.29 35.36  616.52 35.66 629.64
35.45 636.2 35.24 649.32 34.43 655.88 33.69  675.55 34.39 682.11 35.11 695.23
35.23 708.35 36.27 714.9 37.52  721.46 37.55 728.02 36.46 734.58 35.51 741.14
34.98 747.7 34.62  760.82 34.05 767.37 33.93 773.93 33.99 780.49 33.85 787.05
33.28  793.61 32.88 806.73 33.18 832.96 34.02 846.08 34.68 852.64 35.17
865.76 35.12 872.31 36.15 878.87 35.42 885.43 34.48 891.99 32.83  898.55
32.17 905.11 32.14 911.67 32.81 918.23 33.66 924.78 35.3  937.9 35.47 944.46
35.79 951.02 35.87 957.58 35.65 964.14 35.27  977.25 34.07 983.81 34 996.93
34.09 1003.49 34.24 1010.05 34.18  1036.28 33.02 1049.4 33.05 1055.96 33.43
1062.52 34.21 1075.64 33.86  1082.19 33.94 1088.75 31.7 1095.31 32.07 1101.87
33.11 1108.43 32.65  1114.99 31.34 1121.55 29.12 1128.1 28.38 1134.66 28.05
1908.59 28.05  1915.15 28.43 1928.27 29.95 1934.82 30.18 1941.38 30.03 1954.5
29.22  1967.62 28.87 1980.74 28.82 1987.29 28.68 1993.85 28.68 2006.97 28.37
2013.53 28.37 2020.09 28.08 2026.65 27.18 2033.21 26.6 2039.76 26.18  2052.88
26.1 2059.44 25.87 2072.56 24.96 2085.67 24.24 2098.79 23.91  2105.35 23.86
2118.47 23.23 2138.14 22.61 2151.26 22.12 2157.82 22  2184.06 20.61 2190.61
20.05 2203.73 19.47 2210.29 18.97 2216.85 18.71  2236.53 18.44 2243.08 18.12
2249.64 18.22 2262.76 17.84 2269.32 17.86  2275.88 17.63 2302.11 17.78
2308.67 17.94 2321.79 17.94 2334.91 18.18  2341.46 18.46 2348.02 18.97
2361.14 19.02 2393.93 19.75 2407.05 19.75  2433.29 20.34 2439.84 20.19 2446.4
19.86 2452.96 18.93 2459.52 18.57  2472.64 18.35 2485.76 17.9 2492.31 17.89
2518.55 18.39 2525.11 18.36  2531.67 17.88 2538.23 17.22 2544.78 16.81 2557.9
15.71 2564.46 15.47  2584.14 15.35 2597.25 15.38 2603.81 15.66 2610.37 16.57
2616.93 17.28  2630.05 17.94 2636.61 18.15 2643.16 18.63 2656.28 18.96
2662.84 18.97  2675.88 19.78 2682.35 19.87 2688.83 19.69 2695.31 19.7 2701.79
19.51  2714.74 19.73 2721.22 19.63 2747.13 19.99 2760.08 20.35 2766.56 19.34
2773.04 16.63 2779.4 14.42 2779.52 14.38 2798 13 2815 8.5  2830 8.5 2845 8.3
2862 13 2870.2 14.38 2876.68 14.39  2883.15 14.79 2889.63 16.64 2892.35 16.57
2896.11 16.47 2902.59 16.43  2909.06 16.76 2915.54 17.96 2922.02 19.61 2928.5
20.43 2941.45 22.43  2947.93 22.85 2954.41 22.62 2967.36 22.78 2980.32 23.18
2993.27 23.27  2999.75 23.49 3019.18 23.49 3025.66 23.33 3038.61 22.64
3051.57 22.35  3064.52 22.72 3071 22.71 3077.48 22.88 3090.43 23.61 3096.91
23.71  3103.39 24.1 3122.82 24.73 3148.97 25.74 3168.58 25.88 3181.65 25.71
```

3194.73 25.86 3214.34 26.39 3227.41 26.34 3253.56 26.61 3273.17 26.45
3279.71 26.68 3286.24 26.77 3292.78 26.69 3299.32 26.33 3325.46 25.56
3338.54 25.66 3351.61 25.53 3364.69 25.2 3371.22 25.26 3377.76 25.15 3384.3
24.74 3397.37 25.03 3416.98 26.06 3423.52 26.16 3436.59 26.59 3443.13 27.03
3449.67 27.33 3469.28 27.05 3475.81 27.13 3495.42 26.44 3515.03 25.29
3521.57 24.7 3534.65 24.69 3541.18 24.44 3547.72 24.37 3554.26 23.97 3560.79
23.71 3567.33 23.98 3573.87 24.08 3586.94 23.75 3593.48 23.97 3600.01 24.05
3613.09 25.28 3619.63 25.7 3632.7 27.17 3639.24 27.46 3652.31 28.28 3658.85
28.31 3684.99 27.37 3704.6 26.91 3724.22 25.93 3730.75 25.86 3737.29 25.94
3743.83 26.21 3756.9 26.38 3763.44 26.14 3769.97 26.09 3789.58 25.13 3802.66
24.66 3809.2 24.28 3815.73 24.24 3822.27 24.54 3828.81 25.12 3835.34 25.87
3841.88 26.49 3854.95 28.12 3861.49 29.06 3868.03 29.73 3881.1 30.55 3887.64
30.82 3900.71 30.73 3913.79 31 3926.86 30.4 3933.4 29.5 3939.93 28.41
3946.47 27.77 3953.01 27.29 3959.54 27.01 3972.62 27.05 3979.16 26.89
3992.23 25.87 3998.77 25.26 4011.84 24.99 4024.91 25.18 4031.45 25.12
4044.52 25.24 4051.06 25.07 4070.67 25.08 4077.21 25.21 4090.28 24.96
4103.36 25.58 4109.89 25.75 4122.97 26.56 4129.5 27.21 4136.04 27.39 4162.19
28.36 4168.72 28.31 4175.26 28.01 4181.8 27.9 4188.33 27.64 4201.41 27.69
4214.48 28.08 4221.02 28.17 4227.55 28.02 4247.16 26.36 4253.7 25.95 4266.77
25.66 4273.31 25.37 4286.39 25.21 4292.92 24.94 4306 24.95 4319.07 25.2
4325.61 25.2 4332.14 25.43 4345.22 25.54 4351.75 25.73 4358.29 26.19 4364.83
26.34 4371.36 26.9 4390.97 27.93 4404.05 28.5 4423.66 30.52 4430.19 30.98
4443.27 31.17 4462.88 30.99 4482.49 30.33 4489.02 29.91 4495.56 29.78 4502.1
29.15 4508.64 29.08 4515.17 29.18 4521.71 28.99 4528.25 28.95 4541.32 29.89
4547.86 29.81 4560.95 30.41 4567.5 30.46 4587.17 31.15 4593.73 31.26 4606.84
31.01 4613.4 30.78 4633.06 30.6 4639.62 30.69 4659.29 30.33 4672.4 30.78
4685.51 30.79 4692.07 30.45 4698.62 30.31 4718.29 30.73 4724.85 30.64
4737.96 30.18 4744.51 30.14 4764.18 29.53 4770.74 29.22 4777.29 29.24
4783.85 29.4 4790.4 29.37 4803.52 29.03 4816.63 29.27 4862.52 29.18 4869.08
29.27 4888.74 28.97 4895.3 29.15 4908.41 29.1 4921.52 29.4 4934.63 29.29
4947.75 29.59 4960.86 29.5 4967.41 29.11 5006.75 29.57 5019.86 30.08 5032.97
30.36 5046.08 30.28 5052.64 30.59 5059.2 30.68 5065.75 30.52 5072.31 30.52
5078.86 30.28 5085.42 30.19 5118.2 30.85 5137.87 30.96 5144.42 31.09 5150.98
31.04 5157.53 31.46 5170.65 31.81 5216.54 31.67 5223.09 31.37 5229.65 30.7
5236.21 31.16 5242.76 31.3 5255.87 31.03 5275.54 31.49 5288.65 31.2 5295.21
31.22 5301.76 31.47 5327.99 31.89 5341.1 31.96

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .095 2760.08 .055 2999.75 .095

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2760.08
2999.75 1561.57 1566.81 1580.91 .3 .5 Ineffective Flow num= 2
Sta L Sta R Elev Permanent
3292 3660 26.5 F
3660 4400 27.5 F

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 107644.2

INPUT

Description: 96
Station Elevation Data num= 189
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 38.96 150.66 38.83 157.21
40.75 163.76 46.07 170.31 45.71 176.86 43.74 189.96 38.52 196.51 37.83
222.71 38.16 327.52 36.31 340.62 35.67 419.22 33.81 432.32 33.92 445.42
32.27 451.98 31.91 458.53 32.13 471.63 30.52 478.18 30.25 484.73 30.81
497.83 32.89 517.48 34.25 530.58 34.38 543.68 33.57 556.78 34.26 589.53
34.48 602.63 34.25 615.73 36.27 635.39 36.05 648.49 36.83 661.59 36.78
674.69 35.37 681.24 34.21 700.89 32.37 707.44 32.35 727.09 33.62 753.29
33.48 766.39 34.68 812.24 34.74 818.79 34.39 825.34 33.62 831.9 34.07 838.45
33.66 845 34.18 851.55 33.52 858.1 31.56 864.65 30.24 871.2 29.95 877.75
30.63 890.85 33.08 903.95 33.41 917.05 34.14 969.45 33.79 989.1 32.96
1021.86 31.92 1041.51 30.47 1048.06 30.4 1054.61 30.83 1074.26 32.82 1093.91
33.45 1231.47 32.21 1238.02 30.93 1244.57 29.21 1251.12 28.83 1270.77 30.67
1303.52 30.34 1323.17 29.09 1355.93 29 1369.03 29.56 1375.58 29.11 1382.13
28.1 1388.68 27.93 1401.78 28.98 1421.43 28.03 1447.63 25.98 1526.24 24.75
1558.99 25.64 1565.54 25.1 1572.09 23.11 1578.64 19.98 1606.31 17.4 1615.81
11.2 1632.01 6.34 1643.89 5.4 1661.42 4.74 1682.29 10.77 1690 17.52 1722.75
18.75 1755.49 17.06 1768.58 16.1 1775.12 15.29 1807.84 15.36 1814.38 15.11
1820.93 15.39 1827.47 16.24 1840.56 16.99 1860.19 16.52 1866.73 17.03
1873.27 17.1 1899.45 15.53 1905.99 15.4 1919.08 16.35 1945.25 20.02 1951.79
21.4 1958.34 22.11 1984.51 20.63 2233.16 19.08 2265.87 19.55 2344.39 21.51
2547.24 21.96 2612.67 21.9 2625.76 22.52 2632.3 22.46 2651.93 20.72 2684.65
20.23 2704.28 20.85 2717.37 22.01 2743.54 22.29 2776.26 23.36 2789.34 23.3
2808.97 22.22 2867.86 23.21 2913.67 23.3 2920.21 22.86 2926.75 23.19 2939.84
22.48 2966.01 22.61 2985.64 22.01 3005.27 22.41 3018.36 21.96 3051.08 21.96
3090.34 21.94 3123.05 21.39 3129.6 20.82 3142.68 21.55 3168.86 21.09 3201.57
21.66 3208.12 21.36 3240.83 22.68 3299.72 23.29 3312.81 22.37 3319.35 22.5
3378.24 25.42 3410.96 26.28 3450.22 25.05 3456.77 24.56 3489.48 24.9 3496.03
25.34 3535.29 24.79 3548.37 24.23 3581.09 24.18 3587.63 24.53 3607.26 27.01
3613.81 27.34 3659.61 27.46 3679.27 28.22 3705.5 30.12 3797.31 31.61 3830.1
30.94 3836.66 30.51 3876.01 30.89 3882.57 30.69 3889.12 31.16 3974.38 31.85
4007.17 31.74 4020.29 31.95 4033.4 31.31 4138.33 32.05 4177.68 30.52 4223.58
30.73 4236.7 31.16 4243.26 30.78 4262.93 31.05 4276.05 30.06 4348.18 29.33
4387.53 29.78 4400.65 29.25 4413.76 29.75 4420.32 29.41 4426.88 29.82
4479.34 29.77 4492.46 29.34 4518.69 29.68 4551.48 30.42 4636.73 29.64
4676.08 29.9 4689.19 31.04 4735.1 31.5 4767.89 30.87 4833.47 30.88

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .095 1558.99 .055 1722.75 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1558.99
1722.75 65.61 65.84 69.27 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent 2470 3160 28.4 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 107578.3

INPUT
Description: 95 Auburn St constriction

Station Elevation Data num= 387
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 39.5 111.55 39.2 118.11
39.04 124.67 39.29 137.79 45.34 144.35 46.35 150.92 45.23 157.48 42.9 164.04
38.9 170.6 38.21 183.72 38.41 203.41 38.09 216.53 38.12 229.65 37.85 236.22
37.57 242.78 37.65 249.34 37.54 255.9 37.12 275.59 36.44 282.15 36.12
295.27 36.26 301.83 36.19 308.39 36.34 314.95 36.16 341.2 35.83 360.89 35.07
380.57 34.56 387.13 34.28 393.69 34.36 400.26 34.14 406.82 34.22 413.38
33.84 419.94 32.15 426.5 31.54 433.06 32.46 439.62 34.35 446.19 35.21 452.75
35.56 459.31 35.62 465.87 35.97 478.99 36.27 492.12 36.27 498.68 36.52
505.24 36.31 511.8 35.89 524.92 34.35 538.05 33.21 557.73 33.23 570.86 32.79
590.54 32.86 603.66 32.62 629.91 32.56 636.47 32.8 643.03 32.6 649.59 32.83
682.4 33.22 695.52 33.74 708.65 34.66 715.21 35.64 728.33 35.86 734.89 35.85
748.02 35.67 761.14 35.79 774.26 35.34 780.82 34.87 787.39 34.15 800.51
33.11 813.63 32.69 826.76 33.13 833.32 33.11 846.44 33.51 859.56 33.38
866.12 32.69 872.69 31.63 879.25 31.22 885.81 31.25 892.37 31.71 912.06
34.17 925.18 35.18 931.74 35.45 957.99 35.44 964.55 35.31 977.67 34.73
990.79 33.41 997.36 32.88 1003.92 32.53 1017.04 32.42 1043.29 32.67 1049.85
32.62 1056.41 32.95 1089.22 33.08 1108.9 33.44 1122.03 33.44 1128.59 33.07
1148.27 32.25 1174.52 31.82 1181.08 31.61 1187.64 31 1194.2 29.88 1200.76
29.64 1207.33 32.39 1213.89 33.11 1220.45 32.83 1227.01 32.08 1233.57 31.57
1240.13 31.2 1246.69 31.01 1266.38 30.84 1286.06 30.43 1292.63 29.98 1299.19
29.16 1305.75 27.64 1312.31 26.81 1318.87 26.53 1331.99 26.42 1351.68 25.85
1358.24 26 1364.8 26.71 1371.36 27.72 1377.93 28.26 1384.49 29.05 1391.05
29.1 1397.61 28.78 1404.17 28.61 1410.73 28.28 1423.86 27.09 1430.42 26.63
1436.98 26.92 1443.54 27.35 1456.66 28.71 1469.79 27.25 1482.91 24.34
1489.47 23.36 1496.03 23.45 1502.6 22.51 1509.16 21.27 1515.72 20.32 1522.28
20.5 1535.4 20 1541.96 20.19 1554.26 21.15 1575 21.91 1575.07 17.99 1593.13
10.66 1597.06 10.7 1602.01 8.81 1610.59 8.17 1614.02 8.4 1617.69 10.55
1618.84 11.16 1622.71 11.59 1625.58 11.88 1628.69 11.77 1630.73 11.6 1630.96
16.68 1637.19 17.87 1638.51 21.56 1656.08 23.92 1666.63 24.1 1673.2 24.07
1679.76 24.2 1692.88 24.17 1699.44 24.4 1706 24.33 1712.57 24.43 1725.69
24.19 1758.5 24.22 1765.05 23.95 1771.59 24.16 1778.14 24.2 1784.69 24.08
1797.79 24.2 1804.34 23.78 1810.89 23.75 1817.44 23.39 1823.99 22.79 1830.54
22.41 1837.08 22.7 1843.63 23.27 1850.18 21.7 1856.73 21.04 1863.28 21.12
1869.83 20.83 1876.38 20.72 1882.93 20.14 1889.48 19.7 1896.03 18.83 1902.58
19.08 1909.12 19.69 1915.67 20.9 1922.22 21.46 1941.87 21.45 1954.97 21.1
1968.07 20.93 1981.16 20.9 2013.91 21.2 2040.11 20.9 2072.85 19.73 2079.4
19.37 2092.5 19.12 2112.15 19.22 2131.79 19.75 2157.99 19.75 2184.18 19.45
2203.83 19.51 2223.48 20.01 2262.77 20.95 2275.87 21.15 2321.71 22.23
2347.91 22.32 2374.11 22.63 2387.2 23 2393.75 22.92 2400.3 23.1 2433.05
24.91 2439.6 25.39 2446.15 25.73 2459.24 26.84 2472.34 27.38 2491.99 27.61
2524.73 27.06 2544.38 26.64 2577.13 26.52 2609.87 25.57 2622.97 25.58
2642.62 25.79 2649.16 25.42 2688.46 25.25 2695.01 25.1 2708.11 25.09 2753.95
24.7 2773.6 24.71 2806.34 25.43 2852.18 25.97 2891.48 26.14 2898.03 26.06
2904.58 25.84 2911.12 25.96 2943.87 25.68 2956.97 25.32 2963.52 25.02
3035.56 23.78 3055.2 23.71 3074.85 23.36 3087.95 22.89 3107.59 22.35 3120.69
22.24 3133.79 22.43 3140.34 22.39 3153.44 21.89 3173.08 21.72 3179.63 21.82
3199.28 21.51 3205.83 21.52 3212.38 21.67 3225.48 21.45 3232.03 21.87
3238.58 21.45 3258.22 21.83 3271.32 21.62 3277.87 20.97 3290.97 22.36
3297.52 22.69 3304.07 22.88 3323.71 22.98 3330.26 23.22 3356.46 23.16
3363.01 23.27 3369.56 23.54 3382.65 23.73 3389.2 24.1 3402.3 24.39 3415.4
25.02 3428.5 25.27 3448.14 24.87 3454.69 24.6 3467.79 24.83 3480.89 24.7
3493.99 24.19 3500.54 24.24 3513.63 24.58 3533.28 24.22 3559.48 24.56
3572.57 25 3585.67 25.79 3598.77 26.01 3618.42 25.79 3624.97 25.62 3631.52

25.67 3638.06 25.94 3657.71 25.8 3664.26 26.03 3670.81 27.05 3677.36 27.65
3683.91 27.86 3690.46 28.3 3697.01 29.18 3703.55 29.77 3716.65 30.56 3723.2
30.83 3729.75 30.87 3749.33 31.55 3762.39 31.11 3768.92 31.23 3781.97 30.72
3788.5 30.31 3808.08 28.37 3814.61 28.14 3821.14 28.24 3827.67 28.04 3866.83
28.27 3873.36 28.17 3892.94 28.81 3906 29.52 3932.11 30.01 3945.17 30.03
3951.69 29.86 3964.75 30.05 3971.28 30.31 3977.8 30.75 3984.33 30.78 3990.86
30.35 3997.39 30.21 4010.44 30.73 4016.97 30.79 4043.08 31.33 4049.61 31.35
4062.67 31.09 4095.3 30.99 4101.83 30.88 4108.36 31.15 4127.94 31.55 4141
31.3 4154.05 31.3 4173.64 31.6 4199.75 31.14 4225.86 30.48 4238.92 30.4
4251.97 30.02 4278.08 29.49 4291.14 29.37 4304.19 29.56 4323.78 29.35
4343.36 29.57 4356.42 29.16 4376 29.46 4382.53 29.37 4402.11 29.39 4408.64
29.57 4421.7 29.55 4428.22 29.76 4434.75 29.79 4447.81 29.52 4454.33 29.88
4460.86 29.69 4473.92 29.55 4480.45 29.23 4493.5 29.68 4545.72 29.68 4558.78
29.48 4565.31 29.48 4578.36 29.9 4591.42 29.86 4604.48 29.6 4611 29.57
4624.06 29.95 4630.59 29.54 4650.17 29.99 4656.7 29.85 4682.81 29.99 4689.34
29.92 4695.86 30.13 4708.92 29.78 4721.98 30.23 4741.56 29.91 4761.14 30.41
4774.2 30.16 4793.78 30.5 4800.31 30.77 4806.84 30.82 4813.37 30.65 4819.89
30.79 4826.42 31.29 4832.95 31.55 4852.53 31.7 4865.59 31.58 4891.7 31.88

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .095 1575 .055 1656.08 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1575
1656.08 123.92 126.38 129.99 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 2386 3076 28.4 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 107452

INPUT
Description: 94
Station Elevation Data num= 169
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 35.05 13.11 34.38 19.66 34.7
26.21 34.13 39.32 34.82 45.87 34.57 58.98 34.96 72.08 34.54 85.19 33.57
117.95 33.39 131.06 34.1 144.17 33.62 157.27 33.77 176.93 33.19 196.59 33.81
216.25 34.06 235.91 34.79 262.12 33.28 281.78 32.91 314.55 34.87 353.86
32.63 386.63 32.36 458.71 36.88 484.92 36.8 517.69 36.62 530.8 35.92 550.45
35.77 576.67 36.63 602.88 35.28 622.54 33.69 635.64 32.13 661.86 32.21
694.62 33.85 720.83 34.53 733.94 34.4 747.05 34.88 779.81 34.32 799.47 34.27
806.02 34.63 812.58 35.44 819.13 35.44 838.79 34.37 858.45 34.97 878.11
33.82 884.66 33.76 891.21 33.12 897.77 31.95 904.32 31.3 910.87 31.25 969.85
33.54 1002.61 33.43 1022.27 32.74 1035.38 33.11 1041.93 32.98 1074.7 33.91
1100.91 32.54 1107.46 32.46 1120.57 33.1 1153.33 33.08 1186.1 29.69 1231.97
28.81 1258.18 26.57 1264.74 25.42 1290.95 18.3 1297.5 16.96 1310.61 15.77
1323.71 16.2 1336.82 17.07 1369.58 16.92 1376.14 17.21 1382.69 18.35 1415.45
19.26 1450.9 18.89 1451 9.69 1453.4 1.01 1479 -6.95 1484.8 -6.48 1541.4 -
1.66 1560.1 8.21 1567.3 15.97 1612.05 18.81 1625.15 18.62 1638.26 17.18
1644.81 15.79 1651.36 15.36 1716.83 15.82 1729.92 15.63 1736.46 16.24
1749.55 20.69 1756.09 21.16 1769.18 20.29 1782.27 17.58 1788.81 16.93

1834.61 16.73 1873.87 17.13 1880.41 17.44 1893.5 19.08 1900.04 19.53 1939.3 18.87 1985.11 18.69 2024.37 19.17 2057.08 21.44 2063.63 22.34 2076.71 22.75 2083.25 23.47 2089.8 24.78 2096.34 25.06 2109.43 24.6 2214.12 25.9 2318.81 28.08 2436.59 32.74 2495.48 33.17 2920.79 28.6 3110.54 22.4 3156.34 22.54 3182.52 21.73 3208.69 22.25 3221.78 21.87 3300.3 23.36 3333.01 23.83 3346.1 23.52 3372.27 25.1 3398.44 25.44 3404.99 25.97 3450.79 25.33 3476.96 25.73 3529.31 29.13 3548.94 29.3 3562.02 27.93 3575.11 27.55 3588.2 28.31 3601.28 28.36 3627.46 27.7 3673.26 28.86 3679.8 29.41 3686.35 29.43 3705.96 28.21 3745.17 28.83 3784.37 30.7 3810.51 30.91 3836.65 30.66 3843.18 30.33 3862.79 30.97 3888.93 30.85 3928.13 31.51 4000.01 30.81 4019.62 32.14 4052.29 31.77 4058.83 32.05 4098.03 30.59 4117.64 31.15 4150.31 29.7 4294.07 30.39 4346.34 29.62 4359.41 30.11 4379.02 29.53 4398.62 29.97 4411.69 29.76 4463.96 30.36 4477.03 29.95 4516.24 30.36 4633.86 29.95 4640.39 30.31 4660 29.81 4692.67 30.31 4699.2 29.98 4771.08 30.71 4784.15 31.13 4810.29 31.3

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 1450.9 .055 1612.05 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1450.9 1612.05 2317.83 2224.61 2187.27 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 2287 2977 28.4 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 105227.3

INPUT
Description: 93
Station Elevation Data num= 438
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 29.15 6.56 29.27 13.11 29.24 19.67 29.35 45.9 29.19 52.45 28.89 59.01 28.76 72.12 28.81 91.79 28.43 98.35 28.56 104.9 28.5 118.02 28.15 137.69 28.15 163.91 27.72 170.47 27.9 183.58 27.63 196.69 27.84 209.81 27.54 216.36 27.6 229.48 28.07 236.03 28.18 242.59 28.03 255.7 27.15 262.26 26.93 275.37 27.69 281.93 27.81 288.49 28.23 295.04 28.43 314.71 28.34 327.82 28.44 334.38 28 347.49 28.03 354.05 28.16 367.16 27.79 386.83 27.57 419.61 27.01 426.17 26.74 445.84 25.47 452.4 25.32 458.95 25.53 472.07 26.38 478.62 26.51 511.41 26.5 531.08 25.84 537.63 25.53 550.74 25.14 557.3 25.5 563.86 26.34 570.41 26.8 576.97 27.67 583.53 28.04 590.08 27.76 596.64 27.86 603.2 28.31 609.75 28.94 622.87 29.39 629.42 29.9 635.98 30.15 649.09 29.53 655.65 29.45 668.76 29.9 694.99 30.15 701.54 29.98 727.77 30.41 734.33 30.36 740.88 30.13 754 30.17 767.11 30.5 780.22 30.21 793.33 30.13 799.89 29.92 806.45 29.95 813 30.2 819.56 30.27 839.23 30.89 852.34 30.74 858.9 30.84 865.46 31.08 872.01 31.05 878.57 31.31 885.13 31.79 891.68 32.04 898.24 32.1 904.79 31.82 917.91 30.61 924.46 29.89 931.02 29.39 937.58 29.36 944.13 29.12 970.36 28.82 983.47 28.39 990.03 27.98 996.59 27.75 1003.14 27.79 1022.81 27.26 1029.37 27.37 1042.48 28.5 1062.15 29.4 1068.71 29.5 1081.82 28.83 1121.16 24.79 1127.71 23.94 1140.83 21.73 1147.38 21.4 1153.94 21.35 1160.5 21.54 1180.17 21.49 1186.72 21.81 1193.28 22.59 1199.84 23.11 1212.95 23.57 1226.06 24.6 1232.62 24.95 1252.29 26.33 1271.96 27.2 1311.3 27.19 1317.85 26.98 1324.41 26.96 1330.97 26.8 1337.52 27.13

1344.08 27.27 1383.42 26.43 1396.53 25.6 1409.64 24.36 1416.2 24.01 1422.76
23.92 1435.87 24.5 1442.42 24.64 1475.06 27.3 1481.57 27.71 1507.6 28.75
1514.11 28.84 1520.62 28.69 1527.13 27.25 1533.64 24.09 1540.15 20.78
1546.65 18.51 1553.16 17.28 1563.47 15.03 1585 8.6 1600 8.2 1615 9.2 1637
12.8 1640.85 16.07 1644.28 16.12 1650.79 15.95 1657.3 15.64 1663.8 15.97
1670.31 16.59 1676.82 16.95 1683.33 16.77 1689.84 16.38 1696.35 16.17
1702.85 16.11 1728.89 16.42 1761.43 17.33 1774.45 17.43 1800.48 17.02
1846.04 16.43 1852.55 16.54 1878.58 16.36 1891.6 16.41 1911.12 16.14 1930.65
16.16 1995.73 17.67 2060.81 18.22 2067.32 18.17 2080.34 18.39 2093.36 18.7
2099.86 18.63 2106.37 18.73 2145.42 18.42 2158.44 18.18 2164.95 17.93
2177.96 17.84 2197.49 17.3 2204 16.99 2249.78 16.36 2302.19 17.57 2321.85
17.29 2348.06 17.2 2374.27 16.99 2380.82 17.15 2393.92 17.21 2400.48 17.35
2413.58 17.88 2446.34 18.35 2452.89 18.3 2459.45 17.92 2466 17.27 2472.55
16.43 2479.1 17.13 2485.65 17.97 2492.21 18.96 2498.76 19.27 2511.86 18.97
2538.07 19.9 2564.28 20.58 2583.94 21.18 2616.7 22.86 2629.8 23.35 2636.35
23.78 2642.91 24.4 2695.32 26.97 2747.74 27.41 2800.16 27.28 2819.81 26.77
2826.37 26.47 2865.68 25.85 2878.78 25.41 2885.34 25.39 2891.89 25.2 2924.65
25.37 2944.31 25.72 2957.41 26.08 2963.96 26.1 2977.07 26.4 3029.48 26.57
3055.69 26.17 3068.8 26.2 3081.9 26.53 3088.45 27.69 3095.01 31.02 3101.56
34.19 3108.11 34.08 3114.66 30.77 3121.21 28.15 3127.77 26.83 3134.32 26.36
3140.87 26.08 3147.42 27.42 3153.98 28.39 3186.74 27.95 3212.95 27.98 3219.5
28.11 3258.81 27.76 3265.36 27.56 3285.02 27.57 3317.78 26.99 3324.33 27.13
3330.88 27 3350.54 26.92 3370.2 26.97 3376.75 27.16 3383.3 27.09 3402.96
26.64 3409.51 26.64 3416.06 26.29 3422.62 25.4 3429.17 24.16 3435.72 23.4
3448.82 22.46 3455.38 22.42 3461.93 22.24 3468.48 22.44 3494.69 22.76
3507.79 22.61 3520.9 22.13 3527.45 22 3534 22.02 3540.55 21.79 3547.11 21.39
3553.66 21.52 3573.31 22.35 3586.42 21.79 3599.52 21.9 3612.63 21.71 3619.18
22.08 3625.73 22.12 3638.84 21.77 3651.94 21.74 3658.49 22.04 3665.05 22.04
3678.15 21.53 3697.81 21.55 3710.91 22.14 3717.46 21.86 3737.12 21.58
3743.67 21.62 3756.78 21.36 3769.88 21.54 3782.98 22.04 3796.09 21.71
3809.19 21.99 3822.3 21.77 3848.51 22.3 3861.61 22.24 3868.16 22.35 3881.27
22.27 3887.82 22.46 3894.37 22.01 3900.92 21.93 3914.03 22.27 3920.58 22.34
3927.13 22.23 3946.79 22.58 3953.34 22.27 3973 21.87 3979.55 21.93 3992.65
21.65 3999.21 21.77 4005.76 22.06 4012.31 22.15 4018.86 22.4 4025.42 22.26
4031.97 22.38 4045.07 22.86 4051.62 23.21 4058.18 23.71 4064.73 24.07
4071.28 24.62 4077.83 24.72 4084.38 25.02 4090.94 25.5 4097.49 25.73 4110.59
25.86 4123.7 25.37 4143.35 25.55 4176.12 26.4 4189.22 26.64 4202.33 27.31
4208.88 27.13 4215.43 27.44 4221.98 27.55 4254.74 28.75 4261.3 28.8 4274.4
29.1 4294.06 28.97 4300.61 28.75 4313.71 28.7 4320.27 28.95 4333.37 28.83
4353.03 29.27 4359.58 29.21 4379.24 28.61 4385.79 28.55 4392.34 28 4398.89
27.85 4405.44 27.85 4425.1 27.46 4438.21 26.96 4444.76 27 4451.31 26.83
4470.97 25.96 4484.07 25.79 4490.62 25.46 4497.18 24.96 4503.73 24.61
4516.83 24.59 4523.38 24.69 4529.94 24.65 4536.49 24.41 4556.15 24.41 4575.8
25 4582.35 25.08 4595.46 24.91 4608.56 24.93 4615.12 24.73 4621.67 24.72
4628.22 25.09 4641.33 25.01 4660.98 25.27 4680.64 24.91 4687.19 24.99
4693.74 25.3 4700.3 25.13 4706.85 25.25 4713.4 25.15 4739.52 26.02 4746.04
26.4 4752.56 26.24 4772.12 26.91 4785.16 27.1 4804.73 28.31 4811.25 28.6
4817.77 28.48 4824.29 28.61 4837.33 28.58 4869.94 29.04 4882.98 29.41 4889.5
29.74 4902.54 30.17 4915.58 30.8 4928.62 32.01 4941.67 32.33 4948.19 32.29
4954.71 32.43 4961.23 32.72 4967.75 32.76 4980.79 33.36 5013.4 34.06 5026.44
34.26 5065.57 35.3 5072.09 35.3 5085.13 35.8 5098.17 36.06 5104.69 36.54
5117.73 37.02 5124.25 37.11 5130.78 37.35 5150.34 36.96 5156.86 36.98
5163.38 36.81 5169.9 36.99 5176.42 36.88 5195.99 37.43 5202.51 37.52 5215.55
38.2 5228.59 38.61 5235.11 39.15 5241.63 39.35 5261.2 40.4 5274.24 40.9

5287.28 41.83 5326.41 42.96 5365.53 44 5372.05 44.06 5385.1 43.76 5398.14 44.37 5404.66 44.91 5417.7 47.05 5424.22 47.99 5437.26 49.02 5443.78 50.8 5450.31 52.18 5456.83 52.54 5469.87 52.84 5482.91 53.6 5489.43 53.86 5495.95 54.41 5515.52 55.28 5522.04 55.46 5548.12 56.77 5554.64 57.81 5567.68 60.82 5580.73 61.67 5606.81 63.95 5652.46 66.11

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .095 1520.62 .055 1676.82 .095

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1520.62 1676.82 1458.48 1428.11 1397.47 .3 .5 Ineffective Flow num= 3
 Sta L Sta R Elev Permanent
 0 1068.71 29.5 T
 1068.71 1475.06 27.3 F
 4353 5000 29.27 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 103799.2

INPUT
Description: 92
Station Elevation Data num= 439
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 30.96 13.11 30.95 19.67 30.72 32.79 29.34 45.9 29.31 59.01 29.04 72.13 29.26 85.24 29.02 91.8 29.08 98.36 29.36 104.91 29.33 124.59 29.72 144.26 29.46 163.93 29.51 170.49 29.35 177.04 29.35 183.6 29.56 209.83 29.14 229.5 29.32 236.06 29.22 242.61 29.32 249.17 29.73 281.96 29.97 288.51 30.1 295.07 30.44 308.19 30.29 314.74 30.6 321.3 30.7 340.97 30.28 367.2 30.39 373.76 30.54 380.32 30.47 393.43 30.75 399.99 30.59 406.54 30.63 413.1 30.52 432.77 30.89 459 32.12 465.56 32.09 478.67 32.74 485.23 32.88 524.57 32.55 531.13 32.64 550.8 31.54 563.92 30.05 577.03 28.98 583.59 28.15 590.14 27.63 596.7 27.65 603.26 26.94 609.82 26.49 622.93 25.85 629.49 25.25 636.04 25.6 649.16 25.25 655.72 25.26 662.27 25.41 668.83 25.74 675.39 25.42 681.94 25.56 688.5 25.84 701.62 25.66 721.29 27.1 747.52 27.09 754.07 26.89 760.63 26.89 767.19 27.29 773.74 27.84 780.3 28.57 793.41 28.64 806.53 29.23 813.09 29.1 819.64 29.17 832.76 29.78 839.29 29.88 858.89 28.97 878.49 27.52 885.03 26.84 891.56 25.99 898.09 24.97 911.16 21.94 917.7 21.59 930.76 21.49 937.3 21.75 950.36 22.7 956.9 23.39 969.97 25.04 976.5 25.6 989.57 27.05 1002.63 28.17 1009.17 28.83 1035.3 29.55 1041.84 29.27 1061.44 27.66 1067.97 26.77 1081.04 24.78 1100.64 22.83 1107.17 22.4 1126.77 20.3 1133.31 19.13 1139.84 18.5 1152.91 17.88 1159.44 17.32 1172.51 17.03 1179.04 17.09 1198.65 16.88 1205.18 17.35 1211.71 18.34 1231.31 19.58 1237.85 19.74 1244.38 19.74 1250.92 19.35 1263.98 18.12 1270.52 17.63 1277.05 16.84 1283.58 16.82 1290.12 18.59 1296.65 19.78 1303.19 19.71 1309.72 19.79 1322.79 19.74 1329.32 19.14 1361.99 18.09 1388.12 18.07 1394.66 17.83 1401.19 18.01 1420.79 17.62 1427.33 17.79 1433.86 17.72 1440.39 17.41 1460 17.55 1466.53 17.76 1473.06 17.78 1486.13 18.35 1492.66 18.31 1499.2 18.13 1505.73 18.17 1518.8 17.87 1525.33 17.53 1531.87 17.73 1538.4 17.64 1558 17.7 1571.07 17.23 1584.14 17.34 1603.74 17.15 1610.27 17.37 1636.41 17.41 1662.54 16.79 1701.74 17.7 1734.41 17.68 1760.55 18.19 1773.61 18.2 1780.15 18.33 1793.22 18.1 1812.82 18.05 1878.15

19.41 1884.69 19.74 1897.76 19.71 1904.29 19.45 1910.82 18.28 1917.36 16.88
1923.89 16.37 1930.42 16.82 1936.96 17.78 1943.49 18.87 1950.03 19.51
1956.56 19.71 1982.69 19.14 1995.76 18.29 2002.3 18.28 2008.83 18.46 2021.9
18.51 2034.94 18.26 2047.97 17.48 2054.49 17.39 2061 17.63 2074.03 18.54
2093.57 18.84 2106.6 18.74 2113.12 18.48 2132.66 17.33 2139.17 16.62 2142.98
15.95 2158 12.8 2175 9.7 2190 7.2 2205 8.2 2222 12.3 2228.16 14.36 2230.38
14.55 2236.89 16.6 2249.92 16.83 2262.95 17.66 2269.46 18.9 2275.98 20.31
2289 24.87 2295.52 26.64 2302.03 27.34 2315.06 27.39 2328.09 27.74 2341.12
27.7 2367.18 27.35 2373.69 27.37 2380.21 27.56 2425.81 28.35 2451.86 29.12
2458.38 29.17 2490.95 28.05 2503.98 27.96 2510.49 27.71 2536.55 27.36
2556.09 27.34 2562.61 27.2 2569.12 26.88 2608.38 27.25 2654.18 27.09 2686.89
27.85 2699.98 28.76 2713.06 29.89 2719.6 30.09 2745.77 29.94 2758.86 29.44
2778.49 28.33 2791.57 27.76 2811.2 27.48 2824.29 27.82 2843.92 28.54 2850.46
28.6 2870.09 28.31 2883.17 27.83 2902.8 27.33 2915.89 27.36 2942.06 27.69
2948.6 27.99 2987.86 27.77 3014.03 27.25 3020.57 27.25 3033.65 26.74 3046.74
26.39 3053.28 26.34 3066.37 26.56 3072.91 26.46 3079.45 26.1 3086 26.7
3105.62 27.46 3112.17 27.59 3118.71 27.44 3144.88 27.82 3151.42 27.78
3164.51 27.37 3177.59 27.27 3190.68 27.64 3197.22 27.63 3203.76 27.47
3216.85 27.41 3256.11 27.1 3262.65 26.74 3282.28 24.77 3295.36 24.16 3308.45
23.73 3314.99 23.98 3321.53 24 3328.08 23.63 3334.62 24.2 3341.16 24.24
3347.7 23.95 3354.25 24.04 3360.79 23.89 3367.33 23.6 3373.88 23.46 3406.59
23.43 3419.67 22.99 3432.76 22.22 3439.3 21.69 3445.85 21.6 3452.39 21.65
3458.93 21.41 3465.47 21.57 3478.56 21.29 3517.82 21.19 3530.9 21.42 3570.16
21.17 3583.24 21.29 3596.33 21.13 3622.5 21.27 3629.04 21.17 3642.13 21.35
3655.21 21.07 3674.84 21.4 3687.93 21.25 3701.01 21.42 3707.55 21.61 3720.64
21.64 3727.18 21.54 3733.73 21.87 3753.35 21.37 3779.52 21.25 3799.15 21.38
3805.7 21.33 3812.24 21.44 3818.78 21.7 3825.32 21.75 3831.87 21.41 3838.41
21.3 3858.04 21.42 3864.58 21.36 3884.21 21.49 3897.29 22.04 3903.84 22.03
3916.92 21.55 3943.09 21.57 3949.64 21.76 3956.18 21.79 3962.72 21.59
3969.26 21.7 3995.43 21.48 4008.52 21.82 4015.06 21.64 4028.15 21.75 4034.69
21.94 4054.32 21.87 4067.4 21.73 4073.95 21.95 4093.57 22.01 4100.12 22.35
4113.2 23.49 4126.29 23.58 4139.37 23.43 4159 24.06 4178.63 24.07 4198.26
24.45 4211.34 24.8 4224.43 24.95 4230.97 25.23 4244.05 26 4250.6 26.09
4270.22 27.15 4289.85 27.86 4309.48 28.16 4342.19 28.21 4348.73 28.33
4381.44 27.63 4407.62 27.54 4433.79 27.88 4440.33 28.06 4446.87 28.03
4453.41 27.74 4466.5 28.35 4479.58 28.63 4505.75 29.45 4512.28 29.46 4518.82
29.75 4525.35 29.81 4544.96 30.36 4590.71 32.5 4597.25 32.54 4610.32 32.84
4623.39 32.88 4636.46 33.33 4649.53 33.46 4669.14 32.76 4695.28 32.6 4708.35
32.21 4721.42 32.41 4747.57 32.51 4760.64 32.71 4767.17 32.52 4773.71 32.49
4780.25 32.89 4793.32 32.53 4812.92 32.7 4819.46 32.96 4832.53 32.94 4858.67
33.46 4871.74 33.33 4878.28 33.4 4884.82 33.22 4891.35 33.22 4910.96 33.78
4917.49 33.66 4943.64 34.86 4956.71 35.03 4969.78 35.52 4976.32 35.64
4989.39 35.46 4995.92 35.64 5022.07 36.03 5028.6 35.95 5035.14 35.65 5048.21
36.16 5067.82 36.66 5074.35 37.01 5080.89 37.17 5087.42 37.66 5100.49 38.02
5107.03 38.33 5120.1 39.16 5139.71 39.55 5146.24 39.81 5159.32 39.93 5172.39
40.48 5198.53 40.86 5205.07 41.12 5211.6 41.53 5218.14 41.65 5231.21 43.3
5237.74 44.53 5244.28 46.05 5250.82 46.98 5263.89 47.81 5270.42 48.35
5290.03 49.15 5316.17 50.5 5322.71 50.65 5335.78 51.4 5355.39 52.25 5361.92
52.39 5368.46 53.15 5374.99 54.26 5381.53 55.56 5388.06 57.23 5401.14 60.18
5407.67 61.17 5414.21 61.61 5427.28 61.71 5446.89 62.8 5459.96 63.33 5473.03
63.4 5479.56 63.63 5486.1 63.62 5492.64 63.75 5512.24 64.46 5525.31 64.59
5544.92 65.04 5597.21 65.63 5610.28 65.54 5623.35 64.84 5629.89 63.84
5636.42 61.8

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .095 2106.6 .055 2302.03 .087

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2106.6 2302.03 1511.12 1623.98 1750.94 .3 .5 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 1040 29.1 F
 2376 3256 28.4 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 102175.3

INPUT
Description: 91
Station Elevation Data num= 350
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 28.53 13.09 27.86 32.72 28.08 39.27 27.79 58.9 28 78.54 27.44 98.17 27.4 111.26 27.67 163.62 27.31 183.25 28.11 202.89 28.01 209.43 28.29 235.61 28.18 255.25 28.46 261.79 28.79 274.88 28.49 307.61 29.11 327.24 29.96 346.87 31.34 359.96 32.64 366.51 32.96 392.69 33.05 399.23 33.26 418.87 32.07 438.5 31.55 458.14 31.42 477.77 31.76 490.86 31.62 497.4 31.86 503.95 31.78 556.31 32.62 562.85 32.54 582.49 32.88 602.12 32.52 615.21 31.8 628.3 31.73 634.84 30.84 647.93 30.37 654.48 29.87 680.66 28.99 687.2 29.06 700.29 29.91 706.84 30.08 713.38 31.26 726.47 32.61 752.65 33.87 772.29 34.3 785.38 34.22 791.92 34.41 811.55 33.59 818.1 33.61 837.73 32.61 857.37 32.47 870.46 32.71 890.09 32.09 909.73 32.04 955.54 30.46 962.08 30.42 981.72 29.16 1001.35 26.94 1007.9 26.72 1020.99 25.45 1027.53 25.52 1034.08 24.92 1047.17 24.61 1053.71 24.93 1060.26 25.85 1073.35 26.17 1092.98 25.02 1099.52 24.9 1112.61 25.17 1119.16 25.08 1132.25 24.2 1145.34 22.55 1158.43 21.6 1171.52 19.43 1178.06 17.79 1200 6.2 1240 6.2 1262 12.8 1265.32 13.89 1269.83 13.89 1282.95 18.4 1296.06 19.29 1302.61 19.48 1315.72 19 1328.83 19.29 1341.94 18.77 1355.05 19.01 1368.16 18.62 1400.94 19.85 1427.16 18.18 1433.72 17.98 1446.83 18.34 1479.6 18.67 1512.38 18.06 1532.04 18.16 1545.15 17.35 1551.71 17.82 1564.82 17.29 1571.37 17.35 1591.04 16.22 1597.6 16.12 1604.15 16.55 1617.26 16.24 1623.82 16.98 1630.37 16.95 1636.93 16.41 1656.59 16.24 1669.7 15.58 1689.34 16.23 1695.89 15.94 1708.98 16.35 1715.53 15.96 1728.62 15.8 1735.17 16.1 1774.45 16.71 1807.19 15.58 1853.02 15.77 1866.11 16.78 1872.66 16.83 1885.75 17.69 1898.84 18.07 1925.03 17.45 1951.22 19.19 1970.86 19.85 1977.41 20.29 1997.05 20.4 2010.14 19.41 2016.69 19.74 2036.33 19.54 2049.42 18.2 2055.97 17.76 2075.61 17.45 2095.25 17.75 2121.44 20.06 2134.53 20.39 2147.63 19.8 2160.72 19.6 2173.81 20.08 2180.36 20.81 2193.45 21.39 2226.19 21.63 2245.83 20.76 2258.92 19.7 2278.57 18.81 2298.21 18.26 2317.85 18.26 2337.49 17.8 2344.04 18.01 2357.13 18.98 2370.22 20.25 2396.41 21.45 2416.05 22.96 2435.69 24.12 2442.24 24.19 2455.33 23.94 2468.43 22.61 2481.52 19.92 2494.62 19.3 2507.71 19.5 2514.26 19.27 2533.9 19.67 2540.44 19.11 2546.99 19.25 2560.09 18.82 2573.18 19.77 2586.27 21.08 2592.82 21.98 2605.91 23.21 2619.01 23.77 2632.1 23.85 2638.65 23.59 2651.74 22.57 2664.84 22.1 2691.03 20.37 2723.76 19.15 2756.5 18.39 2763.04 18 2769.59 17.27 2789.23 16.1 2795.78 16.56 2815.42 16.31 2828.51 16.57 2854.7 18.34 2867.79 18.96 2893.98 19.42 2913.62 19.44 2920.17 19.92 2946.36 20.98 2959.45 21.74 2979.09 22.1 3005.28 23.24 3024.92 25.46 3044.56

26.57 3051.11 26.63 3057.66 26.22 3070.75 26.03 3077.3 25.66 3096.94 25.28
3136.22 27.87 3175.5 28.75 3188.6 28.82 3214.78 30.1 3221.33 30.06 3247.52
30.69 3267.16 30.08 3273.71 30.4 3306.44 29.52 3332.63 29.72 3345.72 29.41
3365.36 29.6 3391.55 28.97 3404.65 27.94 3417.74 27.66 3430.83 27.76 3450.47
27.2 3457.02 26.53 3502.85 26.19 3509.4 26.5 3522.49 26.5 3568.32 27.78
3574.87 27.57 3587.96 27.85 3614.15 27.36 3731.99 27.47 3738.54 27.8 3758.18
28.02 3777.82 28.72 3790.92 28.45 3797.46 28 3810.56 27.7 3843.29 27.69
3856.39 28.26 3862.93 28.1 3869.48 28.25 3895.69 27.81 3908.8 28.24 3928.46
27.93 3935.02 27.49 3948.12 28.06 3954.68 28.02 3961.23 28.31 3980.89 27.91
3987.45 28.09 4026.77 27.6 4033.33 27.91 4066.1 28.24 4072.65 28.91 4098.87
29.72 4105.42 29.46 4131.64 29.8 4164.41 29.69 4210.29 30.19 4243.06 30.03
4249.61 30.42 4269.27 30.49 4282.38 30.33 4308.6 31.07 4334.81 31.02 4367.58
31.93 4420.02 32.38 4426.57 32.22 4433.12 32.5 4465.9 32.64 4479 33.13
4492.11 32.88 4524.88 32.97 4531.44 32.79 4544.54 33.48 4564.21 33.44
4577.31 33.15 4603.53 33.93 4616.64 34.1 4629.75 33.52 4636.3 33.49 4655.96
34.05 4662.52 33.82 4688.73 34.65 4714.95 34.4 4728.06 33.72 4754.27 34.22
4767.38 34.64 4839.48 34.04 4885.36 34.25 4905.02 34.71 4937.79 34.88 4950.9
34.39 4970.56 34.81 5003.33 34.98 5016.44 34.7 5062.32 34.85 5075.42 34.61
5095.09 35.14 5140.97 35.22 5173.74 35.71 5186.84 36.53 5213.06 36.48
5219.61 36.08 5232.72 36.1 5245.83 36.74 5258.94 35.93 5272.05 38 5278.6
38.17 5285.16 37.96 5298.26 39.37 5311.37 39.73 5324.48 39.62 5337.59 40.47
5350.7 40.3 5357.25 39.62 5370.36 39.1 5409.68 40.33 5416.24 40.83 5422.79
40.89 5435.9 39.48 5449.01 39.27 5455.56 39.69 5475.22 39.8 5494.89 39.51
5501.44 39.95 5540.76 40.19 5619.41 39.14 5632.52 39.65 5671.85 39.85
5684.95 40.45 5730.83 41.33 5743.94 41.27 5770.16 41.88 5789.82 42.02
5802.93 42.56 5822.59 42.52 5855.36 43.03 5868.47 43.47 5888.13 43.16
5934.01 44.69 5947.12 44.71 5960.23 45.55 6006.1 46.81 6038.88 49.13 6045.43
50.14 6065.09 52.32 6071.65 53.4 6078.2 55.06 6084.75 56.14 6124.08 58.32
6143.74 58.39 6156.85 58.83 6202.73 64.12 6209.28 64.62

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .095 1112.61 .055 1302.61 .095

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1112.61
1302.61 2000.77 1915.38 1882.93 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 1073.35 26.17 F

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 100259.9

INPUT
Description: 90
Station Elevation Data num= 489
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 31.53 6.54 31.37 13.08 31.55
19.62 32.04 26.16 32.27 39.23 32.28 45.77 32.05 52.31 31.64 58.85 31.51
65.39 31.59 71.93 31.4 78.47 30.69 85.01 30.81 98.09 29.66 104.62 29.48
117.7 29.31 137.32 30.01 143.86 30.15 150.4 29.81 156.94 29.62 170.02 29.82
183.09 29.71 202.71 30.08 209.25 30.1 215.79 29.84 228.87 30.02 241.94 30.4
248.48 30.4 255.02 30.01 268.1 29.71 287.72 28.74 294.26 28.8 300.8 28.59

307.34 28.23 320.41 28.42 326.95 28.18 333.49 28.13 353.11 26.7 359.65 26.81
372.73 27.98 392.34 28.61 398.88 28.47 405.42 28.54 418.5 28.99 425.04 29.45
431.58 29.73 444.66 30.82 457.73 31.17 464.27 31.24 477.35 30.71 496.97
29.26 523.12 28.47 536.2 28.56 549.28 28 555.82 28.22 595.05 27.48 608.13
27.68 614.67 27.9 621.21 27.83 627.75 27.6 634.29 27.89 640.83 28.04 647.37
28.33 653.9 28.34 666.98 27.93 673.52 27.85 686.6 28.4 693.14 28.53 706.22
28.39 725.83 28.73 745.45 28.67 751.99 28.82 765.07 28.59 771.61 28.73
784.69 28.25 797.76 27.22 804.3 26.85 810.84 26.21 817.38 25.75 850.08 24.81
856.62 25.04 863.15 24.9 869.69 25.07 882.77 24.66 895.85 24.6 908.93 24.71
922.01 24.6 928.54 24.78 935.08 24.81 941.62 24.63 954.7 24.48 961.24 24.71
987.4 24.98 993.93 25.42 1007.01 26.65 1052.79 29.24 1059.33 29.37 1065.86
29.75 1072.4 30.33 1085.48 30.23 1098.56 29.61 1111.64 28.2 1124.72 27.78
1137.79 27.91 1150.87 27.56 1170.49 27.94 1190.11 27.88 1196.65 27.51
1209.72 27.82 1222.8 28.86 1255.5 29.57 1268.58 29.54 1288.19 29.05 1294.73
29 1307.81 28.05 1320.89 27.38 1340.51 26.95 1360.12 26.68 1366.66 26.74
1373.2 27.02 1399.36 26.98 1412.44 27.09 1432.05 28.03 1445.13 28.1 1451.67
27.69 1464.75 26.56 1484.37 25.91 1490.9 25.96 1503.98 25.8 1517.06 25.95
1523.6 25.54 1530.14 25.62 1536.68 25.55 1543.22 25.77 1549.76 26.45 1556.29
26.79 1562.83 27.78 1569.37 28.57 1582.45 29.55 1595.53 30.39 1602.07 30.64
1608.61 30.69 1621.69 30.23 1628.22 29.72 1641.3 28.95 1647.84 28.36 1654.38
27.56 1660.92 27.18 1667.46 26.63 1693.62 25.8 1706.69 25.78 1713.23 25.67
1752.47 25.66 1759.01 26.28 1772.08 26.94 1785.16 27.34 1791.7 28.02 1804.78
28.46 1817.86 29.1 1830.94 30.01 1850.55 29.97 1857.09 30.13 1876.71 30.24
1883.25 30.53 1896.33 30.55 1902.85 30.45 1909.38 30.17 1915.9 29.75 1928.95
29.73 1948.52 30.26 1955.04 30.33 1981.14 29.64 1994.19 29.09 2007.24 28.65
2020.29 28.84 2026.81 28.78 2059.43 28.98 2085.53 28.6 2098.58 28.6 2170.34
27.28 2176.87 26.89 2183.39 26.37 2196.44 25.68 2209.49 25.34 2216.01 24.9
2222.54 24.64 2229.06 24.16 2235.58 24.03 2242.11 23.52 2248.63 23.2 2281.25
23.12 2287.78 22.86 2313.87 22.55 2326.92 22.08 2333.45 21.61 2339.97 21.28
2353.02 21.14 2366.07 20.58 2392.16 20.19 2405.21 19.5 2411.74 19.52 2418.26
19.76 2431.31 19.88 2437.83 20.47 2450.88 20.9 2457.41 20.82 2463.93 20.98
2476.98 20.93 2496.55 20.43 2516.12 20.54 2529.17 19.95 2535.7 20.26 2548.74
21.46 2555.27 21.79 2568.32 21.89 2574.84 21.79 2601.06 19.53 2614.17 18.58
2627.28 18 2646.94 16.62 2653.49 16.36 2660.05 16.25 2673.16 16.88 2686.27
16.82 2692.82 16.69 2699.38 16.75 2719.04 17.82 2732.15 18.15 2738.7 18.43
2745.26 18.97 2758.37 19.46 2771.48 19.57 2778.03 19.24 2784.59 19.39
2791.14 19.69 2810.8 19.16 2823.91 19.2 2830.47 19.09 2837.02 18.73 2850.13
17.53 2855.88 16.84 2865 12.2 2885 6.5 2905 5.2 2925 6.2 2945 11.2 2947.74
16.01 2948.45 16.2 2955 16.34 2961.56 15.66 2968.11 15.49 2974.67 15.79
2981.22 15.85 2994.33 15.49 3000.89 15.56 3033.66 15.24 3046.77 15.38
3079.54 15 3092.65 15.18 3099.2 15.11 3105.76 14.74 3118.87 14.44 3131.98
15.77 3138.53 16.17 3145.09 16.21 3151.64 15.99 3164.75 13.93 3204.08 14.3
3217.19 14.66 3230.3 14.54 3243.4 15.49 3256.51 16.74 3263.07 17.23 3276.18
17.3 3282.73 17.61 3295.84 17.86 3302.4 17.84 3308.95 18.14 3315.5 18.21
3322.06 18.1 3341.72 18.14 3348.28 17.94 3354.83 17.95 3361.39 18.3 3381.05
18.79 3387.6 19.17 3407.27 19.82 3420.38 20.47 3426.93 20.92 3433.49 21.1
3446.6 21.23 3453.15 21.52 3459.7 21.61 3472.81 22.05 3485.92 22.84 3512.14
23.93 3518.7 24.53 3531.81 25.02 3551.47 23.8 3558.02 23.5 3584.24 23.51
3590.8 23.84 3617.01 24.26 3643.23 23.92 3649.79 23.98 3669.45 23.62 3695.67
24.77 3702.22 24.96 3708.78 25.3 3721.89 26.18 3728.44 26.33 3741.55 26.45
3754.66 26.7 3767.77 26.63 3787.43 27.37 3793.99 27.47 3800.54 27.35 3820.21
27.65 3846.42 27.7 3859.53 27.91 3866.09 27.88 3872.64 27.7 3885.75 28.29
3892.31 28.39 3898.85 28.3 3918.49 28.64 3925.04 28.66 3931.59 28.91 3944.68
28.91 3964.32 29.24 3970.87 29.17 3990.51 27.94 4003.61 27.57 4016.7 26.63

4023.25 26.83 4029.79 27.21 4036.34 27.04 4042.89 27.28 4055.98 28.02
4062.53 28.26 4095.26 27.41 4108.36 27.45 4128 27.89 4141.09 27.93 4167.28
28.34 4200.02 28.64 4206.57 28.8 4232.75 28.57 4245.85 29 4291.68 28.7
4304.77 28.84 4357.15 28.39 4389.89 28.57 4402.98 28.45 4455.36 29.24
4461.91 29.24 4468.45 29.51 4488.09 29.92 4494.64 30.16 4507.74 30.26
4520.83 30.18 4527.38 30.03 4547.02 29.91 4573.21 29.47 4612.49 29.58
4691.06 29.43 4710.7 29.84 4736.89 30.11 4756.53 30.43 4854.74 30.26 4861.28
30.45 4913.66 31.12 4926.75 31.27 4952.94 32.04 4966.04 31.96 4972.58 32.43
4979.13 32.64 4992.23 32.88 4998.77 33.25 5011.87 33.44 5018.42 33.82
5024.96 33.89 5031.51 33.72 5038.06 34.04 5057.7 34.44 5070.79 34.47 5083.89
34.08 5096.98 34.32 5103.53 34.05 5116.62 34.26 5136.26 34.34 5155.91 33.97
5169 33.61 5195.19 33.66 5208.28 33.86 5214.83 34.1 5227.92 33.65 5234.47
33.57 5260.66 34.1 5273.75 34.01 5280.3 33.71 5293.4 33.87 5299.94 33.82
5313.04 33.52 5326.13 33.66 5332.68 33.85 5352.32 33.74 5371.96 34.34
5378.51 34.31 5385.06 33.91 5398.15 34.2 5417.79 34.28 5430.89 34.13 5437.43
34.39 5443.98 34.21 5463.62 34.04 5476.72 34.62 5489.81 34.84 5496.36 35.07
5516 34.97 5535.64 35.37 5542.19 35.06 5555.28 35.33 5581.47 35.95 5601.11
35.66 5607.66 35.87 5633.85 35.62 5653.49 35.8 5666.58 36.13 5673.13 36.13
5686.23 36.68 5699.32 36.79 5705.87 36.74 5718.96 37.01 5725.51 37.27 5738.6
37.44 5745.15 37.3 5751.7 37.32 5764.79 37.8 5790.98 37.96 5797.53 38.13
5810.62 38.22 5823.72 38.47 5830.26 38.72 5849.91 38.96 5856.45 38.84 5863
39.03 5869.55 39.04 5902.28 40.35 5908.83 40.43 5915.38 40.65 5935.02 40.8
5941.57 40.62 5948.11 40.65 5961.21 41.21 5967.75 41.03 5974.3 41.12 5980.85
41.35 5993.94 41.54 6007.04 42.14 6013.58 42.03 6020.13 42.25 6026.68 42.73
6033.23 42.97 6046.32 42.87 6052.87 43 6065.96 43.53 6072.51 43.68 6085.6
43.43 6098.7 43.77 6111.79 44 6118.34 43.81 6144.53 44.04 6151.08 44.01
6157.62 43.75 6177.26 44.22 6196.91 44.18 6216.55 44.79 6229.64 44.89
6236.19 45.13 6249.28 45.26 6262.38 45.12 6268.92 44.95 6282.02 45.24
6295.11 45.06 6314.75 45.23 6327.85 44.98 6340.94 45.37 6347.49 45.4

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .095 2791.14 .055 2955 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2791.14
2955 1027.78 1066.17 1112.6 .3 .5 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 1052.79 29.24 F
 3964.32 6347.49 29.24 F
 CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 99193.71

INPUT
Description: 89
Station Elevation Data num= 495
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 29.06 13.12 29.46 19.68
29.39 26.24 29.79 32.8 30.25 39.36 30.48 52.48 30.19 59.04 29.88 65.6 29.16
72.16 28.64 78.73 28.74 85.29 28.82 98.41 28.29 104.97 28.17 111.53 28.07
118.09 27.67 124.65 27.31 131.21 27.02 137.77 26.94 144.33 26.92 150.89
26.92 157.45 26.86 164.01 26.88 170.57 26.72 177.13 26.62 183.69 26.71
190.25 27.04 196.81 26.97 203.37 27.08 209.93 26.98 216.49 26.95 223.05

27.24 229.62 27.29 236.18 27.2 242.74 27.14 249.3 27.03 255.86 27.05 262.42
27.24 268.98 27.49 275.54 27.46 282.1 27.19 288.66 27.13 295.22 26.89 301.78
26.88 308.34 26.53 314.9 26.22 321.46 26.07 328.02 26.33 334.58 26.33 341.14
25.85 347.7 25.56 354.26 25.36 360.82 25.44 367.38 25.61 373.95 25.56
380.51 25.48 387.07 25.42 393.63 25.38 400.19 25.43 406.75 25.36 413.31
25.52 419.87 25.3 426.43 25.11 432.99 25.18 439.55 25.22 446.11 25.24 452.67
25.29 459.23 25.39 465.79 25.31 472.35 25.11 485.47 24.74 492.03 24.81
498.59 24.68 505.15 24.74 511.71 24.76 518.28 24.76 524.84 24.59 531.4 24.56
537.96 24.61 544.52 24.64 551.08 24.64 557.64 24.66 564.2 24.91 570.76 25.09
577.32 24.72 583.88 24.65 590.44 25.04 597 25.41 603.56 25.2 610.12 25.58
616.68 25.91 623.24 26.36 629.8 26.53 636.36 26.21 642.92 25.93 649.48 25.83
656.04 25.51 662.61 25.22 669.17 25.06 675.73 24.92 682.29 24.7 688.85 24.52
695.41 24.5 701.97 24.42 708.53 24.29 715.09 24.26 721.65 24.41 728.21 24.14
734.77 24.02 741.33 23.71 747.89 23.65 754.45 23.63 761.01 23.72 767.57
23.93 774.13 23.99 780.69 23.98 787.25 24.03 793.81 24 800.37 24.01 806.93
23.97 813.5 24.23 820.06 24.34 826.62 24.26 833.18 23.71 839.74 23.57 846.3
23.67 852.86 23.65 859.42 23.68 865.98 23.84 872.54 24.05 879.1 24.12 892.22
23.9 898.78 23.98 905.34 24.44 911.9 24.45 918.46 23.73 925.02 23.48 931.58
23.67 938.14 23.99 944.7 24.2 951.27 24.25 957.83 24.02 964.39 24.11 970.95
24.22 977.51 24.3 984.07 24.26 990.63 24.06 997.19 24 1003.75 23.99 1016.87
24.36 1023.43 24.46 1029.99 24.82 1036.55 24.28 1043.11 23.96 1049.67 24.96
1056.23 25.13 1062.79 25.9 1069.35 26.12 1075.91 26.23 1082.47 26.28 1089.03
26.38 1095.59 26.31 1102.16 26.29 1108.72 26.34 1115.28 26.41 1121.84 26.28
1128.4 26.21 1134.96 26.17 1141.52 25.94 1148.08 26.05 1154.64 25.94 1167.76
25.75 1174.32 25.8 1180.88 25.8 1187.44 25.76 1194 25.74 1200.56 25.8
1207.12 25.82 1213.68 25.47 1220.24 25.41 1226.8 25.21 1233.36 25.14 1239.92
25.37 1246.48 25.56 1253.05 25.6 1259.61 25.5 1266.17 25.42 1272.73 25.4
1279.29 25.21 1285.85 25.27 1292.41 25.54 1298.97 25.5 1305.53 25.41 1312.09
25.17 1318.65 24.84 1325.21 24.35 1331.77 23.5 1338.33 22.71 1344.89 24.47
1351.45 24.52 1358.01 24.51 1371.13 24.14 1377.69 24.12 1384.25 23.97
1390.81 24.11 1397.37 24.29 1403.94 24.5 1410.5 24.57 1417.06 24.72 1436.74
25.34 1443.3 25.53 1449.86 25.49 1456.42 25.76 1462.98 25.98 1476.1 25.95
1482.66 26.35 1489.22 26.66 1495.78 26.57 1502.34 26.3 1508.9 26.17 1515.46
26.14 1522.02 26.39 1528.58 26.72 1535.14 27.23 1541.7 27.45 1548.26 27.23
1554.83 27.45 1561.39 27.55 1567.95 26.8 1574.51 26.65 1581.07 26.91 1594.19
26.58 1600.75 26.34 1607.31 25.98 1613.87 25.85 1620.43 25.78 1626.99 25.73
1633.55 26.01 1640.11 26.33 1646.67 26.55 1653.23 26.56 1659.79 26.6 1666.35
26.7 1672.91 26.68 1679.47 26.36 1686.03 26.57 1692.59 26.84 1699.15 26.89
1705.72 27.54 1712.28 28.15 1718.84 27.78 1725.4 27.16 1731.96 27.03 1738.52
27.03 1745.08 26.89 1751.64 27.21 1758.2 27.94 1764.76 28.51 1771.32 28.55
1777.88 28.29 1784.44 28.71 1791 29.48 1797.56 29.57 1804.12 29.53 1810.68
29.61 1817.24 29.62 1830.36 29.77 1843.48 29.71 1850.04 29.58 1856.61 29.42
1863.17 29.53 1876.29 29.6 1882.85 29.57 1889.41 29.4 1895.97 29.36 1902.53
29.28 1909.09 29.23 1915.65 29.06 1922.21 28.98 1928.77 29.07 1935.33 29.2
1941.89 29.2 1948.45 29.07 1955.01 29.09 1961.57 29.05 1968.13 29.04 1974.69
29.14 1981.25 29.14 1987.81 29.02 1994.37 28.99 2000.93 29.03 2007.49 28.97
2014.06 28.89 2020.62 28.84 2027.18 28.63 2040.3 28.66 2053.42 28.27 2059.98
28.12 2066.54 28.27 2073.1 28.24 2079.66 27.89 2086.22 27.74 2092.78 27.56
2099.34 27.25 2105.9 26.8 2112.46 26.41 2125.58 25.44 2132.14 25.05 2138.7
24.71 2145.26 24.55 2151.82 24.45 2158.39 24.37 2164.95 24.27 2171.51 24.06
2178.07 23.91 2184.63 23.71 2191.19 23.74 2197.75 23.87 2204.31 24.17
2210.87 24.42 2217.43 24.61 2223.99 24.39 2237.11 23.52 2243.67 23.17
2250.23 22.88 2256.79 22.43 2263.35 21.85 2269.91 21.06 2276.47 20.44
2283.03 20.17 2289.59 20.26 2296.16 20.28 2302.72 20.08 2309.28 20.08

2315.84 20.02 2322.4 19.76 2328.96 19.74 2335.52 19.59 2342.08 19.39 2348.64 19.24 2355.2 19.33 2361.76 19.13 2374.88 19.35 2381.44 19.56 2388 19.88 2394.56 20.04 2407.69 20.07 2414.25 19.89 2420.81 19.79 2427.37 19.36 2433.93 19.25 2440.49 19.26 2447.05 19.08 2453.61 19.05 2460.17 18.99 2466.73 19.39 2473.29 19.69 2479.85 19.67 2486.41 19.63 2492.97 20.03 2499.53 20.59 2506.1 19.64 2512.66 19.3 2525.78 19.51 2532.34 19.6 2538.9 19.67 2545.46 19.71 2552.02 19.56 2558.58 19.72 2565.14 19.92 2571.7 19.99 2578.26 20.35 2584.82 20.84 2591.38 20.71 2597.95 20.17 2604.51 19.66 2611.07 19.25 2617.63 19.12 2624.19 19.07 2630.75 19.33 2637.31 19.28 2643.87 19.36 2663.55 19.1 2670.11 18.93 2676.67 18.69 2683.23 18.29 2689.79 18.05 2696.36 17.95 2702.92 17.32 2709.48 17.36 2716.04 17.37 2722.6 17.02 2735.72 15.84 2742.28 15.7 2748.84 15.48 2755.4 15.44 2761.96 15.73 2768.52 16 2775.08 15.92 2781.64 15.87 2788.2 15.71 2794.77 15.6 2801.33 15.74 2807.89 15.5 2814.45 15.52 2821.01 15.47 2827.57 15.35 2834.13 15.27 2840.69 15.12 2847.25 15.47 2853.81 16.14 2860.37 16.55 2866.93 16.98 2873.49 17.48 2880.05 17.95 2886.61 18.48 2893.18 19.05 2899.74 19.55 2906.3 19.64 2912.86 19.42 2919.42 18.77 2925.98 18.76 2932.54 18.97 2939.1 18.08 2945.66 17.7 2952.22 18.02 2958.78 17.86 2965.34 16.96 2970 12.9 2990 8.1 3010 6.3 3030 8.6 3050 12 3068 18.7 3069.68 17.47 3083.44 19.32 3103.12 18.72 3175.28 20.64 3267.13 24.53 3313.06 23.81 3345.86 24.31 3372.1 25.5 3398.35 27.77 3411.47 27.99 3437.71 29.62 3457.39 30.11 3503.32 29.6 3621.41 31.49 3739.5 31.85 3811.67 33.19 3851.03 32.19 3929.76 32.18 3942.88 31.51 4047.86 31.32 4100.34 32.05 4159.39 31.72 4198.75 32.43 4277.48 31.94 4323.4 32.52 4362.77 32.08 4507.1 33.01 4520.22 33.54 4631.75 33.91 4671.12 34.48 4710.48 34.09 4776.09 34.48 4795.77 33.74 4835.13 34.09 4867.94 33.72 4940.1 33.78 5064.76 34.56 5071.32 33.51 5077.88 33.08 5091 33.61 5104.12 34.98 5176.29 36.23 5222.21 36.36 5241.9 37.22 5300.94 38.33 5307.5 38.09 5314.06 36.58 5320.62 35.83 5327.18 35.76 5340.3 36.86 5359.99 36.89 5373.11 38.46 5399.35 38.99 5438.71 38.93 5464.96 39.46 5484.64 39.19 5701.14 41.5 5819.23 44.46 5825.79 45.06 5852.04 45.4 5871.72 46.54

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .095 2906.3 .055 3267.13 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2906.3 3267.13 1067.1 1087.9 1112.89 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 1922.21 29 F

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 98105.8

INPUT Description: 88
Station Elevation Data num= 304
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 35.15 19.65 35.21 32.75 34.92 45.85 34.87 52.4 34.72 65.5 34.68 78.6 34.27 85.15 34.17 98.25 34.23 111.35 33.77 124.45 33.68 131 33.26 144.1 32.73 150.65 32.66 163.75 32.92 170.3 33.35 176.85 33.49 189.95 34.22 196.49 34.27 203.04 34.14 216.14 34.35 222.69 34.23 235.79 34.52 242.34 34.41 255.44 34.57 261.99 34.3 275.09 33.46 281.64 33.31 294.74 33.42 301.29 33.13 314.39 33.37 327.49 31.81 334.04

31.68 340.59 31.95 347.14 31.99 360.24 31.65 379.89 31.51 406.09 31.26
432.29 31.17 458.49 30.66 465.04 30.72 484.69 30.52 510.89 29.96 550.19
30.19 569.84 30.71 576.39 31.01 589.48 31.9 615.68 33.1 641.88 33.81 648.43
34.15 661.53 34.49 681.18 34.69 700.83 34.63 713.93 34.29 733.58 33.23
746.68 32.71 753.23 32.55 785.98 30.92 805.63 30.45 812.18 30.53 818.73
30.21 825.28 30.21 858.03 29.59 871.13 29.04 877.68 28.91 890.78 29.22
923.53 29 949.72 29.33 962.82 29.64 969.37 29.37 1021.77 29.35 1093.82 28.86
1113.47 28.79 1120.02 28.67 1133.12 28.7 1172.42 29.98 1178.97 29.71 1192.07
29.69 1198.62 29.34 1211.72 28.42 1231.37 27.48 1237.92 26.93 1244.47 26.71
1251.02 26.64 1264.12 26.94 1277.22 26.88 1296.87 26.34 1309.97 26.23
1316.52 26.03 1323.07 26.03 1336.16 25.69 1342.71 25.75 1355.81 26.12
1382.01 25.38 1388.56 25.53 1408.21 24.72 1414.76 24.93 1440.96 24.81
1447.51 24.25 1454.06 23.22 1460.61 22.8 1467.16 23.1 1473.71 23.26 1480.26
23.06 1486.81 22.64 1499.91 21.61 1526.11 21.12 1552.31 20.84 1558.86 20.5
1571.96 20.46 1578.51 20.67 1591.61 21.81 1598.16 22.26 1617.81 24.37
1624.36 24.66 1630.91 24.59 1637.46 24.1 1650.56 22.87 1676.76 21.24 1683.31
20.92 1696.41 21.06 1748.8 20.65 1768.45 21.06 1781.55 21.09 1801.2 20.66
1827.4 20.85 1833.95 21.03 1847.05 21.91 1853.6 22.46 1873.25 24.63 1879.8
25.25 1886.35 25.68 1892.9 25.94 1899.45 26.06 1912.55 26.78 1919.1 26.68
1925.65 25.78 1932.2 25.26 1938.75 24.6 1951.85 24.59 1958.4 24.84 1964.95
25.28 1971.5 25.92 1978.05 26.22 1984.6 26.11 1991.15 25.8 2010.8 23.61
2023.9 21.86 2043.55 19.54 2063.2 17.88 2069.75 17.17 2109.04 16.25 2115.59
16.34 2135.24 15.93 2148.34 16.25 2154.89 16.57 2161.44 16.49 2167.99 16.86
2174.54 17.68 2187.64 19.52 2194.19 20.22 2213.84 21.27 2226.94 21.32
2253.14 19.91 2259.69 19.39 2266.24 19.14 2272.79 19.12 2279.34 19.27
2285.89 19.66 2292.44 20.3 2298.99 20.54 2305.54 20.51 2312.09 19.63 2318.64
18.56 2331.74 16.85 2338.29 15.81 2344.84 15.32 2351.39 15.19 2357.94 15.34
2377.59 17.6 2384.14 18.11 2397.24 19.58 2403.79 20.49 2410.34 21 2416.84
21.08 2423.34 20.77 2429.84 20.21 2436.33 19.41 2442.83 18.08 2449.33 16.47
2455.83 15.39 2462.33 15 2488.33 14.64 2494.83 15.38 2507.83 16.08 2527.32
16.82 2533.82 17.35 2540.32 18.02 2546.82 18.23 2553.32 18.11 2559.82 17.69
2566.32 17.59 2572.82 17.7 2579.32 16.6 2581.67 15.97 2590 8.1 2610 7 2630 8
2667.02 16.19 2670.31 17.5 2676.8 18.77 2689.8 19.16 2702.8 19.82 2722.3
20.2 2741.8 21.08 2748.3 21.22 2780.79 23.1 2787.29 23.38 2793.79 23.91
2806.79 24.64 2813.29 24.89 2826.29 25.53 2852.28 26.25 2858.78 26.2 2871.78
26.41 2884.78 26.52 2897.78 26.86 2910.78 27.27 2917.28 27.32 2930.27 27.75
2943.28 27.68 2949.79 27.48 2956.31 27.04 2975.84 26.29 2982.35 26.62
2995.37 26.71 3008.39 27.15 3014.9 27.49 3040.95 27.87 3047.46 28.06 3060.48
28.91 3073.5 30.12 3080.01 30.83 3093.03 32.59 3099.54 33.12 3106.05 33.31
3119.07 33.28 3132.1 32.25 3145.12 30.89 3151.63 29.82 3158.14 28.92 3164.65
29.4 3171.16 29.37 3177.67 29.04 3184.18 29.16 3190.69 29.12 3203.71 29.28
3210.22 29.49 3223.25 29.28 3229.76 29.37 3236.27 29.61 3249.29 30.3 3275.33
31.01 3288.35 30.72 3294.86 30.77 3307.89 30.31 3327.42 30.11 3346.95 30.06
3359.97 31.09 3366.48 31.72 3379.5 32.4 3386.01 32.54 3399.04 32.32 3412.06
32.28 3425.08 31.91 3431.59 31.91 3444.61 32.16 3457.63 31.86 3470.65 31.27
3477.17 31.45 3483.68 31.79 3496.7 32.21 3509.72 32.1 3516.23 32.27 3529.25
31.9 3535.76 31.56 3548.78 31.14 3587.85 31.6 3607.38 32.1 3626.91 31.52
3659.47 31.65 3665.98 31.77 3672.49 31.72 3679 31.5 3685.51 31.89 3692.02
31.72 3698.53 31.83 3711.55 31.75 3718.06 31.57 3724.57 31.57 3731.08 31.19
3737.59 31.32 3744.11 31.71 3763.64 31.84

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .095 2546.82 .055 2676.8 .095

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2546.82 2676.8 1679.58 1694.82 1701.02 .3 .5 Ineffective Flow num= 1
Sta L Sta R Elev Permanent
0 1978 26.22 F

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 96410.98

INPUT
Description: 87
Station Elevation Data num= 402
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 31.59 6.55 31.84 13.1 31.9 19.65 31.82 26.2 31.85 32.75 31.91 39.3 32.06 45.85 31.92 52.4 32.07 58.95 32.07 65.5 32.15 72.05 32.04 78.6 31.89 85.15 31.8 91.7 31.83 98.25 32.01 104.8 32.05 111.35 32.11 117.9 31.88 124.45 31.81 131 31.72 137.55 31.59 144.1 31.32 150.65 31.07 157.2 30.77 163.75 30.45 170.3 30.1 176.85 29.77 183.4 29.63 189.95 29.6 203.05 29.35 209.6 29.36 222.7 29.15 229.25 29.12 235.8 29.24 242.35 29.18 248.9 28.93 255.45 28.87 262 28.93 268.55 28.74 275.1 28.53 288.2 28.76 294.75 28.18 301.3 27.16 307.85 27.05 314.4 26.79 320.95 26.08 327.5 25.47 334.05 25.37 340.6 25.07 353.7 25.02 360.25 25.27 366.8 25.37 373.35 26.14 379.9 26.14 386.45 25.84 393 25.67 406.1 25.74 412.65 25.49 425.75 25.27 432.3 25.19 438.85 25.33 445.4 25.5 451.95 25.55 458.5 25.51 465.05 25.67 471.6 25.62 478.15 25.62 484.7 25.7 491.25 25.93 497.8 25.78 504.35 25.58 510.9 25.54 517.45 25.56 524 25.54 530.55 25.62 537.1 25.78 543.65 25.77 556.76 25.86 563.3 25.86 569.86 25.94 576.41 26.05 582.96 26.18 589.51 26.48 596.06 26.46 602.61 26.42 609.16 26.42 615.71 26.4 622.26 26.13 628.81 26.23 635.36 26.25 641.91 26.08 648.46 26.11 655.01 25.92 661.56 25.69 668.11 25.71 674.66 25.59 687.76 24.94 694.31 24.59 700.86 24.04 707.41 23.62 713.96 23.32 720.51 22.43 727.06 21.9 733.61 21.66 740.16 21.61 746.71 21.59 753.26 22.3 759.81 22.57 766.36 22.88 772.91 22.99 779.46 23.14 786.01 23.26 792.56 23.4 799.11 23.51 805.66 23.66 812.21 23.79 818.76 23.77 825.31 23.67 831.86 23.59 838.41 23.62 844.96 23.6 851.51 23.55 858.06 23.57 864.61 23.61 871.16 23.76 877.71 23.78 884.26 23.73 890.81 23.8 897.36 23.97 903.91 24.31 917.01 23.83 923.56 23.83 930.11 23.77 936.66 23.77 943.21 23.29 949.76 23.79 956.31 24.51 962.86 24.58 969.41 24.52 975.96 24.55 982.51 24.39 989.06 24.43 995.61 24.34 1002.16 24.14 1008.71 24.05 1015.26 23.89 1021.81 23.79 1028.36 23.61 1034.91 23.13 1041.46 22.71 1048.01 22.42 1054.56 22.31 1061.11 22.42 1067.66 22.97 1074.21 23.1 1080.76 23.28 1087.31 23.5 1093.86 23.55 1100.41 23.47 1106.96 23.33 1113.51 23.52 1120.06 23.62 1126.61 23.47 1133.16 23.21 1139.71 23.12 1152.81 22.87 1159.36 22.88 1165.91 22.64 1172.46 22.68 1185.56 22.69 1192.11 22.8 1198.66 22.75 1205.21 22.44 1211.76 22.26 1218.31 21.93 1224.86 21.8 1237.96 21.95 1244.51 22.09 1251.06 22.02 1270.71 21.26 1277.26 21.07 1283.81 20.65 1290.36 20.5 1296.91 20.12 1303.46 19.54 1310.01 19.6 1316.56 20.37 1323.11 21.09 1329.66 21.26 1336.21 21.24 1342.76 21.16 1349.31 21.13 1355.86 21.25 1362.41 21.46 1368.96 21.91 1375.51 22.68 1382.06 23.14 1388.61 23.3 1395.16 23.36 1401.71 23.21 1408.26 22.77 1421.36 21.82 1427.91 21.18 1434.46 20.87 1447.56 20.67 1454.11 20.6 1467.21 20.17 1473.76 19.8 1480.31 19.57 1486.86 19.64 1493.41 19.91 1499.96 20.02 1506.51 20.27 1513.06 20.76 1519.61 21.14 1532.71 21.95 1539.26 22.16 1545.81 22.04 1552.36 21.82 1558.91 21.48 1565.46 20.86 1572.01 20.15 1578.56 19.64 1585.12 19.5 1591.67 19.7 1598.21

20.24 1604.77 20.95 1611.32 21.81 1617.87 22.12 1624.42 22.11 1630.97 21.93
1637.52 21.23 1644.07 20.5 1650.62 19.83 1657.17 19.14 1663.72 18.48 1670.27
17.78 1676.82 17.17 1683.37 16.84 1689.92 16.55 1696.47 15.96 1703.02 15.51
1709.57 15.42 1722.67 15.42 1729.22 15.35 1735.77 15.17 1742.32 15.16
1748.87 15.27 1755.42 15.19 1768.52 14.72 1775.07 14.59 1781.62 14.59
1788.17 14.71 1794.72 15.22 1801.27 15.68 1807.82 15.65 1814.37 15.52
1820.92 15.56 1834.02 15.79 1840.57 15.86 1847.12 15.85 1853.67 15.79
1860.22 15.8 1866.77 16.04 1873.32 16.19 1879.87 16.46 1886.42 16.84 1899.52
17.08 1906.07 17.59 1912.62 18.24 1919.17 18.58 1925.72 18.75 1932.27 19.24
1938.82 19.89 1945.37 20.32 1951.92 20.77 1958.47 21.1 1965.02 21.08 1971.57
20.75 1978.12 20.27 1984.67 19.82 1991.22 19.39 1997.77 19.02 2004.32 18.76
2010.87 18.68 2017.42 18.76 2023.97 18.67 2030.52 18.23 2037.07 17.64
2043.62 17.31 2050.17 17.15 2056.72 16.93 2069.82 16.39 2076.37 16.21
2082.92 16.39 2089.47 16.87 2096.02 17.58 2102.57 18.46 2109.12 18.69
2115.67 17.87 2130 8.3 2150 7.9 2169 7.4 2190 9 2200 9.9 2217.06 17.66
2220.47 18.11 2227.02 18.44 2246.67 18.27 2253.22 18.42 2259.77 18.74
2266.32 19.37 2272.87 20.17 2279.42 21.26 2285.97 22.56 2292.52 23.41
2299.07 23.62 2305.62 23.46 2318.73 22.8 2331.83 22.69 2351.48 22.27 2371.13
21.57 2377.68 21.54 2384.23 21.9 2397.33 23.03 2410.43 23.77 2416.98 24.03
2423.53 24.44 2436.63 24.86 2443.18 25.29 2449.73 25.46 2456.28 25.49
2469.38 26.11 2495.58 26.51 2508.68 26.91 2515.23 27.01 2521.78 27.25
2574.18 27.74 2600.38 27.28 2606.93 27.3 2620.03 27 2626.58 26.97 2633.13
27.22 2646.23 27.45 2652.78 27.38 2692.08 27.77 2698.63 27.97 2711.73 27.96
2744.48 28.6 2764.13 28.73 2770.68 28.97 2783.79 29.15 2809.99 29.27 2823.09
29.56 2829.64 29.51 2842.74 29.66 2849.29 29.5 2862.39 29.61 2882.04 29.43
2895.14 29.72 2914.79 29.74 2921.34 29.63 2927.89 29.73 2934.44 29.64
2954.09 29.89 2960.64 30.2 2967.19 30.29 2980.29 30.2 2986.84 30.42 2993.39
30.5 3019.59 30.16 3032.69 29.81 3039.24 29.5 3052.34 29.2 3058.89 29.38
3065.44 28.77 3071.99 26.34 3078.54 23.61 3085.09 23.49 3098.19 28.4 3104.74
29.05 3111.29 29.5 3124.39 29.46 3130.94 29.02 3137.49 28.82 3150.59 28.75
3170.24 29.05 3189.89 28.8 3202.99 28.91 3209.54 29.11 3216.09 28.93 3229.19
29.13 3248.85 29.9 3268.5 30.16 3275.05 30.15 3281.6 30.37 3288.15 30.44
3294.7 30.73 3307.8 30.81 3320.9 31.21 3327.45 31.31

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .095 1958.47 .055 2292.52 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1958.47
2292.52 1563.06 1558.27 1560.01 .3 .5 Ineffective Flow num= 4
 Sta L Sta R Elev Permanent
 0 589.51 26.4 T 589.51 962.86 24.58 F
 2299 2420 23.62 F
 3019 3500 30.2 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 94852.71

INPUT
Description: 86 Approach Summer St
Station Elevation Data num= 67

Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 30.9 104.79 27.4 157.19
30.99 203.03 30.79 268.53 27.41 334.02 28.1 386.41 27.12 399.51 26.07 425.71
26.49 445.36 27.7 484.66 25.33 523.95 25.21 556.7 25.73 596 24.97 609.09
25.07 628.74 24.19 661.49 25.85 674.59 27.28 707.33 27.29 720.43 26.76
818.67 31.18 877.62 34.44 969.31 34.35 1303.38 33.99 1377.76 31.42 1515.52
27.32 1594.24 28.02 1640.16 27.7 1653.28 28.54 1732 26.91 1745.12 27.67
1758.24 29.8 1817.28 29.8 1836.96 29.13 1922.24 30.8 1968.16 31.09 1981.28
31.99 2060 31.36 2099.36 32.94 2289.61 34.66 2401.13 34.52 2512.65 29.05
2545.45 30.97 2683.21 30.2 2801.29 28.18 2932.49 25.78 2991.53 22.05 3075.8
17.41 3126.6 15.67 3150.8 15.79 3155.1 12.91 3172.7 5.19 3193 2.98 3207 3.85
3226.3 7.35 3259 10.7 3272.5 16.55 3309.4 16.52 3376 18.4 3447.6 19.1
3555.66 22.03 3692.97 24.31 4170.3 32.3 4183.38 34.16 4294.54 35.5 4529.94
41.36 4613.05 42.44

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .09 2932.49 .055 3692.97 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2932.49
3692.97 85.28 49.74 36.25 .3 .5 Ineffective Flow num= 2
Sta L Sta R Elev Permanent
0 2932 30 T
3555.66 4613.05 29 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 94802.97

INPUT Description: 85.7 US Face Summer St
Station Elevation Data num= 84
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 34.89 49.961 35.87 184.847
32.42 199.838 33.1 214.822 32.61 239.803 30.71 334.731 32.75 494.597 30.13
569.539 30.23 594.519 32.98 599.514 33.13 614.498 31.79 629.489 32.87
644.473 31.34 649.475 31.35 654.47 32.7 659.465 32.97 709.426 29.29 739.401
29.38 789.355 26.66 829.496 27.02 834.521 27.56 899.826 26.26 929.97 27.8
985.233 27.29 1020.402 24.431025.427 24.52 1045.52 23.011050.546
22.031120.876 22.46 1135.952 21.53 1151.02 22.821161.071 25.061281.646
32.811402.214 31.6 1422.315 30.321432.358 28.511442.408 27.661452.451
26.171462.501 25.94 1477.577 24.561507.713 25.41542.882 29.061598.145
29.891643.365 29.48 1668.483 28.761683.551 29.381753.889 30.161773.983
29.11879.482 29.7 1894.558 30.531990.007 29.792005.083 302165.845
32.072396.945 29.14 2447.183 24.282562.419 29.052567.781 26.922576.208
20.722576.973 20.28 2582.336 17.712590.762 16.822590.762 8.952594.593
6.972603.785 5.06 2613.744 3.82623.702 4.642633.661 4.232643.619 7.572649.748
10.03 2650.514 10.19 2651.28 17.712654.344 18.122668.899 22.32681.922 27.07
2783.675 22.032818.752 19.683039.212 24.313319.792 31.643324.802 31.44
3349.859 34.213394.948 34.833409.978 35.843725.634 43.34

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .0952562.419 .0552681.922 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
2562.4192681.922 97.12 92.48 89.62 .5 .8 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 02572.377 29 T
2672.7293725.634 27 T
Skew Angle = 40

BRIDGE

RIVER: Taunton River
REACH: Main Stem RS: 94760.71

INPUT
Description: 85.5 Summer St/ Woodward
Distance from Upstream XS = 23
Deck/Roadway Width = 35
Weir Coefficient = 2.6
Bridge Deck/Roadway Skew = 40
Upstream Deck/Roadway Coordinates
 num= 16
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord 2125.007 32.81
2306.56 29.66 2373.206 28.18 2449.044 27.48 2547.098 29.29 2550.928 32.12
2580.804 31.59 24.042664.302 29.97 23.442665.069 29.97 2730.948 29.04
2731.025 26.72 2808.319 24.68 2887.221 23.96 2986.041 24.86 3107.076 26.93
3261.051 31.16

Upstream Bridge Cross Section Data
Station Elevation Data num= 84
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 34.89 49.961 35.87 184.847
32.42 199.838 33.1 214.822 32.61 239.803 30.71 334.731 32.75 494.597 30.13
569.539 30.23 594.519 32.98 599.514 33.13 614.498 31.79 629.489 32.87
644.473 31.34 649.475 31.35 654.47 32.7 659.465 32.97 709.426 29.29 739.401
29.38 789.355 26.66 829.496 27.02 834.521 27.56 899.826 26.26 929.97 27.8
985.233 27.29 1020.402 24.431025.427 24.52 1045.52 23.011050.546
22.031120.876 22.46 1135.952 21.53 1151.02 22.821161.071 25.061281.646
32.811402.214 31.6 1422.315 30.321432.358 28.511442.408 27.661452.451
26.171462.501 25.94 1477.577 24.561507.713 25.41542.882 29.061598.145
29.891643.365 29.48 1668.483 28.761683.551 29.381753.889 30.161773.983
29.11879.482 29.7 1894.558 30.531990.007 29.792005.083 302165.845
32.072396.945 29.14 2447.183 24.282562.419 29.052567.781 26.922576.208
20.722576.973 20.28 2582.336 17.712590.762 16.822590.762 8.952594.593
6.972603.785 5.06 2613.744 3.82623.702 4.642633.661 4.232643.619 7.572649.748
10.03 2650.514 10.19 2651.28 17.712654.344 18.122668.899 22.32681.922 27.07
2783.675 22.032818.752 19.683039.212 24.313319.792 31.643324.802 31.44
3349.859 34.213394.948 34.833409.978 35.843725.634 43.34

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .0952562.419 .0552681.922 .085

Bank Sta: Left Right Coeff Contr. Expan.
 2562.4192681.922 .5 .8
Ineffective Flow num= 2

```
 Sta L Sta R Elev Permanent
 02572.377 29 T
2672.7293725.634 27 T
Skew Angle = 40

Downstream Deck/Roadway Coordinates
 num= 16
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord 1348.238 32.81
1529.791 29.66 1596.437 28.18  1672.275 27.48 1771.095 29.29 1774.159 32.12
1801.737 31.59 24.041889.066 29.97 23.441889.449 29.97
 1954 29.04 1954.179 26.72 2032.316 24.68  2110.452 23.96 2209.272 24.86
2331.073 26.93  2485.048 31.16

Downstream Bridge Cross Section Data
Station Elevation Data num= 424
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  0 27.83 10.043 27.6 15.068
27.62 25.111 28.04 50.222 27.93  60.265 28.09 65.29 27.97 70.308 28.07 90.401
27.63 100.444 27.89  110.487 27.42 125.555 27.45 130.58 27.3 140.623 26.58
155.691 26.07  165.734 25.29 170.759 25.04 180.802 24.22 205.913 21.91 210.93
21.58  220.981 21.68 225.998 21.37 231.024 21.68 241.067 22 251.109 22.78
256.135 23.05 271.203 22.75 281.246 22.31 296.314 22.56 306.357 21.77
311.382 22.1 316.399 22.85 321.425 22.83 326.442 22.97 331.467 22.93  341.51
23.67 346.536 24.45 351.553 24.76 356.578 25.64 361.604 25.98  366.621 26.02
371.646 25.83 376.664 25.81 381.689 26.39 386.715 26.54  406.8 26.66 416.843
27.36 421.868 27.57 431.911 27.59 436.936 27.18  441.954 26.39 446.979 26.31
457.022 25.5 462.047 25.26 477.108 25.52  482.133 25.28 492.176 25.6 497.201
26.39 502.226 27.39 507.244 27.94  512.269 29.05 522.312 29.21 542.398 28.5
547.423 28.04 562.491 27.27  572.534 26.55 587.602 24.96 592.62 24.99 597.645
24.7 602.67 24.91  607.688 24.8 617.731 25.71 622.756 25.8 632.799 25.79
637.824 26.28  657.91 27.23 662.935 27.31 672.978 27.05 683.021 26.22 688.046
26.08  693.071 26.34 698.089 26.89 703.114 26.92 708.131 26.38 713.157 25.53
723.2 25.53 733.242 27.57 738.268 28.26 748.31 28.58 753.336 28.6  773.421
29.56 778.447 29.56 788.49 29.79 793.515 29.63 798.532 29.61  803.558 29.74
808.575 30.07 813.6 30.25 823.643 30.39 833.686 30.26  838.711 30.32 843.737
30.24 848.754 29.85 853.78 28.85 858.797 27.32  863.822 27.19 868.848 28.24
873.865 27.71 878.891 28.1 883.908 28.1  888.933 28.74 898.976 28.58 904.001
29.16 909.027 29.25 914.044 29.75  919.069 29.82 924.087 29.23 929.112 29.45
939.155 29.35 944.18 29.59  969.291 29.75 974.309 29.47 984.359 29.38 989.377
29.621014.488 29.95 1019.513 30.281029.556 30.371039.599 30.011054.667
29.781059.692 30.11  1064.71 30.171079.778 29.541089.821 29.531094.846
29.821104.889 29.84 1109.914 29.541119.957 29.841124.982 29.86 1130
30.041135.025 30.01 1140.043 30.291145.068 29.621150.093 29.91155.111
29.781160.136 29.85 1165.154 29.721170.179 29.391180.222 29.341215.375
29.991220.401 29.89 1230.444 30.071240.486 30.551255.554 30.821275.648
31.741285.691 31.86 1295.734 31.661300.759 31.411305.776 31.551310.802
31.471315.827 31.6  1325.87 31.581330.887 31.761335.913 31.651350.981
32.21355.998 32.07 1366.049 32.271371.066 32.511376.092 32.061381.109
31.81386.134 31.82  1391.16 31.681396.177 31.71 1406.22 31.41426.313
31.651431.331 31.62 1451.424 30.681456.442 30.791461.467 30.541476.535
30.461481.553 30.26 1491.603 29.491501.646 29.241511.689 29.321516.714
29.731526.757 28.78 1531.782 28.9 1536.8 28.521546.843 28.411551.868
28.511561.911 28.22 1566.936 27.911576.979 27.911582.004 27.281592.047
26.931597.065 27.03  1602.09 26.451612.133 27.061622.176 25.761637.244
24.821642.269 24.83 1647.293 24.551652.312 24.511662.355 24.681672.405
```

24.621677.423 24.23 1682.448 23.641687.466 23.381697.516 23.31712.584
22.231722.627 21.21 1732.67 20.891737.695 20.881747.738 19.961752.756
19.361757.781 19.58 1762.806 18.961767.824 18.93 1787 20.721798.672
20.281804.035 17.71 1812.461 16.821812.461 8.951820.888 2.671835.443
1.391849.997 2.46 1867.616 5.61872.213 10.191872.979 17.711876.043
18.121890.598 22.3 1928.54 20.171933.565 20.121938.583 20.781943.608
21.761948.625 22.4 1953.651 22.431958.676 21.91963.694 20.681968.719
19.551973.744 19.2 1978.762 19.671983.787 19.891988.805 20.04 1993.83
20.071998.855 20.07 2003.873 19.962008.898 19.982013.916 20.112018.941
20.412023.966 20.5 2028.984 20.52034.009 20.632039.034 20.582044.052
20.622049.077 20.37 2054.094 19.86 2059.12 19.452064.145 19.382069.164
19.462074.188 21.33 2079.205 23.532084.231 24.62089.256 24.832094.273
24.642099.299 24.34 2104.324 24.742109.343 25.072114.367 24.772119.385 24.02
2124.41 23.61 2129.435 23.682134.453 23.582139.478 23.252144.495
23.242149.521 23 2154.546 22.782159.564 22.832164.589 22.972169.614
23.152174.632 23.27 2179.657 23.372184.674 23.43 2189.7 23.662194.725
23.792199.743 24.18 2209.785 24.992214.811 25.362219.836 25.922224.854
25.972229.879 25.98 2234.904 27.142239.922 27.62244.947 27.762249.965 27.74
2254.99 27.78 2260.015 27.882265.032 27.882270.058 27.952275.074
27.582280.101 27.26 2290.144 26.192295.169 26.042300.194 26.192305.212
26.252310.237 26.44 2315.254 26.45 2320.28 26.322325.305 26.52330.323
26.522340.365 26.69 2345.391 26.822350.416 26.712355.434 26.552360.459
26.632370.501 27.34 2375.527 27.542380.544 27.632385.571 27.552390.595
27.642395.613 27.53 2400.638 28.052405.655 28.16 2410.68 28.142415.706
28.222420.723 28.48 2425.749 28.772435.792 28.852440.817 29.092445.834 29.15
2450.86 29.35 2455.885 29.722460.902 29.942465.928 30.032470.945 30.24
2475.97 30.54 2480.996 30.612486.013 30.962491.039 31.032496.064
30.972501.081 31.32 2506.107 31.632511.124 31.67 2516.15 31.92521.175
31.972526.192 32.21 2531.219 32.432536.235 32.6 2541.26 32.822546.286
33.022551.303 33.28 2556.329 33.592561.354 33.882566.371 34.342571.397 34.56
2581.44 35.2 2586.465 35.312591.482 35.442596.508 35.162601.525 352606.551
35.43 2611.576 35.982616.593 36.482621.619 36.932626.636 37.152631.661 36.98
2636.687 37.042641.704 37.192646.729 37.292656.771 37.662661.798 38 2671.841
38.492676.866 38.752681.883 38.92686.908 38.952691.926 39.23 2696.95
39.422701.977 39.632706.993 39.91 2712.02 40.12717.045 40.24 2722.062
40.562727.088 40.862732.105 40.87 2737.13 40.992742.156 41.26 2747.173
41.392752.198 41.612757.216 41.792762.241 41.922767.267 42 2777.309
42.362792.377 42.742797.395 42.85 2802.42 42.992807.447 42.94 2812.463
43.162822.506 43.452827.531 43.662832.556 43.772842.599 43.95 2847.625
44.112852.642 44.152857.667 44.062862.685 43.94 2867.71 43.87 2877.753
43.442882.778 43.392887.796 43.42892.821 43.562897.847 43.75 2902.864
43.732907.889 43.672912.915 43.642917.932 43.652922.957 43.84 2927.975 43.95
2933 43.922938.026 44.022943.043 44.192948.068 44.28 2953.086 44.352963.136
44.742968.154 44.862973.178 45.01

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .095 1787 .0551890.598 .085

Bank Sta: Left Right Coeff Contr. Expan.
 17871890.598 .5 .8
Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 1785 28 T

1911.2812973.178 24 T
Skew Angle = 40
 Upstream Embankment side slope = 0 horiz. to 1.0 vertical Downstream
Embankment side slope = 0 horiz. to 1.0 vertical Maximum allowable
submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
 Energy
 W.S. Pro Method

 W.S.Pro Data
 Left Embankment
 El of the top of the embankment = 30
 El of the toe of the abutment = 9
 Right Embankment
 El of the top of the embankment = 30
 El of the toe of the abutment = 9
 Abutment Type = 4 Vert. abutments and sloping embankments with wingwalls
Slope of abutments = 4
 Top with of embankment = 35 Centroid station of bridge opening =
 Wing Wall Type = Angular wing walls
 Width = 25
 Angle = 45
 Radius =
 Guide Banks Type = No Guide Bank present
 Length =
 Offset =
 Angle =
 Optional Contraction and expansion coefficients
 At approach Section
 At Guide Bank
 At upstream outside
 At upstream inside (BU)
 At downstream inside (BD)
 Piers are Continuous for the width of the bridge
 Use Geometric mean as Friction Slope Method

Selected Low Flow Methods = W.S.Pro Method

High Flow Method
 Pressure and Weir flow
 Submerged Inlet Cd =
 Submerged Inlet + Outlet Cd = .8
 Max Low Cord =

Additional Bridge Parameters Add Friction component to Momentum
 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth

inside the bridge at the upstream end
Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 94710.49

INPUT
Description: 85.3 DS FAce Summer St
Station Elevation Data num= 424
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 27.83 10.043 27.6 15.068
27.62 25.111 28.04 50.222 27.93 60.265 28.09 65.29 27.97 70.308 28.07 90.401
27.63 100.444 27.89 110.487 27.42 125.555 27.45 130.58 27.3 140.623 26.58
155.691 26.07 165.734 25.29 170.759 25.04 180.802 24.22 205.913 21.91 210.93
21.58 220.981 21.68 225.998 21.37 231.024 21.68 241.067 22 251.109 22.78
256.135 23.05 271.203 22.75 281.246 22.31 296.314 22.56 306.357 21.77
311.382 22.1 316.399 22.85 321.425 22.83 326.442 22.97 331.467 22.93 341.51
23.67 346.536 24.45 351.553 24.76 356.578 25.64 361.604 25.98 366.621 26.02
371.646 25.83 376.664 25.81 381.689 26.39 386.715 26.54 406.8 26.66 416.843
27.36 421.868 27.57 431.911 27.59 436.936 27.18 441.954 26.39 446.979 26.31
457.022 25.5 462.047 25.26 477.108 25.52 482.133 25.28 492.176 25.6 497.201
26.39 502.226 27.39 507.244 27.94 512.269 29.05 522.312 29.21 542.398 28.5
547.423 28.04 562.491 27.27 572.534 26.55 587.602 24.96 592.62 24.99 597.645
24.7 602.67 24.91 607.688 24.8 617.731 25.71 622.756 25.8 632.799 25.79
637.824 26.28 657.91 27.23 662.935 27.31 672.978 27.05 683.021 26.22 688.046
26.08 693.071 26.34 698.089 26.89 703.114 26.92 708.131 26.38 713.157 25.53
723.2 25.53 733.242 27.57 738.268 28.26 748.31 28.58 753.336 28.6 773.421
29.56 778.447 29.56 788.49 29.79 793.515 29.63 798.532 29.61 803.558 29.74
808.575 30.07 813.6 30.25 823.643 30.39 833.686 30.26 838.711 30.32 843.737
30.24 848.754 29.85 853.78 28.85 858.797 27.32 863.822 27.19 868.848 28.24
873.865 27.71 878.891 28.1 883.908 28.1 888.933 28.74 898.976 28.58 904.001
29.16 909.027 29.25 914.044 29.75 919.069 29.82 924.087 29.23 929.112 29.45
939.155 29.35 944.18 29.59 969.291 29.75 974.309 29.47 984.359 29.38 989.377
29.621014.488 29.95 1019.513 30.281029.556 30.371039.599 30.011054.667
29.781059.692 30.11 1064.71 30.171079.778 29.541089.821 29.531094.846
29.821104.889 29.84 1109.914 29.541119.957 29.841124.982 29.86 1130
30.041135.025 30.01 1140.043 30.291145.068 29.621150.093 29.91155.111
29.781160.136 29.85 1165.154 29.721170.179 29.391180.222 29.341215.375
29.991220.401 29.89 1230.444 30.071240.486 30.551255.554 30.821275.648
31.741285.691 31.86 1295.734 31.661300.759 31.411305.776 31.551310.802
31.471315.827 31.6 1325.87 31.581330.887 31.761335.913 31.651350.981
32.21355.998 32.07 1366.049 32.271371.066 32.511376.092 32.061381.109
31.81386.134 31.82 1391.16 31.681396.177 31.71 1406.22 31.41426.313
31.651431.331 31.62 1451.424 30.681456.442 30.791461.467 30.541476.535
30.461481.553 30.26 1491.603 29.491501.646 29.241511.689 29.321516.714
29.731526.757 28.78 1531.782 28.9 1536.8 28.521546.843 28.411551.868
28.511561.911 28.22 1566.936 27.911576.979 27.911582.004 27.281592.047
26.931597.065 27.03 1602.09 26.451612.133 27.061622.176 25.761637.244
24.821642.269 24.83 1647.293 24.551652.312 24.511662.355 24.681672.405
24.621677.423 24.23 1682.448 23.641687.466 23.381697.516 23.31712.584
22.231722.627 21.21 1732.67 20.891737.695 20.881747.738 19.961752.756
19.361757.781 19.58 1762.806 18.961767.824 18.93 1787 20.721798.672

20.281804.035 17.71 1812.461 16.821812.461 8.951820.888 2.671835.443
1.391849.997 2.46 1867.616 5.61872.213 10.191872.979 17.711876.043
18.121890.598 22.3 1928.54 20.171933.565 20.121938.583 20.781943.608
21.761948.625 22.4 1953.651 22.431958.676 21.91963.694 20.681968.719
19.551973.744 19.2 1978.762 19.671983.787 19.891988.805 20.04 1993.83
20.071998.855 20.07 2003.873 19.962008.898 19.982013.916 20.112018.941
20.412023.966 20.5 2028.984 20.52034.009 20.632039.034 20.582044.052
20.622049.077 20.37 2054.094 19.86 2059.12 19.452064.145 19.382069.164
19.462074.188 21.33 2079.205 23.532084.231 24.62089.256 24.832094.273
24.642099.299 24.34 2104.324 24.742109.343 25.072114.367 24.772119.385 24.02
2124.41 23.61 2129.435 23.682134.453 23.582139.478 23.252144.495
23.242149.521 23 2154.546 22.782159.564 22.832164.589 22.972169.614
23.152174.632 23.27 2179.657 23.372184.674 23.43 2189.7 23.662194.725
23.792199.743 24.18 2209.785 24.992214.811 25.362219.836 25.922224.854
25.972229.879 25.98 2234.904 27.142239.922 27.62244.947 27.762249.965 27.74
2254.99 27.78 2260.015 27.882265.032 27.882270.058 27.952275.074
27.582280.101 27.26 2290.144 26.192295.169 26.042300.194 26.192305.212
26.252310.237 26.44 2315.254 26.45 2320.28 26.322325.305 26.52330.323
26.522340.365 26.69 2345.391 26.822350.416 26.712355.434 26.552360.459
26.632370.501 27.34 2375.527 27.542380.544 27.632385.571 27.552390.595
27.642395.613 27.53 2400.638 28.052405.655 28.16 2410.68 28.142415.706
28.222420.723 28.48 2425.749 28.772435.792 28.852440.817 29.092445.834 29.15
2450.86 29.35 2455.885 29.722460.902 29.942465.928 30.032470.945 30.24
2475.97 30.54 2480.996 30.612486.013 30.962491.039 31.032496.064
30.972501.081 31.32 2506.107 31.632511.124 31.67 2516.15 31.92521.175
31.972526.192 32.21 2531.219 32.432536.235 32.6 2541.26 32.822546.286
33.022551.303 33.28 2556.329 33.592561.354 33.882566.371 34.342571.397 34.56
2581.44 35.2 2586.465 35.312591.482 35.442596.508 35.162601.525 352606.551
35.43 2611.576 35.982616.593 36.482621.619 36.932626.636 37.152631.661 36.98
2636.687 37.042641.704 37.192646.729 37.292656.771 37.662661.798 38 2671.841
38.492676.866 38.752681.883 38.92686.908 38.952691.926 39.23 2696.95
39.422701.977 39.632706.993 39.91 2712.02 40.12717.045 40.24 2722.062
40.562727.088 40.862732.105 40.87 2737.13 40.992742.156 41.26 2747.173
41.392752.198 41.612757.216 41.792762.241 41.922767.267 42 2777.309
42.362792.377 42.742797.395 42.85 2802.42 42.992807.447 42.94 2812.463
43.162822.506 43.452827.531 43.662832.556 43.772842.599 43.95 2847.625
44.112852.642 44.152857.667 44.062862.685 43.94 2867.71 43.87 2877.753
43.442882.778 43.392887.796 43.42892.821 43.562897.847 43.75 2902.864
43.732907.889 43.672912.915 43.642917.932 43.652922.957 43.84 2927.975 43.95
2933 43.922938.026 44.022943.043 44.192948.068 44.28 2953.086 44.352963.136
44.742968.154 44.862973.178 45.01

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .095 1787 .0551890.598 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
17871890.598 111.72 138.76 147.03 .5 .8 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent 0 1785 28 T
1911.2812973.178 24 T
Skew Angle = 40

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 94571.73

INPUT
Description: 85 Exit Summer St
Station Elevation Data num= 453
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 27.41 6.55 27.76 13.09 28.24
19.64 28.56 26.18 28.71 32.73 28.81 39.27 28.67 45.82 28.61 52.37 28.15
58.91 27.74 65.46 27.44 72 27.29 78.55 27.08 85.1 27.04 91.64 26.92 98.19
26.91 104.73 26.4 111.28 26.3 117.82 25.95 124.37 25.57 130.92 25.4 137.46
25.28 144.01 25.26 150.55 25.27 157.1 25.3 163.65 25.21 176.74 25.53 183.28
25.47 189.83 25.34 196.37 25.6 202.92 25.76 209.47 25.62 216.01 25.82 222.56
25.94 229.1 25.8 235.65 25.61 242.19 25.61 248.74 25.65 255.29 25.52 261.83
25.49 268.38 25.49 274.92 25.4 281.47 25.51 288.02 25.55 301.11 25.34
307.65 25.28 314.2 25.16 320.74 25.11 327.29 24.98 333.84 24.83 340.38 24.84
346.93 24.89 353.47 24.63 360.02 24.48 366.56 24.63 373.11 24.57 379.66
24.29 386.2 24.35 392.75 24.1 399.29 23.75 405.84 23.52 412.39 23.23 418.93
22.89 425.48 22.71 432.02 22.6 438.57 22.31 445.11 22.15 451.66 22.13 458.21
22.07 464.75 21.81 471.3 21.72 477.84 21.78 484.39 21.78 490.94 21.81 497.48
21.61 504.03 21.73 517.12 22.54 523.66 22.8 530.21 22.94 536.76 23.14 543.3
23.27 549.85 22.66 556.39 22.27 562.94 22.19 569.48 22.25 576.03 22.17
582.58 21.84 589.12 21.38 595.67 21.61 602.21 21.88 608.76 21.82 615.31
22.08 621.85 22.42 634.94 22.88 641.49 23.19 648.03 23.44 654.58 23.37
661.13 23.68 667.67 24.23 674.22 24.34 680.76 24.26 687.31 24.13 693.86
23.98 700.4 23.74 706.95 23.46 713.49 23.39 720.04 23.55 726.58 23.48 733.13
23.46 739.68 23.4 746.22 23.12 752.77 23.06 759.31 23.52 765.86 23.7 772.4
23.77 778.95 23.78 785.5 23.81 792.04 23.74 798.59 23.63 805.13 23.68
811.68 23.9 818.23 23.89 824.77 23.77 831.32 23.49 837.86 23.56 844.41 23.52
850.95 23.46 857.5 23.42 864.05 23.4 870.59 23.43 877.14 23.33 883.68 23.27
890.23 23.36 896.78 23.38 903.32 23.38 909.87 23.34 916.41 23.21 922.96
23.04 929.5 22.79 936.05 22.49 942.6 22.31 949.14 22.18 955.69 22.16 962.23
22.2 968.78 22.09 975.32 22.07 988.42 22.08 994.96 22.04 1001.51 22.32
1008.05 22.72 1014.6 23.14 1021.15 23.6 1027.69 24 1034.24 24.26 1047.33
24.95 1053.87 25.39 1060.42 25.63 1066.97 25.9 1073.51 26.2 1080.06 26.56
1086.6 27.21 1093.15 27.33 1099.69 27.27 1106.24 27.44 1112.79 27.66 1119.33
28.05 1125.88 28.37 1132.42 28.77 1145.52 29.74 1152.06 30.06 1158.61 30.51
1165.15 30.58 1171.7 31.09 1178.24 31.58 1184.79 31.87 1191.34 31.99 1197.88
32.06 1210.97 32.15 1217.52 32.23 1224.07 32.23 1230.61 31.96 1237.16 32.09
1243.7 32.2 1250.25 31.58 1256.79 30.36 1263.34 29.05 1269.89 28.29 1276.43
28.32 1282.98 27.7 1289.52 27.12 1296.07 27.24 1302.62 27.6 1309.16 27.85
1315.71 28.25 1322.25 28.55 1328.8 28.66 1335.34 28.6 1341.89 28.64 1348.44
28.77 1354.98 28.82 1361.53 28.81 1368.07 28.7 1374.62 28.32 1381.16 28.26
1387.71 28.17 1394.26 28.11 1400.8 28.18 1407.35 28.22 1413.89 28.38 1426.99
28.45 1433.53 28.74 1440.08 28.94 1446.62 29.06 1459.71 29.15 1466.26 29.07
1472.81 29.06 1479.35 28.95 1485.9 28.81 1498.99 28.41 1505.54 28.14 1512.08
28.02 1518.63 27.99 1525.17 27.99 1531.72 27.95 1538.26 27.88 1544.81 27.75
1551.36 27.65 1557.9 27.65 1564.45 27.58 1570.99 27.57 1577.54 27.7 1590.63
27.86 1603.72 27.97 1610.27 28.06 1616.81 28.21 1623.36 28.41 1629.91 28.65
1636.45 28.86 1643 28.97 1649.54 29.19 1656.09 29.37 1662.63 29.58 1669.18
29.66 1675.73 29.8 1682.27 29.9 1695.36 29.81 1708.46 29.92 1715 29.89
1721.55 29.83 1728.09 29.66 1734.64 29.61 1747.73 29.61 1754.28 29.57
1760.82 29.5 1773.91 29.57 1780.46 29.59 1793.55 29.86 1800.1 29.91 1806.64
30.05 1813.19 30.11 1819.73 30.03 1826.28 30.25 1832.83 30.4 1839.37 30.59
1845.92 30.72 1852.46 30.87 1859.01 31.05 1865.55 31.09 1872.1 31.2 1878.65

31.15 1891.74 31.2 1898.28 31.29 1904.83 31.43 1911.38 31.43 1917.92 31.34
1924.47 31.37 1931.01 31.27 1937.56 31.35 1944.1 31.3 1957.2 31.15 1963.74
31.06 1970.29 30.99 1976.83 30.89 1983.38 30.83 1989.93 30.94 1996.47 30.95
2003.02 30.78 2009.56 30.71 2022.65 30.63 2029.2 30.63 2035.75 30.6 2048.84
30.69 2055.38 30.85 2068.47 30.53 2075.02 30.58 2081.57 30.53 2088.11 30.55
2094.66 30.5 2101.2 30.52 2107.75 30.5 2120.84 30.39 2127.39 30.44 2133.93
30.37 2140.48 30.23 2147.02 30.04 2153.57 30.04 2160.12 30.26 2166.66 30.05
2173.21 29.78 2179.75 29.46 2192.84 28.96 2199.39 28.8 2205.94 28.76 2212.48
28.65 2219.03 28.67 2225.57 28.62 2232.12 28.5 2245.21 28.39 2251.76 28.28
2258.3 28.08 2264.85 28.18 2271.39 28.05 2277.94 27.9 2284.49 27.7 2291.03
27.26 2297.58 26.72 2304.12 26.63 2310.67 26.44 2317.21 25.93 2323.76 25.49
2330.31 25.1 2343.4 24.55 2349.82 24.3 2358.7 23.75 2405.3 21.05 2426.5
17.28 2430.2 13.53 2445.7 .37 2466.4 -6.48 2485 -4.97 2519.1 -2.55 2528.1
.57 2538.9 1.72 2560.6 14.59 2567.2 19.62 2596.5 18.88 2649.9 17.16 2700.7
16.13 2748.7 19.04 2769.1 19.35 2827.9 18.48 2875.7 21.13 2888.55 21.24
2895.11 21.21 2901.67 21.14 2908.23 21.26 2914.78 21.41 2921.34 21.49 2927.9
21.48 2934.46 21.57 2941.01 21.86 2947.57 22.21 2954.13 22.69 2960.69 23.37
2967.25 23.64 2973.8 23.83 2980.36 23.86 2986.92 23.93 2993.48 24.1 3000.03
24.12 3006.59 24.07 3013.15 23.8 3026.27 23.5 3032.82 23.47 3045.94 23.38
3052.5 23.57 3059.05 23.57 3065.61 23.38 3072.17 23.11 3078.73 22.89 3091.84
22.51 3098.4 22.39 3104.96 22.4 3111.52 22.29 3118.07 22.05 3124.63 22.04
3131.19 22.14 3137.75 22.08 3144.31 22.05 3150.86 22.23 3157.42 22.74
3163.98 22.88 3170.54 23.49 3177.09 24.7 3183.65 25.18 3196.77 25.24 3203.33
25.48 3209.88 25.79 3216.44 26.13 3223 26.6 3229.56 27.23 3236.11 27.58
3249.23 28.01 3255.79 28.27 3262.35 28.71 3268.9 28.81 3275.46 29.12 3282.02
29.21 3288.58 29.68 3295.13 30.03 3301.69 30.32 3308.25 30.78 3314.81 31.04
3321.37 31.36 3327.92 31.87 3334.48 32.12 3341.04 32.68 3347.6 32.86 3354.16
33.31 3360.71 33.61 3367.27 33.88 3373.83 34.33 3380.39 34.62 3386.94 35.13
3393.5 35.72 3400.06 36.5 3406.62 36.89 3413.18 37.4 3419.73 38.45 3426.29
38.91 3432.85 39.34 3439.41 39.86 3445.96 40.36 3452.52 40.88 3459.08 41.29
3465.64 41.52 3472.2 41.73 3478.75 41.92 3485.31 42.34 3491.87 42.6 3498.43
42.81 3504.98 42.98 3511.54 43.05 3518.1 43.03 3524.66 43.12 3531.22 43.33
3537.77 43.59 3544.33 43.75 3550.89 43.81 3557.45 43.92 3564 43.77 3570.56
43.52 3577.12 43.59

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .093 2405.3 .055 2567.2 .09
 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2405.3
2567.2 1383.91 1376.7 1373.13 .3 .5 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 1132 28.8 T
 3000 3577.12 28.8 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 93195.04

INPUT
Description: 84
Station Elevation Data num= 342
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 37.26 6.56 37.18 13.12 36.97

19.68 36.73 26.23 36.44 32.79 36.44 39.35 36.47 45.91 36.51 52.47 36.43
59.03 36.59 65.59 36.74 72.15 36.78 78.7 36.83 85.26 36.78 91.82 36.5 98.38
36.17 104.94 36.02 111.5 35.83 118.06 35.7 124.62 35.77 131.17 35.33 137.73
35.34 144.29 35.54 150.85 36.13 157.41 36.44 163.97 36.87 170.53 37.08
177.09 37.13 183.64 37.21 190.2 37.21 196.76 37.28 203.32 37.42 209.88 37.6
216.44 37.85 223 37.85 229.55 37.74 236.11 37.73 242.67 37.8 249.23 37.62
255.79 37.44 262.35 37.32 268.91 37.29 275.47 37.16 282.02 37.02 288.58
36.78 295.14 36.65 301.7 36.65 308.26 36.57 314.82 36.32 321.38 36.42
327.94 36.37 334.49 36.27 341.05 36.37 347.61 36.37 354.17 36.24 360.73
36.22 367.29 36.2 373.85 36.26 380.41 36.58 386.96 36.96 393.52 37.26 400.08
37.55 406.64 37.84 413.2 38.05 419.76 38.03 426.32 37.79 432.87 37.5 439.43
37.54 445.99 37.33 452.55 37.34 459.11 37.57 465.67 37.71 472.23 37.63
478.79 37.51 485.34 37.41 491.9 37.44 498.46 37.34 505.02 37.16 511.58 37.2
518.14 37.29 524.7 37.47 531.26 37.62 537.81 37.37 544.37 37.26 550.93 37.37
557.49 37.68 564.05 37.85 570.61 37.59 577.17 37.68 583.72 37.7 590.28 37.55
596.84 36.98 603.4 36.84 609.96 36.67 616.52 36.43 623.08 36.32 629.64 36.26
636.19 36.14 642.75 36.01 649.31 35.8 655.87 35.71 662.43 35.63 668.99 35.47
675.55 35.38 682.11 35.4 688.66 35.45 695.22 35.48 701.78 35.43 708.34 35.43
714.9 35.57 721.46 35.37 728.02 35.6 734.58 35.76 741.13 35.8 747.69 36.07
754.25 36.46 760.81 37.17 767.37 37.49 773.93 37.62 780.49 37.54 787.04
37.42 793.6 37.14 800.16 36.29 806.72 35.39 813.28 35.09 819.84 34.83 826.4
34.67 832.96 34.71 839.51 34.82 846.07 35 852.63 35.36 859.19 35.56 865.75
35.82 872.31 35.96 878.87 36.22 885.43 36.29 891.98 36.35 898.54 36.74 905.1
37.04 911.66 37.44 918.22 37.07 924.78 36.95 931.34 36.92 937.9 37.02 944.45
36.97 951.01 36.88 957.57 36.56 964.13 36.19 970.69 35.9 977.25 35.57
983.81 35.2 990.36 34.93 996.92 34.75 1003.48 34.68 1010.04 34.64 1016.6
34.65 1023.16 34.67 1029.72 34.66 1036.28 34.53 1042.83 34.46 1049.39 34.14
1055.95 33.53 1062.51 32.56 1069.07 31.14 1075.63 29.93 1082.19 29.67
1088.74 29.88 1095.3 30.08 1101.86 30.07 1108.42 30.09 1114.98 30.11 1121.54
30.06 1128.1 29.93 1134.66 29.68 1141.21 29.67 1147.77 29.81 1154.33 30.09
1160.89 30.26 1167.45 30.46 1174.01 30.62 1180.57 30.98 1187.12 31.19
1193.68 31.41 1200.24 31.64 1206.8 31.93 1213.36 32.32 1219.92 32.86 1226.48
33.48 1233.04 34.24 1239.59 34.76 1246.15 35.04 1252.71 35.24 1259.27 35.37
1265.83 35.46 1288.35 35.69 1426.04 35.73 1498.17 36.85 1504.73 36.34
1550.62 35.91 1576.85 36.67 1662.09 35.14 1780.11 37.72 1832.57 36.92
1845.68 36.31 1858.79 36.51 1878.46 34.63 1924.36 32.83 1970.26 32.17
2016.16 29.95 2094.84 29.13 2121.07 28.43 2127.62 28.69 2147.29 30.55
2186.63 30.6 2212.86 29.82 2225.97 28.76 2278.43 28.01 2291.54 28.62 2311.21
30.41 2330.88 31.06 2370.22 29.79 2448.9 27.58 2639.05 28.18 2665.28 28.79
2691.51 28.62 2698.06 28.28 2730.85 28.81 2743.96 27.96 2816.09 28.95
2848.87 28.13 2901.32 28.64 2920.99 29.43 2973.45 28.75 2986.56 28.66
3084.91 24.75 3130.81 24.79 3143.92 24.51 3150.48 24.75 3242.28 25.59
3261.95 25.25 3301.29 26.55 3314.4 26.63 3353.74 27.97 3399.64 27.68 3412.75
27.38 3432.42 25.84 3438.98 24.98 3445.54 23.29 3452.1 22.99 3471.77 23.13
3511.11 20.16 3642.24 20.09 3661.91 19.74 3668.47 20.07 3688.14 23.1 3701.25
25.5 3707.81 25.68 3714.37 27.35 3720.92 28.27 3734.04 27.86 3747.15 26.5
3766.82 25.77 3786.49 26.44 3799.61 28.24 3819.28 28.85 3825.83 28.37
3838.95 28.72 3845.5 28.45 3852.06 29.03 3891.4 28.13 3904.52 28.33 3950.41
26.52 3989.75 26.65 4015.98 25.81 4022.54 26.21 4035.65 25.56 4061.88 25.96
4081.55 26.58 4160.23 26.53 4350.23 26.39 4389.54 26.48 4422.29 25.84
4468.14 23.09 4527.09 23.49 4559.84 22.1 4572.94 20.9 4586.04 20.13 4625.34
16.39 4664.65 16.51 4671.2 16.85 4677.75 17.67 4684.3 18.35 4690 18.3 4700
12.3 4740 9 4765 9.8 4790 9 4815 8.8 4830 12.7 4841.5 15.49 4880.8 15.55
4887.35 16.34 4907 20.29 4913.55 21.17 4926.65 21.7 4972.51 17.27 4992.16

16.52 5018.36 16.53 5057.66 15.8 5077.31 16.48 5096.96 18.59 5110.06 19.59
5155.91 24.41 5175.56 25.84 5267.27 26.54 5313.12 27.9 5319.67 27.75 5332.77
26.54 5345.87 26.31 5398.27 28.99 5444.12 28.97 5470.32 29.25 5476.88 29.04
5575.13 30.89 5581.68 30.64 5601.29 31.91 5614.36 31.71 5842.99 33.99
5856.05 34.49 5875.65 34.69 5908.31 33.75 5960.57 33.94 5986.7 34.32 6050.05
34.06 6056.58 33.77 6063.12 33.68 6069.65 33.3 6076.18 33.06 6082.71 32.88
6089.24 32.68 6095.78 32.87 6102.31 32.76

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .095 4389.54 .055 5175.56 .095

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 4389.54
5175.56 1691.41 1644.24 1589.83 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 3852 28.3 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 91550.79

INPUT
Description: 83 Approach RR Br
Station Elevation Data num= 161
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 37.41 52.45 34.82 137.68
33.89 150.8 32.74 222.92 34.58 236.03 33.17 288.48 32.9 314.71 34.08 340.93
35.11 373.71 38.48 393.38 41.69 439.28 42.7 465.5 40.9 498.29 41.64 517.95
42.86 531.07 42.57 570.41 43.11 590.07 44.81 708.09 47.75 721.2 47.53
1140.81 57.28 1271.94 56.76 1376.84 52.67 1521.08 51.25 1625.99 48.66 1639.1
50.91 1645.66 51.24 1658.77 49.65 1744 46.85 1770.23 46.94 1829.24 43.65
2117.72 39.48 2275.07 37.69 2288.19 38.26 2301.3 36.9 2517.66 36.77 2543.89
35.84 2589.78 37.75 2642.23 37.99 2694.69 38.43 2747.14 35.56 2773.36 32.88
2930.72 31.5 3081.52 28.24 3278.21 27.36 3337.22 30.11 3481.46 27.18 3488.02
26.65 3514.24 26.3 3533.91 25.46 3547.02 25.52 3560.14 24.93 3566.69 24.09
3573.25 23.91 3579.81 22.69 3606.03 19.94 3619.15 19.27 3625.7 16.92 3638.81
16.89 3645.37 18.54 3651.93 19.19 3665.04 19.4 3671.6 21.69 3697.82 22.4
3710.94 23.94 3737.16 20.72 3763.39 20.09 3776.5 17.55 3783.06 16.88 3796.17
16.64 3809.28 14.64 4209.22 14.88 4215.78 15.39 4222.33 16.54 4235.45 20.32
4274.78 19.76 4386.24 23.67 4635.38 27.77 4661.6 28.83 4694.38 28.68 5146.48
31.79 5153 31.29 5158.06 31.64 5217.08 27.42 5223.64 26.37 5282.67 26.34
5308.91 26.99 5394.17 29.3 5433.52 26.57 5466.31 21.54 5580.19 16.87 5621.49
16.09 5725.9 19.36 5769.77 8.22 5781.51 6.88 5801.8 6.75 5824.05 4.6 5846.24
4.41 5853.69 4.11 5877.12 6.96 5895.61 12.56 5896.32 18.09 5911.99 18.42
5918.54 19.05 5964.37 17.13 5977.46 15.78 5997.1 14.91 6036.38 17.04 6049.48
16.37 6062.57 14.85 6114.94 15.12 6134.58 17.67 6167.32 19.82 6173.86 19.84
6239.33 17.08 6272.06 20.28 6317.89 21.14 6357.17 21.21 6389.91 22.27
6448.83 20.7 6468.47 21.65 6553.57 18.77 6599.4 19.61 6632.14 21.13 6736.88
22.13 6815.44 22.75 6848.18 22.95 6880.91 22.37 7110.05 22.87 7116.59 22.2
7201.7 22.89 7280.26 27.26 7332.63 25.95 7352.27 24.49 7430.84 24.88 7470.12
26.46 7489.76 26.33 7529.04 28.47 7581.41 27.42 7587.96 27.88 7594.5 27.72
7607.6 25.19 7620.69 25.54 7653.42 26.01 7666.52 27.33 7686.16 26.38 7692.7
26.64 7699.25 27.67 7738.53 27.48 7771.26 29.03 7849.82 28.45 7889.1 30.21

7895.65 29.95 7902.2 28.93 7934.93 26.24 7941.48 27.76 8013.49 29.43 8020.04 30.14 8039.68 28.96 8089.75 31.36 8096.3 31.17

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .093 5725.9 .055 5918.54 .095

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 5725.9 5918.54 103.47 107.37 104.58 .3 .5 Ineffective Flow num= 1 Sta L Sta R Elev Permanent
 0 5000 28.3 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 91443.41

INPUT
Description: 82.7 US Face RR Br
Station Elevation Data num= 192
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 37.5 23.165 31.66 46.33 30.63 55.593 29.19 60.231 27.45 83.396 23.11 129.726 19.4 143.62 19.08 347.472 19.97 384.539 19.21 481.83 21.67 495.724 20.78 583.752 22.12 639.352 24.35 676.411 21.81 713.478 22.99 741.274 21.78 875.631 22.48 940.494 22.05 945.126 22.35 1019.252 21.61037.785 23.851051.687 24.491070.213 25.691172.143 25.5 1209.202 27.441213.841 28.211241.637 28.641283.335 26.38 1352.83 27.8 1408.422 27.031454.752 26.171510.345 21.811524.246 23.5 1542.78 23.38 1575.208 24.721755.895 27.21783.691 26.941802.224 26.241825.389 26.16 1885.613 22.541908.778 19.191918.041 18.25 1922.68 16.271927.311 15.11 1955.108 15.241978.273 17.732047.767 17.092080.195 16.572089.465 15.66 2094.097 14.682172.854 14.852205.282 16.572209.921 17.592214.552 17.83 2228.447 20.132233.086 21.392242.349 24.96 2256.25 27.682274.777 28.36 2284.047 27.712307.211 27.692330.376 28.482353.541 28.992358.173 28.54 2372.068 29.22376.706 30.32385.969 29.582390.601 30.012399.871 29.15 2404.502 29.472413.766 28.382423.036 29.162427.667 28.952432.299 30.26 2455.464 29.922464.727 29.26 2483.26 29.212487.891 28.362506.425 28.92 2534.228 29.362543.499 28.212580.579 27.952594.488 27.142603.758 28.99 2645.47 28.472668.649 29.98 2715 28.182733.541 28.422742.811 27.42 2798.432 27.162812.333 26.022821.604 24.012844.782 22.22909.674 20.35 2923.582 18.962932.854 18.782946.753 16.672960.663 16.222983.835 17.24 3053.365 19.843058.003 19.643062.635 19.383067.273 18.763071.905 18.34 3076.544 17.723079.401 16.613081.175 15.923085.814 14.133089.434 13.91 3090.276 12.233101.229 7.78 3109.41 8.223129.895 6.333137.362 5.25 3160.697 5.883165.583 5.73172.922 11.883174.315 14.023178.516 14.09 3183.154 15.323187.786 16.143201.695 15.173206.326 15.983215.596 15.73 3224.866 16.073229.504 15.493234.136 15.913243.407 15.673280.488 15.14 3285.126 15.853289.765 15.813294.396 15.083354.656 15.63387.098 16.74 3401.007 18.543419.547 19.573447.357 18.333465.898 20.833502.979 20.84 3512.249 19.163516.887 19.113526.158 20.593586.417 19.33618.858 22.94 3628.13 22.893642.038 21.453651.308 21.493660.579 20.833669.849 21.31 3693.028 23.573711.568 23.663730.108 25.143739.378 24.59 3744.01 22.84 3753.28 21.163767.189 20.42 3804.27 20.253818.179 21.974012.852 22.59 4031.393 23.354068.472 22.784082.382 23.444091.652 24.74124.101 25.83 4133.372

27.094156.542 26.834175.083 24.974221.441 25.834230.711 27.04 4258.521
26.594272.424 25.564295.603 26.784323.414 26.494365.133 29.06 4388.305
31.84406.845 31.194430.024 27.494485.645 29.164499.555 28.49 4508.824
27.374536.634 29.354629.336 30.414712.768 30.524726.676 29.46 4731.308
29.574740.584 27.934749.854 30.114754.487 30.134763.755 29.39 4782.297
31.134805.477 31.46

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .0933101.229 .0553187.786 .095

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
3053.3653187.786 115.34 121.17 129.47 .5 .8 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 03076.622 28 T
3187.6374805.477 28 T
Skew Angle = 45

BRIDGE

 RIVER: Taunton River
REACH: Main Stem RS: 91395.74

INPUT
Description: 82.5 RR Br
Distance from Upstream XS = 15
Deck/Roadway Width = 20
Weir Coefficient = 2.6
Bridge Deck/Roadway Skew = 45
Upstream Deck/Roadway Coordinates
 num= 7
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord 2466.388 28.63
3059.651 28.71 3081.571 29.36 3082.278 29.24 24.23182.688 29.24 24.23184.102
29.24 4375.577 29.36

Upstream Bridge Cross Section Data
Station Elevation Data num= 192
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 37.5 23.165 31.66 46.33
30.63 55.593 29.19 60.231 27.45 83.396 23.11 129.726 19.4 143.62 19.08
347.472 19.97 384.539 19.21 481.83 21.67 495.724 20.78 583.752 22.12 639.352
24.35 676.411 21.81 713.478 22.99 741.274 21.78 875.631 22.48 940.494 22.05
945.126 22.35 1019.252 21.61037.785 23.851051.687 24.491070.213 25.691172.143
25.5 1209.202 27.441213.841 28.211241.637 28.641283.335 26.38 1352.83 27.8
1408.422 27.031454.752 26.171510.345 21.811524.246 23.5 1542.78 23.38
1575.208 24.721755.895 27.21783.691 26.941802.224 26.241825.389 26.16
1885.613 22.541908.778 19.191918.041 18.25 1922.68 16.271927.311 15.11
1955.108 15.241978.273 17.732047.767 17.092080.195 16.572089.465 15.66
2094.097 14.682172.854 14.852205.282 16.572209.921 17.592214.552 17.83
2228.447 20.132233.086 21.392242.349 24.96 2256.25 27.682274.777 28.36
2284.047 27.712307.211 27.692330.376 28.482353.541 28.992358.173 28.54
2372.068 29.22376.706 30.32385.969 29.582390.601 30.012399.871 29.15 2404.502
29.472413.766 28.382423.036 29.162427.667 28.952432.299 30.26 2455.464
29.922464.727 29.26 2483.26 29.212487.891 28.362506.425 28.92 2534.228
29.362543.499 28.212580.579 27.952594.488 27.142603.758 28.99 2645.47

28.472668.649 29.98 2715 28.182733.541 28.422742.811 27.42 2798.432
27.162812.333 26.022821.604 24.012844.782 22.22909.674 20.35 2923.582
18.962932.854 18.782946.753 16.672960.663 16.222983.835 17.24 3053.365
19.843058.003 19.643062.635 19.383067.273 18.763071.905 18.34 3076.544
17.723079.401 16.613081.175 15.923085.814 14.133089.434 13.91 3090.276
12.233101.229 7.78 3109.41 8.223129.895 6.333137.362 5.25 3160.697
5.883165.583 5.73172.922 11.883174.315 14.023178.516 14.09 3183.154
15.323187.786 16.143201.695 15.173206.326 15.983215.596 15.73 3224.866
16.073229.504 15.493234.136 15.913243.407 15.673280.488 15.14 3285.126
15.853289.765 15.813294.396 15.083354.656 15.63387.098 16.74 3401.007
18.543419.547 19.573447.357 18.333465.898 20.833502.979 20.84 3512.249
19.163516.887 19.113526.158 20.593586.417 19.33618.858 22.94 3628.13
22.893642.038 21.453651.308 21.493660.579 20.833669.849 21.31 3693.028
23.573711.568 23.663730.108 25.143739.378 24.59 3744.01 22.84 3753.28
21.163767.189 20.42 3804.27 20.253818.179 21.974012.852 22.59 4031.393
23.354068.472 22.784082.382 23.444091.652 24.74124.101 25.83 4133.372
27.094156.542 26.834175.083 24.974221.441 25.834230.711 27.04 4258.521
26.594272.424 25.564295.603 26.784323.414 26.494365.133 29.06 4388.305
31.84406.845 31.194430.024 27.494485.645 29.164499.555 28.49 4508.824
27.374536.634 29.354629.336 30.414712.768 30.524726.676 29.46 4731.308
29.574740.584 27.934749.854 30.114754.487 30.134763.755 29.39 4782.297
31.134805.477 31.46

Manning's n Values num= 3 Sta n Val Sta n Val Sta n Val
 0 .0933101.229 .0553187.786 .095

Bank Sta: Left Right Coeff Contr. Expan.
 3053.3653187.786 .5 .8
Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 03076.622 28 T
3187.6374805.477 28 T
Skew Angle = 45

Downstream Deck/Roadway Coordinates
 num= 7
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord 2466.388 28.63
2988.233 28.71 3010.154 29.36 3010.861 29.24 24.2 3111.27 29.24 24.23112.684
29.24 4375.577 29.36

Downstream Bridge Cross Section Data
Station Elevation Data num= 244
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 42.28 9.27 39.98 18.547
37.25 32.455 35.12 41.726 34.4 60.274 34.2 64.912 33.21 69.543 31.52 78.821
29.85 88.091 27.37 92.73 26.46 106.639 25.24 115.909 22.94 129.825 20.92
157.642 18.9 162.275 18.25 185.46 17.76 194.73 17.16 227.186 17.25 241.094
17.5 296.737 17.32 306.008 17.72 319.916 17.86 324.555 18.25 361.643 17.5
370.92 17.61 384.828 18.49 389.467 19.16 412.647 20.01 431.194 19.99 440.464
19.57 468.281 19.53 486.829 20.27 500.738 19.5 593.468 20.42 612.015 19.76
621.285 18.55 658.38 17.23 681.566 18.62 709.384 19.39 737.201 22.99 741.841
23.1 751.109 24.16 783.566 26.02 802.114 26.16 811.384 25.75 825.293 24.54
843.839 23.43 857.75 23.26 867.018 22.56 885.566 22.65 890.205 22.29 899.475
22.76 922.66 22.5 950.479 23.6 978.296 26.481038.569 25.81 1052.48
25.511080.304 25.451126.669 24.98 1163.756 26.121173.034 25.891186.942 26.47

1214.76 271228.669 25.77 1247.216 26.271275.034 28.171302.851 28.521312.121
29.571363.125 30.39 1428.037 27.481455.855 24.661497.581 19.711534.676
17.931548.585 18.05 1557.855 19.321562.493 19.631576.403 19.391599.582
19.821650.585 24.82 1669.133 25.361729.406 25.041757.223 26.091785.042
25.741887.041 15.49 1914.86 14.571956.593 15.821970.501 14.462021.498
15.042100.319 14.56 2142.046 15.392151.322 16 2179.14 14.572183.779 15.63
2188.41 17.68 2202.319 26.242206.958 27.142225.505 26.472267.233 24.17
2271.87 23.54 2281.141 23.492290.418 22.482308.958 21.342318.235
21.582336.783 23.36 2341.414 24.582355.323 27.182373.871 29.092401.688
28.982420.236 27.47 2424.875 28.542438.783 27.52485.148 28.62531.514
31.012596.417 30.68 2605.696 30.242624.236 30.042642.782 28.252656.691
26.622679.878 25.07 2698.418 23.732712.334 23.532758.691 20.512763.331
20.572786.516 19.77 2800.425 19.452832.882 14.44 2865.33 14.052869.969
14.532902.425 14.18 2916.334 14.852925.612 16.12934.882 16.832976.608
18.852990.517 20.06 3018.724 13.913019.565 12.233030.518 7.783038.699
8.223059.184 6.33 3066.65 5.253089.986 5.883094.872 5.7 3102.21
11.883103.605 14.02 3138.889 24.663162.075 24.83194.531 24.433245.534
23.553366.082 24.95 3440.271 24.43449.543 24.993537.641 24.343565.456 24.16
3635.01 24.32 3648.918 24.953667.466 24.763672.096 23.353676.736
23.573681.375 24.49 3699.921 23.943723.101 24.343732.377 23.723755.557
24.053760.196 23.74 3769.468 24.193783.375 24.123797.291 23.33811.199 23.55
3815.83 22.81 3820.469 22.473829.747 24.193866.834 233876.112 23.253908.568
23.13 3917.838 23.473950.294 23.843954.934 24.213959.564 23.914019.844 24.81
4029.113 26.264061.572 29.684075.481 29.914089.389 29.214098.667 28.23
4103.305 28.234117.215 27.014140.393 26.94158.938 25.434172.849 25.69
4182.125 25.284186.758 25.424196.034 26.54205.306 26.494219.213 26.15
4242.399 27.19 4251.67 28.124260.949 27.784270.218 28.254284.125 28.01
4302.672 31.254330.499 31.834335.126 31.34 4349.04 30.954367.586 32.11
4376.861 31.624381.495 30.994390.771 30.644400.042 27.464404.681 26.34
4413.951 26.644418.589 25.644423.229 25.564437.138 27.284441.776 27.29
4446.409 27.974451.045 30.324460.313 30.284464.955 30.574478.864 32.37
4488.14 35.07 4497.41 36.524502.048 36.94515.958 36.284529.869 36.84 4543.774
35.384548.415 33.514557.685 32.154562.324 32.184566.961 31.59 4576.232 31.79
4585.51 31.364608.688 31.644617.966 32.34 4650.42 31.99 4659.688
32.644668.967 324678.237 32.634715.333 33.494733.882 32.84 4743.152
33.234757.061 32.714775.607 30.564780.248 30.58

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val 0 .12990.517 .0553138.889 .095

Bank Sta: Left Right Coeff Contr. Expan.
 2990.5173138.889 .5 .8
Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 02998.133 28 T
 31204780.248 28 T
Skew Angle = 45

Upstream Embankment side slope = 0 horiz. to 1.0 vertical Downstream
Embankment side slope = 0 horiz. to 1.0 vertical Maximum allowable
submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =

```
Weir crest shape = Broad Crested

Number of Piers = 3

Pier Data
Pier Station Upstream=3105.613 Downstream=3034.195
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 3 5.6 3 20.5 6.8 20.6 6.8 25.22 Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 3 5.6 3 20.5 6.8 20.6 6.8 25.22

Pier Data
Pier Station Upstream=3132.483 Downstream=3061.065
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 3 5.6 3 20.5 6.8 20.6 6.8 25.22
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 3 5.6 3 20.5 6.8 20.6 6.8 25.22

Pier Data
Pier Station Upstream= 3160.06 Downstream=3088.642
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 3 5.6 3 20.5 6.8 20.6 6.8 25.22
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 3 5.6 3 20.5 6.8 20.6 6.8 25.22

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data  Energy
 W.S. Pro Method

 W.S.Pro Data
 Left Embankment
 El of the top of the embankment = 28.6
 El of the toe of the abutment = 16.9
 Right Embankment
 El of the top of the embankment = 28.6
 El of the toe of the abutment = 16.9
 Abutment Type = 2 Vert. abutments and sloping embankments  Slope of
abutments =
 Top with of embankment = 20
 Centroid station of bridge opening =
 Wing Wall Type = No wing walls present
 Width =
 Angle =
 Radius =
 Guide Banks Type = No Guide Bank present
 Length =
 Offset =
 Angle =
```

```
 Optional Contraction and expansion coefficients
 At approach Section
 At Guide Bank  At upstream outside
 At upstream inside (BU)
 At downstream inside (BD)
 Piers are Continuous for the width of the bridge
 Use Geometric mean as Friction Slope Method

Selected Low Flow Methods = W.S.Pro Method

High Flow Method
 Pressure and Weir flow
 Submerged Inlet Cd =
 Submerged Inlet + Outlet Cd = .8
 Max Low Cord =

Additional Bridge Parameters
 Add Friction component to Momentum
 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION


RIVER: Taunton River
REACH: Main Stem RS: 91322.25

INPUT
Description: 82.3 - DS Face RR Br
Station Elevation Data num= 244
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  0 42.28 9.27 39.98 18.547
37.25 32.455 35.12 41.726 34.4  60.274 34.2 64.912 33.21 69.543 31.52 78.821
29.85 88.091 27.37  92.73 26.46 106.639 25.24 115.909 22.94 129.825 20.92
157.642 18.9  162.275 18.25 185.46 17.76 194.73 17.16 227.186 17.25 241.094
17.5  296.737 17.32 306.008 17.72 319.916 17.86 324.555 18.25 361.643 17.5
370.92 17.61 384.828 18.49 389.467 19.16 412.647 20.01 431.194 19.99  440.464
19.57 468.281 19.53 486.829 20.27 500.738 19.5 593.468 20.42  612.015 19.76
621.285 18.55 658.38 17.23 681.566 18.62 709.384 19.39  737.201 22.99 741.841
23.1 751.109 24.16 783.566 26.02 802.114 26.16  811.384 25.75 825.293 24.54
843.839 23.43 857.75 23.26 867.018 22.56  885.566 22.65 890.205 22.29 899.475
22.76 922.66 22.5 950.479 23.6  978.296 26.481038.569 25.81 1052.48
25.511080.304 25.451126.669 24.98 1163.756 26.121173.034 25.891186.942 26.47
1214.76 271228.669 25.77 1247.216 26.271275.034 28.171302.851 28.521312.121
29.571363.125 30.39 1428.037 27.481455.855 24.661497.581 19.711534.676
17.931548.585 18.05 1557.855 19.321562.493 19.631576.403 19.391599.582
19.821650.585 24.82 1669.133 25.361729.406 25.041757.223 26.091785.042
25.741887.041 15.49  1914.86 14.571956.593 15.821970.501 14.462021.498
15.042100.319 14.56 2142.046 15.392151.322 16 2179.14 14.572183.779 15.63
2188.41 17.68 2202.319 26.242206.958 27.142225.505 26.472267.233 24.17
2271.87 23.54 2281.141 23.492290.418 22.482308.958 21.342318.235
21.582336.783 23.36 2341.414 24.582355.323 27.182373.871 29.092401.688
28.982420.236 27.47 2424.875 28.542438.783 27.52485.148 28.62531.514
```

31.012596.417 30.68 2605.696 30.242624.236 30.042642.782 28.252656.691
26.622679.878 25.07 2698.418 23.732712.334 23.532758.691 20.512763.331
20.572786.516 19.77 2800.425 19.452832.882 14.44 2865.33 14.052869.969
14.532902.425 14.18 2916.334 14.852925.612 16.12934.882 16.832976.608
18.852990.517 20.06 3018.724 13.913019.565 12.233030.518 7.783038.699
8.223059.184 6.33 3066.65 5.253089.986 5.883094.872 5.7 3102.21
11.883103.605 14.02 3138.889 24.663162.075 24.83194.531 24.433245.534
23.553366.082 24.95 3440.271 24.43449.543 24.993537.641 24.343565.456 24.16
3635.01 24.32 3648.918 24.953667.466 24.763672.096 23.353676.736
23.573681.375 24.49 3699.921 23.943723.101 24.343732.377 23.723755.557
24.053760.196 23.74 3769.468 24.193783.375 24.123797.291 23.33811.199 23.55
3815.83 22.81 3820.469 22.473829.747 24.193866.834 233876.112 23.253908.568
23.13 3917.838 23.473950.294 23.843954.934 24.213959.564 23.914019.844 24.81
4029.113 26.264061.572 29.684075.481 29.914089.389 29.214098.667 28.23
4103.305 28.234117.215 27.014140.393 26.94158.938 25.434172.849 25.69
4182.125 25.284186.758 25.424196.034 26.54205.306 26.494219.213 26.15
4242.399 27.19 4251.67 28.124260.949 27.784270.218 28.254284.125 28.01
4302.672 31.254330.499 31.834335.126 31.34 4349.04 30.954367.586 32.11
4376.861 31.624381.495 30.994390.771 30.644400.042 27.464404.681 26.34
4413.951 26.644418.589 25.644423.229 25.564437.138 27.284441.776 27.29
4446.409 27.974451.045 30.324460.313 30.284464.955 30.574478.864 32.37
4488.14 35.07 4497.41 36.524502.048 36.94515.958 36.284529.869 36.84 4543.774
35.384548.415 33.514557.685 32.154562.324 32.184566.961 31.59 4576.232 31.79
4585.51 31.364608.688 31.644617.966 32.34 4650.42 31.99 4659.688
32.644668.967 324678.237 32.634715.333 33.494733.882 32.84 4743.152
33.234757.061 32.714775.607 30.564780.248 30.58

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .12990.517 .0553138.889 .095

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
2990.5173138.889 49.58 50.95 49.51 .5 .8 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 02998.133 28 T
 31204780.248 28 T
Skew Angle = 45

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 91271.3

INPUT
Description: 82 Exit RR Br
Station Elevation Data num= 233
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 35.84 137.39 36.97 235.53
38.52 268.24 39.96 477.6 37.88 503.77 39.47 700.05 41.48 732.76 42.52 752.39
41.88 765.47 42.22 791.64 41.06 804.73 41.4 824.35 45.92 830.9 46.44 837.44
47.61 843.98 47.86 857.07 45.86 876.69 46.05 896.32 43.8 902.86 45.82
909.41 46.62 915.95 48.59 922.49 51.3 929.03 52 942.12 49.31 961.75 52.51
968.29 54.32 974.83 54.7 1020.63 54.8 1072.97 50.63 1118.77 51.77 1151.48
48.16 1249.62 44.43 1269.24 43.08 1360.88 42.09 1367.43 41.38 1380.54 36.7

1387.1 35.99 1406.76 37.7 1420.57 37.49 1459.93 34.54 1479.61 30.97 1499.29 25.77 1512.41 24.32 1545.21 19.62 1558.33 18.22 1591.13 17.13 1715.78 17.45 1728.9 17.88 1781.38 17.47 1801.06 16.93 1814.18 17.68 1827.3 17.18 1879.78 17 1925.7 18.05 1945.39 18.22 1971.63 20.01 1991.31 20.75 2017.55 20.79 2030.67 20.07 2056.91 20.48 2122.51 23.45 2214.36 20.63 2266.84 17.9 2332.44 17.58 2352.12 19.65 2391.48 22.27 2424.28 23.86 2522.69 26.26 2614.53 25.89 2667.01 27.21 2706.37 26.37 2732.61 26.67 2804.78 25.3 2870.38 24.75 2896.62 25.22 2942.54 24.91 2975.34 25.5 2988.46 25.07 2995.02 25.31 3008.14 24.84 3027.82 25.57 3073.74 25.31 3126.23 27.85 3185.27 29.76 3237.75 30.6 3263.99 30.57 3336.15 28.39 3408.32 23.76 3421.44 22.11 3487.04 17.04 3513.28 17.24 3532.96 16.8 3565.76 17.96 3578.88 19.35 3592 19.97 3651.04 25.04 3677.29 25.23 3696.97 24.36 3703.53 23.22 3716.65 23.23 3736.33 22.07 3756.01 20.05 3762.57 20.41 3788.81 23.77 3815.05 24.93 3834.73 24.39 3867.53 22.24 3893.77 21.18 3920.01 17.92 3939.7 17 3979.06 17.48 4024.98 15.15 4051.22 15.24 4077.46 16.32 4103.7 15.54 4116.82 14.53 4169.3 14.16 4208.67 14.78 4293.95 14.55 4326.75 15.84 4346.43 14.81 4385.79 15.81 4392.35 16.63 4398.91 18.61 4412.03 23.8 4418.59 24.58 4444.83 23.47 4536.68 16.88 4543.24 17.5 4556.36 16.32 4569.48 15.91 4654.76 17.42 4707.24 21.58 4726.93 21.7 4759.73 19.97 4785.97 20.76 4805.65 20.6 4825.33 21.66 4884.37 28.18 4897.49 28.69 4930.29 28.72 4982.77 29.74 4989.34 29.29 5009.02 30.6 5041.82 30.06 5081.18 27.31 5113.98 23.95 5173.02 22.02 5192.7 20.32 5232.06 19.51 5258.31 17.96 5297.67 14.04 5310.79 13.78 5330.47 14.41 5389.51 13.78 5422.31 14.96 5435.43 16.19 5527.28 18.97 5553.52 20.45 5564.48 20.33 5574.58 14.69 5578.28 10.69 5593.29 3.27 5624.73 4.87 5649.74 2.5 5650.05 11.85 5653.66 15.81 5663.71 18.79 5684.72 20.02 5691.28 22.22 5697.84 23.65 5704.4 24.17 5724.08 23.49 5743.77 23.54 5789.69 24.69 5979.94 24.25 6084.9 25.04 6235.79 24.95 6281.71 23.68 6334.19 23.57 6386.67 25.14 6485.08 25.03 6537.56 27.17 6570.36 27.14 6629.35 28.52 6662.08 30 6681.73 29.61 6734.1 30.76 6858.49 31.74 6950.15 31.32 6969.79 30.3 6976.33 28.7 6995.98 28.84 7022.16 26.1 7028.71 25.03 7035.26 24.59 7054.9 25.36 7067.99 26.61 7081.08 28.57 7094.18 29.86 7153.1 28.9 7212.02 30.11 7251.3 28.92 7270.94 27.88 7284.04 28.89 7303.68 26.77 7329.87 27.9 7342.96 28 7356.05 28.97 7447.71 31.44 7467.35 31.02 7519.73 32.47 7526.27 33.05 7532.82 32.96 7559.01 35.07 7637.57 37.48 7650.66 37.35 7696.49 39.46 7716.13 40.8 7755.41 42.51 7768.51 43.62 7807.79 45.74 7840.52 49.06 7879.8 51.24 7925.63 55.73 7945.27 57.18 8030.38 65.88 8076.21 69.38 8180.96 72.68 8194.05 72.54 8207.15 73.19 8444.69 76.65

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .095 5553.52 .055 5704.4 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 5553.52 5704.4 3090.08 3016.84 2959.28 .3 .5 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 5435 28 T
 5980 8444.69 28 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 88254.45

INPUT

Description: 81 DS Nemasket River Trib
Station Elevation Data num= 388
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 50.83 26.2 50.37 39.3 50.41
78.59 50.08 117.89 49.03 130.99 49.26 157.19 49.21 170.29 48.53 189.93 48.71
255.43 47.69 261.98 47.9 268.53 47.88 275.08 47.6 281.63 47.6 294.73 47.15
307.83 47.2 327.47 46.53 347.12 46.27 386.42 45.27 406.07 44.94 419.17 44.32
432.27 43.24 445.36 42.63 465.01 41.01 497.76 39.87 517.41 38.36 530.51
36.73 537.06 36.09 550.16 35.5 556.71 35.48 563.26 35.7 569.8 35.7 582.9
36.19 602.55 35.89 628.75 34.91 648.4 34.34 654.95 34.33 674.6 33.63 746.64
32.3 753.19 32.36 772.84 31.84 812.14 31.39 844.88 30.68 864.53 30.94 877.63
30.55 897.28 30.51 903.83 30.34 910.38 29.95 975.87 29.74 988.97 29.35
1015.17 30.55 1021.72 30.63 1034.82 30.16 1080.66 31.23 1093.76 31.08
1106.86 30.65 1113.41 30.78 1133.06 30.19 1146.16 29.99 1152.71 29.6 1159.26
29.45 1165.81 29.64 1172.36 30.09 1178.91 30.09 1192.01 29.37 1205.1 29.59
1211.65 29.91 1224.75 29.86 1231.3 29.53 1237.85 30.47 1244.4 30.92 1250.95
30.94 1257.5 30.68 1264.05 30.02 1270.6 29.65 1277.15 29.69 1290.25 29.16
1342.64 29.36 1362.29 29.72 1368.84 30.19 1395.04 31.04 1408.14 31.16
1421.24 30.98 1447.43 31.45 1467.08 31.17 1493.28 31.52 1552.23 31.28
1558.78 31.47 1584.97 30.9 1604.62 30.02 1617.72 30.31 1637.37 29.66 1663.57
29.42 1670.12 29.86 1683.22 30.23 1696.31 29.64 1709.41 29.35 1722.51 27.51
1729.06 26.88 1735.61 26.67 1742.16 26.99 1748.71 27.73 1755.26 28.14
1761.81 28.02 1788.01 26.87 1794.56 27.08 1801.11 27.51 1807.66 27.62
1814.21 28.02 1820.76 28.18 1833.85 28.13 1840.4 28.4 1860.05 28.39 1879.7
28.86 1886.25 28.83 1892.8 28.59 1905.9 28.43 1912.45 28.52 1925.55 29.96
1932.1 30.83 1938.65 30.87 1945.19 31.23 1951.74 31.87 1958.29 31.14 1964.84
30.11 1977.94 29.22 1984.49 28.01 1991.04 27.59 1997.59 27.52 2036.89 24.86
2049.99 24.52 2063.09 23.61 2082.73 25.1 2095.83 26.51 2102.38 26.77 2108.93
26.81 2128.58 26.46 2135.13 25.46 2141.68 23.76 2148.23 22.91 2154.78 22.68
2159.27 22.35 2165.81 21.16 2172.36 20.76 2185.45 22.03 2191.99 22.18
2205.08 21.68 2218.17 21.82 2224.72 22.12 2231.26 22.1 2244.35 22.74 2250.89
23.23 2257.44 24.06 2270.53 27.33 2277.07 28.66 2283.62 29.34 2296.71 30.1
2316.34 30.44 2329.43 29.95 2335.98 29.28 2349.07 27.38 2355.61 26.84 2368.7
26.33 2388.33 26.43 2394.88 26.22 2407.97 26.38 2421.06 26.25 2447.24 26.56
2460.33 26.33 2466.87 26.6 2486.51 26.98 2499.59 27 2525.77 27.44 2538.86
27.87 2551.95 27.81 2571.59 27.99 2604.31 28.62 2610.86 28.6 2656.67 29.5
2669.76 30.03 2676.3 30.1 2682.85 30.4 2748.29 31.93 2794.11 32.45 2800.65
32.81 2846.47 34.26 2872.64 34.35 2905.37 34.76 2911.91 34.59 2925 34.97
2990.45 35.3 3003.54 35.5 3023.17 35.41 3036.26 35.69 3068.99 35.62 3088.62
35.8 3101.71 35.73 3114.8 35.89 3134.43 35.48 3180.22 34.89 3193.26 34.44
3206.29 33.72 3225.85 33.06 3238.89 32.31 3251.92 31.96 3271.48 30.82
3291.03 29.97 3304.07 29.59 3310.59 28.93 3323.62 28.14 3343.18 27.59
3362.74 26.66 3388.81 24.78 3395.33 24.18 3401.85 23.87 3414.88 23.66 3421.4
23.35 3427.92 22.34 3434.44 21.56 3447.47 20.45 3467.03 19.24 3480.07 18.03
3486.59 17.31 3493 16.8 3498 11.5 3530 5.8 3562 11.9 3578.45 19.09 3583.38
17.62 3590.88 16.9 3603.92 16.61 3616.95 16.79 3623.47 17.09 3636.51 17.17
3649.55 16.75 3656.06 16.82 3669.17 16.24 3675.72 16.16 3688.82 16.55
3695.37 17 3708.47 17.21 3728.12 16.97 3734.67 16.65 3747.77 16.32 3754.33
16.44 3760.88 16.79 3787.08 17.11 3806.73 16.95 3813.28 16.53 3819.83 15.61
3826.38 15.03 3846.04 15.3 3865.69 16.39 3878.79 16.54 3898.44 15.36 3904.99
15.31 3918.09 15.94 3931.2 16.14 3944.3 15.76 3950.85 15.85 3957.4 15.68
3970.5 14.9 3977.05 14.75 3996.7 14.93 4009.8 15.85 4016.35 15.8 4036.01
14.62 4042.56 14.62 4055.66 15.15 4062.21 16.84 4068.76 19.55 4075.31 22.85
4081.86 25.83 4088.41 27.13 4094.96 25.92 4101.51 24.27 4108.06 23.57
4114.62 23.21 4121.17 21.68 4127.72 20.74 4134.27 20.45 4140.82 19.72

4147.37 19.72 4153.92 20.12 4173.57 20.51 4186.67 21.04 4199.77 17.75
4212.88 12.45 4219.43 10.33 4225.98 8.56 4232.53 7.12 4245.63 3.49 4258.73
3.06 4271.83 1.16 4284.93 -1.67 4291.48 -2.74 4298.04 -3.08 4304.59 -4.14
4317.69 -6.58 4324.24 -8.41 4330.79 -9.85 4343.89 -10.15 4350.44 -9.8
4376.64 -10.37 4383.2 -10.19 4389.75 -9.7 4409.4 -7.02 4429.05 -3.81 4435.6
-1.74 4448.7 -2.34 4468.35 -.9 4474.91 .04 4481.46 1.57 4494.56 3.72 4507.66
4.78 4514.21 7.17 4520.76 9.16 4527.31 12.09 4540.41 13.84 4546.96 15.02
4553.51 16.42 4560.06 18.1 4566.62 20.39 4573.17 23.54 4579.72 22.59 4586.27
22.46 4612.47 22.79 4625.57 23.24 4632.12 23.83 4638.67 23.96 4645.22 24.51
4651.78 25.33 4658.33 26.44 4664.88 26.43 4671.43 25.57 4677.98 24.96
4684.53 23.78 4691.08 22.04 4704.18 18.15 4710.73 16.57 4717.28 10 5064.47
10 5071.02 15.66 5077.57 20.65 5084.12 24.06 5090.67 26.2 5097.23 26.71
5103.78 26.26 5110.33 26.02 5129.98 26.56 5149.63 26.17 5156.18 25.71
5162.73 24.51 5169.28 22.84 5175.83 21.98 5182.38 20.88 5188.94 17.32
5195.49 14.56 5202.04 14.74 5208.59 10 5496.82 10 5503.37 16.41 5509.92
20.29 5516.47 25.53 5523.02 30.19 5529.57 34.31 5536.12 36.11 5542.67 35.08
5549.22 34.77 5555.78 35.17 5562.33 35.17 5568.88 32.28 5575.43 29.63
5581.98 28.1 5595.08 27.21 5601.63 26.52 5608.18 26.07 5614.73 25.13 5627.44
26.16 5633.8 27.53 5646.51 28.67 5652.86 28.83 5678.29 28.23 5687.22 28.26
5693.57 28.75 5699.93 30.25 5706.28 30.05 5712.64 28.18

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 3467.03 .055 3578.45 .085
 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
3467.03 3578.45 973.59 1026.95 1087.56 .3 .5 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 3088 29 F
 4088 5712.64 27.13 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 87227.5

INPUT
Description: 80
Station Elevation Data num= 277
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 28.83 19.66 28.87 32.76
29.54 39.31 30.11 45.87 30.3 52.42 30.32 78.63 31.33 85.18 31.24 91.73 30.35
98.28 29.09 104.84 28.77 111.39 29.59 117.94 29.88 124.49 29.67 131.04 29.85
144.15 29.99 150.7 29.68 157.25 29.98 183.46 30.2 209.67 29.33 222.78 29.27
229.33 29.34 235.88 29.55 242.43 29.92 248.98 29.96 255.54 29.72 262.09
29.77 268.64 29.99 275.19 30 281.75 30.17 294.85 30.1 301.4 29.95 307.96
30.03 314.51 29.94 321.06 30.01 327.61 29.15 334.16 28.83 347.27 29.25
353.82 29.23 366.93 29.72 393.13 30.22 399.69 30.53 419.34 30.89 432.45
30.92 452.1 31.36 465.21 31.11 478.31 31.14 484.87 31.51 497.97 31.42 511.07
31.63 524.18 31.54 537.28 31.64 543.84 31.59 556.94 31.94 576.6 32.18
602.81 32.18 615.91 32.43 622.46 32.43 635.57 32.78 642.12 32.69 655.22
32.86 674.88 32.82 687.98 32.62 714.19 32.92 740.4 32.7 753.51 33.25 766.61
33.2 779.72 32.87 786.27 32.86 792.82 33.01 799.37 32.93 812.48 33.25 819.03
32.69 838.69 32.43 845.24 32.45 864.89 32.23 878 32.36 884.55 32.3 897.66
32.55 930.42 32.36 950.07 32.48 956.63 32.61 963.18 32.9 969.73 32.83 989.39

31.75 1048.32 29.68 1074.45 29.12 1087.51 28.63 1113.64 27.19 1120.18 26.92
1126.71 27.59 1133.24 30.05 1139.77 30.27 1146.31 29.83 1152.84 29.04
1159.37 30.06 1165.91 28.06 1172.44 25.82 1185.5 25.02 1192.04 25.38 1198.57
25.22 1205.1 25.31 1211.63 24.52 1218.17 25.25 1224.7 27.16 1231.23 26.4
1237.76 23.11 1244.3 21.85 1257.36 21.08 1263.9 20.59 1270.43 20.27 1290.03
20.13 1296.56 19.9 1309.62 19.24 1322.69 18.22 1329.22 17.85 1342.29 17.93
1348.82 17.66 1355.35 17.54 1368.42 17.78 1374.95 17.66 1388.02 16.7 1394.55
16.65 1407.61 18.02 1414.15 18.15 1427.21 17.61 1440.28 16.79 1453.34 15.61
1466.41 15.69 1486.01 16.5 1505.6 16.61 1525.2 16.38 1538.27 15.58 1544.8
15.84 1551.33 16.25 1557.86 16.36 1570.93 16.16 1584 17.03 1590.53 17.23
1603.59 17.08 1616.66 17.61 1623.19 17.75 1629.72 17.6 1639.86 16.94 1642.79
16.75 1649.32 16.37 1655.85 15.03 1663 16.8 1668 11.5 1700 5.8 1732 11.9
1744 18.9 1779.98 16.55 1793.04 15.07 1799.57 14.48 1812.64 13.91 1819.17
14.05 1825.7 14.36 1832.24 14.53 1838.77 14.33 1871.43 14.6 1891.03 14.52
1904.1 14.25 1910.63 14.84 1917.16 16.69 1923.69 19.65 1930.23 23.07 1936.76
24.24 1943.29 23.94 1949.82 23.11 1956.36 20.42 1962.89 17.25 1969.42 12.34
1975.95 9.14 1982.49 7.84 1989.02 6.72 1995.55 3.71 2002.09 -.43 2008.62 -
5.16 2015.15 -9.23 2021.68 -9.81 2028.22 -10.11 2047.81 -10.49 2073.94 -
10.41 2093.54 -10.06 2100.08 -10.09 2106.61 -9.86 2113.14 -8.29 2119.67 -
7.08 2126.21 -5.59 2132.74 -5.01 2139.27 -3.27 2145.8 -1.77 2152.34 -.44
2158.87 .37 2165.4 2.16 2171.93 4.46 2178.47 5.61 2185 6.53 2191.53 6.66
2198.06 8.13 2204.6 11.72 2211.13 17.66 2217.66 19.43 2224.2 19.17 2230.73
18.51 2237.26 17.56 2243.79 18.09 2250.33 19.4 2256.86 19.95 2263.39 20.31
2269.92 19.28 2276.46 18.9 2282.99 18.85 2289.52 19.36 2296.05 18.99 2302.59
16.42 2315.65 15.41 2328.72 15.1 2335.25 15.16 2341.78 15.06 2374.45 16.39
2380.98 18.48 2387.51 22.41 2394.04 22.72 2400.58 23.72 2407.11 21.79
2413.64 21.54 2420.18 22.04 2433.24 22.05 2439.77 22.29 2446.31 21.97
2452.84 22.1 2465.9 22.13 2472.44 22.32 2478.98 22.7 2485.52 22.24 2492.06
21.42 2498.6 21.26 2511.68 20.54 2518.22 18.42 2524.76 16.13 2531.3 15.32
2537.84 15.08 2544.38 15.07 2550.92 15.65 2564 16.11 2570.54 16.64 2577.08
18.96 2583.62 20.6 2590.16 21.04 2596.7 20.3 2616.32 16.63 2622.86 14.94
2629.4 0 2845.21 0 2851.75 14.59 2858.29 16.17 2864.83 19.77 2871.37 25.67
2877.91 30.36 2884.45 32.46 2890.99 32.93 2897.53 32.64 2904.07 33.01
2917.15 33.13 2936.77 33.84 2943.31 31.91 2949.85 29.6 2956.39 27.66 2962.93
26.28 2969.47 25.53 2976.01 25.28 2989.09 25.87 3002.17 25.82 3008.7 25.64
3034.86 25.77

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .0875 1663 .055 1744 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1663
1744 1820.81 1790.19 1770.77 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 1936 3034.86 24.24 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 85437.3

INPUT
Description: 79 Approach Titicut St

Station Elevation Data num= 381
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 30.23 19.66 30.06 32.77
29.56 52.43 29 65.54 28.37 72.09 28.22 91.75 27.22 98.31 27.08 104.86 26.32
111.41 25.91 124.52 26.04 131.08 25.9 144.18 25.79 150.74 25.62 163.84 25.62
170.4 25.52 176.95 25.57 190.06 24.32 196.61 24.03 209.72 24.38 216.27 24.32
222.83 23.88 229.38 24.11 235.94 24.04 255.6 23.33 262.15 23.32 268.7 23.08
275.26 22.7 288.37 22.8 301.47 22.73 308.03 22.56 314.58 22.9 327.69 22.94
334.24 22.71 340.8 23.05 347.35 23.11 360.46 23.68 380.12 23.9 386.67 24.09
406.33 24.2 412.89 24.46 419.44 24.41 426 24.11 432.55 23.19 445.66 23.48
452.21 22.76 458.76 21.51 465.32 20.4 471.87 19.58 484.98 19.43 511.19 19.88
517.75 19.61 524.3 19.58 530.86 19.41 543.96 19.4 550.52 19.16 557.07 19.2
583.29 20.06 596.39 19.07 602.95 18.84 622.61 18.48 635.72 18.79 655.38
20.13 661.93 20.48 681.59 19.72 720.92 19.43 734.02 19.61 740.58 19.54
753.68 19.13 760.24 18.76 766.79 18.25 773.35 18.19 779.9 17.4 786.45 17.04
799.56 15.74 825.78 14.8 832.33 14.81 845.44 15.49 851.99 15.52 871.65 15.86
878.21 16.59 884.76 17.45 891.31 17.84 896.2 17.14 903.13 16.84 909.99 16.37
918.26 13.93 936.91 14.42 939.09 9.63 957.78 6.63 962.96 5.24 972.96 4.71
987.88 3.1 1011.1 1.63 1037.68 1.86 1054.98 4.01 1060.55 8.76 1074.19 15.5
1094.48 15.87 1101.04 16.42 1107.59 16.46 1114.14 16.6 1120.7 16.36 1127.25
16.41 1133.8 16.42 1140.36 16.37 1146.91 16.43 1153.47 16.47 1160.02 16.54
1166.57 16.44 1173.13 16.31 1179.68 16.12 1186.24 15.78 1192.79 15.68
1199.34 15.52 1205.9 15.54 1212.45 15.74 1225.56 16 1232.11 16.03 1238.67
16.14 1245.22 16.04 1251.77 15.84 1258.33 15.93 1264.88 16.05 1277.99 16.7
1284.54 16.97 1291.1 17.32 1297.65 17.57 1310.76 17.61 1317.31 17.65 1323.86
17.48 1330.42 17.64 1336.97 17.66 1350.08 17.93 1356.63 17.87 1363.19 17.89
1369.74 17.87 1376.3 18.09 1382.85 18.21 1389.4 18.21 1395.96 18.14 1402.51
18.16 1409.06 18.4 1415.62 18.39 1422.17 18.42 1428.73 18.54 1435.28 18.97
1441.83 19.75 1448.39 21.49 1454.94 24.27 1461.49 24.86 1468.05 25.21 1474.6
25.32 1481.16 25.21 1487.71 24.92 1494.26 24.84 1507.37 24.96 1513.92 25.08
1520.48 25.23 1527.03 25.26 1533.59 25.08 1540.14 25.17 1546.69 25.07
1553.25 24.99 1559.8 24.94 1566.36 24.83 1572.91 25.16 1579.46 25.25 1586.02
25.05 1592.57 24.77 1599.12 25.27 1605.68 25.7 1612.23 25.46 1618.77 25.05
1625.31 24.6 1631.85 25.04 1638.39 25.85 1644.94 27.45 1651.48 28.71 1658.02
28.69 1664.56 28.34 1671.1 28.22 1677.64 28.06 1684.18 27.97 1690.72 27.71
1697.26 27.43 1703.8 26.7 1710.34 26.97 1716.88 27.86 1723.42 28.35 1736.51
28.48 1743.05 28.46 1749.59 28.57 1756.13 28.39 1762.67 27.52 1769.21 26.67
1775.75 25.9 1782.29 25.54 1788.83 25.71 1795.37 26 1801.91 26.55 1808.45
26.55 1815 27.06 1821.54 27.41 1828.08 27.45 1834.62 27.05 1841.16 26.38
1847.7 26.66 1854.24 26.76 1860.78 25.84 1867.32 25.51 1873.86 25.55 1880.4
25.69 1886.94 25.69 1893.48 25.71 1900.03 26.15 1906.57 26.63 1913.11 27.08
1919.65 27.3 1926.19 27.28 1932.73 27.49 1939.27 27.67 1945.81 27.76 1952.35
27.95 1958.89 27.85 1965.43 28.04 1971.97 28.17 1978.51 28.38 1985.06 28.65
1991.6 28.48 1998.14 28.36 2004.68 28.72 2011.22 28.65 2017.76 28.64 2024.3
28.69 2030.84 28.67 2037.38 28.21 2043.92 28.43 2050.46 28.58 2057 28.76
2063.54 28.91 2070.09 29.03 2076.63 29.06 2083.17 29.07 2089.71 29.17
2096.25 29.22 2102.79 29.34 2115.87 29.45 2122.41 29.45 2128.95 29.49
2135.49 29.49 2142.03 29.42 2148.57 29.42 2155.12 29.49 2161.66 29.59
2174.74 29.74 2181.28 29.75 2194.36 29.87 2200.9 29.89 2207.44 29.84 2213.98
29.85 2220.52 30.05 2227.06 30.23 2233.6 30.15 2240.15 30.25 2246.69 30.32
2253.23 30.32 2259.77 30.27 2266.31 30.28 2272.85 30.51 2285.93 30.15
2292.47 30.29 2299.01 30.53 2312.09 30.78 2318.64 30.83 2325.18 30.97
2331.72 31.29 2338.26 31.43 2344.8 31.41 2351.34 31.34 2357.88 31.45 2364.42
31.59 2370.96 31.67 2377.5 31.72 2384.04 31.83 2390.58 31.78 2397.12 31.75
2403.67 31.52 2410.21 31.16 2416.75 30.93 2423.29 30.98 2429.83 30.85

2436.37 30.67 2442.91 30.78 2449.45 30.65 2455.99 30.75 2462.53 30.82
2469.07 30.79 2475.61 30.51 2482.15 30.55 2488.7 30.57 2495.24 30.46 2501.78
30.46 2508.32 30.38 2514.86 30.4 2521.4 30.34 2527.94 30.3 2534.48 30.12
2541.02 30.1 2547.56 30.02 2554.1 30 2560.64 29.88 2567.18 29.7 2580.27
29.39 2586.81 29.33 2593.35 29.16 2599.89 29.06 2606.43 28.84 2612.97 28.57
2619.51 28.19 2632.59 27.6 2639.13 26.98 2645.67 26.33 2652.21 26.24 2658.76
26.25 2665.3 26.47 2671.84 26.66 2678.38 26.36 2684.92 26.5 2691.46 26.57
2698 26.62 2704.54 27.02 2711.08 27.07 2717.62 27.23 2724.16 27.69 2730.7
28.02 2737.24 27.88 2743.79 28.46 2750.33 29.28 2756.87 31.34 2763.41 33.31
2769.95 35.11 2776.49 36.95 2783.03 38.16 2789.57 38.78 2796.11 38.09
2802.65 37.82 2809.19 37.25 2815.73 37.54 2822.27 37.15 2828.82 34.17
2835.36 30.58 2841.9 27.76 2848.44 26.62 2854.98 27.5 2861.52 27.99 2868.06
27.94 2874.6 27.56 2881.14 27.33 2887.68 27.14 2894.22 27.05 2900.76 27.13
2907.3 27.16 2913.85 27.23 2920.39 27.51 2926.93 27.6 2933.47 27.59 2940.01
27.76 2946.55 27.91 2953.09 28.02 2959.63 28.22 2966.17 28.45 2972.71 28.8
2979.25 29.11 2992.33 29.68 2998.88 30 3005.42 30.13 3011.96 30.32 3018.5
30.4 3025.04 30.45 3031.58 30.56

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 891.31 .055 1114.14 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 891.31
1114.14 103.69 101.02 107.47 .3 .5 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 426 25.5 T
 1464 3031.58 25.5 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 85336.28

INPUT
Description: 78.7- US Face Titicut St
Station Elevation Data num= 278
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 30.5 10.005 29.95 14.999
29.87 40.003 30.21 55.009 29.74 65.006 28.84 80.013 27.17 90.01 26.54 95.012
25.93 115.014 25.42 120.016 25.02 125.019 24.89 130.02 24.3 135.016 24.05
140.018 24.3 145.019 24.17 150.022 24.59 160.02 24.78 165.021 24.52 170.023
23.91 175.026 24.05 180.028 24.54 185.022 24.89 190.025 25.82 200.03 26.53
220.031 26.35 230.028 26.03 235.03 26.09 240.033 25.99 245.034 25.75 250.037
25.69 255.032 25.38 265.036 25.35 270.038 25 275.041 24.23 280.035 22.99
285.037 21.59 290.04 21.03 295.042 20.76 300.045 19.99 305.039 20.23 310.041
19.86 320.046 19.91 330.043 20.38 335.045 20.35 340.047 20.15 350.044 20.16
355.046 20.68 360.048 21.93 365.051 21.72 370.053 21.16 375.047 21.17
385.052 21.39 390.055 21.72 395.057 23.34 400.051 25.21 410.056 26.12
425.055 26.64 435.059 26.57 450.058 26.97 455.061 26.77 465.066 26.82
485.067 26.57 495.064 26.08 510.071 25.68 525.07 24.95 540.076 22.79 545.072
22.16 550.073 21.8 555.076 21.15 560.078 19.02 565.08 17.9 570.075 17.97
575.077 18.23 590.084 18.7 595.079 19.13 615.08 18.86 640.083 19.54 645.086
19.48 650.088 19.75 655.09 20.26 660.093 21.52 675.092 22.6 685.097 23.03
690.091 23.12 691.777 22.87 715.616 12.43 718.557 11.78 721.56 11.33 725.276

11.24 732.224 10.78 738.866 10.72 744.013 10.09 749.966 9.83 754.967 10.86
761.18 10.96 766.749 11.24 772.127 11.43 777.642 12.8 779.772 11.89 797.621
22.19 800.111 22.86 805.112 22.76 810.108 22.41 815.11 22.22 820.111 21.89
825.114 22.18 835.112 20.16 845.108 19 850.111 19.03 855.105 18.7 865.102
18.31 870.104 17.93 880.101 17.59 885.095 17.79 895.1 17.56 900.094 17.75
905.097 17.46 910.091 17.72 915.093 17.54 930.093 17.5 935.087 18.06 940.089
16.55 950.086 16.72 955.082 16.7 965.078 16.91 970.081 17.32 980.077 17.51
990.074 16.971000.071 17.59 1005.073 18.031020.072 18.421030.069
18.961040.066 19.051045.061 18.88 1055.065 18.961060.059 18.861065.062
19.281070.057 19.41 1075.06 19.35 1080.054 19.11085.056 19.511090.051
19.711095.053 19.251100.055 19.74 1120.049 20.471130.046 20.991135.048
20.781145.045 20.731155.042 20.84 1160.036 21.241165.038 21.231170.034
21.471175.035 22.271185.033 22.82 1190.034 23.31 1195.03 23.481200.032
23.81210.029 24.211215.023 24.64 1220.025 24.851225.028 25.281230.022
25.271235.025 25.471250.016 24.79 1260.021 24.031265.015 24.011270.032
24.561280.068 24.741285.085 24.65 1290.104 24.71295.121 24.531300.139
24.611305.148 25.391315.183 26.43 1320.201 26.441325.218 26.161345.289
27.061350.306 26.891360.342 26.16 1365.359 25.621370.376 25.251375.387
25.121385.422 25.131390.439 25.28 1395.457 25.241415.527 25.791425.562 25.81
1430.58 25.931435.597 25.89 1475.731 26.881505.836 27.421520.882
27.451540.952 27.821545.969 27.77 1596.138 28.491601.155 28.78 1611.19
28.731616.208 28.821621.226 29.06 1656.34 28.71661.359 28.561666.376
28.581686.447 28.111691.464 27.89 1716.546 27.84 1726.58 27.91736.615
27.621741.632 27.741756.685 28.52 1761.703 29.06 1766.72 29.341771.738
29.771776.755 29.951781.773 30.43 1786.783 30.421791.801 30.671801.836
31.551806.854 31.681816.889 31.74 1821.906 31.921826.924 32.281841.976
32.31846.994 32.091867.057 32.19 1872.075 32.31892.145 31.71897.162
31.641912.215 32.031917.233 31.61 1922.243 30.931942.313 29.851947.331
30.021952.348 29.911957.366 29.55 1967.401 29.581982.454 29.992002.517 29.93
2037.64 29.9 2062.72 29.61 2067.738 29.062072.755 29.282077.773 29.1 2082.79
28.622087.808 28.42 2097.843 28.212102.861 27.692107.878 27.972117.913
28.142122.931 27.93 2137.976 28.52148.012 28.292153.029 28.082163.063 27.91
2173.1 27.37 2183.134 27.42 2198.18 26.622203.198 26.542213.233 26.68 2218.25
26.86 2223.268 27.382228.285 28.172233.303 28.25 2238.32 27.692243.338 27.8
2248.356 28.052253.373 28.162258.391 28.062263.401 27.762278.454 27.75
2288.489 28.322298.524 28.412308.559 29.242318.594 29.612328.629 29.67
2333.64 30.092343.675 30.532348.692 30.51

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .095 690.091 .055 800.111 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 690.091
800.111 60.24 60.79 60.96 .5 .8 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent 0 690 25 T
 8002348.692 22.86 T
Skew Angle = 40

BRIDGE

RIVER: Taunton River
REACH: Main Stem RS: 85311.66

INPUT
Description: 78.5 Titicut St
Distance from Upstream XS = 2
Deck/Roadway Width = 35
Weir Coefficient = 2.6
Bridge Deck/Roadway Skew = 40
Upstream Deck/Roadway Coordinates
num= 16
Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
218.322 27.89 395.279 27.05 540.827 25.33
671.055 25.7 711.578 26.24 711.655 29.68
714.72 29.69 714.72 26.24 21.65 779.068 26.54 21.96
779.068 30.04 782.131 30.01 782.131 26.54
853.374 25.39 909.295 24.47 1153.663 22.83 1306.106 24.65

Upstream Bridge Cross Section Data
Station Elevation Data num= 278 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 30.5 10.005 29.95 14.999 29.87 40.003 30.21 55.009 29.74 65.006 28.84
80.013 27.17 90.01 26.54 95.012 25.93 115.014 25.42 120.016 25.02 125.019
24.89 130.02 24.3 135.016 24.05 140.018 24.3 145.019 24.17 150.022 24.59
160.02 24.78 165.021 24.52 170.023 23.91 175.026 24.05 180.028 24.54 185.022
24.89 190.025 25.82 200.03 26.53 220.031 26.35 230.028 26.03 235.03 26.09
240.033 25.99 245.034 25.75 250.037 25.69 255.032 25.38 265.036 25.35
270.038 25 275.041 24.23 280.035 22.99 285.037 21.59 290.04 21.03 295.042
20.76 300.045 19.99 305.039 20.23 310.041 19.86 320.046 19.91 330.043 20.38
335.045 20.35 340.047 20.15 350.044 20.16 355.046 20.68 360.048 21.93
365.051 21.72 370.053 21.16 375.047 21.17 385.052 21.39 390.055 21.72
395.057 23.34 400.051 25.21 410.056 26.12 425.055 26.64 435.059 26.57
450.058 26.97 455.061 26.77 465.066 26.82 485.067 26.57 495.064 26.08
510.071 25.68 525.07 24.95 540.076 22.79 545.072 22.16 550.073 21.8 555.076
21.15 560.078 19.02 565.08 17.9 570.075 17.97 575.077 18.23 590.084 18.7
595.079 19.13 615.08 18.86 640.083 19.54 645.086 19.48 650.088 19.75 655.09
20.26 660.093 21.52 675.092 22.6 685.097 23.03 690.091 23.12 691.777 22.87
715.616 12.43 718.557 11.78 721.56 11.33 725.276 11.24 732.224 10.78 738.866
10.72 744.013 10.09 749.966 9.83 754.967 10.86 761.18 10.96 766.749 11.24
772.127 11.43 777.642 12.8 779.772 11.89 797.621 22.19 800.111 22.86 805.112
22.76 810.108 22.41 815.11 22.22 820.111 21.89 825.114 22.18 835.112 20.16
845.108 19 850.111 19.03 855.105 18.7 865.102 18.31 870.104 17.93 880.101
17.59 885.095 17.79 895.1 17.56 900.094 17.75 905.097 17.46 910.091 17.72
915.093 17.54 930.093 17.5 935.087 18.06 940.089 16.55 950.086 16.72 955.082
16.7 965.078 16.91 970.081 17.32 980.077 17.51 990.074 16.971000.071 17.59
1005.073 18.031020.072 18.421030.069 18.961040.066 19.051045.061 18.88
1055.065 18.961060.059 18.861065.062 19.281070.057 19.41 1075.06 19.35
1080.054 19.11085.056 19.511090.051 19.711095.053 19.251100.055 19.74
1120.049 20.471130.046 20.991135.048 20.781145.045 20.731155.042 20.84
1160.036 21.241165.038 21.231170.034 21.471175.035 22.271185.033 22.82
1190.034 23.31 1195.03 23.481200.032 23.81210.029 24.211215.023 24.64
1220.025 24.851225.028 25.281230.022 25.271235.025 25.471250.016 24.79
1260.021 24.031265.015 24.011270.032 24.561280.068 24.741285.085 24.65
1290.104 24.71295.121 24.531300.139 24.611305.148 25.391315.183 26.43
1320.201 26.441325.218 26.161345.289 27.061350.306 26.891360.342 26.16
1365.359 25.621370.376 25.251375.387 25.121385.422 25.131390.439 25.28
1395.457 25.241415.527 25.791425.562 25.81 1430.58 25.931435.597 25.89
1475.731 26.881505.836 27.421520.882 27.451540.952 27.821545.969 27.77

1596.138 28.491601.155 28.78 1611.19 28.731616.208 28.821621.226 29.06
1656.34 28.71661.359 28.561666.376 28.581686.447 28.111691.464 27.89 1716.546
27.84 1726.58 27.91736.615 27.621741.632 27.741756.685 28.52 1761.703 29.06
1766.72 29.341771.738 29.771776.755 29.951781.773 30.43 1786.783
30.421791.801 30.671801.836 31.551806.854 31.681816.889 31.74 1821.906
31.921826.924 32.281841.976 32.31846.994 32.091867.057 32.19 1872.075
32.31892.145 31.71897.162 31.641912.215 32.031917.233 31.61 1922.243
30.931942.313 29.851947.331 30.021952.348 29.911957.366 29.55 1967.401
29.581982.454 29.992002.517 29.93 2037.64 29.9 2062.72 29.61 2067.738
29.062072.755 29.282077.773 29.1 2082.79 28.622087.808 28.42 2097.843
28.212102.861 27.692107.878 27.972117.913 28.142122.931 27.93 2137.976
28.52148.012 28.292153.029 28.082163.063 27.91 2173.1 27.37 2183.134 27.42
2198.18 26.622203.198 26.542213.233 26.68 2218.25 26.86 2223.268
27.382228.285 28.172233.303 28.25 2238.32 27.692243.338 27.8 2248.356
28.052253.373 28.162258.391 28.062263.401 27.762278.454 27.75 2288.489
28.322298.524 28.412308.559 29.242318.594 29.612328.629 29.67 2333.64
30.092343.675 30.532348.692 30.51

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .095 690.091 .055 800.111 .09

Bank Sta: Left Right Coeff Contr. Expan.
 690.091 800.111 .5 .8
Ineffective Flow num= 2
 Sta L Sta R Elev Permanent 0 690 25 T
 8002348.692 22.86 T
Skew Angle = 40

Downstream Deck/Roadway Coordinates
 num= 16
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 248.965 27.89 425.92 27.05 571.47 25.33
 701.697 25.7 742.221 26.24 742.297 29.68
 745.361 29.69 745.361 26.24 21.65 809.709 26.54 21.96
 809.709 30.04 812.773 30.01 812.773 26.54
 884.015 25.39 939.936 24.47 1184.305 22.83
 1372 24.65

Downstream Bridge Cross Section Data
Station Elevation Data num= 224
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 31.14 25.057 30.17 45.104
28.81 50.115 28.56 60.135 27.32 65.144 26.83 75.172 26.41 85.191 26.27
90.202 25.65 95.219 25.41 100.229 26.28 105.239 26.54 115.259 26.64 130.297
26.28 135.306 26.29 145.334 26.11 160.364 26.1 165.373 26.36 170.392 26.37
185.421 27.01 195.441 27.1 210.479 27.73 215.488 27.74 225.516 27.37 250.574
27.01 255.583 27.07 265.603 26.81 280.641 26.03 295.67 24.85 300.68 24.9
325.737 26.83 340.774 27.2 365.832 27.24 370.842 27.55 385.88 27.54 400.909
27.79 405.919 28.44 410.936 29.36 415.947 29.79 420.956 29.84 430.976 29.47
435.994 29.47 451.024 28.29 456.034 28.59 466.062 28.41 476.082 27.68
486.109 26.65 496.129 26.19 501.138 25.81 516.176 24.11 531.206 23.14
541.233 22.89 556.264 21.96 561.273 21.83 566.291 21.42 571.301 20.56
576.311 20.3 591.34 20.29 596.358 20.12 601.368 20.19 611.388 19.81 631.435
19.84 636.445 20.22 641.455 20.08 651.483 21.06 656.492 22.28 666.512 21.97

671.537 21.17 676.563 20.68 681.588 19.88 686.613 18.61 691.638 18.08
696.656 18.22 701.682 18.87 711.732 19.65 716.758 19.58 720.817 19.07
746.878 10.21 751.88 9 755.733 6.54 760.276 6.75 764.658 5.98 767.086 8.24
770.595 5.98 773.996 6.24 778.814 7.53 783.993 8.35 788.988 8.58 794.878
9.05 800.455 10.1 804.738 11.68 829.495 17.96 832.315 18.99 837.34 19.49
842.358 20.18 847.383 20.65 857.434 20.75 862.459 20.57 867.484 19.89
872.509 19.52 877.527 19.33 887.577 18.46 892.603 18.52 902.653 16.96
907.679 16.59 922.747 16.19 927.772 15.67 937.822 15.34 942.847 14.96
947.866 14.89 952.89 14.67 957.916 14.75 962.94 14.64 972.992 14.8 988.059
15.64 993.085 15.47 998.11 15.151018.203 14.671028.253 14.951033.279 14.77
1038.305 14.771048.355 15.671053.372 16.271063.423 17.141068.448 17.45
1078.498 17.551088.542 17.221093.566 17.191098.592 17.411103.618 17.42
1113.668 18.421138.787 19.571148.837 19.621153.863 19.771163.905 19.57
1173.955 18.871189.031 17.451199.074 16.8 1204.1 16.591219.176 15.16 1224.2
15.071234.243 15.461249.319 16.571259.369 17.481264.387 17.58 1274.437
16.921284.487 16.771289.513 16.891294.539 17.251304.581 17.35 1309.607
17.631314.632 18.191319.657 18.571329.708 19.971344.776 22.61 1349.8
23.681354.826 24.261359.852 25.261364.876 25.371369.895 25.9 1374.919
26.111379.945 25.881395.021 24.31400.046 241420.139 24.02 1435.215
24.331455.308 24.031470.384 24.261475.402 24.541480.427 24.64 1490.478
25.081500.528 25.741535.697 26.891565.841 27.041575.891 26.79 1580.917
26.891590.967 26.851595.991 26.941636.202 26.721641.227 26.6 1661.329
26.861686.454 26.7 1701.53 26.91746.765 27.871751.791 27.63 1791.993
27.211802.043 27.341847.278 27.471852.303 27.571857.328 27.87 1872.404
27.711877.429 27.541912.606 28.011932.714 28.911957.841 29.39 1998.043
29.362013.119 28.712043.278 28.22048.304 27.962053.328 27.96 2068.404
27.512088.506 27.442098.556 26.972113.632 26.832118.656 26.55 2123.682
25.92128.708 26.012133.732 26.762143.782 27.082158.866 27.12 2168.917
26.832173.942 27.022183.992 27.22194.043 27.12199.068 27.5 2214.144
29.932219.169 30.232244.296 29.972259.372 302264.404 29.81 2269.429 29.8
2279.48 29.322284.505 29.29 2289.53 28.87

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .093 656.492 .055 857.434 .093

Bank Sta: Left Right Coeff Contr. Expan.
 656.492 857.434 .5 .8
Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 720 25 T
 829 2289.53 22.8 T
Skew Angle = 40

Upstream Embankment side slope = 0 horiz. to 1.0 vertical Downstream
Embankment side slope = 0 horiz. to 1.0 vertical Maximum allowable
submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Bridge Coefficient Sets = 1

```
Low Flow Methods and Data
 Energy
 W.S. Pro Method

 W.S.Pro Data
 Left Embankment
 El of the top of the embankment = 26.2
 El of the toe of the abutment = 12.4
 Right Embankment
 El of the top of the embankment = 26.2
 El of the toe of the abutment = 12.4
 Abutment Type = 4 Vert. abutments and sloping embankments with wingwalls
Slope of abutments =
 Top with of embankment = 35
 Centroid station of bridge opening =
 Wing Wall Type = Angular wing walls  Width = 16
 Angle = 45
 Radius =
 Guide Banks Type = No Guide Bank present
 Length =
 Offset =
 Angle =
 Optional Contraction and expansion coefficients
 At approach Section
 At Guide Bank
 At upstream outside
 At upstream inside (BU)
 At downstream inside (BD)
 Piers are Continuous for the width of the bridge
 Use Geometric mean as Friction Slope Method

Selected Low Flow Methods = W.S.Pro Method

High Flow Method
 Pressure and Weir flow
 Submerged Inlet Cd =
 Submerged Inlet + Outlet Cd = .8
 Max Low Cord =

Additional Bridge Parameters
 Add Friction component to Momentum
 Do not add Weight component to Momentum  Class B flow critical depth
computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION


RIVER: Taunton River
REACH: Main Stem RS: 85275.49

INPUT
Description: 78.3 DS FAce Titicut St
```

Station Elevation Data num= 224
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 31.14 25.057 30.17 45.104
28.81 50.115 28.56 60.135 27.32 65.144 26.83 75.172 26.41 85.191 26.27
90.202 25.65 95.219 25.41 100.229 26.28 105.239 26.54 115.259 26.64 130.297
26.28 135.306 26.29 145.334 26.11 160.364 26.1 165.373 26.36 170.392 26.37
185.421 27.01 195.441 27.1 210.479 27.73 215.488 27.74 225.516 27.37 250.574
27.01 255.583 27.07 265.603 26.81 280.641 26.03 295.67 24.85 300.68 24.9
325.737 26.83 340.774 27.2 365.832 27.24 370.842 27.55 385.88 27.54 400.909
27.79 405.919 28.44 410.936 29.36 415.947 29.79 420.956 29.84 430.976 29.47
435.994 29.47 451.024 28.29 456.034 28.59 466.062 28.41 476.082 27.68
486.109 26.65 496.129 26.19 501.138 25.81 516.176 24.11 531.206 23.14
541.233 22.89 556.264 21.96 561.273 21.83 566.291 21.42 571.301 20.56
576.311 20.3 591.34 20.29 596.358 20.12 601.368 20.19 611.388 19.81 631.435
19.84 636.445 20.22 641.455 20.08 651.483 21.06 656.492 22.28 666.512 21.97
671.537 21.17 676.563 20.68 681.588 19.88 686.613 18.61 691.638 18.08
696.656 18.22 701.682 18.87 711.732 19.65 716.758 19.58 720.817 19.07
746.878 10.21 751.88 9 755.733 6.54 760.276 6.75 764.658 5.98 767.086 8.24
770.595 5.98 773.996 6.24 778.814 7.53 783.993 8.35 788.988 8.58 794.878
9.05 800.455 10.1 804.738 11.68 829.495 17.96 832.315 18.99 837.34 19.49
842.358 20.18 847.383 20.65 857.434 20.75 862.459 20.57 867.484 19.89
872.509 19.52 877.527 19.33 887.577 18.46 892.603 18.52 902.653 16.96
907.679 16.59 922.747 16.19 927.772 15.67 937.822 15.34 942.847 14.96
947.866 14.89 952.89 14.67 957.916 14.75 962.94 14.64 972.992 14.8 988.059
15.64 993.085 15.47 998.11 15.151018.203 14.671028.253 14.951033.279 14.77
1038.305 14.771048.355 15.671053.372 16.271063.423 17.141068.448 17.45
1078.498 17.551088.542 17.221093.566 17.191098.592 17.411103.618 17.42
1113.668 18.421138.787 19.571148.837 19.621153.863 19.771163.905 19.57
1173.955 18.871189.031 17.451199.074 16.8 1204.1 16.591219.176 15.16 1224.2
15.071234.243 15.461249.319 16.571259.369 17.481264.387 17.58 1274.437
16.921284.487 16.771289.513 16.891294.539 17.251304.581 17.35 1309.607
17.631314.632 18.191319.657 18.571329.708 19.971344.776 22.61 1349.8
23.681354.826 24.261359.852 25.261364.876 25.371369.895 25.9 1374.919
26.111379.945 25.881395.021 24.31400.046 241420.139 24.02 1435.215
24.331455.308 24.031470.384 24.261475.402 24.541480.427 24.64 1490.478
25.081500.528 25.741535.697 26.891565.841 27.041575.891 26.79 1580.917
26.891590.967 26.851595.991 26.941636.202 26.721641.227 26.6 1661.329
26.861686.454 26.7 1701.53 26.91746.765 27.871751.791 27.63 1791.993
27.211802.043 27.341847.278 27.471852.303 27.571857.328 27.87 1872.404
27.711877.429 27.541912.606 28.011932.714 28.911957.841 29.39 1998.043
29.362013.119 28.712043.278 28.22048.304 27.962053.328 27.96 2068.404
27.512088.506 27.442098.556 26.972113.632 26.832118.656 26.55 2123.682
25.92128.708 26.012133.732 26.762143.782 27.082158.866 27.12 2168.917
26.832173.942 27.022183.992 27.22194.043 27.12199.068 27.5 2214.144
29.932219.169 30.232244.296 29.972259.372 302264.404 29.81 2269.429 29.8
2279.48 29.322284.505 29.29 2289.53 28.87

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .093 656.492 .055 857.434 .093

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 656.492
857.434 159.18 160.23 161.81 .5 .8 Ineffective Flow num= 2
Sta L Sta R Elev Permanent
0 720 25 T

829 2289.53 22.8 T
Skew Angle = 40

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 85115.27

INPUT
Description: 78 Exit Titicut St
Station Elevation Data num= 365
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 31.94 6.52 31.69 13.04 31.29
19.56 30.57 26.08 30.15 32.6 30.31 39.12 30.52 45.64 30.45 52.15 30.31 58.67
30.09 65.19 30.06 71.71 30.18 78.23 30.07 84.75 29.8 91.27 29.34 97.79
28.91 104.31 28.58 110.83 28.13 117.35 27.77 123.87 27.35 130.39 26.8 136.91
26.22 143.43 25.89 149.94 26.81 156.46 26.94 162.98 27.09 169.5 27.05 176.02
26.52 182.54 26.46 189.06 26.31 195.58 26.41 202.1 26.4 208.62 26.42 221.66
26.51 241.22 26.72 247.74 26.8 254.25 26.93 260.77 26.91 267.29 26.93 273.81
26.97 280.33 27.13 286.85 27.18 293.37 27.2 299.89 27.31 306.41 27.33
312.93 27.39 319.45 27.42 325.97 27.33 332.49 27.38 339.01 27.38 345.53
27.47 358.56 27.28 365.08 27.3 371.6 27.3 378.12 27.34 384.64 27.43 391.16
27.45 397.68 27.39 404.2 27.5 410.72 27.43 417.24 27.45 423.76 27.57 430.28
27.51 443.32 27.52 449.83 27.59 456.35 27.58 462.87 27.63 469.39 27.73
482.43 27.73 488.95 27.8 495.47 27.83 508.51 27.7 515.03 27.62 521.55 27.74
528.07 27.76 534.59 27.91 541.11 28.08 547.62 28.38 554.14 28.79 560.66
29.24 567.18 29.59 573.7 29.75 580.22 29.73 586.74 29.61 593.26 29.33
599.78 29.07 606.3 28.84 612.82 28.51 619.34 28.06 632.38 27.29 638.9 26.98
645.41 26.71 651.93 26.56 658.45 26.33 664.97 25.98 678.01 25.65 684.53
25.39 691.05 25.01 697.57 24.67 704.09 24.38 710.61 24.16 717.13 23.77
723.65 23.53 730.17 23.56 736.69 23.25 743.21 23.01 749.72 23.12 756.24 23
762.76 22.7 769.28 22.64 775.8 22.46 782.32 22.15 788.84 21.89 795.33 21.65
801.82 21.36 808.31 21.18 814.81 21.08 821.3 21.08 827.79 21.04 834.28 20.63
840.77 20.45 847.26 20.03 860.25 19.93 866.74 19.44 899.15 17.59 919.99
17.44 927.65 10.59 956 5.96 959.1 4.65 977.02 3.02 993.28 1.83 1003.03 -.61
1015.38 -2.22 1033.16 -3.31 1051.37 -2.53 1069.46 -.38 1074.78 3.47 1081.61
11.14 1085.01 17.06 1096.85 17.73 1117.81 17.21 1135 15.37 1172.27 16.2
1218.72 13.7 1268.73 15.41 1365 13.42 1391.39 15.53 1432.3 17.9 1438.82
18.71 1445.34 19.56 1451.86 19.86 1458.38 19.85 1464.9 19.59 1471.42 19.35
1477.94 19.22 1484.47 18.95 1490.99 18.51 1497.51 18 1504.03 17.72 1510.55
17.54 1517.07 17.32 1523.59 17.16 1530.11 17.03 1536.63 16.67 1543.16 16.37
1549.68 15.97 1556.2 15.53 1562.72 14.92 1569.24 14.91 1575.76 14.7 1582.28
14.44 1588.8 14.57 1595.33 14.94 1601.85 15.6 1608.37 16.19 1621.41 17
1627.93 17.35 1634.45 17.34 1640.97 16.96 1647.5 16.4 1654.02 16.15 1660.54
16.6 1667.06 17.2 1673.58 17.9 1680.1 18.15 1686.62 18.55 1693.14 18.66
1699.66 18.94 1706.19 19.2 1712.71 19.85 1719.23 20.66 1725.75 21.07 1732.27
21.28 1738.79 21.28 1745.31 21.23 1751.83 20.95 1758.36 20.98 1764.88 21.23
1771.4 21.55 1777.92 22.36 1784.44 23.78 1790.96 24.6 1797.48 24.65 1804
24.24 1810.52 23.98 1817.05 23.98 1823.57 24.25 1830.09 24.46 1836.61 24.65
1843.13 24.76 1849.65 24.84 1856.17 25.03 1862.69 25.17 1869.22 25.21
1875.74 25.18 1882.26 24.99 1895.3 24.56 1901.82 24.44 1908.34 24.43 1914.86
24.32 1927.91 24.43 1934.43 24.58 1940.95 24.58 1947.47 24.9 1953.99 25.09
1960.51 25.17 1967.03 25.35 1973.55 25.45 1980.08 25.46 1986.6 25.52 1993.12
25.55 1999.64 25.56 2006.16 25.53 2012.68 25.47 2019.2 25.43 2025.72 25.52

2032.25 25.41 2038.79 25.43 2045.33 25.26 2051.87 25.31 2058.41 25.26 2071.5
25.24 2078.04 25.22 2084.58 25.13 2091.12 25.12 2097.67 25.17 2104.21 25.15
2110.75 25.15 2117.29 25.21 2123.83 25.25 2130.38 25.23 2136.92 25.26
2143.46 25.35 2156.54 25.45 2163.09 25.64 2169.63 25.61 2176.17 25.64
2182.71 25.84 2195.8 25.67 2202.34 25.6 2208.88 25.58 2221.96 25.67 2228.5
25.68 2235.05 25.77 2241.59 25.81 2248.13 25.87 2254.67 25.97 2274.3 26.18
2280.84 26.39 2287.38 26.43 2293.92 26.44 2300.47 26.5 2307.01 26.5 2313.55
26.61 2320.09 26.66 2326.63 26.86 2333.18 26.98 2339.72 27.17 2346.26 27.31
2352.8 27.42 2359.34 27.72 2365.89 27.81 2372.43 27.85 2378.97 27.8 2385.51
27.84 2398.6 27.73 2405.14 27.79 2411.68 27.69 2418.22 27.56 2431.31 27.25
2437.85 27.26 2450.93 27.03 2457.47 26.84 2470.56 26.84 2477.1 26.8 2483.64
26.68 2490.18 26.66 2503.27 26.55 2516.35 26.3 2522.89 26.23 2529.44 26.08
2535.98 25.9 2542.52 25.85 2549.06 25.9 2555.6 25.86 2562.15 25.97 2568.69
25.91 2575.23 25.74 2581.77 25.68 2588.31 25.55 2594.86 25.49 2601.4 25.45
2607.94 25.33 2621.02 25.34 2627.57 25.3 2634.11 25.15 2640.65 25.05 2647.19
25.18 2653.73 25.29 2660.28 25.32 2666.82 25.2 2673.36 25.03 2679.9 24.96
2686.44 25.02 2692.99 25.16 2699.53 25.46 2706.07 25.3 2712.61 25.26 2719.15
25.33 2725.69 24.65 2732.24 23.95 2738.78 24.12 2745.32 24.7 2751.86 25.19
2758.4 25.24 2764.95 25.33 2771.49 25.5 2778.03 25.53 2784.57 25.64 2791.11
25.86 2797.66 25.81 2804.2 25.84 2810.74 25.79 2823.82 25.84 2830.37 26.06
2836.91 26.14 2843.45 26.28 2849.99 26.24 2856.53 26.15 2863.08 26.34
2869.62 26.58 2876.16 26.73 2882.7 26.74 2889.24 26.88 2895.79 26.93 2902.33
26.95 2908.87 26.94 2915.41 26.99 2921.95 26.98 2928.5 27.07 2935.04 27.2
2941.58 27.26 2948.12 27.12 2954.66 27.01 2961.21 26.84

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 919.99 .055 1096.85 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 919.99
1096.85 1317.95 1325.49 1349.87 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 1335 2961.21 25.4 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 83789.77

INPUT
Description: 77
Station Elevation Data num= 277
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 34.75 13.12 34.38 26.24
34.48 39.37 34.38 45.93 34.19 52.49 34.47 59.05 34.31 72.17 34.76 78.73
34.82 85.29 34.31 98.41 33.96 111.54 34.03 118.1 33.78 137.78 33.9 144.34
33.61 150.9 33.61 157.46 33.37 170.58 33.26 183.7 33.39 190.27 33.3 196.83
33.42 209.95 33.34 223.07 34.02 229.63 33.81 236.19 34.6 242.75 35.92 249.31
36.96 255.87 36.91 262.44 36.39 269 36.12 275.56 37.1 282.12 36.96 288.68
35.53 295.24 33.94 301.8 32.85 308.36 32.2 314.92 31.38 321.48 30.4 334.61
29.89 347.73 28.18 354.29 27.59 360.85 27.15 373.97 26.66 413.34 23.87 419.9
23.16 426.46 22.64 433.02 22.5 439.58 22.15 465.82 20.24 478.94 19.5 498.63
17.98 505.19 17.33 511.75 16.92 518.31 16.8 531.43 16.26 544.55 16.03 557.68
16.07 564.24 16.23 583.92 15.65 590.48 15.67 597.04 15.84 603.6 15.87 616.72

15.54 623.28 15.59 629.85 15.79 636.41 16.21 642.97 16.35 649.53 16.01
656.09 15.96 669.21 16.17 675.77 15.92 682.33 16.08 688.89 16.62 695.45
17.33 702.01 17.64 708.58 17.77 715.14 18.26 721.7 18.52 728.26 18.92 734.82
18.89 741.38 19.24 747.94 19.07 754.5 18.45 761.06 17.42 767.62 15.66
774.18 14.81 793.87 14.75 800.43 14.91 820.11 14.81 833.23 14.95 846.35 14.7
859.48 15.05 866.04 14.97 872.6 15.26 879.16 15.87 885.72 16.06 892.28 16.08
898.84 16.34 918.52 17.87 931.65 18.43 938.21 18.33 944.77 17.77 957.89
16.25 968.36 15.45 985 10.1 1015 7.9 1047 6.4 1075 6.1 1109 10.4 1115 18.5
1121.91 19.49 1128.47 19.79 1135.03 19.86 1141.59 19.81 1148.16 19.7 1154.72
19.5 1161.28 19.51 1167.84 19.55 1174.4 19.51 1180.96 19.32 1194.08 19.5
1200.64 19.78 1207.2 20.02 1213.76 20.24 1220.32 20.39 1233.45 20.24 1240.01
19.96 1246.57 19.65 1253.13 19.57 1259.69 19.53 1266.25 19.6 1272.81 19.62
1279.37 19.86 1285.93 20.22 1292.49 20.31 1299.06 20.68 1305.62 21.16
1312.18 21.47 1318.74 21.74 1325.3 22.19 1331.86 22.49 1338.42 22.58 1344.98
22.6 1351.54 22.6 1358.1 22.68 1364.66 22.46 1371.23 22.31 1377.79 21.93
1384.35 21.8 1390.91 21.19 1397.47 20.9 1404.03 20.73 1410.59 20.86 1417.15
20.7 1423.71 20.7 1430.27 20.96 1436.83 21.15 1443.4 21.37 1449.96 21.77
1456.52 21.87 1463.08 22.26 1476.2 23.16 1482.76 23.39 1489.32 23.65 1495.88
23.85 1502.44 24.03 1509 24.23 1515.56 24.65 1522.13 24.88 1528.69 25.19
1535.25 25.3 1541.81 25.29 1548.37 25.31 1554.93 25.07 1561.49 24.68 1568.05
24.47 1574.61 24.22 1581.17 23.75 1587.73 23.38 1594.3 23.23 1600.86 23.2
1607.42 23.34 1613.98 23.39 1620.54 23.57 1627.1 23.81 1633.66 23.89 1640.22
24.17 1646.78 24.48 1653.34 24.37 1659.9 24.29 1666.47 24.15 1673.03 23.91
1686.15 23.78 1692.71 23.65 1699.27 23.54 1712.39 23.13 1718.95 22.9 1725.51
22.59 1732.07 22.46 1738.64 22.47 1745.2 22.37 1751.76 22.47 1764.88 22.44
1778 22.86 1784.56 22.99 1791.12 22.71 1797.68 21.99 1804.24 20.79 1810.8
19.74 1817.37 18.88 1823.93 18.41 1830.49 17.42 1837.05 16.29 1843.61 16.46
1850.17 16.54 1856.73 16.42 1863.29 16.26 1869.85 17.59 1876.41 18.37
1882.97 19.1 1889.54 19.23 1896.1 19.09 1902.66 19.02 1909.22 18.61 1915.78
17.88 1922.34 17.05 1928.9 16.66 1935.46 17.22 1942.02 17.03 1948.58 16.73
1955.14 16.25 1961.71 16.88 1968.27 16.73 1974.83 16.88 1981.39 17.09
1987.95 17.27 1994.51 17.55 2001.07 17.72 2007.63 18.3 2014.19 18.41 2020.75
18.76 2027.31 19.23 2033.88 19.68 2040.44 20.17 2047 21.02 2053.56 22.63
2060.12 24.75 2066.68 26.14 2073.24 26.62 2079.8 26.59 2086.36 26.43 2092.92
25.98 2099.48 25.51 2106.05 24.82 2119.17 23.13 2125.73 22.44 2132.29 22.05
2138.85 21.9 2145.41 21.9 2151.97 22.43 2158.53 22.76 2165.09 22.96 2171.65
23.59 2178.22 24.39 2191.34 25.3 2197.9 25.95 2204.46 26.82 2211.02 27.58
2217.58 28.01 2224.14 28.35 2230.7 28.63 2243.83 28.88 2250.39 28.99 2256.95
29.06 2263.51 29.17 2270.07 29.37 2276.63 29.45

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .095 938.21 .055 1128.47 .095

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 938.21
1128.47 1097.27 1096.54 1095.28 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 1548.4 2276.63 25.3 F

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 82693.23

INPUT
Description: 76 Approach Bedford St
Station Elevation Data num= 305 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 41.32 6.56 41.09 13.12 41.08 19.68 41.17 26.24 41.19 32.8 41.19 39.36
41.29 45.92 41.12 52.48 40.91 65.6 40.56 72.16 40.47 78.72 40.33 85.28 40.24
91.84 40.13 98.4 39.97 111.52 39.57 118.08 39.36 124.64 39.17 131.2 38.86
137.76 38.46 144.32 38.33 150.88 38.32 157.44 38.13 164 37.81 170.56 37.63
177.12 37.37 183.68 36.97 190.24 36.52 196.8 36.16 203.36 36.1 209.92 36.01
216.48 35.89 223.04 35.71 229.6 35.49 236.16 35.25 242.72 34.91 249.28 34.67
255.84 34.45 262.4 34.25 268.96 33.96 275.51 33.6 282.07 33.41 288.63 33.36
295.19 33.4 301.75 33.19 308.31 33 314.87 32.78 321.43 32.52 327.99 32.2
334.55 31.63 341.11 30.97 347.67 30.7 354.23 30.52 360.79 30.51 367.35 30.36
373.91 29.93 380.47 29.89 387.03 29.7 393.59 29.73 400.15 29.7 406.71 29.62
413.27 29.66 419.83 29.62 426.39 29.41 432.95 29.37 439.51 29.42 446.07
29.31 452.63 29.09 459.19 28.8 465.75 28.76 472.31 28.56 485.43 28.3 491.99
28.24 498.55 28.1 505.11 28.02 511.67 27.85 518.23 27.41 524.79 27.17 531.35
26.83 537.91 26.26 544.47 25.57 551.03 24.9 557.59 24.43 564.15 24.06 570.71
23.52 577.27 22.92 583.83 22.6 590.39 22.53 596.95 22.24 603.51 22.03
610.07 21.94 616.63 21.53 629.75 21.36 636.31 21.15 642.87 20.86 649.43
20.33 655.99 20.11 662.55 20.09 669.11 20.04 675.67 20.06 682.23 20.04
688.79 19.63 695.35 18.98 701.91 18.53 708.47 18.39 715.03 18.32 721.59
18.14 728.15 17.85 734.71 17.58 760.95 16.65 767.51 16.51 774.07 16.4 780.63
16.22 793.75 16.39 800.31 16.4 806.87 16.54 813.43 16.53 819.99 16.14 826.55
15.9 833.1 15.75 839.66 15.69 852.78 15.52 859.34 15.51 865.9 15.72 872.46
15.69 879.02 15.48 885.58 15.82 892.14 16.47 898.7 17.61 905.26 17.73
911.82 17.61 924.94 17.48 931.5 17.34 938.06 16.8 944.62 16.35 951.18 15.78
957.74 15.16 964.3 15.07 1000.4 14.3 1041.6 16.79 1065.66 14.27 1073.16 7.12
1078.7 4.63 1093.06 2.96 1113.48 3.2 1131.73 4.04 1145.79 4.42 1170.48 5.98
1193.1 16.26 1216.79 15.76 1253.03 19.74 1303.8 17.74 1310.36 17.14 1316.92
16.31 1323.48 16 1336.59 15.87 1343.15 15.88 1349.71 15.71 1356.27 15.41
1362.83 15.32 1369.39 15.53 1375.94 15.7 1382.5 15.66 1389.06 15.6 1395.62
15.77 1402.18 15.98 1408.74 16.13 1415.3 16.19 1421.85 16.37 1428.41 16.79
1448.09 19.1 1454.65 19.78 1461.21 20.57 1467.76 21.19 1474.32 21.6 1480.88
21.61 1487.44 21.36 1494 21.07 1500.56 20.64 1507.12 20 1513.67 19.24
1520.23 18.37 1526.79 18.06 1533.35 17.63 1539.91 17.52 1546.47 18.05
1553.03 18.37 1559.58 18.44 1566.14 18.58 1572.7 18.56 1585.82 17.95 1592.38
17.78 1598.94 18.13 1605.49 18.39 1618.61 18.33 1625.17 18.48 1631.73 18.59
1638.29 18.53 1644.85 18.37 1651.4 18.13 1657.96 18.01 1664.52 18.09 1671.08
18.35 1677.64 18.73 1684.2 19.2 1690.76 19.94 1697.31 20.74 1703.87 21.15
1710.43 21.65 1716.99 21.91 1723.55 21.85 1730.11 21.91 1736.67 22.23
1743.22 22.62 1749.78 22.89 1756.34 23.28 1762.9 23.78 1769.46 23.86 1776.02
23.84 1782.58 23.86 1789.14 23.83 1795.69 23.61 1802.25 23.58 1808.81 23.53
1815.37 23.42 1821.93 23.75 1828.49 23.89 1835.05 23.8 1841.6 23.67 1848.16
23.6 1854.72 23.8 1861.28 24.42 1874.4 25.75 1880.96 26.37 1887.51 26.91
1894.07 27.59 1900.63 28.36 1907.19 28.67 1913.75 29.03 1920.31 29.12
1926.87 29.33 1933.42 29.4 1939.98 29.17 1953.1 28.84 1959.66 28.72 1966.22
28.5 1972.78 28.38 1979.33 27.93 1985.89 28.09 1992.45 28.16 1999.01 27.83
2005.57 27.9 2012.13 28.03 2018.69 28.11 2025.24 28.25 2031.8 28.12 2038.36
28.16 2044.92 28.14 2051.48 28.07 2058.04 27.98 2064.6 27.97 2071.15 28.01
2077.71 27.93 2084.27 27.71 2090.83 27.45 2097.39 27.27 2103.95 27.22
2110.51 27.19 2123.62 27.32 2130.18 27.27 2136.74 27.13 2143.3 27.06 2149.86
27.01 2156.42 26.92 2162.98 27.14 2169.53 27.21 2176.09 27.04 2182.65 26.85
2189.21 26.68 2195.77 26.46 2202.33 26.19 2208.89 25.88 2215.44 25.55 2222
26.36 2228.56 26.32 2235.12 26.42 2241.68 26.05 2248.24 26.04 2254.8 25.98

2261.35 26.19 2267.91 26.43 2274.47 26.51 2281.03 26.38 2287.59 26.42
2300.71 26.61 2307.26 26.59 2313.82 26.45 2320.38 26.46 2326.94 26.6 2333.5
26.66 2340.06 26.6 2346.62 26.61 2353.18 26.58 2359.73 26.6 2366.29 26.81

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 1041.6 .055 1253.03 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1041.6
1253.03 72.73 101.63 122.4 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 82591.6

INPUT
Description: 75.7 US FAce Bedford St
Station Elevation Data num= 350
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 41.35 5.936 41.17 11.873
41.08 17.809 41.17 23.736 41.13 29.673 40.96 41.545 40.87 47.481 40.73
53.418 40.64 59.354 40.6 65.29 40.51 71.218 40.39 77.154 40.3 83.09 40.16
89.027 39.93 94.963 39.75 100.899 39.74 106.836 39.68 112.763 39.5 118.699
39.23 124.635 39.1 130.572 39.02 136.508 38.82 142.444 38.5 148.381 38.23
154.317 37.94 160.244 37.62 166.181 37.37 172.117 37.47 178.053 37.39 183.99
37.19 189.926 36.77 195.862 36.51 201.789 36.33 207.726 36.03 213.662 35.62
219.598 35.24 225.535 34.98 231.471 34.8 237.407 34.54 243.344 34.33 249.271
34.27 255.207 34.16 261.144 34.1 267.08 34.34 273.016 34.56 278.952 34.12
284.889 33.66 290.816 33.4 296.752 33.12 302.689 32.62 308.625 31.89 314.561
31.74 320.498 31.84 326.434 31.62 332.37 31.54 338.298 31.51 344.234 30.88
350.17 30.51 356.106 30.21 362.043 30.12 373.915 30.24 379.843 29.76 385.779
29.49 397.652 29.8 403.588 29.82 409.524 29.61 415.461 29.13 421.397 29.06
427.324 29.21 433.26 28.86 439.197 28.49 445.133 28.39 451.069 28.25 457.006
28.08 462.942 27.83 468.869 27.6 474.806 27.41 480.742 27.15 486.678 26.81
492.615 26.35 498.551 25.82 504.487 25.48 510.423 25.25 516.351 25 522.287
24.95 528.223 25.11 534.16 24.91 546.032 24.86 551.969 24.08 557.896 23.69
563.832 23.51 569.768 23.31 575.705 22.74 581.641 22.12 587.578 22.41
593.514 22.3 599.45 22.01 605.377 21.83 611.314 21.77 617.25 21.67 623.186
21.36 629.123 20.94 635.059 20.47 640.995 19.89 646.922 20.06 652.859 19.98
658.795 20.05 664.732 20.2 670.668 19.74 676.604 18.77 682.54 19.82 688.468
20.28 694.404 20.34 700.34 20.36 706.277 20.98 712.213 20.69 718.149 20.79
724.086 20.92 730.022 20.65 735.949 20.49 741.885 20.4 747.822 20.39 753.758
20.72 759.694 18.9 765.631 17.94 771.567 18.09 777.494 18.37 783.431 18.81
789.367 19.2 795.303 19.34 801.24 19.74 813.112 20.67 819.039 20.98 830.912
21.47 836.848 22.2 842.785 22.48 848.721 22.32 854.657 22.34 860.594 22.47
866.521 22.68 872.457 22.73 878.394 22.8 884.33 22.85 890.266 22.85 896.202
22.77 902.139 22.66 908.066 22.5 919.939 22.85 925.875 23.17 931.811 23.52
937.748 24.01 943.684 24.17 949.62 24.02 955.547 24.05 997.183 21.54 997.555
16.131005.367 15.971008.141 9.761020.249 6.01 1035.212 3.84 1044.91
3.851071.283 4.351080.736 4.921097.294 5.73 1107.3 6.791117.541
12.081117.876 15.161126.522 15.391128.489 20.92 1157.346 22.671169.219
21.241175.146 20.621181.082 20.781187.019 20.87 1192.955 21.031198.891
20.951204.828 20.551210.764 20.31216.691 20.45 1222.627 20.361228.564 20.31

1234.5 20.51240.436 20.51246.373 20.31 1252.309 20.371258.245 20.511264.172
20.581270.109 20.61276.045 20.6 1281.991 20.771287.927 20.851293.872
21.051299.809 21.141305.754 21.34 1311.69 21.581317.636 21.361323.572
21.181329.517 21.221335.454 21.21 1341.399 21.021347.335 21.121353.281
21.561359.217 21.71365.162 21.68 1371.099 20.791377.044 18.921388.926
18.791394.862 18.861400.807 18.88 1406.744 19.181412.689 19.081418.625
19.11424.571 19.251430.507 19.21 1436.453 19.211442.389 19.121454.271
18.551460.216 18.461466.152 18.58 1472.098 19.141478.034 18.991483.979
19.561489.916 19.291495.861 19.31 1501.797 19.71507.743 19.811513.679
19.741519.624 19.751525.561 19.81 1531.506 20.251537.443 19.811543.388
20.111549.324 20.25 1555.27 20.59 1561.206 20.51567.151 20.871573.088
21.321579.033 20.31584.969 20.01 1590.915 20.121596.851 20.321602.796
20.581608.733 20.951614.678 20.92 1620.614 20.92 1626.56 20.731632.496
20.851638.441 20.751644.378 21.02 1650.323 21.321656.259 21.41662.205
20.811668.141 20.81674.087 21.07 1680.023 21.361685.968 21.431691.905 21.35
1697.85 21.341709.732 21.2 1715.668 21.711721.613 22.02 1727.55 22.221733.495
22.531739.431 22.64 1745.377 22.461751.313 22.371757.258 22.551763.195 22.6
1769.14 22.89 1775.076 23.431781.022 22.41786.958 21.131792.903 21.06 1798.84
21.08 1810.721 20.691816.667 20.551822.603 20.941828.548 21.491834.485 21.99
1840.43 22.041846.367 21.961852.312 22.241858.248 22.461864.193 22.58
1870.13 22.351876.075 21.911882.012 21.91887.957 21.831893.893 21.66 1899.839
21.361905.775 21.23 1911.72 21.381917.666 21.371923.602 21.89 1929.538
21.841935.484 21.7 1941.42 21.941947.365 22.281953.311 22.73 1959.247
22.841965.193 23.941971.129 23.841977.074 251983.011 25.64 1988.956
26.11994.892 26.242000.838 26.432006.774 26.542012.719 26.45 2018.656
26.632024.601 26.562036.483 26.72042.419 26.372048.365 25.35 2054.301
24.192060.246 22.552066.182 21.982072.128 22.042078.064 22.06 2084.01
22.492089.946 22.862095.891 22.722101.828 22.262107.773 22.28 2113.709
22.942119.655 23.232125.591 23.992131.536 24.292137.473 23.83 2149.354 23.03
2155.3 23.282161.236 23.52167.181 23.742173.118 24.36 2179.063 24.552184.999
24.292190.945 24.492196.881 24.392202.826 23.85 2208.763 23.352214.708
23.432220.645 24.01 2226.59 24.332232.526 23.92 2238.471 23.832244.408
24.062250.353 24.7 2256.29 25.512262.235 26.12

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 955.547 .0551157.346 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
955.5471157.346 94.57 98.76 101.32 .5 .8 Ineffective Flow num= 3
 Sta L Sta R Elev Permanent
 534 980 24 T
 1150 2000 22.8 T 2000 2262 26 T
Skew Angle = 25

BRIDGE

RIVER: Taunton River
REACH: Main Stem RS: 82538.7

INPUT
Description: 75.5 SR 18/28 Bedford St
Distance from Upstream XS = 8

Deck/Roadway Width = 50
Weir Coefficient = 2.6
Bridge Deck/Roadway Skew = 25
Upstream Deck/Roadway Coordinates
 num= 15
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 328.083 32.92 532.003 26.66 537.441 27.09
 644.385 24.9 972.468 25.56 975.187 26.19
 975.187 28.75 998.751 28.75 21.541130.166 28.43 20.92 1151.917 28.43
1151.917 25.21 1176.388 24.57 1376.682 23.56 1538.004 22.82 1866.088 25.18

Upstream Bridge Cross Section Data
Station Elevation Data num= 350
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 41.35 5.936 41.17 11.873
41.08 17.809 41.17 23.736 41.13 29.673 40.96 41.545 40.87 47.481 40.73
53.418 40.64 59.354 40.6 65.29 40.51 71.218 40.39 77.154 40.3 83.09 40.16
89.027 39.93 94.963 39.75 100.899 39.74 106.836 39.68 112.763 39.5 118.699
39.23 124.635 39.1 130.572 39.02 136.508 38.82 142.444 38.5 148.381 38.23
154.317 37.94 160.244 37.62 166.181 37.37 172.117 37.47 178.053 37.39 183.99
37.19 189.926 36.77 195.862 36.51 201.789 36.33 207.726 36.03 213.662 35.62
219.598 35.24 225.535 34.98 231.471 34.8 237.407 34.54 243.344 34.33 249.271
34.27 255.207 34.16 261.144 34.1 267.08 34.34 273.016 34.56 278.952 34.12
284.889 33.66 290.816 33.4 296.752 33.12 302.689 32.62 308.625 31.89 314.561
31.74 320.498 31.84 326.434 31.62 332.37 31.54 338.298 31.51 344.234 30.88
350.17 30.51 356.106 30.21 362.043 30.12 373.915 30.24 379.843 29.76 385.779
29.49 397.652 29.8 403.588 29.82 409.524 29.61 415.461 29.13 421.397 29.06
427.324 29.21 433.26 28.86 439.197 28.49 445.133 28.39 451.069 28.25 457.006
28.08 462.942 27.83 468.869 27.6 474.806 27.41 480.742 27.15 486.678 26.81
492.615 26.35 498.551 25.82 504.487 25.48 510.423 25.25 516.351 25 522.287
24.95 528.223 25.11 534.16 24.91 546.032 24.86 551.969 24.08 557.896 23.69
563.832 23.51 569.768 23.31 575.705 22.74 581.641 22.12 587.578 22.41
593.514 22.3 599.45 22.01 605.377 21.83 611.314 21.77 617.25 21.67 623.186
21.36 629.123 20.94 635.059 20.47 640.995 19.89 646.922 20.06 652.859 19.98
658.795 20.05 664.732 20.2 670.668 19.74 676.604 18.77 682.54 19.82 688.468
20.28 694.404 20.34 700.34 20.36 706.277 20.98 712.213 20.69 718.149 20.79
724.086 20.92 730.022 20.65 735.949 20.49 741.885 20.4 747.822 20.39 753.758
20.72 759.694 18.9 765.631 17.94 771.567 18.09 777.494 18.37 783.431 18.81
789.367 19.2 795.303 19.34 801.24 19.74 813.112 20.67 819.039 20.98 830.912
21.47 836.848 22.2 842.785 22.48 848.721 22.32 854.657 22.34 860.594 22.47
866.521 22.68 872.457 22.73 878.394 22.8 884.33 22.85 890.266 22.85 896.202
22.77 902.139 22.66 908.066 22.5 919.939 22.85 925.875 23.17 931.811 23.52
937.748 24.01 943.684 24.17 949.62 24.02 955.547 24.05 997.183 21.54 997.555
16.131005.367 15.971008.141 9.761020.249 6.01 1035.212 3.84 1044.91
3.851071.283 4.351080.736 4.921097.294 5.73 1107.3 6.791117.541
12.081117.876 15.161126.522 15.391128.489 20.92 1157.346 22.671169.219
21.241175.146 20.621181.082 20.781187.019 20.87 1192.955 21.031198.891
20.951204.828 20.551210.764 20.31216.691 20.45 1222.627 20.361228.564 20.31
1234.5 20.51240.436 20.51246.373 20.31 1252.309 20.371258.245 20.511264.172
20.581270.109 20.61276.045 20.6 1281.991 20.771287.927 20.851293.872
21.051299.809 21.141305.754 21.34 1311.69 21.581317.636 21.361323.572
21.181329.517 21.221335.454 21.21 1341.399 21.021347.335 21.121353.281
21.561359.217 21.71365.162 21.68 1371.099 20.791377.044 18.921388.926
18.791394.862 18.861400.807 18.88 1406.744 19.181412.689 19.081418.625
19.11424.571 19.251430.507 19.21 1436.453 19.211442.389 19.121454.271

18.551460.216 18.461466.152 18.58 1472.098 19.141478.034 18.991483.979
19.561489.916 19.291495.861 19.31 1501.797 19.71507.743 19.811513.679
19.741519.624 19.751525.561 19.81 1531.506 20.251537.443 19.811543.388
20.111549.324 20.25 1555.27 20.59 1561.206 20.51567.151 20.871573.088
21.321579.033 20.31584.969 20.01 1590.915 20.121596.851 20.321602.796
20.581608.733 20.951614.678 20.92 1620.614 20.92 1626.56 20.731632.496
20.851638.441 20.751644.378 21.02 1650.323 21.321656.259 21.41662.205
20.811668.141 20.81674.087 21.07 1680.023 21.361685.968 21.431691.905 21.35
1697.85 21.341709.732 21.2 1715.668 21.711721.613 22.02 1727.55 22.221733.495
22.531739.431 22.64 1745.377 22.461751.313 22.371757.258 22.551763.195 22.6
1769.14 22.89 1775.076 23.431781.022 22.41786.958 21.131792.903 21.06 1798.84
21.08 1810.721 20.691816.667 20.551822.603 20.941828.548 21.491834.485 21.99
1840.43 22.041846.367 21.961852.312 22.241858.248 22.461864.193 22.58
1870.13 22.351876.075 21.911882.012 21.91887.957 21.831893.893 21.66 1899.839
21.361905.775 21.23 1911.72 21.381917.666 21.371923.602 21.89 1929.538
21.841935.484 21.7 1941.42 21.941947.365 22.281953.311 22.73 1959.247
22.841965.193 23.941971.129 23.841977.074 251983.011 25.64 1988.956
26.11994.892 26.242000.838 26.432006.774 26.542012.719 26.45 2018.656
26.632024.601 26.562036.483 26.72042.419 26.372048.365 25.35 2054.301
24.192060.246 22.552066.182 21.982072.128 22.042078.064 22.06 2084.01
22.492089.946 22.862095.891 22.722101.828 22.262107.773 22.28 2113.709
22.942119.655 23.232125.591 23.992131.536 24.292137.473 23.83 2149.354 23.03
2155.3 23.282161.236 23.52167.181 23.742173.118 24.36 2179.063 24.552184.999
24.292190.945 24.492196.881 24.392202.826 23.85 2208.763 23.352214.708
23.432220.645 24.01 2226.59 24.332232.526 23.92 2238.471 23.832244.408
24.062250.353 24.7 2256.29 25.512262.235 26.12

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 955.547 .0551157.346 .09

Bank Sta: Left Right Coeff Contr. Expan. 955.5471157.346 .5 .8
Ineffective Flow num= 3
 Sta L Sta R Elev Permanent
 534 980 24 T
 1150 2000 22.8 T
 2000 2262 26 T
Skew Angle = 25

Downstream Deck/Roadway Coordinates
 num= 15
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 362.523 32.92 566.442 26.66 571.88 27.09
 678.825 24.9 1006.908 25.56 1009.627 26.19 1009.627 28.75 1033.191 28.75
21.541164.606 28.43 20.92 1186.357 28.43 1186.357 25.21 1210.827 24.57
1411.121 23.56 1572.444 22.82 1900.527 25.18

Downstream Bridge Cross Section Data
Station Elevation Data num= 477
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 44.26 5.927 44.02 11.864
44.43 17.791 43.86 23.727 42.97 35.591 42.74 41.518 42.61 53.382 42.24
59.318 41.99 65.245 41.69 71.181 41.55 83.045 41.15 88.972 40.91 94.899
40.87 100.836 40.81 106.763 41.43 112.699 42.95 118.627 43.6 124.563 43.79
130.49 43.65 136.427 43.57 142.354 43.21 148.29 43.1 154.217 43.06 160.154

42.71 172.017 42.31 183.872 42.15 189.808 42.06 195.735 41.87 201.672 41.49
207.599 41.04 219.462 40.11 225.399 39.61 231.326 39.05 237.262 38.37 243.19
37.29 249.126 36.5 255.053 36.35 260.989 36.16 266.917 36.19 272.844 36.34
284.708 36.36 290.644 36.16 296.571 35.85 302.507 35.59 308.435 35.24
314.371 35.04 320.298 35.23 326.235 35.09 332.162 34.47 338.098 33.55
344.025 32.93 349.962 32.44 355.889 32.23 361.816 31.91 367.753 31.65 373.68
31.43 379.616 31.27 385.543 30.98 391.48 30.41 397.407 30.12 403.343 29.7
409.27 29.48 415.207 29.52 421.134 29.6 427.07 29.51 432.998 29.05 438.925
28.67 444.861 28.37 450.788 28.19 456.725 28.1 462.652 27.97 474.516 27.82
480.452 27.85 486.379 28.19 492.315 28.36 498.243 28.49 504.179 28.46
510.106 28.09 516.043 27.59 521.97 27.45 527.897 27.47 533.833 27.63 539.761
27.86 545.697 28.13 551.624 27.78 557.561 27.35 563.488 27.01 569.424 26.72
575.351 26.12 581.288 25.41 587.215 24.74 593.151 24.34 599.079 24.19
605.015 24.02 610.942 23.6 616.869 23.35 622.806 23.18 628.733 22.86 634.669
22.35 640.596 21.91 646.533 21.6 652.46 21.27 658.396 21.13 664.324 21.01
670.26 20.8 682.124 20.54 688.051 20.4 693.978 20.22 699.914 19.88 711.778
19.33 717.705 19.09 723.641 18.98 735.505 18.63 741.432 18.32 747.369 17.93
753.296 17.68 759.232 17.47 765.159 17.41 771.096 17.17 777.023 16.73 782.95
16.56 788.887 16.41 794.814 16.24 800.75 16.31 806.677 16.17 812.614 16.11
818.541 16.29 824.477 16.01 830.405 16.03 836.341 15.98 842.268 15.7 848.204
15.58 854.132 15.36 860.059 15.45 865.995 15.65 871.922 16.13 877.859 17.05
883.786 17.04 889.722 17.7 895.65 17.81 901.586 17.79 907.513 16.66 969.749
25.551009.699 25.85 1033.436 21.541033.807 16.13 1041.62 15.971044.393
9.761056.501 6.01 1071.464 3.841081.162 3.851107.535 4.351116.988
4.921133.546 5.73 1143.552 6.791153.793 12.081154.129 15.161162.775
15.391164.741 20.92 1186.139 24.71221.884 18.851227.811 19.31233.748
19.281245.611 18.96 1251.539 18.531257.475 18.381263.402 18.481269.339
18.951275.266 19.2 1281.202 19.291287.129 19.571293.057 19.641298.993 19.34
1304.92 19.09 1316.784 18.5 1322.72 18.081328.647 17.811334.584 17.561340.511
17.52 1346.447 17.621352.374 17.651358.311 17.591364.238 17.731370.174 17.71
1376.102 17.961382.029 18.081387.965 18.421393.892 18.641399.829 18.95
1405.756 19.371411.692 19.63 1417.62 19.851423.556 20.11429.483 20.4 1435.419
20.671441.347 20.671447.283 20.93 1453.21 20.91459.137 21.03 1465.074
20.941471.001 20.621476.937 20.431482.865 20.551488.801 20.7 1494.728
20.811500.665 21.631506.592 22.291512.528 22.351518.455 22.37 1524.392
22.411530.319 22.161536.255 21.771542.182 21.51 1548.11 21.13 1554.046
20.941559.973 21.06 1565.91 21.111571.837 21.091577.773 21.33 1583.7
21.51589.637 21.541595.564 21.84 1601.5 22.451607.427 23.17 1613.364
23.671619.291 23.811625.227 23.851631.155 23.71637.082 23.35 1643.018
22.981648.946 22.921654.882 22.941660.809 22.761666.745 22.67 1672.673
22.011684.536 21.621690.473 21.48 1696.4 21.421708.263 21.57 1714.2
21.71720.127 21.641726.054 21.69 1731.99 21.471737.918 21.51 1743.854
21.851749.781 21.881755.718 21.721761.645 21.951767.581 22.24 1773.508
22.271785.372 231791.308 23.661797.236 23.811803.163 24.35 1809.099
24.471815.026 24.271820.963 23.9 1826.89 23.831832.826 23.73 1838.754 24.72
1844.69 25.431850.617 25.711856.553 25.871862.481 26.15 1868.417
26.411874.344 26.281880.281 25.561886.208 25.291892.135 25.49 1898.071
25.741903.999 26.011909.935 26.141915.862 26.331921.798 26.58 1927.726
26.481939.589 25.61945.526 24.991951.453 24.441957.389 24.45 1963.317
24.361969.253 24.18 1975.18 24.161981.107 24.211992.971 25.01 1998.907
24.962004.835 24.962010.771 24.892016.698 25.152022.634 25.9 2028.562
26.742040.425 27.752046.361 27.782052.289 27.522058.225 27.34 2064.152 27.26
2070.08 27.362076.016 27.422087.879 27.492099.743 27.72 2105.67
28.112111.606 27.712117.534 26.83 2123.47 27.572129.397 27.54 2135.334

```
27.742141.261 27.22147.197 27.012153.125 27.552159.052 27.4 2164.988
27.482170.916 27.192176.852 27.672182.779 27.522188.715 27.27 2194.643
27.222200.579 27.562206.506 27.642212.442 27.67 2218.37 27.6 2224.306
27.642230.233 27.622236.161 27.912242.097 27.922248.024 28.11 2259.888
28.362265.824 28.382271.751 28.422283.633 28.362289.569 28.26 2295.506
28.122301.451 27.952307.387 27.972313.323 27.712325.205 27.7 2331.141
27.792337.078 27.792343.023 27.652348.959 27.252354.896 27.21 2360.841
27.292366.778 27.52372.714 26.87 2378.65 27.312384.596 27.34 2390.532
27.242396.468 26.792402.414 26.61 2408.35 26.992414.286 27.16 2420.222
27.282426.168 26.812432.104 27.412438.041 27.752443.986 27.59 2449.922
27.582455.859 27.492461.795 27.442473.677 27.412479.613 27.35 2485.558
27.342491.495 27.422497.431 27.592503.367 27.592509.312 27.37 2515.249
26.662521.185 25.82 2527.13 25.542533.067 25.642539.003 25.71 2544.939
25.72550.885 25.672556.821 25.212562.758 24.872568.703 24.89 2574.639
25.022580.576 25.052586.512 25.022592.457 25.282598.394 25.56  2604.33
25.872610.266 26.32616.211 26.62622.148 26.492628.084 26.34 2639.966
25.992645.902 25.912651.839 25.972657.784 25.86 2663.72 25.97 2669.656
262681.538 25.572687.475 25.422693.411 24.882699.356 24.62 2705.292
24.512711.229 24.612717.174 24.862723.111 24.942729.047 24.88 2734.983
24.742746.865 24.262752.801 24.082758.747 24.072764.683 23.17 2770.619
23.12776.556 22.962782.501 22.912788.437 22.772794.374 22.77 2800.319
22.522806.255 22.212812.191 22.342818.128 22.052824.073 21.97  2830.01
22.082835.946 21.972841.891 22.342847.828 22.282853.764 22.11  2859.7
22.052865.646 22.142877.518 22.562883.464 22.53 2889.4 22.91 2895.336
23.022901.272 22.982907.218 23.192913.154 23.52919.091 23.54 2925.036
23.42930.972 23.362936.909 23.132942.845 22.74 2948.79 22.59 2954.727
22.272960.663 21.92966.608 21.472972.545 21.072978.481 21.12 2984.417
20.992990.363 20.892996.299 20.913002.235 20.883008.181 21.06 3014.117
21.133020.053 21.6 3025.99 22.213031.935 22.443037.871 22.47 3043.808
22.043049.753 21.183055.689 20.913067.562 20.983073.507 21.16 3079.444 21.29
3085.38 21.483091.325 21.63097.262 21.743109.134 21.79  3115.08 21.783121.016
21.53126.952 21.33132.898 21.573138.834 21.44 3144.771 21.543150.707
21.823156.652 21.633168.525 21.95 3174.47 20.2 3180.406 20.033186.343
20.233192.279 20.253198.224 20.363204.161 20.45 3210.097 20.523216.042 24.5

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .091009.699 .041186.139 .09
 Bank Sta: Left Right Coeff Contr. Expan.
 1009.6991186.139 .5 .8
Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 1009 25.5 T
 11863216.042 23.9 T
Skew Angle = 25

Upstream Embankment side slope = 0 horiz. to 1.0 vertical Downstream
Embankment side slope = 0 horiz. to 1.0 vertical Maximum allowable
submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested
```

```
Number of Piers = 1

Pier Data
Pier Station Upstream=1066.724 Downstream=1101.164
Upstream num= 2
 Width Elev Width Elev
 3 6 3 21
Downstream num= 2
 Width Elev Width Elev
 3 6 3 21

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
 Energy
 W.S. Pro Method

 W.S.Pro Data
 Left Embankment
 El of the top of the embankment = 25.5
 El of the toe of the abutment = 9
 Right Embankment
 El of the top of the embankment = 25.5
 El of the toe of the abutment = 9
 Abutment Type = 2 Vert. abutments and sloping embankments  Slope of
abutments =
 Top with of embankment = 50
 Centroid station of bridge opening =
 Wing Wall Type = No wing walls present
 Width =
 Angle =
 Radius =
 Guide Banks Type = No Guide Bank present
 Length =
 Offset =
 Angle =
 Optional Contraction and expansion coefficients
 At approach Section  At Guide Bank
 At upstream outside
 At upstream inside (BU)
 At downstream inside (BD)
 Piers are Continuous for the width of the bridge
 Use Geometric mean as Friction Slope Method

Selected Low Flow Methods = W.S.Pro Method

High Flow Method
 Pressure and Weir flow
 Submerged Inlet Cd =
 Submerged Inlet + Outlet Cd = .8
 Max Low Cord =

Additional Bridge Parameters
 Add Friction component to Momentum
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 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION


RIVER: Taunton River
REACH: Main Stem RS: 82492.84

INPUT
Description: 75.3 DS FAce Bedford St
Station Elevation Data num= 477  Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 44.26 5.927 44.02 11.864 44.43 17.791 43.86 23.727 42.97  35.591 42.74
41.518 42.61 53.382 42.24 59.318 41.99 65.245 41.69  71.181 41.55 83.045
41.15 88.972 40.91 94.899 40.87 100.836 40.81  106.763 41.43 112.699 42.95
118.627 43.6 124.563 43.79 130.49 43.65  136.427 43.57 142.354 43.21 148.29
43.1 154.217 43.06 160.154 42.71  172.017 42.31 183.872 42.15 189.808 42.06
195.735 41.87 201.672 41.49  207.599 41.04 219.462 40.11 225.399 39.61
231.326 39.05 237.262 38.37  243.19 37.29 249.126 36.5 255.053 36.35 260.989
36.16 266.917 36.19  272.844 36.34 284.708 36.36 290.644 36.16 296.571 35.85
302.507 35.59  308.435 35.24 314.371 35.04 320.298 35.23 326.235 35.09
332.162 34.47  338.098 33.55 344.025 32.93 349.962 32.44 355.889 32.23
361.816 31.91  367.753 31.65 373.68 31.43 379.616 31.27 385.543 30.98 391.48
30.41  397.407 30.12 403.343 29.7 409.27 29.48 415.207 29.52 421.134 29.6
427.07 29.51 432.998 29.05 438.925 28.67 444.861 28.37 450.788 28.19  456.725
28.1 462.652 27.97 474.516 27.82 480.452 27.85 486.379 28.19  492.315 28.36
498.243 28.49 504.179 28.46 510.106 28.09 516.043 27.59  521.97 27.45 527.897
27.47 533.833 27.63 539.761 27.86 545.697 28.13  551.624 27.78 557.561 27.35
563.488 27.01 569.424 26.72 575.351 26.12  581.288 25.41 587.215 24.74
593.151 24.34 599.079 24.19 605.015 24.02  610.942 23.6 616.869 23.35 622.806
23.18 628.733 22.86 634.669 22.35  640.596 21.91 646.533 21.6 652.46 21.27
658.396 21.13 664.324 21.01  670.26 20.8 682.124 20.54 688.051 20.4 693.978
20.22 699.914 19.88  711.778 19.33 717.705 19.09 723.641 18.98 735.505 18.63
741.432 18.32  747.369 17.93 753.296 17.68 759.232 17.47 765.159 17.41
771.096 17.17  777.023 16.73 782.95 16.56 788.887 16.41 794.814 16.24 800.75
16.31  806.677 16.17 812.614 16.11 818.541 16.29 824.477 16.01 830.405 16.03
836.341 15.98 842.268 15.7 848.204 15.58 854.132 15.36 860.059 15.45  865.995
15.65 871.922 16.13 877.859 17.05 883.786 17.04 889.722 17.7  895.65 17.81
901.586 17.79 907.513 16.66 969.749 25.551009.699 25.85 1033.436
21.541033.807 16.13 1041.62 15.971044.393 9.761056.501 6.01 1071.464
3.841081.162 3.851107.535 4.351116.988 4.921133.546 5.73 1143.552
6.791153.793 12.081154.129 15.161162.775 15.391164.741 20.92 1186.139
24.71221.884 18.851227.811 19.31233.748 19.281245.611 18.96 1251.539
18.531257.475 18.381263.402 18.481269.339 18.951275.266 19.2 1281.202
19.291287.129 19.571293.057 19.641298.993 19.34 1304.92 19.09 1316.784 18.5
1322.72 18.081328.647 17.811334.584 17.561340.511 17.52 1346.447
17.621352.374 17.651358.311 17.591364.238 17.731370.174 17.71 1376.102
17.961382.029 18.081387.965 18.421393.892 18.641399.829 18.95 1405.756
19.371411.692 19.63 1417.62 19.851423.556 20.11429.483 20.4 1435.419
20.671441.347 20.671447.283 20.93 1453.21 20.91459.137 21.03 1465.074
20.941471.001 20.621476.937 20.431482.865 20.551488.801 20.7 1494.728
20.811500.665 21.631506.592 22.291512.528 22.351518.455 22.37 1524.392
```

22.411530.319 22.161536.255 21.771542.182 21.51 1548.11 21.13 1554.046
20.941559.973 21.06 1565.91 21.111571.837 21.091577.773 21.33 1583.7
21.51589.637 21.541595.564 21.84 1601.5 22.451607.427 23.17 1613.364
23.671619.291 23.811625.227 23.851631.155 23.71637.082 23.35 1643.018
22.981648.946 22.921654.882 22.941660.809 22.761666.745 22.67 1672.673
22.011684.536 21.621690.473 21.48 1696.4 21.421708.263 21.57 1714.2
21.71720.127 21.641726.054 21.69 1731.99 21.471737.918 21.51 1743.854
21.851749.781 21.881755.718 21.721761.645 21.951767.581 22.24 1773.508
22.271785.372 231791.308 23.661797.236 23.811803.163 24.35 1809.099
24.471815.026 24.271820.963 23.9 1826.89 23.831832.826 23.73 1838.754 24.72
1844.69 25.431850.617 25.711856.553 25.871862.481 26.15 1868.417
26.411874.344 26.281880.281 25.561886.208 25.291892.135 25.49 1898.071
25.741903.999 26.011909.935 26.141915.862 26.331921.798 26.58 1927.726
26.481939.589 25.61945.526 24.991951.453 24.441957.389 24.45 1963.317
24.361969.253 24.18 1975.18 24.161981.107 24.211992.971 25.01 1998.907
24.962004.835 24.962010.771 24.892016.698 25.152022.634 25.9 2028.562
26.742040.425 27.752046.361 27.782052.289 27.522058.225 27.34 2064.152 27.26
2070.08 27.362076.016 27.422087.879 27.492099.743 27.72 2105.67
28.112111.606 27.712117.534 26.83 2123.47 27.572129.397 27.54 2135.334
27.742141.261 27.22147.197 27.012153.125 27.552159.052 27.4 2164.988
27.482170.916 27.192176.852 27.672182.779 27.522188.715 27.27 2194.643
27.222200.579 27.562206.506 27.642212.442 27.67 2218.37 27.6 2224.306
27.642230.233 27.622236.161 27.912242.097 27.922248.024 28.11 2259.888
28.362265.824 28.382271.751 28.422283.633 28.362289.569 28.26 2295.506
28.122301.451 27.952307.387 27.972313.323 27.712325.205 27.7 2331.141
27.792337.078 27.792343.023 27.652348.959 27.252354.896 27.21 2360.841
27.292366.778 27.52372.714 26.87 2378.65 27.312384.596 27.34 2390.532
27.242396.468 26.792402.414 26.61 2408.35 26.992414.286 27.16 2420.222
27.282426.168 26.812432.104 27.412438.041 27.752443.986 27.59 2449.922
27.582455.859 27.492461.795 27.442473.677 27.412479.613 27.35 2485.558
27.342491.495 27.422497.431 27.592503.367 27.592509.312 27.37 2515.249
26.662521.185 25.82 2527.13 25.542533.067 25.642539.003 25.71 2544.939
25.72550.885 25.672556.821 25.212562.758 24.872568.703 24.89 2574.639
25.022580.576 25.052586.512 25.022592.457 25.282598.394 25.56 2604.33
25.872610.266 26.32616.211 26.62622.148 26.492628.084 26.34 2639.966
25.992645.902 25.912651.839 25.972657.784 25.86 2663.72 25.97 2669.656
262681.538 25.572687.475 25.422693.411 24.882699.356 24.62 2705.292
24.512711.229 24.612717.174 24.862723.111 24.942729.047 24.88 2734.983
24.742746.865 24.262752.801 24.082758.747 24.072764.683 23.17 2770.619
23.12776.556 22.962782.501 22.912788.437 22.772794.374 22.77 2800.319
22.522806.255 22.212812.191 22.342818.128 22.052824.073 21.97 2830.01
22.082835.946 21.972841.891 22.342847.828 22.282853.764 22.11 2859.7
22.052865.646 22.142877.518 22.562883.464 22.53 2889.4 22.91 2895.336
23.022901.272 22.982907.218 23.192913.154 23.52919.091 23.54 2925.036
23.42930.972 23.362936.909 23.132942.845 22.74 2948.79 22.59 2954.727
22.272960.663 21.92966.608 21.472972.545 21.072978.481 21.12 2984.417
20.992990.363 20.892996.299 20.913002.235 20.883008.181 21.06 3014.117
21.133020.053 21.6 3025.99 22.213031.935 22.443037.871 22.47 3043.808
22.043049.753 21.183055.689 20.913067.562 20.983073.507 21.16 3079.444 21.29
3085.38 21.483091.325 21.63097.262 21.743109.134 21.79 3115.08 21.783121.016
21.53126.952 21.33132.898 21.573138.834 21.44 3144.771 21.543150.707
21.823156.652 21.633168.525 21.95 3174.47 20.2 3180.406 20.033186.343
20.233192.279 20.253198.224 20.363204.161 20.45 3210.097 20.523216.042 24.5
 Manning's n Values num= 3

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 Sta n Val Sta n Val Sta n Val
 0 .091009.699 .041186.139 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1009.6991186.139 128.81 112.38 109.35 .5 .8 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 1009 25.5 T
 11863216.042 23.9 T
Skew Angle = 25

CROSS SECTION


RIVER: Taunton River
REACH: Main Stem RS: 82380.46

INPUT
Description: 75 Exit Bedford St
Station Elevation Data num= 332
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  0 54.96 6.55 54.85 13.09 54.29
19.64 54 26.19 53.8  32.74 53.42 39.29 52.93 45.83 52.55 52.38 52.11 58.93
51.73  65.48 51.6 72.02 51.38 78.57 50.96 85.12 50.7 91.66 50.48  98.21 50.19
104.76 49.93 111.31 49.57 117.85 49.33 124.4 49.26  130.95 48.94 137.5 48.69
144.04 48.49 150.59 48.25 157.14 47.97  163.69 47.65 170.23 47.4 176.78 47.1
183.33 46.85 189.88 46.63  196.42 46.35 202.97 46.16 209.52 45.9 216.07 45.72
222.61 45.48  235.71 45.09 242.26 44.88 248.8 44.8 255.35 44.66 268.45 44.05
274.99 43.73 281.54 43.45 288.09 43.39 294.64 43.26 301.18 43.21  307.73
43.04 314.28 42.9 320.83 42.79 327.37 42.49 333.92 42.34  340.47 42.13 347.02
41.75 353.56 41.54 360.11 41.3 373.21 40.89  379.75 40.64 386.3 40.31 392.85
40.04 399.4 39.81 405.94 39.56  412.49 39.26 419.04 39 425.59 38.61 432.13
38.18 438.68 37.83  445.23 37.61 451.78 37.31 458.32 37.08 464.87 36.81
471.42 36.48  477.97 36.03 484.51 35.74 491.06 35.38 497.61 34.97 504.16
34.66  510.7 34.46 517.25 34.29 530.35 34.06 536.89 33.8 549.99 33.19  556.54
33.01 563.08 32.8 576.18 31.95 582.73 31.63 589.27 31.38  602.37 31.23 608.92
30.9 615.46 30.39 622.01 30.06 628.56 29.86  635.11 29.55 641.65 29.14 648.2
28.88 654.75 28.84 661.3 28.56  667.84 28.22 674.39 27.9 680.94 27.64 694.03
27.15 700.58 26.82  713.68 26.35 720.22 26.05 726.77 25.78 739.87 25.59
759.51 24.78  766.06 24.67 772.6 24.51 779.15 24.28 785.7 24.31 792.25 24.22
798.79 24.17 805.34 23.83 811.89 23.6 818.44 23.44 824.98 23.32  831.53 22.8
838.08 22.22 844.63 21.83 851.17 21.53 857.72 21.26  864.27 21.06 870.82
20.76 877.36 20.61 883.91 20.59 890.46 20.42  897.01 20.19 903.55 20.05 910.1
19.88 916.65 19.45 923.2 18.87  929.74 18.31 936.29 18 942.84 17.58 949.39
17.05 955.93 16.73  1001.14 14.94 1066.06 13.83 1107.83 16.62 1159.8 6.51
1169.38 4.9  1184.93 3.62 1199.94 4.05 1209.63 3.96 1228.12 4.33 1244.36 5.18
1255.8 7.87 1277.03 14.02 1333.92 16.45 1340.46 17 1347 17.75  1353.55 18.25
1360.09 18.52 1366.64 18.71 1373.18 18.86 1379.73 18.83  1386.27 18.74
1392.81 18.91 1399.36 18.99 1405.9 18.9 1412.45 18.73  1418.99 18.66 1425.53
18.55 1432.08 18.42 1438.62 18.26 1445.17 18.15  1451.71 18.15 1458.26 18.13
1464.8 18.27 1471.34 18.57 1490.98 19.1  1497.52 19.26 1504.06 19.5 1517.15
19.91 1523.7 20.43 1536.79 21.6  1543.33 21.98 1549.87 22.21 1556.42 22.38
1562.96 22.51 1576.05 23.16  1582.59 23.2 1589.14 23.3 1595.68 23.38 1602.23
23.38 1608.77 23.35  1615.32 23.48 1621.86 23.41 1628.4 23.41 1634.95 23.54
1641.49 23.56  1648.04 23.5 1654.58 23.78 1661.12 23.96 1667.67 23.01 1674.21
23.06  1680.76 22.7 1687.3 22.28 1693.85 21.69 1700.39 21.84 1706.93 22.08
```

1713.48 22.24 1720.02 22.24 1726.57 22.19 1733.11 22 1746.2 21.45 1752.74 21.28 1759.29 21.37 1765.83 21.53 1772.38 21.6 1778.92 21.96 1785.46 21.98 1792.01 21.89 1805.1 21.86 1811.64 21.68 1818.18 21.7 1824.73 21.41 1831.27 21.45 1837.82 21.96 1844.36 21.97 1850.91 22.13 1857.45 21.76 1863.99 21.45 1870.54 21.65 1877.08 21.6 1883.63 21.66 1890.17 22.1 1896.72 22.31 1903.26 22.75 1909.8 23.43 1916.35 24.3 1922.89 24.98 1929.44 25.42 1935.98 25.41 1942.52 25.1 1949.07 25.31 1955.61 25.92 1962.16 25.86 1968.7 25.06 1975.25 24.43 1988.33 23.82 1994.88 23.73 2001.42 23.93 2007.97 23.76 2014.51 23.5 2021.05 23.5 2027.6 23.58 2034.14 23.68 2040.69 23.59 2047.23 23.87 2053.78 24.66 2060.32 25.16 2066.86 25.5 2073.41 25.63 2079.95 25.67 2086.5 25.51 2093.04 25.24 2099.58 24.58 2106.13 24.05 2112.67 23.93 2119.22 23.78 2125.76 23.57 2132.31 23.53 2138.85 23.55 2145.39 23.74 2151.94 24.37 2158.48 26.03 2165.03 27.77 2171.57 28.53 2178.11 28.53 2184.66 28.39 2191.2 28.62 2197.75 28.83 2204.29 29.11 2210.84 29.28 2217.38 29.29 2223.92 29.32 2237.01 29.23 2243.56 29.16 2250.1 29.07 2256.64 29.1 2263.19 29.62 2269.73 29.76 2276.28 29.71 2282.82 29.71 2289.37 29.44 2295.91 29.28 2302.45 29.14 2309 29.08 2315.54 29.12 2322.09 29.29 2328.63 29.19 2335.18 28.72 2341.72 28.52 2348.26 28.2 2354.81 27.91 2361.35 27.49 2367.9 27.3 2374.44 27.63 2380.98 28.24 2387.53 28.21 2394.07 28.69 2400.62 28.67 2407.16 28.1 2413.71 26.83 2420.25 25.92 2426.79 25.78 2433.34 25.67 2439.88 25.6 2446.43 25.45 2459.51 25.33 2466.06 25.4 2472.6 25.4 2479.15 25.56 2485.69 25.67 2492.24 25.8 2498.78 26.5 2505.32 27.31 2511.87 27.96 2518.41 28.65 2524.96 29.07 2531.5 29.19 2538.04 29.4 2544.59 29.63 2551.13 29.71 2557.68 29.66 2564.22 29.63 2570.76 29.44 2577.31 29.16 2583.85 29.08 2590.4 28.85 2596.94 28.52 2603.48 28.11

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 1107.83 .04 1379.73 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1107.83 1379.73 1341.34 1298.77 1269.65 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 1621.9 2603.48 24.2 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 81081.69

INPUT
Description: 74
Station Elevation Data num= 297
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 43.27 19.63 42.67 45.8 42.57 65.43 42.03 78.52 41.9 91.6 42.16 98.14 42.16 111.23 41.96 117.77 41.73 130.86 41.5 143.95 40.96 176.66 40.55 202.83 40.59 255.18 39.37 287.89 38.17 307.52 37.77 314.06 37.28 340.24 37.05 346.78 36.89 366.41 36.67 372.95 36.8 386.04 36.61 392.58 36.24 399.12 36.16 405.66 36.27 418.75 35.7 425.29 35.59 431.84 35.67 444.92 35.48 458.01 34.96 464.55 34.55 471.09 34.44 477.64 34.55 490.72 34.48 497.27 34.6 536.52 34.45 543.07 34.27 549.61 34.26 562.7 34.56 569.24 34.48 582.33 34.11 588.87 34.1 601.95 33.67 615.04 33.61 634.67 34 641.21 34.45 660.84 34.29 673.93 34.27 680.47 33.94 700.1 33.71 706.64 33.44 713.19 32.87 726.27 32.78 732.81 32.85 745.9 32.61 752.44 32.39 765.53

32.24 778.62 31.77 785.16 31.39 798.24 31.14 804.79 30.89 824.42 30.64
850.59 29.42 863.67 29.14 870.22 29.13 876.76 29.31 896.39 29.52 902.93
29.44 909.48 29.13 922.56 28.06 929.1 27.85 942.19 27.08 955.28 26.98 961.82
26.75 968.36 26.35 994.53 25.53 1001.08 25.5 1014.16 24.95 1020.71 24.98
1027.25 24.15 1033.79 23.56 1040.34 23.56 1046.88 23.84 1053.42 24.29
1066.51 24.27 1073.05 24.11 1105.77 22.37 1112.31 21.84 1125.39 22.11
1138.48 22.08 1177.74 21.12 1190.82 20.83 1203.91 20.24 1236.62 17.71
1243.17 17.11 1262.8 15.89 1282.43 15.64 1295.51 15.08 1302.05 14.91 1328.23
15.5 1334.77 15.82 1341.31 15.97 1347.85 15.92 1360.94 16.2 1367.48 16.23
1380.57 15.99 1387.11 15.29 1393.66 14.14 1400.2 13.39 1406.74 13.68 1413.28
13.49 1426.37 13.61 1432.91 13.52 1439.46 14 1446 14.68 1452.54 15.52
1459.09 16.07 1472.17 16.71 1478.71 16.82 1491.8 16.29 1492.52 16.23 1498.34
15.73 1504.89 15.09 1511.43 14.24 1517.97 13.27 1524 10.2 1545 4.7 1570 5.3
1595 5.2 1616 10.3 1622.66 12.08 1629.2 13.54 1635.75 17.72 1642.29 19.79
1648.83 20.73 1655.37 21.05 1661.92 21.05 1668.46 20.87 1675 20.35 1681.55
19.56 1688.09 18.83 1694.63 17.65 1701.17 17.24 1707.72 17.29 1714.26 17.37
1720.8 17.9 1727.35 18.74 1733.89 19.37 1740.43 19.69 1746.98 19.62 1760.06
18.9 1766.6 18.09 1773.15 17.66 1779.69 17.61 1786.23 17.41 1792.78 17.85
1799.32 17.71 1805.86 17.61 1812.41 17.85 1818.95 18.41 1825.49 19.05
1832.03 19.67 1838.58 19.92 1845.12 20 1851.66 20.15 1858.21 20.46 1864.75
20.46 1871.29 20.54 1877.83 20.85 1884.38 20.88 1890.92 21.28 1897.46 21.87
1904.01 22.3 1910.55 22.54 1917.09 22.89 1923.64 23.46 1930.18 24.06 1936.72
24.38 1943.26 24.43 1949.81 24.53 1956.35 24.72 1962.89 25.14 1969.44 25.4
1975.98 25.55 1982.52 25.45 1989.07 24.93 1995.61 24.13 2002.15 23.42
2008.69 22.62 2015.24 22.38 2021.78 22.29 2034.87 22.19 2041.41 22.16
2047.95 22.26 2054.49 22.43 2061.04 22.42 2067.58 22.16 2074.11 22.03
2080.64 22.45 2093.7 22.99 2100.23 23.22 2106.76 23.62 2113.29 23.83 2119.82
23.6 2126.35 23.58 2132.88 23.21 2139.42 23.17 2145.95 23.18 2152.48 23.05
2159.01 22.7 2165.54 22.71 2172.07 22.94 2178.6 23.14 2185.13 23.29 2191.66
23.6 2198.19 23.84 2204.72 24.5 2211.25 24.85 2217.78 25.69 2224.31 26.71
2237.37 28.33 2243.9 29.07 2250.43 29.87 2256.96 30.41 2263.49 30.79 2270.02
31.09 2276.55 31.11 2283.08 31.08 2289.61 31.12 2296.15 30.88 2302.68 30.81
2309.21 31.09 2315.74 31.17 2322.27 31.21 2328.8 31.27 2335.33 31.54 2341.86
31.5 2354.92 31.65 2361.45 31.75 2367.98 31.77 2374.51 31.61 2381.04 31.57
2387.57 31.43 2394.1 31.38 2400.63 30.22 2407.16 28.97 2413.69 27.64 2420.22
26.85 2426.75 27.48 2433.28 28.35 2439.81 28.51 2446.34 28.37 2452.88 27.92
2459.41 27.32 2465.94 26.55 2472.47 25.87 2485.53 23.8 2492.06 23.29 2498.59
22.93 2505.12 22.85 2511.65 23.46 2518.18 23.89 2524.71 24.34 2531.24 24.63
2537.77 25.07 2544.3 25.63 2550.83 25.99 2557.36 26.05 2563.89 26.02 2570.42
25.71 2576.95 25.57 2583.48 25.16 2590.01 25.1 2596.54 25.57 2603.07 26.23
2609.61 27.04 2616.14 27.73 2622.67 28.46 2635.73 30.03 2642.26 30.08
2648.79 30 2655.32 30.05 2661.85 30.08 2668.38 30.06 2674.91 29.99 2681.44
29.94 2687.97 29.92 2694.5 29.79 2701.03 29.71 2707.56 29.6 2714.09 29.58
2720.62 29.62 2733.68 29.75 2740.21 29.72 2746.74 29.85 2753.27 30.23
2759.81 30.66

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 1478.71 .04 1655.37 .095
 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1478.71 1655.37 1963.31 1977.44 1977.97 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 1969 2759.81 25.4 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 79104.25

INPUT
Description: 73
Station Elevation Data num= 387
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 29.82 6.56 29.71 19.68 29.52
26.24 29.48 32.8 29.49 39.36 29.56 45.92 29.67 52.48 29.83 59.04 30.03 72.15
30.48 78.71 30.63 85.27 30.65 91.83 30.57 98.39 30.35 104.95 30.21 111.51
30.22 118.07 30.35 131.19 30.1 137.75 30.3 144.31 29.93 150.87 27.64 157.43
25.7 163.99 25.56 177.11 26.55 183.67 27.08 190.23 27.29 196.79 27.43 203.35
27.54 209.91 27.61 216.46 27.58 229.58 27.89 236.14 28.11 242.7 28.28 249.26
28.36 255.82 28.39 262.38 28.9 268.94 29.37 275.5 29.72 282.06 30.03 288.62
30.81 295.18 31.33 301.74 32.06 308.3 32.53 314.86 32.54 327.98 32.43
334.54 32.47 341.1 32.33 347.66 31.3 354.22 29.28 360.77 27.21 367.33 25.73
373.89 23.83 387.01 23.04 393.57 22.82 400.13 22.45 406.69 22.65 413.25
23.16 419.81 23.85 426.37 24.17 432.93 24.24 439.49 24.79 446.05 24.42
452.61 25.52 459.17 27.22 465.73 28.59 472.29 29.42 478.85 29.72 491.97
29.29 498.53 29.2 505.08 29.33 511.64 29.31 518.2 29.03 524.76 28.63 531.32
28.15 537.88 27.93 544.44 28.15 551 28.03 557.56 27.56 564.12 26.81 570.68
26.25 577.24 25.99 590.36 25.32 596.92 25.44 603.48 25.46 610.04 25.06
616.6 24.99 623.16 25.07 629.72 25.03 642.84 24.85 649.39 24.97 655.95 25.13
662.51 25.05 669.07 25.01 675.63 24.91 682.19 24.54 688.75 24.46 695.31
24.45 701.87 24.08 708.43 22.59 714.99 22.25 721.55 22.48 728.11 23.14
734.67 23.23 741.23 22.46 747.79 21.25 754.35 20.57 760.91 20.18 767.47
20.28 774.03 20.93 780.59 21.7 787.15 22.16 793.7 22.01 800.26 20.93 806.82
18.21 813.38 17.91 819.94 18.27 826.5 18 833.06 18.05 839.62 17.98 846.18
18.59 852.74 19.34 859.3 19.69 865.86 19.71 872.42 19.6 878.98 19.51 885.54
19.23 892.1 19.25 898.66 19.84 905.22 20.63 911.78 20.91 918.34 20.98 931.46
21.7 938.01 21.68 944.57 21.55 951.13 21.5 957.69 21.75 964.25 22.07 977.37
22.5 983.93 22.76 990.49 23.34 997.05 23.79 1003.61 24.57 1010.17 25.17
1016.73 25.58 1023.29 25.72 1029.85 25.77 1036.41 25.88 1049.53 25.75
1062.65 25.85 1069.21 25.76 1075.77 25.71 1082.32 25.68 1088.88 25.68
1095.44 25.42 1102 25.39 1108.56 25.22 1115.12 25.38 1121.68 25.29 1128.24
25.41 1134.8 25.51 1141.36 25.73 1147.92 25.66 1154.48 25.64 1161.04 25.58
1167.6 25.39 1174.16 25.01 1180.72 24.68 1193.84 25.04 1200.4 25.17 1206.96
25.6 1213.52 25.76 1220.08 25.94 1226.64 26.06 1233.19 26 1239.75 26.01
1246.31 25.93 1252.87 25.96 1259.43 25.87 1272.55 25.58 1279.11 25.63
1285.67 25.76 1292.23 25.52 1298.79 25.33 1305.35 25.2 1311.91 24.93 1318.47
24.52 1325.03 24.21 1331.59 23.94 1338.15 23.84 1344.71 23.71 1351.27 23.52
1357.83 23.5 1370.95 23.53 1377.5 23.47 1384.06 23.38 1390.62 23.03 1397.18
22.88 1403.74 22.68 1410.3 22.67 1416.86 22.53 1423.42 22.41 1429.98 22.01
1436.54 21.69 1443.1 21.5 1449.66 21.51 1456.22 21.65 1462.78 21.99 1469.34
22.65 1475.89 23.47 1482.44 24.01 1489 24.59 1495.55 25.07 1502.1 25.26
1508.65 25.38 1515.2 25.43 1521.76 25.37 1528.31 25.14 1534.86 24.93 1547.96
23.89 1554.52 23.43 1561.07 22.92 1567.62 22.37 1574.17 22 1580.73 21.61
1587.28 21.15 1593.83 20.96 1600.38 20.79 1606.93 20.65 1613.49 20.4 1620.04
20.24 1626.59 19.77 1633.14 19.15 1639.69 18.73 1646.25 18.1 1652.8 17.62
1659.35 17.65 1665.9 17.83 1672.46 17.99 1679.01 18.55 1685.56 19.05 1692.11
19.64 1698.66 19.73 1705.22 19.97 1711.77 20.15 1718.32 20.3 1724.87 20.4
1731.42 20.42 1737.98 20.42 1751.08 20.36 1757.63 20.45 1770.74 20.52

1777.29 20.26 1783.84 20.18 1790.39 20.45 1796.95 20.47 1803.5 20.59 1810.05 20.51 1816.6 19.02 1823.15 16.17 1835 5.9 1845 3.8 1858 -1.6 1870 -2.8 1880 -2.2 1895 .2 1905 6.2 1918 10.7 1935.21 15.55 1941.09 16.09 1954.2 16.1 1967.3 15.72 1973.85 15.84 1986.96 16.51 1993.51 16.5 2006.61 15.64 2013.17 15.03 2019.72 14.65 2026.27 14.52 2032.82 14.61 2045.93 15.84 2052.48 16.13 2065.58 16.26 2104.9 14.95 2124.55 15.25 2131.1 15.21 2137.66 14.91 2144.21 14.89 2150.76 15.53 2163.86 18.04 2170.42 18.68 2183.52 19.53 2190.07 19.81 2196.62 19.8 2209.73 19.31 2216.28 18.87 2229.39 18.87 2275.25 17.57 2294.91 16.3 2308.01 15.94 2321.11 15.34 2327.67 15.17 2334.22 15.32 2347.32 15.16 2366.98 15.34 2380.08 15.15 2386.64 15.32 2399.74 15.1 2406.29 15.38 2419.4 15.32 2458.71 15.71 2478.36 15.57 2498.02 16.31 2511.12 17.48 2524.23 18.23 2537.33 18.71 2543.89 18.65 2550.44 18.41 2556.99 18.63 2570.09 19.75 2596.3 21.54 2609.41 22.27 2615.96 22.46 2622.51 22.4 2635.61 22.89 2648.72 23.09 2668.37 23.1 2681.48 23.43 2694.58 23.91 2720.79 23.91 2733.9 23.31 2740.45 23.15 2747 23.37 2753.55 23.31 2766.66 23 2773.21 23.17 2779.76 23.63 2786.31 23.49 2792.86 23.68 2799.42 24.26 2805.97 25.39 2812.52 26.16 2819.07 26.31 2825.62 27.01 2832.18 27.49 2838.73 28.37 2845.28 28.72 2851.83 28.55 2858.38 28.93 2864.94 29.14 2878.04 29.31 2884.59 29.13 2904.25 28.89 2910.8 28.66 2917.35 27.85 2923.91 28.37 2930.46 28.7 2937.01 28.62 2943.56 28.84 2950.11 29.38 2956.67 30.12 2963.22 30.65 2976.32 30.67 2982.87 30.23 2989.43 30.08 2995.98 29.67 3002.53 28.56 3009.08 27.96 3015.63 28.76 3022.19 29.1 3028.74 29.04 3035.29 28.44 3041.84 28.13 3074.6 28.36 3087.71 28.19 3100.81 28.91 3107.36 29.47 3127.02 30.13 3146.68 31.22 3159.78 32.04 3172.88 32.56 3199.09 32.99 3231.85 32.67 3258.06 33.1 3277.72 33.77 3297.37 34.89 3303.93 35.16 3317.03 35.35

Manning's n Values num= 3 Sta n Val Sta n Val Sta n Val
 0 .09 1810.05 .04 1941.09 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1810.05 1941.09 1084.58 1111.59 1135.96 .3 .4 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 1016 25.6 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 77992.66

INPUT
Description: 72
Station Elevation Data num= 359
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 26.51 13.1 26.76 19.65 27.05 26.2 27.32 32.75 27.13 39.3 26.67 45.85 26.69 58.95 26.98 65.5 27.43 72.05 27.75 78.6 28.31 85.15 28.9 91.71 29.45 98.26 29.83 104.81 29.95 111.36 30.2 117.91 30.31 124.46 30.26 131.01 30.04 137.56 29.63 144.11 29.46 150.66 29.39 157.21 29.37 163.76 29.26 170.31 29 176.86 28.86 183.41 28.79 189.96 28.7 196.51 28.69 203.06 28.57 209.61 28.58 216.16 28.63 222.71 28.64 229.26 28.69 235.81 28.86 242.36 29.07 248.91 29.19 255.46 29.22 262.01 29.09 268.57 29.06 275.12 28.87 281.67 28.94 288.22 29.14 294.77 29.29 301.32 29.41 307.87 29.4 314.42 29.23 320.97 29.26 327.52 29.03 334.07 28.94 340.62 28.91 347.17 28.75 353.72 28.67 360.27 28.57 373.37 28.28 379.92 28.26 386.47 28.28 393.02 28.22 406.12 28.21 412.67 28.23 419.22 28.32

425.77 28.51 432.32 28.47 445.43 28.35 458.53 28.54 465.08 28.67 471.63 28.69 478.18 28.8 484.73 28.81 491.28 28.71 497.83 28.78 504.38 28.67 510.93 28.58 530.58 27.76 537.13 27.78 543.68 27.63 550.23 27.27 556.78 26.95 563.33 26.89 569.88 26.79 576.43 26.6 582.98 26.56 589.53 26.6 596.08 26.45 602.63 26.53 609.18 26.51 615.73 26.67 622.29 26.68 628.84 26.72 635.39 26.91 641.94 27.01 648.49 26.94 655.04 27.17 661.59 27.2 668.14 27.48 674.69 27.7 681.24 27.79 694.34 28.26 700.89 28.34 707.44 28.32 713.99 28.37 720.54 28.61 727.09 28.64 733.64 28.52 740.19 28.33 746.74 28.07 753.29 27.87 759.84 27.7 766.39 27.42 772.94 27.22 779.49 26.93 792.59 26.28 799.15 26.14 805.7 25.81 812.25 25.62 825.35 25.5 831.9 25.56 838.45 25.53 845 25.4 851.55 25.31 864.65 24.76 871.2 24.68 877.75 24.67 884.3 24.53 890.85 24.43 897.4 24.48 903.95 24.16 917.05 23.56 923.6 23.56 930.15 23.43 936.7 23.13 943.25 22.87 949.8 22.77 956.35 22.77 962.9 22.59 969.46 22.34 976.01 22 982.56 22.22 989.11 22.36 995.66 22.41 1002.21 22.18 1008.76 21.23 1015.31 19.39 1021.86 17.93 1028.41 16.99 1034.96 16.42 1041.51 16.02 1048.06 15.81 1054.61 15.5 1061.16 15.58 1067.71 15.38 1074.26 15.24 1080.81 15.25 1087.36 15.33 1093.91 15.12 1100.46 15.12 1107.01 15.22 1113.56 15.18 1120.11 15.24 1126.66 15.19 1133.21 15.48 1139.76 15.94 1146.31 15.84 1152.86 15.54 1159.42 15.57 1165.97 15.82 1172.52 15.81 1179.07 15.78 1185.62 15.91 1192.17 16.08 1198.72 16.4 1205.27 16.52 1218.37 16.72 1224.92 16.88 1231.47 17.52 1238.02 17.98 1244.57 18.1 1251.12 18.35 1257.67 18.52 1264.22 18.37 1270.77 18.29 1277.31 17.98 1283.86 17.94 1290.4 17.84 1296.95 17.67 1303.49 17.62 1310.03 17.82 1316.58 18.13 1323.12 18.59 1329.67 18.97 1336.21 19 1342.75 19.1 1349.3 19.43 1355.84 19.53 1362.39 19.46 1368.93 19.57 1375.47 19.91 1382.02 20.28 1388.56 20.47 1395.11 20.73 1401.65 20.57 1408.19 20.13 1414.74 19.47 1421.28 17.93 1427.83 16.14 1434.37 14.74 1440.91 13.71 1447.46 13.52 1454 14.04 1460.55 14.85 1467.09 15.42 1473.63 15.53 1480.18 15.52 1486.72 15.32 1493.26 15.45 1499.81 15.69 1506.35 15.85 1512.9 16.13 1519.44 16.08 1525.98 16.05 1546 17.5 1564 9.9 1585 5.9 1610 4.2 1635 4.6 1656 9.7 1682 16.7 1696.13 16.08 1702.67 15.69 1709.22 15.79 1715.76 16.36 1728.85 18.01 1735.39 18.72 1741.93 19.47 1748.48 20.13 1755.02 20.59 1761.57 20.82 1768.11 20.74 1781.2 20.49 1787.74 20.41 1800.83 20.12 1807.37 20.04 1813.92 20.22 1827.01 21.28 1833.55 22.21 1840.09 23.11 1846.64 23.72 1853.18 24.54 1859.73 25.55 1866.27 26.94 1872.81 27.59 1879.36 28.18 1885.9 28.82 1892.45 29.29 1898.99 29.6 1905.53 29.72 1912.08 29.7 1918.62 29.65 1925.17 29.52 1931.71 29.53 1938.25 29.67 1951.34 29.28 1957.89 29.37 1964.43 29.39 1970.97 29.59 1977.52 30.08 1984.06 30.36 1990.6 30.7 1997.15 30.97 2003.69 31.07 2010.24 31.1 2016.78 31.39 2023.32 31.77 2029.87 32.31 2036.41 32.74 2049.5 33.57 2056.04 33.79 2062.59 33.96 2069.13 34.06 2075.65 34 2082.17 34.02 2088.68 33.93 2095.2 34.05 2101.72 34.23 2108.24 34.3 2114.75 34.08 2121.27 34.2 2127.79 34.3 2134.3 34.77 2140.82 34.97 2147.34 35.06 2153.86 35.02 2160.37 35 2173.41 35.15 2179.93 35.13 2192.96 34.75 2199.48 34.55 2205.99 34.33 2219.03 33.98 2225.55 33.95 2232.06 33.86 2238.58 34.09 2245.1 34.16 2251.62 33.79 2258.13 33.74 2264.65 33.87 2271.17 33.89 2277.68 33.85 2284.2 33.94 2290.72 33.86 2297.24 33.64 2303.75 33.47 2310.27 33.59 2316.79 33.78 2323.3 33.95 2329.82 34.05 2336.34 34.12 2342.86 34.16 2349.37 34.03 2362.41 34.06 2375.44 34.03 2381.96 34.57 2388.48 34.77 2394.99 34.85 2401.51 34.97 2408.03 35 2414.55 35.25 2427.58 35.47 2434.1 35.71 2447.13 36.02 2453.65 36.24 2460.17 36.58 2473.2 37.1 2479.72 37.32 2486.24 37.43 2492.75 37.48 2499.27 37.58 2505.79 37.77 2512.3 38.09 2518.82 38.18 2525.34 38.31 2531.86 38.32 2538.37 38.41 2544.89 38.53 2551.41 38.9 2557.93 39.23 2564.44 39.46 2570.96 39.66 2577.48 40 2583.99 40.43 2597.03 41.18 2603.55 41.64 2610.06 42.24 2616.58 42.6 2623.1 43 2629.62 43.21 2636.13 43.51 2642.65 43.47 2649.17 43.55

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 1546 .04 1682 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1546
1682 1393.51 1401.69 1405.75 .3 .4

CROSS SECTION

RIVER: Taunton River REACH: Main Stem RS: 76590.96

INPUT
Description: 71 875 ft US Snows Bk Trib
Station Elevation Data num= 138
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 26.53 6.51 26.4 13.01 26.17
19.52 25.92 26.02 25.6 32.53 25.27 39.03 24.99 45.54 24.48 52.04 24.08 58.55
23.8 65.06 23.47 71.56 23.17 78.07 22.91 84.57 22.65 91.08 22.48 97.58
22.39 104.09 22.27 110.59 22.05 117.1 21.99 123.61 22.05 130.11 21.92 136.62
21.7 143.12 21.72 149.63 22.01 156.13 22.39 162.64 22.85 166.21 23.14 192.42
23.7 218.63 23.51 225.18 23.37 231.73 23.37 244.84 23.74 251.39 23.81 271.04
24.54 303.81 25.24 330.01 25.03 356.22 24.16 369.33 23.61 388.98 23.22
402.09 23.12 408.64 23.24 415.19 23.09 434.85 23.27 441.4 23.18 447.95 22.87
467.61 22.28 474.16 21.99 487.27 20.9 500.37 19.57 513.48 18.64 526.58 17.1
539.68 15.93 552.79 15.09 559.34 14.92 572.45 14.78 585.55 15.1 618.31 17.51
637.97 18.38 644.52 18.48 664.18 18.12 677.28 18.4 683.83 17.95 690.39 16.17
694.36 14.81 709 9.2 735 4.9 760 3.5 811 9.2 811.7 13.96 814.88 14.56
821.43 15.05 834.53 16.43 847.64 16.57 867.29 16.51 873.85 16.34 880.4 15.69
886.95 14.86 893.5 14.26 900.06 13.99 913.16 13.78 932.82 13.92 945.92 14.84
959.03 15.27 965.58 15.77 972.13 16.51 978.68 16.91 1011.44 17.3 1018 17.53
1031.1 17.44 1037.65 17.7 1044.2 17.73 1063.86 18.86 1070.41 19.48 1076.97
20.58 1083.52 21.24 1090.07 21.39 1109.73 23.9 1116.28 25.16 1122.83 25.73
1129.38 25.95 1149.04 27.42 1162.14 28.85 1188.35 30.8 1201.46 31.3 1227.67
32.12 1234.22 32.21 1240.77 31.96 1247.32 31.95 1260.43 32.12 1266.98 32.43
1273.53 32.14 1280.08 32 1306.29 32.53 1325.95 33.1 1332.5 33.4 1352.16
34.02 1358.71 34.44 1391.47 35.55 1398.02 35.86 1404.58 36.51 1411.13 37.92
1424.23 38.17 1476.65 37.66 1502.86 37.63 1515.96 37.58 1529.07 37.72
1542.17 37.69 1555.28 38.2 1561.83 38.29 1568.38 38.06 1594.59 38.17 1601.14
38.04 1621.86 38.64 1628.4 38.76 1634.94 38.78 1641.49 38.73 1648.03 38.71
1654.58 38.75

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 677.28 .04 834.53 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 677.28
834.53 982.05 1055.95 1121.6 .3 .4

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 75535.01

INPUT
Description: 70- Approach Sturtevant Station Elevation Data num= 191
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 25.57 6.51 25.48 13.03 25.36
19.54 25.23 26.05 24.97 32.56 24.77 39.08 24.55 45.59 24.36 52.1 24.19 58.62
23.92 65.13 23.64 71.64 23.38 78.15 23.19 84.67 23.06 91.18 22.83 97.69
22.69 104.2 22.45 110.72 22.29 117.23 22.25 123.74 22.2 130.26 21.98 136.77
21.91 143.28 21.91 149.79 21.67 156.31 21.42 162.82 21.25 169.33 21.1 175.85
20.99 182.36 20.76 188.87 20.61 195.38 20.64 201.9 20.66 208.41 20.83 214.92
20.98 221.44 21.03 227.95 21.16 234.46 21.17 240.97 21.26 247.49 21.25 254
21.38 260.51 21.57 267.03 21.54 305 21.5 311.54 21.65 318.08 21.83 324.63
22.18 331.17 22.26 337.71 22.28 344.25 22.38 350.79 22.5 357.33 22.57 363.88
22.56 370.42 22.49 383.5 22.3 390.04 22.23 396.58 22.27 403.13 22.38 409.67
22.53 416.21 22.57 422.75 22.59 429.29 22.57 435.83 22.57 442.38 22.55
455.46 22.36 462 22.28 468.54 22.01 475.09 21.79 481.63 21.43 488.17 20.92
494.71 20.43 501.25 20.03 507.79 19.69 514.34 19.12 520.88 18.47 527.42
18.03 533.96 17.55 540.5 16.86 547.04 16.2 553.59 15.99 560.13 16 596.16
17.2 648.8 11.76 688.79 11.42 714.8 11.87 734.43 15.37 743.42 12.33 755.67
13.39 771.11 15.22 788.21 15.8 820.22 13.79 820.79 10.07 833.15 9.4 844.21
9.48 852.25 8.93 858.92 9.78 864.22 8.44 867.64 8.42 873.63 8.95 907.59
12.34 923.28 14.29 937.86 15.63 950.6 21.57 974.58 22.33 1023.69 22.92
1057.78 23.46 1132.61 24.33 1139.1 24.28 1145.59 23.9 1152.14 23.86 1158.69
23.75 1171.79 23.96 1178.34 24.03 1191.44 24.29 1197.99 24.62 1204.55 24.92
1211.1 25.36 1217.65 26.17 1224.2 27.25 1230.75 28.6 1237.3 29.87 1243.85
30.81 1250.4 31.44 1256.95 31.75 1263.5 31.85 1270.05 31.93 1276.6 31.82
1283.16 31.66 1289.71 31.56 1302.81 31.25 1309.36 31.19 1315.91 31.19
1322.46 31.13 1329.01 31.21 1335.56 31.45 1342.11 31.5 1348.66 31.46 1355.22
31.54 1361.77 31.72 1368.32 32 1374.87 32.42 1381.42 33.04 1387.97 33.79
1394.52 34.51 1401.07 35.1 1407.62 35.48 1414.17 35.89 1420.72 36.13 1427.28
36.32 1433.83 36.43 1440.38 36.64 1446.93 36.79 1453.48 36.86 1460.03 37.05
1466.58 37.18 1479.68 37.2 1486.23 37.14 1492.78 36.85 1499.33 36.49 1505.89
35.95 1512.44 35.06 1518.99 34.13 1525.54 34.75 1532.09 35.62 1538.64 36.73
1545.19 37.42 1551.74 37.6 1558.29 37.64 1564.84 37.71 1571.39 37.63 1577.95
37.72 1584.5 37.63 1591.05 37.61 1597.6 37.65 1604.15 37.76 1610.7 37.7
1617.25 37.75 1630.35 37.52 1636.9 37.21 1643.45 36.87 1650.01 36.62 1656.56
36.27 1663.11 36.06 1669.66 36.48 1676.21 37.41 1682.76 38.26 1689.31 38.82
1695.86 39.26 1701.64 39.58 1708.19 39.89 1714.74 40.12 1721.29 40.23

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .085 455.46 .04 974.58 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 455.46
974.58 90.65 91.01 91.43 .3 .4 Ineffective Flow num= 1
Sta L Sta R Elev Permanent
0 357.3 24 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 75444

INPUT
Description: 69.7 US FAce Sturtevant

Station Elevation Data num= 211
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 25.12 6.52 25.13 13.04 24.96
19.57 24.83 26.09 24.88 32.61 24.92 39.13 24.68 45.66 24.49 52.18 24.41 58.7
24.36 65.22 24.24 71.75 24.13 78.27 23.93 84.79 23.76 91.31 23.5 97.83
23.33 104.36 23.28 110.88 23.1 117.4 22.98 123.92 22.96 130.45 22.97 136.97
22.68 143.49 22.59 150.01 22.5 156.54 22.34 163.06 22.07 169.58 21.89 176.1
21.81 182.63 21.65 189.15 21.39 195.67 21.1 202.19 20.69 208.71 20.49 215.24
20.67 221.76 20.84 228.28 20.81 234.8 20.72 241.33 20.65 247.85 20.66 254.37
20.86 260.89 20.95 267.42 21.09 273.94 21.18 280.5 21.25 287.06 21.27
293.62 21.43 295.77 21.4 302.31 21.25 308.85 21.21 315.39 20.76 321.93 21.12
328.47 21.6 335.01 22.24 341.55 22.27 348.09 22.25 354.63 22.5 361.16 22.77
367.7 22.89 374.24 23.03 380.78 23.07 387.32 22.92 393.86 22.91 400.4 22.28
406.94 22.61 413.48 22.78 420.02 22.42 426.56 22.58 433.09 22.43 439.63
22.16 446.17 21.91 452.71 21.51 459.25 21.31 465.79 21.3 472.33 21.07 478.87
21.1 485.41 20.78 491.95 20.35 498.49 19.19 505.02 18.23 511.56 18.47 518.1
18.02 524.64 18.12 531.18 18.08 537.72 17.45 544.26 17.48 550.8 17.56 557.34
17.25 563.88 17.05 570.42 16.98 576.96 17.13 583.49 17.02 590.03 16.52
596.57 16.98 603.11 17.95 609.64 18.99 616.17 19.72 622.71 20.74 629.24
21.33 635.78 21.63 642.31 21.83 648.85 21.89 655.38 21.78 661.91 21.62
668.45 21.75 674.98 21.94 681.52 21.95 688.05 22.02 694.58 21.96 701.12
21.87 707.65 22.08 714.19 22.12 727.25 21.68 733.79 21.38 752.11 11.1 756.54
10.33 760.99 8.67 767.94 5.2 777.12 6.63 796.64 8.2 802.95 6.47 809.7 6.62
814.65 6.96 819.31 7.24 834.57 8.51 840.81 9.15 847.56 9.37 857.77 9.96
862.16 10.4 884.07 22.29 890.61 22.35 897.14 22.46 903.67 22.45 910.21 22.35
916.74 22.41 923.28 22.56 929.81 22.73 942.88 23.54 949.41 23.54 955.95
23.61 962.48 23.71 969.02 23.83 982.08 23.99 988.62 24.14 995.15 24.23
1001.69 24.25 1008.22 24.33 1014.75 24.36 1021.29 24.37 1027.82 24.27
1034.36 24.14 1040.89 24.03 1047.42 23.95 1053.96 24.09 1060.49 24.12
1067.03 24.18 1073.56 24.42 1080.09 24.53 1093.16 24.84 1099.7 24.9 1106.23
25.02 1112.76 25.4 1119.3 26.24 1125.83 27.23 1132.37 27.8 1138.9 28.29
1145.44 28.61 1151.97 28.66 1158.5 28.76 1165.04 28.84 1171.57 28.98 1178.11
29.17 1184.64 29.47 1191.17 29.74 1197.71 29.92 1210.78 30.36 1217.31 30.44
1223.84 30.29 1230.38 30.16 1236.91 30.35 1243.45 30.69 1249.98 31.18
1256.51 31.58 1263.05 31.91 1269.58 32.11 1276.12 32.23 1282.61 32.13 1289.1
32.36 1295.59 33.18 1302.08 34.05 1308.57 34.87 1315.06 35.78 1321.55 36.1
1328.04 36.19 1334.53 36.25 1341.02 36.53 1354 37.18 1366.99 37.52 1373.48
37.51 1386.46 37.42 1399.44 37.49 1405.93 37.43 1412.42 37.24 1418.91 36.9
1425.4 36.38 1431.89 35.88 1438.38 34.98 1444.87 34.32 1451.36 34.86 1456.63
35.7 1463.12 36.51 1469.61 36.97

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .085 714.19 .04 884.07 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 714.19
884.07 83.92 85.68 87.62 .5 .4 Ineffective Flow num= 2
Sta L Sta R Elev Permanent
0 715 24 T
880 1469.61 24.5 T

BRIDGE

RIVER: Taunton River

REACH: Main Stem RS: 75397.22

INPUT Description: 69.5 Sturtevant St/Plymouth St
Distance from Upstream XS = 36
Deck/Roadway Width = 35
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
 num= 24
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 0 25.1 184 25.08 270 23.6
 396 22.31 573 22.37 738 24.52
 744 25.05 744.1 28.99 749 29 21.16
 787 29.53 21.28 821 29.46 21.4 859 28.92 21.52
 864 28.92 21.52 864.1 24.87 869 24.87
 910 24.12 951 23.52 1040 24.16
 1098 25.22 1146 26.52 1205 29.2
 1228 30.08 1287 31.74 1338 32.62

Upstream Bridge Cross Section Data
Station Elevation Data num= 211 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 25.12 6.52 25.13 13.04 24.96 19.57 24.83 26.09 24.88 32.61 24.92 39.13
24.68 45.66 24.49 52.18 24.41 58.7 24.36 65.22 24.24 71.75 24.13 78.27 23.93
84.79 23.76 91.31 23.5 97.83 23.33 104.36 23.28 110.88 23.1 117.4 22.98
123.92 22.96 130.45 22.97 136.97 22.68 143.49 22.59 150.01 22.5 156.54 22.34
163.06 22.07 169.58 21.89 176.1 21.81 182.63 21.65 189.15 21.39 195.67 21.1
202.19 20.69 208.71 20.49 215.24 20.67 221.76 20.84 228.28 20.81 234.8 20.72
241.33 20.65 247.85 20.66 254.37 20.86 260.89 20.95 267.42 21.09 273.94
21.18 280.5 21.25 287.06 21.27 293.62 21.43 295.77 21.4 302.31 21.25 308.85
21.21 315.39 20.76 321.93 21.12 328.47 21.6 335.01 22.24 341.55 22.27 348.09
22.25 354.63 22.5 361.16 22.77 367.7 22.89 374.24 23.03 380.78 23.07 387.32
22.92 393.86 22.91 400.4 22.28 406.94 22.61 413.48 22.78 420.02 22.42 426.56
22.58 433.09 22.43 439.63 22.16 446.17 21.91 452.71 21.51 459.25 21.31
465.79 21.3 472.33 21.07 478.87 21.1 485.41 20.78 491.95 20.35 498.49 19.19
505.02 18.23 511.56 18.47 518.1 18.02 524.64 18.12 531.18 18.08 537.72 17.45
544.26 17.48 550.8 17.56 557.34 17.25 563.88 17.05 570.42 16.98 576.96 17.13
583.49 17.02 590.03 16.52 596.57 16.98 603.11 17.95 609.64 18.99 616.17
19.72 622.71 20.74 629.24 21.33 635.78 21.63 642.31 21.83 648.85 21.89
655.38 21.78 661.91 21.62 668.45 21.75 674.98 21.94 681.52 21.95 688.05
22.02 694.58 21.96 701.12 21.87 707.65 22.08 714.19 22.12 727.25 21.68
733.79 21.38 752.11 11.1 756.54 10.33 760.99 8.67 767.94 5.2 777.12 6.63
796.64 8.2 802.95 6.47 809.7 6.62 814.65 6.96 819.31 7.24 834.57 8.51 840.81
9.15 847.56 9.37 857.77 9.96 862.16 10.4 884.07 22.29 890.61 22.35 897.14
22.46 903.67 22.45 910.21 22.35 916.74 22.41 923.28 22.56 929.81 22.73
942.88 23.54 949.41 23.54 955.95 23.61 962.48 23.71 969.02 23.83 982.08
23.99 988.62 24.14 995.15 24.23 1001.69 24.25 1008.22 24.33 1014.75 24.36
1021.29 24.37 1027.82 24.27 1034.36 24.14 1040.89 24.03 1047.42 23.95
1053.96 24.09 1060.49 24.12 1067.03 24.18 1073.56 24.42 1080.09 24.53
1093.16 24.84 1099.7 24.9 1106.23 25.02 1112.76 25.4 1119.3 26.24 1125.83
27.23 1132.37 27.8 1138.9 28.29 1145.44 28.61 1151.97 28.66 1158.5 28.76
1165.04 28.84 1171.57 28.98 1178.11 29.17 1184.64 29.47 1191.17 29.74
1197.71 29.92 1210.78 30.36 1217.31 30.44 1223.84 30.29 1230.38 30.16
1236.91 30.35 1243.45 30.69 1249.98 31.18 1256.51 31.58 1263.05 31.91
1269.58 32.11 1276.12 32.23 1282.61 32.13 1289.1 32.36 1295.59 33.18 1302.08
34.05 1308.57 34.87 1315.06 35.78 1321.55 36.1 1328.04 36.19 1334.53 36.25

1341.02 36.53 1354 37.18 1366.99 37.52 1373.48 37.51 1386.46 37.42 1399.44 37.49 1405.93 37.43 1412.42 37.24 1418.91 36.9 1425.4 36.38 1431.89 35.88 1438.38 34.98 1444.87 34.32 1451.36 34.86 1456.63 35.7 1463.12 36.51 1469.61 36.97

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 714.19 .04 884.07 .09

Bank Sta: Left Right Coeff Contr. Expan.
 714.19 884.07 .5 .4
Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 715 24 T
 880 1469.61 24.5 T

Downstream Deck/Roadway Coordinates num= 24
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 -86 25.1 -85 25.08 2 23.6
 127 22.31 304 22.37 469 24.52
 475 25.05 475 28.99 480 29 21.16
 518 29.53 21.28 552 29.46 21.4 590 28.92 21.52
 595 28.9 21.52 595 24.87 600 24.87
 641 24.12 682 23.52 771 24.16
 829 25.22 877 26.52 936 29.2
 959 30.08 1018 31.74 1069 32.62

Downstream Bridge Cross Section Data
Station Elevation Data num= 164
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 23.89 6.54 23.57 13.07 23.04 19.61 22.53 32.69 22 39.23 21.79 45.76 21.72 52.3 21.76 58.84 21.57 65.38 21.54 71.91 21.48 78.45 21.51 84.99 21.74 98.06 22.31 104.6 22.42 111.14 22.5 117.68 22.69 124.21 23.26 130.75 24.13 137.29 25.06 143.83 25.4 150.36 25.62 156.9 25.69 163.44 25.55 169.97 25.14 176.51 24.03 183.05 22.66 189.59 21.98 196.13 21.32 202.66 21.04 222.27 20.34 228.81 20.2 235.35 20.24 241.89 20.3 248.43 20.16 254.96 19.7 261.5 19.12 268.04 18.73 274.58 18.66 281.11 18.39 287.65 18.35 294.19 18.2 300.73 18.08 313.8 18.39 320.36 18.43 326.92 18.63 333.48 18.62 340.04 18.69 346.6 19 353.16 19.11 359.72 18.93 366.28 18.55 372.84 17.94 379.4 17.51 385.96 17.38 392.52 16.95 399.08 16.44 405.64 16.56 412.2 16.87 418.76 18.34 425.32 19.69 431.88 19.14 438.44 18.88 445 19.16 451.56 19.17 482.11 11.1 486.54 10.33 490.99 8.67 497.94 5.2 507.12 6.63 526.64 8.2 532.95 6.47 539.7 6.62 544.65 6.96 549.31 7.24 564.57 8.51 570.81 9.15 577.56 9.37 587.77 9.96 592.16 10.4 608.99 19.09 615.55 19.35 622.11 18.81 628.67 18.59 635.23 19.07 641.79 20.4 648.35 21.33 654.91 21.28 661.47 21.85 668.03 22.08 674.59 22.1 681.15 22.93 687.71 23.84 694.27 24.57 700.83 24.46 707.39 23.65 713.95 22.99 720.51 22.57 727.07 22.34 733.63 22.41 746.75 23.2 753.31 23.46 759.87 23.47 766.43 23.26 772.99 23.43 779.55 23.72 786.11 23.74 792.67 23.66 799.23 24.07 805.79 25.06 812.35 25.74 818.91 26.07 825.47 26.34 832.03 26.55 838.59 26.72 845.15 26.87 851.71 26.99 858.27 26.85 864.83 27.04 871.39 27.41 877.95 27.17 884.51 26.8 891.07 26.56 897.63 26.51 904.19 26.65 917.31 26.24 930.43 26.17 936.99 26.32 943.55 26.83 950.11 28.14 956.67 29.66 963.23 30.58 969.79 31.17 976.35 31.67 982.88 32.04 989.42 32.2 995.96 32.3 1002.5 32.34 1009.03 32.45 1015.57 32.51 1022.11 32.4 1028.65 32.35 1035.18 32.35 1041.72 32.47 1048.26

32.47 1054.8 32.36 1067.87 32.33 1074.41 32.33 1080.95 32.46 1087.48 32.48 1094.02 32.47 1100.56 32.65 1107.09 32.85 1113.63 32.94 1120.17 33 1126.71 32.92 1139.78 32.73 1146.32 32.68 1152.86 32.69 1159.39 32.84 1165.93 33.11 1172.47 33.18 1179.01 33.08 1185.54 33.07

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 451.56 .04 608.99 .09

Bank Sta: Left Right Coeff Contr. Expan.
 451.56 608.99 .3 .4
Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 465 24 T
 610 1185.54 24 T

Upstream Embankment side slope = 0 horiz. to 1.0 vertical Downstream Embankment side slope = 0 horiz. to 1.0 vertical Maximum allowable submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Piers = 2

Pier Data
Pier Station Upstream= 785 Downstream= 517
Upstream num= 3
 Width Elev Width Elev Width Elev
 4 8 4 20.76 6 21.2
Downstream num= 3
 Width Elev Width Elev Width Elev
 4 8 4 20.76 6 21.2

Pier Data
Pier Station Upstream= 822 Downstream= 554
Upstream num= 3
 Width Elev Width Elev Width Elev
 4 8 4 20.76 6 21.2
Downstream num= 3
 Width Elev Width Elev Width Elev 4 8 4 20.76 6 21.2

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
 Energy
 W.S. Pro Method

 W.S.Pro Data
 Left Embankment
 El of the top of the embankment = 25.1
 El of the toe of the abutment = 11.1
 Right Embankment

```
 El of the top of the embankment = 25.1
 El of the toe of the abutment = 11.1
 Abutment Type = 4 Vert. abutments and sloping embankments with wingwalls
Slope of abutments =
 Top with of embankment = 35
 Centroid station of bridge opening =
 Wing Wall Type = Angular wing walls
 Width = 12
 Angle = 45
 Radius =
 Guide Banks Type = No Guide Bank present
 Length =
 Offset =   Angle =
 Optional Contraction and expansion coefficients
 At approach Section
 At Guide Bank
 At upstream outside
 At upstream inside (BU)
 At downstream inside (BD)
 Piers are Continuous for the width of the bridge
 Use Geometric mean as Friction Slope Method

Selected Low Flow Methods = W.S.Pro Method

High Flow Method
 Pressure and Weir flow
 Submerged Inlet Cd =
 Submerged Inlet + Outlet Cd = .8
 Max Low Cord =

Additional Bridge Parameters
 Add Friction component to Momentum
 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION


RIVER: Taunton River
REACH: Main Stem RS: 75358.33

INPUT Description: 69.3 DS Face Sturtevant
Station Elevation Data num= 164
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  0 23.89 6.54 23.57 13.07 23.04
19.61 22.53 32.69 22  39.23 21.79 45.76 21.72 52.3 21.76 58.84 21.57 65.38
21.54  71.91 21.48 78.45 21.51 84.99 21.74 98.06 22.31 104.6 22.42  111.14
22.5 117.68 22.69 124.21 23.26 130.75 24.13 137.29 25.06  143.83 25.4 150.36
25.62 156.9 25.69 163.44 25.55 169.97 25.14  176.51 24.03 183.05 22.66 189.59
21.98 196.13 21.32 202.66 21.04  222.27 20.34 228.81 20.2 235.35 20.24 241.89
20.3 248.43 20.16  254.96 19.7 261.5 19.12 268.04 18.73 274.58 18.66 281.11
18.39  287.65 18.35 294.19 18.2 300.73 18.08 313.8 18.39 320.36 18.43  326.92
18.63 333.48 18.62 340.04 18.69 346.6 19 353.16 19.11  359.72 18.93 366.28
```

18.55 372.84 17.94 379.4 17.51 385.96 17.38 392.52 16.95 399.08 16.44 405.64
16.56 412.2 16.87 418.76 18.34 425.32 19.69 431.88 19.14 438.44 18.88 445
19.16 451.56 19.17 482.11 11.1 486.54 10.33 490.99 8.67 497.94 5.2 507.12
6.63 526.64 8.2 532.95 6.47 539.7 6.62 544.65 6.96 549.31 7.24 564.57 8.51
570.81 9.15 577.56 9.37 587.77 9.96 592.16 10.4 608.99 19.09 615.55 19.35
622.11 18.81 628.67 18.59 635.23 19.07 641.79 20.4 648.35 21.33 654.91 21.28
661.47 21.85 668.03 22.08 674.59 22.1 681.15 22.93 687.71 23.84 694.27 24.57
700.83 24.46 707.39 23.65 713.95 22.99 720.51 22.57 727.07 22.34 733.63
22.41 746.75 23.2 753.31 23.46 759.87 23.47 766.43 23.26 772.99 23.43
779.55 23.72 786.11 23.74 792.67 23.66 799.23 24.07 805.79 25.06 812.35
25.74 818.91 26.07 825.47 26.34 832.03 26.55 838.59 26.72 845.15 26.87
851.71 26.99 858.27 26.85 864.83 27.04 871.39 27.41 877.95 27.17 884.51 26.8
891.07 26.56 897.63 26.51 904.19 26.65 917.31 26.24 930.43 26.17 936.99
26.32 943.55 26.83 950.11 28.14 956.67 29.66 963.23 30.58 969.79 31.17
976.35 31.67 982.88 32.04 989.42 32.2 995.96 32.3 1002.5 32.34 1009.03 32.45
1015.57 32.51 1022.11 32.4 1028.65 32.35 1035.18 32.35 1041.72 32.47 1048.26
32.47 1054.8 32.36 1067.87 32.33 1074.41 32.33 1080.95 32.46 1087.48 32.48
1094.02 32.47 1100.56 32.65 1107.09 32.85 1113.63 32.94 1120.17 33 1126.71
32.92 1139.78 32.73 1146.32 32.68 1152.86 32.69 1159.39 32.84 1165.93 33.11
1172.47 33.18 1179.01 33.08 1185.54 33.07

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val 0 .085 451.56 .04 608.99 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 451.56
608.99 55.08 52.55 49.93 .3 .4 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 465 24 T
 610 1185.54 24 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 75305.77

INPUT
Description: 69 Exit Sturtevant St
Station Elevation Data num= 106
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 25.7 13 23.18 19.5 22.31
25.99 22 32.49 21.83 45.49 21.28 64.98 20.99 77.98 21.19 90.98 22.14 97.48
23.01 103.97 23.64 110.47 23.88 116.97 24.28 136.47 26.38 142.96 26.89
149.46 27.25 155.96 27.29 168.96 26.83 181.95 25.99 207.95 22.82 227.44
21.07 246.94 20.3 253.44 20.19 259.94 19.93 272.93 18.96 292.45 18.01 325.01
17.14 331.52 17.14 344.55 17.63 357.57 17.92 364.08 18.28 370.59 18.38 377.1
17.76 383.61 16.31 390.13 15.19 396.64 14.99 409.66 15.34 429.2 16.64 435.71
16.53 442.22 15.24 448.73 13.33 455.24 11.95 459.73 11.56 462.56 11.12
467.83 6.63 479.3 3.76 509.45 3.76 519.8 4.04 537.58 5.31 564.99 8.64
570.38 12.24 578.91 15.46 579.31 14.91 585.47 16.31 591.98 16.35 605.01
15.92 611.52 15.99 637.56 15.49 650.59 15.96 657.1 16.73 663.61 18.13 670.12
19.01 676.63 19.55 696.17 19.78 715.7 20.3 722.21 20.84 735.24 20.55 741.75
20.65 748.26 21.06 754.77 21.09 767.79 21.99 774.31 22.34 780.82 22.88
793.84 24.72 806.86 24.63 813.37 25.22 819.89 26.01 826.4 26.54 852.28 26.93
858.71 26.46 865.14 26.21 884.43 26.41 890.86 26.35 910.15 26.78 916.57

27.31 923 28.93 929.43 30.68 942.29 31.63 948.72 31.72 955.15 31.28 961.58 30.99 968.01 30.83 974.44 30.85 980.87 31.16 987.3 31.87 993.73 32.33 1000.16 32.06 1006.59 31.6 1013.02 31.33 1019.45 31.21 1058.02 31.83 1083.74 31.56 1096.6 31.79 1115.89 31.22 1122.32 30.92 1135.18 31.31

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 435.71 .04 591.98 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 435.71 591.98 864.05 841.86 823.45 .1 .3 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 155 27 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 74463.91

INPUT
Description: 68
Station Elevation Data num= 84 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 33.9 26.2 34.76 39.3 34.99 45.85 35.23 72.05 35.5 111.35 35.73 117.9 35.69 137.54 36.18 163.74 36.22 203.04 36.69 216.14 36.61 229.24 36.36 235.79 36.1 248.89 35.73 268.54 34.62 281.64 34.41 294.74 34.39 307.84 34.47 320.94 34.33 340.59 34.35 366.78 33.26 373.33 33.14 392.98 33.17 399.53 33.55 412.63 33.81 419.18 34.04 432.28 34.25 438.83 33.71 445.38 31.44 451.93 28.46 465.03 25.88 471.58 24.69 478.13 23.8 484.68 22.74 491.23 21.84 497.78 21.26 510.88 20.66 517.43 20.57 523.98 20.84 530.53 20.8 543.63 20.37 550.18 20 556.73 19.9 563.28 19.47 569.83 18.48 576.38 17.22 582.93 14.07 589.48 11.26 595.11 10.94 620 5.8 645 4.3 670 6.3 695.73 11.22 700.82 12.47 707.37 15.57 713.92 16.32 720.47 15.93 733.57 14.84 740.12 14.89 759.77 16.32 766.32 16.61 772.87 16.44 779.42 15.43 785.97 15.22 799.07 15.09 805.62 15.17 812.17 15.49 825.27 16.58 844.91 19.03 851.46 19.58 871.11 20.73 890.76 21.29 903.86 21.48 916.96 21.81 930.06 21.86 969.36 22.69 995.56 23.45 1002.11 23.48 1106.9 25.75 1126.55 25.97 1139.65 26.24 1165.85 25.91 1192.05 26.13 1198.6 26.27

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 530.53 .04 871.11 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 530.53 871.11 1832.03 1771.2 1714.64 .1 .3

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 72692.7

INPUT
Description: 67- Approach Vernon St

Station Elevation Data num= 199 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 35.64 6.51 35.52 13.02 35.08 19.53 34.21 32.55 33.08 39.06 32.72 45.56
32.82 65.09 33.59 71.6 33.62 78.11 33.47 84.62 33.14 91.13 33.31 97.64 33.8
110.66 35.96 117.17 36.44 123.67 36.35 130.18 36.49 143.2 37.22 156.22 37.64
162.73 37.13 169.24 37.19 175.75 37.03 182.26 36.54 195.28 36.11 201.78 35.6
208.29 35.46 221.31 34.66 253.86 33.41 260.37 33.36 286.4 32.59 318.95 32.6
331.97 32.28 344.99 32.1 351.5 31.89 358.01 31.92 371.02 31.57 384.04 31.52
397.06 31.07 403.57 30.99 416.59 30.99 423.1 30.89 436.12 30.33 449.13 29.93
455.64 29.46 468.66 28.22 475.17 27.43 481.68 26.42 501.21 24.48 507.72
23.95 520.73 23.39 527.24 23.23 540.26 22.4 546.77 21.52 553.28 21.05 559.79
20.87 579.32 19.24 585.83 18.88 598.85 18.35 605.35 18.43 611.86 18.15
618.37 18.02 624.88 17.69 637.9 17.44 644.41 17.68 650.92 17.72 657.43 18.14
663.94 18.04 670.45 18.32 683.46 19.53 702.99 20.83 735.59 21.48 748.66
21.51 755.19 21.31 774.8 21.2 781.33 21.3 800.94 20.94 846.68 20.67 859.75
19.38 872.82 18.81 879.35 18.9 885.89 19.21 898.96 20.56 905.49 20.5 925.1
19.65 931.63 19.67 938.17 19.51 944.7 18.81 951.24 17.55 957.77 15.88 964.31
14.06 970.84 12.8 978.56 11.86 984.9 10.85 991 7.8 1003.8 7.7 1022.9 8.12
1033.7 7.6 1052.3 7.35 1065.8 6.97 1076.7 7.14 1088.2 7.24 1100 6.84 1105.8
7.1 1115 9.5 1124 14.02 1134.21 14.5 1140.74 16.08 1147.28 17.24 1153.81
17.64 1160.35 17.72 1166.88 17.74 1173.42 17.74 1179.95 17.72 1186.49 17.65
1193.02 17.49 1199.56 17.28 1206.09 17.1 1219.16 17 1225.7 17.06 1232.23
17.08 1238.77 16.79 1245.3 16.22 1251.84 15.82 1258.37 15.69 1264.91 15.59
1271.44 15.23 1277.97 14.81 1284.51 14.56 1291.04 14.52 1297.58 14.54
1304.11 14.62 1310.65 14.6 1317.2 14.38 1323.75 14.06 1330.3 14.1 1336.85
14.52 1343.4 15.94 1349.95 17.48 1356.5 18.16 1363.05 18.47 1369.6 18.96
1376.15 19.56 1382.7 20.05 1389.25 20.31 1395.8 20.54 1402.35 21.02 1408.9
21.62 1415.45 22.08 1422 22.05 1428.55 21.83 1435.1 21.73 1441.66 21.72
1448.21 21.86 1461.31 21.86 1467.86 21.67 1474.41 21.55 1480.96 21.46
1487.51 21.3 1494.06 21.23 1500.61 21.2 1507.16 21.03 1513.71 21.11 1520.26
21.14 1526.81 20.97 1533.36 21.03 1539.91 22.1 1546.46 23.4 1553.01 24.26
1559.56 24.75 1566.11 24.89 1572.66 24.66 1579.21 24.67 1585.76 24.75
1592.31 24.69 1598.86 24.58 1605.41 24.62 1611.96 24.58 1618.51 24.69
1625.06 24.77 1638.17 24.9 1644.72 25.24 1651.27 25.96 1657.82 25.88 1664.37
26.66 1670.92 27.6 1677.47 28.35 1690.57 30.78 1697.12 31.05 1703.67 31.38
1710.22 31.88 1723.32 33.15 1729.87 33.74 1736.42 34.35 1742.97 35.32
1749.52 35.76 1756.07 36.39 1762.62 36.69 1769.17 37.03 1775.72 37.22

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 905.49 .04 1160.35 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 905.49
1160.35 102.69 95.32 96.09 .1 .3 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 749 24.5 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 72597.39

INPUT
Description: 66.7 US FAce Vernon St

Station Elevation Data num= 170 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 32.98 12.31 32.81 18.456 32.86 30.766 32.57 43.076 32.59 49.23 32.45
61.531 32.59 67.686 32.96 86.151 33.37 110.762 33.12 123.072 33.28 129.217
33.03 141.527 32.91 147.682 32.71 166.138 32.4 172.293 31.99 184.603 30.31
190.758 29.78 203.058 28.94 209.213 28.42 227.678 26.1 233.833 25.57 246.134
24.91 270.754 22.56 283.054 21.7 289.209 21.38 295.364 21.32 313.82 20.22
338.44 18.4 344.595 18.38 356.895 18.84 363.05 19.31 381.515 20.17 393.816
21.12 406.126 21.77 424.581 22.1 449.164 22.1 486.037 21.36 541.338 20.9
553.629 21.01 565.92 21.52 572.066 21.56 578.202 21.03 584.348 20.79 596.639
21.54 602.785 21.76 615.076 23.33 627.367 23.37 633.513 23.24 639.658 22.8
645.804 22.15 651.949 21.71 664.231 22.09 670.377 22.13 676.522 22 682.668
21.45 694.959 21.44 701.105 21.23 707.25 20.53 713.396 19.13 719.541 18.24
725.687 18.16 731.833 18.26 737.969 18.81 744.114 18.93 750.26 20.8 750.636
20.77 756.406 20.36 772.07 11.24 780.264 8.69 795.074 8.51 800.383 8.54
806.284 7.98 816.865 8.04 828.696 6.92 840.395 7.49 859.321 8.29 860.27 10.2
864.367 10.65 872.796 16.58 872.974 19.88 879.308 19.75 885.454 22.36
891.599 23.25 897.735 23.9 903.881 24.27 910.026 24.28 916.172 24.32 922.318
24.2 934.609 24.05 940.754 24.3 946.9 24.91 953.046 24.73 959.191 24.61
965.337 24.68 971.482 24.97 977.619 25.55 983.764 25.22 989.91 25.69 996.055
25.96 1002.201 26.071008.347 26.331014.492 26.651020.657 25.451026.821 25.14
1032.985 24.53 1039.15 23.961045.323 23.631051.488 23.411057.652 23.93
1063.817 24.061069.981 24.461076.145 24.49 1082.31 25.31088.474 25.22
1094.639 23.571100.803 23.481106.977 23.73 1125.47 24.291137.799 24.56
1143.963 24.881150.127 25.221156.292 24.911162.456 24.67 1168.63 24.48
1174.794 24.711180.959 25.291187.123 25.841193.287 26.11199.452 26.12
1205.616 25.521211.781 25.091217.945 24.811224.109 24.861230.283 25.42
1236.448 26.241242.612 27.081248.776 27.91254.941 28.71261.105 29.39 1267.269
29.651273.434 29.111279.598 28.81285.763 28.021291.936 28.12 1298.101
28.451304.265 28.82 1310.43 29.161316.594 29.951322.758 31.2 1328.923
32.691335.087 33.431341.251 34.91347.416 35.73 1353.59 35.76 1359.754
35.831365.918 36.051372.083 36.161384.411 36.291390.576 36.38 1396.74
36.521409.078 36.91421.407 37.21427.572 37.321433.736 37.54 1439.9
37.631446.065 37.381452.229 371458.394 37.121464.558 36.91

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val 0 .09 750.26 .04 903.881 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 750.26
903.881 67.7 64.48 66.6 .3 .4 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 744.237 24.5 T
 878.6131464.558 25.6 T
Skew Angle = 20

BRIDGE

RIVER: Taunton River
REACH: Main Stem RS: 72569.03

INPUT
Description: 66.5 Vernon St/Pratts Br
Distance from Upstream XS = 7
Deck/Roadway Width = 35

```
Weir Coefficient = 2.6
Bridge Deck/Roadway Skew = 20
Upstream Deck/Roadway Coordinates
 num= 18
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 228.345 25.91 484.881 22.81 530.926 23.02
 744.237 24.99 767.729 25 767.823 27.73
 769.608 27.73 769.702 25.32 770.548 25.3 21.15  863.578 25.4 21.6 866.397
25.96 21.6 866.491 27.51
 868.276 27.51 868.37 26 874.854 26.04  1032.722 26.63 1157.701 27.85 1400 28

Upstream Bridge Cross Section Data
Station Elevation Data num= 170
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  0 32.98 12.31 32.81 18.456
32.86 30.766 32.57 43.076 32.59  49.23 32.45 61.531 32.59 67.686 32.96 86.151
33.37 110.762 33.12  123.072 33.28 129.217 33.03 141.527 32.91 147.682 32.71
166.138 32.4  172.293 31.99 184.603 30.31 190.758 29.78 203.058 28.94 209.213
28.42  227.678 26.1 233.833 25.57 246.134 24.91 270.754 22.56 283.054 21.7
289.209 21.38 295.364 21.32 313.82 20.22 338.44 18.4 344.595 18.38  356.895
18.84 363.05 19.31 381.515 20.17 393.816 21.12 406.126 21.77  424.581 22.1
449.164 22.1 486.037 21.36 541.338 20.9 553.629 21.01  565.92 21.52 572.066
21.56 578.202 21.03 584.348 20.79 596.639 21.54  602.785 21.76 615.076 23.33
627.367 23.37 633.513 23.24 639.658 22.8  645.804 22.15 651.949 21.71 664.231
22.09 670.377 22.13 676.522 22  682.668 21.45 694.959 21.44 701.105 21.23
707.25 20.53 713.396 19.13  719.541 18.24 725.687 18.16 731.833 18.26 737.969
18.81 744.114 18.93  750.26 20.8 750.636 20.77 756.406 20.36 772.07 11.24
780.264 8.69  795.074 8.51 800.383 8.54 806.284 7.98 816.865 8.04 828.696
6.92  840.395 7.49 859.321 8.29 860.27 10.2 864.367 10.65 872.796 16.58
872.974 19.88 879.308 19.75 885.454 22.36 891.599 23.25 897.735 23.9  903.881
24.27 910.026 24.28 916.172 24.32 922.318 24.2 934.609 24.05  940.754 24.3
946.9 24.91 953.046 24.73 959.191 24.61 965.337 24.68  971.482 24.97 977.619
25.55 983.764 25.22 989.91 25.69 996.055 25.96 1002.201 26.071008.347
26.331014.492 26.651020.657 25.451026.821 25.14 1032.985 24.53 1039.15
23.961045.323 23.631051.488 23.411057.652 23.93 1063.817 24.061069.981
24.461076.145 24.49 1082.31 25.31088.474 25.22 1094.639 23.571100.803
23.481106.977 23.73 1125.47 24.291137.799 24.56 1143.963 24.881150.127
25.221156.292 24.911162.456 24.67 1168.63 24.48 1174.794 24.711180.959
25.291187.123 25.841193.287 26.11199.452 26.12 1205.616 25.521211.781
25.091217.945 24.811224.109 24.861230.283 25.42 1236.448 26.241242.612
27.081248.776 27.91254.941 28.71261.105 29.39 1267.269 29.651273.434
29.111279.598 28.81285.763 28.021291.936 28.12 1298.101 28.451304.265 28.82
1310.43 29.161316.594 29.951322.758 31.2 1328.923 32.691335.087 33.431341.251
34.91347.416 35.73 1353.59 35.76 1359.754 35.831365.918 36.051372.083
36.161384.411 36.291390.576 36.38  1396.74 36.521409.078 36.91421.407
37.21427.572 37.321433.736 37.54  1439.9 37.631446.065 37.381452.229
371458.394 37.121464.558 36.91

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 750.26 .04 903.881 .09

Bank Sta: Left Right Coeff Contr. Expan.
 750.26 903.881 .3 .4
Ineffective Flow num= 2
```

```
 Sta L Sta R Elev Permanent
 0 744.237 24.5 T
 878.6131464.558 25.6 T
Skew Angle = 20

Downstream Deck/Roadway Coordinates
 num= 17
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 257.476 25.91 514.012 22.81 645.569 23.02
 773.367 24.99 796.859 25 796.953 27.73
 798.739 27.73 798.833 25.32 799.678 25.3 21.15  892.708 25.4 21.6 895.527
25.96 21.6 895.621 27.51
 897.406 27.51 897.5 26 903.984 26.04  1061.853 26.63 1186.832 27.85

Downstream Bridge Cross Section Data
Station Elevation Data num= 211
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  0 34.89 6.089 34.81 12.178
34.66 30.455 34.05 36.545 33.81  42.634 33.66 48.723 33.72 54.822 33.69
60.911 33.59 67 33.45  73.089 33.25 79.179 33.09 85.277 33.04 91.366 32.89
97.456 32.68  103.545 32.51 109.634 32.16 115.723 31.77 121.822 31.16 127.911
30.64  134 30.23 140.089 30.07 146.179 30.03 152.277 29.83 158.366 29.57
164.456 29.22 170.545 28.83 176.634 28.48 182.723 28.11 194.911 27.32  201
26.81 207.089 26.27 213.179 25.88 219.277 25.51 225.366 25.12  231.456 24.88
237.545 24.36 243.634 23.95 255.822 23.32 261.911 23.03  268 22.89 274.09
22.69 280.179 22.24 286.277 22.16 292.367 22.17  298.456 21.92 304.545 21.78
310.634 21.99 316.733 22.46 322.822 22.69  328.911 22.67 335 22.41 341.09
22.11 347.179 21.93 353.277 21.61  359.367 21.37 365.456 21.4 377.634 21.59
383.723 21.7 389.822 21.74  395.911 21.71 408.09 21.96 414.179 22.07 420.278
22.13 426.367 22.26  438.545 22.31 444.653 22.45 450.752 22.51 456.86 22.53
462.958 22.47  469.066 22.24 481.273 21.93 487.372 21.88 493.48 21.8 499.578
22.02  505.686 22.26 511.785 22.19 517.893 21.81 530.099 21.18 536.198 20.99
542.306 21.02 548.405 21.01 554.513 20.92 560.611 21.05 566.719 21.23
572.818 21.29 578.926 21.53 585.024 21.83 591.132 21.89 597.231 21.75
603.339 21.43 609.438 21.22 615.546 21.22 621.644 21.29 627.752 21.54
633.851 21.96 639.959 22.01 646.057 22.24 652.165 22.67 658.264 22.99
664.372 23.22 670.471 23.32 676.579 23.47 682.677 23.64 688.785 23.61
700.992 23.02 707.09 22.97 713.198 23.24 719.297 24.07 725.405 24.2  731.504
22.81 779.945 18.72 780.152 16.67 800.261 11.24 808.455 8.69  823.265 8.51
828.574 8.54 834.475 7.98 845.056 8.04 856.887 6.92  868.586 7.49 887.511
8.29 888.461 10.2 892.558 10.65 900.987 16.58  901.165 19.88 914.612 18.66
920.711 18.51 926.819 17.76 932.917 17.11  939.025 16.93 945.124 16.47
951.232 15.67 957.331 15.21 963.439 16.04  969.537 15.4 975.645 15.13 981.744
15.39 987.852 15.31 993.95 15.86 1006.148 22.731012.246 24.771018.335
25.491024.434 26.021030.523 26.47 1036.622 26.49 1048.81 26.781060.998
27.031067.087 27.391073.185 27.66 1079.275 27.711085.364 27.821091.462
27.91097.552 28 1103.65 28.2 1109.739 28.331121.927 28.341128.026
28.481140.214 28.611152.401 28.87 1164.589 29.181170.678 29.311182.866
29.431188.965 29.681195.054 30.04 1201.153 30.351207.242 30.77 1219.43
31.81225.528 32.131237.716 32.44 1243.805 32.521249.904 32.571255.993
32.731262.092 33.021268.181 33.25  1274.27 33.291280.369 33.241286.458
33.31292.557 33.281298.646 33.07 1304.744 33.191310.834 33.621316.932
33.981323.021 34.27 1329.12 34.6 1335.209 34.911341.308 34.931347.397
35.041353.496 35.281365.683 35.63 1371.773 35.741377.871 35.821383.961
35.841396.148 35.671402.247 35.72 1408.336 36.051414.435 36.21420.524
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36.481432.712 36.54 1438.81 36.43  1444.9 36.211450.989 36.381457.087
36.461463.177 36.851469.275 37.32 1475.364 37.261481.463 37.31487.552
37.731493.651 38.13 1499.74 37.85 1505.839 37.55

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 725.405 .04 901.165 .09
 Bank Sta: Left Right Coeff Contr. Expan.
 725.405 901.165 .3 .4
Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 779.945 24.5 T
 911.5021505.839 26 T
Skew Angle = 20

Upstream Embankment side slope = 0 horiz. to 1.0 vertical Downstream
Embankment side slope = 0 horiz. to 1.0 vertical Maximum allowable
submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
 Energy
 W.S. Pro Method

 W.S.Pro Data
 Left Embankment
 El of the top of the embankment = 25.3
 El of the toe of the abutment = 11.2
 Right Embankment
 El of the top of the embankment = 25.3  El of the toe of the abutment = 11.2
 Abutment Type = 4 Vert. abutments and sloping embankments with wingwalls
Slope of abutments =
 Top with of embankment = 35
 Centroid station of bridge opening =
 Wing Wall Type = Angular wing walls
 Width = 20
 Angle = 45
 Radius =
 Guide Banks Type = No Guide Bank present
 Length =
 Offset =
 Angle =
 Optional Contraction and expansion coefficients
 At approach Section
 At Guide Bank
 At upstream outside
 At upstream inside (BU)
 At downstream inside (BD)
 Piers are Continuous for the width of the bridge
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 Use Geometric mean as Friction Slope Method

Selected Low Flow Methods = W.S.Pro Method

High Flow Method
 Pressure and Weir flow
 Submerged Inlet Cd =
 Submerged Inlet + Outlet Cd = .8
 Max Low Cord =

Additional Bridge Parameters
 Add Friction component to Momentum
 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION


RIVER: Taunton River
REACH: Main Stem RS: 72532.91

INPUT
Description: 66.3 DS FAce Vernon St
Station Elevation Data num= 211
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  0 34.89 6.089 34.81 12.178
34.66 30.455 34.05 36.545 33.81  42.634 33.66 48.723 33.72 54.822 33.69
60.911 33.59 67 33.45  73.089 33.25 79.179 33.09 85.277 33.04 91.366 32.89
97.456 32.68  103.545 32.51 109.634 32.16 115.723 31.77 121.822 31.16 127.911
30.64  134 30.23 140.089 30.07 146.179 30.03 152.277 29.83 158.366 29.57
164.456 29.22 170.545 28.83 176.634 28.48 182.723 28.11 194.911 27.32  201
26.81 207.089 26.27 213.179 25.88 219.277 25.51 225.366 25.12  231.456 24.88
237.545 24.36 243.634 23.95 255.822 23.32 261.911 23.03  268 22.89 274.09
22.69 280.179 22.24 286.277 22.16 292.367 22.17  298.456 21.92 304.545 21.78
310.634 21.99 316.733 22.46 322.822 22.69  328.911 22.67 335 22.41 341.09
22.11 347.179 21.93 353.277 21.61  359.367 21.37 365.456 21.4 377.634 21.59
383.723 21.7 389.822 21.74  395.911 21.71 408.09 21.96 414.179 22.07 420.278
22.13 426.367 22.26  438.545 22.31 444.653 22.45 450.752 22.51 456.86 22.53
462.958 22.47  469.066 22.24 481.273 21.93 487.372 21.88 493.48 21.8 499.578
22.02  505.686 22.26 511.785 22.19 517.893 21.81 530.099 21.18 536.198 20.99
542.306 21.02 548.405 21.01 554.513 20.92 560.611 21.05 566.719 21.23
572.818 21.29 578.926 21.53 585.024 21.83 591.132 21.89 597.231 21.75
603.339 21.43 609.438 21.22 615.546 21.22 621.644 21.29 627.752 21.54
633.851 21.96 639.959 22.01 646.057 22.24 652.165 22.67 658.264 22.99
664.372 23.22 670.471 23.32 676.579 23.47 682.677 23.64 688.785 23.61
700.992 23.02 707.09 22.97 713.198 23.24 719.297 24.07 725.405 24.2  731.504
22.81 779.945 18.72 780.152 16.67 800.261 11.24 808.455 8.69  823.265 8.51
828.574 8.54 834.475 7.98 845.056 8.04 856.887 6.92  868.586 7.49 887.511
8.29 888.461 10.2 892.558 10.65 900.987 16.58  901.165 19.88 914.612 18.66
920.711 18.51 926.819 17.76 932.917 17.11  939.025 16.93 945.124 16.47
951.232 15.67 957.331 15.21 963.439 16.04  969.537 15.4 975.645 15.13 981.744
15.39 987.852 15.31 993.95 15.86 1006.148 22.731012.246 24.771018.335
25.491024.434 26.021030.523 26.47 1036.622 26.49 1048.81 26.781060.998
```

27.031067.087 27.391073.185 27.66 1079.275 27.711085.364 27.821091.462
27.91097.552 28 1103.65 28.2 1109.739 28.331121.927 28.341128.026
28.481140.214 28.611152.401 28.87 1164.589 29.181170.678 29.311182.866
29.431188.965 29.681195.054 30.04 1201.153 30.351207.242 30.77 1219.43
31.81225.528 32.131237.716 32.44 1243.805 32.521249.904 32.571255.993
32.731262.092 33.021268.181 33.25 1274.27 33.291280.369 33.241286.458
33.31292.557 33.281298.646 33.07 1304.744 33.191310.834 33.621316.932
33.981323.021 34.27 1329.12 34.6 1335.209 34.911341.308 34.931347.397
35.041353.496 35.281365.683 35.63 1371.773 35.741377.871 35.821383.961
35.841396.148 35.671402.247 35.72 1408.336 36.051414.435 36.21420.524
36.481432.712 36.54 1438.81 36.43 1444.9 36.211450.989 36.381457.087
36.461463.177 36.851469.275 37.32 1475.364 37.261481.463 37.31487.552
37.731493.651 38.13 1499.74 37.85 1505.839 37.55

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 725.405 .04 901.165 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 725.405
901.165 70.06 59.59 49.81 .3 .4 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 779.945 24.5 T
 911.5021505.839 26 T
Skew Angle = 20

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 72473.31

INPUT
Description: 66 Exit Vernon St
Station Elevation Data num= 229
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 34.89 6.52 34.82 13.04 34.66
26.08 34.38 32.6 34.25 45.64 34.14 58.68 34.07 71.72 34.03 78.24 34 84.76
34.01 91.28 33.94 97.8 33.82 104.32 33.74 110.84 33.5 117.36 31.31 123.88
30.76 130.4 30.48 136.91 30.4 143.43 30.07 156.47 29.02 162.99 28.55 169.51
28.02 176.03 27.34 182.55 26.63 189.07 26.16 202.11 25.27 208.63 24.72
215.15 24.27 221.67 23.79 228.19 23.41 241.23 22.78 247.75 22.44 254.27
22.13 260.79 21.9 267.31 21.37 273.83 21.06 280.35 20.81 286.87 20.53 299.91
20.24 306.43 20.24 312.95 20.31 325.99 20.5 332.51 20.64 339.03 20.72 345.55
20.87 352.07 20.73 358.59 21.4 365.11 22.35 371.63 22.34 378.15 21.95
384.67 21.87 391.19 21.98 397.71 22.03 404.22 22.42 410.74 22.57 417.26
22.81 430.3 23.12 436.82 23.3 443.34 23.46 456.38 24.15 462.9 24.16 469.42
24.04 482.46 23.93 488.98 23.83 495.5 23.67 502.02 23.53 508.57 23.2 515.12
23.29 521.66 23.01 528.21 22.85 534.76 22.67 547.85 22.12 554.4 21.69 560.95
21.42 567.5 21.03 574.04 20.66 580.59 20.52 587.14 20.55 593.69 20.39 600.23
20.33 613.33 20.36 619.88 20.08 626.42 19.91 632.97 19.8 639.52 19.76
646.06 19.8 652.61 19.79 659.16 19.75 665.71 20.15 672.25 20.72 678.8 21.73
685.35 22.64 691.9 23.41 698.44 23.8 704.99 24.07 711.54 24.19 718.09 24.36
724.63 24.34 731.18 24.43 737.73 24.6 744.28 24.65 750.82 24.5 757.37 24.32
763.92 24.1 777.01 22.89 783.56 22.5 790.11 22.17 796.66 21.91 803.2 21.86
809.75 21.14 816.3 17.73 830.39 11.32 851.35 12.33 882.88 9.63 886.95 7.75

897.37 6.84 910.58 6.18 914.82 6.56 925.8 5.97 937.82 5.99 948.13 6.63
972.41 7.47 979.03 7.74 981.24 10.95 1021.63 12.14 1094.25 13.57 1117.48
24.42 1124.03 25.46 1130.57 26.29 1137.12 26.81 1150.22 27.05 1156.76 27.19
1163.31 27.28 1169.86 27.32 1176.41 27.29 1182.95 27.35 1189.5 27.58 1202.6
28.31 1209.14 28.59 1222.24 29.01 1228.78 29.16 1235.33 29.24 1241.88 29.34
1254.97 29.8 1261.52 29.93 1268.07 30.08 1274.62 30.1 1281.16 30.25 1287.71
30.63 1294.26 31.06 1300.81 31.45 1313.9 32.31 1320.45 32.67 1327 32.98
1333.54 33.24 1340.09 33.46 1346.64 33.61 1353.19 33.82 1359.73 34.06
1366.28 34.23 1372.83 34.28 1379.37 34.28 1385.92 34.31 1392.47 34.29
1399.02 34.17 1405.56 34.1 1412.11 34.17 1418.66 34.4 1431.6 35.15 1438.07
35.3 1444.54 35.37 1451.01 35.51 1457.48 35.69 1463.95 35.77 1470.42 35.77
1483.36 35.89 1489.83 35.97 1496.3 36.02 1502.77 36 1509.24 35.86 1515.71
35.68 1528.65 35.68 1535.12 35.65 1541.59 35.73 1548.06 35.89 1554.53 35.99
1561 36 1567.47 35.89 1573.94 36.16 1580.41 36.53 1586.88 36.83 1593.35
37.05 1612.76 37.48 1619.23 37.57 1625.7 37.56 1638.64 37.38 1645.11 37.4
1651.58 37.47 1658.05 37.43 1664.52 37.46 1670.99 37.33 1677.46 37.41
1683.93 37.72 1690.4 37.5 1696.87 36.05 1703.34 35.5 1709.81 35.39 1716.28
35.34 1722.75 35.34 1729.22 35.31 1735.69 35.3 1748.63 35.35 1761.57 35.44
1768.04 35.51 1774.51 34.79 1780.98 34.29 1787.45 34.72 1793.92 35.27
1800.39 35.46 1806.86 35.42 1813.33 34.81 1819.8 33.96 1826.27 33.38 1832.74
32.98 1839.21 32.83 1845.68 32.64 1852.15 32.43 1858.62 32.26 1865.09 32.57

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 744.28 .04 1137.12 .09
 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 744.28
1137.12 1517.78 1599.96 1630.87 .1 .4 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 734 24 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 70873.35

INPUT
Description: 65
Station Elevation Data num= 324
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 34.29 19.66 34.5 32.77 34.98
39.32 34.85 45.88 34.56 52.43 33.57 78.65 33.16 85.2 32.82 91.75 32.72
157.29 32.77 170.4 33.08 183.51 33.71 196.62 34.03 203.17 34.32 209.72 34.45
222.83 35.11 229.39 35.21 255.6 34.84 268.71 34.82 275.26 34.71 281.82 34.84
294.93 34.7 301.48 34.44 308.03 33.92 321.14 33.56 327.69 33.55 340.8 33.3
367.02 32.1 386.68 30.79 412.9 28.79 426 28.13 439.11 27.23 458.77 25.64
478.43 24.43 491.54 23.29 504.65 22.48 517.76 21.96 524.31 21.46 530.87 21.1
537.42 20.59 557.08 19.71 576.74 18.42 589.85 17.32 609.51 16.41 616.07
16.22 635.73 16.41 648.84 16.41 655.39 16.73 694.71 17.18 701.27 17.77
707.82 18.69 720.93 19.54 734.04 20.95 740.59 21.9 747.14 22.57 760.25 23.19
766.81 24.25 773.36 26.56 779.91 26.86 786.47 26.6 793.02 26.63 806.13 27.2
832.34 27.58 838.9 27.55 858.56 27.12 897.88 26.78 910.99 26.99 950.31 26.66
956.87 26.74 969.98 26.64 989.64 26.71 1002.75 26.49 1015.85 26.39 1028.96
26.61 1055.18 26.65 1081.39 26.39 1094.45 26.12 1107.5 25.6 1133.62 24.95
1146.67 24.33 1153.2 24.22 1166.26 23.8 1192.37 22.65 1205.43 22.49 1218.48

22.06 1231.54 21.49 1238.07 21.08 1244.59 21.59 1251.12 21.46 1257.65 21.57
1264.18 21.17 1270.71 20.93 1277.23 20.96 1283.76 20.76 1290.29 20.41
1296.82 19.92 1329.46 18.81 1342.51 18.08 1349.04 17.86 1381.68 18.23
1388.21 18.42 1394.74 18.42 1401.27 18.16 1407.79 18.16 1414.32 17.97
1420.85 17.94 1427.38 18.06 1440.43 17.76 1446.96 17.36 1479.6 17.12 1492.66
16.89 1525.3 15.54 1538.35 15.3 1544.88 15.32 1551.41 15.56 1564.47 16.39
1570.99 16.95 1590.58 18.95 1597.11 19.42 1610.16 19.7 1623.22 19.62 1629.75
19.42 1636.28 19.44 1642.8 19.61 1649.33 19.62 1655.86 19.35 1662.39 18.86
1668.92 18.22 1675.44 17.45 1681.97 16.26 1695.03 12.48 1701.56 11.69
1714.61 11.67 1727.67 12 1734.2 13.28 1740.72 13.62 1747.25 14.25 1760.31
14.8 1766.84 14.85 1779.89 14.61 1792.95 14.82 1806 14.77 1812.53 14.86
1819.06 14.67 1825.59 14.06 1832.12 13.66 1845.17 12.49 1858.23 11.99
1871.28 11.79 1877.81 11.58 1884.34 11.62 1897.4 12.17 1910.45 12.96 1923.51
13.33 1930.04 13.73 1936.57 13.66 1943.09 13.93 1949.62 14.39 1962.68 14.81
1982.26 14.86 2001.85 14.68 2008.37 14.31 2021.43 14.13 2027.96 13.6 2047.54
13.12 2054.07 12.85 2073.65 12.43 2086.71 12.72 2106.29 12.28 2112.82 12.25
2119.35 12.36 2125.88 12.69 2138.93 12.89 2145.46 13.39 2165.05 14.34
2171.57 14.81 2178.1 15.09 2184.63 15.15 2197.69 14.76 2204.21 14.68 2217.27
15.09 2249.91 14.79 2262.97 13.95 2269.49 13.9 2282.55 13.45 2295.61 13.36
2302.13 13.6 2315.19 13.21 2328.24 12.4 2341.33 12.59 2347.9 12.58 2367.58
12.9 2393.83 15.3 2400.39 15.6 2426.64 15.56 2433.2 15.09 2452.88 15.62 2466
15.5 2479.13 15.91 2492.25 16.09 2498.81 16.28 2518.5 15.95 2519.86 15.97
2525.06 16.05 2545 13.7 2555 7.2 2575 4.5 2600 4 2625 4.7 2645 7.5 2656.29
18.13 2662.85 22.78 2669.41 27.53 2675.98 29.91 2682.54 31.29 2689.1 32.28
2695.66 33.38 2702.22 35.17 2708.78 36.23 2715.34 37.01 2721.91 37.67
2728.47 38.74 2741.59 38.55 2748.15 38.55 2754.71 39 2761.28 39.77 2767.84
40.23 2780.96 40.59 2787.52 41.08 2794.08 41.48 2800.65 41.9 2807.21 42.28
2813.77 42.53 2820.33 42.65 2826.89 42.81 2833.45 43.11 2840.01 43.43
2846.58 43.61 2853.14 44.06 2859.7 44.06 2866.26 43.82 2872.82 43.5 2879.38
44.29 2885.95 44.77 2892.51 45.13 2899.07 45.47 2905.63 45.77 2912.19 45.93
2918.75 46.17 2925.32 46.44 2931.88 46.63 2938.44 46.87 2945 47.04 2951.56
47.26 2958.12 47.75 2964.68 48.17 2971.25 48.52 2977.81 49.38 2984.37 50.7
2990.93 52.37 2997.49 53.89 3004.05 54.99 3010.62 56.34 3017.18 57.33
3023.74 58.64 3030.3 59.62 3036.86 60.73 3043.42 61.73 3049.99 62.67 3056.55
63.37 3063.11 63.83 3069.67 63.85 3076.23 63.7 3082.79 63.15 3089.35 62.12
3095.92 60.75 3102.48 59.4 3109.04 58.17 3115.6 57.19 3122.16 56.45 3128.72
56.05 3135.29 54.96 3141.85 54.16 3148.41 53.98 3154.97 53.92 3161.53 54.24
3168.09 54.01 3174.66 54.27 3181.22 54.24 3187.78 53.99 3194.34 53.71 3200.9
53.7 3207.46 53.9 3214.02 54.49 3220.59 55.51 3227.15 56.86 3233.71 57.59
3240.27 58.39 3246.83 59.12 3253.39 60.29 3259.96 61.54 3266.52 62.09
3273.08 63.1 3279.64 63.32 3286.2 63.78 3292.76 63.93 3305.89 63.63 3312.45
63.33 3319.01 63.05 3325.57 62.84 3332.13 62.52 3338.69 61.85 3345.26 60.98
3351.82 60.14 3358.38 59.47 3364.94 59.14 3371.5 58.62 3378.06 58.48 3391.19
58.55 3397.75 58.8 3404.31 58.52 3417.43 58.22 3424 58.28 3430.56 58.06

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val 0 .085 2519.86 .04 2728.47 .093

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2519.86
2728.47 2059.45 2036.14 2092.49 .1 .4 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 832 27.5 F

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 68837.21

INPUT
Description: 64
Station Elevation Data num= 417
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 36.39 6.55 36.12 13.1 35.95
19.65 35.8 26.19 35.38 32.74 34.89 39.29 34.57 45.87 34.05 52.42 33.45 58.98
33.24 65.53 33.21 72.08 33.13 78.64 33.12 85.19 33.13 91.74 33.09 98.29 33
104.85 32.88 111.4 32.81 117.95 32.67 124.51 32.59 131.06 32.4 137.61 32.16
144.16 32.09 150.72 31.94 157.27 31.81 163.82 31.78 170.38 31.82 176.93
31.81 183.48 31.97 196.59 32.09 203.14 32.16 209.69 32.27 222.8 32.64 229.35
32.89 235.91 33.17 242.46 33.48 249.01 33.86 255.56 34.16 268.67 34.53
275.22 34.63 281.78 34.56 288.33 34.52 294.88 34.4 301.43 34.3 307.99 34.18
314.54 34.02 321.09 33.93 327.65 33.82 334.2 33.68 340.75 33.66 347.3 33.6
353.86 33.51 360.41 33.29 373.52 32.73 386.62 31.76 393.18 31.25 399.73
30.68 406.28 30.06 412.83 29.38 419.39 28.88 425.94 28.54 432.49 28.36
439.05 28.21 445.6 27.99 452.15 27.65 458.7 27.38 465.26 27.26 471.81 27.23
478.36 27.3 484.92 27.16 491.47 27.24 498.02 27.17 504.57 26.85 511.13 26.8
517.68 26.78 524.23 26.52 530.79 26.2 537.34 25.9 543.89 25.29 550.45 24.04
563.55 21.63 570.1 20.6 576.66 19.83 583.21 19.04 596.32 18.07 602.87 17.29
609.42 16.81 615.97 16.69 622.53 16.55 629.08 16.26 635.63 16.04 642.19
16.64 655.29 16.69 661.84 16.85 668.4 17.21 674.95 17.37 681.5 17.8 688.06
18.04 694.61 18.16 701.16 18.39 707.72 18.45 720.82 19.54 727.37 20.21
733.93 20.72 740.48 21.12 747.03 21.26 753.59 21.24 766.69 21.08 773.24
21.02 779.8 20.79 786.35 20.42 792.9 20.34 799.46 20.28 806.01 20.32 812.56
20.44 819.11 20.68 825.67 20.99 832.22 21.54 838.77 22.05 845.33 22.59
851.88 23.11 858.43 23.72 864.99 24.43 871.54 25.1 878.09 25.63 891.2 26.36
897.75 26.48 904.3 26.39 910.86 26.47 917.41 26.51 923.96 26.59 930.51 26.6
937.07 26.58 943.62 26.32 950.17 26.24 956.73 26.22 963.28 26.51 969.83
26.52 976.38 26.34 982.94 26.41 989.49 26.38 996.04 26.29 1002.6 26.38
1009.15 26.53 1015.7 26.47 1022.26 26.57 1028.81 26.33 1035.36 26.42 1041.91
26.39 1055.02 26.09 1061.57 26.24 1068.13 26.19 1074.68 26.39 1081.23 26.36
1087.78 26.35 1094.34 26.42 1100.89 26.18 1107.44 26.24 1114 26.22 1120.55
26.28 1127.1 26.17 1133.66 25.86 1140.21 25.51 1146.76 25.9 1153.31 26.11
1159.87 26.23 1166.42 26.2 1172.97 26 1179.53 26.26 1192.63 25.71 1199.19
25.42 1205.74 25.09 1212.29 24.63 1218.84 24.1 1225.4 23.63 1231.95 24.1
1238.5 24.01 1245.06 23.25 1251.61 22.85 1258.16 22.76 1264.71 22.69 1271.27
22.72 1277.82 22.72 1284.37 22.51 1290.93 22.2 1297.48 21.95 1310.59 21.7
1317.14 21.41 1323.69 21.5 1330.24 21.26 1336.8 20.78 1343.35 20.51 1349.9
20.2 1356.46 19.78 1363.01 19.16 1376.12 18.02 1382.67 17.28 1389.22 17.06
1395.77 16.99 1402.33 16.49 1408.88 16.22 1415.43 15.2 1421.99 14.76 1428.54
14.78 1435.09 14.56 1441.65 14.85 1448.2 15.02 1454.75 15.21 1461.3 15.58
1467.86 15.81 1474.41 15.95 1480.96 15.91 1487.52 16.26 1494.07 16.7 1500.62
16.77 1507.18 16.78 1513.73 16.71 1520.28 16.36 1526.83 16.22 1533.39 16.01
1539.94 15.43 1546.49 14.87 1553.05 14.28 1559.6 13.98 1566.15 13.57 1572.7
13.46 1579.26 13.22 1585.81 13.19 1592.36 13.5 1598.92 13.71 1605.47 14.26
1612.02 14.99 1618.58 15.67 1625.13 16.13 1631.68 16.74 1638.23 17 1644.79
17.29 1651.34 17.14 1657.89 17.4 1664.45 17.56 1671 17.53 1677.55 17.75
1684.11 17.58 1690.66 18.02 1697.21 18.41 1703.76 18.53 1710.32 18.46
1716.87 18.53 1723.42 18.66 1729.98 18.75 1736.53 18.78 1743.08 18.78
1749.63 18.96 1756.19 18.72 1769.29 18.94 1782.4 19.37 1788.95 19.2 1795.51
19.4 1802.06 19.7 1808.61 19.74 1815.16 19.81 1821.72 20.11 1828.27 20.21
1841.38 20.7 1847.93 20.77 1854.48 20.54 1861.04 20.39 1867.59 20.13 1874.14

19.37 1880.69 18.7 1887.25 18.1 1893.8 17.65 1900.35 17.12 1906.91 16.34
1913.46 15.67 1920.01 15.06 1926.57 14.86 1933.12 15.01 1946.22 14.96
1952.78 14.98 1959.33 15.09 1965.88 15.32 1972.44 15.76 1978.99 16.08
1985.54 16.24 1992.1 16.42 1998.65 16.47 2005.2 16.82 2011.75 16.5 2018.31
15.55 2024.86 14.27 2031.41 13.77 2050 14.1 2083 13.7 2090 6.6 2110 2.9
2130 3.1 2150 3.9 2170 7.1 2182.13 22.14 2188.68 27.54 2195.24 31.46 2201.79
33.64 2208.34 34.57 2214.9 35.39 2221.45 35.82 2228 35.88 2241.11 35.73
2247.66 35.59 2254.21 35.32 2260.77 35.59 2267.32 35.59 2273.87 35.52
2280.43 35.59 2286.98 35.59 2293.53 35.83 2300.08 35.89 2306.64 36.14
2311.62 36.25 2318.15 36.11 2324.68 36.14 2331.21 36.2 2337.74 36.09 2344.26
36.12 2350.79 36.36 2357.32 36.9 2363.85 37.32 2370.38 37.44 2376.91 37.61
2383.44 37.83 2389.97 38.12 2396.5 38.59 2403.03 39 2409.56 39.2 2416.09
39.47 2422.61 39.83 2429.14 40.04 2435.67 40.2 2442.2 40.35 2448.73 40.41
2455.26 40.42 2461.79 40.54 2468.32 40.72 2474.85 40.88 2481.38 40.93
2487.91 40.87 2494.44 40.95 2500.96 41.06 2507.49 41.04 2514.02 40.82
2520.55 40.79 2527.08 41.03 2533.61 41.12 2540.14 41.17 2546.67 41.25 2553.2
41.43 2559.73 41.61 2566.26 41.74 2572.79 41.98 2579.32 42.09 2585.84 42.09
2592.37 42.18 2598.9 42.08 2605.43 42.28 2611.96 42.33 2618.49 42.28 2625.02
42.54 2631.55 42.66 2638.08 42.59 2644.61 42.77 2651.14 42.75 2657.67 42.78
2664.2 42.75 2670.72 42.9 2677.25 43.47 2683.78 43.62 2690.31 43.79 2696.84
43.83 2703.37 43.98 2709.9 44.02 2716.43 44.23 2722.96 44.65 2729.49 45.05
2736.02 45.45 2742.55 45.61 2749.07 46 2755.6 46.36 2762.13 46.6 2768.66
46.93 2775.19 47.35 2781.72 47.77 2788.25 48.21 2794.78 48.63 2801.31 49.03
2807.84 49.45 2814.37 50.2 2820.9 51.03 2827.42 51.63 2833.95 52.09 2840.48
52.63 2847.01 52.93 2853.54 53.38 2860.07 53.64 2866.6 54.13 2873.13 54.59
2879.66 54.81 2886.19 54.95 2892.72 54.76 2899.25 54.47 2905.77 54.66 2912.3
55.84 2918.83 57.45 2925.36 59.75 2931.89 61.09 2938.42 62.25 2944.95 62.54
2951.48 62.57

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .087 2083 .04 2221.45 .095

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2083
2221.45 1628.08 1647.15 1663.03 .1 .4 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 1000 26.4 F

CROSS SECTION

RIVER: Taunton River REACH: Main Stem RS: 67190.06

INPUT
Description: 63
Station Elevation Data num= 374
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 40.46 6.54 39.81 13.08 39.82
19.61 39.9 26.15 39.75 32.69 39.75 39.23 39.85 45.77 39.9 52.3 39.78 58.84
39.75 65.38 40.12 78.46 40.69 84.99 41.08 91.53 41 98.07 41.24 104.61 41.45
111.14 40.72 124.22 39.03 130.76 38.67 137.3 38.75 143.83 38.77 150.37 39.27
156.91 39.63 163.45 39.74 176.52 39.31 183.06 39.22 189.6 39.24 196.14 39.34
202.68 39.51 209.21 39.37 222.29 38 228.83 37.51 235.37 37.04 241.9 36.6
248.44 36.21 254.98 35.93 261.52 35.62 268.06 35.42 281.13 35.21 287.67 35
294.21 34.6 300.75 34.37 307.28 34.27 313.82 33.97 326.9 33.32 333.43 33.16

339.97 33.16 346.51 33.18 353.05 33.12 359.59 32.99 366.12 32.88 379.2 32.76
385.74 32.71 392.28 32.54 398.81 32.46 405.35 32.26 411.89 32.36 418.43
32.65 424.97 33.1 431.5 33.35 438.04 33.57 444.58 33.5 451.12 32.95 457.66
32.8 464.19 32.78 470.73 32.73 477.27 32.78 490.35 32.76 496.88 32.84 503.42
32.97 509.96 32.94 516.5 32.8 523.04 32.78 529.57 32.86 536.11 32.88 542.65
33.02 555.72 33.86 562.26 34.17 568.8 34.53 575.34 34.69 581.88 34.68 588.41
34.73 594.95 34.68 601.49 35.03 608.03 35.4 614.57 35.39 621.1 35.45 627.64
35.55 634.18 35.53 640.72 35.46 647.26 35.34 653.79 35.18 660.33 35.14
666.87 35.03 673.41 34.76 679.95 34.55 686.48 34.01 693.02 33.55 699.56
33.39 706.1 33.2 712.64 32.95 719.17 32.57 725.68 32.5 738.69 32.83 745.2
32.94 751.71 32.85 758.21 32.68 764.72 32.84 771.23 32.9 777.73 32.67
784.24 32.05 790.74 30.59 797.25 29.68 803.76 29.34 810.26 29.18 816.77
28.99 823.28 28.82 829.78 28.25 836.29 27.94 842.8 27.58 855.81 27.61 862.32
27.36 868.82 26.94 875.33 26.86 881.83 26.89 888.34 26.83 894.85 26.69
907.86 26.35 914.37 26.04 920.87 25.75 927.38 25.8 933.89 25.5 940.39 25.1
946.9 24.92 959.91 24.72 972.92 24.59 979.43 24.63 985.94 24.65 992.44 24.58
998.95 24.43 1005.46 24.31 1011.96 24.61 1024.98 25.02 1031.48 25.21 1037.99
25.31 1044.49 25.39 1051 25.5 1057.51 25.47 1064.01 25.15 1070.52 25.06
1077.03 24.7 1083.53 24.28 1090.04 24.16 1096.55 24.06 1103.05 24.09 1109.56
24.47 1116.07 24.8 1122.57 25.17 1129.08 25.58 1135.59 26.04 1142.09 26.29
1148.6 26.48 1155.1 26.81 1161.61 27.02 1168.12 27.4 1174.62 27.46 1181.13
27.41 1187.64 27.48 1194.14 27.57 1200.65 27.5 1207.16 27.25 1213.66 27.03
1220.17 26.79 1226.68 26.53 1233.18 25.86 1239.69 25.05 1246.2 24.27 1252.7
23.34 1259.21 22.53 1265.71 21.56 1272.22 20.42 1278.73 19.58 1285.26 18.67
1291.8 18.15 1298.33 18.05 1304.86 18.12 1311.4 18.26 1317.93 18.19 1324.47
18.33 1331 18.58 1337.53 18.92 1344.07 18.9 1350.6 18.67 1357.14 18.73
1363.67 18.81 1370.21 19.24 1376.74 19.35 1383.27 18.87 1389.81 18 1396.34
8.57 1408 7 1425 3.1 1450 2.2 1475 4 1492 7.2 1493.21 11.12 1494.35 11.55
1500.89 12.9 1513.96 13.15 1520.49 13.74 1527.02 15.37 1533.56 15.9 1540.09
15.56 1546.63 15 1553.16 13.95 1559.69 13.24 1566.23 12.75 1579.3 12.69
1585.83 12.48 1592.36 12.87 1598.9 13.73 1611.97 15.21 1618.5 15.72 1631.57
15.39 1638.1 15.05 1644.64 15.15 1657.71 15.15 1670.71 14.81 1690.13 15.51
1703.08 15.62 1716.03 15.38 1735.45 15.31 1748.39 14.95 1754.87 14.46
1761.34 13.84 1767.82 13.39 1793.71 12.38 1800.18 12.26 1813.13 12.77 1819.6
12.79 1826.08 12.99 1832.55 13.02 1845.5 12.72 1864.92 12.43 1871.39 12.82
1877.86 13.92 1884.34 15.52 1890.81 17.41 1903.76 18.55 1923.18 18.05
1929.65 17.68 1942.6 17.6 1949.07 17.32 1955.55 17.92 1968.49 18.52 1974.97
18.64 1981.44 18.93 1994.39 19.05 2000.86 18.84 2007.33 18.46 2026.75 18.18
2033.23 17.85 2046.18 16.69 2052.65 16.34 2072.07 16.06 2085.02 16.86
2091.49 16.97 2104.44 17.99 2117.38 19.16 2123.86 19.52 2136.97 19.84
2150.09 20.66 2163.21 21.93 2169.77 21.85 2176.33 21.91 2182.89 22.34 2196
23.74 2209.12 25.01 2228.8 27.84 2261.59 31.88 2268.15 32.56 2274.71 33.44
2281.27 34.74 2300.94 40.19 2314.06 43.5 2320.62 45.3 2333.74 48.31 2340.3
49.97 2353.42 52.31 2359.97 53.61 2366.53 54.27 2379.65 56.01 2386.21 56.48
2419 59.38 2425.56 59.69 2438.68 59.98 2458.36 61.12 2471.47 60.48 2478.03
60.27 2497.71 60.35 2510.83 60.95 2517.39 61.36 2523.94 61.96 2550.18 63.94
2556.74 64.17 2563.3 64.25 2589.53 63.5 2596.09 63.21 2609.21 62.07 2628.88
59.59 2635.44 58.59 2648.56 56.18 2655.12 54.72 2661.68 52.81 2720.71 38.65
2727.27 37.38 2740.38 35.21 2753.5 34.06 2766.62 32.29 2773.18 31.67 2779.74
30.87 2786.3 30.25 2792.85 29.97 2805.97 28.33 2812.53 27.74 2819.09 27.47
2825.65 27.75 2832.21 27.42 2845.32 26.01 2858.44 25.74 2878.12 26.1 2884.68
26.09 2904.35 26.54 2937.15 28.15 2963.38 29 2969.94 28.83 2976.5 28.89
2983.06 29.23 2989.62 29.78 2996.18 30.05 3002.74 29.91 3015.85 31.05
3024.23 31.61 3030.75 31.96 3037.2 32.43 3043.64 32.91 3050.08 33.31 3056.53

33.98 3062.97 34.67 3069.41 34.76 3075.86 35.33 3082.3 36.04 3088.75 36.46
3095.19 36.27 3101.63 36.63 3108.08 37.18 3114.52 37.46 3120.96 37.32
3127.41 36.9 3133.85 36.59 3140.29 36.59 3146.74 36.78 3153.18 36.63 3159.63
37.32 3166.07 38.67 3172.51 40.31 3178.96 42.23 3185.4 43.93 3191.84 45.52
3198.29 47.22 3204.73 48.88 3211.18 50.28 3217.62 51.75 3224.06 53.11

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .087 1376.74 .04 1533.56 .093

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1376.74
1533.56 997.16 932.92 890.31 .1 .4 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 1994 3224.06 19 F

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 66257.14

INPUT
Description: 62 Approach 495
Station Elevation Data num= 324 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 32.88 6.55 32.71 13.1 32.8 19.64 33.04 26.19 32.86 32.74 32.9 39.29 32.9
45.84 33.07 52.39 33.12 65.48 32.86 72.03 33.15 78.58 33.38 85.13 33.42
98.22 33.46 104.77 33.35 111.32 33.15 117.87 33.08 130.97 33.33 137.51 33.18
144.06 33.05 150.61 32.8 157.16 32.76 163.71 32.57 176.8 32.27 183.35 32.14
189.9 32.04 196.45 31.96 203 32.04 209.54 32.14 216.09 32.14 222.64 32.23
229.19 32.35 235.74 32.33 242.29 32.43 248.83 32.51 255.38 32.51 268.48
32.64 275.03 32.77 281.58 32.64 288.12 32.76 294.67 32.86 301.22 33.27
307.77 33.43 314.32 33.38 320.87 33.11 333.96 33.41 340.51 33.5 347.06 33.35
353.61 33.17 360.16 33.14 366.7 33.16 373.25 32.91 386.35 31.98 399.44 31.71
405.99 31.65 412.54 31.56 419.09 31.49 425.64 31.4 432.19 31.21 445.28 31.34
451.83 31.24 458.38 31.44 464.93 31.45 471.48 31.18 478.02 31.21 484.57
30.95 491.12 31.06 497.67 31.11 504.22 31 510.77 30.54 523.86 29.34 530.41
29.36 536.96 28.56 543.51 28 550.06 27.75 556.6 27.22 563.15 26.71 569.7
26.31 576.25 26.06 582.8 26.13 589.34 26.26 595.89 26.5 602.44 27.04 608.99
26.95 615.54 27.21 622.09 27.21 628.63 27.3 635.18 27.95 641.73 29.38 648.28
30.38 654.83 31.4 661.38 32.22 667.92 32.48 674.47 32.5 681.02 32.47 687.57
32.26 694.12 32.23 700.67 32.15 713.76 32.12 720.31 32.21 726.86 31.98
733.41 31.8 739.96 31.65 746.5 31.84 753.05 31.86 759.6 31.74 766.15 31.51
772.7 31.4 779.24 31.38 785.79 31.43 792.34 31.19 805.44 30.49 811.99 30.46
818.53 30.22 825.08 30.04 838.18 30 844.73 30 851.28 30.07 857.82 29.88
870.92 29.66 877.47 29.4 884.02 29.34 890.57 29.22 897.11 29.14 903.66 29.31
910.21 29.02 916.76 28.75 929.86 28.33 936.4 28.07 942.95 27.62 949.5 26.71
956.05 25.66 962.6 25.32 969.15 25.21 975.69 25.36 982.24 25.07 988.79 24.4
995.34 24.23 1001.89 24.31 1008.44 23.69 1014.98 22.69 1021.53 22.3 1028.08
22.25 1034.63 21.76 1041.18 19.24 1057.66 9.83 1058.6 6.74 1062.21 5.77
1073.02 2.46 1094.79 -.34 1115.31 -.94 1130.91 3.91 1140.47 5.64 1146.53 8
1154.42 11.85 1159.05 12.86 1165.59 14.86 1172.14 16.43 1178.69 16.92
1204.88 16.83 1217.98 16.33 1224.53 16.23 1244.17 15.05 1257.27 13.87
1270.37 13.03 1276.91 12.72 1283.46 12.21 1296.56 11.96 1309.66 11.03 1316.2
10.73 1322.75 10.19 1329.3 10.01 1342.4 9.99 1348.95 10.68 1355.49 11.02

1362.04 11.1 1375.14 10.71 1381.69 10.78 1388.24 11.09 1401.33 11 1407.88
11.24 1414.43 11.32 1434.07 12.01 1440.62 12.36 1453.72 13.89 1466.82 14.44
1473.36 14.56 1479.91 14.43 1486.46 14.54 1493.01 14.49 1499.56 14.29
1512.65 13.42 1519.2 12.79 1525.75 12.52 1532.3 12.62 1538.85 12.95 1545.39
13.76 1551.94 14.38 1565.04 14.43 1571.59 14.77 1578.14 14.91 1591.23 15.68
1597.78 16.36 1604.33 16.9 1610.88 16.14 1617.43 16.1 1637.07 16.48 1643.62
16.24 1650.17 16.98 1669.81 17.29 1682.91 17.22 1702.55 17.47 1709.1 17.42
1715.65 17.58 1722.2 17.92 1728.75 17.76 1735.29 17.75 1748.39 18.18 1787.68
19.82 1794.23 19.93 1807.33 20.58 1813.87 21.01 1826.97 21.39 1833.52 21.28
1840.07 20.85 1846.62 21.29 1853.16 22.53 1859.71 23.07 1872.81 24.67
1885.91 25.77 1892.45 26.54 1905.55 28.65 1918.65 30.27 1931.74 31.25
1938.29 32.12 1944.84 33.22 1951.39 33.32 1957.94 33.96 1964.49 35.11
1971.03 36.84 1977.58 37.41 1984.13 37.7 2036.52 44.28 2049.61 45.32 2056.16
46.14 2075.81 47.98 2102 51.04 2115.09 52.69 2121.64 53.37 2134.74 55.09
2141.29 56.22 2147.83 57.11 2154.38 57.64 2167.48 57.9 2174.03 58.44 2180.58
59.28 2193.67 59.43 2206.77 59.09 2226.41 59.25 2232.96 59.1 2252.61 59.24
2265.7 61.81 2272.25 62.65 2278.8 61.86 2285.35 61.21 2291.89 61.11 2298.44
61.73 2304.99 62.52 2311.54 63.1 2318.09 63.21 2324.64 63.71 2331.18 63.34
2344.28 62.84 2363.92 61.64 2370.47 61.12 2377.02 61.01 2390.12 60.28
2403.21 60.1 2409.76 59.84 2422.86 59.64 2429.41 59.28 2455.6 58.82 2462.15
58.8 2475.24 57.99 2488.34 57.87 2501.44 57.39 2514.53 57.49 2534.18 56.22
2540.72 55.57 2547.27 54.46 2553.82 54.15 2560.37 53.22 2566.92 52.74
2573.47 53.83 2580.01 52.47 2586.56 50.97 2593.11 49.68 2599.66 48.68 2619.3
44.62 2625.85 43.13 2638.95 41.27 2645.5 39.99 2652.04 38.9 2658.59 38.09
2665.14 37.14 2671.69 36.85 2678.24 36.76 2684.78 36.46 2697.88 36.35
2704.43 36.14 2710.98 36.23 2717.53 36.6 2724.07 36.57 2730.62 36.72 2737.17
37.06 2743.72 37.09 2756.81 37.56 2763.36 38.05 2769.91 38.05 2776.46 38.2
2796.1 39.49 2809.2 39.93 2822.3 40.12 2828.84 40.38

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 1034.63 .04 1178.69 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1034.63
1178.69 57.41 52.76 51.67 .1 .4 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 1500 2828.84 29.5 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 66204.38

INPUT Description: 61.7 US Face 495
Station Elevation Data num= 321
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 43.4 12.216 42.98 42.765
42.81 48.883 42.87 54.991 42.7 73.324 42.63 79.432 42.74 85.54 42.33 103.874
41.97 109.982 42.12 116.09 41.97 122.198 40.19 128.306 39.67 134.423 39.48
140.531 39.57 152.747 39.34 158.855 38.92 164.972 38.75 171.08 38.73 177.188
38.97 183.296 38.32 189.404 38.04 226.071 37.81 232.179 36.48 238.287 35.89
262.729 36.18 268.837 36.35 274.945 36.19 281.062 36.24 287.17 36.62 299.386
36.45 305.503 36.49 317.719 37.01 336.053 36.9 342.161 36.61 366.602 36.58
378.818 36.23 391.034 36.16 415.476 36.37 421.584 36.01 427.701 35.02

433.809 34.72 439.917 34.62 446.025 34.67 452.143 34.57 458.251 34.33
470.467 34.3 476.575 34.09 482.692 34.32 494.908 34.04 513.241 33.92 519.349
33.32 525.457 33.02 531.565 33.29 537.673 33.27 549.899 33.79 556.007 34.19
568.232 33.65 574.34 33.5 586.556 33.58 592.664 33.47 611.045 33.5 629.519
33.25 635.674 33.36 647.993 33.25 654.148 33.3 660.303 33.2 666.468 33.44
672.623 32.86 691.097 32.28 709.571 32.27 715.726 32.03 721.881 31.57
734.201 31.11 740.356 31.14 746.52 30.99 752.675 31.01 758.83 31.18 771.149
31.12 777.304 30.69 789.624 30.43 795.779 30.12 801.934 29.99 814.253 29.49
820.408 28.85 826.563 28.4 832.727 27.71 845.037 27.3 851.202 26.61 857.357
26.26 869.676 26.21 881.986 25.8 900.46 25.76 906.615 26.18 912.78 26.46
918.935 26.25 925.09 25.18 931.254 24.45 943.564 23.89 949.719 23.03 955.883
21.27 962.039 19.34 968.193 16.89 971.924 15.33 988.641 5.98 993.405
4.141015.817 -.791029.349 -1.131047.701 -.711057.427 3.67 1064.174
8.591085.599 9.46 1095.71 15.391097.514 16.151103.669 18.08 1109.824
20.031115.979 21.541122.143 22.581128.298 23.251134.453 23.41 1140.618
231146.773 21.471152.928 21.261159.092 21.191165.247 21.08 1171.402
21.191177.557 21.21 1183.72 21.151189.876 21.581196.031 21.72 1202.196
20.831208.351 20.771214.506 21.051220.661 21.541226.825 22.35 1232.98
22.681239.135 22.731245.298 22.911251.454 23.371257.609 23.18 1263.774
23.311276.084 23.861282.239 24.411288.403 24.521294.558 22.87 1300.713
22.71306.878 22.81313.033 23.021319.188 23.441325.352 23.54 1331.507
23.551337.662 23.941343.817 23.931349.981 23.851356.136 23.86 1362.291
24.211368.457 24.53 1374.61 24.551380.766 24.91386.922 25.17 1393.085 25.22
1399.24 25.41405.395 25.621411.559 25.291417.714 25.87 1423.869 25.941430.034
25.541436.189 25.51448.499 25.671454.663 25.82 1460.818 25.681466.973
25.291473.137 24.871479.292 25.051485.447 25.25 1491.612 25.11497.767
25.331503.922 25.631516.241 26.181522.396 26.23 1528.551 26.31534.714 26.7
1540.87 27.281547.025 27.23 1553.18 27.42 1559.345 27.46 1565.5 27.351571.655
28.261577.819 27.321583.974 26.21 1590.129 26.291596.293 26.861602.448
26.481608.603 26.331620.923 27.95 1627.078 27.571633.233 27.791639.397
28.451645.552 28.51651.707 29.1 1657.871 29.491664.026 29.961670.182
30.11682.501 30.061688.656 30.73 1694.811 31.011700.975 30.76 1707.13
31.171713.285 31.02 1719.44 31.25 1725.604 31.68 1731.76 31.811744.079
32.641750.234 33.041756.389 33.67 1762.553 33.821768.708 34.381774.863
34.571781.018 34.141787.183 34.28 1793.338 34.611799.493 34.741805.657
35.131811.812 35.51817.967 35.82 1824.131 36.421830.286 36.961836.441
37.31842.596 37.551854.916 38.36 1861.071 38.94 1873.39 40.511879.545 41.21
1885.7 41.811891.864 42.12 1898.019 42.321910.339 42.911916.494 42.871922.649
42.761928.813 42.79 1934.968 43.021941.123 43.131947.278 43.131953.443
42.931959.598 43.12 1965.751 43.211984.227 43.711990.391 43.571996.546
43.572002.701 43.48 2015.021 43.62021.174 43.442027.329 43.342033.495 43.55
2039.65 43.6 2045.805 43.512051.969 43.722058.124 43.722064.279 43.462070.445
43.53 2076.6 43.412088.918 43.562095.073 43.732101.228 44.762107.392 44.93
2113.547 452119.702 44.832125.857 44.952132.022 45.022138.177 45.35 2144.332
46.912150.496 47.022156.651 46.912162.806 46.46 2168.97 46.42 2175.125 46.47
2181.28 46.352187.445 46.46 2193.6 46.372199.755 46.39 2205.91 46.392212.074
46.362218.229 46.492224.384 46.652230.548 46.65 2236.703 46.722242.858
46.832249.023 46.762255.178 46.752261.333 46.91 2267.497 47.132273.652
47.072279.807 47.062285.962 47.152292.125 46.9 2298.281 46.732304.438
46.72310.601 46.492316.756 46.42322.911 46.25 2329.075 46.22 2335.23
46.32341.385 46.46 2347.55 46.492353.705 46.57 2359.86 46.582366.015
46.522372.179 46.572384.489 46.62390.653 46.53 2396.808 46.622402.963
46.672415.282 46.72421.438 46.432427.602 46.12 2433.757 45.452439.912
45.122446.067 44.572452.231 44.692458.386 44.65 2464.541 44.8

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 918.935 .041134.453 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
918.9351134.453 221.18 217.52 217.92 .3 .4 Skew Angle = 20

BRIDGE

RIVER: Taunton River
REACH: Main Stem RS: 66018.66

INPUT
Description: 61.5 I-495/ SR 25/ Star Mem Hwy Distance from Upstream XS = 22
Deck/Roadway Width = 175
Weir Coefficient = 2.6
Bridge Deck/Roadway Skew = 20
Upstream Deck/Roadway Coordinates
 num= 9
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 744.237 33.83 909.622 31.45 949.09 34.85 27.42 1029.903 34.19 26.681102.259
33.81 26.241138.907 29.58
 1193.41 29.65 1249.791 29.89 1487.533 32.57

Upstream Bridge Cross Section Data
Station Elevation Data num= 321
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 43.4 12.216 42.98 42.765
42.81 48.883 42.87 54.991 42.7 73.324 42.63 79.432 42.74 85.54 42.33 103.874
41.97 109.982 42.12 116.09 41.97 122.198 40.19 128.306 39.67 134.423 39.48
140.531 39.57 152.747 39.34 158.855 38.92 164.972 38.75 171.08 38.73 177.188
38.97 183.296 38.32 189.404 38.04 226.071 37.81 232.179 36.48 238.287 35.89
262.729 36.18 268.837 36.35 274.945 36.19 281.062 36.24 287.17 36.62 299.386
36.45 305.503 36.49 317.719 37.01 336.053 36.9 342.161 36.61 366.602 36.58
378.818 36.23 391.034 36.16 415.476 36.37 421.584 36.01 427.701 35.02
433.809 34.72 439.917 34.62 446.025 34.67 452.143 34.57 458.251 34.33
470.467 34.3 476.575 34.09 482.692 34.32 494.908 34.04 513.241 33.92 519.349
33.32 525.457 33.02 531.565 33.29 537.673 33.27 549.899 33.79 556.007 34.19
568.232 33.65 574.34 33.5 586.556 33.58 592.664 33.47 611.045 33.5 629.519
33.25 635.674 33.36 647.993 33.25 654.148 33.3 660.303 33.2 666.468 33.44
672.623 32.86 691.097 32.28 709.571 32.27 715.726 32.03 721.881 31.57
734.201 31.11 740.356 31.14 746.52 30.99 752.675 31.01 758.83 31.18 771.149
31.12 777.304 30.69 789.624 30.43 795.779 30.12 801.934 29.99 814.253 29.49
820.408 28.85 826.563 28.4 832.727 27.71 845.037 27.3 851.202 26.61 857.357
26.26 869.676 26.21 881.986 25.8 900.46 25.76 906.615 26.18 912.78 26.46
918.935 26.25 925.09 25.18 931.254 24.45 943.564 23.89 949.719 23.03 955.883
21.27 962.039 19.34 968.193 16.89 971.924 15.33 988.641 5.98 993.405
4.141015.817 -.791029.349 -1.131047.701 -.711057.427 3.67 1064.174
8.591085.599 9.46 1095.71 15.391097.514 16.151103.669 18.08 1109.824
20.031115.979 21.541122.143 22.581128.298 23.251134.453 23.41 1140.618
231146.773 21.471152.928 21.261159.092 21.191165.247 21.08 1171.402
21.191177.557 21.21 1183.72 21.151189.876 21.581196.031 21.72 1202.196
20.831208.351 20.771214.506 21.051220.661 21.541226.825 22.35 1232.98
22.681239.135 22.731245.298 22.911251.454 23.371257.609 23.18 1263.774

23.311276.084 23.861282.239 24.411288.403 24.521294.558 22.87 1300.713
22.71306.878 22.81313.033 23.021319.188 23.441325.352 23.54 1331.507
23.551337.662 23.941343.817 23.931349.981 23.851356.136 23.86 1362.291
24.211368.457 24.53 1374.61 24.551380.766 24.91386.922 25.17 1393.085 25.22
1399.24 25.41405.395 25.621411.559 25.291417.714 25.87 1423.869 25.941430.034
25.541436.189 25.51448.499 25.671454.663 25.82 1460.818 25.681466.973
25.291473.137 24.871479.292 25.051485.447 25.25 1491.612 25.11497.767
25.331503.922 25.631516.241 26.181522.396 26.23 1528.551 26.31534.714 26.7
1540.87 27.281547.025 27.23 1553.18 27.42 1559.345 27.46 1565.5 27.351571.655
28.261577.819 27.321583.974 26.21 1590.129 26.291596.293 26.861602.448
26.481608.603 26.331620.923 27.95 1627.078 27.571633.233 27.791639.397
28.451645.552 28.51651.707 29.1 1657.871 29.491664.026 29.961670.182
30.11682.501 30.061688.656 30.73 1694.811 31.011700.975 30.76 1707.13
31.171713.285 31.02 1719.44 31.25 1725.604 31.68 1731.76 31.811744.079
32.641750.234 33.041756.389 33.67 1762.553 33.821768.708 34.381774.863
34.571781.018 34.141787.183 34.28 1793.338 34.611799.493 34.741805.657
35.131811.812 35.51817.967 35.82 1824.131 36.421830.286 36.961836.441
37.31842.596 37.551854.916 38.36 1861.071 38.94 1873.39 40.511879.545 41.21
1885.7 41.811891.864 42.12 1898.019 42.321910.339 42.911916.494 42.871922.649
42.761928.813 42.79 1934.968 43.021941.123 43.131947.278 43.131953.443
42.931959.598 43.12 1965.751 43.211984.227 43.711990.391 43.571996.546
43.572002.701 43.48 2015.021 43.62021.174 43.442027.329 43.342033.495 43.55
2039.65 43.6 2045.805 43.512051.969 43.722058.124 43.722064.279 43.462070.445
43.53 2076.6 43.412088.918 43.562095.073 43.732101.228 44.762107.392 44.93
2113.547 452119.702 44.832125.857 44.952132.022 45.022138.177 45.35 2144.332
46.912150.496 47.022156.651 46.912162.806 46.46 2168.97 46.42 2175.125 46.47
2181.28 46.352187.445 46.46 2193.6 46.372199.755 46.39 2205.91 46.392212.074
46.362218.229 46.492224.384 46.652230.548 46.65 2236.703 46.722242.858
46.832249.023 46.762255.178 46.752261.333 46.91 2267.497 47.132273.652
47.072279.807 47.062285.962 47.152292.125 46.9 2298.281 46.732304.438
46.72310.601 46.492316.756 46.42322.911 46.25 2329.075 46.22 2335.23
46.32341.385 46.46 2347.55 46.492353.705 46.57 2359.86 46.582366.015
46.522372.179 46.572384.489 46.62390.653 46.53 2396.808 46.622402.963
46.672415.282 46.72421.438 46.432427.602 46.12 2433.757 45.452439.912
45.122446.067 44.572452.231 44.692458.386 44.65 2464.541 44.8
 Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 918.935 .041134.453 .09

Bank Sta: Left Right Coeff Contr. Expan.
 918.9351134.453 .3 .4
Skew Angle = 20

Downstream Deck/Roadway Coordinates
 num= 9
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 800.618 33.83 966.004 31.45 1005.471 34.85 27.42 1086.285 34.19
26.681158.641 33.81 26.241195.289 29.58 1249.791 29.65 1306.173 29.89
1543.915 32.57

Downstream Bridge Cross Section Data
Station Elevation Data num= 320
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 29.52 6.136 29.57 12.263
29.59 24.535 29.66 30.662 29.88 36.798 30.29 42.935 30.34 49.061 30.26

55.198 30.32 61.334 30.42 67.47 31.1 73.597 31.67 79.733 31.46 85.869 31.45
91.996 31.61 98.132 31.65 104.268 31.73 110.395 31.56 116.531 31.98 122.667
32.23 128.794 31.81 141.067 32.08 147.203 32.14 153.33 32.54 159.466 32.45
165.602 32.32 177.865 32.53 184.001 32.35 190.128 32.3 196.264 32.55 202.4
32.78 208.527 32.67 214.663 32.67 220.8 32.65 226.926 32.27 233.063 32.49
239.199 32.49 245.335 32.71 251.462 32.63 257.598 32.69 263.734 32.67
269.861 32.46 275.997 32.47 282.133 32.45 288.26 32.22 294.396 32.15 300.533
32.22 306.659 32.36 312.795 32.56 318.932 32.54 325.058 32.37 331.195 32.06
337.331 32.42 343.467 32.64 349.594 33.22 355.73 33.57 361.866 34.39 367.993
36.29 374.129 37.64 380.265 37.8 386.392 38.13 392.528 38.1 398.665 38.27
404.791 38.47 410.928 38.7 417.064 38.47 423.191 38.16 429.327 38.29 435.463
38.49 447.726 38.6 453.862 38.51 459.998 38.25 466.125 38.24 472.261 38.33
478.398 38.28 484.524 38.14 490.661 38.21 496.797 38.31 502.923 38.18 509.06
38.14 515.196 38.21 521.323 38.19 527.459 37.91 533.595 37.7 539.731 37.64
545.858 37.52 558.13 37.38 564.257 37.21 570.393 37.1 576.53 36.82 582.656
36.66 588.793 36.42 594.929 36.12 607.192 36.33 613.328 36.09 619.455 35.74
625.591 35.46 631.727 35.24 637.863 35.13 650.126 34.83 656.263 34.64
662.389 35.67 668.526 36.5 674.662 37.58 680.789 37.12 686.925 37.01 693.061
37.04 699.188 36.64 705.324 36.04 711.46 35.96 717.587 35.76 723.723 35.39
729.859 35.23 735.995 35.2 742.122 35 748.258 34.97 754.395 34.88 760.521
34.81 772.794 33.57 778.921 33.62 785.057 33.63 791.193 33.21 797.32 33.26
803.456 32.87 809.592 32.51 815.719 32.19 821.855 32.03 827.991 31.5 834.128
31.18 840.254 30.9 846.391 30.72 852.527 30.48 858.654 30.08 864.79 29.71
870.926 29.23 877.053 28.42 883.189 28.02 889.325 27.55 895.452 27.28
901.588 26.92 907.724 26.31 913.851 26.15 919.987 26.15 926.123 26.23 932.25
25.7 938.385 25.52 944.523 25.55 950.659 25.37 956.786 25.08 962.941 28.11
969.105 29.16 975.26 28.79 981.415 28.63 987.57 27.99 993.734 26.14 999.889
24.091006.044 22.11016.522 17.581025.374 12.181031.519 10.78 1035.551
5.841043.256 2.81063.102 .71079.857 -.71098.322 .78 1110.012 5.411119.991
8.181130.929 9.1 1137.78 11.571141.501 13.14 1147.665 15.55 1153.82
18.251159.975 20.19 1166.13 21.61172.295 22.58 1178.45 22.711184.605
23.011203.079 23.131209.234 23.331215.389 23.69 1221.552 23.081227.708
22.881233.863 22.991240.017 24.811246.183 24.52 1252.338 23.831258.493
23.341270.803 23.541276.967 23.361283.122 23.97 1289.277 25.691295.432
25.761301.596 25.991326.226 26.41332.381 25.96 1338.536 26.4 1369.32
25.781375.484 25.79 1381.64 25.661387.793 25.11 1393.949 25.041400.114
25.121412.424 24.771424.734 24.081430.898 24.58 1437.053 24.421449.363
24.981455.526 24.711467.838 24.591486.312 25.35 1492.467 25.461504.786
24.811510.941 24.781517.096 25.361523.251 27.37 1529.415 27.55 1547.88
27.331554.045 27.79 1560.2 27.8 1572.51 27.31 1578.665 26.931584.829
26.691590.984 27.161597.139 27.161603.294 27.69 1609.458 28.521615.615
28.121621.768 28.391627.923 28.381640.243 28.71 1652.553 28.81664.872
29.21683.347 29.41695.656 29.841707.966 29.92 1720.286 30.321732.596 31.3
1738.76 32.09 1751.07 34.381757.225 35.17 1763.39 34.671769.545 35.27 1775.7
36.291788.019 36.811800.329 37.16 1806.484 37.491818.803 38.371824.958
38.651831.113 38.791849.588 39.9 1855.743 39.931868.062 40.441880.372
40.741892.691 41.331898.846 41.34 1911.156 41.961923.476 42.361929.631 42.45
1941.95 42.141960.415 41.84 1966.579 41.921978.889 42.391991.209
43.091997.364 43.232009.673 43.76 2015.829 43.752021.993 43.952028.148
43.872040.458 44.142046.621 43.72 2052.777 43.542071.252 43.412077.407
43.482083.562 43.82089.717 43.6 2108.191 44.162114.346 44.53 2120.51 44.72
2132.82 44.812138.975 44.52 2145.14 44.552151.295 44.87 2157.45
45.342188.234 45.782194.389 45.97 2200.553 45.822206.708 46.022219.018
45.782237.493 46.562255.967 45.89 2268.277 46.47 2274.44 46.382292.906

45.292305.226 45.142311.381 45.4 2329.855 47.232342.165 47.82354.485
48.92360.638 48.92366.793 48.3 2372.949 48.282379.114 48.482391.424
48.372397.579 48.552409.898 48.6 2428.372 49.242434.527 49.672440.682
49.872446.836 50.232453.002 50.74 2465.312 51.542471.467 51.82489.941
51.972496.096 51.822502.251 52.05 2508.415 51.972520.725 50.77 2526.88
50.372533.045 49.8 2551.51 50.09

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 981.415 .04 1178.45 .09

Bank Sta: Left Right Coeff Contr. Expan.
 981.415 1178.45 .5 .7
Skew Angle = 20

Upstream Embankment side slope = 0 horiz. to 1.0 vertical Downstream
Embankment side slope = 0 horiz. to 1.0 vertical Maximum allowable
submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Piers = 2

Pier Data
Pier Station Upstream= 992.315 Downstream=1053.395
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev 3.2 .1 3.2 6.9 3.2 22.5 3.2 30
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 3.2 .1 3.2 6.9 3.2 22.5 3.2 30

Pier Data
Pier Station Upstream=1059.034 Downstream=1112.596
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 3.2 .1 3.2 6.9 3.2 22.5 3.2 26.5
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 3.2 .1 3.2 6.9 3.2 22.5 3.2 26.5

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
 Energy
 W.S. Pro Method

 W.S.Pro Data
 Left Embankment
 El of the top of the embankment = 32
 El of the toe of the abutment = 6
 Right Embankment
 El of the top of the embankment = 32

```
 El of the toe of the abutment = 6  Abutment Type = 3 Sloping abutments and
sloping embankments  Slope of abutments = 4
 Top with of embankment = 175
 Centroid station of bridge opening =
 Wing Wall Type = No wing walls present
 Width =
 Angle =
 Radius =
 Guide Banks Type = No Guide Bank present
 Length =
 Offset =
 Angle =
 Optional Contraction and expansion coefficients
 At approach Section
 At Guide Bank
 At upstream outside
 At upstream inside (BU)
 At downstream inside (BD)
 Piers are Continuous for the width of the bridge
 Use Geometric mean as Friction Slope Method

Selected Low Flow Methods = W.S.Pro Method

High Flow Method
 Energy Only

Additional Bridge Parameters  Add Friction component to Momentum
 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION


RIVER: Taunton River
REACH: Main Stem RS: 65986.86

INPUT
Description: 61.3 DS Face 495
Station Elevation Data num= 320
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  0 29.52 6.136 29.57 12.263
29.59 24.535 29.66 30.662 29.88  36.798 30.29 42.935 30.34 49.061 30.26
55.198 30.32 61.334 30.42  67.47 31.1 73.597 31.67 79.733 31.46 85.869 31.45
91.996 31.61  98.132 31.65 104.268 31.73 110.395 31.56 116.531 31.98 122.667
32.23  128.794 31.81 141.067 32.08 147.203 32.14 153.33 32.54 159.466 32.45
165.602 32.32 177.865 32.53 184.001 32.35 190.128 32.3 196.264 32.55  202.4
32.78 208.527 32.67 214.663 32.67 220.8 32.65 226.926 32.27  233.063 32.49
239.199 32.49 245.335 32.71 251.462 32.63 257.598 32.69  263.734 32.67
269.861 32.46 275.997 32.47 282.133 32.45 288.26 32.22  294.396 32.15 300.533
32.22 306.659 32.36 312.795 32.56 318.932 32.54  325.058 32.37 331.195 32.06
337.331 32.42 343.467 32.64 349.594 33.22  355.73 33.57 361.866 34.39 367.993
36.29 374.129 37.64 380.265 37.8  386.392 38.13 392.528 38.1 398.665 38.27
404.791 38.47 410.928 38.7  417.064 38.47 423.191 38.16 429.327 38.29 435.463
```

38.49 447.726 38.6 453.862 38.51 459.998 38.25 466.125 38.24 472.261 38.33
478.398 38.28 484.524 38.14 490.661 38.21 496.797 38.31 502.923 38.18 509.06
38.14 515.196 38.21 521.323 38.19 527.459 37.91 533.595 37.7 539.731 37.64
545.858 37.52 558.13 37.38 564.257 37.21 570.393 37.1 576.53 36.82 582.656
36.66 588.793 36.42 594.929 36.12 607.192 36.33 613.328 36.09 619.455 35.74
625.591 35.46 631.727 35.24 637.863 35.13 650.126 34.83 656.263 34.64
662.389 35.67 668.526 36.5 674.662 37.58 680.789 37.12 686.925 37.01 693.061
37.04 699.188 36.64 705.324 36.04 711.46 35.96 717.587 35.76 723.723 35.39
729.859 35.23 735.995 35.2 742.122 35 748.258 34.97 754.395 34.88 760.521
34.81 772.794 33.57 778.921 33.62 785.057 33.63 791.193 33.21 797.32 33.26
803.456 32.87 809.592 32.51 815.719 32.19 821.855 32.03 827.991 31.5 834.128
31.18 840.254 30.9 846.391 30.72 852.527 30.48 858.654 30.08 864.79 29.71
870.926 29.23 877.053 28.42 883.189 28.02 889.325 27.55 895.452 27.28
901.588 26.92 907.724 26.31 913.851 26.15 919.987 26.15 926.123 26.23 932.25
25.7 938.385 25.52 944.523 25.55 950.659 25.37 956.786 25.08 962.941 28.11
969.105 29.16 975.26 28.79 981.415 28.63 987.57 27.99 993.734 26.14 999.889
24.091006.044 22.11016.522 17.581025.374 12.181031.519 10.78 1035.551
5.841043.256 2.81063.102 .71079.857 -.71098.322 .78 1110.012 5.411119.991
8.181130.929 9.1 1137.78 11.571141.501 13.14 1147.665 15.55 1153.82
18.251159.975 20.19 1166.13 21.61172.295 22.58 1178.45 22.711184.605
23.011203.079 23.131209.234 23.331215.389 23.69 1221.552 23.081227.708
22.881233.863 22.991240.017 24.811246.183 24.52 1252.338 23.831258.493
23.341270.803 23.541276.967 23.361283.122 23.97 1289.277 25.691295.432
25.761301.596 25.991326.226 26.41332.381 25.96 1338.536 26.4 1369.32
25.781375.484 25.79 1381.64 25.661387.793 25.11 1393.949 25.041400.114
25.121412.424 24.771424.734 24.081430.898 24.58 1437.053 24.421449.363
24.981455.526 24.711467.838 24.591486.312 25.35 1492.467 25.461504.786
24.811510.941 24.781517.096 25.361523.251 27.37 1529.415 27.55 1547.88
27.331554.045 27.79 1560.2 27.8 1572.51 27.31 1578.665 26.931584.829
26.691590.984 27.161597.139 27.161603.294 27.69 1609.458 28.521615.615
28.121621.768 28.391627.923 28.381640.243 28.71 1652.553 28.81664.872
29.21683.347 29.41695.656 29.841707.966 29.92 1720.286 30.321732.596 31.3
1738.76 32.09 1751.07 34.381757.225 35.17 1763.39 34.671769.545 35.27 1775.7
36.291788.019 36.811800.329 37.16 1806.484 37.491818.803 38.371824.958
38.651831.113 38.791849.588 39.9 1855.743 39.931868.062 40.441880.372
40.741892.691 41.331898.846 41.34 1911.156 41.961923.476 42.361929.631 42.45
1941.95 42.141960.415 41.84 1966.579 41.921978.889 42.391991.209
43.091997.364 43.232009.673 43.76 2015.829 43.752021.993 43.952028.148
43.872040.458 44.142046.621 43.72 2052.777 43.542071.252 43.412077.407
43.482083.562 43.82089.717 43.6 2108.191 44.162114.346 44.53 2120.51 44.72
2132.82 44.812138.975 44.52 2145.14 44.552151.295 44.87 2157.45
45.342188.234 45.782194.389 45.97 2200.553 45.822206.708 46.022219.018
45.782237.493 46.562255.967 45.89 2268.277 46.47 2274.44 46.382292.906
45.292305.226 45.142311.381 45.4 2329.855 47.232342.165 47.82354.485
48.92360.638 48.92366.793 48.3 2372.949 48.282379.114 48.482391.424
48.372397.579 48.552409.898 48.6 2428.372 49.242434.527 49.672440.682
49.872446.836 50.232453.002 50.74 2465.312 51.542471.467 51.82489.941
51.972496.096 51.822502.251 52.05 2508.415 51.972520.725 50.77 2526.88
50.372533.045 49.8 2551.51 50.09

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val 0 .09 981.415 .04 1178.45 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 981.415

1178.45 60.77 66.17 74.2 .5 .7 Skew Angle = 20

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 65920.69

INPUT
Description: 61 Exit 495
Station Elevation Data num= 221
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 31.14 19.65 31.17 26.2 31.36
32.75 31.72 78.6 31.9 85.15 31.83 91.7 31.59 124.44 31.5 137.54 31.8 150.64
31.8 157.19 31.95 163.74 31.94 170.29 31.78 196.49 31.96 209.59 31.97
229.24 32.5 235.79 32.89 242.34 32.54 255.44 31.49 261.99 31.87 275.09 31.75
288.18 31.24 301.28 31.02 307.83 31.06 314.38 30.68 340.58 29.86 353.68
29.06 360.23 29.02 373.33 29.4 379.88 29.73 392.98 30.12 399.53 30.21 412.63
30.02 445.38 30.32 458.48 30.24 465.02 30.08 484.67 30.06 497.77 29.27
510.87 28.84 517.42 28.51 523.97 28 530.52 28.04 543.62 27.43 550.17 27.32
576.37 27.44 582.92 27.28 589.47 26.9 609.12 26.08 615.67 26 622.22 26.28
628.77 26.24 648.42 25.24 668.06 24.75 681.16 24.13 694.26 23.89 713.91
23.16 727.01 23.39 733.56 23.24 785.96 21.12 805.61 21.09 825.26 20.33
838.36 19.41 864.55 18.01 877.65 17.61 890.75 16.77 903.85 14.99 916.95 13.9
930.02 13.98 943.06 13.46 956.1 14.3 962.62 14.25 969.14 14.02 982.18 13.83
988.7 14.06 995.22 14.06 1001.74 14.38 1008.26 14.94 1014.78 15.33 1021.3
15.11 1027.82 15.03 1034.34 15.13 1053.9 16.14 1060.42 16.22 1066.94 15.71
1073.46 14.45 1079.98 11.16 1081.05 10.73 1082.27 7.26 1092.91 .4 1107.2
-.43 1123.95 -2.05 1137.61 -1.24 1152.42 -.93 1164.7 3.04 1174.49 6.25 1187
10.48 1190.83 11.26 1203.87 13.38 1210.39 14.26 1216.91 14.63 1223.43 14.77
1229.95 15.07 1242.99 15.04 1249.51 14.62 1256.03 14.57 1262.55 15.69
1269.07 17.97 1275.59 19.23 1282.11 19.68 1288.63 19.57 1295.15 18.94
1308.22 18.11 1327.87 18.47 1340.97 16.97 1347.52 16.5 1367.18 15.81 1380.28
15.65 1386.83 15.88 1393.38 16.5 1399.93 16.88 1406.48 17.07 1413.03 17.78
1426.14 18.6 1432.69 18.79 1445.79 18.45 1452.34 18.64 1465.44 20.95 1471.99
21.64 1478.54 21.93 1491.64 21.49 1498.2 20.24 1504.75 20.09 1511.3 19.67
1517.85 19.77 1530.95 20.53 1537.5 20.06 1544.05 19.98 1557.15 21.16 1563.7
21.47 1583.36 21.69 1589.91 22.66 1596.46 23.44 1603.01 23.93 1616.11 24.38
1642.32 23.97 1655.42 24.13 1681.62 23.32 1694.72 23.73 1701.27 24.05
1714.38 25.31 1720.93 26.81 1727.48 27.87 1734.03 29.14 1740.58 30.25
1747.13 31.21 1753.68 31.64 1760.23 33.2 1773.33 35.2 1786.44 36.52 1792.99
37.44 1799.54 37.95 1812.64 38.32 1819.19 38.37 1838.84 38.92 1845.39 38.84
1865.05 39.22 1878.15 39.71 1891.25 41.07 1897.8 40.76 1904.35 39.72 1910.9
39.35 1924 39.61 1950.21 39.26 1969.86 39.82 1982.96 39.27 1996.06 39.16
2002.62 39.36 2015.72 39.49 2048.47 39.42 2055.02 39.52 2061.57 39.91
2068.12 40.07 2081.23 40.04 2100.88 40.5 2107.43 40.48 2113.98 40.09 2120.53
39.9 2140.18 40.15 2146.73 40 2153.28 39.67 2199.14 38.75 2212.24 38.77
2218.79 38.96 2225.34 39.76 2238.45 42.08 2251.55 45.2 2258.1 45.98 2277.75
46.83 2284.3 47.3 2297.4 47.16 2317.06 49.09 2323.61 50.24 2330.16 49.75
2336.71 49.08 2343.26 48.85 2362.91 49.12 2376.01 49.17 2389.12 48.77
2395.67 48.84 2408.77 48.66 2415.32 49.24 2421.87 48.93 2428.42 48.76
2434.97 48.75 2441.52 49.07 2461.18 48.95 2467.73 48.76 2474.28 48.77
2480.83 49.44 2487.38 49.84 2493.93 50.05

Manning's n Values num= 3

```
 Sta n Val Sta n Val Sta n Val
 0 .09 1060.42 .04 1282.11 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  1060.42
1282.11 1486.1 1501.44 1534.95 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 1282 2493.93 29.5 T

CROSS SECTION


RIVER: Taunton River
REACH: Main Stem RS: 64419.25

INPUT
Description: 60
Station Elevation Data num= 202
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  0 25.23 13.03 24.69 19.55
24.58 39.1 24.71 52.13 24.36  58.65 24.32 65.16 24.44 71.68 24.14 84.71 23.94
91.23 23.47  97.75 23.22 104.26 23.46 110.78 23.84 117.29 24 169.43 23.65
182.46 24.02 188.97 24.35 202.01 24.46 215.04 24.84 234.59 25.68  241.11
26.08 247.62 26.11 254.14 25.96 260.65 25.48 267.17 24.26  273.69 24.11
364.92 24.13 371.43 24.21 377.95 24.71 384.46 25.43  390.98 25.96 397.5 26.15
423.56 25.71 430.08 25.43 443.11 25.09  449.63 24.81 456.14 24.68 462.66
24.29 475.69 24.04 501.76 22.85  527.82 21.19 547.37 20.39 560.41 20.12
566.92 19.85 573.44 19.74  579.96 19.83 592.99 19.32 606.02 19.15 612.54
18.95 619.05 18.53  625.57 18.26 645.12 17.88 651.64 17.63 658.15 17.03
664.67 16.78  671.18 16.34 710.28 15.77 723.32 15.79 729.83 15.91 736.35
15.86  742.86 15.33 755.9 15.52 762.41 15.39 768.93 16.01 788.48 17.32
801.51 17.46 814.54 17.29 834.13 16.73 840.69 16.73 847.24 16.96  860.35
17.04 866.91 17.32 880.02 17.25 886.57 16.94 893.13 17.09  919.35 17.11
932.46 16.85 939.01 16.87 965.23 17.54 971.78 17.62  984.89 18.18 991.45
18.02 1011.11 16.92 1017.67 16.39 1024.22 16.05  1030.78 16.25 1037.33 16.31
1050.44 15.84 1057 15.33 1063.55 14.54  1070.11 13.44 1076.66 12.52 1083.22
12.1 1089.77 12.11 1102.88 11.59  1109.44 11.69 1122.55 12.43 1129.1 12.25
1135.66 11.78 1148.76 11.35  1155.32 11.32 1168.43 11.71 1181.54 12.51
1194.65 14.06 1207.76 15.1  1214.31 15.43 1233.98 15.46 1247.09 16.2 1253.64
16.4 1266.75 16.36  1273.31 16.24 1279.86 15.45 1286.42 13.36 1292.97 11.1
1299.53 8.11  1301.73 8.11 1304 6.6 1325 3.3 1350 1.2 1375 1.1  1396 7.1
1403.54 11.73 1404.4 11.85 1410.96 13.04 1417.51 16.02  1424.07 17.99 1430.62
18.96 1437.18 19.15 1443.73 18.7 1450.29 18.54  1463.4 19.23 1469.95 19.29
1476.51 19.57 1483.06 19.59 1496.17 20.58  1502.73 20.58 1515.84 19.78
1522.39 19.66 1528.95 20.8 1535.5 22.34  1542.06 22.8 1555.16 22.86 1587.94
22.45 1601.05 22.66 1607.6 22.54  1614.16 22.21 1620.71 22.06 1640.38 21.97
1679.71 21.33 1686.26 21.35  1699.37 22.21 1712.48 23.33 1725.59 24.76 1738.7
25.69 1745.26 25.96  1804.25 26.46 1810.8 26.34 1817.36 26.37 1823.91 26.25
1830.47 26.35  1837.02 26.23 1843.58 26.37 1850.13 26.13 1856.69 25.24
1863.24 24.88  1876.35 24.71 1889.46 24.19 1915.68 24.28 1935.32 24.5 1954.91
24.3  1967.97 24.41 1987.56 24.4 2000.61 24.12 2033.26 24.2 2046.32 23.99
2059.38 24.2 2078.97 24.02 2111.62 23.86 2124.67 23.93 2157.32 23.55  2203.03
23.87 2229.15 24.8 2255.26 25 2294.44 25.88 2307.5 25.91  2340.15 26.42
2353.2 26.79 2372.79 27.93 2392.38 28.11 2398.91 28.04  2411.97 28.72 2425.03
29.71 2444.62 30.32 2477.26 30.89 2483.79 30.88  2503.38 31.76 2509.91 31.96
2516.44 32.39 2522.97 32.58 2536.03 32.37  2542.56 32.64 2562.15 32.62
```

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 1273.31 .04 1437.18 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1273.31 1437.18 1895.09 1994.8 2138.57 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 62424.45

INPUT
Description: 59
Station Elevation Data num= 351
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 27.99 6.56 27.54 32.8 26.7 45.92 25.99 52.48 25.52 59.04 25.48 65.6 25.97 72.16 27 78.72 27.44 85.28 27.65 104.97 27.77 118.09 26.87 124.65 26.63 131.21 25.94 137.77 24.86 144.33 24.07 150.89 23.75 157.45 23.59 164.01 24.01 170.57 24.28 183.69 24.54 196.81 25.28 216.49 25.45 223.05 25.23 236.17 24.57 249.29 24.3 268.97 23.64 282.1 23.5 288.66 23.31 295.22 23.33 308.34 23.56 328.02 23.19 347.7 22.52 354.26 22.64 360.82 22.33 367.38 22.37 380.5 22.11 393.62 21.38 400.18 21.5 413.3 20.41 426.42 19.94 439.54 19.86 446.1 19.72 452.66 19.2 459.22 18.3 472.34 15.74 478.91 15.39 485.47 15.19 492.03 14.72 498.59 14.63 505.15 14.94 524.83 15.05 531.39 15.21 537.95 15.6 551.07 15.28 564.19 14.59 570.75 14.41 583.87 14.5 590.43 14.29 610.11 14.14 623.23 14.18 636.35 13.86 649.47 13.96 656.03 14.12 662.59 14.42 675.72 15.85 682.28 16.25 695.4 16.52 701.96 16.54 708.52 16.41 715.08 16.52 728.2 15.99 741.32 16.09 747.88 15.86 761 14.61 774.12 14.66 780.68 14.52 787.24 14.21 793.8 13.63 800.36 12.89 806.92 12 813.48 11.26 820.04 10.87 826.6 10.33 833.16 10.32 839.72 11.9 846.28 12.02 852.85 11.76 859.41 11.23 865.97 10.85 872.53 10.76 879.09 11.01 885.65 11.06 898.77 10.95 905.33 10.71 918.45 10.51 925.01 10.24 938.13 10.44 957.81 10.4 964.37 10.68 970.93 11.21 977.49 11.58 984.05 11.74 997.17 11.69 1003.73 11.92 1016.85 11.45 1023.41 11.69 1029.97 12.19 1036.54 12.3 1043.1 12.09 1049.66 12.15 1056.22 12.02 1062.78 12.14 1069.34 11.95 1075.9 11.57 1082.46 11.44 1089.02 11.5 1102.14 11.44 1108.7 11.67 1115.23 12.12 1121.77 12.85 1128.3 13.16 1134.83 13.31 1141.37 13.16 1147.9 12.73 1154.44 12.69 1160.97 12.19 1167.5 11.55 1180.57 10.79 1187.11 10.72 1200.17 11.17 1232.84 11.76 1239.38 11.32 1245.91 11.09 1252.45 11.52 1258.98 11.6 1265.51 11.32 1272.05 10.78 1278.58 10.5 1304.72 10.68 1311.25 10.96 1317.78 11.64 1324.32 11.97 1330.85 12.14 1343.92 12.21 1356.99 12.65 1370.06 13.48 1376.59 13.23 1383.12 12.68 1396.19 12.05 1402.73 11.55 1409.26 11.92 1415.79 12.56 1422.33 12.45 1428.86 11.99 1435.4 11.18 1448.46 9.78 1455 9.48 1461.53 9.49 1474.6 9.1 1481.13 9.27 1487.67 9.61 1494.2 10.27 1507.27 11 1513.8 11.53 1539.94 12.92 1546.47 13.02 1553.01 12.76 1566.07 12.42 1572.61 11.91 1579.14 12.02 1585.68 11.89 1592.21 11.92 1598.74 12.12 1605.28 12.48 1618.35 13.48 1624.88 13.69 1631.41 13.68 1637.95 13.51 1639.32 13.35 1644.48 12.75 1651.02 12.06 1657.55 11.76 1670.62 11.55 1677.15 10.45 1683.69 9.17 1692 6.3 1710 1.7 1725 .3 1740 1.6 1758 6.8 1781.7 15.19 1788.23 16.67 1792.5 16.43 1794.76 16.31 1801.3 16.06 1807.83 15.53 1814.36 15.31 1820.9 15.6 1827.43 15.62 1833.97 15.42 1847.03 15.32 1860.1 14.89 1873.17 14.76 1879.7 14.55 1886.23 14.14 1892.76 13.97 1905.83 13.93 1912.36 14.42 1931.96 15.19 1938.49 15.33 1945.02 15.22 1964.62 15.48

1971.15 15.46 1984.21 15.9 2003.81 16.09 2010.34 16.29 2016.88 16.26 2023.41 16.48 2062.6 16.89 2075.67 17.22 2082.2 17.61 2095.26 18 2101.79 17.9 2121.39 18.14 2127.92 18.37 2140.99 18.55 2147.52 18.87 2154.05 19.43 2180.18 20.79 2199.78 21.21 2219.37 21.36 2271.63 22.61 2284.7 22.66 2317.36 23.48 2330.42 24.41 2343.49 24.61 2356.55 24.09 2376.15 23.78 2395.74 24.17 2402.28 24.48 2415.34 24.65 2421.87 24.57 2448 24.56 2480.66 25.2 2487.2 24.71 2500.26 24.74 2519.86 24.05 2526.39 24.02 2532.92 24.16 2545.99 23.86 2552.52 23.81 2565.58 23.27 2572.11 24.11 2591.71 24.45 2598.24 24.68 2611.31 24.34 2617.84 24.31 2637.44 23.9 2663.62 24.07 2670.17 23.68 2676.71 23.53 2702.9 23.69 2709.45 23.89 2729.08 24.9 2735.63 25.12 2748.72 25.16 2761.82 25.58 2781.46 25.01 2807.64 24.82 2814.19 24.94 2820.73 24.68 2827.28 24.16 2840.37 24.14 2853.47 25.92 2879.65 26.88 2892.74 26.37 2899.29 26.23 2905.84 25.94 2918.93 24.95 2925.47 24.34 2938.57 23.65 2945.11 23.69 2951.66 25.34 2958.21 26.41 2977.85 26.87 2984.39 26.76 2997.48 26.32 3004.03 26.2 3023.67 26.48 3036.76 26.34 3043.31 26.99 3049.85 28.02 3069.49 31.7 3076.04 32.68 3082.59 33.13 3095.68 33.32 3115.32 33.17 3134.96 32.54 3141.5 32.17 3154.6 30.88 3161.14 30.09 3167.69 29.47 3174.24 29.2 3206.97 29.24 3213.51 29.63 3239.7 32.38 3252.79 33.41 3265.88 34.15 3272.43 34.41 3278.98 34.51 3285.52 34.42 3292.07 34.16 3298.62 33.72 3305.16 33.48 3318.25 33.72 3324.8 33.7 3337.89 33.86 3350.99 33.44 3357.53 33.38 3370.62 33.68 3383.72 34.26 3390.26 34.41 3403.36 34.36 3409.9 34.55 3423 34.57 3429.54 34.47 3436.09 34.54 3455.73 34.11 3462.27 33.75 3468.82 33.56 3488.46 33.64 3495.01 33.89 3508.1 35.01 3514.64 35.32 3521.19 35.45 3534.28 35.41 3547.38 35.1 3560.47 34.43 3573.56 34.43 3593.2 33.97 3599.75 33.91 3606.29 33.99 3619.39 34.68 3625.93 34.77 3639.02 33.02 3645.57 32.25 3652.12 31.74 3658.66 32.11 3671.76 31.7 3691.39 31.5

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .093 1631.41 .04 1792.5 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1631.41 1792.5 2215.34 2110.96 2048.7 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 60313.49

INPUT
Description: 58 Station Elevation Data num= 209
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 50.49 6.56 50.2 19.67 49.91 39.34 49.12 85.23 45.95 98.35 44.53 104.9 43.93 124.57 42.94 131.13 42.75 144.24 41.68 150.8 41.59 170.46 40.92 177.02 40.47 190.13 40.65 196.69 40.09 203.25 39.38 209.8 38.82 216.36 38.53 229.47 38.47 236.03 38.29 249.14 38.18 262.25 37.19 275.37 36.66 288.48 35.32 301.59 34.67 314.7 33.53 340.93 32.09 354.04 31 360.6 30.98 380.27 28.73 386.82 28.14 393.38 27.92 399.94 27.42 406.49 26.6 413.05 25.26 432.72 22.43 439.27 21.01 445.83 19.83 458.94 18.46 478.61 18.19 485.17 18.27 498.28 16.99 511.39 15.38 517.95 14.73 531.06 13.7 544.18 12.12 550.43 10.33 560 6.8 585 4.1 610 2 635 3.2 660 6.9 662.06 8.08 662.19 8.09 668.75 10.13 675.3 12.76 681.86 14.55 688.42 15.17 708.08 14.97 714.64 14.66 727.75 13.78 734.31 13.06 753.98 12.11 760.54 12.02 780.2 12.65 786.76 13.19 799.87 13.54 806.43 14.08 826.1 15.01 839.21 15 852.32 14.56

865.44 14.61 878.55 14.35 898.22 14.37 904.77 14.49 911.33 14.23 924.44 13.04 931 12.33 944.11 12.15 957.22 12.2 963.78 12.1 970.34 12.22 976.89 12.66 983.45 14.68 990.01 16.06 996.56 16.74 1009.68 17.28 1029.34 17.35 1049.01 17.64 1081.8 17.53 1088.35 17.65 1140.8 16.28 1153.91 16.11 1173.58 15.35 1199.81 14.11 1219.48 13.53 1239.15 13.38 1258.82 13.63 1278.48 14.44 1285.04 15.19 1298.15 16.24 1317.82 16.94 1330.94 17.7 1337.49 17.87 1363.72 17.51 1370.27 17.75 1383.39 17.78 1429.28 18.58 1442.39 19.09 1501.4 20.54 1553.85 20.84 1560.41 20.74 1573.52 21.08 1586.63 21.16 1606.3 21.86 1612.86 22.21 1619.41 22.09 1632.53 22.66 1658.75 22.61 1665.31 22.76 1671.87 22.32 1678.42 22.5 1691.53 23.22 1698.09 23.36 1711.2 24.14 1717.76 24.18 1743.98 24.65 1757.1 24.57 1776.77 25 1789.88 25.11 1796.44 25.04 1802.97 24.47 1809.5 24.15 1816.04 24.26 1822.57 24.01 1848.71 24.51 1861.78 26.04 1868.31 25.86 1881.38 24.3 1887.92 23.86 1894.45 23.83 1907.52 24.04 1920.59 24.4 1927.12 24.41 1953.26 23.89 1966.33 24.01 1972.87 23.57 1985.93 23.21 1999 23.27 2031.68 24.19 2038.21 23.85 2064.35 24.25 2090.49 24.13 2097.02 24.48 2103.55 24.64 2116.62 24.33 2129.69 24.96 2136.23 24.78 2142.76 24.45 2155.83 24.17 2168.9 23.42 2175.43 23.39 2214.64 24.41 2221.18 24.48 2234.24 24.08 2240.78 24.15 2253.85 24.97 2260.38 25.22 2273.45 25.12 2286.52 25.72 2293.05 25.8 2299.59 25.7 2306.12 26.16 2312.66 26.94 2319.19 27.96 2325.73 28.48 2338.8 28.92 2345.33 29.02 2358.4 28.78 2423.74 29.26 2436.81 29.09 2476.02 29.71 2482.55 29.72 2495.62 29.46 2515.23 28.59 2534.83 27.41 2567.5 27.19 2600.18 27.82 2619.78 27.82 2626.31 27.95 2645.92 28.08 2672.05 28.42 2685.12 28.8 2711.26 29.23 2717.8 29.46 2724.33 29.83 2730.87 29.94 2737.4 29.35 2743.93 28.97 2763.54 28.83 2770.07 28.89 2783.14 28.81 2815.81 29.58 2828.88 29.59 2848.49 30.03 2861.56 30.84 2868.09 31.1 2907.3 31.09 2913.83 31

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .087 485.17 .04 688.42 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 485.17 688.42 1181.48 1167.23 1157.27 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 59146.26

INPUT
Description: 57 Station Elevation Data num= 352
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 30.38 6.55 30.37 13.09 30.15 19.64 29.5 72 28.42 78.55 28.6 91.64 29.19 117.82 29.27 130.91 29.45 144 29.25 157.09 29.38 163.64 29.32 176.73 29.57 189.82 29.56 196.37 29.45 209.46 28.97 229.1 28.71 248.73 29.28 281.46 29.59 294.55 30 301.1 30.06 327.28 29.11 333.83 28.97 340.37 29.17 346.92 29.23 353.46 28.98 366.55 28.95 379.65 28.58 392.74 28.1 412.37 27.88 432.01 26.97 438.56 26.96 471.28 27.72 490.92 27.8 497.47 27.66 504.01 27.05 510.56 26.58 523.65 26.32 543.29 26.49 556.38 26.26 569.47 25.56 582.56 25.96 595.65 25.8 602.2 25.4 608.74 24.84 615.29 24.5 621.83 24.45 628.38 24.22 634.93 23.35 641.47 21.81 648.02 19.61 661.11 13.71 667.65 11.97 672.5 11.36 676 12.1 687 5.9 705 2.8 730 1.4 755 2.9 773 6.2 780 11.2 788.42 11.88 798.57 11.67 805.11 11.9 818.2 13 824.75 13.19 831.29 13.7 837.84 14.61 844.39 15.06 850.93 14.98 864.02

14.28 870.57 14.31 896.75 12.78 909.84 12.35 922.93 11.62 929.48 11.88
936.02 12.31 942.57 12.48 955.66 12.3 975.3 12.25 988.39 11.9 994.93 11.61
1001.48 11.17 1008.03 11.01 1021.12 11.15 1027.66 11.07 1040.75 11.35
1060.39 11.31 1073.48 11.38 1080.03 11.22 1086.57 11.25 1099.66 11.64
1125.85 11.2 1132.39 11.39 1158.58 10.98 1165.12 11.09 1171.67 11.42 1178.21
12.19 1184.76 14.1 1191.3 15.65 1197.85 16.39 1204.39 16.29 1210.94 15.9
1217.49 15.36 1224.03 15.3 1237.12 15.97 1250.21 16.13 1256.76 16.33 1269.85
16.47 1276.4 16.77 1282.94 16.71 1289.49 15.93 1296.03 15.57 1309.12 15.66
1315.67 15.83 1335.31 15.57 1348.4 14.58 1354.94 14.31 1368.03 14.56 1374.58
14.88 1381.13 14.98 1387.67 14.54 1394.22 13.56 1400.76 13.2 1407.31 13.11
1413.85 12.6 1420.4 12.5 1433.49 12.53 1440.04 12.66 1446.58 12.99 1459.67
12.94 1479.31 13.39 1485.86 13.69 1492.4 14.53 1498.95 14.6 1505.49 14.91
1512.04 14.55 1518.58 13.9 1525.13 13.71 1538.22 13.77 1557.86 13.54 1564.4
13.73 1570.95 13.56 1577.49 13.15 1584.04 13.09 1590.59 13.25 1597.13 13.65
1610.22 15.13 1636.41 16.91 1649.5 18.34 1656.04 18.91 1669.13 20.3 1675.68
20.89 1688.77 21.37 1701.86 21.58 1708.41 21.84 1721.5 21.94 1734.59 22.27
1747.68 22.08 1754.23 21.6 1760.77 20.87 1773.86 20.5 1780.41 21.75 1786.95
22.25 1806.59 22.94 1813.14 22.39 1826.23 21.65 1832.77 21.16 1845.87 20.48
1852.41 20.25 1865.5 20.13 1872.05 20.3 1878.59 20.15 1891.68 20.31 1898.23
20.28 1911.32 21.48 1917.87 22.35 1924.41 22.76 1930.96 22.69 1937.5 22.46
1944.05 22.08 1950.6 21.5 1957.14 20.68 1976.78 20.67 1983.32 20.53 1989.87
20.24 2002.96 19.9 2009.51 20.06 2022.6 20.07 2029.14 20.3 2035.69 20.29
2042.23 20.57 2048.78 20.46 2055.33 20.5 2068.42 21.28 2074.96 21.95 2081.51
22.87 2088.05 23.34 2101.14 23.97 2120.79 23.97 2133.88 23.64 2140.43 23.81
2160.07 24.92 2166.62 25.07 2179.71 25.18 2186.26 25.35 2199.35 25.02
2212.45 24.33 2225.54 24.11 2238.63 23.58 2251.73 23.33 2258.28 23.56
2271.37 24.81 2277.92 25.03 2284.46 24.94 2297.56 25.17 2304.11 24.53
2310.65 24.59 2323.75 25.13 2330.29 25.24 2336.84 25.52 2343.39 25.29
2369.58 25.34 2376.12 25.5 2389.22 25.42 2402.31 24.5 2408.86 24.15 2421.95
24.67 2435.05 24.3 2448.14 24.1 2454.69 23.5 2461.24 23.19 2467.78 23.15
2474.33 22.79 2480.88 23.28 2487.43 23.5 2500.52 23.01 2507.07 23.14 2513.61
23 2526.71 23.11 2533.26 23.35 2539.8 23.4 2552.9 23.06 2559.44 23.04
2572.54 22.77 2585.63 23.06 2592.18 23.46 2624.92 24.09 2644.56 24.03 2651.1
24.21 2657.65 24.59 2664.2 24.78 2670.75 24.63 2683.84 24.93 2690.39 25.25
2696.93 25.36 2703.48 25.62 2710.03 25.58 2723.12 26.12 2729.67 26.51
2742.76 26.71 2755.86 27.48 2762.41 27.56 2782.05 27.56 2788.59 27.78
2827.88 27.21 2834.42 27.28 2847.52 27.66 2867.16 27.67 2873.71 27.55 2886.8
27.55 2899.9 27.79 2906.44 28.05 2912.99 28.07 2919.54 28.25 2926.08 28.07
2945.73 28.42 2952.27 28.63 2958.82 28.67 2965.37 28.46 2991.55 28.6 2998.1
29.06 3011.2 29.01 3024.29 29.13 3043.93 29.74 3050.48 30.13 3063.57 30.53
3070.12 30.41 3076.67 30.03 3083.21 29.85 3102.86 29.63 3122.5 29.82 3129.04
29.76 3135.59 29.52 3142.14 29.46 3155.23 29.77 3161.78 29.49 3174.87 29.97
3181.42 29.9 3201.06 30.38 3207.61 30.31 3214.16 30.38 3227.25 30.75 3240.35
30.84 3246.89 31.14 3259.99 31.34 3266.53 31.54 3273.08 31.58 3299.27 31.5
3305.82 31.74 3312.36 31.72 3325.46 32.02 3332.01 31.56 3345.1 31.63 3351.65
31.8 3358.19 31.55 3390.93 31.72 3397.48 32.33 3404.02 32.61 3410.57 32.64
3423.67 32.14 3430.21 32.22 3436.76 32.55 3449.85 32.55 3476.04 33.17
3508.78 33.53 3521.87 33.82 3534.97 33.93 3561.16 33.75 3580.8 33.99 3587.34
34.27 3593.89 34.27 3600.44 33.91 3606.99 34.04 3613.53 34.44 3620.08 34.59
3633.17 34.49 3646.27 34.67 3652.82 34.98 3659.36 35.1 3672.46 35.6 3685.55
35.9 3698.65 35.9 3711.74 35.52 3731.38 35.46 3737.93 35.71 3764.12 35.8
3777.21 35.69 3783.76 35.53 3790.31 35.19 3796.85 34.99 3809.95 35.17

Manning's n Values num= 3 Sta n Val Sta n Val Sta n Val

0 .09 628.38 .04 844.39 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 628.38 844.39 1379 1332.76 1299.32 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 57813.5

INPUT
Description: 56
Station Elevation Data num= 496
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 43.13 6.54 43.26 32.72 39.61 78.54 36.66 91.62 35.41 183.25 34.94 222.52 35.22 229.06 34.56 242.15 35.1 268.33 34.86 281.42 34.12 294.51 34.02 320.69 34.71 333.77 34.16 346.86 34.39 353.41 34.03 373.04 34.42 386.13 35.15 471.21 36.13 503.93 35.41 517.02 35.64 536.66 35.25 647.91 35.54 706.82 36.44 726.45 37.27 765.72 36.22 778.81 35.19 804.98 35.11 831.19 34.52 837.75 33.91 890.24 32.38 903.36 32.57 923.04 31.64 995.2 31.1 1093.6 28.7 1211.68 29.31 1251.05 27.9 1277.29 27.79 1329.77 28.38 1369.13 29.42 1401.93 30.88 1474.09 30.68 1500.33 30.07 1520.01 29.06 1592.17 27.17 1618.42 27.51 1690.58 29.28 1697.14 30.01 1729.94 29.18 1769.3 27.32 1808.66 27.05 1828.34 25.78 1854.58 23.59 1874.26 22.67 1900.5 20.87 1907.06 20.76 1913.62 19.75 1920.18 18.28 1926.74 16.16 1933.3 13.62 1939.86 11.97 1946.42 11.1 1952.98 11.28 1972.67 10.35 1998.91 9.78 2012.03 10.08 2025.15 9.77 2038.27 10.05 2057.95 9.81 2071.07 10.47 2090.75 10.26 2110.43 9.1 2123.55 9.51 2136.67 8.92 2143.23 8.98 2156.35 10.17 2176.03 10.44 2189.15 9.71 2208.83 10.76 2215.4 10.74 2241.64 11.97 2254.76 13.65 2258.7 13.87 2266 13 2271 6.1 2305 .2 2306 -2.5 2355 -.5 2369 5.8 2387 16.1 2430 16.2 2461 16.2 2489 10.4 2510.61 10.24 2517.17 10.49 2523.73 11.01 2530.29 11.1 2536.85 11.21 2543.41 11.43 2549.97 11.51 2556.53 11.77 2563.09 12.47 2569.65 13 2576.21 13.03 2582.77 12.92 2595.89 12.24 2609.01 11.27 2615.57 10.96 2622.13 10.93 2628.69 11.21 2635.25 11.43 2641.81 11.71 2648.38 11.97 2654.94 12.15 2661.5 12.18 2668.06 12.18 2674.62 12.06 2687.74 11.69 2694.3 11.55 2700.86 11.44 2707.42 11.41 2713.98 10.92 2720.54 10.81 2733.66 10.78 2740.22 10.85 2746.78 10.85 2753.34 10.78 2759.9 10.74 2766.45 10.87 2773.01 11.04 2779.57 10.89 2786.12 10.99 2792.68 11.04 2799.23 10.98 2805.79 10.99 2812.35 10.87 2818.9 11.04 2825.46 11.11 2832.02 11.03 2838.57 11.08 2845.13 11.3 2851.68 11.4 2858.24 11.61 2864.8 11.66 2871.35 11.58 2877.91 11.54 2884.47 11.53 2891.02 11.68 2904.14 12.87 2910.69 13.14 2917.25 13.61 2923.8 13.82 2930.36 13.73 2936.92 13.59 2943.47 13.28 2950.03 13.46 2956.59 13.68 2963.14 13.67 2969.7 13.82 2976.26 14.17 2982.81 14.17 2989.37 14.34 2995.92 14.79 3002.48 15.54 3009.04 16.31 3015.59 16.96 3022.15 17.69 3028.71 18.25 3035.26 18.43 3041.82 18.4 3048.37 18.61 3054.93 18.5 3061.49 18.34 3068.04 18.34 3074.6 18.19 3081.16 18.31 3087.71 18.3 3094.27 18.07 3100.83 18.16 3107.38 17.95 3113.94 17.54 3120.49 17.66 3127.05 17.82 3133.61 17.61 3146.72 17.43 3153.28 17.37 3159.83 17.58 3166.39 17.91 3172.94 17.64 3179.5 17.39 3186.06 17.29 3192.61 17.64 3199.17 17.53 3205.73 17.31 3212.28 16.87 3218.84 16.54 3225.4 16.6 3231.95 16.47 3238.51 16.21 3245.06 16.18 3251.62 16.42 3258.18 16.45 3264.73 16.42 3271.29 16.23 3277.85 16.07 3284.4 15.73 3290.96 15.53 3297.52 15.4 3304.07 15.39 3310.63 15.35 3317.18 15.24 3323.74 15.74 3330.3 15.72 3336.85 15.88 3343.41 16.07 3349.97 16.01 3363.08 16.02 3369.63 16.21

3376.19 16.27 3382.75 16.45 3389.3 16.75 3395.86 17.28 3402.42 17.79 3408.97
17.94 3415.53 18.07 3422.09 18.65 3428.64 19.25 3435.2 19.37 3441.75 19.32
3448.31 19.41 3454.87 19.68 3461.42 20.1 3467.98 20.35 3474.54 20.77 3481.09
21.12 3487.65 21.38 3494.2 21.41 3500.76 21.61 3507.32 21.99 3513.87 22.3
3520.43 22.56 3526.99 22.47 3533.54 22.6 3540.1 22.59 3553.21 23.68 3559.77
24.02 3572.88 24.29 3579.44 24.51 3585.99 24.54 3592.55 24.81 3599.11 24.9
3605.66 25.01 3612.22 25.09 3618.78 24.97 3625.31 25.02 3631.85 25.2 3638.39
25.42 3644.93 25.49 3651.47 25.41 3658 25.25 3664.54 24.98 3671.08 24.84
3677.62 24.66 3684.16 24.45 3690.7 24.35 3697.23 24.49 3703.77 24.33 3716.85
24.12 3723.39 24.06 3729.93 24.33 3736.46 24.22 3743 24.27 3749.54 24.07
3756.08 23.93 3762.62 23.92 3769.16 23.8 3782.23 23.62 3788.77 23.44 3795.31
23.47 3801.85 23.67 3808.39 23.78 3814.92 23.74 3821.46 23.76 3828 23.76
3834.54 24.16 3841.08 24.21 3847.62 24.05 3854.15 24.08 3860.69 24.43
3867.23 24.8 3873.77 25.13 3880.31 25.21 3886.85 25.43 3893.38 25.58 3899.92
25.77 3906.46 25.87 3913 26.1 3919.54 26.46 3926.08 26.69 3932.61 26.67
3939.15 26.7 3945.69 26.68 3952.23 26.57 3958.77 26.68 3965.31 26.65 3971.84
26.73 3978.38 26.87 3984.92 26.99 3991.46 26.88 3998 26.75 4011.07 26.62
4017.61 26.77 4024.15 26.9 4030.69 26.75 4037.23 26.64 4043.77 26.74 4050.3
26.94 4056.84 26.96 4063.38 26.7 4069.92 26.52 4076.46 26.62 4083 26.81
4089.53 26.72 4096.07 26.47 4102.61 26.12 4109.15 26.27 4115.69 26.22
4122.22 26.23 4128.76 26.17 4135.3 26.03 4141.84 25.64 4148.38 25.2 4154.92
24.53 4161.45 24.3 4167.99 24.22 4174.53 24.05 4181.07 23.8 4187.61 23.77
4194.14 23.96 4200.68 24.38 4207.22 24.56 4213.76 24.63 4220.3 24.68 4226.84
24.56 4233.37 24.57 4239.91 24.63 4252.99 24.56 4259.53 24.16 4266.06 23.98
4272.6 24.14 4279.14 24.27 4285.68 24.17 4298.76 23.94 4305.29 23.91 4311.83
23.9 4318.37 23.96 4324.91 24.1 4331.45 24.1 4337.98 24.13 4344.52 24.07
4351.06 23.99 4357.6 24.16 4364.14 24.18 4370.68 24.26 4377.21 24.38 4383.75
24.21 4390.29 24.07 4396.83 24.12 4403.37 23.94 4409.91 24.17 4416.44 23.98
4436.06 24.11 4442.6 24.02 4455.67 24.09 4468.75 23.96 4475.29 23.97 4481.83
24.05 4494.9 24.13 4501.44 23.93 4507.98 23.95 4514.52 23.95 4521.05 24.16
4527.59 24.07 4540.67 24.09 4547.21 24.07 4560.28 24.22 4566.82 24.27 4579.9
24.15 4586.44 24.14 4592.98 24.33 4599.51 24.2 4606.05 23.99 4612.59 24.03
4619.13 24.09 4625.67 24 4632.2 23.89 4645.28 23.98 4651.82 23.93 4658.36
23.92 4664.9 23.81 4677.97 23.92 4684.51 24.08 4691.05 24.04 4697.59 24.16
4704.12 24.04 4710.66 24.07 4717.2 24.03 4736.82 23.8 4743.35 23.89 4749.89
24.04 4756.43 24.23 4762.97 24.46 4769.51 24.33 4776.04 24.17 4782.58 24.22
4789.12 23.99 4795.66 24.21 4802.2 24.27 4808.74 24.16 4815.27 24.42 4821.81
24.39 4828.35 24.08 4834.89 24.05 4841.43 24.06 4847.96 24.09 4854.5 24.22
4861.04 24.44 4867.58 24.57 4874.12 24.55 4880.66 24.37 4887.19 24.17
4893.73 24.05 4900.27 24.1 4906.81 24.1 4913.35 24.05 4919.89 24.22 4926.42
24.3 4932.96 24.57 4939.5 24.65 4946.04 24.55 4952.58 24.38 4959.11 24.57
4965.65 24.58 4972.19 24.42 4978.73 24.46 4985.27 24.45 4991.81 24.68
5004.88 24.91 5011.42 25.17 5017.96 25.32 5024.5 25.26 5031.03 25.35 5037.57
25.7 5044.11 26.08 5050.65 26.37 5057.19 26.58 5063.73 26.73 5070.26 26.71
5076.8 27.16 5083.34 27.57 5089.88 27.94 5096.42 28.24 5102.96 28.43 5109.49
28.54 5116.03 28.77 5122.57 29.14 5129.11 29.53 5135.65 29.81 5142.18 30.23
5148.72 30.91 5155.26 31.71 5161.8 32.7 5168.34 34.3 5174.88 36.06 5181.41
38.6 5187.95 42.26 5194.49 43.85 5201.03 44.95 5207.57 45.67 5214.1 45.96
5220.64 46.13 5227.18 46.19 5233.72 46.19 5240.26 46.21 5246.8 46.17 5253.33
46.18 5259.87 46.29 5272.95 46.28 5279.49 46.31 5286.02 46.41 5292.56 46.61
5299.1 46.97 5312.18 48.12 5318.72 48.63 5325.25 48.93 5331.79 49.21

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

0 .09 2258.7 .04 2387 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2258.7 2387 1426.36 1487.57 1534.98 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 56325.92

INPUT
Description: 55 Approach Harding St Rte 44
Station Elevation Data num= 497
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 29.47 209.09 27.29 287.5 24.67 300.57 23.27 326.7 25.58 457.39 27.66 692.61 26.64 731.82 28.15 823.29 25.55 901.7 25.5 1012.78 19.85 1032.39 17.2 1078.12 14.36 1156.53 13.26 1176.14 11.94 1247.88 14.89 1261.21 11.57 1267.1 10.04 1273.17 8.85 1278.45 4.78 1287.16 3.55 1302.31 2.55 1313.27 2.08 1325.95 1.84 1337.09 2.07 1348.96 2.56 1356.07 2.82 1369.08 2.98 1382.73 3.18 1388.22 3.31 1391.74 4.5 1393.71 5.56 1400.02 9.46 1408.14 11.16 1414.64 12.72 1421.15 13.73 1427.65 14.06 1434.16 14 1440.66 13.27 1447.17 12.96 1453.67 12.71 1460.18 12.61 1466.68 12.54 1473.19 12.51 1479.69 12.98 1486.2 14.39 1492.7 15.58 1499.21 16.38 1505.71 17.08 1518.72 17.57 1525.23 17.78 1531.73 17.85 1544.74 18.23 1551.25 18.09 1557.75 18.14 1570.76 18.58 1577.27 18.68 1583.77 18.9 1590.28 19.07 1596.78 19.09 1603.29 19.28 1609.79 19.53 1616.3 19.98 1622.8 20.2 1629.31 20.76 1635.81 20.96 1642.32 21.14 1648.82 20.99 1655.33 20.81 1661.83 20.56 1668.34 20.07 1674.84 19.48 1681.35 18.44 1687.85 18.14 1694.36 17.93 1700.86 17.06 1707.37 15.53 1713.87 14.08 1720.38 12.95 1726.88 12.26 1733.39 11.73 1739.89 11.28 1746.4 11.25 1752.9 11.26 1759.41 11.29 1772.42 11.28 1791.93 11.31 1804.94 11.34 1817.95 11.32 1830.96 11.23 1837.47 11.14 1843.97 11.07 1850.48 11.18 1856.98 12.07 1863.49 14.13 1869.99 17.2 1876.5 18.66 1883 19.6 1889.51 20.65 1896.01 22.74 1902.52 24.35 1909.02 25.34 1915.53 26.07 1922.03 26.34 1928.54 26.57 1941.55 26.69 1954.56 26.88 1961.06 26.93 1967.57 26.94 1974.07 27.02 1980.58 27.19 1987.08 27.5 1993.59 27.83 2000.09 27.82 2006.6 27.57 2013.1 27.54 2019.61 27.56 2026.11 27.65 2032.62 27.7 2039.12 27.53 2045.63 26.45 2052.13 26.12 2058.64 25.89 2065.14 25.89 2071.69 25.84 2078.24 25.65 2091.33 25.75 2097.88 25.82 2104.43 25.54 2110.98 25.41 2117.52 25.38 2124.07 25.86 2130.62 26 2137.16 26.08 2143.71 25.86 2150.26 25.44 2156.81 24.77 2163.35 24.33 2169.9 24.36 2176.45 24.29 2183 24.1 2189.54 24.06 2196.09 23.74 2202.64 23.4 2209.19 23.22 2215.73 23.27 2222.28 23.03 2228.83 23.23 2235.38 23.32 2241.92 23.77 2248.47 24.41 2255.02 25.2 2261.57 25.36 2268.11 25.73 2274.66 25.47 2281.21 24.08 2287.75 24.12 2294.3 25.47 2300.85 25.75 2307.4 25.59 2313.94 25.24 2320.49 24.85 2327.04 24.91 2333.59 25.31 2340.13 25.37 2346.68 25.48 2353.23 25.24 2359.78 25.18 2366.32 24.77 2372.87 24.46 2379.42 24.47 2385.96 24.7 2392.51 24.77 2399.06 24.67 2405.61 25.02 2412.15 24.66 2418.7 24.32 2425.25 24.3 2431.8 24.97 2438.34 25.04 2444.89 25.17 2451.44 25.18 2457.99 25.27 2471.08 25.15 2477.63 25.28 2484.18 25.04 2490.72 25.06 2497.27 24.89 2503.82 24.64 2510.37 24.61 2516.91 24.74 2523.46 24.85 2530.01 24.78 2536.55 25 2543.1 25.02 2549.65 25.07 2556.2 25 2562.74 25.25 2569.29 25.35 2582.39 25.3 2588.93 25.47 2595.48 25.7 2602.03 25.7 2608.58 25.47 2615.12 25.49 2621.67 25.73 2628.22 25.87 2634.77 25.53 2641.31 25.63 2654.41 25.56 2660.96 25.8 2667.5 26.25 2674.05 26.65 2680.6

26.87 2687.14 26.93 2693.69 26.61 2700.24 26.78 2706.79 27.08 2713.33 27.29
2719.88 27.2 2726.43 27.04 2732.98 27.14 2739.52 27.3 2746.07 26.87 2752.62
26.91 2759.17 27.21 2765.71 27.42 2772.26 27.55 2778.81 27.66 2785.36 27.71
2791.9 27.78 2798.45 28.22 2805 29.25 2811.54 30.18 2818.09 30.41 2824.64
30.27 2837.73 29.1 2844.28 28.95 2850.83 29 2863.92 29 2870.47 29.21 2877.02
29.67 2883.57 29.93 2890.11 30.22 2896.66 30.42 2903.21 30.5 2909.76 30.99
2916.3 31.34 2922.85 31.54 2929.4 31.8 2935.95 32.13 2942.49 32.31 2949.04
32.18 2955.59 31.94 2962.13 31.93 2968.68 31.7 2975.23 31.64 2981.78 31.55
2988.32 31.69 2994.87 31.91 3001.42 32.22 3007.97 32.65 3014.51 33.28
3021.06 34.11 3027.61 35.02 3034.16 35.8 3040.7 36.5 3047.25 37.52 3053.8
38.76 3060.35 40.03 3066.89 41.85 3073.44 44.1 3079.99 45.64 3086.53 46.28
3093.08 46.65 3099.63 46.87 3106.18 46.92 3112.72 46.95 3132.37 47.12
3138.91 47.19 3145.46 47.4 3152.01 47.71 3158.56 47.86 3165.1 48.05 3171.65
48.28 3178.2 48.4 3184.75 48.58 3191.29 48.84 3197.84 49.04 3204.39 49.13
3210.93 49.13 3217.48 49.05 3224.03 48.89 3230.58 48.66 3237.12 48.53
3250.22 48.31 3256.77 48.31 3263.31 48.34 3269.86 48.41 3276.41 48.44
3282.96 48.43 3289.5 48.52 3302.6 48.92 3309.15 49.11 3315.69 49.2 3322.24
49.21 3328.79 49.2 3335.34 49.04 3341.88 49.01 3348.43 49 3354.98 48.89
3361.53 49.02 3368.07 49.45 3374.62 50.06 3381.17 51.1 3387.71 52.32 3394.26
53.39 3400.81 54.19 3407.36 54.6 3413.9 54.76 3420.45 54.97 3427 55.44
3433.55 55.87 3440.09 55.87 3446.64 55.76 3453.19 55.74 3459.74 55.57
3466.28 55.5 3472.83 55.54 3492.47 55.8 3499.02 55.86 3505.57 55.63 3512.12
55.14 3518.66 54.82 3525.21 54.83 3531.76 54.98 3538.3 54.98 3544.85 55.03
3551.4 55.01 3557.95 54.95 3564.49 54.84 3571.04 54.69 3577.59 54.63 3584.14
54.67 3590.68 54.82 3597.23 54.99 3603.78 55.04 3616.87 54.91 3623.42 54.81
3636.51 54.74 3643.06 54.88 3649.61 55.04 3662.7 55.03 3669.25 55.01 3675.8
55.02 3688.89 54.95 3695.44 55.56 3701.99 56.04 3708.54 56.38 3715.08 56.33
3734.73 55.9 3741.27 55.72 3747.82 55.73 3754.37 55.82 3760.91 55.97 3774.01
55.75 3780.56 55.85 3787.1 56.04 3793.65 56.4 3800.2 56.71 3806.75 56.9
3813.29 56.97 3819.84 57.08 3826.39 57.07 3832.94 56.99 3839.48 57.36
3846.03 59.14 3852.58 61.74 3859.13 64.12 3865.67 65.7 3872.22 66.26 3878.77
66.58 3885.32 66.55 3891.86 66.09 3898.41 65.77 3904.96 65.88 3911.5 65.67
3918.05 65.34 3924.6 65.06 3931.15 64.95 3937.69 64.75 3944.24 64.4 3950.79
63.86 3957.34 63.47 3963.88 63.02 3976.98 62.45 3983.53 62.09 3990.07 61.61
3996.62 61.28 4003.17 60.72 4009.72 59.57 4016.26 56.84 4022.81 54.97
4029.36 51.65 4035.91 48.71 4042.45 47.23 4049 46.15 4055.55 45.13 4062.09
44.7 4068.64 44.22 4075.19 43.57 4081.74 42.73 4088.28 42.11 4094.83 42.04
4101.38 42.04 4107.93 42.14 4114.47 42.42 4121.02 42.27 4127.57 42.25
4134.12 42.31 4140.66 42.39 4147.21 42.41 4153.76 42.37 4160.31 42.3 4173.4
42.06 4186.49 42.76 4193.04 43.44 4199.59 43.81 4206.14 43.76 4212.68 43.92
4219.23 44.2 4225.78 44.46 4232.33 44.8 4238.87 45.11 4245.42 45.14 4251.97
45.29 4258.52 45.06 4265.06 45.05 4271.61 45.37 4278.16 45.42 4284.71 45.28
4291.25 45.88 4297.8 46.36 4304.35 46.82 4310.89 47.61 4317.44 47.9 4323.99
47.84 4330.54 47.9 4337.08 47.94 4343.63 48.06 4350.18 47.99 4356.73 47.95
4363.27 48.1 4369.82 48.31 4376.37 48.24 4382.92 48.26 4389.46 48.41 4396.01
48.52 4402.56 49.28 4409.1 49.54 4415.65 49.52 4422.2 48.91 4428.75 47.19
4435.29 45.92 4441.84 45.33 4448.39 45.83 4454.94 48.33 4461.48 50.99
4468.03 52.45 4474.58 53.17 4481.13 53.24 4487.67 53.16 4494.22 53.26
4500.77 53.3 4513.86 53.61 4520.41 53.8 4526.96 54.09 4533.5 54.17 4546.6
54.28 4553.15 54.5 4559.69 54.93 4572.79 55.1 4579.34 55.3 4585.88 55.01
4592.43 55.05 4598.98 55.12 4605.53 55.31 4612.07 55.55 4618.62 55.64
4625.17 55.83 4631.72 56.06 4638.26 56.41 4644.81 56.84 4651.36 56.91 4657.9
56.8 4664.45 56.64 4671 56.71

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 1247.88 .04 1421.15 .093

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1247.88 1421.15 58 48.47 42.98 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 1640 4671 21.1 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 56277.45

INPUT
Description: 54.7 US Face Harding St- Rte 44
Station Elevation Data num= 447
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 29.34 6.155 29.21 12.301 29.15 18.456 29.29 24.601 29.15 30.756 28.88 36.902 28.91 43.057 29.15 49.202 29.3 55.357 29.26 61.512 28.99 67.658 28.82 73.813 28.89 79.958 29.09 86.113 29.17 92.259 29.03 98.414 28.29 104.569 27.7 110.715 27.65 116.87 28.09 123.015 27.69 129.17 27.41 135.316 27.23 141.471 27.18 153.771 26.83 159.926 26.73 166.072 26.61 172.227 26.08 178.372 26.49 184.527 26.96 190.673 27.18 196.828 27.03 202.974 27.1 209.129 27.01 215.284 27.12 221.429 27.41 227.584 27.81 233.73 28 239.885 27.99 252.185 28.09 258.34 28.13 264.486 28.3 270.641 28.21 276.786 28.02 282.941 28.08 295.242 28.47 301.388 28.56 307.543 28.27 313.698 28.39 319.843 28.47 325.998 28.27 332.144 27.89 338.299 27.97 344.444 28.39 356.754 28.78 362.9 28.91 375.2 28.64 381.355 28.71 387.501 28.92 393.656 29.18 399.802 29.37 405.957 29.47 412.112 29.46 418.257 29.42 424.412 29.35 430.558 29.23 436.713 29.23 442.858 29.32 449.013 29.34 461.314 29.26 467.469 29.34 473.614 29.32 479.769 29.46 485.915 29.54 492.07 29.5 498.216 29.34 504.371 29.24 510.526 29.24 516.671 29.36 522.826 29.3 528.972 29.02 535.127 29.1 541.272 29.11 547.427 28.87 553.573 28.59 559.728 28.5 565.883 28.44 572.029 28.27 578.183 28.18 584.329 27.9 590.484 27.87 596.63 27.77 602.785 27.82 608.93 28.08 615.085 28.27 621.24 28.29 627.386 28.55 633.541 28.06 639.686 27.76 645.841 27.54 651.987 27.59 658.142 27.77 670.442 27.18 676.597 27.03 682.743 27.01 688.898 26.91 695.044 26.9 707.344 26.71 713.499 26.54 719.654 26.3 725.8 26.4 731.955 26.35 738.1 26.02 744.255 25.94 750.401 25.82 756.556 25.63 762.711 25.48 768.857 25.23 781.157 25.2 787.312 25.34 793.458 25.46 799.613 25.45 805.758 25.13 811.913 25.11 818.068 25.33 824.214 25.5 830.369 25.61 836.514 25.56 848.815 25.73 854.97 25.9 861.125 25.86 867.271 25.48 873.425 25.12 879.571 24.98 885.726 24.96 891.872 25.05 898.027 25.18 904.172 24.8 910.327 24.63 916.482 24.9 922.628 25.03 928.783 24.87 934.928 24.74 941.083 24.9 947.229 24.81 953.384 24.05 959.539 22.8 965.685 20.75 971.839 19.02 977.985 17.78 984.14 17.32 996.441 18.431002.586 18.771008.741 18.851014.896 18.61 1021.042 18.591027.197 18.961033.342 18.771045.643 18.041051.798 17.88 1057.943 18.161064.099 18.411070.253 18.421076.399 18.411082.554 18.76 1088.7 19.171094.855 19.18 1101 19.351107.155 19.441113.301 19.46 1119.456 19.531125.611 19.371131.756 17.971137.911 16.971156.546 5.68 1157.495 5.731165.191 4.31173.404 4.08 1181.41 2.951185.093 2.27 1202.074 .521207.928 2.091215.342 2.781223.085 2.231227.624 .64 1242.076 1.141246.061 2.311251.548 3.171258.305 3.81266.424 4.68 1269.816 5.631269.938 5.481270.399 22.91

1272.25 22.31322.429 20.63 1334.739 20.761340.885 20.8 1347.04 20.731353.186
20.8 1359.34 20.82 1365.486 20.81371.641 20.631377.787 19.351383.942
18.111390.097 18.11 1396.242 18.321402.397 18.331408.543 18.31414.698
18.431420.844 18.63 1426.998 18.61433.144 18.511439.299 18.541445.454 18.72
1451.6 18.82 1457.755 19.08 1463.9 19.361470.055 19.391476.201 19.251482.356
19.5 1488.511 20.051494.656 20.291500.811 20.061506.957 19.761513.112 19.71
1519.257 18.891525.412 18.731537.713 19.041543.868 19.041550.014 18.3
1556.169 18.341562.314 19.011568.469 18.421574.615 17.78 1580.77 18.08
1586.915 18.44 1593.07 17.511599.225 17.561611.526 17.21617.671 17.53
1636.127 17.341642.282 17.371648.428 17.291654.583 17.571660.728 17.63
1666.883 17.911673.029 18.071679.184 18.051685.329 18.241691.484 18.38
1697.639 18.71703.785 18.94 1709.94 18.831716.085 18.61 1722.24 18.66
1728.386 18.981734.541 19.521740.687 20.331746.842 21.211752.997 22 1759.142
22.561765.297 22.981771.443 23.341777.598 23.621796.053 24.23 1802.199
24.41808.354 24.661814.499 24.721820.654 24.38 1826.8 24.1 1832.955
24.071839.101 24.021845.256 24.511851.411 25.441857.556 25.79 1863.711
25.891869.857 26.221876.012 26.531882.157 26.441888.312 25.97 1894.467
25.781900.613 25.911906.768 26.061912.914 26.131919.068 26.18 1931.331
25.891937.468 25.551943.594 25.151949.731 24.951955.867 24.91 1961.994 24.8
1968.13 24.921974.266 25.261980.393 25.441992.665 25.73 2004.928
25.792011.064 25.872017.191 25.932023.327 25.812029.464 25.84 2035.59
25.832041.727 25.842047.863 25.77 2053.99 25.772060.126 26.05 2066.262
25.922072.389 25.712078.525 25.372084.661 25.472090.788 25.53 2096.924 25.71
2103.06 26.242109.187 26.172115.323 26.32121.459 26.22 2127.586 26.092133.722
25.872139.859 25.962145.985 25.882152.122 25.85 2158.258 25.962164.385
262170.521 25.912176.657 25.642182.784 25.48 2188.92 25.662195.056
25.272201.183 24.752207.319 24.862213.455 25.51 2219.582 25.532225.719
26.092231.855 25.962244.117 26.172250.254 26.32 2256.38 26.182262.517
26.282268.653 26.24 2274.78 26.42280.916 26.59 2287.052 26.682299.315
26.952305.451 27.12311.578 27.32317.714 26.92 2323.85 26.892329.977
26.62336.114 26.8 2342.25 26.872348.376 26.76 2354.513 27.082360.649
26.462366.776 26.442372.912 26.672379.048 26.84 2385.175 26.622391.311
27.62397.447 27.772403.574 27.3 2409.71 27.42 2415.846 26.952421.973
26.992428.109 27.82434.246 27.732440.372 27.4 2446.509 27.522452.645
27.872458.771 28.352464.908 28.52471.044 28.36 2477.171 28.992483.307
30.382489.443 31.52 2495.57 32.252501.706 31.82 2507.842 30.772513.969
29.962520.105 29.682526.241 29.652532.368 29.73 2538.504 29.482544.641
29.512550.767 29.512556.904 29.99 2563.04 30.29 2569.167 30.122575.303
29.812581.439 30.042587.566 30.032593.702 30.11 2599.838 30.082605.965
30.392612.101 30.62624.364 30.85 2630.5 31.29 2636.637 31.492642.763
31.582648.899 31.382655.036 29.722661.162 28.95 2667.299 29.052673.435
29.422679.562 29.642685.698 29.672691.834 29.86 2697.961 30.332704.097
30.712710.233 30.82 2716.36 31.132722.496 31.35 2728.632 31.422734.759
31.712740.896 32.252747.032 32.762759.294 33.49 2765.431 33.952771.558
34.352777.694 34.64 2783.83 34.362789.957 34.23 2802.229 34.822808.356
34.742814.492 33.722820.628 32.822826.755 34.33 2832.891 382839.028
41.772845.154 44.062851.291 44.892857.427 45.19 2863.553 45.77 2869.69
46.162881.953 46.272888.089 46.32894.225 46.36 2900.352 46.372906.488
46.42912.624 46.462918.751 46.562924.887 46.77 2931.023 47.03 2937.15
47.232949.423 47.562955.549 47.682967.822 48.04 2980.085 48.152986.221 48.11

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .091125.611 .041270.399 .093

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1125.6111270.399 84.16 80.55 81.19 .5 .8 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 01118.234 23 T
Skew Angle = 20

BRIDGE

RIVER: Taunton River
REACH: Main Stem RS: 56238.98

INPUT
Description: 54.5 Harding St/Rte 44/ Cape Hwy
Distance from Upstream XS = 20
Deck/Roadway Width = 50
Weir Coefficient = 2.6
Bridge Deck/Roadway Skew = 20
Upstream Deck/Roadway Coordinates
 num= 26
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 642.75 27.74 970.702 25.17 1123.872 23.8 1152.063 23.96 1152.063 27.7
1155.822 27.7 1155.916 25.67 18.141164.279 25.6 18.821177.435 25.53 18.87
1186.832 25.46 18.09 1193.41 25.39 18.051207.505 25.32 18.54
 1221.6 25.25 18.281231.937 25.18 17.71235.696 25.11 17.55 1246.032 25.04
18.251257.309 24.97 18.241269.525 24.9 17.5 1269.619 26.67 1273.283 26.71
1273.377 23.12
 1314.63 22.6 1441.489 21.77 1594.658 21.73 1731.854 22.85 1800 22.85

Upstream Bridge Cross Section Data
Station Elevation Data num= 447
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 29.34 6.155 29.21 12.301
29.15 18.456 29.29 24.601 29.15 30.756 28.88 36.902 28.91 43.057 29.15
49.202 29.3 55.357 29.26 61.512 28.99 67.658 28.82 73.813 28.89 79.958 29.09
86.113 29.17 92.259 29.03 98.414 28.29 104.569 27.7 110.715 27.65 116.87
28.09 123.015 27.69 129.17 27.41 135.316 27.23 141.471 27.18 153.771 26.83
159.926 26.73 166.072 26.61 172.227 26.08 178.372 26.49 184.527 26.96
190.673 27.18 196.828 27.03 202.974 27.1 209.129 27.01 215.284 27.12 221.429
27.41 227.584 27.81 233.73 28 239.885 27.99 252.185 28.09 258.34 28.13
264.486 28.3 270.641 28.21 276.786 28.02 282.941 28.08 295.242 28.47 301.388
28.56 307.543 28.27 313.698 28.39 319.843 28.47 325.998 28.27 332.144 27.89
338.299 27.97 344.444 28.39 356.754 28.78 362.9 28.91 375.2 28.64 381.355
28.71 387.501 28.92 393.656 29.18 399.802 29.37 405.957 29.47 412.112 29.46
418.257 29.42 424.412 29.35 430.558 29.23 436.713 29.23 442.858 29.32
449.013 29.34 461.314 29.26 467.469 29.34 473.614 29.32 479.769 29.46
485.915 29.54 492.07 29.5 498.216 29.34 504.371 29.24 510.526 29.24 516.671
29.36 522.826 29.3 528.972 29.02 535.127 29.1 541.272 29.11 547.427 28.87
553.573 28.59 559.728 28.5 565.883 28.44 572.029 28.27 578.183 28.18 584.329
27.9 590.484 27.87 596.63 27.77 602.785 27.82 608.93 28.08 615.085 28.27
621.24 28.29 627.386 28.55 633.541 28.06 639.686 27.76 645.841 27.54 651.987
27.59 658.142 27.77 670.442 27.18 676.597 27.03 682.743 27.01 688.898 26.91
695.044 26.9 707.344 26.71 713.499 26.54 719.654 26.3 725.8 26.4 731.955
26.35 738.1 26.02 744.255 25.94 750.401 25.82 756.556 25.63 762.711 25.48
768.857 25.23 781.157 25.2 787.312 25.34 793.458 25.46 799.613 25.45 805.758

25.13 811.913 25.11 818.068 25.33 824.214 25.5 830.369 25.61 836.514 25.56
848.815 25.73 854.97 25.9 861.125 25.86 867.271 25.48 873.425 25.12 879.571
24.98 885.726 24.96 891.872 25.05 898.027 25.18 904.172 24.8 910.327 24.63
916.482 24.9 922.628 25.03 928.783 24.87 934.928 24.74 941.083 24.9 947.229
24.81 953.384 24.05 959.539 22.8 965.685 20.75 971.839 19.02 977.985 17.78
984.14 17.32 996.441 18.431002.586 18.771008.741 18.851014.896 18.61 1021.042
18.591027.197 18.961033.342 18.771045.643 18.041051.798 17.88 1057.943
18.161064.099 18.411070.253 18.421076.399 18.411082.554 18.76 1088.7
19.171094.855 19.18 1101 19.351107.155 19.441113.301 19.46 1119.456
19.531125.611 19.371131.756 17.971137.911 16.971156.546 5.68 1157.495
5.731165.191 4.31173.404 4.08 1181.41 2.951185.093 2.27 1202.074 .521207.928
2.091215.342 2.781223.085 2.231227.624 .64 1242.076 1.141246.061 2.311251.548
3.171258.305 3.81266.424 4.68 1269.816 5.631269.938 5.481270.399 22.91
1272.25 22.31322.429 20.63 1334.739 20.761340.885 20.8 1347.04 20.731353.186
20.8 1359.34 20.82 1365.486 20.81371.641 20.631377.787 19.351383.942
18.111390.097 18.11 1396.242 18.321402.397 18.331408.543 18.31414.698
18.431420.844 18.63 1426.998 18.61433.144 18.511439.299 18.541445.454 18.72
1451.6 18.82 1457.755 19.08 1463.9 19.361470.055 19.391476.201 19.251482.356
19.5 1488.511 20.051494.656 20.291500.811 20.061506.957 19.761513.112 19.71
1519.257 18.891525.412 18.731537.713 19.041543.868 19.041550.014 18.3
1556.169 18.341562.314 19.011568.469 18.421574.615 17.78 1580.77 18.08
1586.915 18.44 1593.07 17.511599.225 17.561611.526 17.21617.671 17.53
1636.127 17.341642.282 17.371648.428 17.291654.583 17.571660.728 17.63
1666.883 17.911673.029 18.071679.184 18.051685.329 18.241691.484 18.38
1697.639 18.71703.785 18.94 1709.94 18.831716.085 18.61 1722.24 18.66
1728.386 18.981734.541 19.521740.687 20.331746.842 21.211752.997 22 1759.142
22.561765.297 22.981771.443 23.341777.598 23.621796.053 24.23 1802.199
24.41808.354 24.661814.499 24.721820.654 24.38 1826.8 24.1 1832.955
24.071839.101 24.021845.256 24.511851.411 25.441857.556 25.79 1863.711
25.891869.857 26.221876.012 26.531882.157 26.441888.312 25.97 1894.467
25.781900.613 25.911906.768 26.061912.914 26.131919.068 26.18 1931.331
25.891937.468 25.551943.594 25.151949.731 24.951955.867 24.91 1961.994 24.8
1968.13 24.921974.266 25.261980.393 25.441992.665 25.73 2004.928
25.792011.064 25.872017.191 25.932023.327 25.812029.464 25.84 2035.59
25.832041.727 25.842047.863 25.77 2053.99 25.772060.126 26.05 2066.262
25.922072.389 25.712078.525 25.372084.661 25.472090.788 25.53 2096.924 25.71
2103.06 26.242109.187 26.172115.323 26.32121.459 26.22 2127.586 26.092133.722
25.872139.859 25.962145.985 25.882152.122 25.85 2158.258 25.962164.385
262170.521 25.912176.657 25.642182.784 25.48 2188.92 25.662195.056
25.272201.183 24.752207.319 24.862213.455 25.51 2219.582 25.532225.719
26.092231.855 25.962244.117 26.172250.254 26.32 2256.38 26.182262.517
26.282268.653 26.24 2274.78 26.42280.916 26.59 2287.052 26.682299.315
26.952305.451 27.12311.578 27.32317.714 26.92 2323.85 26.892329.977
26.62336.114 26.8 2342.25 26.872348.376 26.76 2354.513 27.082360.649
26.462366.776 26.442372.912 26.672379.048 26.84 2385.175 26.622391.311
27.62397.447 27.772403.574 27.3 2409.71 27.42 2415.846 26.952421.973
26.992428.109 27.82434.246 27.732440.372 27.4 2446.509 27.522452.645
27.872458.771 28.352464.908 28.52471.044 28.36 2477.171 28.992483.307
30.382489.443 31.52 2495.57 32.252501.706 31.82 2507.842 30.772513.969
29.962520.105 29.682526.241 29.652532.368 29.73 2538.504 29.482544.641
29.512550.767 29.512556.904 29.99 2563.04 30.29 2569.167 30.122575.303
29.812581.439 30.042587.566 30.032593.702 30.11 2599.838 30.082605.965
30.392612.101 30.62624.364 30.85 2630.5 31.29 2636.637 31.492642.763
31.582648.899 31.382655.036 29.722661.162 28.95 2667.299 29.052673.435

29.422679.562 29.642685.698 29.672691.834 29.86 2697.961 30.332704.097
30.712710.233 30.82 2716.36 31.132722.496 31.35 2728.632 31.422734.759
31.712740.896 32.252747.032 32.762759.294 33.49 2765.431 33.952771.558
34.352777.694 34.64 2783.83 34.362789.957 34.23 2802.229 34.822808.356
34.742814.492 33.722820.628 32.822826.755 34.33 2832.891 382839.028
41.772845.154 44.062851.291 44.892857.427 45.19 2863.553 45.77 2869.69
46.162881.953 46.272888.089 46.32894.225 46.36 2900.352 46.372906.488
46.42912.624 46.462918.751 46.562924.887 46.77 2931.023 47.03 2937.15
47.232949.423 47.562955.549 47.682967.822 48.04 2980.085 48.152986.221 48.11

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .091125.611 .041270.399 .093

Bank Sta: Left Right Coeff Contr. Expan.
 1125.6111270.399 .5 .8 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 01118.234 23 T
Skew Angle = 20

Downstream Deck/Roadway Coordinates
 num= 26
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 653.086 27.74 981.039 25.17 1134.209 23.8
 1162.4 23.96 1162.4 27.7 1166.159 27.7 1166.252 25.67 18.141174.616 25.6
18.821187.771 25.53 18.87 1197.168 25.46 18.091203.746 25.39 18.051217.842
25.32 18.54 1231.937 25.25 18.281242.274 25.18 17.71246.032 25.11 17.55
1256.369 25.04 18.251267.645 24.97 18.241279.861 24.9 17.5 1279.955 26.67
1283.62 26.71 1283.714 23.12 1324.967 22.6 1451.825 21.77 1604.995 21.73
 1742.19 22.85 1800 22.85

Downstream Bridge Cross Section Data
Station Elevation Data num= 281 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 29.39 6.155 29.56 12.301 29.42 18.456 29.55 30.766 29.35 43.066 29.5
49.221 29.42 61.522 28.94 67.677 29.05 79.987 28.42 92.287 28.35 98.442
28.44 104.597 28.37 110.743 27.97 116.898 27.72 123.053 27.76 129.208 28.07
135.353 28.04 141.508 26.47 147.663 25.99 153.818 27.05 159.964 27.72
172.274 28.23 178.429 28.89 184.574 29.3 190.729 29.2 196.884 28.57 203.039
28.72 209.185 28.63 215.34 28.32 246.105 28.71 252.251 28.65 264.561 29.09
289.172 29.11 295.327 29.03 301.472 29.09 332.238 30.57 338.393 30.69
363.003 30.38 369.158 30.22 387.614 30.25 399.914 30.02 436.835 30.36
492.202 30.23 498.357 29.9 510.667 29.66 516.812 29.44 522.967 29.56 541.423
29.36 553.733 28.89 566.033 29 590.644 28.48 596.799 28.17 633.719 27.09
639.865 27 646.02 27.13 707.542 26.67 726.006 27.1 738.307 26.88 750.617
26.86 762.918 27.14 769.073 27.05 781.373 26.45 805.984 25.92 818.294 25.95
842.904 26.67 849.059 26.7 873.67 25.84 879.815 25.85 885.97 25.59 898.28
24.59 904.426 24.38 910.581 24.43 922.882 23.49 929.036 22.8 935.192 21.68
941.346 21.54 947.492 20.88 953.647 20.58 972.103 20.37 978.258 20.11
984.413 20.24 996.713 19.471002.868 19.351015.178 18.76 1021.324
19.031027.479 18.811033.634 18.921039.789 19.641045.934 20.02 1052.089
19.791058.244 19.261064.399 19.63 1076.7 19.591082.855 19.46 1101.31
19.521113.611 19.831119.766 19.781132.076 18.991138.221 20.24 1144.376
20.751150.531 18.961156.687 15.761162.832 12.751168.893 9.39 1169.917
6.511173.375 5.921190.356 3.471213.397 1.241220.943 1.83 1228.573

2.121238.383 .811258.878 1.551265.428 3.1 1273.96 3.32 1282.671 5.46 1287.83
8.25 1292.04 9.951298.195 12.62 1304.34 15.54 1310.495 17.88 1316.65
18.131322.805 18.021335.106 18.321341.261 18.15 1353.562 18.681359.716
20.471378.172 20.421384.327 20.051390.482 19.99 1396.637 19.761427.393
19.311433.548 19.491439.703 19.531458.159 20.3 1464.314 20.121470.459
20.11476.614 20.661488.924 20.94 1495.07 20.5 1501.225 20.21 1507.38
20.431513.535 20.44 1519.68 20.31 1531.99 19.84 1538.145 19.731544.291
19.31556.601 19.591562.756 19.411568.901 19.53 1575.056 19.511581.211
19.11587.366 18.961593.512 18.971605.822 19.36 1618.122 19.461630.432
19.841661.189 19.771673.499 20.31679.654 20.39 1691.954 19.73 1710.41 19.65
1735.02 20.29 1747.33 21.091753.485 21.14 1759.631 21.471765.786
21.651771.941 22.121778.086 22.251784.241 23.65 1796.551 23.761821.162
24.611839.617 24.751864.228 25.21882.684 25.22 1888.839 25.381894.994
25.371901.139 25.531925.769 25.551938.088 25.7 1968.872 25.831975.027
25.961981.192 25.881993.501 25.951999.656 26.51 2005.821 26.74 2030.45
26.662036.605 26.77 2055.08 26.762079.709 26.51 2092.028 26.662110.503
26.492122.813 26.262128.977 26.392135.132 26.23 2141.287 26.42153.606
27.022172.081 27.382178.236 27.68 2196.71 27.74 2202.865 27.65 2209.02
28.432215.185 28.622221.339 28.662227.494 28.85 2258.288 292270.598
29.412276.762 29.362289.073 29.612301.392 28.92 2313.702 28.812326.021 29.05
2338.34 28.85 2350.65 29.062356.805 28.77 2381.444 29.142393.754
29.722406.073 30.992412.229 31.462418.384 32.59 2424.548 33.142430.703
32.912443.022 31.72449.177 32.072455.332 31.86 2461.487 32.012473.807
31.932486.126 31.512492.281 31.422498.436 31.47 2504.591 31.722510.755 31.83
2516.91 31.46 2529.23 31.172547.704 31.7 2566.169 31.622572.333 31.752584.643
31.552603.118 30.782609.273 30.37 2615.437 30.312621.592 30.092627.747
30.922633.911 32.752640.066 33.28 2646.221 33.362658.541 32.922664.696
33.32670.851 33.42677.015 33.3 2683.17 33.56 2695.49 33.652701.645
33.852726.274 33.682744.748 34.19 2750.903 34.532757.058 34.092775.532
34.782781.697 35.212787.852 35.25 2800.171 35.592806.326 34.772812.481
33.122818.636 32.642824.801 34.08 2830.956 37.092843.275 40.05 2849.43
41.032855.585 41.452867.904 43.45 2874.059 43.92886.379 44.082898.688
44.682904.853 44.852917.163 44.85 2923.318 45.072929.482 45.152935.637
45.472941.792 46.062954.112 47.59 2960.267 48.25

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .091144.376 .041310.495 .093

Bank Sta: Left Right Coeff Contr. Expan.
 1144.3761310.495 .5 .8 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 01118.234 23 T
 13102960.267 23 T
Skew Angle = 20

Upstream Embankment side slope = 0 horiz. to 1.0 vertical Downstream
Embankment side slope = 0 horiz. to 1.0 vertical Maximum allowable
submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Piers = 2

Pier Data
Pier Station Upstream=1189.651 Downstream=1199.987
Upstream num= 6
 Width Elev Width Elev Width Elev Width Elev Width Elev Width Elev 11 .8 11 5 3.5 5.1 3
8 2 18 3 18.1
Downstream num= 6
 Width Elev Width Elev Width Elev Width Elev Width Elev Width Elev 11 .8 11 5 3.5 5.1 3
8 2 18 3 18.1

Pier Data
Pier Station Upstream=1232.877 Downstream=1243.213
Upstream num= 6
 Width Elev Width Elev Width Elev Width Elev Width Elev Width Elev 11 .8 11 5 3.5 5.1 3
8 2 18 3 18.1
Downstream num= 6
 Width Elev Width Elev Width Elev Width Elev Width Elev Width Elev 11 .8 11 5 3.5 5.1 3
8 2 18 3 18.1

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
 Energy
 W.S. Pro Method

 W.S.Pro Data
 Left Embankment
 El of the top of the embankment = 24
 El of the toe of the abutment = 5.7
 Right Embankment
 El of the top of the embankment = 24
 El of the toe of the abutment = 5.7 Abutment Type = 4 Vert. abutments and
sloping embankments with wingwalls Slope of abutments =
 Top with of embankment = 50
 Centroid station of bridge opening =
 Wing Wall Type = Angular wing walls
 Width = 22
 Angle = 45
 Radius =
 Guide Banks Type = No Guide Bank present
 Length =
 Offset =
 Angle =
 Optional Contraction and expansion coefficients
 At approach Section
 At Guide Bank
 At upstream outside
 At upstream inside (BU)
 At downstream inside (BD)
 Piers are Continuous for the width of the bridge
 Use Geometric mean as Friction Slope Method

Selected Low Flow Methods = W.S.Pro Method

High Flow Method
 Pressure and Weir flow Submerged Inlet Cd =
 Submerged Inlet + Outlet Cd = .8
 Max Low Cord =

Additional Bridge Parameters
 Add Friction component to Momentum
 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 56196.91

INPUT
Description: 54.3 DS FAce Harding St Rte 44
Station Elevation Data num= 281
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 29.39 6.155 29.56 12.301
29.42 18.456 29.55 30.766 29.35 43.066 29.5 49.221 29.42 61.522 28.94 67.677
29.05 79.987 28.42 92.287 28.35 98.442 28.44 104.597 28.37 110.743 27.97
116.898 27.72 123.053 27.76 129.208 28.07 135.353 28.04 141.508 26.47
147.663 25.99 153.818 27.05 159.964 27.72 172.274 28.23 178.429 28.89
184.574 29.3 190.729 29.2 196.884 28.57 203.039 28.72 209.185 28.63 215.34
28.32 246.105 28.71 252.251 28.65 264.561 29.09 289.172 29.11 295.327 29.03
301.472 29.09 332.238 30.57 338.393 30.69 363.003 30.38 369.158 30.22
387.614 30.25 399.914 30.02 436.835 30.36 492.202 30.23 498.357 29.9 510.667
29.66 516.812 29.44 522.967 29.56 541.423 29.36 553.733 28.89 566.033 29
590.644 28.48 596.799 28.17 633.719 27.09 639.865 27 646.02 27.13 707.542
26.67 726.006 27.1 738.307 26.88 750.617 26.86 762.918 27.14 769.073 27.05
781.373 26.45 805.984 25.92 818.294 25.95 842.904 26.67 849.059 26.7 873.67
25.84 879.815 25.85 885.97 25.59 898.28 24.59 904.426 24.38 910.581 24.43
922.882 23.49 929.036 22.8 935.192 21.68 941.346 21.54 947.492 20.88 953.647
20.58 972.103 20.37 978.258 20.11 984.413 20.24 996.713 19.471002.868
19.351015.178 18.76 1021.324 19.031027.479 18.811033.634 18.921039.789
19.641045.934 20.02 1052.089 19.791058.244 19.261064.399 19.63 1076.7
19.591082.855 19.46 1101.31 19.521113.611 19.831119.766 19.781132.076
18.991138.221 20.24 1144.376 20.751150.531 18.961156.687 15.761162.832
12.751168.893 9.39 1169.917 6.511173.375 5.921190.356 3.471213.397
1.241220.943 1.83 1228.573 2.121238.383 .811258.878 1.551265.428 3.1 1273.96
3.32 1282.671 5.46 1287.83 8.25 1292.04 9.951298.195 12.62 1304.34 15.54
1310.495 17.88 1316.65 18.131322.805 18.021335.106 18.321341.261 18.15
1353.562 18.681359.716 20.471378.172 20.421384.327 20.051390.482 19.99
1396.637 19.761427.393 19.311433.548 19.491439.703 19.531458.159 20.3
1464.314 20.121470.459 20.11476.614 20.661488.924 20.94 1495.07 20.5 1501.225
20.21 1507.38 20.431513.535 20.44 1519.68 20.31 1531.99 19.84 1538.145
19.731544.291 19.31556.601 19.591562.756 19.411568.901 19.53 1575.056
19.511581.211 19.11587.366 18.961593.512 18.971605.822 19.36 1618.122
19.461630.432 19.841661.189 19.771673.499 20.31679.654 20.39 1691.954 19.73
1710.41 19.65 1735.02 20.29 1747.33 21.091753.485 21.14 1759.631
21.471765.786 21.651771.941 22.121778.086 22.251784.241 23.65 1796.551

23.761821.162 24.611839.617 24.751864.228 25.21882.684 25.22 1888.839
25.381894.994 25.371901.139 25.531925.769 25.551938.088 25.7 1968.872
25.831975.027 25.961981.192 25.881993.501 25.951999.656 26.51 2005.821 26.74
2030.45 26.662036.605 26.77 2055.08 26.762079.709 26.51 2092.028
26.662110.503 26.492122.813 26.262128.977 26.392135.132 26.23 2141.287
26.42153.606 27.022172.081 27.382178.236 27.68 2196.71 27.74 2202.865 27.65
2209.02 28.432215.185 28.622221.339 28.662227.494 28.85 2258.288 292270.598
29.412276.762 29.362289.073 29.612301.392 28.92 2313.702 28.812326.021 29.05
2338.34 28.85 2350.65 29.062356.805 28.77 2381.444 29.142393.754
29.722406.073 30.992412.229 31.462418.384 32.59 2424.548 33.142430.703
32.912443.022 31.72449.177 32.072455.332 31.86 2461.487 32.012473.807
31.932486.126 31.512492.281 31.422498.436 31.47 2504.591 31.722510.755 31.83
2516.91 31.46 2529.23 31.172547.704 31.7 2566.169 31.622572.333 31.752584.643
31.552603.118 30.782609.273 30.37 2615.437 30.312621.592 30.092627.747
30.922633.911 32.752640.066 33.28 2646.221 33.362658.541 32.922664.696
33.32670.851 33.42677.015 33.3 2683.17 33.56 2695.49 33.652701.645
33.852726.274 33.682744.748 34.19 2750.903 34.532757.058 34.092775.532
34.782781.697 35.212787.852 35.25 2800.171 35.592806.326 34.772812.481
33.122818.636 32.642824.801 34.08 2830.956 37.092843.275 40.05 2849.43
41.032855.585 41.452867.904 43.45 2874.059 43.92886.379 44.082898.688
44.682904.853 44.852917.163 44.85 2923.318 45.072929.482 45.152935.637
45.472941.792 46.062954.112 47.59 2960.267 48.25

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .091144.376 .041310.495 .093

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1144.3761310.495 110.85 93.05 75.7 .5 .8 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 01118.234 23 T
 13102960.267 23 T
Skew Angle = 20

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 56103.86

INPUT Description: 54 Exit Harding St Rte 44
Station Elevation Data num= 386
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 28.27 6.54 28.26 13.07 28.27
19.61 28.32 26.15 28.4 32.68 28.44 39.22 28.68 45.76 28.95 58.83 29.04 65.37
29.18 71.9 29.34 78.44 29.37 84.98 29.34 91.51 29.38 98.05 29.83 104.59
30.14 111.13 30.19 124.2 29.89 130.74 29.83 137.27 29.83 143.81 29.96 150.35
29.97 156.88 29.91 163.42 30.07 169.96 30.14 176.49 30.12 183.03 30.24
189.57 30.39 196.1 30.56 209.18 30.4 215.71 30.61 228.79 30.48 235.32 30.34
241.86 30.45 248.4 30.59 254.93 30.47 261.47 30.58 268.01 30.61 274.54 30.6
281.08 30.77 287.62 30.78 294.15 30.57 300.69 30.42 313.77 30.17 320.3 30.29
326.84 30.29 333.38 30.14 339.91 30.13 346.45 30.14 352.99 30.07 359.52
29.83 366.06 29.76 372.6 29.85 379.13 29.99 385.67 29.89 392.21 29.53 398.74
29.41 405.28 29.41 411.82 29.31 418.35 29.12 424.89 29.07 431.43 28.88
437.96 28.76 444.5 28.53 451.04 28.58 464.11 28.61 470.65 28.72 477.18 28.79

483.72 28.68 490.26 28.7 496.8 28.69 503.33 28.59 509.87 28.75 522.94 28.78
529.48 28.69 536.02 28.48 542.55 28.45 549.09 28.28 555.63 28.13 562.16
28.27 568.7 28.37 575.24 28.21 581.77 28.1 588.31 28.34 594.85 28.34 601.38
27.58 607.92 26.4 614.46 25.47 620.99 25.26 627.53 25.22 634.07 25.33 640.6
25.41 653.68 25.34 666.75 25.31 699.43 25.35 712.51 25.35 725.58 25.32
738.66 25.23 751.73 25.07 758.27 25 764.8 24.95 771.34 24.93 777.88 24.89
784.41 24.7 790.95 24.33 797.49 23 804.02 22.05 810.56 22.16 817.1 22.86
823.63 23.62 830.17 23.87 836.71 23.66 843.24 23.34 849.78 23.04 856.32
22.09 862.85 20.44 869.39 18.9 875.93 17.32 882.46 16.45 889 16.22 895.54
15.96 902.08 14.86 908.61 14.32 915.15 13.66 921.69 13.81 928.22 13.6 934.76
13.7 941.3 13.58 947.83 13.39 954.37 13.36 960.91 13.41 967.44 13.38 973.98
13.06 980.52 12.76 987.05 12.6 993.59 12.53 1000.13 12.74 1006.66 13.08
1055.36 14.35 1087.33 10.17 1177.61 12.89 1193.55 9.09 1198.38 3.46 1214.37
2.87 1234.25 2.01 1250.52 1.17 1262.83 .63 1272.4 1.28 1279.49 .8 1288.91
1.26 1298.05 1.66 1309.47 4.54 1313.32 8.87 1366.33 11.88 1398.96 17.27
1438.36 17.51 1444.92 17.45 1451.48 17.64 1458.04 17.76 1464.6 18.07 1477.71
19.01 1484.27 19.29 1490.83 19.38 1497.39 19.53 1503.95 19.89 1510.51 19.83
1517.07 19.37 1523.63 19.46 1530.18 19.46 1543.3 19.17 1549.86 18.66 1556.42
18.48 1562.98 18.12 1569.54 17.93 1576.1 18.01 1582.65 18.12 1589.21 18.34
1595.77 18.64 1602.33 18.59 1608.89 18 1615.45 17.48 1622.01 16.72 1628.57
16.37 1635.12 15.88 1641.68 15.2 1648.24 15 1654.8 14.95 1661.36 14.76
1667.92 15.28 1674.48 15.59 1681.03 15.44 1687.59 15.14 1694.15 15.33
1700.71 15.54 1707.27 15.62 1713.83 15.35 1720.39 15.33 1726.95 15.02 1733.5
15.59 1740.06 16.4 1746.62 16.13 1753.18 15.18 1759.74 14.79 1766.3 14.86
1772.86 15.1 1779.42 15.21 1785.97 15.23 1792.53 15.17 1799.09 15.04 1805.65
14.62 1812.21 14.7 1818.77 15.61 1825.33 16.71 1838.44 17.8 1851.56 18.53
1858.12 19.07 1864.68 19.48 1871.24 20 1877.8 20.27 1884.35 20.79 1890.91
21.17 1897.47 21.44 1904.03 21.68 1910.59 22.03 1917.15 22.29 1923.71 22.26
1930.27 22.13 1943.38 21.69 1949.94 21.03 1956.5 20.53 1963.06 20.21 1969.62
20.08 1976.18 20.02 1982.74 19.94 1989.29 20.06 1995.85 20.53 2002.41 21.12
2008.97 21.69 2015.53 21.91 2022.09 21.77 2028.65 21.93 2035.2 22.12 2041.76
22.16 2048.32 22.24 2054.88 22.45 2061.44 22.72 2068 22.96 2074.56 23.12
2081.12 23.32 2087.67 23.56 2094.23 23.77 2100.79 23.82 2107.35 24.01
2113.91 24.15 2120.47 24.36 2127.03 24.73 2133.58 25.05 2140.14 25.57
2153.26 25.98 2159.82 26.27 2166.38 26.43 2179.5 26.5 2192.61 26.66 2199.17
26.77 2205.73 26.82 2212.29 26.73 2218.85 26.75 2225.41 26.73 2245.08 26.56
2251.64 26.61 2258.2 26.56 2264.76 26.48 2271.32 26.36 2277.88 26.13 2284.43
26.04 2290.99 26.03 2297.55 25.96 2304.11 25.93 2310.67 26 2317.23 25.94
2323.79 25.83 2330.34 25.7 2336.9 25.54 2343.46 25.28 2350.02 25.1 2356.58
25.11 2363.14 25.42 2369.7 25.77 2376.26 25.91 2382.81 25.99 2389.37 26.11
2395.93 26.19 2402.49 26.29 2409.05 26.3 2415.61 26.34 2422.17 26.51 2428.72
26.76 2435.28 26.75 2441.84 26.71 2448.4 26.89 2454.96 27.09 2461.52 27.2
2468.08 27.34 2481.19 27.57 2487.75 27.78 2494.31 27.93 2500.87 27.89
2507.43 27.77 2513.99 27.8 2520.55 27.93 2527.1 28.08 2533.66 28.16 2540.22
28.09 2546.78 28.07 2553.34 28.02 2559.9 28.13 2566.46 28.57 2573.02 28.94
2579.57 28.98 2586.13 28.88 2592.69 28.45 2599.25 28.17 2605.81 28.18
2612.37 28.13 2618.93 28.02 2625.48 28.02 2632.04 28.08 2638.6 28.16 2645.16
28.49 2651.72 28.91 2658.28 29.17 2664.84 29.28 2671.4 29.29 2684.51 29.06
2691.07 29.01 2697.63 28.58 2704.19 28.19 2710.75 28.17 2717.31 28.18
2723.86 27.85 2730.42 28.14 2736.98 28.46 2743.54 28.41 2750.1 28.15 2763.22
28.04 2769.78 27.93 2776.33 27.67 2782.89 27.48 2789.45 27.8 2796.01 27.75
2802.57 27.48 2809.13 27.59 2815.69 27.82 2822.24 28 2828.8 28.01 2841.92
27.69 2848.48 27.72 2855.04 27.95 2861.6 28.21 2868.16 28.93 2874.71 29.73
2881.27 30.34 2887.83 30.69 2900.95 31.23 2907.51 31.45 2914.07 31.73

2920.62 32.29 2927.18 33.33 2933.74 35.26 2940.3 38.07 2946.86 40.7 2953.42
42.48 2959.98 43.53 2966.54 43.98 2973.09 44.21 2979.65 44.49 2986.21 44.72
2992.77 44.85 2999.33 45.05 3012.45 45.59 3019 46.69 3025.56 48.48 3032.12
50.69 3038.68 52.6 3045.24 53.19 3051.8 53.36

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 1177.61 .04 1398.96 .093

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1177.61
1398.96 1404.65 1394.42 1387.7 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 1504 3051.8 19.9 T
 CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 54709.44

INPUT
Description: 53
Station Elevation Data num= 245
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 54.31 6.56 53.82 13.12 53.15
26.24 52.53 45.93 51.98 59.05 50.79 72.17 50.59 78.73 50.22 85.29 49.64
104.98 46.75 137.78 43.05 144.34 42.41 150.9 41.97 164.03 41.52 177.15 40.63
190.27 39.27 196.83 38.31 203.39 37.04 209.95 36.07 229.64 34.07 236.2 33.66
249.32 33.28 275.56 32 282.13 31.54 295.25 31.01 308.37 30.34 314.93 30.12
328.05 29.93 347.74 28.81 373.98 27.96 380.54 27.86 387.1 27.49 393.66 26.96
400.22 26.69 406.79 26.6 413.35 25.95 433.03 24.7 439.59 24.46 446.15 23.92
459.27 23.42 472.4 23.27 485.52 23.4 498.64 22.97 505.2 22.94 538.01 22.37
551.13 22.47 564.25 22.29 570.81 22.3 577.37 22.46 583.93 22.44 590.5 22.11
597.06 20.95 603.62 19.96 610.18 19.23 616.74 19.08 728.28 19.08 734.84
19.86 741.4 20.9 747.96 21.6 767.64 21.31 780.77 21.44 787.33 21.26 800.45
20.57 820.13 19.94 826.69 19.87 859.5 20.74 879.18 20.73 885.74 20.97 898.87
20.73 918.55 20.04 944.79 19.62 1003.84 19.08 1023.53 18.26 1049.77 17.84
1082.58 16.73 1089.14 16.28 1095.7 16.51 1102.26 16.16 1115.38 14.81 1128.5
14.28 1161.31 12.26 1167.87 11.7 1207.24 11.03 1226.92 11.15 1238.36 10.82
1240.04 10.76 1246.6 9.44 1253.16 7.18 1259.72 6.37 1265 2.68 1265.67 2.45
1266.54 2.04 1267.35 1.63 1268.46 1.22 1269.24 .97 1269.81 .83 1270.58 .74
1271.6 .54 1272.79 .4 1274.25 .27 1275.85 .18 1279.5 .04 1281.57 .07 1283.35
.12 1285.16 .2 1286.84 .39 1288.46 .51 1290 .58 1291.73 .79 1293.43 .39
1295.54 .64 1297.53 .05 1299.63 .19 1301.63 .08 1303.73 .18 1305.6 .08
1307.89 .15 1309.91 .05 1312.17 .05 1314.26 -.03 1316.66 .01 1319 -.33
1321.42 -.27 1323.54 -.06 1325.73 -.01 1327.74 .1 1329.7 .23 1331.56 .43
1333.48 .6 1335.26 .89 1337.12 1.18 1338.8 1.4 1340.56 1.6 1342.29 1.7
1343.89 1.66 1345.58 1.55 1347.44 1.42 1349.31 1.28 1351.23 1.29 1352.99 3
1358.14 6.88 1364.7 9.6 1367.96 10.49 1371.26 11.4 1377.82 12.74 1384.38
12.96 1390.94 12.91 1404.07 12.31 1410.63 12.34 1417.19 12.74 1430.31 14.09
1436.87 15.08 1443.43 15.85 1449.99 16.15 1476.24 16.02 1495.92 16.72
1515.61 16.65 1535.29 16.88 1541.85 17.13 1548.41 17.04 1554.97 17.14
1561.53 17.4 1568.09 17.35 1574.65 16.76 1581.22 17.83 1587.78 18.48 1594.34
18.77 1607.46 19.12 1614.02 19.18 1633.7 18.78 1640.27 18.83 1659.95 18.59
1666.51 18.35 1673.07 17.85 1679.63 17.62 1686.19 17.22 1705.88 15.47
1712.44 14.76 1719 14.29 1725.56 14.19 1732.12 13.88 1758.36 13.77 1764.93

13.84 1771.49 14.16 1784.61 13.96 1791.17 14.21 1797.73 14.26 1804.29 14.06
1810.85 14.06 1817.41 14.45 1830.54 14.71 1843.66 14.68 1869.9 15.41 1889.59
16.91 1896.15 17.02 1902.71 17.51 1909.27 18.46 1915.83 19.08 1948.64 20.65
1974.88 21.26 1988 21.98 2001.12 23 2007.68 23.37 2014.25 23.51 2020.81
23.98 2047.05 24.15 2053.61 24.09 2066.73 24.45 2079.86 24.19 2099.54 24.39
2106.1 24.25 2119.22 24.56 2125.78 24.56 2138.91 25.06 2145.47 25.08 2158.59
24.81 2171.71 24.94 2178.27 25.22 2184.84 25.33 2191.4 25.18 2211.08 25.37
2224.2 26.22 2230.76 27.36 2237.32 27.79 2243.88 27.75 2250.45 27.42 2257.01
27.57 2270.13 28.21 2276.69 28.26 2289.81 28.01 2302.94 28.22 2316.06 28.21
2322.62 28.31 2335.74 28.2 2355.42 28.43 2375.11 28.15 2381.67 28.27 2394.79
28.83 2447.28 29.66 2460.4 30.12 2466.96 30.51 2473.52 30.76 2480.08 30.82
2493.21 31.34 2499.77 31.5

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 1240.04 .04 1377.82 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1240.04
1377.82 1402 1447.38 1492.06 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 741 20.9 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 53262.06

INPUT
Description: 52
Station Elevation Data num= 230
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 56.56 13.09 52.88 26.17
49.61 32.71 48.2 39.26 46.65 52.34 43.12 65.43 39.85 71.97 38.4 78.51 37.6
85.05 36.23 91.6 34.6 104.68 31.8 111.22 30.73 117.77 30.02 124.31 29.55
150.48 28.11 163.56 27.48 170.11 26.85 183.19 25.93 215.91 24.38 222.45
23.75 228.99 22.55 235.53 21.14 242.08 20.16 340.22 20.16 346.76 20.27
359.84 21.08 392.56 21.69 405.64 21.47 412.18 21.67 425.27 21.72 438.35 22.1
444.9 21.91 457.98 22.09 464.52 22.32 497.24 22.89 510.32 22.81 529.95 22.24
549.58 21.53 556.12 21.45 575.75 20.69 582.29 20.26 595.38 19.73 608.46
19.48 634.63 19.33 647.72 19.48 673.89 19.48 772.03 18.93 778.57 18.97
785.11 18.87 798.2 19.37 811.28 19.16 824.37 19.61 837.45 19.01 850.54 18.83
870.17 19.12 876.71 19.31 883.25 19.35 889.79 18.92 896.34 18.01 902.88
17.82 915.96 18.29 922.51 18.92 929.05 19.27 942.13 19.31 955.22 19.58
961.76 19.84 968.31 19.85 981.39 18.42 987.93 18.43 994.48 18.69 1001.02
19.17 1007.56 19.88 1014.1 20.32 1020.65 20.47 1033.73 20.3 1053.36 20.35
1059.9 20.51 1072.99 20.53 1079.53 20.69 1086.07 20.65 1105.7 20.92 1118.79
21.77 1125.33 21.23 1131.87 21.35 1151.5 21.02 1158.04 21.06 1184.21 20.79
1190.75 20.48 1197.3 20.02 1203.84 19.73 1216.92 20.08 1223.47 19.82 1230.01
19.71 1236.55 20.93 1243.09 22.63 1249.64 23.92 1256.18 24.57 1269.27 25.28
1288.89 25.24 1301.98 25.01 1321.61 24.89 1334.69 24.03 1367.39 22.85
1373.92 22.47 1380.44 21.96 1419.61 21.34 1426.13 21.06 1432.66 20.5 1445.72
19.72 1452.24 19.11 1465.3 16.79 1478.35 15.33 1497.93 13.7 1504.46 13.33
1517.52 12.28 1524.04 11.6 1530.57 10.66 1537.1 10.48 1550.15 11.56 1556.68
12.21 1569.73 12.91 1582.79 14.01 1602.37 14.75 1608.9 14.6 1615.43 14.14

1628.48 12.8 1641.53 11.29 1648.06 11.12 1661.12 11.6 1687.23 13.04 1693.26 13.13 1693.75 13.13 1700.28 12.92 1706.81 12.38 1713.33 11.57 1719.86 10.19 1726.39 7.8 1732 3.11 1733.34 2.82 1735.01 2.36 1736.79 1.68 1738.45 1.06 1741.04 .7 1743.34 .51 1745.57 .28 1747.65 .13 1749.92 .13 1752.28 .1 1754.93 .05 1757.44 .08 1760.14 .15 1762.53 .18 1765.04 .09 1767.28 0 1769.67 .02 1771.83 .02 1773.98 .04 1775.96 .1 1778.15 .22 1780.12 .36 1782.06 .42 1783.79 .54 1785.68 .56 1787.29 .94 1789.06 .86 1790.77 .94 1792.62 1.09 1794.24 1.1 1795.96 1.31 1797.46 1.15 1799.03 1.25 1800.27 1.31 1801.31 1.33 1802.42 1.42 1803.33 1.59 1804.24 1.58 1805.22 1.71 1806.53 2.08 1808.23 1.94 1809.74 2.1 1812.08 2.56 1814.74 2.53 1816.47 2.44 1817.99 2.67 1820.21 2.25 1823.81 2.93 1830.83 8.02 1832.32 8.74 1837.35 11.17 1843.88 11.37 1856.93 11.1 1863.46 11.27 1876.52 12.11 1883.04 12.63 1902.63 13.64 1915.68 14.55 1967.9 16.55 1974.43 16.89 1980.95 17.05 2000.53 18.07 2033.17 18.9 2046.23 19.66 2059.28 20 2078.86 20.08 2085.39 19.94 2137.2 20.46 2188.95 21.23 2208.35 21.88 2221.29 22.12 2240.69 22.74 2247.16 22.79 2253.63 23 2260.1 23.06 2279.51 22.7 2318.32 22.51 2324.79 22.22 2331.26 22.18 2370.07 23.54 2389.47 24.53 2415.35 26.6 2434.75 27.69 2473.57 30.53 2480.03 31.18 2492.97 32.34 2499.44 33.46 2505.91 34.02 2518.85 34.04 2531.78 33.73 2538.25 33.42

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .087 1693.26 .04 1915.68 .085
 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1693.26 1915.68 1383.55 1262.42 1156.9 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 1014 20.3 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 51999.64

INPUT
Description: 51 Approach Church St
Station Elevation Data num= 261
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 20.23 6.56 20.75 13.12 20.83 19.68 20.6 26.24 20.49 32.8 20.4 39.36 20.29 45.92 20.34 59.04 20.09 65.6 20.12 72.16 19.85 78.72 19.71 85.28 19.89 91.84 19.85 98.41 19.6 104.97 19.09 111.53 18.82 124.65 18.69 131.21 18.46 137.77 18.34 150.89 18.19 157.45 17.94 164.01 17.77 170.57 17.63 177.13 17.63 183.69 17.72 190.25 17.78 196.81 17.71 203.37 17.56 209.93 17.36 216.49 17.23 223.05 17.18 229.61 17.04 236.17 16.74 242.73 16.78 249.29 16.7 255.85 16.67 268.97 16.26 275.53 15.92 282.09 15.45 288.65 15.28 295.21 15.41 301.78 15.32 308.34 15.36 314.9 15.73 321.46 15.89 328.02 16.24 334.58 16.71 341.14 16.96 347.7 17.54 360.82 18.45 367.38 19.31 373.94 20 380.5 20.38 387.06 20.44 393.62 20.6 400.18 20.56 406.74 20.57 413.3 20.63 419.86 20.62 426.42 20.55 432.98 20.52 439.54 20.58 446.1 20.59 452.66 20.62 459.22 20.87 465.78 21.16 472.34 21.41 478.9 21.4 485.46 21.49 492.03 21.82 498.59 22.3 505.15 22.76 511.71 23.07 518.27 23.57 524.83 23.99 531.39 24.61 537.95 25.1 544.51 25.53 551.07 25.36 557.63 25.6 564.19 25.79 570.75 25.79 577.31 25.66 583.87 25.6 590.43 25.68 596.99 25.74 603.55 25.74 610.11 25.55 616.67 25.38 623.23 25.14 629.79 25.14 636.35 25.33 642.91 25.25 649.47 25.25 656.03 25.46 669.15

25.61 675.71 25.72 688.83 26.12 695.39 26.35 701.96 26.82 708.52 27.33
715.08 27.76 721.64 27.99 728.2 28.39 734.76 28.48 741.32 28.69 747.88 28.96
754.44 28.94 761 28.8 767.56 28.68 774.12 28.58 780.68 28.33 787.24 28.26
800.36 28.58 806.92 28.72 820.04 28.94 826.6 28.9 833.16 28.71 839.72 28.4
846.28 28.14 852.84 27.9 859.4 27.87 872.52 28.12 879.08 28.26 885.64 28.2
892.2 28.12 905.33 27.87 911.89 27.79 918.45 27.67 931.57 27.16 938.13 27.04
944.69 26.98 951.25 26.83 957.81 26.52 964.37 26.55 970.93 26.4 977.49 26.62
984.05 26.33 990.61 25.81 997.17 24.92 1003.73 24.7 1010.29 24.73 1016.85
24.5 1023.41 24.51 1029.97 24.35 1036.53 23.98 1043.09 23.45 1049.65 22.78
1062.77 21.41 1069.33 20.32 1075.89 19.42 1082.45 18.97 1089.01 18.35
1095.57 17.71 1102.14 17.14 1108.7 16.68 1115.26 16.31 1121.82 16.08 1146.82
14.81 1174.39 14.89 1195.35 13.57 1209.63 10.51 1215.33 5.51 1231.3 4.16
1242.8 2.86 1252.07 1.33 1259.46 1.18 1263.14 2.79 1273.05 2.99 1303.69 2.35
1316.2 2.34 1321.48 3.85 1326.85 8.36 1336.58 9.31 1343.03 9.66 1349.47 9.97
1355.92 10.22 1362.37 10.44 1368.81 10.6 1375.26 10.55 1381.7 10.58 1388.15
10.73 1394.59 10.81 1401.04 10.87 1407.48 10.95 1413.93 11.09 1420.37 11.27
1426.82 11.41 1433.27 11.5 1439.71 11.65 1446.16 11.84 1452.71 12.07 1459.26
12.34 1472.36 12.5 1478.91 12.63 1485.46 12.8 1492.02 12.89 1498.57 13.16
1505.12 13.35 1511.67 13.56 1518.22 13.89 1531.32 14.38 1537.87 14.61
1544.43 14.86 1550.98 14.99 1564.08 15.32 1570.63 15.52 1577.18 16.12
1583.73 17.1 1590.28 17.67 1596.84 17.94 1603.39 18.73 1609.94 19.71 1616.49
20.64 1623.04 21.16 1629.59 21.55 1636.14 21.73 1642.69 21.81 1649.25 22.44
1655.8 21.64 1662.35 20.46 1668.9 20.15 1675.45 20.26 1682 20.67 1688.55
21.3 1695.1 22.17 1701.66 22.76 1708.21 23.08 1714.76 23.22 1721.31 23.23
1727.86 23.27 1734.41 23.39 1740.96 23.4 1747.51 23.48 1760.62 23.49 1767.17
23.53 1773.72 23.62 1780.27 23.73 1786.82 23.7 1793.37 23.74 1799.92 23.9
1806.48 24.12 1813.03 24.32 1826.13 24.93 1832.68 25.38 1839.23 25.69
1845.78 25.83 1852.33 26.09 1858.89 26.23 1871.99 26.6 1878.54 26.64 1885.09
26.71 1891.64 26.86 1904.74 27.11 1911.3 27.26 1917.85 27.37 1924.4 27.5
1930.95 27.65 1937.5 27.76 1944.05 27.95

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 1174.39 .04 1368.81 .085
 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1174.39 1368.81 86.45 102.74 130.56 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 373 20 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 51896.9

INPUT
Description: 50.7 US Face Church St
Station Elevation Data num= 168
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 19.79 12.272 19.6 42.963
19.32 61.371 19.56 85.916 19.24 92.052 18.59 116.597 18.44 135.015 18.71
141.151 18.98 147.287 19.11 159.56 18.79 202.523 18.38 208.659 18.18 220.931
17.12 227.067 16.86 233.204 16.92 239.34 17.15 245.476 17.23 251.612 17.7
257.748 17.79 276.157 18.46 282.302 18.92 288.439 19.18 300.711 20.01
306.847 19.84 312.983 20.03 319.12 20.46 349.801 21.09 362.082 21.51 368.219

21.55 380.491 22.26 386.627 22.4 392.763 22.77 398.9 23.36 411.172 24.27
423.444 24.84 429.58 25.23 447.998 25.71 484.816 26.31 497.088 26.72 509.36
26.34 533.915 26.17 540.051 26.24 558.459 25.99 570.732 26.34 583.004 27.05
589.14 27.27 607.558 28.43 619.831 28.33 638.239 28.84 650.512 28.88 675.056
29.5 724.155 30.58 736.428 31.55 742.564 31.79 748.7 31.56 754.836 31.14
767.118 30.76 791.663 29.53 803.935 29.27 810.071 28.98 822.344 28.85
840.762 28.1 859.17 27.07 871.443 26.7 883.715 26.58 895.987 26.01 902.124
26.21 908.26 26.1 926.678 25.07 945.086 24.65 963.495 24.81 969.631 25.02
981.904 24.77 988.04 25.12 994.176 25.051000.322 25.231006.458 24.77 1018.73
24.971024.866 24.8 1031.003 24.781043.275 25.141049.411 25.451073.956
24.831079.322 24.93 1080.102 24.941086.238 24.361092.374 23.451106.901
4.091108.114 3.09 1116.665 2.851124.615 2.851130.488 1.11132.724 .331133.749
1.74 1134.284 -.131139.744 -.271146.679 -.741155.089 -1.791164.899 -1.4
1173.845 -.17 1183.28 -.481193.757 .631200.382 2.011207.693 4.71 1227.38
20.51233.525 20.691239.661 20.81245.797 21.02 1258.07 21.33 1264.206
21.451270.229 21.721276.262 21.731282.286 21.521288.309 20.95 1294.342
21.081300.365 21.371306.389 21.221312.422 21.281318.445 21.51 1324.469
21.761330.501 20.661336.525 20.211342.548 20.21348.581 20.12 1360.628
20.071366.661 20.11372.684 20.451378.708 20.86 1384.74 21.13 1390.764
21.351396.787 21.85 1402.82 22.231414.876 22.43 1420.9 22.49 1426.923
22.751432.947 22.91 1438.97 23.181445.003 23.291451.026 23.42 1457.05
23.481463.073 23.621469.097 23.73 1475.12 23.791481.143 23.87 1487.176
24.011499.223 24.231505.247 24.38 1511.27 24.55 1529.35 24.79 1535.373 24.82
1547.42 25.041559.467 25.57 1565.49 25.741571.523 25.83 1577.547 26.1 1583.57
26.191589.593 26.451595.617 26.73 1601.64 26.93 1607.664 27.041613.697 27.39
1619.72 27.511625.743 27.61631.767 27.72 1637.79 27.91643.814 28.111649.837
28.14

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .091079.322 .04 1227.38 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1079.322 1227.38 72.49 67.2 64.58 .5 .8 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 300 20 T
Skew Angle = 20

BRIDGE

RIVER: Taunton River
REACH: Main Stem RS: 51859.01

INPUT
Description: 50.5 Church St
Distance from Upstream XS = 6
Deck/Roadway Width = 53 Weir Coefficient = 2.6
Bridge Deck/Roadway Skew = 20
Upstream Deck/Roadway Coordinates
 num= 19
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 428.5 27.4 724.503 28.26 804.377 27.59
 918.08 26.04 1060.913 25.02 1100.38 25

1100.38 28.25 1103.199 28.25 1103.199 25.62 18.39 1153.943 25.12
18.081207.505 24.76 17.281207.505 28.27 1209.384 28.25 1210.324 28.19
1210.324 23.12 1297.715 22.75 1406.72 22.34 1547.674 24.79
1681.11 29.1

Upstream Bridge Cross Section Data
Station Elevation Data num= 168
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 19.79 12.272 19.6 42.963
19.32 61.371 19.56 85.916 19.24 92.052 18.59 116.597 18.44 135.015 18.71
141.151 18.98 147.287 19.11 159.56 18.79 202.523 18.38 208.659 18.18 220.931
17.12 227.067 16.86 233.204 16.92 239.34 17.15 245.476 17.23 251.612 17.7
257.748 17.79 276.157 18.46 282.302 18.92 288.439 19.18 300.711 20.01
306.847 19.84 312.983 20.03 319.12 20.46 349.801 21.09 362.082 21.51 368.219
21.55 380.491 22.26 386.627 22.4 392.763 22.77 398.9 23.36 411.172 24.27
423.444 24.84 429.58 25.23 447.998 25.71 484.816 26.31 497.088 26.72 509.36
26.34 533.915 26.17 540.051 26.24 558.459 25.99 570.732 26.34 583.004 27.05
589.14 27.27 607.558 28.43 619.831 28.33 638.239 28.84 650.512 28.88 675.056
29.5 724.155 30.58 736.428 31.55 742.564 31.79 748.7 31.56 754.836 31.14
767.118 30.76 791.663 29.53 803.935 29.27 810.071 28.98 822.344 28.85
840.762 28.1 859.17 27.07 871.443 26.7 883.715 26.58 895.987 26.01 902.124
26.21 908.26 26.1 926.678 25.07 945.086 24.65 963.495 24.81 969.631 25.02
981.904 24.77 988.04 25.12 994.176 25.051000.322 25.231006.458 24.77 1018.73
24.971024.866 24.8 1031.003 24.781043.275 25.141049.411 25.451073.956
24.831079.322 24.93 1080.102 24.941086.238 24.361092.374 23.451106.901
4.091108.114 3.09 1116.665 2.851124.615 2.851130.488 1.11132.724 .331133.749
1.74 1134.284 -.131139.744 -.271146.679 -.741155.089 -1.791164.899 -1.4
1173.845 -.17 1183.28 -.481193.757 .631200.382 2.011207.693 4.71 1227.38
20.51233.525 20.691239.661 20.81245.797 21.02 1258.07 21.33 1264.206
21.451270.229 21.721276.262 21.731282.286 21.521288.309 20.95 1294.342
21.081300.365 21.371306.389 21.221312.422 21.281318.445 21.51 1324.469
21.761330.501 20.661336.525 20.211342.548 20.21348.581 20.12 1360.628
20.071366.661 20.11372.684 20.451378.708 20.86 1384.74 21.13 1390.764
21.351396.787 21.85 1402.82 22.231414.876 22.43 1420.9 22.49 1426.923
22.751432.947 22.91 1438.97 23.181445.003 23.291451.026 23.42 1457.05
23.481463.073 23.621469.097 23.73 1475.12 23.791481.143 23.87 1487.176
24.011499.223 24.231505.247 24.38 1511.27 24.55 1529.35 24.79 1535.373 24.82
1547.42 25.041559.467 25.57 1565.49 25.741571.523 25.83 1577.547 26.1 1583.57
26.191589.593 26.451595.617 26.73 1601.64 26.93 1607.664 27.041613.697 27.39
1619.72 27.511625.743 27.61631.767 27.72 1637.79 27.91643.814 28.111649.837
28.14

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .091079.322 .04 1227.38 .085

Bank Sta: Left Right Coeff Contr. Expan.
1079.322 1227.38 .5 .8
Ineffective Flow num= 1
Sta L Sta R Elev Permanent
0 300 20 T
Skew Angle = 20
Downstream Deck/Roadway Coordinates
num= 19
Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord

457.63 27.4 753.633 28.26 833.507 27.59
947.21 26.04 1090.043 25.02 1129.51 25
1129.51 28.25 1132.33 28.25 1132.33 25.62 18.39 1183.073 25.12 18.081236.635
24.76 17.281236.635 28.27 1238.515 28.25 1239.455 28.19 1239.455 23.12
1326.846 22.75 1435.85 22.34 1576.804 24.79 1710.241 29.1

Downstream Bridge Cross Section Data
Station Elevation Data num= 244
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 23.49 6.164 23.79 12.329
23.96 18.493 24.43 24.658 24.5 30.822 24.61 36.986 24.53 43.151 24.26 49.315
24.18 55.479 24.13 67.808 23.92 73.973 23.75 80.137 23.55 86.301 23.29
92.466 22.97 98.63 22.73 104.795 22.36 110.959 21.33 117.123 20.23 123.288
19.77 129.452 19.9 141.781 20.09 147.936 20.24 154.1 20.16 160.265 19.92
166.429 19.78 172.593 19.53 178.758 19.2 184.922 19.03 191.087 18.72 197.251
18.61 203.415 18.57 209.58 18.5 215.744 18.41 221.908 18.65 228.073 18.58
234.237 18.6 240.402 18.85 246.566 19.06 252.73 18.89 258.895 19.05 271.223
18.9 277.388 19.19 283.552 19.36 289.717 19.55 295.881 19.81 302.045 19.92
308.21 19.95 314.374 20.29 320.539 20.68 326.703 21.05 332.867 21.3 339.032
21.68 345.196 22.01 351.36 22.16 357.525 22.5 363.689 22.93 369.854 23.42
376.018 23.68 388.347 24.78 394.511 25.02 400.676 25.28 406.84 25.38 413.004
25.74 419.169 26.19 425.333 26.55 431.488 26.68 437.652 26.74 443.817 26.9
449.981 26.88 456.146 27.01 462.31 27.11 474.639 27.39 480.803 27.22 486.967
27.38 493.132 27.47 499.296 27.5 505.461 27.61 511.625 27.62 517.789 27.65
530.118 27.8 536.283 27.81 548.611 27.8 554.776 27.75 560.94 27.83 567.104
27.83 573.269 27.9 585.598 27.93 591.762 28.07 597.926 28 604.091 28.04
610.255 28.13 616.42 28.1 622.584 28.24 628.748 28.32 634.913 28.16 641.077
28.21 647.242 28.33 653.406 28.32 659.57 28.49 665.735 28.46 671.899 28.49
678.063 28.67 684.228 28.66 690.392 28.77 696.557 28.64 702.721 28.62
708.885 28.52 715.05 28.76 721.214 28.88 727.378 28.93 733.543 28.9 739.707
28.96 745.862 29.21 752.027 29.41 758.191 29.52 764.355 29.6 770.52 29.78
776.684 29.93 782.849 30.01 789.013 30.18 801.342 30.67 807.506 30.78 813.67
30.95 819.835 30.91 825.999 30.9 832.164 30.85 838.328 30.72 844.492 30.65
850.657 30.54 862.985 30.71 869.15 30.34 875.314 30.02 881.479 28.92 887.643
27.66 893.807 27.31 899.972 27.24 906.136 27.19 918.465 27.02 924.629 26.97
930.794 26.9 943.122 26.58 955.451 26.3 961.616 26.18 967.78 26.12 980.109
25.79 986.273 25.66 992.438 25.62 998.602 25.411004.766 25.27 1010.931
25.421017.095 25.42 1023.26 25.31029.424 25.161035.588 25.16 1041.753
25.11047.917 24.841054.081 24.931060.236 24.741066.401 24.65 1072.565
24.421078.729 24.381084.894 24.091091.058 23.831097.223 23.75 1103.387 23.81
1132.33 25.521132.743 4.561148.107 2.451165.106 .79 1179.192 .361186.982
.791199.236 1.81210.503 .651220.642 1.33 1233.046 3.841233.083 21.041245.168
23.491251.332 23.391257.497 23.22 1263.661 23.211269.825 23.48 1275.99
23.561282.154 23.451288.319 23.21 1294.483 23.331300.647 23.311306.812
22.761312.976 22.331319.141 22.19 1325.305 22.141331.469 22.231337.634
22.281343.798 22.541349.962 22.73 1356.117 22.561362.282 22.411368.446 22.44
1374.61 22.521380.775 22.47 1386.939 22.471393.104 22.341399.268 22.11405.432
22.111411.597 22.04 1417.761 21.991423.926 22.181430.034 22.411436.151
22.571442.259 22.66 1448.367 22.841454.475 23.111460.583 23.421466.691
23.631472.799 23.71 1478.907 23.831485.015 24.011491.132 24.26 1497.24
24.41503.348 24.5 1509.456 24.651515.564 24.881521.672 25.05 1527.78
25.291533.888 25.76 1540.006 25.921546.114 26.041552.222 26.1 1558.33
25.841564.438 25.42 1570.546 25.41576.654 25.771582.762 26.73 1588.87
27.111594.987 27.21 1601.095 27.461607.203 27.751613.311 28.121625.527
28.391631.635 28.67 1637.743 28.921643.861 29.041649.969 29.321656.077 29.37

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 1132.33 .041245.168 .08

Bank Sta: Left Right Coeff Contr. Expan. 1132.331245.168 .5 .8
Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 320 20 T
Skew Angle = 20

Upstream Embankment side slope = 0 horiz. to 1.0 vertical Downstream Embankment side slope = 0 horiz. to 1.0 vertical Maximum allowable submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
 Energy
 W.S. Pro Method

 W.S.Pro Data
 Left Embankment
 El of the top of the embankment = 25
 El of the toe of the abutment = 4.5
 Right Embankment
 El of the top of the embankment = 25
 El of the toe of the abutment = 4.5 Abutment Type = 4 Vert. abutments and sloping embankments with wingwalls Slope of abutments =
 Top with of embankment = 53
 Centroid station of bridge opening =
 Wing Wall Type = Angular wing walls
 Width = 5
 Angle = 45
 Radius =
 Guide Banks Type = No Guide Bank present
 Length =
 Offset =
 Angle =
 Optional Contraction and expansion coefficients
 At approach Section
 At Guide Bank
 At upstream outside
 At upstream inside (BU)
 At downstream inside (BD)
 Piers are Continuous for the width of the bridge
 Use Geometric mean as Friction Slope Method

Selected Low Flow Methods = W.S.Pro Method

High Flow Method

```
 Pressure and Weir flow  Submerged Inlet Cd =
 Submerged Inlet + Outlet Cd = .8
 Max Low Cord =

Additional Bridge Parameters
 Add Friction component to Momentum
 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION


RIVER: Taunton River
REACH: Main Stem RS: 51829.71

INPUT
Description: 50.3 DS Face Church St
Station Elevation Data num= 244
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  0 23.49 6.164 23.79 12.329
23.96 18.493 24.43 24.658 24.5  30.822 24.61 36.986 24.53 43.151 24.26 49.315
24.18 55.479 24.13  67.808 23.92 73.973 23.75 80.137 23.55 86.301 23.29
92.466 22.97  98.63 22.73 104.795 22.36 110.959 21.33 117.123 20.23 123.288
19.77  129.452 19.9 141.781 20.09 147.936 20.24 154.1 20.16 160.265 19.92
166.429 19.78 172.593 19.53 178.758 19.2 184.922 19.03 191.087 18.72  197.251
18.61 203.415 18.57 209.58 18.5 215.744 18.41 221.908 18.65  228.073 18.58
234.237 18.6 240.402 18.85 246.566 19.06 252.73 18.89  258.895 19.05 271.223
18.9 277.388 19.19 283.552 19.36 289.717 19.55  295.881 19.81 302.045 19.92
308.21 19.95 314.374 20.29 320.539 20.68  326.703 21.05 332.867 21.3 339.032
21.68 345.196 22.01 351.36 22.16  357.525 22.5 363.689 22.93 369.854 23.42
376.018 23.68 388.347 24.78  394.511 25.02 400.676 25.28 406.84 25.38 413.004
25.74 419.169 26.19  425.333 26.55 431.488 26.68 437.652 26.74 443.817 26.9
449.981 26.88  456.146 27.01 462.31 27.11 474.639 27.39 480.803 27.22 486.967
27.38  493.132 27.47 499.296 27.5 505.461 27.61 511.625 27.62 517.789 27.65
530.118 27.8 536.283 27.81 548.611 27.8 554.776 27.75 560.94 27.83  567.104
27.83 573.269 27.9 585.598 27.93 591.762 28.07 597.926 28  604.091 28.04
610.255 28.13 616.42 28.1 622.584 28.24 628.748 28.32  634.913 28.16 641.077
28.21 647.242 28.33 653.406 28.32 659.57 28.49  665.735 28.46 671.899 28.49
678.063 28.67 684.228 28.66 690.392 28.77  696.557 28.64 702.721 28.62
708.885 28.52 715.05 28.76 721.214 28.88  727.378 28.93 733.543 28.9 739.707
28.96 745.862 29.21 752.027 29.41  758.191 29.52 764.355 29.6 770.52 29.78
776.684 29.93 782.849 30.01  789.013 30.18 801.342 30.67 807.506 30.78 813.67
30.95 819.835 30.91  825.999 30.9 832.164 30.85 838.328 30.72 844.492 30.65
850.657 30.54  862.985 30.71 869.15 30.34 875.314 30.02 881.479 28.92 887.643
27.66  893.807 27.31 899.972 27.24 906.136 27.19 918.465 27.02 924.629 26.97
930.794 26.9 943.122 26.58 955.451 26.3 961.616 26.18 967.78 26.12  980.109
25.79 986.273 25.66 992.438 25.62 998.602 25.411004.766 25.27 1010.931
25.421017.095 25.42 1023.26 25.31029.424 25.161035.588 25.16 1041.753
25.11047.917 24.841054.081 24.931060.236 24.741066.401 24.65 1072.565
24.421078.729 24.381084.894 24.091091.058 23.831097.223 23.75 1103.387 23.81
1132.33 25.521132.743 4.561148.107 2.451165.106 .79 1179.192 .361186.982
.791199.236 1.81210.503 .651220.642 1.33 1233.046 3.841233.083 21.041245.168
23.491251.332 23.391257.497 23.22 1263.661 23.211269.825 23.48 1275.99
```

23.561282.154 23.451288.319 23.21 1294.483 23.331300.647 23.311306.812
22.761312.976 22.331319.141 22.19 1325.305 22.141331.469 22.231337.634
22.281343.798 22.541349.962 22.73 1356.117 22.561362.282 22.411368.446 22.44
1374.61 22.521380.775 22.47 1386.939 22.471393.104 22.341399.268 22.11405.432
22.111411.597 22.04 1417.761 21.991423.926 22.181430.034 22.411436.151
22.571442.259 22.66 1448.367 22.841454.475 23.111460.583 23.421466.691
23.631472.799 23.71 1478.907 23.831485.015 24.011491.132 24.26 1497.24
24.41503.348 24.5 1509.456 24.651515.564 24.881521.672 25.05 1527.78
25.291533.888 25.76 1540.006 25.921546.114 26.041552.222 26.1 1558.33
25.841564.438 25.42 1570.546 25.41576.654 25.771582.762 26.73 1588.87
27.111594.987 27.21 1601.095 27.461607.203 27.751613.311 28.121625.527
28.391631.635 28.67 1637.743 28.921643.861 29.041649.969 29.321656.077 29.37

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 1132.33 .041245.168 .08
 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1132.331245.168 68.99 67.69 68.38 .5 .8 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 320 20 T
Skew Angle = 20

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 51762.02

INPUT
Description: 50 Exit Church St
Station Elevation Data num= 157
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 25.27 13.11 25.29 32.77
25.22 52.43 25.51 72.09 25.31 98.31 24.61 111.42 23.84 124.52 23.42 131.08
22.87 144.19 21.01 150.74 20.61 157.29 20.52 163.85 20.7 176.95 21.4 183.51
21.46 196.62 20.55 203.17 20.38 209.72 20.56 216.28 21.02 222.83 21.83
235.94 23.72 249.05 24.87 262.15 25.5 281.82 25.29 308.03 25.44 321.14 25.26
334.25 25.25 347.36 25.04 360.46 25.07 386.68 25.53 393.23 25.53 419.45
25.19 426 25.19 445.66 24.91 452.22 24.91 471.88 24.64 478.43 24.68 491.54
24.46 498.09 24.47 517.76 25.04 530.86 24.87 550.53 25.24 609.51 28.16
635.73 28.88 642.28 29.17 661.94 29.27 668.49 29.59 681.6 29.78 694.71 30.55
701.26 31.12 707.82 31.52 714.37 31.56 727.48 31.1 734.03 31.05 747.14 31.4
773.36 31.87 806.13 32.94 832.34 33.17 865.11 33.87 897.88 33.78 904.43
33.49 910.99 32.69 917.54 31.42 924.1 31.25 930.65 31.34 943.76 31.29 950.31
31.01 969.97 28.88 976.53 28.26 989.63 26.62 1022.4 21.43 1035.51 19.55
1042.07 18.75 1048.62 18.47 1055.17 18.33 1061.73 17.5 1068.28 16.34 1081.39
15.47 1094.5 14.98 1120.71 14.56 1127.27 14.35 1153.48 12.09 1160.04 11.79
1179.7 10.45 1186.25 9.6 1192.8 9.25 1193.99 9.21 1215.13 8.29 1223.96 3.75
1228.38 2.93 1238.2 2.31 1245.13 2.04 1251.81 3.19 1262.56 3.16 1270.33 3.9
1277.49 3.87 1288.91 3.32 1299.85 3.12 1305.63 2.05 1312.18 3.45 1320.97
5.03 1322.43 8.36 1369.71 15.97 1376.21 17.11 1382.72 17.8 1389.22 18.33
1395.73 18.67 1402.23 18.79 1408.73 19.07 1421.74 19.77 1428.25 20.1 1434.75
20.27 1441.26 20.4 1447.76 20.55 1460.77 20.94 1467.27 21.22 1473.78 21.61
1480.28 21.86 1486.79 21.98 1493.29 22.25 1499.79 22.59 1506.3 22.88 1512.8
22.99 1519.31 23 1525.81 23.26 1532.31 23.47 1538.82 23.57 1545.32 23.73

1551.83 23.99 1558.33 24.13 1564.84 24.23 1571.34 24.4 1577.84 24.65 1584.35 25.02 1590.85 25.42 1597.36 25.61 1603.86 25.75 1610.36 25.93 1616.87 26.38 1623.37 26.94 1629.88 27.52 1636.38 27.98 1642.89 28.12 1649.39 28.12 1662.4 28.25 1675.41 28.27 1681.91 28.44 1688.41 28.64 1701.42 28.71 1707.93 28.56 1714.43 28.6 1720.94 29.45 1727.44 30.24 1733.94 30.43 1740.45 30.54 1746.95 30.97 1753.46 31.07

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 1120.71 .04 1389.22 .08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1120.71 1389.22 1675.78 1643.73 1610.01 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 50118.29

INPUT
Description: 49
Station Elevation Data num= 159
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 23.45 6.56 23.3 19.67 22.81 52.44 22.61 65.55 23 72.11 22.88 78.66 23.4 85.22 23.52 91.77 23.18 98.33 23.12 104.88 23.2 111.44 23.54 137.66 23.44 157.32 23.64 170.43 24.18 203.21 24.54 209.76 24.7 222.87 24.62 229.43 24.47 242.54 24.8 255.65 24.61 262.21 24.7 268.76 24.64 281.87 24.77 288.43 25.12 321.2 25.12 334.31 25.26 367.09 24.49 380.2 23.82 399.86 23.78 406.42 23.93 419.53 23.73 439.19 22.95 445.75 22.92 458.86 22.36 478.53 21.25 491.64 20.76 511.3 19.8 517.86 19.2 524.41 18.4 530.97 17.75 557.19 15.88 570.3 15.2 589.96 14.54 596.52 14.71 609.63 14.35 629.29 14.9 648.96 13.64 655.51 13.12 662.07 12.09 668.62 10.56 672.5 9.55 675.18 8.85 681.74 6.33 690 2.06 690.42 1.98 690.81 1.99 691.19 1.93 691.48 1.83 691.83 1.78 692.18 1.7 692.62 1.94 693.09 1.46 693.7 1.35 694.46 1.26 695.41 1.17 696.41 .97 697.76 1.01 699.83 1.11 701.97 1.31 704.23 1.13 705.85 1.38 708.61 1.26 710.41 1.43 712.29 1.7 717.25 1.65 718.83 1.55 720.43 1.4 727.16 1.36 728.42 1.31 729.57 1.27 729.57 2.43 735.28 1.78 736.44 1.28 737.78 1.27 739.38 1.28 740.82 1.33 742.31 1.44 742.31 1.2 745.14 1.22 746.39 1.32 748.12 1.36 749.86 1.32 751.76 1.26 756.56 1.4 758.3 1.34 759.91 1.34 761.6 1.37 763.07 1.37 764.67 1.43 766.14 1.45 767.7 1.6 769.16 1.82 770.69 1.94 772.12 1.82 773.58 1.86 774.99 1.89 776.51 1.91 777.88 1.96 779.42 2.08 780.9 2.23 782.39 2.25 783.68 2.19 784.98 2.25 789.08 2.37 790.11 2.41 791.04 2.49 792.18 2.78 799.73 5.17 806.28 5.96 808.69 6.58 812.84 7.64 819.39 9.64 825.95 10.41 832.5 10.56 839.06 10.43 845.61 10.46 858.72 10.87 865.28 11.71 871.83 13 878.39 13.88 884.94 14.58 898.05 15.51 904.61 16.4 917.72 17.22 924.28 17.43 957.05 17.59 963.61 17.8 976.72 18.75 983.27 19.05 989.83 19.76 1002.94 20.91 1009.49 21.34 1022.6 21.53 1029.16 21.79 1081.6 22.64 1101.26 22.82 1107.82 23.22 1114.37 23.13 1140.6 23.54 1153.71 23.94 1160.26 23.94 1173.37 24.46 1199.59 24.89 1212.7 24.93 1278.25 26.29 1291.36 26.52 1317.58 26.65 1343.81 27.16

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 629.29 .04 924.28 .082

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 629.29
924.28 1344.97 1367.54 1376.48 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 48750.75

INPUT
Description: 48
Station Elevation Data num= 403
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 24.73 6.55 24.63 13.11 24.55
19.66 24.75 26.21 24.49 32.76 24.55 39.32 24.71 45.87 24.74 52.42 24.72
58.98 24.7 65.53 24.62 85.19 24.61 98.29 24.79 104.85 24.61 117.95 24.74
131.06 24.63 144.16 24.68 157.27 24.93 163.82 24.72 190.03 24.51 196.59
24.35 209.69 24.55 216.25 24.54 222.8 24.2 229.35 23.68 235.9 23.41 262.12
23.35 275.22 24.17 281.77 24.39 288.33 24.88 294.88 25.51 301.43 25.38
314.54 24.61 321.09 24.71 334.2 24.61 347.3 25.3 353.86 25.41 366.96 24.78
380.07 24.97 386.62 24.93 393.17 25.04 399.73 25.32 406.28 25.4 432.49 25.15
452.15 25.14 465.25 24.62 478.36 23.46 484.91 21.58 491.47 19.56 511.12
15.02 517.68 13.92 524.23 13.55 530.78 13.46 543.89 12.97 550.44 12.87 557
13 570.1 13.51 602.87 12.83 615.97 13.06 622.52 13.47 629.08 13.57 642.18
13.31 661.84 13.32 701.16 13.67 707.71 13.61 720.82 13.34 733.92 13.72
747.03 13.48 753.58 13.55 760.14 13.34 806.01 14.13 812.56 13.97 819.11
14.08 825.66 14.37 832.22 14.48 838.77 14.77 851.88 14.78 864.98 15.53
878.09 15.84 891.19 15.53 897.75 15.03 904.3 14.37 910.85 13.43 923.96 12.2
937.06 11.78 943.62 11.03 947.09 10.14 950.17 9.36 956.72 6.88 963.28 5.03
970 1.75 970.78 1.73 971.59 1.66 972.25 1.62 972.95 1.59 973.91 1.58 974.99
1.51 975.74 1.43 976.83 1.38 977.98 1.33 979.59 1.29 981.1 1.22 983.02 1.25
992.52 1.02 994.08 .91 995.85 .89 995.85 .95 999.13 .84 1000.83 .59 1002.68
.48 1004.44 -.07 1012.35 -.02 1015.25 -.11 1015.25 .09 1024.94 -.03 1027.97
-.13 1030.7 -.25 1033.1 -.38 1035.4 -.44 1037.52 -.48 1039.51 -.4 1041.46
-.3 1043.57 -.21 1045.86 -.21 1048.41 -.2 1050.7 -.26 1052.96 -.07 1055.02
-.17 1056.94 -.33 1059.38 -.14 1061.37 .3 1063.31 .56 1064.04 5.2 1068.19
5.63 1074.74 7.15 1081.3 8.28 1087.86 8.99 1107.53 9.84 1120.64 9.89 1127.2
10.69 1140.31 13.51 1146.87 14.73 1153.43 15.57 1159.98 15.78 1179.65 15.58
1212.44 16.01 1238.67 15.92 1251.78 15.97 1278.01 15.55 1291.12 15.53
1297.68 15.74 1310.79 15.87 1323.91 16.45 1337.02 16.76 1350.13 17.38
1382.92 18.09 1402.59 18.13 1461.6 17.19 1474.72 17.14 1487.83 17.39 1500.94
17.36 1514.06 17.67 1533.73 17.65 1559.96 17.36 1566.51 17.45 1579.63 17.36
1612.41 17.63 1618.97 17.55 1645.2 17.65 1658.31 17.61 1671.42 17.48 1677.98
17.54 1684.94 17.44 1691.5 17.45 1698.05 17.27 1704.6 17.11 1711.16 16.93
1717.71 16.97 1724.27 17.04 1730.82 16.89 1737.38 16.75 1743.93 16.62
1750.48 16.27 1757.04 16.32 1763.59 16.29 1770.15 16.07 1776.7 16.21 1783.25
16.05 1789.81 15.92 1796.36 15.89 1802.92 15.97 1809.47 15.82 1816.03 15.62
1822.58 15.72 1829.13 15.84 1835.69 15.84 1842.24 15.89 1848.8 15.9 1855.35
16 1861.91 15.95 1868.46 16.21 1875.01 16.58 1881.57 17.99 1888.12 18.83
1894.68 19.23 1901.23 19.28 1907.78 19.49 1914.34 19.66 1920.89 20.04
1927.45 20.4 1934 20.74 1940.56 21.15 1947.11 21.53 1953.66 22.01 1960.22
22.48 1966.77 22.98 1973.33 23.33 1979.88 23.74 1986.43 24.11 1992.99 24.38
1999.54 24.69 2006.1 25.22 2012.65 25.4 2019.21 25.48 2025.76 25.56 2032.31
25.89 2038.87 25.94 2045.42 25.93 2051.98 25.85 2058.53 25.87 2065.09 25.69
2071.64 25.76 2078.19 25.92 2084.75 25.93 2091.3 25.97 2097.86 26.09 2104.41

26.04 2110.96 26.07 2117.52 26.25 2124.07 26.3 2130.63 26.18 2137.18 25.96
2143.74 25.34 2150.29 24.53 2156.84 23.98 2163.4 23.52 2169.95 23.2 2176.51
23.37 2183.06 23.32 2189.62 23.46 2196.17 23.31 2202.72 23.43 2209.28 23.76
2215.83 23.77 2222.39 23.76 2228.94 23.78 2235.49 23.95 2242.05 24.09 2248.6
23.93 2255.16 23.43 2261.71 22.68 2268.27 22.2 2274.82 22.45 2281.37 22.63
2287.93 22.65 2294.48 23.19 2301.04 23.38 2307.59 23.4 2314.15 23.21 2320.7
22.85 2327.25 22.58 2333.81 22.23 2340.36 21.81 2346.92 21.51 2353.47 20.6
2360.02 18.99 2366.58 18.09 2373.13 17.73 2379.69 17.53 2386.24 17.53 2392.8
17.49 2399.35 17.3 2405.9 17.45 2412.46 17.83 2419.01 17.82 2425.57 17.84
2432.12 18.14 2438.68 18.44 2445.23 18.66 2451.78 18.8 2458.34 18.96 2464.89
19 2471.45 18.89 2478 18.81 2484.55 18.74 2491.11 18.64 2497.66 18.64
2504.22 18.65 2510.77 18.73 2517.33 18.79 2523.88 18.73 2530.43 18.84
2536.99 19.14 2543.54 19.49 2550.1 19.9 2556.65 20.5 2563.21 21.07 2569.76
21.38 2576.31 21.58 2582.87 22.02 2589.42 22.72 2595.98 23.89 2602.53 25.32
2609.08 26.58 2615.64 27.68 2622.19 28.53 2628.75 29.09 2635.3 29.55 2641.86
30.02 2648.41 30.49 2654.96 30.88 2661.52 31.03 2668.07 31.03 2674.63 31.12
2681.18 31.18 2687.74 31.18 2694.29 31.13 2700.84 31.06 2707.4 30.91 2713.95
30.79 2720.51 30.67 2727.06 30.32 2733.61 29.79 2740.17 29.15 2746.72 28.61
2753.28 28.39 2759.83 28.18 2766.39 28.06 2772.94 28.17 2779.49 28.15
2786.05 28.15 2792.6 28.41 2799.16 28.74 2805.71 28.85 2812.27 28.95 2818.82
29.02 2825.37 29.03 2831.93 28.98 2838.48 28.91 2845.04 28.73 2851.59 28.37
2858.14 27.92 2864.7 27.36 2871.25 26.79 2877.81 26.5 2884.36 26.41 2890.92
26.26 2897.47 26.31 2904.02 26.65 2910.58 26.77 2917.13 26.46 2923.69 25.61
2930.24 24.66 2936.8 24.37 2943.35 24.48 2949.9 24.21 2956.46 23.85 2963.01
24.68 2969.57 24.44 2976.12 24.25 2982.67 24.19 2989.23 24.33 2995.78 24.2
3002.34 24.11 3008.89 23.99 3015.45 23.82 3022 23.82 3028.55 23.59 3035.11
23.31 3041.66 23.12 3048.22 23.2 3054.77 23.41 3061.33 23.66 3067.88 23.69
3074.43 23.73 3080.99 23.81 3087.54 23.97 3094.1 24.13 3100.65 23.9 3107.2
23.72 3113.76 23.88 3120.31 23.91 3126.87 23.9 3133.42 23.97 3139.98 24.12
3146.53 24.29 3153.08 24.35 3159.64 24.4 3166.19 24.5 3172.75 24.64 3179.3
24.78 3185.85 25.27 3192.41 26.17

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .088 878.09 .04 1159.98 .08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 878.09
1159.98 1747.9 1742.19 1739.19 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 1403 3192.41 18.13 F

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 47008.56

INPUT
Description: 47
Station Elevation Data num= 157
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 22.35 19.61 23.42 39.23
22.11 411.89 21.91 509.96 22.24 575.34 24.98 653.8 24.79 974.16 22.94
1026.46 20.6 1098.38 20.41 1111.46 20.93 1137.61 20.71 1150.68 22.17 1281.44
21.45 1359.9 19 1431.81 19.33 1464.49 18.28 1536.38 10.95 1555.99 11.28

1562.53 10.51 1565.97 9.52 1569.06 8.64 1575.6 5.69 1593.04 2.11 1594 2.05
1595.04 2 1596 1.96 1597.09 1.91 1598.26 1.89 1599.56 1.85 1600.77 1.83
1602.06 1.8 1603.17 1.68 1604.54 1.62 1605.81 1.58 1607.19 1.59 1608.42 1.56
1609.92 1.55 1611.14 1.49 1611.14 1.74 1613.6 1.51 1614.77 1.41 1615.9 1.36
1617.2 1.35 1618.32 1.26 1619.5 1.28 1620.62 1.23 1621.84 1.2 1622.93 1.43
1624.19 1.37 1625.42 1.14 1626.76 1.1 1628.03 1.13 1629.44 1.02 1630.78 1.05
1632.14 1.23 1633.32 1.17 1634.55 1.05 1635.72 .95 1636.96 .9 1639.29 .81
1641.91 1.08 1642.75 1.07 1643.84 .81 1644.84 .93 1646.24 .45 1647.9 .15
1650.88 -.03 1653.84 -.11 1656.61 -.24 1659.26 -.33 1662.04 -.39 1664.51
-.37 1667.23 -.37 1669.64 -.31 1674.11 -.51 1680.96 -1.01 1681.41 -.5
1683.45 -.4 1685.38 -.06 1687.91 4.48 1693.24 4.98 1699.78 7.16 1706.32 8.28
1712.85 8.7 1719.39 9.29 1725.92 10.04 1732.46 10.43 1738.99 10.6 1745.53
10.83 1752.07 10.95 1758.6 11.18 1765.14 11.72 1771.67 12.42 1778.21 13.11
1784.75 13.58 1791.28 13.75 1797.82 13.99 1830.5 11.56 1837.03 10.27 1843.57
9.69 1908.93 9.81 1928.53 12.65 1935.07 14.42 1948.14 15.19 1993.89 23.11
2000.43 23.22 2039.64 26.97 2150.75 32.86 2157.29 33.56 2163.82 33.05
2222.64 34.79 2242.25 35.85 2425.25 38.68 2457.93 37.32 2503.68 36.85
2557.35 31.44 2577 30.21 2603.19 31.25 2622.84 30.51 2681.77 21.22 2753.81
23.64 2780 22.24 2786.55 21.25 2812.74 13.66 2819.29 12.78 2871.68 13
2884.78 13.45 2897.88 12.5 2917.52 12.85 2937.17 14.19 2976.46 13.2 3015.75
10.73 3081.24 10.41 3087.79 10.87 3094.33 10.72 3100.88 9.93 3159.82 10.81
3172.92 10.38 3231.85 13.83 3271.15 13.77 3310.44 17.87 3421.76 23.3 3565.83
23 3670.61 19.75 3736.09 21.8 3742.64 22.62 3749.19 24.99 3755.74 26.26
3775.39 27.73 3788.48 27.37 3808.13 24.53 3821.23 20.66 3827.77 20.72
3847.42 23.87 3893.26 25.1 3958.75 31.19

Manning's n Values num= 3 Sta n Val Sta n Val Sta n Val
 0 .085 1431.81 .04 1797.82 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1431.81
1797.82 1593.35 1644.1 1707.52 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 45364.46

INPUT
Description: 46
Station Elevation Data num= 399
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 24.22 13.09 24.02 26.19
24.06 32.73 23.94 52.37 24.09 65.46 23.47 78.56 23.32 85.1 22.84 91.65 22.66
104.74 22.54 130.93 23.34 144.02 23.19 150.56 22.98 157.11 23.2 176.75 23.06
196.39 22.68 202.93 22.8 209.48 23.1 216.03 23.15 222.57 22.86 255.3 22.84
281.49 22.29 288.04 22.25 294.58 21.69 307.68 21.49 314.22 21.01 320.77
20.86 340.41 21.07 353.5 20.94 360.05 21.03 373.14 20.74 392.78 20.76 399.32
20.65 405.87 20.81 425.51 20.8 438.6 21.18 445.15 21.2 458.24 20.82 471.33
20.83 477.88 21.16 484.42 21.26 497.52 21.17 510.61 20.75 517.16 20.4 530.25
20.16 543.34 20.49 556.43 20.55 562.98 20.32 569.53 20.75 576.07 20.55
582.62 19.83 595.71 19.29 608.8 18.96 615.35 19.3 621.9 19.29 634.99 19.83
654.63 19.59 674.27 19.98 700.45 19.91 713.54 19.96 726.64 19.8 739.73 19.1
752.82 19.09 759.37 18.97 765.91 18.99 772.46 18.61 779.01 18.78 792.1 18.2
798.65 18.01 811.74 18.1 818.28 18.28 824.83 18.15 851.02 17.12 864.11 17.12

870.66 17.23 883.75 16.61 890.29 16.03 896.84 16.05 903.39 16.6 909.93 16.26
923.03 16.16 936.12 15.76 942.66 15.88 949.21 15.79 968.85 15.9 975.4 15.72
988.49 16.11 995.03 16.02 1001.58 16.09 1021.22 15.77 1027.77 16 1034.31
16.9 1040.86 18 1053.95 18.66 1067.04 19.08 1073.59 19.11 1099.77 20 1119.41
20.45 1132.51 20.33 1145.6 20.65 1165.24 20.73 1178.33 20.52 1184.88 20.53
1191.42 20.79 1204.52 20.91 1211.06 21.19 1230.7 21.32 1250.34 20.81 1263.43
20.18 1276.52 19.95 1283.07 19.53 1296.16 19.43 1302.71 19.82 1328.89 20.33
1335.44 20.56 1348.53 20.65 1361.63 21.17 1374.72 21.49 1381.27 22.13
1387.81 22.14 1394.36 22.29 1400.9 22.19 1407.45 21.72 1414 20.93 1427.09
18.99 1440.18 17.38 1446.73 16.94 1453.27 16.84 1459.82 16.58 1466.37 16.59
1479.46 16.04 1486.01 15.5 1492.55 15.11 1499.1 15.09 1505.64 15.39 1525.28
15.58 1531.83 15.75 1538.38 15.78 1571.11 15.35 1584.2 16.65 1590.75 16.93
1597.29 16.69 1603.84 17.85 1610.38 18.86 1616.93 19.33 1630.02 18.47
1636.57 17.76 1649.66 15.52 1656.21 14.2 1662.76 13.51 1675.85 11.43 1688.94
11.06 1695.49 11.09 1702.03 10.94 1708.58 11.12 1754.4 11.28 1767.5 10.74
1780.59 11.18 1787.13 11.12 1819.87 11.41 1826.41 11.33 1832.96 11.4 1846.05
10.92 1852.6 10.21 1865.69 9.74 1878.78 9.09 1898.42 9.23 1918.06 8.74
1937.7 8.66 1950.79 8.76 1976.97 8.6 1996.6 8.21 2016.24 8.24 2022.78 8
2042.42 7.96 2048.96 8.07 2075.14 7.87 2088.23 8.02 2101.32 7.92 2114.41
7.67 2120.96 7.76 2140.59 7.71 2153.68 8.14 2160.23 8.48 2166.77 9.31
2173.32 10.43 2179.86 11.07 2199.5 12.27 2206.04 12.89 2212.59 13.73 2225.68
14.05 2251.86 13.58 2264.95 12.83 2271.49 12.3 2284.58 12.17 2291.13 12.25
2297.67 11.92 2317.3 11.8 2350.03 11.32 2356.57 11.49 2369.66 11.49 2376.21
11.7 2395.84 11.79 2415.48 11.46 2422.02 11.16 2428.57 11 2435.11 10.42
2448.2 9.64 2454.75 9.62 2467.84 10.54 2474.38 11.8 2487.47 13.15 2500.56
14.2 2513.65 14.79 2526.74 14.76 2539.83 14.17 2546.38 12.78 2552.92 11.55
2559.47 10.67 2572.56 9.26 2579.1 8.11 2585.65 5.56 2586.56 5.35 2600 .52
2600.61 .42 2601.19 .4 2601.87 .42 2602.29 .4 2602.73 .37 2603.1 .37
2603.86 .49 2604.65 .47 2605.77 .23 2607.03 .2 2608.55 .19 2609.98 .17
2611.55 .13 2613.01 .03 2614.55 -.11 2615.91 -.13 2617.33 -.2 2618.58 -.2
2619.89 -.24 2621.04 -.37 2622.28 -.31 2624.56 -.54 2625.64 -.66 2626.9 -.75
2628.25 -.84 2630.51 -.87 2632.68 -.94 2634.81 -.94 2637.07 -.89 2639.38
-.87 2641.62 -.92 2643.07 -1.01 2645.32 -1.02 2647.52 -1.01 2649.67 -1.02
2651.76 -1.01 2653.71 -1.02 2655.48 -1.01 2657.1 -1.02 2658.74 -.94 2660.51
-.85 2662.65 -.65 2664.94 -.58 2666.54 -.32 2668.07 -.15 2669.66 -.05
2671.15 .09 2672.78 .21 2674.22 .39 2675.71 .43 2677.07 .58 2678.48 .56
2678.48 .67 2680.85 .63 2681.93 .64 2692.83 7.87 2696.91 9.56 2703.46 11.34
2710 12.18 2716.55 12 2723.09 11.46 2736.18 9.62 2742.73 8.86 2749.27 8.27
2755.82 7.92 2782 7.59 2801.63 7.14 2821.27 6.9 2847.44 7.31 2853.99 6.5
2860.53 6.94 2867.08 7.75 2880.17 8.08 2886.71 8.98 2893.26 10.36 2899.8
11.57 2906.35 12.23 2919.44 13.31 2932.53 13.53 2945.62 13.26 2958.71 12.62
2971.8 12.39 2984.89 12.68 2991.43 12.64 2997.98 12.37 3004.52 12.39 3017.61
12.81 3024.16 13.14 3037.25 14.26 3063.43 15.43 3076.52 16.16 3089.61 16.07
3115.79 15.47 3128.88 15.62 3148.51 16.4 3161.6 16 3168.15 16.11 3187.78
17.07 3207.42 17.15 3220.51 17.32 3240.14 18.14 3253.23 19.22 3259.78 20.05
3272.87 23.03 3279.41 23.57 3285.96 23.68 3292.5 23.65 3305.59 24.02 3318.68
24.8 3351.41 26.23 3377.58 26.8 3403.76 27.05 3416.85 27.09 3423.4 27.36
3475.76 27.61 3495.39 27.23 3501.94 26.94 3515.03 26.81 3521.57 26.96
3547.75 27.06 3560.84 26.89 3573.93 27.05 3587.02 27.61 3606.66 28.86
3632.84 29.98 3652.47 30.15 3665.56 30.54 3672.11 30.48 3691.74 30.94
3704.83 31.41 3731.01 31.9 3750.65 33.01 3783.37 33.9 3789.92 34.17 3803.01
34.33 3816.1 34.18 3881.55 35.22 3888.09 35.14 3914.27 35.82 3920.81 36.23
3927.36 36.85 3946.99 38.92 3953.54 39.37 3966.63 41.38 3973.17 41.36
3979.72 41.06 3986.26 40.41 3992.81 39.61 3999.35 39.39 4012.44 39.88

4018.99 40.33 4025.53 41.66 4032.08 44.38 4038.62 45.27 4045.17 42.66
4051.71 40.25 4058.26 40.19 4064.8 41.01 4071.35 41.33 4077.89 41.45 4084.44
40.7 4104.07 40.8 4123.71 41.04 4130.25 41.49 4156.43 42.43 4162.98 42.57
4176.07 42.64 4208.79 43.75 4221.88 44.35 4228.42 44.89 4234.97 45.64
4241.51 46.16 4248.06 46.38 4254.6 46.38 4261.15 46.11

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 2526.74 .04 2716.55 .08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2526.74
2716.55 1089.81 1089.81 1089.81 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 1119 20.4 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 44274.65

INPUT
Description: 45
Station Elevation Data num= 491
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 22.9 2.82 23.22 13.9 23.9
19.32 24.32 21.76 24.42 26.82 24.38 56.1 24.38 56.1 24.08 61.32 24.1 67.8
23.35 73.32 22.86 82.32 22.24 96.25 22.03 115.32 21.52 119.43 21.47 125.82
21.51 133.69 21.65 152.82 21.77 157.64 21.6 163.32 21.56 169.62 21.36 178.32
21 182.55 20.9 187.05 20.67 197.57 20.31 205.09 20.44 208.55 20.2 214.32
20.19 220.11 20.68 221.62 21.14 225.02 21.25 229.32 20.79 232.32 20.34
236.64 20.04 247.48 19.89 257.96 19.97 266.95 19.61 280.22 19.24 287.73
19.11 293.74 18.93 302.88 18.99 314.86 18.76 320.79 18.93 331.33 18.96
332.81 18.83 337.32 18.83 340.32 18.71 346.34 18.69 350.85 19.43 352.3 19.85
355.29 20.22 358.28 20.33 359.86 20.19 362.78 19.45 368.77 19.05 371.76
19.18 374.75 19.51 377.89 19.52 380.74 20.05 383.74 19.69 386.91 19.54
389.92 19.68 392.72 20.44 395.72 20.55 397.43 20.03 398.71 19.14 400.21
18.48 401.71 18.33 404.82 18.97 407.7 19.31 415.46 19.18 419.97 19.49 422.67
19.8 425.66 19.87 433.32 19.62 442.51 19.67 448.52 19.82 454.11 19.83 457.32
20 460.1 19.88 466.32 19.84 469.32 19.92 472.56 19.84 478.07 19.89 487.05
19.86 494.54 20.03 502.03 19.69 505.32 19.44 514.32 19.45 528.98 19.1
532.32 19.08 536.82 19.23 542.46 18.93 547.7 18.88 555.93 18.96 562.73 18.76
566.82 18.78 568.32 18.38 572.82 18.27 578.82 18.3 587.38 18.14 591.28 17.88
597.29 17.81 601.32 17.55 610.81 17.31 611.33 17.35 620.32 17 629.82 16.96
632.82 17.12 637.86 17.03 644.82 17.23 651.38 17.04 661.9 17.11 666.41 17.05
672.42 16.72 680.82 16.46 689.19 16.42 695.82 16.26 704.82 15.78 719.14
15.88 722.82 15.87 725.82 16.15 728.12 15.81 732.53 16.07 735.53 16.45
742.32 16.48 745.32 16.72 749.82 16.57 760.32 16.65 763.32 16.78 770.82 16.9
773.82 16.79 778.32 16.88 793.32 16.88 796.32 17.05 801.49 16.94 805.99
17.02 816.47 17.09 818.18 17.29 821.82 17.36 824.19 16.66 827.82 16.21
833.82 16.01 842.82 14.89 847.91 14.5 850.91 13.99 853.9 13.69 857.25 13.57
859.32 13.33 865.88 12.32 884.82 10.78 894.82 10.57 902.82 9.61 906.31 9.52
908.82 9.68 913.32 9.43 916.32 9.66 922.78 9.68 925.32 9.56 926.82 9.79
930.88 9.96 933.89 10.28 939.9 10.31 943.74 10.52 949.73 9.65 952.32 9.52
954.22 9.62 960.21 10.19 966.2 10.59 973.69 10.91 979.32 11.07 988.32 11.19

990.99 11.09 1004.52 11.13 1009.32 11.05 1017.11 10.74 1023.1 10.78 1028.56 10.52 1033.07 10.42 1039.08 10.05 1042.56 9.75 1045.56 9.18 1049.6 9.06 1053.04 9.23 1058.82 9.23 1065.02 9.79 1071.01 9.97 1075.14 10.27 1082.65 10.53 1094.68 10.47 1105.2 10.7 1111.21 10.74 1114.43 11.02 1117.22 11.09 1126.23 12.98 1127.91 13.52 1133.82 14.92 1135.4 15.08 1138.25 16.25 1141.39 17.28 1142.88 17.53 1145.77 17.68 1150.37 17.68 1154.86 17.21 1157.86 16.38 1160.79 15.89 1163.8 15.7 1168.31 15.58 1174.33 15.74 1177.32 16.04 1181.81 16.3 1186.31 16.19 1190.8 16.26 1198.36 16.25 1202.87 15.96 1214.76 15.43 1223.74 15.2 1235.72 15.01 1241.94 15.06 1249.45 15.38 1250.69 15.29 1262.82 15.24 1273.15 14.98 1278 15.01 1290.03 14.68 1297.54 14.62 1306.32 14.31 1313.82 14.17 1317.07 13.96 1327.32 14.02 1337.54 13.84 1342.03 13.62 1348.02 13.54 1360 13.1 1365.16 12.75 1372.11 12.66 1389.97 12.8 1399 12.42 1405.44 12.23 1414.74 7.97 1422.79 4.6 1448.4 .66 1449.55 .51 1454.82 .5 1461.96 .87 1474.12 1.25 1475.71 1.22 1477.8 .71 1485.58 .64 1490.89 3.48 1515.83 4.26 1532.02 6.61 1541.27 8.07 1556.63 9.24 1561.04 9.54 1565.63 9.19 1566.52 9.12 1571.03 8.95 1576.32 8.53 1579.32 8.2 1583.82 8.24 1586.82 8.12 1590.56 7.76 1600.32 7.32 1607.06 7.11 1613.1 7.11 1616.11 6.98 1619.82 7.08 1628.13 6.8 1634.14 7.03 1642.99 7.19 1651.98 7.69 1654.32 7.92 1661.19 8.05 1666.32 8.46 1672.94 8.89 1684.92 10.2 1691.82 10.67 1697.25 11.15 1702.32 11.09 1706.27 11.2 1710.37 11.15 1712.82 10.94 1717.86 11 1722.35 10.62 1724.82 10.58 1727.31 10.97 1729.32 11.52 1738.32 11.93 1742.33 12.32 1751.82 12.62 1756.32 12.98 1762.78 13.19 1763.37 13.44 1764.87 13.07 1768.32 12.75 1773.89 12.84 1784.82 12.6 1788.92 12.71 1793.82 12.96 1804.7 13.24 1810.69 13.32 1813.69 13.45 1820.82 13.56 1830.16 14.11 1834 14.18 1838.82 14.14 1843.63 13.95 1844.52 14.09 1849.03 14.16 1852.32 14.44 1856.82 14.53 1861.32 15.09 1874.82 15.06 1876.57 15.15 1882.08 15 1885.56 15.04 1888.55 14.87 1889.6 15.17 1893.05 15.23 1896.04 15.92 1903.12 15.93 1908.02 16.32 1913.82 16.49 1919.65 16.8 1927.16 16.62 1930.17 16.93 1933.47 16.93 1937.96 16.76 1945.45 17.17 1946.7 17.31 1952.71 17.42 1958.93 17.62 1960.22 17.5 1966.23 17.86 1967.91 17.83 1975.25 17.99 1979.76 18.33 1984.38 18.44 1990.28 18.69 1994.79 19.1 1997.86 19.2 2002.3 19.56 2005.34 20.12 2008.31 21.58 2011.32 22.45 2015.82 24.22 2018.82 25.15 2020.32 25.43 2026.31 25.67 2030.85 25.64 2033.79 25.77 2038.29 25.67 2041.28 25.72 2053.39 25.67 2060.75 25.75 2071.42 25.69 2086.49 25.47 2089.85 25.53 2101.23 26.55 2109.99 27.25 2114.46 27.54 2123.41 27.9 2140.19 28.02 2146.9 27.89 2152.5 28.01 2156.97 27.8 2165.92 27.65 2169.28 27.67 2171.51 27.53 2179.34 27.44 2190.53 27.52 2208.6 27.89 2213.5 28.04 2216.85 27.95 2220.73 28.25 2226.33 28.25 2228.62 28.12 2233.61 28.36 2238.63 28.44 2252.09 28.92 2262.19 29.5 2275.34 29.62 2291.21 29.57 2295.85 29.32 2304.63 29.53 2306.87 29.67 2312.05 29.58 2320.74 29.79 2327.44 29.83 2338.75 30.09 2346.74 30.09 2346.74 30.23 2352.58 30.31 2362.81 30.34 2366.16 30.3 2370.64 30.18 2376.03 30.29 2377.71 30.46 2381.06 31.32 2384.06 31.84 2386.09 32.67 2394.13 32 2396.14 31.64 2404.52 30.81 2413.15 30.31 2416.5 29.94 2418.74 29.89 2422.1 29.55 2426.3 29.34 2431.33 29.24 2440.57 29.46 2444.74 29.46 2450.06 29.67 2456.46 29.67 2462.37 29.75 2465.72 30.13 2468.19 30.04 2479.15 29.98 2485.86 30.05 2486.98 29.9 2489.98 30.07 2495 29.82 2499.28 30.06 2506 30.06 2508.23 30.32 2510.47 31.83 2512.71 32 2514.95 32.39 2518.46 32.78 2526.13 33.38 2533.54 33.61 2552.98 33.78 2567.52 33.81 2570.88 33.93 2576.44 33.88 2576.44 34.42 2590.44 34.42 2590.44 34.03 2599.96 33.84 2607.27 33.76 2630.17 33.7 2641.36 33.94 2654.78 33.93 2659.1 33.99 2663.73 34.24 2669.32 34.27 2674.92 34.43 2679.53 34.26 2689.38 34.59 2699.14 35.15 2705.12 35.42 2714.51 35.97 2723.28 36.08 2725.26 36.25 2730.01 36.32 2752.24 36.32 2753.57 36.23 2763.1 36.47 2765.53 36.32 2771.48 36.36 2776.51 36.51 2782.31 36.84 2786.56 37.33 2792.38 38.15 2796.62 38.9 2799.97 38.94 2801.33 42.43

2802.44 42.27 2802.59 43.13 2803.56 43.07 2815.05 43.47 2823.7 43.61 2830.41 43.61 2840.48 43.45 2850.55 42.85 2868 41.94 2871.8 41.86 2879.63 41.97 2890.82 41.91 2895.29 42.2 2901.66 42.41 2917.26 42.57 2934.45 42.58 2938.68 42.65 2954.12 42.65 2966.89 42.56 2974.72 42.66 2981.43 42.65 2993.74 42.78 2999.81 42.8
 Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 1405.44 .04 1565.63 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1405.44 1565.63 298.21 298.21 298.21 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 1146 20 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 43977

INPUT
Description:
Station Elevation Data num= 490
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 18.53 2.87 18.59 5.87 18.56 13.38 18.63 16.64 18.63 20.98 18.55 25.32 18.64 30.14 18.54 34 18.55 38.9 18.49 43.4 18.71 46.4 18.68 52.41 18.71 56.66 18.78 60.03 18.69 63.14 18.41 66.03 18.31 70.71 18.44 74.49 18.74 79.43 18.93 82.43 19.11 85.43 19.16 88.43 18.9 90.99 18.79 93.29 18.79 97.44 19.1 105.03 19.41 106.59 19.75 107.75 19.79 109.71 20.13 110.65 20.56 113.54 20.79 114.98 20.79 117.88 20.63 123.66 19.93 128.96 20.07 130.89 20.19 133.78 20.6 134.68 21 138.12 21.44 139.57 21.5 144.04 21.48 146.8 21.89 148.25 21.75 150.28 21.79 151.14 21.64 154.03 21.71 157.48 22.11 167.45 22.21 174.28 22.57 175.25 22.67 179.93 22.79 185.85 22.79 188.74 22.72 192.41 22.72 196.51 22.59 199.51 22.6 201.01 22.53 205.52 22.06 208.52 22.08 210.43 22.02 212.7 21.77 216.22 21.27 219.11 21.25 222 21.36 225.18 21.24 231.03 20.6 234.04 20.12 238.54 19.52 242.25 18.94 245.14 18.61 252.05 18.1 255.05 17.73 259.6 17.41 264.19 17.25 269.72 17.39 271.17 17 277.57 16.45 280.57 15.81 282.07 15.26 283.57 14.92 286.57 14.44 291.08 14.21 294.08 13.91 298.51 13.71 303.2 13.62 307.32 13.7 311.66 13.7 314.12 13.78 318.1 14.08 323.48 14.1 328.6 14.07 333.35 13.93 336.25 13.91 339.08 14 342.2 13.99 346.37 13.82 349.62 13.82 351.57 13.69 355.62 13.2 359.37 12.22 361.63 11.78 363.13 10.51 364.63 9.83 368.73 9.51 370.64 9.46 372.14 9.3 375.14 9.2 376.74 9.79 378.09 10.47 379.65 10.3 381.08 9.75 385.42 9.3 389.76 9.51 392.65 9.81 396.15 10 402.16 10.16 407.11 9.95 414.34 9.8 424.46 9.79 429.18 10.11 434.26 10.13 441.19 10.7 442.69 10.7 447.19 10.43 450.19 10.39 454.83 10.54 459.17 10.43 462.2 10.46 466.4 10.73 470.74 10.76 475.08 10.88 476.53 11.04 481.07 11.3 484.72 11.98 486.22 12.34 490.72 14.3 492.43 14.97 496.77 16.17 499.66 16.65 504 18.17 505.73 18.46 508.73 18.67 514.74 18.54 518.46 18.11 522.24 17.39 523.75 17.29 527.88 17.24 534.37 17.31 538.81 17.29 541.6 17.22 727.2 17.22 732.5 17.4 733.94 17.32 736.97 16.93 742.12 16.45 742.12 15.8 743.12 15.8 750.57 15.53 767.39 14.79 771.6 14.67 791.53 5.19 792.1 4.97 795.73 2.96 798.91 2.54 802.52 1.95 806.16 1.45 817.3 -.48 822.32 -.51 833.82 -1.53 836.81 -1.84 840.37 -2.08 853.16 -1.56 871.35 -.8 880.09 -.58 886.03 1.33 888.24 2.47 889.79 2.46 891.99 3.54 892.53 3.49 896.6 4.85 905.17 6.99 914.93 11.33

924.09 14.63 930.62 14.39 956.25 13.7 959.18 13.67 959.18 14.27 962.32 13.85
964.11 13.71 967.41 13.59 971.28 13.59 975.32 13.5 978.88 13.49 985.22 13.6
989.16 13.54 991.06 13.44 997.69 13.64 1001.16 13.85 1004.58 13.98 1012.09
13.98 1015.51 14.07 1018.7 14.03 1019 14.1 1024.11 14.01 1029.85 14.02
1033.2 14.09 1036.05 13.97 1039.42 14.23 1040.64 14.48 1041.73 14.34 1044.57
14.24 1045.15 14.42 1047.41 14.38 1048.15 14.21 1053.09 14.2 1053.77 14.08
1056.96 13.92 1060.14 14.1 1066.52 13.77 1070.14 13.71 1074.49 13.74 1078.2
13.82 1081.21 14.04 1084.06 14.02 1087.25 14.1 1091.46 13.93 1093.62 14.01
1097.74 14.05 1103.19 13.97 1105.66 14.02 1109.93 13.99 1114.35 14.16
1117.27 14.04 1121.29 14.06 1124.78 13.93 1128.39 14.01 1130.79 13.99
1133.48 14.15 1135.07 14.15 1138.26 14.01 1139.76 14.21 1142.6 14.33 1145.81
14.2 1150.32 14.24 1153.33 14.05 1156.81 14.18 1158.98 14.16 1162.49 13.91
1165.36 13.9 1171.02 13.98 1174.36 13.9 1179.54 14.24 1184.88 14.44 1189.27
14.38 1194.06 14.65 1196.9 14.73 1199.9 14.54 1202.91 14.5 1206.54 14.54
1211.92 14.77 1213.43 14.9 1216.48 15.4 1217.97 15.49 1219.56 15.39 1222.16
15.43 1223.94 16 1226.95 15.77 1228.45 15.48 1230.72 15.34 1233.53 15.6
1235.5 15.9 1237.79 15.83 1240.63 15.48 1241.88 15.22 1243.49 15.15 1246.32
14.55 1249.16 14.31 1255.5 14.14 1257 14.22 1265.79 14.2 1268.98 14.27
1273.53 14.19 1281.04 14.22 1285.54 14.49 1288.11 14.57 1296.08 14.65
1299.07 14.53 1302.07 14.25 1305.65 14.24 1314.09 13.97 1316.81 13.98
1323.18 13.92 1327.61 13.96 1332.98 14.11 1341.51 14 1343.91 14.11 1350.03
14.1 1353.47 14.17 1355.72 14.3 1359.17 14.19 1368.18 14.62 1372.6 14.63
1377.39 14.78 1378.45 14.88 1382.71 14.8 1386.21 14.84 1388.39 15.04 1391.73
15.07 1398.23 15.59 1404.02 15.73 1406.08 15.98 1409.27 16.12 1409.7 16.23
1415.39 16.41 1417.24 16.36 1420.77 16.51 1423.77 16.73 1428.17 16.82
1432.74 17.07 1434.4 17.27 1439.12 17.53 1444.23 17.51 1448.56 17.55 1452
17.71 1455.72 17.66 1460.32 17.7 1464.29 17.79 1469 17.7 1471.13 17.77
1475.92 18.07 1480.7 18.11 1484.73 17.86 1489.45 18.09 1495.05 18.02 1501.02
18.09 1503.41 18.06 1505.81 17.93 1506.28 18.02 1510.88 17.99 1516.19 17.83
1520.91 18.19 1527.33 18.26 1530.35 18.17 1534.5 18.4 1538.09 18.47 1541.36
18.67 1546.46 18.57 1551.24 18.6 1553.63 18.57 1557.22 18.64 1558.41 18.59
1560.8 18.69 1564.95 18.54 1568.33 18.71 1569.17 18.94 1575.15 18.94 1577.53
18.83 1580.68 18.85 1585.4 19.02 1593.27 18.88 1596.67 18.99 1602.81 19.07
1605.85 19 1608.63 19.04 1612 19.28 1616.6 19.52 1621.78 19.53 1625.79 19.65
1631.34 19.9 1634.16 20.11 1638.52 20.29 1643.3 20.81 1646.89 20.74 1651.46
20.97 1657.76 21.22 1660.26 21.43 1662.56 21.51 1670.8 21.95 1676.63 22.19
1679.17 22.45 1681.56 22.97 1685.15 22.62 1687.84 22.69 1692.19 22.95
1697.03 23 1705.47 23.23 1707.86 23.37 1711.23 23.44 1717.72 23.68 1723.41
23.94 1728.19 24.04 1732.97 24.06 1735.36 24.21 1736.56 24.42 1740.14 24.61
1743.73 24.69 1747.59 24.65 1750.9 24.77 1754.49 25.06 1756.79 25.16 1763.68
25.18 1768.84 25.36 1774.15 25.5 1780.44 25.85 1781.91 26 1785.58 26.13
1790.36 26.44 1793.95 26.44 1798.73 26.55 1802.46 26.78 1805.9 26.82 1808.29
26.72 1809.65 26.78 1811.94 27.09 1813.48 27.19 1816.66 27.14 1817.86 27.03
1822.91 26.83 1825.03 26.88 1827.42 27.15 1832.35 27.11 1835.79 27.16
1839.52 27.51 1844.12 27.43 1850.14 27.17 1854.92 27.09 1858.51 27.08
1863.81 27.17 1865.38 27.24 1872.86 27.86 1876.61 28.06 1879.54 28.58
1882.42 29.31 1883.62 29.72 1885.83 30.03 1887.4 29.8 1888.98 35.58 1891.99
35.85 1894.38 35.97 1898.41 36.01 1901.57 36.7 1903.13 36.83 1906.17 36.83
1908.72 36.6 1911.12 36.52 1928.3 36.56 1936.41 36.47 1942.2 36.5 1948.18
36.61 1958.18 36.55 1963.72 36.58 1968.5 36.44 1976.87 36.3 1983.35 35.98
1988.83 36.1 1994.81 36.19 2001.98 35.95 2006.19 35.9 2016.16 35.6 2021.14
35.58 2027.98 35.5 2038.4 35.62 2047.84 35.82 2061.76 36.27 2064.75 36.3
2068.94 36.48 2073.72 36.8 2077.73 36.97 2085.43 37.15 2096.43 37.62 2101.52
37.89 2113.17 38.31 2119.9 38.61 2124.91 38.75 2130.79 39.05 2140.59 39.42

2142.89 39.53 2150.24 39.64 2154.8 39.82 2157.95 40.35 2159.8 40.18 2162.19 40.52 2204.38 40.52 2204.38 39.76 2216.43 39.63 2221.97 39.63 2225.49 39.55 2235.12 39.55 2239.11 39.61

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .08 771.6 .04 924.09 .08
 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 771.6 924.09 360.52 360.52 360.52 .1 .3 Blocked Obstructions num= 1
 Sta L Sta R Elev
 541.6 727.2 26.1

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 43616

INPUT
Description:
Station Elevation Data num= 490
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 21.24 2.64 21.29 10.66 21.23 13.67 21.28 22.98 21.26 29.72 21.29 41.11 21.15 47.19 21.24 53.25 21.18 63.56 21.17 69.97 21.35 71.88 21.35 79.59 21.2 86 21.12 89.34 21.12 93.97 21.21 100.43 21.27 106.73 21.23 116.12 21.38 123.11 21.63 127.76 21.66 132.63 22.04 140.35 22.34 143.71 22.28 150.12 22.29 155.7 22.58 159.2 22.88 159.74 23.14 163.85 23.95 166.27 24.7 168.65 24.85 169.68 24.75 170.84 24.12 172 23.92 174.33 23.78 178.2 23.78 178.2 23.61 181.51 23.53 183.65 23.58 188.59 23.45 191.79 23.89 194.12 24.02 197.62 24.1 199.81 24.34 203.02 24.46 209.26 24.91 213.92 24.92 217.41 24.8 224.39 24.88 234.87 24.88 243.02 24.8 246.3 25.07 249.5 25.14 252.33 25.12 258.16 25.21 259.32 25.4 261.65 26.28 266.3 26.33 268.98 25.84 269.8 25.34 271.95 25.14 275.62 25.16 278.36 25.45 290.75 25.46 295.41 25.31 298.9 25.26 302.42 25.05 304.72 24.67 307.05 24.43 311.71 24.08 317.53 23.84 321.64 23.44 326.84 23.15 334.46 22.52 339.65 21.83 343.58 20.94 345.47 20.65 348.89 19.82 351.3 19.48 355.95 18.68 360.61 18.12 362.93 17.7 368.13 17 374.68 16.18 378.93 15.81 382.73 15.39 387.32 15.07 393.2 14.83 400.18 14.6 406.6 14.46 414.61 14.47 418.82 14.79 421.46 14.9 429.04 15.46 431.62 15.39 434.22 15.43 439.77 15.27 443.47 15.3 448.28 15.5 453.74 15.52 459.35 15.36 461.89 15.37 465.39 15.57 469.12 15.59 475.53 16.29 477.03 16.67 479.36 17.74 481.68 18.33 483.54 18.49 486.75 18.58 489.83 18.51 494.76 18.55 498.02 18.46 501.18 18.87 504.38 19.2 510.8 19.28 512.4 19.21 517.77 18.58 518.81 18.35 521.27 18.17 530.03 17.8 539.1 17.6 544.55 17.55 555.03 17.37 558.88 17.39 565.3 17.3 575.12 17.25 584.53 17.23 588.79 17.18 596.94 17.01 603.42 16.93 609.75 16.98 616.28 16.88 619.06 16.88 631.72 16.75 635.83 16.64 650.26 16.43 657.48 16.39 664.63 16.26 665.88 16.19 673.4 16.05 678.47 16.04 681.51 16.1 690.74 15.94 698.39 15.87 701.51 15.76 706.51 15.82 708.12 15.71 710.41 15.35 714.66 12.39 731.18 2.6 743.78 -.41 745.55 -.7 752.64 -1.29 755.01 -1.34 756.66 -.96 758.48 -.87 761.31 -.97 766.62 -1.25 769.18 -1.15 771.36 -1.21 778.54 -1.03 790.21 -1.02 792.75 -.94 799.26 -.22 803.99 .19 807.54 .43 809.62 .76 818.14 2.51 827.68 10.67 833.44 13.9 834.47 13.9 835.35 14.18 837.55 15.4 840.06 15.73 843.04 15.59 846.32 14.85 850.08 14.44 852.59 14.04 855.35 13.77 858.4 13.7 862.92 13.4 867.44 13.43 868.82 13.57 878.59 12.86 884.16 12.91 885.41 12.77 891.51 12.33 893.93 12.25 899.51 11.95 902.3 11.92 905 11.99

908.06 11.82 913.17 11.33 915.58 11.35 916.25 11.23 920.43 11.07 923.22
11.11 924.6 11.03 927.87 11.04 931.59 10.83 936.65 10.87 938.15 11.03 939.96
11.45 941.35 11.59 942.57 12.03 944.2 12.4 947.47 12.58 949.72 12.5 952.37
12.63 952.51 12.8 955.3 12.73 957.71 12.51 960.72 12.5 963.8 12.59 976.22
12.41 982.05 12.53 985.99 12.7 989.31 12.59 996.83 12.64 999.94 12.44
1001.36 12.44 1004.63 12.25 1005.52 12.09 1009.7 11.91 1011.88 11.97 1020.96
12.05 1023.92 12.18 1025.86 12.39 1033.41 12.56 1035.66 12.88 1037.46 12.96
1038.92 12.85 1040.56 12.52 1047.09 12.2 1050.15 11.96 1051.55 11.37 1054.34
11.24 1058.52 10.79 1061.31 10.04 1069.05 8.8 1071.08 8.72 1074.85 8.8
1082.6 8.85 1085.02 8.95 1087.92 9.28 1093.13 9.54 1096.09 9.49 1099.15 9.62
1108.74 9.57 1109.15 9.92 1110.13 9.92 1110.78 9.47 1115.87 9.7 1118.5 9.91
1122.68 9.88 1125.48 10.08 1127.74 10.14 1128.75 10.31 1130.74 10.37 1132.02
10.21 1135.24 10.02 1136.92 9.63 1139.77 9.76 1142.21 10.1 1145.08 10.13
1147.79 9.99 1151.61 9.68 1154.88 9.62 1160.35 9.75 1166.86 9.81 1171.5
10.12 1174.29 10.12 1176.11 10.26 1178.89 10.19 1184.28 10.47 1189.18 10.54
1195.22 10.37 1197.34 10.41 1200.8 10.15 1203.59 10.03 1208.99 10.1 1213.67
10.44 1214.75 10.68 1216.94 10.58 1217.53 10.81 1220.21 10.69 1220.32 10.21
1221.72 10.34 1221.84 9.91 1223.11 10.1 1223.47 10.55 1225.11 10.81 1227.3
11.51 1228.69 12.16 1231.64 12.53 1234.56 12.72 1238.17 12.73 1243.59 12.59
1246.83 12.69 1248.22 12.65 1252.41 12.18 1254.12 12.28 1258.64 12.28
1259.38 12.42 1261.65 12.34 1264.3 12.11 1267.67 12.07 1269.2 11.93 1270.54
11.37 1274.72 11.09 1277.51 10.83 1280.3 10.37 1281.7 10.41 1284.22 10.9
1288.8 11.3 1291.74 11.44 1293.25 11.86 1295.65 11.82 1297.76 11.54 1302.27
11.72 1306.77 11.78 1310.99 11.95 1317.96 11.63 1321.46 11.58 1326.36 11.86
1331.91 11.94 1336.16 12.2 1337.49 12.37 1342.7 12.63 1347.26 12.66 1350.86
12.56 1354.13 12.06 1357.95 11.86 1365.39 11.96 1369.98 11.59 1373.73 11.37
1380.51 11.16 1384.92 11.12 1393.32 11.43 1398.57 11.45 1404.45 11.54
1410.61 11.81 1414.21 11.85 1415.6 12.24 1418.13 12.66 1419.79 12.72 1421.09
13.87 1422.58 13.95 1423.97 14.34 1426.76 14.55 1430.17 14.34 1431.67 14.37
1436.19 15.04 1437.69 15.16 1440.7 15.17 1443.5 15.28 1448.85 15.19 1451.87
15.41 1453.75 15.45 1456.05 15.35 1457.02 15.43 1460.29 15.37 1461.63 15.19
1467.21 14.99 1472.3 15.07 1476.98 15.76 1481.16 15.6 1486.42 15.63 1491.32
15.75 1493.36 15.61 1497.85 15.56 1501.11 15.39 1506.27 15.34 1509.91 15.48
1514.43 15.4 1519.08 15.52 1521.61 16.12 1523.46 15.99 1530.51 16.2 1535.49
16.01 1542.54 16.24 1551.74 16.4 1556.64 16.39 1564.08 16.72 1566.25 16.7
1569.71 16.83 1573.22 16.74 1576.24 16.82 1582.14 16.86 1592.57 16.63
1595.84 16.62 1601.7 16.44 1612.17 16.3 1613.8 16.32 1620.34 16.77 1621.26
16.89 1623.44 16.88 1626.23 16.65 1630.14 16.52 1635.04 16.61 1639.94 16.63
1644.36 16.42 1649.84 16.73 1662.49 16.72 1666.68 17.01 1669.41 17.3 1672.6
17.44 1675.42 17.47 1680.63 17.84 1687.6 18.14 1691.79 18.52 1700.15 18.86
1704.01 19.19 1707.02 19.21 1709.92 19.35 1713.43 19.4 1715.06 19.32 1718.29
18.98 1722.07 18.84 1725.26 19.06 1728.09 18.76 1731.1 18.77 1737.11 19.11
1741.19 19.18 1746.09 19.41 1749.36 19.49 1753.67 19.7 1755.17 19.99 1758.18
20.23 1759.68 20.24 1762.92 20.53 1767.32 20.62 1771.29 20.87 1772.69 21.19
1774.73 21.25 1777.74 21.55 1783.85 21.79 1786.92 22.05 1792.21 22.26
1795.79 22.56 1799.19 22.94 1801.81 23.08 1806.33 23.85 1809.79 24.73
1811.42 24.97 1811.74 25.26 1814.53 26.19 1817.32 26.02 1817.95 26.23
1819.87 26.12 1824.48 26.41 1827.09 26.22 1831.27 26.2 1834.28 26.29 1835.46
26.22 1838.24 26.37 1839.18 26.27 1843.82 26.35 1845.45 26.1 1848.01 26.13
1855.98 25.99 1862.05 26.09 1865.31 26.25 1872.53 26.49 1876.75 26.81
1880.09 27.34 1882.88 27.61 1891.45 27.71 1895.43 27.92 1896.34 28.15
1897.98 28.11 1902.88 28.17 1907.14 28.1 1910.15 28.32 1911.65 28.59 1917.67
30.54 1922.18 31.63 1925.19 32.07 1929.71 32.49 1934.49 32.68 1940.07 32.74
1946.26 32.99 1949.27 33.01 1955.14 33.14 1960.04 32.86 1962.81 32.83

1971.47 33.16 1979.64 33.52 1985.38 33.72

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .08 706.51 .04 840.06 .08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 706.51 840.06 232.69 232.69 232.69 .1 .3

CROSS SECTION

RIVER: Taunton River REACH: Main Stem RS: 43383.23

INPUT
Description: 44 Approach Old Col Ave
Station Elevation Data num= 491
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 24.15 2.21 24.18 9.15 24.44 12.43 25.03 14.93 25.16 19.01 24.97 20.62 25.05 22.24 24.6 32.9 24.6 32.9 23.59 41.44 23.57 47.32 23.3 49.64 23.24 52.86 22.99 56.58 22.82 62.36 22.36 66.02 22.2 70.91 22.12 78.65 21.86 80.87 21.85 85.1 21.92 88.33 21.88 94.83 21.93 100.53 21.69 106.06 21.62 110.78 21.52 117.89 21.53 136.69 21.1 141.02 20.87 146.36 20.75 149.58 20.79 153.74 20.91 157.64 21.15 161.84 21.5 167.31 21.84 172.52 22 176.88 22.19 179.19 22.38 183.43 23.42 184.98 23.62 187.29 23.55 189.88 23.61 211.7 23.61 215.67 23.59 217.28 23.65 220.84 23.66 223.15 23.87 225.34 23.97 226.96 24.17 230.18 23.81 235.87 23.76 237.03 23.66 238.36 24.08 239.34 23.97 241.66 24.03 243.07 24.2 245.13 24.15 251.13 23.88 252.75 23.76 254.44 23.75 259.19 23.97 264.79 24.06 269.42 24.17 275.57 24.36 280.99 24.83 285.61 25.03 286.2 25.23 287.93 25.49 291.31 25.8 296.27 25.92 299.5 25.8 304.33 26.09 307.69 25.93 312.22 25.86 324.6 25.86 324.6 26.47 328.73 26.47 333.04 26.35 334.96 26.17 337.67 26.11 344.56 25.84 347.85 25.84 353.86 25.69 357.52 25.39 359.14 25.35 365.43 25.55 367.74 25.66 373.23 26.14 377 26.37 381.63 26.74 383.32 26.81 387.41 26.86 392.99 27.05 397.83 27.32 402.45 27.43 416.5 27.43 416.5 27.91 420.39 27.93 423.62 27.88 427.07 27.55 427.9 27.42 430.06 27.32 433.68 27.32 436.51 27.2 443.02 27.18 444.09 27.13 448.72 27.1 452.63 27.24 454.5 27.46 455.85 27.96 456.81 28.1 460.28 28.14 461.44 27.98 465.53 27.19 467.44 26.88 470.36 26.54 472.26 26.6 473.01 26.78 476.81 26.5 478.42 26.43 481.65 26.52 486.48 26.57 491.32 26.69 497.3 26.53 503.08 26.24 507.44 25.56 511.18 25.09 514.65 24.54 520.1 24.06 525.17 23.76 532.98 23.55 537.08 23.5 540.1 23.53 544.73 23.38 547.74 23.46 554.19 23.11 557.41 23.32 559.02 23.34 562.24 23.21 567.08 23.29 569.02 22.72 571.33 22.21 573.26 21.48 578.27 19.69 579.98 19.42 583.2 19.34 585.21 19.5 587.53 19.79 592.87 19.88 595.62 19.96 599.32 19.96 605.77 19.6 608.35 19.49 609.51 19.57 612.22 19.45 614.91 19.4 620.28 19.4 629.17 19.54 631.56 19.61 638.42 19.61 644.21 19.55 660.57 19.85 663.63 19.77 722.7 19.77 722.7 16.14 729.81 16.03 735.18 16 740.82 16.06 742.35 18.19 747.31 18.05 749.89 18.05 753.02 17.95 757.54 17.91 763.15 17.72 764.17 17.83 767.96 17.69 777.8 17.46 778.57 17.46 786.33 12.46 797.4 5.57 798.28 4.99 799.58 4.53 803.67 3.57 808.1 2.31 819.86 -1.39 821.56 -1.29 829.52 -1.16 830.65 -1.37 834.41 -1.59 836.77 -1.4 840.39 -1.26 844.37 -1.33 847.04 -1.47 851.75 -1.46 854.8 -1.33 858.48 -1.32 859.04 -1.21 861.66 -1.26 862.89 -.95 864.78 -1.38 867 -1.35 868.61 -.87 872.07 -.91 873.31 -.79 874.7 -.51 884.47 1.14 888.19 2.56 889 3.26 894 5.36 897.7 7.13 899.58 7.67 914.01 14.04 915.02 14.04 915.02 14.44 919.14 14.29 920.64 14.5 924 15.17 925.4 15.33 929.6

16.15 931.17 16.27 932.67 19.44 934.18 20.89 937.87 21.03 940.8 21.03 945
21.29 949.25 21.4 952 21.56 956.74 21.97 959 21.97 960.3 21.87 961.8 21.75
963.87 21.51 968.75 21.25 972 20.85 973 20.83 975.79 20.6 978.59 20.51
979.99 20.36 982.31 19.91 985.32 19.54 988.39 19.25 991.5 19.24 995.39 19.15
1000.36 18.73 1003.37 18.6 1009.38 18.12 1011 18.06 1015.4 18.14 1016.91
18.09 1021.42 17.5 1026.19 17.23 1028.99 17.2 1033.45 17.3 1035.38 16.82
1035.99 16.49 1037.97 16.04 1041.59 14.57 1044.39 13.1 1045.13 13.01 1047.19
12.16 1048.59 11.78 1050.01 11.25 1051.39 11.03 1053.26 10.99 1055.59 11.06
1057.52 10.66 1059.76 10.82 1063.54 10.45 1066.54 10.44 1071.14 10.21
1073.79 10.14 1075.19 10.22 1080.08 10.18 1084.59 10.37 1087.6 10.37 1092.27
10.53 1097.14 10.5 1101.78 10.54 1105.98 10.65 1110.14 10.53 1113.39 10.51
1119.98 10.53 1125.21 10.73 1129.64 11.02 1134.52 11 1137.24 11.1 1140.25
11.54 1143.78 11.65 1146.26 11.79 1152.18 11.89 1155.65 11.69 1158.9 11.65
1164.31 11.81 1168.98 12.11 1173.34 12.1 1180.86 12.17 1183.87 12.43 1185.78
12.78 1191.4 13.97 1193.03 14.17 1197.41 14.55 1199.53 14.61 1202.58 14.61
1207.66 14.79 1212.38 14.79 1215.18 15.18 1219.37 15.6 1221.47 15.64 1222.17
15.52 1224.48 15.61 1228.99 15.52 1233.51 15.53 1236.91 15.41 1241.78 15.31
1245.54 15.35 1249.91 15.24 1253.16 15.27 1256.41 15.23 1261.29 15.23
1266.97 15.36 1271.99 15.59 1273.97 15.61 1275.37 15.41 1276.77 15.08
1278.63 14.78 1280.97 14.61 1284.65 14.49 1287.97 14.59 1296.37 14.29
1301.92 14.33 1304.2 14.39 1307.57 14.39 1308.97 14.46 1313.29 15.07 1317.37
15.41 1319.24 15.51 1323.75 15.89 1329.55 15.46 1331.37 15.39 1334.42 15.37
1338.8 15.42 1343.96 15.58 1347.82 15.57 1352.33 15.67 1355.34 15.81 1359.36
16.18 1362.16 16.55 1370.56 17.78 1371.8 18.02 1374.76 18.37 1377.9 18.66
1379.41 18.72 1383.18 18.75 1390.16 18.69 1394.55 18.73 1398.56 18.63
1404.16 18.79 1409.49 18.86 1416.76 18.91 1420.96 18.97 1425.16 18.97
1436.36 18.82 1439.57 18.68 1445.59 18.33 1450.36 17.92 1454.69 17.63
1459.13 17.46 1462.14 17.45 1468.15 17.36 1471.35 17.42 1475.55 17.61
1478.68 17.71 1483.95 18 1487.71 18.17 1495.15 18.36 1499.74 18.39 1509.15
18.58 1521.32 18.99 1527.35 19.1 1531.55 19.1 1538.55 18.99 1544.15 18.78
1553.95 18.58 1565.15 18.28 1574.9 17.85 1580.54 17.74 1585.48 17.74 1589.58
17.81 1595.09 17.8 1605.74 17.9 1615.29 17.86 1618.83 17.88 1623.08 17.85
1629.54 17.87 1633.74 17.83 1639.63 17.97 1643.54 18 1647.15 17.96 1651.94
18.04 1660.33 18.31 1666.02 18.46 1672.58 18.59 1677.5 18.83 1683.97 19.08
1687.78 19.26 1699.82 19.55 1708.67 19.45 1711.95 19.35 1717.35 19.11
1722.91 18.83 1736.55 18.09 1740.99 17.89 1756.28 17.41 1758.52 17.37
1763.03 17.38 1766.02 17.51 1768.8 17.43 1773.57 17.58 1779.59 17.69 1787.39
17.8 1788.62 17.89 1790.12 19.27 1793.13 19.34 1794.64 19.44 1797.65 19.79
1799.15 19.84 1804.95 19.84 1812 20.05 1821.64 20.17 1825.12 20.19 1830.76
20.17 1834.15 20.12 1836.6 20.03 1842.5 19.89 1851.83 19.44 1854.84 19.42
1860.86 19.64 1864.75 19.87 1875.87 20.35 1880.88 20.48 1884.94 20.7 1889.78
20.78 1893.64 20.95 1896.73 21.02 1903.68 21.25 1907.52 21.29 1913.42 21.4
1919.56 21.67 1924.07 21.69 1927.32 21.83 1933.11 22.16 1937.62 22.31
1944.01 22.65 1949.77 22.86 1956.33 23.06 1959.3 23.21 1961.7 23.44 1966.17
23.76 1973.74 24.13 1976.75 24.12 1981.27 23.75 1984.28 23.73 1988.51 23.93
1990.3 24.11 1992.68 24.67 1994.81 25.31 1996.32 25.63 1997.82 25.69 2001.02
25.22 2002.41 25.15 2006.58 25.75 2012.87 25.72 2015.88 25.78 2023.27 25.85
2030.22 26 2033.42 26.14 2035.78 26.36 2037.17 26.4 2045.99 25.98 2052.01
25.94 2062.2 26.09 2067.06 26.21 2071.57 26.61 2074.58 26.68 2079.34 26.89
2080.6 27.02 2083.06 27.06 2102.52 27.06 2102.52 29.11 2108.86 28.95 2110.31
28.84

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

0 .085 778.57 .04 960.3 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 778.57 960.3 47.15 47.15 47.15 .8 .8 Ineffective Flow num= 1
Sta L Sta R Elev Permanent
960.3 2110.31 22 T
Blocked Obstructions num= 1
Sta L Sta R Elev
655 748 30

CROSS SECTION

RIVER: Taunton River REACH: Main Stem RS: 43336.08

INPUT
Description: 43.7 US Face Old Col Ave
Station Elevation Data num= 490
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 24.29 1.33 24.36 2.95 24.39 3.51 24.43 4.66 24.38 6.19 24.51 8.12 24.48 9.27 24.53 11.57 24.48 12.87 24.4 13.87 24.22 15.02 24.22 15.9 24.26 16.85 24.24 17.98 24.15 18.48 24.04 20.71 23.92 21.93 23.7 24 23.52 25.39 23.44 27.69 23.45 33.71 23.45 36.77 23.37 40.19 23.3 42.65 23.32 44.96 23.28 48.72 23.27 51.86 23.34 53.02 23.39 54.76 23.4 56.68 23.32 59.92 23.14 65.68 22.92 67.72 22.91 73.74 22.71 76.6 22.6 80.58 22.47 82.95 22.43 83.46 22.44 85.53 22.39 88.55 22.35 94.46 22.35 97.91 22.34 99.83 22.31 104.96 22.3 107.12 22.34 108.27 22.33 110.58 22.41 115.18 22.47 116.19 22.52 117.48 22.53 120.42 22.62 121.15 22.63 126.01 22.54 127.84 22.54 129.84 22.61 132.56 22.74 135.72 22.84 137.05 22.83 139.36 22.87 140.75 22.84 142.81 22.74 144.32 22.6 145.44 22.46 147.42 22.27 148.68 22.18 150.29 22.1 152.02 22.14 153.17 22.2 155.47 22.27 157.78 22.3 159.84 22.28 161.23 22.29 162.38 22.27 165.3 22.28 166.99 22.31 170.44 22.22 171.34 22.22 172.96 22.26 175.05 22.35 176.21 22.43 178.5 22.47 178.94 22.51 182.68 22.63 185.92 22.68 190.77 22.74 193.46 22.71 198.07 22.7 200.77 22.67 203.83 22.62 205.35 22.63 207.28 22.68 210.73 22.73 211.68 22.76 214.19 22.96 214.41 23.08 215.06 23.16 215.34 23.32 216.68 23.77 217.64 23.88 218.79 23.89 219.86 23.7 221.09 23.82 222.25 23.82 222.59 23.74 223.16 23.73 241.9 23.73 241.9 24.13 245.27 24.2 246.42 24.17 247.15 24.21 251.03 24.27 253.92 24.38 254.48 24.29 255.85 23.98 256.78 23.73 257.16 23.7 258.78 23.67 260.79 23.68 262.02 23.72 265.26 23.76 265.99 23.84 266.24 23.97 267.14 24.13 268.29 24.72 268.5 24.77 268.97 24.71 269.45 24.77 270.6 24.6 271.7 24.71 272.9 24.77 275.77 24.85 277.15 24.99 277.9 24.99 277.9 25.09 279.75 25.32 281.45 25.26 282.11 25.2 282.61 25.23 283.74 25.21 286.31 25.21 287.72 25.23 289.02 25.21 290.17 25.27 290.8 25.22 292.47 25.31 294.4 25.36 296.25 25.32 297.08 25.27 298.23 25.31 298.98 25.24 300.53 25.2 301.68 25.22 301.71 25.17 304.12 25.17 305.13 25.26 307.44 25.29 310.89 25.43 313.19 25.45 314.34 25.48 316.65 25.46 318.95 25.53 320.31 25.52 322.4 25.58 323.53 25.66 325.17 25.71 327.01 25.73 331.54 25.65 333.91 25.57 336.22 25.46 338.12 25.39 339.9 25.35 342.63 25.26 348.09 25.02 349.45 24.91 350.03 24.81 350.81 24.61 351.45 24.5 352.33 24.41 353.49 24.18 353.54 24.26 354.31 24.16 361.54 24.35 362.7 24.4 366.15 24.45 369.6 24.63 370.5 24.74 370.75 24.86 371.37 25.33 371.91 25.68 372.12 26.07 372.64 26.26 373.06 27.07 375.37 27.28 376.98 27.54 378.81 27.68 381.84 27.73 383.32 27.74 387.3 27.71 391.29 27.6 393.78 27.57 397.19 27.6 399.54 27.59 404.14 27.68 406.13 27.7 409.36 27.66 411.2 27.58 413.35 27.35 414.5 27.28 417.95 26.89 420.26 26.51 422.56 25.92

423.71 25.58 424.47 25.45 424.86 25.46 426.01 25.27 427.2 25.16 428.79 25.09
434.07 24.95 437.53 24.91 438.68 24.92 443.07 24.85 446.3 24.86 447.89 24.88
454.79 24.88 455.95 24.94 459.56 25.29 462.67 25.53 465.4 25.71 467.66 25.82
470.85 25.87 473.58 25.88 476.67 25.83 480.12 25.68 481.77 25.66 485.47
25.65 488.18 25.6 490.32 25.53 491.63 25.42 492.78 25.27 495.18 25.01 496.8
24.87 498.54 24.67 500.04 24.56 501.99 24.37 503.28 24.22 505.45 24.09
506.32 24.02 508.14 23.93 509.75 23.96 511.77 24.09 513.51 24.23 516.23
24.54 517.85 24.68 519.47 24.7 521.57 24.64 523.87 24.42 526.17 24.34 527.32
24.25 529.18 24.17 532.42 24.09 535.38 24.1 536.53 24.12 539.06 24.1 539.98
24.07 543.44 24.03 545.38 23.97 549.97 23.88 553.8 23.78 555.42 23.75 558.4
23.62 560.71 23.6 560.88 23.62 563.19 23.67 565.31 23.65 566.43 23.59 569.66
23.59 572.22 23.64 576.14 23.65 579.38 23.43 579.98 23.26 580.28 23.11 581
22.93 582.49 22.33 583.73 21.88 584.24 21.76 585.86 21.46 587.19 21.32
588.34 21.16 590.64 20.8 592.33 20.48 593.95 20.3 595.57 20.19 599.08 20.1
600.43 20.05 602.05 20.02 605.29 20.2 606.76 20.24 608.52 20.32 609.99 20.36
611.76 20.34 614.81 20.24 619.29 20.21 619.29 20.52 620.37 20.52 678.32
19.76 686.81 19.31 690.94 19.23 691.1 19.11 692.71 19.2 700.17 18.91 713.6
18.7 717.93 18.66 721.39 18.57 728.31 18.56 729.31 18.87 729.71 18.66 731.59
18.19 733.27 17.86 734.46 17.78 738.14 17.72 738.84 17.73 744.87 17.67
749.87 17.61 751.44 18.31 751.56 18.32 759.93 18.53 761.35 18.54 769.35
18.73 773.48 18.75 776.35 18.67 782.31 18.76 790.53 18.92 791.94 19.06
793.27 19.07 794.33 18.81 802.85 14.13 802.96 14.03 803.96 13.98 808.44
11.28 813.94 8.15 815.37 7.44 821.04 3.78 824.84 3.15 844.58 .41 847.05 0
848.45 -.35 851.11 -.78 852.95 -.74 855.53 -.35 856.98 -.53 866.68 -.33
868.04 -.79 869.71 -1.29 872.45 -1.47 875.33 -1.19 880.81 -.95 883.35 -.77
897.42 2.9 897.9 2.86 898.5 2.92 899.54 3.19 902.29 5.09 904.72 6.63 916.11
12.72 916.78 12.72 917.33 13.22 917.44 16.58 917.84 18.73 918.27 18.76
919.22 18.74 920.56 18.66 922.43 18.24 923.64 18.29 925.48 18.13 929.27
18.05 930.66 18 935.06 17.94 945.01 17.67 952.75 17.65 958.29 17.25 958.44
17.25 958.79 17.75 965.93 17.51 967.7 17.46 978.79 17.1 983.8 17.07 994.52
17.02 1002.79 16.93 1004.89 16.92 1010.78 16.82 1020.11 16.61 1062.51 16.04
1065.19 16.03 1066.76 16.05 1067.98 15.98 1319.66 15.5 1332.26 15.73 1335.61
15.64 1339.92 15.75 1343.93 15.84 1376.88 16.6 1393.47 16.77 1399.55 17.06
1412.32 17.02 1460.19 17.09 1461.19 17.09 1461.19 17.15 1462.25 17.15 1468.9
17.05 1471.28 16.99 1474.46 16.98 1477.3 16.94 1480.66 16.96 1483.94 17.03
1484.19 17.02 1487.22 17.12 1490.85 17.2 1493.78 17.14 1498.09 17.17 1502.26
17.17 1507.4 17.21 1508.55 17.23 1515.11 17.24 1517.94 17.22 1519.44 17.23
1520.33 17.26 1523.96 17.28 1525.89 17.26 1529.88 17.33 1532.84 17.36 1537.5
17.39 1539.79 17.45 1543.01 17.49 1543.53 17.48 1546.75 17.54 1548.14 17.55
1552.31 17.62 1554.06 17.63 1557.77 17.59 1559.41 17.56 1562.04 17.57
1563.43 17.55 1567.48 17.46 1569.26 17.44 1571.77 17.45 1574.18 17.41
1576.64 17.34 1578.14 17.28 1581.15 17.22 1582.39 17.21 1585.68 17.14
1587.31 17.09 1590.18 17.07 1594.7 17.17 1598.18 17.15 1602.08 17.2 1605.13
17.17 1606.74 17.18 1607.91 17.23 1610.69 17.27 1614.27 17.26 1617.28 17.29
1622.08 17.29 1624.59 17.25 1626.69 17.24 1630.82 17.27 1633.25 17.27
1637.11 17.3 1639.81 17.35 1644.37 17.36 1648.88 17.46 1650.39 17.48 1654.9
17.48 1655.18 17.47 1660.92 17.43 1663.93 17.42 1666.94 17.45 1671.86 17.54
1677.42 17.61 1678.81 17.64 1681.59 17.66 1683.5 17.66 1688.02 17.73 1689.93
17.73 1691.32 17.75 1695.6 17.75 1702.44 17.79 1706.61 17.79 1710.35 17.81

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 802.96 .04 917.84 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 802.96
917.84 52.87 52.87 52.87 .5 .8 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 800 20.9 T
 927 1710.35 20 T

BRIDGE

RIVER: Taunton River
REACH: Main Stem RS: 43308.41

INPUT
Description: 43.5 Old Colony Ave/South St Distance from Upstream XS = 17.42
Deck/Roadway Width = 35
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
 num= 42
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 0 17.72 706.24 17.72 724.79 17.72
 783.93 17.72 793 17.72 800.01 17.72
 806.7 17.94 807.04 17.94 809.65 17.91
 815 17.83 815 17.83 14.35 815.77 17.85 14.35
 817.17 17.85 14.35 824.78 17.82 14.35 827.39 17.8 14.35
 831.99 17.8 14.35 835.49 17.79 14.35 837.58 17.77 14.35
 843.91 17.76 14.35 847.41 17.75 14.35 850.13 17.73 14.35
 854.42 17.72 14.35 857.51 17.72 14.35 863.29 17.7 14.35
 867.43 17.69 14.35 870.75 17.67 14.35 874.87 17.65 14.35
 877.3 17.64 14.35 883.23 17.62 14.35 887.04 17.61 14.35 887.49 17.61 14.35
894.71 17.6 14.35 897.36 17.59 14.35
 900.75 17.59 14.35 902.11 17.58 14.35 902.11 17.58
 907.03 17.57 912 17.57 919.16 17.57
 922.81 17.57 954.51 17.57 1712.86 17.57

Upstream Bridge Cross Section Data
Station Elevation Data num= 490
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 24.29 1.33 24.36 2.95 24.39
3.51 24.43 4.66 24.38 6.19 24.51 8.12 24.48 9.27 24.53 11.57 24.48 12.87
24.4 13.87 24.22 15.02 24.22 15.9 24.26 16.85 24.24 17.98 24.15 18.48 24.04
20.71 23.92 21.93 23.7 24 23.52 25.39 23.44 27.69 23.45 33.71 23.45 36.77
23.37 40.19 23.3 42.65 23.32 44.96 23.28 48.72 23.27 51.86 23.34 53.02 23.39
54.76 23.4 56.68 23.32 59.92 23.14 65.68 22.92 67.72 22.91 73.74 22.71 76.6
22.6 80.58 22.47 82.95 22.43 83.46 22.44 85.53 22.39 88.55 22.35 94.46 22.35
97.91 22.34 99.83 22.31 104.96 22.3 107.12 22.34 108.27 22.33 110.58 22.41
115.18 22.47 116.19 22.52 117.48 22.53 120.42 22.62 121.15 22.63 126.01
22.54 127.84 22.54 129.84 22.61 132.56 22.74 135.72 22.84 137.05 22.83
139.36 22.87 140.75 22.84 142.81 22.74 144.32 22.6 145.44 22.46 147.42 22.27
148.68 22.18 150.29 22.1 152.02 22.14 153.17 22.2 155.47 22.27 157.78 22.3
159.84 22.28 161.23 22.29 162.38 22.27 165.3 22.28 166.99 22.31 170.44 22.22
171.34 22.22 172.96 22.26 175.05 22.35 176.21 22.43 178.5 22.47 178.94 22.51
182.68 22.63 185.92 22.68 190.77 22.74 193.46 22.71 198.07 22.7 200.77 22.67
203.83 22.62 205.35 22.63 207.28 22.68 210.73 22.73 211.68 22.76 214.19
22.96 214.41 23.08 215.06 23.16 215.34 23.32 216.68 23.77 217.64 23.88
218.79 23.89 219.86 23.7 221.09 23.82 222.25 23.82 222.59 23.74 223.16 23.73

241.9 23.73 241.9 24.13 245.27 24.2 246.42 24.17 247.15 24.21 251.03 24.27
253.92 24.38 254.48 24.29 255.85 23.98 256.78 23.73 257.16 23.7 258.78 23.67
260.79 23.68 262.02 23.72 265.26 23.76 265.99 23.84 266.24 23.97 267.14
24.13 268.29 24.72 268.5 24.77 268.97 24.71 269.45 24.77 270.6 24.6 271.7
24.71 272.9 24.77 275.77 24.85 277.15 24.99 277.9 24.99 277.9 25.09 279.75
25.32 281.45 25.26 282.11 25.2 282.61 25.23 283.74 25.21 286.31 25.21 287.72
25.23 289.02 25.21 290.17 25.27 290.8 25.22 292.47 25.31 294.4 25.36 296.25
25.32 297.08 25.27 298.23 25.31 298.98 25.24 300.53 25.2 301.68 25.22 301.71
25.17 304.12 25.17 305.13 25.26 307.44 25.29 310.89 25.43 313.19 25.45
314.34 25.48 316.65 25.46 318.95 25.53 320.31 25.52 322.4 25.58 323.53 25.66
325.17 25.71 327.01 25.73 331.54 25.65 333.91 25.57 336.22 25.46 338.12
25.39 339.9 25.35 342.63 25.26 348.09 25.02 349.45 24.91 350.03 24.81 350.81
24.61 351.45 24.5 352.33 24.41 353.49 24.18 353.54 24.26 354.31 24.16 361.54
24.35 362.7 24.4 366.15 24.45 369.6 24.63 370.5 24.74 370.75 24.86 371.37
25.33 371.91 25.68 372.12 26.07 372.64 26.26 373.06 27.07 375.37 27.28
376.98 27.54 378.81 27.68 381.84 27.73 383.32 27.74 387.3 27.71 391.29 27.6
393.78 27.57 397.19 27.6 399.54 27.59 404.14 27.68 406.13 27.7 409.36 27.66
411.2 27.58 413.35 27.35 414.5 27.28 417.95 26.89 420.26 26.51 422.56 25.92
423.71 25.58 424.47 25.45 424.86 25.46 426.01 25.27 427.2 25.16 428.79 25.09
434.07 24.95 437.53 24.91 438.68 24.92 443.07 24.85 446.3 24.86 447.89 24.88
454.79 24.88 455.95 24.94 459.56 25.29 462.67 25.53 465.4 25.71 467.66 25.82
470.85 25.87 473.58 25.88 476.67 25.83 480.12 25.68 481.77 25.66 485.47
25.65 488.18 25.6 490.32 25.53 491.63 25.42 492.78 25.27 495.18 25.01 496.8
24.87 498.54 24.67 500.04 24.56 501.99 24.37 503.28 24.22 505.45 24.09
506.32 24.02 508.14 23.93 509.75 23.96 511.77 24.09 513.51 24.23 516.23
24.54 517.85 24.68 519.47 24.7 521.57 24.64 523.87 24.42 526.17 24.34 527.32
24.25 529.18 24.17 532.42 24.09 535.38 24.1 536.53 24.12 539.06 24.1 539.98
24.07 543.44 24.03 545.38 23.97 549.97 23.88 553.8 23.78 555.42 23.75 558.4
23.62 560.71 23.6 560.88 23.62 563.19 23.67 565.31 23.65 566.43 23.59 569.66
23.59 572.22 23.64 576.14 23.65 579.38 23.43 579.98 23.26 580.28 23.11 581
22.93 582.49 22.33 583.73 21.88 584.24 21.76 585.86 21.46 587.19 21.32
588.34 21.16 590.64 20.8 592.33 20.48 593.95 20.3 595.57 20.19 599.08 20.1
600.43 20.05 602.05 20.02 605.29 20.2 606.76 20.24 608.52 20.32 609.99 20.36
611.76 20.34 614.81 20.24 619.29 20.21 619.29 20.52 620.37 20.52 678.32
19.76 686.81 19.31 690.94 19.23 691.1 19.11 692.71 19.2 700.17 18.91 713.6
18.7 717.93 18.66 721.39 18.57 728.31 18.56 729.31 18.87 729.71 18.66 731.59
18.19 733.27 17.86 734.46 17.78 738.14 17.72 738.84 17.73 744.87 17.67
749.87 17.61 751.44 18.31 751.56 18.32 759.93 18.53 761.35 18.54 769.35
18.73 773.48 18.75 776.35 18.67 782.31 18.76 790.53 18.92 791.94 19.06
793.27 19.07 794.33 18.81 802.85 14.13 802.96 14.03 803.96 13.98 808.44
11.28 813.94 8.15 815.37 7.44 821.04 3.78 824.84 3.15 844.58 .41 847.05 0
848.45 -.35 851.11 -.78 852.95 -.74 855.53 -.35 856.98 -.53 866.68 -.33
868.04 -.79 869.71 -1.29 872.45 -1.47 875.33 -1.19 880.81 -.95 883.35 -.77
897.42 2.9 897.9 2.86 898.5 2.92 899.54 3.19 902.29 5.09 904.72 6.63 916.11
12.72 916.78 12.72 917.33 13.22 917.44 16.58 917.84 18.73 918.27 18.76
919.22 18.74 920.56 18.66 922.43 18.24 923.64 18.29 925.48 18.13 929.27
18.05 930.66 18 935.06 17.94 945.01 17.67 952.75 17.65 958.29 17.25 958.44
17.25 958.79 17.75 965.93 17.51 967.7 17.46 978.79 17.1 983.8 17.07 994.52
17.02 1002.79 16.93 1004.89 16.92 1010.78 16.82 1020.11 16.61 1062.51 16.04
1065.19 16.03 1066.76 16.05 1067.98 15.98 1319.66 15.5 1332.26 15.73 1335.61
15.64 1339.92 15.75 1343.93 15.84 1376.88 16.6 1393.47 16.77 1399.55 17.06
1412.32 17.02 1460.19 17.09 1461.19 17.09 1461.19 17.15 1462.25 17.15 1468.9
17.05 1471.28 16.99 1474.46 16.98 1477.3 16.94 1480.66 16.96 1483.94 17.03
1484.19 17.02 1487.22 17.12 1490.85 17.2 1493.78 17.14 1498.09 17.17 1502.26

17.17 1507.4 17.21 1508.55 17.23 1515.11 17.24 1517.94 17.22 1519.44 17.23
1520.33 17.26 1523.96 17.28 1525.89 17.26 1529.88 17.33 1532.84 17.36 1537.5
17.39 1539.79 17.45 1543.01 17.49 1543.53 17.48 1546.75 17.54 1548.14 17.55
1552.31 17.62 1554.06 17.63 1557.77 17.59 1559.41 17.56 1562.04 17.57
1563.43 17.55 1567.48 17.46 1569.26 17.44 1571.77 17.45 1574.18 17.41
1576.64 17.34 1578.14 17.28 1581.15 17.22 1582.39 17.21 1585.68 17.14
1587.31 17.09 1590.18 17.07 1594.7 17.17 1598.18 17.15 1602.08 17.2 1605.13
17.17 1606.74 17.18 1607.91 17.23 1610.69 17.27 1614.27 17.26 1617.28 17.29
1622.08 17.29 1624.59 17.25 1626.69 17.24 1630.82 17.27 1633.25 17.27
1637.11 17.3 1639.81 17.35 1644.37 17.36 1648.88 17.46 1650.39 17.48 1654.9
17.48 1655.18 17.47 1660.92 17.43 1663.93 17.42 1666.94 17.45 1671.86 17.54
1677.42 17.61 1678.81 17.64 1681.59 17.66 1683.5 17.66 1688.02 17.73 1689.93
17.73 1691.32 17.75 1695.6 17.75 1702.44 17.79 1706.61 17.79 1710.35 17.81

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .045 802.96 .032 917.84 .045

Bank Sta: Left Right Coeff Contr. Expan.
 802.96 917.84 .5 .8
Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 800 20.9 T 927 1710.35 20 T

Downstream Deck/Roadway Coordinates
 num= 42
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 13.86 17.72 739 17.72 757.55 17.72
 816.69 17.72 825 17.72 832.77 17.72
 839.46 17.94 839.8 17.94 842.41 17.91
 847.76 17.83 848.53 17.85 849.93 17.85
 849.93 17.85 854.02 17.82 14.35 860.15 17.8 14.35
 864.75 17.8 14.35 868.25 17.79 14.35 870.34 17.77 14.35
 876.67 17.76 14.35 880.17 17.75 14.35 882.89 17.73 14.35
 887.18 17.72 14.35 890.27 17.72 14.35 896.05 17.7 14.35
 900.19 17.69 14.35 903.51 17.67 14.35 907.63 17.65 14.35
 910.06 17.64 14.35 915.99 17.62 14.35 919.8 17.61 14.35
 920.25 17.61 14.35 927.47 17.6 14.35 930.12 17.59 14.35 933.51 17.59 14.35
936.49 17.58 14.35 939.79 17.57 14.35
 941.39 17.57 14.35 941.39 17.57 951.92 17.57
 955.57 17.57 987.27 17.57 1745.62 17.57

Downstream Bridge Cross Section Data
Station Elevation Data num= 490
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 23.76 1.38 23.8 4.6 23.98
5.48 23.99 6.64 23.93 7.7 23.76 9.44 23.6 11.05 23.55 12.66 23.56 14.73
23.62 19.12 23.63 22.82 23.56 24.05 23.46 25.57 23.41 26.29 23.5 26.55
23.43 27.45 23.49 28.79 23.42 38.5 23.42 38.5 24.17 41.69 24.12 43.64 24.11
44.79 24.08 47.86 24.09 51.37 24.18 54.04 24.07 56.2 24 59.83 24 61.04 23.98
63.84 23.98 70.23 23.91 71.83 23.91 75.55 23.86 77.16 23.78 78.78 23.76
80.64 23.81 82 23.89 83.62 23.94 85.35 23.91 88.73 23.81 89.89 23.73 91.68
23.5 93.29 23.32 95.67 23.1 97.98 22.95 99.74 22.92 101.36 22.93 102.97
22.98 106.46 23.18 109.12 23.26 112.64 23.31 115.33 23.43 118.8 23.5 121.11
23.61 122.27 23.64 123.93 23.73 127.16 23.83 130.3 23.96 131.52 23.98 135.22

24.19 138.48 24.3 140.77 24.48 141.08 24.48 144.89 24.75 147.7 25.04 149.73
25.19 151.34 25.23 156.18 25.01 158.11 24.87 159.27 24.72 162.39 24.48
165.86 24.25 170.38 24.05 173.05 23.79 175.71 23.55 177.77 23.43 180.37
23.37 185.21 23.35 186.82 23.39 189.33 23.5 191.61 23.57 193.27 23.59 197.02
23.55 198.58 23.51 200.89 23.49 206.17 23.54 208.99 23.6 211.3 23.72 212.46
23.71 213.61 23.84 215.66 23.96 217.08 23.96 218.24 23.92 219.39 23.93
222.86 24.04 223.65 23.98 225.18 24.01 227.13 23.96 241 23.96 241 24.08
242.3 24.07 244.73 24 245.99 24.01 247.15 23.94 247.63 23.97 249.71 23.92
251.77 23.99 254.08 23.99 256.16 23.97 259.86 23.97 262.18 23.99 264.49
24.03 266.8 24.03 270.27 23.95 274.26 23.92 277.43 23.92 279.52 23.94 281.96
23.94 283.57 23.97 286.46 23.96 287.62 24.06 288.77 24.2 290.02 24.55 291.64
25.08 292.24 25.2 292.91 25.14 293.4 25.2 294.55 25.14 294.86 25.05 295.57
25 295.71 24.91 296.87 24.84 299.7 24.45 301.49 24.39 304.54 24.47 307.76
24.46 309.37 24.49 315.37 24.5 319.05 24.48 322.2 24.54 323.89 24.55 326.93
24.48 328.09 24.42 328.72 24.32 329.24 24.32 330.19 24.44 334.64 24.54
337.34 24.54 340.01 24.49 346.46 24.5 350.99 24.62 352.91 24.63 354.17 24.67
356.83 24.84 359.49 24.91 360.46 25.18 360.98 25.11 362.59 25.12 379.7 25.12
379.7 24.81 380.8 24.82 382.43 24.89 384.74 24.9 391.46 24.77 395.15 24.76
396.45 24.74 398.06 24.83 399.68 25.04 400.93 25.27 402.09 25.53 402.9 25.67
404.4 25.8 406.71 25.92 409.35 26 415.43 26.1 420.46 26.15 422.25 26.14
425.48 26.05 427.53 26.06 428.64 26.14 430.31 26.44 431.93 26.51 433.31
26.45 434.47 26.36 437.93 26.18 439.4 26.14 443.72 25.98 447.18 25.93 450.65
25.82 452.97 25.8 456.12 25.7 457.59 25.73 459.9 25.71 460.95 25.75 462.57
25.75 464.53 25.78 465.69 25.77 466.84 25.8 470.31 25.79 472.62 25.74
474.03 25.68 476.09 25.63 478.4 25.64 480.72 25.62 485.34 25.52 490.01 25.48
493.2 25.4 495.75 25.31 498.11 25.27 501.53 25.14 504.49 25.09 507.72 25.08
509.62 25.05 511.94 25.05 513.09 25.02 517.39 24.98 520.62 24.97 527.07
24.82 532.75 24.62 536.74 24.5 539.69 24.33 543.28 24.19 544.31 24.17 546.63
24.05 549.64 23.76 551.24 23.41 552.41 23.25 552.87 23.13 553.89 23 553.89
23.24 554.97 23.24 555.47 22.74 576.45 22.25 576.95 22.59 653.9 20.79 662.3
20.34 697.34 19.33 699.2 19.25 701.53 19.22 702.27 19.25 705.06 19.3 705.63
19.29 709.07 19.44 713.14 19.57 716.09 19.65 718.64 19.38 726.63 19.08
728.24 19.1 728.73 19.27 731.45 19.15 734.47 19.39 741.11 19.52 742.72 19.3
746.16 19.09 749.88 19.08 753.99 19.05 766.39 19.13 770.02 19.17 771.25
19.13 774.29 18.91 776.74 18.93 781.66 18.95 785.49 19.07 788.88 19.21
795.47 19.14 804.05 19.13 807.35 18.66810.7569 18.19 812.69 17.92 814.15
17.57 838.35 11.72 838.45 11.65 841.61 11.59 844.03 10.89 845.09 9.83 848.3
7.98 855.07 5.99 858.03 5.24 862.25 5.18 869.33 2.7 871.88 2.17 896.22 2.17
896.22 -.77 900.69 -1.14 905.68 -1.67 908.22 -1.81 913.77 -.83 919.21 -1.06
926.64 -1.29 931.4 -.81 936.23 -.73 940.43 1.39 946.17 2.59 946.23 2.34
948.96 2.89 952.5464 4.19 954.57 4.92 956.94 6.43 958.04 6.79 958.05 7.14
958.7 10.73 959.26 15.61 961.99 15.17 965.24 14.73 967.1 14.74 969.41 15.04
970.29 14.97 973.63 14.51 983.95 16.6 991.96 16.4 994.75 16.59 1004.68 17.62
1008.64 17.66 1009.53 17.51 1015.75 17.57 1020.42 17.44 1032.74 17.07
1039.31 17.26 1042.76 16.99 1052.19 16.89 1059 16.71 1065.13 16.9 1067.41
16.63 1071.42 17.07 1072.73 17.06 1085.98 16.92 1091.53 16.92 1094.5 16.65
1102.05 16.69 1105.09 16.58 1107.6 16.56 1113.28 16.49 1117.74 16.37 1123.63
16.33 1126.51 16.43 1132.45 15.72 1140.29 15.15 1144.3 15.8 1144.85 15.75
1145.6 15.79 1157.04 14.71 1161.54 15.33 1165.24 15.31 1169.04 15.12 1170.7
14.84 1180.23 15.15 1183.31 15.1 1185.57 14.97 1187.79 15.1 1194.27 15.64
1198.3 15.57 1199.68 15.62 1200.76 15.48 1219.76 15.46 1224.77 15.58 1227.93
15.53 1232.27 15.6 1233.14 15.54 1235.67 15.68 1242.31 15.53 1261.19 14.74
1262.01 14.73 1263.38 14.78 1275.82 14.95 1275.94 14.84 1276.89 14.76
1277.74 14.78 1288.4 14.95 1289.8 14.95 1291.52 15.22 1302.78 15.83 1307.58

15.86 1326.3 16.05 1330.55 15.51 1331.54 15.42 1338.66 15.56 1346.75 15.71
1366.8 15.88 1369.27 15.98 1381.47 16.72 1382.87 16.8 1390.71 16.72 1399.61
16.87 1430.98 17.07 1431.98 17.07 1431.98 17.36 1434.01 17.37 1436.05 17.42
1439.21 17.43 1440.51 17.46 1442.07 17.46 1444.81 17.5 1448.64 17.51 1449.01
17.48 1451.09 17.46 1452.6 17.51 1456 17.56 1458.4 17.54 1460.2 17.46
1464.63 17.37 1466.14 17.36 1471.4 17.24 1474.65 17.18 1476.66 17.11 1484.41
17.14 1487.19 17.09 1489.29 17.08 1493.21 17.02 1494.71 17.02 1499.04 17.14
1503.92 17.16 1507.17 17.24 1508.79 17.23 1514.27 17.16 1516.18 17.21
1517.58 17.22 1520.17 17.18 1523.43 17.22 1529.31 17.36 1532.98 17.36
1533.18 17.34 1535.78 17.36 1536.43 17.39 1539.98 17.46 1541.31 17.56
1542.94 17.56 1544.17 17.45 1544.56 17.49 1545.57 17.37 1549.77 17.37
1552.57 17.45 1556.39 17.62 1560.97 17.61 1563.77 17.57 1565.7 17.51 1569.37
17.43 1573.82 17.36 1577.08 17.36 1578.95 17.34 1582.01 17.36 1584.76 17.33
1587.97 17.32 1593.33 17.33 1596.59 17.27 1598.5 17.25 1604.35 17.27 1605.75
17.24 1609.03 17.23 1614.15 17.26 1615.55 17.24 1618.35 17.24 1620.97 17.22
1625.85 17.23 1630.95 17.32 1633.1 17.39 1636.11 17.43 1638.86 17.43 1640.48
17.39 1644.94 17.32 1648.14 17.3 1652.65 17.31 1655.66 17.33 1658.36 17.33
1663.13 17.27 1666.49 17.26 1669.74 17.19 1672.93 17.16 1677.13 17.15
1681.13 17.07 1684.13 17.03 1685.53 16.99 1690.26 16.78 1691.76 16.73
1694.77 16.72 1698.12 16.85 1700.63 16.92 1705.12 17.07 1708.31 17.16
1711.32 17.23 1713.52 17.3 1717.72 17.41 1720.14 17.45 1723.39 17.47 1727.86
17.62 1729.9 17.63 1733.11 17.67 1735.91 17.73 1738.71 17.77 1741.28 17.84
1747.47 17.94

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 812.69 .04 954.57 .085

Bank Sta: Left Right Coeff Contr. Expan.
 812.69 954.57 .5 .8
Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 834 20.9 T
 964 1747.47 20 T
Blocked Obstructions num= 1
 Sta L Sta R Elev 766.68 828.6519.14989

Upstream Embankment side slope = 0 horiz. to 1.0 vertical Downstream
Embankment side slope = 0 horiz. to 1.0 vertical Maximum allowable
submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Piers = 1

Pier Data
Pier Station Upstream= 858.49 Downstream= 897.72
Upstream num= 2
 Width Elev Width Elev
 3 8 2.9 15
Downstream num= 2
 Width Elev Width Elev

```
 3 8 2.9 15

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
 Energy
 W.S. Pro Method

 W.S.Pro Data
 Left Embankment
 El of the top of the embankment = 19
 El of the toe of the abutment = 6  Right Embankment
 El of the top of the embankment = 19
 El of the toe of the abutment = 6
 Abutment Type = 1 Vert. abutments and vert. embankments with or without
wingwalls  Slope of abutments =
 Top with of embankment = 35
 Centroid station of bridge opening =
 Wing Wall Type = No wing walls present
 Width =
 Angle =
 Radius =
 Guide Banks Type = No Guide Bank present
 Length =
 Offset =
 Angle =
 Optional Contraction and expansion coefficients
 At approach Section
 At Guide Bank
 At upstream outside
 At upstream inside (BU)
 At downstream inside (BD)
 Piers are Continuous for the width of the bridge  Use Geometric mean as
Friction Slope Method

Selected Low Flow Methods = Energy

High Flow Method
 Pressure and Weir flow
 Submerged Inlet Cd =
 Submerged Inlet + Outlet Cd = .8
 Max Low Cord =

Additional Bridge Parameters
 Add Friction component to Momentum
 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION


RIVER: Taunton River
```

REACH: Main Stem RS: 43283.2

INPUT
Description: 43.3 DS FAce Old Col Ave
Station Elevation Data num= 490
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 23.76 1.38 23.8 4.6 23.98
5.48 23.99 6.64 23.93 7.7 23.76 9.44 23.6 11.05 23.55 12.66 23.56 14.73
23.62 19.12 23.63 22.82 23.56 24.05 23.46 25.57 23.41 26.29 23.5 26.55
23.43 27.45 23.49 28.79 23.42 38.5 23.42 38.5 24.17 41.69 24.12 43.64 24.11
44.79 24.08 47.86 24.09 51.37 24.18 54.04 24.07 56.2 24 59.83 24 61.04 23.98
63.84 23.98 70.23 23.91 71.83 23.91 75.55 23.86 77.16 23.78 78.78 23.76
80.64 23.81 82 23.89 83.62 23.94 85.35 23.91 88.73 23.81 89.89 23.73 91.68
23.5 93.29 23.32 95.67 23.1 97.98 22.95 99.74 22.92 101.36 22.93 102.97
22.98 106.46 23.18 109.12 23.26 112.64 23.31 115.33 23.43 118.8 23.5 121.11
23.61 122.27 23.64 123.93 23.73 127.16 23.83 130.3 23.96 131.52 23.98 135.22
24.19 138.48 24.3 140.77 24.48 141.08 24.48 144.89 24.75 147.7 25.04 149.73
25.19 151.34 25.23 156.18 25.01 158.11 24.87 159.27 24.72 162.39 24.48
165.86 24.25 170.38 24.05 173.05 23.79 175.71 23.55 177.77 23.43 180.37
23.37 185.21 23.35 186.82 23.39 189.33 23.5 191.61 23.57 193.27 23.59 197.02
23.55 198.58 23.51 200.89 23.49 206.17 23.54 208.99 23.6 211.3 23.72 212.46
23.71 213.61 23.84 215.66 23.96 217.08 23.96 218.24 23.92 219.39 23.93
222.86 24.04 223.65 23.98 225.18 24.01 227.13 23.96 241 23.96 241 24.08
242.3 24.07 244.73 24 245.99 24.01 247.15 23.94 247.63 23.97 249.71 23.92
251.77 23.99 254.08 23.99 256.16 23.97 259.86 23.97 262.18 23.99 264.49
24.03 266.8 24.03 270.27 23.95 274.26 23.92 277.43 23.92 279.52 23.94 281.96
23.94 283.57 23.97 286.46 23.96 287.62 24.06 288.77 24.2 290.02 24.55 291.64
25.08 292.24 25.2 292.91 25.14 293.4 25.2 294.55 25.14 294.86 25.05 295.57
25 295.71 24.91 296.87 24.84 299.7 24.45 301.49 24.39 304.54 24.47 307.76
24.46 309.37 24.49 315.37 24.5 319.05 24.48 322.2 24.54 323.89 24.55 326.93
24.48 328.09 24.42 328.72 24.32 329.24 24.32 330.19 24.44 334.64 24.54
337.34 24.54 340.01 24.49 346.46 24.5 350.99 24.62 352.91 24.63 354.17 24.67
356.83 24.84 359.49 24.91 360.46 25.18 360.98 25.11 362.59 25.12 379.7 25.12
379.7 24.81 380.8 24.82 382.43 24.89 384.74 24.9 391.46 24.77 395.15 24.76
396.45 24.74 398.06 24.83 399.68 25.04 400.93 25.27 402.09 25.53 402.9 25.67
404.4 25.8 406.71 25.92 409.35 26 415.43 26.1 420.46 26.15 422.25 26.14
425.48 26.05 427.53 26.06 428.64 26.14 430.31 26.44 431.93 26.51 433.31
26.45 434.47 26.36 437.93 26.18 439.4 26.14 443.72 25.98 447.18 25.93 450.65
25.82 452.97 25.8 456.12 25.7 457.59 25.73 459.9 25.71 460.95 25.75 462.57
25.75 464.53 25.78 465.69 25.77 466.84 25.8 470.31 25.79 472.62 25.74
474.03 25.68 476.09 25.63 478.4 25.64 480.72 25.62 485.34 25.52 490.01 25.48
493.2 25.4 495.75 25.31 498.11 25.27 501.53 25.14 504.49 25.09 507.72 25.08
509.62 25.05 511.94 25.05 513.09 25.02 517.39 24.98 520.62 24.97 527.07
24.82 532.75 24.62 536.74 24.5 539.69 24.33 543.28 24.19 544.31 24.17 546.63
24.05 549.64 23.76 551.24 23.41 552.41 23.25 552.87 23.13 553.89 23.24
553.89 23 554.97 23.24 555.47 22.74 576.45 22.25 576.95 22.59 653.9 20.79
662.3 20.34 697.34 19.33 699.2 19.25 701.53 19.22 702.27 19.25 705.06 19.3
705.63 19.29 709.07 19.44 713.14 19.57 716.09 19.65 718.64 19.38 726.63
19.08 728.24 19.1 728.73 19.27 731.45 19.15 734.47 19.39 741.11 19.52 742.72
19.3 746.16 19.09 749.88 19.08 753.99 19.05 766.39 19.13 770.02 19.17 771.25
19.13 774.29 18.91 776.74 18.93 781.66 18.95 785.49 19.07 788.88 19.21
795.47 19.14 804.05 19.13 807.35 18.66810.7569 18.19 812.69 17.92 814.15
17.57 838.35 11.72 838.45 11.65 841.61 11.59 844.03 10.89 845.09 9.83 848.3
7.98 855.07 5.99 858.03 5.24 862.25 5.18 869.33 2.7 871.88 2.17 896.22 2.17
896.23 -.77 900.69 -1.14 905.68 -1.67 908.22 -1.81 913.77 -.83 919.21 -1.06

926.64 -1.29 931.4 -.81 936.23 -.73 940.43 1.39 946.17 2.59 946.23 2.34
948.96 2.89 952.5464 4.19 954.57 4.92 956.94 6.43 958.04 6.79 958.05 7.14
958.7 10.73 959.26 15.61 961.99 15.17 965.24 14.73 967.1 14.74 969.41 15.04
970.29 14.97 973.63 14.51 983.95 16.6 991.96 16.4 994.75 16.59 1004.68 17.62
1008.64 17.66 1009.53 17.51 1015.75 17.57 1020.42 17.44 1032.74 17.07
1039.31 17.26 1042.76 16.99 1052.19 16.89 1059 16.71 1065.13 16.9 1067.41
16.63 1071.42 17.07 1072.73 17.06 1085.98 16.92 1091.53 16.92 1094.5 16.65
1102.05 16.69 1105.09 16.58 1107.6 16.56 1113.28 16.49 1117.74 16.37 1123.63
16.33 1126.51 16.43 1132.45 15.72 1140.29 15.15 1144.3 15.8 1144.85 15.75
1145.6 15.79 1157.04 14.71 1161.54 15.33 1165.24 15.31 1169.04 15.12 1170.7
14.84 1180.23 15.15 1183.31 15.1 1185.57 14.97 1187.79 15.1 1194.27 15.64
1198.3 15.57 1199.68 15.62 1200.76 15.48 1219.76 15.46 1224.77 15.58 1227.93
15.53 1232.27 15.6 1233.14 15.54 1235.67 15.68 1242.31 15.53 1261.19 14.74
1262.01 14.73 1263.38 14.78 1275.82 14.95 1275.94 14.84 1276.89 14.76
1277.74 14.78 1288.4 14.95 1289.8 14.95 1291.52 15.22 1302.78 15.83 1307.58
15.86 1326.3 16.05 1330.55 15.51 1331.54 15.42 1338.66 15.56 1346.75 15.71
1366.8 15.88 1369.27 15.98 1381.47 16.72 1382.87 16.8 1390.71 16.72 1399.61
16.87 1430.98 17.07 1431.98 17.07 1431.98 17.36 1434.01 17.37 1436.05 17.42
1439.21 17.43 1440.51 17.46 1442.07 17.46 1444.81 17.5 1448.64 17.51 1449.01
17.48 1451.09 17.46 1452.6 17.51 1456 17.56 1458.4 17.54 1460.2 17.46
1464.63 17.37 1466.14 17.36 1471.4 17.24 1474.65 17.18 1476.66 17.11 1484.41
17.14 1487.19 17.09 1489.29 17.08 1493.21 17.02 1494.71 17.02 1499.04 17.14
1503.92 17.16 1507.17 17.24 1508.79 17.23 1514.27 17.16 1516.18 17.21
1517.58 17.22 1520.17 17.18 1523.43 17.22 1529.31 17.36 1532.98 17.36
1533.18 17.34 1535.78 17.36 1536.43 17.39 1539.98 17.46 1541.31 17.56
1542.94 17.56 1544.17 17.45 1544.56 17.49 1545.57 17.37 1549.77 17.37
1552.57 17.45 1556.39 17.62 1560.97 17.61 1563.77 17.57 1565.7 17.51 1569.37
17.43 1573.82 17.36 1577.08 17.36 1578.95 17.34 1582.01 17.36 1584.76 17.33
1587.97 17.32 1593.33 17.33 1596.59 17.27 1598.5 17.25 1604.35 17.27 1605.75
17.24 1609.03 17.23 1614.15 17.26 1615.55 17.24 1618.35 17.24 1620.97 17.22
1625.85 17.23 1630.95 17.32 1633.1 17.39 1636.11 17.43 1638.86 17.43 1640.48
17.39 1644.94 17.32 1648.14 17.3 1652.65 17.31 1655.66 17.33 1658.36 17.33
1663.13 17.27 1666.49 17.26 1669.74 17.19 1672.93 17.16 1677.13 17.15
1681.13 17.07 1684.13 17.03 1685.53 16.99 1690.26 16.78 1691.76 16.73
1694.77 16.72 1698.12 16.85 1700.63 16.92 1705.12 17.07 1708.31 17.16
1711.32 17.23 1713.52 17.3 1717.72 17.41 1720.14 17.45 1723.39 17.47 1727.86
17.62 1729.9 17.63 1733.11 17.67 1735.91 17.73 1738.71 17.77 1741.28 17.84
1747.47 17.94

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085810.7569 .04952.5464 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
810.7569952.5464 85.94 85.94 85.94 .5 .8 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 834 20.9 T
 964 1747.47 20 T
Blocked Obstructions num= 1
 Sta L Sta R Elev
 766.68 828.6519.14989

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 43197.27

INPUT
Description: 43 Exit Old Col Ave
Station Elevation Data num= 492
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 22.26 1.72 22.33 4.48 22.59
6.44 22.58 7.72 22.53 10.5 22.68 12.22 22.75 13.51 22.55 15.01 22.5 16.91
22.4 18.41 22.29 21.22 21.99 22.53 21.89 24.22 21.79 25.89 21.77 28.72
21.88 30.22 21.88 33.37 21.77 37.57 21.67 40.85 21.5 42.09 21.39 43.84 21.35
46.83 21.26 49.61 21.2 54.12 21.27 55.81 21.4 57.3 21.49 60.14 21.74 61.79
21.76 63.14 21.5 64.78 21.35 66.15 21.2 67.78 21.12 70.77 21.1 72.26 21
73.67 20.95 76.68 20.9 78.18 20.86 79.74 20.88 82.7 21 84.23 21.02 85.73
20.99 87.21 20.93 88.71 20.9 90.22 20.9 93.21 21.03 96.2 20.99 97.74 21.01
100.69 21.1 102.22 21.11 103.75 21.25 105.18 21.34 106.76 21.55 108.27 21.66
109.77 21.71 112.78 21.68 114.28 21.63 115.65 21.5 117.29 21.44 118.64 21.42
120.13 21.47 123.31 21.64 124.62 21.64 127.82 21.77 129.32 21.76 132.33
21.59 135.22 21.52 141.08 21.47 145.57 21.46 147.22 21.5 148.56 21.51 150.05
21.58 151.88 21.61 153.39 21.67 156.04 21.64 157.9 21.71 159.22 21.85 160.91
21.95 162.22 22.07 165.01 22.12 168.43 22.07 171.22 22.08 172.72 22.12
175.48 22.23 176.98 22.32 179.97 22.44 182.96 22.47 185.96 22.45 187.45
22.42 189.22 22.42 190.99 22.52 192.22 22.64 195.22 22.85 197.01 22.92
199.42 22.92 200.92 22.9 202.72 22.9 206.03 22.98 209.04 23.12 211.72 23.35
213.22 23.51 214.72 23.64 216.56 23.89 218.87 24.3 219.57 24.44 221.07 24.65
221.86 24.81 223.36 24.98 224.08 25.02 226.35 25.03 232.72 24.78 235.72
24.73 237.22 24.77 238.72 24.92 239.81 24.94 243.22 25.22 244.72 25.28
246.22 25.39 247.29 25.57 250.28 26.13 252.66 26.32 254.16 26.49 257.17
26.64 260.75 26.71 265.24 26.78 267.7 26.73 270.22 26.74 273.22 26.65 274.72
26.56 277.21 26.58 279.22 26.64 280.72 26.52 282.74 26.54 284.69 26.6 285.22
26.65 286.72 26.62 288.22 26.63 290.5 26.59 294.9 26.36 299.5 26.3 299.5
26.6 317.5 26.6 317.5 26.08 319 26.04 320.59 26.04 324.22 26.14 324.85 26.13
325.08 26.21 327.86 26.19 328.07 26.11 330.22 26.06 331.72 26.06 333.22
26.13 334.06 26.13 334.72 26.08 336.89 26.07 337.05 26.01 337.72 26.01
339.89 25.91 341.54 25.86 342.9 25.76 345.22 25.68 346.72 25.6 349.72 25.38
351.22 25.29 353.5 25.23 356.5 25.23 358.72 25.2 360.22 25.13 362.46 25.07
364.72 25.06 366.22 25.12 367.72 25.3 369.22 25.54 369.96 25.56 369.98 25.62
370.72 25.64 372.22 25.13 372.95 25.12 372.98 24.99 373.72 24.98 375.22 24.9
375.94 24.64 375.99 24.47 377.44 23.96 377.5 23.98 378.93 23.51 379 23.57
380.43 23.14 380.5 23.2 381.22 22.99 383.42 22.59 383.51 22.47 384.92 22.19
387.22 21.85 391.03 21.56 392.54 21.52 397.05 21.28 398.38 21.22 402.22
21.13 404.37 21.03 405.86 20.88 406.72 20.75 408.22 20.3 409.72 19.71
411.22 19.33 412.72 19.07 414.22 19.13 415.72 19.57 417.22 19.89 418.72 20.1
421.11 20.2 423.81 20.29 424.12 20.28 426.22 20.33 428.64 20.44 432.22 20.51
435.78 20.78 436.72 20.82 440.27 20.76 441.76 20.71 443.26 20.6 443.68 20.61
446.68 20.23 447.22 20.21 448.72 20.07 451.72 19.91 453.22 18.97 455.23
18.88 455.71 18.83 457.21 18.76 461.21 18.62 463.23 18.58 465.7 18.58 467.74
18.55 469.72 18.5 471.22 18.44 472.72 18.43 475.26 18.31 477.22 18.31
478.27 18.34 480.66 18.53 481.72 18.64 482.78 18.7 484.29 18.71 486.22 18.81
487.29 19.02 489.22 19.32 492.22 19.26 493.72 19.26 495.22 19.16 496.72
19.24 499 19.22 499 19.27 511.17 19.55 570.15 19.37 596.36 18.71 609.47
18.04 616.02 17.57 622.58 16.93 648.79 13.49 655.34 12.97 661.9 11.82 667
11.86 667 12.18 669.29 12.21 670.64 12.11 671.44 12.16 673.64 12.29 675.13
12.41 677.86 12.56 677.86 9.82 678.86 9.82 692.33 13.48 694.98 13.42 700.19
13.24 702.63 13.11 704.89 9.24 707.17 6.07 711.41 3.35 728.75 1.25 734.35

```
.01 739.11 .81 742.79 -.77 745.13 -1.81  762.1 .57 787.86 3.43 789.66 4.2
794.58 7.79 798.82 9.86  798.89 7 828.16 7.3 836.22 8.04 839.79 7.48 839.92
7.49  839.93 12 840 12 841.79 12 845.51 12.14 860.45 13.26  877.58 13.86
909.62 12.52 919.75 12.81 925.76 12.25 937.43 11.1  938.24 10.96 939.44 11.46
943.37 8.89 946.13 7.37 948.14 7.22  955 7.2 988.79 7.36 990.14 7.82 1005.96
12.81 1010.85 12.58  1116.72 15.73 1137.21 16.19 1146.02 16.3 1150.18 16.4
1154.43 16.33  1157.86 16.25 1160.71 16.23 1167.17 17 1171.11 17.33 1172.99
17.34  1178.27 16.94 1179.27 16.95 1182.26 17.07 1186.69 17.11 1189.74 17.09
1192.73 16.86 1194.21 17.07 1195.72 17.19 1197.22 17.18 1200.23 17.25
1201.71 17.3 1206.2 17.4 1213.68 17.47 1216.77 17.47 1218.28 17.49  1221.29
17.49 1224.15 17.53 1227.3 17.55 1230.13 17.62 1236.11 17.71  1242.1 17.76
1245.09 17.74 1248.36 17.74 1251.07 17.7 1254.38 17.7  1255.56 17.68 1258.89
17.71 1261.55 17.69 1263.4 17.69 1267.91 17.59  1269.42 17.6 1270.52 17.53
1272.42 17.75 1273.51 17.78 1276.51 18  1278.44 17.95 1279.5 18 1279.95 17.98
1280.99 18.05 1282.95 17.87  1287.22 17.83 1288.97 17.9 1290.47 18 1291.72
18.13 1294.72 18.22  1297.99 18.34 1298.94 18.39 1301.94 18.49 1304.01 18.53
1308.52 18.55  1309.42 18.53 1312.72 18.55 1316.04 18.55 1319.05 18.57
1325.07 18.49  1325.87 18.5 1329.58 18.5 1331.86 18.53 1334.09 18.52 1334.85
18.49  1338.6 18.48 1341.61 18.52 1342.72 18.55 1344.62 18.55 1345.72 18.59
1346.81 18.69 1350.64 18.85 1351.3 18.92 1352.8 18.99 1354.72 19.15  1356.22
19.06 1358.78 19.1 1359.66 19.09 1360.28 19.04 1362.22 19.05  1363.72 19.09
1367.18 19.12 1371.22 19.14 1376.21 19.14 1378.23 19.12  1380.22 19.12
1385.23 19.2 1387.72 19.2 1391.25 19.28 1394.26 19.25  1397.26 19.24 1399.72
19.2 1401.78 19.01 1403.66 18.91 1404.78 18.89  1405.16 18.94 1406.29 18.92
1407.22 18.86 1410.22 18.73 1413.22 18.66  1416.22 18.66 1417.72 18.6 1421.33
18.3 1423.72 18.13 1425.84 18.04  1426.1 18.01 1428.22 17.94 1430.35 17.83
1430.59 17.84 1432.72 17.69  1434.22 17.54 1436.37 17.42 1437.22 17.35
1439.38 17.26 1442.56 17.17  1446.22 16.98 1450.72 16.58 1453.03 16.44
1455.92 16.21 1458.22 15.99  1459.72 15.89 1461.22 15.74 1463.5 15.55 1464.95
15.38 1465 15.4  1467.96 15.06 1469.46 14.87 1469.48 14.9 1471.72 14.66
1473.22 14.46  1474.72 14.32 1476.98 14.07 1478.46 13.89 1479.95 13.76 1483
13.44  1485.22 13.25 1486.72 13.16 1488.93 13.15 1489.72 13.17 1491.22 13.15
1493.42 12.99 1494.22 12.89 1495.72 12.86 1496.53 12.92 1497.91 13.08
1499.54 13.24 1501.05 13.33 1503.22 13.41 1506.22 13.48 1507.72 13.5  1511.37
13.66 1513.72 13.79 1515.86 13.98 1518.22 14.15 1520.6 14.43  1525.11 14.73
1525.72 14.75 1529.62 14.98 1530.82 15.09 1532.31 15.18  1532.63 15.24
1533.81 15.31 1534.72 15.32 1535.3 15.4 1535.64 15.38  1537.72 15.66 1539.79
15.84 1540.15 15.89 1543.72 16.17 1545.22 16.23  1545.78 16.29 1546.61 16.3

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 671.44 .04 840 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  671.44
840 810.65 810.65 810.65 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 1383 1546.61 19.2 T
Blocked Obstructions num= 1
 Sta L Sta R Elev
 513.33 648.3 30

CROSS SECTION
```

RIVER: Taunton River
REACH: Main Stem RS: 42387

INPUT
Description:
Station Elevation Data num= 490
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 22.27 1.96 22.23 7.98 22.27
10.5 22.34 14.32 22.39 18.87 22.5 22.15 22.48 25.01 22.55 28.13 22.53 32.03
22.6 33.12 22.56 38.15 22.58 40.38 22.63 46.95 22.69 48.86 22.69 52.67
22.77 54.21 22.77 57.01 22.84 59.52 22.86 63.65 22.85 67.06 22.91 72.09
23.06 74.61 23.11 80.33 23.15 83.41 23.26 84.94 23.37 89.55 23.42 92.63
23.59 97.24 23.55 100.31 23.65 103.38 23.81 107.99 23.75 111.08 23.81 117.01
24.06 121.12 24.34 123.63 24.54 124.84 24.68 127.4 24.8 128.66 25 129.92
25.01 132.58 24.86 137.19 24.9 138.75 25.02 143.34 25.97 145 26.21 146.41
26.3 152.58 26.3 157.17 26.2 161.78 26.19 166.41 26.21 170.14 26.17 178.94
26.23 181.75 26.21 189 26.08 197.12 26.13 200.19 26.22 202.82 26.25 205.94
26.35 209.41 26.5 212.49 26.78 217.91 26.79 218.63 26.74 221.75 26.7 230.93
26.53 233.61 26.53 240.53 26.36 241.51 26.3 244.76 26.3 249.33 26.17 252.44
26.14 254.36 26.08 257.05 25.94 260.65 25.87 261.28 25.78 266.93 25.39
271.96 25.22 275.49 25.05 278.25 24.83 280.1 24.77 285.79 24.73 287.78 24.58
290.82 24.47 294.59 24.08 298.36 23.85 300.08 23.82 304.45 23.81 306.22
23.77 310.93 23.75 313.91 23.65 318.59 23.54 320.05 23.46 323.13 23.42
324.66 21.2 326.2 20.91 329.27 20.08 331.04 19.55 332.3 19.04 335.42 18.55
337.33 18.42 339.84 18.01 342.35 17.83 344.87 17.74 348.64 17.4 350.79 17.4
353.67 17.81 356.18 18.4 358.47 18.75 360.09 18.83 363.08 18.91 364.62 18.91
367.5 18.78 368.75 18.64 370.76 18.5 372.52 18.17 373.78 18 376.29 18.08
378.45 18.23 381.83 18.31 384.59 18.43 386.13 18.8 389.2 19.16 390.74 19.13
392.64 19.33 393.81 19.63 397.7 19.63 397.7 19.29 400.18 19.28 402.69 18.9
403.57 18.89 405.21 18.75 406.11 18.76 407.64 18.51 410.72 18.1 412.75 17.95
414.01 17.94 415.26 17.83 418.4 17.24 419.94 17.14 424.55 17.09 429.09 16.95
432.86 16.91 436.63 16.84 444.52 16.61 447.72 16.47 454.2 16.39 455.6 16.33
458.96 16.3 461.07 16.24 463.91 16.11 467.74 16 474.41 15.87 476.08 15.8
484.78 15.68 489.83 15.53 490.39 15.49 493.07 15.48 496.01 15.38 498.25
15.35 504.42 15.35 507.76 15.31 511.09 15.23 515.74 15.19 518.46 15.22
522.95 15.22 526.1 15.13 528.56 15.11 531.1 15.03 533.05 15.09 536.1 15.12
542.03 15.09 542.77 15.12 546.1 15.07 552.77 15.04 554.25 15.01 558.87 15.14
559.99 15.28 562.24 15.34 564.56 15.58 567.78 15.62 574.45 15.53 577.78
15.51 580.2 15.44 582.78 15.29 584.69 15.12 585.81 15.08 588.61 14.82 591.42
14.79 595.91 14.82 598.16 14.76 600.4 14.6 601.53 14.74 603.2 14.69 612.66
14.66 616.1 14.49 617.24 14.52 619.4 14.48 622.64 14.49 627.8 14.37 630.71
14.34 632.8 14.36 637.45 14.27 641.14 14.26 646.14 14.18 651.79 14.17 656.53
14.14 659.9 14.01 666.15 13.93 670 13.93 672.82 13.97 676.15 13.88 678.98
13.94 680.1 14.03 680.95 13.96 685.72 13.92 688.24 13.95 690.21 13.92 692.45
13.8 693.57 13.83 696.16 13.76 699.49 13.83 702.55 14.02 704.5 14.03 705.92
13.97 708.17 13.97 711.17 14.02 712.66 14.13 716.02 14.02 721.17 14.16 725
14.15 731.17 14.31 735.11 14.3 737.35 14.32 739.78 14.39 746.18 14.45 751.18
14.97 754.19 15.15 756.44 15.1 759.8 14.89 761.19 14.84 764.29 14.89 769.91
14.9 776.19 15.03 780.01 15 782.86 15.01 788.99 14.95 790.11 14.98 798.19
15.08 802.87 15.17 806.2 15.19 810.32 15.14 812.87 15.18 817.87 15.1 822.88
15.09 827.88 15.11 830.52 15.18 832.88 15.33 841.75 15.34 849.72 15.41
851.22 15.44 854.55 15.42 855.22 15.45 857.89 15.77 859.11 16.12 860.03
16.27 861.22 16.29 863.46 15.95 865.32 15.46 866.45 15.23 869.56 15 876.55
14.67 877.9 14.63 881.79 14.39 884.41 14.32 887.73 14.11 887.73 14.69
890.67 14.61 908.27 14.21 937.41 13.22 949.55 3.67 952.53 2.15 959.58 1.66

963.02 1.52 963.79 1.37 964.65 1.41 965.82 .72 969.67 .55 973.56 -.17 980.79
.14 982.84 .11 990.34 1.03 1019.73 .44 1025.5 .2 1026.51 .49 1028.82 .13
1030.54 .39 1032.19 .56 1033.38 .59 1034.26 .71 1034.96 .68 1046.13 1.44
1050.75 4.35 1055.95 5.61 1064.84 10.54 1086.02 11.81 1098.34 11.94 1099.45
11.94 1099.45 11.36 1104.42 11.45 1105.55 11.57 1108.54 11.66 1108.91 11.71
1111.32 11.76 1113.4 11.88 1114.27 11.86 1116.77 11.95 1119.66 11.95 1122.38
12 1122.99 11.93 1125.75 12.21 1126.87 12.41 1129.12 12.71 1131.22 12.88
1132.49 13.09 1134.66 13.34 1136.98 14.1 1138.32 14.44 1141.33 15.5 1143.71
16.59 1144.66 17.24 1145.96 18.33 1146.33 18.56 1147.08 19.33 1147.41 19.19
1148 19.67 1148.62 20.94 1149.33 22.77 1149.67 23.2 1151.33 23.76 1152.69
24.51 1153.82 25.3 1154.67 25.73 1156.34 26.04 1158.31 26.51 1159.67 26.63
1161.67 27.05 1163.01 27.17 1166.16 27.74 1168.01 27.93 1171.34 28.17 1174.8
28.24 1180.31 28.21 1183.51 28.28 1184.84 28.47 1188.73 28.88 1189.9 28.89
1192.61 29.11 1194.55 29.19 1197.36 29.16 1198.41 29.09 1201.62 29.03
1204.27 29.24 1206.95 29.3 1208.15 29.54 1210.1 29.77 1211.21 29.74 1212.04
29.83 1213.34 29.84 1218.67 30.09 1219.81 30.39 1221.75 30.51 1224.37 30.56
1226.13 30.37 1226.73 30.41 1229.09 30.25 1230.4 29.95 1232.53 29.75 1233.59
29.7 1235.35 29.74 1236.79 29.71 1237.85 29.76 1241.18 29.8 1245.07 30.01
1247.01 30.24 1248.95 30.29 1250.89 30.44 1252.84 30.43 1253.84 30.54
1254.78 30.9 1255.97 31 1261.3 31.25 1263.43 31.3 1265.56 31.46 1270.32
31.61 1273.02 31.78 1275.15 31.97 1277.28 32.24 1278.66 32.3 1281.02 32.48
1285.74 32.54 1290.07 32.49 1293.27 32.5 1297.55 32.61 1299.91 32.52 1304.63
32.29 1306.06 32.17 1306.99 32.21 1310.32 32.19 1311.38 32.15 1312.45 32.35
1313.52 32.17 1314.58 32.49 1315.65 32.33 1316.95 32.33 1317.78 32.24
1319.91 32.23 1322.77 32.11 1324.17 32.2 1326.66 32.18 1330.59 32.28 1331.63
32.34 1334.83 32.38 1338.03 32.53 1343.35 32.66 1345.48 32.8 1349.97 33.01
1352.94 33.06 1355.8 33.17 1358.92 33.23 1364.67 33.19 1365.73 33.29 1368.36
33.39 1373.08 33.48 1378.52 33.49 1380.65 33.6 1382.78 33.62 1384.88 33.52
1388.11 33.63 1395.57 33.81 1396.6 33.78 1397.7 33.94 1400.9 34.11 1405.16
34.19 1408.49 34.15 1410.49 34.23 1411.55 34.17 1412.62 34.35 1413.69 34.28
1419.01 34.44 1429.13 34.57 1436.06 34.71 1439.34 34.88 1442.46 34.98
1446.25 34.97 1449.92 35.08 1456.82 35.16 1459.51 35.24 1465.9 35.32 1468.48
35.31 1471.23 35.38 1474.58 35.37 1480.82 35.55 1485.08 35.63 1487.9 35.74
1491.48 35.75 1493.73 35.8 1497.62 35.83 1503.45 35.83 1507.62 35.75 1509.27
35.68 1511.73 35.65 1515.1 35.66 1518.12 35.53 1522.38 35.56 1524.15 35.6
1529.84 35.59 1531.97 35.63 1534.1 35.73 1538.31 35.82 1541.56 36 1544.76
36.1 1551.15 36.12 1552.01 36.07 1557.84 36.14 1561.73 36.04 1565.01 35.82
1570.34 35.29 1572.47 34.98 1575.33 34.75 1579.21 34.36 1581.75 34.22

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .08 937.41 .04 1064.84 .08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 937.41
1064.84 976.94 976.94 976.94 .1 .3

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 41409.68

INPUT
Description: 42

Station Elevation Data num= 357
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 20.98 19.66 21.93 26.21
22.14 39.32 22.32 45.87 22.61 52.42 22.64 58.97 22.96 78.63 23.36 85.19
23.29 91.74 23.58 104.84 23.79 117.95 23.6 131.05 23.66 137.61 23.8 157.27
23.72 170.37 24.21 183.48 24.18 203.14 25.02 242.45 25.83 255.56 25.78
268.66 25.46 294.87 24.36 301.43 24.39 314.53 23.61 321.08 23.42 334.19
23.35 340.74 23.51 347.3 23.88 353.85 23.9 366.95 23.32 373.51 23.46 393.16
23.56 412.82 23.91 425.93 23.95 432.48 23.83 439.03 23.94 465.25 23.69 484.9
23.85 491.46 23.77 498.01 23.97 504.56 23.68 517.67 23.91 524.22 23.89
543.88 24.07 556.98 24.56 570.09 24.55 583.19 24.28 602.85 24.31 609.41
24.43 648.72 24.12 655.27 24.17 661.83 24.41 668.38 24.08 674.93 24.27
688.04 24.24 701.14 24.44 714.25 24.29 727.36 23.61 733.91 23.71 740.46
23.65 747.01 23.78 753.57 23.53 760.12 23.67 766.67 24.13 773.22 24.78
779.78 25.12 805.99 25.19 812.54 25.33 825.65 25.38 851.86 25.93 871.52
25.69 884.62 25.4 891.17 25.4 897.73 25.26 904.28 25.59 910.83 25.66 930.49
25.51 943.6 24.98 956.7 24.92 963.25 24.78 969.81 24.43 989.46 24.19 996.02
24.42 1002.57 24.22 1015.68 24.11 1022.23 23.91 1028.78 24.06 1035.33 24.01
1054.99 24.65 1074.65 26.15 1081.2 26.31 1087.76 26.12 1094.31 25.22 1100.86
23.02 1107.42 22.08 1113.97 22.44 1133.63 22.49 1140.18 22.68 1159.84 22.43
1166.39 22.56 1172.94 24.12 1179.5 24.87 1186.05 24.16 1192.6 22.61 1199.15
22.85 1205.71 23.23 1212.26 23.07 1218.81 22.32 1225.37 22.13 1231.92 22.53
1238.47 22.42 1245.02 22.02 1258.13 21.63 1271.24 21.73 1284.34 21.66
1323.57 22.09 1336.6 22.32 1349.62 22.21 1369.16 22.42 1382.18 22.45 1408.22
22.94 1421.25 22.59 1460.32 23.54 1479.85 23.82 1492.87 23.7 1499.38 23.48
1505.9 23.57 1512.41 23.43 1544.96 24.26 1577.52 24.58 1584.03 24.5 1597.06
24.71 1603.57 24.58 1610.08 24.62 1623.1 24.46 1629.61 24.2 1636.13 24.2
1649.15 24.59 1681.71 25.02 1688.22 24.81 1694.73 24.46 1701.24 24.6 1707.75
24.9 1714.26 25.04 1727.29 24.58 1733.8 24.16 1740.31 23.95 1746.82 23.38
1753.33 23.09 1759.84 22.61 1766.35 21.58 1772.87 20.38 1779.38 19.54
1785.89 19.2 1792.4 19.07 1805.42 17.5 1811.94 15.7 1818.45 14.39 1824.96
14.03 1831.47 13.99 1844.49 14.74 1857.52 16.38 1864.03 16.97 1870.54 16.86
1877.05 16.26 1890.07 15.42 1896.58 14.44 1903.1 12.78 1909.61 11.28 1916.12
10.54 1929.14 10.46 1935.65 10.22 1942.16 9.73 1948.68 9.48 1955.19 9.56
1961.7 9.4 1981.23 8.47 2000.77 6.07 2013.79 5.85 2020.3 6.28 2026.81 6.44
2033.33 6.74 2039.84 7.21 2046.35 7.49 2052.86 7.62 2059.37 7.6 2078.91 6.85
2085.42 6.78 2104.95 7.89 2111.46 7.78 2131 7.17 2150.64 7.08 2163.73 7.49
2170.28 7.52 2176.83 7.69 2183.37 7.62 2196.47 7.86 2203.02 8.27 2216.11
9.42 2222.66 9.44 2229.2 9.3 2235.75 9.32 2235.82 9.31 2242.3 8.02 2248.85
5.09 2256.52 -1.05 2261.84 -1.73 2263.54 -2.09 2265.07 -2.68 2267.58 -3.01
2270.02 -3.07 2272.47 -3.14 2274.9 -3.04 2277.44 -3.1 2280.01 -3.01 2282.56
-2.83 2285.35 -3.01 2287.65 -2.96 2290.37 -2.93 2292.88 -3.02 2295.15 -2.87
2297.21 -2.89 2299.28 -3.01 2301.22 -2.89 2304.79 -3.16 2306.46 -3.23
2308.08 -3.24 2309.95 -3.35 2311.9 -3.47 2314.24 -3.42 2316.58 -3.42 2318.87
-3.36 2320.96 -3.28 2323 -3.19 2325.3 -3.07 2327.59 -2.96 2329.64 -2.85
2331.89 -2.71 2334.02 -2.48 2336.18 -2.31 2338.09 -2.25 2339.87 -2.16
2341.44 -.15 2347.72 -.27 2359.03 5.16 2360.15 5.56 2366.7 9.1 2373.24 10.45
2379.79 10.01 2386.34 9.26 2399.43 9.12 2412.53 9.24 2432.17 8.54 2445.26
7.88 2464.9 7.63 2478 6.85 2484.54 7.62 2491.09 7.47 2497.64 7.15 2517.28
7.33 2523.83 7.28 2530.36 7.41 2536.9 7.34 2543.43 7.1 2549.97 6.55 2556.5
6.16 2569.58 6.11 2576.11 5.9 2589.18 5.96 2602.25 6.43 2608.79 6.54 2621.86
6.25 2628.39 6.49 2634.93 7.67 2648 9.78 2654.54 11.17 2661.07 11.22 2674.14
11.12 2706.82 11.3 2719.89 11.12 2739.5 11.58 2765.64 11.58 2778.71 11.44
2791.78 11.57 2811.39 11.42 2830.99 11.01 2889.81 10.46 2896.34 10.5 2909.42
10.41 2935.56 10.65 2974.77 10.81 3000.91 10.74 3033.59 10.96 3105.48 10.92

3125.08 11.06 3138.15 11.47 3164.3 11.53 3177.37 11.8 3190.44 12.29 3210.04 12.68 3223.11 13.34 3236.18 14.47 3255.79 14.77 3281.93 15.6 3301.54 16.73 3308.07 17.22 3314.61 17.52 3321.14 18.22 3327.68 18.59 3334.21 18.36 3340.75 18.41 3347.29 18.6 3353.82 18.58 3360.36 18.13 3366.89 17.55 3373.43 17.31 3379.96 17.31 3386.5 16.93 3393.03 16.09 3412.64 15.81 3425.71 15.92 3445.32 17.24 3451.85 17.4 3458.39 17.7 3491.06 19.83 3504.13 20.4 3510.67 20.87 3536.81 21.81 3543.35 22.46 3549.88 24.34 3556.42 26.54 3562.95 27.3 3569.49 26.57 3582.56 24.38 3589.09 23.98 3595.63 24.32 3608.7 25.84 3615.24 26.43 3621.77 27.29 3628.31 28.38 3634.84 29.17 3641.38 30.37 3647.91 32.95 3654.45 33.51 3660.98 31.87 3667.52 32.17 3674.05 34.49 3680.59 33.72 3687.13 31.85 3693.66 31.03 3700.2 31.13 3713.27 32.33 3726.34 32.7 3732.87 33.06 3739.41 33.25 3745.94 33.27 3765.55 34.4

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 2235.82 .04 2373.24 .08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2235.82 2373.24 1488.16 1354.06 1248.76 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 40055.61

INPUT Description: 41
Station Elevation Data num= 362
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 47.87 19.64 47.58 39.28 46.86 45.83 46.74 58.92 46.78 65.47 46.26 78.56 45.92 91.66 45.83 104.75 45.47 117.84 45.26 130.94 45.43 137.48 45.06 150.58 44.78 157.13 44.79 170.22 45.43 183.31 45.48 202.95 45.22 209.5 45.04 222.59 44.06 229.14 43.26 235.69 42.71 248.78 42.54 261.88 42.85 268.42 43.17 274.97 43.15 294.61 42.38 314.25 40.67 320.8 40.3 327.34 39.47 333.89 38.85 346.98 38.21 360.08 38.23 366.62 37.78 373.17 37.47 392.81 37.19 399.36 36.76 405.91 36.55 412.45 36.05 451.73 35.2 458.28 35.16 471.37 34.75 491.02 34.65 523.75 33.73 536.84 34.41 543.39 34.38 556.48 33.61 576.12 33.03 595.77 32.71 608.86 32.71 635.05 32.22 641.59 32.39 648.14 32.38 654.69 32.21 667.78 32.4 680.87 32.26 693.97 32.45 700.52 32.39 707.06 32.04 713.61 32.03 726.7 32.83 752.89 33.33 759.44 33.3 765.98 33.05 779.08 31.92 785.62 31.51 798.72 31.49 805.27 31.2 818.36 30.96 824.91 31.02 831.45 30.89 838 30.59 851.09 29.61 857.64 29.52 870.73 30.03 877.28 30.08 883.83 29.08 890.37 28.56 910.02 28.04 929.66 27.86 942.75 27.82 949.3 27.56 962.39 28.03 975.48 27.6 982.03 27.03 1040.95 26.06 1054.05 25.99 1073.69 26.1 1080.23 26.37 1126.06 26.39 1132.61 26.51 1152.25 26.51 1198.08 27.02 1224.26 27.07 1237.36 26.67 1250.45 26.69 1296.28 26.3 1302.83 26.38 1315.92 26.09 1342.11 25.73 1348.65 25.75 1361.75 25.35 1374.84 25.35 1381.39 25.48 1387.94 25.94 1394.48 26.18 1401.03 26.04 1407.58 25.67 1414.12 25.55 1420.67 25.89 1427.22 26.08 1433.76 25.83 1440.31 25.44 1446.86 24.9 1459.95 24.74 1473.05 24.93 1518.87 25.1 1531.97 25.38 1551.61 25.36 1558.15 25.59 1571.25 25.64 1610.53 25.55 1636.72 25.62 1682.54 25.77 1741.47 25.46 1780.75 25.71 1787.29 25.65 1806.94 24.73 1820.03 23.92 1826.58 23.87 1833.12 23.14 1839.67 21.55 1846.22 20.46 1852.76 18.65 1865.86 14.54 1872.4 12.38 1878.95 10.51 1885.5 9.14 1892.04 8.48 1905.14 7.92 1911.68 8.22 1924.78 8.19 1931.33 8.35

1937.87 8.72 1944.42 9.33 1957.51 9.74 1964.06 10.22 1970.61 10.56 1996.79
10.22 2003.34 10.24 2009.89 9.85 2016.43 9.31 2042.62 7.96 2055.72 6.65
2062.26 6.23 2068.81 6.3 2081.9 7.34 2101.54 8.53 2108.09 8.78 2114.64 8.76
2121.19 8.54 2127.73 8.08 2140.83 7.64 2147.37 7.31 2153.92 7.14 2160.47
7.18 2186.65 8.24 2193.2 8.39 2199.75 8.26 2225.94 8.55 2232.48 8.77
2245.58 9.42 2252.12 9.58 2297.95 8.63 2311.05 8.63 2343.78 9.51 2369.97
9.86 2376.52 10.32 2383.06 10.28 2389.61 10.44 2396.16 10.08 2402.7 9.56
2409.25 9.27 2428.89 9.21 2435.44 9.1 2441.99 8.71 2448.53 8 2455.08 7.64
2468.15 7.9 2474.68 7.91 2487.74 8.21 2494.26 7.91 2507.32 6.86 2513.85 7.21
2520.38 8.07 2526.9 8.79 2533.43 8.38 2537.8 6.7 2539.96 5.88 2546.49 3.05
2560 -1.16 2560.71 -1.33 2561.67 -1.58 2562.57 -1.73 2563.71 -1.8 2564.74 -
2.22 2566.38 -2.7 2568.01 -3.11 2569.6 -3.35 2571.04 -3.47 2572.45 -3.47
2573.97 -3.45 2575.36 -3.36 2576.9 -3.24 2578.4 -3.2 2580.18 -3.14 2581.95 -
3.13 2585.96 -3.03 2588.18 -2.97 2592.41 -2.91 2594.44 -2.77 2599.13 -2.59
2601.56 -2.59 2603.58 -2.61 2606.1 -2.74 2608.34 -2.78 2610.56 -2.85 2612.64
-2.69 2614.78 -2.57 2616.59 -2.59 2618.67 -2.76 2620.64 -2.69 2623.07 -2.93
2625.5 -3.06 2627.91 -3.05 2630.24 -3.09 2632.73 -3.12 2634.69 -2.96 2636.9
-2.21 2638.95 -.69 2641.31 -.16 2657.46 3.24 2663.99 5.69 2666.53 6.09
2670.51 6.71 2677.04 6.94 2683.57 6.86 2690.1 6.92 2696.63 6.78 2703.18 6.91
2709.74 6.72 2716.3 6.81 2722.86 7.04 2729.42 6.95 2735.97 7.6 2742.53 8.07
2749.09 8.29 2762.21 8.04 2775.32 6.87 2781.88 6.59 2788.44 6.52 2801.56 6.7
2834.35 6.27 2847.46 6.67 2854.02 7.11 2860.58 6.85 2867.14 6.96 2873.69
7.38 2880.25 8.14 2893.37 9.28 2899.93 10.33 2906.48 11.6 2913.04 12.38
2926.16 12.98 2939.27 13.12 2958.95 13.15 2972.07 12.96 2985.18 12.36
2991.74 12.19 3011.41 11.93 3017.97 12.04 3031.09 11.72 3044.2 11.63 3057.32
10.87 3076.99 10.91 3103.23 10.79 3129.46 11.01 3136.02 10.82 3142.58 10.45
3149.13 10.38 3168.81 9.5 3201.6 9.78 3214.71 9.97 3234.39 9.69 3240.95 9.89
3254.06 9.85 3260.62 9.65 3280.3 9.29 3299.97 9.48 3306.53 9.64 3326.2 9.68
3339.32 9.97 3358.99 10.09 3385.22 10.01 3391.78 9.79 3398.34 9.9 3404.9 9.7
3411.46 9.65 3418.01 10.07 3431.13 10.5 3444.25 10.38 3457.36 10.69 3463.92
10.7 3483.6 10.16 3516.39 10.26 3536.06 10.28 3542.62 10.48 3549.18 10.54
3555.73 10.45 3562.29 10.51 3575.41 11 3601.64 12.33 3608.2 12.42 3614.76
12.88 3627.87 14.34 3640.99 15.01 3647.55 15.59 3654.11 15.94 3660.66 16.43
3673.78 17.06 3680.34 16.89 3686.9 17.13 3719.69 17.38 3732.8 17.31 3745.92
17.56 3778.71 17.31 3785.27 17.15 3791.83 17.16 3798.38 16.95 3804.94 16.52
3811.5 16.23 3837.73 16.19 3844.29 16.09 3857.41 15.6 3863.96 15.51 3896.75
16.21 3929.54 16.3 3942.66 16.95 3962.34 17.34 3968.89 17.57 3982.01 18.31
4001.68 18.96 4047.59 20.85 4054.15 21.36 4067.26 21.67 4073.82 22.13
4086.94 22.35 4113.17 23.36 4126.29 23.62 4145.96 24.67 4172.19 25.56
4178.75 25.62 4185.31 25.38

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 2526.9 .04 2677.04 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2526.9
2677.04 1195.98 1379.74 1532.92 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 38675.88

INPUT
Description: 40
Station Elevation Data num= 497
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 32.52 6.55 32.36 19.66 32.57
26.21 32.42 32.76 31.94 72.07 30.91 91.73 30.94 111.38 30.5 124.49 30.51
157.25 29.55 275.19 27.47 307.95 27.63 360.36 26.96 366.91 27.2 393.12 29.12
406.23 27.57 432.43 25.94 445.54 25.44 517.61 25.31 589.68 25.9 629 25.31
661.76 25.73 694.52 25.77 727.28 24.91 733.83 25.03 740.38 25.5 746.93 25.31
753.48 24.21 760.04 21.5 779.69 10.59 786.24 7.43 792.8 5.49 799.35 4.92
805.9 4.81 812.45 5 832.11 4.95 838.66 5.24 864.87 4.98 877.97 4.74 891.08
5.38 910.73 5.38 923.84 6.06 936.94 6.04 963.15 6.7 976.25 6.49 1009.01
6.88 1022.12 6.73 1035.22 5.94 1041.77 5.12 1048.33 4.95 1054.88 4.4 1067.98
4.03 1074.53 4.19 1081.09 3.96 1113.85 3.95 1120.4 4.17 1146.61 4.27 1172.81
3.95 1179.37 4.12 1185.92 3.97 1192.47 4.13 1205.57 3.9 1225.23 4.39 1238.33
3.97 1264.54 4.22 1277.65 3.84 1284.2 4.54 1297.3 5.05 1316.96 5.31 1330.06
5.81 1356.27 5.22 1389.03 5.63 1415.24 4.79 1434.89 5.5 1448 6.55 1454.55
6.34 1480.76 6.69 1493.87 7.18 1506.98 6.52 1526.65 5.91 1539.76 6.78
1546.32 6.99 1565.98 6.29 1592.2 7.56 1605.31 7.86 1611.87 7.56 1624.98 5.44
1630.37 4.79 1631.53 4.65 1638.09 4.52 1644.64 3.6 1655 .02 1658.75 -.06
1661.34 -.1 1662.85 -.37 1664.31 -.76 1667.25 -1 1668.97 -1.32 1670.59 -2.29
1674.61 -2.39 1676.76 -2.86 1678.68 -3.22 1680.48 -3.27 1682.15 -3.45
1683.85 -3.37 1685.34 -2.92 1686.71 -3.14 1688.17 -3.26 1689.71 -3.59
1691.29 -4.15 1693.14 -4.36 1695.04 -4.55 1696.95 -4.78 1698.74 -4.66
1700.61 -4.88 1702.29 -4.9 1704.07 -4.58 1705.64 -4.62 1707.24 -4.64 1708.72
-4.51 1710.24 -4.54 1711.62 -4.46 1713.21 -4.45 1714.93 -4.49 1716.71 -4.5
1718.42 -4.49 1720.09 -4.46 1721.48 -4.26 1723.08 -4.05 1724.51 -3.51
1726.02 -3.78 1727.37 -3.41 1728.91 -3.27 1730.4 -2.93 1732.08 -2.29 1733.82
-1.46 1735.89 -1.32 1737.25 -.92 1749.53 5.34 1756.09 8.89 1762.64 8.85
1769.2 8.41 1775.75 7.66 1782.31 7.57 1788.86 7.54 1795.42 7.66 1801.97 7.73
1808.53 7.71 1815.08 7.72 1821.64 7.68 1828.19 7.69 1834.75 7.78 1841.3 7.76
1847.86 7.54 1854.41 7.36 1860.97 7.22 1874.08 7.11 1880.64 7.04 1887.19
6.91 1893.75 6.71 1900.3 6.57 1906.86 6.33 1913.41 6.53 1926.53 6.83 1939.65
6.99 1946.21 7.18 1952.77 7.66 1959.33 8.07 1965.89 8.01 1972.45 7.89
1979.01 7.63 1985.57 7.75 1992.13 7.85 1998.69 7.99 2005.25 8.17 2011.81
8.19 2018.37 8.31 2024.93 8.33 2031.49 8.28 2038.05 8.21 2044.61 8.2 2051.17
8.14 2057.73 8.06 2064.29 8.03 2070.85 8.15 2077.4 8.17 2083.96 8.33 2090.52
8.43 2097.08 8.51 2110.2 8.75 2116.76 8.74 2123.32 8.76 2129.88 8.89 2136.44
8.87 2143 9.01 2149.56 9.21 2156.12 9.37 2162.68 9.48 2169.24 9.47 2175.8
9.42 2182.36 9.4 2188.92 9.45 2195.48 9.42 2202.04 9.5 2208.6 9.76 2215.16
9.97 2221.72 10 2234.84 10.19 2241.4 10.16 2247.96 10.21 2254.52 10.22
2261.08 10.21 2267.64 10.28 2274.2 10.44 2280.76 10.4 2293.88 10.28 2300.44
10.25 2307 10.17 2313.56 10.05 2320.12 9.79 2326.68 9.74 2333.24 9.6 2339.79
9.62 2346.35 9.55 2352.91 9.42 2359.47 9.25 2366.03 9.55 2372.59 10.07
2379.15 10.39 2385.71 10.65 2392.27 11.1 2398.83 11.45 2405.39 11.76 2411.95
11.94 2418.51 12.03 2425.07 12.01 2431.63 11.97 2438.19 11.99 2444.75 11.94
2451.31 11.78 2464.43 11.63 2470.99 11.62 2477.55 11.7 2484.11 11.74 2490.67
11.61 2497.23 11.52 2503.79 11.54 2510.35 11.53 2516.91 11.38 2523.47 11.5
2530.03 11.35 2536.59 11.32 2543.15 11.44 2549.71 11.35 2562.83 11.26
2569.39 11.17 2575.95 11.1 2582.51 10.91 2589.07 10.87 2608.75 10.69 2615.3
10.66 2621.86 10.6 2628.42 10.61 2634.98 10.53 2641.54 10.49 2648.1 10.34
2654.66 10.23 2661.22 10.37 2667.78 10.1 2674.34 10.05 2680.9 9.74 2694.02
9.09 2700.58 8.71 2713.7 8.16 2720.26 7.9 2726.82 7.86 2733.33 7.69 2739.84
7.64 2746.35 7.35 2752.87 7.21 2759.38 7.4 2765.89 7.51 2778.91 7.06 2785.42
7.3 2791.93 7.18 2798.44 6.85 2804.95 6.84 2811.47 6.94 2817.98 7.07 2824.49

7.24 2831 7.21 2837.51 7.05 2844.02 7.31 2850.53 7.48 2857.04 7.55 2863.55
7.54 2870.07 7.47 2876.58 7.36 2883.09 7.27 2889.6 7.49 2896.11 7.59 2902.62
7.46 2909.13 7.35 2915.64 7.35 2922.15 7.22 2928.67 7.33 2935.18 7.46
2941.69 7.31 2948.2 7.6 2954.71 7.87 2961.22 8.19 2967.73 8.07 2980.75 8.59
2987.27 8.83 2993.78 9.11 3000.29 9.13 3006.8 9.23 3013.31 9.51 3019.82 9.28
3032.84 9.04 3039.35 8.65 3045.87 8.11 3052.38 7.77 3058.89 7.83 3065.4 7.71
3071.91 7.56 3078.42 7.51 3084.93 7.44 3097.95 7.79 3104.47 7.84 3110.98
7.75 3117.49 7.83 3124 7.83 3130.51 7.72 3137.02 7.73 3143.53 7.91 3150.04
8.27 3156.55 8.38 3163.07 8.76 3176.09 9.63 3189.11 10.55 3195.62 10.97
3202.13 11.52 3221.67 12.75 3228.18 13.09 3234.69 13.57 3247.71 14.1 3254.22
14.29 3260.73 14.41 3267.24 14.57 3273.76 14.69 3280.27 14.67 3286.78 14.68
3293.29 14.59 3299.8 14.47 3306.31 14.25 3312.82 14.25 3319.33 14.22 3325.84
14.01 3332.36 14.16 3338.87 14.28 3345.38 14.27 3351.89 14.41 3358.4 14.7
3364.91 14.95 3371.42 15.14 3377.93 15.36 3384.44 15.49 3390.96 15.71
3397.47 15.76 3403.99 15.67 3410.5 15.63 3417.02 15.61 3423.53 15.47 3430.05
15.42 3436.56 15.51 3443.08 15.46 3449.59 15.35 3456.11 15.36 3462.62 15.24
3469.14 15.15 3475.65 15.04 3482.17 14.79 3495.2 14.57 3501.71 14.33 3508.23
14.06 3514.74 14.1 3521.26 13.99 3527.77 13.86 3534.29 13.93 3547.32 13.71
3553.83 13.66 3560.35 13.65 3566.86 13.54 3573.38 13.34 3579.89 13.19
3586.41 13.23 3592.93 13.15 3599.44 13.05 3605.96 12.91 3612.47 12.64
3618.99 12.51 3625.5 12.51 3632.02 12.48 3638.53 12.39 3645.05 12.39 3651.56
12.19 3658.08 11.97 3664.59 11.87 3671.11 11.87 3677.62 12.1 3684.14 12.23
3690.65 12.46 3697.17 12.6 3703.68 12.96 3710.2 13.11 3716.71 13.45 3723.23
13.9 3729.74 14.08 3736.26 14.16 3749.29 14.44 3755.8 14.61 3762.32 14.54
3768.83 14.63 3775.35 14.56 3781.86 14.55 3794.9 14.72 3801.41 14.96 3807.93
15.07 3814.44 15.16 3827.47 15.28 3833.99 15.23 3840.5 15.21 3847.02 15.23
3853.53 15.28 3860.05 15.39 3866.56 15.47 3873.08 15.73 3886.11 15.86
3892.62 15.94 3899.14 16.05 3912.17 16.1 3918.68 16.11 3925.2 16.7 3931.71
17.05 3938.23 17.1 3944.74 17.2 3951.26 17.32 3957.77 17.32 3964.29 17.5
3970.8 17.56 3977.32 17.47 3990.35 17.4 3996.86 17.42 4003.38 17.35 4009.9
17.37 4016.41 17.46 4022.93 17.58 4029.44 17.76 4035.96 18.13 4042.47 18.37
4048.99 18.56 4055.5 18.83 4062.02 18.87 4068.53 18.97 4081.56 19.24 4088.08
19.44 4094.59 19.59 4101.11 19.84 4107.62 19.99 4120.65 20.74 4127.17 20.89
4133.68 21.07 4140.2 21.48 4146.71 21.86 4153.23 22.08 4159.74 21.85 4166.26
21.6 4172.77 21.86 4179.29 21.77 4185.8 21.61 4192.32 21.55 4198.83 21.62
4205.35 21.63 4211.86 21.76 4218.38 21.97 4224.9 22.07 4231.41 22.25 4237.93
22.46 4244.44 22.82 4250.96 23.13 4257.47 23.61 4263.99 24.16 4270.5 24.58
4277.02 24.95 4283.53 25.55 4290.05 26.08
 Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .082 1605.31 .04 1762.64 .08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1605.31
1762.64 1736.85 1644.44 1625.84 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 37031.44

INPUT
Description: 39 500 ft US Cotley Riv Trib
Station Elevation Data num= 196

Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 30.36 26.21 30.12 52.42 30.73 85.19 29.37 190.03 28.25 216.24 26.74 235.9 25.08 249.01 25 262.11 24.53 281.77 22.62 307.98 19.26 327.64 15.28 334.19 14.89 347.3 12.89 353.85 11.26 360.4 10.05 366.96 9.39 380.06 11.4 386.61 12.03 393.17 13.6 399.72 13.63 406.27 12.74 419.38 8.76 439.04 6.76 478.35 6.33 498.01 5.17 530.77 5.24 556.99 5.89 563.54 5.75 576.64 4.37 602.85 3.8 635.62 4.98 655.28 4.86 674.94 3.92 688.04 4.28 701.15 3.88 760.12 4.43 786.33 3.06 799.44 4.04 812.54 4.42 819.1 4.99 832.2 4.5 845.31 5.11 871.52 4.5 891.18 4.87 897.73 4.58 904.28 3.6 910.84 3.15 976.36 2.61 989.47 3.68 1068.1 3.05 1087.76 3.64 1100.87 3.03 1120.52 2.88 1133.63 3.72 1140.18 3.71 1146.73 5.07 1153.29 5.74 1192.6 5.51 1199.16 3.92 1205.71 3.08 1297.45 3.48 1323.66 4.05 1343.32 3.23 1356.42 3.62 1362.97 4.54 1369.53 6.58 1376.08 7.61 1395.74 5.78 1474.37 5.67 1500.58 6.93 1533.35 5.63 1572.66 6.9 1631.64 5.41 1644.74 5.83 1664.4 7.33 1749.59 7.58 1769.24 6.96 1842.42 7.66 1847.44 7.46 1853.9 6.77 1860.37 5.97 1866.83 5.48 1873.3 4.88 1879.76 3.71 1890 -.94 1890.62 -1 1891.34 -1.08 1891.91 -1.3 1892.57 -1.39 1892.98 -1.44 1893.54 -1.47 1894.27 -1.74 1895.38 -2.02 1896.93 -2.33 1898.8 -2.97 1901 -4.12 1905.57 -5.28 1907.3 -5.45 1909.17 -5.62 1911.17 -5.78 1913.75 -6.02 1916.24 -6.33 1918.97 -6.69 1921.25 -7.33 1923.71 -7.83 1926 -8.46 1928.4 -8.97 1930.69 -9.2 1932.96 -9.51 1935.08 -9.54 1937.34 -9.41 1939.41 -9.15 1941.84 -9 1944.27 -8.38 1946.46 -7.99 1948.35 -7.34 1950.27 -6.9 1951.95 -6.48 1953.45 -6.16 1954.54 -5.72 1955.5 -5.49 1956.38 -5.11 1957.55 -4.86 1959.06 -4.43 1960.92 -4.05 1962.65 -3.6 1964.72 -2.75 1966.66 -2.22 1968.72 -1.95 1970.17 -1.73 1971.33 -1.48 1973.68 -.87 1975.66 -.51 1978.17 -.64 1993.81 6.89 1996.13 7.97 2002.6 8.29 2041.72 6.83 2048.27 6.34 2094.11 6.32 2107.21 6.04 2113.76 7.27 2126.86 11.64 2133.41 12.63 2146.5 13.26 2153.05 13.04 2166.15 11 2192.35 11.06 2205.44 11.45 2251.29 10.87 2316.78 10.72 2388.81 9.21 2408.46 9.22 2447.75 7.31 2460.85 7.38 2480.5 6.46 2552.54 7.15 2565.63 7.77 2624.57 7.55 2644.22 7.62 2650.77 7.35 2683.51 7.54 2696.61 7.77 2716.26 7.3 2749 8.97 2768.65 8.6 2794.84 7.47 2840.69 8.47 2853.78 8.4 2919.27 10.9 2932.37 12.16 2971.66 14.12 3004.41 14.41 3187.78 13.38 3286.01 11.55 3423.54 13 3443.18 13.01 3489.03 14.03 3521.77 13.53 3547.97 14.42 3574.16 15.89 3639.65 16.12 3659.3 15.75 3678.94 16.25 3698.59 15.56 3764.08 17.31 3816.47 18.37 3868.86 18.28 3895.06 20.04 3934.35 21.05 3960.55 20.2 3999.84 20.67 4006.39 21.35 4078.43 24.33 4104.62 26.7

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .085 1842.42 .04 2002.6 .08
Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1842.42 2002.6 1361.41 1290.79 1264.72 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 35740.65

INPUT
Description: 38
Station Elevation Data num= 481
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 41.08 6.53 43.39 13.07 45.74 19.6 46.46 26.14 47.03 32.67 46.77 39.21 46.7 45.74 46.69 52.28 46.73 58.81 46.62 65.34 46.54 71.88 46.35 78.41 46.36 84.95 46.02 91.48 44.58 98.02

42.72 104.55 40.81 111.09 38.78 117.62 38.34 124.15 37.32 130.69 34.84
137.22 32.4 143.76 30.18 150.29 28.26 156.83 28.13 163.36 28.21 169.9 28.43
176.43 28.79 182.97 29.2 189.5 29.53 196.03 29.81 215.64 30.76 222.17 31.12
228.71 31.33 235.24 31.61 241.78 32.2 248.31 32.96 261.38 34.44 267.91 35.35
274.45 36.68 280.98 36.67 287.52 36.61 294.05 36.63 300.59 36.48 307.12
36.51 320.19 36.49 326.72 36.52 333.26 36.88 339.79 37.22 346.33 37.77
352.86 38.74 359.4 40.27 365.93 40.69 372.46 40.77 379 40.92 385.53 41.09
392.07 41.35 398.6 41.44 405.14 41.44 411.67 41.74 418.21 42.42 424.74 43.08
431.27 43.69 444.34 44.56 450.88 45.01 463.95 45.64 470.48 45.8 477.02 45.99
483.55 46.29 490.08 46.31 496.62 46.38 503.15 46.52 509.69 46.61 516.22
46.57 522.76 46.51 535.83 46.53 542.36 46.37 548.89 46.18 555.43 46.13 568.5
46.09 575.03 46.04 581.57 45.95 588.1 45.76 594.64 45.35 601.17 44.57 607.7
42.14 614.24 39.86 620.77 39.4 627.31 39.28 633.84 39.02 640.38 38.81 653.45
38.31 659.98 38.07 666.52 37.98 673.05 37.87 692.65 37.76 699.19 37.74
705.72 37.82 712.26 37.83 718.79 37.74 725.33 37.57 731.86 37.38 738.39
37.02 744.93 36.73 751.46 36.29 758 36.06 764.53 35.37 771.07 33.42 777.6
30.95 784.14 29.66 790.67 29.43 797.2 29.58 803.74 29.6 810.27 30.28 816.81
31.26 823.34 31.76 829.88 31.71 836.41 31.7 842.95 31.46 849.48 31.36
856.01 31.4 869.08 31.09 875.62 30.9 882.15 30.89 888.69 30.9 901.76 31.03
908.29 31 914.82 31.09 921.36 31.53 927.89 31.75 934.43 31.79 947.5 31.97
954.03 32.13 960.57 32.12 967.1 32.14 980.17 31.75 986.7 31.52 999.77 30.81
1006.31 30.37 1012.84 30.19 1019.38 29.97 1025.91 29.69 1032.44 29.55
1038.98 29.07 1045.51 28.7 1052.05 28.48 1058.58 28.42 1065.12 28.33 1071.65
28.43 1078.19 28.3 1084.72 28.05 1091.25 27.86 1097.79 27.64 1104.32 27.53
1110.86 27.39 1117.39 27.19 1123.93 26.92 1130.46 27.37 1137 27.56 1143.53
27.48 1150.06 27.46 1156.6 27.56 1163.13 27.52 1169.67 27.25 1176.2 27.32
1182.74 27.59 1189.27 28.06 1195.81 28.29 1202.34 28.21 1208.87 28.04
1215.41 28.31 1221.94 28.92 1228.48 29.09 1241.55 29.13 1248.08 29.16
1254.62 29.57 1261.15 29.67 1267.69 29.57 1274.22 29.7 1280.75 29.7 1287.29
29.68 1293.82 29.57 1300.36 29.62 1306.89 29.32 1313.43 29.12 1319.96 28.94
1326.49 28.86 1333.03 28.59 1339.56 28.3 1346.1 28.35 1352.63 27.85 1359.17
27.58 1365.7 27.4 1372.24 27.38 1378.77 27.38 1385.3 27.33 1391.84 27.11
1398.37 27.02 1404.91 27 1411.44 26.9 1417.98 26.76 1424.51 26.58 1431.05
26.32 1437.58 26.02 1444.12 26.21 1450.65 26.16 1457.18 25.95 1463.72 25.83
1470.25 25.73 1476.79 25.38 1483.32 25.14 1489.86 25.04 1496.38 25.04
1502.91 25 1509.43 24.89 1515.96 24.62 1522.49 24.74 1529.01 24.67 1535.54
24.45 1542.06 24.37 1548.59 24.27 1555.11 24.4 1561.64 24.61 1568.17 24.31
1574.69 24.2 1581.22 24 1587.74 23.96 1594.27 24.28 1600.8 24.47 1607.32
24.49 1613.85 24.31 1620.37 23.97 1633.42 23.32 1639.95 22.79 1646.48 22.39
1653 21.63 1659.53 20.66 1666.05 19.57 1672.58 18.53 1679.11 17.58 1685.63
17.05 1692.16 16.48 1698.68 15.86 1705.21 15.16 1711.73 14.82 1718.26 14.14
1724.79 13.41 1737.84 12.63 1744.36 12.83 1750.89 13.08 1757.42 12.98
1763.94 10.62 1770.47 5.86 1780 -1.14 1780.66 -1.22 1781.2 -1.43 1782 -1.4
1782.91 -1.55 1783.95 -1.65 1784.67 -1.9 1785.25 -2 1785.87 -2.22 1786.63 -
2.42 1787.26 -2.87 1788.43 -3.73 1790.71 -4.39 1792.98 -5.13 1795.19 -5.48
1797.36 -5.25 1799.46 -5.39 1801.81 -5.57 1804.12 -5.12 1806.74 -4.78
1809.13 -4.6 1811.43 -4.6 1813.94 -4.42 1816.49 -4.34 1818.85 -4.2 1821.34 -
4.26 1823.68 -4.24 1826.1 -4.34 1828.51 -4.32 1830.97 -4.46 1833.24 -4.55
1835.71 -4.72 1838.12 -4.73 1840.62 -4.87 1843.02 -4.97 1845.65 -4.96
1848.21 -4.81 1850.64 -4.81 1852.81 -4.76 1855.07 -4.64 1856.99 -4.74
1858.96 -4.57 1860.74 -4.32 1862.49 -4.27 1864 -3.89 1865.44 -3.77 1866.57 -
3.59 1867.61 -3.33 1868.39 -3.19 1869.17 -2.98 1869.83 -2.68 1870.59 -2.32
1887.93 5.45 1890.4 6.08 1894.46 7.12 1900.98 7.34 1914.04 6.26 1953.19 5.48
1959.72 5.81 2018.45 6.65 2024.98 6.93 2070.66 7.32 2090.23 7.03 2129.39

7.53 2175.07 7.62 2194.65 8.26 2207.75 8.17 2247.05 6.93 2253.6 6.95 2266.7
6.21 2292.91 6.27 2312.56 6.69 2338.76 6.25 2345.31 5.95 2351.86 6.09
2397.72 5.51 2410.82 5.15 2430.47 5.68 2443.57 6.25 2450.12 6.17 2463.22
6.77 2482.88 6.39 2495.98 6.53 2509.08 6.11 2522.18 5.32 2535.28 5.15
2561.49 5.97 2581.14 5 2594.24 4.73 2607.34 5.18 2646.64 5.67 2659.75 7.64
2672.85 8.66 2692.5 8.1 2725.25 8.56 2751.45 8.55 2758.01 8.17 2797.31 7.03
2816.96 7.27 2830.06 6.95 2836.61 7.02 2849.72 6.17 2856.27 6.05 2869.37
6.47 2875.92 6.32 2882.47 5.84 2889.02 5.96 2902.12 7.14 2908.67 7.37
2921.77 6.08 2934.87 5.49 2954.53 5.11 2967.63 5.24 2974.18 4.97 2980.73
5.55 2993.83 7.44 3000.38 7.85 3033.13 8.32 3039.68 7.82 3046.24 6.59
3052.79 4.99 3072.44 4.2 3098.64 4.36 3111.74 5.18 3137.95 5.46 3144.5 6.28
3157.6 8.34 3164.15 9.09 3170.7 9.27 3203.45 8.86 3216.55 9.1 3236.21 8.87
3255.86 9.22 3268.96 8.99 3282.06 8.37 3301.71 7.92 3314.81 7.99 3347.57
7.39 3354.12 8.31 3386.87 8.81 3413.07 7.63 3426.17 7.81 3439.28 7.3 3465.48
7.33 3491.68 6.68 3504.78 6.95 3530.99 6.56 3557.19 7.69 3570.29 7.59
3589.94 7.04 3609.59 6.99 3622.7 7.58 3629.25 7.54 3635.8 7.86 3655.45 8.14
3675.1 9.28 3701.3 10.04 3720.96 10.15 3753.71 12.48 3760.26 11.86 3773.36
8.73 3779.91 8.78 3786.46 10.07 3793.01 12.62 3799.56 13.83 3806.11 14.66
3812.67 15.06 3819.22 14.91 3832.32 14.15 3838.87 14.15 3851.97 13.65
3858.52 13.68 3871.62 13.24 3910.93 13.62 3937.13 12.84 3943.68 12.36
3963.33 12.46 3982.98 11.92 4041.94 12.14 4055.04 12.55 4087.79 12.57
4107.45 13.23 4133.65 13.45 4166.4 13.26 4199.16 11.13 4205.71 10.9 4231.91
10.83 4251.56 12.06 4271.21 12.12 4297.42 11.41 4317.07 11.79 4349.82 13.45
4382.58 13.48 4415.33 12.75 4441.53 12.36 4461.18 13.12 4467.74 13.16
4474.29 13.51 4480.84 13.54 4493.94 13.1 4520.14 14.16 4526.69 14.22 4546.34
13.52 4559.44 14.3 4585.65 14.65 4611.85 13.89 4631.5 15.3 4664.26 15.69
4690.46 15.52 4716.66 15.88 4742.86 15.53 4762.52 15.69 4788.72 16.28
4814.92 15.86 4834.57 16 4841.12 16.39 4880.43 17.54 4900.08 17.53 4952.49
18.76 4959.04 18.57 4985.24 19.65 4991.79 20.45 5004.89 20.63 5011.44 20.24
5017.99 20.51 5024.54 21.39 5031.1 21.74 5050.75 21.57

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .088 1607.32 .04 1894.46 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1607.32
1894.46 1785.36 1632.89 1530.18 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 34107.76

INPUT
Description: 37
Station Elevation Data num= 499
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 24.64 360.62 19.68 406.52
23.9 661.51 23.33 686.2 12.7 687.25 12.13 693.68 5.4 700 -1.08 700.45 -1.25
700.85 -1.5 701.42 -1.62 701.98 -1.84 702.33 -2.1 702.62 -2.24 703.35 -2.35
704.28 -2.81 705.63 -3.83 708.31 -4.91 711.03 -5.93 713.31 -6.71 716.1 -7.14
718.64 -7.51 721.01 -7.69 723.53 -7.63 726.11 -8.19 728.78 -8.2 731.64 -8.54
734.05 -8.56 736.6 -8.45 739.04 -8.25 741.38 -8.07 743.66 -7.66 745.87 -7.41
748.18 -7 750.75 -6.73 752.97 -6.33 756.13 -6.1 758.72 -5.66 761.27 -5.15

763.83 -4.96 766.37 -4.91 768.72 -5.02 770.97 -4.94 773.08 -4.54 775.4 -4.4
777.28 -4.25 779.14 -4.15 780.64 -3.86 782.15 -2.98 783.44 -3.18 803.08 2.33
809.52 2.09 815.95 2.1 822.39 2.16 828.82 2.54 841.69 2.83 854.68 2.92
861.23 2.9 867.78 3.12 874.33 3.24 880.89 3.41 887.44 3.43 893.99 3.4 907.1
3.7 913.65 3.76 920.2 3.36 926.75 2.82 933.3 1.9 939.86 1.57 966.07 1.57
972.62 2.31 979.17 4.62 985.72 7.6 992.27 9.93 998.83 11.21 1005.38 12.63
1011.93 14.18 1018.48 16.03 1025.03 18.5 1031.59 20.65 1038.14 21.71 1044.69
21.54 1051.24 20.35 1057.8 18.81 1064.35 17.5 1070.9 16.22 1077.45 15.06
1084 13.51 1090.56 12.08 1097.11 10.58 1103.66 8.14 1110.21 6.12 1116.77
5.17 1123.32 4.74 1129.87 4.55 1136.42 4.55 1142.97 4.64 1149.53 4.55
1156.08 4.31 1162.63 4.27 1169.18 4.4 1175.73 4.55 1188.84 4.64 1195.39 4.41
1201.94 3.82 1208.5 3.52 1215.05 4.11 1221.6 4.48 1228.15 4.59 1234.7 4.67
1241.26 4.77 1247.81 5.06 1254.36 5.1 1260.91 4.95 1267.47 5.12 1274.02 5.24
1280.57 4.86 1287.12 4.72 1300.23 4.57 1306.78 4.42 1313.33 4.51 1332.99
4.47 1339.54 4.42 1346.09 4.43 1352.64 4.33 1359.2 4.01 1372.3 3.13 1378.85
3.23 1385.4 3.4 1391.96 3.4 1398.51 3.55 1405.06 4.22 1411.61 3.99 1418.17
3.78 1424.72 3.66 1431.27 3.67 1437.82 3.37 1444.37 3.35 1450.93 3.46
1457.48 3.61 1464.03 3.49 1470.58 3.54 1477.14 3.56 1490.24 3.27 1496.79
3.31 1503.34 3.65 1509.9 3.72 1516.45 4.34 1523 4.98 1529.55 5.25 1536.11
5.43 1542.66 5.18 1549.21 5.28 1555.76 5.31 1562.31 5.57 1568.87 5.96
1575.42 6.33 1581.97 6.52 1588.52 6.67 1595.07 6.61 1614.73 6.83 1621.28
6.97 1627.84 7.16 1634.39 7 1640.94 5.48 1647.49 2.44 1654.04 1.55 1745.77
1.55 1752.33 1.56 1758.88 2.63 1765.43 3.89 1771.98 4.47 1778.54 5.73
1785.09 8.27 1791.64 10.52 1798.19 11.55 1804.74 11.62 1811.3 11.3 1817.85
11.03 1824.4 10.79 1830.95 10.71 1837.51 10.72 1850.61 10.69 1857.16 10.66
1870.27 10.48 1876.82 10.44 1883.37 10.37 1889.92 10.22 1903.03 10.19
1909.58 10.16 1916.13 10.28 1922.68 10.43 1935.79 10.55 1942.34 10.51
1948.89 10.6 1955.44 10.74 1962 10.71 1968.55 10.49 1975.1 10.31 1981.65
10.03 1988.21 9.79 1994.76 9.27 2001.31 8.82 2007.86 8.46 2014.41 8.31
2020.97 8.21 2027.52 8.04 2034.07 7.92 2040.62 7.78 2047.18 7.67 2053.73
7.66 2066.83 7.52 2073.38 7.48 2079.94 7.41 2086.49 7.46 2093.04 7.38
2106.14 7.08 2112.7 6.94 2119.25 6.84 2125.8 6.78 2132.35 6.66 2138.91 6.64
2145.46 6.72 2152.01 6.77 2158.56 6.88 2165.11 7.01 2171.67 7.18 2178.22
7.37 2184.77 7.33 2191.32 7.03 2197.88 6.76 2204.43 6.67 2210.98 6.7 2217.53
7.59 2224.08 7.73 2237.19 7.45 2243.74 7.12 2250.29 6.89 2263.4 6.7 2269.95
6.59 2283.05 6.53 2289.61 6.67 2296.16 6.64 2302.71 6.65 2309.26 6.85
2315.81 6.85 2322.37 7.08 2328.92 7.16 2335.47 7.31 2342.02 7.55 2348.58 7.7
2355.13 7.74 2361.68 7.75 2368.23 7.62 2374.79 8.14 2381.34 8.39 2387.89
8.45 2394.44 8.39 2400.99 8.47 2407.55 8.42 2414.1 8.56 2420.65 8.83 2427.2
8.58 2433.75 8.24 2440.31 8.34 2446.86 8.48 2453.41 8.41 2459.96 8.48
2466.52 8.59 2473.07 8.52 2479.62 8.27 2486.17 8.1 2492.72 8.01 2499.28 7.81
2505.83 7.65 2512.38 7.38 2518.93 7.05 2525.49 6.59 2532.04 6.43 2538.59
6.57 2545.14 6.64 2551.69 6.54 2558.25 6.49 2564.8 6.52 2571.35 6.57
2584.46 6.43 2591.01 6.42 2597.56 6.46 2604.11 6.54 2610.66 6.57 2617.22
6.72 2623.77 6.83 2630.32 6.76 2636.87 6.75 2643.43 6.92 2649.98 6.95
2656.53 7 2663.08 7.28 2669.63 7.54 2676.19 7.64 2682.74 7.56 2689.29 7.7
2695.84 8.09 2702.4 8.44 2708.95 8.65 2722.05 8.92 2728.6 8.92 2735.16 8.88
2741.71 8.89 2748.26 8.92 2754.81 9.04 2761.36 9.07 2767.92 8.8 2774.47 8.27
2781.02 7.88 2787.57 7.65 2794.13 7.51 2807.23 7.62 2813.78 7.6 2820.33 7.9
2826.89 8.33 2839.99 9.6 2846.54 9.7 2853.1 9.5 2859.65 9.85 2866.2 9.82
2872.75 9.73 2879.3 9.45 2885.86 9.06 2892.41 8.56 2898.96 8.17 2905.51 7.63
2912.07 7.65 2918.62 7.52 2925.17 7.5 2931.72 7.54 2938.27 7.39 2951.38 7.76
2957.93 7.9 2964.48 7.8 2971.03 7.91 2977.59 8.19 2984.14 8.22 2990.69 8.6
2997.24 8.96 3003.8 9.26 3010.35 9.53 3016.9 9.75 3023.45 10.19 3030 10.96

3036.56 11.09 3043.11 10.73 3049.66 11.24 3056.21 11.46 3062.77 10.91
3069.32 10.33 3075.87 10.2 3082.42 9.77 3088.97 9.77 3095.53 9.98 3102.08
9.94 3108.63 10.46 3115.18 11.25 3121.74 11.83 3128.29 12.09 3134.84 12.49
3141.39 13.16 3147.94 13.6 3161.05 14.35 3167.6 14.48 3174.15 14.5 3180.7
14.23 3187.26 14.18 3193.81 13.9 3200.36 13.68 3206.91 13.59 3213.47 13.52
3220.02 13.01 3226.57 12.74 3233.12 13.05 3239.67 13.05 3246.23 12.91
3252.78 12.5 3259.33 12.46 3265.88 13.06 3272.43 13.35 3278.99 13.28 3285.54
13.05 3292.09 13 3298.64 12.98 3305.2 12.92 3318.3 12.6 3324.85 12.93 3331.4
13.12 3337.96 13.09 3344.51 13.13 3351.06 13.23 3357.61 13.24 3364.17 13.27
3370.72 13.1 3377.27 12.77 3383.82 12.53 3390.37 12.75 3396.93 13.14 3403.48
13.38 3410.03 13.57 3416.58 13.6 3423.13 13.37 3429.69 13.36 3436.24 13.54
3442.79 13.36 3449.34 13.23 3462.45 13.14 3469 13 3475.55 12.81 3482.1 12.49
3488.66 12.26 3495.21 12.15 3508.31 11.99 3514.87 11.96 3521.42 12.09
3527.97 12.07 3534.52 12.03 3541.07 12.15 3547.63 12.13 3554.18 12 3560.73
11.99 3567.28 12.01 3573.84 12.05 3580.39 12.17 3586.94 12.24 3593.49 12.35
3606.6 12.52 3613.15 12.76 3619.7 12.79 3626.25 12.84 3632.8 13.11 3639.36
13.29 3645.91 13.16 3652.46 13.13 3659.01 13.02 3665.57 13.07 3672.12 13.04
3678.67 13.09 3685.22 13.25 3691.77 13.32 3698.33 13.37 3704.88 13.33
3711.43 13.24 3724.54 12.89 3731.09 12.99 3737.64 13.3 3744.19 13.35 3750.74
13.17 3757.3 12.8 3763.85 12.97 3770.4 13.38 3776.95 13.66 3783.51 14.2
3796.61 14.1 3803.16 14.13 3809.71 14.26 3816.27 14.44 3822.82 14.64 3829.37
14.74 3835.92 14.96 3842.47 15.14 3849.03 14.99 3855.58 14.58 3862.13 14.64
3875.24 14.67 3881.79 14.89 3888.34 14.66 3901.44 15.04 3908 15.25 3914.55
15.22 3921.1 15.48 3927.65 15.86 3934.21 16.09 3940.76 16.12 3947.31 16.31
3953.86 16.43 3960.41 16.8 3966.97 16.99 3973.52 17.09 3986.62 16.96 3993.18
17.12 3999.73 17.95 4006.28 18.7 4012.83 19.2 4019.38 19.54 4032.49 19.62
4039.04 19.49 4045.59 19.4 4052.15 19.12 4058.7 18.59 4065.25 18.03 4071.8
17.97 4084.91 18.26

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .08 661.51 .04 1038.14 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 661.51
1038.14 1212.6 1253.07 1397.48 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 1621 4084.91 6.9 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 32854.69

INPUT
Description: 36
Station Elevation Data num= 349
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 22.49 6.55 22.23 13.1 22.15
39.29 22.9 52.39 22.61 58.94 22.83 65.49 23.29 72.04 23.58 78.58 23.7 104.78
23.44 130.97 23.78 163.72 23.59 170.27 23.38 176.81 23.02 189.91 22.6
209.56 22.67 216.11 22.39 222.65 22.25 235.75 21.53 255.4 21.2 261.95 20.85
275.04 20.64 281.59 20.8 288.14 20.77 301.24 21.41 314.34 21.5 327.43 22
333.98 22.52 347.08 22.6 392.92 21.58 412.57 20.82 432.21 20.36 445.31 19.84
451.86 19.82 458.41 19.98 478.05 20.06 484.6 20.25 510.8 21.34 530.44 22.58

543.54 23.04 595.93 23.47 615.57 23.23 622.12 23.26 641.77 23.01 654.87 22.08 661.41 21.74 681.06 21.16 694.16 21.47 700.71 21.37 707.26 20.29 720.35 15.85 726.9 13.25 733.45 10.25 740 8.88 753.1 7.14 759.64 6.69 766.19 6.53 779.29 6.76 785.84 6.7 798.94 6.95 805.49 6.64 812.03 6.07 825.13 5.8 831.68 6.05 838.23 6.02 844.78 5.51 851.33 5.83 864.42 7.06 870.97 7.49 877.52 7.68 890.62 7.59 923.36 6.35 929.91 6.24 936.46 6.82 943.01 7.13 949.56 7.06 956.1 7.21 969.2 7.03 975.75 6.53 982.3 6.43 988.85 6.15 995.4 6.07 1008.49 5.43 1015.04 5.31 1028.14 5.94 1034.69 6.11 1047.79 6.77 1060.88 7.02 1073.98 6.85 1080.53 7.05 1087.08 7.54 1093.63 7.61 1100.17 7.41 1106.72 7.37 1113.27 7.49 1146.02 6.99 1152.56 7.26 1159.11 7.35 1172.21 7.03 1178.76 6.69 1185.24 6.68 1191.72 6.53 1204.68 6.8 1215.75 6.86 1217.64 6.89 1224.12 7.17 1230.6 7.25 1237.08 5.71 1243.56 3.38 1300 -3.36 1301 -3.88 1301.75 -4.3 1302.23 -4.54 1303.13 -4.81 1305.04 -5.29 1307.37 -6.15 1309.97 -6.85 1312.3 -7.39 1314.8 -7.81 1317.17 -8.29 1319.97 -8.71 1325.55 -9.32 1328.29 -9.63 1331.36 -9.61 1334 -9.66 1336.79 -9.6 1339.46 -9.61 1342.06 -9.46 1344.6 -9.29 1347.41 -9.17 1350.23 -9.02 1353.37 -8.82 1356.24 -8.61 1359.11 -8.53 1361.58 -8.43 1364.05 -8.25 1366.44 -8.02 1368.83 -7.6 1370.89 -7.31 1373.07 -6.98 1377.46 -6.2 1379.79 -5.78 1381.83 -5.39 1384.11 -5 1386.57 -4.64 1389.38 -4.27 1392.04 -3.87 1394.84 -3.31 1397.42 -2.96 1402.03 -2.5 1404.35 -2.25 1406.41 -2.04 1408.42 -1.83 1409.85 -1.64 1411.13 -1.5 1412.45 -1.38 1413.68 -1.2 1414.98 -1.08 1416.1 -.99 1417.3 -.89 1418.26 -.79 1419.33 -.71 1420.22 -.52 1468.42 1.45 1470.38 1.45 1476.86 2.77 1483.42 5.66 1489.98 7.28 1503.09 8.68 1516.21 8.96 1535.88 8.85 1548.99 9.07 1588.34 9.16 1601.45 9.09 1614.56 9.17 1621.12 9.09 1640.79 9.46 1673.58 9.21 1686.69 8.92 1706.37 9.11 1726.04 8.73 1745.71 8.24 1765.38 7.95 1791.61 8.03 1817.84 8.89 1844.07 8.67 1870.3 8.67 1876.86 8.55 1896.53 7.6 1922.76 7.27 1942.43 7.18 1962.1 7.32 1975.21 7.08 1981.77 6.74 1994.89 5.3 2001.44 5.15 2008 5.37 2014.56 6.13 2021.12 7.03 2027.67 7.34 2040.79 7.11 2060.46 7.21 2073.57 7.45 2139.15 6.7 2158.82 5.9 2165.38 5.73 2171.93 5.9 2178.49 6.24 2198.16 6.54 2204.72 6.39 2224.39 6.69 2237.51 7.06 2250.62 7.09 2263.74 7.39 2270.29 7.15 2276.85 7.31 2296.52 6.87 2329.31 6.84 2335.87 7.02 2342.42 7.06 2348.98 7.66 2355.54 8.45 2362.09 9.01 2368.65 9.14 2375.21 9.43 2408 9.62 2414.55 9.94 2427.67 10.02 2434.22 9.88 2447.34 8.51 2453.9 8.25 2460.45 9.06 2467.01 9.59 2480.13 10.13 2493.24 10.28 2499.8 9.88 2506.36 9.64 2519.47 8.67 2526.03 8.51 2539.14 8.46 2545.7 8.19 2552.26 8.36 2565.37 8.15 2578.49 8.42 2585.04 8.32 2591.6 8.41 2598.16 8.33 2604.71 8.83 2611.27 9.58 2630.94 10.93 2637.5 11.72 2650.62 12.71 2657.17 13.04 2670.29 13.23 2689.96 13.01 2703.07 12.05 2709.63 11.29 2716.19 10.27 2742.42 9.05 2748.98 9.08 2755.53 9.32 2762.09 9 2768.65 9.21 2781.76 10.09 2788.32 10.15 2794.88 11.06 2801.43 11.38 2807.99 11.44 2821.11 12.02 2840.78 11.64 2847.33 11.04 2867.01 10.3 2873.56 9.96 2880.12 10.15 2886.68 10.61 2899.79 10.98 2919.47 10.64 2932.58 11.14 2945.69 10.84 2952.25 11.2 2958.81 10.93 2965.37 11.22 2991.6 11.53 3004.71 12.11 3017.82 12.14 3024.38 12.59 3030.94 13.49 3037.5 13.92 3050.61 13.64 3057.17 13.81 3063.73 13.7 3070.28 13.31 3083.4 14.38 3116.18 15.99 3129.3 16.43 3135.86 16.35 3142.41 16.49 3148.97 16.3 3168.64 16.27 3194.87 15.71 3207.99 16.34 3214.54 16.82 3234.22 16.14 3253.89 16.26 3260.44 16.06 3267 16.19 3273.56 16.73 3280.12 16.78 3286.67 17.54 3293.23 17.91 3299.79 17.99 3312.9 18.6 3319.46 18.51 3326.02 18.16 3332.57 18.24 3345.69 18.7 3365.36 18.57 3371.92 18.69 3398.15 18.9 3404.71 18.15 3411.26 17.86 3417.82 17.77 3430.93 18.35 3437.49 18.41 3444.05 18.65 3450.61 18.62 3463.72 18.16 3470.28 18.06 3476.84 18.1 3483.39 17.87 3489.95 18.17 3496.51 18.62 3503.06 18.35 3509.62 18.44 3522.74 19.26 3542.41 19.29 3555.52 19.84 3568.64 19.84 3575.2 19.99 3581.75 20.33 3588.31 20.33 3601.42 20.02 3607.98 20.28 3627.65

20.66 3640.77 21.27 3653.88 21.53 3660.44 21.39 3673.55 22.38 3680.11 22.73

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .082 1230.6 .04 1503.09 .085
 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1230.6 1503.09 1846.6 1695.15 1689.56 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 31159.54

INPUT
Description: 35
Station Elevation Data num= 311
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 20.95 6.55 19.39 13.1 18.29 19.65 17.89 26.2 17.95 32.75 18.16 39.3 18.16 45.85 18.02 58.95 18.36 85.15 19.67 91.7 19.88 104.8 19.8 117.9 19.32 124.45 19.32 131 19.61 137.55 19.65 150.65 19.11 157.2 19 170.3 19.28 176.85 19.59 183.4 19.59 189.95 19.87 196.5 19.67 203.05 19.67 209.6 19.82 216.15 19.74 229.25 19.3 235.8 19.31 248.9 20 268.55 19.75 281.65 19.2 294.75 19.11 347.15 17.63 353.7 17.6 373.35 17.12 379.9 17.15 386.45 17.38 393 17.47 406.1 17.31 412.65 17.12 432.3 17.4 451.95 17.88 458.5 17.8 465.05 18.1 478.15 18.31 491.25 19.09 504.35 19.45 517.45 19.55 524 19.76 537.1 19.86 543.66 20.13 556.76 19.99 563.31 20.03 569.86 20.26 576.41 19.85 582.96 18.13 589.51 15.41 596.06 11.99 602.61 8.71 609.16 6.78 615.71 5.49 622.26 4.75 628.81 4.37 641.91 4.08 648.46 3.32 655.01 2.7 681.21 2.3 687.76 2.36 700.86 2.27 727.06 2.4 746.71 2.21 786.01 2.46 792.56 2.86 805.66 3.88 812.21 4.96 825.25 6.68 831.74 6.42 838.23 4.98 842.57 3.82 844.72 3.25 851.21 2.84 857.7 1.97 864.19 1.28 870 -1.54 870.33 -1.55 870.7 -1.52 871 -1.43 871.28 -1.45 871.64 -1.52 871.82 -1.43 871.88 -1.52 872.41 -2.55 873.56 -3.16 874.86 -4.13 877.45 -4.92 879.68 -5.67 881.76 -6.3 884.07 -6.84 886.17 -7.39 888.47 -7.56 890.61 -7.61 892.85 -7.75 895.17 -7.64 897.7 -7.61 899.94 -7.46 902.06 -7.16 904.32 -6.97 906.77 -7.08 909.18 -6.77 911.65 -6.94 913.99 -6.97 916.27 -6.86 918.34 -6.63 920.51 -6.31 922.57 -6.03 924.69 -5.65 927 -5.34 929.74 -5.08 932.26 -4.91 934.6 -4.69 937.13 -4.23 939.48 -3.85 941.57 -3.02 943.49 -2.35 945.55 -2.17 946.83 -1.98 947.96 -2.05 949.15 -2.01 950.4 -1.99 951.76 -1.89 952.98 -1.71 954.27 -1.59 955.38 -1.4 956.54 -1.18 957.53 -.96 968.02 4.7 973.48 5.16 974.51 5.25 981 5.2 993.98 7.56 1000.47 7.71 1006.96 7.48 1013.45 7.07 1026.43 6.85 1045.9 6.76 1058.88 6.32 1065.37 5.7 1084.84 4.41 1097.82 4.51 1104.31 4.26 1110.8 4.44 1117.29 4.31 1136.76 4.51 1149.73 5.2 1156.22 5.22 1162.71 5.48 1169.2 5.46 1175.69 5.27 1182.18 5.45 1188.67 5.32 1195.16 5.37 1201.65 5.58 1208.14 6.07 1221.12 6.67 1227.61 6.38 1234.1 5.59 1247.08 5.55 1253.64 5.08 1260.2 5.05 1266.76 4.86 1273.32 4.15 1279.88 3.62 1286.44 3.71 1293 3.98 1299.57 4.04 1306.13 4.28 1338.93 4.61 1345.49 4.8 1352.05 4.84 1371.73 4.63 1397.97 4.76 1404.53 4.9 1424.22 5.72 1437.34 6.48 1443.9 6.59 1457.02 6.55 1470.14 6.01 1476.7 6.05 1483.26 6.36 1496.38 7.25 1522.62 7.59 1535.74 7.57 1548.87 7.83 1555.43 7.86 1561.99 8.04 1568.55 8.03 1581.67 7.77 1594.79 7.3 1660.39 7.72 1666.96 7.63 1686.64 8.01 1693.2 7.94 1699.76 7.72 1726 7.66 1739.12 7.26 1778.48 7.28 1791.61 7.14 1798.17 6.94 1824.41 7.35 1837.53 7.27 1844.09 7.35 1850.65 7.27 1870.33 7.27 1876.89 7.4 1896.57 7.41 1903.13 7.25 1935.94 7.68 1955.62 8.04 1968.74 8.61

1988.42 8.28 2021.22 8.93 2054.03 8.52 2086.83 7.38 2126.19 5.52 2145.87
5.21 2159 4.79 2178.68 4.54 2211.48 4.79 2224.6 5.3 2237.72 5.5 2250.84 6
2263.96 6.79 2270.52 6.89 2277.08 6.81 2283.65 7.16 2303.33 7.62 2316.45
8.37 2329.57 8.67 2342.69 8.78 2355.81 8.78 2362.37 8.98 2368.93 8.9 2375.49
9.07 2382.05 9.49 2395.17 9.82 2401.73 10.1 2427.98 9.82 2441.1 9.88 2447.66
9.7 2467.34 7.99 2473.9 7.65 2487.02 7.78 2493.58 7.65 2500.14 7.66 2506.7
7.83 2519.82 8.77 2532.94 9.35 2539.51 9.45 2552.63 8.58 2559.19 8.4
2565.75 8.38 2572.31 8.5 2578.87 8.48 2585.43 8.26 2591.99 8.29 2618.23 9.44
2624.79 9.9 2631.35 10.59 2644.47 11.74 2677.28 13.11 2683.84 13.55 2696.96
14.79 2716.64 16.04 2742.88 17.38 2756 17.88 2775.68 19.43 2788.8 19.95
2821.61 20.46 2841.29 21.44 2847.85 21.62 2854.41 22.08 2867.53 22.43
2874.09 22.85 2880.65 23.07 2906.89 23.21 2926.58 23.04 2952.82 23.35
2959.38 23.15 2979.06 23.02 2985.62 22.87 2992.18 22.58 3005.3 22.49 3011.86
22.92 3038.1 23.57 3044.66 23.38 3064.35 23.32 3070.91 23.19 3077.47 22.92
3084.03 22.9 3090.59 22.3 3097.15 20.4 3110.27 20.58 3116.83 20.43 3123.39
19.14 3129.95 20.16 3136.51 20.79 3143.07 21.27 3149.63 21.96 3156.19 22.32
3169.31 22.3 3175.88 21.98

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 825.25 .04 993.98 .082

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 825.25
993.98 1600.85 1613.53 1832.86 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 29546.01

INPUT
Description: 34 Station Elevation Data num= 298
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 22.98 6.52 22.86 19.56 23.4
26.08 23.81 32.6 23.75 39.12 23.45 52.17 23.49 84.77 22.2 91.29 22.13 97.81
22.24 110.85 22.68 123.89 22.76 143.46 22.46 149.98 22.54 176.06 21.84
182.58 21.81 202.14 22.25 221.71 22.18 234.75 21.89 241.27 21.54 247.79
21.03 254.31 20.26 267.35 18.43 273.87 18 280.39 18.26 293.43 19.85 299.95
20.49 313 21.33 326.04 21.79 332.56 21.86 345.6 21.53 352.12 20.92 371.68
18.51 378.2 18.02 384.72 17.38 397.77 16.94 404.29 16.91 410.81 17.02 417.33
16.84 430.37 17.22 436.89 17.72 443.41 17.85 449.93 18.14 456.45 18.08
462.97 17.58 469.49 16.75 476.01 15.68 482.53 14.3 489.06 13.08 495.58 11.52
502.1 10.38 508.62 9.89 515.14 10.09 521.66 9.84 528.18 9.82 541.22 10.27
547.74 10.39 554.26 10.07 560.78 9.94 567.3 10.06 573.83 11.09 580.35 11.47
593.39 11.92 619.47 11.94 625.99 12.12 632.51 11.78 639.03 11.64 645.55
11.68 652.07 11.57 658.59 11.71 671.64 11.72 684.68 12.07 691.2 12.06 704.24
11.81 717.28 11.73 730.32 11.43 743.36 11.38 762.93 10.33 775.97 10.23
782.49 9.99 808.57 10.59 821.61 10.36 834.65 10.48 854.22 10.1 867.26 10.42
886.82 10.24 899.86 10.31 912.9 10.02 919.42 10.01 925.95 10.16 932.47 10.45
938.99 10.91 952.03 11.52 971.59 12.69 978.13 12.78 991.21 13.14 1004.29
13.2 1017.36 12.97 1030.44 12.96 1036.98 12.81 1043.52 12.47 1050.06 12.32
1056.6 12.02 1063.14 11.87 1069.68 11.46 1076.22 10.91 1082.75 10.53 1108.91
10.04 1141.61 10.73 1148.14 10.65 1161.22 10.88 1167.76 11.3 1180.84 11.85
1200.46 12.01 1213.54 11.74 1220.07 11.17 1233.15 10.35 1239.69 9.52 1252.77

8.7 1259.31 8.41 1265.85 8.33 1278.93 7.25 1285.46 6.59 1292 6.39 1298.54
6.65 1311.62 7.66 1318.16 7.85 1331.24 7.09 1344.32 5.98 1350.85 5.73
1357.39 5.9 1363.93 6.44 1370.47 6.73 1377.01 6.78 1383.55 6.63 1390.09 6.65
1403.17 5.53 1409.71 5.23 1416.24 6.03 1422.78 6.46 1429.32 6.36 1435.86 5.7
1442.4 4.88 1448.94 4.83 1462.02 6.22 1468.56 6.81 1475.1 7.21 1481.63 7.19
1488.17 6.79 1494.71 6.67 1501.25 6.73 1520.87 6.43 1533.95 6.01 1547.03 6
1553.56 6.42 1560.1 6.68 1573.18 6.43 1586.26 6.52 1592.8 6.92 1599.34 7.05
1611.52 6.52 1612.42 6.48 1618.95 6.93 1625.49 5.27 1631.91 2.87 1638.33
1.49 1650 -.76 1656.01 -.87 1657.41 -1.05 1658.79 -1.41 1660.28 -1.67
1661.73 -2.03 1663.38 -2.35 1664.87 -2.96 1667.11 -3.25 1669.2 -3.49 1671.82
-3.8 1674.41 -3.94 1676.97 -4.23 1679.73 -4.56 1682.54 -4.79 1685.27 -4.94
1688.14 -5.17 1691.12 -5.38 1694.06 -5.63 1697.38 -5.95 1700.28 -6.42
1703.19 -6.95 1705.96 -7.53 1708.82 -8.12 1711.78 -8.58 1714.83 -8.96
1717.71 -9.25 1720.63 -9.5 1723.54 -9.73 1726.52 -9.77 1729.06 -9.72 1731.61
-9.77 1734.24 -9.61 1737.21 -9.51 1740.37 -9.15 1743.26 -8.76 1745.94 -8.21
1748.61 -7.59 1750.7 -6.68 1752.88 -5.99 1754.79 -5.1 1756.76 -4.3 1758.47 -
3.65 1760.1 -3.2 1761.58 -2.71 1763.39 -2.41 1765.5 -2.09 1767.43 -1.84
1768.71 -1.57 1769.92 -1.36 1770.97 -1.12 1772.01 -.83 1805.21 2.9 1811.63
4.47 1818.04 5.88 1822.22 6.34 1824.46 6.6 1830.88 6.8 1850.53 6.94 1857.07
6.83 1863.62 6.58 1870.17 6.52 1889.81 5.66 1922.55 5.84 1929.1 5.79 1955.29
6.32 1968.39 6.4 1974.94 6.05 1988.03 6.5 1994.58 6.49 2020.77 7.34 2040.42
7.4 2053.52 7.76 2079.71 8.06 2086.26 8.7 2092.8 8.87 2099.35 8.59 2105.9
8.12 2112.45 8.22 2119 7.97 2125.54 8.3 2145.19 8.37 2151.74 8.56 2184.48
8.56 2197.57 8.31 2210.67 8.84 2236.86 8.97 2243.41 8.75 2249.96 8.68
2256.5 8.85 2276.15 8.75 2315.44 8.76 2321.98 8.97 2335.08 10.36 2341.63
11.42 2348.18 12.25 2367.82 13.6 2380.92 13.73 2387.46 14.01 2394.01 14.09
2413.66 14.64 2420.2 15.25 2433.3 15.8 2446.4 16.11 2485.69 17.77 2492.23
18.15 2498.78 18.26 2524.97 19.62 2538.07 19.99 2551.17 20.56 2557.71 21.13
2564.26 21.98 2570.81 22.42 2583.91 22.66 2590.45 23.02 2597 23.56 2603.55
24.48 2610.1 24.83 2616.65 25.41 2623.19 25.83 2629.74 25.88 2655.93 25.71
2669.03 25.43 2688.67 25.46 2708.32 24.91 2721.41 24.96 2727.96 25.09
2767.25 24.59 2780.35 24.93 2793.44 25.85 2806.54 26.36 2832.73 26.53

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .088 1618.95 .04 1822.22 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1618.95
1822.22 1803.19 1875.89 1978.98 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 27670.12

INPUT
Description: 33
Station Elevation Data num= 225
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 22.42 6.56 22.27 13.11 21.73
19.67 20.95 26.22 20.61 59 20.77 65.55 20.54 72.11 20.1 85.22 18.76 104.89
17.01 111.44 16.52 118 16.32 131.11 16.49 150.77 17.45 157.33 17.49 163.88
17.26 176.99 16.44 190.11 15.21 196.66 14.86 203.22 14.28 209.77 13.86
222.88 13.45 235.99 13.35 255.66 13.6 268.77 14.01 288.44 15.34 294.99 15.67

301.55 15.8 308.1 15.64 314.66 15.21 321.21 14.54 327.77 13.54 334.32 12.06
340.88 10.2 347.43 9.24 353.99 8.42 360.54 8.08 380.21 7.96 399.88 8.34
406.43 9.49 412.99 10.36 426.1 11.25 432.65 11.59 439.21 11.76 452.32 11.76
465.43 11.95 485.1 11.47 491.65 11.42 498.21 11.22 504.76 11.18 524.43 10.66
544.09 8.8 550.65 8.3 557.2 8.2 570.32 7.56 629.31 7.16 648.98 7.33 655.53
7.81 662.09 8.5 668.65 9.58 675.2 10.17 681.76 10.94 694.87 10.78 707.98
11.01 714.53 10.37 721.09 7.88 727.48 1.71 729.4 1.48 740 -1.63 740.46 -1.82
740.93 -2.06 741.47 -2.24 741.95 -2.63 742.36 -2.84 744.01 -3.17 746.08 -
3.85 748.76 -4.57 751.39 -5.33 753.78 -6.12 756.23 -6.85 758.35 -7.45 760.33
-7.93 762.12 -7.98 763.78 -8.12 765.47 -8.14 767.26 -8.12 769.28 -8 771.56 -
7.83 773.87 -7.55 775.92 -7.39 778.08 -7.32 780.06 -7.17 782.12 -7.16 784.02
-7.09 786.37 -7.02 788.45 -6.88 792.8 -6.63 794.92 -6.58 797.14 -6.44 799.45
-6.41 801.79 -6.35 804.57 -6.23 807.05 -6.21 809.62 -5.99 811.8 -5.58
814.03 -5.13 816 -4.25 817.91 -1.54 820.74 -1 822.18 -.38 836.15 1.65 837.15
1.73 842.54 2.17 855.46 4.88 861.99 5.38 868.51 5.41 875.04 4.6 881.57 4.12
888.09 4.61 894.62 5.29 901.15 5.64 907.67 5.79 920.73 7.37 927.25 7.42
933.78 7.15 940.3 6.57 953.36 6.31 979.46 6.29 992.52 5.96 1005.57 5.84
1012.1 5.59 1018.62 5.79 1025.15 6.25 1031.68 6.41 1051.26 6.33 1057.78 5.87
1064.31 5.25 1077.36 4.82 1083.89 5.01 1090.42 5.6 1096.94 7.63 1103.47 8.55
1110 9.02 1116.52 9.64 1129.58 10.36 1136.1 10.54 1142.63 10.42 1149.16
10.52 1155.68 10.48 1181.79 9.95 1188.32 9.92 1194.84 10.17 1220.95 10.83
1227.47 11.21 1240.53 12.37 1247.05 12.6 1260.11 13.57 1273.16 14.13 1286.21
15.52 1292.74 15.59 1299.27 16.1 1305.79 16.74 1318.85 17.8 1331.9 19.06
1338.43 19.39 1344.95 19.97 1351.48 20.71 1364.53 22.52 1371.06 22.99
1377.59 23.92 1384.11 25.28 1390.64 26.24 1403.69 26.91 1410.22 26.93
1416.75 27.27 1423.27 27.39 1429.8 27.72 1442.85 28.07 1449.38 27.96 1455.91
26.9 1462.43 24.73 1468.96 23.74 1475.49 24.64 1482.01 25.3 1488.54 25.83
1514.65 27.24 1540.75 27.69 1547.28 28.1 1553.8 28.19 1573.38 29.26 1592.96
29.35 1599.49 29.88 1606.02 30.09 1612.54 30.1 1619.07 30.36 1625.6 30.81
1632.12 30.71 1645.18 29.98 1651.7 29.97 1677.81 30.5 1684.34 30.76 1723.5
31.58 1730.02 31.46 1743.08 32.29 1749.6 31.88 1756.13 32.16 1769.18 32.3
1775.71 32.57 1788.76 32.54 1808.34 32.87 1821.4 33.92 1834.45 34.31 1840.98
34.69 1847.5 35.21 1854.03 35.56 1867.08 36.86 1873.61 36.98 1880.13 37.25
1886.66 37.72 1893.19 37.95 1906.24 38.84 1912.77 39.13 1919.29 39.69
1925.82 40.44 1964.98 42.55

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .088 707.98 .04 861.99 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 707.98
861.99 918.95 956.75 981.98 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 26713.37

INPUT
Description: 32 Approach Am Vets HWY (Rte 24)
Station Elevation Data num= 312
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 19.83 6.56 19.43 13.12 19.29
19.67 19.33 26.23 19.32 32.79 19.15 39.35 18.82 45.9 18.85 52.46 19 59.02

19.25 65.58 19.45 72.13 19.39 78.69 19.38 85.25 18.96 91.81 18.42 98.36
17.76 104.92 17 111.48 16.39 118.04 16.27 124.59 16.27 131.15 16.06 137.71
15.95 144.27 16.08 150.83 16.16 157.38 16.3 163.94 16.38 170.5 16.48 177.06
16.5 183.61 16.41 190.17 16.16 196.73 15.97 203.29 16.02 209.84 15.92 216.4
15.68 222.96 15.78 229.52 15.72 236.07 15.48 242.63 15.36 249.19 15.22
255.75 15.12 262.31 15.11 268.86 15.08 275.42 15 281.98 14.78 288.54 14.71
295.09 14.52 301.65 14.46 308.21 14.36 314.77 13.84 321.32 13.56 327.88
12.75 334.44 12.14 341 11.39 347.55 10.26 354.11 9.08 360.67 8.41 367.23
8.01 373.78 7.75 380.34 7.69 386.9 7.89 393.46 8.11 400.01 8.01 406.57 7.83
413.13 7.81 426.25 7.65 432.8 7.66 439.36 7.51 445.92 7.14 452.48 7.45
459.03 7.66 465.59 7.44 472.15 7.15 478.71 7.17 485.26 7.26 491.82 7.23
498.38 7.29 504.94 7.24 511.49 6.91 518.05 7.13 524.61 6.94 531.17 6.87
537.72 7.14 544.28 7.28 550.84 7.32 557.4 7.01 563.96 6.97 570.51 7.26
577.07 7.51 583.63 7.7 590.19 7.75 603.3 7.58 616.42 7.73 622.97 8.01 629.53
8.07 636.09 8 642.65 7.56 649.2 7.34 655.76 7.32 662.32 7.2 668.88 6.98
675.43 6.86 681.99 7.04 688.55 7.11 695.11 7.13 701.67 7.18 708.22 7.03
714.78 7.25 721.34 7.49 727.9 7.34 734.45 7.42 741.01 7.64 747.57 7.66
754.13 7.88 760.68 8.06 767.24 8.01 780.36 8.11 786.91 7.76 793.47 7.43
800.03 7.23 806.59 7.58 813.14 7.78 819.7 7.85 826.26 8.17 832.82 8.35
839.37 8.49 845.93 8.51 852.49 8.59 859.05 9.1 865.61 9.52 872.16 9.65
878.72 9.91 885.28 9.77 891.84 9.22 898.39 8.6 904.95 8.02 911.51 7.81
918.07 8.17 924.62 8.69 931.18 8.92 937.74 9.01 944.3 9.32 950.85 9.44
957.41 9.49 963.97 9.76 970.53 10.08 977.08 10.47 983.64 10.95 990.2 11.06
996.76 11.06 1003.32 11.17 1016.43 12.12 1022.99 12.25 1029.55 12.86 1036.1
12.77 1042.66 12.82 1055.78 13.01 1062.33 13.19 1068.89 13.39 1075.45 13.66
1082.01 13.98 1095.12 14.34 1101.68 14.06 1114.8 13.26 1121.35 12.8 1127.91
12.49 1134.47 12.2 1141.03 11.82 1147.58 11.5 1154.14 11.22 1160.7 10.83
1167.26 10.38 1173.81 9.6 1180.37 8.94 1186.93 8.52 1193.49 8.16 1206.6 7.93
1213.16 7.94 1232.83 8.17 1239.39 8.23 1245.95 8.1 1252.51 8.09 1259.06 8.18
1265.62 8.15 1272.18 8.43 1278.74 7.93 1285.29 7.58 1291.85 7.37 1298.41
7.31 1304.97 7.48 1311.52 7.61 1318.08 7.78 1324.64 7.77 1331.2 7.85 1344.31
8.1 1350.87 8.11 1357.43 8.15 1363.99 8.03 1370.54 8.09 1377.1 7.99 1383.66
8.07 1390.22 7.94 1396.77 7.93 1403.33 8.04 1409.89 8.3 1416.45 8.46 1423
8.69 1429.56 8.52 1436.12 8.58 1442.68 8.6 1449.23 8.26 1455.79 8.15 1462.25
7.94 1468.71 7.43 1475.16 7.51 1481.62 6.96 1515.74 5.39 1517.69 1 1536.34 -
5.39 1561.94 -8.6 1583.07 -9.75 1583.41 -9.8 1601.44 -6.22 1621.31 -1.2
1636.36 2 1637.5 5 1643.1 5.4 1649.53 8.05 1761.63 14.64 1775.07 15.13
1781.61 15.28 1788.14 15.54 1794.67 15.62 1801.2 15.35 1807.74 14.71 1814.27
14.27 1820.8 14.99 1827.34 16.15 1833.87 18.37 1840.4 19.49 1846.94 17.81
1853.47 14.29 1860 8.71 1866.54 5.22 1873.07 4.27 1879.6 4.97 1886.14 5.89
1892.67 8.26 1899.2 8.11 1905.73 8.09 1912.27 8.19 1918.8 8.54 1925.33 8.67
1931.87 8.67 1938.4 8.84 1944.93 8.83 1951.47 8.76 1964.53 9.29 1971.07 9.61
1977.6 9.66 1984.13 9.87 1990.67 9.91 1997.2 9.91 2003.73 9.99 2010.27 10.34
2016.8 10.94 2023.33 11.37 2029.86 12.1 2036.4 12.61 2042.93 13 2049.46
13.69 2056 14.6 2062.53 17.61 2069.06 18.61 2075.6 18.26 2082.13 16.65
2088.66 16.06 2101.73 15.76 2108.26 15.55 2114.79 15.64 2121.33 15.77
2127.86 15.84 2134.39 15.82 2140.93 15.49 2147.46 15.14 2153.99 14.9 2167.06
14.77 2173.59 14.8 2180.12 14.64 2186.66 14.53 2193.19 14.6 2199.72 14.77
2206.26 14.82 2212.79 14.78 2225.85 14.82 2238.92 14.65 2245.45 14.37
2251.99 14.26 2258.52 14.2 2265.05 14.22 2271.59 14.42 2278.12 14.98 2284.65
15.75 2291.18 16.65 2297.72 17.32 2304.25 17.47 2310.78 17.77 2317.32 17.67
2323.85 17.05 2330.38 18.54 2336.92 20.59 2343.45 23.14 2349.98 25.15

Manning's n Values num= 3

Sta n Val Sta n Val Sta n Val
0 .085 1442.68 .04 1649.53 .088

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1442.68 1649.53 43.75 79.77 95.66 .5 .5 Ineffective Flow num= 2
Sta L Sta R Elev Permanent
0 1095 14.3 T
1840 2349.98 19.5 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 26633.6

INPUT
Description: 31.7 US Face Am Vets HWY (Rte 24)
Station Elevation Data num= 315
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 23.76 4.639 23.71 9.27 23.68 13.909 23.62 18.54 23.58 23.179 23.57 27.811 23.46 32.449 22.74 37.081 22.91 46.351 22.68 50.989 22.71 55.621 22.5 60.26 22.51 64.891 22.36 69.53 22.25 74.161 22.11 78.8 21.79 83.432 21.49 88.07 21.42 92.702 21.33 97.34 21.51 101.972 21.54 106.61 21.63 111.242 21.79 115.881 21.89 120.512 21.86 125.151 21.75 129.782 21.73 134.421 21.84 139.053 21.82 143.691 21.69 148.323 21.72 152.961 21.7 157.593 21.7 162.232 21.68 171.502 21.77 176.133 21.72 180.772 21.64 185.403 21.51 190.042 21.67 194.674 21.56 199.312 21.59 203.944 21.56 208.582 21.18 213.214 20.78 217.853 20.7 222.484 20.72 227.123 20.6 231.754 20.42 236.393 20.36 241.024 19.86 245.663 19.3 250.295 18.77 254.933 18.19 259.565 17.71 264.203 17.53 268.835 17.37 273.474 17.15 278.105 16.66 282.744 16.67 287.375 16.83 292.014 16.9 296.645 16.86 301.284 16.73 305.916 16.93 310.554 16.92 319.824 16.76 324.456 16.85 329.095 17.02 333.726 17.05 338.365 16.81 342.996 16.84 347.635 16.9 352.266 16.93 356.905 16.89 366.175 17.12 375.445 17.21 380.084 16.34 384.723 14.66 389.361 14.48 393.993 14.69 398.631 14.45 403.27 14.49 407.909 14.34 412.547 14.41 417.179 14.56 421.817 14.62 426.456 14.6 431.095 14.74 440.365 14.98 445.004 14.91 449.642 14.39 454.281 14.08 458.919 13.81 463.551 13.99 468.19 14.06 472.828 14.24 477.467 14.28 482.105 14.58 486.737 14.97 491.376 15.11 496.014 14.85 500.653 14.78 505.291 15.09 509.923 14.87 514.562 14.94 519.2 15.05 523.839 14.98 528.47 15.12 537.748 15.57 542.386 15.35 547.025 15.36 551.656 15 556.295 14.66 560.934 12.19 565.572 12.44 570.211 12.97 574.842 13.39 579.481 13.89 584.12 13.98 588.758 13.9 593.397 13.98 598.028 14.02 602.667 14.25 607.306 14.02 611.944 14.06 616.583 14.56 621.215 14.73 625.853 14.94 630.492 14.97 635.13 14.89 639.762 15.07 644.401 15.09 649.039 15.01 653.678 15.14 658.316 15.24 662.948 15.25 667.587 15.43 672.225 16 676.864 15.68 681.502 15.62 686.134 15.83 690.773 15.96 695.411 16.25 700.05 16.11 704.688 16.43 709.32 16.48 713.959 16.55 718.597 16.65 723.236 16.83 727.875 17.06 732.506 15.53 737.145 15.38 741.783 15.48 746.422 15.44 751.061 15.51 755.692 15.79 760.331 16.11 769.608 16.22 778.878 16.16 783.517 16.22 788.155 16.43 792.794 16.29 797.425 16.37 802.064 16.29 806.703 16.31 811.341 16.56 815.98 16.65 820.612 16.66 825.25 16.26 829.889 15.79 834.527 15.73 839.166 15.73 843.798 15.7 848.436 15.58 853.075 15.66 857.713 15.65 866.984 15.71 871.622 15.66 876.261 15.87 880.899 15.7 885.538 15.67 890.17 15.76 894.808 15.76 899.447 15.68 904.085 15.62 913.356 14.13 917.994 14.31 922.633 14.31 927.272 14.48 931.91 14.81 936.542 14.37 941.18 14.45 945.819 14.55 950.458

14.48 955.096 14.62 959.728 14.72 964.366 14.77 969.005 15.04 973.644 14.98
978.282 15.09 982.914 15.09 992.191 15.76 996.83 15.961001.468 16.22 1006.1
16.41010.738 16.561015.377 16.821020.016 16.831024.654 16.91 1029.286
16.891033.924 16.951038.563 17.241043.202 17.18 1047.84 17.67 1052.472 17.49
1057.11 17.581061.749 17.831066.388 17.811071.026 18.14 1075.658
18.141080.297 18.041084.935 17.231089.574 17.281094.212 17.55 1106.629
13.441112.632 10.711125.134 4.55 1130.72 3.961131.816 2.3 1142.706 -
3.171147.182 -2.571160.688 -7.84 1171.45 -8.461190.718 -11.29 1206.437 -
6.481225.579 -.891242.266 3.091247.237 5.521251.876 8.17 1256.507
10.691261.146 14.81265.785 16.611270.423 18.051275.062 19.28 1279.694
20.121284.332 20.81288.971 21.281293.609 21.191298.248 21.33 1302.88
21.311307.518 21.221312.157 21.441316.795 21.461321.434 21.56 1326.066
21.551330.704 21.691339.981 21.9 1344.62 21.991349.252 21.91 1353.89
22.021363.168 22.151367.806 22.161372.438 22.151377.076 22.31 1381.715
22.231386.354 22.261390.992 22.351395.624 22.411400.262 22.37 1404.901
22.381414.178 22.531428.087 22.561432.726 22.681437.364 22.69 1441.996
22.621446.634 23.041451.273 231455.912 23.21 1460.55 23.13 1465.182 23.36
1469.82 23.271474.459 23.341479.098 23.341483.736 23.4 1488.368 23.551493.006
23.541497.645 23.551502.284 23.611506.915 23.73 1511.554 23.681516.193
23.851520.831 23.67 1525.47 23.861530.101 23.89 1534.74 23.831539.379
23.861548.656 23.981553.287 24.071557.926 24.13 1562.565 24.211567.203
24.261571.842 24.391576.473 24.451581.112 24.56 1585.751 24.571590.389
24.511595.021 24.571599.659 24.71604.298 24.7 1608.937 24.751613.575
24.931622.845 25.081627.484 25.251632.123 25.13

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .0851094.212 .041288.971 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1094.2121288.971 137.27 118.57 119.67 .6 .8 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 1071 18.14 T
Skew Angle = 45

BRIDGE

RIVER: Taunton River
REACH: Main Stem RS: 26591.05

INPUT
Description: 31.5 Rte 24/ Am Vets Mem Hwy
Distance from Upstream XS = 2
Deck/Roadway Width = 105
Weir Coefficient = 2.6
Bridge Deck/Roadway Skew = 45
Upstream Deck/Roadway Coordinates
 num= 13
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 0 17 998.435 17.06 1050.054 18.11 1100.965 18.88 1107.329 19.25 14.95
1129.25 19.61 15.46 1143.392 19.98 13.031227.537 20.34 13.931233.901 20.71
16.61
 1263.6 21.07 16.91 1268.55 21.43 1330.068 21.7 1370.373 22.47

Upstream Bridge Cross Section Data
Station Elevation Data num= 315
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 23.76 4.639 23.71 9.27 23.68
13.909 23.62 18.54 23.58 23.179 23.57 27.811 23.46 32.449 22.74 37.081 22.91
46.351 22.68 50.989 22.71 55.621 22.5 60.26 22.51 64.891 22.36 69.53 22.25
74.161 22.11 78.8 21.79 83.432 21.49 88.07 21.42 92.702 21.33 97.34 21.51
101.972 21.54 106.61 21.63 111.242 21.79 115.881 21.89 120.512 21.86 125.151
21.75 129.782 21.73 134.421 21.84 139.053 21.82 143.691 21.69 148.323 21.72
152.961 21.7 157.593 21.7 162.232 21.68 171.502 21.77 176.133 21.72 180.772
21.64 185.403 21.51 190.042 21.67 194.674 21.56 199.312 21.59 203.944 21.56
208.582 21.18 213.214 20.78 217.853 20.7 222.484 20.72 227.123 20.6 231.754
20.42 236.393 20.36 241.024 19.86 245.663 19.3 250.295 18.77 254.933 18.19
259.565 17.71 264.203 17.53 268.835 17.37 273.474 17.15 278.105 16.66
282.744 16.67 287.375 16.83 292.014 16.9 296.645 16.86 301.284 16.73 305.916
16.93 310.554 16.92 319.824 16.76 324.456 16.85 329.095 17.02 333.726 17.05
338.365 16.81 342.996 16.84 347.635 16.9 352.266 16.93 356.905 16.89 366.175
17.12 375.445 17.21 380.084 16.34 384.723 14.66 389.361 14.48 393.993 14.69
398.631 14.45 403.27 14.49 407.909 14.34 412.547 14.41 417.179 14.56 421.817
14.62 426.456 14.6 431.095 14.74 440.365 14.98 445.004 14.91 449.642 14.39
454.281 14.08 458.919 13.81 463.551 13.99 468.19 14.06 472.828 14.24 477.467
14.28 482.105 14.58 486.737 14.97 491.376 15.11 496.014 14.85 500.653 14.78
505.291 15.09 509.923 14.87 514.562 14.94 519.2 15.05 523.839 14.98 528.47
15.12 537.748 15.57 542.386 15.35 547.025 15.36 551.656 15 556.295 14.66
560.934 12.19 565.572 12.44 570.211 12.97 574.842 13.39 579.481 13.89 584.12
13.98 588.758 13.9 593.397 13.98 598.028 14.02 602.667 14.25 607.306 14.02
611.944 14.06 616.583 14.56 621.215 14.73 625.853 14.94 630.492 14.97 635.13
14.89 639.762 15.07 644.401 15.09 649.039 15.01 653.678 15.14 658.316 15.24
662.948 15.25 667.587 15.43 672.225 16 676.864 15.68 681.502 15.62 686.134
15.83 690.773 15.96 695.411 16.25 700.05 16.11 704.688 16.43 709.32 16.48
713.959 16.55 718.597 16.65 723.236 16.83 727.875 17.06 732.506 15.53
737.145 15.38 741.783 15.48 746.422 15.44 751.061 15.51 755.692 15.79
760.331 16.11 769.608 16.22 778.878 16.16 783.517 16.22 788.155 16.43
792.794 16.29 797.425 16.37 802.064 16.29 806.703 16.31 811.341 16.56 815.98
16.65 820.612 16.66 825.25 16.26 829.889 15.79 834.527 15.73 839.166 15.73
843.798 15.7 848.436 15.58 853.075 15.66 857.713 15.65 866.984 15.71 871.622
15.66 876.261 15.87 880.899 15.7 885.538 15.67 890.17 15.76 894.808 15.76
899.447 15.68 904.085 15.62 913.356 14.13 917.994 14.31 922.633 14.31
927.272 14.48 931.91 14.81 936.542 14.37 941.18 14.45 945.819 14.55 950.458
14.48 955.096 14.62 959.728 14.72 964.366 14.77 969.005 15.04 973.644 14.98
978.282 15.09 982.914 15.09 992.191 15.76 996.83 15.961001.468 16.22 1006.1
16.41010.738 16.561015.377 16.821020.016 16.831024.654 16.91 1029.286
16.891033.924 16.951038.563 17.241043.202 17.18 1047.84 17.67 1052.472 17.49
1057.11 17.581061.749 17.831066.388 17.811071.026 18.14 1075.658
18.141080.297 18.041084.935 17.231089.574 17.281094.212 17.55 1106.629
13.441112.632 10.711125.134 4.55 1130.72 3.961131.816 2.3 1142.706 -
3.171147.182 -2.571160.688 -7.84 1171.45 -8.461190.718 -11.29 1206.437 -
6.481225.579 -.891242.266 3.091247.237 5.521251.876 8.17 1256.507
10.691261.146 14.81265.785 16.611270.423 18.051275.062 19.28 1279.694
20.121284.332 20.81288.971 21.281293.609 21.191298.248 21.33 1302.88
21.311307.518 21.221312.157 21.441316.795 21.461321.434 21.56 1326.066
21.551330.704 21.691339.981 21.9 1344.62 21.991349.252 21.91 1353.89
22.021363.168 22.151367.806 22.161372.438 22.151377.076 22.31 1381.715
22.231386.354 22.261390.992 22.351395.624 22.411400.262 22.37 1404.901
22.381414.178 22.531428.087 22.561432.726 22.681437.364 22.69 1441.996

22.621446.634 23.041451.273 231455.912 23.21 1460.55 23.13 1465.182 23.36
1469.82 23.271474.459 23.341479.098 23.341483.736 23.4 1488.368 23.551493.006
23.541497.645 23.551502.284 23.611506.915 23.73 1511.554 23.681516.193
23.851520.831 23.67 1525.47 23.861530.101 23.89 1534.74 23.831539.379
23.861548.656 23.981553.287 24.071557.926 24.13 1562.565 24.211567.203
24.261571.842 24.391576.473 24.451581.112 24.56 1585.751 24.571590.389
24.511595.021 24.571599.659 24.71604.298 24.7 1608.937 24.751613.575
24.931622.845 25.081627.484 25.251632.123 25.13

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .0851094.212 .041288.971 .085

Bank Sta: Left Right Coeff Contr. Expan.
 1094.2121288.971 .6 .8
Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 1071 18.14 T
Skew Angle = 45
 Downstream Deck/Roadway Coordinates
 num= 13
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 0 17 1005.506 17.06 1057.125 18.11 1108.036 18.88 1117.936 19.25
14.951139.856 19.61 15.46 1153.998 19.98 13.031238.144 20.34 13.931244.508
20.71 16.61 1274.206 21.07 16.911275.621 21.43 1337.139 21.7 1377.444 22.47

Downstream Bridge Cross Section Data
Station Elevation Data num= 317
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 16.93 4.603 16.73 9.214
16.85 13.817 16.95 18.42 17 23.023 17.56 27.634 17.92 32.237 17.99 36.84
17.56 41.444 16.57 46.054 15.99 50.657 15.6 55.26 15.5 59.864 15.47 64.474
15.19 69.077 15.24 73.681 15.53 78.284 15.25 82.894 14.86 87.497 15.13
92.101 15.44 96.711 15.51 101.314 15.63 105.918 16.06 110.521 16.25 115.131
16.35 119.734 16.3 124.338 16.36 128.941 16.68 133.551 16.98 138.155 17.31
142.758 17.33 147.361 17 151.971 16.85 156.575 16.72 161.178 16.62 165.781
16.33 170.392 16.02 174.995 15.73 179.598 15.41 184.208 15.43 188.812 15.39
193.415 14.99 198.018 14.51 202.629 13.97 207.232 14.03 211.835 13.89
216.438 14.09 221.049 14.39 225.652 14.57 230.255 14.84 234.858 15.15
239.469 15.43 244.072 15.79 248.675 15.76 253.279 15.63 257.889 15.53
262.492 15.48 267.095 15.18 271.706 14.42 276.309 13.62 280.912 13.06
285.551 12.31 290.19 11.33 294.821 10.48 299.46 10.85 304.098 10.6 308.737
10.62 313.376 11.93 318.014 12.9 322.646 12.88 327.284 12.51 336.562 12.14
341.2 12.07 345.832 11.97 350.47 11.76 355.109 11.88 359.748 11.7 364.386
11.56 369.018 11.88 373.656 12.05 382.934 11.8 387.572 11.91 392.211 11.87
396.842 12.06 401.481 12.18 406.12 11.92 410.758 12.06 415.397 11.88 420.029
12 424.667 12.14 429.306 12.15 433.944 12.11 438.583 12.3 443.215 11.79
447.853 11.64 452.492 11.58 457.13 11.37 461.769 11.59 471.039 11.36 475.678
11.2 480.316 11.17 484.955 11.33 489.594 11.53 494.225 13.39 498.864 12.89
503.502 12.56 508.141 12.58 512.78 12.39 522.05 12.4 526.688 12.58 531.327
12.5 535.966 12.34 540.604 12.56 545.236 12.26 549.875 12.22 554.513 12.02
559.152 12.04 563.79 12.04 568.422 11.84 573.061 11.72 577.699 11.8 582.338
11.7 586.976 11.53 591.615 11.8 596.247 11.58 600.885 11.38 605.524 11.26
610.162 11.17 614.801 11.22 619.433 11.85 624.071 12.34 628.71 12.42 633.348
12.24 637.987 11.76 642.619 11.85 647.257 11.99 651.896 11.94 656.534 12.02

```
661.173 11.74  665.812 12.91 670.443 13.68 675.082 13.45 679.721 13.01
684.359 13.03  688.998 12.99 693.629 12.79 698.268 12.87 702.907 12.62
707.545 12.83  712.184 12.95 716.815 12.88 721.454 12.63 726.093 12.5 730.731
12.62  735.37 12.64 740.008 12.69 744.64 12.65 749.279 12.71 753.917 12.9
758.556 13.02 763.194 13.21 767.826 13.14 772.465 13.2 777.103 13.31  781.742
13.49 786.38 13.48 791.012 13.67 795.651 13.55 800.289 13.78  804.928 14.06
809.567 14.01 814.198 14.05 818.837 14.38 823.475 14.54  828.114 14.5 832.753
14.48 837.391 14.41 842.023 14.39 846.661 14.56  851.3 14.39 855.939 14.18
860.577 14.07 865.209 14.13 869.847 14.27  874.486 14.36 879.125 14.23
883.763 14.36 888.395 14.19 893.033 14.17  897.672 13.86 902.311 13.89
906.949 13.88 911.581 13.61 916.219 13.02  920.858 12.54 925.497 12.3 930.135
12.27 939.406 12.13 944.044 11.89  948.683 11.97 953.321 12 957.96 11.78
962.592 11.63 967.23 11.55  971.869 11.84 976.507 11.92 981.146 12.15 985.778
12.27 990.416 12.24  995.055 12.38 999.693 11.961004.332 12.051008.971
11.771013.602 11.32 1018.241 12.561022.879 13.651027.518 13.431036.788
13.511041.427 13.45 1050.704 13.641055.343 13.881059.974 13.991064.613
13.881069.251 13.93  1073.89 14.131078.529 14.31 1083.16 14.391087.799
14.561092.438 14.82 1097.076 14.311101.715 14.091106.346 13.931110.985
13.371120.771 13.44 1126.775 10.711139.276 4.551144.862 3.961145.958
2.31156.848 -3.17 1161.324 -2.57 1174.83 -7.841185.592 -8.46 1204.86 -
11.291220.579 -6.48 1239.721 -.891256.408 3.091259.378 10.191264.017
12.811268.656 15.89 1273.294 18.421277.926 19.981282.564 20.481287.203
20.951291.842 21.14  1296.48 21.281301.112 21.46 1305.75 21.671310.389
21.81315.028 21.59 1319.666 21.781324.305 21.791328.937 21.731333.575
21.71338.214 21.63 1342.852 21.581347.491 21.291352.122 21.281356.761 21.37
1361.4 21.24 1370.677 21.281375.308 21.291379.947 21.321384.586 21.421389.224
21.36 1393.863 21.241398.495 20.941403.133 21.211407.772 21.2 1412.41 21.08
1417.049 20.991421.688 20.881426.319 20.941430.958 20.721435.596 20.85
1440.235 20.851444.874 20.991449.505 20.941454.144 20.781458.782 20.92
1463.421 20.96 1468.06 20.951472.691 20.84 1477.33 20.821481.969 20.86
1486.607 20.871491.246 20.861495.884 20.921500.516 21.021505.155 20.93
1509.793 20.871514.432 21.3 1519.07 21.491523.702 21.59 1528.34 21.37
1532.979 21.031537.618 20.831542.256 20.951546.895 21.131551.527 21.98
1556.165 22.331560.804 22.421570.081 22.271574.713 22.11579.351 22.3  1583.99
22.31588.628 22.32

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .0851120.771 .041282.564 .085
 Bank Sta: Left Right Coeff Contr. Expan.
 1120.7711282.564 .5 .8
Ineffective Flow num= 3
 Sta L Sta R Elev Permanent
 0 138 17 F
 138 243 16 F
 243 1092 14.8 F
Skew Angle = 45

Upstream Embankment side slope = 0 horiz. to 1.0 vertical Downstream
Embankment side slope = 0 horiz. to 1.0 vertical Maximum allowable
submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
```

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Weir crest shape = Broad Crested

Number of Piers = 2

Pier Data
Pier Station Upstream=1137.735 Downstream=1150.463
Upstream num= 3
 Width Elev Width Elev Width Elev
 7 .85 7 3.9 7 16.8
Downstream num= 3  Width Elev Width Elev Width Elev
 7 .85 7 3.9 7 16.8

Pier Data
Pier Station Upstream= 1231.78 Downstream=1244.508
Upstream num= 3
 Width Elev Width Elev Width Elev
 7 .85 7 3.9 7 16.8
Downstream num= 3
 Width Elev Width Elev Width Elev
 7 .85 7 3.9 7 16.8

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
 Energy
 W.S. Pro Method

 W.S.Pro Data
 Left Embankment
 El of the top of the embankment = 20
 El of the toe of the abutment = 0
 Right Embankment
 El of the top of the embankment = 20
 El of the toe of the abutment = 0
 Abutment Type = 3 Sloping abutments and sloping embankments  Slope of
abutments = 4
 Top with of embankment = 105
 Centroid station of bridge opening =   Wing Wall Type = Angular wing walls
 Width = 25
 Angle = 45
 Radius =
 Guide Banks Type = No Guide Bank present
 Length =
 Offset =
 Angle =
 Optional Contraction and expansion coefficients
 At approach Section
 At Guide Bank
 At upstream outside
 At upstream inside (BU)
 At downstream inside (BD)
 Piers are Continuous for the width of the bridge
 Use Geometric mean as Friction Slope Method
```

Selected Low Flow Methods = W.S.Pro Method

High Flow Method
 Pressure and Weir flow
 Submerged Inlet Cd =
 Submerged Inlet + Outlet Cd = .8
 Max Low Cord =

Additional Bridge Parameters
 Add Friction component to Momentum Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 26515.04

INPUT
Description: 31.3 DS Face Am Vets HWY (Rte 24)
Station Elevation Data num= 317
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 16.93 4.603 16.73 9.214
16.85 13.817 16.95 18.42 17 23.023 17.56 27.634 17.92 32.237 17.99 36.84
17.56 41.444 16.57 46.054 15.99 50.657 15.6 55.26 15.5 59.864 15.47 64.474
15.19 69.077 15.24 73.681 15.53 78.284 15.25 82.894 14.86 87.497 15.13
92.101 15.44 96.711 15.51 101.314 15.63 105.918 16.06 110.521 16.25 115.131
16.35 119.734 16.3 124.338 16.36 128.941 16.68 133.551 16.98 138.155 17.31
142.758 17.33 147.361 17 151.971 16.85 156.575 16.72 161.178 16.62 165.781
16.33 170.392 16.02 174.995 15.73 179.598 15.41 184.208 15.43 188.812 15.39
193.415 14.99 198.018 14.51 202.629 13.97 207.232 14.03 211.835 13.89
216.438 14.09 221.049 14.39 225.652 14.57 230.255 14.84 234.858 15.15
239.469 15.43 244.072 15.79 248.675 15.76 253.279 15.63 257.889 15.53
262.492 15.48 267.095 15.18 271.706 14.42 276.309 13.62 280.912 13.06
285.551 12.31 290.19 11.33 294.821 10.48 299.46 10.85 304.098 10.6 308.737
10.62 313.376 11.93 318.014 12.9 322.646 12.88 327.284 12.51 336.562 12.14
341.2 12.07 345.832 11.97 350.47 11.76 355.109 11.88 359.748 11.7 364.386
11.56 369.018 11.88 373.656 12.05 382.934 11.8 387.572 11.91 392.211 11.87
396.842 12.06 401.481 12.18 406.12 11.92 410.758 12.06 415.397 11.88 420.029
12 424.667 12.14 429.306 12.15 433.944 12.11 438.583 12.3 443.215 11.79
447.853 11.64 452.492 11.58 457.13 11.37 461.769 11.59 471.039 11.36 475.678
11.2 480.316 11.17 484.955 11.33 489.594 11.53 494.225 13.39 498.864 12.89
503.502 12.56 508.141 12.58 512.78 12.39 522.05 12.4 526.688 12.58 531.327
12.5 535.966 12.34 540.604 12.56 545.236 12.26 549.875 12.22 554.513 12.02
559.152 12.04 563.79 12.04 568.422 11.84 573.061 11.72 577.699 11.8 582.338
11.7 586.976 11.53 591.615 11.8 596.247 11.58 600.885 11.38 605.524 11.26
610.162 11.17 614.801 11.22 619.433 11.85 624.071 12.34 628.71 12.42 633.348
12.24 637.987 11.76 642.619 11.85 647.257 11.99 651.896 11.94 656.534 12.02
661.173 11.74 665.812 12.91 670.443 13.68 675.082 13.45 679.721 13.01
684.359 13.03 688.998 12.99 693.629 12.79 698.268 12.87 702.907 12.62
707.545 12.83 712.184 12.95 716.815 12.88 721.454 12.63 726.093 12.5 730.731
12.62 735.37 12.64 740.008 12.69 744.64 12.65 749.279 12.71 753.917 12.9
758.556 13.02 763.194 13.21 767.826 13.14 772.465 13.2 777.103 13.31 781.742

13.49 786.38 13.48 791.012 13.67 795.651 13.55 800.289 13.78 804.928 14.06
809.567 14.01 814.198 14.05 818.837 14.38 823.475 14.54 828.114 14.5 832.753
14.48 837.391 14.41 842.023 14.39 846.661 14.56 851.3 14.39 855.939 14.18
860.577 14.07 865.209 14.13 869.847 14.27 874.486 14.36 879.125 14.23
883.763 14.36 888.395 14.19 893.033 14.17 897.672 13.86 902.311 13.89
906.949 13.88 911.581 13.61 916.219 13.02 920.858 12.54 925.497 12.3 930.135
12.27 939.406 12.13 944.044 11.89 948.683 11.97 953.321 12 957.96 11.78
962.592 11.63 967.23 11.55 971.869 11.84 976.507 11.92 981.146 12.15 985.778
12.27 990.416 12.24 995.055 12.38 999.693 11.961004.332 12.051008.971
11.771013.602 11.32 1018.241 12.561022.879 13.651027.518 13.431036.788
13.511041.427 13.45 1050.704 13.641055.343 13.881059.974 13.991064.613
13.881069.251 13.93 1073.89 14.131078.529 14.31 1083.16 14.391087.799
14.561092.438 14.82 1097.076 14.311101.715 14.091106.346 13.931110.985
13.371120.771 13.44 1126.775 10.711139.276 4.551144.862 3.961145.958
2.31156.848 -3.17 1161.324 -2.57 1174.83 -7.841185.592 -8.46 1204.86 -
11.291220.579 -6.48 1239.721 -.891256.408 3.091259.378 10.191264.017
12.811268.656 15.89 1273.294 18.421277.926 19.981282.564 20.481287.203
20.951291.842 21.14 1296.48 21.281301.112 21.46 1305.75 21.671310.389
21.81315.028 21.59 1319.666 21.781324.305 21.791328.937 21.731333.575
21.71338.214 21.63 1342.852 21.581347.491 21.291352.122 21.281356.761 21.37
1361.4 21.24 1370.677 21.281375.308 21.291379.947 21.321384.586 21.421389.224
21.36 1393.863 21.241398.495 20.941403.133 21.211407.772 21.2 1412.41 21.08
1417.049 20.991421.688 20.881426.319 20.941430.958 20.721435.596 20.85
1440.235 20.851444.874 20.991449.505 20.941454.144 20.781458.782 20.92
1463.421 20.96 1468.06 20.951472.691 20.84 1477.33 20.821481.969 20.86
1486.607 20.871491.246 20.861495.884 20.921500.516 21.021505.155 20.93
1509.793 20.871514.432 21.3 1519.07 21.491523.702 21.59 1528.34 21.37
1532.979 21.031537.618 20.831542.256 20.951546.895 21.131551.527 21.98
1556.165 22.331560.804 22.421570.081 22.271574.713 22.11579.351 22.3 1583.99
22.31588.628 22.32

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .0851120.771 .041282.564 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1120.7711282.564 99.49 94.6 91.95 .5 .8 Ineffective Flow num= 3
 Sta L Sta R Elev Permanent
 0 138 17 F
 138 243 16 F
 243 1092 14.8 F
Skew Angle = 45

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 26420.44

INPUT
Description: 31- Exit Am Vets HWY (Rte 24)
Station Elevation Data num= 260
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 16.58 6.56 16.58 13.12 16.65
19.68 16.5 26.24 16.43 32.81 16.31 39.37 16.32 52.49 16.61 59.05 16.67 65.61

16.55 72.17 16.53 78.73 16.54 85.29 16.51 91.85 16 98.42 15.77 104.98 15.23
111.54 14.53 118.1 14.25 124.66 14.56 131.22 15.05 137.78 15.36 144.34 15.35
150.9 15.36 157.47 15.23 170.59 15.43 177.15 15.7 183.71 15.82 190.27 15.7
196.83 15.91 203.39 16.17 209.95 16.41 216.52 16.53 223.08 16.52 229.64
16.69 236.2 16.71 242.76 16.89 249.32 16.81 255.88 16.67 262.44 16.64 269
16.57 275.56 16.44 282.13 16.26 288.69 15.89 301.81 14.68 308.37 14.19
314.93 13.07 321.49 11.86 328.05 10.69 334.61 9.8 341.18 9.36 347.74 9.14
354.3 8.76 360.86 8.89 367.42 8.74 380.54 8.83 387.1 9.03 393.66 9.28 400.23
9.56 406.79 10.35 413.35 11.51 419.91 12.58 426.47 13.08 439.59 12.95 446.15
12.85 452.71 12.58 459.27 11.84 465.84 10.83 472.4 9.84 478.96 9.07 485.52
8.57 492.08 8.28 498.64 7.9 505.2 7.68 511.76 7.49 518.32 7.45 524.89 7.47
531.45 7.55 538.01 7.43 544.57 7.39 551.13 7.57 557.69 7.35 564.25 7.25
570.81 7.17 577.37 7.31 583.94 7.38 590.5 7.39 597.06 7.46 603.62 7.4 610.18
7.52 616.74 7.51 623.3 7.69 636.42 7.86 642.98 8.08 649.55 8.61 656.11 8.82
662.67 9.13 669.23 9.26 675.79 9.19 682.35 9.2 688.91 9.11 695.47 9.1 702.03
9.05 708.6 8.77 715.16 8.36 721.72 8.31 728.28 8.22 734.84 7.97 741.4 7.59
747.96 7.43 754.52 7.43 761.08 7.52 767.64 7.5 774.21 7.59 780.77 7.25
787.33 7.2 800.45 7.31 807.01 7.29 813.57 7.17 820.13 7.01 826.69 6.75
833.26 6.57 839.82 6.69 846.38 6.84 852.94 7.56 859.5 7.84 872.62 8.13
879.18 8.17 885.74 7.99 892.3 7.91 898.87 8 905.43 7.92 911.99 7.72 918.55
7.13 925.11 7.05 938.23 7.38 944.79 7.23 951.35 7.28 957.92 7.06 964.48 6.74
971.04 6.67 984.16 6.8 990.72 6.72 997.28 7.11 1003.84 7.65 1010.4 7.42
1016.97 7.04 1023.53 7.18 1030.09 7.3 1036.65 7.44 1043.21 7.56 1049.77 7.77
1056.33 8.17 1062.89 8.68 1069.45 8.93 1076.01 9.1 1082.58 9.19 1089.14 9.46
1095.7 9.77 1102.26 10.03 1108.82 10.32 1115.38 10.49 1121.94 10.7 1128.5
10.88 1135.06 11.1 1141.63 11 1148.19 11.42 1154.75 11.58 1161.31 11.69
1174.43 11.64 1180.99 11.81 1187.55 12.12 1194.11 12.5 1200.67 12.94 1207.24
13.11 1213.8 13.35 1220.36 13.33 1226.92 13.34 1240.04 13.29 1246.6 13.19
1253.16 13.01 1259.72 12.76 1266.29 12.53 1272.85 12.12 1279.41 11.96
1285.97 11.78 1292.53 11.77 1299.09 11.88 1305.65 12.15 1318.77 12.82
1325.34 12.91 1331.9 12.93 1338.46 12.86 1345.02 12.59 1351.58 12.12 1403.41
7.12 1474.33 8.92 1495.55 5.74 1542.67 4.32 1569.41 4.13 1582.63 5.03
1598.15 3.98 1672.87 5.26 1684.67 4.17 1687.57 3.11 1707.63 -5.25 1719.18 -
7.6 1736.56 -8.88 1760.93 -8.32 1766.03 -9.03 1785.84 .78 1788.07 4.75
1800.36 4.68 1832.57 21.6 1881.87 22.76 1928.95 22.85 1935.51 22.72 1942.08
22.46 1948.64 22.09 1955.2 21.65 1961.76 21.15 1968.32 20.86 1974.88 20.59
1981.44 19.99 1988 19.8 1994.56 19.43 2001.12 19.38 2007.69 19.3 2014.25
19.38 2020.81 19.58 2027.37 19.66 2040.49 19.65 2047.05 19.63 2053.61 19.54
2060.17 19.61 2066.74 19.3 2073.3 18.91 2079.86 18.81 2086.42 18.67 2092.98
18.81 2099.54 19.2 2112.66 19.77 2119.22 19.66 2132.35 20.22 2138.91 20.36
2145.47 20.53 2152.03 20.83 2158.59 20.93 2165.15 20.8 2171.71 20.77 2178.27
20.53 2184.83 20.43 2191.4 20.54 2197.96 20.78 2204.52 21.14 2211.08 21.62
2217.64 21.96 2224.2 22.06 2230.76 22.26 2237.32 22.31 2243.88 22.67

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val 0 .088 1672.87 .04 1832.57 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1672.87
1832.57 990.69 960.09 928.97 .3 .5 Ineffective Flow num= 3
 Sta L Sta R Elev Permanent
 0 242 16.9 F
 242 426 13 F
 426 1214 13 F

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 25460.34

INPUT
Description: 30
Station Elevation Data num= 345
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 24.35 13.11 24.16 26.22
23.51 32.77 23.39 52.44 22.35 58.99 21.72 65.55 21.45 78.66 20.47 98.32
19.78 111.43 19.15 131.09 17.74 137.65 17.56 150.76 16.54 176.98 15.63
190.09 16.01 203.2 15.7 209.75 15.82 216.31 16.3 229.41 17.64 235.97 17.87
242.52 17.68 255.63 17.02 268.74 15.92 275.3 15.12 281.85 14.59 288.41 14.51
294.96 14.27 308.07 14.38 314.63 14.24 321.18 13.92 347.4 13.98 360.51 14.12
367.06 13.95 380.17 14.15 399.84 14.04 412.95 13.67 432.61 13.73 439.16
13.56 465.38 14.42 471.94 15.05 491.6 15.54 498.16 15.42 511.27 16.59 517.82
16.87 524.38 17.52 530.93 17.78 544.04 17.33 563.7 16.08 576.81 14.92 583.37
14.14 603.03 11.25 609.59 10.05 622.7 9.16 629.25 8.94 635.81 9.08 642.36
8.92 655.47 9.23 675.13 9.14 688.24 8.82 701.35 9.22 714.46 8.9 727.57 9.74
753.79 9.86 760.35 9.44 766.9 8.82 780.01 8.88 786.57 9.52 793.12 9.98
799.67 10.11 812.78 9.76 819.34 9.7 825.89 9.05 839 8.15 858.67 7.34 865.22
6.88 898 6.69 904.55 6.74 911.1 6.64 924.21 6.78 930.77 6.62 950.43 6.62
963.54 6.87 970.1 6.64 976.65 6.78 983.21 6.69 989.76 6.39 1015.98 6.54
1022.53 6.38 1042.2 6.6 1068.42 6.4 1094.64 6.63 1114.3 6.59 1120.86 6.84
1133.96 6.62 1140.52 6.67 1166.74 7.4 1173.29 7.36 1179.85 7.68 1192.96 7.87
1212.62 8.79 1225.73 9.53 1258.5 10.27 1284.72 9.25 1297.83 9.49 1304.39
9.47 1310.94 9.71 1330.61 9.85 1350.27 10.91 1356.82 10.88 1363.38 11.01
1376.49 10.92 1389.6 11 1396.15 11.26 1402.71 11.35 1415.82 10.99 1442.04
9.3 1455.15 8.83 1481.36 8.53 1487.92 8.22 1494.47 8.3 1501.03 8.1 1507.58
8.53 1520.69 8.81 1527.25 8.8 1540.36 9.32 1546.91 9.38 1553.47 9.72 1560.02
9.87 1566.57 9.8 1579.68 10.16 1592.79 10.36 1605.9 10.81 1612.46 10.73
1632.12 10.07 1651.79 9.72 1664.9 9.26 1684.56 9.03 1697.67 9.16 1717.33
8.98 1730.44 9.1 1737 9.34 1750.11 10.16 1769.77 10.62 1782.88 10.69 1789.43
10.6 1809.1 10.04 1815.65 10.04 1822.21 10.18 1841.87 11.34 1861.54 12.93
1868.09 13.35 1894.31 12.63 1900.86 12.03 1913.97 11.35 1927.08 10.39
1933.64 10.19 1940.19 10.19 1959.86 10.92 1986.08 11.18 1992.63 11.13
1999.18 10.94 2018.85 9.59 2031.96 8.91 2038.51 8.92 2045.07 9.32 2058.18
9.45 2064.73 9.4 2071.29 9.52 2084.4 9.33 2097.51 9.51 2104.06 9.46 2117.13
8.79 2123.65 8.1 2136.69 6.31 2143.2 5.21 2149.72 4.8 2156.24 4.79 2175.79
5.09 2201.86 4.73 2214.9 4.87 2221.41 4.78 2227.93 4.86 2247.48 4.68 2260.52
4.78 2273.56 5.13 2280.07 5.66 2286.59 5.88 2293.11 5.52 2299.63 5.01
2312.66 4.67 2325.7 4.92 2332.21 5.18 2338.73 5.01 2351.77 5.04 2358.28 5.37
2364.8 6.3 2371.32 6.67 2384.35 6.79 2390.87 7.41 2397.39 7.85 2410.43 8.32
2423.46 8.11 2443.01 8.31 2449.53 8.65 2456.05 8.85 2462.57 8.9 2469.08 8.51
2475.6 8.88 2482.12 8.62 2488.64 8.64 2501.67 9 2508.19 8.95 2540.78 7.2
2547.29 7.29 2560.33 7.96 2561.89 7.98 2566.85 8.02 2573.37 5.26 2579.88
1.51 2585 -4.01 2586.46 -4.44 2588.21 -4.88 2589.89 -5.45 2592.04 -5.83
2594.17 -6.33 2596.35 -6.66 2598.37 -6.67 2600.48 -6.55 2602.24 -6.55
2604.42 -6.47 2606.44 -6.48 2608.55 -6.53 2610.58 -6.59 2612.91 -6.72
2617.15 -6.72 2619.3 -6.81 2621.63 -6.84 2623.73 -6.95 2625.85 -6.93 2627.82
-7.03 2629.94 -6.98 2635.86 -6.98 2637.71 -7.01 2639.61 -7.08 2641.64 -7.13
2643.57 -7.32 2647.48 -7.63 2651.26 -7.94 2653.16 -7.95 2654.98 -8.09
2656.91 -8.13 2658.46 -7.96 2660.23 -7.89 2661.93 -7.72 2663.77 -7.37

2665.59 -6.94 2667.57 -6.4 2669.53 -5.08 2671.44 -4.61 2673.33 -3.66 2675.14 -2.5 2676.8 -1 2680.65 1.2 2684.25 1.75 2690.77 4.12 2697.3 4.57 2703.86 4.85 2710.42 5.43 2716.98 6.61 2723.54 8.15 2736.66 11.72 2743.22 14.18 2749.79 16.47 2756.35 19.94 2762.91 22.2 2769.47 22.76 2776.03 22.97 2815.4 23.09 2835.06 23.03 2848.16 23.27 2861.25 24.03 2867.8 24.69 2874.35 24.95 2907.08 25.35 2920.18 25.19 2926.73 25.22 2933.27 25.04 2939.82 24.67 2946.37 24.49 2952.91 24.56 2979.1 24.01 2998.74 23.37 3011.84 23.29 3038.03 22.71 3051.12 22.54 3057.67 22.27 3064.22 22.14 3070.76 21.79 3077.31 21.94 3083.86 21.7 3123.14 21.2 3129.69 21 3142.78 20.89 3149.33 20.66 3155.88 20.69 3162.43 20.45 3188.61 20.02 3195.16 20.06 3221.35 19.81 3247.54 20.56 3254.09 20.6 3267.18 20.94 3313.01 21.53 3326.11 21.43 3358.84 21.48 3371.94 21.18 3378.48 21.34 3391.58 21.08 3417.77 20.98 3424.31 21.1 3437.41 21.57 3463.6 21.28 3470.14 21.09 3476.69 20.68 3483.24 20.76 3496.33 20.67 3509.43 21.15 3515.98 21.25 3522.52 21.5 3529.07 21.98 3535.62 23.04 3542.16 24.88 3548.71 27.27 3555.26 29.26 3561.81 30.15 3568.35 30.47 3574.9 30.02 3607.64 30.33 3646.92 30.2 3653.47 30.06 3660.01 30.38 3673.11 31.41 3692.75 30.78 3705.84 30.81 3712.39 30.68

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .088 2561.89 .04 2776.03 .08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2561.89 2776.03 1917.46 2059.03 2182.8 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 23401.31

INPUT
Description: 29- 1000 Ft DS Dam Lot Trib
Station Elevation Data num= 308
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 19.76 13.09 19.43 52.36 19.36 65.45 19.1 71.99 19.09 78.54 18.88 91.63 17.79 98.17 17.04 130.9 16.13 157.08 16.27 163.62 16.5 176.71 16.21 183.26 16.27 189.8 15.77 202.89 15.91 222.53 16.38 235.62 16.45 248.71 16.07 261.8 15.33 274.89 15.27 281.43 15.46 294.52 16.26 307.61 16.83 327.25 17.23 333.79 17.27 353.43 16.63 359.97 16.29 366.52 15.8 373.06 15.14 379.61 13.99 392.7 11.33 399.24 10.16 412.33 9.63 425.42 8.78 445.06 8.07 458.15 8.52 464.69 9.43 471.24 9.93 490.87 9.33 497.42 9.37 503.96 9.18 510.51 8.81 530.14 7.97 536.69 7.9 543.23 7.51 575.96 7.23 582.5 7.02 595.59 7.18 602.14 7.11 608.68 7.29 621.77 7.19 628.32 7.35 641.41 7.27 654.5 6.73 667.59 6.7 687.22 6.44 693.77 6.26 700.31 6.37 706.86 6.3 713.4 6.45 733.04 6.28 746.13 6.38 752.67 6.13 759.22 6.15 778.85 6.67 785.4 7.03 791.94 7.25 811.58 7.48 824.67 7.5 837.76 7.81 850.85 8.85 857.39 9.21 863.94 9.39 870.48 9.4 883.57 8.93 890.12 8.91 903.21 9.58 916.3 10.58 922.84 10.64 929.39 10.17 949.02 7.65 955.57 7.34 962.11 7.36 968.66 7.69 981.75 9.4 988.29 9.56 994.83 9.47 1007.93 8.76 1021.01 7.14 1027.56 7.22 1034.1 7.58 1040.65 7.54 1047.19 7.18 1053.74 7.02 1060.28 7.06 1066.83 7.34 1079.92 7.48 1093.01 7.09 1106.1 7.32 1119.19 7.87 1132.28 7.74 1145.37 7.17 1158.46 7 1165 7.52 1178.09 8.01 1184.64 7.8 1191.18 7.36 1197.73 7.36 1210.82 8.5 1243.54 9.42 1256.63 10.14 1276.27 10.85 1295.9 10.67 1308.99 9.97 1315.54 9.79 1335.17 10.34 1367.9 10.06

1380.99 10.24 1387.53 10.43 1394.08 10.38 1413.71 9.6 1426.8 9.33 1433.35 9.09 1452.98 9.21 1459.53 9.37 1472.62 9.95 1479.16 9.97 1505.34 9.24 1511.89 9.19 1531.52 8.27 1538.07 8.24 1544.61 8.37 1564.25 8.36 1570.79 8.12 1596.97 6.24 1610.06 4.8 1616.61 4.47 1623.15 4.49 1636.24 4.21 1642.79 4.3 1662.42 4.29 1668.97 4.13 1675.51 4.35 1682.05 4.28 1688.6 4.39 1695.15 4.65 1701.69 4.75 1721.32 4.58 1727.87 4.84 1734.41 4.87 1740.96 4.64 1760.59 4.49 1773.68 4.18 1806.41 4.34 1826.04 4.12 1858.77 4.4 1871.86 4.41 1878.4 4.6 1884.94 5.25 1891.47 6.16 1898 6.69 1904.54 6.88 1924.14 6.92 1930.67 6.59 1943.74 5.66 1950.28 5.6 1956.81 5.99 1963.34 6.77 1969.88 7.17 1982.94 7.2 1996.01 7.65 2002.55 7.74 2015.61 7.52 2022.15 7.23 2028.68 7.09 2035.21 7.55 2041.75 7.71 2054.82 7.26 2061.35 6.73 2067.88 5.5 2074.42 4.92 2080.95 5.74 2087.49 6.32 2100.55 7.25 2107.09 6.96 2113.62 5.88 2120.16 5.88 2126.69 6.48 2133.22 6.41 2139.76 6.16 2146.29 6.48 2152.82 7.01 2159.36 7.4 2185.49 6.16 2191.58 6.32 2192.03 6.33 2198.56 6.1 2205.1 4.26 2211.63 1.88 2220 -1.34 2220.17 -1.77 2220.31 -2.09 2220.4 -1.84 2220.47 -2.23 2220.49 -2.31 2220.79 -2.32 2221.4 -2.49 2221.97 -3.11 2223.69 -3.64 2225.91 -3.75 2228.18 -3.91 2230.17 -4.37 2232.39 -4.41 2234.49 -4.81 2236.64 -5.03 2238.51 -5.16 2240.42 -5.34 2242.1 -5.73 2244.11 -6.08 2245.99 -6.44 2248.08 -6.94 2250.2 -7.46 2252.39 -7.72 2256.55 -8.56 2258.56 -8.82 2260.67 -8.98 2262.8 -9.43 2264.86 -9.48 2266.93 -8.77 2269.17 -8.53 2270.94 -8.21 2272.98 -7.65 2276.78 -6.73 2279.06 -6.41 2283.93 -5.79 2286.72 -5.69 2289.2 -5.35 2291.94 -5.02 2294.46 -4.71 2297.03 -4.29 2299.07 -3.76 2301.08 -3.11 2302.78 -2.24 2304.38 -1.49 2305.73 -.99 2307.43 1.83 2309.64 2.45 2316.17 5.2 2322.71 6.45 2329.24 7.19 2335.77 8.23 2342.31 9.53 2348.84 11.64 2355.38 15.18 2361.91 18.22 2368.44 19.94 2374.98 20.6 2381.51 20.07 2394.58 17.69 2401.11 17.48 2486.05 18 2518.72 18.34 2538.33 18.25 2577.53 18.53 2584.06 19.38 2590.6 20.37 2597.13 20.32 2610.2 19.03 2623.27 18.11 2636.33 18.01 2655.94 17.57 2662.47 17.57 2682.07 17.1 2695.14 17.09 2714.76 16.71 2721.3 15.94 2727.85 15.96 2740.93 16.97 2767.1 17.38 2780.19 18.08 2799.82 17.99 2806.36 18.26 2852.16 19.01 2911.05 19.24 2917.59 19.15 2937.22 18.19 2969.94 17.14 2983.02 16.42 3002.65 15.8 3009.2 15.36 3015.74 14.44 3022.28 14.75 3041.91 15.01 3074.63 14.4 3087.71 14.86 3094.26 14.78 3100.8 14.48 3113.89 13.51 3120.43 12.65 3126.97 11.98 3133.51 9.89 3140.06 9.15 3146.6 8.85 3179.32 8.5 3198.94 9.31 3212.03 10.63 3218.57 11.05 3231.66 16

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 2198.56 .04 2374.98 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2198.56 2374.98 1321.59 1234.68 1184.64 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 2911 3231.66 19 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 22166.63

INPUT
Description: 28
Station Elevation Data num= 326

Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 17.92 13.12 18.12 19.68
18.15 26.24 18.2 32.8 18.18 45.92 18.27 52.48 18.33 59.04 18.47 72.16 18.66
78.72 18.82 85.28 19.13 91.84 19.21 98.39 19.54 104.95 20.07 111.51 20.5
118.07 20.85 124.63 21.16 131.19 21.33 137.75 21.41 144.31 21.66 150.87
21.64 157.43 21.11 163.99 21.08 170.55 21.19 177.11 21.39 183.67 21.53
190.23 21.65 196.79 21.9 203.35 22.1 209.91 22.53 216.47 22.82 223.03 22.79
229.59 22.58 249.27 21.61 255.83 21.34 262.39 21.12 268.95 21.05 275.51
20.91 282.07 20.8 288.62 20.92 295.18 20.92 301.74 20.89 308.3 20.79 314.86
20.59 321.42 20.49 327.98 20.3 334.54 20.08 341.1 19.9 347.66 19.74 354.22
19.53 360.78 19.49 367.34 19.43 373.9 19.46 380.46 19.54 387.02 19.52
393.58 19.19 400.14 18.97 406.7 18.78 419.82 18.47 432.94 18.24 439.5 18.1
446.06 18.09 452.62 17.92 459.18 18.08 465.74 18.09 472.3 17.75 478.85 17.71
485.41 17.77 491.97 17.46 498.53 17.28 505.09 16.95 511.65 16.75 518.21
16.63 524.77 16.22 531.33 15.93 537.89 15.75 544.45 15.28 551.01 15.48
557.57 15.48 564.13 15.28 570.69 15.34 577.25 15.35 583.81 15.63 590.37 15.4
596.93 15.25 603.49 14.94 610.05 14.86 616.61 14.8 623.17 14.93 629.73 14.91
636.29 14.84 642.85 14.96 649.41 15.12 655.97 15.19 662.52 14.94 669.08
14.97 675.64 14.8 682.2 14.83 688.76 15.26 695.32 15.53 701.88 15.61 715 16
721.56 16.18 728.12 16.29 734.68 16.37 741.24 16.58 747.8 16.74 754.36 17.04
760.92 16.77 767.48 16.68 774.04 16.43 780.6 16.11 806.84 15.49 813.4 15.38
819.96 15.41 826.52 15.07 833.08 14.52 839.64 14.05 846.2 13.56 852.75 13.18
859.31 12.89 865.87 12.37 872.43 12.08 878.99 11.94 885.55 11.83 892.11
11.43 898.67 11.17 905.23 11.08 911.79 10.83 918.35 10.7 924.91 10.45 931.47
10.44 938.03 10.5 944.59 10.61 951.15 10.58 964.27 10.45 970.83 10.06 977.1
6.04 983.37 2.07 990 -.72 995.16 -.81 996.24 -.91 997.38 -1.18 998.67 -1.55
999.88 -1.79 1002.25 -2.21 1003.56 -2.51 1004.76 -2.89 1006.45 -3.02 1007.96
-3.32 1009.16 -3.45 1010.19 -3.41 1011.23 -3.46 1012.42 -3.51 1013.94 -3.57
1015.82 -3.77 1018.15 -4.06 1020.43 -4.86 1024.85 -6.17 1029.72 -7.23
1032.25 -7.68 1034.76 -8.12 1037.29 -8.43 1039.58 -8.84 1041.82 -8.98
1043.75 -9.05 1045.63 -9.08 1047.18 -9.25 1048.84 -9.31 1050.4 -9.17 1052.31
-9.23 1054.44 -9.28 1057.01 -9.2 1059.24 -9.12 1061.74 -9.1 1064.1 -8.68
1066.6 -8.47 1068.84 -8.22 1071.23 -7.56 1073.37 -7.25 1075.46 -7.03 1077.27
-6.31 1078.97 -5.8 1080.4 -5.34 1081.82 -4.8 1082.98 -4.07 1084.03 -3.68
1084.79 -3.01 1085.37 -2.15 1085.84 -1.94 1094.08 4.04 1096.27 5.29 1102.78
6.64 1109.29 7.73 1115.79 7.84 1128.81 6.38 1141.83 6.4 1148.34 6.58 1161.36
6.43 1180.88 6.52 1193.9 6.36 1219.94 6.9 1232.96 6.79 1239.46 6.97 1245.97
6.88 1252.48 6.54 1272.01 6.07 1278.52 6.21 1291.54 6.04 1298.05 6.34
1304.55 6.42 1311.06 6.36 1324.08 5.65 1363.14 4.77 1376.15 4.73 1389.17
4.24 1421.72 4.31 1434.73 4.59 1447.75 4.7 1454.26 5.92 1460.77 8 1473.79
11.48 1480.3 12.52 1486.81 12.23 1493.31 11.77 1506.33 11.9 1512.84 11.42
1525.86 11.77 1532.37 11.75 1538.88 12.22 1545.39 12.47 1558.4 12.53 1564.91
12.7 1577.93 12.66 1597.46 13.72 1603.97 13.83 1610.48 13.77 1623.49 15.03
1630 15.02 1636.51 14.82 1649.53 14.73 1662.55 14.35 1675.57 14.56 1688.58
15.01 1695.09 15.08 1701.6 15.34 1708.11 15.37 1714.62 15.61 1721.13 16.03
1734.15 16.62 1740.66 17.58 1753.67 18.3 1760.18 19.03 1773.2 19.46 1779.71
19.5 1786.22 19.75 1805.75 21.32 1812.25 21.34 1818.76 21.99 1825.27 23.02
1831.78 23.48 1844.8 23.07 1851.31 23 1870.84 23.45 1877.34 23.76 1883.85
23.81 1890.4 23.68 1903.49 23.1 1929.66 22.76 1936.21 22.44 1942.75 22.33
1949.3 22.97 1955.84 23.03 1962.38 22.94 1968.93 23.03 1982.02 23.5 2001.65
23.57 2008.19 23.1 2014.74 22.78 2027.83 22.79 2034.37 22.93 2040.92 22.91
2054 22.34 2060.55 22.25 2067.09 22 2073.64 21.47 2086.73 21.6 2112.9 21.54
2119.45 21.62 2145.63 21.33 2152.17 21.42 2171.8 21.32 2217.61 22.02 2224.16
21.88 2256.88 21.9 2276.51 22.17 2302.69 21.41 2309.23 21.58 2315.78 22.06
2328.87 22.12 2335.41 21.63 2341.96 21.38 2355.04 21.35 2368.13 21.18

2387.77 21.05 2400.85 20.71 2407.4 20.8 2427.03 20.78 2453.21 20.9 2472.84 20.55 2479.39 20.58 2518.65 20 2538.29 19.4 2544.83 19.1 2551.37 19.08 2571.01 18.57 2590.64 17.7 2616.82 17.34 2623.36 16.97 2629.91 16.12 2636.45 14.9 2643 14.13 2649.54 13.92 2656.08 13.98 2662.63 14.19 2675.72 16

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 964.27 .04 1115.79 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 964.27 1115.79 978.05 935.95 915.59 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 2590 2675.72 17.7 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 21230.68

INPUT
Description: 27 - 5 ft US Forge River Trib
Station Elevation Data num= 269
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 27.52 26.22 27.7 39.32 27.69 52.43 27.25 78.65 25.61 98.31 25.08 111.42 24.36 117.97 23.85 124.53 23.2 131.08 22.83 137.64 22.61 163.85 22.49 170.41 22.55 183.51 22.22 190.07 21.91 203.18 22.72 209.73 22.66 216.28 22.14 222.84 20.37 235.95 18.22 242.5 17.85 255.61 17.77 262.16 18.1 275.27 19.21 281.82 19.6 288.38 19.69 294.93 19.22 301.49 18.61 308.04 17.62 314.59 17.25 327.7 17.41 340.81 17.19 347.37 17.2 353.92 17.39 386.69 17.25 393.24 17.1 406.35 17.48 412.91 17.82 419.46 17.77 426.01 17.53 445.68 17.79 452.23 18.17 471.89 20.34 478.45 20.9 517.77 23.36 530.88 23.79 550.54 24.82 557.09 24.91 563.65 24.79 576.76 24.06 583.31 23.56 589.86 22.86 596.42 22.41 616.08 22.56 622.64 22.38 629.19 22.49 642.3 23.09 661.96 24.34 675.07 24.64 681.62 24.64 714.39 23.99 727.5 23.12 740.61 22.09 760.27 20.96 766.82 20.23 773.38 19.71 779.93 19.41 786.49 18.87 799.59 17.03 812.7 16.15 819.26 15.87 832.37 14.95 838.92 14.73 845.47 14.33 852.03 13.72 858.58 12.9 871.69 11.93 878.24 11.71 891.35 11.57 897.91 11.28 911.01 11.05 924.12 11.26 937.23 10.49 950.34 9.38 970 8.34 976.55 7.85 983.11 7.75 989.66 7.83 995.65 7.41 996.22 7.37 1002.51 6.27 1008.81 4.7 1015.1 2.34 1021.39 .67 1030 -4.34 1031.85 -4.87 1033.27 -4.82 1033.37 -4.83 1033.93 -5.08 1034.43 -5.18 1036 -5.53 1037.96 -5.64 1039.68 -5.83 1041.43 -5.83 1042.9 -6.03 1044.42 -6.17 1046.27 -6.17 1048.99 -6.19 1051.5 -6.33 1056.76 -6.45 1059.36 -6.45 1061.99 -6.47 1065 -6.52 1067.86 -6.5 1070.85 -6.44 1073.48 -6.14 1076.16 -5.8 1078.85 -5.49 1084.58 -5.17 1087.33 -5.06 1089.96 -4.98 1092.9 -4.98 1095.64 -5.05 1098.82 -5.15 1101.76 -5.18 1104.94 -5.23 1107.88 -5.15 1110.34 -5.1 1112.83 -4.99 1115.85 -4.95 1118.54 -4.75 1121.36 -4.5 1123.66 -4.06 1126.09 -3.43 1128.14 -2.64 1130.21 -2.06 1132.02 -1.49 1133.12 -.84 1135.29 .67 1141.79 1.48 1148.29 3.16 1154.78 3.89 1161.28 4.1 1167.77 4.36 1174.27 4.43 1180.77 4.41 1187.26 4.36 1193.76 4.14 1200.26 4.23 1206.75 4.64 1213.25 4.9 1219.74 5.25 1226.24 5.39 1232.74 5.59 1239.23 5.88 1245.73 6.33 1252.23 6.52 1265.22 7 1271.71 7.21 1278.21 7.44 1284.71 7.89 1291.2 9.17 1297.7 11.51 1304.19 15.43 1310.69 16.28 1317.19 16.66 1323.68 16.62 1330.18 16.41 1336.68 16.29 1343.17 16.31 1349.67 16.13 1356.16 16.3 1362.66 16.43 1369.16 16.42 1375.65 16.6 1382.15

16.84 1388.64 17.35 1395.14 17.59 1401.64 17.66 1408.13 17.7 1414.63 17.69
1421.13 17.59 1427.62 17.34 1434.12 17.3 1440.61 17.18 1447.11 17.08 1453.61
17.01 1460.1 17.01 1466.6 17.11 1473.1 17.02 1486.09 17.26 1492.58 17.37
1499.08 17.38 1505.58 17.43 1512.07 17.5 1518.57 17.54 1525.06 17.65 1538.06
17.64 1544.55 17.66 1551.05 17.52 1557.55 17.62 1564.04 17.62 1570.54 17.67
1577.03 17.74 1583.53 17.69 1596.52 17.8 1603.02 17.96 1622.51 18.36 1629.05
18.43 1635.59 18.54 1642.14 18.62 1648.68 18.76 1655.22 18.81 1661.77 18.83
1668.31 18.92 1674.85 19.06 1687.94 19.13 1694.48 19.19 1701.03 19.19
1707.57 19.23 1714.11 19.15 1727.2 19.1 1746.83 19.11 1753.37 19.16 1759.92
19.07 1766.46 18.95 1773 19.09 1779.55 19.33 1786.09 19.41 1792.63 19.55
1799.18 19.59 1805.72 19.72 1812.26 19.82 1818.8 20 1825.35 20.1 1831.89
20.32 1838.43 20.47 1844.98 20.45 1851.52 20.45 1864.61 20.62 1871.15 20.67
1877.69 20.68 1903.87 20.67 1969.3 20.82 1982.39 20.81 1995.47 20.77 2015.1
20.73 2021.65 20.7 2028.19 20.69 2034.73 20.62 2041.28 20.6 2047.82 20.25
2054.36 20 2060.91 19.56 2067.45 19.08 2073.99 18.55 2080.54 17.9 2087.08
17.22 2093.62 16.81 2100.17 16.31 2106.71 15.78 2113.25 15.18 2119.79 15
2126.34 14.48 2132.88 13.9 2139.42 13.52 2145.97 13.53 2152.51 13.79 2159.05
16

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .082 989.66 .04 1317.19 .08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 989.66
1317.19 1970.54 1969.09 1971.46 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 2080 2159.05 17.9 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 19261.59

INPUT
Description: 26 Station Elevation Data num= 185
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 22.45 91.78 22.29 144.23
22.33 157.34 22.21 177.01 22.31 183.57 22.23 196.68 22.3 203.24 22.22 216.35
22.32 222.9 22.23 255.68 22.38 327.8 22.67 340.91 22.36 360.58 20.95 367.13
20.37 373.69 19.95 393.36 17.94 399.91 17.62 413.03 17.55 426.14 17.87
432.69 18.18 439.25 18.3 452.36 18.22 458.92 18.06 465.47 17.75 472.03 17.22
485.14 16.62 491.7 16.21 504.81 15.62 524.48 15.29 531.03 15.35 550.7 14.24
563.81 13.43 570.37 12.9 596.59 12.39 609.71 11.82 622.82 11.49 629.37 11.13
635.93 11 642.49 11.04 649.04 10.85 662.15 11.01 688.38 10.76 694.93 10.9
708.05 10.6 740.83 10.38 747.38 10.24 753.94 10.29 760.49 10.11 780.16 10.39
819.5 11.3 832.61 11.4 845.72 11.18 865.39 11.52 871.95 11.3 885.06 11.17
891.61 10.25 898.17 6.06 901.26 4 904.73 1.69 915 -1.23 915.5 -1.28 915.75 -
1.46 916.24 -1.49 916.44 -1.7 917.04 -1.61 917.48 -1.91 918.66 -1.93 919.76
-2.3 921.23 -2.71 922.79 -3.19 924.42 -3.77 926.79 -4.49 931.51 -5.33 934.07
-5.71 936.43 -5.92 938.96 -6.04 941.32 -6.28 946.22 -6.51 948.83 -6.5
951.22 -6.53 953.69 -6.51 956.08 -6.45 958.64 -6.44 960.98 -6.41 963.4 -6.33
968.44 -6.1 970.81 -5.97 973.25 -5.72 975.53 -5.67 977.94 -5.52 980.4 -5.55
982.68 -5.56 985.19 -5.61 987.51 -5.8 989.86 -5.93 992.01 -6.13 994.38 -6.25
996.55 -6.17 998.42 -6.02 1000.43 -5.63 1002.16 -5.28 1003.85 -4.65 1005.39

-4.29 1006.99 -3.77 1008.48 -3.25 1010.13 -2.62 1011.66 -1.63 1013.42 -1.16
1022.73 1.18 1023.65 1.55 1029.29 3.83 1035.85 5.81 1042.4 5.97 1048.96 6.38
1068.62 6.86 1075.18 6.72 1081.74 6.87 1101.4 6.47 1114.52 6.53 1121.07 6.69
1160.41 7.12 1173.52 7.12 1180.08 7.3 1193.19 7.31 1212.86 7.66 1225.97 8.08
1232.52 8.5 1239.08 9.13 1252.19 10.13 1258.75 11.04 1265.3 11.65 1271.86
12.65 1278.42 13.36 1291.53 14.34 1298.08 14.38 1311.2 14.65 1343.98 16.06
1357.09 16.37 1383.31 17.2 1416.09 17.73 1468.54 17.48 1488.21 17.87 1501.32
17.95 1507.87 17.73 1514.43 17.75 1534.1 18.18 1547.21 18.23 1553.77 17.91
1573.43 17.94 1579.99 18.11 1586.55 18.77 1593.1 19.59 1599.66 20.68 1606.21
23.62 1612.77 24.42 1625.88 24.47 1645.55 24.81 1658.66 25.67 1671.77 25.93
1678.33 25.65 1698 25.85 1717.67 26.28 1724.22 26.32 1763.56 27.03 1770.11
27.31 1776.67 27.31 1809.45 28.01 1829.12 28.27 1835.67 28.45 1861.9 28.54
1881.56 28.93 1894.68 29.33 1927.46 28.96 2006.13 27.54 2143.8 25.62 2170.03
25.69 2183.14 25.53 2196.25 25.66 2202.81 25.86 2209.36 26.79 2215.92 27.53
2222.48 27.83 2229.03 27.81 2242.14 28.08

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .082 871.95 .04 1291.53 .082

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 871.95
1291.53 1135.1 1183.89 1211.84 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 18077.71

INPUT
Description: 25 App Trestle Br
Station Elevation Data num= 198
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 18.73 6.56 18.62 13.12 18.58
19.68 18.52 26.24 18.42 32.8 18.29 39.36 18.2 52.48 17.91 59.03 17.69 65.59
17.49 78.71 17.21 85.27 17.03 91.83 17.04 98.39 17.02 104.95 16.8 111.51
16.54 118.07 16.2 124.63 15.95 131.19 15.78 137.75 15.57 144.31 15.23 157.43
14.88 163.99 14.76 170.54 14.75 177.1 14.67 183.66 14.77 190.22 14.75 196.78
14.63 209.9 14.73 216.46 14.68 223.02 14.57 229.58 14.37 236.14 14.27 242.7
14.45 249.26 14.53 255.82 14.43 262.38 14.4 268.94 14.39 275.49 14.32 282.05
14.31 288.61 14.27 301.73 14.04 308.29 13.91 314.85 13.8 321.41 13.79
327.97 13.7 334.53 13.46 341.09 13.27 347.65 13.12 354.21 13.06 360.77 12.91
367.33 12.85 373.89 12.74 380.45 12.59 387 12.46 393.56 12.28 413.24 12.11
426.36 11.92 439.48 11.66 446.04 11.58 459.16 11.33 465.72 11.39 472.28
11.31 478.84 11.14 491.96 11 505.07 10.75 511.63 10.69 518.19 10.66 524.75
10.52 531.31 10.4 537.87 10.2 544.43 10.09 550.99 10.01 557.55 9.91 564.11
9.93 570.67 9.9 577.23 9.79 583.79 9.75 590.35 9.54 596.91 9.45 603.46 9.32
610.02 9.05 623.14 8.56 629.7 8.53 636.26 8.64 642.82 8.88 649.38 8.98
655.94 9.2 662.5 9.28 669.06 9.45 675.62 9.46 682.18 9.55 688.74 9.62 695.3
9.66 701.86 9.8 708.42 9.64 714.97 9.44 721.53 9.42 728.09 9.43 734.65 9.49
741.21 9.5 747.77 9.66 754.33 9.67 767.45 9.82 774.01 9.73 787.13 9.72
793.69 9.69 800.25 9.62 806.81 9.58 813.37 9.46 826.48 9.52 833.04 9.45
839.6 9.57 846.16 9.58 852.72 9.52 859.28 9.63 865.84 9.66 872.4 9.67 878.96
9.64 885.52 9.66 892.08 9.65 898.64 9.69 905.2 9.62 911.76 9.58 918.32 9.56
924.87 9.52 931.43 9.54 937.99 9.58 951.11 9.5 957.67 9.39 964.23 9.35

970.79 9.28 977.35 9.06 983.91 8.93 990.47 8.74 997.03 8.76 1003.59 8.88
1010.15 7.83 1016.71 6.64 1023.27 6.04 1029.82 5.47 1036.38 4.73 1042.94
3.72 1049.5 4.16 1056.06 4.42 1062.62 4.46 1069.18 4.46 1082.3 4.15 1088.86
3.93 1095.42 4.26 1101.98 4.55 1179.84 8.31 1204.75 7.18 1269.14 10.73
1306.31 9.88 1307.02 6.5 1313.49 5.94 1319.44 .89 1353.11 -6.32 1384.09 -
7.81 1413.85 -5.93 1436.19 .77 1443.77 9.09 1493.04 10.17 1563.65 10.29
1633.29 12.45 1639.85 12.78 1646.41 13.09 1652.97 13.31 1659.53 13.51
1666.09 13.82 1672.65 14.11 1679.21 14.31 1685.76 14.33 1692.32 14.22
1705.44 14.25 1731.68 14.25 1757.92 14.19 1764.48 14.2 1771.04 14.23 1777.6
14.17 1784.16 14.05 1790.72 14.05 1797.27 14.24 1803.83 14.4 1810.39 14.71
1816.95 14.95 1823.51 15.28 1830.07 15.57 1836.63 15.82 1843.19 16.11
1849.75 16.28 1856.31 16.6 1869.43 17.07 1875.99 17.25 1882.55 17.56 1889.11
17.92 1895.67 18.12

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .082 1269.14 .04 1443.77 .082

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1269.14
1443.77 80.62 78.41 79.01 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 17999.3

INPUT
Description: 24.7 US Face Trestle Br
Station Elevation Data num= 161
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 18.6 6.317 18.59 12.634
18.74 25.269 18.32 31.586 18.36 44.23 18.11 50.547 18.22 63.181 17.44 75.816
18.47 82.133 18.63 94.767 18.51 126.362 17.04 132.68 16.86 164.265 15.26
170.583 15.12 183.217 14.32 195.851 14.01 208.495 14.04 221.129 13.86
240.081 13.06 252.715 13.13 271.667 12.62 277.984 12.27 284.301 12.1 303.262
12.21 315.896 12.13 328.531 12.27 347.482 11.74 398.029 11.41 410.663 11.05
442.249 10.73 454.883 10.45 486.479 10.33 505.43 10.57 537.016 10.61 562.294
10.75 606.514 10.6 631.793 9.93 669.696 9.72 688.647 9.88 707.599 9.36
713.925 9.44 720.243 9.33 739.194 9.41 745.511 9.25 758.146 9.12 777.097
8.67 783.414 8.41 802.375 8.09 833.961 8.18 840.278 8.02 846.595 8.06 859.23
8.6 871.864 8.76 878.191 8.96 890.825 8.24 903.459 8.27 909.777 8.12 935.045
8 941.362 8.23 953.997 8.32 960.314 8.01 966.641 7.38 972.958 6.1 979.275
5.06 985.592 4.16 991.909 3.471004.544 3.131010.861 3.211029.812 4.41
1042.446 4.551048.773 4.84 1055.09 4.371067.725 3.91080.359 4.03 1099.31
4.641105.628 5.191111.945 5.911118.262 6.841124.589 7.53 1137.223
7.661168.809 7.771194.077 8.61206.721 9.161213.039 9.18 1231.99 8.681238.307
9.121244.624 10.811250.942 11.991257.259 12.18 1269.893 12.04 1274.22
11.41279.861 12.211287.734 12.631293.462 13 1304.512 12.441304.531 -
1.251318.759 -5.881341.285 -7.51364.689 -7.98 1395.512 .681395.802
12.351398.796 13.261440.476 11.561446.793 11.29 1453.12 11.061459.437
10.961465.754 10.841472.071 10.821478.388 10.77 1484.705 10.571491.022 10.62
1497.34 11.121503.657 11.761509.974 12 1516.291 11.971522.608 12.021528.925
12.211535.252 12.381541.569 12.62 1547.886 12.891554.204 13.031560.521
13.351566.838 13.741573.155 13.99 1579.472 13.671585.789 13.131592.107

12.321598.424 10.91604.741 10.29 1611.058 10.461617.385 10.581623.702
10.531636.336 10.851642.653 10.98 1648.971 11.091655.288 10.961661.605
10.891667.922 10.761674.239 11.18 1680.556 11.971686.874 13.121693.191
13.871699.517 14.11705.835 14.29 1712.152 14.511718.469 14.671724.786
14.911731.103 14.99 1737.42 15.32 1743.738 15.471750.055 15.731756.372
15.841762.689 15.991769.006 16.27 1775.323 16.51 1781.65 16.711787.967
17.111794.284 17.891800.602 18.98 1806.919 19.27

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .0821293.462 .041398.796 .082

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1293.4621398.796 50.15 48.83 48.16 .6 .8 Ineffective Flow num= 3
 Sta L Sta R Elev Permanent
 209 1293.46 13 F
 1398 1573.16 13.26 T
 1573.16 1699.52 14.1 T
Skew Angle = 15

BRIDGE

RIVER: Taunton River
REACH: Main Stem RS: 17978.26

INPUT
Description: 24.5 Closed Trestle Br Distance from Upstream XS = 5
Deck/Roadway Width = 30
Weir Coefficient = 2.6
Bridge Deck/Roadway Skew = 15
Upstream Deck/Roadway Coordinates
 num= 3
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 1293 13.85 12.451394.797 13.15 12.351436.332 11.34

Upstream Bridge Cross Section Data
Station Elevation Data num= 161
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 18.6 6.317 18.59 12.634
18.74 25.269 18.32 31.586 18.36 44.23 18.11 50.547 18.22 63.181 17.44 75.816
18.47 82.133 18.63 94.767 18.51 126.362 17.04 132.68 16.86 164.265 15.26
170.583 15.12 183.217 14.32 195.851 14.01 208.495 14.04 221.129 13.86
240.081 13.06 252.715 13.13 271.667 12.62 277.984 12.27 284.301 12.1 303.262
12.21 315.896 12.13 328.531 12.27 347.482 11.74 398.029 11.41 410.663 11.05
442.249 10.73 454.883 10.45 486.479 10.33 505.43 10.57 537.016 10.61 562.294
10.75 606.514 10.6 631.793 9.93 669.696 9.72 688.647 9.88 707.599 9.36
713.925 9.44 720.243 9.33 739.194 9.41 745.511 9.25 758.146 9.12 777.097
8.67 783.414 8.41 802.375 8.09 833.961 8.18 840.278 8.02 846.595 8.06 859.23
8.6 871.864 8.76 878.191 8.96 890.825 8.24 903.459 8.27 909.777 8.12 935.045
8 941.362 8.23 953.997 8.32 960.314 8.01 966.641 7.38 972.958 6.1 979.275
5.06 985.592 4.16 991.909 3.471004.544 3.131010.861 3.211029.812 4.41
1042.446 4.551048.773 4.84 1055.09 4.371067.725 3.91080.359 4.03 1099.31
4.641105.628 5.191111.945 5.911118.262 6.841124.589 7.53 1137.223
7.661168.809 7.771194.077 8.61206.721 9.161213.039 9.18 1231.99 8.681238.307

9.121244.624 10.811250.942 11.991257.259 12.18 1269.893 12.04 1274.22
11.41279.861 12.211287.734 12.631293.462 13 1304.512 12.441304.531 -
1.251318.759 -5.881341.285 -7.51364.689 -7.98 1395.512 .681395.802
12.351398.796 13.261440.476 11.561446.793 11.29 1453.12 11.061459.437
10.961465.754 10.841472.071 10.821478.388 10.77 1484.705 10.571491.022 10.62
1497.34 11.121503.657 11.761509.974 12 1516.291 11.971522.608 12.021528.925
12.211535.252 12.381541.569 12.62 1547.886 12.891554.204 13.031560.521
13.351566.838 13.741573.155 13.99 1579.472 13.671585.789 13.131592.107
12.321598.424 10.91604.741 10.29 1611.058 10.461617.385 10.581623.702
10.531636.336 10.851642.653 10.98 1648.971 11.091655.288 10.961661.605
10.891667.922 10.761674.239 11.18 1680.556 11.971686.874 13.121693.191
13.871699.517 14.11705.835 14.29 1712.152 14.511718.469 14.671724.786
14.911731.103 14.99 1737.42 15.32 1743.738 15.471750.055 15.731756.372
15.841762.689 15.991769.006 16.27 1775.323 16.51 1781.65 16.711787.967
17.111794.284 17.891800.602 18.98 1806.919 19.27

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .0821293.462 .041398.796 .082

Bank Sta: Left Right Coeff Contr. Expan.
 1293.4621398.796 .6 .8
Ineffective Flow num= 3
 Sta L Sta R Elev Permanent
 209 1293.46 13 F
 1398 1573.16 13.26 T
 1573.16 1699.52 14.1 T
Skew Angle = 15

Downstream Deck/Roadway Coordinates
 num= 3
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord 1328.148 13.85
12.451436.332 13.15 12.351465.309 11.34

Downstream Bridge Cross Section Data
Station Elevation Data num= 272
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 18.87 6.327 18.77 12.663
18.74 18.99 18.65 25.327 18.65 31.653 18.48 37.99 18.42 44.317 18.38 50.653
18.45 56.98 18.49 63.316 18.35 69.643 18.89 75.97 19.31 82.307 19.16 88.633
18.84 94.97 18.57 101.297 18.24 107.633 17.78 113.96 17.25 120.296 16.74
126.623 16.27 132.96 15.95 139.286 15.55 145.613 15.11 151.95 14.77 158.277
14.64 170.94 14.48 177.276 14.08 183.603 13.83 189.94 13.69 196.266 13.64
202.603 13.8 208.93 13.82 215.257 13.67 227.92 13.19 234.256 13.05 246.92
12.68 253.246 12.63 259.583 12.53 265.91 12.52 278.573 12.43 284.9 12.43
291.236 12.36 303.9 12.33 310.226 12.44 316.563 12.52 322.89 12.66 329.226
12.87 335.553 12.85 348.216 12.32 354.553 12.24 360.88 12.2 367.206 12.14
373.543 12.05 379.87 11.98 386.206 11.94 392.533 11.84 398.869 11.76 405.196
11.6 411.533 11.38 417.86 11.31 424.196 11.26 430.523 11.13 436.85 11.02
443.186 10.99 449.513 10.94 455.849 10.79 462.176 10.66 468.513 10.59
474.839 10.58 481.176 10.71 487.503 10.76 493.839 10.78 506.493 10.93
519.156 11 538.156 11.26 544.483 11.31 550.819 11.31 557.146 11.35 563.482
11.34 569.809 11.23 582.473 11.22 588.799 11.16 595.136 11.13 607.799 11.1
614.126 11.02 620.462 10.97 626.789 10.87 639.453 10.75 645.779 10.73
652.116 10.79 658.443 10.79 664.779 10.71 671.106 10.68 677.442 10.67

683.769 10.68 690.106 10.8 696.432 10.77 702.769 10.7 709.096 10.65 715.423
10.49 721.759 10.39 734.422 10.33 740.749 10.4 753.412 10.41 759.749 10.36
766.076 10.16 778.739 10.32 785.066 9.99 791.402 9.53 797.729 9.46 804.066
8.67 810.392 6.79 816.729 6.24 823.056 6.41 829.392 6.35 835.719 6.03
842.055 5.67 848.382 5.85 854.709 6.14 861.046 6.33 867.372 6.58 873.709
6.79 880.036 7.34 886.372 7.8 892.699 7.77 899.035 6.79 905.362 5.89 911.699
5.42 918.026 4.87 924.352 4.61 930.689 4.46 937.016 4.2 943.352 4.14 949.679
3.52 956.015 3.52 962.342 3.36 968.679 3.26 975.006 3.35 981.342 3.21
994.005 3.981000.332 4.271006.659 4.271012.995 4.091019.322 3.94 1025.659
3.061031.985 3.421038.322 3.851044.649 4.081057.312 4.35 1063.649
4.881069.975 4.721076.302 4.581082.639 4.471088.965 3.99 1095.302
3.681101.629 3.681107.965 4.141114.292 4.651120.629 4.35 1126.955
5.181133.292 6.261139.619 6.61145.945 7.131152.282 7.4 1158.609 7.711164.945
7.891171.272 8.211177.609 8.351190.272 8.77 1196.599 8.971202.935
8.811209.262 8.951215.589 9.181221.925 9.27 1228.252 9.521234.588
9.561240.915 9.451247.252 9.31253.579 9.28 1259.915 9.241266.242 9.461272.578
9.91278.905 10.661285.232 10.73 1294.341 10.81 1298.33 11.27 1302.85
11.691308.839 12.211316.711 12.63 1322.439 13 1333.49 12.441333.509 -
1.251347.737 -5.881370.262 -7.5 1393.667 -7.981424.489 .681424.779
12.351427.774 13.261462.508 11.54 1468.845 11.331475.172 11.241481.508
11.171487.835 11.021500.498 10.83 1506.825 11.151519.488 12.131525.825
12.561532.151 12.771538.488 12.93 1551.151 13.191557.478 13.481563.815
13.81570.141 13.951576.468 14.13 1582.805 14.421589.131 14.611595.468
14.611608.131 14.421620.795 14.26 1639.785 14.11646.111 14.011652.448
13.91658.775 13.811684.101 13.51 1709.428 13.371715.755 12.891722.091
12.511728.418 13.131734.754 14.15 1741.081 15.121747.418 15.951753.745
16.361760.081 16.541766.408 16.54 1772.744 16.641779.071 16.931785.398
17.21791.734 17.411798.061 17.48 1804.398 17.671810.724 18.021817.061
18.351823.388 18.641829.647 18.36 1842.165 17.691848.415 17.481854.674
17.421860.933 17.221867.193 16.96 1873.452 16.661879.701 16.51 1885.96 16.52
1892.22 16.371898.479 16.02 1904.729 15.341910.988 14.451917.247
13.621923.506 12.841929.765 12.82 1936.015 13.261942.274 13.341954.792
13.411967.301 13.521979.819 13.69 1992.338 13.842004.847 14.042017.365
14.142029.874 14.272042.392 14.46 2054.901 14.672186.305 15.5

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .0821322.439 .041427.774 .082

Bank Sta: Left Right Coeff Contr. Expan.
 1322.4391427.774 .5 .8
Ineffective Flow num= 3
 Sta L Sta R Elev Permanent
 329.2 1322.4 13 T
 1427.7 1582.8 13.26 T
 1582.8 2054.9 14.6 T
Skew Angle = 15
 Upstream Embankment side slope = 0 horiz. to 1.0 vertical Downstream
Embankment side slope = 0 horiz. to 1.0 vertical Maximum allowable
submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
 Energy
 W.S. Pro Method

 W.S.Pro Data
 Left Embankment
 El of the top of the embankment = 13.8
 El of the toe of the abutment = -5.88
 Right Embankment
 El of the top of the embankment = 13.8
 El of the toe of the abutment = -5.88
 Abutment Type = 1 Vert. abutments and vert. embankments with or without wingwalls Slope of abutments =
 Top with of embankment = 30 Centroid station of bridge opening =
 Wing Wall Type = Angular wing walls
 Width = 35
 Angle = 20
 Radius =
 Guide Banks Type = No Guide Bank present
 Length =
 Offset =
 Angle =
 Optional Contraction and expansion coefficients
 At upstream inside (BU)
 Piers are Continuous for the width of the bridge
 Use Geometric mean as Friction Slope Method

Selected Low Flow Methods = W.S.Pro Method

High Flow Method
 Energy Only

Additional Bridge Parameters
 Add Friction component to Momentum
 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line
 CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 17950.46

INPUT
Description: 24.3 DS Face Trestle Br
Station Elevation Data num= 272
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 18.87 6.327 18.77 12.663 18.74 18.99 18.65 25.327 18.65 31.653 18.48 37.99 18.42 44.317 18.38 50.653 18.45 56.98 18.49 63.316 18.35 69.643 18.89 75.97 19.31 82.307 19.16 88.633 18.84 94.97 18.57 101.297 18.24 107.633 17.78 113.96 17.25 120.296 16.74 126.623 16.27 132.96 15.95 139.286 15.55 145.613 15.11 151.95 14.77 158.277

14.64 170.94 14.48 177.276 14.08 183.603 13.83 189.94 13.69 196.266 13.64
202.603 13.8 208.93 13.82 215.257 13.67 227.92 13.19 234.256 13.05 246.92
12.68 253.246 12.63 259.583 12.53 265.91 12.52 278.573 12.43 284.9 12.43
291.236 12.36 303.9 12.33 310.226 12.44 316.563 12.52 322.89 12.66 329.226
12.87 335.553 12.85 348.216 12.32 354.553 12.24 360.88 12.2 367.206 12.14
373.543 12.05 379.87 11.98 386.206 11.94 392.533 11.84 398.869 11.76 405.196
11.6 411.533 11.38 417.86 11.31 424.196 11.26 430.523 11.13 436.85 11.02
443.186 10.99 449.513 10.94 455.849 10.79 462.176 10.66 468.513 10.59
474.839 10.58 481.176 10.71 487.503 10.76 493.839 10.78 506.493 10.93
519.156 11 538.156 11.26 544.483 11.31 550.819 11.31 557.146 11.35 563.482
11.34 569.809 11.23 582.473 11.22 588.799 11.16 595.136 11.13 607.799 11.1
614.126 11.02 620.462 10.97 626.789 10.87 639.453 10.75 645.779 10.73
652.116 10.79 658.443 10.79 664.779 10.71 671.106 10.68 677.442 10.67
683.769 10.68 690.106 10.8 696.432 10.77 702.769 10.7 709.096 10.65 715.423
10.49 721.759 10.39 734.422 10.33 740.749 10.4 753.412 10.41 759.749 10.36
766.076 10.16 778.739 10.32 785.066 9.99 791.402 9.53 797.729 9.46 804.066
8.67 810.392 6.79 816.729 6.24 823.056 6.41 829.392 6.35 835.719 6.03
842.055 5.67 848.382 5.85 854.709 6.14 861.046 6.33 867.372 6.58 873.709
6.79 880.036 7.34 886.372 7.8 892.699 7.77 899.035 6.79 905.362 5.89 911.699
5.42 918.026 4.87 924.352 4.61 930.689 4.46 937.016 4.2 943.352 4.14 949.679
3.52 956.015 3.52 962.342 3.36 968.679 3.26 975.006 3.35 981.342 3.21
994.005 3.981000.332 4.271006.659 4.271012.995 4.091019.322 3.94 1025.659
3.061031.985 3.421038.322 3.851044.649 4.081057.312 4.35 1063.649
4.881069.975 4.721076.302 4.581082.639 4.471088.965 3.99 1095.302
3.681101.629 3.681107.965 4.141114.292 4.651120.629 4.35 1126.955
5.181133.292 6.261139.619 6.61145.945 7.131152.282 7.4 1158.609 7.711164.945
7.891171.272 8.211177.609 8.351190.272 8.77 1196.599 8.971202.935
8.811209.262 8.951215.589 9.181221.925 9.27 1228.252 9.521234.588
9.561240.915 9.451247.252 9.31253.579 9.28 1259.915 9.241266.242 9.461272.578
9.91278.905 10.661285.232 10.73 1294.341 10.81 1298.33 11.27 1302.85
11.691308.839 12.211316.711 12.63 1322.439 13 1333.49 12.441333.509 -
1.251347.737 -5.881370.262 -7.5 1393.667 -7.981424.489 .681424.779
12.351427.774 13.261462.508 11.54 1468.845 11.331475.172 11.241481.508
11.171487.835 11.021500.498 10.83 1506.825 11.151519.488 12.131525.825
12.561532.151 12.771538.488 12.93 1551.151 13.191557.478 13.481563.815
13.81570.141 13.951576.468 14.13 1582.805 14.421589.131 14.611595.468
14.611608.131 14.421620.795 14.26 1639.785 14.11646.111 14.011652.448
13.91658.775 13.811684.101 13.51 1709.428 13.371715.755 12.891722.091
12.511728.418 13.131734.754 14.15 1741.081 15.121747.418 15.951753.745
16.361760.081 16.541766.408 16.54 1772.744 16.641779.071 16.931785.398
17.21791.734 17.411798.061 17.48 1804.398 17.671810.724 18.021817.061
18.351823.388 18.641829.647 18.36 1842.165 17.691848.415 17.481854.674
17.421860.933 17.221867.193 16.96 1873.452 16.661879.701 16.51 1885.96 16.52
1892.22 16.371898.479 16.02 1904.729 15.341910.988 14.451917.247
13.621923.506 12.841929.765 12.82 1936.015 13.261942.274 13.341954.792
13.411967.301 13.521979.819 13.69 1992.338 13.842004.847 14.042017.365
14.142029.874 14.272042.392 14.46 2054.901 14.672186.305 15.5

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .0821322.439 .041427.774 .082

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1322.4391427.774 90.54 100.66 105.81 .5 .8 Ineffective Flow num= 3

```
 Sta L Sta R Elev Permanent
 329.2 1322.4 13 T
 1427.7 1582.8 13.26 T
 1582.8 2054.9 14.6 T
Skew Angle = 15

CROSS SECTION


RIVER: Taunton River
REACH: Main Stem RS: 17849.81

INPUT
Description: 24 Exit Trestle Br
Station Elevation Data num= 208
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  0 19.31 26.18 19.33 32.73
19.31 45.82 19.23 52.37 19.21  58.92 19.31 65.46 19.52 72.01 19.63 78.55
19.38 85.1 18.96  98.19 17.88 104.74 17.55 111.28 17.19 117.83 16.74 130.92
15.65  137.47 15.2 144.02 14.84 150.56 14.51 157.11 14.22 163.65 14.03  170.2
13.81 176.75 13.5 183.29 13.12 189.84 13 196.38 13.19  202.93 13.58 209.48
13.88 216.02 13.78 235.66 13.18 242.21 13.04  248.75 12.97 261.85 12.89
268.39 12.86 274.94 12.92 281.48 12.94  288.03 12.88 294.58 12.9 301.12 13.07
307.67 13.22 314.22 13.24  320.76 13.42 327.31 13.42 333.85 13.12 340.4 12.91
353.49 12.71  360.04 12.66 366.58 12.59 373.13 12.58 379.68 12.51 386.22 12.4
392.77 12.33 399.32 12.28 405.86 12.15 418.95 11.98 425.5 11.88  438.59 11.79
445.14 11.71 451.68 11.59 458.23 11.63 471.32 11.51  477.87 11.53 484.42 11.7
490.96 11.74 497.51 11.81 504.05 11.77  510.6 11.78 517.15 11.77 523.69 11.84
530.24 11.99 536.78 11.98  543.33 12.05 549.88 12.01 562.97 11.85 569.52 11.8
576.06 11.73  582.61 11.74 595.7 11.79 602.25 11.8 615.34 11.68 621.88 11.66
634.98 11.67 641.52 11.58 648.07 11.45 654.62 11.47 661.16 11.36  667.71
11.42 674.25 11.36 680.8 11.4 693.89 11.33 700.44 11.19  706.98 11.17 713.53
11.18 720.08 11.11 726.62 11.13 733.17 11.21  739.72 11.18 746.26 11.04
752.81 10.88 759.35 10.93 765.9 10.93  772.45 10.83 778.99 10.8 785.54 10.79
792.09 10.87 798.63 10.68  805.18 10.74 811.72 10.71 818.27 10.81 824.82
10.88 831.36 10.38  837.91 10.29 844.45 9.37 851 7.93 857.55 7.1 864.09 5.9
870.64 5.81 877.19 6.55 883.73 6.96 890.28 6.93 896.82 6.94  903.37 6.5
909.92 5.67 916.46 5.18 923.01 5.03 929.55 4.72  936.1 4.8 942.65 4.9 949.19
5.08 955.74 4.94 962.29 4.71  968.83 4.65 975.38 4.75 981.92 4.71 988.47 4.24
995.02 4.12  1001.56 3.85 1008.11 3.82 1014.65 3.81 1021.2 3.97 1027.75 3.95
1034.29 4.03 1040.84 3.98 1047.39 3.9 1053.93 3.47 1060.48 3.32  1067.02 3.64
1073.57 3.82 1086.66 3.59 1099.76 3.4 1106.3 3.53  1112.85 3.76 1119.39 4.1
1132.49 4.13 1139.03 4.12 1152.12 4.88  1158.67 5.3 1165.22 6.59 1171.76 7.38
1178.31 7.4 1184.86 7.35  1191.4 7.36 1197.95 7.49 1204.49 7.72 1211.04 7.75
1217.59 7.94  1224.13 8.2 1230.68 8.24 1237.23 8.22 1243.77 8.27 1250.32 8.2
1256.88 8.29 1263.44 8.43 1270 8.49 1276.56 8.69 1291.2 8.68  1339.54 6.53
1374.16 5.55 1379.52 1.74 1410.91 -6.63 1433.27 -7.73  1454.85 -8.3 1472.27 -
4.98 1483.19 .61 1487.95 5.55 1498.67 10.79  1547.22 11.17 1722.6 15.71
1735.72 15.76 1742.28 15.75 1748.84 15.68  1761.96 15.73 1768.52 15.77
1775.08 15.72 1781.64 15.72 1788.2 15.89  1794.76 15.97 1801.32 15.96 1814.44
15.97 1821 16.05 1827.56 16.07  1834.12 16.11 1840.67 16.3 1847.23 16.33
1853.79 16.22 1860.35 16.2  1866.91 16.25 1873.47 16.27 1886.59 16.27

Manning's n Values num= 3  Sta n Val Sta n Val Sta n Val
 0 .082 1291.2 .04 1498.67 .082
```

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1291.2
1498.67 887.1 936.69 998.6 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 16913.12

INPUT
Description: 23
Station Elevation Data num= 456
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 19.4 78.43 19.25 111.1 19.25
117.64 19.03 150.32 18.69 163.39 18.79 189.53 18.27 196.07 18.35 202.6 18.23
209.14 17.59 228.74 17.05 235.28 17.14 254.88 16.16 274.49 14.75 307.17
13.64 359.45 12.29 372.52 11.73 405.2 11.03 424.81 10.33 450.95 9.89 457.48
9.87 477.09 10.28 483.63 10.55 490.16 10.41 503.23 9.2 509.77 8.88 529.38
8.45 562.05 8.59 575.12 8.49 594.73 8.68 614.34 8.36 640.48 8.52 653.55 8.27
666.62 8.19 699.3 7.6 745.05 7.64 771.19 7.84 777.72 8.07 784.26 8.49 790.79
8.71 797.33 8.68 816.94 9.39 823.47 8.64 830.01 7.68 836.49 6.59 849.46
5.05 855.94 4.44 862.43 3.98 875.4 3.5 894.85 3.23 901.33 3.31 933.76 2.87
940.24 2.89 953.21 3.1 959.69 3 966.18 3.1 972.66 3.39 985.63 3.63 992.11
3.95 998.6 4.52 1005.08 5.28 1011.57 5.66 1031.02 5.84 1043.99 6.29 1050.47
6.25 1063.44 5.64 1069.92 5.73 1082.89 5.12 1102.35 5.3 1108.83 5.18 1121.8
5.61 1141.25 5.56 1147.73 5.71 1154.22 6.05 1160.7 5.8 1167.19 5.78 1173.67
5.56 1180.16 5.47 1186.64 5.56 1199.61 5.24 1212.58 4.23 1215.2 4.09 1219.06
3.87 1225.55 3.93 1232.03 4.2 1238.54 3.19 1250 -.96 1250.62 -1.13 1252.35 -
1.49 1254.47 -1.7 1256.24 -1.54 1257.64 -2.08 1258.8 -3.18 1260.28 -4.39
1262.36 -5.49 1264.56 -6.31 1266.7 -7.12 1268.91 -7.64 1271.03 -7.99 1273.46
-8.06 1275.8 -8.11 1278.4 -8.23 1280.73 -8.24 1283.12 -8.18 1285.25 -8.2
1287.5 -8.13 1289.54 -8.05 1291.39 -7.94 1293.1 -7.97 1295.08 -7.94 1296.78
-7.77 1298.56 -7.77 1300.16 -7.61 1301.79 -7.6 1303.31 -7.45 1304.84 -7.38
1306.2 -7.16 1307.65 -7.07 1309.06 -7 1310.52 -6.85 1311.97 -6.66 1313.89 -
6.62 1315.88 -6.47 1318.09 -6.19 1320.33 -6.01 1322.53 -5.68 1324.52 -5.43
1328.31 -4.79 1329.88 -4.32 1331.38 -3.78 1332.58 -3.18 1333.73 -2.69
1334.42 -2.25 1342.71 3.21 1349.23 9.58 1355.74 10.87 1362.26 10.7 1368.78
10.64 1375.3 10.6 1388.33 10.31 1394.85 10.23 1401.37 10.42 1407.88 9.94
1414.4 9.62 1420.92 9.58 1427.44 9.61 1433.96 9.59 1440.47 9.36 1446.99 9.17
1453.51 9.21 1460.03 9.72 1466.54 10.05 1473.06 10.29 1479.58 10.5 1486.1
10.67 1492.61 10.88 1505.65 11.69 1512.17 11.18 1518.68 10.88 1525.2 10.71
1531.72 10.48 1538.24 10.11 1544.75 9.89 1551.27 9.78 1557.79 9.78 1564.31
9.73 1570.83 9.82 1577.34 10.28 1583.86 10.39 1590.38 10.48 1596.9 10.72
1603.41 10.8 1609.93 10.6 1616.45 10.44 1622.97 9.97 1629.48 9.52 1636 8.98
1642.52 8.58 1649.04 7.82 1655.55 7.34 1662.07 6.45 1668.59 5.53 1675.11
5.15 1681.63 5.49 1688.14 5.48 1694.66 5.74 1701.18 5.89 1707.7 6.58 1714.21
7.71 1720.73 8.22 1727.26 8.48 1733.79 8.49 1740.32 7.74 1746.85 6.35
1753.38 5.46 1759.91 5.63 1766.44 5.84 1772.97 6.14 1779.5 6.82 1786.03 7.55
1792.57 7.94 1799.1 8 1812.16 8.06 1818.69 8.44 1825.22 9.16 1838.28 9.35
1844.81 9.32 1851.34 8.96 1857.87 9.41 1864.4 10.05 1870.93 10.93 1877.46
11.9 1883.99 12.98 1890.52 14.17 1897.05 15.25 1903.58 15.71 1910.11 15.78
1916.64 15.72 1923.17 15.45 1929.7 15.44 1936.23 15.5 1942.76 15.79 1949.29
16.29 1955.82 16.59 1962.35 16.73 1968.88 17.06 1975.41 17.43 1988.48 17.87
1995.01 18.01 2001.54 18.1 2008.07 18.22 2014.6 18.29 2027.66 18.22 2034.19
18.02 2040.72 17.6 2047.25 17.3 2053.78 17.15 2060.31 16.97 2066.84 16.84

2073.37 16.76 2079.9 16.64 2086.43 16.7 2092.96 16.82 2099.49 16.91 2106.02
17.03 2112.55 17.21 2119.08 17.43 2132.14 17.74 2138.67 17.7 2145.2 17.56
2151.73 17.4 2158.26 17.2 2164.8 17.04 2171.33 17.28 2177.87 17.26 2184.4
16.88 2190.94 16.43 2197.47 16.46 2204.01 16.2 2210.54 16.25 2217.07 16.43
2223.61 16.51 2230.14 16.33 2236.68 16.12 2243.21 16 2249.75 16.1 2256.28
16.27 2269.35 16.3 2275.88 16.39 2282.42 16.9 2288.95 17.18 2302.02 17.45
2308.56 17.45 2321.62 17.24 2328.16 17.09 2334.69 16.89 2341.23 16.66
2347.76 16.39 2354.3 16.07 2360.83 15.46 2367.36 15.19 2373.9 14.34 2380.43
12.97 2386.97 9.92 2393.5 9.21 2400.04 9.21 2406.57 9.39 2413.11 9.48
2419.64 9.27 2426.17 9.39 2432.71 9.66 2439.24 9.71 2445.78 9.84 2452.31
9.95 2458.85 9.65 2465.38 9.11 2471.92 9.17 2478.45 9.93 2491.52 9.6 2498.05
9.83 2504.59 9.69 2511.12 9.6 2517.66 9.82 2524.19 10.01 2530.73 10.15
2537.26 11.2 2543.79 12.86 2550.33 14.35 2556.86 15.3 2563.4 15.65 2569.93
15.67 2576.47 15.71 2583 15.52 2589.54 15.42 2596.07 15.35 2602.6 15.43
2609.14 15.55 2615.67 15.56 2622.21 15.59 2628.74 15.48 2635.28 15.46
2641.81 15.42 2648.34 15.4 2654.88 15.31 2661.41 15.12 2667.95 14.95 2674.48
14.84 2681.02 14.88 2687.55 14.84 2694.09 14.74 2707.15 14.7 2713.69 14.64
2720.22 14.51 2726.76 14.48 2733.29 14.48 2739.83 14.5 2746.36 14.61 2752.9
14.63 2759.43 14.69 2765.96 14.69 2772.5 15.03 2785.57 15.16 2798.64 15.34
2805.17 15.45 2811.7 15.65 2824.77 15.67 2831.31 15.73 2844.38 15.88 2850.91
15.94 2863.98 16.01 2870.51 15.99 2877.05 15.94 2883.58 15.85 2890.1 15.72
2896.62 15.67 2903.14 15.64 2909.65 15.59 2916.17 15.49 2922.69 15.49
2929.21 15.71 2935.73 15.75 2942.24 15.76 2948.76 15.81 2955.28 16.14 2961.8
16.49 2968.31 16.45 2974.83 16.43 2987.87 16.46 3007.42 16.58 3013.94 16.61
3020.46 16.61 3026.98 16.52 3033.49 16.38 3046.53 16.35 3066.08 16.21 3072.6
16.19 3092.15 16.25 3098.67 16.37 3105.19 16.57 3111.71 16.72 3118.22 16.79
3124.74 16.82 3131.26 16.79 3137.78 16.89 3144.3 17.03 3157.33 17.43 3163.85
17.29 3170.37 17.35 3176.88 17.59 3183.4 18.62 3189.92 19.49 3196.44 19.82
3202.96 19.98 3209.47 20.03 3215.99 20.06 3222.51 20.13 3229.03 20.1 3235.54
20.12 3242.06 20.08 3248.58 20.12 3261.62 20.36 3268.13 20.45 3281.17 20.81
3287.69 20.98 3294.21 21.09 3300.72 21.06 3307.24 21.06 3313.76 21.14
3320.28 21.2 3333.31 21.26 3339.83 21.3 3346.35 21.37 3352.87 21.48 3359.38
21.57 3385.45 21.73 3391.97 21.76 3398.49 21.77 3405.01 21.76 3411.53 21.73
3424.56 21.62 3431.08 21.77 3437.6 21.85 3444.11 21.87 3457.15 21.78 3463.67
21.79 3470.19 21.63 3476.7 21.76 3496.26 21.69 3502.77 21.91 3509.29 21.9
3515.81 21.97 3522.33 21.97 3528.85 22.1 3535.36 22.1 3541.88 21.94 3548.4
21.87 3554.92 21.86 3561.44 21.75 3567.95 21.46 3574.47 21.6 3580.99 22
3587.51 22.17 3594.02 22.11 3600.54 21.98 3607.06 21.78 3613.58 21.91 3620.1
21.87 3626.61 22.07 3633.13 22.08 3639.65 21.62 3652.68 21.59 3659.2 21.56
3665.72 21.4 3672.24 21.29 3678.76 21.24 3685.27 21.21

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .082 816.94 .04 1355.74 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 816.94
1355.74 882.21 816.31 764.31 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 2300 3685.27 17.4 T

CROSS SECTION

RIVER: Taunton River

REACH: Main Stem RS: 16096.81

INPUT
Description: 22 - App GorOwPkwy
Station Elevation Data num= 443
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 19.13 12.95 19.94 19.43
20.31 25.91 20.58 32.38 21.16 38.86 21.65 45.34 21.95 51.81 22.11 58.29
21.99 64.76 21.25 71.24 20.48 77.72 19.87 84.19 19.29 90.67 19.01 97.15
18.91 103.62 18.85 110.1 18.67 116.58 18.57 123.05 18.52 129.53 18.5 136.01
18.83 142.48 19.36 148.96 19.64 155.44 19.61 161.91 19.67 174.86 19.66
181.34 19.67 187.82 19.85 194.29 19.18 200.77 17.5 207.25 15.57 213.72 14.65
220.2 14.68 226.68 14.61 233.15 14.45 239.63 14.24 246.11 13.96 252.58 13.63
259.06 13.41 265.54 12.94 272.01 12.38 278.49 11.55 284.96 11.44 291.44
11.25 297.92 10.86 304.39 10.24 310.87 10.04 330.3 9.64 343.25 9.08 349.73
8.88 356.21 8.79 362.68 8.68 369.16 8.62 375.64 8.6 382.11 8.43 395.06 8.31
401.54 8.11 408.02 7.87 414.49 7.84 420.97 7.68 427.45 7.49 433.92 7.36
440.4 7.16 446.88 6.99 453.35 6.93 459.83 6.69 466.31 6.5 472.78 6.11 485.74
5.28 492.22 4.39 498.7 4.27 505.18 3.97 511.66 3.74 518.14 3.85 524.62 4.04
531.11 4.09 537.59 3.99 544.07 3.79 550.55 3.75 557.03 3.83 569.99 3.8
576.47 3.89 582.95 3.88 589.43 3.76 602.4 3.85 615.36 3.88 621.84 3.82
628.32 3.79 634.8 3.82 647.76 4.17 654.24 4.64 660.72 6.29 667.2 8.57 673.69
10.2 680.17 10.45 686.65 10 693.13 9.46 699.61 8.71 706.09 8.08 712.57 7.84
725.53 7.61 732.01 7.42 738.49 7.28 744.98 7.07 751.46 7 764.42 7.21 770.9
6.81 777.38 6.24 783.72 6.54 790.06 6.86 796.4 6.84 802.74 6.78 809.09 5.97
811.36 6.17 812.5 2.53 828.11 -1.03 853.59 -8.07 878.23 -7.1 899.9 -4.86
912.8 -4.05 932.23 -.89 985.03 3.1 1224.32 5.35 1259.85 11.56 1315.71 11.32
1328.83 11.1 1335.39 11.29 1341.95 11.55 1348.51 10.79 1355.07 9.72 1361.63
9.22 1368.19 9.18 1374.75 9.04 1381.31 9.08 1387.87 9.24 1394.43 9.5 1400.99
9.68 1407.55 9.8 1414.11 9.8 1420.67 9.77 1427.23 9.82 1433.79 10.13 1440.35
10.4 1446.91 10.55 1453.47 10.67 1460.03 10.91 1466.59 11.05 1473.15 11.22
1479.71 11.37 1486.27 11.59 1492.83 11.79 1499.39 12.16 1505.95 12.43
1512.51 12.63 1519.07 13.07 1525.63 13.54 1532.19 13.79 1538.75 14.06
1545.31 14.21 1551.87 14.39 1558.43 14.37 1564.99 14.26 1571.55 14.34
1584.66 14.54 1591.22 14.53 1597.78 14.46 1604.34 14.31 1610.9 14.26 1617.46
14.16 1630.58 13.93 1637.14 13.95 1643.7 14 1650.26 13.85 1656.82 13.75
1663.38 13.67 1676.5 12.53 1683.06 12.19 1689.62 12.25 1702.74 12.51 1709.3
12.71 1715.86 12.83 1722.42 12.84 1728.98 12.75 1735.54 12.59 1742.1 11.81
1748.66 10.27 1755.22 9.69 1768.34 9.91 1774.9 9.92 1781.46 9.72 1788.02
9.05 1801.14 8.29 1807.7 7.94 1820.82 7.79 1827.38 7.73 1833.94 7.72 1840.5
7.67 1847.06 7.67 1853.61 7.45 1860.17 7.57 1866.73 7.74 1873.29 7.63
1879.85 7.67 1886.41 7.5 1892.97 7.49 1906.09 7.33 1912.65 7.24 1919.21 7.25
1925.77 7.38 1932.33 7.82 1938.89 8.22 1945.45 8.47 1952.01 8.5 1958.57 8.7
1965.13 9.14 1971.69 9.52 1978.25 9.78 1984.81 9.89 1991.37 10.07 1997.93
10.07 2004.49 10.2 2017.61 10.37 2024.17 10.75 2030.73 10.94 2037.29 10.74
2043.85 10.57 2050.41 10.69 2056.97 10.85 2063.53 11.07 2070.09 11.13
2076.65 11.1 2083.21 11.14 2089.77 11.12 2102.89 11.44 2109.45 11.56 2116
11.54 2122.56 11.6 2135.68 11.8 2142.24 11.63 2148.8 11.39 2155.36 11.32
2161.92 11.29 2168.48 11.01 2175.04 10.84 2181.6 10.96 2188.16 11.03 2194.72
11.23 2201.28 11.68 2207.84 10.88 2214.4 10.91 2220.96 10.41 2227.52 10.07
2234.08 10.07 2240.64 9.69 2247.2 9.82 2253.76 10.71 2260.32 11.75 2266.88
12.65 2273.44 13.03 2280 13.34 2286.56 13.51 2293.12 13.74 2299.68 13.81
2306.24 14.01 2319.36 14.28 2325.92 13.97 2332.48 13.98 2339.04 13.97 2345.6
13.82 2352.15 13.79 2358.71 13.93 2365.27 13.97 2371.83 14.03 2378.39 14.29
2384.95 14.38 2391.51 14.23 2404.63 14.1 2411.19 14.09 2417.75 13.97 2424.31

13.93 2430.87 13.71 2437.43 14.05 2443.99 14.12 2450.55 14.04 2463.67 14.19
2470.23 14.11 2483.35 14.01 2489.91 13.79 2496.47 13.61 2503.03 13.52
2509.59 13.39 2516.15 13.52 2522.71 13.55 2529.27 13.63 2535.83 13.59
2542.39 13.65 2548.95 13.57 2555.51 13.47 2562.07 13.35 2568.63 13.34
2575.19 13.41 2581.75 13.38 2588.3 13.29 2594.86 13.22 2607.98 12.97 2614.54
12.87 2621.1 12.67 2627.66 12.56 2634.22 12.4 2647.34 12.43 2653.9 12.5
2667.02 12.49 2693.26 12.79 2699.82 12.8 2706.38 12.88 2712.94 12.84 2719.5
12.82 2726.06 12.85 2739.18 12.38 2745.74 12.18 2752.3 12.19 2758.86 12.18
2765.42 12.24 2771.98 12.19 2778.54 12.24 2785.1 12.37 2791.66 12.39 2798.22
12.61 2804.78 12.89 2811.34 13.25 2817.9 13.28 2824.46 13.12 2831.02 13.18
2837.58 13.09 2844.14 13.14 2850.7 12.86 2857.26 12.61 2863.82 12.6 2870.38
12.64 2876.94 12.66 2883.5 12.66 2890.06 12.75 2896.62 12.88 2903.18 12.94
2909.74 13.07 2922.86 13.37 2929.42 13.47 2935.98 13.49 2942.54 13.49 2949.1
13.55 2955.66 13.55 2962.22 13.67 2968.78 13.84 2975.34 13.8 2981.9 13.74
2988.46 13.66 2995.02 13.71 3008.14 13.85 3014.7 13.86 3021.26 13.69 3027.82
13.43 3034.38 13.48 3040.94 13.62 3047.49 13.59 3054.05 13.52 3060.61 13.52
3067.17 13.67 3073.73 13.76 3080.29 13.69 3086.85 13.57 3093.41 13.73
3099.97 13.92 3106.53 13.91 3113.09 13.96 3119.65 14.1 3126.21 14.43 3132.77
15 3139.33 15.31 3145.89 15.38 3152.45 15.24 3159.01 15.05 3165.57 14.8
3172.13 14.82 3178.69 14.81 3185.25 14.69 3191.81 14.72 3198.37 14.82
3204.93 14.9 3211.49 15.02 3218.05 15.02 3224.61 15.11 3231.17 15.23 3237.73
15.28 3244.29 15.87 3250.85 17.3 3257.41 18.75 3263.97 19.03 3270.53 19.18
3277.09 19.11 3283.65 18.93 3296.77 18.64 3303.33 18.56 3309.89 18.51
3316.45 17.86 3323.01 16.08 3329.57 14.86 3336.13 15.05 3342.69 15.55
3349.25 16.08 3355.81 17.1 3362.37 17.45 3368.93 17.43 3375.49 17.27 3382.05
17.18 3388.61 16.82 3395.17 16.54 3401.73 15.86 3408.29 14.84 3414.85 14.39
3421.41 14.74 3427.97 15.25 3441.09 16.21 3447.65 16.14 3454.21 16.27
3460.77 16.14 3467.33 15.82 3473.89 15.53 3480.45 17.16 3487.01 19.18
3493.57 19.9 3500.12 20.05 3506.68 20.17 3513.24 20.34 3519.8 20.48 3526.36
18.87 3532.92 17.71 3539.48 17.75 3546.04 17.64 3552.6 17.22 3559.16 16.72
3565.72 16.35 3572.28 16.38 3578.84 16.26

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .08 680.17 .04 1259.85 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 680.17
1259.85 106.5 128.05 139.73 .3 .5 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 673 10.2 T
 1545 3578.84 14.2 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 15968.76

INPUT
Description: 21.7 -US Face GorOwPkwy
Station Elevation Data num= 492
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 21.56 13.11 21.49 19.67
21.56 26.22 21.48 32.78 21.11 39.33 20.48 45.89 19.56 52.45 18.78 59 18.05
65.56 17.41 72.11 16.93 78.67 16.56 85.22 16.36 91.78 16.22 98.34 15.89

104.89 15.68 111.45 15.8 118 16.12 124.56 16.25 131.11 16.33 137.67 16.69
144.23 16.99 150.78 17.18 157.34 18.06 163.89 19.92 170.45 21.89 177 22.64
183.56 22.99 190.11 23 196.67 22.95 203.23 22.95 209.78 22.87 216.34 22.85
229.45 23.33 236 23.41 242.56 23.29 249.12 23.31 255.67 23.6 262.23 23.56
268.78 22.67 275.34 22.91 288.45 22.87 295.01 23.12 301.56 23.13 308.12
23.29 314.67 23.61 321.23 23.85 327.78 23.79 334.34 23.75 340.9 23.94
360.56 23.69 367.12 23.66 373.67 23.54 380.23 23.44 386.79 23.4 393.34 23.23
399.9 23.11 406.45 23.1 413.01 23.01 419.56 22.96 432.68 22.93 439.23 22.84
445.79 22.82 452.34 22.78 458.9 22.7 465.45 22.59 472.01 22.43 478.56 22.29
485.12 22.39 491.68 22.81 498.23 22.85 504.79 22.79 511.34 22.79 517.9 22.72
524.45 22.68 531.01 22.57 537.57 22.4 544.12 22.33 550.68 22.46 557.23 22.56
563.79 22.51 570.34 22.3 576.9 22.17 583.46 21.77 590.01 21.67 596.57 21.65
603.08 21.91 609.59 21.67 616.1 21.67 622.61 21.85 629.13 21.71 635.64 21.8
642.15 22.03 648.66 21.89 655.17 21.91 661.68 21.87 668.2 21.78 674.71 21.81
681.22 22.01 687.73 21.79 694.24 21.78 700.76 21.75 713.78 21.6 720.29 21.42
726.8 21.13 733.31 20.71 739.83 20.56 746.34 20.23 752.85 20.48 759.36 21.21
765.87 21.12 772.38 20.68 778.9 20.44 798.78 11.26 804.26 9.9 814.14 3.79
816.39 1.54 820.83 .07 830.49 -1.96 841.67 -5.82 857.23 -6.8 876.24 -8.13
882.69 -5.49 884.65 -6.24 885.77 -5.45 905.83 -3 925.98 -3.48 946.52 -1
954.71 1.12 961.23 4.3 967.74 6.96 974.25 9.6 980.76 12.13 987.3 14.18
993.84 15.37 1000.38 15.82 1006.91 15.76 1013.45 15.21 1019.99 14.53 1026.53
14.95 1033.06 15.07 1039.6 14.52 1046.14 14.65 1052.68 15.22 1059.22 14.98
1065.75 15 1072.29 15.36 1078.83 14.88 1085.37 14.66 1091.91 14.78 1098.44
14.31 1104.98 13.72 1111.52 13.35 1118.06 13.14 1124.6 12.91 1131.13 12.5
1137.67 12.11 1144.21 11.86 1150.75 11.59 1157.29 11.24 1170.36 11 1176.9
11.05 1183.44 11.04 1189.97 10.98 1196.51 10.88 1203.05 10.95 1209.59 11.14
1216.13 11.25 1222.66 11.01 1235.74 10.69 1242.28 10.85 1248.82 10.86
1255.35 10.85 1261.89 10.88 1268.43 10.72 1274.97 10.62 1288.04 10.33
1294.58 10.28 1307.66 10.23 1320.73 10.32 1327.27 10.61 1333.81 10.94
1340.35 11.16 1346.88 11.16 1353.42 11.11 1359.96 11.28 1373.04 11.37
1379.57 11.61 1386.11 11.96 1392.65 12.33 1399.19 12.49 1412.26 13.07 1418.8
13.12 1425.34 13.34 1431.88 13.65 1438.42 13.86 1444.95 14.22 1458.03 14.36
1464.57 14.5 1477.64 14.51 1484.18 14.54 1497.26 14.76 1503.79 14.72 1516.87
14.27 1523.41 14.22 1529.95 14.58 1536.48 14.72 1543.02 14.76 1549.56 14.93
1556.1 14.89 1569.17 15.4 1575.71 15.41 1588.79 15.33 1595.33 15.31 1601.86
15.38 1608.4 15.26 1614.94 15.03 1621.48 15.25 1628.02 14.99 1634.55 15.18
1641.09 15.21 1647.63 15.22 1660.7 15.28 1667.24 15.34 1673.78 15.44 1680.32
15.49 1693.39 15.68 1699.93 15.8 1706.47 15.76 1713.01 15.93 1719.55 16.06
1726.08 16.05 1732.62 15.99 1739.16 16.06 1745.7 16.18 1752.24 16.15 1758.77
16.02 1765.31 15.97 1771.85 15.97 1778.39 16.06 1784.92 16.09 1791.46 16.25
1798 17.04 1804.54 17.39 1811.08 17.31 1817.61 17.39 1824.15 17.6 1830.69
17.58 1837.23 17.49 1850.3 16.92 1856.84 17.12 1863.38 17.37 1869.92 17.33
1876.46 17.48 1882.99 17.54 1889.53 17.55 1896.07 17.61 1902.61 17.43
1909.15 17.48 1915.68 17.49 1928.76 17.29 1935.3 17.34 1941.83 17.37 1948.37
17.33 1954.91 17.23 1961.45 17.1 1974.52 17.21 1981.06 17.36 1987.6 17.69
1994.14 17.9 2000.68 18.03 2007.21 18.34 2013.75 18.62 2020.29 18.93 2026.83
19.22 2033.37 19.36 2039.9 19.34 2046.44 19.2 2052.98 19.14 2059.52 19.14
2066.05 18.92 2072.59 18.58 2079.13 18.57 2085.67 18.62 2092.21 18.53
2098.74 18.47 2111.82 18.41 2118.36 18.42 2124.9 18.34 2131.43 18.34 2137.97
18.51 2144.51 18.36 2151.05 18.13 2157.59 17.84 2164.12 17.7 2170.66 17.8
2177.2 17.73 2183.74 17.72 2190.27 17.76 2196.81 17.83 2203.35 17.82 2216.43
17.47 2222.96 17.45 2229.5 17.49 2236.04 17.46 2242.58 17.51 2249.12 17.54
2255.65 17.49 2262.19 17.53 2268.73 17.49 2275.27 17.54 2281.81 17.42
2288.34 17.05 2294.88 16.74 2301.42 16.67 2314.49 16.71 2321.03 16.75

2327.57 16.84 2334.11 16.9 2340.65 16.81 2353.72 16.86 2360.26 16.82 2373.34 16.5 2379.87 16.46 2386.41 16.49 2392.95 16.3 2399.49 15.99 2406.03 15.74 2412.56 15.56 2419.1 15.42 2432.18 15.36 2438.71 15.39 2445.25 15.52 2451.79 15.71 2458.33 15.76 2464.87 15.93 2471.4 15.93 2484.48 15.68 2497.56 15.64 2504.09 15.52 2510.63 15.22 2517.17 15.56 2523.71 15.44 2530.25 15.44 2536.78 15.52 2543.32 15.55 2549.86 15.56 2556.4 15.59 2562.93 15.73 2576.01 15.92 2582.55 15.87 2595.62 15.94 2602.16 15.72 2608.7 15.59 2615.24 15.91 2621.78 15.98 2634.85 16.18 2641.38 16.31 2647.91 16.38 2654.43 16.37 2660.96 16.1 2674.02 16.15 2680.55 16 2687.07 15.58 2693.6 15.25 2700.13 15.08 2713.18 14.71 2719.71 14.62 2726.24 14.64 2732.77 14.6 2745.82 14.37 2752.35 14.24 2758.88 14.02 2765.4 13.9 2771.93 14.13 2778.46 14.34 2784.99 14.31 2798.04 14.08 2804.57 14.07 2817.63 14.01 2824.15 14.07 2830.68 14.23 2837.21 14.42 2843.74 14.51 2850.26 14.65 2856.79 14.68 2863.32 14.78 2876.38 14.67 2882.9 14.72 2889.43 14.84 2895.96 14.84 2902.49 14.96 2909.01 14.8 2915.54 14.78 2922.07 14.62 2928.6 14.92 2935.12 14.78 2941.65 14.95 2948.18 14.73 2954.71 14.69 2961.23 14.88 2967.76 14.89 2974.29 15.31 2980.82 15.43 2987.34 15.49 2993.87 15.52 3000.4 15.73 3006.93 15.96 3013.46 16.34 3019.98 16.67 3026.51 16.82 3033.04 17.09 3039.57 17.39 3046.09 17.5 3052.62 17.57 3059.15 17.89 3065.68 18.11 3072.2 18.42 3085.26 18.89 3091.79 17.65 3098.32 17.17 3104.84 17.62 3117.9 18.04 3124.43 18.27 3130.95 18.67 3137.48 19.15 3144.01 19.57 3150.54 19.96 3157.06 20.04 3163.59 19.95 3170.12 20.03 3176.65 20.13 3183.17 20.17 3189.7 20.33 3196.23 20.47 3202.76 20.47 3209.29 20.43 3215.81 20.46 3222.34 20.51 3228.87 20.39 3235.4 20.12 3241.92 20.08 3248.45 20.13 3261.51 20.36 3268.03 20.37 3274.56 20.36 3281.09 20.51 3287.62 20.8 3294.15 21.01 3300.67 21.16 3307.2 21.07 3313.73 21.01 3320.26 21.1 3326.78 21.47 3333.31 21.55 3339.84 21.74 3346.37 21.71 3352.89 21.83 3359.42 22.15 3365.95 22.25 3372.48 21.89 3379 21.85 3385.53 21.95 3392.06 22.07 3398.59 22.45 3405.11 22.77 3411.64 22.73 3418.17 22.61 3424.7 22.66 3431.23 22.84 3437.75 23.11 3444.28 23.27 3457.34 23.3 3470.39 23.41 3476.92 23.59 3483.45 23.64 3489.97 23.91 3496.5 24.09 3509.56 24.09 3516.09 24.07 3522.61 24.19 3529.14 24.26 3535.67 24.24 3542.2 24.27 3548.72 24.16 3561.78 24.03 3568.31 23.92 3574.83 23.95 3581.36 24 3587.89 24.03 3594.42 24.02 3600.94 24.05
 Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 778.9 .04 1000.38 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 778.9 1000.38 71.69 72.2 74.47 .5 .8 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 1051.7 3600.94 15.1 T

BRIDGE

RIVER: Taunton River
REACH: Main Stem RS: 15933.16

INPUT
Description: 21.5 Hon Gordon Owen Pkwy
Distance from Upstream XS = 8
Deck/Roadway Width = 60
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates

num= 12
Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
0 23.89 272 23.89 587 21.32
785 20.92 15.19 885 20.33 14.44 957 19.45 13.69
1002 17.81 13.69 1100 13.31 1206 10.72 1326 10.81 1526 14.47 1691 15.47

Upstream Bridge Cross Section Data
Station Elevation Data num= 492
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 21.56 13.11 21.49 19.67
21.56 26.22 21.48 32.78 21.11 39.33 20.48 45.89 19.56 52.45 18.78 59 18.05
65.56 17.41 72.11 16.93 78.67 16.56 85.22 16.36 91.78 16.22 98.34 15.89
104.89 15.68 111.45 15.8 118 16.12 124.56 16.25 131.11 16.33 137.67 16.69
144.23 16.99 150.78 17.18 157.34 18.06 163.89 19.92 170.45 21.89 177 22.64
183.56 22.99 190.11 23 196.67 22.95 203.23 22.95 209.78 22.87 216.34 22.85
229.45 23.33 236 23.41 242.56 23.29 249.12 23.31 255.67 23.6 262.23 23.56
268.78 22.67 275.34 22.91 288.45 22.87 295.01 23.12 301.56 23.13 308.12
23.29 314.67 23.61 321.23 23.85 327.78 23.79 334.34 23.75 340.9 23.94
360.56 23.69 367.12 23.66 373.67 23.54 380.23 23.44 386.79 23.4 393.34 23.23
399.9 23.11 406.45 23.1 413.01 23.01 419.56 22.96 432.68 22.93 439.23 22.84
445.79 22.82 452.34 22.78 458.9 22.7 465.45 22.59 472.01 22.43 478.56 22.29
485.12 22.39 491.68 22.81 498.23 22.85 504.79 22.79 511.34 22.79 517.9 22.72
524.45 22.68 531.01 22.57 537.57 22.4 544.12 22.33 550.68 22.46 557.23 22.56
563.79 22.51 570.34 22.3 576.9 22.17 583.46 21.77 590.01 21.67 596.57 21.65
603.08 21.91 609.59 21.67 616.1 21.67 622.61 21.85 629.13 21.71 635.64 21.8
642.15 22.03 648.66 21.89 655.17 21.91 661.68 21.87 668.2 21.78 674.71 21.81
681.22 22.01 687.73 21.79 694.24 21.78 700.76 21.75 713.78 21.6 720.29 21.42
726.8 21.13 733.31 20.71 739.83 20.56 746.34 20.23 752.85 20.48 759.36 21.21
765.87 21.12 772.38 20.68 778.9 20.44 798.78 11.26 804.26 9.9 814.14 3.79
816.39 1.54 820.83 .07 830.49 -1.96 841.67 -5.82 857.23 -6.8 876.24 -8.13
882.69 -5.49 884.65 -6.24 885.77 -5.45 905.83 -3 925.98 -3.48 946.52 -1
954.71 1.12 961.23 4.3 967.74 6.96 974.25 9.6 980.76 12.13 987.3 14.18
993.84 15.37 1000.38 15.82 1006.91 15.76 1013.45 15.21 1019.99 14.53 1026.53
14.95 1033.06 15.07 1039.6 14.52 1046.14 14.65 1052.68 15.22 1059.22 14.98
1065.75 15 1072.29 15.36 1078.83 14.88 1085.37 14.66 1091.91 14.78 1098.44
14.31 1104.98 13.72 1111.52 13.35 1118.06 13.14 1124.6 12.91 1131.13 12.5
1137.67 12.11 1144.21 11.86 1150.75 11.59 1157.29 11.24 1170.36 11 1176.9
11.05 1183.44 11.04 1189.97 10.98 1196.51 10.88 1203.05 10.95 1209.59 11.14
1216.13 11.25 1222.66 11.01 1235.74 10.69 1242.28 10.85 1248.82 10.86
1255.35 10.85 1261.89 10.88 1268.43 10.72 1274.97 10.62 1288.04 10.33
1294.58 10.28 1307.66 10.23 1320.73 10.32 1327.27 10.61 1333.81 10.94
1340.35 11.16 1346.88 11.16 1353.42 11.11 1359.96 11.28 1373.04 11.37
1379.57 11.61 1386.11 11.96 1392.65 12.33 1399.19 12.49 1412.26 13.07 1418.8
13.12 1425.34 13.34 1431.88 13.65 1438.42 13.86 1444.95 14.22 1458.03 14.36
1464.57 14.5 1477.64 14.51 1484.18 14.54 1497.26 14.76 1503.79 14.72 1516.87
14.27 1523.41 14.22 1529.95 14.58 1536.48 14.72 1543.02 14.76 1549.56 14.93
1556.1 14.89 1569.17 15.4 1575.71 15.41 1588.79 15.33 1595.33 15.31 1601.86
15.38 1608.4 15.26 1614.94 15.03 1621.48 15.25 1628.02 14.99 1634.55 15.18
1641.09 15.21 1647.63 15.22 1660.7 15.28 1667.24 15.34 1673.78 15.44 1680.32
15.49 1693.39 15.68 1699.93 15.8 1706.47 15.76 1713.01 15.93 1719.55 16.06
1726.08 16.05 1732.62 15.99 1739.16 16.06 1745.7 16.18 1752.24 16.15 1758.77
16.02 1765.31 15.97 1771.85 15.97 1778.39 16.06 1784.92 16.09 1791.46 16.25
1798 17.04 1804.54 17.39 1811.08 17.31 1817.61 17.39 1824.15 17.6 1830.69
17.58 1837.23 17.49 1850.3 16.92 1856.84 17.12 1863.38 17.37 1869.92 17.33
1876.46 17.48 1882.99 17.54 1889.53 17.55 1896.07 17.61 1902.61 17.43

1909.15 17.48 1915.68 17.49 1928.76 17.29 1935.3 17.34 1941.83 17.37 1948.37
17.33 1954.91 17.23 1961.45 17.1 1974.52 17.21 1981.06 17.36 1987.6 17.69
1994.14 17.9 2000.68 18.03 2007.21 18.34 2013.75 18.62 2020.29 18.93 2026.83
19.22 2033.37 19.36 2039.9 19.34 2046.44 19.2 2052.98 19.14 2059.52 19.14
2066.05 18.92 2072.59 18.58 2079.13 18.57 2085.67 18.62 2092.21 18.53
2098.74 18.47 2111.82 18.41 2118.36 18.42 2124.9 18.34 2131.43 18.34 2137.97
18.51 2144.51 18.36 2151.05 18.13 2157.59 17.84 2164.12 17.7 2170.66 17.8
2177.2 17.73 2183.74 17.72 2190.27 17.76 2196.81 17.83 2203.35 17.82 2216.43
17.47 2222.96 17.45 2229.5 17.49 2236.04 17.46 2242.58 17.51 2249.12 17.54
2255.65 17.49 2262.19 17.53 2268.73 17.49 2275.27 17.54 2281.81 17.42
2288.34 17.05 2294.88 16.74 2301.42 16.67 2314.49 16.71 2321.03 16.75
2327.57 16.84 2334.11 16.9 2340.65 16.81 2353.72 16.86 2360.26 16.82 2373.34
16.5 2379.87 16.46 2386.41 16.49 2392.95 16.3 2399.49 15.99 2406.03 15.74
2412.56 15.56 2419.1 15.42 2432.18 15.36 2438.71 15.39 2445.25 15.52 2451.79
15.71 2458.33 15.76 2464.87 15.93 2471.4 15.93 2484.48 15.68 2497.56 15.64
2504.09 15.52 2510.63 15.22 2517.17 15.56 2523.71 15.44 2530.25 15.44
2536.78 15.52 2543.32 15.55 2549.86 15.56 2556.4 15.59 2562.93 15.73 2576.01
15.92 2582.55 15.87 2595.62 15.94 2602.16 15.72 2608.7 15.59 2615.24 15.91
2621.78 15.98 2634.85 16.18 2641.38 16.31 2647.91 16.38 2654.43 16.37
2660.96 16.1 2674.02 16.15 2680.55 16 2687.07 15.58 2693.6 15.25 2700.13
15.08 2713.18 14.71 2719.71 14.62 2726.24 14.64 2732.77 14.6 2745.82 14.37
2752.35 14.24 2758.88 14.02 2765.4 13.9 2771.93 14.13 2778.46 14.34 2784.99
14.31 2798.04 14.08 2804.57 14.07 2817.63 14.01 2824.15 14.07 2830.68 14.23
2837.21 14.42 2843.74 14.51 2850.26 14.65 2856.79 14.68 2863.32 14.78
2876.38 14.67 2882.9 14.72 2889.43 14.84 2895.96 14.84 2902.49 14.96 2909.01
14.8 2915.54 14.78 2922.07 14.62 2928.6 14.92 2935.12 14.78 2941.65 14.95
2948.18 14.73 2954.71 14.69 2961.23 14.88 2967.76 14.89 2974.29 15.31
2980.82 15.43 2987.34 15.49 2993.87 15.52 3000.4 15.73 3006.93 15.96 3013.46
16.34 3019.98 16.67 3026.51 16.82 3033.04 17.09 3039.57 17.39 3046.09 17.5
3052.62 17.57 3059.15 17.89 3065.68 18.11 3072.2 18.42 3085.26 18.89 3091.79
17.65 3098.32 17.17 3104.84 17.62 3117.9 18.04 3124.43 18.27 3130.95 18.67
3137.48 19.15 3144.01 19.57 3150.54 19.96 3157.06 20.04 3163.59 19.95
3170.12 20.03 3176.65 20.13 3183.17 20.17 3189.7 20.33 3196.23 20.47 3202.76
20.47 3209.29 20.43 3215.81 20.46 3222.34 20.51 3228.87 20.39 3235.4 20.12
3241.92 20.08 3248.45 20.13 3261.51 20.36 3268.03 20.37 3274.56 20.36
3281.09 20.51 3287.62 20.8 3294.15 21.01 3300.67 21.16 3307.2 21.07 3313.73
21.01 3320.26 21.1 3326.78 21.47 3333.31 21.55 3339.84 21.74 3346.37 21.71
3352.89 21.83 3359.42 22.15 3365.95 22.25 3372.48 21.89 3379 21.85 3385.53
21.95 3392.06 22.07 3398.59 22.45 3405.11 22.77 3411.64 22.73 3418.17 22.61
3424.7 22.66 3431.23 22.84 3437.75 23.11 3444.28 23.27 3457.34 23.3 3470.39
23.41 3476.92 23.59 3483.45 23.64 3489.97 23.91 3496.5 24.09 3509.56 24.09
3516.09 24.07 3522.61 24.19 3529.14 24.26 3535.67 24.24 3542.2 24.27 3548.72
24.16 3561.78 24.03 3568.31 23.92 3574.83 23.95 3581.36 24 3587.89 24.03
3594.42 24.02 3600.94 24.05

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 778.9 .04 1000.38 .085

Bank Sta: Left Right Coeff Contr. Expan.
 778.9 1000.38 .5 .8
Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 1051.7 3600.94 15.1 T

Downstream Deck/Roadway Coordinates
 num= 12
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 0 23.89 266 23.89 580 21.32 778 20.92 15.19 878 20.33 14.44 950 19.45
13.69
 995 17.81 1093 13.31 1199 10.72
 1319 10.81 1519 14.47 1685 15.47

Downstream Bridge Cross Section Data
Station Elevation Data num= 99
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 20.57 13.06 20.8 19.59 21.35
130.62 21.07 156.74 19.97 202.46 18.98 235.12 17.82 320.02 17.61 333.08
18.13 457.73 16.38 470.85 16.59 483.97 18.97 549.57 20.2 562.69 21.02 575.68
20.94 588.68 20.18 601.67 20.08 627.66 19.44 686.14 18.49 692.64 18.7
705.63 18.27 712.13 20.47 725.12 19.99 731.62 20.55 757.5 19.94 778.78 11.26
784.26 9.9 794.14 3.79 796.39 1.54 800.83 .07 810.49 -1.96 821.67 -5.82
837.23 -6.8 856.24 -8.13 862.69 -5.49 864.65 -6.24 865.77 -5.45 885.83 -3
905.98 -3.48 926.52 -1 942.82 3.67 949.21 6.85 955.6 10.12 961.99 13.22
968.38 15.67 974.77 16.93 994.09 17.04 1013.71 16.45 1020.25 15.75 1033.33
15.53 1052.95 13.99 1085.65 13.2 1151.04 10.66 1229.52 10.46 1281.84 9.84
1340.7 12.04 1360.32 13.38 1419.17 15.78 1451.87 15.08 1471.49 15.38 1582.67
17.85 1595.75 17.15 1602.29 16.43 1608.83 16.23 1634.99 17.62 1667.68 18.29
1713.46 17.83 1739.62 17.05 1837.72 18.89 1857.34 18.17 1883.5 15.91 1909.65
15.18 1961.97 15.77 2020.83 14.9 2027.37 14.49 2105.85 14.28 2118.93 18.69
2151.62 19.51 2210.48 17.93 2282.42 18.75 2354.35 18.05 2360.89 17.75
2380.51 18.25 2511.31 16.77 2524.39 17.45 2746.59 17.68 2955.65 18.3 2968.72
17.62 3001.38 18.57 3086.31 18.56 3177.78 21.49 3230.04 23.04 3262.71 23.29
3275.77 23.08 3314.97 24.11 3334.57 25.94 3393.37 26.76 3543.63 26.2 3576.3
25.95

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 757.5 .035 974.77 .085

Bank Sta: Left Right Coeff Contr. Expan.
 757.5 974.77 .5 .8
Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 994 3576.3 17 T

Upstream Embankment side slope = 0 horiz. to 1.0 vertical Downstream
Embankment side slope = 0 horiz. to 1.0 vertical Maximum allowable
submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Piers = 1

Pier Data
Pier Station Upstream= 871 Downstream= 883
Upstream num= 4 Width Elev Width Elev Width Elev Width Elev
 1.6 3.2 1.6 6 1.3 10 1.3 14.5

Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.6 3.2 1.6 6 1.3 10 1.3 14.5

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
 Energy
 W.S. Pro Method

 W.S.Pro Data
 Left Embankment
 El of the top of the embankment = 20.3
 El of the toe of the abutment = -1
 Right Embankment
 El of the top of the embankment = 17.8
 El of the toe of the abutment = -1
 Abutment Type = 2 Vert. abutments and sloping embankments Slope of abutments =
 Top with of embankment = 60
 Centroid station of bridge opening =
 Wing Wall Type = No wing walls present
 Width =   Angle =
 Radius =
 Guide Banks Type = No Guide Bank present
 Length =
 Offset =
 Angle =

Selected Low Flow Methods = W.S.Pro Method

High Flow Method
 Energy Only

Additional Bridge Parameters
 Add Friction component to Momentum
 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 15896.56

INPUT
Description: 21.3 - DS Face GorOwPkwy
Station Elevation Data num= 99
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 20.57 13.06 20.8 19.59 21.35 130.62 21.07 156.74 19.97 202.46 18.98 235.12 17.82 320.02 17.61 333.08 18.13 457.73 16.38 470.85 16.59 483.97 18.97 549.57 20.2 562.69 21.02 575.68 20.94 588.68 20.18 601.67 20.08 627.66 19.44 686.14 18.49 692.64 18.7

705.63 18.27 712.13 20.47 725.12 19.99 731.62 20.55 757.5 19.94 778.78 11.26
784.26 9.9 794.14 3.79 796.39 1.54 800.83 .07 810.49 -1.96 821.67 -5.82
837.23 -6.8 856.24 -8.13 862.69 -5.49 864.65 -6.24 865.77 -5.45 885.83 -3
905.98 -3.48 926.52 -1 942.82 3.67 949.21 6.85 955.6 10.12 961.99 13.22
968.38 15.67 974.77 16.93 994.09 17.04 1013.71 16.45 1020.25 15.75 1033.33
15.53 1052.95 13.99 1085.65 13.2 1151.04 10.66 1229.52 10.46 1281.84 9.84
1340.7 12.04 1360.32 13.38 1419.17 15.78 1451.87 15.08 1471.49 15.38 1582.67
17.85 1595.75 17.15 1602.29 16.43 1608.83 16.23 1634.99 17.62 1667.68 18.29
1713.46 17.83 1739.62 17.05 1837.72 18.89 1857.34 18.17 1883.5 15.91 1909.65
15.18 1961.97 15.77 2020.83 14.9 2027.37 14.49 2105.85 14.28 2118.93 18.69
2151.62 19.51 2210.48 17.93 2282.42 18.75 2354.35 18.05 2360.89 17.75
2380.51 18.25 2511.31 16.77 2524.39 17.45 2746.59 17.68 2955.65 18.3 2968.72
17.62 3001.38 18.57 3086.31 18.56 3177.78 21.49 3230.04 23.04 3262.71 23.29
3275.77 23.08 3314.97 24.11 3334.57 25.94 3393.37 26.76 3543.63 26.2 3576.3
25.95

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 757.5 .035 974.77 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 757.5
974.77 162.26 134.72 118.38 .5 .8 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent 994 3576.3 17 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 15761.84

INPUT
Description: 21 Exit GorOwPkwy
Station Elevation Data num= 353
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 21.7 6.55 21.29 13.1 21.04
19.65 20.82 26.2 20.62 39.3 20.27 45.85 20.26 52.4 20.36 58.94 20.43 65.49
20.57 78.59 21.05 85.14 21.07 91.69 21.03 98.24 21.09 111.34 21.17 137.54
21.27 203.03 21.3 209.58 21.29 222.68 21.32 229.23 21.28 235.78 21.14 248.88
20.75 255.43 20.59 261.97 20.45 268.52 20.08 275.07 19.64 281.62 19.35
288.17 19.13 294.72 19.06 301.27 19.03 307.82 18.79 314.37 18.6 320.92 18.45
434.54 15.43 668.24 11.27 896.01 8.54 901.01 1.61 935.32 -1.49 952.06 -6.57
978.62 -5.64 994.78 -4.62 1012.02 -5.53 1025.12 -6.83 1047.31 .44 1063.44
1.98 1070.61 6.65 1105.64 6.75 1138.68 5.62 1184.64 4.61 1250.1 9.14
1257.37 10.37 1339.24 9.74 1449.3 15.16 1455.86 15.44 1462.42 16.1 1468.98
16.25 1482.1 16.32 1495.23 16.21 1501.79 16.04 1508.35 15.97 1514.91 15.84
1521.47 15.83 1528.03 16.03 1534.59 16.01 1541.15 15.84 1547.71 15.58
1554.27 15.45 1560.83 15.67 1567.4 15.99 1573.96 16.13 1580.52 16.21 1587.08
16.37 1593.64 16.7 1600.2 17.01 1606.76 17.22 1613.32 17.51 1619.88 17.74
1626.44 17.53 1633.01 17.58 1639.57 17.35 1652.69 16.92 1659.25 16.58
1665.81 16.16 1672.37 15.82 1678.93 15.73 1685.49 15.72 1698.61 15.76
1705.18 15.7 1711.74 15.88 1718.3 15.75 1724.86 15.75 1737.98 15.5 1744.54
15.5 1751.1 15.65 1757.66 15.54 1764.22 15.45 1770.79 15.88 1777.35 15.65
1783.91 15.34 1790.47 15 1797.03 14.68 1803.59 14.81 1810.15 14.75 1816.71
14.66 1823.27 14.72 1829.83 14.82 1836.39 14.84 1849.52 15.01 1862.64 15
1869.2 15.11 1875.76 15.3 1882.32 15.37 1888.88 15.5 1895.44 15.61 1902 15.5

1915.13 14.97 1921.69 14.84 1928.25 14.77 1934.81 14.58 1941.37 14.31
1947.93 14.22 1954.49 14.04 1961.05 14.1 1967.61 13.76 1974.17 13.23 1980.74
12.87 1987.3 12.89 1993.86 12.98 2000.42 13.19 2006.98 13.38 2013.54 13.59
2020.1 14 2026.66 14.01 2033.22 13.75 2039.78 13.52 2046.35 13.45 2052.91
13.23 2059.47 13.08 2066.03 13.27 2072.59 13.32 2079.15 13.11 2085.71 13.25
2092.27 13.37 2098.83 13.31 2105.39 13.01 2111.95 12.89 2118.51 12.96
2131.64 13.01 2138.2 13.15 2144.76 13.22 2151.32 13.18 2157.88 13.16 2164.44
13.12 2171 13.12 2177.56 13.01 2184.12 12.94 2190.68 12.97 2197.25 13.06
2203.81 13.07 2210.37 13.1 2216.93 13.17 2230.05 12.94 2236.61 13.01 2243.17
13.11 2249.73 13.24 2256.29 13.5 2262.85 13.66 2269.41 13.69 2282.54 13.87
2289.1 13.59 2295.66 13.48 2302.22 13.66 2308.78 13.9 2315.34 14.12 2321.9
14.36 2328.46 14.65 2335.02 14.97 2341.58 14.97 2348.14 15.38 2354.71 15.36
2361.27 15.67 2367.83 15.85 2374.39 15.99 2380.95 16.16 2387.51 16.1 2394.07
16.21 2400.63 16.4 2407.19 16.57 2413.75 16.92 2420.31 17.24 2426.88 17.48
2433.44 17.64 2440 17.4 2446.56 17.07 2453.12 16.84 2459.68 16.72 2466.24
16.69 2472.8 16.76 2479.36 16.77 2485.92 16.81 2492.48 16.79 2499.04 16.93
2505.61 16.94 2512.17 16.92 2518.73 16.76 2531.85 16.68 2538.41 16.71
2544.97 16.77 2551.53 16.66 2558.09 16.39 2564.65 16.23 2577.77 16.29
2584.34 16.17 2597.46 16.12 2617.14 16.11 2630.26 16.06 2649.94 16.06
2656.51 16.08 2663.07 15.98 2669.63 15.96 2682.75 15.85 2702.43 16 2708.99
15.97 2715.55 15.82 2722.08 15.69 2728.6 15.69 2735.13 15.64 2741.65 15.61
2748.18 15.65 2754.7 15.85 2761.23 16 2767.75 16.06 2774.28 16.18 2780.8
16.44 2787.33 16.73 2793.85 16.85 2800.38 16.74 2806.9 16.71 2813.43 16.98
2819.95 17.03 2826.48 17.12 2833 17.26 2839.53 17.42 2846.05 17.13 2852.58
17.1 2859.1 17.17 2865.63 17.07 2872.15 17.05 2878.68 16.94 2885.2 16.91
2891.73 16.73 2898.25 16.8 2904.78 16.7 2911.3 16.84 2917.83 16.85 2924.35
16.93 2930.88 16.98 2937.4 17.12 2943.93 17.14 2950.45 17.2 2956.98 17.36
2963.5 17.03 2970.03 17.42 2976.55 17.09 2983.08 16.56 2996.13 15.25 3002.65
15.08 3009.18 15.08 3015.7 14.93 3028.75 14.67 3041.8 14.49 3048.33 14.48
3054.85 14.55 3061.38 14.47 3067.91 14.44 3074.43 14.58 3080.95 14.68
3087.48 14.58 3094 14.58 3100.53 14.71 3107.06 14.89 3113.58 15.15 3120.11
15.71 3126.63 17.13 3133.16 18.34 3139.68 19.11 3146.21 20.28 3152.73 21.64
3159.26 22.84 3165.78 23.44 3172.31 23.63 3178.83 23.77 3185.36 23.84
3191.88 23.86 3204.93 23.73 3211.46 23.69 3217.98 23.71 3224.51 23.83
3231.03 23.92 3237.56 23.92 3244.08 24.08 3250.61 24.34 3257.13 24.2 3263.66
23.95 3270.18 23.93 3276.71 24.05 3283.23 24.26 3289.76 24.45 3296.28 24.53
3302.81 24.51 3309.33 24.62 3315.86 24.85 3328.91 24.97 3335.43 25 3341.96
25.11 3348.48 24.93 3355.01 25.18 3361.53 25.24 3368.06 24.95 3374.58 25.22
3381.11 25.17 3387.63 25.14 3394.16 25.24 3400.68 25.25 3407.21 25.45
3413.73 25.61 3420.26 26.09 3426.78 26.29 3433.31 26.45 3439.83 26.57
3446.36 26.72 3452.88 26.84 3459.41 27.17 3465.93 27.36 3472.46 27.46
3485.51 27.75 3492.03 27.88 3498.56 27.98 3511.61 28.26 3518.13 28.31
3524.66 28.31 3531.18 28.44 3537.71 28.53 3544.23 28.45 3550.76 28.48
3557.28 28.44 3563.81 28.48 3576.86 28.63 3583.38 28.64 3589.91 28.55
3596.43 28.63 3602.96 28.67 3609.48 28.64

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .085 896.01 .035 1070.61 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 896.01
1070.61 770.87 758.69 764.06 .3 .5 Ineffective Flow num= 1
Sta L Sta R Elev Permanent
1650 3609.48 17.2 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 15003.16

INPUT
Description: 20
Station Elevation Data num= 476
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 23.41 6.54 23.49 19.61 22.9
58.84 22.9 65.37 22.82 84.99 23.17 91.52 23.47 98.06 23.51 104.6 23.73
117.67 24.73 150.36 25.29 156.9 25.61 196.12 25.55 215.73 24.96 235.34 24.86
241.88 24.72 261.49 23.26 274.57 22.07 287.64 20.44 294.18 20.34 307.26
19.21 313.79 18.78 320.33 18.09 333.41 17.24 346.48 16.78 353.02 16.81
372.63 15.99 379.17 15.81 411.85 14.19 418.39 14.02 431.47 14.85 444.54
14.18 457.62 13.79 483.76 11.76 490.3 11.37 496.84 11.14 503.38 10.72 509.91
10.15 529.53 8.76 549.14 8.4 555.68 8.19 568.75 8.13 575.29 7.96 581.82 7.57
588.36 7.49 594.9 8.04 601.44 8.07 607.97 7.91 634.12 7.83 647.2 7.94
660.27 7.77 679.89 7.98 686.42 7.89 692.96 8.22 699.5 8.28 712.57 8.06
725.65 8.13 738.72 7.91 751.8 7.35 758.33 7.3 771.41 7.73 791.02 8.18 830.24
8.93 843.32 9.45 882.54 10.77 895.62 10.72 902.16 10.82 921.77 10.49 928.3
10.17 934.84 10.07 947.92 9.49 954.45 9.38 960.99 9.62 980.6 10.68 993.68
11.06 1000.22 11.41 1006.75 11.53 1013.29 11.29 1019.83 10.87 1032.9 10.48
1052.51 8.96 1059.05 8.03 1065.59 6.61 1072.13 4.49 1072.97 4.17 1078.58
2.03 1090 -.84 1095.6 -1.12 1096.58 -1.29 1097.84 -1.6 1099.12 -2 1100.8 -
2.55 1102.25 -3.36 1104.34 -4.26 1107.39 -5.33 1112.74 -6.71 1115.3 -7.26
1117.28 -7.56 1119.52 -7.94 1124.46 -8 1126.95 -7.93 1129.61 -7.68 1134.73 -
7.45 1137.33 -7.21 1139.88 -7.04 1142.39 -6.9 1144.89 -6.73 1147.38 -6.6
1149.94 -6.57 1152.32 -6.57 1154.6 -6.46 1156.68 -6.46 1158.89 -6.51 1161.01
-6.47 1163.2 -6.42 1165.31 -6.36 1167.39 -6.31 1169.21 -6.15 1171.06 -6.06
1172.65 -6.09 1174.2 -5.98 1175.63 -5.93 1177.43 -5.84 1179.18 -5.73 1181.2
-5.53 1183.23 -5.22 1185.47 -4.84 1187.51 -4.24 1189.45 -3.68 1191.07 -3.08
1192.79 -2.35 1194.34 -1.81 1195.32 -1.07 1201.7 1.96 1208.26 4.89 1214.82
5.38 1221.38 5.16 1227.95 5.14 1234.51 5.38 1241.07 5.31 1247.63 5.44
1254.19 5.3 1260.75 5.1 1267.32 4.78 1273.88 4.99 1280.44 4.82 1287 4.53
1293.56 4.5 1300.12 4.4 1306.69 4.45 1313.25 4.43 1319.81 4.31 1326.37 4.69
1332.93 4.38 1339.49 4.27 1346.06 4.44 1352.62 4.98 1359.18 5.23 1365.74
5.24 1372.3 6.35 1378.86 8.69 1385.43 10.59 1391.99 11.92 1398.55 12.39
1405.11 11.35 1411.67 11.1 1418.23 10.98 1424.79 10.9 1437.92 10.68 1444.48
10.99 1451.04 11.25 1457.6 11.44 1464.16 11.42 1470.73 11.24 1477.29 11.18
1490.41 11.3 1496.97 11.4 1510.1 11.99 1516.66 12.23 1523.22 12.45 1536.34
13.04 1542.9 13.41 1549.47 13.76 1556.03 14.06 1562.59 14.41 1569.15 14.67
1575.71 14.84 1582.27 15.22 1588.84 15.79 1595.4 16 1608.52 16.51 1615.08
16.65 1621.64 16.83 1634.77 16.98 1641.33 17.17 1647.89 17.3 1654.45 17.03
1661.01 17.01 1667.57 16.89 1674.14 16.79 1687.26 16.77 1713.51 16.74
1726.63 16.77 1733.19 16.55 1739.75 16.01 1746.31 15.31 1759.44 14.14 1766
14.11 1772.56 13.92 1779.12 13.66 1785.68 13.44 1792.25 13.53 1798.81 13.45
1805.37 13.52 1811.93 13.5 1818.49 13.61 1825.05 13.84 1831.62 13.96 1838.18
14.02 1844.74 13.84 1851.3 13.82 1857.86 13.82 1864.42 13.53 1870.99 13.54
1877.55 13.3 1890.67 12.95 1897.23 13.02 1903.79 13 1910.35 13.02 1916.92
13.01 1923.48 12.93 1930.04 12.81 1936.6 12.75 1943.16 12.82 1949.72 12.85
1956.29 12.76 1962.85 12.59 1969.41 12.49 1975.97 12.58 1982.53 12.38
1989.09 12.11 2002.22 11.92 2008.78 11.92 2021.9 11.88 2028.46 11.95 2035.03
11.89 2041.59 11.87 2067.83 11.7 2074.4 11.69 2087.52 11.73 2094.08 11.78

2100.64 11.79 2107.2 11.82 2113.77 11.93 2120.33 12.07 2126.89 12.29 2133.45
12.48 2140.01 13.15 2146.57 13.77 2153.14 13.86 2159.7 13.91 2166.26 14.11
2172.82 14.28 2179.38 14.36 2185.94 14.46 2199.07 14.59 2205.63 14.58
2212.19 14.55 2218.75 14.61 2225.31 14.37 2231.87 14.27 2238.44 13.97 2245
13.59 2251.56 13.55 2258.12 13.19 2264.68 13.13 2277.81 13.47 2284.37 13.48
2290.93 13.83 2297.49 13.78 2304.05 14.09 2310.61 14.23 2317.18 14.43
2323.74 14.5 2336.86 14.15 2343.42 14.1 2349.98 14.11 2356.55 14.44 2363.11
14.54 2369.67 14.77 2376.23 14.94 2382.79 14.92 2395.92 15.04 2402.48 14.8
2409.04 14.75 2415.6 14.76 2422.16 14.75 2428.72 14.51 2435.29 14.42 2441.85
14.55 2448.41 14.53 2454.97 14.57 2461.53 14.48 2468.09 14.2 2474.66 14.31
2481.22 14.27 2487.78 14.31 2494.34 14.44 2500.9 14.55 2507.46 14.99 2514.02
16.2 2520.59 16.3 2527.15 15.92 2533.71 15.91 2540.27 16.4 2546.83 16.7
2553.39 16.12 2559.96 15.78 2566.52 15.81 2579.64 16.02 2586.2 16 2599.33
15.88 2605.89 15.93 2612.45 16.18 2619.01 16.3 2625.57 16.26 2632.13 16.14
2638.7 16.24 2645.26 16.4 2651.82 16.38 2658.38 16.42 2664.94 16.56 2671.5
16.58 2678.07 16.71 2684.63 16.66 2691.19 16.58 2704.31 16.5 2710.87 16.6
2717.44 16.43 2724 16.43 2730.56 16.46 2737.12 16.45 2743.68 16.46 2750.24
16.56 2756.8 16.56 2763.37 16.35 2769.93 16.37 2783.05 16.32 2789.61 16.25
2796.17 16.25 2802.74 16.37 2809.3 16.29 2815.86 16.23 2822.42 16.34 2828.98
16.3 2835.54 16.23 2842.11 16.23 2848.67 16.19 2861.79 16 2874.91 15.92
2881.48 15.85 2888.04 15.7 2894.6 15.64 2901.16 15.73 2914.28 15.79 2920.85
15.71 2927.41 15.8 2933.97 15.82 2940.53 15.72 2947.09 15.69 2953.65 15.72
2960.22 16.01 2966.78 16.24 2973.34 16.23 2979.9 16.08 2986.46 16.57 2993.02
17.39 2999.59 19.14 3006.15 22.24 3012.71 22.37 3019.27 19.67 3025.83 16.93
3032.39 15.5 3038.95 15.2 3045.52 15.31 3052.08 14.78 3058.64 14.08 3065.2
14.07 3071.76 14.2 3078.32 14.19 3084.89 14.14 3091.45 14.29 3098.01 14.24
3117.69 14.41 3124.26 14.5 3137.38 14.3 3143.94 14.28 3150.5 14.19 3157.06
14.29 3163.63 14.36 3170.19 14.4 3183.31 14.44 3196.43 14.47 3203 14.5
3209.56 14.68 3216.12 14.68 3222.68 14.58 3229.24 14.67 3235.8 14.58 3242.31
14.58 3248.82 14.64 3255.33 14.62 3261.84 14.58 3268.35 14.58 3274.86 14.67
3281.37 14.88 3287.88 15.35 3294.39 16.34 3307.41 21.71 3313.92 23.47
3320.43 24.21 3326.94 24.27 3333.45 23.91 3339.96 23.58 3346.47 23.38
3352.98 23.26 3359.49 23.08 3366 22.84 3372.51 22.97 3379.02 23.08 3385.53
23.01 3392.04 23.01 3398.55 23.15 3405.06 23.41 3411.57 23.71 3418.08 23.99
3424.59 24.24 3431.1 24.41 3437.61 24.48 3444.12 24.62 3457.14 24.87 3463.65
24.91 3470.16 24.73 3476.67 24.67 3483.18 25.05 3489.69 25.26 3496.2 25.07
3502.71 25.01 3509.22 24.98 3515.73 25.02 3522.24 24.99 3528.75 24.83
3535.26 24.88 3541.77 25.07 3548.28 25.21 3554.79 25.33 3561.3 25.32 3567.81
25.41 3574.32 25.89 3580.83 26.08 3587.34 26.17 3593.85 26.08 3600.36 26.11
3613.38 26.29 3619.89 26.42 3626.4 26.33 3632.91 26.26 3639.42 26.24 3645.93
26.19 3652.44 26.18 3658.95 26.25 3698.01 27.08 3711.03 27.34 3717.54 27.45
3724.05 27.52 3730.56 27.55

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 1006.75 .035 1398.55 .085
 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1006.75 1398.55 749.32 742.03 737.61 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 3012 3730.56 22 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 14261.13

INPUT
Description: 19 Approach RR Br
Station Elevation Data num= 121
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 23.58 32.8 23.06 78.72 24.08 124.64 26.95 150.88 26.91 190.24 27.31 255.84 24.57 275.53 23.4 282.09 22.71 295.21 19.36 308.33 18.48 406.73 13.18 432.97 12.63 472.33 9.51 505.13 7.75 524.81 7.59 557.61 8.43 583.85 7.65 675.69 7.74 741.29 9.01 787.22 11.02 806.9 10.86 859.38 8.88 970.9 8.91 997.14 10.24 1010.26 10 1016.82 10.21 1023.38 9.95 1036.5 6.77 1043.06 5.54 1056.18 4.2 1069.3 3.86 1134.9 4.57 1161.14 4.78 1213.62 5.62 1272.67 3.65 1305.47 3.34 1449.73 4.74 1482.24 6.71 1527.76 6.47 1537.58 6.98 1606.13 5.76 1652.08 5.3 1654.17 2.05 1667.89 -.84 1699.29 -7.38 1713.7 -10.22 1736.02 -11.33 1750.35 -11.98 1762.16 .14 1768.2 3.68 1794.82 14.93 1845.18 14.52 1858.28 14.93 1877.92 14.25 1891.02 14.55 1982.72 12.14 2008.92 12.47 2041.67 13.26 2048.22 12.78 2061.32 13.04 2080.97 12.51 2120.26 12.86 2126.81 12.54 2316.75 14.51 2369.15 13.51 2395.35 14.72 2401.9 14.2 2415 12.47 2434.64 12.35 2487.04 13.27 2526.34 15 2644.23 15.74 2683.53 14.76 2781.77 15.35 2834.17 16.57 2906.22 17.54 2932.42 16.9 2965.16 17.02 3011.01 15.96 3017.56 16.32 3024.11 16.11 3037.21 16.47 3050.31 15.85 3069.96 16.01 3207.5 14.89 3227.15 15.36 3233.7 15.24 3240.25 15.57 3266.45 15.07 3273 16.08 3279.55 14.98 3325.39 14.49 3358.14 15.24 3377.79 14.84 3403.99 16.47 3410.54 16.27 3449.84 17.84 3456.39 17.57 3462.94 18.04 3469.48 17.35 3476.03 17.56 3482.58 16.88 3508.78 16.62 3515.33 15.75 3521.88 15.9 3528.43 16.58 3534.98 16.83 3548.08 16.55 3561.18 16.76 3574.28 17.55 3593.93 17.28 3613.58 18.36 3620.13 19.45 3626.68 19.93 3659.42 19.87 3672.52 20.6 3724.92 21.2 3836.26 23.02 3862.46 23.83 3908.31 23.98

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .085 1652.08 .035 1794.82 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1652.08 1794.82 78.25 69.35 66.1 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 14191.78

INPUT
Description: 18.7 - US Face RR Br
Station Elevation Data num= 110 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 31.38 78.42 28.3 111.09 28.3 137.23 27.94 156.84 28.1 241.79 23.74 261.39 21.19 326.74 18.25 365.95 16.29 372.49 16.2 392.09 15.04 411.7 12.76 483.58 8.24 503.18 8.21 529.32 6.42 542.39 7.13 620.81 6.63 712.3 8.63 744.97 10.16 784.18 10.79 823.39 8.96 927.95 9.1 947.55 9.39 954.09 9.1 973.69 8.93 993.3 10.26 1006.37 10.2 1032.51 8.48 1058.65 4.84 1078.25 3.57 1189.34 4.45 1208.95 5.78 1228.55 5.55 1241.62 4.38 1261.23 3.82 1293.9 3.89 1333.11 3.68 1418.06 3.36 1450.74 4.47 1463.81 5.47 1483.41 5.2 1489.95 4.65 1496.48 5.34 1503.02 7.47 1509.55 10.58 1529.23 11.42 1535.79 10.64 1542.35 9.29 1575.15

7.11 1607.95 11.4 1621.07 10.42 1627.63 11.13 1634.19 11.13 1647.31 9.71
1653.87 10.74 1660.43 10.52 1666.99 10.91 1680.11 10.77 1693.23 11.81
1719.47 11.65 1740 13.96 1753.45 13.89 1753.69 13.75 1754.08 2.65 1759.81
.53 1763.3 -1.58 1769.05 -3.33 1772.95 -5.41 1779.66 -6.96 1783.33 -7.36
1790.85 -6.94 1794.65 -5.3 1799.89 -5.32 1803.29 -5.31 1809.58 -4.97 1813.69
-2.69 1821.52 -7.23 1825.23 -9.32 1829.72 -10.03 1841.06 -11.09 1846.96 -9.3
1850.3 -7.08 1857.36 -4.21 1861.19 -2.77 1870.09 .46 1870.37 13.32 1870.58
13.39 1890.45 12.9 1896.64 14.94 1994.78 15.57 2053.67 15.02 2197.61 14.35
2230.33 14.39 2269.59 13.93 2295.76 14.82 2335.02 14.77 2374.27 15.62
2400.45 15.36 2406.99 14.81 2433.16 14.51 2583.65 14.94 2590.19 14.73
2629.45 15.31 2806.11 16.08 2812.65 15.82 3022.02 17.35 3192.14 18.46
3859.52 22.79 3872.61 22.4 4049.26 24.1

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val 0 .085 1753.45 .035 1896.64 .082

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1753.45
1896.64 44.24 43.72 44.72 .6 .8 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 1500 1753 13.89 T

BRIDGE

RIVER: Taunton River
REACH: Main Stem RS: 14174.03

INPUT
Description: 18.5 RR
Distance from Upstream XS = 5
Deck/Roadway Width = 20
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
 num= 18
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 1289 13.55 1507 14.6 1744 15.04
 1753 16.76 12.55 1759 16.76 12.55 1762 16.76 12.53
 1812 16.76 12.62 1821 16.76 12.7 1821.5 16.76 10.88
 1825 16.76 10.88 1850 16.86 10.87 1850.1 16.86 12.65 1856 16.86 12.67 1867
16.86 12.69 1870 14.93
 1954 14.56 2085 15.16 2271 15.21

Upstream Bridge Cross Section Data
Station Elevation Data num= 110
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 31.38 78.42 28.3 111.09 28.3
137.23 27.94 156.84 28.1 241.79 23.74 261.39 21.19 326.74 18.25 365.95 16.29
372.49 16.2 392.09 15.04 411.7 12.76 483.58 8.24 503.18 8.21 529.32 6.42
542.39 7.13 620.81 6.63 712.3 8.63 744.97 10.16 784.18 10.79 823.39 8.96
927.95 9.1 947.55 9.39 954.09 9.1 973.69 8.93 993.3 10.26 1006.37 10.2
1032.51 8.48 1058.65 4.84 1078.25 3.57 1189.34 4.45 1208.95 5.78 1228.55
5.55 1241.62 4.38 1261.23 3.82 1293.9 3.89 1333.11 3.68 1418.06 3.36 1450.74
4.47 1463.81 5.47 1483.41 5.2 1489.95 4.65 1496.48 5.34 1503.02 7.47 1509.55
10.58 1529.23 11.42 1535.79 10.64 1542.35 9.29 1575.15 7.11 1607.95 11.4
1621.07 10.42 1627.63 11.13 1634.19 11.13 1647.31 9.71 1653.87 10.74 1660.43

10.52 1666.99 10.91 1680.11 10.77 1693.23 11.81 1719.47 11.65 1740 13.96
1753.45 13.89 1753.69 13.75 1754.08 2.65 1759.81 .53 1763.3 -1.58 1769.05 -
3.33 1772.95 -5.41 1779.66 -6.96 1783.33 -7.36 1790.85 -6.94 1794.65 -5.3
1799.89 -5.32 1803.29 -5.31 1809.58 -4.97 1813.69 -2.69 1821.52 -7.23
1825.23 -9.32 1829.72 -10.03 1841.06 -11.09 1846.96 -9.3 1850.3 -7.08
1857.36 -4.21 1861.19 -2.77 1870.09 .46 1870.37 13.32 1870.58 13.39 1890.45
12.9 1896.64 14.94 1994.78 15.57 2053.67 15.02 2197.61 14.35 2230.33 14.39
2269.59 13.93 2295.76 14.82 2335.02 14.77 2374.27 15.62 2400.45 15.36
2406.99 14.81 2433.16 14.51 2583.65 14.94 2590.19 14.73 2629.45 15.31
2806.11 16.08 2812.65 15.82 3022.02 17.35 3192.14 18.46 3859.52 22.79
3872.61 22.4 4049.26 24.1

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 1753.45 .035 1896.64 .082

Bank Sta: Left Right Coeff Contr. Expan.
 1753.45 1896.64 .6 .8
Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 1500 1753 13.89 T

Downstream Deck/Roadway Coordinates
 num= 18
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 1374 13.55 1592 14.6 1829 15.04
 1838 16.76 12.55 1844 16.76 12.55 1847 16.76 12.53
 1897 16.76 12.62 1906 16.76 12.7 1906.1 16.76 10.88
 1910 16.76 10.88 1935 16.86 10.87 1935.1 16.86 12.65
 1941 16.86 12.67 1952 16.86 12.69 1955 14.93   2039 14.56 2170 15.16 2356
15.21

Downstream Bridge Cross Section Data
Station Elevation Data num= 493
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 32.67 19.62 32.01 26.16
31.57 39.25 31.04 52.33 30.21 65.41 28.88 71.95 28.4 85.03 27.93 104.66
26.38 124.28 26.33 130.82 26.16 137.36 25.76 150.44 25.84 163.52 26.11
176.61 25.96 189.69 25.37 196.23 24.96 222.39 22.77 228.93 22.33 235.48
21.63 242.02 20.69 248.56 19.93 268.18 19.8 300.89 18.46 327.05 17.87
359.75 16.57 372.84 16.4 392.46 14.85 418.62 12.36 438.25 11.11 444.79 10.97
451.33 10.62 464.41 9.55 484.03 8.37 490.57 8.18 497.12 7.85 503.66 7.69
510.2 7.73 529.82 7.43 542.9 6.03 549.44 6.25 555.98 6.7 562.53 6.94 569.07
6.56 575.61 6.49 595.23 6.77 608.31 6.5 614.85 6.77 634.48 7.23 647.56 7.71
660.64 7.78 673.72 8.06 693.35 8.63 699.89 8.99 712.97 9.33 739.13 10.51
758.76 10.7 765.3 10.57 798 10.45 817.63 8.98 837.25 8.56 843.79 8.51 850.33
8.6 869.95 8.36 896.12 8.71 915.74 8.72 922.28 8.94 928.82 8.92 948.45 9.43
961.53 9.52 974.61 9.37 981.15 9 987.69 9.16 994.23 9.74 1000.77 10.04
1007.31 9.94 1013.86 10.3 1026.94 10.68 1033.48 10.51 1040.02 10.15 1046.56
9.61 1059.64 7.01 1072.72 4.54 1079.27 4.06 1085.81 3.78 1098.89 3.55
1125.05 3.92 1131.59 3.8 1144.67 3.88 1151.22 4.06 1157.76 3.9 1170.84 4.04
1183.92 3.76 1190.46 3.9 1197 4.37 1203.54 5.1 1216.63 6.19 1223.17 6.43
1229.71 6.4 1236.25 5.7 1242.79 4.8 1249.33 4.54 1255.87 4.54 1288.58 3.4
1301.66 3.67 1314.74 3.55 1321.28 3.34 1334.36 3.32 1340.9 3.17 1353.99 3.69
1360.53 3.41 1373.61 3.72 1393.23 3.65 1399.77 3.42 1406.31 3.34 1412.85

3.44 1425.94 4.04 1445.56 4.2 1452.1 4.88 1458.64 7.69 1465.18 10.82 1471.72
12.95 1484.81 13.44 1491.35 13.47 1497.89 13.29 1504.43 12.05 1510.97 9.44
1517.51 5.42 1524.05 4.35 1537.11 4.73 1550.14 4.64 1556.66 4.39 1563.17
5.46 1569.69 4.87 1576.21 4.69 1582.72 5.08 1589.24 4.91 1595.76 4.58
1608.79 4.94 1615.31 4.58 1628.34 4.87 1634.86 5.51 1654.41 6.38 1660.92
5.67 1667.44 5.49 1680.47 6.17 1686.99 6.67 1700.02 7.24 1706.54 7.05
1713.06 6.7 1719.57 6.79 1726.09 7.27 1732.61 7.37 1745.64 6.4 1752.16 6.19
1758.67 6.73 1765.19 6.96 1771.7 6.48 1778.22 6.74 1784.74 7.39 1797.77 7.14
1804.29 6.79 1810.8 6.6 1817.32 6.94 1823.85 6.82 1830.37 5.99 1830.9 5.87
1836.9 4.46 1839.08 2.65 1844.81 .53 1848.3 -1.58 1854.05 -3.33 1857.95 -
5.41 1864.66 -6.96 1868.33 -7.36 1875.85 -6.94 1879.65 -5.3 1884.89 -5.32
1888.29 -5.31 1894.58 -4.97 1898.69 -2.69 1906.52 -7.23 1910.23 -9.32
1914.72 -10.03 1926.06 -11.09 1931.96 -9.3 1935.3 -7.08 1942.36 -4.21
1946.19 -2.77 1955.09 .46 1955.37 13.32 1955.58 13.39 1980.45 13.83 1987.01
14.72 1993.57 14.86 2006.69 15.19 2013.25 15.22 2019.81 15.19 2026.37 14.9
2032.93 14.84 2039.49 15.03 2046.05 15.35 2052.61 15.58 2059.17 15.4 2065.73
14.8 2072.29 14.41 2078.85 14.62 2085.41 15.15 2091.97 15.44 2098.53 15.26
2105.1 15.15 2118.22 15.22 2124.78 15.2 2131.34 15.21 2137.9 15.38 2144.46
15.64 2151.02 15.74 2157.58 15.81 2164.14 15.86 2170.7 15.89 2177.26 15.89
2183.82 15.78 2196.94 15.48 2203.5 15.37 2210.06 15.29 2216.62 15.25 2223.18
15.24 2236.3 15.33 2242.86 15.41 2249.42 15.52 2255.98 15.65 2262.54 15.75
2269.1 15.78 2275.66 15.75 2288.78 15.64 2295.34 15.56 2301.9 15.6 2308.46
15.56 2315.02 15.42 2328.14 15.33 2334.7 15.26 2347.82 15.16 2354.38 15.14
2360.94 15.17 2367.5 15.07 2374.06 15.06 2380.62 15.07 2387.18 14.98 2393.74
14.96 2400.3 14.84 2406.86 14.8 2413.42 14.81 2419.98 14.89 2426.54 14.77
2433.1 14.86 2439.66 14.86 2446.22 14.76 2452.78 14.76 2459.34 14.85 2465.9
14.97 2472.46 15.02 2479.02 15.02 2485.58 15.16 2492.15 15.24 2498.71 15.12
2505.27 15.34 2511.83 15.4 2518.39 15.32 2524.95 15.11 2531.51 14.95 2538.07
14.9 2557.75 14.61 2570.87 14.82 2577.43 14.71 2590.55 14.82 2597.11 14.86
2610.23 15.04 2616.79 15.24 2623.35 15.36 2629.91 15.41 2636.47 15.48
2643.03 15.25 2649.59 15.6 2656.15 15.74 2662.71 15.83 2669.27 15.9 2675.83
15.95 2688.95 15.96 2695.51 15.99 2702.07 16.05 2708.63 16.15 2715.19 16.31
2721.75 16.57 2728.31 16.85 2734.87 16.8 2741.43 16.86 2747.99 17 2754.55
17.06 2761.11 17.06 2767.67 16.89 2774.23 16.69 2780.79 16.45 2787.35 16.27
2793.91 16.35 2800.47 16.35 2807.03 16.31 2813.59 16.37 2826.71 16.4 2833.27
16.5 2852.95 16.64 2859.51 16.76 2866.07 16.76 2872.63 16.8 2879.19 16.69
2885.75 16.68 2898.88 16.77 2905.44 16.76 2918.56 16.69 2925.12 16.64
2931.68 16.7 2938.24 16.62 2951.36 16.71 2957.92 16.62 2964.48 16.68 2971.04
16.7 2977.6 16.66 2984.16 16.57 2990.72 16.64 3003.84 16.7 3010.4 16.63
3016.96 16.67 3023.52 16.74 3030.08 16.72 3043.2 16.71 3056.32 16.65 3062.88
16.69 3069.44 16.75 3076 16.69 3082.56 16.73 3089.12 16.71 3102.24 16.59
3108.8 16.65 3115.36 16.54 3121.92 16.59 3128.48 16.73 3135.04 17.15 3141.6
17.37 3148.16 19.29 3154.72 19.88 3161.28 17.85 3167.84 17.75 3180.96 18.16
3187.52 18.12 3194.08 17.95 3200.64 17.66 3207.2 17.7 3213.76 17.89 3220.32
18.03 3226.88 18.33 3233.44 18.76 3240 19.03 3246.56 19.41 3253.12 19.65
3259.68 19.6 3266.24 19.65 3272.8 19.92 3279.36 20.07 3285.92 20.08 3292.48
20.04 3299.04 19.74 3305.61 19.02 3312.17 17.24 3318.73 15.12 3325.29 14.36
3331.85 14.3 3338.41 14.34 3344.97 14.7 3351.53 15.23 3358.09 15.42 3364.65
15.33 3371.21 15.37 3377.77 15.72 3384.33 16.84 3390.89 16.49 3397.45 14.71
3404.01 14.49 3410.57 14.23 3417.13 14.8 3423.69 14.8 3430.25 14.97 3436.81
15.08 3443.37 15.06 3449.93 14.65 3456.49 13.71 3463.05 13.1 3469.61 13.09
3476.17 13.16 3482.73 13.27 3489.29 13.13 3495.85 13.1 3502.41 13.13 3508.97
13.18 3515.53 13.31 3522.09 13.37 3528.65 13.45 3535.21 13.48 3541.77 13.44
3548.33 13.22 3554.89 13.12 3561.45 13.07 3568.01 13.05 3574.57 13.23

3581.13 13.27 3587.69 13.27 3594.25 13.23 3600.81 13.35 3607.37 13.4 3620.49 13.9 3633.61 13.59 3640.17 13.56 3646.73 13.59 3653.29 13.38 3659.85 13.27 3666.41 13.41 3679.53 13.76 3686.09 13.57 3692.65 13.62 3699.22 13.62 3705.78 13.77 3712.34 13.68 3718.9 13.88 3725.46 13.95 3732.02 13.64 3738.58 13.59 3745.14 13.68 3751.7 13.8 3758.26 13.83 3764.82 13.76 3771.38 13.86 3784.5 13.92 3791.06 14.01 3797.62 14.07 3804.18 14.22 3810.74 14.42 3817.3 14.42 3823.86 14.36 3836.98 14.3 3843.54 14.38 3850.1 14.38 3863.22 14.59 3869.78 14.75 3876.34 14.76 3882.9 14.84 3889.46 14.72 3896.02 15.05 3902.58 15.07 3909.14 15.26 3915.7 15.32 3922.26 15.36 3928.82 15.36 3935.38 15.63 3941.94 15.71 3948.5 15.62 3955.06 15.86 3961.62 15.97 3968.18 15.81 3974.74 16.01 3981.3 16.06 3987.86 16 3994.42 16.05 4000.98 16.17 4007.54 16.32 4027.22 16.59 4033.78 16.63 4040.34 16.74 4046.9 16.95 4060.02 17.1 4066.58 17.23 4073.14 17.41 4079.7 17.27 4086.26 17.79 4092.82 18.07 4099.39 18.09 4105.95 18.28 4112.51 18.15 4119.07 18.1 4125.63 18.14 4132.19 18.44 4138.75 18.63 4145.31 18.87 4158.43 19.24 4164.99 19.29 4171.55 19.1

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 1817.32 .035 1955.37 .082

Bank Sta: Left Right Coeff Contr. Expan.
 1817.32 1955.37 .5 .5

Upstream Embankment side slope = 0 horiz. to 1.0 vertical Downstream Embankment side slope = 0 horiz. to 1.0 vertical Maximum allowable submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Piers = 21

Pier Data
Pier Station Upstream= 1759 Downstream= 1844
Upstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14
Downstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14

Pier Data
Pier Station Upstream= 1762 Downstream= 1847
Upstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14
Downstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14

Pier Data
Pier Station Upstream= 1768 Downstream= 1853
Upstream num= 2

```
 Width Elev Width Elev
 .8 -12 .8 14
Downstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14

Pier Data
Pier Station Upstream= 1772 Downstream= 1857 Upstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14
Downstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14

Pier Data
Pier Station Upstream= 1778 Downstream= 1863
Upstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14
Downstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14

Pier Data
Pier Station Upstream= 1782 Downstream= 1867
Upstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14
Downstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14

Pier Data
Pier Station Upstream= 1790 Downstream= 1875
Upstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14
Downstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14

Pier Data Pier Station Upstream= 1793 Downstream= 1878
Upstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14
Downstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14

Pier Data
Pier Station Upstream= 1799 Downstream= 1884
Upstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14
```

```
Downstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14

Pier Data
Pier Station Upstream= 1802 Downstream= 1887
Upstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14
Downstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14

Pier Data
Pier Station Upstream= 1808 Downstream= 1893
Upstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14
Downstream num= 2
 Width Elev Width Elev  .8 -12 .8 14

Pier Data
Pier Station Upstream= 1813 Downstream= 1898
Upstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14
Downstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14

Pier Data
Pier Station Upstream= 1820 Downstream= 1905
Upstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14
Downstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14

Pier Data
Pier Station Upstream= 1820 Downstream= 1905
Upstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14
Downstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14

Pier Data
Pier Station Upstream= 1824 Downstream= 1909
Upstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14
Downstream num= 2  Width Elev Width Elev
```

```
 .8 -12 .8 14

Pier Data
Pier Station Upstream= 1829 Downstream= 1914
Upstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14
Downstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14

Pier Data
Pier Station Upstream= 1840 Downstream= 1925
Upstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14
Downstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14

Pier Data
Pier Station Upstream= 1846 Downstream= 1931
Upstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14
Downstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14

Pier Data
Pier Station Upstream= 1849 Downstream= 1934
Upstream num= 2
 Width Elev Width Elev  .8 -12 .8 14
Downstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14

Pier Data
Pier Station Upstream= 1856 Downstream= 1941
Upstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14
Downstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14

Pier Data
Pier Station Upstream= 1860 Downstream= 1945
Upstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14
Downstream num= 2
 Width Elev Width Elev
 .8 -12 .8 14
```

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
 Energy
 W.S. Pro Method

 W.S.Pro Data
 Left Embankment
 El of the top of the embankment = 15
 El of the toe of the abutment = 2.6
 Right Embankment
 El of the top of the embankment = 15
 El of the toe of the abutment = 2.6
 Abutment Type = 3 Sloping abutments and sloping embankments Slope of abutments = 4
 Top with of embankment = 17
 Centroid station of bridge opening =
 Wing Wall Type = No wing walls present
 Width =
 Angle =
 Radius =
 Guide Banks Type = No Guide Bank present
 Length =
 Offset =
 Angle =

Selected Low Flow Methods = W.S.Pro Method

High Flow Method
 Energy Only

Additional Bridge Parameters
 Add Friction component to Momentum
 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line
 CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 14148.05

INPUT
Description: 18.3 DS Face RR Br
Station Elevation Data num= 493
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 32.67 19.62 32.01 26.16 31.57 39.25 31.04 52.33 30.21 65.41 28.88 71.95 28.4 85.03 27.93 104.66 26.38 124.28 26.33 130.82 26.16 137.36 25.76 150.44 25.84 163.52 26.11 176.61 25.96 189.69 25.37 196.23 24.96 222.39 22.77 228.93 22.33 235.48 21.63 242.02 20.69 248.56 19.93 268.18 19.8 300.89 18.46 327.05 17.87 359.75 16.57 372.84 16.4 392.46 14.85 418.62 12.36 438.25 11.11 444.79 10.97 451.33 10.62 464.41 9.55 484.03 8.37 490.57 8.18 497.12 7.85 503.66 7.69 510.2 7.73 529.82 7.43 542.9 6.03 549.44 6.25 555.98 6.7 562.53 6.94 569.07

6.56 575.61 6.49 595.23 6.77 608.31 6.5 614.85 6.77 634.48 7.23 647.56 7.71
660.64 7.78 673.72 8.06 693.35 8.63 699.89 8.99 712.97 9.33 739.13 10.51
758.76 10.7 765.3 10.57 798 10.45 817.63 8.98 837.25 8.56 843.79 8.51 850.33
8.6 869.95 8.36 896.12 8.71 915.74 8.72 922.28 8.94 928.82 8.92 948.45 9.43
961.53 9.52 974.61 9.37 981.15 9 987.69 9.16 994.23 9.74 1000.77 10.04
1007.31 9.94 1013.86 10.3 1026.94 10.68 1033.48 10.51 1040.02 10.15 1046.56
9.61 1059.64 7.01 1072.72 4.54 1079.27 4.06 1085.81 3.78 1098.89 3.55
1125.05 3.92 1131.59 3.8 1144.67 3.88 1151.22 4.06 1157.76 3.9 1170.84 4.04
1183.92 3.76 1190.46 3.9 1197 4.37 1203.54 5.1 1216.63 6.19 1223.17 6.43
1229.71 6.4 1236.25 5.7 1242.79 4.8 1249.33 4.54 1255.87 4.54 1288.58 3.4
1301.66 3.67 1314.74 3.55 1321.28 3.34 1334.36 3.32 1340.9 3.17 1353.99 3.69
1360.53 3.41 1373.61 3.72 1393.23 3.65 1399.77 3.42 1406.31 3.34 1412.85
3.44 1425.94 4.04 1445.56 4.2 1452.1 4.88 1458.64 7.69 1465.18 10.82 1471.72
12.95 1484.81 13.44 1491.35 13.47 1497.89 13.29 1504.43 12.05 1510.97 9.44
1517.51 5.42 1524.05 4.35 1537.11 4.73 1550.14 4.64 1556.66 4.39 1563.17
5.46 1569.69 4.87 1576.21 4.69 1582.72 5.08 1589.24 4.91 1595.76 4.58
1608.79 4.94 1615.31 4.58 1628.34 4.87 1634.86 5.51 1654.41 6.38 1660.92
5.67 1667.44 5.49 1680.47 6.17 1686.99 6.67 1700.02 7.24 1706.54 7.05
1713.06 6.7 1719.57 6.79 1726.09 7.27 1732.61 7.37 1745.64 6.4 1752.16 6.19
1758.67 6.73 1765.19 6.96 1771.7 6.48 1778.22 6.74 1784.74 7.39 1797.77 7.14
1804.29 6.79 1810.8 6.6 1817.32 6.94 1823.85 6.82 1830.37 5.99 1830.9 5.87
1836.9 4.46 1839.08 2.65 1844.81 .53 1848.3 -1.58 1854.05 -3.33 1857.95 -
5.41 1864.66 -6.96 1868.33 -7.36 1875.85 -6.94 1879.65 -5.3 1884.89 -5.32
1888.29 -5.31 1894.58 -4.97 1898.69 -2.69 1906.52 -7.23 1910.23 -9.32
1914.72 -10.03 1926.06 -11.09 1931.96 -9.3 1935.3 -7.08 1942.36 -4.21
1946.19 -2.77 1955.09 .46 1955.37 13.32 1955.58 13.39 1980.45 13.83 1987.01
14.72 1993.57 14.86 2006.69 15.19 2013.25 15.22 2019.81 15.19 2026.37 14.9
2032.93 14.84 2039.49 15.03 2046.05 15.35 2052.61 15.58 2059.17 15.4 2065.73
14.8 2072.29 14.41 2078.85 14.62 2085.41 15.15 2091.97 15.44 2098.53 15.26
2105.1 15.15 2118.22 15.22 2124.78 15.2 2131.34 15.21 2137.9 15.38 2144.46
15.64 2151.02 15.74 2157.58 15.81 2164.14 15.86 2170.7 15.89 2177.26 15.89
2183.82 15.78 2196.94 15.48 2203.5 15.37 2210.06 15.29 2216.62 15.25 2223.18
15.24 2236.3 15.33 2242.86 15.41 2249.42 15.52 2255.98 15.65 2262.54 15.75
2269.1 15.78 2275.66 15.75 2288.78 15.64 2295.34 15.56 2301.9 15.6 2308.46
15.56 2315.02 15.42 2328.14 15.33 2334.7 15.26 2347.82 15.16 2354.38 15.14
2360.94 15.17 2367.5 15.07 2374.06 15.06 2380.62 15.07 2387.18 14.98 2393.74
14.96 2400.3 14.84 2406.86 14.8 2413.42 14.81 2419.98 14.89 2426.54 14.77
2433.1 14.86 2439.66 14.86 2446.22 14.76 2452.78 14.76 2459.34 14.85 2465.9
14.97 2472.46 15.02 2479.02 15.02 2485.58 15.16 2492.15 15.24 2498.71 15.12
2505.27 15.34 2511.83 15.4 2518.39 15.32 2524.95 15.11 2531.51 14.95 2538.07
14.9 2557.75 14.61 2570.87 14.82 2577.43 14.71 2590.55 14.82 2597.11 14.86
2610.23 15.04 2616.79 15.24 2623.35 15.36 2629.91 15.41 2636.47 15.48
2643.03 15.25 2649.59 15.6 2656.15 15.74 2662.71 15.83 2669.27 15.9 2675.83
15.95 2688.95 15.96 2695.51 15.99 2702.07 16.05 2708.63 16.15 2715.19 16.31
2721.75 16.57 2728.31 16.85 2734.87 16.8 2741.43 16.86 2747.99 17 2754.55
17.06 2761.11 17.06 2767.67 16.89 2774.23 16.69 2780.79 16.45 2787.35 16.27
2793.91 16.35 2800.47 16.35 2807.03 16.31 2813.59 16.37 2826.71 16.4 2833.27
16.5 2852.95 16.64 2859.51 16.76 2866.07 16.76 2872.63 16.8 2879.19 16.69
2885.75 16.68 2898.88 16.77 2905.44 16.76 2918.56 16.69 2925.12 16.64
2931.68 16.7 2938.24 16.62 2951.36 16.71 2957.92 16.62 2964.48 16.68 2971.04
16.7 2977.6 16.66 2984.16 16.57 2990.72 16.64 3003.84 16.7 3010.4 16.63
3016.96 16.67 3023.52 16.74 3030.08 16.72 3043.2 16.71 3056.32 16.65 3062.88
16.69 3069.44 16.75 3076 16.69 3082.56 16.73 3089.12 16.71 3102.24 16.59
3108.8 16.65 3115.36 16.54 3121.92 16.59 3128.48 16.73 3135.04 17.15 3141.6

17.37 3148.16 19.29 3154.72 19.88 3161.28 17.85 3167.84 17.75 3180.96 18.16
3187.52 18.12 3194.08 17.95 3200.64 17.66 3207.2 17.7 3213.76 17.89 3220.32
18.03 3226.88 18.33 3233.44 18.76 3240 19.03 3246.56 19.41 3253.12 19.65
3259.68 19.6 3266.24 19.65 3272.8 19.92 3279.36 20.07 3285.92 20.08 3292.48
20.04 3299.04 19.74 3305.61 19.02 3312.17 17.24 3318.73 15.12 3325.29 14.36
3331.85 14.3 3338.41 14.34 3344.97 14.7 3351.53 15.23 3358.09 15.42 3364.65
15.33 3371.21 15.37 3377.77 15.72 3384.33 16.84 3390.89 16.49 3397.45 14.71
3404.01 14.49 3410.57 14.23 3417.13 14.8 3423.69 14.8 3430.25 14.97 3436.81
15.08 3443.37 15.06 3449.93 14.65 3456.49 13.71 3463.05 13.1 3469.61 13.09
3476.17 13.16 3482.73 13.27 3489.29 13.13 3495.85 13.1 3502.41 13.13 3508.97
13.18 3515.53 13.31 3522.09 13.37 3528.65 13.45 3535.21 13.48 3541.77 13.44
3548.33 13.22 3554.89 13.12 3561.45 13.07 3568.01 13.05 3574.57 13.23
3581.13 13.27 3587.69 13.27 3594.25 13.23 3600.81 13.35 3607.37 13.4 3620.49
13.9 3633.61 13.59 3640.17 13.56 3646.73 13.59 3653.29 13.38 3659.85 13.27
3666.41 13.41 3679.53 13.76 3686.09 13.57 3692.65 13.62 3699.22 13.62
3705.78 13.77 3712.34 13.68 3718.9 13.88 3725.46 13.95 3732.02 13.64 3738.58
13.59 3745.14 13.68 3751.7 13.8 3758.26 13.83 3764.82 13.76 3771.38 13.86
3784.5 13.92 3791.06 14.01 3797.62 14.07 3804.18 14.22 3810.74 14.42 3817.3
14.42 3823.86 14.36 3836.98 14.3 3843.54 14.38 3850.1 14.38 3863.22 14.59
3869.78 14.75 3876.34 14.76 3882.9 14.84 3889.46 14.72 3896.02 15.05 3902.58
15.07 3909.14 15.26 3915.7 15.32 3922.26 15.36 3928.82 15.36 3935.38 15.63
3941.94 15.71 3948.5 15.62 3955.06 15.86 3961.62 15.97 3968.18 15.81 3974.74
16.01 3981.3 16.06 3987.86 16 3994.42 16.05 4000.98 16.17 4007.54 16.32
4027.22 16.59 4033.78 16.63 4040.34 16.74 4046.9 16.95 4060.02 17.1 4066.58
17.23 4073.14 17.41 4079.7 17.27 4086.26 17.79 4092.82 18.07 4099.39 18.09
4105.95 18.28 4112.51 18.15 4119.07 18.1 4125.63 18.14 4132.19 18.44 4138.75
18.63 4145.31 18.87 4158.43 19.24 4164.99 19.29 4171.55 19.1

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 1817.32 .035 1955.37 .082

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1817.32
1955.37 99.87 117.75 129.37 .5 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 14030.31

INPUT
Description: 18 Exit RR Br
Station Elevation Data num= 491
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
  0 32.79 6.56 32.79 13.12 32.61 19.68 32.47 26.24 32.25 32.81 31.81 39.37
31.4 45.93 30.86 52.49 30.42 59.05 29.72 65.61 28.95 72.17 28.38 78.73 27.73
85.3 27.57 91.86 27.49 98.42 27.18 111.54 26.42 118.1 26.07 124.66 26.1
131.22 25.94 137.78 25.75 144.35 25.51 150.91 25.36 157.47 25.34 164.03
25.25 170.59 25 183.71 24.83 190.27 24.82 196.84 24.28 203.4 23.65 209.96
23.48 216.52 22.94 223.08 22.5 229.64 22.02 236.2 21.02 242.76 20.09 249.32
19.61 255.89 19.63 262.45 19.41 275.57 18.8 282.13 18.57 288.69 18.38 295.25
18.16 301.81 17.99 308.38 17.76 314.94 17.63 321.5 17.54 328.06 17.43 334.62
17.17 341.18 17.03 347.74 16.83 354.3 16.69 360.86 16.7 367.43 16.62 373.99

16.36 380.55 15.9 387.11 15.47 393.67 14.86 400.23 14.2 406.79 13.72 413.35
13.18 419.92 12.66 426.48 12.2 433.04 11.78 439.6 11.5 446.16 11.05 452.72
10.72 459.28 10.17 465.84 9.68 472.4 9.14 478.97 9 485.53 8.69 492.09 8.16
498.65 7.78 505.21 7.63 511.77 7.52 518.33 7.28 524.89 7.31 531.46 7.09
538.02 7.02 551.14 6.48 557.7 6.64 564.26 6.64 570.82 6.59 577.38 6.36
583.94 6.53 590.51 6.74 597.07 6.66 603.63 6.65 610.19 6.78 616.75 6.76
623.31 7.06 629.87 7.21 636.43 7.38 643 7.58 649.56 7.66 662.68 7.97 669.24
8.01 675.8 8.37 682.36 8.63 688.92 8.86 695.48 9.01 702.05 9.29 708.61 9.47
715.17 9.69 721.73 10.04 728.29 10.26 734.85 10.51 741.41 10.91 747.97 10.84
754.54 10.7 761.1 10.58 767.66 10.41 774.22 10.32 780.78 10.29 787.34 10.2
793.9 10.06 807.02 9.41 813.59 9.1 820.15 8.74 826.71 8.54 833.27 8.53
846.39 8.6 852.95 8.59 859.51 8.6 866.08 8.55 872.64 8.54 879.2 8.72 885.76
8.76 892.32 8.77 905.44 8.88 912 8.85 918.57 8.92 925.13 9.13 931.69 9.08
938.25 9.25 944.81 9.36 951.37 9.55 957.93 9.56 964.49 9.53 977.62 9.3
984.18 9 990.74 9.08 997.3 9.58 1003.86 10.03 1016.98 10.16 1023.54 10.15
1030.11 10.21 1036.67 10.22 1043.23 9.67 1049.79 8.8 1056.35 7.74 1062.91
6.76 1069.47 5.72 1076.03 4.91 1082.59 4.22 1089.16 3.82 1095.72 3.71
1108.84 3.45 1115.4 3.24 1121.96 3.43 1128.52 3.47 1135.08 3.42 1141.64 3.42
1148.21 3.38 1154.77 3.44 1161.33 3.53 1167.89 3.49 1174.45 3.57 1181.01
3.82 1187.57 3.77 1194.13 3.79 1200.69 3.95 1207.26 4.06 1213.82 3.98
1233.5 4.22 1240.06 4.06 1253.18 4.11 1259.74 3.9 1266.31 3.87 1272.87 3.64
1279.43 3.53 1285.99 3.55 1292.55 3.65 1299.11 3.7 1305.67 3.63 1312.23 3.69
1318.8 3.55 1325.36 3.57 1331.92 3.77 1338.48 3.9 1345.04 3.87 1351.6 3.75
1358.16 3.85 1364.72 3.97 1371.28 4.12 1377.85 4.15 1384.41 3.95 1390.97
3.88 1397.53 4.05 1404.09 6.48 1410.65 7.48 1417.21 9.55 1423.77 11.13
1430.33 12.19 1436.9 12.8 1443.46 12.89 1450.02 12.79 1456.58 12.57 1463.14
10.98 1469.7 8.49 1476.26 5.97 1482.82 5.1 1489.38 5.08 1495.95 5.68
1502.51 5.42 1509.07 4.53 1515.63 4.08 1522.19 4.26 1528.75 4.37 1535.31
4.53 1541.84 4.34 1548.36 4.43 1561.41 5.37 1567.94 5.88 1574.46 6.18
1580.99 6.37 1587.51 6.65 1594.04 6.96 1600.56 7.06 1607.09 7.09 1613.61
7.06 1620.14 7 1626.66 7.28 1633.19 7.51 1639.72 7.27 1646.24 7.27 1652.77
7.09 1659.29 7.2 1665.82 7.23 1672.34 7.17 1678.87 7.23 1685.39 7.34 1698.44
8 1704.97 7.89 1711.49 7.95 1724.54 8.11 1731.07 8.13 1802.71 7.13 1869.98
5.86 1872.42 2.65 1886.07 -2.67 1907.09 -4.65 1948.08 -11.39 1969.32 -1.61
1978.62 10.39 2023.63 10.62 2225.71 12.58 2231.25 12.93 2244.32 13.22
2250.86 13.15 2263.93 12.88 2270.46 12.77 2277 12.8 2283.53 12.68 2290.07
12.4 2296.6 12.18 2303.13 12.03 2309.67 12.2 2316.2 12.34 2322.74 12.44
2329.27 12.47 2335.81 12.35 2342.34 12.08 2348.88 12.09 2355.41 12.03
2361.95 11.75 2368.48 11.67 2375.02 11.76 2381.55 11.97 2388.09 12.01
2394.63 12 2401.16 12.02 2407.7 12 2414.23 12.12 2420.77 12.13 2427.31 12.18
2433.84 12.38 2440.38 12.42 2446.91 12.27 2453.45 12.35 2459.99 12.54
2466.52 12.93 2473.06 13.02 2486.13 12.88 2492.67 12.77 2499.2 11.76 2505.74
9.99 2512.27 9.31 2518.81 9.74 2525.35 10.21 2531.88 10.32 2538.42 10.29
2544.95 10.52 2551.49 10.94 2558.03 11.26 2564.56 11.48 2571.1 11.82 2577.63
12.3 2584.17 12.56 2590.71 12.37 2597.24 12.06 2603.78 11.95 2610.31 12.06
2616.85 12.28 2623.39 12.63 2629.92 13.03 2636.46 13.17 2642.99 13.11
2656.06 12.92 2662.6 12.95 2669.14 12.87 2682.21 12.53 2688.74 12.62 2695.28
12.67 2708.35 12.86 2721.42 12.84 2727.96 12.77 2734.5 12.57 2741.03 12.48
2747.57 12.53 2754.1 12.46 2760.64 12.15 2767.18 10.24 2773.71 8.02 2780.25
7.19 2786.78 8.2 2793.32 9.4 2799.86 9.86 2806.39 10.4 2812.93 10.85 2819.46
11.02 2826 11.04 2832.54 11.24 2845.61 11.7 2852.14 11.94 2858.68 12.15
2865.22 12.11 2871.75 11.99 2878.29 11.95 2891.36 11.78 2897.9 11.66 2904.43
11.6 2910.97 11.74 2917.5 11.85 2924.04 11.99 2930.57 12.18 2937.11 12.41
2943.65 12.76 2950.18 13.07 2956.72 13.52 2963.25 14.11 2969.79 14.45

2976.33 14.56 2989.4 14.7 2995.93 14.78 3002.47 14.7 3009.01 14.33 3015.54 14.18 3028.61 14.39 3035.15 14.44 3041.69 14.42 3048.22 14.58 3054.76 14.68 3061.29 14.65 3067.83 14.88 3074.37 14.82 3080.9 14.9 3093.97 14.87 3100.51 15.11 3107.05 15.19 3113.58 15.22 3120.12 15.39 3126.65 15.42 3133.19 15.42 3139.73 15.49 3146.26 15.49 3152.8 15.45 3165.87 15.52 3172.41 15.51 3178.94 15.67 3185.48 15.81 3192.01 15.87 3198.55 16.01 3205.08 16.31 3211.62 16.34 3218.16 16.52 3224.69 18.15 3231.23 20.02 3237.76 21.65 3244.3 23 3250.84 21.44 3257.37 19.28 3263.91 17.73 3270.44 17.19 3276.98 16.82 3283.52 16.87 3290.05 16.98 3296.59 16.66 3303.12 16.49 3309.66 16.97 3316.2 17.29 3322.73 17.22 3329.27 17.54 3335.8 17.83 3342.34 17.91 3348.88 18.05 3355.41 18.44 3361.95 19.49 3368.48 20.6 3375.02 21.21 3381.56 21.31 3388.09 21.2 3401.16 21.04 3407.7 20.92 3414.24 20.56 3420.77 20.06 3427.31 19.95 3433.84 20.17 3440.38 20.37 3446.92 20.62 3459.99 20.96 3466.52 21.04 3473.06 21.29 3479.59 21.41 3486.13 21.46 3492.67 21.57 3499.2 21.49 3505.74 21.81 3512.27 22.61 3518.81 23.19 3525.35 23.8 3531.88 24.39 3538.42 24.56 3544.95 24.88 3551.49 25.32 3558.03 25.8 3564.56 26.42 3571.1 27.07 3577.63 27.67 3584.17 28.18 3590.71 28.51 3597.24 28.69 3603.78 28.8 3610.31 28.86 3623.39 28.93 3629.92 28.79 3636.46 28.48 3642.99 28.3 3649.53 28.22 3656.07 28.22 3662.6 28.17 3669.14 28.15 3675.67 28.3 3682.21 28.58 3688.75 28.78 3695.28 29.38 3701.82 29.75 3708.35 29.9 3714.89 29.91 3721.43 29.88 3727.96 29.81 3734.5 29.61 3741.03 29.59 3747.57 29.69 3754.1 29.72 3760.64 29.72 3773.71 29.65 3780.25 29.67 3786.78 29.62 3793.32 29.3 3799.86 29.11 3806.39 28.87 3819.46 28.53 3826 28.5 3832.54 28.39 3845.61 27.91 3852.14 27.8 3858.68 27.44 3865.22 27 3871.75 26.53

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 1869.98 .035 1978.62 .082

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1869.98 1978.62 684.11 778.6 861.6 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 2244 3871.75 13.22 F

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 13251.71

INPUT
Description: 17
Station Elevation Data num= 312
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 32.57 26.15 31.62 45.75 31.23 52.29 30.9 58.83 30.18 78.44 28.7 84.97 28.5 104.58 28.32 111.12 28.35 124.19 27.81 150.34 25.88 163.41 25.32 169.95 24.74 183.02 24.02 196.09 23.54 215.7 22.28 222.24 22.17 235.31 21.2 241.85 20.82 248.38 20.88 254.92 20.72 267.99 19.31 274.53 18.76 307.21 17.37 346.43 16.83 352.96 16.83 359.5 17 372.57 16.73 385.65 16.15 411.79 14.21 437.94 12.51 444.47 11.93 457.55 11.16 470.62 10.07 477.16 9.68 483.69 9.08 490.23 8.78 509.84 8.41 522.91 7.82 529.45 7.25 535.98 7.13 549.06 6.74 555.59 6.39 562.13 6.52 568.66 6.92 575.2 6.79 581.74 6.47 594.81 6.37 601.35 6.51 607.88 6.86 620.96 7.16 627.49 7.21 640.56 7.79 653.64 8.45 660.17 8.53 666.71 8.92 699.39 10.1 719 10.46 725.54 10.39 738.61 10.66 751.68 10.69 764.76 10.4 771.29 10.01 784.36

9.6 790.9 9.53 797.44 9.3 817.05 8.93 823.58 8.63 830.12 8.49 856.26 8.98
895.48 9.18 908.56 9.14 915.09 9.02 941.24 9.17 954.31 9.52 967.38 9.55
980.46 9.23 986.99 8.83 993.53 8.61 1013.14 9.56 1019.67 9.64 1032.75 9.52
1045.82 9.02 1052.35 8.48 1071.96 6.31 1078.5 5.38 1085.04 4.81 1098.11 4.26
1104.65 3.71 1117.72 3.43 1130.79 3.48 1143.86 3.06 1163.47 3.58 1170.01
3.34 1183.08 3.45 1189.62 3.85 1202.69 4.4 1209.23 4.84 1222.3 5.92 1228.84
6.28 1235.37 6.46 1248.45 6.33 1254.98 5.82 1261.52 4.89 1281.13 4.13
1294.2 4.13 1300.74 4.46 1313.81 4.11 1320.34 4.27 1326.88 8.52 1333.42
11.27 1339.95 12.53 1346.49 12.7 1353.03 12.6 1359.56 12.33 1366.1 11.9
1372.64 10.41 1379.17 7.19 1385.71 4.91 1392.24 4.09 1398.78 4.2 1411.85
4.05 1424.93 3.59 1431.46 3.83 1438 4.31 1444.54 5.16 1451.07 5.58 1457.61
5.52 1470.68 4.32 1477.22 3.88 1483.75 3.62 1490.29 3.72 1503.36 4.93 1509.9
5.29 1516.44 5.38 1536.04 4.83 1542.58 4.75 1562.19 5.07 1568.73 5.3 1575.26
5.71 1621.02 6.66 1634.09 6.64 1640.63 6.34 1660.23 4.91 1673.3 3.73
1679.84 3.64 1686.37 4.07 1692.9 4.78 1699.44 5.31 1712.51 6.1 1719.04 6.27
1732.11 6.82 1738.64 7.25 1745.17 7.44 1751.71 7.27 1758.24 6.87 1764.78
6.06 1771.31 5.44 1777.84 5.38 1790.91 5.73 1797.45 6.17 1803.98 6.25
1810.51 5.95 1817.05 5.16 1823.58 4.69 1830.11 4.92 1836.65 4.97 1842.91
3.05 1843.18 2.97 1855 -2.51 1855.23 -2.5 1855.41 -2.28 1855.5 -2.32 1855.56
-2.37 1855.64 -2.76 1855.76 -2.93 1855.83 -2.94 1855.96 -2.97 1856.08 -3.05
1857.17 -3.05 1858.58 -3.19 1859.98 -3.63 1861.49 -4.2 1863.1 -4.87 1864.75
-5.25 1866.93 -5.86 1869.15 -6.5 1871.37 -6.93 1873.3 -7.49 1875.27 -8.01
1876.97 -8.23 1878.57 -8.6 1880.15 -8.84 1881.58 -8.96 1883.18 -9.13 1884.84
-9.37 1886.94 -9.52 1889 -9.86 1891.09 -10.04 1892.95 -10.26 1894.9 -10.52
1896.79 -10.86 1898.64 -11.11 1900.24 -11.11 1901.87 -11.13 1903.22 -11.08
1904.55 -11.01 1905.74 -10.97 1907.04 -10.81 1908.44 -10.45 1910.02 -10.16
1911.86 -9.77 1913.65 -9.34 1915.5 -8.61 1917.12 -7.74 1918.68 -6.74 1920.05
-6.07 1921.51 -4.51 1922.72 -4.31 1923.81 -3.7 1924.78 -2.59 1925.83 -2.12
1926.74 -1.76 1934.66 4.61 1936.87 5.75 1941.19 7.99 1954.26 10.4 1960.79
11.91 1967.32 13.17 1973.86 13.96 1986.93 14.7 1993.46 15.35 2006.53 16.21
2013.06 16.45 2019.6 16.93 2026.13 17.99 2032.66 18.16 2045.73 18.11 2052.26
17.84 2058.8 17.32 2065.33 17.03 2078.4 17.62 2091.47 17.97 2098 19 2104.53
21.5 2111.07 23.53 2117.6 25.06 2143.74 26.6 2156.81 27.04 2169.87 27.17
2189.5 28.11 2196.05 27.78 2202.59 27.03 2209.13 26.52 2215.68 26.18 2228.76
25.82 2248.39 24.5 2254.94 24.34 2261.48 24.41 2268.02 24.15 2281.11 24.71
2307.29 25 2313.83 25.28 2320.37 26.43 2326.92 28.25 2333.46 29.13 2346.55
29.23 2366.18 29.48 2385.81 30.05 2411.98 30.22 2418.53 30.08 2425.07 29.62
2438.16 28.17 2444.7 27.71 2451.24 27.96 2477.42 28.31 2483.96 28.55 2490.5
28.93 2523.22 29.8 2601.74 29.89 2621.37 29.73 2641 29.76 2660.63 29.69
2667.18 29.85 2680.26 29.96 2719.53 29.39 2732.61 29.5 2752.24 30.02 2758.79
29.74 2765.33 29.78 2771.87 29.46 2804.59 28.85 2824.22 28.3 2843.85 28.6
2850.4 28.61 2863.48 29.21 2883.11 29.53 2902.74 29.45 2968.18 30.42 2981.27
30.49 3000.9 29.84 3033.61 29.72 3053.24 30.34 3066.33 30.96 3112.14 31.74
3118.68 32.02 3131.77 32.15 3144.85 32.4 3157.94 32.41 3171.03 32.87 3177.57
33.4 3190.66 33.53
 Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 1803.98 .035 2026.13 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1803.98
2026.13 602.45 635.08 678.37 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 12616.64

INPUT
Description: 16 Approach RR Br
Station Elevation Data num= 262
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 32.63 6.54 32.58 13.08 32.49 19.62 31.93 26.16 31.5 32.7 31.39 39.24 31.42 45.78 31.39 58.85 31.52 65.39 31.42 71.93 31.47 78.47 31.12 85.01 30.88 98.09 30.57 104.63 30.11 111.17 29.87 117.71 29.68 124.25 29.39 130.79 29.08 137.33 28.69 143.87 28.32 156.94 27.51 163.48 27.09 170.02 26.72 176.56 26.43 183.1 26.09 189.64 25.78 196.18 25.36 202.72 25.17 209.26 24.63 215.8 24.01 222.34 23.24 228.88 22.56 241.96 21.24 248.5 20.67 255.03 19.96 268.11 19.35 274.65 18.61 281.19 18.07 287.73 17.43 294.27 17.26 300.81 17 307.35 16.87 313.89 16.84 320.43 16.74 326.97 16.49 333.51 16.26 340.05 16.29 346.59 16.38 353.13 16.21 359.66 16.02 366.2 15.96 372.74 15.76 379.28 15.64 385.82 15.63 392.36 15.27 398.9 15.23 405.44 14.91 411.98 14.45 418.52 14.54 425.06 14.95 431.6 14.81 438.14 14.1 444.68 13.6 457.75 12.67 464.29 11.85 470.83 11.21 477.37 10.77 483.91 10.51 490.45 10.15 496.99 9.6 503.53 9.2 510.07 8.82 516.61 8.26 523.15 7.79 529.69 7.18 536.23 7.03 542.77 6.22 549.31 5.77 555.85 6.19 562.38 6.32 568.92 6.36 575.46 6.54 588.54 6.86 595.08 7.1 601.62 7.38 608.16 7.45 614.7 7.3 621.24 7.42 627.78 7.85 634.32 8.4 640.86 8.76 647.4 9.08 653.94 9.44 660.47 9.77 667.01 9.87 673.55 10.19 680.09 10.39 686.63 10.51 693.17 10.59 706.25 10.9 712.79 11.03 719.33 11.12 725.87 11.18 732.41 11.01 745.49 10.86 752.03 10.63 771.64 9.61 778.18 9.59 784.72 9.46 791.26 9.1 797.8 8.9 804.34 8.9 810.88 8.8 817.42 8.34 823.96 8.04 830.5 7.67 837.04 7.67 850.12 7.8 856.66 7.93 863.19 8.04 869.73 7.99 876.27 7.99 889.35 8.24 895.89 8.34 902.43 8.57 908.97 8.76 915.51 8.89 922.05 8.92 928.59 8.84 935.13 8.91 941.67 8.54 948.21 8.35 954.75 8.09 961.29 7.93 967.82 7.93 974.36 7.83 980.9 7.59 987.44 7.45 993.98 7.46 1000.52 7.64 1007.06 7.72 1013.6 7.6 1020.14 7.45 1026.68 7.19 1033.22 7.06 1039.76 7.21 1046.3 7.18 1052.84 7.55 1059.38 7.95 1065.91 8.03 1072.45 7.9 1078.99 7.49 1085.53 7.17 1092.07 6.49 1098.61 5.7 1105.15 5.39 1111.69 5.38 1118.23 5.24 1124.77 4.6 1131.31 4.51 1137.85 4.6 1150.93 4.65 1157.47 4.39 1164.01 3.97 1170.54 4.16 1183.62 4.67 1190.16 4.62 1196.7 4.96 1203.24 5.34 1209.78 5.11 1234.91 4.35 1264.02 3.13 1265.09 1.53 1286.92 -.7 1397.53 -7.34 1409.57 -9.2 1420.3 -9.58 1432.59 -8.07 1444.06 -4.83 1453.35 -2.03 1489.73 .98 1492.64 6.05 1515.17 6.73 1521.65 6.46 1528.13 6.11 1534.61 5.93 1541.09 6.04 1547.57 6.11 1554.04 6.14 1560.52 6.03 1567 6.05 1573.48 6.36 1579.96 6.47 1586.44 6.37 1592.92 6.18 1599.4 6.02 1605.88 6.04 1612.43 6.12 1618.97 5.95 1625.52 5.67 1638.61 5.27 1645.16 4.9 1651.7 4.78 1658.25 4.81 1664.8 4.61 1671.34 4.44 1677.89 4.48 1684.43 4.56 1690.98 4.76 1697.52 5.37 1710.62 7.56 1717.16 8.17 1723.71 8.59 1730.25 9.12 1743.34 10.13 1749.89 10.99 1756.44 11.69 1762.98 11.99 1769.53 12.63 1776.07 13.07 1782.62 13.58 1789.17 14.32 1795.71 15.09 1802.26 15.6 1815.35 17.27 1821.89 17.97 1828.44 18.64 1834.99 19.23 1841.53 19.76 1854.62 21.91 1867.71 23.94 1874.26 24.44 1880.81 25.07 1887.35 25.65 1893.9 26.16 1900.44 26.92 1906.99 26.85 1913.53 26.71 1920.08 26.77 1926.63 26.88 1933.17 27.24 1939.72 27.53 1946.26 27.71 1952.81 27.71 1959.36 27.66 1965.9 27.59 1972.45 27.47 1985.54 26.9 1992.08 26.92 1998.63 27 2005.18 26.94 2011.72 26.86 2018.27 27.2 2024.81 27.76 2031.36 28.07 2044.45 28.2 2051 28.38 2057.54 28.48 2064.09 28.54 2070.63 28.57 2077.18 28.72

Manning's n Values num= 3 Sta n Val Sta n Val Sta n Val
0 .085 1203.24 .035 1492.64 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1203.24
1492.64 48.11 89.77 157.92 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 12526.87

INPUT
Description: 15.7 - US Face RR Br
Station Elevation Data num= 238
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 32.29 13.888 31.74 32.4
31.51 46.28 31.07 55.536 31.03 78.68 29.92 83.304 29.99 92.56 29.51 97.192
29.12 115.704 27.11 124.96 26.52 129.584 26.05 134.216 25.86 157.352 24.48
166.608 23.53 171.24 23.29 180.496 22.12 185.121 22.67 189.752 21.86 194.377
20.74 199.008 19.99 203.633 19.5 212.889 18.06 217.52 17.77 222.152 17.3
226.776 17.25 231.408 16.9 254.544 16.69 259.176 16.79 268.432 16.55 273.056
16.62 282.312 16.42 291.568 15.77 296.2 15.55 328.593 12.67 337.849 12.03
342.48 11.39 356.361 10.16 360.992 9.16 370.248 7.99 384.129 7.19 388.76 6.8
393.385 6.2 398.016 5.33 402.641 5.9 411.904 6.01 425.784 6.63 439.672 7.6
444.296 7.79 453.552 8.72 458.184 9.32 467.44 9.91 476.696 10.97 485.952
11.54 490.577 11.41 499.833 11.69 509.089 11.72 513.72 11.19 518.345 9.69
522.976 7.7 527.601 7.8 532.232 8.43 536.857 8.72 541.488 8.84 550.744 7.76
555.369 7.36 564.625 7.18 569.256 6.97 573.881 7.3 583.137 7.31 597.024 8.12
601.649 8.25 610.905 8.32 620.161 8.66 624.792 8.54 629.424 8.72 638.68 8.71
647.936 9.08 652.561 9.1 666.448 8.63 671.073 8.37 684.96 8.39 689.585 8.2
698.841 8.31 703.472 8.5 708.097 8.39 721.984 7.6 735.865 7.31 745.121 7.44
754.377 7.04 763.633 6.98 777.52 6.26 786.777 5.6 805.289 5.01 809.913 4.76
823.801 4.35 828.425 4.06 833.057 4.42 842.313 4.33 846.944 4.43 851.569
4.94 856.2 5.03 865.456 4.59 870.081 4.94 874.712 7.01 879.337 10.7 883.968
13.1 888.593 14.33 893.224 14.41 897.849 13.78 902.48 12.38 907.105 9.55
911.673 9.78 920.809 8.98 925.377 9.25 925.879 9.26 929.944 9.33 934.519
9.14 939.087 9.39 943.655 10.15 954.594 7.63 954.644 13.43 971.77 12.93
971.932 12.51 972.088 -.25 976.09 -1.49 982.85 -4.23 994.496 -4.951006.199 -
9.031013.093 -10.71 1021.593 -13.621027.066 -3.931042.254 -2.311056.686 -
1.221070.666 .23 1084.659 1.341090.458 1.91091.992 .87 1092.65 12.071103.079
12.52 1108.114 12.861112.739 11.381117.363 9.41121.995 6.571126.619 5.39
1131.244 5.571135.868 5.83 1140.5 5.911145.124 5.851149.749 5.77 1154.38
5.931159.005 5.991163.629 5.741172.885 5.33 1177.51 5.14 1182.134
5.291186.766 5.35 1191.39 5.671196.015 5.821205.271 5.27 1209.895 5.02
1214.52 4.871219.151 4.79 1228.4 4.881233.032 4.62 1237.656 4.561242.281
4.871246.905 4.841251.536 4.71256.161 4.69 1260.786 4.761265.417 4.861270.042
4.891274.666 4.89 1279.29 5.02 1283.922 5.31288.547 5.671293.171 5.961297.802
6.221302.427 6.62 1307.052 7.221311.676 7.781316.308 8.311320.932
8.821325.557 9.39 1330.188 9.991334.812 10.891339.437 12.091344.062
13.21348.693 14.01 1353.318 14.671357.942 15.811362.573 17.091367.198
17.681371.823 18.29 1376.447 19.091381.078 20.561385.703 21.211390.327
21.671394.959 22.73 1399.583 23.661404.208 24.41408.833 24.861413.464
25.111418.089 25.26 1422.713 25.441427.344 25.81431.969 26.331436.594
26.831441.218 27.21 1445.849 27.571450.474 27.74 1459.73 27.821464.354
27.921468.979 28.09 1473.603 28.061478.235 27.861482.859 27.631487.484
27.421492.115 27.17 1496.74 27.361501.365 27.421505.989 27.32 1510.62
27.481515.245 27.82 1519.869 27.881524.501 28.051529.125 28.11 1533.75

28.091538.375 28.16 1543.006 28.02 1547.63 27.961552.255 27.671556.879
27.651561.511 27.53 1566.135 27.56 1570.76 27.441575.391 27.43

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 971.77 .035 1092.65 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 971.77
1092.65 48.42 57.44 51.66 .6 .8 Skew Angle = 45

BRIDGE

RIVER: Taunton River
REACH: Main Stem RS: 12498.05

INPUT
Description: 15.5 RR
Distance from Upstream XS = 2
Deck/Roadway Width = 15 Weir Coefficient = 2.6
Bridge Deck/Roadway Skew = 45
Upstream Deck/Roadway Coordinates
 num= 17
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 756.604 13.53 821.658 14 890.247 14.5
 955.301 13.43 958.837 15.87 969.443 15.87 11.69
 969.443 15.87 12.61001.263 15.87 11.681001.263 15.87 9.29 1026.012 15.87
9.371026.012 15.87 11.681088.944 15.87 12.54 1089.651 15.87 12.561093.187
15.87 1095.308 14.53 1205.617 13.66 1361.888 12.21

Upstream Bridge Cross Section Data
Station Elevation Data num= 238
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 32.29 13.888 31.74 32.4
31.51 46.28 31.07 55.536 31.03 78.68 29.92 83.304 29.99 92.56 29.51 97.192
29.12 115.704 27.11 124.96 26.52 129.584 26.05 134.216 25.86 157.352 24.48
166.608 23.53 171.24 23.29 180.496 22.12 185.121 22.67 189.752 21.86 194.377
20.74 199.008 19.99 203.633 19.5 212.889 18.06 217.52 17.77 222.152 17.3
226.776 17.25 231.408 16.9 254.544 16.69 259.176 16.79 268.432 16.55 273.056
16.62 282.312 16.42 291.568 15.77 296.2 15.55 328.593 12.67 337.849 12.03
342.48 11.39 356.361 10.16 360.992 9.16 370.248 7.99 384.129 7.19 388.76 6.8
393.385 6.2 398.016 5.33 402.641 5.9 411.904 6.01 425.784 6.63 439.672 7.6
444.296 7.79 453.552 8.72 458.184 9.32 467.44 9.91 476.696 10.97 485.952
11.54 490.577 11.41 499.833 11.69 509.089 11.72 513.72 11.19 518.345 9.69
522.976 7.7 527.601 7.8 532.232 8.43 536.857 8.72 541.488 8.84 550.744 7.76
555.369 7.36 564.625 7.18 569.256 6.97 573.881 7.3 583.137 7.31 597.024 8.12
601.649 8.25 610.905 8.32 620.161 8.66 624.792 8.54 629.424 8.72 638.68 8.71
647.936 9.08 652.561 9.1 666.448 8.63 671.073 8.37 684.96 8.39 689.585 8.2
698.841 8.31 703.472 8.5 708.097 8.39 721.984 7.6 735.865 7.31 745.121 7.44
754.377 7.04 763.633 6.98 777.52 6.26 786.777 5.6 805.289 5.01 809.913 4.76
823.801 4.35 828.425 4.06 833.057 4.42 842.313 4.33 846.944 4.43 851.569
4.94 856.2 5.03 865.456 4.59 870.081 4.94 874.712 7.01 879.337 10.7 883.968
13.1 888.593 14.33 893.224 14.41 897.849 13.78 902.48 12.38 907.105 9.55
911.673 9.78 920.809 8.98 925.377 9.25 925.879 9.26 929.944 9.33 934.519
9.14 939.087 9.39 943.655 10.15 954.594 7.63 954.644 13.43 971.77 12.93

971.932 12.51 972.088 -.25 976.09 -1.49 982.85 -4.23 994.496 -4.951006.199 -
9.031013.093 -10.71 1021.593 -13.621027.066 -3.931042.254 -2.311056.686 -
1.221070.666 .23 1084.659 1.341090.458 1.91091.992 .87 1092.65 12.071103.079
12.52 1108.114 12.861112.739 11.381117.363 9.41121.995 6.571126.619 5.39
1131.244 5.571135.868 5.83 1140.5 5.911145.124 5.851149.749 5.77 1154.38
5.931159.005 5.991163.629 5.741172.885 5.33 1177.51 5.14 1182.134
5.291186.766 5.35 1191.39 5.671196.015 5.821205.271 5.27 1209.895 5.02
1214.52 4.871219.151 4.79 1228.4 4.881233.032 4.62 1237.656 4.561242.281
4.871246.905 4.841251.536 4.71256.161 4.69 1260.786 4.761265.417 4.861270.042
4.891274.666 4.89 1279.29 5.02 1283.922 5.31288.547 5.671293.171 5.961297.802
6.221302.427 6.62 1307.052 7.221311.676 7.781316.308 8.311320.932
8.821325.557 9.39 1330.188 9.991334.812 10.891339.437 12.091344.062
13.21348.693 14.01 1353.318 14.671357.942 15.811362.573 17.091367.198
17.681371.823 18.29 1376.447 19.091381.078 20.561385.703 21.211390.327
21.671394.959 22.73 1399.583 23.661404.208 24.41408.833 24.861413.464
25.111418.089 25.26 1422.713 25.441427.344 25.81431.969 26.331436.594
26.831441.218 27.21 1445.849 27.571450.474 27.74 1459.73 27.821464.354
27.921468.979 28.09 1473.603 28.061478.235 27.861482.859 27.631487.484
27.421492.115 27.17 1496.74 27.361501.365 27.421505.989 27.32 1510.62
27.481515.245 27.82 1519.869 27.881524.501 28.051529.125 28.11 1533.75
28.091538.375 28.16 1543.006 28.02 1547.63 27.961552.255 27.671556.879
27.651561.511 27.53 1566.135 27.56 1570.76 27.441575.391 27.43

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 971.77 .035 1092.65 .085

Bank Sta: Left Right Coeff Contr. Expan. 971.77 1092.65 .6 .8
Skew Angle = 45

Downstream Deck/Roadway Coordinates
 num= 17
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 705.693 13.53 770.746 14 839.336 14.5
 904.39 13.43 907.925 15.87 918.532 15.87 11.69
 918.532 15.87 12.6 950.352 15.87 11.68 950.352 15.87 9.29
 975.1 15.87 9.37 975.1 15.87 11.681038.033 15.87 12.54
 1038.74 15.87 12.561042.275 15.87 12.561044.397 14.53 1154.705 13.66
1310.976 12.21

Downstream Bridge Cross Section Data
Station Elevation Data num= 229
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 30.39 13.866 29.54 27.733
29.3 36.975 29.22 55.465 28.71 78.574 28.34 87.816 27.8 97.057 27.69 106.299
27.27 115.548 27.32 120.166 26.85 124.79 25.95 129.415 25.32 134.032 24.84
152.523 24.02 157.14 23.58 166.389 23.17 189.498 21.34 194.115 20.86 217.23
19.5 221.848 19.12 226.472 18.92 231.09 18.53 240.339 18.06 244.956 18.03
249.58 17.83 258.822 17.84 277.313 17 286.555 16.79 305.039 16.74 314.288
17.55 323.53 17.34 332.772 16.72 337.396 15.98 342.013 14.61 360.504 10.91
365.129 10.19 374.371 8.01 378.995 7.24 383.612 7.03 392.854 6.17 402.103
4.68 406.721 5.25 411.345 5.61 415.97 5.71 420.587 6 425.212 6.59 448.32
8.85 457.562 7.64 462.186 7.66 466.804 7.47 471.428 6.82 476.053 6.42
485.294 6.43 489.919 6.33 494.536 6.38 499.161 6.27 517.645 6.41 531.511
6.35 536.135 6.47 545.377 7.02 550.002 6.99 554.619 7.28 559.244 7.38

563.868 7.29 573.11 6.83 577.734 6.9 582.352 7.11 586.976 7.54 591.594 7.67
600.843 8.28 614.709 8.74 619.327 8.7 623.951 8.89 633.193 8.92 642.435 9.16
656.301 9.06 679.409 7.92 684.034 7.87 693.276 8.14 711.767 8.03 721.008
7.67 725.633 7.59 734.875 6.85 744.117 6.67 757.983 6.5 767.225 5.93 776.474
4.92 785.716 4.87 794.958 4.63 808.824 4.77 818.066 5.08 827.315 4.89
831.932 4.44 836.557 4.21 841.181 4.34 845.799 4.26 850.423 4.58 855.041
4.66 864.29 3.13 868.907 2.96 873.531 4.8 878.156 8.74 882.766 8.52 887.384
8.77 888.826 8.77 892.001 8.77 896.618 9.01 905.097 7.63 905.146 13.43
922.272 12.93 922.435 12.51 922.59 -.25 926.593 -1.49 933.353 -4.23 944.999
-4.95 956.701 -9.03 963.596 -10.71 972.095 -13.62 977.568 -3.93 992.757 -
2.311007.189 -1.221021.168 .231035.162 1.34 1040.96 1.9 1042.495 .871043.152
12.071043.272 11.71043.308 14.721076.676 14.3 1081.308 14.411085.932
14.371090.557 13.641095.188 11.671104.437 7.02 1109.062 5.971113.693
5.731118.318 5.681122.942 5.441127.574 5.3 1132.198 5.261136.823 5.141141.447
5.071146.079 5.141150.703 5.28 1155.328 5.291159.959 5.321164.584
5.431169.208 5.33 1173.84 5.08 1178.464 4.951183.089 4.881187.713
4.931192.345 5.051196.969 4.98 1201.594 4.781206.225 4.62 1210.85
4.581215.474 4.511220.099 4.49 1224.73 4.661229.355 4.671233.979
4.651238.611 4.741243.235 4.78 1247.86 4.921252.484 5.021257.116 5.07
1261.74 5.331270.996 5.29 1275.621 5.411280.245 5.721284.877 6.331289.501
7.31294.126 8.55 1298.75 10.211303.382 12.371308.006 14.381312.631
15.891317.262 16.69 1321.887 17.451326.511 18.091331.143 18.711335.767
19.31340.392 19.75 1345.016 20.161349.648 20.491354.272 20.841358.897
21.291363.528 21.77 1368.153 22.331372.777 22.931377.401 23.51382.033
23.941386.658 24.18 1391.282 24.391395.914 24.721405.163 25.291409.787
25.61414.419 25.83 1419.043 25.961423.668 26.181428.299 26.491432.924
26.871437.548 27.28 1446.804 27.661451.428 27.661456.053 27.631465.309
27.511469.934 27.68 1479.189 27.161483.814 27.081488.438 26.54 1493.07
26.91497.695 26.99 1502.319 26.971506.951 27.031511.575 27.45 1516.2
28.041520.824 29.08 1525.456 29.1 1530.08 28.771534.704 28.461539.336
28.211543.961 28.02 1548.585 27.98 1553.21 281557.841 281562.465 28.2

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 922.272 .0351043.308 .085

Bank Sta: Left Right Coeff Contr. Expan.
 922.2721043.308 .5 .5
Skew Angle = 45

Upstream Embankment side slope = 0 horiz. to 1.0 vertical Downstream
Embankment side slope = 0 horiz. to 1.0 vertical Maximum allowable
submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Piers = 28

Pier Data
Pier Station Upstream= 973.686 Downstream= 924.189
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev

```
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream= 978.636 Downstream= 927.724
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream= 980.757 Downstream= 929.845
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream= 985 Downstream= 934.088
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream= 987.121 Downstream= 936.209
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev  1.1 -5.14 1.1 10.6 1 10.7 1
12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream= 992.778 Downstream= 941.866
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream= 995.606 Downstream= 944.695
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
```

```
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream= 999.849 Downstream= 948.937
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream= 1001.97 Downstream= 951.059
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream=1003.385 Downstream= 952.473
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7 Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream=1023.183 Downstream= 972.272
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream=1024.598 Downstream= 973.686
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream=1035.911 Downstream= 985 Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
```

```
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream=1040.861 Downstream= 989.949
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream= 1043.69 Downstream= 992.778
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4  Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream=1047.225 Downstream= 996.313
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream=1050.054 Downstream= 999.142
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream=1055.003 Downstream=1004.092
Upstream num= 4  Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream=1057.125 Downstream=1006.213
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
```

Pier Data
Pier Station Upstream=1061.367 Downstream=1010.456
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream=1064.196 Downstream=1013.284
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream=1069.145 Downstream=1018.234
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream=1071.267 Downstream=1020.355
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream=1076.217 Downstream=1025.305
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream=1078.338 Downstream=1027.426
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

```
Pier Data
Pier Station Upstream=1083.288 Downstream=1032.376
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream=1084.702 Downstream= 1033.79
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7
Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Pier Data
Pier Station Upstream=1088.237 Downstream= 1038.74
Upstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7 Downstream num= 4
 Width Elev Width Elev Width Elev Width Elev
 1.1 -5.14 1.1 10.6 1 10.7 1 12.7

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
 Energy
 W.S. Pro Method

 W.S.Pro Data
 Left Embankment
 El of the top of the embankment = 13.4
 El of the toe of the abutment = -0.2
 Right Embankment
 El of the top of the embankment = 13.4
 El of the toe of the abutment = -0.2
 Abutment Type = 3 Sloping abutments and sloping embankments  Slope of
abutments = 4
 Top with of embankment = 15
 Centroid station of bridge opening =
 Wing Wall Type = No wing walls present
 Width =
 Angle =
 Radius =
 Guide Banks Type = No Guide Bank present  Length =
 Offset =
 Angle =

Selected Low Flow Methods = W.S.Pro Method

High Flow Method
```

Energy Only

Additional Bridge Parameters
Add Friction component to Momentum
Do not add Weight component to Momentum
Class B flow critical depth computations use critical depth
inside the bridge at the upstream end
Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 12469.43

INPUT
Description: 15.3 -DS Face RR Br
Station Elevation Data num= 229
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 30.39 13.866 29.54 27.733
29.3 36.975 29.22 55.465 28.71 78.574 28.34 87.816 27.8 97.057 27.69 106.299
27.27 115.548 27.32 120.166 26.85 124.79 25.95 129.415 25.32 134.032 24.84
152.523 24.02 157.14 23.58 166.389 23.17 189.498 21.34 194.115 20.86 217.23
19.5 221.848 19.12 226.472 18.92 231.09 18.53 240.339 18.06 244.956 18.03
249.58 17.83 258.822 17.84 277.313 17 286.555 16.79 305.039 16.74 314.288
17.55 323.53 17.34 332.772 16.72 337.396 15.98 342.013 14.61 360.504 10.91
365.129 10.19 374.371 8.01 378.995 7.24 383.612 7.03 392.854 6.17 402.103
4.68 406.721 5.25 411.345 5.61 415.97 5.71 420.587 6 425.212 6.59 448.32
8.85 457.562 7.64 462.186 7.66 466.804 7.47 471.428 6.82 476.053 6.42
485.294 6.43 489.919 6.33 494.536 6.38 499.161 6.27 517.645 6.41 531.511
6.35 536.135 6.47 545.377 7.02 550.002 6.99 554.619 7.28 559.244 7.38
563.868 7.29 573.11 6.83 577.734 6.9 582.352 7.11 586.976 7.54 591.594 7.67
600.843 8.28 614.709 8.74 619.327 8.7 623.951 8.89 633.193 8.92 642.435 9.16
656.301 9.06 679.409 7.92 684.034 7.87 693.276 8.14 711.767 8.03 721.008
7.67 725.633 7.59 734.875 6.85 744.117 6.67 757.983 6.5 767.225 5.93 776.474
4.92 785.716 4.87 794.958 4.63 808.824 4.77 818.066 5.08 827.315 4.89
831.932 4.44 836.557 4.21 841.181 4.34 845.799 4.26 850.423 4.58 855.041
4.66 864.29 3.13 868.907 2.96 873.531 4.8 878.156 8.74 882.766 8.52 887.384
8.77 888.826 8.77 892.001 8.77 896.618 9.01 905.097 7.63 905.146 13.43
922.272 12.93 922.435 12.51 922.59 -.25 926.593 -1.49 933.353 -4.23 944.999
-4.95 956.701 -9.03 963.596 -10.71 972.095 -13.62 977.568 -3.93 992.757 -
2.311007.189 -1.221021.168 .231035.162 1.34 1040.96 1.9 1042.495 .871043.152
12.071043.272 11.71043.308 14.721076.676 14.3 1081.308 14.411085.932
14.371090.557 13.641095.188 11.671104.437 7.02 1109.062 5.971113.693
5.731118.318 5.681122.942 5.441127.574 5.3 1132.198 5.261136.823 5.141141.447
5.071146.079 5.141150.703 5.28 1155.328 5.291159.959 5.321164.584
5.431169.208 5.33 1173.84 5.08 1178.464 4.951183.089 4.881187.713
4.931192.345 5.051196.969 4.98 1201.594 4.781206.225 4.62 1210.85
4.581215.474 4.511220.099 4.49 1224.73 4.661229.355 4.671233.979
4.651238.611 4.741243.235 4.78 1247.86 4.921252.484 5.021257.116 5.07
1261.74 5.331270.996 5.29 1275.621 5.411280.245 5.721284.877 6.331289.501
7.31294.126 8.55 1298.75 10.211303.382 12.371308.006 14.381312.631
15.891317.262 16.69 1321.887 17.451326.511 18.091331.143 18.711335.767
19.31340.392 19.75 1345.016 20.161349.648 20.491354.272 20.841358.897
21.291363.528 21.77 1368.153 22.331372.777 22.931377.401 23.51382.033

23.941386.658 24.18 1391.282 24.391395.914 24.721405.163 25.291409.787
25.61414.419 25.83 1419.043 25.961423.668 26.181428.299 26.491432.924
26.871437.548 27.28 1446.804 27.661451.428 27.661456.053 27.631465.309
27.511469.934 27.68 1479.189 27.161483.814 27.081488.438 26.54 1493.07
26.91497.695 26.99 1502.319 26.971506.951 27.031511.575 27.45 1516.2
28.041520.824 29.08 1525.456 29.1 1530.08 28.771534.704 28.461539.336
28.211543.961 28.02 1548.585 27.98 1553.21 281557.841 281562.465 28.2

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 922.272 .0351043.308 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
922.2721043.308 83.23 42.79 17.93 .5 .5 Skew Angle = 45

CROSS SECTION

RIVER: Taunton River REACH: Main Stem RS: 12426.64

INPUT
Description: 15 - Exit RR Br
Station Elevation Data num= 207
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 30.29 6.53 30.35 13.06 30.38
19.59 30.26 26.11 30.06 32.64 29.81 39.17 29.48 45.7 29.06 52.23 28.79 58.76
28.7 65.29 28.68 71.81 28.63 78.34 28.67 84.87 28.58 91.4 28.32 97.93 28.22
104.46 28.14 110.99 27.95 117.51 28.2 124.04 28.25 130.57 28.09 137.1 27.82
143.63 27.74 150.16 27.53 156.69 27.44 163.21 27.06 176.27 26.81 182.8 26.53
189.33 26.02 195.86 25.46 208.91 24.69 215.44 24.35 221.97 24.07 228.5 23.93
235.03 23.57 241.56 22.92 248.08 22.43 254.61 22.12 261.14 21.72 267.67 21.4
274.2 21.24 280.73 20.87 287.26 20.44 293.78 19.96 300.31 19.63 306.84 19.5
313.37 19.28 319.9 19.02 326.43 19.02 332.96 19.08 339.48 18.78 346.01 18.38
359.07 17.97 372.13 17.42 378.66 17.17 385.18 17 391.71 17.04 398.24 16.83
411.3 17.04 417.83 17.38 424.36 17.68 430.88 17.82 437.41 17.71 443.94 17.95
450.47 18.22 457 18.12 463.53 18.08 470.06 17.88 476.58 17.48 483.11 16.75
489.64 15.83 496.17 14.61 502.7 13.74 509.23 12.58 522.28 10.06 528.81 8.96
535.34 7.95 548.4 6.22 554.93 5.72 561.45 5.36 567.98 4.8 574.51 4.86 581.04
5.09 587.57 5.4 594.1 6.23 600.63 8.26 607.15 9.33 613.68 8.78 620.21 8.02
626.74 7.35 633.27 7.34 639.8 7.51 646.33 7.58 652.85 7.48 659.38 6.95
665.91 6.47 672.44 6.38 678.97 6.36 685.5 6.38 692.03 6.28 698.55 6.12
705.08 6.03 711.61 6.12 718.14 6.47 724.67 6.46 731.2 6.39 737.73 6.48
744.25 6.95 750.78 7.48 757.31 7.47 763.84 7.54 913.11 3.61 1041.67 4.59
1121.32 4.87 1201.45 4.07 1203.35 1.71 1205.25 .24 1217.38 -5.61 1240.17 -
8.55 1277.46 -20.01 1284.43 -22.69 1303.24 -15.82 1315.73 -9.67 1364.17 .79
1367.47 4.01 1417.05 3.29 1472.54 3.18 1539.23 5.15 1545.78 5 1552.34 4.98
1558.9 4.89 1565.45 4.86 1572.01 4.78 1578.57 4.68 1585.12 4.67 1591.68 4.52
1598.24 4.34 1604.79 4.35 1611.35 4.34 1617.91 4.16 1624.46 4.03 1631.02
4.05 1637.58 4.11 1644.13 4.15 1650.69 4.09 1657.25 4.06 1663.8 4.17 1670.36
4.01 1676.92 4.2 1683.48 4.15 1690.03 4.5 1696.59 4.76 1703.15 4.88 1709.7
4.95 1716.26 5.16 1722.82 5.29 1729.37 5.65 1735.93 6.33 1742.49 7.67
1749.04 9.85 1755.6 12.23 1762.16 14.08 1768.71 15.27 1775.27 15.75 1781.83
16.04 1788.38 16.61 1794.94 17.22 1808.05 18.26 1821.17 19.44 1827.72 20.11
1840.84 21.22 1847.39 21.67 1853.95 22.24 1860.51 22.89 1867.06 23.37
1873.62 23.82 1880.18 24.4 1886.73 24.85 1893.29 25.32 1899.85 25.7 1906.4

26.05 1912.96 26.27 1919.52 26.44 1926.07 26.51 1939.19 26.54 1945.74 26.57 1958.86 26.72 1985.09 27.2 1991.64 27.26 1998.2 26.97 2004.76 26.79 2011.31 26.88 2017.87 26.87 2024.43 26.73 2030.98 26.54 2037.54 26.4 2044.1 26.47 2050.65 26.42 2057.21 26.35 2063.77 26.61 2076.88 27.42 2083.44 27.97 2089.99 28.34 2096.55 28.57 2103.11 28.76 2116.22 29.09 2122.78 29.24

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 1201.45 .035 1367.47 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1201.45 1367.47 810.43 834.52 1253.76 .3 .5

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 11592.12

INPUT Description: 14
Station Elevation Data num= 322
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 32.7 6.53 32.87 13.06 33.06 19.59 33.09 26.12 32.94 32.65 32.53 39.17 32.21 45.7 31.99 52.23 31.85 58.76 31.6 65.29 31.18 71.82 30.91 78.35 30.48 84.88 29.99 91.41 29.36 97.94 28.75 104.46 28.39 110.99 28.17 117.52 27.84 124.05 27.18 130.58 26.67 137.11 26.45 143.64 25.94 150.17 24.98 156.7 23.98 163.23 22.92 169.75 22.26 176.28 21.67 182.81 21.15 189.34 20.71 195.87 20.41 208.93 20.13 215.46 20.01 221.99 19.74 228.52 19.56 235.04 19.65 241.57 19.63 248.1 19.58 254.63 19.48 261.16 19.15 267.69 18.95 274.22 18.95 280.75 19.23 287.28 19.39 293.81 19.26 300.34 19.19 313.39 18.88 326.45 18.51 332.98 18.35 339.51 18.35 346.04 18.45 352.57 18.49 359.1 18.4 372.15 18.43 378.68 18.23 385.21 18.11 391.74 18.44 398.27 18.65 411.33 18.99 417.86 19.2 424.39 19.24 430.92 19.15 437.44 19.17 443.97 18.93 450.5 18.71 457.03 18.55 463.56 18.47 470.09 18.78 476.62 18.45 483.15 17.65 489.68 16.58 496.21 15.77 502.73 15.22 509.26 14.7 515.79 13.84 522.32 12.82 528.85 11.46 541.91 7.93 548.44 6.85 554.97 6.08 561.5 5.49 568.02 4.86 574.55 4.41 581.08 4 587.61 3.94 594.14 4.23 600.67 4.4 607.2 4.43 613.73 4.85 620.26 5.64 626.79 6.79 633.31 7.37 639.84 7.33 646.37 7.27 659.43 7.02 665.96 7.12 672.49 7.19 679.02 7.21 685.55 7.18 692.08 7.02 698.61 7.1 705.13 7.3 711.66 7.28 718.19 7.05 724.72 6.77 731.25 6.44 737.78 6.06 750.84 5.47 757.37 5.21 763.9 5.05 770.42 5.28 783.48 6.47 790.01 7.02 796.54 7.76 803.07 8.53 809.6 8.85 822.66 8.92 829.19 9.06 835.71 9.27 842.24 9.31 848.77 9.09 855.3 8.65 861.83 8.11 868.36 7.63 874.89 7.34 881.42 7.41 894.48 7.69 901 7.8 907.53 7.86 914.06 7.82 920.59 7.65 927.12 7.84 933.65 8.05 940.18 8.03 953.15 7.95 959.6 7.56 966.05 7.24 972.49 6.81 985.38 5.64 991.83 5.18 998.27 4.49 1004.72 3.99 1011.16 3.85 1017.61 3.79 1024.06 3.85 1030.5 4.01 1036.95 4.28 1043.39 4.5 1049.84 4.47 1056.28 4.29 1062.73 4.24 1069.18 4.44 1075.62 4.46 1082.07 4.57 1088.51 4.66 1094.96 4.43 1101.4 4.76 1107.85 5.11 1114.3 5.31 1120.74 5.56 1127.19 5.52 1133.63 4.87 1140.08 3.24 1146.52 2.15 1153.06 .79 1165 -1.26 1165.05 -1.25 1165.49 -1.55 1168.05 -4.02 1168.64 -3.63 1169.27 -3.87 1169.82 -4.62 1170.38 -4.91 1171.34 -4.97 1172.91 -5.66 1175 -6.14 1177.08 -7.08 1179.23 -7.34 1181.08 -7.57 1183 -7.69 1184.76 -7.75 1186.69 -7.86 1188.64 -7.88 1190.93 -7.92 1192.98 -8.05 1195.19 -8.05 1197.03 -8.31 1199.24 -8.39 1201.37 -8.62 1205.92 -8.7 1208.27 -8.64 1210.54 -8.59 1213.11

-8.35 1215.52 -8.19 1217.89 -8.05 1220.17 -7.86 1222.41 -7.71 1224.3 -7.6 1226.1 -7.51 1227.61 -7.41 1229.1 -7.22 1230.31 -7.08 1231.53 -7.1 1232.6 -7.02 1233.71 -6.96 1234.69 -6.9 1235.69 -6.79 1236.59 -6.87 1237.54 -6.82 1238.4 -6.7 1239.37 -6.72 1240.26 -6.6 1241.29 -6.54 1242.23 -6.24 1243.36 -6.01 1244.63 -5.36 1245.94 -4.85 1247.2 -4.3 1248.6 -3.74 1249.84 -3.1 1251.21 -2.54 1252.55 -2.28 1253.33 -1.92 1254.01 -1.68 1254.7 -1.46 1255.27 -.91 1270.42 2.42 1276.8 5.19 1283.18 6.25 1286.15 6.53 1289.55 6.86 1295.93 7.37 1302.31 8.33 1308.69 11.15 1315.06 13.33 1321.44 15.25 1327.82 18.11 1340.57 21.99 1346.95 23.54 1353.33 24.05 1359.71 24.69 1372.46 25.64 1378.84 26.24 1391.83 26.4 1398.32 26.31 1411.3 25.34 1417.8 24.67 1424.29 24.36 1437.27 24.55 1456.75 25.27 1469.74 25.49 1476.23 25.82 1489.21 25.9 1495.71 26.06 1502.2 25.93 1508.69 25.35 1515.18 23.04 1528.17 15.1 1534.66 11.59 1541.16 9.8 1547.65 9.89 1554.14 9.18 1560.63 10.08 1567.13 11.55 1573.62 12.63 1580.11 12.96 1586.6 14.84 1593.1 17.55 1599.59 19.76 1606.08 21.46 1612.57 21.99 1619.07 21.66 1625.56 20.92 1632.05 19.74 1638.54 17.16 1645.04 15.23 1651.53 14.82 1671.01 15.48 1683.99 16.23 1690.48 16.91 1703.47 19.76 1709.96 22.39 1716.45 23.16 1722.95 23.57 1729.44 23.78 1735.9 22.35 1742.36 20.32 1748.82 18.08 1768.2 18.03 1787.59 18.97 1800.51 19.39 1813.43 20.12 1819.89 20.1 1832.81 20.34 1839.27 20.2 1845.73 20.56 1858.65 21.76 1865.11 22.74 1871.58 23.16 1878.04 23.36 1890.96 23.25 1897.42 23.77 1903.88 24.83 1929.72 26.13 1936.18 26.36 1942.64 27.89 1949.1 28.76 1955.56 29.31 1974.95 29.56 1981.41 29.53 2007.25 28.64 2026.63 28.32 2039.55 27.8 2046.01 27.25 2052.48 27.1 2065.4 27.39 2078.32 27.16 2084.78 27.32 2091.24 27.67 2097.7 28.16 2104.16 28.44 2110.62 28.56

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 1127.19 .035 1378.84 .088

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1127.19 1378.84 680.73 637.06 583.23 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 1515 2110.62 23 T

CROSS SECTION

RIVER: Taunton River REACH: Main Stem RS: 10955.06

INPUT
Description: 13 - Approach County St (Rte 140) Br
Station Elevation Data num= 178
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 27.18 13.01 27.4 19.52 27.3 26.03 27.28 32.53 27.29 39.04 27.36 85.43 26.59 298.37 16.17 447.49 15.67 606.13 13.97 681.58 16.52 700.61 16.55 703.41 15.25 704.03 -2.21 718.35 -4.16 736.89 -5.23 749.83 -2.62 752.75 10.85 757.07 10.83 759.04 -4.05 768.77 -6.13 777.69 -6.22 787.46 -4.58 800.53 -1.82 804.74 16.7 893.09 14.19 954.9 15.35 975.18 24.27 978.31 18.48 978.54 21.97 1078.67 20.98 1091.78 21.29 1098.33 21.28 1104.88 21.78 1111.44 22.9 1117.99 23.48 1124.54 23.56 1131.1 23.26 1137.65 23.41 1163.87 24.11 1170.42 24.39 1176.97 24.49 1183.53 24.43 1190.08 24.24 1196.64 24.22 1203.19 24.26 1209.74 24.16 1216.3 24.48 1222.85 25.85 1229.4 27.63 1235.96 28.29 1249.07 28.34 1262.17 28.07 1275.28 27.48 1281.83 27.35 1288.39 27.33 1301.5 27.34 1308.05 27.37 1314.6 27.13 1327.71 26.75 1334.26 26.45 1340.82 26.41 1347.37 26.44 1353.92 26.55

1360.46 26.74 1367.01 26.78 1373.55 26.75 1380.1 26.86 1386.64 27.22 1393.19 28.28 1399.73 28.47 1406.28 28.59 1412.82 28.53 1432.46 28.15 1439.01 27.96 1445.55 27.4 1452.1 27.08 1458.64 27.11 1471.73 27.03 1478.28 27.05 1484.82 27.09 1491.37 27.11 1504.46 27.06 1511 27.07 1517.55 27.1 1524.1 27.22 1530.64 27.19 1537.19 27.13 1543.73 27.3 1550.28 27.4 1556.82 25.52 1563.37 21.64 1569.91 15.39 1576.46 10.42 1583 9.64 1589.55 9.69 1596.09 11.1 1602.64 14.52 1609.18 17.77 1615.73 18.5 1622.27 18.41 1628.82 18.74 1635.37 19.9 1641.91 21.86 1648.46 23.56 1655 24.18 1661.55 24.49 1668.09 24.29 1674.64 23.48 1681.18 21.72 1687.73 19.06 1694.27 17.53 1700.82 17.29 1707.36 17.64 1713.91 18.11 1720.45 18.43 1727 19.02 1733.55 20.47 1740.09 23.24 1746.64 24.3 1753.18 24.72 1759.73 25.12 1766.27 25.24 1772.82 25.13 1779.33 24.63 1785.84 23.1 1792.34 19.63 1798.85 18.79 1805.36 19.22 1811.87 19.5 1818.38 19.95 1824.89 20.34 1831.4 20.65 1844.42 21.1 1850.93 21.18 1857.43 21.44 1863.94 21.82 1870.45 22.15 1876.96 22.44 1889.98 22.93 1896.49 23.24 1903 23.43 1909.51 23.3 1916.02 23.71 1922.52 24.02 1929.03 24.21 1935.54 24.67 1942.05 25.03 1948.56 25 1955.07 25.77 1961.58 26.14 1974.6 26.4 1981.11 26.82 1987.61 28.47 1994.12 29.38 2013.65 29.39 2020.16 29.38 2026.67 29.47 2033.18 29.34 2039.69 29.04 2046.2 28.76 2059.21 28.68 2065.72 28.49 2072.23 27.84 2078.74 27.1 2085.25 26.88 2091.76 27.16 2098.27 27.33 2104.78 27.27 2111.29 27.25 2117.79 27.19 2124.3 27.42 2130.81 27.73 2137.32 28.15 2143.83 28.12 2150.34 28.12 2156.85 28.09 2163.36 28.29

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 700.61 .035 804.74 .088

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 700.61 804.74 122 83.42 73.8 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 1400 2163.36 28 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 10871.64

INPUT
Description: 12.7 - US Face County St (rte140) Br
Station Elevation Data num= 348
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 22.12 5.918 22.22 11.827 22.26 17.746 22.32 23.655 22.31 29.573 22.34 35.482 22.28 41.4 22.2 47.309 22.19 53.227 22.03 59.146 21.71 65.055 21.52 70.973 21.56 76.882 21.75 82.8 21.97 94.628 22.48 100.537 22.77 106.455 22.98 112.373 23.02 118.282 23.04 124.2 23.04 130.11 22.96 141.937 22.91 147.855 22.91 153.773 23.11 159.682 23.12 165.601 22.97 177.428 23.06 183.337 23.03 195.164 22.94 201.083 22.92 207.001 22.96 212.91 22.95 218.828 22.82 224.737 22.81 236.564 22.86 248.392 23.08 254.31 23.16 260.228 23.16 266.137 23.12 272.055 23.17 277.965 23.26 283.883 23.25 289.792 23.2 301.619 23.49 307.537 23.5 313.456 23.77 319.365 24.47 325.283 24.89 331.192 25.01 337.11 25.05 343.019 25.04 354.856 24.94 366.683 25.25 372.592 25.22 378.51 25.14 384.42 24.91 390.338 24.35 396.247 23.74 402.165 23.31 408.083 22.8 413.992 22.54 419.911 22.44 425.82 22.32 431.738 22.23 437.647 22.36 443.565 22.34 449.474 22.45 455.392 22.49 461.311 22.6 467.22 22.54 473.138 22.44 479.047 22.62 490.874 22.09 496.793

22.16 502.702 21.9 508.62 21.85 514.538 21.78 520.447 21.51 526.365 21.6
532.275 21.61 538.193 21.6 544.102 21.11 550.02 20.66 555.929 20.54 561.847
20.25 567.766 20.46 573.675 20.24 579.593 20.13 585.502 20.25 591.42 20.26
597.329 20.13 603.248 19.84 609.166 18.73 615.075 17.9 620.993 17.6 626.902
17.55 632.82 17.09 638.729 16.67 644.648 16.58 650.557 16.51 662.393 16.14
668.302 15.98 674.221 15.77 680.13 15.62 691.957 15.43 697.875 15.48 703.784
15.47 709.702 15.54 715.621 15.78 721.53 16 733.357 15.97 739.275 15.97
745.184 15.91 751.103 16.28 757.021 16.63 762.93 16.65 768.848 17.38 774.757
18.44 780.675 18.64 786.585 18.49 792.503 18.25 798.412 17.94 810.248 17.7
816.157 17.36 822.076 15.75 827.985 14.16 833.903 13.84 839.812 13.38 845.73
13.06 851.639 13.42 857.558 13.82 863.476 14.15 875.285 14.2 881.194 14.25
887.094 14.37 892.994 14.71 898.894 15.11 904.803 15.2 910.703 15.38 916.603
15.67 922.504 15.67 928.413 15.17 940.213 14.34 969.749 16.77 976.447 17.36
996.893 17.7 996.93 -1.091009.591 -5.331025.478 -4.39 1034.043 .511041.511 -
4.991054.063 -5.261058.368 -6.03 1062.99 17.87 1128.906 15.841134.716
15.451140.525 15.121146.343 14.871152.153 14.48 1157.962 14.621163.772
15.311169.581 15.461175.391 14.92 1181.2 14.47 1187.009 14.341192.819
14.071198.628 13.951204.438 14.031210.247 14.06 1216.057 14.131221.866
14.291227.685 14.281233.494 14.391239.303 14.61 1250.922 14.781256.859
14.851268.731 14.741274.667 14.791280.604 14.65 1286.54 14.571298.413
15.021304.349 15.231310.276 15.361316.213 15.45 1322.149 15.661328.085
15.831334.022 16.121339.958 16.331345.894 16.49 1351.831 16.741357.767
17.041363.703 17.62 1369.64 19.191375.576 21.34 1381.512 21.651387.448
21.581399.321 21.931405.257 22.15 1417.13 22.65 1423.066 22.941429.003
23.271434.939 23.491440.875 23.631446.812 23.64 1452.748 23.681458.684
23.671464.621 23.641470.557 23.81482.421 23.95 1488.357 24.13 1494.23
24.241500.103 24.391505.975 24.61511.848 24.79 1517.721 24.921523.594
25.221529.467 25.82 1535.34 26.121541.213 26.38 1547.086 27.071552.958
27.461558.831 27.481570.577 27.43 1576.45 27.49 1582.323 27.431588.196
27.41594.059 27.391599.932 27.411605.805 27.29 1611.678 27.241617.551
27.161623.424 27.131629.297 27.2 1635.17 27.43 1641.042 27.731664.697
28.151670.624 28.311676.543 28.21 1682.47 28.25 1688.397 28.171694.324
28.181700.252 28.161712.106 28.21718.033 28.11 1723.961 28.081729.888
281735.815 28.031741.733 27.971747.661 27.85 1753.588 28.031759.515
27.911765.442 28.03 1771.37 28.181777.297 28.18 1783.224 28.131789.151
28.231801.006 28.181806.924 28.071812.851 28.17 1818.779 27.141824.706
19.841830.633 11.63 1836.56 9.511842.488 9.79 1848.415 12.821860.269
25.851866.188 27.871872.115 27.771878.042 27.02 1883.969 25.971889.896
25.131895.824 24.581901.751 24.511907.678 24.93 1913.605 25.561919.533 26.01
1925.46 25.051931.378 23.911937.306 22.97 1943.233 22.31 1949.16
22.071955.087 22.221961.015 22.611966.942 23.19 1972.869 23.91978.796
24.721984.723 25.651990.651 25.761996.569 25.95 2002.496 26.162008.423
26.262014.351 26.212020.278 26.482026.196 26.1 2032.123 25.462038.042 25.06
2043.96 25.162055.805 25.212061.733 25.28 2067.651 25.182073.578
25.282079.496 25.362091.342 25.69 2097.26 26.01 2103.187 26.152109.105
26.142115.032 26.12120.951 25.942126.878 25.63 2132.796 25.722138.723
25.942144.642 26.272150.569 26.482162.405 26.41 2174.25 26.442180.178
26.52186.096 26.642197.941 26.462203.869 27.32 2209.787 28.372221.632
28.382227.551 28.42233.478 28.342245.323 28.42 2251.241 28.422257.169
28.462263.087 28.482269.014 28.382274.932 27.51 2280.85 26.942286.778
26.722292.696 26.812298.623 26.872304.542 26.95 2310.469 26.942316.387
272322.314 27.012334.159 27.192345.996 27.25 2351.923 27.142357.842
27.182363.769 27.282369.687 27.262375.614 27.33 2381.532 27.522387.459
27.62393.378 27.52

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 996.893 .035 1062.99 .088

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 996.893
1062.99 69.68 77.94 70.04 .6 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 18002393.378 28 T
Skew Angle = 25

BRIDGE

RIVER: Taunton River
REACH: Main Stem RS: 10832.75

INPUT
Description:
Distance from Upstream XS = 5
Deck/Roadway Width = 55
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
 num= 21
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 270.99 23 402.4 23.21 626.26 17.21
 708.73 15.41 886.37 15.12 941.65 16.96
 992.41 17.7 12.53 1041.35 17.9 12.29 1043.16 17.93 12.29
 1075.79 17.8 12.29 1087.57 17.61 1102.07 17.5
 1159.17 16 1224.42 13.49 1252.52 14.16
 1316.87 15.27 1382.12 20.62 1433.78 24.08
 1456.44 25.34 1513.53 26.75 1547 26.75
 Upstream Bridge Cross Section Data
Station Elevation Data num= 348
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 22.12 5.918 22.22 11.827
22.26 17.746 22.32 23.655 22.31 29.573 22.34 35.482 22.28 41.4 22.2 47.309
22.19 53.227 22.03 59.146 21.71 65.055 21.52 70.973 21.56 76.882 21.75 82.8
21.97 94.628 22.48 100.537 22.77 106.455 22.98 112.373 23.02 118.282 23.04
124.2 23.04 130.11 22.96 141.937 22.91 147.855 22.91 153.773 23.11 159.682
23.12 165.601 22.97 177.428 23.06 183.337 23.03 195.164 22.94 201.083 22.92
207.001 22.96 212.91 22.95 218.828 22.82 224.737 22.81 236.564 22.86 248.392
23.08 254.31 23.16 260.228 23.16 266.137 23.12 272.055 23.17 277.965 23.26
283.883 23.25 289.792 23.2 301.619 23.49 307.537 23.5 313.456 23.77 319.365
24.47 325.283 24.89 331.192 25.01 337.11 25.05 343.019 25.04 354.856 24.94
366.683 25.25 372.592 25.22 378.51 25.14 384.42 24.91 390.338 24.35 396.247
23.74 402.165 23.31 408.083 22.8 413.992 22.54 419.911 22.44 425.82 22.32
431.738 22.23 437.647 22.36 443.565 22.34 449.474 22.45 455.392 22.49
461.311 22.6 467.22 22.54 473.138 22.44 479.047 22.62 490.874 22.09 496.793
22.16 502.702 21.9 508.62 21.85 514.538 21.78 520.447 21.51 526.365 21.6
532.275 21.61 538.193 21.6 544.102 21.11 550.02 20.66 555.929 20.54 561.847
20.25 567.766 20.46 573.675 20.24 579.593 20.13 585.502 20.25 591.42 20.26
597.329 20.13 603.248 19.84 609.166 18.73 615.075 17.9 620.993 17.6 626.902
17.55 632.82 17.09 638.729 16.67 644.648 16.58 650.557 16.51 662.393 16.14
668.302 15.98 674.221 15.77 680.13 15.62 691.957 15.43 697.875 15.48 703.784
15.47 709.702 15.54 715.621 15.78 721.53 16 733.357 15.97 739.275 15.97

745.184 15.91 751.103 16.28 757.021 16.63 762.93 16.65 768.848 17.38 774.757
18.44 780.675 18.64 786.585 18.49 792.503 18.25 798.412 17.94 810.248 17.7
816.157 17.36 822.076 15.75 827.985 14.16 833.903 13.84 839.812 13.38 845.73
13.06 851.639 13.42 857.558 13.82 863.476 14.15 875.285 14.2 881.194 14.25
887.094 14.37 892.994 14.71 898.894 15.11 904.803 15.2 910.703 15.38 916.603
15.67 922.504 15.67 928.413 15.17 940.213 14.34 969.749 16.77 976.447 17.36
996.893 17.7 996.93 -1.091009.591 -5.331025.478 -4.39 1034.043 .511041.511 -
4.991054.063 -5.261058.368 -6.03 1062.99 17.87 1128.906 15.841134.716
15.451140.525 15.121146.343 14.871152.153 14.48 1157.962 14.621163.772
15.311169.581 15.461175.391 14.92 1181.2 14.47 1187.009 14.341192.819
14.071198.628 13.951204.438 14.031210.247 14.06 1216.057 14.131221.866
14.291227.685 14.281233.494 14.391239.303 14.61 1250.922 14.781256.859
14.851268.731 14.741274.667 14.791280.604 14.65 1286.54 14.571298.413
15.021304.349 15.231310.276 15.361316.213 15.45 1322.149 15.661328.085
15.831334.022 16.121339.958 16.331345.894 16.49 1351.831 16.741357.767
17.041363.703 17.62 1369.64 19.191375.576 21.34 1381.512 21.651387.448
21.581399.321 21.931405.257 22.15 1417.13 22.65 1423.066 22.941429.003
23.271434.939 23.491440.875 23.631446.812 23.64 1452.748 23.681458.684
23.671464.621 23.641470.557 23.81482.421 23.95 1488.357 24.13 1494.23
24.241500.103 24.391505.975 24.61511.848 24.79 1517.721 24.921523.594
25.221529.467 25.82 1535.34 26.121541.213 26.38 1547.086 27.071552.958
27.461558.831 27.481570.577 27.43 1576.45 27.49 1582.323 27.431588.196
27.41594.059 27.391599.932 27.411605.805 27.29 1611.678 27.241617.551
27.161623.424 27.131629.297 27.2 1635.17 27.43 1641.042 27.731664.697
28.151670.624 28.311676.543 28.21 1682.47 28.25 1688.397 28.171694.324
28.181700.252 28.161712.106 28.21718.033 28.11 1723.961 28.081729.888
281735.815 28.031741.733 27.971747.661 27.85 1753.588 28.031759.515
27.911765.442 28.03 1771.37 28.181777.297 28.18 1783.224 28.131789.151
28.231801.006 28.181806.924 28.071812.851 28.17 1818.779 27.141824.706
19.841830.633 11.63 1836.56 9.511842.488 9.79 1848.415 12.821860.269
25.851866.188 27.871872.115 27.771878.042 27.02 1883.969 25.971889.896
25.131895.824 24.581901.751 24.511907.678 24.93 1913.605 25.561919.533 26.01
1925.46 25.051931.378 23.911937.306 22.97 1943.233 22.31 1949.16
22.071955.087 22.221961.015 22.611966.942 23.19 1972.869 23.91978.796
24.721984.723 25.651990.651 25.761996.569 25.95 2002.496 26.162008.423
26.262014.351 26.212020.278 26.482026.196 26.1 2032.123 25.462038.042 25.06
2043.96 25.162055.805 25.212061.733 25.28 2067.651 25.182073.578
25.282079.496 25.362091.342 25.69 2097.26 26.01 2103.187 26.152109.105
26.142115.032 26.12120.951 25.942126.878 25.63 2132.796 25.722138.723
25.942144.642 26.272150.569 26.482162.405 26.41 2174.25 26.442180.178
26.52186.096 26.642197.941 26.462203.869 27.32 2209.787 28.372221.632
28.382227.551 28.42233.478 28.342245.323 28.42 2251.241 28.422257.169
28.462263.087 28.482269.014 28.382274.932 27.51 2280.85 26.942286.778
26.722292.696 26.812298.623 26.872304.542 26.95 2310.469 26.942316.387
272322.314 27.012334.159 27.192345.996 27.25 2351.923 27.142357.842
27.182363.769 27.282369.687 27.262375.614 27.33 2381.532 27.522387.459
27.62393.378 27.52

Manning's n Values num= 3 Sta n Val Sta n Val Sta n Val
 0 .085 996.893 .035 1062.99 .088

Bank Sta: Left Right Coeff Contr. Expan.
 996.893 1062.99 .6 .5
Ineffective Flow num= 1

```
 Sta L Sta R Elev Permanent
 18002393.378 28 T
Skew Angle = 25

Downstream Deck/Roadway Coordinates
 num= 21
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 270.99 25.35 402.4 23.21 626.26 17.21
 708.73 15.41 886.37 15.12 941.65 16.96
 992.41 17.7 12.53 1041.35 17.9 12.29 1043.16 17.93 12.29
 1075.79 17.8 12.29 1087.57 17.61 1102.07 17.5
 1159.17 16 1224.42 13.49 1252.52 14.16
 1316.87 15.27 1382.12 20.62 1433.78 24.08
 1456.44 25.34 1513.53 26.75 1725 26.75

Downstream Bridge Cross Section Data Station Elevation Data num= 379
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  0 22.57 5.927 22.65 11.855
22.7 17.782 22.67 23.709 22.79  29.636 22.86 35.564 22.87 41.491 22.89 47.418
22.83 53.345 22.81  59.282 22.85 65.209 22.82 71.136 22.81 77.063 22.88
82.991 22.95  88.918 22.99 94.845 22.99 100.772 23.05 106.7 23.15 112.627
23.18  118.554 23.11 124.481 23.29 130.409 23.38 136.336 23.43 142.263 23.48
148.19 23.62 154.118 23.75 160.045 23.8 165.972 23.77 171.908 23.67  177.836
23.55 183.763 23.62 189.69 23.7 195.617 24.01 201.545 24.51  207.472 24.86
213.399 24.87 219.326 24.78 225.254 24.82 231.181 24.87  237.108 24.86
243.036 24.85 248.963 24.93 254.89 24.64 260.817 24.72  266.745 24.75 272.672
24.85 278.599 24.8 284.535 24.82 290.463 24.9  296.39 24.83 302.317 24.91
308.244 25.04 314.172 25.31 320.099 25.68  326.026 26.28 331.953 26.39
337.881 26.41 343.808 26.43 349.735 26.34  355.662 26.06 361.59 25.86 367.517
25.7 373.444 25.61 379.371 25.38  385.299 25.1 391.226 24.67 397.162 24.14
403.089 23.91 409.017 23.54  414.944 23.5 420.871 23.41 426.798 23.24 432.726
23.08 438.653 22.59  444.58 22.36 450.507 21.93 456.435 21.4 462.362 21.25
468.289 21.26  474.216 21.22 480.144 21.09 486.071 21.26 491.998 21.61
497.926 21.7  503.853 21.97 509.78 21.9 515.716 20.86 521.644 20.44 527.571
19.9  533.498 19.65 539.425 19.69 545.353 19.53 557.207 19.23 569.062 18.9
574.989 18.8 580.916 18.65 586.843 18.32 592.771 18.32 598.698 18.2  604.625
17.82 610.552 17.63 616.48 17.61 622.407 17.42 640.198 17.31  652.052 17.26
663.907 17.11 669.834 16.94 675.761 16.62 681.688 16.45  687.616 16.35
693.543 16.39 699.47 16.58 705.398 16.71 711.325 16.78  717.252 16.88 729.107
16.97 735.034 17 740.97 17.01 746.897 16.98  752.825 16.95 758.752 17.11
764.679 17.2 770.606 17.14 776.534 17.11  782.461 17.07 788.388 17 794.315
16.9 800.243 16.65 806.17 16.1  812.097 15.5 818.024 15.01 823.952 14.75
829.879 14.68 835.806 14.5  841.733 14.26 847.661 14.13 853.597 14.11 859.524
13.99 865.451 13.74  871.379 13.34 877.306 12.87 883.233 12.44 889.16 11.97
895.088 11.83  901.015 11.72 906.942 11.6 912.869 11.59 918.797 11.77 924.724
12.06  930.651 12.9 936.578 13.39 945.225 15.11 951.098 14.73 978.812 16.77
985.51 17.361005.956 17.71005.993 -1.091018.654 -5.331034.541 -4.39 1043.106
.511050.574 -4.991063.126 -5.261067.431 -6.031072.053 17.87 1125.843
15.981131.679 16.021137.525 16.181143.371 16.481149.207 16.12 1155.053
16.081160.899 15.911166.735 15.811172.581 15.831178.427 15.66 1184.263
15.531190.109 15.511195.946 15.461201.791 15.811207.637 15.83 1213.474
15.441219.319 15.451225.165 15.061231.002 14.681236.847 14.38 1242.693 14.24
1248.53 14.131254.375 13.951260.212 13.871266.058 13.91 1271.903
14.051283.586 14.271289.431 14.321301.114 14.411306.986 14.32 1312.868
14.221324.623 14.361330.505 14.42 1342.26 14.451348.133 14.41 1359.888
```

14.561371.642 14.931377.525 15.121383.406 15.351389.279 15.5 1395.161
15.421406.916 161418.671 171424.544 17.231430.426 17.44 1436.299 17.75
1442.18 18.091448.062 18.491453.935 18.7 1465.69 19.22 1471.572 20.351477.445
20.761483.327 20.78 1489.2 20.671495.082 20.73 1506.836 21.211512.709
21.561524.473 21.71530.346 22.021542.101 22.59 1547.983 22.71553.856
22.711559.738 22.79 1565.61 22.871577.365 23.07 1583.247 23.181600.884
23.741606.757 24.21612.639 24.31618.512 24.34 1630.267 24.541636.148
24.731642.021 24.641647.903 24.571653.776 24.45 1665.54 25.121671.413
25.211677.295 25.141683.168 25.11 1689.05 25.09 1694.922 25.11700.804
25.121706.677 25.011712.559 24.791718.432 24.79 1724.323 25.471730.205
26.851736.087 26.831741.969 26.81747.851 26.24 1753.733 25.881759.615
25.681765.497 25.511771.379 25.09 1777.27 24.64 1783.152 24.371789.033
24.511794.915 24.621800.797 24.831806.679 24.95 1812.561 25.251818.443
25.781824.334 26.141830.216 26.081836.098 25.93 1841.98 25.781847.862
25.651853.744 25.531859.626 25.411865.508 25.35 1871.399 25.21877.281
24.181883.163 21.191889.045 15.461894.927 9.73 1900.808 9.5 1906.69
10.591912.572 14.451918.454 19.371924.345 23.96 1930.227 26.171936.109
26.171941.991 26.231947.873 26.481953.755 26.29 1959.637 26.031965.519 25.85
1971.41 25.791977.292 25.791983.174 25.76 1989.056 25.641994.938
25.572000.819 25.532006.701 25.432012.583 25.34 2018.474 25.112024.356
25.092030.238 25.09 2036.12 24.962042.002 24.9 2047.884 24.642053.766
24.512059.648 24.352065.539 24.192071.421 23.93 2077.303 23.722083.185
23.432089.067 23.262094.949 23.072100.831 22.95 2106.712 22.92112.604
22.782118.485 22.92124.358 23.482130.231 24.02 2136.104 24.272141.977 24.2
2147.85 24.352153.723 24.572159.596 24.8 2165.469 24.842171.341 24.822177.214
24.792183.087 24.68 2188.96 24.54 2194.842 24.262200.715 24.072206.588 24.68
2212.46 24.222218.333 24.2 2224.206 24.042230.079 23.912235.952 23.962241.825
24.172247.698 24.29 2253.571 24.582259.444 24.822265.316 252271.189
25.12277.071 25.13 2282.944 25.062288.817 24.99 2294.69 24.932300.562
24.872306.436 24.82 2312.309 24.582318.181 24.552324.054 24.582329.927 24.46
2335.8 24.1 2341.673 24.042347.546 24.262353.427 23.882359.301 23.522365.173
24.02 2371.046 25.122376.919 25.752382.792 26.162388.665 26.572394.538 26.91
2400.411 26.982406.283 27.052412.156 27.042418.029 26.732423.902 26.61
2429.775 26.412435.657 26.45 2441.53 26.532447.403 26.652453.275 26.75
2459.148 26.952465.021 27.122470.894 27.42476.767 27.52

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .0851005.956 .0351072.053 .088

Bank Sta: Left Right Coeff Contr. Expan.
 1005.9561072.053 .5 .5
Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 18502476.767 25 T
Skew Angle = 25

Upstream Embankment side slope = 0 horiz. to 1.0 vertical Downstream
Embankment side slope = 0 horiz. to 1.0 vertical Maximum allowable
submergence for weir flow = .98 Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
 Energy
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
 Pressure and Weir flow
 Submerged Inlet Cd =
 Submerged Inlet + Outlet Cd = .8
 Max Low Cord =

Additional Bridge Parameters
 Add Friction component to Momentum
 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 10793.7

INPUT Description: 12.3- DS Face County St (Rte140) Br
Station Elevation Data num= 379
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 22.57 5.927 22.65 11.855
22.7 17.782 22.67 23.709 22.79 29.636 22.86 35.564 22.87 41.491 22.89 47.418
22.83 53.345 22.81 59.282 22.85 65.209 22.82 71.136 22.81 77.063 22.88
82.991 22.95 88.918 22.99 94.845 22.99 100.772 23.05 106.7 23.15 112.627
23.18 118.554 23.11 124.481 23.29 130.409 23.38 136.336 23.43 142.263 23.48
148.19 23.62 154.118 23.75 160.045 23.8 165.972 23.77 171.908 23.67 177.836
23.55 183.763 23.62 189.69 23.7 195.617 24.01 201.545 24.51 207.472 24.86
213.399 24.87 219.326 24.78 225.254 24.82 231.181 24.87 237.108 24.86
243.036 24.85 248.963 24.93 254.89 24.64 260.817 24.72 266.745 24.75 272.672
24.85 278.599 24.8 284.535 24.82 290.463 24.9 296.39 24.83 302.317 24.91
308.244 25.04 314.172 25.31 320.099 25.68 326.026 26.28 331.953 26.39
337.881 26.41 343.808 26.43 349.735 26.34 355.662 26.06 361.59 25.86 367.517
25.7 373.444 25.61 379.371 25.38 385.299 25.1 391.226 24.67 397.162 24.14
403.089 23.91 409.017 23.54 414.944 23.5 420.871 23.41 426.798 23.24 432.726
23.08 438.653 22.59 444.58 22.36 450.507 21.93 456.435 21.4 462.362 21.25
468.289 21.26 474.216 21.22 480.144 21.09 486.071 21.26 491.998 21.61
497.926 21.7 503.853 21.97 509.78 21.9 515.716 20.86 521.644 20.44 527.571
19.9 533.498 19.65 539.425 19.69 545.353 19.53 557.207 19.23 569.062 18.9
574.989 18.8 580.916 18.65 586.843 18.32 592.771 18.32 598.698 18.2 604.625
17.82 610.552 17.63 616.48 17.61 622.407 17.42 640.198 17.31 652.052 17.26
663.907 17.11 669.834 16.94 675.761 16.62 681.688 16.45 687.616 16.35
693.543 16.39 699.47 16.58 705.398 16.71 711.325 16.78 717.252 16.88 729.107
16.97 735.034 17 740.97 17.01 746.897 16.98 752.825 16.95 758.752 17.11
764.679 17.2 770.606 17.14 776.534 17.11 782.461 17.07 788.388 17 794.315
16.9 800.243 16.65 806.17 16.1 812.097 15.5 818.024 15.01 823.952 14.75
829.879 14.68 835.806 14.5 841.733 14.26 847.661 14.13 853.597 14.11 859.524
13.99 865.451 13.74 871.379 13.34 877.306 12.87 883.233 12.44 889.16 11.97

895.088 11.83 901.015 11.72 906.942 11.6 912.869 11.59 918.797 11.77 924.724
12.06 930.651 12.9 936.578 13.39 945.225 15.11 951.098 14.73 978.812 16.77
985.51 17.361005.956 17.71005.993 -1.091018.654 -5.331034.541 -4.39 1043.106
.511050.574 -4.991063.126 -5.261067.431 -6.031072.053 17.87 1125.843
15.981131.679 16.021137.525 16.181143.371 16.481149.207 16.12 1155.053
16.081160.899 15.911166.735 15.811172.581 15.831178.427 15.66 1184.263
15.531190.109 15.511195.946 15.461201.791 15.811207.637 15.83 1213.474
15.441219.319 15.451225.165 15.061231.002 14.681236.847 14.38 1242.693 14.24
1248.53 14.131254.375 13.951260.212 13.871266.058 13.91 1271.903
14.051283.586 14.271289.431 14.321301.114 14.411306.986 14.32 1312.868
14.221324.623 14.361330.505 14.42 1342.26 14.451348.133 14.41 1359.888
14.561371.642 14.931377.525 15.121383.406 15.351389.279 15.5 1395.161
15.421406.916 161418.671 171424.544 17.231430.426 17.44 1436.299 17.75
1442.18 18.091448.062 18.491453.935 18.7 1465.69 19.22 1471.572 20.351477.445
20.761483.327 20.78 1489.2 20.671495.082 20.73 1506.836 21.211512.709
21.561524.473 21.71530.346 22.021542.101 22.59 1547.983 22.71553.856
22.711559.738 22.79 1565.61 22.871577.365 23.07 1583.247 23.181600.884
23.741606.757 24.21612.639 24.31618.512 24.34 1630.267 24.541636.148
24.731642.021 24.641647.903 24.571653.776 24.45 1665.54 25.121671.413
25.211677.295 25.141683.168 25.11 1689.05 25.09 1694.922 25.11700.804
25.121706.677 25.011712.559 24.791718.432 24.79 1724.323 25.471730.205
26.851736.087 26.831741.969 26.81747.851 26.24 1753.733 25.881759.615
25.681765.497 25.511771.379 25.09 1777.27 24.64 1783.152 24.371789.033
24.511794.915 24.621800.797 24.831806.679 24.95 1812.561 25.251818.443
25.781824.334 26.141830.216 26.081836.098 25.93 1841.98 25.781847.862
25.651853.744 25.531859.626 25.411865.508 25.35 1871.399 25.21877.281
24.181883.163 21.191889.045 15.461894.927 9.73 1900.808 9.5 1906.69
10.591912.572 14.451918.454 19.371924.345 23.96 1930.227 26.171936.109
26.171941.991 26.231947.873 26.481953.755 26.29 1959.637 26.031965.519 25.85
1971.41 25.791977.292 25.791983.174 25.76 1989.056 25.641994.938
25.572000.819 25.532006.701 25.432012.583 25.34 2018.474 25.112024.356
25.092030.238 25.09 2036.12 24.962042.002 24.9 2047.884 24.642053.766
24.512059.648 24.352065.539 24.192071.421 23.93 2077.303 23.722083.185
23.432089.067 23.262094.949 23.072100.831 22.95 2106.712 22.92112.604
22.782118.485 22.92124.358 23.482130.231 24.02 2136.104 24.272141.977 24.2
2147.85 24.352153.723 24.572159.596 24.8 2165.469 24.842171.341 24.822177.214
24.792183.087 24.68 2188.96 24.54 2194.842 24.262200.715 24.072206.588 24.68
2212.46 24.222218.333 24.2 2224.206 24.042230.079 23.912235.952 23.962241.825
24.172247.698 24.29 2253.571 24.582259.444 24.822265.316 252271.189
25.12277.071 25.13 2282.944 25.062288.817 24.99 2294.69 24.932300.562
24.872306.436 24.82 2312.309 24.582318.181 24.552324.054 24.582329.927 24.46
2335.8 24.1 2341.673 24.042347.546 24.262353.427 23.882359.301 23.522365.173
24.02 2371.046 25.122376.919 25.752382.792 26.162388.665 26.572394.538 26.91
2400.411 26.982406.283 27.052412.156 27.042418.029 26.732423.902 26.61
2429.775 26.412435.657 26.45 2441.53 26.532447.403 26.652453.275 26.75
2459.148 26.952465.021 27.122470.894 27.42476.767 27.52

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .0851005.956 .0351072.053 .088

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1005.9561072.053 110.75 131.98 150.03 .5 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent

18502476.767 25 T
Skew Angle = 25

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 10661.72

INPUT Description: 12- Exit County St (Rte 140) Br
Station Elevation Data num= 368
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 22.51 6.53 22.64 13.07 22.54
19.6 22.41 26.14 22.37 32.67 22.64 39.21 23.02 45.74 23.19 52.28 23.08 65.35
23.11 71.88 22.75 78.42 22.28 84.95 21.77 91.49 21.47 98.02 21.35 104.56
21.16 111.09 20.99 117.63 20.6 124.16 20.34 130.7 20.86 137.23 21.84 143.76
22.49 150.3 22.68 163.37 22.52 169.9 22.12 176.44 21.62 182.97 20.86 189.51
20.3 196.04 20.13 202.58 20.11 209.11 20.04 215.65 20 222.18 20 228.72 20.23
235.25 20.58 241.79 20.86 248.32 21.22 254.86 21.55 261.39 21.71 267.93
21.93 280.99 21.92 287.53 22 294.06 22.05 300.6 21.98 307.13 21.85 313.67
21.79 320.2 21.67 333.27 21.55 339.81 21.43 346.34 21.23 352.88 20.66 359.41
19.91 365.95 19.33 372.48 19.02 379.02 18.9 385.55 18.89 392.09 18.94 398.62
19.02 405.16 19.22 411.69 19.58 418.22 19.97 424.76 20.3 431.29 20.66 437.83
21.07 444.36 21.45 450.9 21.64 457.43 21.65 463.97 21.57 470.5 21.45 477.04
21.36 483.57 21.17 490.11 21.11 496.64 21.33 503.18 21.52 509.71 21.64
516.25 21.74 522.78 21.87 529.32 22.08 535.85 22.39 542.39 22.49 548.92
22.47 555.46 22.33 561.99 21.77 568.52 21.4 575.06 21.28 581.59 20.95 588.13
20.78 594.66 20.64 601.2 20.53 607.73 20.59 614.27 20.73 620.8 20.82 627.34
20.86 633.87 20.79 640.41 20.69 646.94 20.64 653.48 20.61 660.01 20.55
666.55 20.61 673.08 20.79 679.62 20.94 686.15 21.03 692.69 21.04 705.75
21.22 712.29 21.32 725.36 21.67 731.89 21.86 738.43 22.01 744.96 22.18 751.5
22.41 758.03 22.6 764.57 22.71 771.1 22.84 777.64 23.03 784.17 23.19 790.71
23.43 797.24 23.6 803.78 23.69 810.31 23.68 816.85 23.53 823.38 23.41 829.92
23.33 836.45 23.15 842.99 22.9 849.52 22.82 856.05 22.83 862.59 22.79 869.12
22.81 875.66 22.86 882.19 22.87 888.73 22.86 895.26 22.98 901.8 23.29 908.33
23.58 914.87 23.9 921.4 24.14 927.94 24.29 934.47 24.56 941.01 24.65 947.54
24.56 954.08 24.7 960.61 24.78 967.15 24.76 973.68 24.76 980.22 24.83
986.75 24.84 993.29 24.72 999.82 24.77 1006.35 24.92 1012.89 24.91 1019.42
24.94 1025.96 24.94 1032.49 25.17 1039.03 25.55 1045.56 25.97 1052.1 26.16
1058.63 26.08 1071.7 25.8 1084.77 25.65 1097.84 25.39 1104.38 25.36 1110.91
25.38 1117.45 25.44 1123.98 25.44 1137.05 25.37 1143.58 25.29 1150.12 25.23
1156.65 25.19 1163.19 25.25 1169.72 25.14 1176.26 24.77 1182.79 23.62
1189.33 23.04 1195.86 24.38 1202.4 24.38 1208.93 23.95 1215.47 23.76 1222
23.64 1235.07 23.45 1241.61 23.48 1248.14 23.38 1254.68 23.1 1261.21 22.91
1267.74 22.78 1280.81 22.31 1287.35 22.25 1293.88 22.08 1300.42 21.85
1306.95 21.72 1313.49 21.85 1320.02 21.75 1339.06 21.92 1342.07 20.28
1472.56 19.77 1586.79 19.53 1625.79 17.65 1671.94 18.44 1711.72 16.56
1815.56 5.22 1817.54 2.37 1835.16 -.21 1836.63 .45 1848.07 -4.27 1860.2 -
5.36 1882.27 -8.58 1904.26 -7.66 1926.37 -8.42 1959.41 -4.06 1972.09 -.45
1972.89 .12 1979.26 1.38 1982.44 4.69 1986.89 5.25 2011.22 5.11 2068.44 3.88
2076.75 -1.17 2117.63 -.74 2139.51 10.4 2146.45 11.68 2174.91 11.66 2184.6
11.25 2221.65 12.08 2228.21 12.19 2234.77 12.18 2241.33 12.07 2247.89 11.82
2254.45 11.66 2261 11.66 2274.12 11.89 2280.68 11.78 2287.24 11.56 2293.8
11.61 2300.36 11.77 2306.92 11.65 2313.48 11.57 2320.04 11.7 2326.6 11.76
2333.16 11.46 2339.71 11.32 2346.27 11.24 2352.83 11.21 2359.39 11.12

2365.95 11.05 2372.51 10.96 2379.07 10.82 2385.63 10.55 2392.19 10.37
2405.31 10.11 2418.43 9.82 2424.98 9.71 2438.1 9.45 2444.66 9.28 2451.22
9.44 2457.78 9.33 2464.34 9.1 2470.9 8.56 2477.46 8.09 2484.02 7.47 2490.58
7.06 2497.14 6.96 2503.7 6.97 2510.25 6.9 2516.81 6.68 2523.37 6.38 2529.93
5.93 2536.49 5.84 2543.05 5.82 2549.61 5.88 2556.17 5.89 2562.73 5.69
2569.29 5.72 2575.85 6.01 2582.41 6.33 2588.96 6.54 2602.08 7.03 2608.64 7.2
2615.2 7.24 2621.76 7.25 2628.32 7.19 2634.88 6.94 2641.44 6.74 2654.56 6.52
2661.12 6.57 2667.68 6.41 2674.23 6.13 2680.79 6.15 2687.35 6.38 2693.91
6.81 2700.47 7.42 2707.03 8.52 2713.59 10.73 2720.15 13.67 2726.71 17.3
2733.27 19.32 2739.83 20.41 2746.39 20.62 2752.95 20.5 2759.5 20.55 2766.06
20.71 2772.62 20.89 2779.18 21.09 2785.74 21.11 2792.3 21.23 2798.86 21.37
2805.42 21.46 2811.98 21.72 2818.54 21.78 2825.1 22.33 2831.66 22.51 2838.22
22.49 2844.77 22.65 2851.33 22.89 2857.89 23.01 2871.01 23.33 2877.57 23.47
2890.69 23.48 2903.81 23.46 2910.37 23.41 2916.93 23.31 2923.48 23.3 2936.6
23.43 2962.84 23.39 2982.52 23.39 2989.08 23.4 2995.64 23.37 3002.2 23.2
3008.75 22.92 3015.31 22.61 3021.87 22.51 3028.43 22.52 3048.11 22.77
3054.67 22.92 3061.23 23.25 3067.79 23.62 3074.35 23.73 3080.91 23.71
3087.46 23.76 3094.02 23.6 3100.58 22.17 3107.14 20.11 3113.7 16.83 3120.26
12.37 3126.82 11.02 3133.38 11.05 3139.94 11.24 3146.5 11.72 3153.06 15.16
3159.62 19.6 3166.18 22.1 3172.73 23.54 3179.29 23.94 3185.85 24.03 3192.41
24.03 3198.97 24.12 3205.53 24.28 3212.09 24.47 3218.65 24.62 3225.21 24.89
3238.33 25.34 3244.89 25.4 3251.44 25.42 3258 25.39 3264.56 25.32 3271.12
25.27 3284.24 25.24 3290.8 25.26 3297.36 25.4 3303.92 25.94

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 1671.94 .035 2146.45 .088

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1671.94
2146.45 1040.28 965.59 915.55 .3 .5 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 2235 2740 12.18 F
 2740 3500 24 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 9696.133

INPUT
Description: 11- 600 ft DS Mill River Trib
Station Elevation Data num= 400
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 30.26 13.11 30.24 39.32
29.88 45.88 29.64 65.54 29.75 72.09 29.91 85.2 30.69 91.75 30.81 98.31 30.68
104.86 30.32 117.97 29.15 124.52 28.99 131.08 29.22 137.63 29.67 150.74
29.99 157.29 30.32 163.85 30.49 170.4 30.51 190.06 30.15 203.17 30.05
216.28 28.32 222.83 28 255.6 27.65 262.15 27.69 275.26 28.97 281.82 29.01
288.37 28.76 294.92 28.35 308.03 27.26 321.14 26.6 334.25 26.26 340.8 26.27
347.35 26.09 367.02 26.2 373.57 26.08 386.68 26.52 393.23 26.61 399.79 26.56
406.34 26.68 419.45 26.52 439.11 26.53 445.66 26.8 458.77 26.82 471.88 27.3
530.86 27.5 537.42 27.43 543.97 27.54 576.74 26.94 583.29 26.69 589.85 26.83
602.96 26.81 616.06 26.87 622.62 26.44 629.17 25.53 642.28 24.73 648.83
24.52 661.94 24.33 675.05 23.95 681.6 23.63 688.16 24.21 694.71 25.23 701.26

25.63 707.82 25.63 740.59 27.32 773.36 27.93 793.02 27.47 799.57 26.9 806.13
26.81 812.68 26.93 819.23 26.87 825.79 26.99 832.34 26.93 845.45 25.83 852
25.39 865.11 25.06 891.33 23.81 897.88 23.59 924.1 23.17 937.2 22.52 950.31
22.6 956.86 21.93 963.42 21.03 976.53 20.03 989.63 19.65 996.19 19.33
1002.74 18.79 1009.3 18.08 1015.85 17.61 1028.96 17.95 1042.06 16.57 1061.73
15.53 1094.5 14.88 1114.16 14.25 1153.48 13.88 1179.7 13.28 1212.47 13.51
1225.57 13.45 1238.68 13.72 1264.9 13.68 1284.56 14.05 1330.43 14.05 1343.54
13.97 1363.2 14.26 1376.31 14.62 1389.42 14.54 1395.97 14.78 1402.53 14.66
1409.08 14.23 1428.74 11.98 1441.85 10.7 1454.96 10.1 1468.07 8.92 1474.62
9.12 1481.17 9.55 1487.73 10.27 1494.28 10.8 1500.84 11.19 1527.05 11.42
1540.16 11.01 1553.27 10.95 1566.37 10.75 1572.93 10.4 1586.04 9.95 1592.59
9.56 1599.14 9.03 1618.8 8.96 1625.36 8.68 1631.91 7.78 1638.47 7.72 1645.02
8.49 1651.57 8.86 1664.68 9.34 1677.79 8.96 1684.34 8.93 1697.45 8.64
1704.01 8.34 1723.67 8.22 1730.22 8.08 1749.88 8.03 1762.99 7.58 1776.1 7.6
1782.65 7.5 1789.21 7.63 1802.31 8.32 1808.87 8.11 1815.42 8.04 1848.19 8.75
1867.85 8.42 1874.41 8.76 1880.96 9.29 1887.51 9.22 1894.07 8.91 1900.62
8.75 1907.18 8.75 1913.73 8.58 1926.84 8.81 1939.94 7.93 1966.16 6.59
1972.71 6.41 1992.38 6.5 2005.48 6.64 2018.59 6.34 2025.14 5.88 2038.25 4.42
2044.81 4.47 2051.36 4.89 2071.02 5.04 2077.58 5.28 2084.13 4.8 2090.68 3.25
2097.24 2.36 2234.87 2.36 2241.42 2.5 2247.98 2.93 2261.08 4.06 2267.64 4.27
2287.3 3.88 2293.85 3.9 2306.96 4.14 2320.07 3.7 2359.39 4.16 2365.95 4.34
2372.5 4.67 2379.05 4.66 2385.61 4.32 2398.72 3.98 2405.27 3.62 2411.82 3.58
2418.38 3.8 2424.93 4.47 2431.49 4.39 2438.04 4.14 2464.26 4.24 2497.03 4.77
2516.69 5.67 2523.24 6.2 2536.35 6.04 2542.9 6.15 2556.01 5.8 2562.56 5.8
2575.67 5.4 2582.23 5.3 2588.78 5.49 2608.44 5.16 2621.55 5.8 2628.1 5.55
2634.66 5.64 2647.76 5.38 2667.43 5.51 2673.98 5.43 2700.2 7.01 2706.75 6.63
2739.52 7.26 2746.07 7.47 2759.18 7.58 2778.84 7 2785.4 7.17 2791.95 7.15
2798.5 6.87 2805.06 6.85 2818.17 6.6 2831.27 6.75 2837.83 7.18 2850.94 7.36
2857.49 7.13 2877.15 7.21 2883.71 7.12 2896.81 7.52 2903.37 7.82 2909.92
8.44 2916.47 9.86 2923.03 10.04 2929.58 9.47 2942.69 9.47 2949.24 9.15
2955.8 8.45 2962.35 7.58 2975.46 6.42 2982.01 5.94 2988.57 5.61 2995.12 5.02
3014.78 5.12 3034.44 4.94 3047.55 4.55 3054.11 4.68 3067.21 5.59 3073.77 5.9
3083.18 6.07 3086.88 6.1 3093.43 6.02 3099.98 5.25 3106.54 2.42 3120 -1.22
3122.59 -1.25 3122.94 -1.27 3123.29 -1.3 3123.67 -1.32 3124.35 -1.4 3124.68
-1.43 3124.98 -1.45 3125.24 -1.48 3125.51 -1.48 3125.75 -1.49 3126.07 -1.55
3126.79 -1.64 3127.89 -1.88 3129.01 -2.53 3130.39 -3.29 3131.68 -4.27
3133.75 -5.14 3135.69 -5.75 3137.67 -6.27 3139.91 -6.83 3142.13 -7.16
3144.32 -7.48 3146.38 -7.75 3149 -7.97 3151.52 -8.06 3154.02 -8.14 3156.43 -
8.29 3158.89 -8.32 3161.1 -8.31 3163.53 -8.23 3166 -8.28 3168.59 -8.38
3171.06 -8.4 3173.82 -8.46 3176.38 -8.5 3178.95 -8.59 3181.45 -8.74 3184.26
-8.82 3186.76 -8.88 3189.25 -8.93 3191.61 -8.95 3194.28 -8.84 3196.58 -8.81
3199.21 -8.45 3201.58 -8.54 3204.04 -8.56 3206.24 -8.54 3208.58 -8.56
3210.63 -8.6 3212.86 -8.56 3215.38 -8.56 3218.33 -8.42 3221.03 -7.93 3223.61
-8.05 3226.03 -7.56 3228.39 -7.56 3230.33 -7.39 3232.36 -7.01 3234.22 -6.57
3236.03 -6.18 3237.55 -5.52 3239.07 -4.83 3240.39 -4.29 3241.52 -3.46
3242.46 -2.06 3243.67 -1.9 3244.04 -1.9 3244.45 -1.77 3244.84 -1.64 3245.25
-1.56 3245.63 -1.47 3246 -1.41 3246.29 -1.14 3263.86 7.38 3270.37 9.48
3276.88 9.61 3289.9 9.43 3302.91 9.52 3315.93 9.83 3322.44 9.93 3328.95 9.89
3335.46 10.04 3341.96 10.16 3348.47 10.12 3354.98 10.29 3361.49 10.48 3368
10.64 3374.51 10.82 3381.01 10.94 3387.52 11.08 3394.03 11.24 3400.54 11.49
3407.05 11.87 3413.56 12.13 3420.06 12.34 3426.57 12.7 3439.59 13.1 3446.1
13.33 3452.61 13.54 3465.62 13.76 3472.13 13.84 3478.64 13.89 3485.15 13.88
3491.66 13.83 3498.17 14.02 3504.67 14.32 3511.18 14.47 3524.2 14.62 3537.22
14.58 3543.72 14.5 3550.23 14.49 3556.74 14.39 3563.25 14.4 3569.76 14.58

3582.78 14.48 3589.28 14.62 3602.3 14.61 3608.81 14.63 3615.32 14.74 3621.83 14.87 3628.33 14.76 3634.84 14.74 3647.86 14.79 3654.37 14.91 3660.88 15.14 3667.38 15.19 3680.4 15.52 3686.91 15.51 3693.42 15.7 3699.93 15.7 3706.44 15.76 3719.45 16 3725.96 16.14 3732.47 16.08 3738.98 16.31 3745.49 16.36 3751.99 16.51 3758.5 16.69 3771.52 16.92 3778.03 16.89 3784.54 17.09 3797.55 17.29 3817.08 17.81 3823.59 18.03 3830.1 18.1 3836.6 18.29 3843.11 18.46

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 3083.18 .035 3276.88 .082

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 3083.18 3276.88 1323.89 1298.37 1295.7 .3 .5 Ineffective Flow num= 1 Sta L Sta R Elev Permanent
 0 2516 5.66 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 8397.759

INPUT
Description: 10
Station Elevation Data num= 319
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 22.85 19.68 22.76 26.24 22.99 39.36 22.48 52.47 22.28 65.59 22.31 78.71 22.57 91.83 22.22 111.51 22.3 124.63 22.62 137.75 23.23 144.3 23.22 150.86 22.75 170.54 22.34 177.1 22.3 183.66 22.71 196.78 22.64 203.34 22.8 229.58 22.94 249.25 22.32 255.81 22.24 268.93 22.58 295.17 22.68 308.29 22.64 321.41 22.95 327.96 22.88 334.52 23.14 380.44 23.55 400.12 23.39 419.8 23.81 459.15 23.71 465.71 23.89 472.27 23.86 478.83 24.14 485.39 23.93 498.51 24.44 505.07 24.39 511.63 24.54 518.18 24.35 524.74 23.98 531.3 23.91 550.98 23.92 564.1 24.29 577.22 24 590.34 24.51 636.25 25.2 649.37 25.62 655.93 26.05 662.49 26.73 669.05 28.07 675.61 28.56 688.73 28.59 701.84 28.2 721.52 28 728.08 27.67 760.88 27.15 767.44 27.19 780.56 26.13 787.12 25.48 800.23 25.47 813.35 25.33 833.03 25.78 872.39 24.64 878.95 24.33 885.51 24.2 892.06 23.89 905.18 23.05 911.74 22.85 918.3 22.47 924.86 22.41 944.54 21.76 951.1 21.44 970.78 20.92 990.45 20.89 1003.57 20.54 1010.13 20.54 1016.69 20.77 1088.84 20.06 1095.4 19.68 1128.2 19.19 1147.88 19.11 1161 18.87 1180.67 18.66 1187.23 18.46 1193.79 18.58 1239.71 17.99 1252.83 17.77 1272.5 17.84 1279.06 18.06 1292.18 19.78 1298.74 20.25 1305.3 20.19 1311.86 20.51 1344.66 20.63 1384.01 20.29 1390.57 20.37 1397.13 20.13 1403.69 19.62 1410.25 19.45 1429.93 19.45 1449.61 19.15 1456.16 18.93 1462.72 18.49 1469.28 17.83 1475.84 17.01 1482.4 16.04 1488.96 14.85 1502.08 12.9 1508.64 12.11 1521.76 11.32 1534.88 10.9 1554.55 10.71 1567.67 10.34 1574.23 9.91 1580.79 9.17 1600.47 8.02 1607.03 7.8 1639.83 7.44 1646.38 7.52 1685.74 6.69 1698.86 6.58 1705.42 6.22 1711.98 5.11 1718.54 3.03 1725.1 1.35 2131.77 1.35 2138.33 1.65 2144.89 2.81 2151.45 5.2 2158.01 8.34 2164.57 9.67 2171.13 9.77 2177.69 8.56 2184.25 8.19 2190.81 8.49 2203.93 8.78 2236.72 8.78 2249.84 7.49 2256.4 7.37 2269.52 7.73 2276.08 8.01 2282.64 8.14 2289.2 8.07 2295.76 8.2 2302.32 7.8 2308.87 6.82 2321.99 6.75 2328.55 7.03 2335.11 8.72 2341.67 8.99 2348.23 8.9 2361.35 7.85 2367.91 7.78 2381.03 8.02 2381.54 8.02 2387.59 8.01 2394.15 5.49 2400.7 2.06 2407.26 .29 2420 -1.44 2420.83 -1.59 2421.84 -1.76 2422.84 -2.04 2424.01 -

2.29 2425.15 -2.68 2426.3 -3.07 2427.37 -3.36 2429.07 -3.62 2430.68 -3.78
2432.17 -4.2 2434 -4.4 2435.71 -4.79 2437.6 -5.31 2439.39 -5.86 2441.32 -
6.23 2443.12 -6.63 2445.07 -7.53 2447 -7.88 2449.14 -8.28 2453.26 -8.59
2455.23 -8.81 2457.38 -8.89 2459.33 -9.02 2461.48 -9.01 2463.39 -8.97
2465.31 -8.89 2467.32 -8.84 2469.41 -8.7 2471.43 -8.47 2473.54 -8.36 2475.48
-8.3 2477.53 -8.11 2479.57 -8.03 2481.72 -7.96 2483.71 -7.8 2485.95 -7.8
2487.94 -7.66 2490.18 -7.58 2492.31 -7.29 2494.63 -7.02 2496.8 -6.72 2499.01
-6.63 2501.14 -6.51 2503.53 -6.38 2505.73 -6.19 2507.85 -5.9 2509.96 -5.77
2512.17 -5.65 2514.29 -5.54 2516.58 -5.41 2518.58 -5.34 2520.83 -5.19
2525.02 -5.01 2526.99 -4.88 2529.15 -4.81 2531.19 -4.69 2533.35 -4.59 2535.2
-4.57 2537.43 -4.5 2539.68 -4.31 2542.42 -4.09 2545.04 -3.75 2547.77 -3.31
2550.39 -3.07 2553.31 -3.02 2556.48 -2.49 2559.54 -2 2561.69 -1.83 2563.52 -
1.67 2565.32 -1.53 2566.78 -1.01 2575.96 .42 2580.97 1.5 2587.52 4.34
2594.06 4.29 2600.6 4.05 2613.69 4 2620.23 3.68 2626.78 3.66 2633.32 3.85
2639.86 4.36 2646.41 5.18 2659.49 7.21 2672.58 7.14 2685.67 6.48 2698.75
6.22 2711.84 4.91 2738.01 3.52 2751.1 3.09 2757.64 2.98 2764.19 3.31 2803.44
3.48 2816.53 3.2 2829.62 3.41 2836.16 3.69 2842.7 4.34 2849.25 4.8 2855.79
5.09 2875.42 5.1 2888.51 4.8 2895.05 4.36 2908.14 3.97 2934.31 3.73 2953.94
3.89 2967.02 3.68 3006.28 3.65 3012.83 3.78 3019.37 4.47 3039 5.13 3052.09
6.22 3058.63 6.5 3071.72 8.13 3078.26 9.08 3084.8 9.85 3097.89 10.77
3143.69 13.1 3163.32 14.43 3169.86 15.09 3176.41 15.42 3189.49 15.51 3196.04
15.72 3202.58 15.72 3215.67 16.27 3241.84 16 3261.47 15.8 3274.56 15.37
3300.73 15.35 3313.82 15.5 3339.99 15.48 3353.08 15.32 3392.33 15.34 3398.88
15.43 3405.42 15.37 3411.96 15.46 3418.51 15.33 3438.14 15.33 3444.68 15.11
3457.77 15.14 3464.31 15.01 3510.11 15.24 3536.29 15.13 3542.83 15.43
3549.37 15.25 3555.92 15.69 3569 16.13 3575.55 16.48 3608.26 16.47 3627.89
16.02 3634.43 16.08 3640.98 16 3647.52 16.14 3667.15 16.01 3680.24 16.07
3686.78 15.93 3706.41 16.13 3712.95 16.36 3719.5 16.44 3726.04 16.68 3745.67
17.06

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 2341.67 .035 2659.49 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2341.67
2659.49 1233.41 1204.5 1191.8 .3 .5 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent 0 2163.6 9.48 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 7193.258

INPUT
Description: 9- Approach RR Br
Station Elevation Data num= 188
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 19.77 215.94 19.11 229.03
19.89 248.66 19.52 261.75 19.67 274.84 18.71 287.93 15.92 301.01 14.13
307.56 12.84 320.64 12.1 327.19 13.2 340.28 13.5 366.45 13.07 372.99 13.63
379.54 12.7 405.71 13.56 418.8 13.05 425.35 13.69 431.89 15.5 444.98 15.61
458.06 15.12 471.15 15.46 490.78 14.82 543.13 14.69 549.68 14.41 569.31
15.08 602.03 15.13 608.57 15.76 615.11 15.8 628.2 14.63 641.29 15.44 680.55
16.06 713.27 15.94 726.36 16.32 752.53 14.47 772.17 15.52 778.71 14.46

785.25 13.96 791.8 13.89 804.88 12.24 817.97 9.76 850.69 10.38 870.32 12.15
896.5 11.49 922.67 9.27 981.57 9.6 994.65 9.28 1001.2 9.9 1033.92 10.01
1060.09 8.45 1066.63 8.71 1073.18 8 1092.81 8.65 1112.44 8 1125.53 6.57
1132.07 6.47 1145.16 8.73 1158.25 9.26 1164.79 10.74 1190.97 12.66 1217.14
9.7 1230.23 8.98 1243.32 7.3 1249.86 6.85 1269.49 8.38 1276.04 7.82 1282.58
6.73 1289.12 6.54 1295.67 7.21 1308.75 9.52 1315.3 9 1321.84 9.72 1334.93
9.62 1354.56 7.34 1387.28 7.78 1393.82 5.83 1400.37 4.44 1406.91 3.75
1433.08 2.88 1439.63 2.93 1446.17 2.31 1452.72 .67 1472.35 -.85 1596.68 -.98
1603.22 -.45 1616.31 3.66 1622.85 4.45 1649.03 4.68 1662.12 5.3 1668.66 4.95
1675.2 5.25 1688.29 4.35 1694.83 2.42 1734.1 3.32 1740.64 3.8 1747.19 3.47
1766.82 4.29 1779.9 3.02 1786.45 3.28 1792.99 2.9 1799.53 2.12 1845.34 3.52
1864.97 4.71 1871.52 4.68 1878.06 4.07 1891.15 3.56 1904.23 3.52 1917.32
5.07 1923.87 4.1 1930.41 .9 1936.95 1.89 1950.04 5.42 1963.13 5.99 1969.67
5.43 1982.76 5.13 1989.3 4.15 1995.85 3.77 2022.02 5.33 2028.57 4.89 2041.65
5.97 2061.29 6.3 2067.83 5.92 2074.37 4.99 2080.92 4.54 2087.46 5.1 2094
4.91 2107.09 3.55 2120.18 2.93 2126.72 1.41 2146.36 3.2 2159.44 1.38 2165.99
1.26 2179.07 1.99 2192.16 3.57 2218.74 1.13 2295.02 1.13 2329.25 .16 2359.85
-.25 2375.28 .4 2400.41 -2.77 2423.16 -11.21 2446.97 -12.12 2463.06 -8.69
2494.08 -9.46 2521.15 -2.01 2539.53 .89 2566.75 8.04 2655.64 7.79 2704.83
10.94 2935.12 13.62 2941.64 13.03 3281.02 13.15 3339.85 13.86 3352.92 15.16
3359.45 15 3365.99 14.3 3450.95 12.38 3490.17 12.79 3529.38 12.02 3535.92
11.29 3542.45 11.54 3548.99 13.14 3555.52 15.27 3575.13 19.15 3588.2 22.09
3601.27 22.8 3660.1 19.09 3679.7 17.03 3692.77 17.47 3725.41 14.48 3731.9
14.72 3738.4 14.49 3751.38 16.01 3913.69 17.83 3933.17 17.04 3939.66 16.42
3946.16 15.18 3952.65 14.68 3991.6 16.06 4004.59 15.89 4011.08 16.11 4017.57
17.89 4024.07 18.91 4030.56 18.85 4037.05 16.39 4043.54 15.97 4127.95 16.31
4186.38 16.86

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 2192.16 .035 2566.75 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2192.16
2566.75 86.6 82.39 79.32 .3 .5 Blocked Obstructions num= 1
 Sta L Sta R Elev
 2786.11 2878.0312.79738

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 7110.866

INPUT
Description: 8.7- US Face RR Br Station Elevation Data num= 430
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 20.18 13.1 19.95 19.66 20.5
32.76 20.61 39.309 20.9 45.87 20.69 58.97 20.79 65.521 20.72 78.63 20.27
85.179 20.24 91.73 19.93 111.391 20.42 117.94 20.36 137.6 20.58 150.71 20.52
163.81 20.8 176.92 21.35 183.47 21.4 190.019 21.19 209.68 21.15 222.78 21.62
242.44 21.34 268.65 21.7 288.31 21.13 307.97 20.28 314.52 20.47 321.07 20.47
327.62 20.15 347.28 20.27 353.831 20.48 360.39 20.05 366.94 19.09 380.04
19.09 393.15 19.55 412.81 19.52 419.36 19.14 425.91 19.14 432.459 19.64
445.571 19.17 465.23 18.98 471.78 19.79 478.329 20.27 484.88 20.3 491.441
19.89 497.99 19.97 504.54 20.2 517.65 20.44 524.199 20.43 530.75 20.19

537.299 20.23 543.86 20.71 556.96 20.64 563.51 20.42 570.069 19.99 583.169
20.17 589.72 19.97 609.38 19.84 615.93 19.7 622.49 19.29 629.039 19.13
635.59 19.49 648.7 19.84 661.8 19.83 668.35 20.07 674.909 19.93 681.46 19.5
688.011 18.72 694.56 18.08 701.12 15.55 707.67 12.62 714.22 11.96 720.77
13.8 727.33 16.59 733.881 16.89 740.43 16.93 746.981 17.86 753.54 17.81
760.09 17.62 773.19 16.79 779.751 17.1 786.3 17.66 799.4 17.25 805.96 17.26
812.51 17.92 819.06 17.83 825.609 17.27 832.17 17.35 838.721 17.2 851.82
17.63 858.38 16.33 864.93 15.43 871.479 16.02 878.03 15.51 884.591 15.24
891.14 15.39 897.69 15.03 904.24 15.32 910.8 16.78 917.349 16.91 923.9 16.49
930.449 16.35 937.01 16.51 943.56 16.87 950.11 17.44 956.66 17.13 963.219 17
969.77 17.3 982.87 17.03 989.43 17.54 1002.53 17.39 1009.08 17.751022.189
17.27 1028.74 17.611035.291 17.47 1041.85 16.65 1048.4 17.13 1054.95
16.31068.059 15.75 1074.61 16.631081.161 16.76 1087.71 17.38 1094.27 16.89
1107.37 17.051113.919 16.611127.031 17.26 1140.13 17.52 1146.69 17.38
1153.24 17.54 1166.34 16.151172.901 15.69 1179.45 14.71 1186 14.64 1199.11
15.92 1205.66 16.08 1212.21 16.42 1231.87 16.77 1244.97 16.73 1258.08
17.141264.629 17.82 1271.18 17.78 1277.741 17.31 1284.29 15.53 1290.84 9.09
1297.39 8.46 1303.95 10.48 1310.499 13.89 1317.05 16.31323.601 16.88 1330.16
17.61 1336.71 17.55 1343.26 16.991356.369 16.65 1362.92 16.911369.471 16.95
1376.02 16.44 1382.58 15.64 1389.13 15.53 1395.68 16.16 1435 16.56 1441.55
16.53 1454.65 16.761461.209 16.58 1467.76 16.181474.311 16.42 1480.86 16.22
1487.42 16.271493.969 16.55 1500.52 16.241507.069 16.23 1513.63 16.52
1520.181 16.41 1539.84 16.47 1546.39 16.391552.939 16.56 1559.49 16.31
1566.051 16.21 1572.6 16.281579.151 16.051598.809 15.93 1605.36 15.32
1611.909 15.27 1618.47 16.03 1631.57 16.321657.781 15.91 1677.44 15.99
1683.99 16.3 1690.54 16.31703.649 15.881716.751 15.9 1723.31 15.75 1742.96
15.88 1756.07 15.621762.619 15.6 1769.17 15.3 1788.83 15.55 1801.94
15.221808.491 15.41 1821.59 15.1 1834.7 15.08 1847.8 15.2 1854.359 15.36
1860.91 15.371867.461 15.15 1893.67 15.361900.219 15.15 1913.33 15.39
1926.43 15.23 1939.54 15.17 1952.64 15.371959.201 15.16 1972.3 15.13 1978.85
14.91 2011.62 14.932037.829 14.82050.929 15.1 2064.04 15.06 2070.59
15.382083.689 15.24 2090.25 14.992096.799 14.97 2109.901 14.72 2129.56 14.65
2136.11 14.78 2149.22 14.72155.771 14.52 2181.98 14.39 2188.53 14.49 2214.74
14.41 2227.85 14.52234.399 14.34 2240.95 13.882247.499 13.86 2254.05 14.37
2286.82 14.312306.471 14.47 2313.03 14.692339.239 14.54 2345.79 14.68
2358.89 14.65 2372 14.83 2391.65 14.572398.211 14.912404.519 15.092410.839
14.69 2413.75 14.07 2417.439 8.57 2421 11.21 2421 10.11 2441 9.33 2442 -.97
2483 -12.29 2489 -16.31 2499 -18.82 2513 -17.59 2525 -12.23 2538.209 9.37
2544.57 12.99 2550.93 13.72 2556.11 14.54 2562.63 14.93 2582.18 14.66
2595.22 14.78 2621.29 14.532653.879 14.46 2660.39 14.62 2666.91
14.422673.429 14.74 2679.95 14.41 2686.46 14.442692.979 14.22 2706.02
14.452719.051 14.2 2738.61 14.26 2751.64 14.19 2758.16 13.29 2771.19 13.14
2777.71 13.36 2784.23 13.1 2790.75 13.772797.261 13.78 2803.78 14.03 2810.3
13.752816.819 13.72 2823.34 13.43 2829.85 13.31 2836.369 13 2842.89
13.62855.919 13.66 2862.44 13.84 2868.96 13.59 2888.51 13.52 2895.03
13.862901.551 14.34 2908.07 14.45 2927.62 14.16 2934.14 14.232940.651 13.92
2947.17 14.01 2953.69 13.82960.211 14.06 2973.24 13.61 2986.28 13.62999.311
13.83 3005.83 14.393018.871 15.09 3031.9 14.883038.419 14.61 3044.94 14.48
3051.45 14.63 3077.53 14.15 3116.63 13.923123.149 13.72 3129.67 13.88
3136.18 13.79 3155.74 14.31 3168.77 14.19 3175.29 13.98 3181.85 13.44
3194.96 12.973201.519 12.86 3221.19 13.33 3227.74 12.68 3234.3 12.73247.411
12.52 3260.53 12.83 3267.079 12.68 3280.2 12.8 3286.76 12.72 3293.31
12.453299.871 12.48 3312.981 12.91 3319.54 12.993332.649 12.59 3339.21 12.74
3345.77 12.68 3358.88 12.953365.439 12.713378.551 12.5 3385.11 12.17 3391.66

12.21 3398.219 12.08 3404.78 12.183411.331 12.47 3417.89 12.57 3424.45 12.89
3431 12.62 3437.56 12.493444.121 12.05 3450.67 12.65 3457.23 12.93 3463.79
12.98 3470.34 13.223476.901 13.6 3483.46 13.51 3490.01 13.19 3496.569
12.663509.681 12.15 3516.24 11.65 3522.8 11.53529.349 12.22 3535.91
12.413542.471 13.35 3549.02 13.49 3555.58 14.2 3581.81 14.55 3588.37 14.28
3601.48 153608.041 15.51 3647.38 15.93 3653.93 15.83 3667.05 15.91 3686.72
15.83 3699.83 16.743706.389 17.45 3712.94 17.94 3719.5 18.583726.059 18.71
3732.61 18.483739.169 18.763758.839 18.28 3798.129 17.863811.189 17.97
3817.72 17.84 3824.26 18.263830.791 19.03 3837.32 19.293843.849 18.23
3850.38 18 3856.91 17.97 3863.44 18.31 3883.04 18.79 3889.57 18.69 3896.1
18.29 3902.63 18.12 3915.69 18.17 3928.76 18.46 3948.35 18.11 3961.41 18.27
3967.94 18.25 3974.48 18.07 3981.01 18.283987.539 18.21 3994.07 18.28
4007.13 18.774020.191 18.87 4033.261 18.644046.319 16.584052.851 16.42
4059.38 17.164065.909 18.2 4078.979 19.57 4092.04 19.554098.569 19.724111.629
20.27 4118.16 20.68 4124.701 20.71 4131.23 21.03 4137.76 21.154144.291
21.614157.349 22.01 4163.88 21.91 4170.41 22.14176.951 21.83 4183.48
22.044190.009 21.54 4196.54 20.74203.069 20.2 4209.6 19.92 4229.2
19.74235.729 19.47

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .092404.519 .035 2562.63 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
2404.519 2562.63 22.89 21.96 21.2 .3 .5

BRIDGE

RIVER: Taunton River
REACH: Main Stem RS: 7100.789

INPUT
Description: 8.5 RR
Distance from Upstream XS = 4
Deck/Roadway Width = 15
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
 num= 14
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 1865 15.82 1998 15.34 2371 14.76   2421 15.05 2421 15.02 11.21 2480 15.1
11.22
 2481 15.11 11.22 2481 16.89 11.23 2517 16.81 11.23
 2517 15 11.23 2546 14.89 11.24 2603 14.54
 2813 14.33 3023 14.19

Upstream Bridge Cross Section Data
Station Elevation Data num= 430
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 20.18 13.1 19.95 19.66 20.5
32.76 20.61 39.309 20.9 45.87 20.69 58.97 20.79 65.521 20.72 78.63 20.27
85.179 20.24 91.73 19.93 111.391 20.42 117.94 20.36 137.6 20.58 150.71 20.52
163.81 20.8 176.92 21.35 183.47 21.4 190.019 21.19 209.68 21.15 222.78 21.62
242.44 21.34 268.65 21.7 288.31 21.13 307.97 20.28 314.52 20.47 321.07 20.47
327.62 20.15 347.28 20.27 353.831 20.48 360.39 20.05 366.94 19.09 380.04

19.09 393.15 19.55 412.81 19.52 419.36 19.14 425.91 19.14 432.459 19.64
445.571 19.17 465.23 18.98 471.78 19.79 478.329 20.27 484.88 20.3 491.441
19.89 497.99 19.97 504.54 20.2 517.65 20.44 524.199 20.43 530.75 20.19
537.299 20.23 543.86 20.71 556.96 20.64 563.51 20.42 570.069 19.99 583.169
20.17 589.72 19.97 609.38 19.84 615.93 19.7 622.49 19.29 629.039 19.13
635.59 19.49 648.7 19.84 661.8 19.83 668.35 20.07 674.909 19.93 681.46 19.5
688.011 18.72 694.56 18.08 701.12 15.55 707.67 12.62 714.22 11.96 720.77
13.8 727.33 16.59 733.881 16.89 740.43 16.93 746.981 17.86 753.54 17.81
760.09 17.62 773.19 16.79 779.751 17.1 786.3 17.66 799.4 17.25 805.96 17.26
812.51 17.92 819.06 17.83 825.609 17.27 832.17 17.35 838.721 17.2 851.82
17.63 858.38 16.33 864.93 15.43 871.479 16.02 878.03 15.51 884.591 15.24
891.14 15.39 897.69 15.03 904.24 15.32 910.8 16.78 917.349 16.91 923.9 16.49
930.449 16.35 937.01 16.51 943.56 16.87 950.11 17.44 956.66 17.13 963.219 17
969.77 17.3 982.87 17.03 989.43 17.54 1002.53 17.39 1009.08 17.751022.189
17.27 1028.74 17.611035.291 17.47 1041.85 16.65 1048.4 17.13 1054.95
16.31068.059 15.75 1074.61 16.631081.161 16.76 1087.71 17.38 1094.27 16.89
1107.37 17.051113.919 16.611127.031 17.26 1140.13 17.52 1146.69 17.38
1153.24 17.54 1166.34 16.151172.901 15.69 1179.45 14.71 1186 14.64 1199.11
15.92 1205.66 16.08 1212.21 16.42 1231.87 16.77 1244.97 16.73 1258.08
17.141264.629 17.82 1271.18 17.78 1277.741 17.31 1284.29 15.53 1290.84 9.09
1297.39 8.46 1303.95 10.48 1310.499 13.89 1317.05 16.31323.601 16.88 1330.16
17.61 1336.71 17.55 1343.26 16.991356.369 16.65 1362.92 16.911369.471 16.95
1376.02 16.44 1382.58 15.64 1389.13 15.53 1395.68 16.16 1435 16.56 1441.55
16.53 1454.65 16.761461.209 16.58 1467.76 16.181474.311 16.42 1480.86 16.22
1487.42 16.271493.969 16.55 1500.52 16.241507.069 16.23 1513.63 16.52
1520.181 16.41 1539.84 16.47 1546.39 16.391552.939 16.56 1559.49 16.31
1566.051 16.21 1572.6 16.281579.151 16.051598.809 15.93 1605.36 15.32
1611.909 15.27 1618.47 16.03 1631.57 16.321657.781 15.91 1677.44 15.99
1683.99 16.3 1690.54 16.31703.649 15.881716.751 15.9 1723.31 15.75 1742.96
15.88 1756.07 15.621762.619 15.6 1769.17 15.3 1788.83 15.55 1801.94
15.221808.491 15.41 1821.59 15.1 1834.7 15.08 1847.8 15.2 1854.359 15.36
1860.91 15.371867.461 15.15 1893.67 15.361900.219 15.15 1913.33 15.39
1926.43 15.23 1939.54 15.17 1952.64 15.371959.201 15.16 1972.3 15.13 1978.85
14.91 2011.62 14.932037.829 14.82050.929 15.1 2064.04 15.06 2070.59
15.382083.689 15.24 2090.25 14.992096.799 14.97 2109.901 14.72 2129.56 14.65
2136.11 14.78 2149.22 14.72155.771 14.52 2181.98 14.39 2188.53 14.49 2214.74
14.41 2227.85 14.52234.399 14.34 2240.95 13.882247.499 13.86 2254.05 14.37
2286.82 14.312306.471 14.47 2313.03 14.692339.239 14.54 2345.79 14.68
2358.89 14.65 2372 14.83 2391.65 14.572398.211 14.912404.519 15.092410.839
14.69 2413.75 14.07 2417.439 8.57 2421 11.21 2421 10.11 2441 9.33 2442 -.97
2483 -12.29 2489 -16.31 2499 -18.82 2513 -17.59 2525 -12.23 2538.209 9.37
2544.57 12.99 2550.93 13.72 2556.11 14.54 2562.63 14.93 2582.18 14.66
2595.22 14.78 2621.29 14.532653.879 14.46 2660.39 14.62 2666.91
14.422673.429 14.74 2679.95 14.41 2686.46 14.442692.979 14.22 2706.02
14.452719.051 14.2 2738.61 14.26 2751.64 14.19 2758.16 13.29 2771.19 13.14
2777.71 13.36 2784.23 13.1 2790.75 13.772797.261 13.78 2803.78 14.03 2810.3
13.752816.819 13.72 2823.34 13.43 2829.85 13.31 2836.369 13 2842.89
13.62855.919 13.66 2862.44 13.84 2868.96 13.59 2888.51 13.52 2895.03
13.862901.551 14.34 2908.07 14.45 2927.62 14.16 2934.14 14.232940.651 13.92
2947.17 14.01 2953.69 13.82960.211 14.06 2973.24 13.61 2986.28 13.62999.311
13.83 3005.83 14.393018.871 15.09 3031.9 14.883038.419 14.61 3044.94 14.48
3051.45 14.63 3077.53 14.15 3116.63 13.923123.149 13.72 3129.67 13.88
3136.18 13.79 3155.74 14.31 3168.77 14.19 3175.29 13.98 3181.85 13.44
3194.96 12.973201.519 12.86 3221.19 13.33 3227.74 12.68 3234.3 12.73247.411

12.52 3260.53 12.83 3267.079 12.68 3280.2 12.8 3286.76 12.72 3293.31
12.453299.871 12.48 3312.981 12.91 3319.54 12.993332.649 12.59 3339.21 12.74
3345.77 12.68 3358.88 12.953365.439 12.713378.551 12.5 3385.11 12.17 3391.66
12.21 3398.219 12.08 3404.78 12.183411.331 12.47 3417.89 12.57 3424.45 12.89
3431 12.62 3437.56 12.493444.121 12.05 3450.67 12.65 3457.23 12.93 3463.79
12.98 3470.34 13.223476.901 13.6 3483.46 13.51 3490.01 13.19 3496.569
12.663509.681 12.15 3516.24 11.65 3522.8 11.53529.349 12.22 3535.91
12.413542.471 13.35 3549.02 13.49 3555.58 14.2 3581.81 14.55 3588.37 14.28
3601.48 153608.041 15.51 3647.38 15.93 3653.93 15.83 3667.05 15.91 3686.72
15.83 3699.83 16.743706.389 17.45 3712.94 17.94 3719.5 18.583726.059 18.71
3732.61 18.483739.169 18.763758.839 18.28 3798.129 17.863811.189 17.97
3817.72 17.84 3824.26 18.263830.791 19.03 3837.32 19.293843.849 18.23
3850.38 18 3856.91 17.97 3863.44 18.31 3883.04 18.79 3889.57 18.69 3896.1
18.29 3902.63 18.12 3915.69 18.17 3928.76 18.46 3948.35 18.11 3961.41 18.27
3967.94 18.25 3974.48 18.07 3981.01 18.283987.539 18.21 3994.07 18.28
4007.13 18.774020.191 18.87 4033.261 18.644046.319 16.584052.851 16.42
4059.38 17.164065.909 18.2 4078.979 19.57 4092.04 19.554098.569 19.724111.629
20.27 4118.16 20.68 4124.701 20.71 4131.23 21.03 4137.76 21.154144.291
21.614157.349 22.01 4163.88 21.91 4170.41 22.14176.951 21.83 4183.48
22.044190.009 21.54 4196.54 20.74203.069 20.2 4209.6 19.92 4229.2
19.74235.729 19.47

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .092404.519 .035 2562.63 .085

Bank Sta: Left Right Coeff Contr. Expan.
 2404.519 2562.63 .3 .5

Downstream Deck/Roadway Coordinates
 num= 14
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 1851 15.82 1984 15.34 2357 14.76   2407 15.05 2407 15.02 11.21 2466 15.1
11.22
 2467 15.11 11.22 2467 16.89 11.23 2503 16.81 11.23
 2503 15 11.23 2532 14.89 11.24 2589 14.54
 2799 14.33 3009 14.19

Downstream Bridge Cross Section Data
Station Elevation Data num= 409
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 21.17 6.551 21.57 13.11
21.74 19.66 21.74 26.22 21.91 32.77 21.94 72.099 21.29 85.211 21.16 91.76
21.22 98.32 21.62 104.87 21.27 117.979 21.37 124.54 21.32 144.2 21.66 150.75
21.53 157.31 21.75 163.861 21.76 170.42 21.39 176.97 21.48 183.53 21.71
203.19 21.57 209.75 21.72 216.3 22.15 222.85 22.06 235.96 21.5 249.07 21.58
255.63 21.75 262.18 21.78 268.74 21.36 275.289 20.8 281.85 20.86 294.95
20.58 327.73 20.24 347.39 20.24 353.949 20.1 380.16 20.24 386.72 19.95
419.49 19.33 426.05 19.1 432.599 19.34 445.711 18.7 452.26 18.1 458.82 18
465.37 17.23 471.93 16.74 478.479 16.94 491.591 15.88 504.7 15.12 511.25
14.63 524.361 14.08 530.92 13.94 544.03 13.18 550.58 12.93 557.139 13.6
563.69 13.44 576.8 12.73 583.35 13.12 589.909 15.15 596.46 15.37 609.57
14.89 622.68 15.44 629.24 16.37 635.789 16.6 655.45 15.69 668.56 15.63
688.23 15.08 694.78 15.34 701.34 15.33 707.89 15.46 721 15.19 740.66 15.07
747.22 14.43 760.331 14.82 766.88 14.24 779.99 14.66 786.54 14.99 793.099

15.49 799.65 15.23 819.32 13.68 832.43 13.61 838.979 13.38 845.53 12.83
858.64 13.27 871.75 12.12 878.31 12.22 884.859 13.85 891.42 14.5 897.97
14.25 904.53 13.83 911.08 14.43 917.629 14.8 924.19 14.72 937.3 15.14 943.85
13.68 950.409 13.14 956.96 13.57 963.521 13.49 970.07 14.52 976.63 15.86
989.73 15.31 996.289 15.56 1002.84 15.21009.401 16.12 1022.51 15.05 1029.06
15.3 1042.169 14.76 1048.73 14.71055.281 15.68 1061.83 16 1068.39 15.84
1074.939 15.5 1081.5 15.641107.719 13.69 1114.27 13.57 1127.38 13.72 1133.94
14.23 1147.04 13.971153.599 13.63 1160.15 13.741166.711 13.63 1173.26 13.23
1179.82 13.78 1186.37 15.191199.479 15.89 1206.04 15.41 1212.591 15.46
1219.14 15.89 1232.25 16.01 1238.81 15.46 1251.92 15.57 1258.47 16.04
1265.03 15.65 1271.58 13.021278.139 9.36 1284.69 8.09 1297.8 13.71 1304.35
14.38 1310.91 13.361324.021 14.64 1330.57 14.78 1337.13 14.47 1343.68 14.37
1350.24 14.43 1363.34 13.58 1376.45 13.3 1383.01 12.93 1389.56 13 1396.12
12.73 1409.23 12.48 1422.34 12.1 1428.89 12.31435.449 12.16 1442
12.621448.551 12.53 1455.11 12.27 1468.219 12.31 1474.77 12.21481.329 13.1
1487.88 14.39 1507.55 14.42 1514.099 14 1520.65 13.941527.211 14.23 1533.76
14.09 1540.32 14.23 1546.87 13.971573.091 14.06 1579.65 13.74 1586.2 13.75
1599.31 14.31 1612.42 14.28 1632.08 15.631638.639 15.87 1645.19 15.53 1658.3
15.53 1671.409 15.091684.519 14.5 1691.07 13.95 1710.74 12.78 1723.85 12.81
1730.401 12.31 1743.51 12.04 1750.06 12.14 1769.73 11.331776.281 11.43
1782.84 13.341795.949 13.36 1802.5 13.551809.061 13.36 1815.61 13.53 1841.829
13.21 1848.38 12.99 1854.94 13.01 1861.49 12.82 1868.05 12.42 1874.599 12.37
1881.16 12.671887.709 12.4 1900.82 12.75 1907.37 12.5 1913.93 12.421920.479
12.081933.591 12.43 1940.15 12.32 1946.7 12.39 1953.259 12.68 1959.81 12.05
1972.92 11.93 1979.48 11.21 1986.03 11.19 1992.58 11.331999.139 11.16
2005.69 12.04 2012.25 13.31 2018.8 12.97 2025.36 12.952031.909 13.09 2038.47
12.52 2064.68 12.152077.789 12.47 2084.35 13.62 2097.46 13.862110.569 13.83
2117.12 13.49 2130.23 13.67 2149.89 13.28 2182.66 13.212189.219 12.9 2215.44
12.8 2221.99 12.96 2228.55 12.82235.099 12.15 2241.65 11.752248.209 11.89
2254.76 11.52 2274.43 11.33 2287.54 11.532294.091 11.11 2300.65 11.6 2307.2
11.61 2313.75 11.42 2320.31 11.562326.861 11.4 2339.97 11.57 2346.53 11.76
2353.08 13.122359.639 13.56 2366.19 13.732372.741 14.372392.009 14.37
2398.37 14.492402.429 13.15 2404.72 12.38 2407 11.21 2407 10.11 2427 9.33
2428 -.97 2469 -12.29 2475 -16.31 2485 -18.82 2499 -17.59 2511 -12.23 2532
-.15 2533 11.24 2550.93 13.72 2557.28 14.19 2582.89 13.732589.419 13.39
2615.56 13.28 2628.63 13.43 2635.159 13.34 2641.7 13.65 2661.3 13.51 2667.84
13.91 2674.37 13.88 2680.899 13.62693.969 13.75 2700.51 14.03 2713.58 14.13
2765.85 13.96 2772.39 13.752798.529 13.47 2831.2 13.4 2837.73 13.52844.271
13.35 2850.8 13.542870.409 13.51 2890.01 13.792903.081 13.82916.149 14.1
2935.75 14.34 2942.29 14.322961.889 14.75 2988.03 14.712994.561 14.79 3001.1
14.733007.629 14.443020.699 14.283066.441 14.37 3118.72 14.38 3125.249 14.53
3144.86 14.393151.389 14.51 3164.46 14.4 3177.53 14.45 3184.059 14.29 3190.6
13.84 3203.67 14.02 3216.74 14.613229.811 14.07 3249.41 14.09 3262.38 13.82
3268.87 14.6 3275.35 14.82 3281.84 15.18 3294.809 14.99 3307.79 15.13 3327.25
14.98 3333.73 14.56 3346.7 14.85 3353.189 14.553372.649 14.27 3379.14 14.35
3385.62 14.82 3392.11 15.05 3405.08 14.83 3411.57 14.91 3418.05 15.13
3437.51 15.18 3456.97 15.91 3482.919 15.323489.399 15.353495.889 15.55
3502.38 15.59 3508.86 15.39 3515.35 15.47 3521.83 15.31 3534.81 15.63
3541.29 15.65 3547.78 15.41 3554.27 15.543560.749 15.443567.239 15.11
3606.16 15.04 3612.64 15.22 3619.13 15.543632.099 15.393645.071 15.86
3651.56 15.7 3658.05 15.89 3664.53 15.68 3671.02 16 3677.51 16.153690.479
15.983696.971 16.03 3703.451 15.72 3709.94 15.13 3716.42 15.05 3729.4 14.57
3735.88 14.16 3742.369 14.13748.859 13.483761.831 12.58 3768.31 12.38 3774.8
12.41 3781.29 13.81 3787.77 15.76 3794.26 15.64 3807.21 16.12 3826.6 16.19

```
3833.06 16.073852.451 16.743858.909 16.723865.369 16.83 3884.76 18.42
3891.22 18.72 3917.07 18.673929.991 18.863942.919 18.323949.379 18.23
3955.839 18.523962.309 18.54 3981.69 18.87 3988.15 18.78 3994.62 18.85
4001.08 18.764026.929 19.034033.389 18.64039.849 18.31 4052.78 17.21  4059.24
17.32 4065.7 18.21 4072.16 17.96 4078.63 17.19 4085.09 15.94  4091.55 14.88
4104.48 12.99 4110.94 12.654117.399 12.13 4130.33 11.76  4143.25 11.9 4156.18
11.83 4162.64 12.57 4169.1 13.51 4175.56 14.32  4182.03 14.794194.951
15.444220.799 15.51 4227.26 15.61

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 2398.37 .035 2557.28 .085

Bank Sta: Left Right Coeff Contr. Expan.
 2398.37 2557.28 .1 .3

Upstream Embankment side slope = 0 horiz. to 1.0 vertical Downstream
Embankment side slope = 0 horiz. to 1.0 vertical Maximum allowable
submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Piers = 5

Pier Data
Pier Station Upstream= 2457 Downstream= 2443 Upstream num= 2
 Width Elev Width Elev
 2 -20 2 13
Downstream num= 2
 Width Elev Width Elev
 2 -20 2 13

Pier Data
Pier Station Upstream= 2480 Downstream= 2466
Upstream num= 2
 Width Elev Width Elev
 2 -20 2 13
Downstream num= 2
 Width Elev Width Elev
 2 -20 2 13

Pier Data
Pier Station Upstream= 2484 Downstream= 2470
Upstream num= 2
 Width Elev Width Elev
 4 -20 4 13
Downstream num= 2
 Width Elev Width Elev
 4 -20 4 13

Pier Data
Pier Station Upstream= 2514 Downstream= 2500
```

```
Upstream num= 2
 Width Elev Width Elev
 4 -20 4 13
Downstream num= 2
 Width Elev Width Elev
 4 -20 4 13

Pier Data Pier Station Upstream= 2518 Downstream= 2504
Upstream num= 2
 Width Elev Width Elev
 2 -20 2 13
Downstream num= 2
 Width Elev Width Elev
 2 -20 2 13

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
 Energy
 W.S. Pro Method

 W.S.Pro Data
 Left Embankment
 El of the top of the embankment = 15
 El of the toe of the abutment = 0
 Right Embankment
 El of the top of the embankment = 15
 El of the toe of the abutment = 0
 Abutment Type = 2 Vert. abutments and sloping embankments  Slope of
abutments =
 Top with of embankment = 15
 Centroid station of bridge opening =
 Wing Wall Type = No wing walls present
 Width =
 Angle =
 Radius =   Guide Banks Type = No Guide Bank present
 Length =
 Offset =
 Angle =

Selected Low Flow Methods = W.S.Pro Method

High Flow Method
 Energy Only

Additional Bridge Parameters
 Add Friction component to Momentum
 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION
```

RIVER: Taunton River
REACH: Main Stem RS: 7088.903

INPUT
Description: 8.3- DS Face RR Br
Station Elevation Data num= 409
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 21.17 6.551 21.57 13.11
21.74 19.66 21.74 26.22 21.91 32.77 21.94 72.099 21.29 85.211 21.16 91.76
21.22 98.32 21.62 104.87 21.27 117.979 21.37 124.54 21.32 144.2 21.66 150.75
21.53 157.31 21.75 163.861 21.76 170.42 21.39 176.97 21.48 183.53 21.71
203.19 21.57 209.75 21.72 216.3 22.15 222.85 22.06 235.96 21.5 249.07 21.58
255.63 21.75 262.18 21.78 268.74 21.36 275.289 20.8 281.85 20.86 294.95
20.58 327.73 20.24 347.39 20.24 353.949 20.1 380.16 20.24 386.72 19.95
419.49 19.33 426.05 19.1 432.599 19.34 445.711 18.7 452.26 18.1 458.82 18
465.37 17.23 471.93 16.74 478.479 16.94 491.591 15.88 504.7 15.12 511.25
14.63 524.361 14.08 530.92 13.94 544.03 13.18 550.58 12.93 557.139 13.6
563.69 13.44 576.8 12.73 583.35 13.12 589.909 15.15 596.46 15.37 609.57
14.89 622.68 15.44 629.24 16.37 635.789 16.6 655.45 15.69 668.56 15.63
688.23 15.08 694.78 15.34 701.34 15.33 707.89 15.46 721 15.19 740.66 15.07
747.22 14.43 760.331 14.82 766.88 14.24 779.99 14.66 786.54 14.99 793.099
15.49 799.65 15.23 819.32 13.68 832.43 13.61 838.979 13.38 845.53 12.83
858.64 13.27 871.75 12.12 878.31 12.22 884.859 13.85 891.42 14.5 897.97
14.25 904.53 13.83 911.08 14.43 917.629 14.8 924.19 14.72 937.3 15.14 943.85
13.68 950.409 13.14 956.96 13.57 963.521 13.49 970.07 14.52 976.63 15.86
989.73 15.31 996.289 15.56 1002.84 15.21009.401 16.12 1022.51 15.05 1029.06
15.3 1042.169 14.76 1048.73 14.71055.281 15.68 1061.83 16 1068.39 15.84
1074.939 15.5 1081.5 15.641107.719 13.69 1114.27 13.57 1127.38 13.72 1133.94
14.23 1147.04 13.971153.599 13.63 1160.15 13.741166.711 13.63 1173.26 13.23
1179.82 13.78 1186.37 15.191199.479 15.89 1206.04 15.41 1212.591 15.46
1219.14 15.89 1232.25 16.01 1238.81 15.46 1251.92 15.57 1258.47 16.04
1265.03 15.65 1271.58 13.021278.139 9.36 1284.69 8.09 1297.8 13.71 1304.35
14.38 1310.91 13.361324.021 14.64 1330.57 14.78 1337.13 14.47 1343.68 14.37
1350.24 14.43 1363.34 13.58 1376.45 13.3 1383.01 12.93 1389.56 13 1396.12
12.73 1409.23 12.48 1422.34 12.1 1428.89 12.31435.449 12.16 1442
12.621448.551 12.53 1455.11 12.27 1468.219 12.31 1474.77 12.21481.329 13.1
1487.88 14.39 1507.55 14.42 1514.099 14 1520.65 13.941527.211 14.23 1533.76
14.09 1540.32 14.23 1546.87 13.971573.091 14.06 1579.65 13.74 1586.2 13.75
1599.31 14.31 1612.42 14.28 1632.08 15.631638.639 15.87 1645.19 15.53 1658.3
15.53 1671.409 15.091684.519 14.5 1691.07 13.95 1710.74 12.78 1723.85 12.81
1730.401 12.31 1743.51 12.04 1750.06 12.14 1769.73 11.331776.281 11.43
1782.84 13.341795.949 13.36 1802.5 13.551809.061 13.36 1815.61 13.53 1841.829
13.21 1848.38 12.99 1854.94 13.01 1861.49 12.82 1868.05 12.42 1874.599 12.37
1881.16 12.671887.709 12.4 1900.82 12.75 1907.37 12.5 1913.93 12.421920.479
12.081933.591 12.43 1940.15 12.32 1946.7 12.39 1953.259 12.68 1959.81 12.05
1972.92 11.93 1979.48 11.21 1986.03 11.19 1992.58 11.331999.139 11.16
2005.69 12.04 2012.25 13.31 2018.8 12.97 2025.36 12.952031.909 13.09 2038.47
12.52 2064.68 12.152077.789 12.47 2084.35 13.62 2097.46 13.862110.569 13.83
2117.12 13.49 2130.23 13.67 2149.89 13.28 2182.66 13.212189.219 12.9 2215.44
12.8 2221.99 12.96 2228.55 12.82235.099 12.15 2241.65 11.752248.209 11.89
2254.76 11.52 2274.43 11.33 2287.54 11.532294.091 11.11 2300.65 11.6 2307.2
11.61 2313.75 11.42 2320.31 11.562326.861 11.4 2339.97 11.57 2346.53 11.76
2353.08 13.122359.639 13.56 2366.19 13.732372.741 14.372392.009 14.37
2398.37 14.492402.429 13.15 2404.72 12.38 2407 11.21 2407 10.11 2427 9.33
2428 -.97 2469 -12.29 2475 -16.31 2485 -18.82 2499 -17.59 2511 -12.23 2532

-.15 2533 11.24 2550.93 13.72 2557.28 14.19 2582.89 13.732589.419 13.39
2615.56 13.28 2628.63 13.43 2635.159 13.34 2641.7 13.65 2661.3 13.51 2667.84
13.91 2674.37 13.88 2680.899 13.62693.969 13.75 2700.51 14.03 2713.58 14.13
2765.85 13.96 2772.39 13.752798.529 13.47 2831.2 13.4 2837.73 13.52844.271
13.35 2850.8 13.542870.409 13.51 2890.01 13.792903.081 13.82916.149 14.1
2935.75 14.34 2942.29 14.322961.889 14.75 2988.03 14.712994.561 14.79 3001.1
14.733007.629 14.443020.699 14.283066.441 14.37 3118.72 14.38 3125.249 14.53
3144.86 14.393151.389 14.51 3164.46 14.4 3177.53 14.45 3184.059 14.29 3190.6
13.84 3203.67 14.02 3216.74 14.613229.811 14.07 3249.41 14.09 3262.38 13.82
3268.87 14.6 3275.35 14.82 3281.84 15.18 3294.809 14.99 3307.79 15.13 3327.25
14.98 3333.73 14.56 3346.7 14.85 3353.189 14.553372.649 14.27 3379.14 14.35
3385.62 14.82 3392.11 15.05 3405.08 14.83 3411.57 14.91 3418.05 15.13
3437.51 15.18 3456.97 15.91 3482.919 15.323489.399 15.353495.889 15.55
3502.38 15.59 3508.86 15.39 3515.35 15.47 3521.83 15.31 3534.81 15.63
3541.29 15.65 3547.78 15.41 3554.27 15.543560.749 15.443567.239 15.11
3606.16 15.04 3612.64 15.22 3619.13 15.543632.099 15.393645.071 15.86
3651.56 15.7 3658.05 15.89 3664.53 15.68 3671.02 16 3677.51 16.153690.479
15.983696.971 16.03 3703.451 15.72 3709.94 15.13 3716.42 15.05 3729.4 14.57
3735.88 14.16 3742.369 14.13748.859 13.483761.831 12.58 3768.31 12.38 3774.8
12.41 3781.29 13.81 3787.77 15.76 3794.26 15.64 3807.21 16.12 3826.6 16.19
3833.06 16.073852.451 16.743858.909 16.723865.369 16.83 3884.76 18.42
3891.22 18.72 3917.07 18.673929.991 18.863942.919 18.323949.379 18.23
3955.839 18.523962.309 18.54 3981.69 18.87 3988.15 18.78 3994.62 18.85
4001.08 18.764026.929 19.034033.389 18.64039.849 18.31 4052.78 17.21 4059.24
17.32 4065.7 18.21 4072.16 17.96 4078.63 17.19 4085.09 15.94 4091.55 14.88
4104.48 12.99 4110.94 12.654117.399 12.13 4130.33 11.76 4143.25 11.9 4156.18
11.83 4162.64 12.57 4169.1 13.51 4175.56 14.32 4182.03 14.794194.951
15.444220.799 15.51 4227.26 15.61

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 2398.37 .035 2557.28 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2398.37
2557.28 57.75 56.88 56.46 .1 .3

CROSS SECTION

RIVER: Taunton River REACH: Main Stem RS: 7032.026

INPUT
Description: 8- Exit RR Br
Station Elevation Data num= 416
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 23.05 6.55 24.26 13.1 23.03
19.65 20.87 26.21 19.81 32.76 19.5 39.31 19.44 45.86 19.3 52.41 19.35 58.96
20.33 65.52 21.18 72.07 21.93 78.62 22.28 85.17 22.5 98.27 22.79 104.82
22.82 111.38 22.74 117.93 22.9 124.48 22.94 131.03 23.04 144.13 22.81 150.69
22.73 157.24 22.63 163.79 22.63 170.34 22.4 176.89 22.06 183.44 21.7 196.55
21.11 203.1 20.78 209.65 20.63 216.2 20.59 222.75 20.57 229.3 20.46 235.86
20.22 242.41 20.29 248.96 20.2 255.51 19.99 268.61 19.73 281.72 19.98 288.27
19.82 294.82 19.62 301.37 19.63 307.92 19.7 314.47 19.72 321.03 19.71
327.58 19.93 334.13 19.98 340.68 19.84 347.23 19.65 353.78 19.63 360.34
19.41 366.89 19.08 373.44 18.68 379.99 18.21 386.54 18 399.64 17.54 406.2

17.23 412.75 16.95 419.3 16.81 425.85 16.32 432.4 15.77 438.95 15.59 445.51
15.11 452.06 14.49 458.61 13.81 465.16 13.04 471.71 12.51 478.26 12.4 484.81
12.16 491.37 11.87 497.92 11.56 504.47 11.48 511.02 10.84 517.57 10.35
524.12 10.15 530.68 9.93 537.23 9.87 550.33 9.83 556.88 9.73 563.43 9.7
569.98 9.69 576.54 9.74 583.09 9.72 589.64 9.77 596.19 9.66 602.74 9.62
609.29 9.71 615.85 9.73 622.4 9.79 628.95 9.92 635.5 10.15 642.05 10.27
648.6 10.23 655.16 10.04 661.71 9.81 668.26 9.38 674.81 9.52 681.36 9.51
687.91 9.41 694.46 9.64 701.02 9.58 707.57 8.95 714.12 7.14 720.67 5.93
727.22 5.91 1192.38 5.91 1198.93 6.56 1205.49 7.32 1212.04 6.92 1218.59 6.94
1225.14 7.43 1231.69 8.01 1238.24 8.44 1244.79 8.82 1251.35 9.67 1257.9
11.15 1264.45 11.73 1271 11.02 1277.55 10.44 1284.1 10.02 1290.66 9.76
1297.21 8.95 1303.76 8.78 1310.31 8.86 1316.86 8.57 1323.41 7.96 1329.96 7.3
1343.07 7.19 1349.62 7.01 1356.17 6.71 1362.72 7.1 1369.27 7.18 1382.38 7.27
1388.93 7.21 1395.48 7.06 1402.03 7.44 1408.58 7.51 1415.13 7.2 1421.69 6.91
1428.24 6.56 1441.34 6.51 1447.89 6.4 1454.44 6.38 1460.99 6.7 1467.55 6.91
1474.1 7.21 1480.65 7.33 1487.2 7.12 1500.3 6.95 1506.86 7.11 1513.41 7.23
1519.96 7.27 1526.51 7.37 1533.06 7.42 1546.16 7.34 1552.72 7.19 1559.27 7.3
1565.82 7.36 1572.37 7.39 1578.92 7.6 1585.47 7.75 1592.03 7.76 1598.58 7.7
1605.13 7.6 1618.23 7.56 1624.78 7.6 1631.33 7.54 1637.89 6.53 1644.44 5.71
1650.99 5.85 1657.54 5.86 1664.09 5.91 1670.64 5.99 1677.19 5.99 1683.75
5.92 1690.3 6.42 1696.85 6.54 1703.4 6.93 1709.95 7.7 1716.5 9 1723.06 9.78
1729.61 10.53 1736.16 11.63 1742.71 11.94 1749.26 11.89 1755.81 11.46
1762.36 10.44 1768.92 9.02 1775.47 7.57 1782.02 6.65 1788.57 6.29 1795.12
6.16 1808.23 5.76 1814.78 5.66 1821.33 5.64 1827.88 5.39 1834.43 5.23
1840.98 4.98 1854.09 4.83 1860.64 4.78 1867.19 4.75 1873.74 4.47 1880.29
4.31 1893.4 4.12 1899.95 4.41 1906.5 4.52 1913.05 4.48 1919.6 4.15 1926.15
3.9 1932.7 3.73 1939.26 3.69 1945.81 3.73 1952.36 3.83 1958.91 3.83 1972.01
3.69 1978.56 3.57 1985.12 3.47 1991.67 3.4 1998.22 3.41 2004.77 3.29
2011.32 3.3 2017.87 3.41 2024.43 3.46 2030.98 3.65 2037.53 3.67 2044.08 3.92
2050.63 3.75 2057.18 3.61 2063.73 3.35 2070.29 3.43 2076.84 3.37 2083.39
3.64 2208.08 2.88 2343.94 3.23 2364.33 7.96 2371.19 1.69 2379.02 .13 2396.94
-12.6 2406.72 -14.01 2420.7 -17.95 2442.46 -20.19 2461.27 -20.88 2476.74 -
16.17 2491.29 -9.07 2497.23 -4.15 2502.98 6.11 2504.02 6.22 2529.89 12.74
2571.59 11.49 2946.27 14 2952.82 13.91 2959.38 13.65 2965.94 13.24 2972.49
13.15 2979.05 13.15 2985.61 13.12 2992.17 13.24 2998.72 13.33 3005.28 13.39
3011.84 13.31 3018.39 13.29 3031.51 13.31 3038.07 13.38 3044.62 13.55
3057.74 13.56 3064.29 13.77 3077.41 13.63 3090.52 13.7 3097.08 13.67 3103.64
13.59 3110.19 13.61 3116.75 13.61 3123.31 13.53 3129.86 13.01 3136.42 13.05
3142.98 13.15 3149.54 13.06 3156.09 12.62 3162.65 12.64 3169.21 12.59
3175.76 12.62 3182.32 12.43 3188.88 12.02 3195.44 11.83 3201.99 11.97
3208.55 12.33 3215.11 12.72 3221.66 13.03 3228.22 13.26 3234.78 13.37
3247.89 13.63 3254.45 13.73 3261.01 13.76 3267.56 13.74 3280.68 13.83
3287.23 13.76 3300.32 14.17 3306.87 14.43 3313.42 14.77 3319.97 14.99
3326.52 14.88 3339.62 14.39 3346.17 14.23 3352.72 14.14 3359.27 13.95
3365.82 13.9 3372.37 13.77 3378.91 13.69 3385.46 13.5 3392.01 13.43 3398.56
13.61 3405.11 13.84 3411.66 14.04 3418.21 14.34 3424.76 14.29 3431.31 14.08
3437.86 13.64 3444.41 13 3450.96 12.52 3457.5 12.22 3464.05 12.04 3470.6
11.73 3477.15 11.16 3483.7 10.69 3490.25 10.13 3496.8 10.16 3503.35 10.25
3509.9 10.23 3516.45 10.19 3523 10.1 3529.54 10.03 3536.09 9.99 3542.64
10.08 3549.19 10.2 3555.74 10.18 3562.29 9.91 3575.39 10.17 3581.94 10.4
3588.49 10.6 3595.04 10.72 3601.59 10.7 3608.13 10.65 3614.68 10.39 3621.23
10.36 3627.78 10.26 3634.33 10.32 3640.88 10.25 3647.43 10.03 3660.53 10.15
3667.08 10.15 3680.18 9.92 3686.72 9.89 3693.27 10.04 3699.82 9.89 3706.37
9.66 3712.92 9.71 3719.47 9.69 3726.02 9.86 3732.57 9.99 3739.12 12.73

3745.67 15.62 3752.22 16.67 3758.76 16.77 3765.31 16.81 3771.86 16.81
3784.96 16.92 3791.51 17.06 3798.06 17.61 3804.61 18.22 3811.16 18.59
3817.71 18.35 3824.26 18.65 3830.8 18.81 3837.35 18.53 3843.9 18.33 3850.45
18.29 3857 18.19 3863.55 18.04 3870.1 17.59 3876.65 16.78 3883.2 14.96
3889.75 13.07 3896.3 11.31 3902.85 10.54 3909.39 10.74 3915.94 10.96 3922.49
12.09 3929.04 12.72 3935.59 13.81 3942.14 14.37 3948.69 14.59 3955.24 14.9
3961.79 15.13 3968.34 14.95 3974.89 14.88 3981.44 14.83 3987.98 14.68
3994.53 14.8 4001.08 14.97 4007.63 14.97 4014.18 14.91 4020.73 15.15 4027.28
15.29 4033.83 15.32 4046.93 15.41 4066.57 15.44 4073.12 15.46 4086.22 15.45
4099.32 15.47 4132.06 15.53 4138.61 15.51 4151.71 15.4 4171.36 15.17 4184.46
15.06 4197.56 15.05 4204.1 15.07

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 2364.33 .035 2529.89 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2364.33
2529.89 1208.71 1041.61 935.52 .1 .3 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 0 1251 9.67 T
 3424 4204.1 14.3 T

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 5990.413

INPUT
Description: 7
Station Elevation Data num= 206
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 23.22 26.08 24.85 156.48
24.77 182.56 24.09 195.6 24.58 215.15 23.64 241.23 24.41 254.27 24.13 267.31
23.16 312.95 22.29 325.99 22.68 339.03 22.19 423.79 21.96 436.83 21.25
502.03 20.44 521.59 21.17 573.75 20.97 586.79 20.54 593.31 19.67 599.83
18.33 710.66 17.34 769.34 18.08 886.73 17.47 932.49 17.75 971.72 17.38
991.33 18.11 1017.48 17.92 1030.55 18.56 1056.7 18.59 1082.85 19.57 1122.08
18.89 1135.15 17.85 1167.84 17.81 1200.52 18.63 1207.06 18.19 1220.14 18.3
1226.67 17.68 1239.75 17.8 1259.36 17.5 1285.51 18.34 1292.05 18.86 1344.35
19.81 1363.96 19.6 1475.09 22.84 1514.32 22.65 1625.45 24.97 1645.06 24.02
1658.14 22.6 1690.82 22.57 1710.46 20.98 1736.68 19.61 1782.58 19.13 1789.14
18.78 1795.7 17.56 1808.81 12.91 1815.37 11.89 1821.93 11.79 1848.15 13.43
1874.38 13.36 1880.94 13.76 1894.05 16 1907.17 16.65 1926.84 16.56 1933.39
15.67 1939.95 16.12 1953.07 15.87 1959.62 15.03 1966.18 15.19 1985.85 17.52
1998.96 18.66 2012.08 19.28 2018.64 19.04 2025.19 17.28 2031.75 17.64
2051.42 20.93 2071.09 21.96 2084.2 21.35 2090.76 20.55 2110.43 15.56 2116.99
14.32 2123.55 13.6 2136.66 13.3 2189.11 13.13 2215.33 12.09 2221.88 12.15
2300.54 11.44 2326.76 10.77 2333.31 11.09 2384.5 9.54 2390.89 8.26 2397.29
5.93 2403.69 2.01 2420 -1.01 2420.9 -1.16 2422.67 -1.46 2422.87 -1.25
2423.27 -1.2 2423.9 -1.34 2424.56 -1.49 2425.33 -1.64 2426.19 -1.7 2427.17 -
1.99 2428.25 -2.21 2429.47 -2.71 2430.61 -3.19 2432.03 -3.66 2434.39 -4.41
2436.83 -5.27 2439.29 -6.1 2442 -6.83 2444.54 -7.28 2447.29 -7.84 2449.88 -
8.1 2452.31 -8.26 2454.84 -8.46 2457.06 -8.57 2459.42 -8.63 2461.45 -8.75
2463.76 -8.96 2466.3 -8.91 2469.13 -9.1 2471.69 -8.95 2474.36 -9.43 2476.97

-9.32 2479.72 -9.27 2482.34 -9.17 2485.22 -8.96 2487.86 -8.61 2490.42 -8.34
2492.88 -8.04 2495.06 -7.61 2497.29 -7.22 2499.32 -7.05 2501.44 -6.77
2503.21 -6.52 2505.32 -6.16 2507.24 -5.86 2508.99 -5.42 2510.58 -5.18
2512.33 -4.81 2513.96 -4.59 2515.81 -4.19 2517.88 -3.76 2520.36 -3.45
2522.71 -2.85 2525.25 -2.51 2527.8 -2.3 2529.49 -2.02 2531.03 -1.89 2532.66
-1.83 2534.11 -1.76 2535.66 -1.62 2536.89 -1.48 2538.22 -1.39 2539.31 -1.28
2540.31 -1.14 2543.95 4.79 2550.21 7.62 2556.47 9.27 2562.73 9.46 2575.24
9.02 2587.76 8.18 2637.82 9.37 2714.81 9.63 2747.45 10.26 2845.37 10.51
2858.43 10.76 2871.49 10.29 2897.6 11.6 3028.46 10.74 3192.3 10.41 3343.02
11.76 3349.57 10.86 3356.13 9.51 3369.23 8.27 3382.34 7.61 3408.55 7.78
3415.11 8.11 3460.98 7.33 3513.41 8.34 3533.07 9.23 3605.15 8.2 3631.37 9.07
3716.56 8.05 3723.11 7.23 3775.54 8.72 3782.09 9.85 3788.65 11.53 3795.2
13.72 3801.75 15.25 3814.86 15.45 3834.52 17.14 3841.07 17.26 3847.63 16.39
3854.18 14.99 3860.73 13.07 3867.28 11.9 3919.71 13.13 3985.24 10.65 4004.9
10.55 4018.01 11.33 4024.56 11.32 4031.12 11.99 4044.22 15.65 4050.78 16.57
4057.33 16.06

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .09 2333.31 .035 2556.47 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2333.31
2556.47 373.51 485.71 679.74 .1 .3 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 2897 4057.33 11.6 T
Blocked Obstructions num= 1
 Sta L Sta R Elev
 2896.5 3167.111.55081

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 5504.704

INPUT
Description: 6- Approach Plain St Br
Station Elevation Data num= 421 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 24.78 6.56 25.23 13.11 25.58 19.67 25.61 26.22 25.55 32.78 25.64 39.33
25.66 45.89 25.9 52.45 26.03 59 26.29 72.11 26.55 78.67 26.66 85.22 26.89
91.78 27.21 98.34 27.35 104.89 27.69 111.45 27.9 118 27.97 124.56 28.19
131.11 28.33 137.67 28.57 144.23 28.64 150.78 28.53 157.34 28.21 163.89
28.06 170.45 27.95 177 28.13 183.56 28.26 190.12 28.35 196.67 28.4 203.23
28.55 209.78 28.82 216.34 28.76 222.89 28.59 229.45 28.52 236 28.41 242.56
28.35 249.12 28.48 255.67 28.65 262.23 28.71 268.78 28.57 275.34 28.2 281.89
27.87 288.45 27.64 295.01 27.6 301.56 27.42 308.12 27.2 314.67 26.9 321.23
26.64 327.78 26.58 334.34 26.47 340.9 26.22 347.45 26.07 354.01 25.83 360.56
25.76 367.12 25.56 373.67 25.24 380.23 25.11 386.79 24.92 393.34 24.82
399.9 24.79 406.45 24.66 413.01 24.14 419.56 24.01 426.12 23.94 432.68 23.82
439.23 24.13 445.79 24.25 452.34 24.24 458.9 24.16 465.45 24.14 472.01 24.01
478.56 23.82 485.12 23.82 491.68 23.96 498.23 24.08 504.79 24 511.34 24.35
517.9 25.42 524.45 25.3 537.57 24.89 544.12 23.96 550.68 23.35 557.23 22.59
563.79 22.05 570.34 21.64 576.9 21.46 583.46 21.24 590.01 21.21 596.57 21.29
603.12 21.17 609.68 21.1 616.23 21.1 629.35 20.87 635.9 20.8 642.46 20.86

649.01 20.96 662.12 21.45 668.68 21.55 675.24 21.53 681.79 21.25 688.35
21.21 694.9 20.58 701.46 20.06 708.01 20.27 714.57 20.26 721.13 20.27 734.24
20.45 740.79 20.53 753.9 20.73 760.46 20.76 767.02 20.85 780.13 20.34 786.68
20.2 793.24 20.18 799.79 20.27 812.91 20.31 819.46 20.36 826.02 20.3 832.57
20.18 839.13 20.17 845.68 20.07 852.24 19.63 858.8 19.64 871.91 19.75
878.46 19.79 885.02 19.73 891.57 19.72 898.13 19.75 904.69 19.88 911.24
19.82 924.35 19.97 930.91 20.26 937.46 20.37 944.02 20.58 950.57 20.73
957.13 20.79 963.69 20.54 970.24 20.52 983.35 20.94 989.91 20.95 996.46
20.88 1003.02 20.95 1009.58 21 1016.13 21 1022.69 20.98 1029.24 21.03 1035.8
21.06 1042.35 21.41 1048.91 21.86 1055.47 21.91 1062.02 22.08 1068.58 22.33
1075.13 22.63 1081.69 22.77 1088.24 22.84 1094.8 22.83 1101.36 22.65 1107.91
22.28 1114.47 21.81 1121.02 21.26 1127.58 20.83 1134.13 20.86 1140.69 21.15
1147.25 21.47 1153.8 21.57 1166.91 21.67 1173.47 21.78 1180.02 21.7 1186.58
21.5 1193.14 21.59 1199.69 21.65 1206.25 21.5 1212.8 21.45 1219.36 21.34
1225.91 21.03 1232.47 20.83 1245.58 20.85 1252.14 20.93 1258.69 20.94
1265.25 20.86 1271.8 20.81 1278.36 20.93 1284.92 21.1 1298.03 21.12 1304.58
21.29 1311.14 21.55 1317.69 21.79 1324.25 21.87 1330.81 21.89 1343.92 22.15
1350.47 22.32 1357.03 22.45 1363.58 22.64 1370.14 23.04 1376.7 23.27 1383.25
23.3 1389.81 23.38 1396.36 23.53 1402.92 23.66 1409.47 23.56 1422.59 23.57
1429.14 23.67 1435.7 23.79 1442.25 23.88 1448.81 24 1455.36 23.9 1468.47
24.01 1475.03 23.94 1481.59 23.9 1488.14 23.71 1494.7 23.55 1501.25 23.79
1507.81 24.49 1514.36 24.93 1520.92 25.07 1527.48 25.11 1534.03 25.27
1540.59 25.46 1547.14 25.57 1553.7 25.72 1560.25 25.9 1566.81 25.99 1573.37
25.97 1579.92 25.91 1586.48 25.9 1599.59 25.73 1606.14 25.74 1612.7 25.71
1625.81 25.5 1632.37 25.26 1638.92 25.07 1645.48 24.81 1652.03 24.63 1658.59
24.52 1665.15 24.59 1671.7 24.7 1684.81 24.01 1691.37 23.79 1697.92 23.37
1704.44 23.14 1717.48 23.2 1724 23.22 1730.52 23.16 1737.04 22.74 1743.56
21.76 1750.08 21.29 1756.6 20.94 1763.12 20.36 1769.64 20.2 1776.16 20
1782.68 19.85 1789.2 19.42 1795.72 18.65 1802.24 17.36 1808.76 16.13 1815.28
15.84 1821.8 15.97 1828.32 16.71 1834.84 17.59 1841.36 18.52 1847.88 18.64
1854.4 18.83 1860.92 18.95 1867.44 19.09 1873.96 19.14 1886.99 19.53 1900.03
19.8 1906.55 19.92 1913.07 19.92 1919.59 20.2 1926.11 20.45 1932.63 20.57
1939.15 20.41 1945.67 20.32 1952.19 20.34 1958.71 20.54 1965.23 21.14
1971.75 21.95 1978.27 22.69 1984.79 22.85 1991.31 22.98 1997.83 23.34
2004.35 23.44 2010.87 23.22 2017.39 22.97 2023.91 23.32 2030.43 23.47
2036.95 23.64 2043.47 23.42 2049.99 23.3 2056.5 23.14 2063.02 22.93 2069.54
22.85 2076.06 22.5 2082.58 21.46 2089.1 19.25 2095.62 18.89 2102.14 18.88
2108.66 18.48 2115.18 17.65 2121.7 17.19 2128.22 16.84 2134.74 16.42 2147.78
15.17 2154.3 15.05 2167.37 14.48 2173.91 14.13 2180.45 13.95 2193.53 13.74
2200.06 13.7 2206.6 13.52 2213.14 13.22 2219.68 12.78 2226.21 12.43 2239.29
12.19 2245.83 12.23 2252.37 12.32 2258.9 12.19 2265.44 11.85 2271.98 11.66
2278.52 11.71 2291.59 11.54 2298.13 11.33 2311.21 11.2 2317.74 11.29 2324.28
11.36 2330.82 11.4 2337.36 11.59 2343.9 11.92 2350.43 12.2 2356.97 12.43
2370.05 12.24 2376.58 12.28 2383.12 12.36 2389.66 12.53 2555.27 11.7 2571.37
6.39 2572.07 -3.74 2580.16 -6.2 2608.37 -10.12 2625.36 -10.88 2644.33 -9.87
2650.91 -10.66 2670.95 -9.1 2674.87 -6.86 2681.57 11.72 2722.61 11.83
2781.61 11.44 2788.1 11.47 2801.07 11.23 2820.54 10.83 2827.03 10.81 2833.52
10.75 2840.01 10.61 2846.5 10.56 2852.99 10.7 2859.48 10.86 2865.97 10.92
2872.46 10.81 2878.95 10.43 2885.43 10.13 2891.92 10.03 2898.41 9.87 2904.9
9.74 2911.39 9.98 2917.88 10.3 2924.37 10.54 2930.86 10.69 2937.35 11.01
2943.84 10.79 2956.82 10.45 2963.31 10.19 2969.79 10.24 2976.28 9.84 2982.77
9.76 2989.26 9.73 2995.75 9.67 3002.24 9.72 3008.73 9.62 3015.22 9.64
3021.71 9.75 3028.2 9.65 3034.69 9.76 3041.18 9.83 3047.67 9.69 3054.15 9.6
3060.64 9.59 3073.62 9.95 3086.6 10.01 3093.09 10.13 3099.58 10.17 3106.07

10.16 3112.56 10.46 3119.05 14.98 3125.54 20.67 3132.03 20.75 3138.51 20.51
3145 19.74 3151.49 19.46 3157.98 19.44 3164.47 19.45 3170.96 19.57 3177.45
18.89 3183.94 17.62 3190.43 17.4 3196.92 18.14 3203.41 17.77 3209.9 17.61
3216.39 17.55 3222.87 17.74 3229.36 18.01 3235.85 17.72 3242.34 17.41
3248.83 17.3 3255.32 17.5 3261.81 18.17 3268.3 18.97 3274.79 19.02 3281.28
19.23 3287.77 19.18

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 2555.27 .035 2681.57 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2555.27
2681.57 98.06 95.18 93.88 .1 .3 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 2722 3287.77 11.6 T
Blocked Obstructions num= 1
 Sta L Sta R Elev
 2791.49 2855.8811.40867

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 5409.52

INPUT
Description: 5.7- US Face Plain St Br
Station Elevation Data num= 429
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 29.95 6.52 30.1 13.05 30.45
19.57 31.19 26.09 31.36 32.62 31.23 39.14 31.05 45.66 30.89 52.19 30.46
58.71 30.14 65.23 30.03 71.75 30.11 78.28 30.08 84.8 30.07 91.32 30.28
97.85 30.47 104.37 30.57 110.89 30.3 117.42 29.89 123.94 29.63 130.46 29.82
136.99 29.94 143.51 30.17 150.03 30.43 156.56 30.52 169.6 30.6 182.65 30.65
195.7 30.48 202.22 30.58 208.74 30.74 215.27 30.96 221.79 31.06 228.31 31.07
234.83 31.01 241.36 31.14 247.88 30.34 254.4 29.99 260.93 30.33 267.45 30.48
273.97 30.49 287.02 30.4 293.54 30.09 300.07 29.34 306.59 28.8 313.11 29.18
319.64 29.77 326.16 30.04 332.68 30.68 339.21 30.92 345.73 30.9 352.25 30.78
358.78 30.35 365.3 29.8 371.82 30.06 378.34 30.87 384.87 31.63 391.39 31.84
397.91 32.26 404.44 32.43 410.96 32.23 430.53 30.92 437.05 30.45 443.58
30.23 450.1 30.54 456.62 31.05 463.15 30.9 469.67 30.39 476.19 29.92 482.72
29.67 489.24 29.58 495.76 29.65 502.29 29.91 508.81 30.46 515.33 31.27
521.85 32.23 528.38 32.82 534.9 32.97 541.42 33.06 547.95 32.41 554.47 32.31
560.99 32.43 574.04 32.86 580.56 32.8 587.09 32.57 600.13 32.78 619.7 32.19
626.23 32.05 632.75 31.27 639.27 30.46 645.8 29.73 652.32 29.4 658.84 29.13
665.36 28.83 671.89 28.7 678.41 29.34 684.93 31.05 691.46 31.69 697.98 31.97
704.5 32.2 711.03 32.1 717.55 31.82 724.07 31.51 730.6 31.17 737.12 30.76
743.64 30.45 750.17 30.58 756.69 30.85 763.21 31.14 769.74 31.5 776.26 31.89
782.78 31.76 789.31 32.29 795.83 32.5 802.35 32.69 808.88 32.85 815.4 32.95
821.92 32.86 828.44 32.72 834.97 32.7 841.49 32.64 848.01 32.56 854.54 32.74
861.06 32.98 867.58 33.45 874.11 33.94 880.63 34.2 887.15 34.09 893.68 34.53
900.2 34.86 906.72 35.06 913.25 34.97 926.25 35.02 945.76 35.36 952.27 35.25
958.77 35.28 965.28 35.34 971.78 35.55 978.28 35.52 984.79 35.29 991.29 35.2
997.79 34.7 1004.3 33.79 1010.8 32.8 1017.31 31.72 1023.81 31.15 1030.31
30.61 1036.82 30.36 1043.32 31.67 1049.82 33.52 1056.33 34.4 1062.83 33.97

1082.34 32.57 1088.85 32.08 1095.35 31.78 1101.85 31.67 1108.36 31.89
1114.86 32.19 1127.87 32.32 1134.37 32.44 1147.38 32.48 1153.88 32.41
1160.39 32.22 1166.89 31.79 1179.9 32.23 1186.4 32.43 1192.91 32.58 1199.41
32.52 1205.91 32.65 1212.42 32.66 1218.92 32.69 1225.43 32.7 1231.93 32.81
1238.43 33.03 1244.94 33.4 1251.44 33.82 1257.94 33.85 1270.95 33.81 1277.46
33.83 1290.46 33.76 1296.97 33.66 1309.97 33.51 1316.48 33.23 1322.98 32.65
1329.48 32.04 1335.99 31.57 1342.49 31.39 1349 31.15 1355.5 31.25 1362 31.28
1375.01 31.43 1381.52 31.52 1388.02 31.69 1394.52 31.81 1401.03 31.85
1407.53 31.83 1414.03 31.76 1420.54 31.52 1427.04 31.2 1433.54 31.29 1440.05
31.29 1446.55 31.27 1453.06 31.18 1459.56 30.99 1466.06 30.68 1472.57 30.67
1479.07 30.57 1485.57 30.41 1492.08 30.17 1498.58 29.97 1505.09 29.97
1511.59 30 1518.09 30.01 1524.6 30.21 1531.1 30.63 1537.6 30.62 1544.11
30.41 1550.61 30.31 1557.12 30.42 1563.62 30.35 1570.12 29.97 1576.63 29.73
1583.13 29.64 1589.63 29.41 1596.14 28.66 1602.64 28.28 1609.15 28.26
1615.65 28 1622.15 28.17 1628.66 28.23 1635.16 28.27 1641.71 28.23 1648.27
28.1 1654.82 27.9 1661.38 27.58 1667.93 26.89 1674.48 26.22 1681.04 25.93
1687.59 25.76 1694.14 25.16 1700.7 24.76 1707.25 24.72 1713.8 24.25 1720.36
24 1726.91 24.26 1733.47 24.54 1740.02 24.92 1746.57 24.95 1753.13 24.85
1759.68 24.87 1766.23 24.94 1772.79 24.46 1779.34 24.13 1785.89 24.48
1792.45 24.97 1805.56 25.14 1818.66 25.41 1825.22 25.21 1831.77 24.06
1838.32 23.96 1844.88 23.75 1851.43 23.88 1857.98 24.15 1864.54 24.57
1871.09 24.77 1877.65 24.76 1884.2 24.62 1890.75 24.35 1897.31 24.19 1903.86
24.12 1910.41 24.08 1923.52 24.35 1930.07 24.52 1936.63 24.74 1943.18 24.77
1962.84 24.54 1969.4 24.13 1975.95 22.67 1982.5 21.37 1995.61 20.92 2015.27
20.41 2021.82 20.2 2028.38 19.71 2034.93 19.56 2041.49 19.24 2048.04 18.64
2054.59 18.09 2061.13 17.65 2067.66 17.47 2074.19 17.62 2080.72 17.68
2087.26 17.54 2106.86 17.23 2113.39 17.15 2119.92 16.84 2126.45 16.17
2132.99 15.13 2139.52 14.62 2146.05 14.65 2159.12 14.85 2172.18 15.02
2178.72 15.12 2185.25 14.81 2191.78 14.47 2204.85 14.46 2217.91 14.21
2224.45 14.13 2230.98 13.97 2237.51 13.87 2244.04 13.85 2250.58 13.9 2257.11
13.81 2263.64 13.65 2270.17 13.59 2276.71 13.56 2283.24 13.59 2289.77 13.71
2296.31 13.78 2302.84 14.02 2315.84 14.12 2322.31 14.33 2328.78 14.48
2335.25 14.67 2341.72 14.77 2348.19 14.9 2354.66 14.97 2361.13 15.13 2367.6
15.11 2374.07 15.19 2380.54 15.37 2387.01 15.25 2393.47 15.25 2399.94 15.4
2406.41 15.5 2412.88 15.39 2419.35 15.26 2425.82 14.58 2432.29 11.87 2438.76
4.39 2441.97 -3.65 2460.77 -9.63 2473.43 -10.96 2519.95 -9.19 2547.66 -4.85
2551.91 -3.45 2552.45 14.33 2568.15 13.28 2574.62 13.83 2581.09 13.58
2587.56 13.43 2594.03 12.93 2600.5 12.63 2606.97 12.44 2613.44 12.29 2619.91
12.2 2626.38 12.18 2632.85 12.09 2639.32 11.98 2645.87 11.7 2652.43 11.72
2658.99 12.02 2665.55 12.13 2672.11 11.9 2678.67 11.57 2691.79 11.05 2698.34
10.77 2704.9 10.52 2711.46 10.25 2718.02 9.94 2724.58 9.51 2731.14 9.32
2737.7 9.18 2744.25 9.07 2750.81 8.99 2757.37 8.84 2763.93 8.79 2770.49 8.69
2777.05 8.91 2783.61 9.21 2790.17 9.15 2796.72 9.14 2803.28 9.27 2809.84
9.31 2816.4 9.39 2822.96 9.42 2829.52 9.52 2855.75 9.55 2862.31 9.73 2875.43
10.24 2881.99 10.27 2888.55 10.15 2895.11 10.28 2901.66 10.33 2908.22 10.28
2914.78 10.26 2934.46 10.38 2947.57 10.36 2954.13 10.36 2960.69 10.81
2967.25 12.12 2973.81 11.64 2980.37 12.35 2986.93 17.36 2993.49 20.71
3000.04 20.87 3006.6 20.86 3013.16 20.93 3019.72 20.91 3026.28 21.07 3032.84
20.74 3039.4 20.38 3045.96 20.35 3052.51 20.26 3059.07 20.4 3065.63 19.79
3072.19 19.35 3078.75 19.81 3085.31 20.06 3091.87 19.81 3098.43 18.68
3104.98 18.04 3111.54 18.21 3118.1 18.45 3124.66 18.53 3131.22 18.75 3137.78
18.99 3150.89 19.09 3157.45 19.29 3164.01 19.57 3170.57 19.73

Manning's n Values num= 3

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 Sta n Val Sta n Val Sta n Val
 0 .085 2419.35 .035 2552.45 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  2419.35
2552.45 81.29 73.58 68.36 .1 .3 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 2630 3170.57 11.6 T
Blocked Obstructions num= 1
 Sta L Sta R Elev
 2662.35 272512.09707

BRIDGE


RIVER: Taunton River
REACH: Main Stem RS: 5376.326

INPUT
Description: 5.5 Plain St
Distance from Upstream XS = 4
Deck/Roadway Width = 58
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
 num= 14
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 2126 14 2300 14 2410 14   2410 19.95 2425 19.95 2425 16.34 12.06
 2490 15.34 11.64 2552 14.33 10.13 2552 17.95 10.13
 2567 17.95 2567 13.1 2649 13.1
 2722 12.55 2981 12.55

Upstream Bridge Cross Section Data
Station Elevation Data num= 429
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  0 29.95 6.52 30.1 13.05 30.45
19.57 31.19 26.09 31.36  32.62 31.23 39.14 31.05 45.66 30.89 52.19 30.46
58.71 30.14  65.23 30.03 71.75 30.11 78.28 30.08 84.8 30.07 91.32 30.28
97.85 30.47 104.37 30.57 110.89 30.3 117.42 29.89 123.94 29.63  130.46 29.82
136.99 29.94 143.51 30.17 150.03 30.43 156.56 30.52  169.6 30.6 182.65 30.65
195.7 30.48 202.22 30.58 208.74 30.74  215.27 30.96 221.79 31.06 228.31 31.07
234.83 31.01 241.36 31.14  247.88 30.34 254.4 29.99 260.93 30.33 267.45 30.48
273.97 30.49  287.02 30.4 293.54 30.09 300.07 29.34 306.59 28.8 313.11 29.18
319.64 29.77 326.16 30.04 332.68 30.68 339.21 30.92 345.73 30.9  352.25 30.78
358.78 30.35 365.3 29.8 371.82 30.06 378.34 30.87  384.87 31.63 391.39 31.84
397.91 32.26 404.44 32.43 410.96 32.23  430.53 30.92 437.05 30.45 443.58
30.23 450.1 30.54 456.62 31.05  463.15 30.9 469.67 30.39 476.19 29.92 482.72
29.67 489.24 29.58  495.76 29.65 502.29 29.91 508.81 30.46 515.33 31.27
521.85 32.23  528.38 32.82 534.9 32.97 541.42 33.06 547.95 32.41 554.47 32.31
560.99 32.43 574.04 32.86 580.56 32.8 587.09 32.57 600.13 32.78  619.7 32.19
626.23 32.05 632.75 31.27 639.27 30.46 645.8 29.73  652.32 29.4 658.84 29.13
665.36 28.83 671.89 28.7 678.41 29.34  684.93 31.05 691.46 31.69 697.98 31.97
704.5 32.2 711.03 32.1  717.55 31.82 724.07 31.51 730.6 31.17 737.12 30.76
743.64 30.45  750.17 30.58 756.69 30.85 763.21 31.14 769.74 31.5 776.26 31.89
782.78 31.76 789.31 32.29 795.83 32.5 802.35 32.69 808.88 32.85  815.4 32.95
821.92 32.86 828.44 32.72 834.97 32.7 841.49 32.64  848.01 32.56 854.54 32.74
861.06 32.98 867.58 33.45 874.11 33.94  880.63 34.2 887.15 34.09 893.68 34.53
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997.79 34.7 1004.3 33.79 1010.8 32.8 1017.31 31.72 1023.81 31.15 1030.31
30.61 1036.82 30.36 1043.32 31.67 1049.82 33.52 1056.33 34.4 1062.83 33.97
1082.34 32.57 1088.85 32.08 1095.35 31.78 1101.85 31.67 1108.36 31.89
1114.86 32.19 1127.87 32.32 1134.37 32.44 1147.38 32.48 1153.88 32.41
1160.39 32.22 1166.89 31.79 1179.9 32.23 1186.4 32.43 1192.91 32.58 1199.41
32.52 1205.91 32.65 1212.42 32.66 1218.92 32.69 1225.43 32.7 1231.93 32.81
1238.43 33.03 1244.94 33.4 1251.44 33.82 1257.94 33.85 1270.95 33.81 1277.46
33.83 1290.46 33.76 1296.97 33.66 1309.97 33.51 1316.48 33.23 1322.98 32.65
1329.48 32.04 1335.99 31.57 1342.49 31.39 1349 31.15 1355.5 31.25 1362 31.28
1375.01 31.43 1381.52 31.52 1388.02 31.69 1394.52 31.81 1401.03 31.85
1407.53 31.83 1414.03 31.76 1420.54 31.52 1427.04 31.2 1433.54 31.29 1440.05
31.29 1446.55 31.27 1453.06 31.18 1459.56 30.99 1466.06 30.68 1472.57 30.67
1479.07 30.57 1485.57 30.41 1492.08 30.17 1498.58 29.97 1505.09 29.97
1511.59 30 1518.09 30.01 1524.6 30.21 1531.1 30.63 1537.6 30.62 1544.11
30.41 1550.61 30.31 1557.12 30.42 1563.62 30.35 1570.12 29.97 1576.63 29.73
1583.13 29.64 1589.63 29.41 1596.14 28.66 1602.64 28.28 1609.15 28.26
1615.65 28 1622.15 28.17 1628.66 28.23 1635.16 28.27 1641.71 28.23 1648.27
28.1 1654.82 27.9 1661.38 27.58 1667.93 26.89 1674.48 26.22 1681.04 25.93
1687.59 25.76 1694.14 25.16 1700.7 24.76 1707.25 24.72 1713.8 24.25 1720.36
24 1726.91 24.26 1733.47 24.54 1740.02 24.92 1746.57 24.95 1753.13 24.85
1759.68 24.87 1766.23 24.94 1772.79 24.46 1779.34 24.13 1785.89 24.48
1792.45 24.97 1805.56 25.14 1818.66 25.41 1825.22 25.21 1831.77 24.06
1838.32 23.96 1844.88 23.75 1851.43 23.88 1857.98 24.15 1864.54 24.57
1871.09 24.77 1877.65 24.76 1884.2 24.62 1890.75 24.35 1897.31 24.19 1903.86
24.12 1910.41 24.08 1923.52 24.35 1930.07 24.52 1936.63 24.74 1943.18 24.77
1962.84 24.54 1969.4 24.13 1975.95 22.67 1982.5 21.37 1995.61 20.92 2015.27
20.41 2021.82 20.2 2028.38 19.71 2034.93 19.56 2041.49 19.24 2048.04 18.64
2054.59 18.09 2061.13 17.65 2067.66 17.47 2074.19 17.62 2080.72 17.68
2087.26 17.54 2106.86 17.23 2113.39 17.15 2119.92 16.84 2126.45 16.17
2132.99 15.13 2139.52 14.62 2146.05 14.65 2159.12 14.85 2172.18 15.02
2178.72 15.12 2185.25 14.81 2191.78 14.47 2204.85 14.46 2217.91 14.21
2224.45 14.13 2230.98 13.97 2237.51 13.87 2244.04 13.85 2250.58 13.9 2257.11
13.81 2263.64 13.65 2270.17 13.59 2276.71 13.56 2283.24 13.59 2289.77 13.71
2296.31 13.78 2302.84 14.02 2315.84 14.12 2322.31 14.33 2328.78 14.48
2335.25 14.67 2341.72 14.77 2348.19 14.9 2354.66 14.97 2361.13 15.13 2367.6
15.11 2374.07 15.19 2380.54 15.37 2387.01 15.25 2393.47 15.25 2399.94 15.4
2406.41 15.5 2412.88 15.39 2419.35 15.26 2425.82 14.58 2432.29 11.87 2438.76
4.39 2441.97 -3.65 2460.77 -9.63 2473.43 -10.96 2519.95 -9.19 2547.66 -4.85
2551.91 -3.45 2552.45 14.33 2568.15 13.28 2574.62 13.83 2581.09 13.58
2587.56 13.43 2594.03 12.93 2600.5 12.63 2606.97 12.44 2613.44 12.29 2619.91
12.2 2626.38 12.18 2632.85 12.09 2639.32 11.98 2645.87 11.7 2652.43 11.72
2658.99 12.02 2665.55 12.13 2672.11 11.9 2678.67 11.57 2691.79 11.05 2698.34
10.77 2704.9 10.52 2711.46 10.25 2718.02 9.94 2724.58 9.51 2731.14 9.32
2737.7 9.18 2744.25 9.07 2750.81 8.99 2757.37 8.84 2763.93 8.79 2770.49 8.69
2777.05 8.91 2783.61 9.21 2790.17 9.15 2796.72 9.14 2803.28 9.27 2809.84
9.31 2816.4 9.39 2822.96 9.42 2829.52 9.52 2855.75 9.55 2862.31 9.73 2875.43
10.24 2881.99 10.27 2888.55 10.15 2895.11 10.28 2901.66 10.33 2908.22 10.28
2914.78 10.26 2934.46 10.38 2947.57 10.36 2954.13 10.36 2960.69 10.81
2967.25 12.12 2973.81 11.64 2980.37 12.35 2986.93 17.36 2993.49 20.71
3000.04 20.87 3006.6 20.86 3013.16 20.93 3019.72 20.91 3026.28 21.07 3032.84
20.74 3039.4 20.38 3045.96 20.35 3052.51 20.26 3059.07 20.4 3065.63 19.79
3072.19 19.35 3078.75 19.81 3085.31 20.06 3091.87 19.81 3098.43 18.68

3104.98 18.04 3111.54 18.21 3118.1 18.45 3124.66 18.53 3131.22 18.75 3137.78 18.99 3150.89 19.09 3157.45 19.29 3164.01 19.57 3170.57 19.73

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 2419.35 .035 2552.45 .085

Bank Sta: Left Right Coeff Contr. Expan.
 2419.35 2552.45 .1 .3
Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 2630 3170.57 11.6 T
Blocked Obstructions num= 1
 Sta L Sta R Elev
 2662.35 272512.09707
 Downstream Deck/Roadway Coordinates
 num= 14
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
 2126 14 2175 14 2285 14
 2285 19.95 2300 19.95 2300 16.23 11.92
 2365 15.48 11.15 2412 14.73 10.5 2412 17.95 10.5
 2427 17.95 2427 13.1 2510 13.1
 2582 12.55 2981 12.55

Downstream Bridge Cross Section Data
Station Elevation Data num= 429
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 33.95 6.51 34.25 13.02 34.92 19.52 35.01 26.03 35.37 32.54 35.43 39.05 35.4 45.55 35.17 52.06 35.06 58.57 35.13 65.08 35.13 71.58 35.04 78.09 34.66 84.6 34.03 91.11 33.96 97.61 33.82 104.12 33.79 110.63 34.31 117.14 34.8 123.64 34.91 130.15 35.06 136.66 35.41 143.17 35.16 149.67 34.12 156.18 33.87 162.69 34.3 169.2 34.89 175.71 35.11 188.72 35.15 195.23 35.2 201.74 35.16 208.24 35.17 214.75 35.22 221.26 35.24 227.77 35.24 234.27 35.09 240.78 34.8 247.29 34.39 253.8 34.27 260.3 34.31 266.81 34.11 273.32 33.52 279.83 33.25 286.33 33.9 292.84 34.33 299.35 34.44 305.86 34.43 312.36 34.37 318.87 34.14 325.38 33.82 331.89 33.82 338.4 33.74 344.9 33.8 351.41 33.96 357.92 33.89 364.43 33.72 370.93 34.01 377.44 34.26 383.95 34.4 390.46 34.33 396.96 34.37 409.98 34.55 416.49 34.5 422.99 34.32 429.5 34.33 436.01 34.37 442.52 34.36 449.02 34.48 455.53 34.91 462.04 35.27 468.55 35.31 475.06 35.38 481.56 35.28 488.07 34.9 494.58 35.03 501.09 35.22 507.59 35.53 514.1 35.74 520.61 35.62 527.12 35.02 533.62 34.67 540.13 35.01 546.64 35.81 553.15 36 559.65 36.08 566.16 36.11 572.67 36.05 579.18 35.9 585.68 35.71 592.19 35.94 598.7 37.51 605.21 38.83 611.71 39.46 618.22 39.68 624.73 39.67 631.24 39.57 637.74 39.43 644.25 39.18 650.76 38.47 657.27 38.18 670.28 38.09 676.79 38.41 683.3 38.62 689.81 38.56 696.31 38.34 702.82 38 709.33 37.79 715.84 38.38 722.34 38.99 728.85 39.21 735.36 39.23 741.87 39.18 748.37 39.03 754.88 38.82 761.39 38.5 767.9 38.6 774.4 38.87 780.96 39.06 787.52 39.89 794.07 40.63 800.63 40.86 807.18 40.88 813.74 40.84 820.29 40.67 826.85 39.92 833.41 39.51 839.96 39.26 846.52 39.32 853.07 39.65 866.19 40.16 872.74 40.26 879.3 38.69 885.85 37.59 892.41 37.46 898.96 37.2 905.52 38.59 912.08 40.08 918.63 40.99 925.19 41.02 931.74 40.97 938.3 40.62 944.85 40.42 951.41 40.25 957.97 40.06 964.52 39.75 971.08 39.67 977.63 39.39 984.19 39.06 990.75 38.85 997.3 38.71 1003.86 38.66 1010.41 38.01 1016.97 36.23 1023.52 36.25 1030.08 36.83 1036.64 37.17 1043.19 37.29 1056.3 37.37 1062.86 37.34 1069.41 37.17 1075.97 37.02 1082.53

36.93 1089.08 36.9 1095.64 36.68 1102.19 35.9 1108.75 35.69 1115.31 35.5
1121.86 35.35 1128.42 34.91 1134.97 34.68 1141.53 34.42 1148.08 34.14
1154.64 33.81 1161.2 33.67 1174.31 33.79 1180.86 33.86 1187.42 33.97 1200.53
34.22 1207.09 34.32 1220.2 34.47 1226.75 34.61 1233.31 34.7 1239.86 34.37
1246.42 34.25 1252.98 34.23 1259.53 34.32 1266.09 34.75 1272.64 35.08 1279.2
35.66 1285.76 35.98 1292.31 35.95 1305.42 36.34 1318.53 36.7 1325.09 36.74
1331.65 36.71 1338.2 36.61 1344.76 36.21 1351.31 35.09 1357.87 34.14 1364.42
33.9 1370.98 33.93 1377.54 33.99 1384.09 34 1390.65 33.99 1397.2 33.91
1403.76 33.53 1416.87 32.96 1423.43 32.97 1429.98 33.32 1436.54 33.79
1443.09 34.21 1449.65 34.53 1456.21 34.78 1469.32 35.14 1475.87 34.78
1482.43 34.03 1488.98 32.11 1495.54 29.87 1502.1 27.85 1508.65 27.33 1515.2
26.79 1534.84 24.47 1541.38 23.67 1547.93 22.77 1554.48 22.18 1561.02 22.03
1567.57 21.76 1574.11 21.01 1580.66 20.5 1587.21 20.65 1593.75 20.63 1606.85
18.68 1613.39 17.98 1619.94 17.42 1626.49 17.03 1633.03 16.88 1639.58 17.59
1646.12 18.53 1652.67 19.16 1659.22 20.17 1665.76 21.02 1672.31 21.72
1678.86 21.75 1685.4 22.3 1691.95 22.42 1698.49 22.45 1705.04 22.23 1711.59
21.71 1718.13 21.24 1724.68 20.9 1731.23 20.71 1737.77 20.57 1744.32 20.48
1750.87 20.34 1757.41 20.23 1763.96 20.16 1770.5 20.13 1777.05 20.16 1783.6
20.16 1790.14 20.02 1796.69 20.4 1803.24 20 1809.78 19.31 1816.33 18.73
1822.87 18.27 1829.42 17.98 1835.97 17.65 1842.51 17.03 1849.06 17.06
1855.61 17.64 1862.15 17.77 1868.7 17.64 1875.24 17.57 1881.79 17.86 1888.34
17.72 1901.43 16.82 1907.98 16.65 1914.52 16.86 1921.07 16.95 1927.62 17.01
1934.16 17.27 1940.71 17.3 1947.25 16.93 1953.8 16.06 1960.35 15.05 1966.89
13.96 1973.44 13.03 1979.99 13.63 1986.35 15.39 1992.72 16.25 1999.09 16.18
2005.46 16.16 2011.83 16.06 2024.57 15.82 2030.94 15.68 2037.31 15.56
2043.68 15.55 2050.04 15.57 2056.41 15.65 2062.78 15.82 2069.15 16.22
2075.52 16.67 2081.89 16.73 2088.26 16.67 2094.63 16.57 2101 16.51 2107.36
16.43 2113.73 16.28 2120.1 16.1 2126.47 15.78 2132.84 15.35 2139.21 14.21
2145.58 13.34 2151.95 12.67 2158.32 12.27 2164.69 12.75 2171.05 12.81
2177.42 12.99 2183.89 13.35 2190.36 13.27 2196.84 13.12 2203.31 13.06
2209.78 13.03 2216.25 13.11 2222.72 13.25 2235.66 14.03 2242.13 14.4 2255.07
14.78 2261.54 14.93 2268.02 15.13 2274.49 15.1 2280.96 15.1 2300 16.34
2300.05 12.06 2301.97 -3.65 2320.77 -9.63 2333.43 -10.96 2379.95 -9.19
2407.66 -4.85 2411.91 -3.45 2412.45 14.33 2442.73 14.04 2449.2 13.75 2455.67
13 2462.23 12.56 2468.79 12.42 2475.35 12.3 2481.91 12.23 2488.47 12.19
2495.03 12.13 2501.59 11.97 2508.16 11.78 2514.72 11.84 2521.28 12.12
2527.84 12.14 2534.4 12 2547.52 11.48 2554.08 11.2 2560.64 10.9 2573.76
10.25 2580.32 9.94 2586.88 9.78 2593.44 9.56 2606.57 9.39 2613.13 9.28
2626.25 8.88 2632.81 8.81 2639.37 8.83 2645.93 8.93 2652.49 9.01 2659.05
9.06 2665.61 9.29 2672.17 9.32 2678.73 9.31 2685.29 9.24 2691.85 9.2 2698.42
9.28 2704.98 9.58 2711.54 9.81 2718.1 10.14 2724.66 10.34 2731.22 10.34
2737.78 10.42 2744.34 10.38 2764.02 10.45 2770.58 10.45 2777.14 10.33 2783.7
10.32 2790.26 10.37 2796.83 10.39 2809.95 10.36 2816.51 11.56 2823.07 16.74
2829.63 20.25 2836.19 20.17 2842.75 20.22 2849.31 20.21 2855.87 20.28
2862.43 20.55 2868.99 20.86 2875.55 20.91 2882.11 20.9 2888.67 20.74 2895.24
20.46 2901.8 20.57 2908.36 20.64 2914.92 20.35 2921.48 20.4 2928.04 20.63
2934.6 20.45 2941.16 20.49 2947.72 20.81 2954.28 20.67 2960.84 19.98 2967.4
19.25 2973.96 18.84 2980.52 18.7 2987.09 18.61 2993.65 18.64 3000.21 18.69
3006.77 18.83 3013.33 19.08 3019.89 19.36 3026.45 19.39 3033.01 19.4 3039.57
19.44 3046.13 19.41 3052.69 19.4 3059.25 19.48

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 2300 .035 2412.45 .082

```
Bank Sta: Left Right Coeff Contr. Expan.  2300 2412.45 .1 .3
Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 2442 3059.25 14 T
Blocked Obstructions num= 1
 Sta L Sta R Elev
 2531.59 2581.5712.08772

Upstream Embankment side slope = 0 horiz. to 1.0 vertical Downstream
Embankment side slope = 0 horiz. to 1.0 vertical Maximum allowable
submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Piers = 1

Pier Data
Pier Station Upstream= 2500 Downstream= 2350
Upstream num= 2
 Width Elev Width Elev
 2.9 -7 2.6 13
Downstream num= 2
 Width Elev Width Elev
 2.9 -7 2.6 13

Number of Bridge Coefficient Sets = 1
 Low Flow Methods and Data
 Energy
 W.S. Pro Method

 W.S.Pro Data
 Left Embankment
 El of the top of the embankment = 14
 El of the toe of the abutment = -5
 Right Embankment
 El of the top of the embankment = 14
 El of the toe of the abutment = -5
 Abutment Type = 1 Vert. abutments and vert. embankments with or without
wingwalls  Slope of abutments =
 Top with of embankment = 58
 Centroid station of bridge opening =
 Wing Wall Type = No wing walls present
 Width =
 Angle =
 Radius =
 Guide Banks Type = Straight
 Length = 100
 Offset = 100
 Angle = 100

Selected Low Flow Methods = W.S.Pro Method
```

High Flow Method Pressure and Weir flow
 Submerged Inlet Cd =
 Submerged Inlet + Outlet Cd = .8
 Max Low Cord =

Additional Bridge Parameters
 Add Friction component to Momentum
 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 5335.943

INPUT
Description: 5.3- DS Face Plain St Br
Station Elevation Data num= 429
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 33.95 6.51 34.25 13.02 34.92
19.52 35.01 26.03 35.37 32.54 35.43 39.05 35.4 45.55 35.17 52.06 35.06 58.57
35.13 65.08 35.13 71.58 35.04 78.09 34.66 84.6 34.03 91.11 33.96 97.61
33.82 104.12 33.79 110.63 34.31 117.14 34.8 123.64 34.91 130.15 35.06 136.66
35.41 143.17 35.16 149.67 34.12 156.18 33.87 162.69 34.3 169.2 34.89 175.71
35.11 188.72 35.15 195.23 35.2 201.74 35.16 208.24 35.17 214.75 35.22 221.26
35.24 227.77 35.24 234.27 35.09 240.78 34.8 247.29 34.39 253.8 34.27 260.3
34.31 266.81 34.11 273.32 33.52 279.83 33.25 286.33 33.9 292.84 34.33
299.35 34.44 305.86 34.43 312.36 34.37 318.87 34.14 325.38 33.82 331.89
33.82 338.4 33.74 344.9 33.8 351.41 33.96 357.92 33.89 364.43 33.72 370.93
34.01 377.44 34.26 383.95 34.4 390.46 34.33 396.96 34.37 409.98 34.55 416.49
34.5 422.99 34.32 429.5 34.33 436.01 34.37 442.52 34.36 449.02 34.48 455.53
34.91 462.04 35.27 468.55 35.31 475.06 35.38 481.56 35.28 488.07 34.9 494.58
35.03 501.09 35.22 507.59 35.53 514.1 35.74 520.61 35.62 527.12 35.02
533.62 34.67 540.13 35.01 546.64 35.81 553.15 36 559.65 36.08 566.16 36.11
572.67 36.05 579.18 35.9 585.68 35.71 592.19 35.94 598.7 37.51 605.21 38.83
611.71 39.46 618.22 39.68 624.73 39.67 631.24 39.57 637.74 39.43 644.25
39.18 650.76 38.47 657.27 38.18 670.28 38.09 676.79 38.41 683.3 38.62 689.81
38.56 696.31 38.34 702.82 38 709.33 37.79 715.84 38.38 722.34 38.99 728.85
39.21 735.36 39.23 741.87 39.18 748.37 39.03 754.88 38.82 761.39 38.5 767.9
38.6 774.4 38.87 780.96 39.06 787.52 39.89 794.07 40.63 800.63 40.86 807.18
40.88 813.74 40.84 820.29 40.67 826.85 39.92 833.41 39.51 839.96 39.26
846.52 39.32 853.07 39.65 866.19 40.16 872.74 40.26 879.3 38.69 885.85 37.59
892.41 37.46 898.96 37.2 905.52 38.59 912.08 40.08 918.63 40.99 925.19 41.02
931.74 40.97 938.3 40.62 944.85 40.42 951.41 40.25 957.97 40.06 964.52 39.75
971.08 39.67 977.63 39.39 984.19 39.06 990.75 38.85 997.3 38.71 1003.86
38.66 1010.41 38.01 1016.97 36.23 1023.52 36.25 1030.08 36.83 1036.64 37.17
1043.19 37.29 1056.3 37.37 1062.86 37.34 1069.41 37.17 1075.97 37.02 1082.53
36.93 1089.08 36.9 1095.64 36.68 1102.19 35.9 1108.75 35.69 1115.31 35.5
1121.86 35.35 1128.42 34.91 1134.97 34.68 1141.53 34.42 1148.08 34.14
1154.64 33.81 1161.2 33.67 1174.31 33.79 1180.86 33.86 1187.42 33.97 1200.53
34.22 1207.09 34.32 1220.2 34.47 1226.75 34.61 1233.31 34.7 1239.86 34.37
1246.42 34.25 1252.98 34.23 1259.53 34.32 1266.09 34.75 1272.64 35.08 1279.2

35.66 1285.76 35.98 1292.31 35.95 1305.42 36.34 1318.53 36.7 1325.09 36.74
1331.65 36.71 1338.2 36.61 1344.76 36.21 1351.31 35.09 1357.87 34.14 1364.42
33.9 1370.98 33.93 1377.54 33.99 1384.09 34 1390.65 33.99 1397.2 33.91
1403.76 33.53 1416.87 32.96 1423.43 32.97 1429.98 33.32 1436.54 33.79
1443.09 34.21 1449.65 34.53 1456.21 34.78 1469.32 35.14 1475.87 34.78
1482.43 34.03 1488.98 32.11 1495.54 29.87 1502.1 27.85 1508.65 27.33 1515.2
26.79 1534.84 24.47 1541.38 23.67 1547.93 22.77 1554.48 22.18 1561.02 22.03
1567.57 21.76 1574.11 21.01 1580.66 20.5 1587.21 20.65 1593.75 20.63 1606.85
18.68 1613.39 17.98 1619.94 17.42 1626.49 17.03 1633.03 16.88 1639.58 17.59
1646.12 18.53 1652.67 19.16 1659.22 20.17 1665.76 21.02 1672.31 21.72
1678.86 21.75 1685.4 22.3 1691.95 22.42 1698.49 22.45 1705.04 22.23 1711.59
21.71 1718.13 21.24 1724.68 20.9 1731.23 20.71 1737.77 20.57 1744.32 20.48
1750.87 20.34 1757.41 20.23 1763.96 20.16 1770.5 20.13 1777.05 20.16 1783.6
20.16 1790.14 20.02 1796.69 20.4 1803.24 20 1809.78 19.31 1816.33 18.73
1822.87 18.27 1829.42 17.98 1835.97 17.65 1842.51 17.03 1849.06 17.06
1855.61 17.64 1862.15 17.77 1868.7 17.64 1875.24 17.57 1881.79 17.86 1888.34
17.72 1901.43 16.82 1907.98 16.65 1914.52 16.86 1921.07 16.95 1927.62 17.01
1934.16 17.27 1940.71 17.3 1947.25 16.93 1953.8 16.06 1960.35 15.05 1966.89
13.96 1973.44 13.03 1979.99 13.63 1986.35 15.39 1992.72 16.25 1999.09 16.18
2005.46 16.16 2011.83 16.06 2024.57 15.82 2030.94 15.68 2037.31 15.56
2043.68 15.55 2050.04 15.57 2056.41 15.65 2062.78 15.82 2069.15 16.22
2075.52 16.67 2081.89 16.73 2088.26 16.67 2094.63 16.57 2101 16.51 2107.36
16.43 2113.73 16.28 2120.1 16.1 2126.47 15.78 2132.84 15.35 2139.21 14.21
2145.58 13.34 2151.95 12.67 2158.32 12.27 2164.69 12.75 2171.05 12.81
2177.42 12.99 2183.89 13.35 2190.36 13.27 2196.84 13.12 2203.31 13.06
2209.78 13.03 2216.25 13.11 2222.72 13.25 2235.66 14.03 2242.13 14.4 2255.07
14.78 2261.54 14.93 2268.02 15.13 2274.49 15.1 2280.96 15.1 2300 16.34
2300.05 12.06 2301.97 -3.65 2320.77 -9.63 2333.43 -10.96 2379.95 -9.19
2407.66 -4.85 2411.91 -3.45 2412.45 14.33 2442.73 14.04 2449.2 13.75 2455.67
13 2462.23 12.56 2468.79 12.42 2475.35 12.3 2481.91 12.23 2488.47 12.19
2495.03 12.13 2501.59 11.97 2508.16 11.78 2514.72 11.84 2521.28 12.12
2527.84 12.14 2534.4 12 2547.52 11.48 2554.08 11.2 2560.64 10.9 2573.76
10.25 2580.32 9.94 2586.88 9.78 2593.44 9.56 2606.57 9.39 2613.13 9.28
2626.25 8.88 2632.81 8.81 2639.37 8.83 2645.93 8.93 2652.49 9.01 2659.05
9.06 2665.61 9.29 2672.17 9.32 2678.73 9.31 2685.29 9.24 2691.85 9.2 2698.42
9.28 2704.98 9.58 2711.54 9.81 2718.1 10.14 2724.66 10.34 2731.22 10.34
2737.78 10.42 2744.34 10.38 2764.02 10.45 2770.58 10.45 2777.14 10.33 2783.7
10.32 2790.26 10.37 2796.83 10.39 2809.95 10.36 2816.51 11.56 2823.07 16.74
2829.63 20.25 2836.19 20.17 2842.75 20.22 2849.31 20.21 2855.87 20.28
2862.43 20.55 2868.99 20.86 2875.55 20.91 2882.11 20.9 2888.67 20.74 2895.24
20.46 2901.8 20.57 2908.36 20.64 2914.92 20.35 2921.48 20.4 2928.04 20.63
2934.6 20.45 2941.16 20.49 2947.72 20.81 2954.28 20.67 2960.84 19.98 2967.4
19.25 2973.96 18.84 2980.52 18.7 2987.09 18.61 2993.65 18.64 3000.21 18.69
3006.77 18.83 3013.33 19.08 3019.89 19.36 3026.45 19.39 3033.01 19.4 3039.57
19.44 3046.13 19.41 3052.69 19.4 3059.25 19.48

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val 0 .085 2300 .035 2412.45 .082

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2300
2412.45 143.56 141.23 144.64 .1 .3 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 2442 3059.25 14 T
Blocked Obstructions num= 1

```
 Sta L Sta R Elev
 2531.59 2581.5712.08772

CROSS SECTION


RIVER: Taunton River
REACH: Main Stem RS: 5194.718

INPUT
Description: 5- Exit Plain St br
Station Elevation Data num= 363
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  0 37.84 6.51 37.14 13.02 36.94
19.53 36.91 32.55 37.14  39.06 37.08 45.58 37.33 52.09 37.63 58.6 37.74 65.11
37.76  71.62 37.84 84.64 37.97 91.15 37.76 97.66 37.61 104.17 37.81  110.68
37.98 117.19 38.01 130.22 37.9 136.73 37.87 143.24 37.88  149.75 37.79 156.26
37.89 162.77 38.15 169.28 38.23 175.79 38.19  182.3 37.83 188.81 37.98 195.32
38.02 201.84 38.13 208.35 38.15  214.86 38.35 221.37 38.66 227.88 38.75
234.39 38.91 240.9 39.09  247.41 39.25 253.92 39.33 260.43 39.29 266.94 39.59
273.45 40.15  286.48 40.27 292.99 40.32 306.01 40.63 312.52 40.84 319.03
40.76  325.54 41.09 332.05 41.37 338.56 41.82 345.07 42.36 351.58 42.64
358.09 42.86 364.61 43.42 371.12 43.45 377.63 42.97 384.14 42.79  390.65
42.64 397.16 42.71 403.67 42.98 410.18 43.28 416.69 43.49  423.2 43.67 429.71
43.78 436.22 43.78 442.73 43.9 455.76 44.07  468.78 44.07 475.29 44.13 481.8
44.35 488.31 44.49 494.82 44.44  501.33 44.46 507.84 44.5 514.35 44.58 520.86
44.86 527.38 44.98  533.89 44.96 540.4 44.98 546.91 45.13 553.42 45.16 559.93
45.03  566.44 44.74 572.95 44.5 579.46 44.51 585.97 44.75 592.48 44.69
598.99 44.76 612.02 45.28 618.53 45.52 625.04 45.61 631.55 45.74  638.06
45.85 644.57 45.83 651.08 45.9 657.59 46.04 664.1 46.01  670.61 45.86 677.12
45.64 690.15 45.4 696.66 45.45 709.68 45.64  716.19 45.57 722.7 45.45 729.21
45.56 742.32 45.89 748.88 45.84  755.43 45.63 761.99 45.39 768.54 45.11 775.1
45.08 788.21 44.88  794.76 44.84 801.32 44.72 807.87 44.54 814.43 44.39
820.98 44.46  827.54 43.46 834.09 41.56 840.65 40.16 847.2 39.39 853.76 39.14
860.31 38.94 873.42 38.7 879.98 38.49 886.53 38.32 893.09 38.22  906.2 38.24
912.75 38.39 919.31 38.5 925.86 38.48 932.42 38.64  938.97 38.67 952.08 38.93
958.64 39.17 965.19 39.26 971.75 39.39  978.3 39.63 984.86 39.96 991.41 40.23
997.97 40.46 1004.52 40.67  1011.08 40.7 1017.63 40.54 1024.19 40.96 1030.75
42.63 1037.3 43.66  1043.86 44.25 1050.41 44.49 1056.97 44.45 1063.52 45.23
1070.08 45.83  1076.63 45.77 1083.19 46.23 1089.74 46.37 1096.3 46.21 1102.85
46.52  1109.41 47.04 1115.96 47.08 1122.52 47.39 1129.07 47.77 1135.63 47.89
1142.18 48.49 1148.74 48.51 1155.29 48.31 1161.85 46.71 1168.4 45.64  1174.96
45.37 1181.51 45.67 1188.07 45.94 1194.62 46.99 1201.18 49.47  1207.73 50.17
1214.29 50.38 1220.84 50.51 1227.4 50.5 1233.95 50.53  1240.51 50.66 1247.06
50.54 1253.62 50.27 1266.73 49.63 1273.28 49.4  1286.39 48.8 1292.95 48.22
1299.5 47.78 1306.06 47.49 1312.61 47.26  1319.17 46.98 1325.72 46.79 1332.28
46.53 1338.83 46.32 1345.39 46.63  1351.94 46.62 1358.5 44.3 1365.05 38.5
1371.61 35.56 1378.16 32.06  1384.72 28.91 1391.27 26.01 1397.83 24.3 1404.38
22.36 1410.94 20.73  1417.49 21.08 1424.05 21.29 1430.6 20.32 1437.16 19.5
1443.71 19.14  1450.27 18.9 1456.81 18.52 1463.36 18.21 1469.9 17.68 1476.44
16.93  1482.99 16.16 1489.53 15.52 1496.07 15.12 1502.62 14.89 1509.16 14.75
1515.71 14.65 1522.25 14.37 1528.79 13.67 1535.34 13.07 1541.88 12.73
1548.42 11.86 1554.97 11.57 1561.51 11.05 1568.05 11.05 1574.6 11.14  1581.14
11.01 1587.68 11.02 1594.23 11.05 1600.77 11.04 1607.31 11.23  1613.86 11.59
1620.4 11.71 1626.94 11.85 1633.49 11.87 1640.03 11.8  1646.58 11.51 1653.12
```

11.52 1659.66 11.58 1672.75 11.63 1679.29 11.7 1685.84 11.85 1692.38 11.83 1698.92 11.87 1705.47 12.14 1712.01 12.14 1718.55 11.98 1725.1 11.68 1731.64 11.46 1738.18 11.35 1744.73 11 1751.27 10.73 1757.81 10.61 1764.36 10.53 1770.9 10.8 1777.45 10.97 1783.99 11.07 1790.53 11.32 1797.08 11.65 1803.62 11.94 1810.16 12.32 1816.71 13.7 1823.25 14.25 1836.34 14.59 1842.88 14.71 1849.42 14.68 1855.97 14.77 1862.51 14.81 1869.05 14.82 1875.6 14.6 1882.14 14.35 1888.68 14.08 1895.23 13.92 1965 14.39 1965.47 11.73 2078.62 11.58 2087.51 6.91 2092.77 -1.67 2108.92 -9.29 2141.12 -8.39 2159.37 -2.62 2164.92 -1.75 2175.5 -2.47 2187.89 -.9 2195 -1.01 2206.94 -3.41 2217.29 -5 2234.59 -3.74 2237.81 11.46 2384.96 11.42 2391.51 11.58 2398.06 11.66 2404.61 11.8 2411.16 11.91 2417.71 11.78 2424.26 11.89 2430.81 11.84 2443.91 11.65 2450.46 11.48 2470.12 11.55 2476.67 11.54 2483.22 11.51 2489.77 11.66 2496.32 11.68 2502.87 11.82 2509.42 12.02 2515.97 12.17 2522.52 12.41 2529.08 12.76 2535.63 12.82 2542.18 12.66 2548.73 12.55 2555.28 12.63 2561.83 12.68 2568.38 12.76 2574.93 12.95 2581.48 13.2 2588.03 13.47 2594.59 13.52 2601.14 13.66 2607.69 13.84 2614.24 14.19 2620.79 15.01 2627.34 15.9 2633.89 16.41 2640.44 16.98 2646.99 19 2653.54 20.54 2660.09 20.64 2666.65 20.44 2673.2 20.3 2679.75 20.32 2686.3 20.38 2692.85 20.47 2699.4 20.59 2705.95 20.63 2712.5 20.63 2719.05 20.76 2725.6 21.04 2732.16 21.21 2738.71 21.31 2745.26 21.37 2751.81 21.73 2758.36 21.65 2764.91 22.57 2771.46 24.52 2778.01 24.9 2784.56 24.41 2791.11 24.14 2797.66 23.84 2804.22 23.71 2810.77 23.66 2823.87 23.79 2830.42 23.89 2836.97 23.86 2843.52 23.73 2850.07 23.52 2856.62 23.43 2863.17 23.36 2876.28 23.09 2882.83 23 2889.38 22.86 2895.93 22.79 2902.48 22.67

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 2078.62 .035 2237.81 .082

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2078.62 2237.81 1072.04 1090.64 1114.7 .1 .3
 CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 4104.082

INPUT
Description: 4
Station Elevation Data num= 195
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 35.1 6.54 34.86 13.09 35.12 32.71 36.52 39.26 37.08 52.34 37.43 58.89 37.47 71.97 37.15 91.6 36.07 98.14 35.55 111.23 33.47 117.77 32.99 130.86 32.49 137.4 31.63 150.48 29.36 157.03 27.84 163.57 26.78 176.66 25.69 183.2 25 196.28 24.16 209.37 23.44 222.45 22.16 235.54 21.24 268.25 19.58 274.8 19.11 314.05 17.93 340.22 17.6 346.77 17.39 353.31 17.44 372.94 17.2 386.02 16.89 399.11 16.85 418.74 16.42 425.28 16.51 464.54 16.29 484.17 16.02 490.71 15.81 510.34 15.56 516.88 15.25 529.96 15.32 536.51 15.67 549.59 15.96 569.22 15.33 575.76 15.28 588.85 14.91 595.39 14.56 601.94 14.39 608.48 14.08 634.65 13.27 647.73 12.71 660.82 11.68 667.36 11.02 673.91 10.08 680.45 9.57 686.99 9.45 700.08 9.55 706.62 9.71 713.16 9.69 719.71 9.47 739.33 8.41 758.96 7.16 785.13 5.03 798.22 2.31 804.76 1.12 811.21 .41 813.75 .05 825 -2.9 825.5 -2.88 826.13 -2.9 826.5 -2.86 826.79 -2.86 827.1 -2.83 827.3 -2.99 827.48 -3.11 827.64 -3.2 828.01 -3.31 828.24 -3.48 829.55 -3.6 831.66 -4.05 834.1 -4.44 836.34 -

4.58 838.23 -4.82 840.95 -5.36 843.29 -6.16 845.41 -6.73 847.48 -7.67 849.56 -8.4 851.67 -8.57 853.71 -9.31 855.95 -9.57 858.21 -10.01 860.64 -10.25 863.34 -10.49 865.85 -10.78 868.46 -10.95 871 -11.17 873.78 -11.17 876.48 -11.19 879 -11.01 881.45 -11.08 884.18 -11.12 886.48 -10.46 889.29 -10.39 892.16 -10.59 895.4 -10.47 898.65 -10.42 902.09 -10.56 905.48 -10.29 908.78 -10.33 911.14 -10.05 913.57 -9.93 915.75 -9.61 917.54 -9.32 919.31 -8.63 920.82 -7.87 922.3 -7.15 923.73 -6.66 924.94 -5.75 926.47 -5.19 927.76 -4.64 929.03 -3.99 930.25 -3.89 931.21 -3.59 932.2 -3.04 933.72 -1.14 937.12 .53 940.17 2.04 946.71 5.12 953.24 6.39 959.78 7.84 966.31 8.27 979.38 8.65 985.92 8.62 992.45 6.91 998.99 6.25 1005.52 6.68 1018.59 7.09 1031.66 7.17 1038.2 6.9 1044.73 6.94 1051.27 7.18 1103.55 7.54 1149.29 8.31 1221.17 9.93 1286.52 10.47 1378.01 10.71 1417.22 11.32 1449.9 12.48 1521.78 11.87 1541.39 12.03 1554.46 11.92 1580.6 12.05 1587.13 12.43 1593.67 14.46 1600.2 18.29 1606.74 22.6 1613.27 26.07 1619.81 26.87 1626.34 26.67 1632.88 26.17 1645.95 25.72 1652.48 23.07 1659.02 17.45 1665.55 16.53 1672.09 16.39 1685.16 16.65 1698.23 16.64 1717.83 17.17 1737.44 17.43 1763.58 17.71 1770.11 17.69 1802.79 18.06 1815.86 18.35 1828.93 19.47 1835.46 19.78 1868.14 20.4 1913.88 20.41 1933.49 20.74 1959.63 21.87 1972.7 22.11 1979.23 22.02 2031.51 23.08 2044.58 23.14 2051.12 23.33 2057.65 23.97 2064.19 24.39 2070.72 24.62 2090.33 24.67 2103.4 26 2116.47 27.16 2123 27.35 2129.54 27.1 2136.07 26.67 2142.61 26.46 2149.14 26.68

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .082 713.16 .035 979.38 .082

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 713.16 979.38 1834.7 1846.57 1854.36 .1 .3 Blocked Obstructions num= 2
 Sta L Sta R Elev Sta L Sta R Elev
 934.72 1002.956.488922 1059.71 1524.9311.92179

CROSS SECTION

RIVER: Taunton River REACH: Main Stem RS: 2257.516

INPUT
Description: 3
Station Elevation Data num= 340
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 34.96 19.65 33.35 26.2 33.02 32.75 32.44 39.3 31.7 52.39 30.64 58.94 30.32 65.49 29.65 72.04 28.84 78.59 28.24 85.14 27.39 91.69 27.11 98.24 27.14 111.34 27.69 117.89 27.59 124.44 27.08 130.99 26.73 150.63 26.01 163.73 25.32 189.93 24.62 209.58 23.88 222.68 22.72 229.23 22.01 235.77 21.47 242.32 21.34 248.87 20.64 255.42 20.27 268.52 20.54 281.62 19.78 288.17 19.21 301.27 19.24 307.82 18.64 314.37 17.48 320.92 16.9 334.01 16.8 366.76 15.2 386.41 14.51 406.06 14.51 412.61 14.39 438.8 14.82 445.35 14.69 451.9 14.42 458.45 14.6 478.1 13.99 491.2 14.11 497.75 14.48 510.84 14.9 517.39 15.36 523.94 15.62 543.59 15.81 550.14 15.77 556.69 15.89 582.89 17.26 589.44 18.19 602.54 20.57 609.08 21.1 615.63 21.89 622.18 21.96 628.73 21.71 707.32 22.41 713.87 22.62 740.07 22.75 785.92 22.51 818.66 22.38 825.21 22.85 857.96 23.09 864.51 23.33 871.06 23.73 890.7 24.34 910.35 24.3 923.45 23.93 936.55 23.28 943.1 23.18 962.75 23.45 975.84 22.51 995.49 22.25 1008.59 23.13 1015.14 22.88 1021.69 22.42 1028.24 21.66 1041.34 19.42 1047.89 18.01 1067.54 12.85 1074.08 11.6

1080.63 11.12 1093.73 8.4 1100.28 7.59 1119.93 5.96 1126.48 5.53 1133.03
5.28 1139.58 5.24 1159.23 4.15 1165.78 2.78 1172.32 1.05 1174.74 .81
1178.87 .4 1185.42 -.01 1191.97 -.21 1200 -.92 1215.28 -1.32 1216.34 -1.41
1217.6 -1.52 1218.82 -1.64 1220.1 -1.77 1221.29 -1.98 1222.66 -2.21 1223.86
-2.48 1225.2 -2.94 1226.48 -3.64 1227.92 -4.46 1230.12 -5.2 1232.38 -5.85
1234.68 -6.48 1237.01 -6.94 1239.48 -7.27 1241.91 -7.72 1244.21 -7.9 1246.55
-7.95 1248.74 -8.03 1251.05 -7.97 1253.31 -7.94 1255.77 -8.02 1260.44 -8.14
1262.63 -8.17 1275.78 -8.17 1278.2 -8.31 1280.43 -8.25 1282.97 -8.34 1287.57
-8.47 1289.64 -8.62 1292.03 -8.9 1294.34 -9.01 1296.67 -9.18 1299.02 -9.37
1301.53 -9.41 1303.96 -9.57 1306.55 -9.85 1308.95 -10.02 1311.4 -10.27
1313.79 -10.4 1316.21 -10.57 1318.43 -10.74 1320.8 -10.93 1322.99 -11.15
1325.49 -11.33 1327.84 -11.55 1330.14 -11.64 1332.3 -11.72 1334.24 -11.46
1336.16 -11.21 1337.83 -10.8 1339.55 -10.28 1341.34 -9.57 1343.75 -7.19
1345.95 -5.67 1348.02 -4.18 1350.29 -3.85 1352.46 -3.31 1355.12 -2.51
1357.93 -1.92 1359.65 -1.69 1361.18 -1.55 1362.69 -.98 1375.35 .51 1377.72
1.25 1381.9 2.58 1388.45 5.38 1395 7.25 1401.55 9.97 1427.75 12.35 1434.3
12.81 1447.4 14.14 1473.59 15.31 1499.79 15.72 1512.89 15.6 1539.09 16.01
1552.19 16.18 1558.74 16.46 1565.28 16.38 1604.58 16.74 1630.78 16.49
1709.37 16.42 1715.92 16.31 1729.02 16.33 1735.57 16.24 1768.31 16.27
1781.41 16.16 1801.06 15.65 1814.16 14.96 1820.71 14.31 1827.26 13.28
1840.36 10.26 1846.91 9.41 1853.46 8.98 1886.2 9.2 1899.3 9.23 1912.4 9.79
1918.95 9.96 1932.05 9.93 1938.6 10.03 1945.15 9.88 1951.69 9.59 1964.79
9.59 1971.34 10.03 1977.89 10.04 1984.44 10.33 1990.99 10.3 1997.54 10.84
2004.09 10.8 2010.64 10.39 2017.19 10.22 2030.29 10.61 2043.39 10.54 2056.48
10.83 2069.58 10.75 2076.13 10.84 2082.68 10.48 2089.23 10.35 2102.33 10.61
2108.88 10.61 2115.43 10.47 2121.98 10.5 2128.53 10.83 2135.08 10.7 2141.62
10.95 2148.17 10.7 2154.72 10.71 2174.37 11.97 2180.92 12.21 2187.47 12.14
2194.02 11.93 2200.57 12.5 2207.12 12.58 2220.22 12.22 2226.76 12.27 2239.86
13.12 2246.41 13.23 2259.51 14.38 2272.61 14.87 2292.26 15.36 2298.81 15.86
2305.36 16.83 2318.45 16.63 2325 15.87 2331.55 16.52 2338.1 16.56 2344.65
16.45 2351.2 16.54 2357.75 17.32 2370.85 20.21 2377.4 20.55 2383.95 20.7
2410.14 20.43 2416.69 20.13 2429.79 19.88 2442.89 17.77 2449.44 17.48
2462.54 17.29 2469.09 17.48 2475.64 18.08 2482.19 19.21 2488.74 20.17
2495.28 20.82 2501.83 20.76 2528.03 21.08 2534.58 20.79 2554.23 19.29
2560.78 19.11 2567.33 19.78 2573.88 20.1 2586.97 20.13 2600.07 20.45 2606.62
20.41 2619.72 19.8 2626.27 19.18 2632.82 18.28 2639.37 17.23 2652.47 15.81
2665.57 15.01 2672.11 14.49 2685.21 13.68 2698.31 13.02 2711.41 12.57
2717.96 13.33 2724.51 13.85 2731.06 13.62 2744.16 12.66 2750.71 12.65
2757.25 13.57 2763.8 15.69 2770.35 17.09 2776.9 17.28 2790 17.13 2803.1
17.58 2809.65 17.7 2822.75 17.69 2829.3 17.46 2835.85 16.56 2842.4 15.27
2862.04 13.6 2901.34 13.22 2907.89 13.61 2914.44 13.86 2920.99 14.25 2927.54
14.43 2934.08 14.8 2940.63 14.98 2953.73 15.98 2966.83 17.25 2973.38 17.62
2979.93 17.28 2986.48 16.6 2993.03 16.44 2999.58 17.35 3025.77 20.22 3032.32
21.7 3038.87 23.37 3045.42 25.93 3051.97 27.96 3065.07 29.01 3071.62 29.97
3078.17 32.14 3084.72 34.81 3091.27 36.99 3097.82 40.7 3104.37 41.4 3110.91
41.47 3124.01 41.97 3130.56 42.09 3137.11 42.07 3163.31 42.8 3196.05 42.59
3202.6 42.45 3222.25 41.62 3241.9 41 3255 41.26 3261.55 41.04 3268.1 40.66
3274.65 39.87 3281.2 39.24

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .082 1008.59 .035 1473.59 .082
 Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1008.59 1473.59 1820.11 1865.71 1922.42 .1 .3 Ineffective Flow num= 1

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 Sta L Sta R Elev Permanent
 1801 3281.2 15 T

CROSS SECTION


RIVER: Taunton River
REACH: Main Stem RS: 391.8054

INPUT
Description: 2
Station Elevation Data num= 304
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  0 21.42 39.31 21.99 58.96
21.84 65.52 21.5 85.17 21.81  98.27 21.12 117.93 22.01 144.14 21.1 183.45
22.7 216.2 23.58  222.76 23.42 255.51 25.6 268.62 26.61 307.93 27.88 327.58
29.19  399.65 34.75 438.96 35.05 445.51 35.39 458.61 36.59 491.37 37.6
504.48 37.68 543.79 39.42 563.44 39.58 583.1 40.7 628.96 40.24  661.72 37.98
681.37 35.01 687.92 34.38 694.47 33.16 701.03 30.83  707.58 27.7 714.13 25.59
779.65 24.3 786.2 23.57 792.75 22  805.85 21.22 825.51 21.29 910.68 20.22
930.33 20.54 1002.4 19.28  1028.61 19.54 1035.16 19.87 1048.26 21.23 1061.37
21.85 1074.47 21.58  1126.88 18.1 1146.54 15.81 1185.85 13.95 1244.81 14.99
1251.36 15.35  1264.47 17.12 1323.43 17.67 1428.26 17.4 1454.47 17.94 1461.02
16.21  1467.57 13.93 1474.12 13.48 1480.67 13.44 1493.78 15.9 1539.64 14.33
1565.84 14.75 1624.81 15.45 1664.12 19.15 1696.88 20.06 1716.53 19.33
1742.74 16.68 1801.7 14.23 1913.08 14.58 1958.94 13.73 1985.15 13.96  1991.7
12.84 1998.25 8.74 2004.8 2.93 2020 -1.25 2022.62 -1.32  2023.16 -1.37 2023.8
-1.46 2024.53 -1.52 2025.41 -1.64 2026.35 -1.66  2027.52 -1.78 2028.84 -1.93
2030.29 -2.06 2031.63 -2.33 2033.06 -2.66  2034.41 -3.03 2035.85 -3.6 2037.95
-4.22 2040.47 -4.85 2042.7 -5.61  2045.08 -6.18 2047.39 -6.71 2049.72 -7.41
2051.86 -7.83 2054.25 -8.45  2056.36 -8.73 2058.6 -9.34 2060.73 -9.55 2062.95
-9.78 2064.88 -10.17  2067.08 -10.53 2069.19 -10.7 2071.49 -10.92 2073.72 -
11.22 2076.1 -11.49  2078.4 -11.84 2080.46 -12.01 2082.68 -12.2 2084.84 -
12.29 2087.18 -12.24  2089.53 -12.37 2091.93 -12.18 2096.84 -11.91 2099.24 -
11.75 2101.9 -11.41  2104.3 -11.25 2106.95 -10.91 2109.31 -10.67 2111.95 -
10.41 2114.44 -10.2  2117.06 -10.02 2122.25 -9.63 2124.85 -9.47 2127.56 -9.24
2130.03 -9.07  2132.45 -8.93 2134.97 -8.72 2137.67 -8.51 2140.17 -8.26
2145.24 -8.16  2147.83 -8.02 2150.38 -7.87 2153.09 -7.76 2155.66 -7.65 2158.2
-7.43  2160.65 -7.19 2163.21 -6.79 2165.51 -6.7 2168.1 -6.27 2170.53 -6.2
2173.06 -6.01 2175.42 -5.92 2177.98 -5.59 2180.48 -5.04 2183.15 -4.75
2186.04 -4.39 2188.7 -4.56 2191.22 -4.32 2193.67 -3.84 2196.14 -3.67  2198.36
-3.45 2200.65 -3.23 2203.03 -3.19 2205.47 -2.95 2207.68 -2.57  2210.09 -2.2
2211.7 -1.92 2213.07 -1.77 2214.33 -1.67 2215.45 -1.52  2216.63 -1.1 2239.39
6.58 2245.93 7.61 2272.1 6.19 2337.53 6.17  2363.7 5.84 2383.32 6.94 2429.12
11.2 2448.75 11.43 2468.38 11.32  2481.46 10.15 2520.72 10.11 2533.8 10.47
2599.23 10.25 2605.77 10.56  2618.83 10.03 2625.34 10.52 2651.39 10.09
2664.41 10.86 2683.95 11.59  2696.97 12.68 2723.02 16.24 2755.58 16.85
2781.63 19.24 2885.82 19.38  2898.85 18.69 2924.9 19 2944.43 20.03 3160.42
23.04 3180.09 24.3  3265.36 24.21 3285.04 25.03 3324.39 24.95 3330.95 25.5
3363.75 31.41  3376.87 32.17 3389.99 31.92 3396.55 31.2 3481.81 30.15 3501.49
35.42  3534.29 46.12 3540.85 46.81 3606.44 46.26 3698.27 37.02 3737.62 35.41
3757.3 32.93 3763.86 32.44 3776.98 32.59 3783.54 33.09 3790.09 33.17  3803.21
32.17 3855.69 33.45 3881.92 33.04 3940.96 33.45 3980.31 31.66  4013.11 31.78
4026.22 31.06 4045.9 31.9 4078.7 31.34 4091.82 29.28  4098.37 28.65 4104.93
28.55 4111.49 27.95 4137.73 27.53 4150.85 26.85  4163.97 25.4 4170.52 25.45
```

4190.2 23.78 4216.44 23.27 4229.56 23.39 4242.67 22.17 4255.79 22.17 4275.47 23.57 4282.03 23.44 4288.59 23.93 4301.71 26 4327.94 25.29 4341.06 26.24 4354.18 26.7 4380.42 29.76 4400.09 33.03 4413.21 35.76 4426.33 37.49 4446.01 37.99 4491.92 36.67 4531.27 36.66 4563.95 35.02 4576.99 34.59 4583.51 34.82 4616.11 33.03 4635.67 30.53 4642.19 30.13 4648.71 28.11 4655.23 24.76 4668.27 21.22 4674.79 20.39 4694.35 20.01 4707.39 20.86 4713.91 23.31 4720.43 23.91 4733.47 23.28 4739.99 24.18 4753.03 26.56 4759.55 27.01 4779.11 25.82 4785.63 26.5 4798.67 25.87 4818.23 27.67 4824.75 29.16 4831.27 31.21 4844.31 33.85 4863.87 35.32 4883.43 36.05 4889.95 37.16 4896.47 38.86 4909.51 44.58 4935.59 48.53 4942.11 49.09 4955.15 51.19 4961.67 51.56 4981.23 54.43 4987.75 54.91 5000.79 53.95 5007.31 52.98 5013.83 52.61 5039.91 52.73 5052.95 53.65 5065.99 53.61 5098.59 55.23 5111.63 56.63 5170.31 57.77 5228.99 56.68 5248.55 57.74 5268.11 59.02 5281.15 59.09 5307.23 57.97 5333.31 56.07 5352.87 55.22 5378.95 53.58 5457.19 56.33 5496.31 59.42 5515.87 59.05 5522.39 59.29 5535.43 59.14

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .082 1985.15 .035 2429.12 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 1985.15 2429.12 619.37 384.58 298.08 .1 .3

CROSS SECTION

RIVER: Taunton River
REACH: Main Stem RS: 7.228003

INPUT
Description: 1-DS Town Limits Taunton/Berkley Station Elevation Data num= 380
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev 0 24.36 6.55 24.88 19.64 27.2 32.73 27.76 72 28.41 104.72 28.36 137.45 28.88 157.09 28.38 170.18 27.44 183.27 27.01 215.99 27.15 222.54 27.86 229.08 28.96 235.63 29.55 261.81 29.08 268.36 28.74 281.45 28.71 294.54 29.16 307.63 28.68 320.72 28.77 333.81 28.39 340.35 28.45 359.99 29.23 379.63 28.49 392.72 28.5 405.81 27.98 425.44 28.17 431.99 28.65 438.53 28.78 451.62 28.17 536.71 26.59 569.44 26.73 575.99 27.13 582.53 27.09 589.08 26.67 628.35 26.26 641.44 25.83 687.26 25.66 693.8 25.38 706.89 25.47 733.07 24.77 791.98 22.22 844.34 21.41 857.43 21.43 870.52 21.84 896.7 21.72 903.25 21.34 909.8 20.43 916.34 20.22 949.07 20.27 975.25 19.95 981.79 20.13 988.34 21.07 994.88 22.91 1001.43 25.8 1007.97 25.62 1021.07 19.45 1027.61 18.71 1079.97 17.4 1099.61 17.33 1191.24 15.25 1223.97 14.25 1263.24 13.86 1276.33 13.99 1322.15 13.33 1341.79 13.27 1361.42 12.29 1381.06 11.81 1413.78 12.57 1420.33 12.37 1439.97 12.46 1472.69 11.1 1479.24 11.05 1498.87 12.13 1511.96 10.65 1518.51 10.56 1531.6 11.18 1551.24 11.31 1570.87 12.64 1577.42 12.61 1597.05 11.89 1610.14 12.18 1623.23 13.24 1675.6 16.19 1708.32 16.54 1714.87 16.15 1734.5 16.36 1747.6 16.14 1773.78 16.48 1780.32 16.83 1793.41 18.07 1799.96 18.4 1819.59 18.63 1852.32 18.39 1865.41 18.78 1898.14 18.77 1911.23 16.33 1917.77 16.48 1930.86 17.37 1950.5 19.13 1976.68 22.67 1989.77 23.73 2002.86 24.27 2009.41 24.28 2048.68 22.5 2061.77 21.47 2081.41 19.19 2094.5 18.93 2100.99 19.48 2120.46 20.23 2133.44 21.75 2146.43 22.97 2185.37 28.55 2198.35 29.25 2217.83 29.97 2230.81 30.97 2243.79 30.82 2263.26 28.88 2282.74 27.74 2289.23 27.1 2308.7 23.16 2321.68 21.03 2328.17 19.68 2341.16

17.43 2347.65 16 2360.63 11.88 2367.12 9.08 2373.61 7.32 2379.88 3.46
2386.15 .42 2392.42 -.75 2398.25 -3.43 2400.04 -3.6 2401.8 -3.68 2403.36 -
3.79 2405.12 -3.93 2407.23 -4.09 2409.29 -4.43 2411.46 -4.66 2413.47 -4.94
2417.39 -5.27 2419.24 -5.42 2421.03 -5.48 2422.98 -5.66 2424.9 -5.75 2427.09
-5.52 2429.12 -5.29 2431.27 -6.18 2433.28 -6.52 2435.28 -7.65 2437.22 -8.45
2439.47 -8.65 2441.48 -8.97 2443.68 -9.27 2445.72 -9.46 2447.94 -9.49
2449.98 -9.41 2454.06 -9.47 2456.2 -9.53 2458.18 -9.49 2460.33 -9.48 2462.4
-9.44 2464.68 -9.38 2466.8 -9.38 2468.97 -9.25 2470.95 -9.38 2473.13 -9.24
2475.21 -9.3 2477.46 -9.18 2479.69 -9.18 2484.13 -8.95 2486.35 -8.77 2488.43
-8.65 2490.58 -8.48 2492.48 -8.36 2494.57 -8.31 2496.6 -8.36 2498.61 -8.31
2500.57 -8.31 2502.94 -8.14 2505.25 -7.81 2507.91 -7.5 2510.53 -6.71 2513.5
-5.84 2516.02 -4.72 2518.65 -4.05 2521.08 -3.41 2523.04 -2.76 2524.87 -2.52
2526.09 -2.39 2527.06 -2.2 2528.32 .33 2537.64 1.35 2557.22 1.95 2570.27
3.77 2583.32 4.82 2596.37 4.53 2609.42 4.94 2635.52 7.95 2648.58 9.85
2661.63 10.95 2674.68 11.12 2713.83 10.18 2746.46 10.64 2766.04 12.24
2772.57 13.1 2824.71 15.24 2837.72 15.53 2870.25 15.1 2980.84 17.63 2987.35
17.97 3000.36 19.43 3019.87 20.13 3026.38 20.71 3045.89 20.83 3052.4 20.17
3071.92 20.46 3091.43 20.03 3110.95 20.11 3137.01 20.84 3163.21 20.97
3182.85 23.28 3189.4 23.79 3195.95 23.9 3202.5 24.33 3235.24 24.88 3313.82
24.61 3340.01 23.98 3385.85 24.9 3444.78 24.59 3477.53 23.56 3510.27 23
3543.01 23.68 3549.56 24.03 3575.75 27.59 3595.4 29.13 3608.49 29.82 3621.59
30.07 3660.88 30.11 3667.43 29.78 3673.98 29.98 3687.07 31.83 3693.62 33.49
3706.72 37.87 3713.27 40.43 3719.82 42.69 3726.36 45.41 3732.91 47.09
3739.46 47.43 3759.11 47.31 3824.59 45.68 3863.88 43.82 3870.43 43.27
3876.98 42.39 3909.72 39.9 3929.36 37.28 3935.91 36.68 3955.56 35.54 3981.75
35.61 4021.04 35.31 4047.23 34.04 4053.78 33.47 4086.52 32.02 4106.17 31.44
4112.72 31.51 4145.46 30.76 4171.65 30.54 4191.3 30.71 4197.85 30.33 4210.94
30.46 4230.59 29.44 4243.68 28.01 4269.88 26.41 4289.52 25.9 4296.07 26.03
4315.72 24.04 4322.26 23.79 4341.91 24.48 4355.01 24.34 4368.1 24.69 4381.2
24.03 4394.3 24.86 4407.39 24.19 4420.49 24 4440.13 24.5 4453.23 25.17
4466.33 26.38 4479.42 26.77 4485.97 27.24 4499.07 28.56 4518.71 28.82
4525.26 29.5 4538.36 32.15 4551.46 34.09 4558 34.8 4564.55 34.94 4577.65
34.08 4584.2 33.24 4590.75 31.84 4597.29 31.06 4623.49 30.71 4630.04 30.98
4636.58 31.7 4643.13 31.9 4669.33 31.38 4695.52 31.96 4715.16 31.87 4721.71
32.19 4728.24 32.94 4741.29 33.75 4773.93 34.35 4793.51 33.65 4819.62 30.59
4832.67 29.29 4858.78 23.96 4865.3 22.22 4871.83 20.9 4878.36 19.91 4884.88
19.49 4904.47 19.47 4917.52 19.8 4930.57 19.27 4937.1 18.36 4943.63 18.02
4963.21 17.7 4976.26 18.17 4982.79 18.69 5002.37 22.05 5041.53 25.65 5054.58
26.48 5080.69 26.93 5087.22 27.73 5093.75 29.17 5100.27 30.02 5113.33 27.09
5126.38 27.16 5152.49 28.98 5165.54 30.36 5191.65 31.11 5224.28 33.51
5230.81 34.33 5237.34 35.48 5250.39 39.21 5269.97 44.34 5283.02 48.45
5289.55 50 5296.08 52.69 5302.6 54.2 5315.66 54.61 5354.82 54.02 5374.4
54.01 5407.04 52.11 5433.14 49.25 5446.2 47.45 5452.72 46.92 5459.25 46.77
5465.78 46.19 5472.3 44.1 5478.83 41.17 5485.36 39.48 5498.41 37.99 5504.94
37.58 5517.99 37.58 5544.1 39.14 5570.21 41.75 5589.79 44.24 5596.31 45.77
5615.9 48.77 5628.95 49.89 5642 50.09 5648.53 50.48 5661.58 52.1 5674.64
54.05 5707.27 56.47 5720.33 56.8 5746.43 58.27 5759.49 57.52 5779.07 57.86
5785.59 57.7 5798.65 58.05

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 0 .085 2243.79 .035 2661.63 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan. 2243.79

2661.63 7.94 7.22 8.54 .1 .3

SUMMARY OF MANNING'S N VALUES

River:Taunton River

Reach	River Sta.	n1	n2	n3
Main Stem	128409	.09	.055	.095
Main Stem	128319	.08	.055	.085
Main Stem	128304	Bridge		
Main Stem	128253.8	.08	.055	.085
Main Stem	128188.2	.08	.055	.095
Main Stem	128020.6	.085	.055	.1
Main Stem	127981.3	Inl Struct		
Main Stem	127955.6	.085	.055	.1
Main Stem	127856.6	.085	.055	.095
Main Stem	126368.5	.1	.0552	.1
Main Stem	125286.5	.085	.055	.09
Main Stem	122282.8	.085	.055	.1
Main Stem	121514.6	.09	.055	.095
Main Stem	120044.2	.085	.055	.095
Main Stem	118774.7	.09	.055	.095
Main Stem	117323	.095	.055	.095
Main Stem	116103.1	.095	.055	.095
Main Stem	114924.7	.09	.055	.09
Main Stem	114842.7	.09	.055	.09
Main Stem	114815.5	Bridge		
Main Stem	114789.1	.09	.055	.09
Main Stem	114747.8	.09	.055	.09
Main Stem	113455.2	.095	.055	.095
Main Stem	111998.1	.082	.055	.095
Main Stem	109992	.09	.055	.095
Main Stem	109211	.095	.055	.095
Main Stem	107644.2	.095	.055	.085
Main Stem	107578.3	.095	.055	.085
Main Stem	107452	.09	.055	.085
Main Stem	105227.3	.095	.055	.095
Main Stem	103799.2	.095	.055	.087
Main Stem	102175.3	.095	.055	.095
Main Stem	100259.9	.095	.055	.09
Main Stem	99193.71	.095	.055	.085
Main Stem	98105.8	.095	.055	.095
Main Stem	96410.98	.095	.055	.085
Main Stem	94852.71	.09	.055	.085
Main Stem	94802.97	.095	.055	.085
Main Stem	94760.71	Bridge		
Main Stem	94710.49	.095	.055	.085
Main Stem	94571.73	.093	.055	.09
Main Stem	93195.04	.095	.055	.095
Main Stem	91550.79	.093	.055	.095
Main Stem	91443.41	.093	.055	.095
Main Stem	91395.74	Bridge		
Main Stem	91322.25	.1	.055	.095
Main Stem	91271.3	.095	.055	.09

Main Stem 88254.45 .09 .055 .085
Main Stem 87227.5 .0875 .055 .09
Main Stem 85437.3 .09 .055 .09
Main Stem 85336.28 .095 .055 .09
Main Stem 85311.66 Bridge
Main Stem 85275.49 .093 .055 .093
Main Stem 85115.27 .09 .055 .085
Main Stem 83789.77 .095 .055 .095
Main Stem 82693.23 .09 .055 .09
Main Stem 82591.6 .09 .055 .09
Main Stem 82538.7 Bridge
Main Stem 82492.84 .09 .04 .09 Main Stem 82380.46 .085 .04 .09
Main Stem 81081.69 .09 .04 .095
Main Stem 79104.25 .09 .04 .09
Main Stem 77992.66 .085 .04 .09
Main Stem 76590.96 .085 .04 .09
Main Stem 75535.01 .085 .04 .09
Main Stem 75444 .085 .04 .09
Main Stem 75397.22 Bridge
Main Stem 75358.33 .085 .04 .09
Main Stem 75305.77 .085 .04 .09
Main Stem 74463.91 .085 .04 .09
Main Stem 72692.7 .09 .04 .09
Main Stem 72597.39 .09 .04 .09
Main Stem 72569.03 Bridge
Main Stem 72532.91 .09 .04 .09 Main Stem 72473.31 .09 .04 .09
Main Stem 70873.35 .085 .04 .093
Main Stem 68837.21 .087 .04 .095
Main Stem 67190.06 .087 .04 .093
Main Stem 66257.14 .09 .04 .09
Main Stem 66204.38 .09 .04 .09
Main Stem 66018.66 Bridge
Main Stem 65986.86 .09 .04 .09
Main Stem 65920.69 .09 .04 .09
Main Stem 64419.25 .09 .04 .085
Main Stem 62424.45 .093 .04 .09
Main Stem 60313.49 .087 .04 .09
Main Stem 59146.26 .09 .04 .09
Main Stem 57813.5 .09 .04 .09
Main Stem 56325.92 .09 .04 .093 Main Stem 56277.45 .09 .04 .093
Main Stem 56238.98 Bridge
Main Stem 56196.91 .09 .04 .093
Main Stem 56103.86 .09 .04 .093
Main Stem 54709.44 .085 .04 .085
Main Stem 53262.06 .087 .04 .085
Main Stem 51999.64 .09 .04 .085
Main Stem 51896.9 .09 .04 .085
Main Stem 51859.01 Bridge
Main Stem 51829.71 .085 .04 .08
Main Stem 51762.02 .085 .04 .08
Main Stem 50118.29 .085 .04 .082
Main Stem 48750.75 .088 .04 .08
Main Stem 47008.56 .085 .04 .085
Main Stem 45364.46 .085 .04 .08 Main Stem 44274.65 .085 .04 .085

Main Stem 43977 .08 .04 .08
Main Stem 43616 .08 .04 .08
Main Stem 43383.23 .085 .04 .085
Main Stem 43336.08 .085 .04 .085
Main Stem 43308.41 Bridge
Main Stem 43283.2 .085 .04 .085
Main Stem 43197.27 .085 .04 .085
Main Stem 42387 .08 .04 .08
Main Stem 41409.68 .085 .04 .08
Main Stem 40055.61 .085 .04 .085
Main Stem 38675.88 .082 .04 .08
Main Stem 37031.44 .085 .04 .08
Main Stem 35740.65 .088 .04 .085
Main Stem 34107.76 .08 .04 .09 Main Stem 32854.69 .082 .04 .085
Main Stem 31159.54 .085 .04 .082
Main Stem 29546.01 .088 .04 .085
Main Stem 27670.12 .088 .04 .085
Main Stem 26713.37 .085 .04 .088
Main Stem 26633.6 .085 .04 .085
Main Stem 26591.05 Bridge
Main Stem 26515.04 .085 .04 .085
Main Stem 26420.44 .088 .04 .085
Main Stem 25460.34 .088 .04 .08
Main Stem 23401.31 .09 .04 .085
Main Stem 22166.63 .085 .04 .085
Main Stem 21230.68 .082 .04 .08
Main Stem 19261.59 .082 .04 .082
Main Stem 18077.71 .082 .04 .082 Main Stem 17999.3 .082 .04 .082
Main Stem 17978.26 Bridge
Main Stem 17950.46 .082 .04 .082
Main Stem 17849.81 .082 .04 .082
Main Stem 16913.12 .082 .04 .09
Main Stem 16096.81 .08 .04 .085
Main Stem 15968.76 .085 .04 .085
Main Stem 15933.16 Bridge
Main Stem 15896.56 .085 .035 .085
Main Stem 15761.84 .085 .035 .085
Main Stem 15003.16 .085 .035 .085
Main Stem 14261.13 .085 .035 .085
Main Stem 14191.78 .085 .035 .082
Main Stem 14174.03 Bridge
Main Stem 14148.05 .085 .035 .082 Main Stem 14030.31 .085 .035 .082
Main Stem 13251.71 .085 .035 .085
Main Stem 12616.64 .085 .035 .085
Main Stem 12526.87 .085 .035 .085
Main Stem 12498.05 Bridge
Main Stem 12469.43 .085 .035 .085
Main Stem 12426.64 .085 .035 .085
Main Stem 11592.12 .085 .035 .088
Main Stem 10955.06 .085 .035 .088
Main Stem 10871.64 .085 .035 .088
Main Stem 10832.75 Bridge
Main Stem 10793.7 .085 .035 .088
Main Stem 10661.72 .085 .035 .088

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 Main Stem 9696.133 .085 .035 .082
 Main Stem 8397.759 .085 .035 .085   Main Stem 7193.258 .09 .035 .085
 Main Stem 7110.866 .09 .035 .085
 Main Stem 7100.789 Bridge
 Main Stem 7088.903 .09 .035 .085
 Main Stem 7032.026 .085 .035 .085
 Main Stem 5990.413 .09 .035 .09
 Main Stem 5504.704 .085 .035 .085
 Main Stem 5409.52 .085 .035 .085
 Main Stem 5376.326 Bridge
 Main Stem 5335.943 .085 .035 .082
 Main Stem 5194.718 .085 .035 .082
 Main Stem 4104.082 .082 .035 .082
 Main Stem 2257.516 .082 .035 .082
 Main Stem 391.8054 .082 .035 .085
 Main Stem 7.228003 .085 .035 .09
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SUMMARY OF REACH LENGTHS

River: Taunton River

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 Reach River Sta. Left Channel Right

 Main Stem 128409 90.02 90.01 93.04
 Main Stem 128319 65.53 65.15 67.23
 Main Stem 128304 Bridge
 Main Stem 128253.8 56.21 65.62 70.36
 Main Stem 128188.2 169.78 167.62 165.71
 Main Stem 128020.6 64.55 64.95 68.4
 Main Stem 127981.3 Inl Struct
 Main Stem 127955.6 95.96 99.03 158.54
 Main Stem 127856.6 1443.78 1488.1 1605.74   Main Stem 126368.5 1117.96
1081.96 1026.32
 Main Stem 125286.5 3030.3 3003.78 3022.24
 Main Stem 122282.8 754.72 768.18 785.63
 Main Stem 121514.6 1409.65 1470.4 1595.6
 Main Stem 120044.2 1210.5 1269.44 1360.7
 Main Stem 118774.7 1513.57 1451.76 1410.95
 Main Stem 117323 1270.29 1219.85 1204.17
 Main Stem 116103.1 1173.1 1178.45 1180.74
 Main Stem 114924.7 78.71 81.96 87.88
 Main Stem 114842.7 53.28 53.62 51.89
 Main Stem 114815.5 Bridge
 Main Stem 114789.1 44.49 41.34 37.16
 Main Stem 114747.8 1281.74 1292.52 1315.33
 Main Stem 113455.2 1492.91 1457.13 1422.7
 Main Stem 111998.1 2057.48 2006.07 1966.74   Main Stem 109992 808.34 781.04
811.8
 Main Stem 109211 1561.57 1566.81 1580.91
 Main Stem 107644.2 65.61 65.84 69.27
 Main Stem 107578.3 123.92 126.38 129.99
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Main Stem 107452 2317.83 2224.61 2187.27
Main Stem 105227.3 1458.48 1428.11 1397.47
Main Stem 103799.2 1511.12 1623.98 1750.94
Main Stem 102175.3 2000.77 1915.38 1882.93
Main Stem 100259.9 1027.78 1066.17 1112.6
Main Stem 99193.71 1067.1 1087.9 1112.89
Main Stem 98105.8 1679.58 1694.82 1701.02
Main Stem 96410.98 1563.06 1558.27 1560.01
Main Stem 94852.71 85.28 49.74 36.25
Main Stem 94802.97 97.12 92.48 89.62
Main Stem 94760.71 Bridge Main Stem 94710.49 111.72 138.76 147.03
Main Stem 94571.73 1383.91 1376.7 1373.13
Main Stem 93195.04 1691.41 1644.24 1589.83
Main Stem 91550.79 103.47 107.37 104.58
Main Stem 91443.41 115.34 121.17 129.47
Main Stem 91395.74 Bridge
Main Stem 91322.25 49.58 50.95 49.51
Main Stem 91271.3 3090.08 3016.84 2959.28
Main Stem 88254.45 973.59 1026.95 1087.56
Main Stem 87227.5 1820.81 1790.19 1770.77
Main Stem 85437.3 103.69 101.02 107.47
Main Stem 85336.28 60.24 60.79 60.96
Main Stem 85311.66 Bridge
Main Stem 85275.49 159.18 160.23 161.81
Main Stem 85115.27 1317.95 1325.49 1349.87 Main Stem 83789.77 1097.27 1096.54 1095.28
Main Stem 82693.23 72.73 101.63 122.4
Main Stem 82591.6 94.57 98.76 101.32
Main Stem 82538.7 Bridge
Main Stem 82492.84 128.81 112.38 109.35
Main Stem 82380.46 1341.34 1298.77 1269.65
Main Stem 81081.69 1963.31 1977.44 1977.97
Main Stem 79104.25 1084.58 1111.59 1135.96
Main Stem 77992.66 1393.51 1401.69 1405.75
Main Stem 76590.96 982.05 1055.95 1121.6
Main Stem 75535.01 90.65 91.01 91.43
Main Stem 75444 83.92 85.68 87.62
Main Stem 75397.22 Bridge
Main Stem 75358.33 55.08 52.55 49.93
Main Stem 75305.77 864.05 841.86 823.45 Main Stem 74463.91 1832.03 1771.2 1714.64
Main Stem 72692.7 102.69 95.32 96.09
Main Stem 72597.39 67.7 64.48 66.6
Main Stem 72569.03 Bridge
Main Stem 72532.91 70.06 59.59 49.81
Main Stem 72473.31 1517.78 1599.96 1630.87
Main Stem 70873.35 2059.45 2036.14 2092.49
Main Stem 68837.21 1628.08 1647.15 1663.03
Main Stem 67190.06 997.16 932.92 890.31
Main Stem 66257.14 57.41 52.76 51.67
Main Stem 66204.38 221.18 217.52 217.92
Main Stem 66018.66 Bridge
Main Stem 65986.86 60.77 66.17 74.2
Main Stem 65920.69 1486.1 1501.44 1534.95

Main Stem 64419.25 1895.09 1994.8 2138.57 Main Stem 62424.45 2215.34 2110.96 2048.7
Main Stem 60313.49 1181.48 1167.23 1157.27
Main Stem 59146.26 1379 1332.76 1299.32
Main Stem 57813.5 1426.36 1487.57 1534.98
Main Stem 56325.92 58 48.47 42.98
Main Stem 56277.45 84.16 80.55 81.19
Main Stem 56238.98 Bridge
Main Stem 56196.91 110.85 93.05 75.7
Main Stem 56103.86 1404.65 1394.42 1387.7
Main Stem 54709.44 1402 1447.38 1492.06
Main Stem 53262.06 1383.55 1262.42 1156.9
Main Stem 51999.64 86.45 102.74 130.56
Main Stem 51896.9 72.49 67.2 64.58
Main Stem 51859.01 Bridge
Main Stem 51829.71 68.99 67.69 68.38 Main Stem 51762.02 1675.78 1643.73 1610.01
Main Stem 50118.29 1344.97 1367.54 1376.48
Main Stem 48750.75 1747.9 1742.19 1739.19
Main Stem 47008.56 1593.35 1644.1 1707.52
Main Stem 45364.46 1089.81 1089.81 1089.81
Main Stem 44274.65 298.21 298.21 298.21
Main Stem 43977 360.52 360.52 360.52
Main Stem 43616 232.69 232.69 232.69
Main Stem 43383.23 47.15 47.15 47.15
Main Stem 43336.08 52.87 52.87 52.87
Main Stem 43308.41 Bridge
Main Stem 43283.2 85.94 85.94 85.94
Main Stem 43197.27 810.65 810.65 810.65
Main Stem 42387 976.94 976.94 976.94
Main Stem 41409.68 1488.16 1354.06 1248.76 Main Stem 40055.61 1195.98 1379.74 1532.92
Main Stem 38675.88 1736.85 1644.44 1625.84
Main Stem 37031.44 1361.41 1290.79 1264.72
Main Stem 35740.65 1785.36 1632.89 1530.18
Main Stem 34107.76 1212.6 1253.07 1397.48
Main Stem 32854.69 1846.6 1695.15 1689.56
Main Stem 31159.54 1600.85 1613.53 1832.86
Main Stem 29546.01 1803.19 1875.89 1978.98
Main Stem 27670.12 918.95 956.75 981.98
Main Stem 26713.37 43.75 79.77 95.66
Main Stem 26633.6 137.27 118.57 119.67
Main Stem 26591.05 Bridge
Main Stem 26515.04 99.49 94.6 91.95
Main Stem 26420.44 990.69 960.09 928.97
Main Stem 25460.34 1917.46 2059.03 2182.8 Main Stem 23401.31 1321.59 1234.68 1184.64
Main Stem 22166.63 978.05 935.95 915.59
Main Stem 21230.68 1970.54 1969.09 1971.46
Main Stem 19261.59 1135.1 1183.89 1211.84
Main Stem 18077.71 80.62 78.41 79.01
Main Stem 17999.3 50.15 48.83 48.16
Main Stem 17978.26 Bridge
Main Stem 17950.46 90.54 100.66 105.81

Main Stem 17849.81 887.1 936.69 998.6
Main Stem 16913.12 882.21 816.31 764.31
Main Stem 16096.81 106.5 128.05 139.73
Main Stem 15968.76 71.69 72.2 74.47
Main Stem 15933.16 Bridge
Main Stem 15896.56 162.26 134.72 118.38
Main Stem 15761.84 770.87 758.69 764.06 Main Stem 15003.16 749.32 742.03 737.61
Main Stem 14261.13 78.25 69.35 66.1
Main Stem 14191.78 44.24 43.72 44.72
Main Stem 14174.03 Bridge
Main Stem 14148.05 99.87 117.75 129.37
Main Stem 14030.31 684.11 778.6 861.6
Main Stem 13251.71 602.45 635.08 678.37
Main Stem 12616.64 48.11 89.77 157.92
Main Stem 12526.87 48.42 57.44 51.66
Main Stem 12498.05 Bridge
Main Stem 12469.43 83.23 42.79 17.93
Main Stem 12426.64 810.43 834.52 1253.76
Main Stem 11592.12 680.73 637.06 583.23
Main Stem 10955.06 122 83.42 73.8
Main Stem 10871.64 69.68 77.94 70.04 Main Stem 10832.75 Bridge
Main Stem 10793.7 110.75 131.98 150.03
Main Stem 10661.72 1040.28 965.59 915.55
Main Stem 9696.133 1323.89 1298.37 1295.7
Main Stem 8397.759 1233.41 1204.5 1191.8
Main Stem 7193.258 86.6 82.39 79.32
Main Stem 7110.866 22.89 21.96 21.2
Main Stem 7100.789 Bridge
Main Stem 7088.903 57.75 56.88 56.46
Main Stem 7032.026 1208.71 1041.61 935.52
Main Stem 5990.413 373.51 485.71 679.74
Main Stem 5504.704 98.06 95.18 93.88
Main Stem 5409.52 81.29 73.58 68.36
Main Stem 5376.326 Bridge
Main Stem 5335.943 143.56 141.23 144.64 Main Stem 5194.718 1072.04 1090.64 1114.7
Main Stem 4104.082 1834.7 1846.57 1854.36
Main Stem 2257.516 1820.11 1865.71 1922.42
Main Stem 391.8054 619.37 384.58 298.08
Main Stem 7.228003 7.94 7.22 8.54

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Taunton River

Reach	River Sta.	Contr.	Expan.
Main Stem	128409	.3	.5
Main Stem	128319	.5	.8
Main Stem	128304	Bridge	

Main Stem 128253.8 .5 .8
Main Stem 128188.2 .3 .5 Main Stem 128020.6 .5 .8
Main Stem 127981.3 Inl Struct
Main Stem 127955.6 .5 .8
Main Stem 127856.6 .3 .5
Main Stem 126368.5 .3 .5
Main Stem 125286.5 .3 .5
Main Stem 122282.8 .3 .5
Main Stem 121514.6 .3 .5
Main Stem 120044.2 .3 .5
Main Stem 118774.7 .3 .5
Main Stem 117323 .3 .5
Main Stem 116103.1 .3 .5
Main Stem 114924.7 .3 .5
Main Stem 114842.7 .5 .8
Main Stem 114815.5 Bridge
Main Stem 114789.1 .5 .8
Main Stem 114747.8 .3 .5
Main Stem 113455.2 .3 .5
Main Stem 111998.1 .3 .5 Main Stem 109992 .3 .5
Main Stem 109211 .3 .5
Main Stem 107644.2 .3 .5
Main Stem 107578.3 .3 .5
Main Stem 107452 .3 .5
Main Stem 105227.3 .3 .5
Main Stem 103799.2 .3 .5
Main Stem 102175.3 .3 .5
Main Stem 100259.9 .3 .5
Main Stem 99193.71 .3 .5
Main Stem 98105.8 .3 .5
Main Stem 96410.98 .3 .5
Main Stem 94852.71 .3 .5
Main Stem 94802.97 .5 .8
Main Stem 94760.71 Bridge
Main Stem 94710.49 .5 .8
Main Stem 94571.73 .3 .5
Main Stem 93195.04 .3 .5
Main Stem 91550.79 .3 .5 Main Stem 91443.41 .5 .8
Main Stem 91395.74 Bridge
Main Stem 91322.25 .5 .8
Main Stem 91271.3 .3 .5
Main Stem 88254.45 .3 .5
Main Stem 87227.5 .3 .5
Main Stem 85437.3 .3 .5
Main Stem 85336.28 .5 .8
Main Stem 85311.66 Bridge
Main Stem 85275.49 .5 .8
Main Stem 85115.27 .3 .5
Main Stem 83789.77 .3 .5
Main Stem 82693.23 .3 .5
Main Stem 82591.6 .5 .8
Main Stem 82538.7 Bridge
Main Stem 82492.84 .5 .8
Main Stem 82380.46 .3 .5

Main Stem 81081.69 .3 .5
Main Stem 79104.25 .3 .4 Main Stem 77992.66 .3 .4
Main Stem 76590.96 .3 .4
Main Stem 75535.01 .3 .4
Main Stem 75444 .5 .4
Main Stem 75397.22 Bridge
Main Stem 75358.33 .3 .4
Main Stem 75305.77 .1 .3
Main Stem 74463.91 .1 .3
Main Stem 72692.7 .1 .3
Main Stem 72597.39 .3 .4
Main Stem 72569.03 Bridge
Main Stem 72532.91 .3 .4
Main Stem 72473.31 .1 .4
Main Stem 70873.35 .1 .4
Main Stem 68837.21 .1 .4
Main Stem 67190.06 .1 .4
Main Stem 66257.14 .1 .4
Main Stem 66204.38 .3 .4
Main Stem 66018.66 Bridge Main Stem 65986.86 .5 .7
Main Stem 65920.69 .3 .5
Main Stem 64419.25 .3 .5
Main Stem 62424.45 .3 .5
Main Stem 60313.49 .3 .5
Main Stem 59146.26 .3 .5
Main Stem 57813.5 .3 .5
Main Stem 56325.92 .3 .5
Main Stem 56277.45 .5 .8
Main Stem 56238.98 Bridge
Main Stem 56196.91 .5 .8
Main Stem 56103.86 .3 .5
Main Stem 54709.44 .3 .5
Main Stem 53262.06 .3 .5
Main Stem 51999.64 .3 .5
Main Stem 51896.9 .5 .8
Main Stem 51859.01 Bridge
Main Stem 51829.71 .5 .8
Main Stem 51762.02 .3 .5 Main Stem 50118.29 .3 .5
Main Stem 48750.75 .3 .5
Main Stem 47008.56 .3 .5
Main Stem 45364.46 .3 .5
Main Stem 44274.65 .3 .5
Main Stem 43977 .1 .3
Main Stem 43616 .1 .3
Main Stem 43383.23 .8 .8
Main Stem 43336.08 .5 .8
Main Stem 43308.41 Bridge
Main Stem 43283.2 .5 .8
Main Stem 43197.27 .3 .5
Main Stem 42387 .1 .3
Main Stem 41409.68 .3 .5
Main Stem 40055.61 .3 .5
Main Stem 38675.88 .3 .5
Main Stem 37031.44 .3 .5

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Main Stem 35740.65 .3 .5
Main Stem 34107.76 .3 .5   Main Stem 32854.69 .3 .5
Main Stem 31159.54 .3 .5
Main Stem 29546.01 .3 .5
Main Stem 27670.12 .3 .5
Main Stem 26713.37 .5 .5
Main Stem 26633.6 .6 .8
Main Stem 26591.05 Bridge
Main Stem 26515.04 .5 .8
Main Stem 26420.44 .3 .5
Main Stem 25460.34 .3 .5
Main Stem 23401.31 .3 .5
Main Stem 22166.63 .3 .5
Main Stem 21230.68 .3 .5
Main Stem 19261.59 .3 .5
Main Stem 18077.71 .3 .5
Main Stem 17999.3 .6 .8
Main Stem 17978.26 Bridge
Main Stem 17950.46 .5 .8
Main Stem 17849.81 .3 .5   Main Stem 16913.12 .3 .5
Main Stem 16096.81 .3 .5
Main Stem 15968.76 .5 .8
Main Stem 15933.16 Bridge
Main Stem 15896.56 .5 .8
Main Stem 15761.84 .3 .5
Main Stem 15003.16 .3 .5
Main Stem 14261.13 .3 .5
Main Stem 14191.78 .6 .8
Main Stem 14174.03 Bridge
Main Stem 14148.05 .5 .5
Main Stem 14030.31 .3 .5
Main Stem 13251.71 .3 .5
Main Stem 12616.64 .3 .5
Main Stem 12526.87 .6 .8
Main Stem 12498.05 Bridge
Main Stem 12469.43 .5 .5
Main Stem 12426.64 .3 .5
Main Stem 11592.12 .3 .5   Main Stem 10955.06 .3 .5
Main Stem 10871.64 .6 .5
Main Stem 10832.75 Bridge
Main Stem 10793.7 .5 .5
Main Stem 10661.72 .3 .5
Main Stem 9696.133 .3 .5
Main Stem 8397.759 .3 .5
Main Stem 7193.258 .3 .5
Main Stem 7110.866 .3 .5
Main Stem 7100.789 Bridge
Main Stem 7088.903 .1 .3
Main Stem 7032.026 .1 .3
Main Stem 5990.413 .1 .3
Main Stem 5504.704 .1 .3
Main Stem 5409.52 .1 .3
Main Stem 5376.326 Bridge
Main Stem 5335.943 .1 .3
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Main Stem 5194.718 .1 .3
Main Stem 4104.082 .1 .3   Main Stem 2257.516 .1 .3
Main Stem 391.8054 .1 .3
Main Stem 7.228003 .1 .3
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APPENDIX C

CLIMATE CHANGE INDICATOR

IMPROVING COMMUNITIES TOGETHER

JOB	South Street East/Old Colony Ave Bridge	NO.	10887
CALC	JMC	DATE	10/08/24
CHKD	BB	DATE	10/08/24
DESC	Climate Change Indicator (CCI)	SHEET	1 OF 1

$$CCI = \frac{P_{24,T,P} - P_{24,T,O}}{P_{24,T,O,U} - P_{24,T,O}}$$

CCI = Climate Change Indicator

$P_{24,T,P}$ = Projected T-Year 24-HR precipitation

$P_{24,T,O}$ = Observed T-Year 24-HR precipitation (NOAA Atlas 14 PFDS)

$P_{24,T,O,U}$ = Upper 90% Confidence Limit T-year 24-HR precipitation for the observed data (NOAA Atlas 14 PFDS)

	10% AEP 10-Year	4% AEP 25-Year	2 % AEP 50-Year	1% AEP 100-Year
$P_{24,T,O}$	5.1	6.14	6.93	7.76
$P_{24,T,O,U}$	6.12	7.64	8.77	10.10
RFB_p	1.15	1.15	1.15	1.15
$P_{24,T,P}$	5.87	7.06	7.97	8.92
CCI	0.75	0.61	0.56	0.50

APPENDIX D

SCOUR COMPUTATIONS

Hydraulic Analysis Report

Contraction Scour

1. Determine return fredquency for the Scour Design Flood and Scour Check Flood using Table 1.3.4-1:

Highway Functional Classification:	Urban Collector Street
Scour Design Flood Return Frequency:	25
Scour Check Flood Return Frequency:	50

2. Determine routine

$$v_C = K_u \times y_1^{1/6} \times D_{50}^{1/3}$$ Equation 1: Critical Velocity

v_c = Critical Velocity (ft/s)
K_u = 11.17 (Constant)
y_1 = Average Depth of flow upstream of the bridge (ft)
D_{50} = Particle Size (ft)

Parameters	25-Year Channel	50-Year Channel
K_u	11.17	11.17
y_1(ft)	10.96	11.41
D_{50} (mm)	2.50	2.50
D_{50} (ft)	0.01	0.01
V_c (ft/s)	3.36	3.38
V_0 (ft/s)	3.43	3.58
V_c - V_0	-0.07	-0.20
Routine:	LIVE	LIVE

Equation 1
v_o = Veclocity in the approach section(ft/s) [Value is from the model]

Clear = $V_c > V_0$; Live = $V_c < V_0$

3. Calculate Contraction Sour Based on Routine

$$\frac{y_2}{y_1} = \left(\frac{Q_2}{Q_1}\right)^{\frac{6}{7}} \times \left(\frac{W_1}{W_a}\right)^{k_1}$$ Equation 2: Average depth in contracted section

$$y_s = y_2 - y_0$$ Equation 3: Contraction Scour

Table 1		
V*/T	k1	Mode of Bed Material Transport
<0.5	0.59	Mostly contact bed material
0.5	0.64	Some suspended bed material discharge
>2.0	0.69	Mostly suspended bed material discharge

Q_1 = Flow in upstream channel (cfs)
Q_2 = Flow in contracted channel (cfs)
W_1 = Bottom width of upstream main channel (ft)
W_2 = Bottom width of main channel in contracted section (ft)
K_1 = Exponent from Table 1
y_0 = Existing depth in contracted section before scour (ft)
y_1 = Average Depth of flow upstream of the bridge (ft)
y_2 = Average depth in contracted section (ft)
y_s = Average contraction scour depth (ft)

V^* = $(\vartheta o/\Delta)^{1/2} = (g y_1 S_1)^{1/2}$, shear velocity in the upstream section, ft/s (m/s)
T = Fall velocity of bed material based on the D50, m/s (Figure 6.8)
For fall velocity in English units (ft/s) multiply T in m/s by 3.28
g = Acceleration of gravity (32.2 ft/s^2) (9.81 m/s^2)
$S1$ = Slope of energy grade line of main channel, ft/ft (m/m)
ϑo = Shear stress on the bed, (lb/ft2) (Pa (N/m2))
Δ = Density of water (1.94 slugs/ft3) (1000 kg/m3)

Live-Water Routine		
Channel Parameters	25-Year	50-Year
Q_1 (cfs)	4812	5430
Q_2 (cfs)	4812	5430
W_1 (ft)	127.52	131.34
W_2 (ft)	84.18	84.18
K_1	0.69	0.69
y_0 (ft)	11.99	12.83
y_2 (ft)	14.60	15.51
y_s(ft)	2.61	2.68

Channel Depth Average inside bridge opening
Equation 2
Equation 3

	25-Year	50-Year
Contraction Scour Y_s =	2.61	2.68

Abutment Scour

1. Determine Computation Type and Method

Computation Method: NCHRP 24-20 Mehtod

L/B is >75%

Scour Condition (a) live-bed scour

2. Calculate Total Scour at the Abutment

$$y_{max} = \propto_A \times y_c$$ Equation 4

y_{max} = Maximum flow depth resulting fromabutment scour (ft)
α_A = Amplification factor for live-bed conditions
y_c = Flow dpeth including live-bed or clear water contraction scour (ft)

$$y_c = y_1 \left(\frac{q_{2c}}{q_1}\right)^{6/7}$$ Equation 5

y_1 = Upstream flow depth (ft)
q_1 = Upstream unit discharge (ft^2/s)
q_{2c} = Unit discharge in the constricted opening (ft^2/s)

	25-Year			50-Year		
	CFS	Width	Unit Discharge (ft^2/s)	CFS	Width (ft)	Unit Discharge (ft^2/s)
Bridge (q_{2c})	4812	84.18	57.16	5430.00	84.19	64.50
Approach (q_1)	4812	127.52	37.74	5430.00	131.34	41.34

	25-Year	50-Year	
q_1 / q^{2c}	1.5	1.6	
α_A	1.60	1.6	
y_1 (ft)	10.96	11.4	
y_c (ft)	15.65	16.70	Equation 5
y_0 (ft)	11.99	12.83	
y_{max} (ft)	25.03	25.89	Equation 4

3. Calculate Abutment Scour Depth

$$y_s = y_{\max} - y_0$$ Equation 6

y_s = Abutment scour depth, ft (m)

	25-Year	50-Year	
y_{max} (ft)	25.03	25.89	
y_0 (ft)	11.99	12.83	
y_s (ft)	13.04	13.06	Equation 6

	25-Year	50-Year
Abutment Scour Y_s =	13.04	13.06

Pier Scour

Existing Pier Scour with Debris

	25-Year	50-Year
a	3.00	3.00
K_1	0.79	0.79
H	2.50	2.50
W	28.00	28.00
y (ft)	10.96	11.41
a^*_d	7.51	7.33

$$a^*_d = \frac{K_1(HW) + (y - K_1H)a}{y} \qquad (7.32)$$

where:

a^*_d = Effective width of pier when debris is present, ft (m)
a = Width of pier perpendicular to flow, ft (m)
K_1 = 0.79 for rectangular debris, 0.21 for triangular debris
H = Height (thickness) of the debris, ft (m)
W = Width of debris perpendicular to the flow direction, ft (m)
y = Depth of approach flow, ft (m)

	25-Year	50-Year
y_s (ft)	4.45	4.48
y_1 (ft)	10.96	11.41
K_1	0.90	0.90
K_2	1.00	1.00
K_3	1.10	1.10
a	7.51	7.33
Fr	0.22	0.23
L	35.00	35.00
V	4.19	4.35

In terms of y_s/a, Equation 7.1 is:

$$\frac{y_s}{a} = 2.0\,K_1\,K_2\,K_3\left(\frac{y_1}{a}\right)^{0.35} Fr_1^{0.43} \qquad (7.3)$$

where:

y_s = Scour depth, ft (m)
y_1 = Flow depth directly upstream of the pier, ft (m)
K_1 = Correction factor for pier nose shape from Figure 7.3 and Table 7.1
K_2 = Correction factor for angle of attack of flow from Table 7.2 or Equation 7.4
K_3 = Correction factor for bed condition from Table 7.3
a = Pier width, ft (m)
L = Length of pier, ft (m)
Fr_1 = Froude Number directly upstream of the pier = $V_1/(gy_1)^{1/2}$
V_1 = Mean velocity of flow directly upstream of the pier, ft/s (m/s)
g = Acceleration of gravity (32.2 ft/s^2) (9.81 m/s^2)

Proposed Pier Scour

	25-Year	50-Year
y_s (ft)	2.45	2.51
y_1 (ft)	10.96	11.41
K_1	0.90	0.90
K_2	1.00	1.00
K_3	1.10	1.10
a	3.00	3.00
Fr	0.22	0.23
L	35.00	35.00
V	4.19	4.35

$$\frac{y_s}{y_1} = 2.0\,K_1\,K_2\,K_3\left(\frac{a}{y_1}\right)^{0.65} Fr_1^{0.43} \qquad (7.1)$$

As a Rule of Thumb, the maximum scour depth for round nose piers aligned with the flow is:

$y_s \le 2.4$ times the pier width (a) for $Fr \le 0.8$
$y_s \le 3.0$ times the pier width (a) for $Fr > 0.8$ (7.2)

In terms of y_s/a, Equation 7.1 is:

$$\frac{y_s}{a} = 2.0\,K_1\,K_2\,K_3\left(\frac{y_1}{a}\right)^{0.35} Fr_1^{0.43} \qquad (7.3)$$

where:

y_s = Scour depth, ft (m)
y_1 = Flow depth directly upstream of the pier, ft (m)
K_1 = Correction factor for pier nose shape from Figure 7.3 and Table 7.1
K_2 = Correction factor for angle of attack of flow from Table 7.2 or Equation 7.4
K_3 = Correction factor for bed condition from Table 7.3
a = Pier width, ft (m)
L = Length of pier, ft (m)
Fr_1 = Froude Number directly upstream of the pier = $V_1/(gy_1)^{1/2}$
V_1 = Mean velocity of flow directly upstream of the pier, ft/s (m/s)
g = Acceleration of gravity (32.2 ft/s^2) (9.81 m/s^2)

Countermeasures

1. Calculate Froude Numbers using Equaition 1

$$\left(\frac{V}{(g \times y)^{1/2}}\right)$$ Equation 1

V= characteristic average velocity in the contracted section, ft/s (m/s) [Total Discharge through bridge (Q)/Cross Sectional Area (A)]
y= Flow depth in bridge opening, ft (m)
g= gravitational acceleration, ft/s^2 (m/s^2)

V (ft/s)	6.00
y (ft)	12.83
g (ft/s^2)	32.20
FR #	0.30

Equation 2

Froude Number is less than or equal to 0.8. Use Equation 14.1

HEC -23 Equation 14.1

$$\frac{D_{50}}{y} = \frac{K}{(S_s - 1)}\left[\frac{V^2}{g \times y}\right]$$ Equation 14.1

D_{50} = median stone diameter, ft (m)
V= characteristic average velocity in the contracted section, ft/s (m/s)
S_s = specific gravity of rock riprap
y= Flow depth in bridge opening, ft (m)
g= gravitational acceleration, ft/s^2 (m/s^2)
K= 0.89 for a spill-through abutment
1.02 for a vertical wall abutment

Abutment Type: Vertical Wall

V (ft/s)	6.00
S_s	2.65
y (ft)	12.83
g (ft/s^2)	32.20
K	1.02
D_{50} (ft)=	0.69
D_{50} (in)=	9.00
Thickness (in)	18.00

D_{50} *(in)*	3.33
D_{50} *(ft)*	0.28
V (ft/s)	4.35
K	1.5
S_S	2.65
g (ft/s^2)	32.2

5.2.3 Riprap for Bridge Piers

According to Hoffmans and Verheij (1997) riprap can be sized using either the Isbash or Shields stability criteria if turbulence intensity is incorporated into the velocity component. The effect of turbulence is to increase instantaneous velocities well above the levels for unobstructed flow. This concept is particularly applicable to the pier riprap equations.

The standard Isbash (1936) formula for sizing riprap on a channel bed is:

$$D_{50} = \frac{0.692(KV)^2}{(2g(S_s - 1))} \qquad (5.1)$$

where:

D_{50} = Riprap size, ft (m)
V = Velocity, ft/s (m/s)
S_s = Specific gravity of the riprap (usually 2.65)
K = 1.0

To incorporate the effects of turbulence intensity, Hoffmans and Verheij (1997) recommend that the value of K be adjusted above a value of 1.0. In the specific case of circular piers, they recommend using the local velocity upstream of the pier and values of K up to 2.0. This amount of adjustment is equivalent to increasing shear stress by a factor of four.

This approach is similar to the equations presented in Design Guideline 8 and in the riprap sizing formula presented by Parola (1993). The only difference is the recommended values of K in the design guideline are 1.5 for circular piers and 1.7 for square piers. The recommended values of K by Parola ranged from 1.44 to 1.90 depending on pier and footing geometry and approach flow angle of attack.

APPENDIX E

SEDIMENT SAMPLE TEST RESULTS

August 28, 2024
Project No. 2404697

VIA EMAIL: CJones@BETA-Inc.com

Mr. Christopher W. Jones, P.E.
BETA GROUP, Inc.
315 Norwood Park S 2nd floor
Norwood, MA 02062

Re: Sediment Sample Test Results
South St. East & Old Colony Ave. Over Taunton River Bridge (Bridge No. R-2-3=T-1-4)
Taunton, Massachusetts

Dear Mr. Jones:

This letter presents the results of our laboratory testing on the soil samples collected from the Taunton River upstream of Bridge R-2-3=T-1-4 in Taunton, Massachusetts (Fig. 1). We understand that the test results will be used for scour evaluation.

Sediment samples were collected on August 2 and August 7, 2024. We collected samples at five locations (SS-101, SS-102, SS-103, SS-104, and BB-102). The samples were collected in accordance with the locations shown in Figure 1.3.1-2 of the Massachusetts Department of Transportation (MassDOT) Bridge Manual – Hundredth Anniversary Edition (2024). Samples SS-101 through SS-104 were collected using a 2-7/8 inch outside diameter vibracore and BB-102 was collected using a 2-inch-diameter split-spoon. The sample locations are shown on Fig. 2.

The samples collected for the scour evaluation were tested by GEI in our Woburn, Massachusetts laboratory. We performed eight grain size with hydrometer analyses (ASTM D7928) and three Atterberg Limits tests on the collected samples. The results of the laboratory tests are attached. D10, D15, D30, D50, D60, and D85 particle sizes for the samples are provided in the Particle Size Distribution Reports. Liquid Limit, Plastic Limit, and Plasticity Index of Soils are provided in the Atterberg Limits Reports.

Please call Joe Giampa at 781-721-4037 or Steve Sarandis at 781-721-4048 if you have any questions.

Sincerely,

GEI Consultants, Inc.

Joseph R. Giampa, Ph.D., P.E.
Project Manager

Stephen J. Sarandis, P.E.
Senior Project Manager

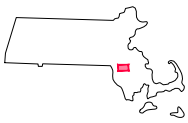
JRG/SJS:vjb
\\geiconsultants.com\data\Data_Storage\Working\BETA GROUP\2404697 South St East Over Taunton River Bridge\11_SEDIMENT SAMPLE LETTER\20240828_2404697 South St. E. & Old Colony Ave. Sediment Sample Letter FINAL.docx

Attachments
- Figure 1 – Site Location Map
- Figure 2 – Exploration Location Plan
- Table 1 – Sediment Sample Information
- Laboratory Test Results

0 1000 2000 4000 6000

SCALE, FEET

This Image is from U.S.G.S. Topographic 7.5 Minute Series
Taunton, MA Quadrangle, 2021.
Datum is North American Vertical Datum of 1988 (NAVD88).
Contour Interval is 10 Feet.



MASSACHUSETTS
QUADRANGLE LOCATION

South St. East & Old Colony Ave. Over Taunton River (Bridge No. R-2-3 = T-1-4) Taunton, Massachusetts	GEI Consultants	SITE LOCATION MAP
BETA Group, Inc. Norwood, Massachusetts	Project 2404697	August 2024 Fig. 1

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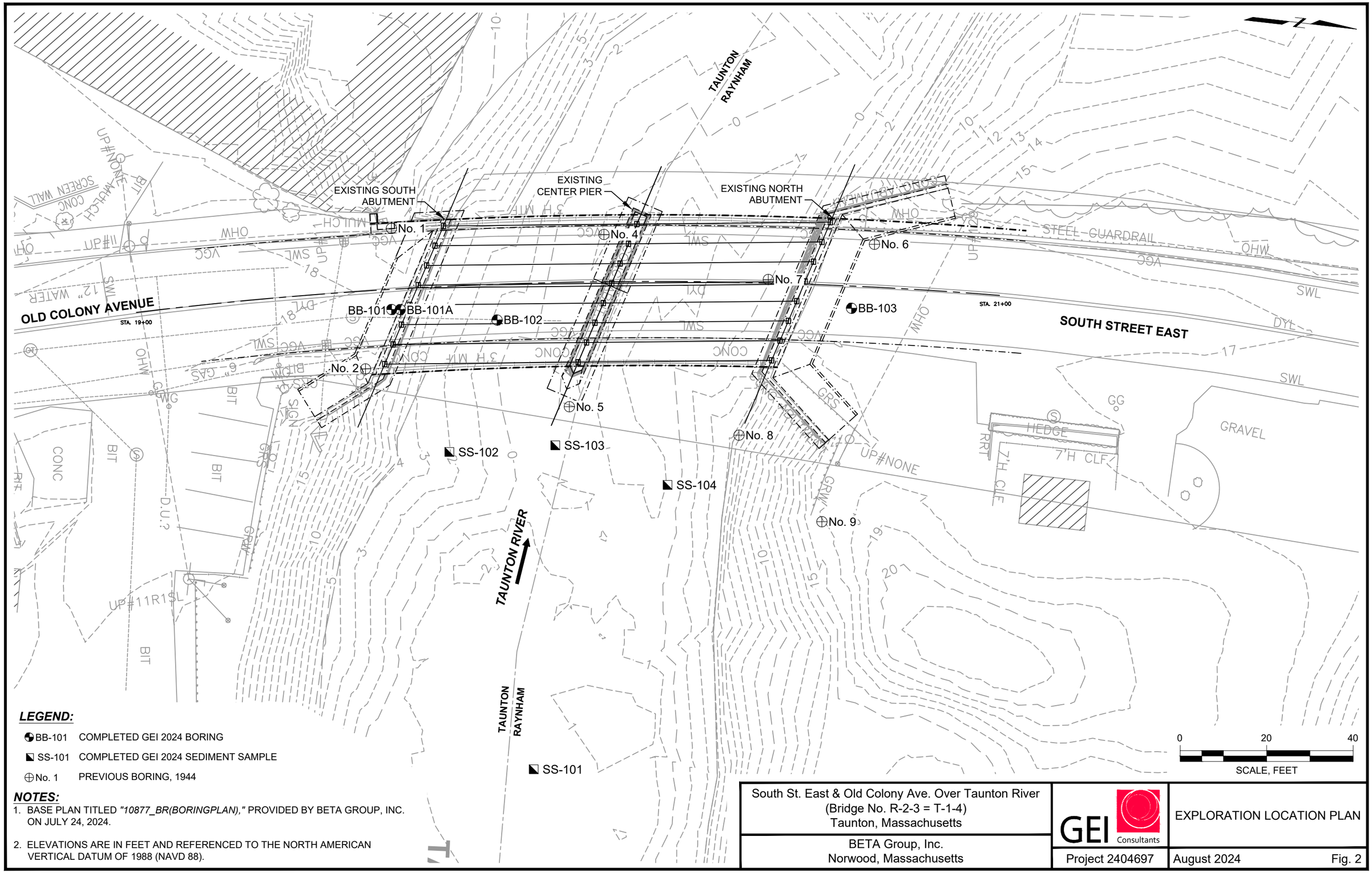


LEGEND:

BB-101	COMPLETED GEI 2024 BORING
SS-101	COMPLETED GEI 2024 SEDIMENT SAMPLE
No. 1	PREVIOUS BORING, 1944

NOTES:

1. BASE PLAN TITLED *"10877_BR(BORINGPLAN),"* PROVIDED BY BETA GROUP, INC. ON JULY 24, 2024.
2. ELEVATIONS ARE IN FEET AND REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).

South St. East & Old Colony Ave. Over Taunton River (Bridge No. R-2-3 = T-1-4) Taunton, Massachusetts	GEI Consultants	EXPLORATION LOCATION PLAN
BETA Group, Inc. Norwood, Massachusetts	Project 2404697	August 2024 Fig. 2

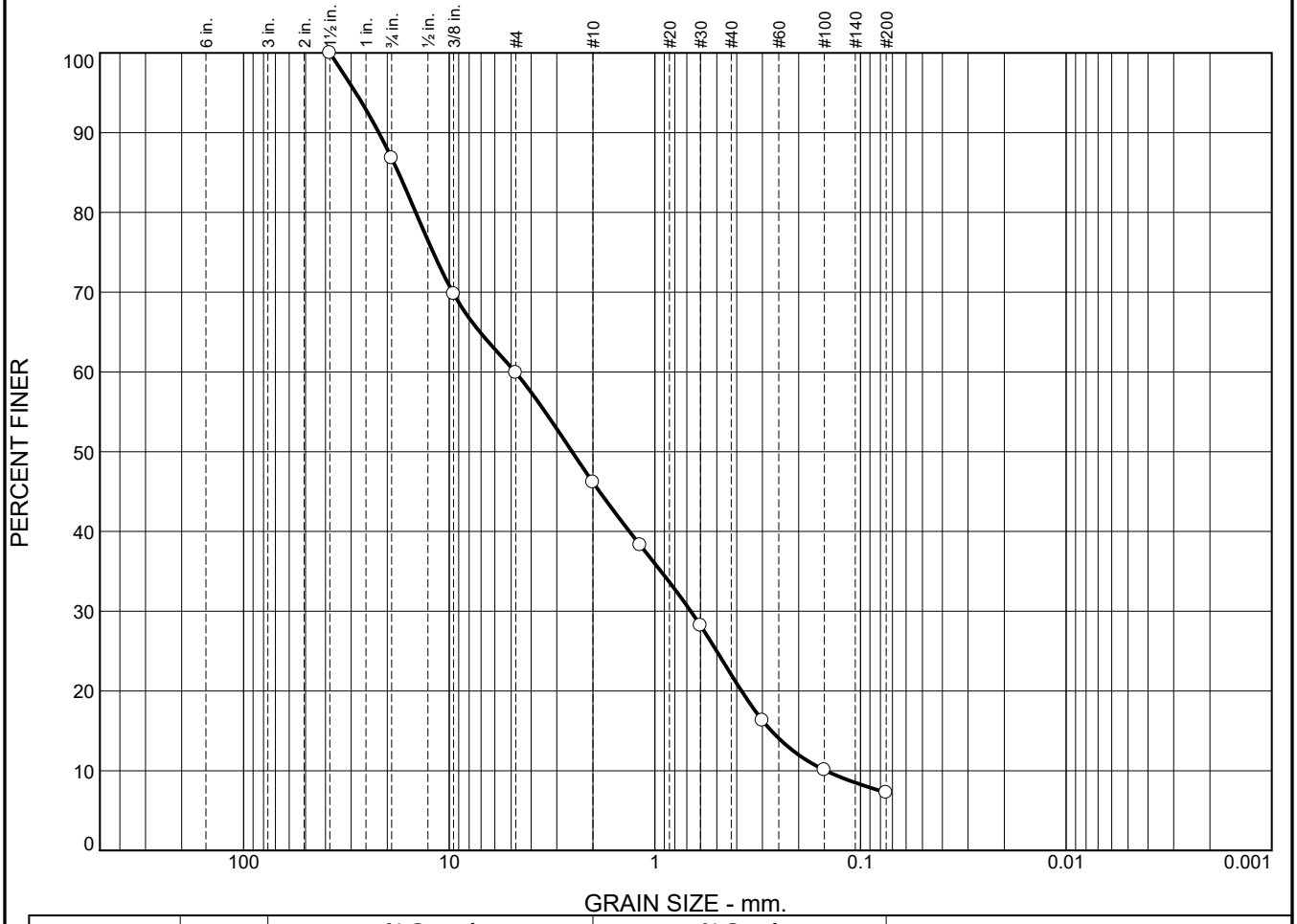
GIAMPA, JOE \\geiconsultants.com\data\Data_Storage\Working\BETA GROUP\2404697 South St East Over Taunton River Bridge\00_CAD\Figures\GT\2404697-02.dwg - 8/14/2024

Table 1. Surface Sampling Information
Bridge No. R-2-3=T-1-4
South St. East & Old Colony Ave. Over Taunton River Bridge
Taunton, Massachusetts

Sample Location No.	Sampling Date	Method of Exploration	Approx. Mudline/Ground Surface Elevation (feet, NAVD 88)	Depth Below Mudline/Ground Surface (feet)	Sample Recovery (inches)	Soil Layers	Laboratory Testing
SS-101	8/2/2024	Vibracore	2 (mudline)	0 - 1.3	12	(0-6"): Wet, dark brown, FINE TO COARSE GRAVEL, some fine to coarse sand, trace inorganic silt. (6"-12"): Wet, gray, INORGANIC SILT, some fine to coarse gravel, some fine to coarse sand.	Grain size and hydrometer performed on sample taken from 0-6". Grain size and hydrometer and Atterberg Limits performed on sample taken from 6"-12".
SS-102	8/2/2024	Vibracore	2 (mudline)	0 - 1	6	(0-6"): Wet, brown, FINE TO COARSE GRAVEL, some fine to coarse sand, trace of inorganic silt.	Grain size and hydrometer performed on sample taken from 0-6".
SS-103	8/2/2024	Vibracore	-1 (mudline)	0 - 2.7	26.4	(0-7"): Wet, brown, FINE TO COARSE GRAVEL AND FINE TO COARSE SAND, trace of inorganic silt. (7"-26"): Wet, gray, LEAN CLAY, some fine to coarse sand, trace of fine to coarse gravel.	Grain size and hydrometer performed on sample taken from 0-7". Grain size and hydrometer and Atterberg Limits performed on sample taken from 7"-26".
SS-104	8/2/2024	Vibracore	-1 (mudline)	0 - 2	13.2	(0-5"): Wet, dark brown, FINE TO COARSE SAND, some fine to coarse gravel, trace of inorganic silt. (5"-13"): Wet, gray, LEAN CLAY, some fine to coarse sand, trace of fine gravel.	Grain size and hydrometer performed on sample taken from 0-5". Grain size and hydrometer and Atterberg Limits performed on sample taken from 5"-13".
BB-102	8/7/2024	BB-102, Split-Spoon Sample (S2)	0 (mudline)	2 – 4 (19.5' - 21.5' below bridge deck)	7	Wet, dark brown, FINE TO COARSE GRAVEL, some fine to coarse sand, trace of inorganic silt.	Grain size and hydrometer performed on sample taken from 2' - 4' (19.5' - 21.5' below bridge deck)

Notes:
1. Mudline/ground surface elevation estimated using existing topographic survey provided by BETA Group, Inc. on 7/24/2042.

Particle Size Distribution Report



	% Boulders	% +3"	% Gravel			% Sand		% Fines
			Coarse	Medium	Fine	Coarse	Fine	
○	0.0	0.0	7.1	23.1	23.6	24.2	14.7	7.3

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_C	C_u
○			17.6747	4.7820	2.5268	0.6690	0.2713	0.1472	0.64	32.49

Material Description	USCS	AASHTO
○ Wet, dark brown, FINE TO COARSE GRAVEL, some fine to coarse sand, trace inorganic silt	SP-SM	

Project No. 2404697 **Client:** BETA GROUP, Inc.

Project: South St. East & Old Colony Ave. Over Taunton River Bridge

○ **Source of Sample:** BB-102 **Depth:** 19.5-21.5 ft **Sample Number:** S2

Remarks:

○As Received WC=16.4%

Fines classified visually

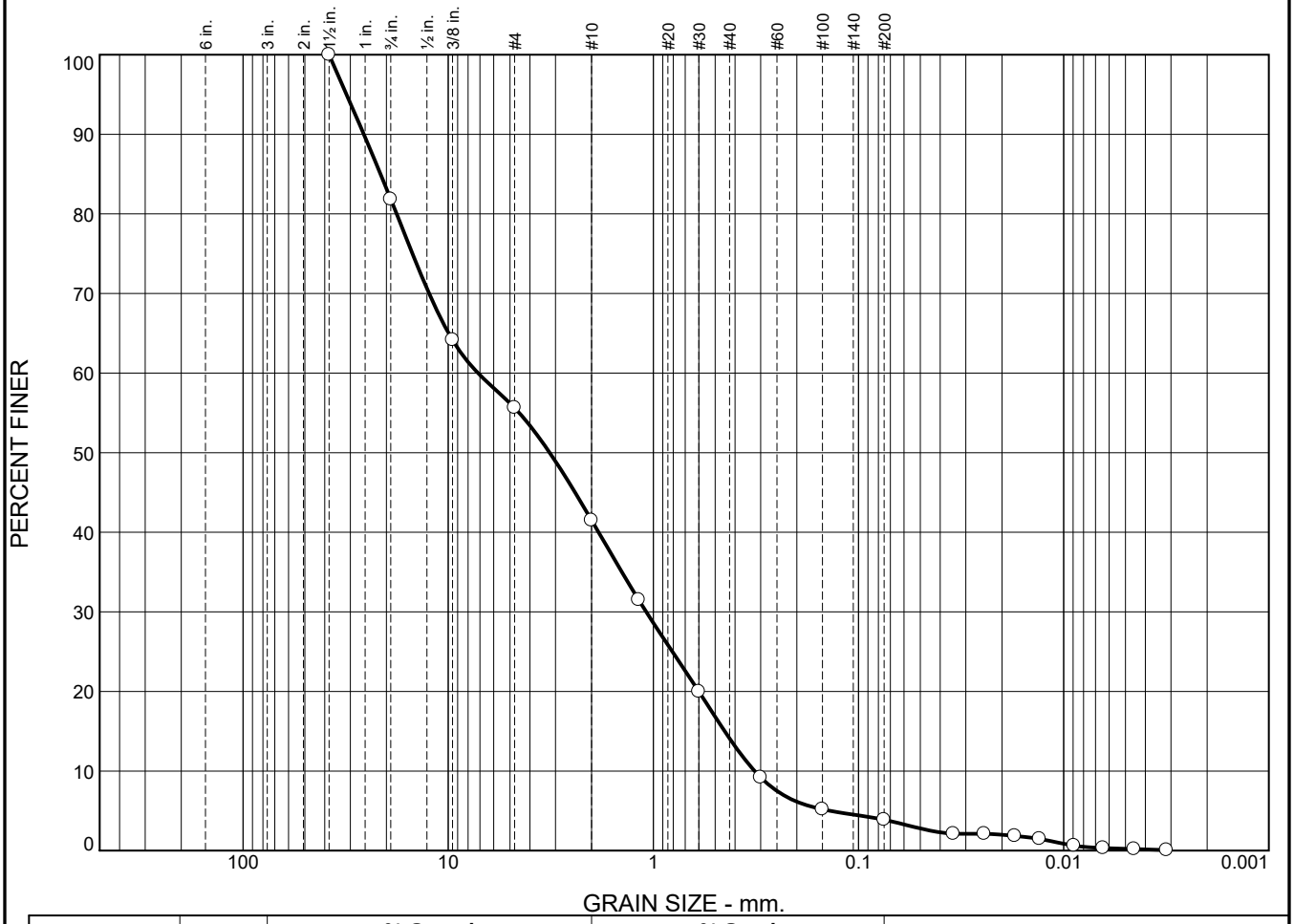
GEI Consultants, Inc.
400 Unicorn Park Drive
Woburn, MA 01801

GEI Consultants

Figure

Tested By: M. Alstede 8/26/24 **Checked By:** W. Lukas 8/27/24

Particle Size Distribution Report



	% Boulders	% +3"	% Gravel			% Sand		% Fines
			Coarse	Medium	Fine	Coarse	Fine	
○	0.0	0.0	10.4	25.5	22.6	27.4	10.2	3.9

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_C	C_u
○			21.3714	7.1570	3.2017	1.0834	0.4490	0.3211	0.51	22.29

Material Description	USCS	AASHTO
○ Wet, dark brown, FINE TO COARSE GRAVEL, some fine to coarse sand, trace inorganic silt	SP	

Project No. 2404697 **Client:** BETA GROUP, Inc.

Project: South St. East & Old Colony Ave. Over Taunton River Bridge

○ **Source of Sample:** SS-101 **Depth:** 0-6" **Sample Number:** -

Remarks:

○As Received WC=10.3%

Fines classified visually

GEI Consultants, Inc.
400 Unicorn Park Drive
Woburn, MA 01801

GEI Consultants

Figure

Tested By: M. Alstede 8/26/24 **Checked By:** W. Lukas 8/27/24

Particle Size Distribution Report

	% Boulders	% +3"	% Gravel			% Sand		% Fines
			Coarse	Medium	Fine	Coarse	Fine	
○	0.0	0.0	3.1	12.1	19.9	16.8	4.6	43.5

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_C	C_u
○	NV	NP	9.6819	1.1442	0.5528	0.0190	0.0075	0.0053	0.06	214.48

Material Description	USCS	AASHTO
○ Wet, gray, INORGANIC SILT, some fine to coarse gravel, some fine to coarse sand	SM	A-4(0)

Project No. 2404697 **Client:** BETA GROUP, Inc.

Project: South St. East & Old Colony Ave. Over Taunton River Bridge

○ **Source of Sample:** SS-101 **Depth:** 6"-12" **Sample Number:** -

Remarks:

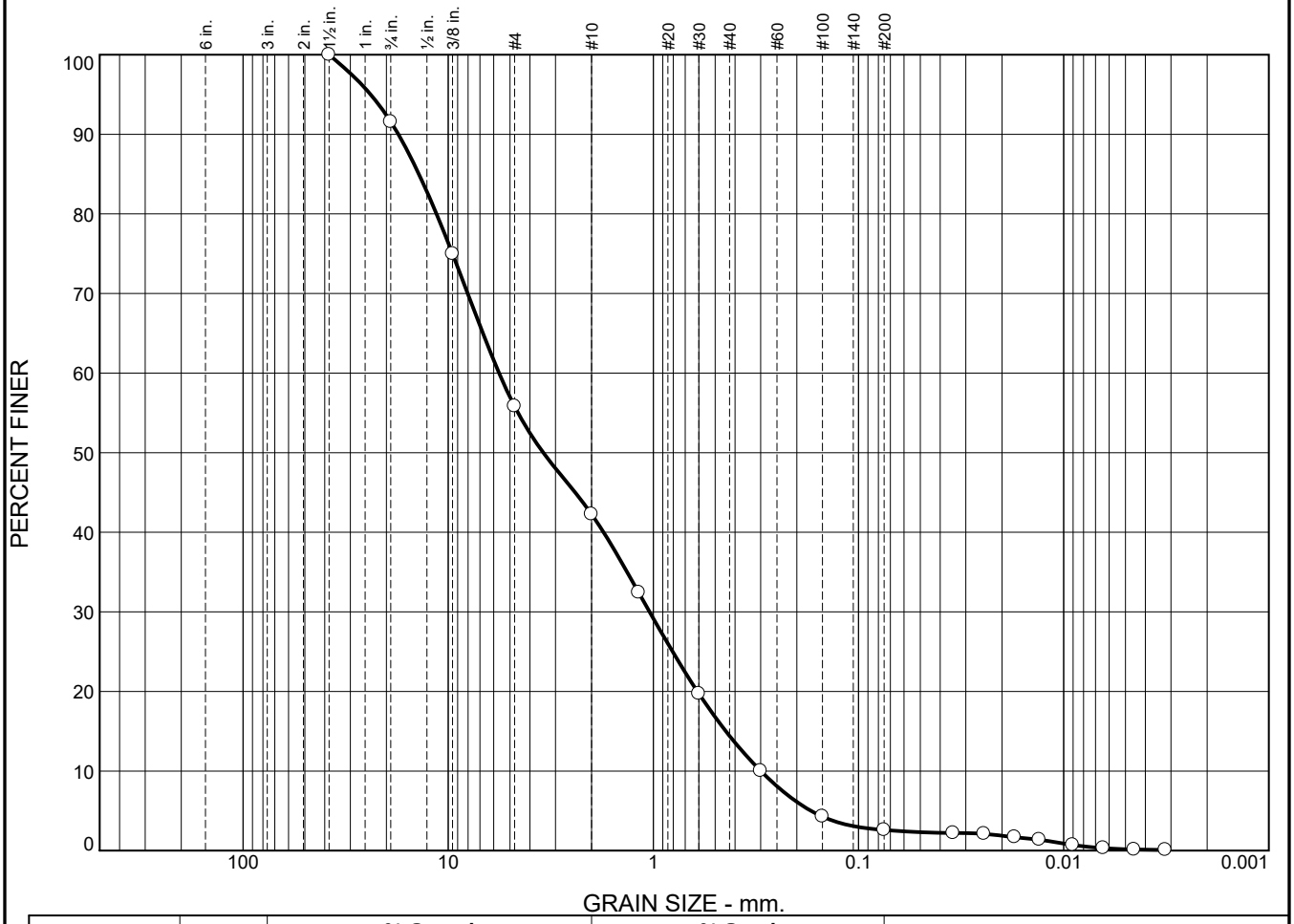
○As Received WC=10.8%

GEI Consultants, Inc.
400 Unicorn Park Drive
Woburn, MA 01801

Figure

Tested By: M. Alstede 8/26/24 **Checked By:** W. Lukas 8/27/24

Particle Size Distribution Report



	% Boulders	% +3"	% Gravel			% Sand		% Fines
			Coarse	Medium	Fine	Coarse	Fine	
○	0.0	0.0	4.2	20.8	32.7	27.9	11.8	2.6

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			13.8966	5.6484	3.4387	1.0436	0.4431	0.2995	0.64	18.86

Material Description	USCS	AASHTO
○ Wet, brown, FINE TO COARSE GRAVEL, some fine to coarse sand, trace inorganic silt	SP	

Project No. 2404697 **Client:** BETA GROUP, Inc.

Project: South St. East & Old Colony Ave. Over Taunton River Bridge

○ **Source of Sample:** SS-102 **Depth:** 0-6" **Sample Number:** -

GEI Consultants, Inc.
400 Unicorn Park Drive
Woburn, MA 01801

Remarks:

○As Received WC=12.7%

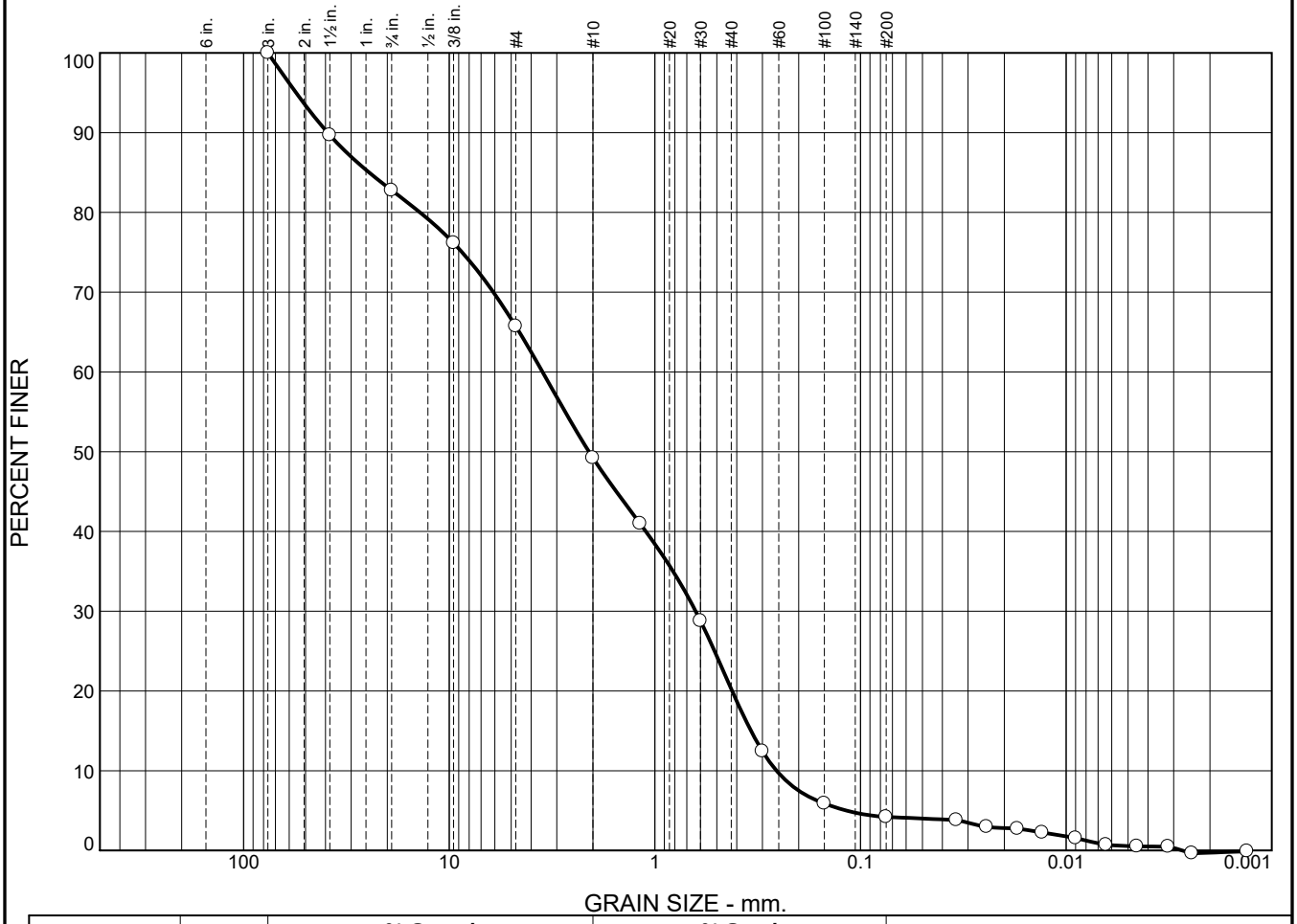
Fines classified visually

Contains glass and clinkers.

Figure

Tested By: M. Alstede 8/26/24 **Checked By:** W. Lukas 8/27/24

Particle Size Distribution Report



	% Boulders	% +3"	% Gravel			% Sand		% Fines
			Coarse	Medium	Fine	Coarse	Fine	
○	0.0	0.0	14.7	9.1	27.0	29.0	16.0	4.2

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_C	C_u
○			24.5051	3.5185	2.0911	0.6334	0.3410	0.2561	0.45	13.74

Material Description	USCS	AASHTO
○ Wet, brown, FINE TO COARSE GRAVEL AND FINE TO COARSE SAND, trace inorganic silt	SP	

Project No. 2404697 **Client:** BETA GROUP, Inc.

Project: South St. East & Old Colony Ave. Over Taunton River Bridge

○ **Source of Sample:** SS-103 **Depth:** 0-7" **Sample Number:** -

GEI Consultants, Inc.
400 Unicorn Park Drive
Woburn, MA 01801

Remarks:

○As Received WC=17.4%

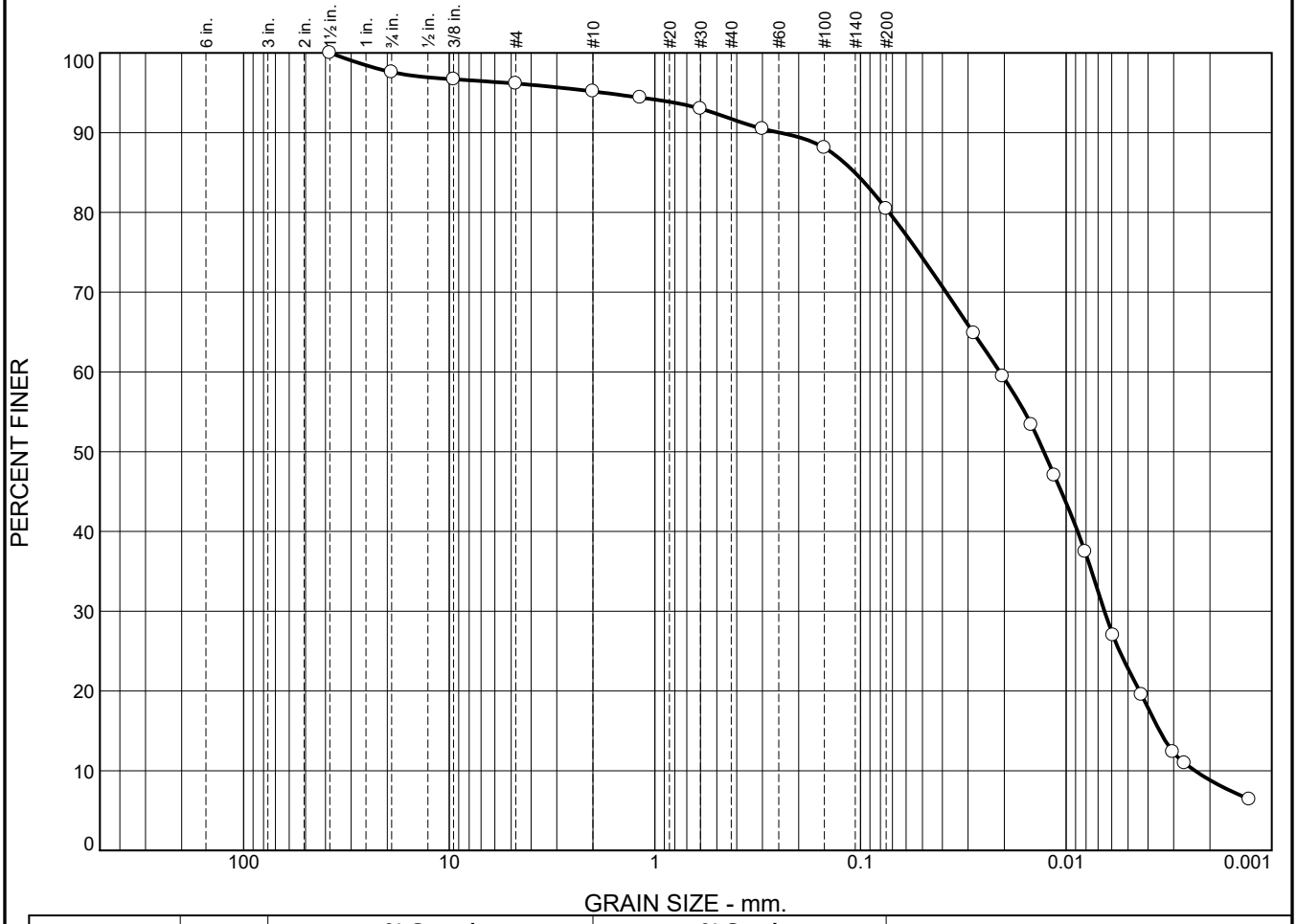
Fines classified visually.

Contains wood fragments and clinkers.

Figure

Tested By: M. Alstede 8/26/24 **Checked By:** W. Lukas 8/27/24

Particle Size Distribution Report



	% Boulders	% +3"	% Gravel			% Sand		% Fines
			Coarse	Medium	Fine	Coarse	Fine	
○	0.0	0.0	1.6	1.7	1.5	3.5	11.2	80.5

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	28	20	0.1065	0.0210	0.0128	0.0065	0.0035	0.0024	0.85	8.89

Material Description	USCS	AASHTO
○ Wet, gray, LEAN CLAY, some fine to coarse sand, trace fine to coarse gravel	CL	A-4(5)

Project No. 2404697 **Client:** BETA GROUP, Inc.

Project: South St. East & Old Colony Ave. Over Taunton River Bridge

○ **Source of Sample:** SS-103 **Depth:** 7"-26" **Sample Number:** -

Remarks:

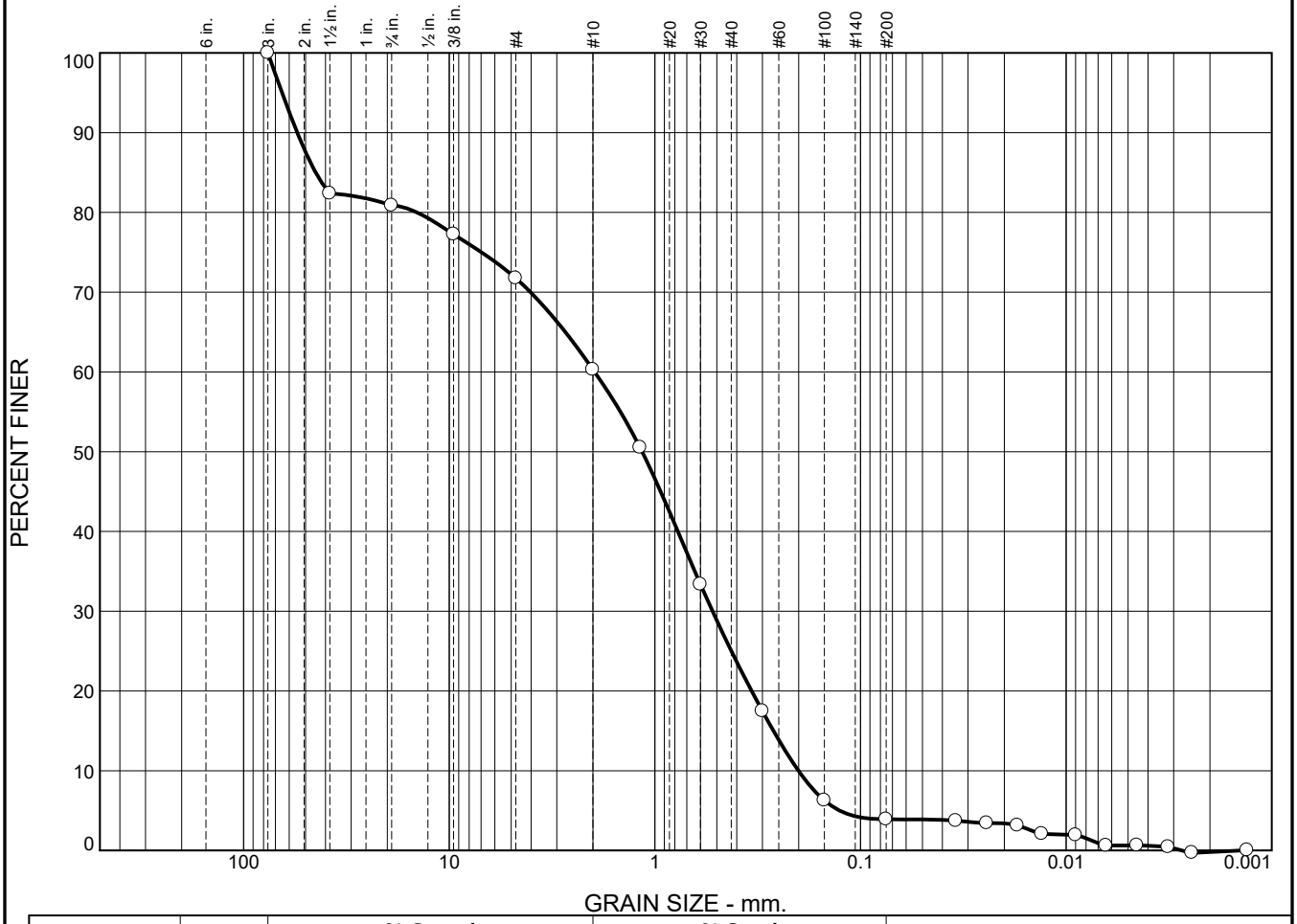
○As Received WC=22.1%

GEI Consultants, Inc.
400 Unicorn Park Drive
Woburn, MA 01801

Figure

Tested By: M. Alstede 8/26/24 **Checked By:** W. Lukas 8/27/24

Particle Size Distribution Report



	% Boulders	% +3"	% Gravel			% Sand		% Fines
			Coarse	Medium	Fine	Coarse	Fine	
○	0.0	0.0	18.2	4.5	17.0	35.3	21.1	3.9

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_C	C_u
○			44.6168	1.9630	1.1533	0.5245	0.2651	0.2004	0.70	9.80

Material Description	USCS	AASHTO
○ Wet, dark brown, FINE TO COARSE SAND, some fine to coarse gravel, trace inorganic silt	SP	

Project No. 2404697 **Client:** BETA GROUP, Inc.

Project: South St. East & Old Colony Ave. Over Taunton River Bridge

○ **Source of Sample:** SS-104 **Depth:** 0-5" **Sample Number:** -

GEI Consultants, Inc.
400 Unicorn Park Drive
Woburn, MA 01801

Remarks:

○As Received WC=17.4%

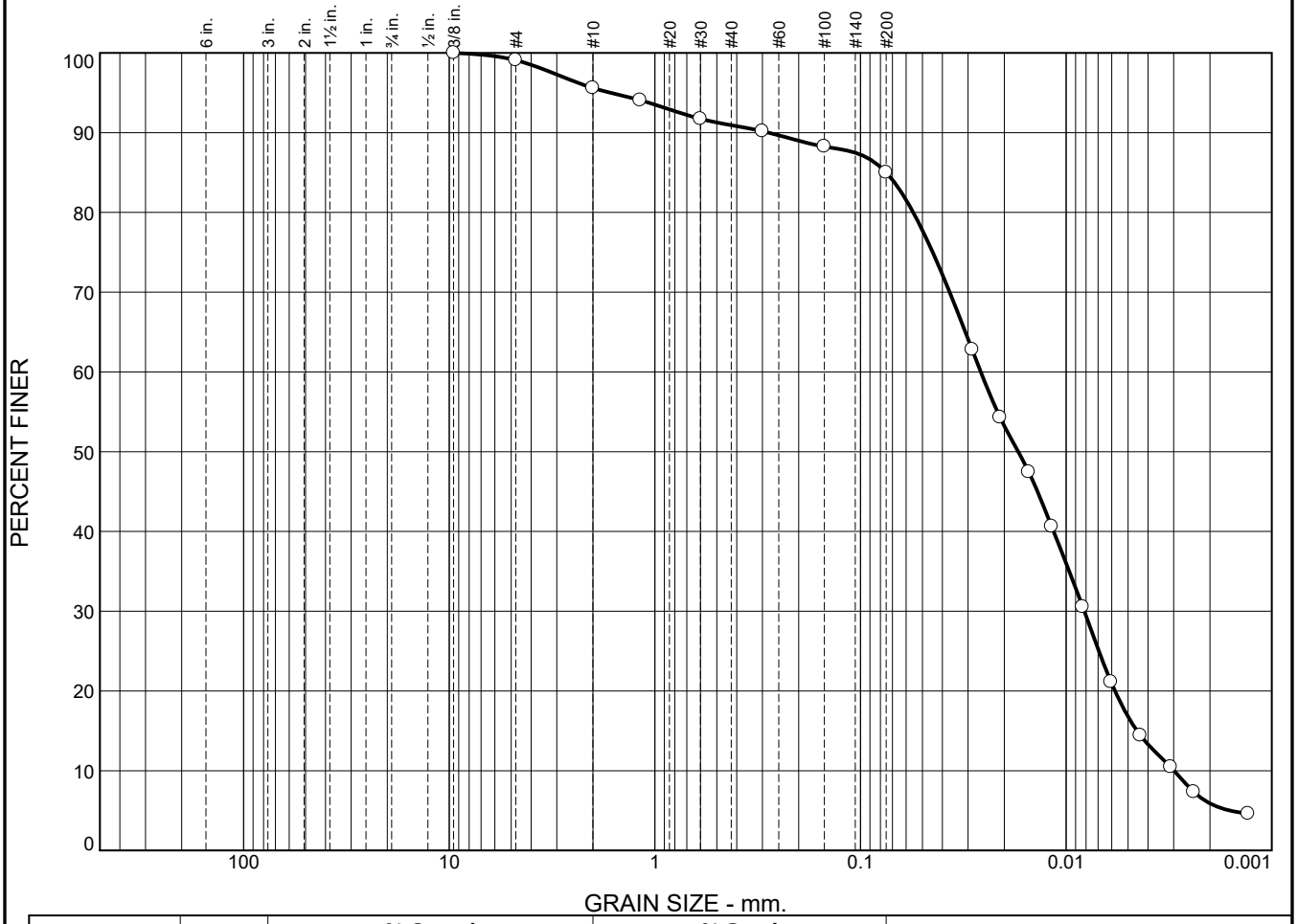
Fines classified visually.

Contains clinkers.

Figure

Tested By: M. Alstede 8/26/24 **Checked By:** W. Lukas 8/27/24

Particle Size Distribution Report



	% Boulders	% +3"	% Gravel			% Sand		% Fines
			Coarse	Medium	Fine	Coarse	Fine	
○	0.0	0.0	0.0	0.0	4.4	4.7	5.9	85.0

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_C	C_u
○	29	21	0.0750	0.0260	0.0171	0.0082	0.0045	0.0030	0.86	8.71

Material Description	USCS	AASHTO
○ Wet, gray, LEAN CLAY, some fine to coarse sand, trace fine gravel	CL	A-4(6)

Project No. 2404697 **Client:** BETA GROUP, Inc.

Project: South St. East & Old Colony Ave. Over Taunton River Bridge

○ **Source of Sample:** SS-104 **Depth:** 5"-13" **Sample Number:** -

Remarks:

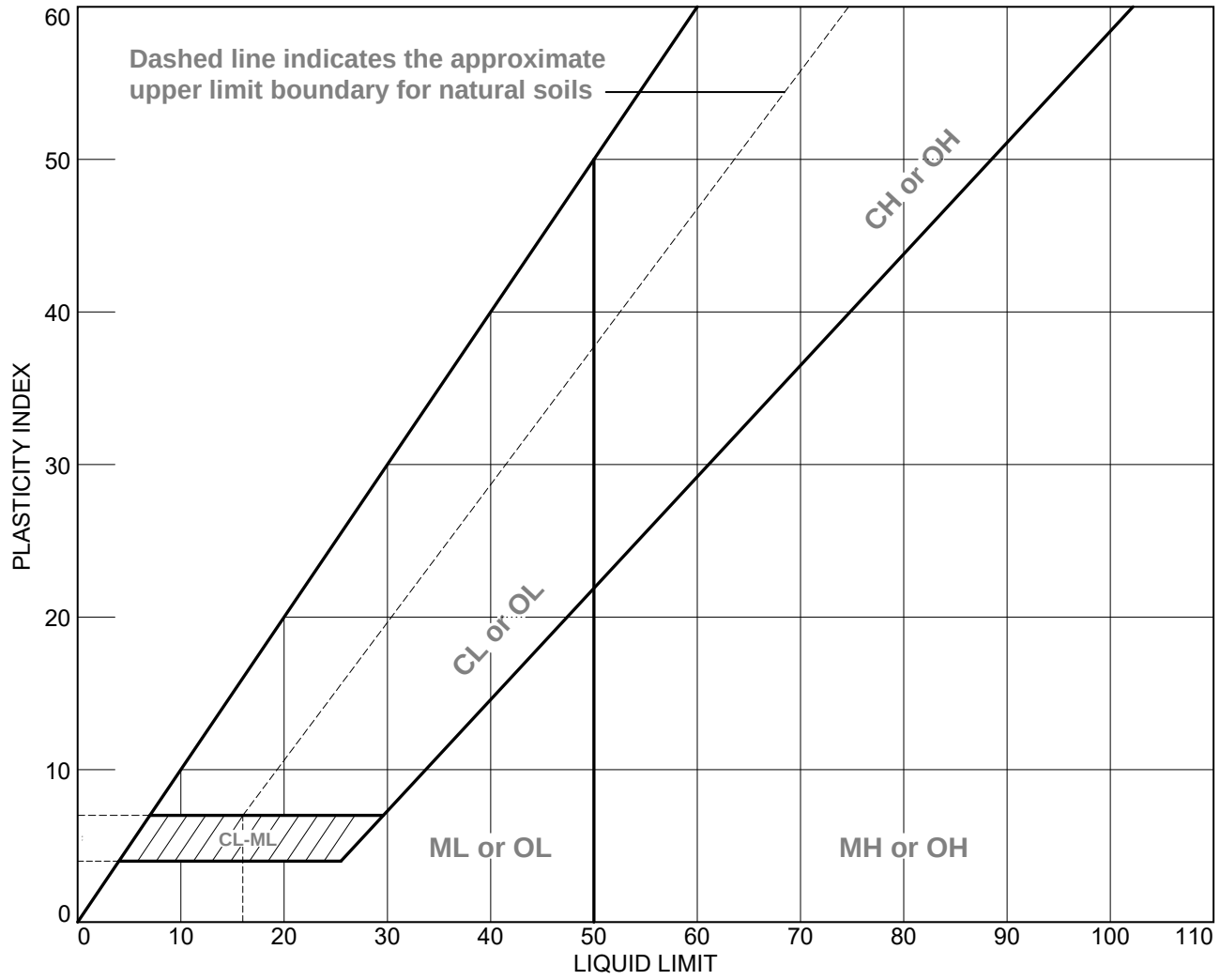
○As Received WC=23.4%

GEI Consultants, Inc.
400 Unicorn Park Drive
Woburn, MA 01801

Figure

Tested By: M. Alstede 8/26/24 **Checked By:** W. Lukas 8/27/24

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA

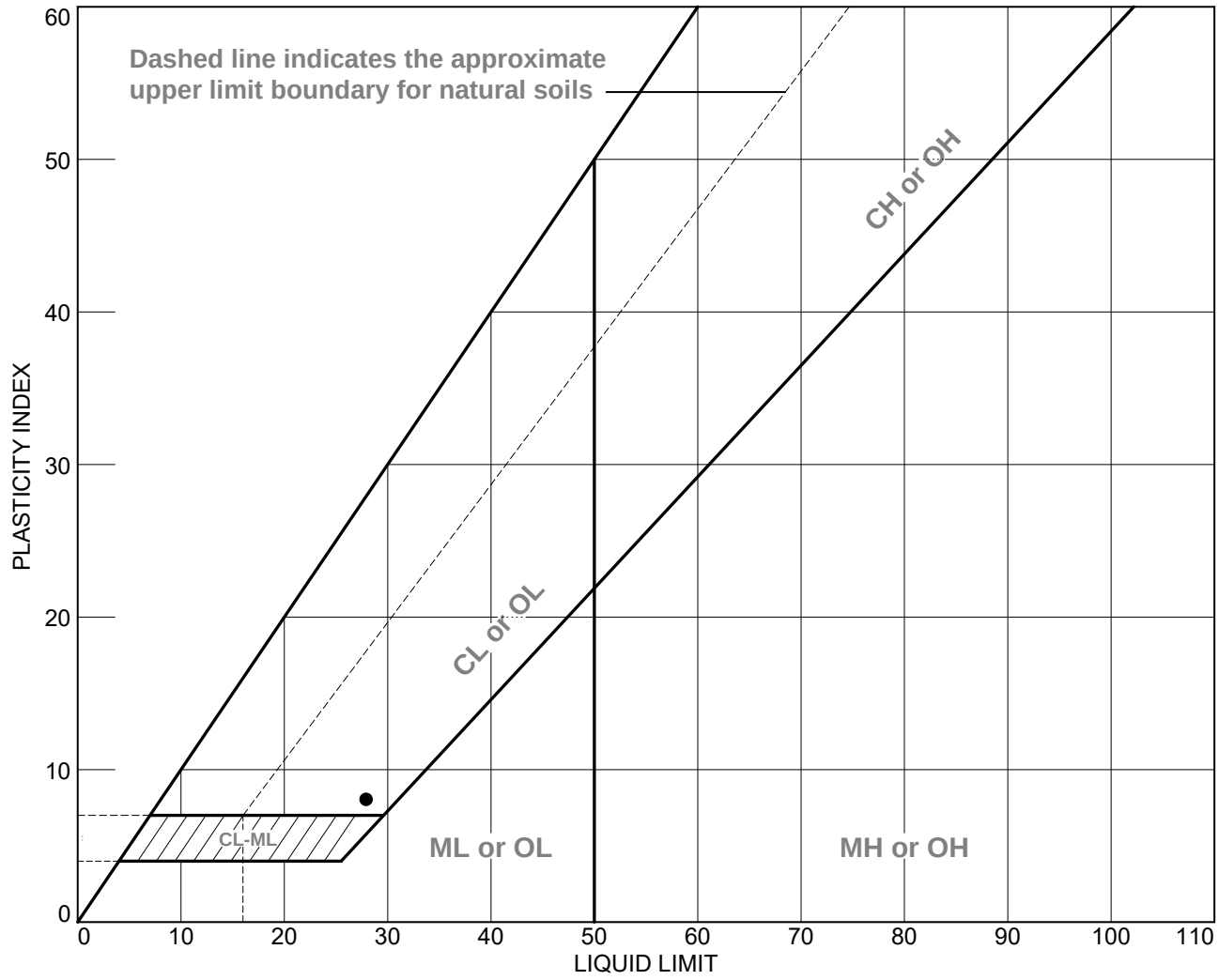
SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	SS-101	-	6"-12"	10.8	NP	NV	NP	SM

GEI Consultants, Inc.
400 Unicorn Park Drive
Woburn, MA 01801

Client: BETA GROUP, Inc.
Project: South St. East & Old Colony Ave. Over Taunton River Bridge
Project No.: 2404697 **Figure**

Tested By: S. Larson 8/27/24 **Checked By:** W. Lukas 8/27/24

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA

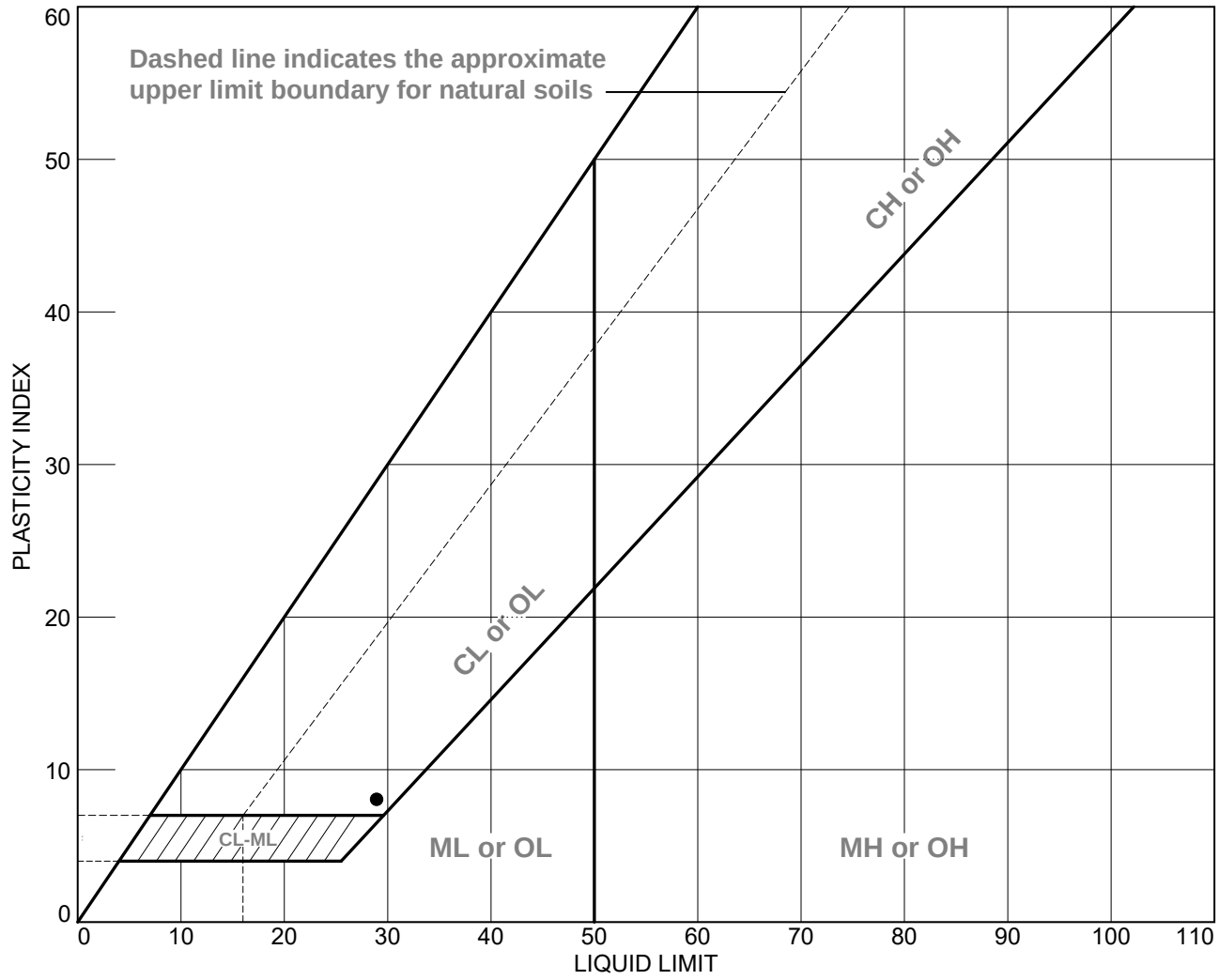
SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	SS-103	-	7"-26"	22.1	20	28	8	CL

GEI Consultants, Inc.
400 Unicorn Park Drive
Woburn, MA 01801

Client: BETA GROUP, Inc.
Project: South St. East & Old Colony Ave. Over Taunton River Bridge
Project No.: 2404697 **Figure**

Tested By: S. Larson 8/27/24 **Checked By:** W. Lukas 8/27/24

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	SS-104	-	5"-13"	23.4	21	29	8	CL

GEI Consultants, Inc.
400 Unicorn Park Drive
Woburn, MA 01801

Client: BETA GROUP, Inc.
Project: South St. East & Old Colony Ave. Over Taunton River Bridge
Project No.: 2404697 **Figure**

Tested By: S. Larson 8/27/24 **Checked By:** W. Lukas 8/27/24

APPENDIX F

SITE PHOTOS

South abutment (Photo taken facing east)

Stone dam at south abutment (Photo taken facing west)

Downstream face of bridge (Photo taken facing east).

Downstream face of bridge (Photo taken facing west).

From:	Vasconcelos, Daniel B CIV USARMY CENAE (USA)
To:	Walker, Courtney L. (DOT)
Cc:	Davis, Heidi (DEP); Lewis, Tyler (DEP); Laura Krause; Jonathan Niro; Collins, Lily R. (DOT); Lamothe, Herrio (DOT)
Subject:	RE: Pre-Construction Notification Application - Raynham/Taunton - - BRIDGE REPLACEMENT, R-02-003=T-01-004 (3M4), SOUTH STREET EAST OVER THE TAUNTON RIVER
Date:	Tuesday, February 3, 2026 12:29:19 PM
Attachments:	image001.png

CAUTION: This email originated from a sender outside of the Commonwealth of Massachusetts mail system. Do not click on links or open attachments unless you recognize the sender and know the content is safe.

Hi Courtney,

I have reviewed the PCN for the Old Colony Avenue bridge over the Taunton River. We have assigned this project Corps file number NAE-2025-02437. I have just a few comments/questions that need to be addressed before we can consider this a complete application, as follows:

1. The Taunton River is non-navigable at this location, and as such Corps jurisdiction is limited to reviewing discharges of fill pursuant to Section 404 of the CWA. We have no Section 10 authority over dredging in this location. The environmental impact plans will need to be revised to not depict impacts due to dredging. Please clarify the work occurring within the yellow hatched area labeled “dredging for access – to be restored” so we can determine if there are any 404 discharges of fill involved. We do consider dewatered areas behind cofferdams to be temporary 404 impacts, so if the area will be dewatered it may be sufficient to simply change the label. Placing streambed material back after removing it could safely be called a temporary 404 impact as well. I am happy to discuss our jurisdiction if more clarification is needed.

2. Please number the plans to form a sequentially numbered set (e.g. 1 of 10 through 10 of 10).

3. I was unable to find an effects determination for Plymouth redbelly turtle. FHWA, or MassDOT on their behalf, needs to provide an effects determination for this species for our records (e.g. No Effect, NLAA, etc.).

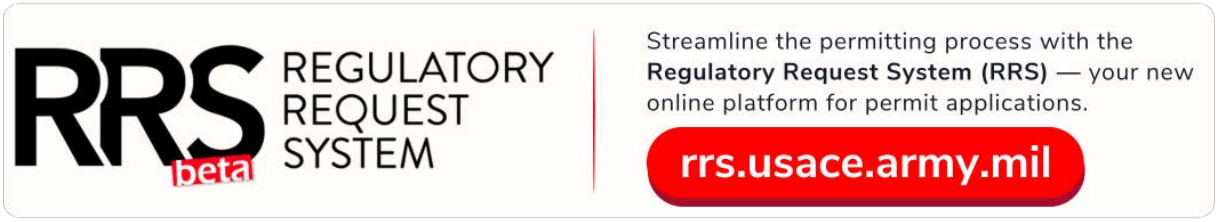
4. The NMFS ESA form was not signed by either MassDOT or NMFS on my end. If the form was signed, somehow the signatures dropped out when it was transmitted to me. Can you please re-send the form showing the signatures? If NMFS has not signed yet, please just let me know and send the form to me once it is signed.

If you have any questions please let me know.

Thank you,
Dan

Daniel B. Vasconcelos, PWS
Senior Project Manager/Environmental Scientist
U.S. Army Corps of Engineers
New England District, Regulatory Division
696 Virginia Road
Concord, MA 01742
(978) 318-8653

USACE is now accepting pre-construction notifications and applications through the Regulatory Request System (RRS)! In order to better serve you and the Nation, USACE has fully transitioned to the RRS. To help ensure timely receipt and processing, please submit your pre-construction notifications and permit applications via the clickable RRS link below.



USACE RRS Promo 90-sec (youtube.com)

From: Walker, Courtney L. (DOT) <Courtney.L.Walker@dot.state.ma.us>
Sent: Monday, February 2, 2026 9:30 AM
To: Vasconcelos, Daniel B CIV USARMY CENAE (USA) <Daniel.B.Vasconcelos@usace.army.mil>; Newton, Kevin M CIV USARMY CENAE (USA) <Kevin.M.Newton@usace.army.mil>
Cc: Davis, Heidi (DEP) <heidi.davis@mass.gov>; Lewis, Tyler (DEP) <Tyler.Lewis@mass.gov>; Laura Krause <LKrause@BETA-Inc.com>; Jonathan Niro <jniro@beta-inc.com>; Collins, Lily R. (DOT) <lily.r.collins@dot.state.ma.us>; Lamothe, Herrio (DOT) <Herrio.Lamothe@dot.state.ma.us>
Subject: [Non-DoD Source] Pre-Construction Notification Application - Raynham/Taunton - - BRIDGE REPLACEMENT, R-02-003=T-01-004 (3M4), SOUTH STREET EAST OVER THE TAUNTON RIVER

Good afternoon,

The City of Taunton in connection with the Massachusetts Department of Transportation is submitting a Pre-Construction Notification application for a bridge replacement on South Street East over the Taunton River in Raynham and Taunton, MA.

The Project will require demolition of the existing bridge superstructure, construction of the new bridge deck and associated structural appurtenances; installation of scour protection within the Taunton River; full depth pavement reconstruction; and grading. The Project proposes to retain the existing bridge substructure while replacing the

superstructure with a deck that is one foot wider to allow for the addition of a bicycle lane. Ancillary Project facets including guardrails and a relocated sidewalk have also been
incorporated into the design, and the Project will also address the addition of scour protection within the river during construction.

As a result of the proposed work the following impacts to resource areas are expected:
• 164 linear feet of temporary and 72 linear feet (lf) of permanent impact to Streambank; and
• 4,699 square feet (sf) of temporary and 8,570 sf of permanent impact to Streambed associated with a dredge volume of 2,055 cubic yards (cy).

The project was filed on the RRS system on 1/30/26 (see email attached).

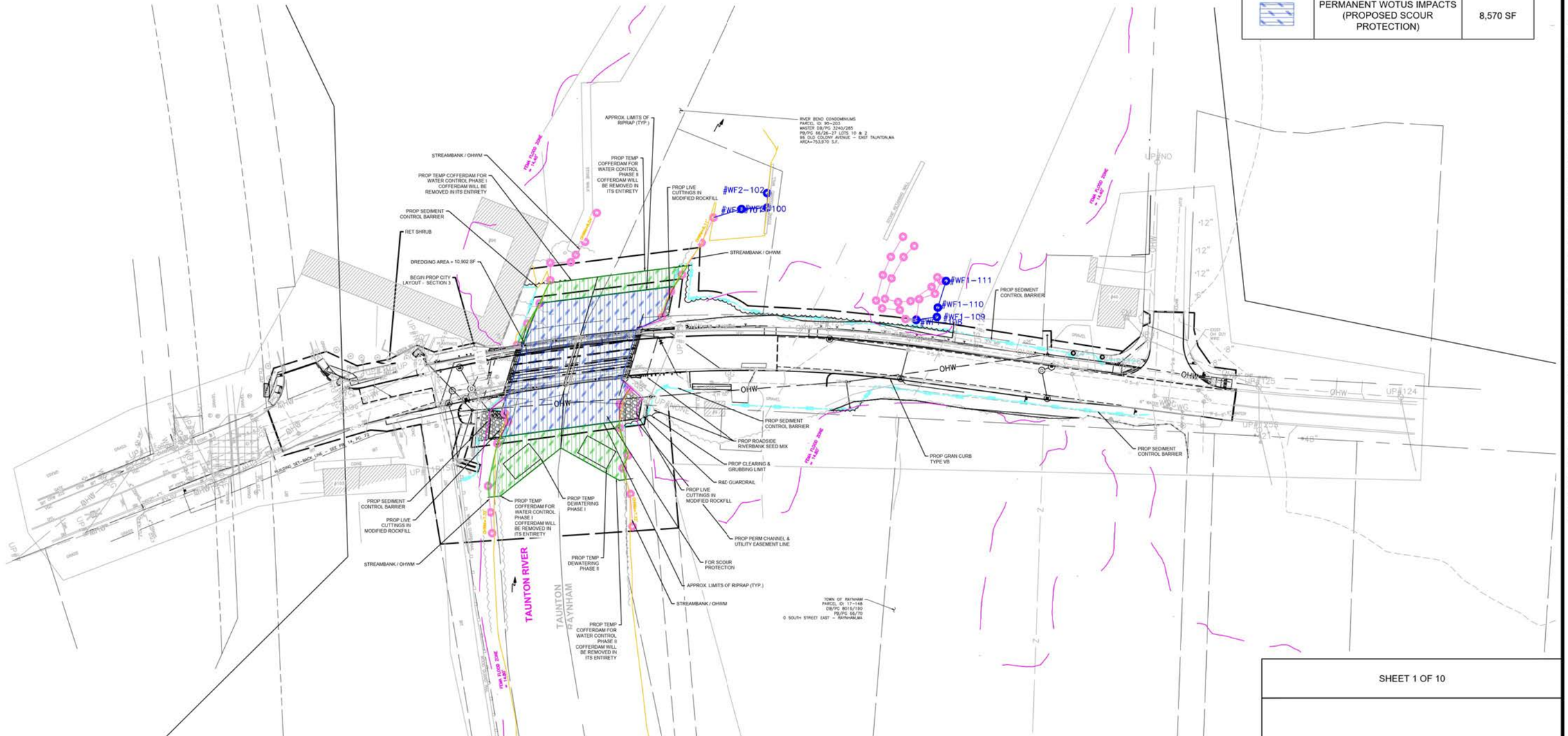
Please let me know if you would like a separate PDF copy. I can send via the share filed system if needed. We look forward to your review.

Thank you,
Courtney

Courtney Walker
Wetlands and Water Resources Coordinator
MassDOT – Highway Division
10 Park Plaza, Boston MA 02116
857-262-0757 | courtney.l.walker@dot.state.ma.us

N

SUMMARY OF RESOURCE AREA IMPACTS		
LINETYPE/ HATCH	DESCRIPTION	IMPACT QUANTITY
	TEMPORARY BANK IMPACT	164 LF
	PERMANENT BANK IMPACT	72 LF
	TEMPORARY IMPACTS FOR WATER CONTROLS AND DEWATERING (WOTUS)	4,699 SF
	PERMANENT WOTUS IMPACTS (PROPOSED SCOUR PROTECTION)	8,570 SF



ENVIRONMENTAL IMPACTS PLAN

40 30 20 10 0 20 40 80

(IN FEET)
1 inch = 40 ft.

NOTES:

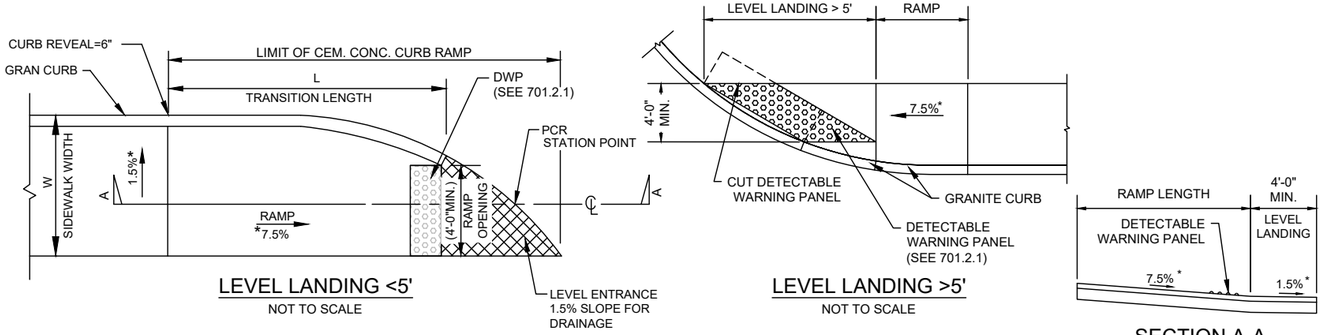
1. THE HORIZONTAL DATUM IS THE NORTH AMERICAN DATUM OF 1983 (NAD83) MASSACHUSETTS STATE PLAN COORDINATE SYSTEM IN U.S. SURVEY FEET.
2. THE VERTICAL DATUM IS THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).

SHEET 1 OF 10

PRE-CONSTRUCTION NOTIFICATION
TAUNTON AND RAYNHAM, MASSACHUSETTS
OLD COLONY AVENUE OVER TAUNTON RIVER
BRIDGE R-02-003=T-01-004
FEBRUARY, 2025

613642_EV_WQC_PCN(IMPACTS).DWG Plotted on 3-Feb-2026 2:52 PM

CURB RAMP TYPE A DATA								
PCR NO.	LOCATION	RAMP REFERENCE POINT		GUTTER PROFILE SLOPE	LENGTH OF PRIMARY RAMP L	WIDTH OF RAMP OPENING W	SIDEWALK WIDTH	LANDING AREA
		STATION	OFFSET					
3	SOUTH STREET EAST	7+72.5	15.1' LT	1.2%	6.5'	4.4'	5.5'	> 5'
4	SOUTH STREET EAST	8+23.2	17.0' LT	0.4%	4.0' 3"R	4.0'	5.5'	> 5'



LEVEL LANDING <5'
NOT TO SCALE

LEVEL LANDING >5'
NOT TO SCALE

SECTION A-A
NOT TO SCALE

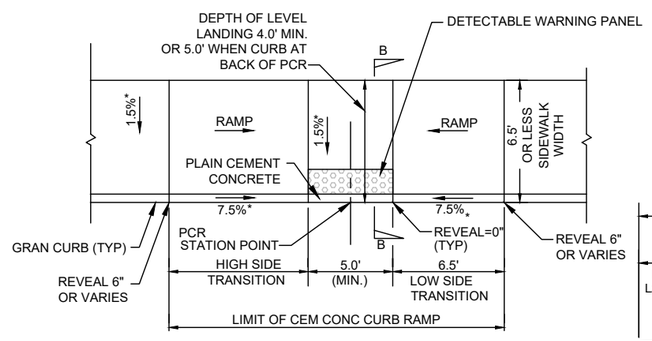
CURB RAMP TYPE "A"
SEE MASSDOT S.D. E107.6.0
NOT TO SCALE

CURB RAMP TYPE B DATA									
PCR NO.	LOCATION	RAMP REFERENCE POINT		GUTTER PROFILE SLOPE	WIDTH OF RAMP OPENING W	DEPTH OF LEVEL LANDING (MIN. 4.0')	TRANSITION LENGTH		SIDEWALK WIDTH
		STATION	OFFSET				LEFT	RIGHT	
1	OLD COLONY WAY	1+24.9	27.4' LT	-2.8%	6.0'	5.4'	8.0' ** 4.5"R±	6.5'	5.5'
2	OLD COLONY WAY	1+58.3	29.6' LT	-0.8%	5.0'	6.0'	7.67'	6.5'	6.0'

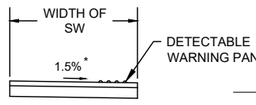
** MATCH EXISTING REVEAL

NOTES:

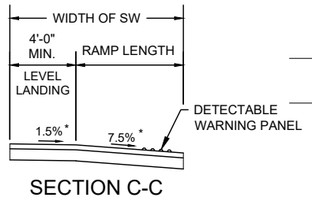
1. ALL PEDESTRIAN CURB RAMPS SHALL CONFORM TO THE REQUIREMENTS OF THE MASSACHUSETTS ARCHITECTURAL ACCESS BOARD (AAB) AND THE AMERICAN WITH DISABILITIES ACT (ADA) AND THE LATEST MASSDOT STANDARDS.
2. THE LOCATIONS OF PROPOSED PEDESTRIAN CURB RAMPS ARE SHOWN ON CONSTRUCTION PLANS AND THE PEDESTRIAN CURB RAMP DETAILS SHEETS. EXACT LOCATIONS MAY BE ADJUSTED, IF NECESSARY, BY THE ENGINEER IN THE FIELD.



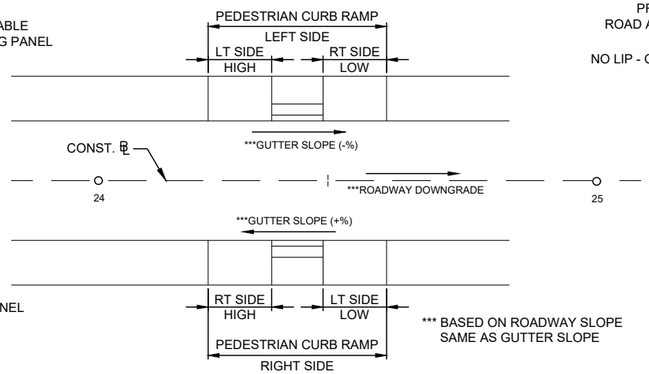
CURB RAMP DETAIL TYPE "B"
SEE MASSDOT STD DETAIL 701.2.2 (JAN 2025)
NOT TO SCALE



SECTION B-B
NOT TO SCALE



SECTION C-C
NOT TO SCALE

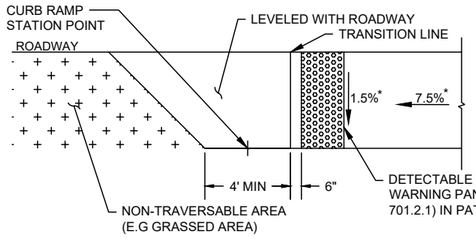


*** BASED ON ROADWAY SLOPE
SAME AS GUTTER SLOPE

GUTTER SLOPE DIAGRAM
NOT TO SCALE

TABLE I	
ROADWAY PROFILE GRADE	* HIGH SIDE TRANSITION LENGTH
%	ENGLISH UNITS
=0%	6'-6"
>0% TO 1%	7'-8"
>1% TO 2%	9'-0"
>2% TO 3%	11'-0"
>3% TO 4%	14'-0"
>4% TO 5%	15'-0" MAX.

CURB TRANSITION LENGTH
FOR CURB RAMPS
MASSDOT CONST. STD DETAIL 701.2.8 (JAN 2025)



PEDESTRIAN TRANSITION RAMP TO SHOULDER NOTES:

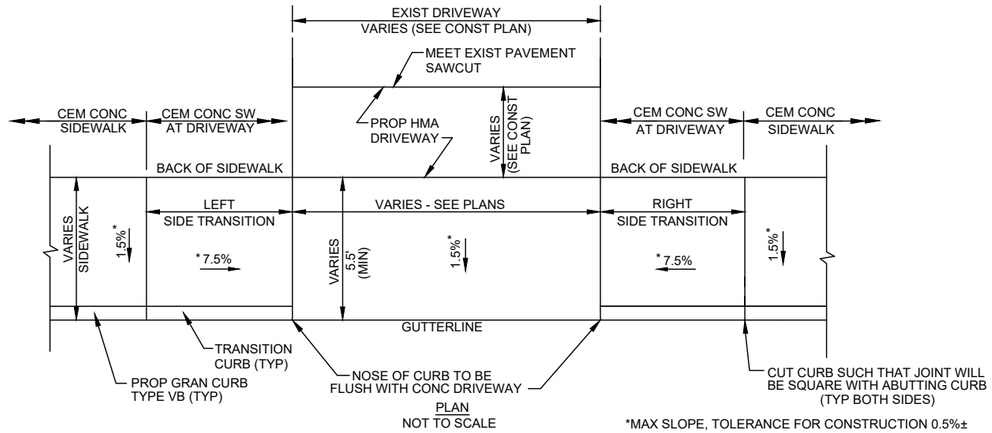
1. DETECTABLE WARMING PANEL TO BE ALIGNED TO THE DIRECTION OF TRAVEL.
2. PEDESTRIAN PATH OF TRAVEL SHALL BE NO LESS THAN 4'-0" WIDE AND FREE OF VERTICAL OBSTRUCTIONS (FOR ALL CONSTRAINED CONDITIONS).
3. ALL SLOPE VALUES LISTED HERE ARE MAXIMUM VALUES WITH CONSTRUCTION TOLERANCE OF ±0.5%.
4. THE DETECTABLE WARNING PANEL IS 2 FEET DEEP MINIMUM AT ALL LOCATIONS IN THE PEDESTRIAN PATH OF TRAVEL

CURB RAMP TYPE "C"
NOT TO SCALE

CURB RAMP TYPE C DATA								
PCR NO.	LOCATION	RAMP REFERENCE POINT		GUTTER PROFILE SLOPE	WIDTH OF RAMP OPENING W	DEPTH OF LEVEL LANDING (MIN. 4.0')	TRANSITION LENGTH	SIDEWALK WIDTH
		STATION	OFFSET					

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	######	2	10
PROJECT FILE NO.	613642		

CONSTRUCTION DETAILS

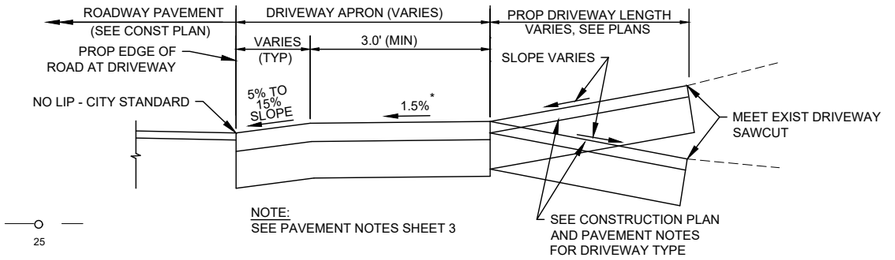


PLAN
NOT TO SCALE

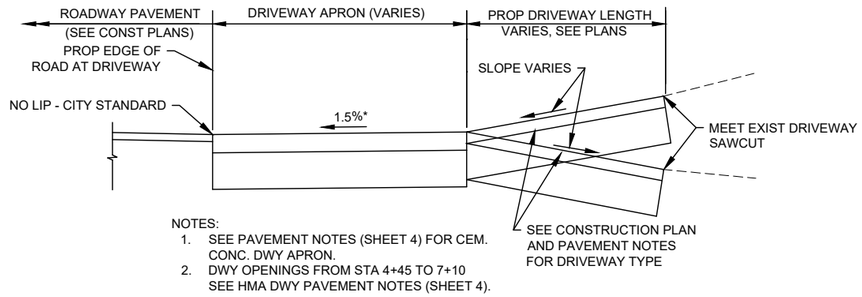
*MAX SLOPE, TOLERANCE FOR CONSTRUCTION 0.5%±

DETAIL FOR DEPRESSED DRIVEWAY WITH SIDEWALK - TYPE A

**DRIVEWAY OPENING DATA- TYPE A								
DWY NO.	LOCATION	℄ DRIVEWAY OPENING AT GUTTER		DRIVEWAY OPENING WIDTH	GUTTER PROFILE SLOPE	DEPTH OF GUTTER TO BACK OF SIDEWALK	PATH OF TRAVEL WIDTH ACROSS DRIVEWAY	TRANSITION LENGTH	
		STATION	OFFSET					LEFT	RIGHT
3	SOUTH STREET EAST	5+11.1	12.0' LT	25.0'	-0.7%	6.0'	6.0'	9.0'	6.5'



SECTION FOR TYPICAL DRIVEWAY WITH SIDEWALK - TYPE A
NOT TO SCALE



NOTES:

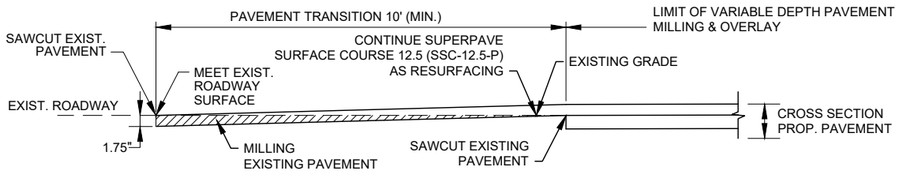
1. SEE PAVEMENT NOTES (SHEET 4) FOR CEM. CONC. DWY APRON.
2. DWY OPENINGS FROM STA 4+45 TO 7+10 SEE HMA DWY PAVEMENT NOTES (SHEET 4).

SECTION FOR DEPRESSED DRIVEWAY WITH SIDEWALK - TYPE B
NOT TO SCALE

SOUTH STREET E/OLD COLONY AVE.

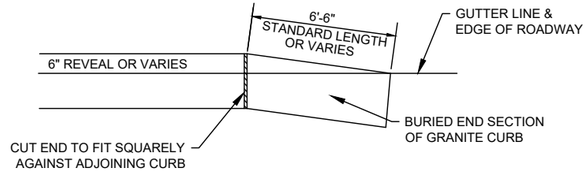
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	######	3	10
PROJECT FILE NO.	613642		

CONSTRUCTION DETAILS



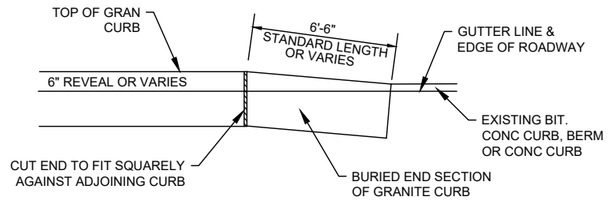
DETAIL FOR PAVEMENT TRANSITION AT LIMIT OF WORK

NOT TO SCALE



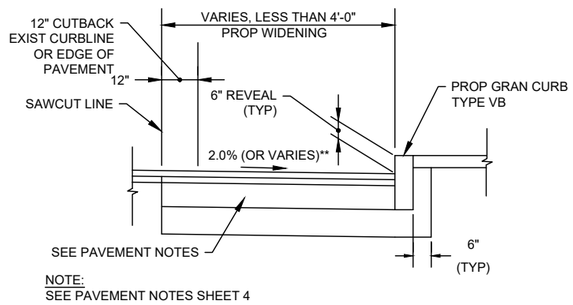
DETAIL FOR TRANSITION CURB
PROP CURB TO EXISTING EDGE OF TRAVEL WAY

NOT TO SCALE



DETAIL FOR TRANSITION CURB
TRANSITION CURB - PROP CURB TO EXISTING CURB

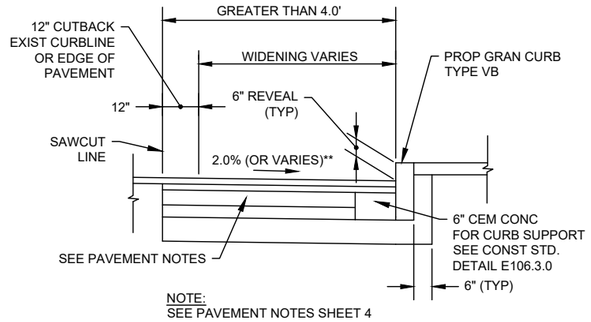
NOT TO SCALE



NOTE:
SEE PAVEMENT NOTES SHEET 4

DETAIL FOR BOX WIDENING 4.0' OR LESS

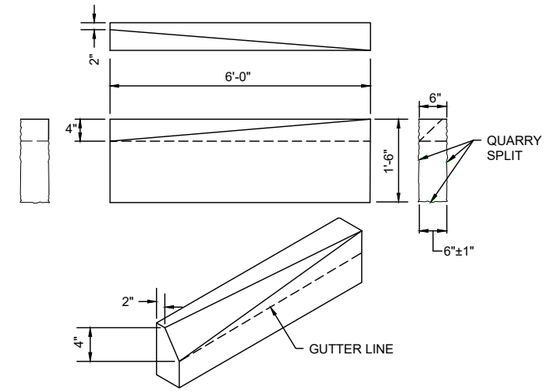
NOT TO SCALE



NOTE:
SEE PAVEMENT NOTES SHEET 4

DETAIL FOR BOX WIDENING GREATER THAN 4.0'

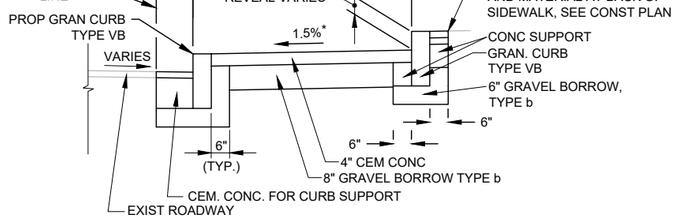
NOT TO SCALE



NOTES:
1. TOP SURFACE AND SLOPED SURFACE TO BE DRESSED BY SAW. REMAINDER TO BE QUARRY SPLIT.
2. DRAWING SHOWS TRANSITION CURB FOR ONE DIRECTION. FOR OTHER DIRECTION USE OPPOSITE HAND.

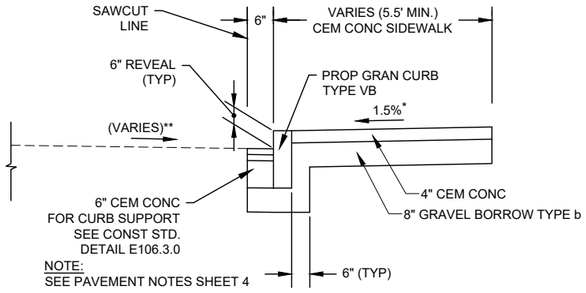
GRANITE CURB TYPE VA4-SPLAYED END
(ITEM 504.2)

NOT TO SCALE



DETAIL FOR GRANITE CURB AT BACK OF SIDEWALK

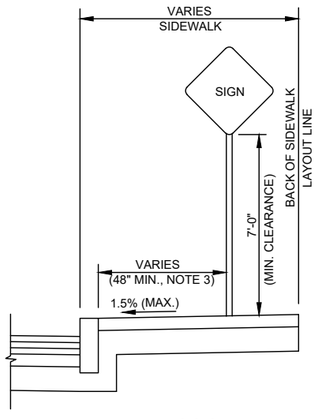
NOT TO SCALE



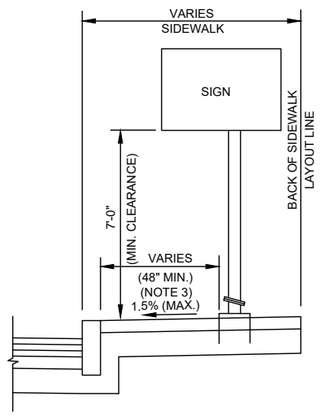
NOTE:
SEE PAVEMENT NOTES SHEET 4

DETAIL FOR SIDEWALK W/ GRANITE CURB - NO ROADWAY WORK

NOT TO SCALE



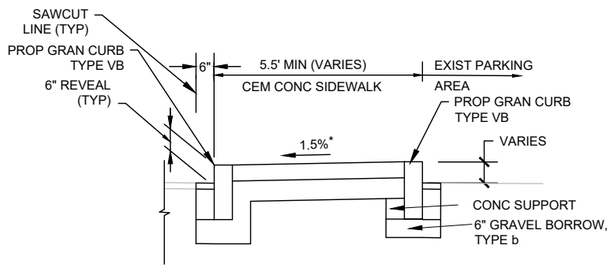
TRAFFIC SIGN



D6/D8 SIGN SUPPORT

NOTES:
1. MINIMUM CLEAR PATH ON ALL SIDEWALKS SHALL BE 48 INCHES, EXCLUDING THE CURB.
2. CONTRACTOR TO ATTAIN 6'0" CLEAR

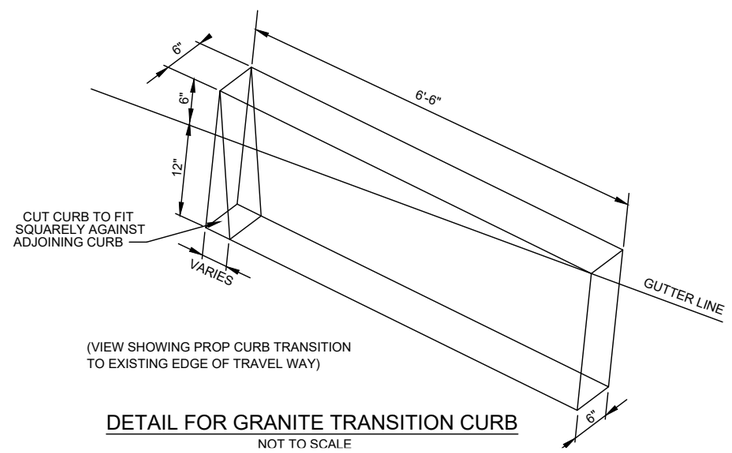
DETAIL FOR MINIMUM OFFSET DISTANCES



CURB AT BACK OF SIDEWALK
NEAR PARKING LOT AREAS

STA 50+45 TO 54+36±

NOT TO SCALE

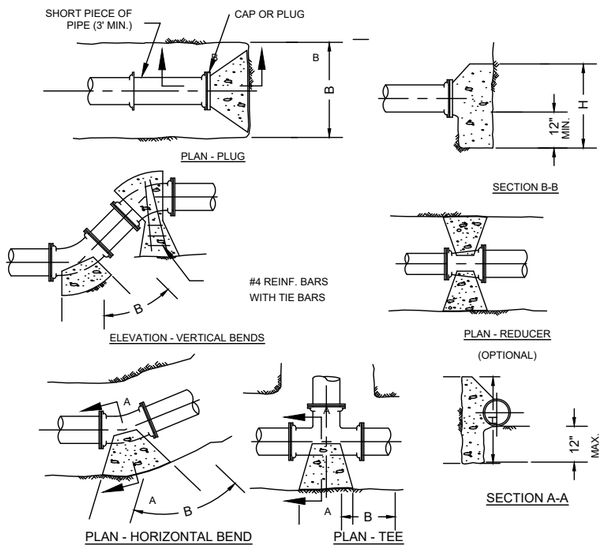


(VIEW SHOWING PROP CURB TRANSITION TO EXISTING EDGE OF TRAVEL WAY)

DETAIL FOR GRANITE TRANSITION CURB

NOT TO SCALE

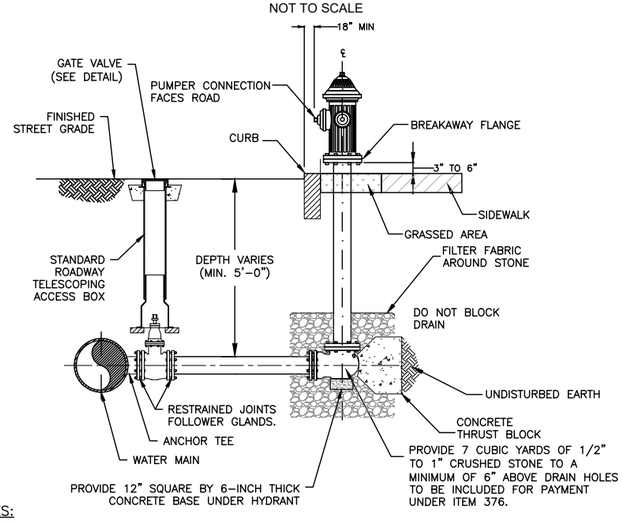
FITTING	MIN. BEARING AREA (H X B)
6" - 1/8 BEND	32" x 32"
8" - 1/8 BEND	24" x 24"
8" x 6" TEE	20" x 20"
12" - 1/8 BEND	32" x 32"
12" x 12" TEE	24" x 24"
12" x 6" TEE	24" x 24"
12" x 8" TEE	32" x 32"
16' x 12" TEE	24" x 24"
HYDRANT	24" x 24"
8" PLUG	32" x 32"
150 mm PLUG	24" x 24"
8" x 6" REDUCER	24" x 24"
8" - 1/16 BEND	20" x 20"
12' x 8" REDUCER	24" x 24"



NOTE:
ALL CONCRETE TO BE PLACED AGAINST UNDISTURBED EARTH

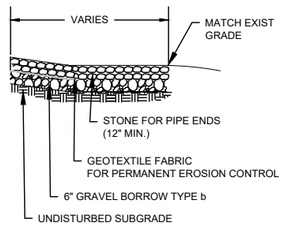
CONCRETE ANCHORAGE DETAILS

NOT TO SCALE



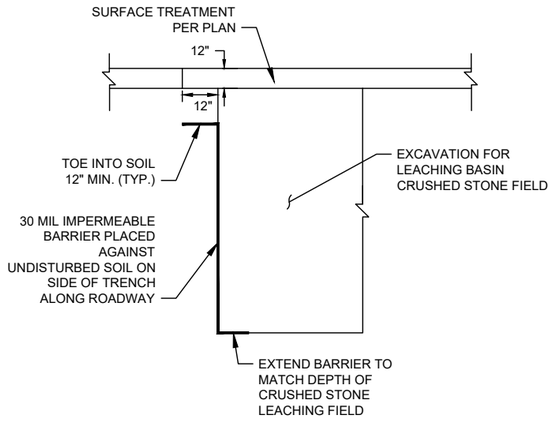
NOTES:

1. HYDRANTS SHALL BE OFFSET 1' FROM THE BACK OF SIDEWALK.
2. HYDRANTS SHALL BE PROVIDED BY THE CITY OF TAUNTON.
3. PROVIDE HYDRANT AND VALVE JOINTS WITH RESTRAINED MECHANICAL JOINTS.
4. ALL JOINTS BETWEEN ANCHOR TEE AND HYDRANT SHALL BE RESTRAINED.
5. SUPPORT BLOCKS TO BE CONCRETE MASONRY BLOCK.
6. SEE HYDRANT TABLE ON THRUST BLOCK BEARING AREAS FOR THE AREA OF CONCRETE REQUIRED.
7. ALL HYDRANTS OUT OF SERVICE MUST BE BAGGED.



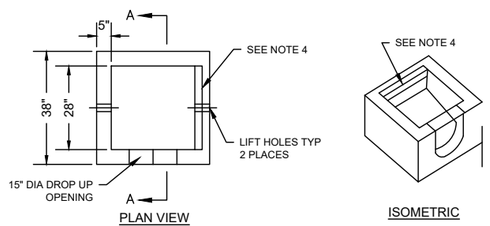
STONE FOR PIPE ENDS

NOT TO SCALE



DETAIL FOR IMPERMEABLE BARRIER INSTALLATION IN EXCAVATION WALL

NOT TO SCALE



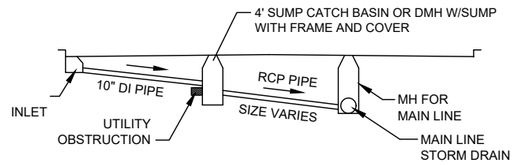
NOTES:

1. DESIGNED FOR AASHTO HS25-44 LOADING
2. CONCRETE STRENGTH fc=4000 PSI
3. REINFORCING STEEL: ASTM A185 (wwf) fy=60,000 PSI
4. CURB INLETS ARE REQUIRED WHEN GUTTER INLETS ARE INSTALLED AGAINST CURBING. PROVIDE 3"X6" OPENING WHERE CURB INLETS ARE PROPOSED.

SPECIAL GUTTER INLET (ITEM 204)

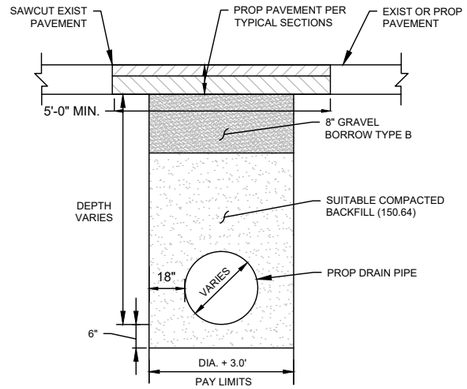
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	######	4	10
PROJECT FILE NO.	613642		

CONSTRUCTION DETAILS



CONTINGENCY DETAIL FOR STORM DRAIN LATERAL LINES

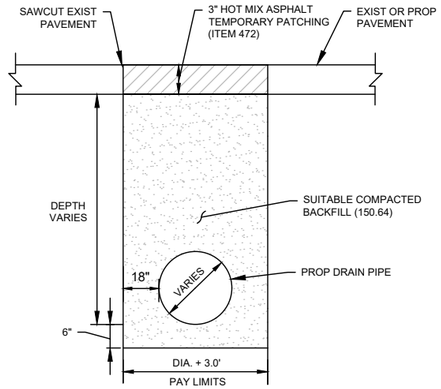
(USE ONLY IF OBSTRUCTION IS ENCOUNTERED)
NOT TO SCALE



NOTES:
1. ANY EXCAVATED MATERIALS DETERMINED BY THE ENGINEER TO BE UNSUITABLE FOR BACKFILL SHALL BE REPLACED WITH GRAVEL BORROW FOR BACKFILLING STRUCTURES AND PIPES AND PAID FOR UNDER ITEM 151.2.

PERMANENT DRAINAGE TRENCH IN MILL AND OVERLAY AREAS

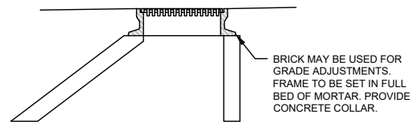
NOT TO SCALE



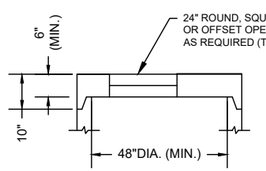
NOTES:
1. ANY EXCAVATED MATERIALS DETERMINED BY THE ENGINEER TO BE UNSUITABLE FOR BACKFILL SHALL BE REPLACED WITH GRAVEL BORROW FOR BACKFILLING STRUCTURES AND PIPES AND PAID FOR UNDER ITEM 151.2.

TEMPORARY DRAINAGE TRENCH IN FULL DEPTH AREAS

NOT TO SCALE



ALTERNATE ECCENTRIC CONE SECTION



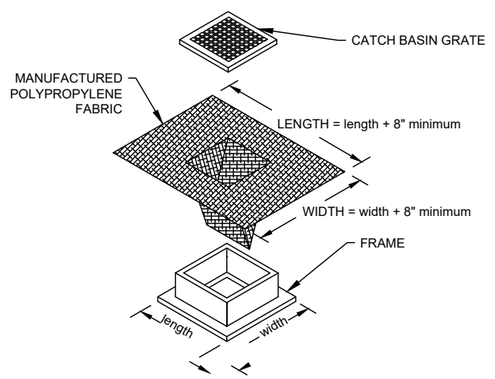
ALTERNATE FLAT TOP SLAB

NOTES:

1. BASED ON ACTUAL FIELD CONDITIONS; THE CONTRACTOR SHALL DETERMINE WHICH STYLE OF TOP SECTION SHOULD BE USED.

ALTERNATE DRAINAGE STRUCTURE TOP CONFIGURATIONS

NOT TO SCALE



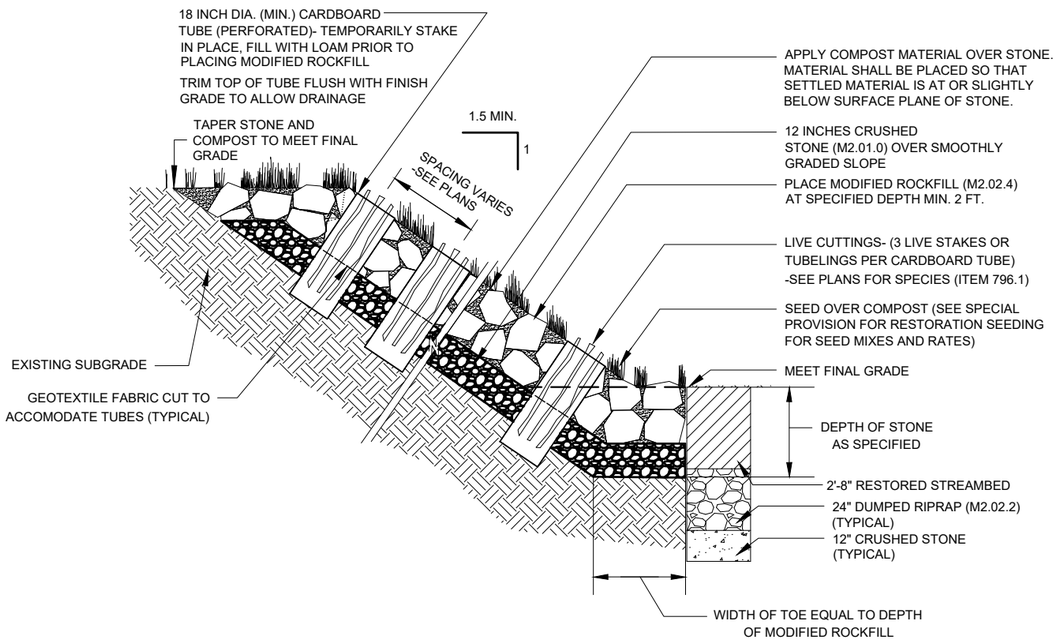
NOTES
1. LENGTH AND WIDTH OF POLYPROPYLENE FABRIC MUST EXCEED EXISTING CATCH BASIN FRAME DIMENSIONS BY A MINIMUM OF 8".
2. REMOVE CATCH BASIN GRATE AND INSTALL POLYPROPYLENE FABRIC OVER CATCH BASIN FRAME. REPLACE CATCH BASIN GRATE TO SECURE POLYPROPYLENE FABRIC IN PLACE.
3. PROVIDE EROSION CONTROL PROTECTION AT ALL EXISTING AND PROPOSED CATCH BASINS WITHIN THE PROJECT LIMITS.

CATCH BASIN EROSION CONTROL PROTECTION (TYP)

NOT TO SCALE

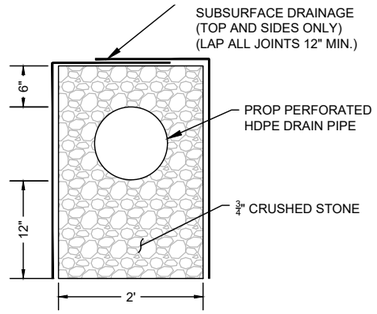
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	######	5	10
PROJECT FILE NO.	613642		

CONSTRUCTION DETAILS



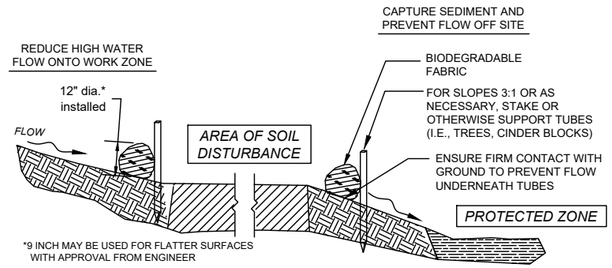
LIVE CUTTINGS IN MODIFIED ROCKFILL

NOT TO SCALE



PERFORATED HDPE INFILTRATION TRENCH

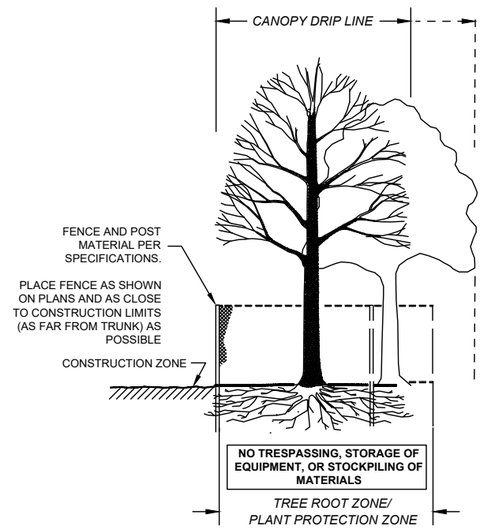
NOT TO SCALE



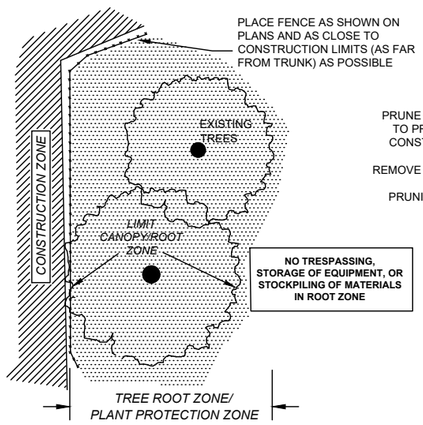
SECTION

SEDIMENT BARRIER - COMPOST FILTER TUBE

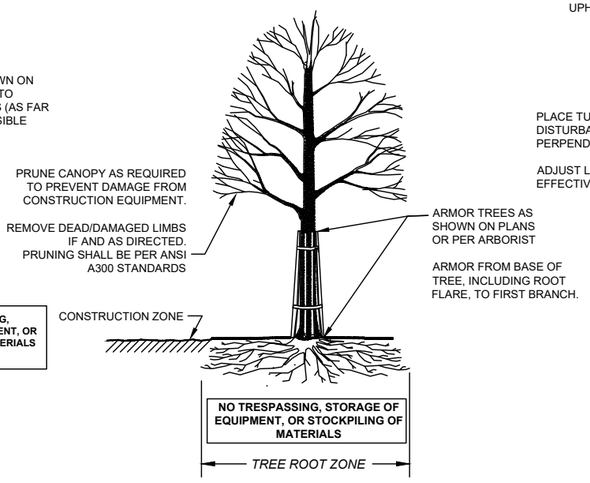
NOT TO SCALE



SECTION - FENCE PROTECTION OF ROOT ZONE

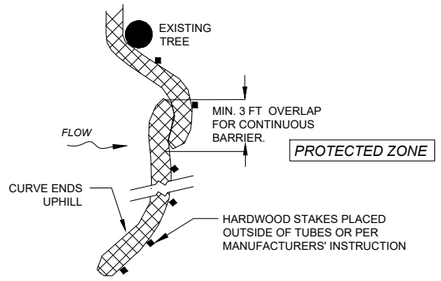


PLAN VIEW - FENCE PROTECTION OF ROOT ZONE



SECTION - TRUNK ARMORING & PRUNING

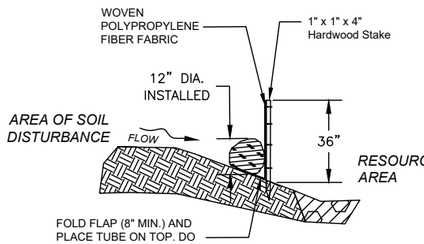
TREE PROTECTION DETAILS



PLACE TUBE AS CLOSE TO LIMIT OF SOIL DISTURBANCE AS POSSIBLE, ALONG CONTOURS, AND PERPENDICULAR TO FLOW.

ADJUST LOCATION AS REQUIRED FOR OPTIMUM EFFECTIVENESS. DO NOT INSTALL IN WATERWAYS.

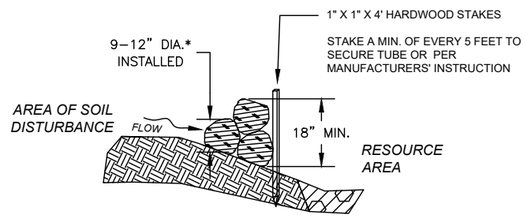
PLAN VIEW



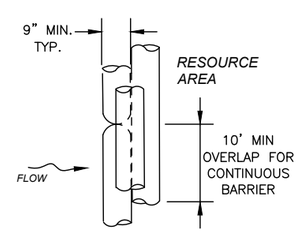
SECTION

COMPOST FILTER TUBE & SILT FENCE

NOT TO SCALE



SECTION



PLAN VIEW

COMPOST FILTER TUBE BERM (SLOPES 2:1 OR STEEPER)

NOT TO SCALE

SOUTH STREET E/OLD COLONY AVE.

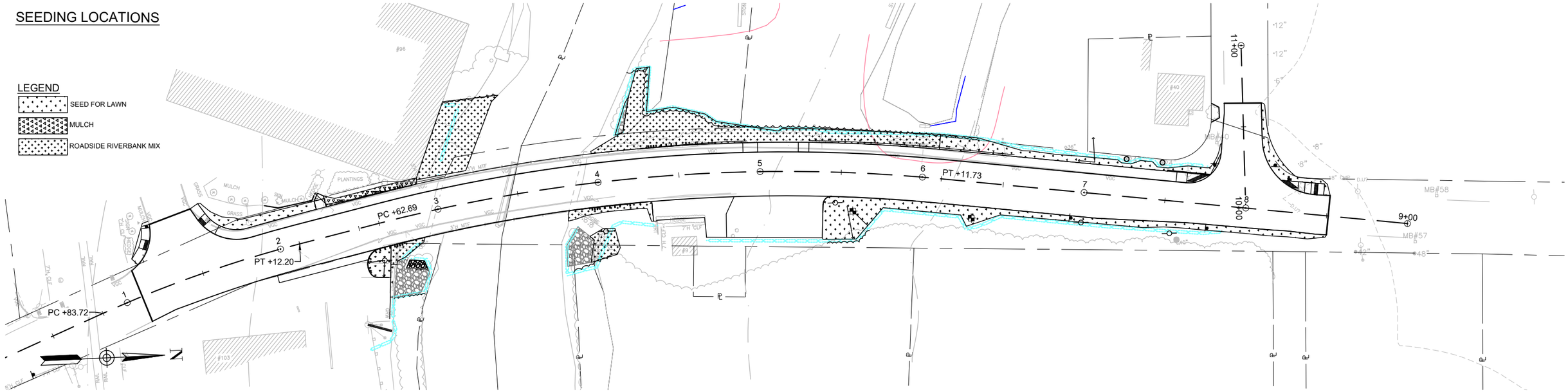
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	######	6	10
PROJECT FILE NO.	613642		

CONSTRUCTION DETAILS

SEEDING LOCATIONS

LEGEND

- SEED FOR LAWN
- MULCH
- ROADSIDE RIVERBANK MIX



HIGHWAY GUARD DETAILS

TRAILING ANCHORAGE - STA 2+41 TO 2+50 LT
GUARDRAIL, TL-3 (SINGLE FACED) - STA 2+50 TO 2+54 LT
TRANSITION TO BRIDGE RAIL - STA 2+54 TO 2+88 LT

TERMINAL END TREAMENT - STA 2+50 RT
CURVED TRANSITION TO BRIDGE RAIL - STA 2+50 TO 2+80 RT

TERMINAL END TREATMENT - STA 2+54 RT (ALONG PARKING)
GUARDRAIL, TL-3 (SINGLE FACED) - STA 2+54 TO 2+64 RT
TERMINAL END TREATMENT - STA 2+64 RT

TRANSITION TO BRIDGE RAIL - STA 3+88 TO 4+22 RT
TRAILING ANCHORAGE - STA 4+22 TO 4+32 RT

TRANSITION TO BRIDGE RAIL - STA 4+26 TO 4+60 LT
GUARDRAIL, TL-3 (SINGLE FACED) - STA 4+60 TO 4+67 LT
TANGENT END TREATMENT - STA 4+67 TO 4+92 LT

TRAILING ANCHORAGE - STA 5+30 TO 5+39 LT
GUARDRAIL, TL-3 (SINGLE FACED) - STA 5+30 TO 5+70 LT
GUARDRAIL, TL-3 (SINGLE FACED) DEEP POST - STA 5+70 TO 6+30 LT
TANGENT END TREATMENT - STA 6+30 TO 6+55 LT

CURB TIE AND GRADING PLAN
SEE SHEET 13

DRAINAGE AND UTILITY PLAN
SEE SHEET 15

SIGN & PAVEMENT MARKING PLAN
SEE SHEET 17

WATER SUPPLY PLAN
SEE BELOW

RAYNHAM/TAUNTON
SOUTH STREET E./OLD COLONY AVE.

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	######	7	10
PROJECT FILE NO.	613642		

CONSTRUCTION PLANS

RIVER BEND CONDOMINIUMS
PARCEL ID: 95-203
MASTER DB/PG 3240/265
PB/PG 66/26-27 LOTS 10 & 2
96 OLD COLONY AVENUE – EAST TAUNTON,MA
AREA=753,970 S.F.

CITY OF TAUNTON – BOARD OF SEWER COMMISSIONERS
EASEMENT – PLAN BOOK 98, PAGE 47
DEED BOOK 1467, PAGE 383 (1965)

COMMONWEALTH OF MASSACHUSETTS
(MASSACHUSETTS BAY TRANSPORTATION AUTHORITY)
PARCEL ID: 96-193
DB/PG 2264/52
0 RR – TAUNTON,MA

JAMES THOMAS & LISA B. DIFFLEY
PARCEL ID: 96-15
DB/PG 25685/348
88 OLD COLONY AVENUE – EAST TAUNTON,MA

MBTA PERMANENT EASEMENT
ORDER OF TAKING NO. 737
MS-31-PE
DB/PG 25571/41

MBTA PERMANENT EASEMENT
ORDER OF TAKING NO. 753 MS-29-PE
DB/PG 25786/251

MBTA
ORDER OF TAKING NO. 753 – MS-
DB/PG 25786/251

RR
PARCEL ID: 96-194
DB/PG 0/0
0 RR – TAUNTON,MA

BATTLE ROW
(PRIVATE)

RIVER BEND CONDOMINIUMS DWY (PRIVATE)

OLD COLONY AVE
(PUBLIC)

SOUTH STREET EAST
(PUBLIC)

TAUNTON RIVER

STONE WALK

STONE RETAINING WALL

PROP. LINE CENTER OF RIVER PER PLAN BK. 66, PG. 26

TOWN OF RAYNHAM – CONSERVATION COMMISSION
ASSESS. MAP 17 – PARCEL ID: 17-2
DB PG 8016/190
PB/PG 66/70
0 SOUTH STREET EAST – RAYNHAM,MA
AREA=167,683 S.F.

TOWN OF RAYNHAM –
BOARD OF SELECTMEN
PARCEL ID: 17-1
DB/PG 5117/145
0 SOUTH STREET EAST –
RAYNHAM,MA
AREA=14,102 S.F.

TOWN OF RAYNHAM
PARCEL ID: 17-151A
DB/PG 6266/303
PB/PG 342/58
9 SOUTH STREET EAST – RAYNHAM,MA

TOWN OF RAYNHAM
PARCEL ID: 17-148

SELPAN ASSOCIATES LIMITED

PROJECT BEGIN
BEGIN MILL & OVERLAY
N2783608.4781
E784198.0476
STA 1+10
SAWCUT
MEET EXIST

SCALE: 1" = 20'

SEE SHEET 14 | SEE SHEET 16 | SEE SHEET 18 | SEE BELOW

TRAILING ANCHORAGE - STA 4+22 TO 4+32 RT

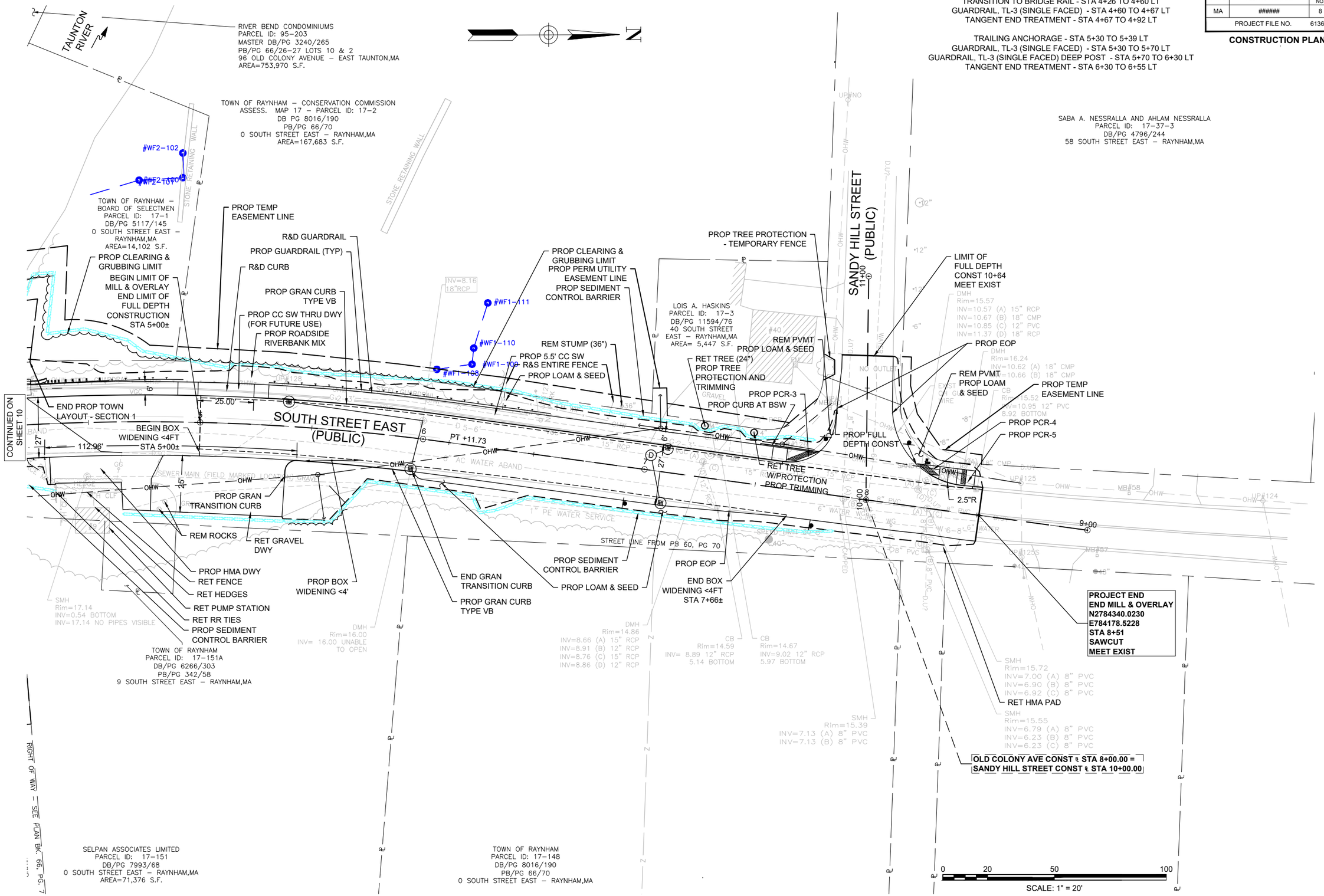
TRANSITION TO BRIDGE RAIL - STA 4+26 TO 4+60 LT
GUARDRAIL, TL-3 (SINGLE FACED) - STA 4+60 TO 4+67 LT
TANGENT END TREATMENT - STA 4+67 TO 4+92 LT

TRAILING ANCHORAGE - STA 5+30 TO 5+39 LT
GUARDRAIL, TL-3 (SINGLE FACED) - STA 5+30 TO 5+70 LT
GUARDRAIL, TL-3 (SINGLE FACED) DEEP POST - STA 5+70 TO 6+30 LT
TANGENT END TREATMENT - STA 6+30 TO 6+55 LT

SOUTH STREET E/OLD COLONY AVE.

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	######	8	10
PROJECT FILE NO.	613642		

CONSTRUCTION PLANS

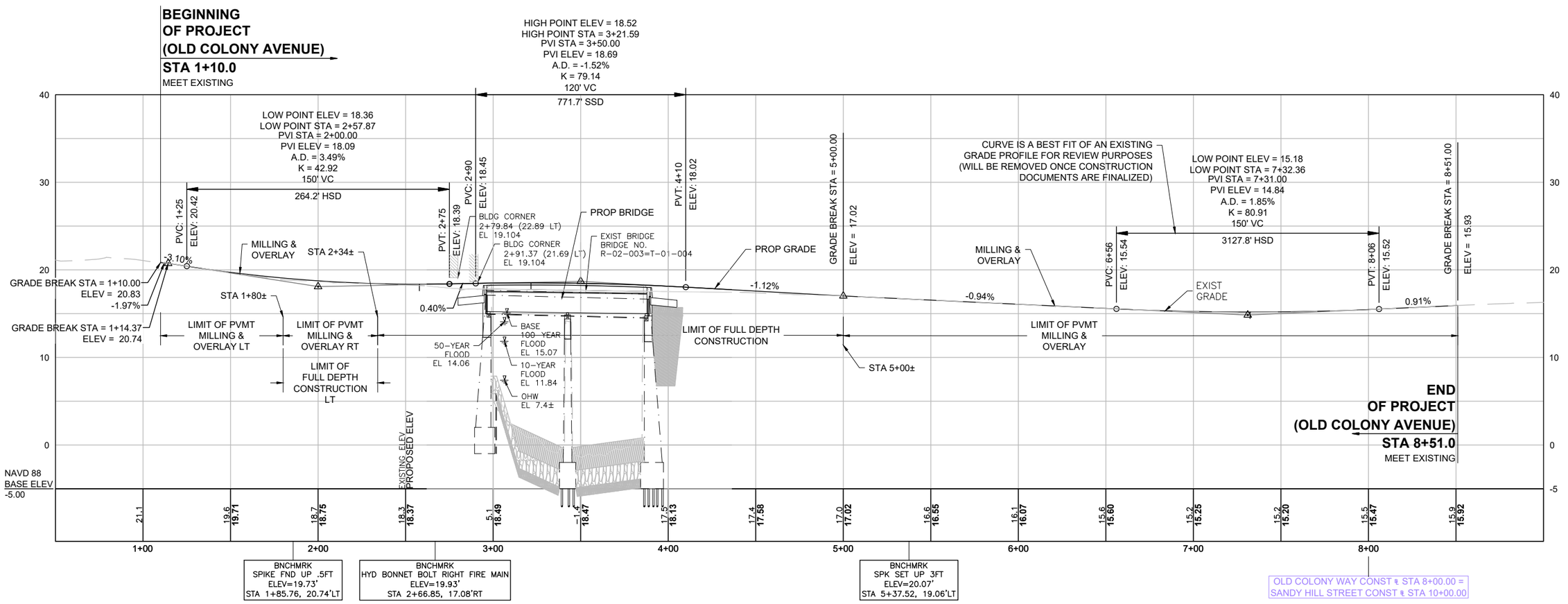


SOUTH STREET E./OLD COLONY AVE.

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	######	9	10
PROJECT FILE NO.	613642		

PROFILES

OLD COLONY AVE



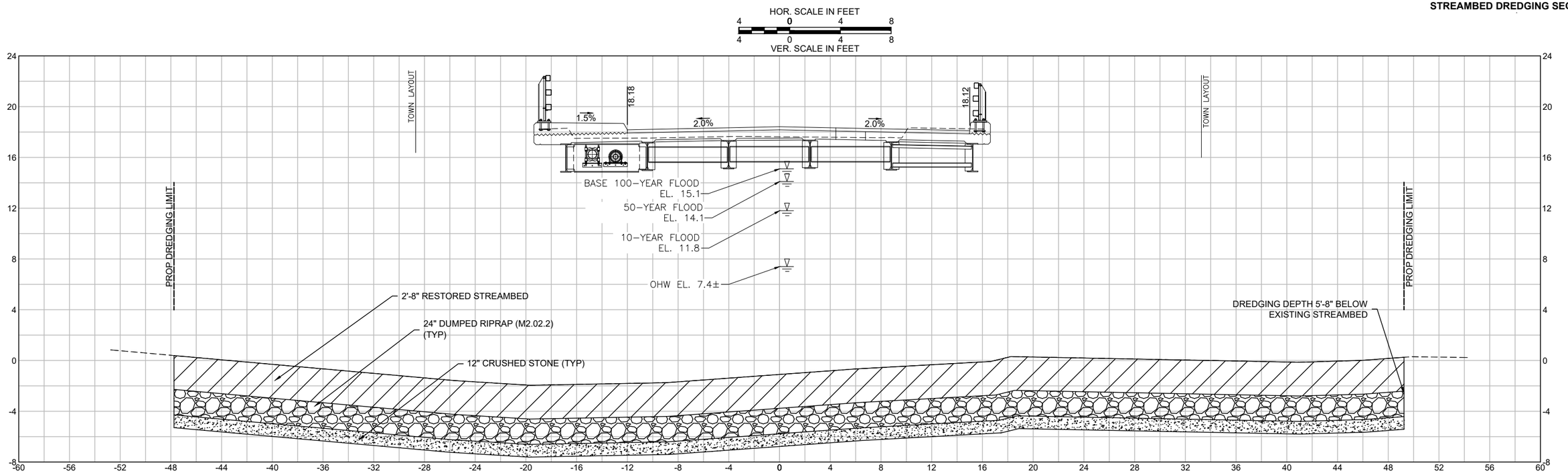
FOR CONSTRUCTION PLANS: SEE SHEETS 4 & 5

HOR. SCALE IN FEET
30 0 30 60
6 0 6 12
VER. SCALE IN FEET

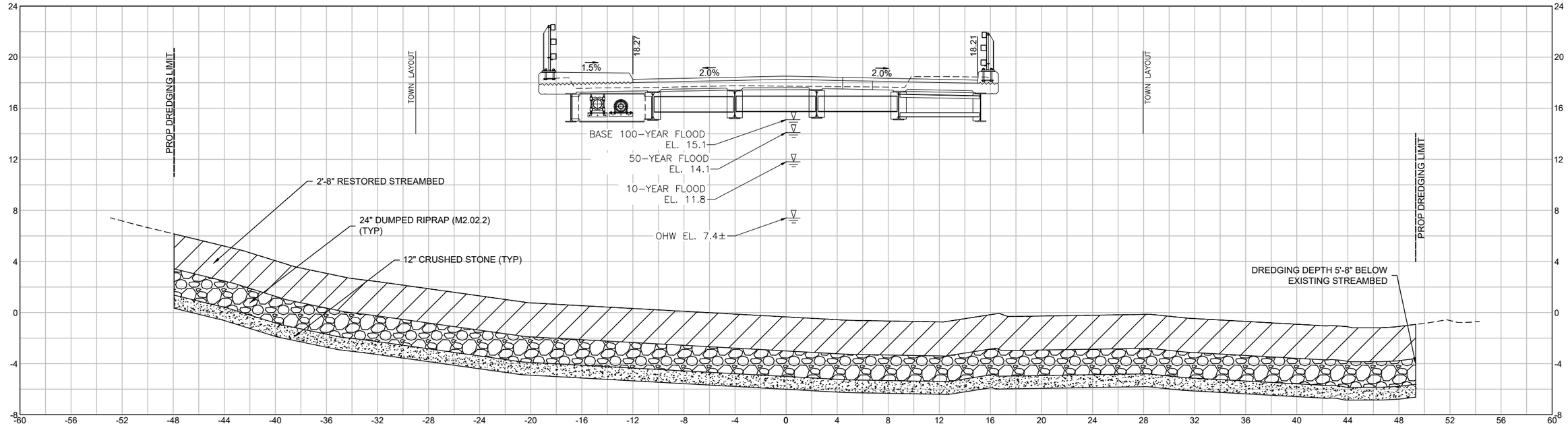
STREET NAME/ROUTE #

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	######	10	10
PROJECT FILE NO.	613642		

STREAMBED DREDGING SECTIONS



3+60



3+30

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DOCUMENT A00841

WATER QUALITY CERTIFICATION

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Commonwealth of Massachusetts
Executive Office of Energy and Environmental Affairs
Department of Environmental Protection
Address: 100 Cambridge Street, Suite 900, Boston MA 02114 | **Phone**: 617-292-5500

Maura T. Healey	**Kim Driscoll**	**Rebecca Tepper**	**Bonnie Heiple**
Governor	Lieutenant Governor	Secretary	Commissioner

April 17, 2026

BETA Group, Inc.
89 Shrewsbury Street, Suite 300
Worcester, MA 01604
ATTN: Jonathan Niro

RE: 401 WATER QUALITY CERTIFICATION
BRP WW 10, Major Fill Project
BRP WW 08, Minor Dredge
Old Colony Ave Bridge (R-02-003=T-01-004) replacement over the Taunton River
Raynham and Taunton, MA

401 WQC Filing Number: 26-WW26-0004-APP
USACE Application No. NAE-2025-02437
MassDOT File Number: 613642

Dear Mr. Niro:

The Massachusetts Department of Environmental Protection (MassDEP) has reviewed your application for a Water Quality Certification (WQC), as referenced above. The WQC application was deemed complete on March 20, 2026. In accordance with the provisions of MGL Ch. 21, §§26-53 and Section 401 of the Federal Clean Water Act as amended (33 U.S.C. §1251 et seq.), it has been determined there is reasonable assurance the proposed project will be conducted in a manner which will not violate applicable water quality standards (314 CMR 4.00) and other applicable requirements of state law.

The project proposes the replacement of the existing Old Colony Avenue Bridge (R-02-003=T-01-004) superstructure over the Taunton River, as well as scour protection installation, full depth road reconstruction, and stormwater improvements in Raynham and Taunton (the Project).

The original bridge, constructed in 1945, consists of a two-span reinforced concrete deck supported by reinforced concrete abutments and timber piles with an overall bridge span of 90 feet and width of 35 feet. This bridge carries two 10-foot travel lanes, two 2.5-foot shoulders, and a 5-foot sidewalk. The bridge rests on two concrete abutments and a single pier. The

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project currently collects stormwater through two closed catch basins at the southern end of the bridge that discharge to the Taunton River through a 12-inch reinforced concrete pipe. The remainder of the site consists of country drainage.

The Project will occur within a diadromous fish run and is habitat for Atlantic Sturgeon (*Acipenser oxyrinchus*). Accordingly, in order to protect diadromous fish migration, MassDEP has conditioned this WQC to require compliance with the conditions outlined in the MA Division of Marine Fisheries (DMF) letter of February 24, 2026. This includes a prohibition of in-water work between March 1st and July 15th for the spring and September 1st to November 15th for the fall.

The Project will occur within a Federal Emergency Management Agency (FEMA) 1% annual chance of flooding zone (Zone AE) associated with the Taunton River but will not impact the Base Flood Elevation or regulatory floodway. The Taunton River is classified as a "Wild and Scenic River".

The Project will replace the bridge superstructure while retaining the existing bridge substructure. The new bridge width will have the same span and increase the width by one foot to incorporate a bicycle lane. The sidewalk will be relocated to the west side of the roadway. To avoid anticipated scour, 8,570 square feet (sf) of riprap will be installed across the river at a depth of 2 feet, and will be topped with 2 feet, 8 inches of streambed material. A wildlife shelf will be provided along the streambank via a 3-foot level riprap landing adjacent to the face of the south abutment. Approximately 790 feet of full depth roadway construction will occur, which includes the bridge and two approaches.

In total, 8,570 sf of permanent impacts and 4,699 sf of temporary impacts to Land Under Water (LUW) are required to complete the project. Permanent impacts are due to the placement of riprap scour countermeasures, and the temporary impacts are due to dewatering for access and riprap placement.

Installation of riprap scour protection will require dredging of approximately 2,075 cubic yards (cy) of material. The Project area is anticipated to have elevated levels of contamination. Sampling was conducted but did not adhere to the approved sampling plan due to hazardous water conditions at the time of sampling. The samples that were collected show low levels of contaminants, but nothing above the reportable limit. To verify these samples and also collect the number of soils samples as required by 314 CMR 9.07, additional sampling is proposed. Prior to dredge work, a Phase II Sampling and Analysis Plan shall be submitted for approval and implemented.

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An alternatives analysis was completed in accordance with 314 CMR 9.00. Four alternatives were considered, and the chosen alternative was picked to minimize impacts to the Taunton River while still implementing scour protection. The chosen alternative also minimizes the increase in impervious area. The no-build alternative is not practicable to meet the project goal of replacing the bridge superstructure.

The Project qualifies as a redevelopment project as defined at 314 CMR 9.02 and meets the Stormwater Management Standards to the maximum extent practicable. The one foot widening of the bridge to incorporate a bike path will increase impervious surface within the Project limits by 781 sf. The proposed stormwater improvements include eight new deep sump catch basins. Two existing catch basins will be replaced with deep sump catch basins on the south side of the bridge and the remaining six new deep sump catch basins will be installed at the northern and southern approach. Curbing will be added to direct flow to these new closed systems. A 45-foot-long infiltration trench will also be installed at the northwestern limit of the project. These new drainage systems will direct water to the Taunton River. Due to steep slopes and adjacent private property, no other stormwater control measures could be considered.

The Project will comply with the Stream Crossing Standards to the maximum extent practicable. All standards will be met except for Standard 3. Bankfull width of the Taunton River is 99.5 feet, requiring a span of 119.42 feet to satisfy 1.2 times bankfull width. The current span of 79 feet will not change because the existing abutments will be utilized for the proposed bridge.

Based on a review of information provided by the applicant, MassDEP finds that this project complies with the standards described under 314 CMR 9.06 and 9.07. Public notice was provided in the Taunton Daily Gazette on January 28, 2026. No comment letters were received during the public comment period.

Therefore, based on information currently in the record, MassDEP grants a WQC for this project subject to the following conditions to maintain water quality, to minimize impact on waters and wetlands, and to ensure compliance with appropriate state law. MassDEP further certifies in accordance with 314 CMR 9.00 that there is reasonable assurance the project or activity will be conducted in a manner which will not violate applicable water quality standards (314 CMR 4.00) and other applicable requirements of state law. Finally, the Department has determined that upon satisfying the conditions and mitigation requirements of this approval, the project provides a level of water quality necessary to protect existing uses and accordingly finds that the project to be implemented satisfies the Surface Water Quality Standards at 314 CMR 4.00.

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Pursuant to 314 CMR 9.09(1)(d); 314 CMR 9.06(6)(a); 310 CMR 9.06(2); 314 CMR 9.07; 314 CMR 9.07(1); 314 CMR 9.09(7)(5)(c); 314 CMR 9.11; and 314 CMR 9.09(1)(e), the following Special Conditions are necessary to ensure that construction practices and stormwater controls are implemented in such a manner as to prevent degradation to wetlands and waters; ensure that practicable steps have been taken which will avoid and minimize impacts to wetlands and waters; minimize turbidity and sediment caused by construction activities; ensure that water quality is not degraded, and that biology of the waters are not negatively impacted by potential discharges; and/or maintain a record of the dredged material for reference and to ensure accountability in its transportation.

Those Special Conditions that require direct submittals to MassDEP for either review, or review and approval, are denoted by the following notation (Submittal) at the end of the condition and are summarized in Attachment A. In addition, those conditions with the (Submittal) designation shall be included in the Special Provisions and, as applicable, reviewed at the Pre-Construction Meeting.

1. All work shall be performed in accordance with the following documents and plans:

    a. Application for Water Quality Certification. “Old Colony Avenue Bridge Reconstruction R-02-003=T-01-004” in Raynham and Taunton, MA. Prepared by BETA Group, Inc. on behalf of MassDOT, dated January 2026, with cover letter and attachments. 401 WQC Filing Number: 26-WW26-0004-APP.

    b. MassDEP Technical Review, 401 Water Quality Certification, “Old Colony Avenue Bridge Reconstruction R-02-003=T-01-004” in Raynham and Taunton, MA. Dated February 24, 2026.

    c. Responses to MassDEP Technical Review, 401 Water Quality Certification, “Old Colony Avenue Bridge Reconstruction R-02-003=T-01-004” in Raynham and Taunton, MA. Prepared and signed by Jonathan Niro of BETA Group, Inc. on behalf of MassDOT, dated March 20, 2026.

Pre-Construction

2. A qualified **Fluvial Geomorphologist** (FGM) with a minimum of five years of relevant professional experience in stream replication and restoration projects shall be employed to oversee all LUW replication and restoration activities as proposed in the WQC application and approved herein. The name, contact information, and qualifications of the FGM shall be provided to MassDEP for review and approval with a copy to the

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Raynham and Taunton Conservation Commissions prior to the Pre-Construction Meeting required in Condition 5. The FGM shall either attend the Pre-Construction Meeting or a separate virtual or onsite meeting with MassDEP, MassDOT, and the Contractor prior to any LUW replacement or restoration work. **(Submittal)**

3. One individual with at least three years of experience with construction period erosion and sedimentation controls shall be employed to be responsible for Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan (CP/PP) inspections (CP/PP Inspector). The name, contact information, and qualifications of the CP/PP Inspector shall be provided to MassDEP for review and approval with a copy to the Raynham and Taunton Conservation Commissions prior to the Pre-Construction Meeting required in Condition 5. **(Submittal)**

4. Prior to the Pre-Construction Meeting required in Condition 5, the applicant shall provide MassDEP with the name and contact information of the Resident Engineer (RE) responsible for ensuring that all work complies with the conditions of this WQC. **(Submittal)**

5. A minimum of 21 days prior to the start of ground disturbance or vegetation clearing, MassDOT shall contact MassDEP to schedule an onsite Pre-Construction Meeting to review the approved plans and terms and conditions of this WQC. The RE, the construction contractor (Contractor), the CP/PP inspector, a representative from the MassDOT Environmental Section and/or the District Environmental Engineer shall attend the Pre-Construction Meeting. **No work shall commence prior to the Pre-Construction Meeting.**

6. MassDEP shall be copied on applicable submittals to the U.S. Army Corps of Engineers (USACE). These include but are not limited to: Self-Verification Notification Form (SVNF); Pre-Construction Notification (PCN); Work-Start Notification Form; Mitigation Work-Start Notification Form; and Compliance Certification Form. The Work-Start Notification Form shall be submitted at least 14 days before the anticipated start of work and the Compliance Certification Form shall be submitted within 30 days following the completion of the authorized work. **(Submittal)**

7. A CP/PP shall be developed and implemented as required by 314 CMR 9.06(6)(a)8. A minimum of 14 days prior to the start of work, MassDOT shall submit the CP/PP for review and approval. If the U.S. Environmental Protection Agency (EPA) Construction General Permit (CGP) applies, the Stormwater Pollution Prevention Plan (SWPPP) may serve as the CP/PP, providing it includes the measures required to be in the CP/PP per

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these Special Conditions, in addition to the measures specifically required by the CGP. Any subsequent changes to the approved CP/PP (defined herein as including the construction period SWPPP if applicable) must be approved by MassDEP. **(Submittal)**

8. Training regarding erosion and sedimentation controls is required. The CP/PP Inspector and any other relevant personnel responsible for erosion and sedimentation controls shall complete the EPA CGP Inspector Training, or other training that meets the CGP requirements, as well as complete a comprehensive review of the approved CP/PP. Proof of completion of the training shall be submitted to MassDEP prior to the start of work. **(Submittal)**

9. The CP/PP shall identify, but shall not be limited to, staging and laydown areas in relation to LUW, proposed dewatering methods and locations, proposed stockpile locations and their proximity to catch basins or other drainage conveyances that discharge to wetland resource areas, and the location of construction-period erosion and sedimentation controls. Stockpiles shall be located no less than 50 feet from LUW, catch basins, or other drainage conveyances that discharge to LUW.

10. A minimum of 14 days prior to the start of work, MassDOT shall submit a Control of Water Plan for review and approval. The Plan shall include a description of proposed methods to isolate and dewater work areas within streams while maintaining stream flow, including but not limited to the method of isolation (e.g., steel sheeting or sandbag cofferdam), dewatering methods and locations and specifications for stream bypass systems as applicable. The Control of Water Plan shall include a plan depicting LUW boundaries, and the location of all relevant methods and materials which shall be located within the LUW impact areas approved herein. The plan shall meet the requirements of the CP/PP and be specific to the Project. Dewatering and stream bypasses shall be conducted under the supervision of the RE or other project staff with knowledge of these practices and comply with the applicable conditions identified herein. **(Submittal)**

11. Prior to the start of work, approved erosion and sedimentation control measures shall be installed per the approved CP/PP and as applicable, the manufacturer specifications. Erosion and sedimentation control measures may consist of, but are not limited to, silt fence, staked straw bales, silt/turbidity curtains, compost filter tubes, etc.

12. Prior to the Pre-Construction Meeting, the boundaries of LUW shall be re-flagged where they are within 50 feet of the limits of work. All boundary markers, once in place, shall

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remain in place throughout construction until all disturbed surfaces have been permanently stabilized. Boundary markers shall be fully evaluated annually and refreshed where needed. Implementation of and compliance with this requirement shall be documented by the RE. All construction personnel shall be made aware of these markers.

13. Prior to any work within the 1% annual chance of flooding zone within Project limits, including mobilization or storage of equipment and materials, a Flood Contingency Plan shall be submitted to MassDEP for review and approval that includes at a minimum the following information and provisions: **(Submittal)**

    a. The RE and/or Contractor shall monitor the National Weather Service forecast daily, and upon issuance of a flood watch or flood warning for the Project area, the Flood Contingency Plan shall be implemented.

    b. Upon implementation of the Flood Contingency Plan, all construction equipment and materials located below the Base Flood Elevation (BFE) shall be removed and placed in an upland location above the BFE and outside of LUW.

    c. Anchored stationary equipment may remain below the BFE if demonstrated to be required and upon written approval from MassDEP. In the event semi-stationary equipment cannot be feasibly removed before the arrival of the storm, they shall be adequately secured and MassDEP shall be notified prior to the storm.

    d. A requirement to inspect and maintain all erosion and sedimentation controls, and stabilize all exposed soils as needed below the BFE prior to the storm shall be included.

    e. A plan depicting at a minimum, but not limited to, LUW boundaries, the Project limits, and the BFE boundary based on ground elevations shall be included.

    f. Staff and materials must be available 24 hours per day, seven days per week to implement the Flood Contingency Plan. The name, affiliation, title, email address, and phone number of each person responsible for implementing the Flood Contingency Plan shall be included.

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g. No work shall commence until the flood watch or flood warning has ended, all areas below the BFE have been inspected, and erosion and sedimentation controls are maintained as needed.

14. The Contractor shall develop an Invasive Plant Management Strategy (IPMS) to be submitted to MassDEP for review and approval prior to the Pre-Construction Meeting. The IPMS shall be implemented as approved. **(Submittal)**

15. If needed, use of herbicides to control invasive species shall be implemented in accordance with the approved IPMS and with the following requirements:

    a. Herbicides shall only be applied by a Licensed Applicator;

    b. Only herbicides registered with the Massachusetts Pesticide Board Subcommittee shall be applied to the targeted area/species;

    c. The manufacturer's label directions must be followed, in addition to any conditions imposed by other state or local authorities;

    d. Herbicide application shall use no more than the minimum application rate to accomplish removal of the target species; and

    e. Applicants must obtain a BRP WM04 Herbicide Permit from the MassDEP Wetlands Program Dredge Unit before performing herbicide application in waterbodies (traditionally lakes and ponds).

16. A minimum of 21 days prior to the start of demolition work, a Demolition Plan shall be submitted for review and approval describing how the existing bridge will be demolished and what measures will be taken to ensure that demolition material, including but not limited to any pollutants, construction debris, toxic or hazardous substances, and airborne dust, is properly contained and does not enter the Taunton River. **(Submittal)**

17. Final Construction Plans (the plans provided to the Contractor) shall be submitted for review at least 30 days prior to the Pre-Construction Meeting. Sufficient supporting information, explanation, and documentation shall be provided to MassDEP and the Raynham and Taunton Conservation Commissions outlining any deviations from the plans approved herein, and MassDEP may at its discretion require additional supporting documentation as a condition of review. The updated set of plans shall become the

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"Final Plan of Record." The Plan shall be prepared and signed by a Professional Engineer in the Commonwealth of Massachusetts and shall incorporate all revisions and additions to the original plans that have been approved as discussed herein. **(Submittal)**

Construction Period

18. No more than **8,570 sf** of permanent impacts and **4,699 sf** of temporary impacts to LUW shall occur. No more than **2,075 cy** of dredging in LUW shall occur. All dredging activities shall avoid unapproved impacts to LUW.

19. Under the direction of the CP/PP Inspector, inspection and maintenance of erosion and sediment controls in active work areas may be performed by both the Contractor and RE or other MassDOT project staff. Maintenance is the responsibility of the Contractor; however, the permittee shall be ultimately responsible for erosion and sedimentation control failure. The RE and/or contractor shall immediately notify MassDEP and the Raynham and Taunton Conservation Commissions if any unauthorized discharges to LUW occur.

20. CP/PP inspections shall occur at least once every seven calendar days and within 24 hours of a storm event that produces 0.5 inches or more of rain within a 24-hour period, or at a more stringent frequency if the CP/PP requires.

21. Copies of CP/PP Inspection and Maintenance Log Forms shall be submitted to MassDEP within 14 days upon request.

22. Disturbed areas shall be stabilized immediately after activities have permanently ceased or will be temporarily inactive for 14 or more calendar days. The installation of stabilization measures shall be implemented as soon as practicable, but no later than 14 calendar days after disturbed areas have been inactive.

23. Work within LUW shall be conducted in low or no-flow conditions to the extent practicable. Notice shall be provided to MassDEP and the Raynham and Taunton Conservation Commissions within 24 hours prior to the commencement of dewatering. Dewatering methods and location(s) shall be approved by the RE or other project staff with knowledge of these practices prior to use to ensure consistency with the approved Control of Water Plan, and shall be documented in the CP/PP. There shall be no discharge of untreated dewatered stormwater or groundwater to LUW. Any discharges shall be visibly free of sediment.

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24. Additional erosion and sedimentation control materials shall be stored on-site at all times for emergency and routine replacement. Materials shall be kept covered, dry, and accessible at all times. The CP/PP Inspector shall be responsible for anticipating the need for and installation of additional erosion and sedimentation controls and shall have the authority to require additional erosion control measures to protect wetland resource areas beyond what is shown on the plans if field conditions or professional judgment dictate that additional protection is necessary.

25. The Contractor shall monitor the National Weather Service forecast for updates, and upon issuance of a flood watch for the 1% annual chance of flooding zone, shall implement the flood contingency plan referenced in Condition 13.

26. Any storm drains with potential to receive discharge from stockpiled materials or construction operations shall be managed to inhibit the inflow of sediment while not increasing the likelihood of roadway flooding during periods of precipitation. The CP/PP shall specify measures to implement this. Filter fabric stretched under storm drain inlet grates are not acceptable for this purpose.

27. Stockpiles shall be located no less than 50 feet from LUW, catch basins, or other drainage conveyances that discharge to LUW.

28. The contractor shall have designated washout areas for concrete equipment that will be comprised of impermeable material and sized to contain project concrete wastes and wash water. Concrete wash out areas shall be located no less than 50 feet from LUW and catch basins or other drainage conveyances that discharge directly or indirectly to LUW.

29. Refueling, washing, and cleaning of vehicles and other construction equipment shall not take place within 50 feet of LUW and any wash water shall be contained such that it does not drain toward LUW. MassDEP shall explicitly approve in writing any deviation to this condition for oversized stationary vehicles.

30. The contractor shall have spill containment kits on site. In the event of a release of fuels and/or oils, the local fire department, MassDEP Emergency Response and MassDEP Wetlands Program Highway Unit shall be immediately contacted, and in addition, the MassDEP Bureau of Waste Site Cleanup shall be notified per the requirements of the Massachusetts Contingency Plan, 310 CMR 40.0000.

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31. No in-water, silt-producing work shall occur during the Time of Year (TOY) restriction between the dates of March 1st and July 15th and September 1st to November 15th. Work may proceed behind dewatered cofferdams at any time, provided they are installed and removed outside of the TOY restriction.

32. All work shall be completed in accordance with the recommendations of DMF, which are hereby incorporated into this WQC through inclusion in the 'Responses to MassDEP Technical Review, 401 Water Quality Certification', dated March 20, 2026.

33. Construction vehicles and equipment shall not enter the LUW unless authorization is provided by way of this permit or amendment. The Contractor shall use equipment with boom reach capabilities and other measures to avoid inadvertent impacts to jurisdictional resource areas as a result of excavation, riprap placement, and/or bridge/pier demolition materials.

34. Sheet piles shall be fully removed from LUW upon stabilization of the area as required. No portion of sheet piles shall remain unless approved by MassDEP in writing prior to installation. A request to leave sheet piles shall include, but not be limited to, demonstration that full removal of the sheet piles is not feasible or practicable, and an alternatives analysis demonstrating alternative methods to isolate the work area(s) are not feasible or practicable.

35. A temporary shielding or containment system shall be in place beneath the bridge structure prior to removal to prevent debris from falling into the water below. In the event that any debris accidentally enters The Taunton River, it shall be immediately retrieved. Notice shall be provided to MassDEP if debris enters the river and that it has been removed with photo-documentation (if practicable) submitted by email.

36. Test pit information confirming Estimated Seasonal High Groundwater shall be provided to MassDEP once test pits are excavated. **(Submittal)**

Dredging

37. MassDEP shall be notified one week prior to the start of dredging so that staff may inspect the work for compliance throughout the project.

38. A Phase II Sampling and Analysis Plan (SAP II) shall be developed and submitted to MassDEP for review and approval. At a minimum, SAP II should include samples from three locations around the project dredge area. **Results of the chemical analysis shall**

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be submitted to MassDEP for review at least 10 days prior to dredging, and dredging shall not commence until MassDEP provides written approval. If sediment samples are found to be contaminated, additional conditions may be required by MassDEP as a contingency plan to protect the environmental and public health from contaminated sediments. **(Submittal)**

39. No later than 21 days prior to commencement of dredging activity, a Dredged Material Dewatering Plan shall be submitted to MassDEP for review and approval. At a minimum, the Plan shall include but not be limited to the type of containment, method of dewatering (i.e. mechanical or by gravity), method of collecting the dewatered effluent and method of disposal. **(Submittal)**

40. All handling of contaminated sediment exceeding MCP RCS-1 criteria and authorized by this WQC shall be conducted under the direction of a Licensed Site Professional (LSP). Prior to the Pre-Construction Meeting required in Condition 5, the applicant shall provide MassDEP with the name, qualifications, and contact information of the LSP. **(Submittal)**

41. An Environmental Health & Safety Plan shall be required for the protection of workers from any exposure to known/suspected contaminants present in environmental media (including sediment which has been characterized as exceeding MCP RCS-1 criteria). A copy shall be provided to MassDEP at least two weeks prior to the commencement of the dredging operation.

42. Dredged sediment shall be sampled to determine the suitability for reuse or if offsite disposal is required. Sampling data including sampling methods and laboratory QA/QC data shall be provided to MassDEP within 48 hours once available from the analytical laboratory for review. Results of the chemical analysis shall be compared to the reuse levels in Policy COMM-97-001- Reuse and Disposal of Contaminated Soil at Massachusetts Landfills for reuse as landfill daily cover and to the Massachusetts Contingency Plan (MCP) RCS-1 criteria. The approved LSP required by Condition 40 will review the data to determine if the sediment exceeds these criteria and requires disposal at an out-of-state facility within ten calendar days. The data and LSP determination shall be submitted to MassDEP prior to transportation of this material. MassDOT shall implement the determination of the LSP and of any further requirements by MassDEP regarding the disposal of all dredged sediment. **(Submittal)**

43. Best Management Practices (BMPs) shall be employed by the contractor to protect resource areas located adjacent to the proposed staging/temporary dredged material

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stockpiling and dewatering areas. Sediment stockpiles shall be constructed in accordance with the MassDEP approved project plans, stabilized, bottom-lined if not placed on paved surfaces and securely covered with wind tear resistance tarpaulin, polyethylene sheeting or similar impermeable material at all times, and properly labeled. Stockpile covers shall be securely weighed down. Stockpiles shall also be secured to restrict access by the public and shall be set back at least 10 feet from temporary construction access roads or other areas and activities which could disturb the stockpiles and associated erosion controls; if the 10-foot setback cannot be met, then a MassDEP-approved barrier shall be provided. Inspection of the sediment containment and dewatering location and associated erosion controls shall be conducted daily and within 24 hours of a storm that produces 0.5 inches or more of rain. Any observed deficiency shall be corrected or repaired in a timely manner.

44. In the event of a precipitation or storm event, the site shall be secured beforehand in such a way as to protect resource areas and waters on site and downstream of the site, including covering of stockpiles of dredged material. Sediment stockpile areas shall be inspected in line with the frequency of the CP/PP required in Condition 7. Any observed deficiency shall be corrected or repaired in a timely manner to prevent discharge from the stockpiled material. If stormwater runoff and erosion is observed from stockpiled dredged material, additional erosion and/or damage prevention controls measures shall be implemented.

45. Dredging, stockpiling of dredged material, and offsite transport of dredged material shall be sequenced and conducted in a manner to limit stockpiling time. Sediment characterized as having concentrations exceeding the RCS-1 criteria shall not be stockpiled at the site longer than 90 days from the date of generation. Extensions may be requested to accommodate unforeseen delays subject to MassDEP approval.

46. Measures shall be in place to prevent turbid waters, due to dredging, demolition, or debris removal activities, from extending past the limits of work into the Taunton River. These measures can be items such as turbidity curtains and/or sheet piles.

47. If visual turbidity escapes the controls in place, as described in Condition 42, work shall stop immediately and MassDEP shall be notified within 24 hours. Work shall not resume until the issue is corrected and to the satisfaction of MassDEP.

48. All turbidity controls shall be inspected daily by the RE or a designated MassDOT Project Staff. If any damage is observed the controls in place will be replaced or repaired immediately.

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49. If dredged sediment is disposed of off-site, MassDEP shall be notified in writing of the name and location of the upland licensed facilities accepting the dredged material for disposal or reuse for review and approval. If the licensed facility is located out of state, documentation shall be provided to MassDEP that the dredged material disposal/reuse has been approved and will be accepted by the receiving State. The dredged material shall not be transported to the facility without concurrence of MassDEP.

50. If dredged sediment is disposed of off-site, Transportation and disposal of the dredged material shall be overseen by the LSP of record. A Bill-of-Lading (BOL) or a Material Shipping Record (MSR) shall be used to track the dredged material to the licensed disposal facility and/or proposed intermediate (stockpiling /dewatering) facility. A fully executed copy of the BOL or MSR shall be provided to MassDEP within 30 days of final shipment to the reused location or facility.

51. If dredged sediment is disposed of off-site, Best Management Practices (BMPs) shall be implemented during transportation of the dredged material to the licensed receiving facility. At a minimum, when transported upon public roadways, all dredged material shall have no free liquid as determined by the Paint Filter Test or other suitably analogous methodology acceptable to MassDEP, and a tarpaulin or other means shall be used to cover the dredged material during transport.

Stream Mitigation

52. The FGM shall oversee all LUW restoration. Placement of streambed materials shall take place in no- or low-flow conditions. The Control of Water Plan required in Condition 10 shall include measures to create no-flow conditions for this work such as a pump bypass system or other dewatering method, if needed. Placement of streambed materials during greater than low-flow conditions shall require a placement plan, with a narrative describing turbidity control measures, submitted to MassDEP for review and approval.

53. A minimum of 14 days prior to installation of the streambed materials, the FGM shall meet with the contractor to determine the suitability of stockpiled streambed material for reuse and whether there is sufficient stockpiled material to complete streambed restoration.

54. Water shall be slowly introduced back into the restored and dewatered LUW work areas as to not cause erosion and sedimentation. This work shall be overseen by the FGM. The FGM shall provide final approval of the streambed restoration upon re-wetting of

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banks and removal of water controls (photographs will suffice unless otherwise determined by the FGM).

55. Upon completion of the LUW restoration, the FGM shall provide photographs and a summary of the completed work to MassDEP and the Raynham and Taunton Conservation Commissions. **(Submittal)**

56. MassDEP reserves the right to determine the success or failure of the LUW restoration areas and reserves the right to require additional measures deemed necessary to promote success.

57. The surface of the wildlife shelf at the southern abutment shall be levelled out with chinked-in stones.

Post-Construction

58. All temporary erosion and sedimentation controls shall be removed at the conclusion of work once the surrounding area has achieved final stabilization.

59. Mulch used as an erosion or sedimentation control may be spread in upland areas at a depth that will not inhibit vegetative growth and shall not be spread in LUW.

General Conditions

60. Any proposed plan changes or amendment requests, as well as any required submittals shall be sent by email for review and approval to heidi.davis@mass.gov and tyler.lewis@mass.gov. **(Submittal)**

61. This WQC remains in effect for the same duration as the Section 404 permit that requires it.

62. No Special Condition set forth herein shall be construed or operate to prohibit MassDEP from taking enforcement against MassDOT or its contractors for any failure to comply with the terms and requirements of this WQC.

63. No activity authorized by this WQC may begin prior to expiration of the 21-day appeal period, or until a final decision is issued by MassDEP in the event of an appeal.

Failure to comply with this Certification is grounds for enforcement, including civil and criminal penalties, under MGL Ch. 21 §42, MGL Ch. 21A §16, or other possible actions/penalties as authorized by the General Laws of the Commonwealth.

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This Certification does not relieve the applicant of the obligation to comply with other appropriate state or federal statutes or regulations.

NOTICE OF APPEAL RIGHTS

a.) Appeal Rights and Time Limits

Certain persons shall have a right to request an adjudicatory hearing concerning certifications by MassDEP when an application is required: (a) the applicant or property owner; (b) any person aggrieved by the decision who has submitted written comments during the public comment period; (c) any ten (10) persons of the Commonwealth pursuant to M.G.L. c.30A where a group member has submitted written comments during the public comment period; or (d) any governmental body or private organization with a mandate to protect the environment which has submitted written comments during the public comment period. Any person aggrieved, any ten (10) persons of the Commonwealth, or a governmental body or private organization with a mandate to protect the environment may appeal without having submitted written comments during the public comment period only when the claim is based on new substantive issues arising from material changes to the scope or impact of the activity and not apparent at the time of public notice. To request an adjudicatory hearing pursuant to M.G.L. c.30A, § 10, a Notice of Claim must be made in writing, provided that the request is made by certified mail or hand delivery to MassDEP, with the appropriate filing fee specified within 310 CMR 4.10 along with a DEP Fee Transmittal Form within twenty-one (21) days from the date of issuance of this Certificate, and addressed to:

Case Administrator
Department of Environmental Protection
100 Cambridge Street, 9th Floor
Boston, MA 02114

A copy of the request shall at the same time be sent by certified mail or hand delivery to the Department of Environmental Protection at:

Department of Environmental Protection
Wetlands Program, Highway Unit
100 Cambridge Street, 8th floor
Boston, MA 02114

b.) Contents of Hearing Request

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Department of Environmental Protection

Address: 100 Cambridge Street, Suite 900, Boston, MA 02114
Phone: 617-292-5500

A Notice of Claim for Adjudicatory Hearing shall comply with MassDEP's Rules for Adjudicatory Proceedings, 310 CMR 1.01(6), and shall contain the following information pursuant to 314 CMR 9.10(3):

1. the 401 Certification Transmittal Number;
2. the complete name of the applicant and address of the project;
3. the complete name, address, and fax and telephone numbers of the party filing the request, and, if represented by counsel or other representative, the name, fax and telephone numbers, and address of the attorney;
4. if claiming to be a party aggrieved, the specific facts that demonstrate that the party satisfies the definition of "aggrieved person" found at 314 CMR 9.02;
5. a clear and concise statement that an adjudicatory hearing is being requested;
6. a clear and concise statement of (1) the facts which are grounds for the proceedings, (2) the objections to this Certificate, including specifically the manner in which it is alleged to be inconsistent with the MassDEP's Water Quality Regulations, 314 CMR 9.00, and (3) the relief sought through the adjudicatory hearing, including specifically the changes desired in the final written Certification; and
7. a statement that a copy of the request has been sent by certified mail or hand delivery to the applicant, the owner (if different from the applicant), the conservation commission of the city or town where the activity will occur, the Department of Conservation and Recreation (when the certificate concerns projects in Areas of Critical Environmental Concern), the public or private water supplier where the project is located (when the certificate concerns projects in Outstanding Resource Waters), and any other entity with responsibility for the resource where the project is located.

c.) Filing Fee and Address

The hearing request along with a DEP Fee Transmittal Form and a valid check or money order payable to the Commonwealth of Massachusetts in the amount of one hundred dollars ($100) must be mailed to:

Commonwealth of Massachusetts
Department of Environmental Protection
Commonwealth Master Lockbox
PO Box 4062
Boston, MA 02211

The request will be dismissed if the filing fee is not paid, unless the appellant is exempt or granted a waiver. The filing fee is not required if the appellant is a city or town (or municipal

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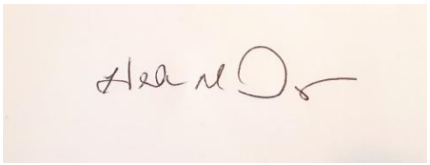
agency), county, or district of the Commonwealth of Massachusetts, or a municipal housing authority. MassDEP may waive the adjudicatory hearing filing fee pursuant to 310 CMR 4.06(2) for a person who shows that paying the fee will create an undue financial hardship. A person seeking a waiver must file an affidavit setting forth the facts believed to support the claim of undue financial hardship together with the hearing request as provided above.

Should you have any questions relative to this permit, please contact myself or at heidi.davis@mass.gov and Tyler Lewis tyler.lewis@mass.gov.

Very truly yours,



Heidi M. Davis
Highway Unit Supervisor

Ecc: DEP SERO – Maissoun Reda
USACE – Dan Vasconcelos
USACE – Kevin Newton
Raynham Conservation Commission - aengelhardt@town.raynham.ma.us
Taunton Conservation Commission – Jenna Freitas - jfreitas@taunton-ma.gov
MassDOT – Lily Collins
MassDOT – Courtney Walker
BETA Group – Hannah Davis
MA DMF – Brad Chase
MA DMF – Stephanie Berkman

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ATTACHMENT A

PRE-CONSTRUCTION SUBMITTAL CHECKLIST

Old Colony Ave Bridge replacement over the Taunton River
Raynham and Taunton, MA

THIS CHECKLIST MUST BE COMPLETED PRIOR TO THE START OF WORK. NOTE THAT SOME CONDITIONS REQUIRE THAT INFORMATION BE SUBMITTED A SPECIFIC NUMBER OF DAYS PRIOR TO THE START OF WORK OR THE PRE-CONSTRUCTION MEETING.

Pre-Construction Meeting Date: _____

Condition	Required Submittal	Due Date	Date Submitted	Date Approved
PRE-CONSTRUCTION SUBMITTAL REQUIREMENTS				
2	Name, contact information, and qualifications of the FGM	Prior to Pre-Construction Meeting		
3	Name, contact information, and qualifications of the CP/PP inspector, including specific experience and years to meet requirement	Prior to Pre-Construction Meeting		
4	Name and contact information of the RE	Prior to Pre-Construction Meeting		
6	USACE Work-Start Notification Form	14 days prior to work start		
7&8	CP/PP and Training Verification	14 days prior to work start		
10	Control of Water Plan	14 days prior to work start		

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13	Flood Contingency Plan	Prior to Work Start		
14	IPMS	Prior to Pre-Construction Meeting		
16	Final Construction Plans	30 days prior to Pre-Construction Meeting		
17	Demo Plan	21 days prior to Pre-Con Meeting		
38	SAP	Prior to Dredge		
39	Dredged Material Dewatering Plan	21 Days Prior to Dredge		
40	LSP qualifications	Prior to Pre-con Meeting		

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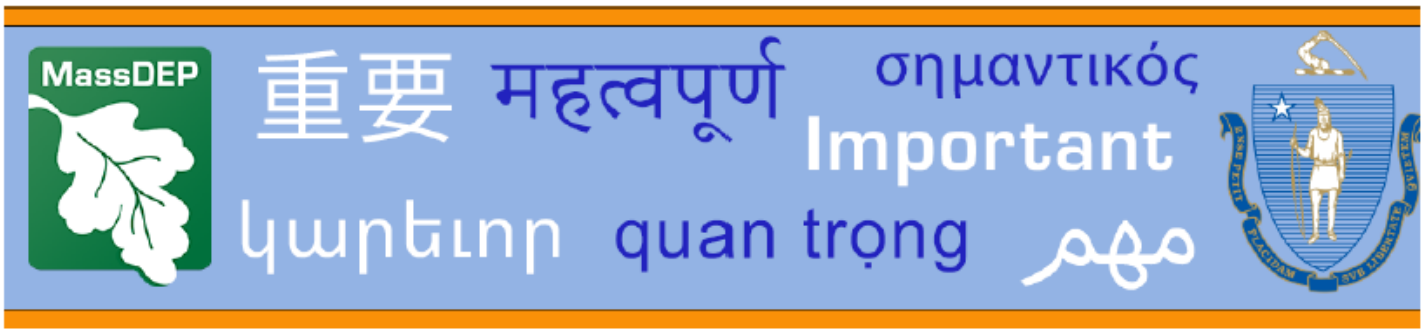

Communication for Non-English-Speaking Parties

This document is important and should be translated immediately.

If you need this document translated, please contact MassDEP's Director of Environmental Justice at the telephone number listed below.

Español Spanish

Este documento es importante y debe ser traducido inmediatamente. Si necesita traducir este documento, póngase en contacto con el Director de Justicia Ambiental de MassDEP (*MassDEP's Director of Environmental Justice*) en el número de teléfono que figura más abajo.

Português Portuguese

Este documento é importante e deve ser traduzido imediatamente. Se você precisar traduzir este documento, entre em contato com o Diretor de Justiça Ambiental do MassDEP no número de telefone listado abaixo.

繁體中文 Chinese Traditional

本文檔很重要，需要即刻進行翻譯。
如需對本文檔進行翻譯，請透過如下列示電話號碼與 MassDEP 的環境司法總監聯絡。

简体中文 Chinese Simplified

这份文件非常重要，需要立即翻译。
如果您需要翻译这份文件，请通过下方电话与 MassDEP 环境司法主任联系。

Ayisyen Kreyòl Haitian Creole

Dokiman sa a enpòtan epi yo ta dwe tradui l imedyatman. Si w bezwen tradui dokiman sa a, tanpri kontakte Direktè. Jistis Anviwònmantal MassDEP a nan nimewo telefòn ki endike anba a.

Việt Vietnamese

Tài liệu này và quan trọng và phải được dịch ngay. Nếu quý vị cần bản dịch của tài liệu này, vui lòng liên hệ với Giám Đốc Phòng Công Lý Môi Trường của MassDEP theo số điện thoại được liệt kê bên dưới.

ប្រទេសកម្ពុជា Khmer/Cambodian

ឯកសារនេះមានសារៈសំខាន់
ហើយគប្បីត្រូវបានបកប្រែភ្លាមៗ។
ប្រសិនបើអ្នកត្រូវការអោយឯកសារនេះបកប្រែ
សូមទាក់ទងនាយកផ្នែកយុត្តិធម៌បរិស្ថានរបស់
MassDEPតាមរយៈលេខទូរស័ព្ទដែលបានរាយដូចខាងក្រោម។

Kriolu Kabuverdianu Cape Verdean

Es dokumentu sta important i tenki ser tradusidu immediatamenti. Se nho ta presisa ke es dokumentu sta tradisidu, por favor kontata O Diretor di Justisia di Environman di DEP ku es numero di telifoni menxionadu di baixo.

MassDEP

The Commonwealth of Massachusetts
Department of Environmental Protection

Русский Russian

Это чрезвычайно важный документ, и он должен быть немедленно переведен. Если вам нужен перевод этого документа, обратитесь к директору Департамента экологического правосудия MassDEP (MassDEP's Director of Environmental Justice) по телефону, указанному ниже.

العربية Arabic

هذه الوثيقة مهمة وتجب ترجمتها على الفور.

إذا كنت بحاجة إلى ترجمة هذه الوثيقة، فيرجى الاتصال بمدير العدالة البيئية في MassDEP على رقم الهاتف المذكور أدناه.

한국어 Korean

이 문서는 중대하므로 즉시 번역되어야 합니다.
본 문서 번역이 필요하신 경우, 매사추세츠 환경보호부의 "환경정의" 담당자 분께 문의하십시오. 전화번호는 아래와 같습니다.

հայերեն Armenian

Այս փաստաթուղթը կարևոր է, և պետք է անհապաղ թարգմանել այն:
Եթե Ձեզ անհրաժեշտ է թարգմանել այս փաստաթուղթը, դիմեք Մասաչուսեթսի շրջակա միջավայրի պահպանության նախարարության (MassDEP) Բնապահպանական հարցերով արդարադատության ղեկավարին (Director of Environmental Justice)՝ ստորև նշված հեռախոսահամարով

فارسی Farsi Persian

این نوشتار بسیار مهمی است و باید فوراً ترجمه شود.
اگر نیاز به ترجمه این نوشتار دارید لطفاً با مدیر عدالت محیط زیستی MassDEP در شماره تلفن ذکر شده زیر تماس بگیرید.

Français French

Ce document est important et doit être traduit immédiatement. Si vous avez besoin d'une traduction de ce document, veuillez contacter le directeur de la justice environnementale du MassDEP au numéro de téléphone indiqué ci-dessous.

Deutsch German

Dieses Dokument ist wichtig und muss sofort übersetzt werden. Wenn Sie eine Übersetzung dieses Dokuments benötigen, wenden Sie sich bitte an MassDEP's Director of Environmental Justice *(Direktor für Umweltgerechtigkeit in Massachusetts)* unter der unten angegebenen Telefonnummer.

Ελληνική Greek

Το έγγραφο αυτό είναι πολύ σημαντικό και πρέπει να μεταφραστεί αμέσως. Αν χρειάζεστε μετάφραση του εγγράφου αυτού, παρακαλώ επικοινωνήστε με τον Διευθυντή του Τμήματος Περιβαλλοντικής Δικαιοσύνης της Μασαχουσέτης στον αριθμό τηλεφώνου που αναγράφεται παρακάτω

Italiano Italian

Questo documento è importante e deve essere tradotto immediatamente. Se hai bisogno di tradurre questo documento, contatta il Direttore della Giustizia Ambientale di MassDEP al numero di telefono sotto indicato.

Język Polski Polish

Ten dokument jest ważny i powinien zostać niezwłocznie przetłumaczony. Jeśli potrzebne jest tłumaczenie tego dokumentu, należy skontaktować się z dyrektorem ds. sprawiedliwości środowiskowej MassDEP pod numerem telefonu podanym poniżej.

हिन्दी Hindi

यह दस्तावेज महत्वपूर्ण है और इसका अनुवाद तुरंत किया जाना चाहिए। यदि आपको इस दस्तावेज का अनुवाद कराने की जरूरत है, तो कृपया नीचे दिए गए टेलीफोन नंबर पर MassDEP के पर्यावरणीय न्याय निदेशक से संपर्क करें।

 Please see below for clarification on Conditions 33 and 47.

From: Jonathan Niro
To: Davis, Heidi (DEP)
Cc: Walker, Courtney L. (DOT); Collins, Lily R. (DOT); Lewis, Tyler (DEP); Chris Jones
Subject: RE: 401 WATER QUALITY CERTIFICATION/Old Colony Ave Bridge (R-02-003=T-01-004) replacement over the Taunton River, Raynham and Taunton
Date: Tuesday, June 23, 2026 9:38:43 AM
Attachments: image001.png

CAUTION: This email originated from a sender outside of the Commonwealth of Massachusetts mail system. Do not click on links or open attachments unless you recognize the sender and know the content is safe.

Heidi,

Great – thank you very much!

Best,

Jonathan Niro, PWS
Project Manager
BETA Group, Inc. | 844.800.2382 x7141

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From: Davis, Heidi (DEP) <heidi.davis@mass.gov>
Sent: Tuesday, June 23, 2026 9:33 AM
To: Jonathan Niro <JNiro@BETA-Inc.com>
Cc: Walker, Courtney L. (DOT) <Courtney.L.Walker@dot.state.ma.us>; Collins, Lily R. (DOT) <lily.r.collins@dot.state.ma.us>; Lewis, Tyler (DEP) <Tyler.Lewis@mass.gov>
Subject: RE: 401 WATER QUALITY CERTIFICATION/Old Colony Ave Bridge (R-02-003=T-01-004) replacement over the Taunton River, Raynham and Taunton

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Good morning, Jonathan –

My apologies for not getting back to you sooner, this got lost in the email deluge.

Regarding #33, no, we did not intend this condition to prohibit on excavators entering the river within dewatered areas behind cofferdams to complete the dredging within the approved impact areas, as the WQC has authorized these impacts. We understand that the contractor will be required to use a mixed staging approach consisting of equipment both on land and within the cofferdam to complete the work.

Regarding #47, this condition is intended to refer to turbidity discharges associated with cofferdam/water control failure, rather than the eventual slow removal of cofferdams/water

controls.

Thanks,
Heidi

From: Jonathan Niro <JNiro@BETA-Inc.com>
Sent: Tuesday, June 23, 2026 7:37 AM
To: Davis, Heidi (DEP) <heidi.davis@mass.gov>
Cc: Reda, Maissoun (DEP) <maissoun.reda@mass.gov>; Vasconcelos, Daniel B CIV USARMY CENAE (USA) <daniel.b.vasconcelos@usace.army.mil>; Newton, Kevin M CIV USARMY CENAE (USA) <kevin.m.newton@usace.army.mil>; aengelhardt <aengelhardt@town.raynham.ma.us>; Jenna Freitas <jfreitas@taunton-ma.gov>; Collins, Lily R. (DOT) <lily.r.collins@dot.state.ma.us>; Walker, Courtney L. (DOT) <Courtney.L.Walker@dot.state.ma.us>; Hannah Davis <hdavis@beta-inc.com>; Chase, Brad (FWE) <brad.chase@mass.gov>; Berkman, Stephanie (FWE) <Stephanie.Berkman@mass.gov>; Lewis, Tyler (DEP) <Tyler.Lewis@mass.gov>; Chris Jones <cjones@beta-inc.com>; Laura Krause <LKrause@BETA-Inc.com>
Subject: RE: 401 WATER QUALITY CERTIFICATION/Old Colony Ave Bridge (R-02-003=T-01-004) replacement over the Taunton River, Raynham and Taunton

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Good morning Heidi,

I just wanted to check in on the email below as we move towards finalizing our final submission with MassDOT on this project. Any clarifications that you can provide would be greatly appreciated.

Best,

Jonathan Niro, PWS
Project Manager
BETA Group, Inc. | 844.800.2382 x7141

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From: Jonathan Niro
Sent: Friday, May 1, 2026 7:29 AM
To: Davis, Heidi (DEP) <heidi.davis@mass.gov>
Cc: Reda, Maissoun (DEP) <maissoun.reda@mass.gov>; Vasconcelos, Daniel B CIV USARMY CENAE (USA) <daniel.b.vasconcelos@usace.army.mil>; Newton, Kevin M CIV USARMY CENAE (USA) <kevin.m.newton@usace.army.mil>; aengelhardt <aengelhardt@town.raynham.ma.us>; Jenna Freitas <jfreitas@taunton-ma.gov>; Collins, Lily R. (DOT) <lily.r.collins@dot.state.ma.us>; Walker, Courtney L. (DOT) <Courtney.L.Walker@dot.state.ma.us>; Hannah Davis <HDavis@BETA-Inc.com>;

Chase, Brad (FWE) <brad.chase@mass.gov>; Berkman, Stephanie (FWE) <Stephanie.Berkman@mass.gov>; Lewis, Tyler (DEP) <Tyler.Lewis@mass.gov>; Chris Jones <cjones@BETA-Inc.com>; Laura Krause <LKrause@BETA-Inc.com>
Subject: RE: 401 WATER QUALITY CERTIFICATION/Old Colony Ave Bridge (R-02-003=T-01-004) replacement over the Taunton River, Raynham and Taunton

Hi Heidi,

Thank you again for sending this over. We have reviewed with MassDOT and just wanted to get clarification of a couple of conditions:

33. *Construction vehicles and equipment shall not enter the LUW unless authorization is provided by way of this permit or amendment. The Contractor shall use equipment with boom reach capabilities and other measures to avoid inadvertent impacts to jurisdictional resource areas as a result of excavation, riprap placement, and/or bridge/pier demolition materials.*

    We would like to confirm if this provides a prohibition on excavators entering the River (only within dewatered areas behind cofferdams) to complete the dredging within the approved impact areas. Given the dimensions of the dredging area, we are anticipating that the contractor will be required to use a mixed staging approach consisting of equipment both on land and within the cofferdam to complete the work.

47. If visual turbidity escapes the controls in place, as described in Condition 42, work shall stop immediately and MassDEP shall be notified within 24 hours. Work shall not resume until the issue is corrected and to the satisfaction of MassDEP.

    We would like to confirm if this is intended to refer to turbidity discharges associated with cofferdam/water control failure, rather than the eventual slow removal of cofferdams/water controls. While slow removal will be required to minimize downstream turbidity, some level of turbidity is anticipated to be unavoidable when demobilizing.

Thank you, and please let us know if you would like to discuss via a call if you have any additional questions based on the notes above!

Best,

Jonathan Niro, PWS
Project Manager
BETA Group, Inc. | 844.800.2382 x7141

Build your future at BETA. *Apply now!*

From: Davis, Heidi (DEP) <heidi.davis@mass.gov>
Sent: Friday, April 17, 2026 1:14 PM
To: Jonathan Niro <JNiro@BETA-Inc.com>
Cc: Reda, Maissoun (DEP) <maissoun.reda@mass.gov>; Vasconcelos, Daniel B CIV USARMY CENAE

(USA) <daniel.b.vasconcelos@usace.army.mil>; Newton, Kevin M CIV USARMY CENAE (USA) <kevin.m.newton@usace.army.mil>; aengelhardt <aengelhardt@town.raynham.ma.us>; Jenna Freitas <jfreitas@taunton-ma.gov>; Collins, Lily R. (DOT) <lily.r.collins@dot.state.ma.us>; Walker, Courtney L. (DOT) <Courtney.L.Walker@dot.state.ma.us>; Hannah Davis <HDavis@BETA-Inc.com>; Chase, Brad (FWE) <brad.chase@mass.gov>; Berkman, Stephanie (FWE) <Stephanie.Berkman@mass.gov>; Lewis, Tyler (DEP) <Tyler.Lewis@mass.gov>
Subject: 401 WATER QUALITY CERTIFICATION/Old Colony Ave Bridge (R-02-003=T-01-004) replacement over the Taunton River, Raynham and Taunton

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Good afternoon, Jonathan –

Attached please find the 401 Water Quality Certification for the replacement of the Old Colony Avenue Bridge (R-02-003=T-01-004) over the Taunton River in Raynham and Taunton.

Please contact me at heidi.davis@mass.gov or Tyler Lewis at tyler.lewis@mass.gov if you have any questions concerning this document.

Best regards,
Heidi

Heidi M. Davis
Senior Wetland Analyst
Highway Unit Supervisor
Wetlands Program, Boston Office
MassDEP
339-225-2332

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DOCUMENT A00842

VERIFICATION FORMS

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Appendix A. Verification Form (updated January 2025)

Federal Highway Administration (FHWA) or the applicable state Department of Transportation (DOT) shall submit a signed version of this completed form, together with any project plans, maps, supporting analyses, etc., to NOAA's National Marine Fisheries Service (NMFS), Greater Atlantic Regional Fisheries Office, Protected Resources Division (GARFO PRD) at nmfs.gar.esa.section7@noaa.gov with "FHWA GARFO NLAA Program: [Project Title or Number]" in the subject line. **Note:** project design contractors and/or consultants may assist in preparing the form, but only FHWA/DOT staff shall sign off on it on the final page.

Project Activity Type (check all that apply to the entire action):

- [x] 1. Bridge repair, demolition, or replacement project
- [ ] 2. Culvert repair or replacement project
- [ ] 3. Dock, pier, or waterway access project (includes construction, demolition, and repairs)
- [ ] 4. Slope stabilization project

Transportation Project Information

Name of Project:	613642 RAYNHAM- TAUNTON- BRIDGE REPLACEMENT, R-02-003=T-01-004		
Reinitiation (Yes/No):	No		
State DOT/Program:	MassDOT		
DOT ID Code:	613642		
Contact Person:	Dave Paulson		
Phone:	+ 1 857 262 3378	Email:	david.j.paulson@dot.state.ma.
Project Latitude (e.g., 42.625884):		41.886006	
Project Longitude (e.g., -70.646114):		-71.030015	
Maximum Water Depth (m)		2.3	
Anticipated Project Start Date:	Decemeber 2026	Anticipated Project End Date:	October 2028
City/Town:	Taunton/ Raynham MA	Water body:	Taunton River
Project/Action Description and Purpose:	The Massachusetts Department of Transportation (MassDOT – Highway Division) Is proposing a reconstruction of the Old Colony Avenue Bridge over the Taunton River. The overall project limits extend 250' north of the intersection of Old Colony Avenue and Battle Row in Taunton, MA; along the Old Colony Avenue Bridge; and 370' to the intersection of South Street East and Sandy Hill Road, in Raynham, MA . The total length of the Project is approximately 790' along Old Colony Avenue and South Street East. The Project will consist of several activities including: Bridge deck replacement; Full depth pavement construction in the vicinity of the bridge; Pavement milling and overlay to the north and south of the bridge; Modifications to roadway geometry; Construction of a new sidewalk; New granite curbing; Striping of two travel lanes and a bike lane; Installation of Americans With Disabilities Act (ADA)-Compliant Ramps; Replacement of Guardrails; Paving of an existing town-owned gravel area associated with the pump station; Modifications to water, sewer, gas, electric and drainage utilities; Installation of a sediment forebay and leaching basins; Placement of riprap scour protection within the Taunton River; and Tree clearing and trimming. The Project only proposes the replacement of the superstructure and will maintain the existing substructure (i.e., piers and abutments). The project will result in temporary and permanent impacts to federally jurisdictional Waters of the U.S. including the land below Ordinary High Water (Streambank and Streambed) associated with the Taunton River. The Project will result in a total of 13,270		

ESA-listed species and/or critical habitats in the action area (Check all that apply)

☑	Atlantic sturgeon (all DPSs)	☐	Kemp's ridley sea turtle
☐	Atlantic sturgeon critical habitat Indicate which DPS (GOM, NYB, Chesapeake Bay DPSs): Select DPS	☐	Loggerhead sea turtle (Northwest Atlantic DPS)
☐	Shortnose sturgeon	☐	Leatherback sea turtle
☐	Atlantic salmon (GOM DPS)	☐	North Atlantic right whale
☐	Atlantic salmon critical habitat (GOM DPS)	☐	North Atlantic right whale critical habitat
☐	Green sea turtle (North Atlantic DPS)	☐	Fin whale

* Please consult GARFO PRD's ESA Section 7 Mapper for ESA-listed species and critical habitat information for your action area at: https://www.fisheries.noaa.gov/new-england-mid-atlantic/consultations/section-7-species-critical-habitat-information-maps-greater.

The following stressors are applicable to the action:

- ☐ Underwater Noise
- ■ Impingement/Entrainment and Entanglement
- ■ Water Quality/Turbidity
- ■ Habitat Alteration
- ☐ Vessel Traffic

Impacts Table

Habitat Alteration		
	Permanent (acres)	Temporary (acres)
Sand (saline)		
Silt/Mud/Clay (saline)		
Hard bottom (saline)		
Submerged Aquatic Vegetation (SAV) (saline)		
Sand (freshwater)		
Silt/Mud/Clay (freshwater)	0.19	0.10
Hard bottom (freshwater)		
Submerged Aquatic Vegetation (SAV) (freshwater)		
Total amount of habitat alteration	0.19	0.10
In-water Construction Impacts		
	Amount in meters	
Width of water body in action area (m)	27.0	
Stressor category that extends furthest distance into water body (e.g.; underwater noise, turbidity plume)	Turbidity	
Maximum extent of stressor into the water body (m)	92.0	

Project Design Criteria (PDC) Checklist
FHWA/DOT shall incorporate all general PDCs and all applicable PDCs in the appropriate stressor categories. For any PDCs that are not incorporated, additional justification is required for a project to be eligible for the NLAA Program. FHWA/DOT shall check the corresponding box for each PDC that is, or will be, incorporated into the project or indicate if not applicable.

GENERAL PDCs			
Yes	N/A	PDC #	PDC Description
☑	☐	1.	Ensure all operators, employees, and contractors are aware of all FHWA environmental commitments, including these PDC, when working in areas where ESA-listed species may be present or in critical habitat.
☑		2.	No portion of the proposed action will individually or cumulatively have an adverse effect on ESA-listed species or critical habitat.
☐	☑	3.	No portion of the proposed action that may affect the GOM DPS of Atlantic salmon will occur in the tidally influenced portion of rivers/streams where their presence is possible from April 10 through November 7. The range of the GOM DPS only occurs in Maine. **Note**: If the project will occur within the geographic range of the GOM DPS Atlantic salmon but their presence is not expected following the best available commercial scientific data, the work window does not need to be applied. Please attach best available information (i.e. local fisheries biologist correspondence).
☐	☑	4.	No portion of the proposed action that may affect shortnose or Atlantic sturgeon will occur in areas identified as spawning grounds as follows: i. Gulf of Maine: Apr 1-Aug 31 ii. Southern New England/New York Bight: Mar 15-Aug 31 iii. Chesapeake Bay: Mar 15-Jul 1 and Sep 15-Nov 1 **Note**: If river specific information exists that provides better or more refined time of year information, those dates may be substituted with NMFS approval.
☐	☑	5.	No portion of the proposed action that may affect shortnose or Atlantic sturgeon will occur in areas identified as overwintering grounds where dense aggregations are known to occur as follows: i. Gulf of Maine: Oct 15-Apr 30 ii. Southern New England/New York Bight: Nov 1-Mar 15 iii. Chesapeake Bay: Nov 1-Mar 15 **Note**: If river specific information exists that provides better or more refined time of year information, those dates may be substituted with NMFS approval.
☐	☑	6.	Within designated critical habitat for Atlantic sturgeon, no work will affect hard bottom substrate (e.g., rock, cobble, gravel, limestone, boulder, etc.) in low salinity waters (i.e., 0.0-0.5 parts per thousand) (PBF 1).
☑		7.	Work will result in no or only temporary/short-term changes in water temperature, water flow, salinity, or dissolved oxygen levels.

Yes	N/A	PDC #	PDC Description
☑		8.	If ESA-listed species are (a) likely to pass through the action area at the time of year when project activities occur; and/or (b) the project will create an obstruction to passage when in-water work is completed, then a zone of passage (~50% of water body) with appropriate habitat for ESA-listed species (e.g., depth, water velocity, etc.) must be maintained (i.e., physical or biological stressors such as turbidity and sound pressure must not create barrier to passage).
☑		9.	The project will not adversely impact any submerged aquatic vegetation (SAV) or oyster reefs.
☑		10.	No blasting or use of explosives will occur.
☑		11.	No in-water work on large dams or tide gates (small dam and tide gate repairs may be permitted with prior review and approval from NMFS).

UNDERWATER NOISE PDCs			
Yes	N/A	PDC #	PDC Description
☐	☑	12.	If pile driving is occurring during a time of year when ESA-listed species may be present, and the anticipated noise is above the behavioral noise threshold, a "soft start" is required to allow animals an opportunity to leave the project vicinity before sound pressure levels increase. *In addition to using a soft start at the beginning of the work day for pile driving, one must also be used at any time following cessation of pile driving for a period of 30 minutes or longer.* For impact pile driving: pile driving will commence with an initial set of three strikes by the hammer at 40% energy, followed by a one minute wait period, then two subsequent three-strike sets at 40% energy, with one-minute waiting periods, before initiating continuous impact driving. For vibratory pile installation: pile driving will be initiated for 15 seconds at reduced energy followed by a one-minute waiting period. This sequence of 15 seconds of reduced energy driving, one-minute waiting period will be repeated two additional times, followed immediately by pile-driving at full rate and energy.

Yes	N/A	PDC #	PDC Description
☐	☑	13.	All underwater noise is below the injury thresholds of ESA-listed species in the action area. Attach your calculations to this verification form supporting this.
☐	☑	14.	Any new pile-supported structure must involve the installation of no more than 50 piles (below MHW).

Information for Pile Driving:
If your project includes **pile driving of any kind**, please attach your calculation to this verification form to verify that it fits within the scope of the behavioral/injury threshold analysis for ESA-listed species in the action area. The NMFS Office of Protected Resources Acoustic Calculator is available as one source, should you not have other information:
https://www.fisheries.noaa.gov/new-england-mid-atlantic/consultations/section-7-effects-analysis-acoustics-greater-atlantic-region

Pile material (e.g., steel pipe, concrete)	Pile diameter/ width (in)	Number of piles	Installation method (e.g., impact hammer, vibratory start and then impact hammer to depth, drilling)

IMPINGEMENT/ENTRAINMENT AND ENTANGLEMENT PDCs			
Yes	N/A	PDC #	PDC Description
☑	☐	15.	If excavating or dredging, only mechanical buckets, hydraulic cutterheads, or low volume hopper dredges (e.g., CURRITUCK, ≤300 cubic yard maximum bin capacity) may be used. **Note**: We consider excavating a smaller scale form of mechanical dredging.
☑	☐	16.	No new excavation or dredging in Atlantic sturgeon or salmon critical habitat (excavation in a prior construction footprint or maintenance dredging is permitted, but still must meet all other PDCs). New excavation or dredging outside Atlantic sturgeon or salmon critical habitat is limited to one-time events (e.g., burying a cable or utility line) and minor (≤2 acres) expansions of areas already subject to prior excavation or maintenance dredging. Locating a replacement bridge within 250 feet (centerline to centerline) of an existing bridge and excavation of sediment around bridge piers are considered work in a previous construction footprint. **Note**: We consider excavating a smaller scale form of mechanical dredging.

Yes	N/A	PDC #	PDC Description
☑	☐	17.	Temporary intakes related to construction are prohibited in sturgeon and salmon spawning, rearing, or overwintering habitat during the time of year windows identified in General PDCs 3-5. If utilized outside those areas and times of year and in an area with anticipated sturgeon and salmon presence, temporary intakes must be equipped with 2-millimeter wedge wire mesh screening and must not have greater than 0.5 feet per second intake velocities, to prevent impingement or entrainment of juvenile and early life stages of these species.
☑	☐	18.	Work behind cofferdams, turbidity curtains, or other instruments that prevent access of animals to the project area is required when ESA-listed species are likely to be present (if presence is limited to rare, transient individuals, access control measures are not necessary). Once constructed, work inside a cofferdam at any time of year may be permitted with NMFS approval, provided the cofferdam is installed/removed outside the time-restricted period.
☑	☐	19.	No new permanent surface water withdrawal, water intakes, or water diversions.
☑	☐	20.	Turbidity control measures, including cofferdams, must be designed to not entangle or entrap ESA-listed species.
☐	☑	21.	Any in-water lines, ropes, or chains must be made of materials and installed in a manner to minimize or avoid the risk of entanglement by using thick, heavy, and taut lines that do not loop or entangle. Lines can be enclosed in a rigid sleeve.

WATER QUALITY/TURBIDITY PDCs			
Yes	N/A	PDC #	PDC Description
☐	☑	22.	In-water offshore disposal may only occur at designated disposal sites that have already been the subject of ESA section 7 consultation with NMFS and where a valid consultation is in place.
☐	☑	23.	Any temporary discharges must meet state water quality standards (e.g., no discharges of substances in concentrations that may cause acute or chronic adverse reactions, as defined by EPA water quality standards criteria).
☑	☐	24.	Only repair, upgrades, relocations, and improvements of existing discharge pipes or replacement in-kind are allowed; no new construction of untreated discharges.
☑	☐	25.	Work behind cofferdams, turbidity curtains, or other instruments to control turbidity is required when operationally feasible and ESA-listed species are likely to be present (if presence is limited to rare, transient individuals, turbidity control methods are not necessary).

HABITAT ALTERATION PDCs			
Yes	N/A	PDC #	PDC Description
☑	☐	26.	Minimize all new waterward encroachment and permanent fill.
☐	☑	27.	In Atlantic salmon critical habitat, stream simulation design with a minimum span of 1.2 bankfull width will be used in areas with minimal tidal influence. In tidal areas, a design that allows for unimpeded flow will be used (no delay in water entering or exiting the area upstream of the crossing).
☐	☑	28.	In Atlantic salmon critical habitat, no culvert end extensions, invert line culvert rehabilitation, or slipline culvert rehabilitation may occur.

VESSEL TRAFFIC PDCs			
Yes	N/A	PDC #	PDC Description
☐	☑	29.	Maintain project (i.e., construction) vessels operating within the action area to speed limits below 10 knots and dredge vessels to speeds of 4 knots maximum, while dredging.
☐	☑	30.	Maintain a 1,500-foot buffer between project (i.e., construction) vessels and ESA-listed whales and a 300-foot buffer between project vessels and sea turtles. This also applies to dredge vessels.
☐	☑	31.	The number of project (construction) vessels must be limited to the greatest extent possible, as appropriate to size and scale of project.
☐	☑	32.	The project must not result in the permanent net increase of commercial vessels.

Justification for NLAA Determination if not Incorporating All PDC
If the project is not in compliance with all of the general and stressor-based PDCs, but you can provide justification and/or special conditions to demonstrate why the project still meets the NLAA determination and is consistent with the aggregate effects considered in the programmatic consultation, you may still certify your project through the NLAA program using this verification form. Please identify which PDCs your project does not meet (e.g., PDC 9, PDC 15, PDC 22, etc.) and provide your rationale and justification for why the project is still eligible for the verification form. Project modifications must not result in different effects not already considered.

To demonstrate that the project is still NLAA, you must explain why the effects on ESA-listed species or critical habitat are **insignificant** (i.e., too small to be meaningfully measured or detected) or **discountable** (i.e., extremely unlikely to occur). **Please use this language in your justification.**

PDC#	Justification

FHWA/DOT Verification of Determination (To be filled out by FHWA/DOT staff only)
By submitting this Verification Form, FHWA, or the state DOT as FHWA's designated non-federal representative, indicates that they determined that the proposed activity described above is not likely to adversely affect (NLAA) ESA-listed species or designated critical habitat under NMFS jurisdiction in accordance with the Program, and all effects (direct, indirect, interrelated, and interdependent) are either insignificant (so small they cannot meaningfully be measured, detected, or evaluated) or discountable (extremely unlikely to occur).

☑	In accordance with the FHWA GARFO NLAA Program, we have determined that the action complies with all applicable PDCs and is not likely to adversely affect listed species.
☐	In accordance with the FHWA GARFO NLAA Program, we have determined that the action is not likely to adversely affect listed species per the justifications and/or special conditions provided above.

FHWA/DOT Signature:	Date:
David Paulson Digitally signed by David Paulson Date: 2026.01.09 15:45:25 -05'00'	01/09/2026

By providing your determination and signature, you are certifying that to the best of your knowledge the information provided in this form is accurate and based upon the best available scientific information. This form must be filled out and signed by FHWA or state DOT staff, as an officially designated non-federal representative.

GARFO PRD Concurrence (To be filled out by GARFO PRD)
After receiving the Verification Form, GARFO PRD will contact FHWA/DOT with any concerns and indicate whether GARFO PRD concurs with FHWA/DOT's determination.

☑	In accordance with the FHWA GARFO NLAA Program, GARFO PRD concurs with FHWA/DOT's determination that the action complies with all applicable PDCs and is not likely to adversely affect listed species or critical habitat.
☐	In accordance with the FHWA GARFO NLAA Program, GARFO PRD concurs with FHWA/DOT's determination that the action is not likely to adversely affect listed species or critical habitat per the justifications and/or special conditions provided above.
☐	GARFO PRD does not concur with FHWA/DOT's determination that the action complies with the applicable PDCs (with or without justifications), and recommends an individual Section 7 consultation to be completed independent from the FHWA GARFO NLAA Program.

GARFO PRD Signature:	Date:
ROOSEVELT.MESA 2026.01.12 11:52:06 -05'00'	01/12/2026

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Appendix B. Verification Form

This form demonstrates compliance with the FHWA/NMFS GARFO EFH Programmatic Consultation dated 1/16/24. The applicable state Department of Transportation (state DOT) will complete this form and enter the project details into the ESA/EFH webtool (https://www.environment.fhwa.dot.gov/esawebtool/) to apply the programmatic consultation to a transportation project. FHWA will receive and review the completed forms before a final NEPA decision as part of the overall environmental review process. FHWA with the assistance of VOLPE will compile the information provided by all covered state DOTs on the completed Verification Forms and ESA/EFH webtool for the purposes of tracking and annual monitoring. FHWA/state DOT must include the completed Verification Form as part of a permit application with any other federal agency, such as U.S. Army Corps of Engineers or U.S. Coast Guard, to confirm that EFH consultation is complete.

Projects that are unable to meet the mandatory conservation recommendations in **bold** the state DOT will work with their FHWA Division Office to complete individual EFH consultation with NMFS.

Project Activity Type

1. ☒ Bridge repair, demolition, and replacement
2. ☐ Culvert repair and replacement
3. ☐ Docks, piers, and waterway access projects
4. ☐ Slope stabilization

Transportation Project Information

Project Name:	RAYNHAM- TAUNTON- B	Project Number:	613642
Project Sponsor:	MassDOT	Contact Person:	Dave Paulson
Email:	david.j.paulson@dot.state.	Phone:	+ 1 857 262 3378
Latitude (e.g., 42.625884):		41.886005903543975	
Longitude (e.g., -70.646114):		71.0300152141668	
City/Town, State:	Taunton/ Raynham MA	Waterway:	Taunton River
Project Description and Purpose:	The Massachusetts Department of Transportation (MassDOT – Highway Division) Is proposing a reconstruction of the Old Colony Avenue Bridge over the Taunton River. The overall project limits extend 250' north of the intersection of Old Colony Avenue and Battle Row in Taunton, MA; along the Old Colony Avenue Bridge; and 370' to the intersection of South Street East and Sandy Hill Road in Raynham, MA. The total length of the Project		
Anticipated Project Start Date:	Dec 2026	Anticipated Project End Date:	October 2028
Total area of impact to EFH (in acres): Include locus map with area of impact.		0.29	
Area of impacts to sensitive habitats (in square feet):		No impacts to submerged aquatic vegetation (SAV) or oyster reefs allowed.	
Natural rocky habitat (e.g., bedrock, boulders, cobble, and/or gravel):		0	
Salt marsh:		0	
Areas containing shellfish (excluding oyster reefs):		0	
Intertidal mudflats:		0	
Area of impact to diadromous fish habitat:		0.29	

Potential Stressors Caused by the Activity (Check all that apply based on activity type)

☐ Underwater Noise
☒ Impingement/Entrainment and Entanglement
☒ Water Quality/Turbidity
☒ Habitat Alteration
☐ Vessel Traffic

EFH Conservation Recommendation Checklist

FHWA/state DOT will indicate how the project addresses each of the programmatic EFH conservation recommendations, by selecting the appropriate check box and providing a brief explanation where necessary. **Bolded CRs are required.** If the project is not in compliance with any additional programmatic EFH conservation recommendation and FHWA/state DOT has still determined that the effects of a project on EFH are not substantial and the project is otherwise consistent with the FHWA programmatic EFH consultation, provide justification below under the conservation recommendations that are not included.

Underwater Noise

☒ Check here if the EFH conservation recommendations in this section are not applicable because the project will not create underwater noise as a stressor. Proceed to the next stressor.

1. Use a vibratory hammer to the maximum extent practicable.

☐ Not met:

☐ Not applicable, provide reasoning:

☐ Project is unable to accommodate, provide justification:

☐ Met:

☐ Shown on project plans
☐ Included in description, other terms and conditions

2. For impact driving, an initial set of three strikes would be made by the hammer at 40 percent energy, followed by a 1-minute wait period, then two subsequent 3-strike sets at 40 percent energy, with 1-minute waiting periods, before initiating continuous impact driving. In addition to a soft start at the beginning of the day for impact pile driving, a soft start must also be used at any time following cessation of impact pile driving for a period of thirty minutes or longer and if any increase in pile installation or removal intensity is required. Build up power slowly from a low energy start-up over a 20-minute period to warn fish to leave the vicinity. This buildup shall occur in uniform stages to provide a constant increase in output. This should be done in accordance with the methods outlined in the NMFS GARFO/FHWA Best Management Practices (BMP) Manual.

☐ Not met:

☐ Not applicable, provide reasoning:

☐ Project is unable to accommodate, provide justification:

☐ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

3. Avoid the use of hollow steel pipe piles when possible.

☐ Not met:
- ☐ Not applicable, provide reasoning:
- ☐ Project is unable to accommodate, provide justification:

☐ Met:
- ☐ Shown on project plans
- ☐ Included in description, other terms and conditions

4. Do not undertake noise-generating work in diadromous streams within the spring diadromous fish TOY restriction listed in Appendix C unless it is isolated behind sealed, dewatered cofferdams, to avoid impeding fish migration.

☐ Not met:
- ☐ Not applicable, provide reasoning:
- ☐ Project is unable to accommodate, provide justification:

☐ Met:
- ☐ Shown on project plans
- ☐ Included in description, other terms and condition

Impingement/Entrainment and Entanglement

☐ Check here if the EFH conservation recommendations in this section are not applicable because the project will not lead to impingement/entrainment and entanglement as a stressor. Proceed to the next stressor.

5. **Turbidity control measures must be properly installed, secured and regularly monitored to ensure aquatic species are not entangled or trapped in the project area.**

☐ Not met: Project requires individual consultation with NMFS

☒ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

6. **No new permanent surface water withdrawal, water intakes, or water diversions. (Permanent surface water intakes do not include dry hydrants.)**

☐ Not met: Project requires individual consultation with NMFS

☒ Met
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

7. Install and operate temporary intakes related to construction in accordance with the NMFS GARFO/FHWA Best Management Practices (BMP) Manual and equip intakes with mesh size screening and approach velocity appropriate for the species and life stage anticipated to be present during construction. Temporary pumping/intakes related to construction water handling will be based on the resource present and be in accordance with state fisheries consultation (with documentation provided) where such consultation is available. In addition,
   a) Per the NMFS Anadromous Salmonid Passage Facility Design manual, screen openings must not exceed 3/32 inch and screen approach velocity must be less than 0.25 feet per second (ft. /sec) in waters supporting anadromous salmonids.
   b) The use of 2 millimeter (mm) wedge wire screens must be used with a maximum intake velocity of 0.5 feet per second (ft. /sec).
   c) In Virginia, a 1 mm wedge wire screen with a maximum intake velocity of 0.25 ft. /sec) is required.

☐ Not met:
- ☐ Not applicable, provide reasoning:
- ☐ Project is unable to accommodate, provide justification:

☒ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

Water Quality/Turbidity

☐ Check here if the EFH conservation recommendations in this section are not applicable because the project will not negatively affect water quality or create turbidity. Proceed to the next stressor.

8. **Install soil erosion, sediment, and turbidity controls and maintain them in effective operating condition during construction. Remove controls upon completion of work, after all exposed soil and other fills, as well as any work waterward of ordinary high water or the high tide line, are permanently stabilized.**

☐ Not met: Project requires individual consultation with NMFS

☒ Met:
- ☒ Shown on project plans
- ☒ Included in description, other terms and conditions

9. **Prevent construction debris and sediment from entering aquatic areas and remove all construction debris and excess/deteriorated materials and dispose of in an appropriate upland area.**

☐ Not met: Project requires individual consultation with NMFS

☒ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

10. **Dredged and/or excavated materials, including any fine-grained materials removed from inside culverts, shall either be moved to an upland location and stabilized to prevent reentry into the waterway or disposed of at a previously approved disposal site.**

☐ Not met: Project requires individual consultation with NMFS

☒ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

11. **Completely remove and do not reuse existing creosote piles that are affected by project activities and do not install new creosote piles. Piles that break or cannot be removed due to site conditions must be cut off at the mudline.**

☐ Not met: Project requires individual consultation with NMFS

☒ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

12. **Ensure that raw concrete does not contact the water; wet pours of concrete must be confined within sealed forms until the concrete is set or pre-cast members installed. Ensure grout bags are watertight.**

☐ Not met: Project requires individual consultation with NMFS

☒ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

13. Install and remove any in-water soil erosion, sediment, and turbidity controls outside of the TOY restrictions listed in Appendix C.

☐ Not met:

☐ Not applicable, provide reasoning:

☐ Project is unable to accommodate, provide justification:

☒ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

14. Conduct in-water work that produces turbidity or sedimentation in diadromous streams or EFH outside of the TOY restriction(s) in Appendix C.

☐ Not met:
- ☐ Not applicable, provide reasoning:
- ☐ Project is unable to accommodate, provide justification:

☒ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

15. Do not use any creosote, coal tar epoxy, or other hydrocarbon-based coatings on any in-water structures or overwater structures. Dispose of any demolished structures treated with creosote, coal tar epoxy, or other hydrocarbon-based coatings in an approved upland disposal site.

☒ Not met:
- ☒ Not applicable, provide reasoning:

Project does not propose any hydrocarbon-based coatings

- ☐ Project is unable to accommodate, provide justification:

☐ Met:
- ☐ Shown on project plans
- ☐ Included in description, other terms and conditions

16. In NJ only, in areas mapped as shellfish beds pursuant to N.J.A.C 7:7-9.2
    - All structures should be constructed with alternative materials, such as plastic, natural cedar or other untreated wood, or pressure-treated wood, coated offsite with an impact resistant, biologically inert substance to minimize leachate into shellfish areas.

- Coat any chemically or pressure treated piles (CCA, ACQ, etc.) with an impact-resistant, biologically inert substance. Coating should be applied during the manufacturing process, not post-manufacturing by a third party or contractor.

☒ Not met:

☒ Not applicable, provide reasoning:

Project action area is not in New Jersey

☐ Project is unable to accommodate, provide justification:

☐ Met:

☐ Shown on project plans

☐ Included in description, other terms and conditions

Habitat Alteration

☐ Check here if the EFH conservation recommendations in this section are not applicable because the project will not cause habitat alteration. Proceed to the next stressor.

17. **Remove temporary and/or obsolete structures and fills in their entirety. Use geotextile barriers prior to placement of temporary fill material to ensure complete removal.**

☐ Not met: Project requires individual consultation with NMFS

☒ Met:

☐ Shown on project plans

☒ Included in description, other terms and conditions

18. **Return areas impacted by temporary activities, fills, or structures to pre-construction or better condition, including elevations and substrate, and replant with native species.**

☐ Not met: Project requires individual consultation with NMFS

☒ Met:

☐ Shown on project plans

☒ Included in description, other terms and conditions

19. **Temporary monitoring devices, if used in-water as part of an activity, shall be removed and the substrate restored to pre-construction elevations no later than 24 months from initial installation, or upon completion of data acquisition.**

☐ Not met: Project requires individual consultation with NMFS

☒ Met:

☐ Shown on project plans

☒ Included in description, other terms and conditions

20. **Pipelines and cables that cross a waterway must not rest on the substrate. They may be**

attached to an overwater structure or be buried to allow an area to return to preexisting conditions.

☐ Not met: Project requires individual consultation with NMFS

☒ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

21. **Any fill, including planting media and placement of any seed shellfish, spatted-shell, or cultch must be free of all non-native or invasive species and/or contaminants. An invasive species control plan must be part of the project if the transportation agency cannot guarantee this.**

☐ Not met: Project requires individual consultation with NMFS

☒ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

22. **Prevent dislodging of coir logs, mats, or native oyster shell.**

☐ Not met: Project requires individual consultation with NMFS

☒ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

23. **Lowermost section of floating docks and vessels must be ≥18 inches above the substrate at all times.**

☐ Not met: Project requires individual consultation with NMFS

☒ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

24. **Avoid propeller scour and grounding of all project vessels and floating docks.**

☐ Not met: Project requires individual consultation with NMFS

☒ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

25. Provide compensatory mitigation for all permanent impacts to aquatic habitats and for temporary impacts in place over 12 months to address the temporal loss of aquatic habitat functions. This could include a contribution to an existing in-lieu fee program. Because compensatory mitigation is intended to offset adverse effects of an action, it

cannot be viewed separately from an action causing the effect.

When impacts are unavoidable:

a) Conduct a pre-biological survey to map the coverage of the sensitive habitats;
b) Develop a compensatory mitigation plan for biological resource losses, including success criteria, monitoring and adaptive management plans, and long-term maintenance plan. Use the 2008 Final Rule, Compensatory Mitigation for Losses of Aquatic Resources under Clean Water Act Section 404 (33 CFR Parts 325 and 332, 40 CFR Part 230) and NOAA's Mitigation Policy as guides for the development of the compensatory mitigation plan.
c) Undertake compensatory mitigation prior to or concurrent with any impacts to sensitive habitat.

☒ Not met:

◉ Not applicable, provide reasoning:

The project does not propose any loss of aquatic resources

☐ Project is unable to accommodate, provide justification:

☐ Met:

☐ Shown on project plans
☐ Included in description, other terms and conditions

26. Prior to construction, identify and mark in the field any SAV and wetlands at the project site. An SAV survey is required for activities adjacent to mapped or known SAV if a survey has not been conducted in the previous three years.

☐ Not met:

☐ Not applicable, provide reasoning:

☐ Project is unable to accommodate, provide justification:

☒ Met:

☐ Shown on project plans
☒ Included in description, other terms and conditions

27. Locate temporary structures, anchors, spud barges, and construction, access, and dewatering activities outside of special aquatic sites.

☐ Not met:

☐ Not applicable, provide reasoning:

☐ Project is unable to accommodate, provide justification:

☒ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

28. All in-water work, including dredging or discharge of fill material will be undertaken at, or approximating, low tide and using low ground pressure equipment to prevent compaction. Low ground pressure is defined as < 3 psi. Where construction requires heavy equipment operation in or across wetlands or mudflats, the equipment shall be placed on construction timber mats that are adequate to support the equipment; be operated on dry or frozen wetlands such that shear pressure does not cause subsidence of the wetlands immediately beneath equipment and upheaval of adjacent wetlands. Construction mats must not be dragged into position.

☐ Not met:
- ☐ Not applicable, provide reasoning:
- ☐ Project is unable to accommodate, provide justification:

☒ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

29. Remove temporary and/or obsolete structures and fills in their entirety, unless the structure or fill is to be left in place in order to comply with conditions imposed by other state or federal permits. Obsolete structures do not include any structures that are repurposed or preserved to prevent habitat degradation (e.g., abutments or sheet piling that remain in place for habitat or scour protection).

☐ Not met:
- ☐ Not applicable, provide reasoning:
- ☐ Project is unable to accommodate, provide justification:

☒ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

30. If rock relocation is necessary, move them to an area of equivalent depth and substrate.

☐ Not met:

☐ Not applicable, provide reasoning:

☐ Project is unable to accommodate, provide justification:

☒ Met:

☐ Shown on project plans

☒ Included in description, other terms and conditions

31. The height of docks and piers must be at least four feet above salt marsh substrate and must be greater than or equal to the width of the deck to minimize shading impacts. The height must be measured from the marsh substrate to the bottom of the longitudinal support beam.

☐ Not met:

☐ Not applicable, provide reasoning:

☐ Project is unable to accommodate, provide justification:

☐ Met:

☐ Shown on project plans

☐ Included in description, other terms and conditions

32. The lowermost part of floating docks must be greater than or equal to 18 inches above the substrate at all times to avoid grounding and propeller scour and to provide adequate circulation and flushing.

☒ Not met:

☒ Not applicable, provide reasoning:

Floating docks not proposed

☐ Project is unable to accommodate, provide justification:

☐ Met:

☐ Shown on project plans

☐ Included in description, other terms and conditions

33. Habitat restoration or mitigation projects must not result in a permanent conversion or loss of sensitive habitats such as SAV, natural rocky habitats, areas containing shellfish, mudflats, and riffle and pool complexes.

☒ Not met:

☒ Not applicable, provide reasoning:

No SAS in action area

☐ Project is unable to accommodate, provide justification:

☐ Met:

☐ Shown on project plans

☐ Included in description, other terms and conditions

34. Grain size of any sediment used as part of habitat restoration must be the same size or larger than the native material at the site. Material must be free from toxic chemicals (in excess of ERM values in NOAA SQuiRT tables), asphalt, and other trash or anthropogenic debris.

☐ Not met:

☐ Not applicable, provide reasoning:

☐ Project is unable to accommodate, provide justification:

☒ Met:

☐ Shown on project plans

☒ Included in description, other terms and conditions

35. The following buffers apply between the following habitats and the top of slope of the area to be dredged/excavated.:

a) In New England, setbacks of 100 ft. from tidal SAV or 25 ft. from natural rocky habitats, Special Aquatic Sites (wetlands, mudflats, riffle/pool complexes) and areas containing shellfish.
b) In NY, NJ, DE and PA, dredging shall not occur within 25 ft. from the edge of vegetated wetlands.
c) In NY and NJ, dredging shall not occur within 500 ft. of SAV in sediments greater than or equal to 90% sand and 250 ft. of SAV if sediments are less than 90% sand during the growing season (April 15-October 15) to minimize impacts to SAV due to turbidity.
d) In Virginia and Maryland, dredging shall not occur in areas within the distance from wetlands equal to four times the depth of the dredging.
e) In Maryland, dredging shall not occur within 500 yds. of a natural oyster beds between December 16 to March 14 and June 1 to September 30.

☐ Not met:
  ☐ Not applicable, provide reasoning:

  ☐ Project is unable to accommodate, provide justification:

☒ Met:
  ☐ Shown on project plans
  ☒ Included in description, other terms and conditions

36. Do not discharge new or proposed outlets directly into sensitive habitats and redirect upgrades to existing outlets away from sensitive habitats.

☐ Not met:
  ☐ Not applicable, provide reasoning:

  ☐ Project is unable to accommodate, provide justification:

☒ Met:
  ☐ Shown on project plans
  ☒ Included in description, other terms and conditions

Fish Passage/Migration Habitat

37. Design replacement crossings to provide anadromous and resident fish and aquatic organism passage to the maximum extent possible. Use the Federal Interagency Nature-like Fishway Passage Design Guidelines for Atlantic Coast Diadromous Fishes and Culvert Design For Aquatic Organism Passage FHWA-HIF-11-008) for design guidance. In addition, structures must:
    - provide sufficient water depth and maintain suitable water velocities during migration periods; and
    - maintain or replicate natural stream channel and flow conditions.

☐ Not met:
  ☐ Not applicable, provide reasoning:

  ☐ Project is unable to accommodate, provide justification:

☒ Met:

☒ Shown on project plans
☒ Included in description, other terms and conditions

38. Replaced or upgraded crossings must be a similar or improved structure type and must be designed to provide diadromous and resident fish organism passage by providing sufficient water depth, maintaining suitable water velocities during migration periods, and maintaining or replicating natural stream channel and flow conditions. Upgraded crossings must be designed in accordance with the order of preference set out in NMFS' Anadromous Salmonid Passage Facility Design, unless such design is otherwise approved by the State Fisheries Agency.

☐ Not met:
☐ Not applicable, provide reasoning:

☐ Project is unable to accommodate, provide justification:

☒ Met:
☒ Shown on project plans
☒ Included in description, other terms and conditions

39. For activities that require soil erosion, sediment, and turbidity controls, prevent impeding the run by incorporating the following:
    a) in non-tidal streams containing diadromous fish
        i. the activities must not encroach >25% of the stream width measured from ordinary high water during the anadromous TOY restriction unless such encroachment is otherwise approved by State Fisheries; and
        ii. In waterways supporting diadromous fish, the activities must maintain safe, timely, and effective downstream fish passage throughout the project.
    b) in tidal waters:
        i. The activities must not encroach >50% of a tidal stream's width as measured from mean high water unless such encroachment is otherwise approved by the State Fisheries Agency.

☐ Not met:
☐ Not applicable, provide reasoning:

☐ Project is unable to accommodate, provide justification:

☒ Met:

☐ Shown on project plans
☒ Included in description, other terms and conditions

40. Incorporate climate change and sea level rise projections into the project design as appropriate to address changing hydrologic conditions (increased precipitation and stream flow, altered tidal regimes, etc.). Guidance can be found in NOAA Fisheries' national Procedure for Addressing Climate Change in NMFS Essential Fish Habitat Consultations and GARFO's Guidance for Integrating Climate Change Information in Greater Atlantic Region Habitat Conservation Division Consultation Processes, including the recommendation to use relevant local or regional climate prediction models where available as well as emission and climate projection scenarios on a global scale from the Intergovernmental Panel on Climate Change (IPCC). The use of a "high" (e.g., RCP/SSP8.5) and an "intermediate" (e.g., RCP/SSP 4.5 or RCP 6.0) scenario (IPCC 2021) is suggested. For SLR projections, at a minimum the 1.0 m mean global scenario is recommended with the relevant downscaled projections for the closest tide gauge location identified in Sweet et al. (2022).

☒ Not met:
☒ Not applicable, provide reasoning:

Climate change analysis was not done due to the project keeping existing abutments.

☐ Project is unable to accommodate, provide justification:

☐ Met:
☐ Shown on project plans
☐ Included in description, other terms and conditions

Vessel Interactions

☒ Check here if the EFH conservation recommendations in this section are not applicable because the project will not use vessels.

41. Project vessels shall be operated in adequate water depths in the action area to avoid propeller scour and grounding at all tides. Shallow draft vessels will be used in shallow areas to maximize the navigational clearance between the vessel and the bottom substrate. Spuds may be used to elevate the vessel.

☐ Not met:
☐ Not applicable, provide reasoning:
☐ Project is unable to accommodate, provide justification:

☐ Met:
- ☐ Shown on project plans
- ☐ Included in description, other terms and conditions

42. Project vessels shall not be moored in or use spuds in SAV or be located in such a way that the vessel could shade SAV.

☐ Not met:
- ☐ Not applicable, provide reasoning:
- ☐ Project is unable to accommodate, provide justification:

☐ Met:
- ☐ Shown on project plans
- ☐ Included in description, other terms and conditions

43. Vessels transit through SAV shall be done at high tide.

☐ Not met:
- ☐ Not applicable, provide reasoning:
- ☐ Project is unable to accommodate, provide justification:

☐ Met:
- ☐ Shown on project plans
- ☐ Included in description, other terms and conditions

Activities that Require Individual Consultation

1. Any work (including anchoring) that results in temporary or permanent impacts to:
    a) Existing or historically mapped submerged aquatic vegetation (SAV) beds or areas within 100 feet of existing or historically mapped SAV beds unless otherwise confirmed to be absent by survey.
    b) ≥ 1,000 SF of tidal SAS (except tidal SAV, see 1 above), natural rocky habitats, or freshwater SAV.
2. Stream channelization.
3. Any temporary structures, construction access, and dewatering activities proposed to be in place for ≥ two years
4. Slip-lining or invert lining existing culverts in tidal waters or non-tidal waters that support diadromous fishes. Resources to assist in the identification of these waters can be found in Appendix H and from State fishery agencies.
5. Structures (docks, piers, walkways) or temporary structures: Less than 1:1 height/width ratio or wider than 4 ft. over salt marsh waterward of MHW. The height should be measured from the substrate to the bottom of the longitudinal support beam lowermost portion of the deck structure.
6. Construction of new or expansion of existing boating facilities. For the purposes of this programmatic EFH consultation, a boating facility is boat docking or mooring space for more than two non-commercial vessels.
7. Excavation for the purpose of establishing new or improved navigation channels (e.g. dredging), exceeding the thresholds listed under number 1 above.
8. Any nearshore disposal or beach nourishment activities.
9. New fill or stabilization structures placed below mean low water in excess of 200 linear feet (lf).
10. Replacement of:
    a) slope stabilization structures > 200 lf. *and* waterward of the existing toe, or
    b) vertical structures > 18 inches waterward of the existing face *and* > 200 lf.
11. in layer deposition as a part of wetland restoration.
12. Placement of any seed shellfish, spatted-shell, or cultch in the following sensitive habitats: fish and wildlife sanctuaries and refuges, mudflats, SAV beds, riffle/pool complexes, natural rocky habitats, intertidal areas, and areas containing shellfish.
13. In-water utility lines ≥100 linear feet (LF) installed by trench excavation; or where installed by jet-plow, fluidization or other direct burial methods:
    a) installed in mud, clay, or silt substrates; or
    b) ≥200 LF when installed in sandy substrates (e.g. >/= 90% coarse grained sand habitats (Wentworth <35 ASTM No. US Standard)). Direct burial methods do not include jacking or directional drilling/boring.
14. Airgun seismic activities.
15. Any new permanent surface water withdrawal, water intakes, or water diversions.
16. All work to tide gates without a USACE-approved operation and maintenance plan or alterations to tide gates that will affect the hydraulic regime. This does not include work on tide gates (e.g., duckbills, flap gates, etc.) that solely convey stormwater and/or NPDES-permitted discharges. See The Effects of Tide Gates on New England Wetlands and Other Tidal Resources. Greater Atlantic Region Policy Series [23-01] for additional information on tide gates and associated BMPs.
17. In-water blasting that affects EFH or diadromous species habitat, or out-of-water blasting with the discharge of blasted material in water.

18. Construction of new bridges or culverts, where no crossing existed previously.
19. Any new or replacement causeways (raised roadways across waters or wetlands). Temporary causeways do not require project specific consultation (i.e., they are covered under the programmatic consultation), provided they do not exceed the above listed threshold or include other excluded activities.
20. Dam and flood control or levee repairs that will alter water levels or flood elevations during the diadromous time of year (TOY) restriction provided in App C.
21. Living shoreline >500 linear feet in length located below OHW or the HTL and/or includes beach nourishment/ land reclamation activities.
22. Living shorelines with structure and/or fill area that extends into the waterbody more than 30 FT from the MLW line, including sand fills, sills, breakwaters, or reefs, or any living shoreline that proposes to impact SAV.
23. Excavated materials, stored, deposited, and retained anywhere but an upland area that prevents sediments from reentering aquatic habitats, except as authorized/required by the terms of a USACE or USCG approval.

DOT Determination of Effects to Essential Fish Habitat and Signature
After reviewing the programmatic EFH conservation recommendations in Section 6.0 and Appendix B, state DOT will select the appropriate determination:

☒ The activity is in compliance with all programmatic EFH conservation recommendations in the FHWA programmatic EFH consultation and adverse effects to EFH will not be substantial.

☐ The activity is not in compliance with all of the programmatic EFH conservation recommendations in the FHWA programmatic EFH consultation and individual consultation with NMFS is needed.

Use the electronic fillable fields to include the name and signature of the state DOT preparing this Verification Form, along with the date.

State DOT Name Massachusetts Department of Transportation

Signature David Paulson

Digitally signed by David Paulson
Date: 2025.12.19 10:03:33 -05'00'

Date 12/19/2025

By providing your determination and signature, you are certifying that to the best of your knowledge the information provided in this form is accurate and based upon the best available scientific information. This form must be filled out and signed state DOT staff, as an officially designated non-federal representative. Email this Verification Form to your FHWA Division Office.

FHWA Review
After receiving the Verification Form, the FHWA Division Office will contact the state DOT with any concerns. FHWA will review this form before a final NEPA decision. FHWA will email the signed form back to the state DOT for record keeping.

☐ FHWA concurs with state DOT's determination that the proposed project is consistent with the programmatic EFH consultation (without the need for justification).

☒ FHWA concurs with state DOT's determination that the proposed project is consistent with the programmatic EFH consultation, with justification described above.

☐ FHWA does not concur with state DOT's determination that the project is consistent with the programmatic EFH consultation. FHWA/state DOT must conduct additional coordination with GARFO HCD and a separate individual EFH consultation may be required.

FHWA Reviewer

Name Anthony M. Jones

Signature ANTHONY MAROC JONES

Digitally signed by ANTHONY MAROC JONES
Date: 2026.02.09 09:38:32 -05'00'

Date of Review 02/09/2026

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DOCUMENT A00844

U.S. FISH AND WILDLIFE SERVICE

NLAA CONCURRENCE VERIFICATION LETTER

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
New England Ecological Services Field Office
70 Commercial Street, Suite 300
Concord, NH 3301-5094
Phone: (603) 223-2541 Fax: (603) 223-0104

In Reply Refer To: 12/18/2025 17:10:42 UTC
Project code: 2026-0024808
Project Name: 613642- RAYNHAM- TAUNTON- BRIDGE REPLACEMENT, R-02-003, SOUTH STREET EAST OVER THE TAUNTON RIVER

Subject: Not Likely to Adversely Affect Concurrence verification letter for the '613642- RAYNHAM- TAUNTON- BRIDGE REPLACEMENT, R-02-003, SOUTH STREET EAST OVER THE TAUNTON RIVER' project under the December 13, 2024, FHWA, FRA, FTA Programmatic Biological Opinion for Transportation Projects within the Range of the Indiana Bat, Northern Long-eared Bat, and Tricolored Bat.

To whom it may concern:

This letter records the determination of effects to federally listed (or proposed) bat species anticipated to result from the 613642- RAYNHAM- TAUNTON- BRIDGE REPLACEMENT, R-02-003, SOUTH STREET EAST OVER THE TAUNTON RIVER (the Project). This determination is based upon information you entered into the assisted determination key (Dkey) associated with the above referenced Programmatic Biological Opinion/Conference Opinion (PBO/PCO) in the U.S. Fish and Wildlife Service's (Service) Information for Planning and Consultation (IPaC) system on the date listed above to verify that the Project may rely on the concurrence provided in the PBO/PCO to satisfy requirements under section 7(a)(2) of the Endangered Species Act of 1973 (ESA) (16 USC 1536), as amended.

Ensuring Accurate Determinations When Using IPaC:

The Service developed the IPaC system and this Dkey in accordance with the ESA and based on the PBO/PCO. All information submitted by the project proponent into IPaC must accurately represent the full scope and details of the Project.

Failure to accurately represent or implement the Project as detailed in the Dkey invalidates this letter. Answers to certain questions in the Dkey commit the project proponent to implementation of conservation measures that must be followed for the ESA determinations to remain valid. Carefully review this letter, your ESA requirements are <u>NOT</u> yet complete.

Determinations:

Based on the information you provided (Project Description shown below), you have determined that the Project is within the scope and adheres to the criteria of the PBO/PCO, including the adoption of applicable avoidance and minimization measures. Based on your IPaC submission and the PBO/PCO, the Project is consistent with the following effect determinations:

Species	**Listing Status**	**Determination**
Northern Long-eared Bat (*Myotis septentrionalis*)	Endangered	NLAA
Tricolored Bat (*Perimyotis subflavus*)	Proposed Endangered	NLAA

The tricolored bat is proposed for listing as endangered under the ESA, but not yet listed. For actions that may affect a proposed species, agencies cannot consult, but they can confer under the authority of section 7(a)(4) of the ESA. Such conferences can follow the procedures for a consultation and be adopted as such if the proposed species is listed. Should the tricolored bat be listed, agencies must review projects that are not yet complete, or projects with ongoing effects within the tricolored bat range that previously received a no effect or not likely to adversely affect (NLAA) determination from the key to confirm that the determination is still accurate.

The Service has 14 calendar days to notify the lead Federal action agency or designated non-federal representative if we determine that the Project does not meet the criteria for a NLAA determination under the PBO/PCO. **If the Service does <u>not</u> notify the lead Federal action agency or designated non-federal representative within that timeframe, you may proceed with the Project under the terms of the NLAA concurrence provided in the PBO/PCO**. This verification period allows Service Field Offices to apply local knowledge to implementation of the PBO, as we may identify a small subset of actions having impacts that were unanticipated. In such instances, Service Field Offices may request additional information that is necessary to verify inclusion of the proposed action under the PBO/PCO.

If the Project is modified, or new information reveals that it may affect the Indiana bat, northern long-eared bat, or tricolored bat in a manner or to an extent not considered in the PBO/PCO, further review to conclude the requirements of ESA section 7(a)(2) may be required.

For Proposed Actions that include bridge/culvert or structure removal, replacement, and/or maintenance activities:

If your initial bridge, culvert, or structure assessment failed to detect Indiana bat, northern long-eared bat, or tricolored bat use or occupancy, yet bats are later detected prior to, or during construction, promptly notify the local Service Field Office within 2 working days of the discovery. In addition, please document whether incidental take occurred, and if so, the type (i.e. kill or harm) and amount (i.e. number of individuals) and submit documentation to the local Service Field Office within 5 working days from the completion of the bridge, culvert, or structure construction (use Appendix E - Post Assessment Discovery of Bats at Bridge/Culvert or Structure Form in the User's Guide). In these instances, potential incidental take of Indiana bats, northern long-eared bats, or tricolored bats may be exempted provided that the take is reported to

the Service. In these instances, potential incidental take of Indiana bats, northern long-eared bats, or tricolored bats may be exempted provided that the take is reported to the Service.

If the Project may affect any other federally listed or proposed species and/or designated critical habitat, additional consultation between the lead Federal action agency and this Service Field Office is required for those species/designated critical habitat. If the Project has the potential to take bald or golden eagles, additional coordination with the Service under the Bald and Golden Eagle Protection Act may also be required. In either of these circumstances, please advise the lead Federal action agency to contact this Service Field Office

The following species may occur in your project area and **are not** covered by this determination:

- Monarch Butterfly *Danaus plexippus* Proposed Threatened
- Plymouth Redbelly Turtle = Plymouth Redbelly Cooter *Pseudemys rubriventris bangsi* Endangered

PROJECT DESCRIPTION

The following project name and description was collected in IPaC as part of the endangered species review process.

NAME

613642- RAYNHAM- TAUNTON- BRIDGE REPLACEMENT, R-02-003, SOUTH STREET EAST OVER THE TAUNTON RIVER

DESCRIPTION

RAYNHAM- TAUNTON- BRIDGE REPLACEMENT, R-02-003=T-01-004 (3M4), SOUTH STREET EAST OVER THE TAUNTON RIVER

The proposed project consists of replacing the bridge deck, increasing safety, and improving operations of the roadway. The proposed design relocates the existing bridge sidewalk from the east to the west side of the bridge to connect to an existing sidewalk on the southwest approach. A 5-foot shoulder for a bike lane in the northbound direction improves safety by providing dedicated space for cyclists, separating them from vehicular traffic. This separation reduces the risk of conflicts between cyclists and vehicles.

Monarch Butterfly: Proposed Threatened Species only. The project action will not jeopardize the continued existence of the proposed species.

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@41.88630155,-71.03005054127355,14z

DETERMINATION KEY RESULT

Based on your answers provided, this project(s) may affect, but is not likely to adversely affect the Indiana bat, northern long-eared bat or tricolored bat, therefore, consultation with the U.S. Fish and Wildlife Service pursuant to Section 7(a)(2) of the Endangered Species Act of 1973 (ESA) (87 Stat. 884, as amended 16 U.S.C. 1531 et seq.) is required. However, also based on your answers provided, this project may rely on the concurrence provided in the Programmatic Biological Opinion/Conference Opinion for Transportation Projects in the Range of the Indiana bat, northern long-eared bat, and tricolored bat, dated December 13, 2024.

QUALIFICATION INTERVIEW

1. Which Federal Agency is the lead federal agency the action?

   A) Federal Highway Administration (FHWA)

2. Does the Action Area intersect the species list area of the Northern long-eared bat?

   Automatically answered
   Yes

3. Does the Action Area intersect the species list area of the tricolored Bat (TCB)?

   Automatically answered
   Yes

4. [Semantic] Is any portion of the action area within a 0.5 mile radius of an entrance/opening to any known NLEB or TCB hibernacula?

   Note: The map queried for this question contains proprietary information and cannot be displayed. If you need additional information, please contact the Field Office listed in the letterhead of this letter.

   Automatically answered
   No

5. Does your project's activities include raising the road profile above the tree canopy in documented habitat for the Indiana bat, NLEB, or TCB?

   Note: For the definition of documented habitat, refer to Appendix A: https://www.fws.gov/media/users-guide-range-wide-programmatic-consultation-indiana-bat-and-northern-long-eared-bat

   No

6. Is your project located within a karst area?

   No

7. Will the project include bridge, culvert, or structure removal, replacement, and/or alteration activities?

   Note: For definitions of bridge, culvert, and structure, refer to Appendix A: https://www.fws.gov/media/users-guide-range-wide-programmatic-consultation-indiana-bat-and-northern-long-eared-bat.

   Yes

8. Do your project's activities involve tree removal/trimming, temporary lighting, new/ additional permanent lighting, ground disturbance, percussives that involves noise/ vibration above existing background levels, vibrations, or slash pile burning?

   Yes

9. Is there suitable summer habitat for the Indiana bat, NLEB, or TCB within the project action area?

   Note: See the Service's summer survey guidance for current definitions of suitable habitat [https://www.fws.gov/midwest/endangered/mammals/inba/inbasummersurveyguidance.html].

   Yes

10. Have P/A surveys for the Indiana bat, NLEB, or TCB been conducted within the suitable summer habitat located within your project action area? This refers to mist-netting or acoustic surveys, not bridge assessments.

    Note: See the Service's survey guidance https://www.fws.gov/midwest/endangered/mammals/inba/inbasummersurveyguidance.html

    Yes

    SUBMITTED DOCUMENTS

    - *Raynham_613642_memo_20251027.pdf https://ipac.ecosphere.fws.gov/project/A3767GZ2FBHULEJFUCBVE3PERE/projectDocuments/173932326*

11. Did the P/A surveys detect Indiana bats, NLEBs, or TCBs?

    Note: If Indiana bats, NLEBs, or TCBs are detected, the action area is considered **documented habitat.**

    No

12. Did the local Service Field Office verify that this P/A survey can be used to determine Indiana bat, NLEB, and TCB are **not likely to be present** within the suitable summer habitat located within your project area?

    Yes

13. Will the project include **bridge** removal, replacement, and/or alteration activities?

    Yes

14. Has a Bridge Bat Assessment been conducted **within the last 24 months** to determine if the bridge is being used by the Indiana bat, NLEB, or TCB? If yes, upload assessment.

    Note: Refer to the Service's current survey guidance for acceptable assessment practices and validity timeframe of bridge/culvert and structure bat assessments: https://www.fws.gov/library/collections/range-wide-indiana-bat-and-northern-long-eared-bat-survey-guidelines.

    Yes

    SUBMITTED DOCUMENTS

    - *Raynham_613642_memo_20251027.pdf https://ipac.ecosphere.fws.gov/project/A3767GZ2FBHULEJFUCBVE3PERE/projectDocuments/173932326*

15. Please select one of the following results of the Bridge Bat Assessment:

    c) *Indicates the* ***absence*** *of Indiana bats, NLEBs, or TCBs roosting in/under the bridge (no bats, guano, etc.)?*

16. Does the project include **culvert** removal, replacement, and/or alteration activities?

    No

17. Does the project include **structure** removal, replacement, and/or alteration activities?

    No

18. Does the Action Area intersect the species list area of the tricolored Bat (TCB)?

    Automatically answered
    Yes

19. Does the Action Area intersect the species list area of the northern long-eared bat (NLEB)?

    Automatically answered
    Yes

PROJECT QUESTIONNAIRE

1. Have you made a No Effect determinations for all other species included on the FWS IPaC generated species list?

   Yes

2. Have you made a May Affect determination for any other species on the FWS IPaC generated list?

   No

3. Please enter the date of the bridge assessment.

   6/2/2025

AVOIDANCE AND MINIMIZATION MEASURES (AMMS)

This determination key result includes the commitment to implement the following Avoidance and Minimization Measures (AMMs):

GAMM1

Ensure all operators, employees, and contractors working in areas of Indiana bat, NLEB, or TCB suitable habitat are aware of all Transportation Agency environmental commitments, including all applicable AMMs.

DETERMINATION KEY DESCRIPTION: FHWA, FRA, FTA PROGRAMMATIC CONSULTATION FOR TRANSPORTATION PROJECTS AFFECTING IBAT, NLEB, OR TCB

This key was last updated in IPaC on September 11, 2025. Keys are subject to periodic revision.

This decision key is intended for projects/activities funded or authorized by the Federal Highway Administration (FHWA), Federal Railroad Administration (FRA), and/or Federal Transit Administration (FTA), which may require consultation with the U.S. Fish and Wildlife Service (Service) under Section 7 of the Endangered Species Act (ESA) and may affect the federally listed endangered Indiana bat (*Myotis sodalis*), northern long-eared bat (*Myotis septentrionalis*), and/or federally proposed endangered tricolored bat (*Perimyotis subflavus*).

This decision key should only be used to verify project applicability with the Service's Programmatic Biological Opinion/Conference Opinion for Transportation Projects in the Range of the Indiana bat, northern long-eared bat, and tricolored bat, dated December 13, 2024. The programmatic consultation limited transportation activities that may affect the covered bat species and addresses situations that are both likely and not likely to adversely affect the covered bat species. This decision key will assist in identifying the effect of a specific project/activity and the applicability of the programmatic consultation. The programmatic consultation is not intended to cover all types of transportation actions. Activities outside the scope of the programmatic consultation, or that may affect ESA-listed species other than the Indiana bat, northern long-eared bat, or tricolored bat, or their designated critical habitat, may require additional ESA Section 7 consultation.

IPAC USER CONTACT INFORMATION

Agency: Massachusetts Department of Transportation
Name: Stephanie Barton
Address: 10 Park Plaza
City: Boston
State: MA
Zip: 02116
Email stephanie.g.barton@dot.state.ma.us
Phone: 8572623378

DOCUMENT A00860

MASSACHUSETTS

DEPARTMENT OF ENVIRONMENTAL PROTECTION

NOTICE OF INTENT

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IMPROVING COMMUNITIES TOGETHER

February 9, 2026

David McRae, Chair
Raynham Conservation Commission
558 South Main Street
Raynham, MA 02767

Re: Notice of Intent – Old Colony Avenue Bridge Replacement
Old Colony Avenue, Taunton, MA

Dear Mr. Turner and Commissioners:

On behalf of the City of Taunton, BETA Group, Inc. (BETA) is submitting this Notice of Intent (NOI) for the proposed Bridge Reconstruction of bridge R-02-003=T-01-004 (the Project) at Old Colony Avenue over the Taunton River in Taunton and Raynham, Massachusetts (the Site). The Project is being filed under the MassDOT bridge exemption as specified in the 2014 Transportation Bond Bill. The bridge replacement design is substantially the functional equivalent of and in similar alignment to, the existing bridge. Therefore, the Project is not subject to the Massachusetts Wetlands Protection Act (M.G.L. ch.131, s.40 – the Act) and this NOI is being filed under the Raynham Wetlands Protection Bylaw (Chapter 336 – the Bylaw).

The Project is necessary to improve safety and transportation infrastructure in Taunton and Raynham along the Taunton River. The existing bridge was constructed in 1945, and following a recent rating it was recommended the bridge be closed to vehicular traffic due to poor conditions along the bridge abutments. The Project will require demolition of the existing bridge superstructure, construction of the new bridge deck and associated structural appurtenances; installation of scour protection within the Taunton River; full depth pavement reconstruction; and grading. The Project proposes to retain the existing bridge substructure while replacing the superstructure with a deck that is one foot wider to allow for the addition of a bicycle lane. Ancillary Project facets including guardrails and a relocated sidewalk have also been incorporated into the design, and the Project will also address the addition of scour protection within the river during construction.

The Project is considered a limited project because it involves the maintenance and improvement of an existing public roadway limited to widening less than a single lane, adding shoulders, and improving the drainage system per 310 CMR 10.53(3)(f), and it involves the repair and improvement of a bridge and culvert per 310 CMR 10.53(3)(i).

The Project will consist of the following:

- Bridge deck replacement;
- Installation of scour protection within the Taunton River;
- Full depth pavement construction in the vicinity of the bridge;
- Pavement milling and overlay to the north and south of the bridge;
- Modifications to roadway geometry;
- Construction of a new sidewalk;
- Installation of new granite curbing;
- Striping of two travel lanes and a bike lane;

BETA GROUP, INC.
89 Shrewsbury Street, Suite 300, Worcester, MA 01604
P: 508.756.1600 | W: www.BETA-Inc.com

- Installation of Americans With Disabilities Act (ADA)-Compliant Ramps;
- Replacement of guardrails;
- Modifications to water, sewer, gas, electric and drainage utilities;
- Installation of a perforated High-Density Polyethylene (HDPE) infiltration trench; and
- Tree clearing and trimming.

The Project only proposes the replacement of the superstructure and will maintain the existing substructure (i.e., piers and abutments). Accordingly, the Project will meet the Massachusetts Stream Crossing Standards to the maximum extent practicable because the existing conditions do not meet the Standards, and compliance of the existing bridge with the Standards will not change given the nature of work. Work associated with the Project will result in temporary and permanent impacts to Areas Subject to Protection under the Bylaw including Bank, Land Under Water (LUW), Bordering Land Subject to Flooding (BLSF), Riverfront Area (RA) associated with the Taunton River, 100' Buffer Zone to BLSF, and 25' No-Activity Buffer Zone. The Project will result in a total of 15,128 square feet (sf) and 117 linear feet (lf) of impacts to Resource Areas with the Town of Raynham, further broken down as follows:

- 66 linear feet (lf) of temporary and 51 lf of permanent impact to Bank;
- 2,304 square feet (sf) of temporary and 4,399 sf of permanent impact to LUW associated with a dredge volume of 1,052 cubic yards (cy);
- 1,121 sf of permanent impact to BLSF;
- 1,867 sf of temporary impact and 4,477 sf permanent impact to Riverfront Area; and
- 315 sf of temporary impact and 645 sf of permanent impact to the Bylaw 25' No-Activity Buffer Zone.

The Project is located entirely within the Bylaw 100' Buffer Zone to BLSF and therefore will result in 5,518 sf of temporary impact and 5,616 sf of permanent impact to the Bylaw 100' Buffer Zone to BLSF. The Project will also result in 1,309 sf of temporary impact and 3,253 sf of permanent impact to 100' Buffer Zone to Bank and 3,479 sf of temporary impact and 3,895 sf of permanent impact to 100' Buffer Zone to BVW.

An NOI with the Taunton Conservation Commission has been prepared and submitted concurrently with this Application. The NOI for work in Taunton is being filed under the MassDOT bridge exemption as specified in the 2014 Transportation Bond Bill and is therefore only subject to review under the Taunton Wetlands Protection Ordinance. As a municipal project, this filing is not subject to the fee requirements of the Bylaw. Abutters to the Project have been notified in accordance with Local requirements.

We trust that the following application provides adequate information to facilitate the issuance of an Order of Conditions approving the Project as presented. Should you have any additional questions, please do not hesitate to contact us.

Very truly yours,
BETA Group, Inc.

Hannah Davis
Staff Scientist

Jonathan Niro, PWS
Project Manager

cc:
Christopher Jones, PE (BETA)
Laura Krause (BETA)
Courtney Walker (MassDOT)
Lily Collins (MassDOT)

Job No: 23.10887.00

Raynham, Massachusetts

Old Colony Avenue Bridge Reconstruction
R-02-003=T-01-004

MassDOT Project Number 613642

February 2026

NOTICE OF INTENT

89 Shrewsbury Street
Suite 300
Worcester, MA 01604
508.756.1600
www.BETA-Inc.com

Old Colony Avenue Bridge Reconstruction
R-02-003=T-01-004

Raynham, Massachusetts

MassDOT Project Number 613642

NOTICE OF INTENT

Prepared by: BETA GROUP, INC.
Prepared for: City of Taunton

February 2026

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WPA Form 3 – Notice of Intent

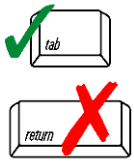
Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 3 – Notice of Intent

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:
MassDEP File Number
Document Transaction Number
Raynham
City/Town

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



Note: Before completing this form consult your local Conservation Commission regarding any municipal bylaw or ordinance.

A. General Information

1. Project Location (**Note:** electronic filers will click on button to locate project site):

Old Colony Avenue Bridge over Taunton River	Taunton and Raynham	02718 and 02767
a. Street Address	b. City/Town	

Latitude and Longitude:

41°53'09.9"N	71°01'48.1"W
d. Latitude	e. Longitude

N/A Roadway ROW	N/A
f. Assessors Map/Plat Number	g. Parcel /Lot Number

2. Applicant:

Katherine	Nunes
a. First Name	b. Last Name

City of Taunton
c. Organization

90 Ingell Street
d. Street Address

Taunton	MA	02780
e. City/Town	f. State	g. Zip Code

508-821-1431	508-821-1059	knunes@taunton-ma.gov
h. Phone Number	i. Fax Number	j. Email Address

3. Property owner (required if different from applicant): ☐ Check if more than one owner

a. First Name	b. Last Name

Town of Raynham
c. Organization

558 South Main Street
d. Street Address

Raynham	MA	02780
e. City/Town	f. State	g. Zip Code

(508) 824-2700		
h. Phone Number	i. Fax Number	j. Email address

4. Representative (if any):

Jonathan	Niro
a. First Name	b. Last Name

BETA Group Inc
c. Company

89 Shrewsbury Street
d. Street Address

Worcester	MA	01604
e. City/Town	f. State	g. Zip Code

844.800.2382 x7141		jniro@beta-inc.com
h. Phone Number	i. Fax Number	j. Email address

5. Total WPA Fee Paid (from NOI Wetland Fee Transmittal Form):

Fee Exempt	Fee Exempt	Fee Exempt
a. Total Fee Paid	b. State Fee Paid	c. City/Town Fee Paid

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

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Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

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A. General Information (continued)

6. General Project Description:

The purpose of the Project is to replace the existing superstructure that makes up bridge No. R-02-003=T-01-004 over the Taunton River to address deteriorating conditions, install scour protection and to improve pedestrian and bicycle accommodations.

7a. Project Type Checklist: (Limited Project Types see Section A. 7b.)

1. ☐ Single Family Home
2. ☐ Residential Subdivision
3. ☐ Commercial/Industrial
4. ☐ Dock/Pier
5. ☐ Utilities
6. ☐ Coastal engineering Structure
7. ☐ Agriculture (e.g., cranberries, forestry)
8. ☒ Transportation
9. ☐ Other

7b. Is any portion of the proposed activity eligible to be treated as a limited project (including Ecological Restoration Limited Project) subject to 310 CMR 10.24 (coastal) or 310 CMR 10.53 (inland)?

1. ☒ Yes ☐ No

If yes, describe which limited project applies to this project. (See 310 CMR 10.24 and 10.53 for a complete list and description of limited project types)

Inland limited project per 310 CMR 10.53(3)(f) and (i)
2. Limited Project Type

If the proposed activity is eligible to be treated as an Ecological Restoration Limited Project (310 CMR10.24(8), 310 CMR 10.53(4)), complete and attach Appendix A: Ecological Restoration Limited Project Checklist and Signed Certification.

8. Property recorded at the Registry of Deeds for:

N/A - Roadway ROW
a. County

b. Certificate # (if registered land)

c. Book

d. Page Number

B. Buffer Zone & Resource Area Impacts (temporary & permanent)

1. ☐ Buffer Zone Only – Check if the project is located only in the Buffer Zone of a Bordering Vegetated Wetland, Inland Bank, or Coastal Resource Area.
2. ☒ Inland Resource Areas (see 310 CMR 10.54-10.58; if not applicable, go to Section B.3, Coastal Resource Areas).

Check all that apply below. Attach narrative and any supporting documentation describing how the project will meet all performance standards for each of the resource areas altered, including standards requiring consideration of alternative project design or location.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 3 – Notice of Intent

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

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City/Town

B. Buffer Zone & Resource Area Impacts (temporary & permanent) (cont'd)

For all projects affecting other Resource Areas, please attach a narrative explaining how the resource area was delineated.

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
a. ☒ Bank	51 PERM, 66 TEMP 1. linear feet	66 REST 2. linear feet
b. ☐ Bordering Vegetated Wetland	1. square feet	2. square feet
c. ☒ Land Under Waterbodies and Waterways	4,399 PERM, 2,304 TEMP 1. square feet 1,052 3. cubic yards dredged	6,703 REST 2. square feet

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
d. ☒ Bordering Land Subject to Flooding	1,121 PERM, 0 SF TEMP 1. square feet	2. square feet
	3. cubic feet of flood storage lost	4. cubic feet replaced
e. ☐ Isolated Land Subject to Flooding	1. square feet	
	2. cubic feet of flood storage lost	3. cubic feet replaced
f. ☒ Riverfront Area	Taunton River 1. Name of Waterway (if available) - **specify coastal or inland**	

2. Width of Riverfront Area (check one):

☐ 25 ft. - Designated Densely Developed Areas only

☐ 100 ft. - New agricultural projects only

☒ 200 ft. - All other projects

3. Total area of Riverfront Area on the site of the proposed project: 43,100 square feet

4. Proposed alteration of the Riverfront Area:

a. total square feet	b. square feet within 100 ft.	c. square feet between 100 ft. and 200 ft.
6,344	6,344	0

5. Has an alternatives analysis been done and is it attached to this NOI? ☒ Yes ☐ No

6. Was the lot where the activity is proposed created prior to August 1, 1996? ☐ Yes ☒ No

3. ☐ Coastal Resource Areas: (See 310 CMR 10.25-10.35)

Note: for coastal riverfront areas, please complete **Section B.2.f**. above.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 3 – Notice of Intent

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:

MassDEP File Number

Document Transaction Number

Raynham
City/Town

B. Buffer Zone & Resource Area Impacts (temporary & permanent) (cont'd)

Check all that apply below. Attach narrative and supporting documentation describing how the project will meet all performance standards for each of the resource areas altered, including standards requiring consideration of alternative project design or location.

Online Users: Include your document transaction number (provided on your receipt page) with all supplementary information you submit to the Department.

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
a. ☐ Designated Port Areas	Indicate size under Land Under the Ocean, below	
b. ☐ Land Under the Ocean	1. square feet 2. cubic yards dredged	
c. ☐ Barrier Beach	Indicate size under Coastal Beaches and/or Coastal Dunes below	
d. ☐ Coastal Beaches	1. square feet	2. cubic yards beach nourishment
e. ☐ Coastal Dunes	1. square feet	2. cubic yards dune nourishment

	Size of Proposed Alteration	Proposed Replacement (if any)
f. ☐ Coastal Banks	1. linear feet	
g. ☐ Rocky Intertidal Shores	1. square feet	
h. ☐ Salt Marshes	1. square feet	2. sq ft restoration, rehab., creation
i. ☐ Land Under Salt Ponds	1. square feet 2. cubic yards dredged	
j. ☐ Land Containing Shellfish	1. square feet	
k. ☐ Fish Runs	Indicate size under Coastal Banks, inland Bank, Land Under the Ocean, and/or inland Land Under Waterbodies and Waterways, above 1. cubic yards dredged	
l. ☐ Land Subject to Coastal Storm Flowage	1. square feet	

4. ☐ Restoration/Enhancement
If the project is for the purpose of restoring or enhancing a wetland resource area in addition to the square footage that has been entered in Section B.2.b or B.3.h above, please enter the additional amount here.

a. square feet of BVW

b. square feet of Salt Marsh

5. ☐ Project Involves Stream Crossings

a. number of new stream crossings

b. number of replacement stream crossings

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

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Provided by MassDEP:

MassDEP File Number

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Raynham
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C. Other Applicable Standards and Requirements

☐ This is a proposal for an Ecological Restoration Limited Project. Skip Section C and complete Appendix A: Ecological Restoration Limited Project Checklists – Required Actions (310 CMR 10.11).

Streamlined Massachusetts Endangered Species Act/Wetlands Protection Act Review

1. Is any portion of the proposed project located in **Estimated Habitat of Rare Wildlife** as indicated on the most recent Estimated Habitat Map of State-Listed Rare Wetland Wildlife published by the Natural Heritage and Endangered Species Program (NHESP)? To view habitat maps, see the *Massachusetts Natural Heritage Atlas* or go to http://maps.massgis.state.ma.us/PRI_EST_HAB/viewer.htm.

a. ☐ Yes ☒ No

If yes, include proof of mailing or hand delivery of NOI to:

Natural Heritage and Endangered Species Program
Division of Fisheries and Wildlife
1 Rabbit Hill Road
Westborough, MA 01581

2023
b. Date of map

If *yes*, the project is also subject to Massachusetts Endangered Species Act (MESA) review (321 CMR 10.18). To qualify for a streamlined, 30-day, MESA/Wetlands Protection Act review, please complete Section C.1.c, and include requested materials with this Notice of Intent (NOI); *OR* complete Section C.2.f, if applicable. *If MESA supplemental information is not included with the NOI, by completing Section 1 of this form, the NHESP will require a separate MESA filing which may take up to 90 days to review (unless noted exceptions in Section 2 apply, see below).*

c. Submit Supplemental Information for Endangered Species Review*

1. ☐ Percentage/acreage of property to be altered:

(a) within wetland Resource Area _____ percentage/acreage

(b) outside Resource Area _____ percentage/acreage

2. ☐ Assessor's Map or right-of-way plan of site

2. ☐ Project plans for entire project site, including wetland resource areas and areas outside of wetlands jurisdiction, showing existing and proposed conditions, existing and proposed tree/vegetation clearing line, and clearly demarcated limits of work **

(a) ☐ Project description (including description of impacts outside of wetland resource area & buffer zone)

(b) ☐ Photographs representative of the site

* Some projects **not** in Estimated Habitat may be located in Priority Habitat, and require NHESP review (see https://www.mass.gov/ma-endangered-species-act-mesa-regulatory-review).
Priority Habitat includes habitat for state-listed plants and strictly upland species not protected by the Wetlands Protection Act.

** MESA projects may not be segmented (321 CMR 10.16). The applicant must disclose full development plans even if such plans are not required as part of the Notice of Intent process.

Massachusetts Department of Environmental Protection
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WPA Form 3 – Notice of Intent
Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:
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C. Other Applicable Standards and Requirements (cont'd)

(c) ☐ MESA filing fee (fee information available at https://www.mass.gov/how-to/how-to-file-for-a-mesa-project-review).
Make check payable to "Commonwealth of Massachusetts - NHESP" and ***mail to NHESP*** at above address

*Projects altering **10 or more acres** of land, also submit:*

(d) ☐ Vegetation cover type map of site

(e) ☐ Project plans showing Priority & Estimated Habitat boundaries

(f) OR Check One of the Following

1. ☐ Project is exempt from MESA review.
Attach applicant letter indicating which MESA exemption applies. (See 321 CMR 10.14, https://www.mass.gov/service-details/exemptions-from-review-for-projectsactivities-in-priority-habitat; the NOI must still be sent to NHESP if the project is within estimated habitat pursuant to 310 CMR 10.37 and 10.59.)

2. ☐ Separate MESA review ongoing. a. NHESP Tracking # b. Date submitted to NHESP

3. ☐ Separate MESA review completed.
Include copy of NHESP "no Take" determination or valid Conservation & Management Permit with approved plan.

3. For coastal projects only, is any portion of the proposed project located below the mean high water line or in a fish run?

a. ☒ Not applicable – project is in inland resource area only b. ☐ Yes ☐ No

If yes, include proof of mailing, hand delivery, or electronic delivery of NOI to either:

South Shore - Bourne to Rhode Island border, and the Cape & Islands:

Division of Marine Fisheries -
Southeast Marine Fisheries Station
Attn: Environmental Reviewer
836 South Rodney French Blvd.
New Bedford, MA 02744
Email: dmf.envreview-south@mass.gov

North Shore - Plymouth to New Hampshire border:

Division of Marine Fisheries -
North Shore Office
Attn: Environmental Reviewer
30 Emerson Avenue
Gloucester, MA 01930
Email: dmf.envreview-north@mass.gov

Also if yes, the project may require a Chapter 91 license. For coastal towns in the Northeast Region, please contact MassDEP's Boston Office. For coastal towns in the Southeast Region, please contact MassDEP's Southeast Regional Office.

c. ☐ Is this an aquaculture project? d. ☐ Yes ☒ No

If yes, include a copy of the Division of Marine Fisheries Certification Letter (M.G.L. c. 130, § 57).

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 3 – Notice of Intent

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:
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Raynham
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C. Other Applicable Standards and Requirements (cont'd)

Online Users: Include your document transaction number (provided on your receipt page) with all supplementary information you submit to the Department.

4. Is any portion of the proposed project within an Area of Critical Environmental Concern (ACEC)?

   a. ☐ Yes ☒ No If yes, provide name of ACEC (see instructions to WPA Form 3 or MassDEP Website for ACEC locations). **Note:** electronic filers click on Website.

   b. ACEC

5. Is any portion of the proposed project within an area designated as an Outstanding Resource Water (ORW) as designated in the Massachusetts Surface Water Quality Standards, 314 CMR 4.00?

   a. ☐ Yes ☒ No

6. Is any portion of the site subject to a Wetlands Restriction Order under the Inland Wetlands Restriction Act (M.G.L. c. 131, § 40A) or the Coastal Wetlands Restriction Act (M.G.L. c. 130, § 105)?

   a. ☐ Yes ☒ No

7. Is this project subject to provisions of the MassDEP Stormwater Management Standards?

   a. ☒ Yes. Attach a copy of the Stormwater Report as required by the Stormwater Management Standards per 310 CMR 10.05(6)(k)-(q) and check if:
      1. ☒ Applying for Low Impact Development (LID) site design credits (as described in Stormwater Management Handbook Vol. 2, Chapter 3)
      2. ☒ A portion of the site constitutes redevelopment
      3. ☐ Proprietary BMPs are included in the Stormwater Management System.

   b. ☐ No. Check why the project is exempt:
      1. ☐ Single-family house
      2. ☐ Emergency road repair
      3. ☐ Small Residential Subdivision (less than or equal to 4 single-family houses or less than or equal to 4 units in multi-family housing project) with no discharge to Critical Areas.

D. Additional Information

☐ This is a proposal for an Ecological Restoration Limited Project. Skip Section D and complete Appendix A: Ecological Restoration Notice of Intent – Minimum Required Documents (310 CMR 10.12).

Applicants must include the following with this Notice of Intent (NOI). See instructions for details.

Online Users: Attach the document transaction number (provided on your receipt page) for any of the following information you submit to the Department.

1. ☒ USGS or other map of the area (along with a narrative description, if necessary) containing sufficient information for the Conservation Commission and the Department to locate the site. (Electronic filers may omit this item.)

2. ☒ Plans identifying the location of proposed activities (including activities proposed to serve as a Bordering Vegetated Wetland [BVW] replication area or other mitigating measure) relative to the boundaries of each affected resource area.

Massachusetts Department of Environmental Protection
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Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

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D. Additional Information (cont'd)

3. ☒ Identify the method for BVW and other resource area boundary delineations (MassDEP BVW Field Data Form(s), Determination of Applicability, Order of Resource Area Delineation, etc.), and attach documentation of the methodology.

4. ☒ List the titles and dates for all plans and other materials submitted with this NOI.

Superstructure Repacement Plans
a. Plan Title

BETA Group, Inc. | Unsigned and unstamped
b. Prepared By | c. Signed and Stamped by

October 22, 2025 | 1" = 20'
d. Final Revision Date | e. Scale

Environmental Impacts Plan | October 22, 2025
f. Additional Plan or Document Title | g. Date

5. ☐ If there is more than one property owner, please attach a list of these property owners not listed on this form.

6. ☐ Attach proof of mailing for Natural Heritage and Endangered Species Program, if needed.

7. ☐ Attach proof of mailing for Massachusetts Division of Marine Fisheries, if needed.

8. ☐ Attach NOI Wetland Fee Transmittal Form

9. ☒ Attach Stormwater Report, if needed.

E. Fees

1. ☒ Fee Exempt: No filing fee shall be assessed for projects of any city, town, county, or district of the Commonwealth, federally recognized Indian tribe housing authority, municipal housing authority, or the Massachusetts Bay Transportation Authority.

Applicants must submit the following information (in addition to pages 1 and 2 of the NOI Wetland Fee Transmittal Form) to confirm fee payment:

N/A
2. Municipal Check Number

N/A
3. Check date

N/A
4. State Check Number

N/A
5. Check date

N/A
6. Payor name on check: First Name

N/A
7. Payor name on check: Last Name

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands
WPA Form 3 – Notice of Intent
Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:
MassDEP File Number
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Raynham
City/Town

F. Signatures and Submittal Requirements

I hereby certify under the penalties of perjury that the foregoing Notice of Intent and accompanying plans, documents, and supporting data are true and complete to the best of my knowledge. I understand that the Conservation Commission will place notification of this Notice in a local newspaper at the expense of the applicant in accordance with the wetlands regulations, 310 CMR 10.05(5)(a).

I further certify under penalties of perjury that all abutters were notified of this application, pursuant to the requirements of M.G.L. c. 131, § 40. Notice must be made by Certificate of Mailing or in writing by hand delivery or certified mail (return receipt requested) to all abutters within 100 feet of the property line of the project location.

1. Signature of Applicant Gregory W. Barnes	2. Date 1/30/2026
3. Signature of Property Owner (if different)	4. Date 1/14/2026
5. Signature of Representative (if any)	6. Date 1/30/2026

For Conservation Commission:
Two copies of the completed Notice of Intent (Form 3), including supporting plans and documents, two copies of the NOI Wetland Fee Transmittal Form, and the city/town fee payment, to the Conservation Commission by certified mail or hand delivery.

For MassDEP:
One copy of the completed Notice of Intent (Form 3), including supporting plans and documents, one copy of the NOI Wetland Fee Transmittal Form, and a **copy** of the state fee payment to the MassDEP Regional Office (see Instructions) by certified mail or hand delivery.

Other:
If the applicant has checked the "yes" box in any part of Section C, Item 3, above, refer to that section and the Instructions for additional submittal requirements.

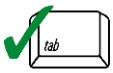
The original and copies must be sent simultaneously. Failure by the applicant to send copies in a timely manner may result in dismissal of the Notice of Intent.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

NOI Wetland Fee Transmittal Form

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A. Applicant Information

1. Location of Project:

FEE EXEMPT

a. Street Address | b. City/Town

c. Check number | d. Fee amount

2. Applicant Mailing Address:

a. First Name | b. Last Name

c. Organization

d. Mailing Address

e. City/Town | f. State | g. Zip Code

h. Phone Number | i. Fax Number | j. Email Address

3. Property Owner (if different):

a. First Name | b. Last Name

c. Organization

d. Mailing Address

e. City/Town | f. State | g. Zip Code

h. Phone Number | i. Fax Number | j. Email Address

B. Fees

To calculate filing fees, refer to the category fee list and examples in the instructions for filling out WPA Form 3 (Notice of Intent).

Fee should be calculated using the following process & worksheet. ***Please see Instructions before filling out worksheet.***

Step 1/Type of Activity: Describe each type of activity that will occur in wetland resource area and buffer zone.

Step 2/Number of Activities: Identify the number of each type of activity.

Step 3/Individual Activity Fee: Identify each activity fee from the six project categories listed in the instructions.

Step 4/Subtotal Activity Fee: Multiply the number of activities (identified in Step 2) times the fee per category (identified in Step 3) to reach a subtotal fee amount. Note: If any of these activities are in a Riverfront Area in addition to another Resource Area or the Buffer Zone, the fee per activity should be multiplied by 1.5 and then added to the subtotal amount.

Step 5/Total Project Fee: Determine the total project fee by adding the subtotal amounts from Step 4.

Step 6/Fee Payments: To calculate the state share of the fee, divide the total fee in half and subtract $12.50. To calculate the city/town share of the fee, divide the total fee in half and add $12.50.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

NOI Wetland Fee Transmittal Form

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

B. Fees (continued)

Step 1/Type of Activity	Step 2/Number of Activities	Step 3/Individual Activity Fee	Step 4/Subtotal Activity Fee

Step 5/Total Project Fee: _____

Step 6/Fee Payments:

Total Project Fee:	FEE EXEMPT a. Total Fee from Step 5
State share of filing Fee:	FEE EXEMPT b. 1/2 Total Fee **less $**12.50
City/Town share of filling Fee:	FEE EXEMPT c. 1/2 Total Fee **plus** $12.50

C. Submittal Requirements

a.) Complete pages 1 and 2 and send with a check or money order for the state share of the fee, payable to the Commonwealth of Massachusetts.

Department of Environmental Protection
Box 4062
Boston, MA 02211

b.) **To the Conservation Commission:** Send the Notice of Intent or Abbreviated Notice of Intent; a **copy** of this form; and the city/town fee payment.

To MassDEP Regional Office (see Instructions): Send a copy of the Notice of Intent or Abbreviated Notice of Intent; a **copy** of this form; and a **copy** of the state fee payment. (E-filers of Notices of Intent may submit these electronically.)

ABUTTERS INFORMATION

Affidavit of Service
Under the Town of Raynham Wetlands Protection Bylaw

(to be submitted to the Conservation Commission when filing a Notice of Intent)

I, Hannah Davis, hereby certify under the pains and penalties of perjury that on or before February 9, 2026 I gave notification to abutters in compliance with the Bylaw, which is consistent with the second paragraph of Massachusetts General Laws Chapter 131, Section 40, and the DEP Guide to Abutter Notification dated April 8, 1994, in connection with the following matter:

A Notice of Intent filed under the Bylaw by The City of Taunton in conjunction with MassDOT – Highway Division with the Town of Raynham Conservation Commission on February 9, 2026 for The Old Colony Avenue Bridge Reconstruction Project in Taunton, Massachusetts and Raynham, Massachusetts.

The form of notification, and a list of the abutters to whom it was given and their addresses, are attached to this Affidavit of Service.

Name

2/9/2026
Date

Notification to Abutters

By Hand Delivery, Certified Mail (return receipt requested), or Certificates of Mailing

This is a notification required by law. You are receiving this notification because you have been identified as the owner of land abutting another parcel of land for which certain activities are proposed. Those activities require a permit under the Town of Raynham Wetlands Protection Bylaw.

In accordance with the Bylaw, which is consistent with the second paragraph of the Massachusetts Wetlands Protection Act, and 310 CMR 10.05(4)(a) of the Wetlands Regulations, you are hereby notified that:

A. A Notice of Intent was filed with the Raynham Conservation Commission on or before February 9, 2026 seeking permission to remove, fill, dredge, or alter an area subject to protection under M.G.L. c. 131 §40. The following is a description of the proposed activity/activities:

The Project proposes the replacement of the bridge superstructure along Old Colony Avenue and installation of riprap scour protection within the Taunton River. In addition to the repair and improvement of the bridge, the Project will also consist of paving, construction of a new sidewalk, and stormwater improvements including a new infiltration trench along South Street East.

B. The name of the applicant is: **The City of Taunton in conjunction with MassDOT – Highway Division.**

C. The address of the land where the activity is proposed is: **Old Colony Avenue (Right-of-Way) and South Street East**

D. Copies of the Notice of Intent may be examined or obtained at the office of the Raynham Conservation Commission, located at 558 South Main Street, Raynham, MA 02767. The regular business hours of the Commission are Monday, Tuesday, Wednesday and Thursday from 8:30 am to 1:30 pm, and the Commission may be reached at (508)-824-2706.

E. Copies of the Notice of Intent may be obtained from the applicant or their representative by contacting Hannah Davis, BETA Group, Inc. at (844)-800-2382 ext. 7241 or at hdavis@BETA-Inc.com. An administrative fee may be applied for providing copies of the NOI and plans.

F. Information regarding the date, time, and location of the public hearing regarding the Notice of Intent may be obtained from the Raynham Conservation Commission. Notice of the public hearing will be published at least five business days in advance, in the **Taunton Daily Gazette**.

Proposal No. 613642 - 136413

SUBJECT LOCATION: 0 SOUTH ST EAST
SUBJECT ID: 17-148-0

TOWN OF RAYNHAM
ABUTTER'S LIST
100 FT

RECEIVED

SEP 22 2025

BOARD OF ASSESSORS
RAYNHAM, MA 02767

Property ID	Site Address	Owner	Owner Address	City	State	Zip Code
17-1-0	0 SOUTH STREET EAST	RAYNHAM TOWN OF	558 SOUTH MAIN ST	RAYNHAM	MA	02767
17-143-1	0 SOUTH STREET EAST	TWIN TOWERS REALTY TRUST, JOHNSON DEBRA A ETAL TRUSTEES	272 HILL ST	RAYNHAM	MA	02767
17-146-0	0 SOUTH STREET EAST	TWIN TOWERS REALTY TRUST, JOHNSON DEBRA A ETAL TRUSTEES	272 HILL ST	RAYNHAM	MA	02767
17-147-0	57 SOUTH STREET EAST	BACHOFNER PAUL R JR	57 SOUTH STREET EAST	RAYNHAM	MA	02767
17-151-0	0 SOUTH STREET EAST	SELPAN ASSOCIATES LIMITED	272 HILL ST	RAYNHAM	MA	02767
17-2-0	0 SOUTH STREET EAST	RAYNHAM TOWN OF	558 SOUTH MAIN ST	RAYNHAM	MA	02767
17-3-0	40 SOUTH STREET EAST	HASKINS LOIS A	40 SOUTH STREET EAST	RAYNHAM	MA	02767
17-37-3	58 SOUTH STREET EAST	NESSRALLA SABA A & AHLAM	58 SOUTH STREET EAST	RAYNHAM	MA	02767

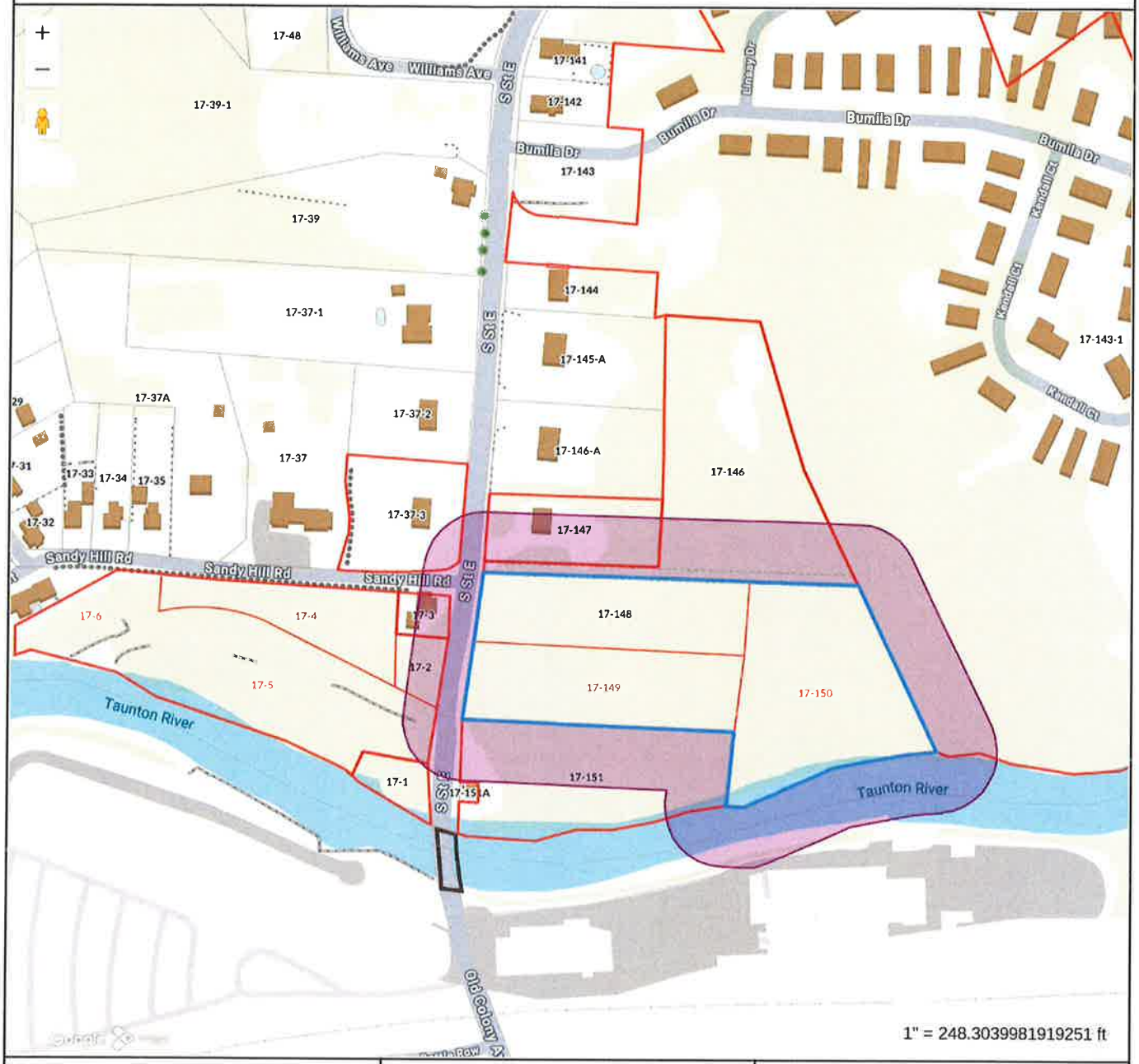
BOARD OF ASSESSORS

MAXWELL LAMBERT
MLambert@BETA-Inc.com

Town of Raynham, MA

September 23, 2025

Abutter's List - 100 ft



Property Information

Property ID	17-148-0
Location	0 SOUTH STREET EAST
Owner	RAYNHAM TOWN OF

MAP FOR REFERENCE ONLY
NOT A LEGAL DOCUMENT

Town of Raynham, MA makes no claims and no warranties, expressed or implied, concerning the validity or accuracy of the GIS data presented on this map.

Geometry updated 01/06/2025
Data updated 01/06/2025

Print map scale is approximate. Critical layout or measurement activities should not be done using this resource.

NARRATIVE

1.0 INTRODUCTION

On behalf of the City of Taunton, BETA Group, Inc. (BETA) is submitting this Notice of Intent (NOI) for the proposed Bridge Reconstruction of bridge R-02-003=T-01-004 (the Project) at Old Colony Avenue over the Taunton River in Taunton and Raynham, Massachusetts (the Site). The Project is being filed under the MassDOT bridge exemption as specified in the 2014 Transportation Bond Bill. The bridge replacement design is substantially the functional equivalent of and in similar alignment to, the existing bridge. Therefore, the Project is not subject to the Massachusetts Wetlands Protection Act (M.G.L. ch.131, s.40 – the Act) and this NOI is being filed under the Raynham Wetlands Protection Bylaw (Chapter 336 – the Bylaw).

The Project is necessary to improve safety and transportation infrastructure in Taunton and Raynham along the Taunton River. The existing bridge was constructed in 1945, and following a recent rating it was recommended the bridge be closed to vehicular traffic due to poor conditions along the bridge abutments. The Project will require demolition of the existing bridge superstructure, construction of the new bridge deck and associated structural appurtenances; installation of scour protection within the Taunton River; full depth pavement reconstruction; and grading. The Project proposes to retain the existing bridge substructure while replacing the superstructure with a deck that is 1' wider to allow for the addition of a bicycle lane. Ancillary Project facets including guardrails and a relocated sidewalk have also been incorporated into the design, and the Project will also address the addition of scour protection within the river during construction.

The Project is considered a limited project because it involves the maintenance and improvement of an existing public roadway limited to widening less than a single lane, adding shoulders, and improving the drainage system per 310 CMR 10.53(3)(f), and it involves the repair and improvement of a bridge and culvert per 310 CMR 10.53(3)(i).

The Project will consist of the following:

- Bridge deck replacement;
- Installation of scour protection within the Taunton River;
- Full depth pavement construction in the vicinity of the bridge;
- Pavement milling and overlay to the north and south of the bridge;
- Modifications to roadway geometry;
- Construction of a new sidewalk;
- Installation of new granite curbing;
- Striping of two travel lanes and a bike lane;
- Installation of Americans With Disabilities Act (ADA)-Compliant curb ramps;
- Replacement of guardrails;
- Modifications to water, sewer, gas, electric and drainage utilities;
- Installation of a perforated High-Density Polyethylene (HDPE) infiltration trench; and
- Tree clearing and trimming.

The Project only proposes the replacement of the superstructure and will maintain the existing substructure (i.e., piers and abutments). Accordingly, the Project will not meet the Massachusetts Stream Crossing Standards to the maximum extent practicable because the existing conditions do not meet the Standards, and compliance of the existing bridge with the Standards will not change given the nature of work. Work associated with the Project will result in temporary and permanent impacts to Areas Subject to Protection under the Bylaw including Bank, Land Under Water (LUW), Bordering Land Subject to

Flooding (BLSF), Riverfront Area (RA), Buffer Zone to Land Subject to Flooding, and No-Activity Buffer Zone. The Project will result in a total of 15,128 square feet (sf) and 117 linear feet (lf) of impacts to Resource Areas with the Town of Raynham, further broken down as follows:

- 66 linear feet (lf) of temporary and 51 lf of permanent impact to Bank;
- 2,304 square feet (sf) of temporary and 4,399 sf of permanent impact to LUW associated with a dredge volume of 1,052 cubic yards (cy);
- 1,121 sf of permanent impact to BLSF;
- 1,867 sf of temporary impact and 4,477 sf permanent impact to Riverfront Area; and
- 315 sf of temporary impact and 645 sf of permanent impact to the Bylaw 25' No-Activity Buffer Zone.

The Project is located entirely within the Bylaw 100' Buffer Zone to BLSF and therefore will result in 5,518 sf of temporary impact and 5,616 sf of permanent impact to the Bylaw 100' Buffer Zone to BLSF. The Project will also result in 1,309 sf of temporary impact and 3,253 sf of permanent impact to 100' Buffer Zone to Bank and 3,479 sf of temporary impact and 3,895 sf of permanent impact to 100' Buffer Zone to BVW.

It is anticipated that this Project will address the existing safety concerns while also improving non-vehicular transportation accommodations. These accommodations associated with the Project have been designed to meet standards set forth by the ADA.

Given the nature of the bridge reconstruction work, there are no feasible alternatives that avoid the impacts to Resource Areas described herein. The Project has been designed to minimize impacts and restore altered areas following construction. During construction, erosion and sedimentation controls and in-water controls including compost filter tubes, siltation fencing, and cofferdams will be installed and maintained to prevent migration of sediment into the stream. Post-construction restoration activities include regrading and stabilizing Banks with a native seed mix and placing suitable streambed material over the proposed scour protection measures within the Taunton River.

The environmental permits and reviews required to construct the Project beyond the submission of this NOI include:

- A 401 Water Quality Certification (WQC) from MassDEP for impacts to Waters of the U.S. that exceed 5,000 sf of loss and 100 cy of dredging;
- Coverage under the U.S. Army Corps of Engineers (USACE) Section 404 Massachusetts General Permit including General Permits 23: Linear Transportation Projects and Wetland/Stream Crossings and 24: Temporary Construction, Access, and Dewatering;
- Order of Conditions under the Taunton Wetlands Protection Ordinance;
- Coverage under the National Pollutant Discharge Elimination Systems (NPDES) Construction General Permit (CGP);
- Coordination with the National Parks Service due to the status of the Taunton River as a Wild and Scenic River;
- National Historic Preservation Act of 1966 Section 106 review;
- National Oceanic and Atmospheric Administration (NOAA) Section 7 review;
- U.S. Fish and Wildlife Service (USFWS) Essential Fish Habitat (EFH) Section 7 review; and
- National Environmental Policy Act (NEPA) Review through preparation of a programmatic Categorical Exclusion.

The sediment Sampling and Analysis Plan prepared as part of the Section 401 Water Quality Certification that is being filed in addition to this NOI can be made available upon request.

2.0 Site Description

2.1 Project Locus & Existing Conditions

The Site is located along Old Colony Avenue approximately 250 linear feet north of its intersection with Battle Row (Figure 1 – Site Locus). The Taunton River flows east/northeast through the Site towards its confluence with Mount Hope Bay in Fall River, Massachusetts. The centerline of the Taunton River is the common boundary between Taunton and Raynham; therefore, the Site includes land in both municipalities. This NOI pertains to the work proposed within the Town of Raynham only.

South Street East is a two-lane road oriented in a north to south direction adjacent to the Taunton River through undeveloped forest and residential properties (Figure 1 – Site Locus). The roadway is under the jurisdiction of the Town of Raynham and is classified as an Urban Collector. Old Colony Ave is a two-lane road oriented in a north to south direction adjacent to the Taunton River through multi-family and industrial properties (Figure 1 – Site Locus). The roadway is under the jurisdiction of the City of Taunton and is classified as an Urban Collector.

The existing structure is an approximately 90’ two-span bridge with equal spans of approximately 45’ 3.5”, constructed in 1945. The structure consists of eight (8) steel beams supporting a 7” concrete deck and 2-1/4” of bituminous paving. The bridge is supported by unreinforced concrete gravity abutments and wingwalls and a reinforced concrete pier. The south abutment is founded on spread footings and the north abutment and pier are founded on timber piles. The bridge is 35’-0” wide, which includes a 26’-0” roadway, a 2’-6” safety walk and 5’-0” sidewalk with metal railing. The bridge has a skew angle of 23.6° and was designed for H20 loading. Stormwater infrastructure in the vicinity of the bridge includes two closed catch basins at the southern end of the bridge that discharge to the Taunton River through a 12-inch reinforced concrete pipe (RCP) within the southeastern wingwall. The remainder of the Site, particularly the portion in Raynham, consists of “country drainage”. A 4” Cast-Iron (CI) and an 8” Asbestos Cement (AC) sewer pipe is located within the bridge superstructure. Additionally, a 6” gas main suspected to be Ductile Iron (DI) is located within the bridge superstructure.

According to the USDA Natural Resources Conservation Service – Soil Survey and the field delineation performed by BETA Group, Inc (BETA) in March 2023, the soils on the Site and in the vicinity of the Site are classified as Birdsall Silt Loam, Urban Land, and Smoothed Udorthents.

Temporary and permanent easements are required for work within and along the Taunton River on both municipal and private properties. A total of 9 easements are required in Raynham (3 permanent, 6 temporary).

2.2 Wetland Resource Areas

A Site inspection was conducted by BETA Wetland Scientists on March 31st 2023, to review the previously delineated boundaries of existing Resource Areas within and in the immediate vicinity of the Site. LUW boundaries were identified and delineated in accordance with the methods developed by the *U.S. Army Corps of Engineers Wetland Delineation Manual; Northeast Region* (2009).

According to the July 16, 2015 FEMA Flood Insurance Rate Map (FIRM) Number 25005C0169G, the Site is within a National Flood Insurance Program (NFIP) Special Flood Hazard) Zone AE. Zone AE areas are considered to be within the 100-year floodplain. The base flood elevation onsite is 14.8’ on the upstream

side of the Old Colony Ave Bridge and 14.4' on the downstream side of the bridge. The Taunton River has a designated Regulatory Floodway at the Site.

The Taunton River is designated as a Wild and Scenic River by the United States Congress. Within the Site, the Taunton River is classified as a "Scenic River Area." Under Sec 2. [16 U.S.C 1273].b.(2) of the Wild and Scenic Rivers Act, Scenic River Areas is defined as "Those River or sections of rivers that are free of impoundments, with shorelines or watershed still largely primitive and shorelines undeveloped, but accessible in places by roads".

Wetland and Resource Areas identified on the Site include Bank, Bordering Vegetated Wetlands (BVWs), LUW, Bordering Land Subject to Flooding (BLSF), and Riverfront Area (RA). Areas Subject to Protection under the Act and Bylaw that are present throughout the Site include:

- Bank – Bank at the Site is associated with one (1) perennial stream (the Taunton River) and one (1) unnamed intermittent stream.
- Bordering Vegetated Wetlands (BVW) – Two (2) areas of BVW are present at the Site. The WF1 Series BVW is a scrub shrub wetland that borders on the B3/B4 Series intermittent stream. The WF2 Series BVW is a scrub shrub wetland located along the northern bank of the perennial stream (the Taunton River).
- Land Under Water (LUW) – LUW exists between the Bank boundaries below the mean annual low water level (MLW) of the streams located at the Site and generally consist of muck and gravel. The boundary of LUW is the MLW, which was not field delineated by BETA.
- Bordering Land Subject to Flooding (BLSF) – BLSF at the Site exists in the Zone AE Flood Hazard associated with the Taunton River.
- Riverfront Area (RA) – RA is present at the Site associated with mean annual high water (MAHW).
- 25' No-Activity Zone (the Bylaw) – The 25' No-Activity Zone is present at the western extent of the Site 25' from BVWs.

The Taunton River at the Site is also mapped as a diadromous fish run.

2.2.1 BANK

Banks were delineated by BETA in the field in March 2023 as described in Table 1: Bank Boundary Description and the Resource Area Boundary Delineation Report included in Appendix A.

Table 1: Bank Boundary Description

FLAG SERIES	LOCATION	DESCRIPTION / NOTES
B1 Series Flags B1-99 to 95 and B2 Series Flags B2-91 to 99 and B2-100 to 105	Taunton River, located east, under and west of the Old Colony Ave Bridge	The northern (*B1 Series*) and southern (*B2 Series*) Banks associated with the Taunton River, a perennial stream, that generally flows west were delineated in two (2) segments along the first observable break in slope consistent with the mean annual flood level. The Bank north of the Taunton River was delineated west (*B1-99 to B1-95*) and east (*B1-100 to B1-106*) of the Old Colony Avenue Bridge in Raynham. Banks west of the bridge were generally well defined and consisted of eroded soils. Banks east of the bridge were observed to be undercut and also consisted of eroded soils. Where vegetated, both Banks consist primarily of woody vegetation including bush honeysuckle (*Diervilla lonicera*), silky dogwood (*Cornus amomum*) and Norway maple (*Acer platanoides*).

		Populations of poison ivy (*Toxicodendron radicans*) were also observed. The Bank south of the Taunton River was delineated west (*B2-91 to 99*) and east (*B2-100 to 105*) of the Old Colony Avenue Bridge in Taunton. Banks west of the bridge were generally poorly defined and consisted of rocks and stones of various sizes. Banks east of the bridge were generally well defined and generally consisted of eroded soils. Where vegetated, both Banks consist primarily of woody vegetation including slippery elm (*Ulmus rubra*), Norway maple, and silky dogwood. Populations of poison ivy were also observed. The channel width downstream of the Old Colony Avenue bridge is between 95 to 110 feet wide with a mucky, gravel substrate. The channel width upstream is 90 to 100 feet wide with a mixed cobble, gravel, and mucky substrate. Water depths within the Taunton River could not be determined in the field. The Taunton River is mapped as perennial on USGS topographic maps; therefore, it meets the definition of a perennial stream (River) per 310 CMR 10.58(2).
B3/B4 Series Flags B3-96 to 107 and B4-96 to 107	Northwest of Old Colony Avenue Bridge at 0 South East Street	The interior (*B4 Series*) and exterior (*B3 Series*) Banks associated with a shallow, braided intermittent stream west of South Street East were delineated along the first observable break in slope (consistent with the mean annual flood level). The *B3/B4 Series* stream flows west out of a drainage outfall associated with the closed drainage system under South Street East in Raynham, where flow becomes braided prior to reaching a confluence west of the Site. The *B3/ B4 Series* Banks were primarily vegetated with silky dogwood. The channel is approximately 3 to 5 feet wide and 2 to 6 inches deep with a substrate of sand and muck. This stream is not depicted on current USGS topographic maps or on the StreamStats program; therefore, it is presumed to be intermittent.

2.2.2 Bordering Vegetated Wetland (BVW)

BVWs[1] were delineated by BETA in the field in March 2023 as described in Table 2: BVW Boundary Description and the Resource Area Boundary Delineation Report included in Appendix A.

[1] BVWs described herein are located within the Town of Raynham only.

Table 2: BVW Boundary Description

Flag Series	Location	Description / Notes
WF1 Series Flags WF1-108 to 111	Northwest of Old Colony Avenue Bridge at 0 South East Street	The *WF1 Series* BVW is a scrub shrub wetland bordering on the *B3/B4 Series* intermittent stream. The attached U.S. Army Corps of Engineers Field Data Sheets describe evidence of hydrophytic vegetation, hydric soils, and indicators of hydrology at a specific data plot.
WF2 Series Flags WF2-100 to 102	Along the northern Bank of the Taunton River	The *WF2 Series* BVW is a scrub shrub wetland located along the northern bank of the Taunton River, west of the *B1 Series* Bank. Dominant hydrophytic vegetation observed within the area includes silky dogwood. Evidence of hydrology observed in the field includes sediment deposition and stressed vegetation (buttressed roots), and hydric soils indicators including sandy soils with prominent redox concentrations. A formal data plot was not performed at this location.

The dominant plant species in the *WF1 Series* BVW include silky dogwood (*Cornus amomum*) and multiflora rose (*Rosa multiflora*).

2.2.3 Land Under Water (LUW)

LUW exists between the Bank boundaries below the mean annual low water levels of the streams delineated at the Site. The boundary of LUW is the mean annual low water level. This boundary was not field delineated by BETA and is described in the Resource Area Boundary Delineation Report included in Appendix A.

2.2.4 Bordering Land Subject to Flooding (BLSF)

According to the Federal Emergency Management Agency (FEMA) FIRM Number 25005C0169G, dated July 16, 2015, a Zone AE Flood Hazard associated with the Taunton River exists at the Site with Base Flood Elevations (BFE) ranging from 14.4 feet (NAVD88) downstream of the bridge and 14.8 feet (NAVD88) upstream of the bridge. The Site is also located within the Regulatory Floodway of the Taunton River. Any work performed within BLSF (i.e. areas with a 0.1% yearly chance of flooding) is Subject to Jurisdiction under the Bylaw.

2.2.5 Riverfront Area (RA)

According to 310 CMR 10.58(2), RA is defined as the area of land between a river's mean annual high water (MAHW) line and a parallel line measured 200' away horizontally. A River is any natural flowing body of water that empties to any ocean, lake, pond, or other River flowing throughout the year and is shown as perennial on the current United States Geological Survey or more recent map provided by the Department, or has a watershed size of at least 0.50 square miles and a predicted flow rate greater than or equal to 0.01 cubic feet per second at the 99% flow duration using the USGS Stream Stats Method.

As noted in Table 2 above, the B1/B2 Series stream qualifies as a perennial stream (River) and is therefore afforded a 200' RA. The RA at the Site would be measured 200' horizontally from the MAHW flags. Descriptions of the MAHW boundaries associated with the Taunton River are provided below in Table 3: MAHW Boundary Description and the Resource Area Boundary Delineation Report included in Appendix A.

Table 3: MAHW Boundary Description

Flag Series	Waterbody	Description / Notes
B1 Series Flags B1-99 to 95, and B1-100 to 106 *B2 Series Flags B2-91 to 99, and B2-100 to 105*	Taunton River	The northern (*B1 Series*) Banks were delineated at the mean annual flood level (coincident with the mean annual high-water mark – MAHW) approximately ten (10) feet upgradient of Bank. MAHW was determined based on observations of sediment accumulation and scour. The southern (*B2 Series*) Banks were delineated approximately ten (10) feet upgradient of Bank. MAHW was determined based on observations of sediment accumulation, scour and the presence of debris.

2.2.6 25' No-Activity Zone (The Bylaw)

According to Section 7 of the Bylaw, a 25' No-Activity Zone is required around BVWs for construction activities. There are two (2) BVW series at the Site, the WF1 Series wetland and the WF2 Series wetland. The 25' No-Activity Zone extends 25' from these BVWs.

2.3 Buffer Zones

The Project is located within the 100' Buffer Zone to Bank and BVW; however, the Buffer Zone within the Project area overlaps entirely within RA of the Taunton River. Buffer Zone on the Site consists of vegetated areas and the bituminous concrete roadway.

The Project is also located within the 100' Buffer Zone to BLSF. According to Section 2 of the Bylaw, a 100' Buffer Zone around BLSF is required for construction activities. The Site is entirely within the 100' Buffer Zone to BLSF.

2.4 NHESP-Mapped Habitat and Other Sensitive Areas

The Site is not located within Natural Heritage and Endangered Species Program (NHESP)-mapped Priority Habitat of Rare Species or Estimated Habitat of Rare Wildlife. No Certified or Potential Vernal Pools are present at the Site. In addition, according to the U.S. Fish and Wildlife Service (USFWS)'s Information for Planning and Consultation (IPaC) tool, the Site is located within the range of the northern long-eared bat (*Myotis septentrionalis*), and the Plymouth redbelly turtle/cooter (*Pseudemys rubriventris bangsi*), both endangered species under the federal Endangered Species Act (ESA). The Site is also within the range of the tricolored bat (*Perimyotis subflavus*), a proposed endangered species, and the monarch butterfly (*Danaus plexippus*), a proposed threatened species. The Site is not within the vicinity of any mapped Critical Habitats for the northern long-eared bat (*Myotis septentrionalis*) or the tricolored bat (*Perimyotis subflavus*). There is final critical habitat for the Plymouth redbelly turtle/cooter, but the Project is not within this habitat.

In addition, the Taunton River is a diadromous fish run and is habitat for the Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*), an endangered species. The Project is in mapped habitat of federally listed endangered species and therefore Endangered Species Act (ESA) Section 7 consultation with NOAA and USFWS for EFH is required (Appendix G).

A Time of Year (TOY) restriction will be observed within the Taunton River from March 15th to June 30th

and from September 1st to November 15th per TR-47 (pending confirmation from NOAA) in order to achieve a "Not Likely To Adversely Affect" determination via the IPaC NLEB Determination Key and to protect rare species. Water controls will be installed and removed outside of this time period. Section 7 consultation has commenced with NOAA to confirm these TOY restrictions.

The Taunton River is designated as a Wild and Scenic River with the River Classification of being a "Scenic River Area" Under Sec 2. [16 U.S.C 1273].b.(2) of the Wild and Scenic Rivers Act, Scenic River Areas is defined as "Those River or sections of rivers that are free of impoundments, with shorelines or watershed still largely primitive and shorelines undeveloped, but accessible in places by roads". Coordination with the National Park Service through the interagency review process is anticipated.

According to the latest MassGIS data, the Site is not located within NHESP mapped Priority Habitat of Rare Species or Estimated Habitat of Rare Wildlife. The Site is not located within an Area of Critical Environmental Concern (ACEC), Outstanding Resource Water (ORW) or within 200 feet of mapped Certified or Potential Vernal Pools. There are no Zone I, Zone II or IWPA groundwater protection areas or Zone A, B or C surface water protection areas.

3.0 Work Description

The Project consists of replacing the bridge superstructure while retaining the existing bridge substructure. The Project proposes to widen the bridge by 1' for curb-to-curb width of 27', which will allow a bicycle lane to be added to the roadway. The proposed sidewalk will be relocated from the east side to the west side of the roadways to connect the existing sidewalk at the condominium building south of the bridge and to Sandy Hill Street in Raynham. While the substructure will be retained, it is anticipated that in-water work will be required for placement of scour protection. Dredging will be required to install the scour protection and cofferdams will be installed within the River for control of water. Scour protection will consist of a 2'-8" layer of streambed material over 2'-0" layer of dumped riprap, which will all be over 1' of crushed stone for a total depth of 5'-8". Water controls and a dewatering system will be installed to install a the scour protection in dry conditions. Additional details on anticipated dewatering and water controls are provided in Section 7.3 below.

Specific activities associated with the Project include:

- Implementation of traffic controls and installation of erosion and sedimentation controls.
- Bridge Replacement:
    - Removal of existing Bridge superstructure.
    - Replace superstructure with the following:
        - S3-MTL4 Bridge Barrier
        - 3" Wearing surface at the roadway over an 8" cast-in-place reinforced concrete deck support by (6) W27 steel stringers;
        - Proposed superstructure will utilize the existing substructure that will remain in place;
        - Proposed low chord will match the existing low chord elevation of 14.35' and the hydraulic opening will remain unchanged;
        - Removal of debris that has accumulated at the pier.
- Full depth pavement reconstruction in the vicinity of the bridge.
- Pavement mill and overlay to the north and the south of the bridge.
    - Establishment of two 13.5' wide travel lanes with no shoulders south of the Bridge along Old Colony Avenue.

  - Establishment of two 11’ to 11.5’ wide travel lanes with 1.5’ to 2’ shoulders north of the Bridge along South Street East.
- Construction of a 6’-wide concrete sidewalk along the east side of Old Colony Avenue.
- Construction of a 5.5’-wide concrete sidewalk along the eastern side of the Old Colony Avenue Bridge.
- Construction a 5.5’-wide concrete sidewalk along the eastern side of South Street East.
- Installation of granite curbing.
- Striping for two (2) 10’ wide travel lanes and one (1) 2’ wide bicycle lane.
- Installation of ADA Compliant Ramps.
- Installation of guardrails.
- Modifications to water, sewer, gas, electric and drainage utilities.
- Installation of a 45’ 8” perforated High-Density Polyethylene (HDPE) infiltration trench.
- Dredging of 1,052 cy of LUW and subsequent LUW/Bank restoration:
  - Installation of 1’ crushed stone scour protection.
  - Installation of 2’-0” of riprap over 1’ crushed stone scour protection.
  - Installation of 2’-8” of streambed material over 2’-0” of riprap.
  - Placement of modified rockfill over permanently impacted segments of Bank.
- Clearing, grubbing, and grading.
- Stabilization of disturbed areas.

In order to complete the work outlined above, the bridge will be closed, and a detour will be implemented during construction. The 6.5-mile detour is proposed via New State Highway (Route 44) to Church Street/ Precinct Street to Middleboro Avenue. Erosion and sedimentation control measures will be implemented as discussed in Section 6.0 – Erosion and Sediment Controls to protect adjacent Resource Areas. Material stockpiles and staging areas will be located as far from the onsite resource areas as possible and will be placed on poly fabric and surrounded with erosion and sedimentation control measures. Stockpiling and equipment storage will occur on the adjacent paved surfaces of Old Colony Avenue and South Street East.

Cofferdams will be installed in two phases associated with dewatering and scour protection installation. Phase I covers the southern cell, diverting flow through the northern cell throughout construction. Phase II will cover the southern cell. A Time of Year (TOY) restriction will be observed within the Taunton River from March 15th to June 30th and from September 1st to November 15th per TR-47 (pending confirmation from NOAA) in order to achieve a “Not Likely To Adversely Affect” determination via the IPaC NLEB Determination Key and to protect rare species. Water controls will be installed and removed outside of this time period. Given the layout of the municipal boundary in relation to the River, water control efforts will span across both municipalities.

A Water Control Plan designed by a Mass. Registered PE is required to be submitted prior to starting work on the bridge replacement. The Water Control Plan will include a Sedimentation and Erosion Control Plan, as well as a Water Flow Diversion and Containment Plan. Work within Resource Areas, including placement of fill, will only occur within dewatered areas. Final streambed restoration will be overseen by a Fluvial Geomorphologist.

3.1 Work in Buffer Zones

The Project will occur within the 100’ Buffer Zone to Bank, BVW, and BLSF. Due to the nature of bridge work, Buffer Zone impacts are unavoidable. The Project was designed to result in the least possible impacts to Buffer Zone as practicable while still accomplishing the Project goals.

Proposed work within the 100' Buffer Zone to Bank and BVW include the following:

- Clearing and grubbing;
- Installation of guardrails;
- Roadway, sidewalk, and curb reconstruction;
- Installation of water controls and cofferdams;
- Drainage improvements; and
- Erosion control installation.

The Bylaw provides a 100' Buffer Zone to any land subject to flooding or inundation by groundwater or surface water, where a Buffer Zone to these Resource Areas is not present under the Act. The area of BLSF associated with the Taunton River meets the definition of land subject to flooding or inundation. Therefore, BLSF has a 100' Buffer Zone under the Bylaw. Given that the Project consists of bridge work within and over the Taunton River, work within the 100' Buffer Zone to land subject to flooding is required to complete the Project and consists of activities consistent with those described above.

Erosion and sedimentation control measures will be implemented as discussed in Section 4.1 to protect adjacent Resource Areas. Material stockpiles and staging areas will be located as far from the onsite Resource Areas as possible and will be surrounded with erosion and sedimentation control measures.

3.2 WORK WITHIN JURISDICTIONAL RESOURCE AREAS

Due to the nature of bridge repair activities, the Project will result in unavoidable temporary and permanent impacts to Resource Areas Subject to Protection and Jurisdiction under the Bylaw. Construction activities, including staging, dewatering, and construction work, have been designed to minimize impacts to Resource Areas to the extent practical by using appropriate erosion and sedimentation controls described in Section 4.1 and by conducting work far from the roadway when possible.

3.2.1 BANK (TO PERENNIAL STREAM, 310 CMR 10.54)

Permanent and temporary impacts to Bank will result from scour protection, clearing and grubbing, cofferdam installation, and dewatering. Table 4: Bank Impacts Summary describes the locations and areal extents of impacts.

Table 4. Bank Impacts Summary

LOCATION	BANK SERIES	IMPACT TYPE*	LENGTH (LF)
West of Station 4+00, along flags B1-98 to B1-97	BF1	Erosion control installation *	19
West of Station 4+00, along flags B1-98 to B1-99	BF1	Riprap scour construction	25
East of Station 4+00, along flags B1-100 to B1-102	BF1	Riprap scour construction	26
East of Station 4+00, along flags B1-102 to B1-104	BF1	Erosion control installation *	47
		TOTAL PERMANENT BANK IMPACTS:	51
		TOTAL TEMPORARY BANK IMPACTS:	66

Denotes a temporary impact that will be restored in-place per Project Specifications.

The majority of permanent impacts to Bank result from dredging and construction of the riprap scour protection. Temporary impacts result from water control through cofferdam installation and dewatering. Although riprap scour construction is considered a permanent impact, all impacts to Bank will be restored in place as described in Section 5.0.

3.2.2 Land Under Water (310 CMR 10.56)

Permanent and temporary impacts to LUW that occur within and adjacent to the Site will result from installation of water control / diversion devices, scour protection, cofferdam installation, and dewatering. A total of 6,703 square feet (sf) of LUW alteration is proposed within the Taunton River. Table 5: LUW Impacts Summary describes the locations and areal extents of impacts.

Table 5: LUW Impacts Summary

LOCATION	IMPACT TYPE*	AREA (SF)
Western side of the bridge between B1-97 and B1-98	Cofferdam installation and dewatering *	177
Western side of the bridge between B1-97 and B1-98	Dredging for access *	658
Eastern side of the bridge between B1-98 and B1-102	Dredging and installation of riprap scour protection	4,399
Eastern side of the bridge between B1-102 and B1-104	Cofferdam installation and dewatering *	961
Eastern side of the bridge at B1-102	Dredging for access *	508
	TOTAL PERMANENT LUW IMPACTS:	4,399
	TOTAL TEMPORARY LUW IMPACTS:	2,304

Denotes a temporary impact that will be restored in-place per Project Specifications.

Permanent impacts to LUW result from dredging and the installation of riprap scour protection. 1,052 cy of material will be dredged from the Taunton River to install scour protection. Although a suitable streambed material will be placed on these impacts areas, the presence of new riprap scour protection has resulted in these impacts being qualified as permanent with in-kind restoration. Temporary impacts result from the temporary control of water through the use of a cofferdam during construction that will be restored after work is completed. Dredging to access the area of scour protection installation will be restored and results in temporary impacts.

3.2.3 Bordering Land Subject to Flooding (310 CMR 10.57)

No permanent fill is proposed within BLSF. A total of 1,121 sf of permanent BLSF impact is proposed over the course of the Project. The majority of these impacts result from:

- Clearing and grubbing;
- Installation of riprap scour protection; and
- Updates to drainage outfalls.

3.2.4 Riverfront Area (310 CMR 10.58)

A total of 1,867 sf of temporary impacts and 4,477 sf of permanent impacts to Riverfront Area is proposed over the course of the Project. The majority of these impacts result from:

- Roadway improvements and guardrail installation.

All temporary impacts will be restored in-place per the mitigation measures described in Section 4.0.

3.2.5 100' Buffer Zone

A total of 1,309 sf of temporary impacts and 3,253 sf of permanent impacts to the 100' Buffer Zone to Bank is proposed over the course of the Project. The majority of these impacts result from:

- Clearing and grubbing;
- Installation of guardrails; and
- Erosion control installation.

A total of 3,479 sf of temporary impacts and 3,895 sf of permanent impacts to the 100' Buffer Zone to BVW is proposed over the course of the Project. In addition to the activities listed above, the majority of these impacts result from:

- Roadway, sidewalk, and curb reconstruction.

The Bylaw provides a 100' Buffer Zone to BLSF. The Site is located entirely within the 100' Buffer Zone to BLSF. A total of 5,518 sf of temporary and 5,616 sf of permanent impacts to the 100' Buffer Zone to BLSF is proposed over the course of the Project. In addition to the activities listed above, these impacts result from:

- Installation of water controls and cofferdams; and
- Drainage improvements,

3.2.6 25' No-Activity Buffer Zone (The Bylaw)

A total of 315 sf of temporary impacts and 645 sf of permanent impacts to the Bylaw 25' No-Activity Buffer Zone is proposed over the course of the Project. The majority of these impacts result from:

- Clearing and grubbing;
- Installation of guardrails;
- Roadway, sidewalk, and curb reconstruction;
- Installation of water controls and cofferdams;
- Drainage improvements; and
- Erosion control installation.

4.0 Mitigation Measures

4.1 Erosion and Sedimentation Controls

Best Management Practices (BMPs) for erosion and sedimentation controls will be adhered to for all phases of construction to minimize erosion, sedimentation, and impacts on Resource Areas.

Due to the clearing of vegetation, removal of dredged sediment and installation of stone, dust management will be necessary. Water will likely be used by contractors to minimize airborne particulate matter during construction.

Prior to final completion of construction, areas of exposed soils will be present at the Site and will require temporary stabilization. Temporary stabilization methods may include temporary seeding, application of straw mulch, and use of erosion control blankets. Erosion and sedimentation controls will be installed before any land disturbance begins and will remain in place for the duration of the Project. These control measures will be used throughout construction to prevent impacts to downgradient Resource Areas and may include compost filter tubes and siltation fencing or similar controls at the Contractor's specification. Compost filter tubes will be placed as close to the limit of soil disturbance as possible, along contours, and perpendicular to flow. Silt sacks will be used in all existing catch basins within and near the limit of work.

Erosion and sedimentation control measures will be implemented along the limit of work downgradient of the disturbed areas during construction to minimize further resource area impacts and act as a visual limit of work. Erosion and sedimentation barriers will be installed to reduce the chance of soil or sediment migration beyond the limits of work. Temporarily impacted areas will be restored to existing conditions upon completion of the Project. Erosion and sedimentation controls will remain in place and in proper working order until the Site is completely stabilized. A stockpile of approved erosion and sedimentation control materials will be kept on-site for emergency and routine replacement.

Clearing and grubbing will be mitigated with the application of loam and seed. Areas cleared for work will be revegetated with native herbaceous vegetation and monitored for growth after the completion of the Project.

The Contractor will be responsible for obtaining coverage under the Construction General Permit (CGP) pursuant to the Environmental Protection Agency (EPA) National Pollutant Discharge Elimination Systems (NPDES). A Stormwater Pollution Prevention Plan (SWPPP) will be developed prior to any land disturbance. Per the SWPPP, the Contractor will monitor and assess conditions and identify problems in the field during and after construction activities.

4.2 WATER CONTROLS AND DEWATERING

The dredging of the streambed (LUW) and installation of riprap scour protection will require the implementation and maintenance of temporary water controls within the Taunton River so that the work can be completed in dry conditions. While the exact means and methods for water control will be determined by the contractor, it is anticipated that water controls will consist of cofferdams in the form of portadams or sandbags.

A Water Control Plan designed by a Massachusetts Registered Professional Engineer is required to be submitted prior to starting in-water work. The Water Control Plan will include a Sedimentation and Erosion Control Plan and a Water Flow Diversion and Containment plan. Work within Resource Areas, including placement of fill, will only occur within dewatered areas. Final LUW restoration will be overseen by a Fluvial Geomorphologist.

According to preliminary hydraulic studies performed for the Project, temporary closure of each half of the Taunton River will result in water levels remaining below bankfull conditions. Flow is expected to remain within the channel with no overbank flooding in response to a 2-year flood.

Cofferdams will be installed in two phases consistent with the phasing of the dredging work. Phase I addresses the southern half of the River and will divert flow through the northern cell, while Phase II addresses the northern half of the River and will divert flow through the southern cell. A Time of Year (TOY) restriction will be observed within the Taunton River from March 15th to June 30th and from September 1st and November 15th per TR-47 (pending confirmation from NOAA) to protect rare species habitat. Water controls will be installed and removed outside this period.

Dewatering of the work area will be completed to avoid an increase in turbidity over the baseline conditions. It is anticipated that the work area will be dewatered via pumping to a settling tank or dewatering system that filters the water prior to discharge back to the stream. The means and methods for dewatering will be determined by the Contractor at the time of construction based on Site-specific conditions and will be included in the prepared SWPPP which will be completed by the Contractor prior to the start of work.

4.3 Invasive Species Control

Invasive species observed at the Site by BETA include, Norway Maple (*Acer platanoides*), Garlic Mustard (*Alliera petiolata*), and Multiflora Rose (*Rosa multiflora*).

During or after construction, the contractor will employ BMPs designed to prevent further propagation of invasive plant species at the Site. These BMPs include proper disposal of any excavated invasive species, prevention of migration of rhizome fragments and seed pods, and cleaning vehicles of soil before and after accessing the Site. Any application of herbicides will be done in accordance with the practices set forth by the Massachusetts Department of Agricultural Resources.

4.4 Stormwater Management

4.4.1 Existing Stormwater Management

Stormwater runoff from the Site is described as Drainage Areas Ex-1E, Ex-2E, and Ex-3E in the Stormwater Report (Appendix B). Existing closed drainage systems are present along the roadway which convey stormwater runoff to two outfalls, one of which discharges to the Taunton River and one of which discharges to a nearby intermittent stream. No edge treatment is provided on the southern side of South Street East in Raynham, and stormwater runoff from this portion of the Site flows overland into a forested area.

4.4.2 Proposed Stormwater Management

Stormwater management is proposed via modifications to the existing closed drainage system. Existing inlets will be replaced with deep-sump catch basins, and additional deep-sump catch basins will be installed throughout the corridor to provide more effective stormwater collection and treatment. New curbing is proposed to better direct stormwater runoff to catch basins. The majority of existing trunklines will be retained. The Project will retain existing drainage runoff patterns to the maximum extent practicable.

The Project will retain the existing outfall from the closed drainage system within the Town of Raynham and will replace the existing outfall associated with the closed drainage system within the City of Taunton. The new outfall will be increased in size from 12” to 18” and the existing headwall will be rebuilt at the same location.

The Project proposes a new 45’ 8” HDPE infiltration trench within the Town of Raynham near the northeastern limit of work. Stormwater runoff will be directed to this SCM through a new deep sump catch basin which will overflow into the existing closed drainage system.

Additionally, country drainage/pavement disconnection will be implemented for several portions of South Street East by excluding curbing to allow treatment in the grass/woodland area adjacent to the roadway. Of this, approximately 100’ of South Street East, on the eastern side of the roadway, drains to an area that meets the definition of qualifying pervious area and is comprised of approximately 1,500 sf of impervious area.

4.5 COMPLIANCE WITH STORMWATER STANDARDS

The Project complies with the MassDEP Stormwater Management Standards (the Standards).

The Project is classified as a Limited[2] and Redevelopment[3] project under section 310 CMR 10.53(3)(f) and (i).

The proposed work within the roadway, such as replacing the existing catch basins with deep sump catch basins, constitutes Redevelopment work because the work will substantially occur within an existing paved area. Redevelopment work is required to meet Standards 1 and 7 through 10 fully, and Standards 2 through 6 only to the maximum extent practicable.

This section details the regulatory framework for stormwater management, the existing impervious cover and stormwater system, an assessment of impacts, and the project's regulatory compliance with the Massachusetts Stormwater Standards.

4.5.1 REGULATORY FRAMEWORK

The Project consists of redevelopment of an existing / paved bridge and roadway, widening of roadway and installation of a bicycle pathway, relocation of an existing sidewalk from the eastern side of the bridge to the west, associate drainage infrastructure improvements, and installation of scour protection within the Taunton River. The Project complies with the MassDEP Stormwater management Standards that meets all standards to the maximum extent practicable.

The Project is classified as a Limited[4] and Redevelopment[5] project under section 310 CMR 10.53(3)(f) and (i). As a result, the Project is only required to meet Standards 1 and 7 through 10 fully, and Standards 2

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[2]The following projects may be permitted as a limited project pursuant to 310 CMR 10.24(7) provided the project complies with all applicable provisions of 310 CMR 10.24(1) through (6) and (9) and (10): 1. Maintenance and improvement of existing public roadways, but limited to widening less than a single lane, adding shoulders, correcting substandard intersections, and improving drainage systems. 2. The maintenance, repair and improvement (but not substantial enlargement except when necessary to reduce or eliminate a tidal restriction) of structures, including buildings, piers, towers, headwalls, bridges and culverts which existed on November 1, 1987.

[3] Redevelopment means replacement, rehabilitation, or expansion of existing structures, improvement of existing roads or reuse of degraded or previously developed areas for purposes of 310 CMR 10.58, governing work in the riverfront area. For purpose of the Stormwater Management Standards as provided in 310 CMR 10.05(6)(k) through (q), redevelopment is defined to include the following projects: (a) maintenance and improvement of existing roadways including widening less than a single lane, adding shoulders, correcting substandard intersections, improving existing drainage systems and repaving

[4]The following projects may be permitted as a limited project pursuant to 310 CMR 10.24(7) provided the project complies with all applicable provisions of 310 CMR 10.24(1) through (6) and (9) and (10): 1. Maintenance and improvement of existing public roadways, but limited to widening less than a single lane, adding shoulders, correcting substandard intersections, and improving drainage systems. 2. The maintenance, repair and improvement (but not substantial enlargement except when necessary to reduce or eliminate a tidal restriction) of structures, including buildings, piers, towers, headwalls, bridges and culverts which existed on November 1, 1987.

[5] Redevelopment means replacement, rehabilitation, or expansion of existing structures, improvement of existing roads or reuse of degraded or previously developed areas for purposes of 310 CMR 10.58, governing work in the riverfront area. For purpose of the Stormwater Management Standards as provided in 310 CMR 10.05(6)(k) through (q), redevelopment is defined to include the following projects: (a) maintenance and improvement of existing roadways including widening less than a single lane, adding shoulders, correcting substandard intersections, improving existing drainage systems and repaving

through 6 only to the maximum extent practicable. The Stormwater design for these Standards is described in the following sections.

4.5.2 Regulatory Compliance

The Project will result in vegetative clearing, grading, and construction of 781 square feet of new impervious area. Accordingly, stormwater SCMs that comply with the Stormwater Management Standards are required.

The Project qualifies as Limited Redevelopment Project under the Stormwater Management Standards. This section provides a list of the Stormwater Management Standards and a brief description of the Project's compliance with the Standards to the maximum extent practicable.

LID Measures

Low Impact Development (LID) techniques utilized along portions of the Project include:

- Preservation of existing vegetation;
- Use of country drainage for portions of the Site; and
- Preservation of existing drainage patterns.

Standard 1: No New Untreated Discharges

No new stormwater conveyances (e.g. outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.

The Project has been designed to comply with Standard 1. The Project proposes to replace the existing outfall from the City of Taunton closed drainage system. This work will include replacing the existing 12" MTL and 12" CMP outfalls with a new 18" DI outfall at the same location, replacing the existing headwall, and providing stone for pipe ends as stabilization to prevent erosion to the Taunton River. The Project proposes to retain the existing outfall from the Town of Raynham closed drainage system.

The Stormwater Management Report (Appendix B) provides supporting calculations for the outlet protection design.

Stormwater runoff will be treated by deep sump catch basins, the infiltration trench, or country drainage before discharging off-site.

See Standard 4 for the water quality treatment provided by the Project.

Standard 2: Peak Rate Attenuation

Stormwater management systems shall be designed so that the post-development peak discharge rates do not exceed pre-development peak discharge rates.

The Project has been designed to comply with Standard 2 only to the maximum extent practicable as a Redevelopment / Limited Project. This Project reduces post development peak runoff rates to below pre-development peak runoff rates for DP 3 during the 2-year and 100-year 24-hour design storm events based on NOAA Atlas 14 precipitation data as shown in Table 6. Otherwise, a net increase in peak runoff rates is anticipated for all design points and design storm events.

Table 6: Rainfall Depths (in)

DESIGN STORM EVENTS	RAINFALL DEPTH (in)
2-Year	3.42
10-Year	5.08
100-Year	7.71

Table 7 provides a summary of peak rates for each design point under existing and proposed conditions. The Stormwater Management Report (Appendix B) provides computations and supporting information regarding the hydraulic and hydrologic modeling.

Table 7: Peak Discharge Rates (cfs)

DESIGN POINT	EXISTING RATE (cfs)			PROPOSED RATE (cfs)		
	2-Year	10-Year	100-Year	2-Year	10-Year	100-Year
DP 1	1.14	2.08	3.61	1.23	2.22	3.81
DP 2	0.74	1.39	2.44	0.67	1.28	2.20
DP 3	0.52	1.11	2.14	0.39	0.90	1.81
TOTAL	2.40	4.58	8.19	2.29	4.41	7.82

The Project is unable to fully meet this standard due to constraints including right-of-way, grades, and existing developed properties. This Project includes a net increase of 781± square feet of impervious surface, which will result in minor increases to the volume and rate of stormwater runoff from the Project area. This increase in impervious area is necessary to provide sidewalks where none currently exist. Despite Project constraints and an increase in peak flow rates, the proposed deep-sump catch basins and infiltration trench will improve existing conditions throughout the Project corridor. Refer to HydroCAD calculations provided in the Stormwater Management Report (Appendix B) for additional information.

Standard 3: Recharge

Loss of annual recharge to groundwater shall be eliminated or minimized through the use of infiltration measures, including environmentally sensitive site design, low impact development techniques, stormwater best management practices, and good operation and maintenance. At a minimum, the annual recharge from the post-development site shall approximate the annual recharge from pre-development conditions based on soil type. This Standard is met when the stormwater management system is designed to infiltrate the required recharge volume as determined in accordance with the Massachusetts Stormwater Handbook.

The Project has been designed to meet this standard on a Project-wide basis, as the Project is a Redevelopment / Limited Project. The Project has significant right-of-way constraints, which restrict opportunities for recharge on the southern portions of the Site. Despite constraints, the proposed infiltration trench has been designed to provide the sitewide required recharge volume for new and a portion of the existing impervious area. However, the required recharge volume will not be achieved for design points DP 1 and DP 2.

Table 8 provides the required recharge volume for the Project, and Table 9 provides the recharge volumes proposed for each design point.

Table 8: Required Recharge Volume for Project

	HSG A	HSG B	HSG C	HSG D	Total
Existing Impervious (sq. ft)	26,829		1,964	2,417	31,210
Proposed Impervious (sq. ft)	27,280		2,213	2,498	31,991
Net Impervious Area (sq. ft)	451		249	81	781
Target depth, F (in)	0.6	0.35	0.25	0.10	
Required Recharge Volume, ReV (cf)	22.55		5.19	0.68	28.41

Table 9: Provided Recharge Volumes at Each Design Point

	HSG A	HSG B	HSG C	HSG D	Total
DP-1					
Net Impervious Area (sq. ft)	461		5	705	9,844
Required Recharge Volume, ReV (cf)	23.05		0.10	5.88	29.03
Provided Recharge Volume (cf)	0		0		0.00
DP-2					
Net Impervious Area (sq. ft)	1,583		0	-195	1,388
Required Recharge Volume, ReV (cf)	79.15		0.00	-1.63	77.53
Provided Recharge Volume (cf)	81.42		0		81.42
DP-3					
Net Impervious Area (sq. ft)	-1593		244	-429	-1,778
Required Recharge Volume, ReV (cf)	-79.65		5.08	-3.58	-78.14
Provided Recharge Volume (cf)	0.00		0		0.00

The infiltration SCMs are designed to drain completely within 72 hours.

Standard 4: Water Quality Treatment

Stormwater management systems shall be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS)

The Project has been designed to comply with Standard 4 only to the maximum extent practicable as a

Redevelopment / Limited Project. Proposed drainage system improvements, including the installation of deep sump catch basins and an infiltration trench, will provide treatment of stormwater runoff that does not currently exist and will improve existing conditions. The proposed Project will provide an average TSS removal rate of 20% for 31,991± sq. ft. of impervious surfaces.

The Project is located in an area with a rapid infiltration rate (>2.4 in/hr) and the required water quality volume has been calculated based on the 1.0" water quality depth.

Table 10 shows the WQV to be treated for both new and existing impervious area within each drainage area, organized by design point.

Table 10: WQV at Each Design Point

DESIGN POINT	WQV FOR NEW IA (cf)	WQV FOR EXISTING IA (cf)	TOTAL WQV (cf)
DP-1			
10P	*97.58*	*722.75*	*820.33*
Total	97.58	722.75	820.33
DP-2			
20P	*44.75*	*1,028.50*	*1,073.25*
21P	*70.92*	*0.00*	*70.92*
Total	115.67	1,028.50	1,144.17
DP-3			
30P	*-148.17*	*849.58*	*701.42*
Total	-148.17	849.58	701.42
Project Total	**65.08**	**2,600.83**	**2,665.92**

Table 11 shows the WQV provided by the SCMs at each design point.

Table 11: WQV by the SCMs at Each Design Point

DESIGN POINT	PRETREATMENT (Y/N)	*WQV PROVIDED (cf)*	*MEETS TOTAL WQV (cf)*	*MEETS REQUIRED WQV for NEW IA*
DP-1		0	No	No
DP-2			No	Yes
Linear Infiltration Practice	Y	81.42	No	Yes
Total	Y	81.42		
DP-3		0		
Project Total			***No***	***Yes***

Opportunities to install treatment and recharge SCMs are limited due to the aforementioned constraints. Despite Project constraints, the proposed deep sump catch basins and linear infiltration practice will improve existing conditions throughout the Project corridor. Refer to Appendix A in the Stormwater Management Report for calculations relating to TSS Removal. Refer to Illicit Discharge Compliance Statement under Standard 10.

Appendix B includes the Long Term Pollution Prevention Plan for this Project.

Standard 5: Land Uses with Higher Potential Pollutant Loads (LUHPPLs)

Land use with high potential pollutant loads must have source control and pollution prevention measures implemented in accordance with the Massachusetts Stormwater Handbook.

Standard 5 does not apply to the Project. There are no Land Uses with Higher Potential Pollutant Loads proposed as part of the Project.

Standard 6: Critical Areas

Stormwater discharges within the Zone II or Interim Wellhead Protection Area of a public water supply and stormwater discharges near or to any other critical area require the use of specific source control, pollution prevention measures.

Standard 6 does not apply to the Project. There are no Critical Areas near the Project area.

Standard 7: Redevelopment

A redevelopment project is required to meet certain Stormwater Management Standards only to the maximum extent practicable.

The Project is a Redevelopment Project under the first definition: “Maintenance and improvement of existing roadways, including widening less than a single lane, adding shoulders, correcting substandard intersections, improving existing drainage systems and repaving.” Proposed deep sump catch basins and infiltration trench will provide treatment to the maximum extent practicable and represent an improvement to the existing conditions. Standards 1, 8, 9, and 10 are met, Standards 3 and 4 are met on a Project-wide basis, and Standard 2 is met to the maximum extent practicable. Standards 5 and 6 are not applicable to this Project.

Standard 8: Construction Period Pollution Prevention and Erosion and Sediment Control

A plan to control construction related impacts, including erosion, sedimentation, and other pollutant sources during construction and land disturbance activities shall be developed and implemented.

The implementation of erosion and sedimentation (E&S) controls during construction is considered a standard practice for all City projects. E&S controls will be installed before any land disturbance begins for the Project and will remain in place for the duration of the Project. The E&S controls for the Project are shown on the Project plans and include perimeter sediment control barrier, tree protection, temporary cofferdam for water control, and dewatering.

The Project as currently design disturbs one or more acres of land; therefore, the Project contractor will request coverage under the NPDES Construction General Permit (CGP) and develop a Stormwater Pollution Prevention Plan (SWPPP). The SWPPP follows the requirements of this standard and complies with the NPDES CGP.

Standard 9: Long Term Operation and Maintenance Plan

A Long-Term Operation and Maintenance Plan shall be developed and implemented to ensure that stormwater management systems function as designed.

The roadway and bridge included in this Project are located in both the City of Taunton and the Town of Raynham. Ownership is divided between the City of Taunton and the Town of Raynham. The activities included in the O&M Plan will be implemented by the municipality. Appendix B of the Stormwater Management Report (Appendix B) includes the O&M Plan for this Project.

Standard 10: Prohibition of Illicit Discharges

All illicit discharges to the stormwater management system are prohibited.

The Project's stormwater management system, as shown on the plans submitted with this report, has been designed in full compliance with Standard 10. The Project area does not have any known illicit connections. Any illicit connections to the stormwater management system found in the Project limit of work during construction will be removed and/or resolved through the City's Illicit Discharge Detention and Elimination (IDDE) Program. The Long-Term Pollution Prevention Plan, provided in Appendix B of the Stormwater Report (Appendix B), includes measures to prevent illicit discharges.

For additional details see Stormwater Report in Appendix B– Stormwater Management Report details the stormwater management improvements proposed by the Project and describes the Project's relation to the Stormwater Management Standards.

The Contractor will be responsible for obtaining a National Pollutant Discharge Elimination Systems (NPDES) Dewatering and Remediation General Permit (DRGP). A Stormwater Pollution Prevention Plan (SWPPP) will be prepared prior to any land disturbance and will be submitted to the Conservation Commission for review and approval. Per the SWPPP, the Contractor will monitor and assess conditions and identify problems in the field during and after construction activities.

4.6 Resource Area Restoration and Replication

The Project was designed to avoid, minimize, and mitigate impacts to Resource Areas, wildlife habitat, and other sensitive areas. Due to the nature of the Project being a bridge replacement within a linear corridor, avoidance of impacts is infeasible; however, they have been minimized to the extent possible. Impacts will be mitigated with LUW and BVW restoration as described below.

4.6.1 LUW Restoration

To address the proposed permanent LUW impacts, the Project will restore the LUW conditions in place through the addition of native streambed material over installed scour protections. To restore LUW, 2'-8" layer of streambed material will be placed over a 2'-0" layer of dumped Class III riprap, which will all be over 1' of crushed stone for a total depth of 5'-8". The riprap will extend the length of the channel from each abutment and will extend 25' upstream and downstream of the embankment. All 6,703 sf of permanent and temporary LUW impacts will be restored in place.

4.6.2 Bank Restoration

To address the proposed temporary Bank impacts caused by the installation of erosion controls, all 66 lf of temporary Bank impacts and 51 lf of permanent Bank impacts will be restored through the application of a native roadside part-shade seed mix. Four inches (4") of loam and seed will be applied over pavement milling mulch.

Erosion and sedimentation controls will be 100% biodegradable and left in place at the conclusion of the Project. Compost filter tubes will be overlapped by a minimum of 3' for a continuous barrier and secured using hardwood stakes. Erosion and sedimentation controls will be used to reduce flow onto work and to prevent flow off-site by placing the controls as close to the area of disturbance as possible. Compost filter tube berms will be used for slopes 2:1 or steeper and will be staked every 5' to secure the tube or per the manufacturer's instructions. Any non-biodegradable material, if used, will be removed and disposed of off-site at the Contractor's expense. Filter tube compost will be spread or raked around to eliminate berm. The restored areas will be monitored over the course of two (2) years to document adequate hydrology and plant survivability.

BMPs will be employed by the Contractor to prevent further propagation of invasive plant species at the Site. These BMPs include proper disposal of any excavated invasive species, prevention of migration of rhizome fragments and seed pods, and cleaning vehicles of soil before and after accessing the Site. Any application of herbicides will be done in accordance with the practices set forth by the Massachusetts Department of Agricultural Resources. Further details regarding invasive species control can be found in Appendix D – Project Plans.

5.0 Alternatives Analysis

The purpose of this Project is to reconstruct a structurally deficient bridge, protect the bridge from scour, and improve safety for vehicles, cyclists, and pedestrians. As described in further detail within the Alternatives Analysis prepared for the Project (Appendix F), several factors were considered when determining the scope and approach of the Project design, including cost, construction constraints, and environmental concerns.

The intent of this analysis is to demonstrate that there is no alternative to the Project with less impacts on the environment that meets the Project purpose. Accordingly, this Alternatives Analysis focuses on the considerations made during the preparation of the Bridge Reconstruction R-02-003=T-01-004 Alternatives Analysis and were used to develop this Alternatives Analysis. This Alternatives Analysis assesses the following alternatives:

- No-Build Alternative;
- 10' Travel Lanes and 4' Shoulder on Safety Curb Side (Alternative #1 – Preferred);
- 12' Travel Lanes and 2' Shoulders on Either Side (Alternative #2);
- No Scour Protection (Alternative #3); and
- Embedment Below Scour Depths (Alternative #4).

5.1 Project Construction Alternatives

5.1.1 No-Build Alternative

The No-Build Alternative was assessed as a potential Project alternative. Under the No-Build Alternative, no aspect of the Project purpose as defined above is realized. While the No-Build Alternative would not result in a loss of Resource Areas, the Old Colony Avenue Bridge would remain deteriorating and insufficient for safe public transportation. Pursuing the Non-Build Alternative is not consistent with the Project purpose and would not serve the needs of the City of Taunton or the Town of Raynham, therefore, this alternative was not selected.

5.1.2 Alternative #1: 10' Travel Lanes and 4' Shoulder on Safety Curb Side (Preferred)

Alternative #1 features a cross-section with two 10'-wide travel lanes in each direction, accompanied by one 2' -wide shoulder on the sidewalk side and one 4'-wide shoulder on the safety curb side. Sidewalk is proposed on the west side of the roadway. The sidewalk is 6' wide from the condominium driveway to over the bridge. North of the bridge the sidewalk tapers down to 5.5' wide and terminates at Sandy Hill Street with reciprocal ramps. Vertical granite curb is proposed along the front of the sidewalk. Vertical granite curb is proposed at the back of sidewalk at Station 5+70 +/- to 6+32 +/- (LT) to avoid impacts to the wetlands. Alternative #1 will require a design justification for pedestrian accomodations because only one sidewalk is being proposed. The design does not allow for sidewalks on both sides of the road due to the width constraint of the existing bridge substructure. A design justification is also needed for the bicycle accomodations. Neither a shared use path or seperated bike lanes were able to fit within the existing bridge structure. Therefore, a 4' shoulder was provided on the east side, which is the minimum width for bicycle accomodation. A 2' shoulder was provided on the west side against the sidewalk for drainage, errant vehicles, and encroachment and off-tracking of wide vehicles. Sharrows can be added in the northbound lane.

Alternative #1 results in impacts to LUW totaling 6,703 square feet (4,399 square feet permanent and 2,304 square feet temporary); and impacts to Bank totaling 117 linear feet (51 feet permanent and 66 linear feet temporary). Alternative #1 and Alternative #2 result in the same impacts to Resource Areas.

Alternative #1 allows for bicycle accommodation southbound with a 4' shoulder, while still maintaining the minimum lane width for a collector of 10'. Old Colony Avenue and South Street East is a bus route on the Greater Attleboro Taunton Regional Transit Authority. Bus lanes are permitted on 10' travel lanes. The narrower 10' roadway will help reduce speeds. Alternative #1 presents an improvement upon existing bridge conditions and achieves the Project's purpose and need with no increase in Resource Area impacts compared to Alternative #2. Therefore, Alternative #1 is the preferred alternative.

5.1.3 Alternative #2: 12' Travel Lanes and 2' Shoulders on Either Side

Alternative #2 features a cross-section with two 11'-wide travel lanes in each direction, accompanied by two 2'-wide shoulders. Vertical granite curbing lines both sides of the roadway. Sidewalk proposed on the west side of the roadway. The sidewalk is 6' wide from the condominium driveway to over the bridge. North of the bridge the sidewalk tapers down to 5.5' wide and terminates at Sandy Hill Street with reciprocal ramps. Vertical granite curb is proposed along the front of the sidewalk. Vertical granite curb is proposed at the back of sidewalk at Station 5+70 +/- to 6+32 +/- (LT) to avoid impacts to the wetlands. Alternative #2 will require a design justification for pedestrian accomodations because only one sidewalk is being proposed. The design does not allow for sidewalks on both sides of the road due to the width constraint of the existing bridge substructure. A design justification is also needed for the bicycle accomodations. Neither a shared use path or seperated bike lanes were able to fit within the existing bridge structure. Therefore, 2' shoulders were provided on both sides of the roadway. Sharrows can be added to both travel lanes.

Alternative #2 results in impacts to LUW totaling 6,703 square feet (4,399 square feet permanent and 2,304 square feet temporary); and impacts to Bank totaling 117 linear feet (51 feet permanent and 66 linear feet temporary). Alternative #1 and Alternative #2 result in the same impacts to Resource Areas.

Alternative #2 presents the same conditions as existing conditions, where the lane widths are 11' wide and the shoulders are 2' wide. Alternative #2 does not propose any pedestrian or bicycle improvements in addition to addressing unsafe bridge conditions, while providing no decrease in impacts to Resource Areas. Therefore, Alternative #2 was not selected.

5.1.4 Alternative #3: No Scour Protection

Alternative #3 includes the design provisions of the preferred Alternative #1 without the addition of scour protection. In Alternative #1, scour protection consists of a 2'-8" layer of streambed material over 2'-0" layer of dumped riprap, which will all be over 1' of crushed stone for a total depth of 5'-8". Constructing the Project without scour protection eliminates the need for dredging and dewatering, reducing impacts to Resource Areas. Although Alternative #3 results in less impacts to Resource Areas, scour protection has been determined as necessary to protect the Taunton River and bridge from scour and eventual compromising of the substructure. Therefore, Alternative #3 was not selected.

5.1.5 Alternative #4: Embedment Below Scour Depths

Alternative #4 proposes to lower the bridge footings below predicted scour depths. This alternative would require the substructure to be replaced in order to embed it below the level where scour would occur.

Hydraulic analysis confirms that scour countermeasures are required around the bridge to prevent erosion. Under proposed conditions, the scour analysis predicts contraction scour of approximately 2.6' to 2.7' and worst local abutment scour of approximately 13' during the 25-year and 50-year storm events. Total predicted scour exceeds 5'. These scour depths indicate that the existing bridge is vulnerable to scour without protection. Accordingly, riprap countermeasures are required to protect the substructure and reduce erosion risk during flood events. Dredging is only proposed to install scour countermeasures. An alternative to installing scour protection would be to replace the substructure and embed it to a depth below the level where scour would occur. However, this alternative would still result in significant impacts to LUW and Bank associated with water controls and pier removal/installation and would be cost-prohibitive to the City of Taunton based on current funding. Installation of scour protection is significantly less costly than substructure replacement and the proposed 2' of native streambed material proposed over the scour protection will provide appropriate restoration in the final condition.

Alternative #1 was selected because the installation of riprap countermeasures is necessary to protect the area around the bridge from scour and results in less disturbance than Alternative #4. The proposed riprap countermeasures are consistent with the MassDOT Bridge Manual - Hundredth Anniversary Edition.

6.0 Regulatory Compliance

The Project is proposed under the provisions specified under Town of Raynham Wetlands Protection Bylaw (the Bylaw), which builds upon the provisions of the Massachusetts Wetlands Protection Act pursuant to "Home Rule". The Project was designed to meet the Performance Standards of the Act, and where more stringent, the Bylaw.

The Project will result in the following impacts:

- 66 linear feet (lf) of temporary and 51 lf of permanent impact to Bank;
- 2,304 square feet (sf) of temporary and 4,399 sf of permanent impact to LUW associated with a dredge volume of 1,052 cubic yards (cy);
- 1,121 sf of permanent impact to BLSF;
- 1,867 sf of temporary impact and 4,477 sf permanent impact to Riverfront Area; and
- 315 sf of temporary impact and 645 sf of permanent impact to the Bylaw 25' No-Activity Buffer Zone.

The Project is located entirely within the Bylaw 100' Buffer Zone to BLSF and therefore will result in 5,518 sf of temporary impact and 5,616 sf of permanent impact to the Bylaw 100' Buffer Zone to BLSF. The

Project will also result in 1,309 sf of temporary impact and 3,253 sf of permanent impact to 100' Buffer Zone to Bank and 3,479 sf of temporary impact and 3,895 sf of permanent impact to 100' Buffer Zone to BVW.

6.1 MASSACHUSETTS STREAM CROSSING STANDARDS

The Project only proposes the replacement of the superstructure and will make no changes to the existing bridge substructure. While the existing conditions do not fully meet all Massachusetts Stream Crossing Standards, the proposed Project conditions meet the Standards to the maximum extent practicable. The compliance of the existing bridge with the Standards will not change given the nature of the work being applicable only to the superstructure. Proposing improvements to the bridge to meet the Standards would require a full bridge substructure replacement which is outside the scope of the Project.

The existing structure is an approximately 90' two-span bridge with equal spans of approximately 45'. The hydraulic opening of the existing bridge is 79' with a sharp nose pier that varies in width from 3' to 2.75'. The bankfull width of the Taunton River is estimated to be approximately 99.5'. Bankfull width was calculated in AutoCAD by measuring the width between flags of the B1/B2 Series, taking the average of three (3) bankfull widths upstream of the bridge and three (3) bankfull widths downstream of the bridge. Table 12: Stream Crossing Standards Compliance demonstrates the Project's ability to comply with the Massachusetts Stream Crossing Standards as follows:

Table 12: Stream Crossing Standards Compliance

Stream Information and Standards	Existing/Proposed Project
Standard 1 **Crossing Type**	Bridge – **Met** (**Optimal Standard Met)**
Standard 2 **Embedment > 2 feet**	Crossing type is a bridge. **Not Applicable**
Standard 3 **Crossing Span >1.2*BFW**	BFW = 99.5' 1.2*99.5' = 119.4' Span = 79.0' 79.0' < 119.4' **Not Met**
Standard 4 **Substrate Type**	Simulated natural substrate will be used to restore streambed (LUW) **Met**
Standard 5 **Water Depth and Velocity**	The Project will result in water depths and velocities equivalent to existing conditions during 25/50/100-year storm events at the location of the Bridge. **Met – proposed water depths and velocity are comparable to existing conditions upstream and downstream of the bridge. See Appendix D– Hydraulic Analysis and Scour Report.**
Standard 6 **Openness Ratio > 0.82**	$\frac{15.6' \; x \; 79.0'}{37.7'}$ = 32.69 Openness Ratio: 32.69 > 1.64 (Optimal) > 0.82

	Height: 15.6’ > 6’ (Optimal) **Met (Optimal Standard Met)**

6.2 TOWN OF RAYNHAM WETLANDS PROTECTION BYLAW (THE BYLAW)

The Town of Raynham has individual wetland protection regulations, which outline the specific wetland protections applied within its municipal boundaries. While some of these regulations are unique to the Bylaw, it relies on the Act for the majority of the wetland protection regulations. Therefore, references to the Act Performance Standards per 310 CMR 10.00 are included below as appropriate. The Project will fully adhere to Performance Standards for Bank, LUW, and BLSF.

6.2.1 INLAND BANK – GENERAL PERFORMANCE STANDARDS – 310 CMR 10.54(4)

Work impacting Inland Bank will fully meet the Performance Standards at 310 CMR 10.54(4). Permanent impacts to Bank result from scour protection that will not impair the capacity of the Bank to provide wildlife habitat, water carrying capacity, or physical stability of the Bank. Once scour protection is placed, a typical modified rockfill detail will be used (i.e., voids will be filled with loam/compost, seeded with a native seed mix, and covered with erosion control matting if necessary). Final grades will match existing conditions and there will be no change to the geometry of the River. Temporarily impacted banks will be restored to existing grade and stabilized with a native seed mix.

6.2.2 LUW – GENERAL PERFORMANCE STANDARDS – 310 CMR 10.56(4)

The Project will involve the loss of less than 5,000 sf of LUW (4,171 sf) that shall be mitigated in accordance with the Performance Standards listed at 310 CMR 10.56(4)(a)1. through 5. There will be no loss in capacity of LUW to support the interests of the Bylaw.

Dredging will remove 1,052 cy that will be restored in-place through the placement of streambed material over the proposed scour protection, which will protect ground and surface water quality following Project completion. Temporary impacts to LUW will be restored in-place following construction activities through then restoring with native streambed material over the proposed scour protection to reestablish existing wildlife habitat functions. All temporary LUW impacts will be restored upon completion of the Project. Therefore, work impacting LUW will meet the Performance Standards at 310 CMR 10.56(4) because impacted areas will be restored in-place and stream crossing conditions will not change from existing conditions. While areas with proposed scour protection are quantified as permanent impacts, conditions at the surface of the streambed will match existing conditions.

6.2.3 BORDERING LAND SUBJECT TO FLOODING – 310 CMR 10.57(4)

Work impacting BLSF will meet the Performance Standards at 310 CMR 10.57(4) fully, as the proposed permanent impacts will not impair the capacity of the BLSF to provide wildlife habitat or flood storage. No fill is proposed within BLSF, and all disturbed areas will be restored and/or stabilized.

6.2.4 RIVERFRONT AREA – 310 CMR 10.58(4)

The Project proposes temporary and permanent impacts to the RA to the Taunton River; however, the Performance Standards will be met fully. There are no practicable or substantially equivalent alternatives that would result in less adverse effects on the interest of the Act as discussed in the Alternatives Analysis provided in Section 5. All alternatives for the Project result in the same impacts to RA with the exception of the No Build Alternative, which was not selected due to it being inconsistent with the Project purpose.

The bridge carrying Old Colony Avenue over the Taunton River was constructed in 1946. Proposed impacts total less than 5,000 sf, are primarily temporary, and are proposed within an area of maintained roadway. Due to the bridge's proximity to the roadway, a 100'-wide vegetated area does not exist between the structure and the roadway. RA in the vicinity of the Project primarily consists of maintained road, road shoulder, and vegetated areas. Roadway resurfacing was not considered in impact calculations or the assessment of Performance Standards compliance, as this activity will only occur within an existing altered footprint and will not result in new encroachment into RA. Cleared areas of vegetation will be restored following completion of the work to replace any lost wildlife habitat. There are no vernal pools in the vicinity of the Project. Temporarily cleared vegetation adjacent to the roadway will be restored using native seed mix.

The Project qualifies as a Redevelopment Project under the Massachusetts Stormwater Management Standards and will meet Standards 1 and 7 through 10 fully. Erosion and sedimentation controls will be maintained throughout the Project, and work within the Taunton River will be conducted in the dry to prevent migration of sediment into the waterway. Erosion controls will only be removed once full stabilization of the Site is achieved. Therefore, work within Riverfront Area fully complies with the Performance Standards at 310 CMR 10.58(4).

6.2.5 25' No-Activity Buffer Zone

The Bylaw provides a 25' No-Activity Buffer Zone around BVWs for all construction activities. This No-Activity Buffer Zone extends 25' upgradient of the delineated boundaries of the *WF1* and *WF2* Series BVWs. Given that the Project consists of bridge work in proximity to BVWs, work within the 25' No-Activity Buffer Zone is required to complete the Project.

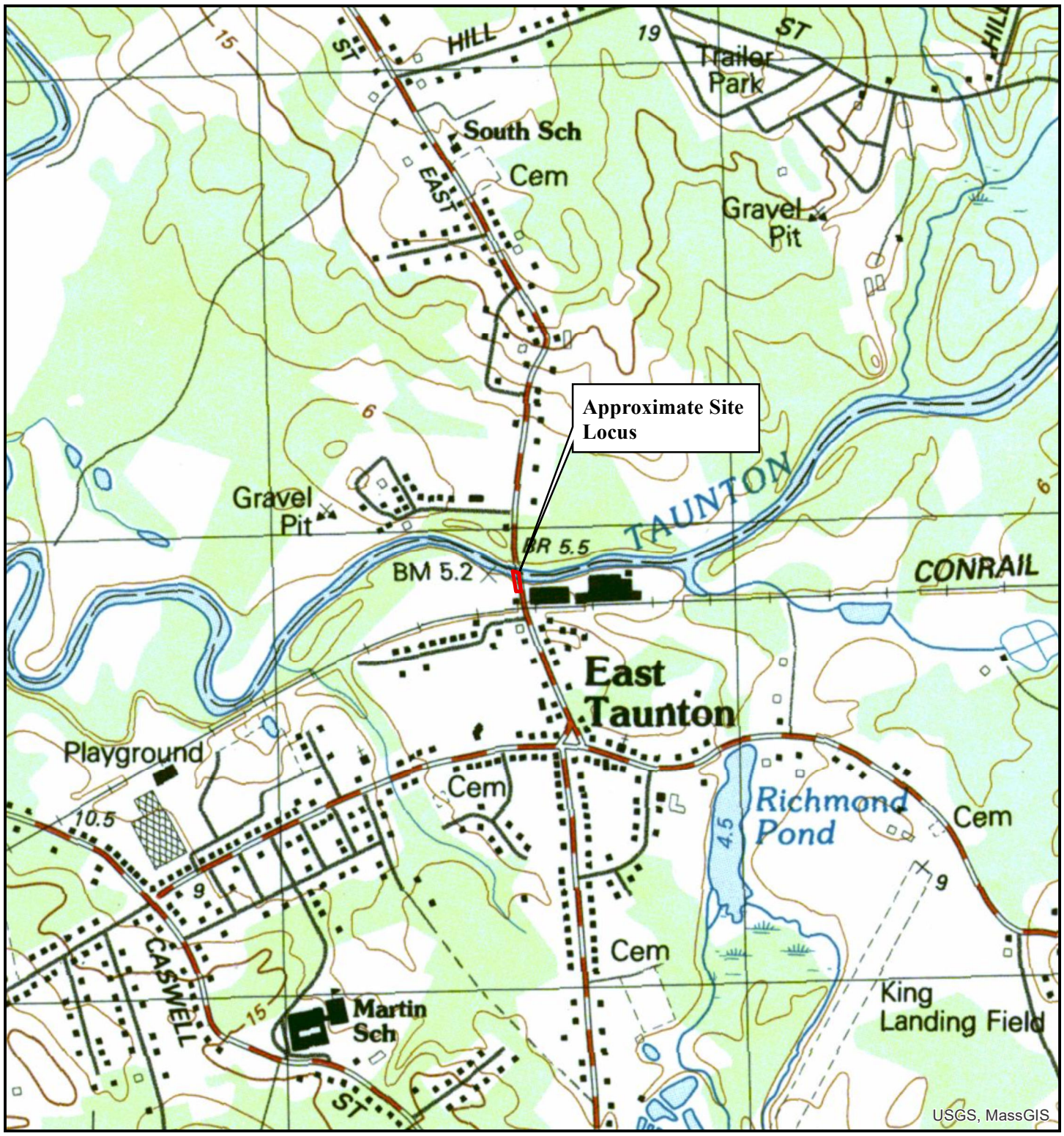
A total of 631 sf of temporary impacts and 329 sf of permanent impacts to the 25' No-Activity Buffer Zone is proposed with the Project. These impacts result from the activities described in Section 3.1. Wildlife habitat function is not anticipated to be impacted by the Project.

7.0 Summary

The proposed Project is anticipated to provide a critical bridge replacement to support motorist, cyclist, and pedestrian safety along Old Colony Avenue and South Street East. Construction of the Project will result in permanent and temporary impacts to jurisdictional Resource Areas which have been minimized to the maximum extent possible and will be mitigated through in-kind restoration. The Project has been designed to meet all local, state, and federal standards and comply with the regulations set forth in the Bylaw as described herein.

The City of Taunton respectfully requests that the Raynham Conservation Commission find these measures adequately protective of the interests of the Bylaw, the Order of Conditions approving the work as described in the Notice of Intent and accompanying plans.

FIGURES



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N
W E
S

0 1,000 2,000 Feet

1 inch = 1,000 feet

Figure 1a
USGS Site Locus
Old Colony Avenue Bridge
Taunton and Raynham, MA

Data Source: MassGIS USGS Topographic Quadrangle Images (2001)

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N
W E
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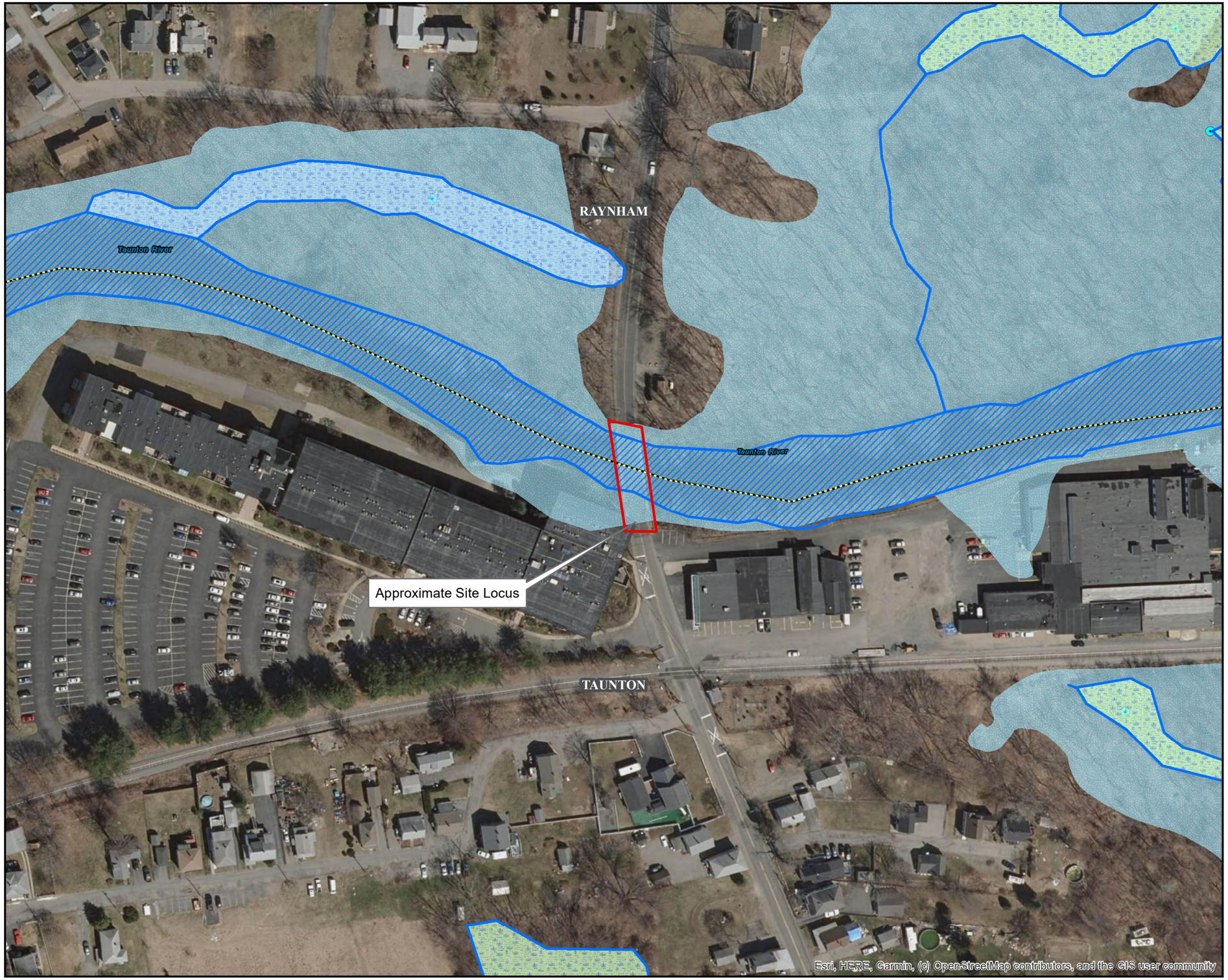
0 1,000 2,000 Feet

1 inch = 1,000 feet

Figure 1b
Aerial Site Locus
Old Colony Avenue Bridge
Taunton and Raynham, MA

Data Source: MassGIS USGS Topographic Quadrangle Images (2001)

Figure 2
Environmental Resources Figure
Old Colony Avenue Bridge
Taunton and Raynham, MA



Environmental Resources Legend

- MassDEP Hydrologic Feature
- Marsh/Bog
- Wooded marsh
- Open Water
- NFHL 100 Year Flood Zone
- NHESP Potential Vernal Pool
- NHESP Certified Vernal Pool
- NHESP Priority Habitat of Rare Species
- NHESP Estimated Habitats of Rare Wildlife
- Zone A
- Zone B
- ZONE C
- MassDEP Zone I
- MassDEP Zone II
- MassDEP IWPA
- Outstanding Resource Water
- Area of Critical Environmental Concern (ACEC)
- Town Boundary

N
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0 125 250 Feet

1 inch = 125 feet

Data Source: MassGIS USGS Color Ortho Imagery (2014), MassDEP Wetlands (1:12000) (2009), NHESP Potential Vernal Pools (2000), NHESP Certified Vernal Pools, NHESP Priority Habitats of Rare Species (2008), NHESP Estimated Habitats of Rare Species (2008), Areas of Critical Environmental Concern (2009), FEMA National Flood Hazard Layer (2014),

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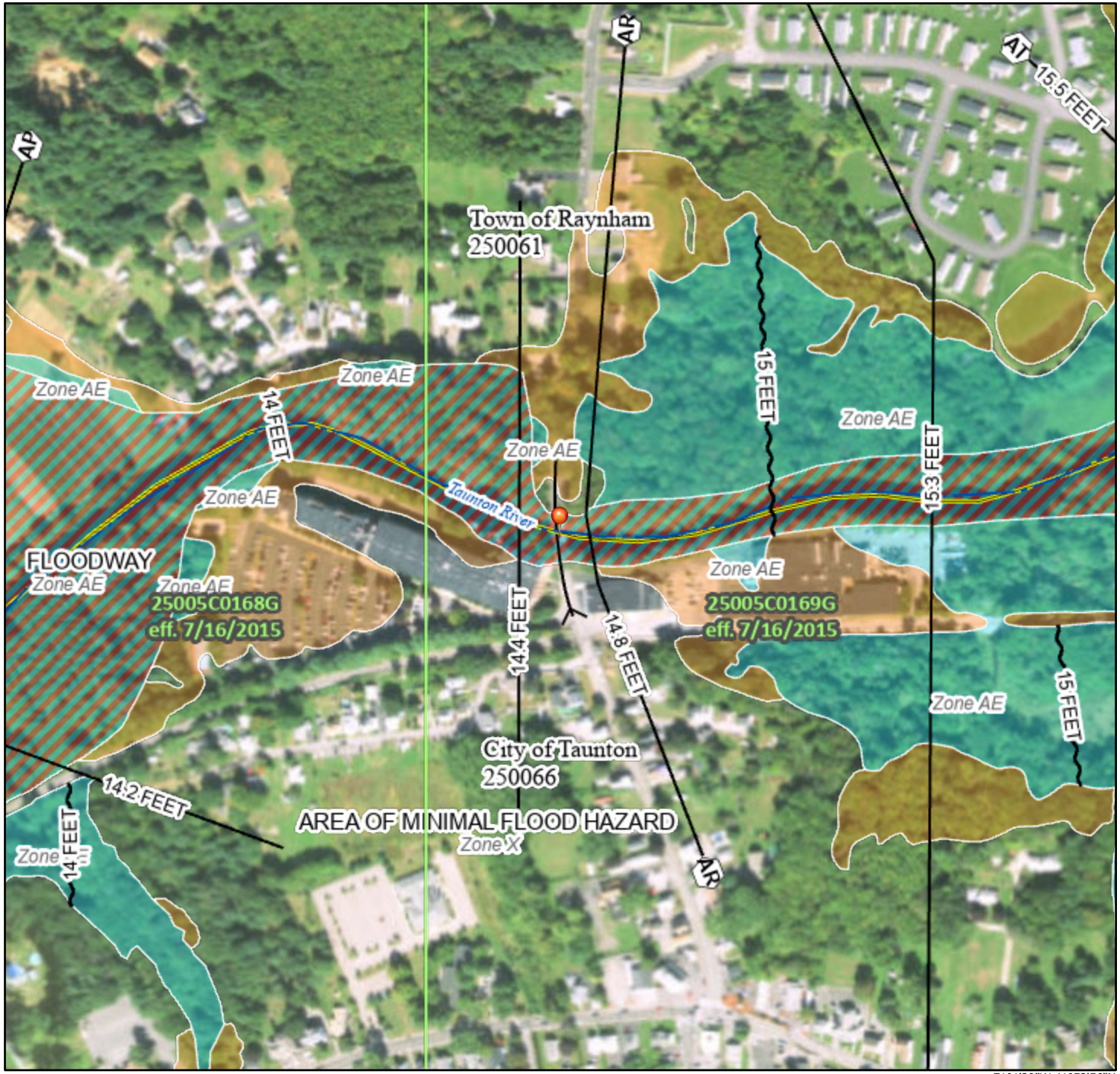
National Flood Hazard Layer FIRMette

FEMA

71°2'7"W 41°53'23"N



71°1'29"W 41°52'56"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

A00860 - 59

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 3/28/2023 at 3:27 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Figure 4
Historic Resources Map
Old Colony Avenue Bridge
Taunton and Raynham, MA

Legend

MassHistoric Commission Inventory (Points)

- Inventoried Property
- LHD
- MA/HL
- NRHP
- NRHP and LHD
- PR

MassHistoric Commission Inventory (Areas)

- Inventoried Property
- LHD
- MA/HL
- NRHP
- NRHP and LHD
- PR

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0 200 400 Feet

1 inch = 200 feet

Data Source: MassGIS USGS Color Ortho Imagery (2023), MHC Historic Inventory (2024)

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Figure 5
OpenSpace Resources Map
Old Colony Avenue Bridge
Taunton and Raynham, MA

Legend

ARTICLE97

- Yes
- No
- Unknown

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0 200 400 Feet

1 inch = 200 feet

Data Source: MassGIS USGS Color Ortho Imagery (2023), Protected and Recreational OpenSpace (2024). Land Use (2009).

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Figure 6
Soil Survey Map
Old Colony Avenue Bridge
Taunton and Raynham, MA

Legend

- Site Locus
- MassDEP Soils

N
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0 200 400
Feet
1 inch = 200 feet

Data Source: MassGIS USGS Color Ortho Imagery (2023), MassDEP Wetlands (2017), NHESP Potential Vernal Pools (2013), NHESP Certified Vernal Pools, NHESP Priority Habitats of Rare Species (2021), NHESP Estimated Habitats of Rare Species (2021), Areas of Critical Environmental Concern (2009), FEMA National Flood Hazard Layer (2014),

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PHOTOGRAPHIC DOCUMENTATION

Photo 1

View of the B1-100 Series Bank along the Taunton River—Facing west

Photo 2

View of the B1-99 Series Bank along the Taunton River—Facing east

PHOTOGRAPHIC DOCUMENTATION

Old Colony Avenue Bridge over the Taunton River

Taunton and Raynham, Massachusetts

Photographs Documented 3.31.2023

Photo 3

View of the B2-100 Series Bank along the Taunton River—Facing east

Photo 4

View of the B2-99 Series Bank along the Taunton River—Facing west

PHOTOGRAPHIC DOCUMENTATION

Old Colony Avenue Bridge over the Taunton River

Taunton and Raynham, Massachusetts

Photographs Documented 3.31.2023

Photo 5

View of the B3/B4 Series Intermittent Streams—facing west

Photo 6

View of the B3/B4 Series Intermittent Streams and headwall—facing south

PHOTOGRAPHIC DOCUMENTATION

Old Colony Avenue Bridge over the Taunton River

Taunton and Raynham, Massachusetts

Photographs Documented 3.31.2023

Photo 7

View of the WF1 Series BVW—facing west

Photo 8

View of the WF2 Series BVW—facing west

PHOTOGRAPHIC DOCUMENTATION

Old Colony Avenue Bridge over the Taunton River

Taunton and Raynham, Massachusetts

Photographs Documented 3.31.2023

APPENDIX A – Resource Area Boundary Delineation Report

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Resource Area Boundary Delineation
Old Colony Avenue Bridge
Taunton and Raynham, Massachusetts

July 01, 2024

On March 31, 2023, BETA Group, Inc. (BETA) Wetland Scientists performed Wetland Resource Area delineations near the bridge over the Taunton River along Old Colony Avenue in Taunton and South Street East in Raynham, Massachusetts (the Site). This report describes Wetland Resource Areas Subject to Protection under the Massachusetts Wetlands Protection Act (M.G.L. Chapter 131 Section 40 - the Act), the City of Taunton Wetlands Protection Ordinance (City of Taunton Code (2010) §§ 16-30 to 16-38 – the Ordinance), the Raynham Wetland Protection Bylaw (the Bylaw), the federal Clean Water Act (33 U.S.C. §1251 et seq (1972)), and the Massachusetts Clean Waters Act (MGL Chapter 21 Section 26-53) that exist on or within 100 feet of the Site as well as the methodologies used to delineate their boundaries.

Site Description

The Site consists of a two-lane bituminous concrete roadway and underlying bridge that spans the Taunton River at the municipal boundary between the City of Taunton and the Town of Raynham (Figure 1 – Site Locus). The bridge is a two-span reinforced concrete deck supported on reinforced concrete abutments and timber piles. The Site is bounded by undeveloped forest and residential housing to the north, multi-family residential and industrial properties to the south, and the Taunton River to the east and west (Figure 2 – Environmental Resources).

According to the USDA Natural Resources Conservation Service – Soil Survey, mapped soils on and within proximity to the Site are generally classified as Urban Land, Birdsall silt loam and Udorthents, smoothed. Field observations generally confirmed the soil types at the Site. The *Custom Soil Resource Report for Bristol County, Massachusetts, Northern Part* is attached.

State jurisdictional Resource Areas identified within 100 feet of the Site include Inland Bank (to perennial and intermittent streams), Bordering Vegetated Wetlands (BVW), Land Under Water (LUW), Bordering Land Subject to Flooding (BLSF), and Riverfront Area (RA). The MassGIS database was used as the initial step in identifying critical areas on or within proximity to the Site. The table below describes selected environmentally critical categories as determined through MassGIS.

Table 1. Selected MassGIS Environmental Data Layers

Mapped Resource On or Within Proximity to Site	Yes	No
Area of Critical Environmental Concern		✓
NHESP Certified Vernal Pool		✓
NHESP Potential Vernal Pool		✓
NHESP Estimated Habitat of Rare Wildlife		✓
NHESP Priority Habitat of Rare Species		✓
Outstanding Resource Waters		✓
FEMA Flood Zones	✓	
Surface Water Protection Area (Zones A and B)		✓
Interim Wellhead Protection Area		✓
Zone I Wellhead Protection Area		✓
Zone II Wellhead Protection Area		✓
Wild and Scenic River	✓	

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P: 508.756.1600 | W: www.BETA-Inc.com

Mapped Resource On or Within Proximity to Site	Yes	No
DCR Dams		✓
Coldwater Fisheries Resource		✓

Source: MassGIS

Jurisdictional Wetland Resource Areas – Massachusetts Wetlands Protection Act

A Site visit was conducted by BETA Wetland Scientists on March 31, 2023 to identify and delineate the boundaries of Wetland Resource Areas at and in the immediate vicinity to the Site. Resource Area boundaries were identified and delineated in accordance with methods developed by the Massachusetts Department of Environmental Protection's *Delineating Bordering Vegetated Wetlands Under the Massachusetts Wetlands Protection Act: Second Edition*, dated September 2022, as well as definitions set forth in the Wetland Regulations, 310 CMR 10.00. Several areas subject to Protection under the Act exist along the Site and are described below.

Inland Bank (to perennial and intermittent streams) – 310 CMR 10.54

According to 310 CMR 10.54(2), the definition of a Bank is the portion of the land surface which normally abuts and confines a water body, occurring between a water body and a vegetated bordering wetland and adjacent floodplain, or, in the absence of these, it occurs between a water body and an upland. The upper boundary of a Bank is the first observable break in the slope or the mean annual flood level, whichever is lower.

BETA identified the resource Bank to one (1) perennial stream (the Taunton River) and one (1) unnamed intermittent stream within and near the Site. Banks were delineated in the field with blue flagging as described in Table 2.

Table 2: Bank Boundary Description

Flag Series	Location	Description / Notes
B1 Series *Flags* *B1-99 to 95, and B1-100 to 106* *B2 Series* *Flags* *B2-91 to 99, and 100 to 105*	Taunton River, located east, under and west of the Old Colony Ave Bridge	The northern (*B1 Series*) and southern (*B2 Series*) Banks associated with the Taunton River, a perennial stream, that generally flows west were delineated in two (2) segments along the first observable break in slope consistent with the mean annual flood level. The Bank north of the Taunton River was delineated west (*B1-99 to B1-95*) and east (*B1-100 to B1-106*) of the Old Colony Avenue Bridge in Raynham. Banks west of the bridge were generally well defined and consisted of eroded soils. Banks east of the bridge were observed to be undercut and also consisted of eroded soils. Where vegetated, both Banks consist primarily of woody vegetation including bush honeysuckle (*Diervilla lonicera*), silky dogwood (*Cornus amomum*) and Norway maple (*Acer platanoides*). Populations of poison ivy (*Toxicodendron radicans*) were also observed. The Bank south of the Taunton River was delineated west (*B2-91 to 99*) and east (*B2-100 to 105*) of the Old Colony Avenue Bridge in Taunton. Banks west of the bridge were generally poorly defined and consisted of rocks and stones of various sizes. Banks east of the bridge were generally well defined and generally consisted of eroded soils. Where vegetated, both Banks consist primarily of woody vegetation including slippery elm (*Ulmus rubra*),

Flag Series	Location	Description / Notes
		Norway maple, and silky dogwood. Populations of poison ivy were also observed. The channel width downstream of the Old Colony Avenue bridge is between 95 to 110 feet wide with a mucky, gravel substrate. The channel width upstream is 90 to 100 feet wide with a mixed cobble, gravel, and mucky substrate. Water depths within the Taunton River could not be determined in the field. The Taunton River is mapped as perennial on USGS topographic maps; therefore, it meets the definition of a perennial stream (River) per 310 CMR 10.58(2).
B3/B4 Series *Flags* *B3-96 to 107 and B4-96 to 107*	Northwest of Old Colony Avenue Bridge at 0 South East Street	The interior (*B4 Series*) and exterior (*B3 Series*) Banks associated with a shallow, braided intermittent stream west of South Street East were delineated along the first observable break in slope (consistent with the mean annual flood level). The *B3/B4 Series* stream flows west out of a drainage outfall associated with the closed drainage system under South Street East in Raynham, where flow becomes braided prior to reaching a confluence west of the Site. The *B3/ B4 Series* Banks were primarily vegetated with silky dogwood. The channel is approximately 3 to 5 feet wide and 2 to 6 inches deep with a substrate of sand and muck. This stream is not depicted on current USGS topographic maps or on the StreamStats program; therefore, it is presumed to be intermittent.

Bordering Vegetated Wetlands – 310 CMR 10.55

According to 310 CMR 10.55(2), the definition of BVW are freshwater wetlands which border on creeks, Rivers, streams, ponds and lakes and are areas where the soils are saturated and/or inundated such that they support a predominance of wetland indicator plants. The boundary of BVW is the line within which 50% or more of the vegetation community consists of wetland indicator plants and saturated or inundated conditions exist.

BETA identified two (2) areas of BVW within and adjacent to the Site. US Army Corps of Engineers' *Vegetated Wetland Boundary Delineation Field Data Sheets* documenting BETA's observed evidence of hydrology, soils, and hydrophytic vegetation at specific data plots are attached.

Table 3: BVW Boundary Description

Flag Series	Location	Description / Notes
WF1 Series *Flags* *WF1-108 to 111*	Northwest of Old Colony Avenue Bridge at 0 South East Street	The *WF1 Series* BVW is a scrub shrub wetland bordering on the *B3/B4 Series* intermittent stream. The attached U.S. Army Corps of Engineers Field Data Sheets describe evidence of hydrophytic vegetation, hydric soils, and indicators of hydrology at a specific data plot.

Flag Series	Location	Description / Notes
WF2 Series *Flags* *WF2-100 to 102*	Along the northern Bank of the Taunton River	The *WF2 Series* BVW is a scrub shrub wetland located along the northern bank of the Taunton River, west of the *B1 Series* Bank. Dominant hydrophytic vegetation observed within the area includes silky dogwood. Evidence of hydrology observed in the field includes sediment deposition and stressed vegetation (buttressed roots), and hydric soils indicators including sandy soils with prominent redox concentrations. A formal data plot was not performed at this location.

Land Under Water – 310 CMR 10.56

According to 310 CMR 10.56(2), the definition of LUW is the land beneath any creek, river, stream, pond or lake and may be composed of organic muck or peat, fine sediments, rocks or bedrock. LUW exists between the Bank boundaries below the mean annual low water levels of the streams delineated at the Site (Table 2). The boundary of LUW is the mean annual low water level. This boundary was not delineated in the field.

Bordering Land Subject to Flooding – 310 CMR 10.57

According to the Federal Emergency Management Agency (FEMA) FIRM Number 25005C0169G, dated July 16, 2015, a Zone AE Flood Hazard associated with the Taunton River exists at the Site with Base Flood Elevations (BFE) ranging from 14.4 feet (NAVD88) downstream of the bridge and 14.8 feet (NAVD88) upstream of the bridge. The Site is also located within the Regulatory Floodway of the Taunton River. Any work performed within BLSF (i.e. areas with a 0.1% yearly chance of flooding) is Subject to Jurisdiction under the Act.

Riverfront Area – 310 CMR 10.58

According to 310 CMR 10.58(2), RA is defined as the area of land between a river's MAHW line and a parallel line measured 200' away horizontally. A River is any natural flowing body of water that empties to any ocean, lake, pond, or other River flowing throughout the year and is shown as perennial on the current United States Geological Survey or more recent map provided by the Department, or has a watershed size of at least 0.50 square miles and a predicted flow rate greater than or equal to 0.01 cubic feet per second at the 99% flow duration using the USGS Stream Stats Method.

As noted in Table 2 above, the B1/B2 Series stream qualifies as a perennial stream (River) and is therefore afforded a 200-foot RA. The RA at the Site would be measured 200 feet horizontally from the MAHW flags. Descriptions of the MAHW boundaries associated with the Taunton River are provided below in Table 4.

Table 4: MAHW Boundary Description

Flag Series	Waterbody	Description / Notes
B1 Series *Flags* *B1-99 to 95, and B1-100 to 106* *B2 Series* *Flags* *B2-91 to 99, and 100 to 105*	Taunton River	The northern (*B1 Series*) Banks were delineated at the mean annual flood level (coincident with the mean annual high-water mark – MAHW) approximately ten (10) feet upgradient of Bank. MAHW was determined based on observations of sediment accumulation and scour. The southern (*B2 Series*) Banks were delineated approximately ten (10) feet upgradient of Bank. MAHW was determined based on observations of sediment accumulation, scour and the presence of debris.

Jurisdictional Wetland Resource Areas – City of Taunton

The City of Taunton protects resource areas under the City of Taunton Wetlands Protection Ordinance and Conservation Ordinance Regulations. In some instances, these regulations provide additional jurisdiction and protection beyond what is set forth in the Wetlands Regulations at 310 CMR 10.00.

Freshwater Wetland

The Ordinance and Regulations defines a freshwater wetland per the definition presented in the Act, or if it meets two of three total criteria including vegetation within the community consisting of at least 50% wetland plant species, hydric soils are present, or hydrology or field indicators of hydrology are present. BVWs delineated at the Site (Table 3) meet the Ordinance definition of a freshwater wetland.

Vernal Pool

The Ordinance and Regulations consider vernal pools to be *"any confined basin depression that has been certified as such by the Natural Heritage and Endangered Species Program or has been demonstrated by credible proof to contain obligate vernal pool breeding species".* A potential vernal pool (PVP) is mapped interior to the *WF1 Series* BVW approximately 350 feet from the Site; however, it has not been certified, nor was the area reviewed for the presence of vernal pool breeding species.

Wetland Protection Zone (WPZ)

The WPZ as defined in the Ordinance and Regulations is *"an area of no less than 25 feet and no more than 100 feet from the border of BVWs, vernal pools, lakes, ponds and ILSFs larger than a quarter acre-foot in size".* The WPZ is measured from the boundary of Bank and BVW at the Site and allows for limitations and prohibitions on activities that may negatively impact a Resource Area.

Wildlife Corridors

The Ordinance defines Wildlife Corridors as: "*contiguous areas of land within a Wetlands Protection Zone, which provide feeding areas, breeding areas, and normal home range movement for wildlife. An area will be deemed a wildlife corridor upon presentation of credible evidence of the corridors and wildlife value. Wildlife corridors may be both narrow and vulnerable. Wildlife corridors can also contain core vegetative life, which make them sensitive and important for plant diversity*." A narrow strip of contiguous area is located along the southern (B2 Series) Bank to the Taunton River, located within the City of Taunton. This area is primarily developed however it supports vegetation that may provide habitat for wildlife therefore this area may be considered a Wildlife Corridor under the Ordinance.

Jurisdictional Wetland Resource Areas – Town of Raynham

The Town of Raynham protects resource areas under the Town of Raynham Conservation Bylaw. In some instances, these regulations provide additional jurisdiction and protection beyond what is set forth in the Wetlands Regulations at 310 CMR 10.00.

Land Subject to Flooding

The Town of Raynham provides a 100 foot buffer zone to any land subject to flooding or inundation by groundwater or surface water, where a buffer zone to these resource areas is not present under the Act. The area of BLSF associated with the Taunton River has a 100-foot buffer zone under the Bylaw.

25-foot No Activity Buffer

The Bylaw provides a 25-foot "No Activity Buffer" around bordering vegetated wetlands for all construction activities. This No Activity Buffer extends 25-feet upgradient of the delineated boundaries of the WF1 and WF2 Series BVW's.

Jurisdictional Wetland Resource Areas – Federal Clean Water Act (Section 404)

The wetlands and waterways located at the Site are "Waters of the United States," and are therefore subject to the federal Clean Water Act, 33 U.S.C. §1251 et seq (1972). The boundary to "Waters of the United States" is the vegetated wetlands boundary, or, in the absence of vegetated wetlands, is the Ordinary High Water Mark (OHWM) for non-tidal rivers and streams, as specified at 33 CFR §328.4.

According to 33 CFR §328.3(c)(4), vegetated wetlands are defined as "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions." The wetland boundary previously described in this report was delineated in accordance with this definition. US Army Corps vegetated wetland boundary delineation field data sheets are attached documenting BETA's observations of evidence of hydrology, soils, and hydrophytic vegetation at specific data plots.

Work conducted below the boundary of Vegetated Wetlands or the OHWM is Subject to Jurisdiction under Section 404 of the Clean Water Act. Where present, Vegetated Wetland boundaries (Table 3) are the extent of federal Jurisdiction. Where streams are present and upgradient Vegetated Wetlands are absent, the OHWM coincides with the delineated boundaries of the B1/B2 Series Banks. The OHWM for the unnamed intermittent stream coincides with the delineated boundaries of the B3/B4 Series Banks.

Jurisdictional Wetland Resource Areas – Massachusetts Clean Waters Act (Section 401)

The limit of jurisdiction under the Massachusetts Clean Waters Act (Section 401), as specified in 314 CMR 9.00, is the limit of Section 404 jurisdiction under the federal Clean Water Act. Exceedances of the jurisdictional threshold under 314 CMR 9.00 require filing for a Water Quality Certification under Section 401.

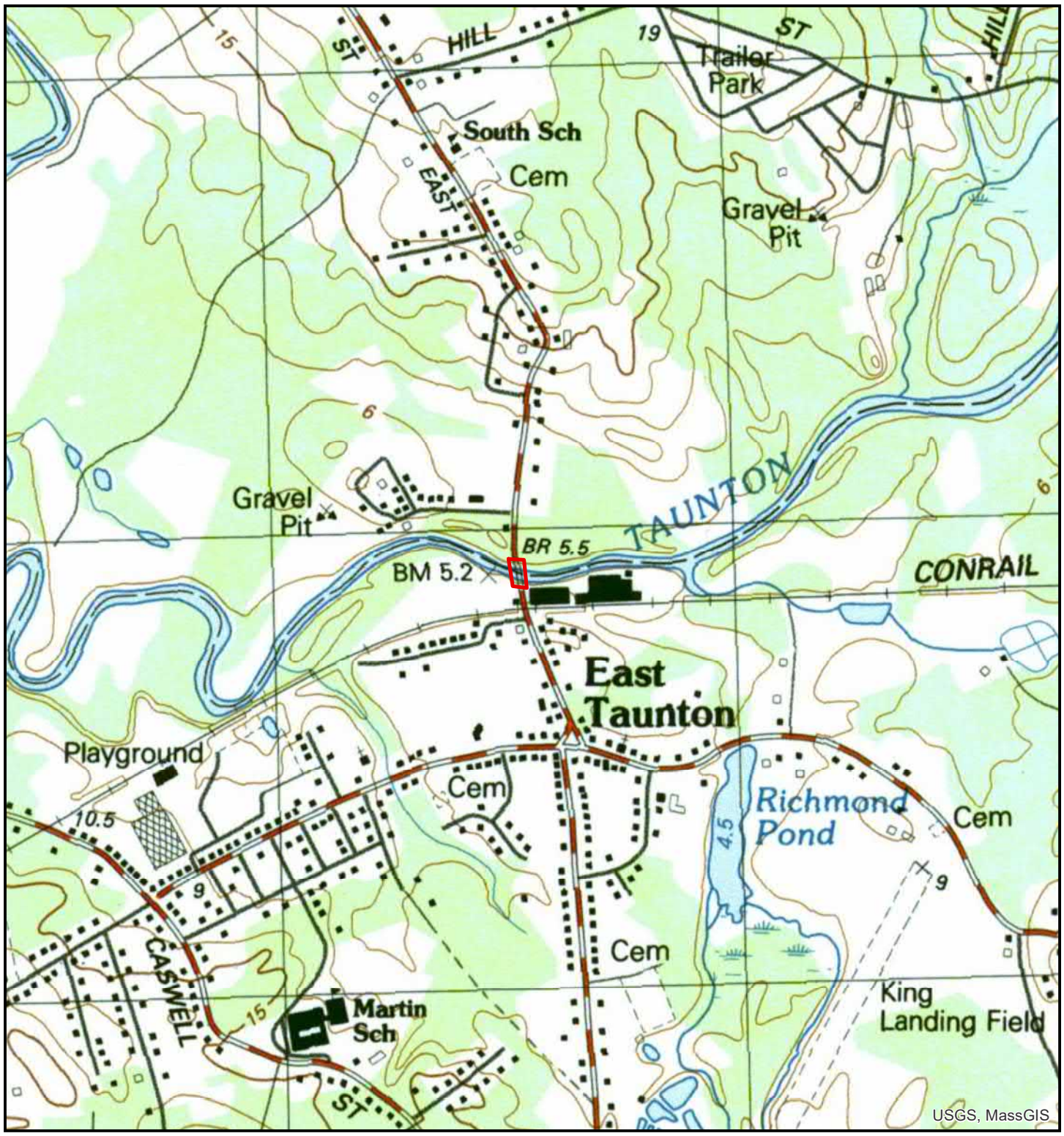
Findings and Recommendations

BETA has identified areas Subject to Protection and/or Jurisdiction under the Massachusetts Wetlands Protection Act, the Taunton Conservation Ordinance, the Town of Raynham Wetland Protection Bylaw, the federal Clean Water Act, and the Massachusetts Clean Waters Act located on or within 100 feet of the Site, and has delineated the boundaries of Bank, BVW, and MAHW that exist along the Site. In order to definitively determine the extent of Conservation Commission jurisdiction, Army Corps jurisdiction, and

MassDEP jurisdiction, the boundary flags would need to be located and depicted on a to-scale plan of the Site.

Attachments: Figure 1 – Site Locus
Figure 2 – Environmental Resources Map
Figure 3 – FEMA FIRMette
Photographic Documentation
US Army Corps of Engineers' *Vegetated Wetland Boundary Delineation Field Data Sheets*
Custom Soil Report for Bristol County, Massachusetts, Northern Part

Job No: 22.10887.00



BETA
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N
W E
S

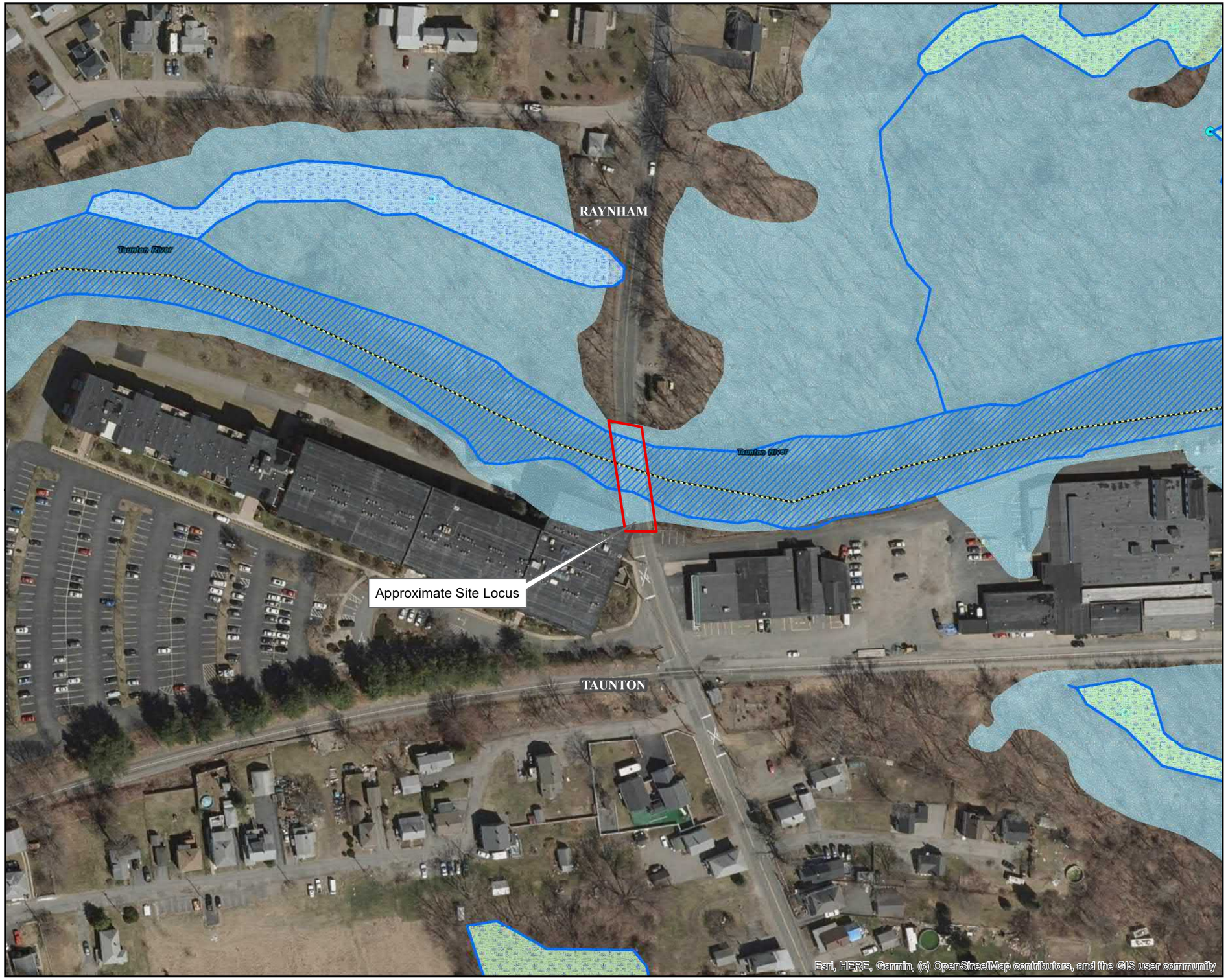
0 1,000 2,000 Feet

1 inch = 1,000 feet

Figure 1
Site Locus
Old Colony Avenue Bridge
Taunton and Raynham, MA

Data Source: MassGIS USGS Topographic Quadrangle Images (2001)

Figure 2
Environmental Resources Figure
Old Colony Avenue Bridge
Taunton and Raynham, MA



Environmental Resources Legend

- MassDEP Hydrologic Feature
- Marsh/Bog
- Wooded marsh
- Open Water
- NFHL 100 Year Flood Zone
- NHESP Potential Vernal Pool
- NHESP Certified Vernal Pool
- NHESP Priority Habitat of Rare Species
- NHESP Estimated Habitats of Rare Wildlife
- Zone A
- Zone B
- ZONE C
- MassDEP Zone I
- MassDEP Zone II
- MassDEP IWPA
- Outstanding Resource Water
- Area of Critical Environmental Concern (ACEC)
- Town Boundary

N
W E
S

0 125 250 Feet

1 inch = 125 feet

Data Source: MassGIS USGS Color Ortho Imagery (2014), MassDEP Wetlands (1:12000) (2009), NHESP Potential Vernal Pools (2000), NHESP Certified Vernal Pools, NHESP Priority Habitats of Rare Species (2008), NHESP Estimated Habitats of Rare Species (2008), Areas of Critical Environmental Concern (2009), FEMA National Flood Hazard Layer (2014),

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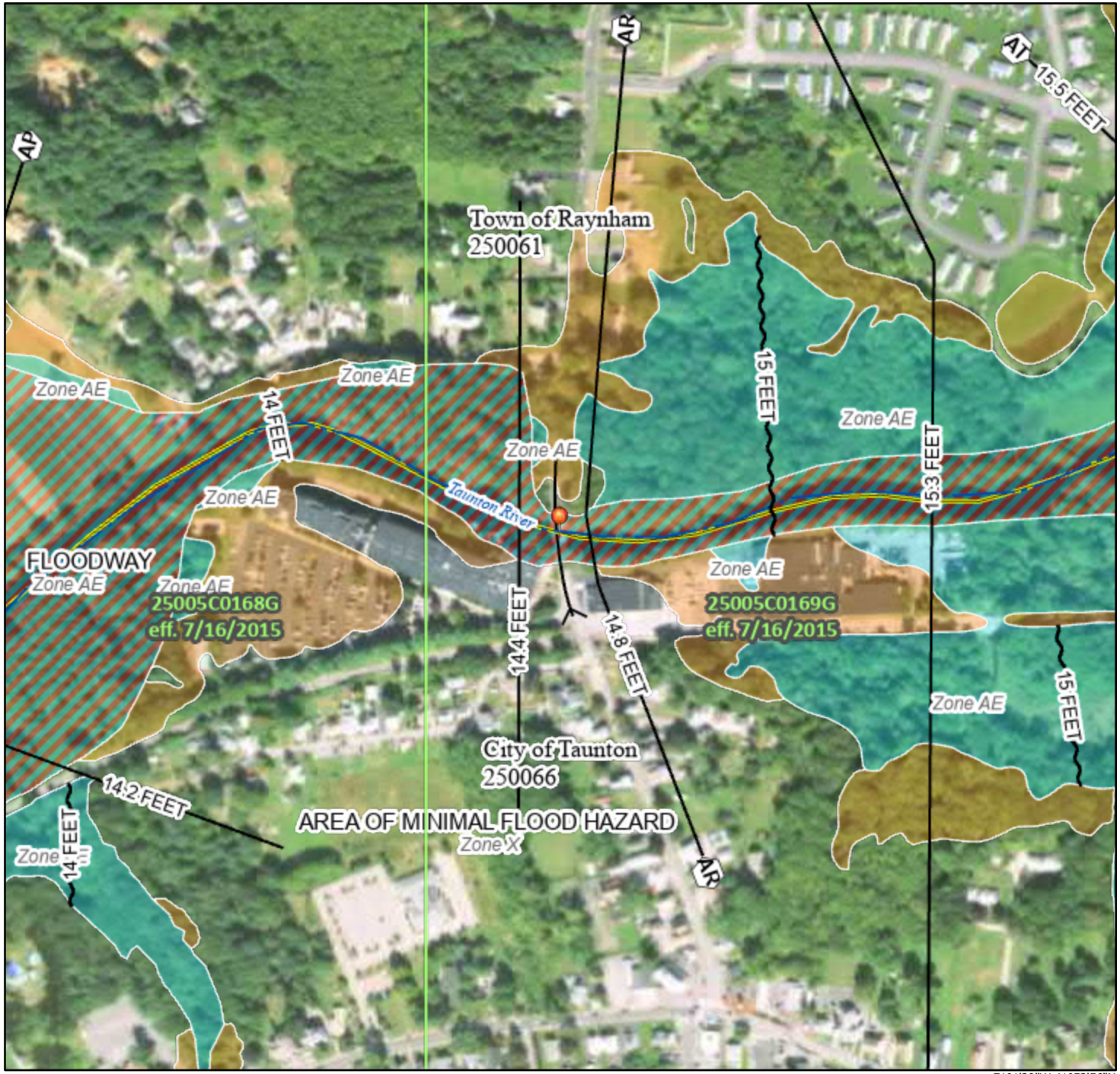
National Flood Hazard Layer FIRMette

FEMA

71°2'7"W 41°53'23"N



71°1'29"W 41°52'56"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

A00860 - 78

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 3/28/2023 at 3:27 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Photo 1

View of the B1-100 Series Bank along the Taunton River—Facing west

Photo 2

View of the B1-99 Series Bank along the Taunton River—Facing east

PHOTOGRAPHIC DOCUMENTATION

Old Colony Avenue Bridge over the Taunton River

Taunton and Raynham, Massachusetts

Photographs Documented 3.31.2023

Photo 3

View of the B2-100 Series Bank along the Taunton River—Facing east

Photo 4

View of the B2-99 Series Bank along the Taunton River—Facing west

PHOTOGRAPHIC DOCUMENTATION

Old Colony Avenue Bridge over the Taunton River

Taunton and Raynham, Massachusetts

Photographs Documented 3.31.2023

Photo 5

View of the B3/B4 Series Intermittent Streams—facing west

Photo 6

View of the B3/B4 Series Intermittent Streams and headwall—facing south

PHOTOGRAPHIC DOCUMENTATION

Old Colony Avenue Bridge over the Taunton River

Taunton and Raynham, Massachusetts

Photographs Documented 3.31.2023

Photo 7

View of the WF1 Series BVW—facing west

Photo 8

View of the WF2 Series BVW—facing west

PHOTOGRAPHIC DOCUMENTATION

Old Colony Avenue Bridge over the Taunton River

Taunton and Raynham, Massachusetts

Photographs Documented 3.31.2023

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Old Colony Avenue Bridge City/County: Taunton and Raynham Sampling Date: 3/31/23

Applicant/Owner: MassDOT State: MA Sampling Point: WF1-109 UP

Investigator(s): Tyler Drew, Jonathan Niro Section, Township, Range: Bristol County

Landform (hillside, terrace, etc.): Hillside Local relief (concave, convex, none): Convex Slope %: 10

Subregion (LRR or MLRA): LRR R, MLRA 144A Lat: 41.88676 Long: -71.03012 Datum: WGS84

Soil Map Unit Name: Udorthents, smoothed NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	**Is the Sampled Area**
Hydric Soil Present?	Yes ____	No X	**within a Wetland?** **Yes** ____ **No** X
Wetland Hydrology Present?	Yes ____	No X	If yes, optional Wetland Site ID: ____

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____
Water Table Present?	Yes ____	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ____	No X	Depth (inches): ____

Wetland Hydrology Present? **Yes** ____ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: WF1-109 UP

Tree Stratum (Plot size: 30' radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer platanoides*	50	Yes	UPL
2. *Ulmus rubra*	5	No	FAC
3.			
4.			
5.			
6.			
7.			
	55	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15' radius)			
1. *Rosa multiflora*	10	Yes	FACU
2.			
3.			
4.			
5.			
6.			
7.			
	10	=Total Cover	
Herb Stratum (Plot size: 5' radius)			
1. *Alliaria petiolata*	30	Yes	FACU
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	30	=Total Cover	
Woody Vine Stratum (Plot size: N/A)			
1.			
2.			
3.			
4.			
		=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	5	x 3 =	15
FACU species	40	x 4 =	160
UPL species	50	x 5 =	250
Column Totals:	95 (A)		425 (B)

Prevalence Index = B/A = 4.47

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ___ **No** X

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WF1-109 UP

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 2/1	100						Loamy Sand

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ High Chroma Sands (S11) (**LRR K, L)**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: Stoney Refusal (3 attempts)

Depth (inches): 4

Hydric Soil Present? **Yes** ___ **No** X

Remarks:

This data form is revised from Northcentral and Northeast Regional Supplement Version 2.0 to include the NRCS Field Indicators of Hydric Soils, Version 7.0, 2015 Errata. (http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_051293.docx)

Refusal at 4 inches. 3 Attempts.

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Old Colony Avenue Bridge City/County: Taunton and Raynham Sampling Date: 3/31/23

Applicant/Owner: MassDOT State: MA Sampling Point: WF1-109 WET

Investigator(s): Tyler Drew, Jonathan Niro Section, Township, Range: Bristol County

Landform (hillside, terrace, etc.): Toe of Slope Local relief (concave, convex, none): Concave Slope %: 0-5

Subregion (LRR or MLRA): LRR R, MLRA 144A Lat: 41.88676 Long: -71.03012 Datum: WGS84

Soil Map Unit Name: Udorthents, smoothed NWI classification: PEM1Fh

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area**
Hydric Soil Present?	Yes X	No ____	**within a Wetland?** **Yes** X **No** ____
Wetland Hydrology Present?	Yes X	No ____	If yes, optional Wetland Site ID: WF1

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- X Inundation Visible on Aerial Imagery (B7)
- X Sparsely Vegetated Concave Surface (B8)
- X Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- X Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____
Water Table Present?	Yes ____	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes X	No ____	Depth (inches): 1

Wetland Hydrology Present? **Yes** X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: WF1-109 WET

Tree Stratum (Plot size: N/A)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	=Total Cover		
Sapling/Shrub Stratum (Plot size: 15' radius)			
1. *Cornus amomum*	40	Yes	FACW
2. *Rosa multiflora*	10	Yes	FACU
3.			
4.			
5.			
6.			
7.			
	50 =Total Cover		
Herb Stratum (Plot size: N/A)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	=Total Cover		
Woody Vine Stratum (Plot size: N/A)			
1.			
2.			
3.			
4.			
	=Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	40	x 2 =	80
FAC species	0	x 3 =	0
FACU species	10	x 4 =	40
UPL species	0	x 5 =	0
Column Totals:	50 (A)		120 (B)

Prevalence Index = B/A = 2.40

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WF1-109 WET

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 2/2	100						Sandy Silt Loam
8-16	5Y 5/1	40	2.5Y 5/4	30	C	M		Loamy Sand
			5YR 4/6	30	C	M		

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- X Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ High Chroma Sands (S11) (**LRR K, L)**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** ___

Remarks:

This data form is revised from Northcentral and Northeast Regional Supplement Version 2.0 to include the NRCS Field Indicators of Hydric Soils, Version 7.0, 2015 Errata. (http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_051293.docx)

Refusal at 4 inches. 3 Attempts.

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Bristol County, Massachusetts, Northern Part

January 10, 2024

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

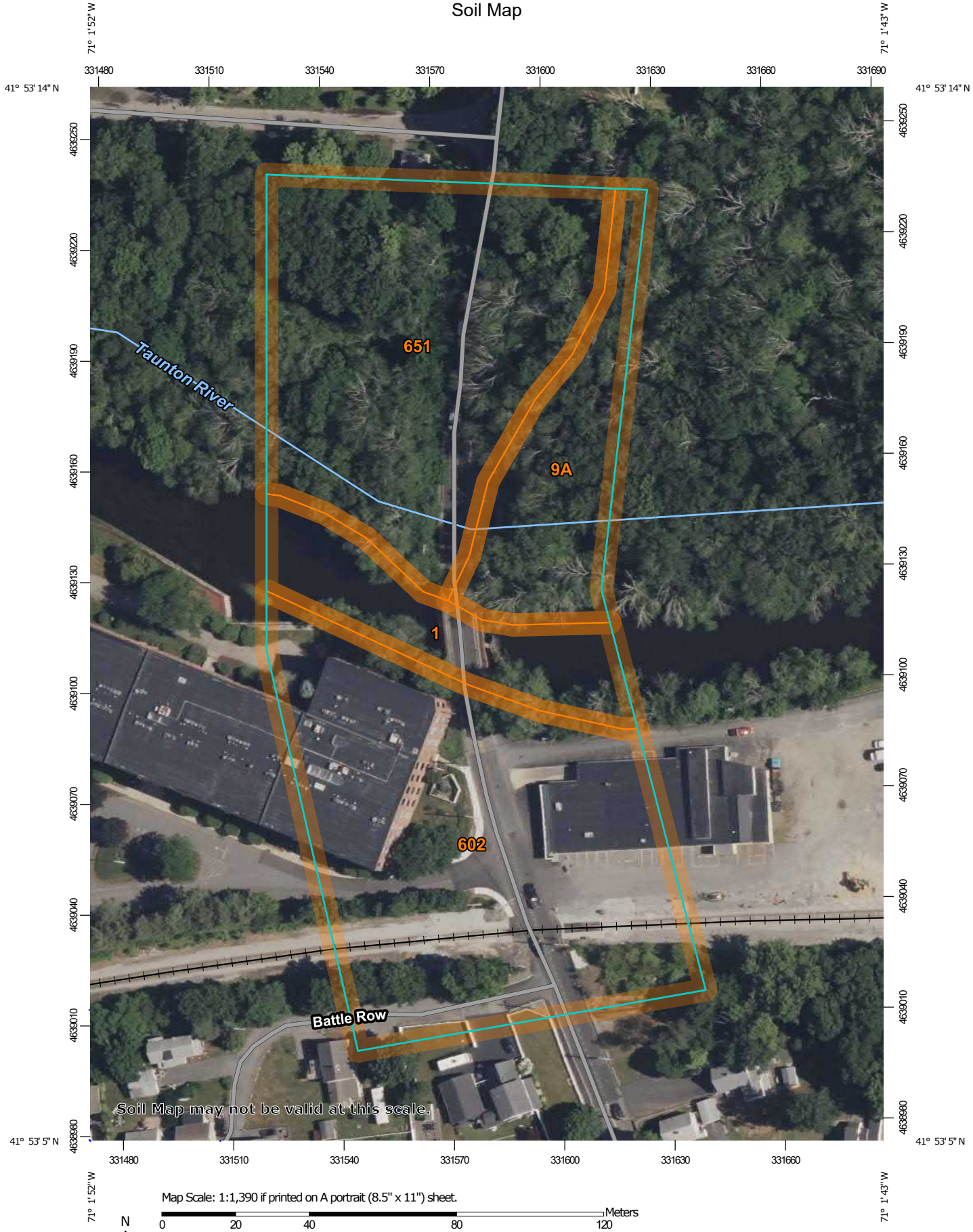
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:1,390 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 20 40 80 120

Feet
0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Bristol County, Massachusetts, Northern Part
Survey Area Data: Version 16, Sep 10, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 14, 2022—Jul 1, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
1	Water	0.6	10.7%
9A	Birdsall silt loam, 0 to 3 percent slopes	0.7	12.5%
602	Urban land	2.3	41.8%
651	Udorthents, smoothed	1.9	35.0%
Totals for Area of Interest		**5.5**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The

delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Bristol County, Massachusetts, Northern Part

1—Water

Map Unit Setting

National map unit symbol: 997q
Frost-free period: 120 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

9A—Birdsall silt loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 997p
Elevation: 0 to 150 feet
Mean annual precipitation: 45 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 145 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Birdsall and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Birdsall

Setting

Landform: Depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Soft coarse-silty lacustrine deposits over hard coarse-silty lacustrine deposits

Typical profile

H1 - 0 to 7 inches: silt loam
H2 - 7 to 21 inches: silt loam
H3 - 21 to 60 inches: very fine sandy loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None

Frequency of ponding: Frequent
Available water supply, 0 to 60 inches: Very high (about 12.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: C/D
Ecological site: F144AY031MA - Very Wet Outwash
Hydric soil rating: Yes

Minor Components

Raynham

Percent of map unit: 10 percent
Landform: Depressions
Hydric soil rating: Yes

Swansea

Percent of map unit: 10 percent
Landform: Bogs
Hydric soil rating: Yes

602—Urban land

Map Unit Setting

National map unit symbol: 9999
Frost-free period: 120 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

651—Udorthents, smoothed

Map Unit Setting

National map unit symbol: v4w7
Elevation: 0 to 3,000 feet
Mean annual precipitation: 45 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 145 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Udorthents and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Udorthents

Setting

Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Excavated and filled land over loose sandy and gravelly glaciofluvial deposits and/or firm loamy basal till

Typical profile

H1 - 0 to 6 inches: variable
H2 - 6 to 60 inches: variable

Properties and qualities

Slope: 0 to 15 percent
Depth to restrictive feature: More than 80 inches
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to very high (0.06 to 20.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A
Hydric soil rating: Unranked

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

APPENDIX B – Stormwater Management Report

Raynham / Taunton, Massachusetts

South Street East / Old Colony Avenue

MassDOT Highway Division
Project File # 613642
January 2026

STORMWATER MANAGEMENT REPORT

PREPARED FOR

City of Taunton
Department of Public Works
90 Ingell Street
Taunton, MA 02780

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1

Introduction

This Stormwater Management Report has been prepared to demonstrate compliance with the Massachusetts Stormwater Management Standards (the Standards) in accordance with the Massachusetts Wetlands Protection Act Regulations (310 CMR 10.00) and Water Quality Certification Regulations (314 CMR 9.00). Appendix A includes a completed Massachusetts Department of Environmental Protection (MassDEP) Checklist for Stormwater Report, stamped by a Massachusetts registered professional engineer.

The Project follows the guidance presented in the MassDOT Stormwater Design Guide (SDG), and stormwater management systems are designed in accordance with the Standards.

2

Project Summary

The Applicant, the City of Taunton, is proposing Project 613642 for the replacement of the Old Colony Avenue Bridge (Bridge #R-02-00=T-01-004) over the Taunton River, including work along adjacent roadways (the Project) located in Raynham, MA and Taunton, MA.

As proposed, the Project generally consists of bridge replacement, roadway paving, and new sidewalk, as more fully described in Section 4. The purpose of this project is to replace a structurally deficient bridge as well as improving safety for vehicles, cyclists, and pedestrians.

The project area is an approximately 0.14-mile-long section of a roadway which is identified as Old Colony Ave within the City of Taunton and South Street East within the Town of Raynham. Old Colony Ave crosses over the Taunton River and the work includes temporary and permanent work within the river's footprint. The project also includes portions of Sandy Hill Road, an intersecting side street, and the Riverbend Condominiums driveway.

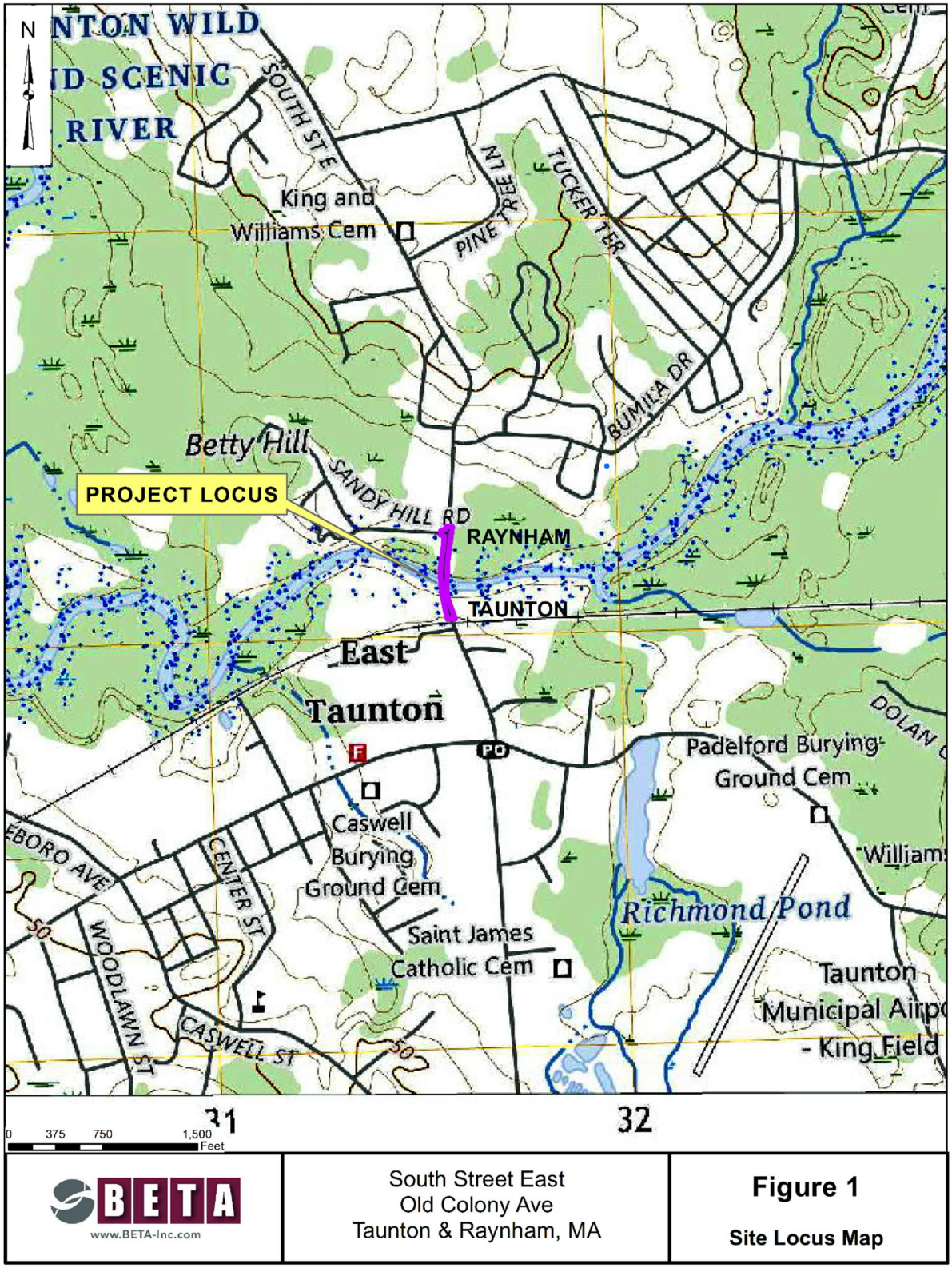
Land use on surrounding lots includes the River Bend Condominiums, several commercial properties, a pump station, a single family residence, and woodlands.

Wetland resource areas are located in proximity to the project area, notably including the Taunton River. Refer to Notice of Intent narrative for a summary of project compliance. The project is not considered a Land Use with Higher Potential Pollutant Loads (LUHPPL) and the project is not located within or near to a Zone II or Interim Wellhead Protection Area, any other critical areas, or a NHESP-mapped habitat.

This stormwater analysis has been prepared to support a bridge replacement and roadway reconstruction project and associated stormwater management measures, as more fully described in Section 3.0. A total disturbance of approximately 1.05± Acres is anticipated as a result of the proposed work.

See Figure 1 for the Project Locus Map.

Figure 1 Locus Figure



3

Existing Conditions

The project includes Old Colony Ave / South Street East, a two-lane, two-way Urban Collector roadway. A bridge carries Old Colony Avenue over the Taunton River. Within the project area, the width of the roadway generally varies from 27 to 35 feet, with one lane in each direction. A short sidewalk segment is provided on the north side of the road near Riverbend Condominiums and along the south side of the bridge. Otherwise, the roadway is bordered by grass or driveways. Granite curb is provided along the north side of the roadway and along the bridge; otherwise, no edge treatment is provided.

The project corridor generally consists of an impervious roadway and pervious grass/woodland side areas or impervious driveways. Topography is generally directed away from the roadway and towards the Taunton River, and the roadway is crowned throughout the entire project limits.

Resource Areas of Interest

Wetland resource areas are located (within or in proximity to) the project area. Refer to Notice of Intent narrative for a thorough description of these areas and a summary of project compliance. Notably, the project crosses over the Taunton River, which flows east to west. A stream is located in the northwestern portion of the project.

The project is located In the IWP Priority #2: Taunton Watershed. Waterbodies located immediately downgradient of the Site include the Taunton River, a Category 5 water, which is impaired for Dissolved Oxygen, Enterococcus, and E. Coli. The Taunton River eventually discharges to Mt. Hope Bay. Refer to Section 5 for discussion of impairments and TMDLs.

Existing Stormwater Characteristics

Topography in areas adjacent to the roadway is generally directed away from the roadway. Existing closed drainage systems are present along the roadway which convey stormwater runoff to two outfalls, one of which discharges to the Taunton River and one of which discharges to a stream. As no formal edge treatment is provided on the southern side of South Street East, stormwater runoff from this portion of the Site can flow overland into an area of woodlands.

Refer to the watershed plans in Appendix F for detailed delineation of pre-development flow patterns and watershed boundaries. Refer to Appendix D for hydrologic calculations relating to existing conditions.

Table 1 presents the existing drainage areas and their characteristics. See Figure 2 for existing drainages areas and existing SCMs by design point.

Table 1 Existing Drainage Areas

Drainage Area	Design Point	Area (acres)	Curve Number
Ex-1E	DP-1L	0.576	82
Ex-2E	DP-2L	0.395	81
Ex-3E	DP-3L	0.400	74

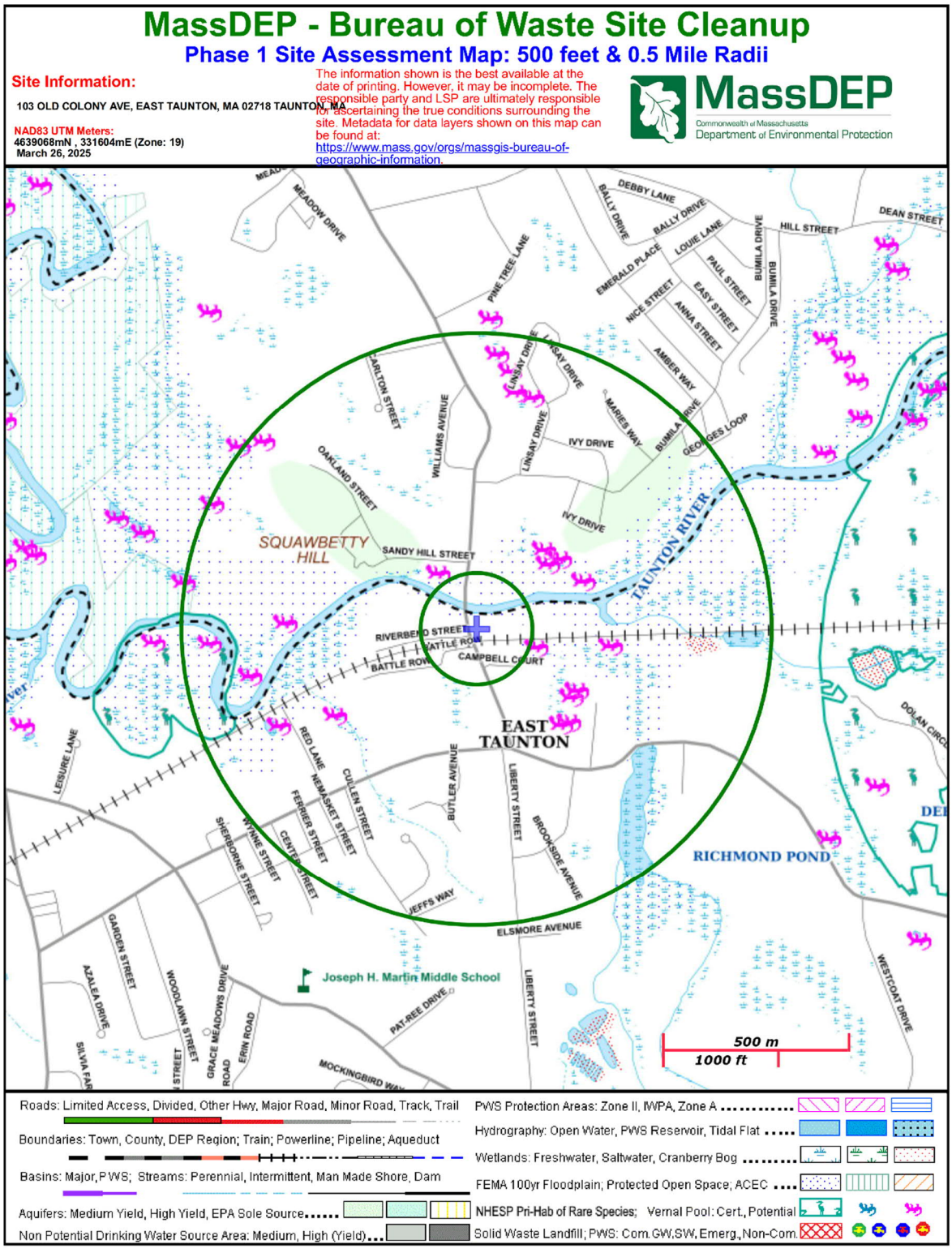
Key features in and around the project area include the Taunton River and associated riverfront area, a stream, and vegetated wetlands, as shown on Figure 2.

The Project is partially located within the 100-year floodplain as shown on FEMA map panel 25005C0169G eff. 7/16/2015. A FEMA flood map is included in Appendix B. 100-year flood areas included a Zone AE Floodway coincident with the Taunton River (Elev. 15 ft.) and a Zone AE (Elev. 15 ft.). Refer to the Notice of Intent for an evaluation of impact to flood zones.

Review of the NRCS Soil Survey map of the project area identified three major soil groups. South Street East is mapped as Unit 651: Udorthents with Hydrologic Soil Group Rating (HSGR) A and Unit 9A: Birdsall silt loam with HSGR C/D. Old Colony Ave is mapped as 602: Urban Land with no assigned HSGR. Additionally, the footprint of the Taunton River is mapped as Unit 1: Water with no assigned HSGR. NRCS soils information is shown on the plans in Appendix F and included in Appendix B.

Figure 2 Existing Key Features and Wetland Resource Areas

MassDEP Phase 1 Site Assessment Map https://maps.massgis.digital.mass.gov/images/dep/mcp/mcp.htm



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4

Proposed Conditions

Scope of Work

The scope of work generally consists of bridge replacement, full depth pavement construction in the vicinity of the bridge, pavement milling and overlay to the north and south of the bridge, modifications to roadway geometry (less than a single lane), construction of a sidewalk, new granite curbing, striping of two travel lanes and a bike lane, new ADA compliant ramps, replacement of guardrail, modifications to water, sewer, gas, electric, and drainage utilities, and restoration of disturbed areas.

Table 2 provides a breakdown of the impervious area for the Project.

Table 2 Impervious Area

Condition	Impervious Area (sq. ft)
Existing	31210
Proposed	31991
Net	781

Proposed Stormwater Management

Stormwater Management will be accomplished through modifications to the existing closed drainage systems. Existing inlets will be replaced, where necessary, with deep-sump catch basins, and additional deep-sump catch basins will be installed to provide more effective stormwater collection and treatment. New curbing is proposed to better direct stormwater runoff to catch basins. The majority of existing trunklines will be retained. The project will retain existing drainage grading patterns to the maximum extent practicable.

The project will retain the existing outfall from the closed drainage system within the Town of Raynham. The project will replace the existing outfall associated with the closed drainage system within the Town of Taunton. The new outfall will be increased in size from 12” to 18” and the existing headwall will be rebuilt at the same location.

The project proposes new stormwater control measures (SCM) including a new infiltration trench. This new practice is proposed within the Town of Raynham near the northeastern limit of work. Stormwater runoff will be directed to this SCM through a new deep sump catch basin which will overflow into the existing closed drainage system.

Additionally, country drainage/pavement disconnection will be implemented for several portions of South Street East by excluding curbing to allow treatment in the grass/woodland area adjacent to the roadway. Of this, approximately 100 ft. of South Street East, on the eastern side of the roadway, drains to an area that meets the definition of qualifying pervious area and is comprised of 1,500 ± sq. ft. of impervious area.

Table 3 presents the proposed drainage areas and their characteristics under proposed conditions. Refer to Appendix F for proposed drainage patterns and drainage area delineations by design point.

Table 3 Proposed Drainage Areas

Drainage Area	Design Point	Area (acres)	Curve Numbers
Pr-10P	DP-1L	0.598	83
Pr-20P/21P	DP-2L	0.410	83
Pr-30P	DP-3L	0.363	71

Project Constraints

The project is constrained by the presence of the Taunton River, presence of wetland resource areas, presence of private commercial and residential features within the Town of Taunton, and conflicts with existing utilities which restrict the opportunity to install substantial Stormwater Control Measures (SCMs). The project is also constrained by minimum required setbacks outlined in the MassDOT Stormwater Design Guide, namely the 10 foot setback to property lines, the 50 foot setback to surface waters, and the 50 foot setback to any slope greater than 15% for infiltration basins. The project area was evaluated for potential locations of SCMs and is summarized on the SCM Analysis Plan located in Appendix G. Despite constraints, the proposed stormwater management systems will provide an improvement to the existing conditions by installing deep sump catch basins and a new infiltration trench. Note the project is considered a redevelopment, as discussed in Section 7.0.

Table 4 lists the proposed SCMs and provides a description of each.

Table 4 Proposed SCMs

SCM	Description
Infiltration Trench	One infiltration trench consisting of a perforated pipe surrounded by crushed stone, located from STA 6+00 RT to STA 6+45 RT. A deep-sump catch basin is provided at STA 5+96 for pretreatment and conveyance to the infiltration trench as well to convey overflow.

LID measures incorporated at the project include the preservation of existing vegetation and maintaining pre-development drainage patterns. The use of country drainage/pavement disconnection is proposed for stormwater runoff from portions of the roadway by directing portions of South Street East to areas of pervious grass/woodlands. The reduction of impervious cover was considered; however, the introduction of new impervious area is required to replace the bridge and extend sidewalks to areas where none currently exist.

5

Impaired Waters and TMDLs

As described under the previous sections, the Project will discharge to the Taunton River, which is impaired based on the MassDEP Year 2023 Integrated List of Waters, also known as the 303(d) list.

Table 5 lists the receiving water bodies that are impaired and if the water body has a TMDL.

Table 5 Impaired Waters and TMDL Information

Water Body	303(d) Category	303(d) Impairments	TMDL	TMDL Pollutant	TMDL Report Name
Taunton River (MA62-01)	5 – Waters Requiring a TMDL	Dissolved Oxygen, Enterococcus, E. Coli	Yes	Pathogens (Fecal coliform, E. Coli, Enterococcus)	Final Pathogen TMDL for the Taunton River Watershed

Note that this segment of the Taunton River is not included in the TMDL. However, the downstream portions of the river are.

As stated in the Final Pathogen TMDL for the Taunton River Watershed, leading sources of bacterial surface water pollution include failing septic systems, combined sewer overflows (CSOs), sanitary sewer overflows (SSOs), sewer pipes connecting to storm drains, certain recreational activities, wildlife, and direct overland stormwater runoff.

The project includes relocation of a portion of the existing sanitary sewer force main. This work will not include any sanitary sewer discharges to the Taunton River. Any sanitary sewer pipes connecting to the storm drain will be eliminated, if identified. See Illicit Discharge Compliance Statement under Standard 10 in Section 6 below. All stormwater runoff discharged from the Site will receive additional treatment via deep sump catch basins, the new infiltration trench, or through country drainage. As a transportation facility, pathogen loads from the roadway surfaces are anticipated to be minimal.

The proposed infiltration trench has been selected for their capability to treat phosphorus, nitrogen, and total suspended solids. A load reduction of 0.03 lb/yr of phosphorus, 0.21 lb/yr of nitrogen, and 29 lb/yr of total suspended solids is anticipated for this SCM, as calculated based on EPA Water Quality Curves in the MassDOT Water Quality Date Form.

See Standard 4 in Section 6 below for more water quality calculations and discussion.

6

Stormwater Management Standards

As demonstrated below, the proposed Project complies with the MassDEP Stormwater Management Standards (the Standards).

The Project is classified as a limited, redevelopment under the first definition “Maintenance and improvement of existing roadways, including widening less than a single lane, adding shoulders, correcting substandard intersections, improving existing drainage systems and repaving.” Work related to the maintenance, repair, and improvement of the bridge is considered a Limited Project.

Standard 1: No New Untreated Discharges

No new stormwater conveyances may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.

The Project has been designed to comply with Standard 1. The project proposes to replace the existing outfall from the City of Taunton closed drainage system. This work will include replacing the existing 12” MTL and 12” CMP outfalls with a new 18” DI outfall at the same location, replacing the existing headwall, and providing stone for pipe ends as stabilization to prevent erosion to the Taunton River. The project proposes to retain the existing outfall from the Town of Raynham closed drainage system.

Appendix C provides supporting calculations for the outlet protection design.

Stormwater runoff will be treated by deep sump catch basins, the infiltration trench, or country drainage before discharging off-site.

See Standard 4 for the water quality treatment provided by the Project.

Standard 2: Peak Rate Attenuation

Stormwater management systems shall be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates. This Standard may be waived for discharges to land subject to coastal storm flowage as defined in 310 CMR 10.04.

The Project has been designed to comply with Standard 2 only to the maximum extent practicable as the project is a limited, redevelopment project. This project reduces post-development peak runoff rates to below pre-development peak runoff rates for DP-2 and DP-3, as well as on a site-wide basis, during the 1-year, 2-year, 10-year, and 100-year 24-hour

design storm events based on NOAA Atlas 14 precipitation data. Minor increases in peak runoff rates are anticipated for DP-1.

Table 6 Rainfall Depths (in)

Design Storm Event	Rainfall Depth (in)
2-year	3.42
10-year	5.08
100-year	7.71

Table 7 provides a summary of peak rates for each design point under existing and proposed conditions. Appendix D provides computations and supporting information regarding the hydrologic modeling.

Table 7 Peak Discharge Rates (cfs)

Design Point	Existing			Proposed		
	2-year	10-year	100-year	2-year	10-year	100-year
DP 1	1.14	2.08	3.61	1.23	2.22	3.81
DP 2	0.74	1.39	2.44	0.67	1.28	2.20
DP 3	0.52	1.11	2.14	0.39	0.90	1.81
Total	2.40	4.58	8.19	2.29	4.41	7.82

The project is unable to fully meet this standard due to constraints at the project site as described previously. This project includes a net increase of 781± sq. ft. of impervious surface, which will result in minor increases to the volume and rate of stormwater runoff from the project area. This increase in impervious area is necessary to provide sidewalks where none currently exist. Despite project constraints and an increase in peak flow rates, the proposed deep-sump catch basins and infiltration trench will improve existing conditions throughout the project corridor. Refer to HydroCAD calculations provided in Appendix D for additional information.

Standard 3: Recharge

Loss of annual recharge to groundwater shall be eliminated or minimized through the use of infiltration measures, including environmentally sensitive site design, low impact development techniques, stormwater best management practices, and good operation and maintenance. At a minimum, the annual recharge from the post-development site shall approximate the annual recharge from pre-development conditions based on soil type. This Standard is met when the stormwater management system is designed to infiltrate the required recharge volume as determined in accordance with the Massachusetts Stormwater Handbook.

The project has been designed to meet this standard on a project-wide basis. The project has significant right-of-way constraints as described previously, which restrict opportunities for recharge on the southern portions of the Site. Despite constraints, the proposed infiltration trench has been designed to provide the sitewide required recharge volume for new and a portion of the existing impervious area.

Table 8 provides the required recharge volume for the Project, and Table 9 provides the recharge volumes proposed for each design point.

Table 8 Required Recharge Volume for Project

	HSG A	HSG B	HSG C	HSG D	Total
Existing Impervious (sq. ft.)	26829		1964	2417	31210
Proposed Impervious (sq. ft.)	27280		2213	2498	31991
Net Impervious Area (sq. ft.)	451		249	81	781
Target depth, F (in)	0.6	0.35	0.25	0.1	-
Required Recharge Volume, ReV (cf)	22.55		5.19	0.68	28.41

Table 9 Provided Recharge Volumes at Each Design Point

	HSG A	HSG B	HSG C	HSG D	Total
DP-1					
Net Impervious Area (sf)	461		5	705	9844
Required Recharge Volume, ReV (cf)	23.05		0.10	5.88	29.03
Provided Recharge Volume (cf)	0		0		0.00
DP-2					
Net Impervious Area (sf)	1583		0	-195	1388
Required Recharge Volume, ReV (cf)	79.15		0.00	-1.63	77.53
Provided Recharge Volume (cf)	81.42		0		81.42
DP-3					
Net Impervious Area (sf)	-1593		244	-429	-1778
Required Recharge Volume, ReV (cf)	-79.65		5.08	-3.58	-78.14
Provided Recharge Volume (cf)	0.00		0		0.00

The infiltration SCM has been designed to drain completely within 72 hours.

Appendix B provides soil evaluation information (including the geotechnical report if applicable), and Appendix C provides computations, drawdown calculations, and supporting information regarding recharge.

Standard 4: Water Quality Treatment

Stormwater management systems shall be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS). This Standard is met when:

- Suitable practices for source control and pollution prevention are identified in a long-term pollution prevention plan, and thereafter are implemented and maintained.
- Structural stormwater best management practices are sized to capture the required water quality volume determined in accordance with the Massachusetts Stormwater Handbook.

› Pretreatment is provided in accordance with the Massachusetts Stormwater Handbook.

The Project has been designed to comply with Standard 4 on a project wide basis. Proposed drainage system improvements, including the installation of deep sump catch basins and an infiltration trench will provide treatment of stormwater runoff that does not currently exist and will improve existing conditions. The proposed project will provide an average TSS removal rate of 20% for 31,991± sq. ft. of impervious surfaces.

Note that the project is located in an area with a rapid infiltration rate (>2.4 in/hr) and the required water quality volume has been calculated based on the 1.0-inch water quality depth.

Table 10 shows the WQV to be treated for both new and existing impervious area within each drainage area, organized by design point.

Table 10 WQV at Each Design Point

Design Point	WQV for New IA (cf)	WQV for Existing IA (cf)	Total WQV (cf)
DP-1			
10P	97.58	722.75	820.33
Total	97.58	722.75	820.33
DP-2			
20P	44.75	1028.50	1073.25
21P	70.92	0.00	70.92
Total	115.67	1028.50	1144.17
DP-3			
30P	-148.17	849.58	701.42
Total	-148.17	849.58	701.42
Project Total	65.08	2600.83	2665.92

Table 11 shows the WQV provided by the SCMs at each design point.

Table 11 WQV Provided by the SCMs at Each Design Point

Design Point	Pretreatment (y/n)	WQV Provided (cf)	Meets Total WQV	Meets Required WQV for New IA
DP-1		0	No	No
DP-2			No	Yes
Linear Infiltration Practice	Y	81.42		
Total	Y	81.42		
DP-3		0	No	No
Project Total			No	Yes

As previously noted, the project is a limited, redevelopment project; therefore, the project is required to meet this standard only to the maximum extent practicable. Opportunities to install treatment and recharge SCMs are limited due to the constraints described previously. Despite project constraints, the proposed deep sump catch basins will improve existing

conditions throughout the project corridor and groundwater recharge will be provided via the new infiltration trench. Refer to Appendix C for calculations relating to TSS Removal. Refer to Illicit Discharge Compliance Statement under Standard 10.

Appendix E includes the Long Term Pollution Prevention Plan for this project.

Standard 5: Land Uses with Higher Potential Pollutant Loads

For Land Uses with Higher Potential Pollutant Loads (LUHPPLs), source control and pollution prevention shall be implemented in accordance with the Massachusetts Stormwater Handbook to eliminate or reduce the discharge of stormwater runoff from such land uses to the maximum extent practicable. If through source control and/or pollution prevention all LHPPLs cannot be completely protected from exposure to rain, snow, snow melt, and stormwater runoff, the proponent shall use the specific structural stormwater BMPs determined by the Department to be suitable for such uses as provided in the Massachusetts Stormwater Handbook. Stormwater discharges from LUHPPLs shall also comply with the requirements of the Massachusetts Clean Waters Act, M.G.L. c. 21, §§ 26-53 and the regulations promulgated thereunder at 314 CMR 3.00, 314 CMR 4.00 and 314 CMR 5.00.

Standard 5 does not apply to the Project. There are no Land Uses with Higher Potential Pollutant Loads within the project area.

Standard 6: Critical Areas

Stormwater discharges within the Zone II or Interim Wellhead Protection Area of a public water supply and stormwater discharges near or to any other critical area require the use of the specific source control and pollution prevention measures and the specific structural stormwater best management practices determined by the Department to be suitable for managing discharges to such areas as provided in the Massachusetts Stormwater Handbook. A discharge is near a critical area if there is a strong likelihood of a significant impact occurring to said area, taking into account site-specific factors. Stormwater discharges to Outstanding Resource Waters and Special Resource Waters shall be removed and set back from the receiving water or wetland and receive the highest and best practical method of treatment. A “stormwater discharge” as defined in 314 CMR 3.04(2)(a)1 or (b), to an Outstanding Resource Water or Special Resource Water shall comply with 314 CMR 3.00 and 314 CMR 4.00. Stormwater discharges to a Zone I or Zone A are prohibited unless essential to the operation of a public water supply.

Standard 6 does not apply to the Project. There are no Critical Areas near the project area.

Standard 7: Redevelopment

A redevelopment project is required to meet the following Stormwater Management Standards only to the maximum extent practicable: Standard 2, Standard 3, and the pretreatment and structural best management practice requirements of Standards 4, 5, and 6. Existing stormwater discharges shall comply with Standard 1 only to the maximum extent practicable. A redevelopment project shall also comply with all other requirements of the Stormwater Management Standards and improve existing conditions.

The Project is a limited, redevelopment project under the first definition: “Maintenance and improvement of existing roadways, including widening less than a single lane, adding shoulders, correcting substandard intersections, improving existing drainage systems and repaving.” Proposed deep sump catch basins and infiltration trench will provide treatment to the maximum extent practicable and represent an improvement to the existing conditions. Standards 1, 8, 9, and 10 are met, Standards 3 and 4 are met on a project wide basis, and Standard 2 is met to the maximum extent practicable. Standards 5 and 6 are not applicable to this project.

Standard 8: Erosion and Sediment Control

A plan to control construction related impacts, including erosion, sedimentation and other pollutant sources during construction and land disturbance activities (construction period erosion, sedimentation, and pollution prevention plan) shall be developed and implemented.

The implementation of erosion and sediment (E&S) controls during construction is considered a standard practice for all projects. E&S controls will be installed before any land disturbance begins for the Project and will remain in place for the duration of the Project. The E&S controls for the Project are shown on the project plans and include perimeter sediment control barrier, inlet protection, tree protection, temporary cofferdam for water control, and dewatering.

The Project disturbs one or more acres of land; therefore, the project contractor will request coverage under the NPDES Construction General Permit (CGP) and develop a Stormwater Pollution Prevention Plan (SWPPP). The SWPPP follows the requirements of this standard and complies with the NPDES CGP.

Standard 9: Operation and Maintenance Plan

A long-term operation and maintenance plan shall be developed and implemented to ensure that stormwater management systems function as designed.

The roadway and bridge included in this project are located in both the City of Taunton and the Toad of Raynham. Ownership is divided between the Town of Taunton and the Town of Raynham. The activities included in the O&M Plan will be implemented by the municipality. Appendix E includes the O&M Plan for this project.

Standard 10: Prohibition of Illicit Discharges

All illicit discharges to the stormwater management system are prohibited.

Illicit Discharge Statement

The project’s stormwater management system, as shown on the plans submitted with this report, have been designed in full compliance with Standard 10. The project area does not have any known illicit connections. Any illicit connections to the stormwater management system found in the project limit of work during construction will be removed and/or resolved through the City of Taunton’s or Town of Raynham’s Illicit Discharge Detention and Elimination (IDDE) Programs. The Long-Term Pollution Prevention Plan, provided in Appendix E, includes measures to prevent illicit discharges.

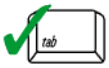
Appendix A: MassDEP Checklist for Stormwater Report

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

A. Introduction

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the Massachusetts Stormwater Handbook. The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.[1] This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8[2]
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

[1] The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

[2] For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.

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Checklist for Stormwater Report

B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature

01/30/26

Signature and Date

Checklist

Project Type: Is the application for new development, redevelopment, or a mix of new and redevelopment?

- ☐ New development
- ☒ Redevelopment
- ☐ Mix of New Development and Redevelopment

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

Checklist (continued)

LID Measures: Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

- ☐ No disturbance to any Wetland Resource Areas
- ☐ Site Design Practices (e.g. clustered development, reduced frontage setbacks)
- ☐ Reduced Impervious Area (Redevelopment Only)
- ☒ Minimizing disturbance to existing trees and shrubs
- ☐ LID Site Design Credit Requested:
  - ☐ Credit 1
  - ☐ Credit 2
  - ☐ Credit 3
- ☒ Use of “country drainage” versus curb and gutter conveyance and pipe
- ☐ Bioretention Cells (includes Rain Gardens)
- ☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)
- ☐ Treebox Filter
- ☐ Water Quality Swale
- ☐ Grass Channel
- ☐ Green Roof
- ☐ Other (describe): _____

Standard 1: No New Untreated Discharges

- ☒ No new untreated discharges
- ☒ Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth
- ☐ Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.

Massachusetts Department of Environmental Protection
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Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.

☐ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.

☐ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

☐ Soil Analysis provided.

☒ Required Recharge Volume calculation provided.

☐ Required Recharge volume reduced through use of the LID site Design Credits.

☒ Sizing the infiltration, BMPs is based on the following method: Check the method used.

☒ Static ☐ Simple Dynamic ☐ Dynamic Field[1]

☐ Runoff from all impervious areas at the site discharging to the infiltration BMP.

☐ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.

☒ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.

☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:

- ☐ Site is comprised solely of C and D soils and/or bedrock at the land surface
- ☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
- ☐ Solid Waste Landfill pursuant to 310 CMR 19.000
- ☒ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.

☒ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.

☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

[1] 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

☐ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.

☐ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:

- Good housekeeping practices;
- Provisions for storing materials and waste products inside or under cover;
- Vehicle washing controls;
- Requirements for routine inspections and maintenance of stormwater BMPs;
- Spill prevention and response plans;
- Provisions for maintenance of lawns, gardens, and other landscaped areas;
- Requirements for storage and use of fertilizers, herbicides, and pesticides;
- Pet waste management provisions;
- Provisions for operation and management of septic systems;
- Provisions for solid waste management;
- Snow disposal and plowing plans relative to Wetland Resource Areas;
- Winter Road Salt and/or Sand Use and Storage restrictions;
- Street sweeping schedules;
- Provisions for prevention of illicit discharges to the stormwater management system;
- Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
- Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
- List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.

☒ A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.

☒ Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:

- ☐ is within the Zone II or Interim Wellhead Protection Area
- ☐ is near or to other critical areas
- ☒ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
- ☐ involves runoff from land uses with higher potential pollutant loads.

☐ The Required Water Quality Volume is reduced through use of the LID site Design Credits.

☒ Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

☒ The BMP is sized (and calculations provided) based on:

- ☒ The ½" or 1" Water Quality Volume or
- ☐ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.

☐ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.

☐ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)

☐ The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.

☐ The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted ***prior to*** the discharge of stormwater to the post-construction stormwater BMPs.

☐ The NPDES Multi-Sector General Permit does ***not*** cover the land use.

☐ LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.

☐ All exposure has been eliminated.

☐ All exposure has ***not*** been eliminated and all BMPs selected are on MassDEP LUHPPL list.

☐ The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

☐ The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.

☐ Critical areas and BMPs are identified in the Stormwater Report.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

Checklist (continued)

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

☒ The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:

- ☒ Limited Project
- ☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
- ☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
- ☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
- ☐ Bike Path and/or Foot Path
- ☒ Redevelopment Project
- ☐ Redevelopment portion of mix of new and redevelopment.

☒ Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.

☐ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
- Construction Period Operation and Maintenance Plan;
- Names of Persons or Entity Responsible for Plan Compliance;
- Construction Period Pollution Prevention Measures;
- Erosion and Sedimentation Control Plan Drawings;
- Detail drawings and specifications for erosion control BMPs, including sizing calculations;
- Vegetation Planning;
- Site Development Plan;
- Construction Sequencing Plan;
- Sequencing of Erosion and Sedimentation Controls;
- Operation and Maintenance of Erosion and Sedimentation Controls;
- Inspection Schedule;
- Maintenance Schedule;
- Inspection and Maintenance Log Form.

☐ A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

Checklist (continued)

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

☐ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has ***not*** been included in the Stormwater Report but will be submitted ***before*** land disturbance begins.

☐ The project is ***not*** covered by a NPDES Construction General Permit.

☐ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.

☒ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

☒ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:

- ☒ Name of the stormwater management system owners;
- ☒ Party responsible for operation and maintenance;
- ☒ Schedule for implementation of routine and non-routine maintenance tasks;
- ☒ Plan showing the location of all stormwater BMPs maintenance access areas;
- ☒ Description and delineation of public safety features;
- ☒ Estimated operation and maintenance budget; and
- ☒ Operation and Maintenance Log Form.

☐ The responsible party is ***not*** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:

- ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
- ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

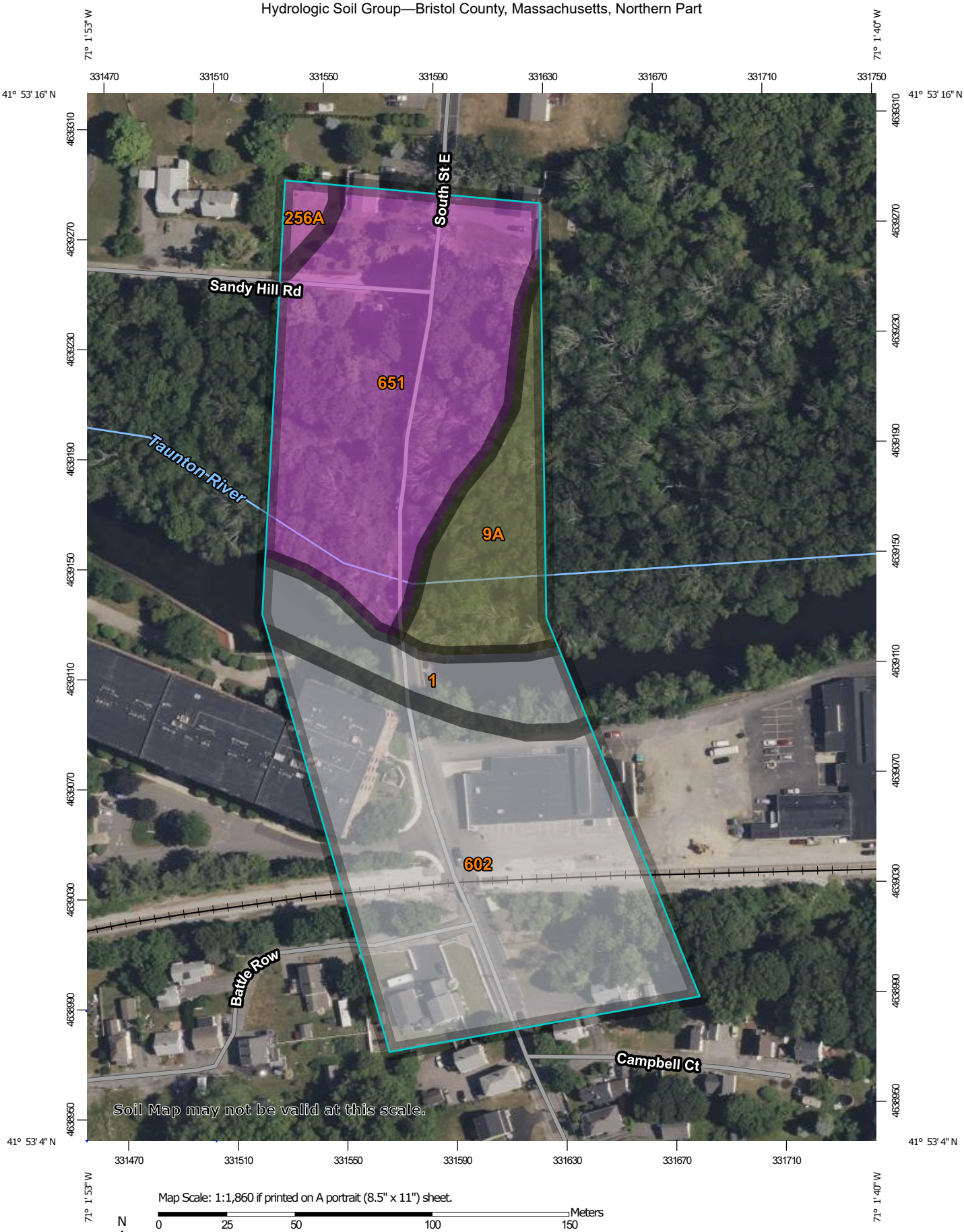
☒ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;

☒ An Illicit Discharge Compliance Statement is attached;

☐ NO Illicit Discharge Compliance Statement is attached but will be submitted ***prior to*** the discharge of any stormwater to post-construction BMPs.

Appendix B: Soils and FEMA Information

Hydrologic Soil Group—Bristol County, Massachusetts, Northern Part



Map Scale: 1:1,860 if printed on A portrait (8.5" x 11") sheet.

N

0 25 50 100 150 Meters

0 50 100 200 300 Feet

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

Hydrologic Soil Group—Bristol County, Massachusetts, Northern Part

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Bristol County, Massachusetts, Northern Part
Survey Area Data: Version 17, Aug 27, 2024

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 14, 2022—Jul 1, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
1	Water		0.7	9.0%
9A	Birdsall silt loam, 0 to 3 percent slopes	C/D	0.9	11.6%
256A	Deerfield loamy fine sand, 0 to 3 percent slopes	A	0.1	1.4%
602	Urban land		3.3	42.2%
651	Udorthents, smoothed	A	2.8	35.8%
Totals for Area of Interest			**7.9**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

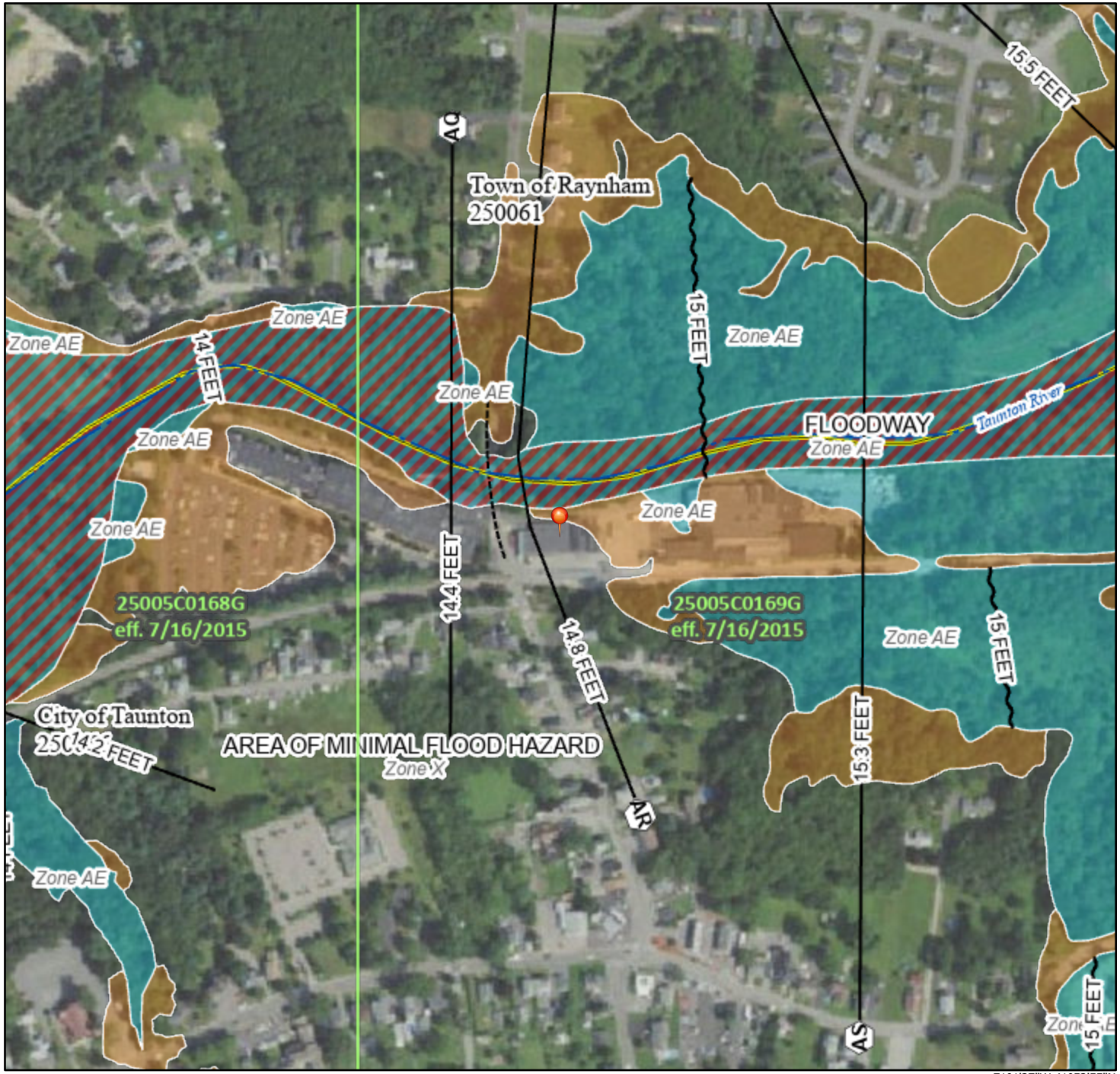
Component Percent Cutoff: None Specified

Tie-break Rule: Higher

National Flood Hazard Layer FIRMette

FEMA

71°2'4"W 41°53'22"N



71°1'27"W 41°52'55"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

A00860 - 139

Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 3/26/2025 at 11:50 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Appendix C: Supporting Calculations

PROJECT NAME:	**South Street East / Old Colony Ave**	PROJ NO.	**10887**
DESCRIPTION:	**Standards 3 & 4 Worksheet**	DATE	**01/30/26**
CALCULATED BY:	**SLB**	SHEET	**1**

Recharge Volume (Rv) and Water Quality Volume (WQv)
Provided Volumes Worksheet

Calculation of Required Recharge Volume

	Soil Group	Impervious Area (Sq. Ft.)	Runoff Depth (In.)	Recharge Volume (Cu. Ft.)
Pre-Development	Total	**31210**		
	HSG A	26829		
	HSG C	1964		
	HSG D	2417		
Post-Development	Total	**31991**		**1430.92**
	HSG A	27280	0.60	1364.00
	HSG C	2213	0.25	46.10
	HSG D	2498	0.10	20.82
Net Change	Total	**781**		**28.41**
	HSG A	451	0.60	22.55
	HSG C	249	0.25	5.19
	HSG D	81	0.10	0.68

Recharge Volume (R_V) Required = Impervious Area x Runoff Depth (from HSG)

Total Recharge Volume Required: **28 CF**

Total Recharge Volume Provided: **81 CF**

Calculation of Required Water Quality Volume

	Impervious Area (Sq. Ft.)	Runoff Depth (In.)	Water Quality Volume (Cu. Ft.)
Total Impervious Area	31991	1.0	2666
Net New Impervious Area Only	781	1.0	**65**

Water Quality Volume (WQ_V) Required = Impervious Area x Runoff Depth (0.5" or 1.0" Depth)

Total Water Quality Volume Provided: **81 CF**

PROJECT NAME:	**South Street East / Old Colony Ave**	PROJ NO.	**10887**
DESCRIPTION:	**Standards 3 & 4 Worksheet**	DATE	**01/30/26**
CALCULATED BY:	**SLB**	SHEET	**2**

Total Suspended Solids (TSS)
Provided Treatment Worksheet

Treatment Train	A: Total Removal Rate (%)	B: Total Treatment Area (Sq. Ft.)	C: A x B (Sq. Ft.)
No Treatment (30P)	0%	8417	0
Deep Sump Catch Basins (10P, 20P)	25%	22723	5681
Treatment Train - Infiltration Trench (21P)	80%	851	681
Totals:		31,991 SF	6,362 SF

Total Sitewide TSS Removal (C / B) 20%
Total of Column C divided by Total of Column B

Equivalent Area for 80% TSS Removal **7,952 SF**
Total of Column B x total TSS Rate divided by 80%

Proposed New Impervious Area: **781 SF**

PROJECT NAME:	**South Street East / Old Colony Ave**	PROJ NO.	**10887**
DESCRIPTION:	**Standards 3 & 4 Worksheet**	DATE	**01/30/26**
CALCULATED BY:	**SLB**	SHEET	**3**

Infiltration Trench
Provided Volumes & TSS Worksheet

Total Storage

Storage Within Basins	Length (Ft.)	Width (Ft.)	Depth (Ft.)	Volume - Perforated Pipe (Cu. Ft.)	Volume Stone (40% Voids) (Cu. Ft.)	Total Volume Provided (Cu. Ft.)
Infiltration Trench	45	2	2.00	15.7	65.7	81

Total Storage Volume Provided: **81 CF**

TSS Removal

Best Management Practice (BMP)	SCM Removal Rate (%)	Remaining TSS (%)	Cumulative Removal Rate (%)
Sediment Forebay (Pretreatment)	25%	75%	25%
Total Pretreatment Provided:			**25%**
Infiltration Trench	80%	20%	**80%**

Drawdown Calculations

BMP: **Infiltration Trench**

Rv (cu. ft.) =	81	Drawdown (hrs) =	**10.6**
K (in/hr) =	1.02		
Bottom Area (sq. ft.)	90	Less than 72 hrs?	**PASS**

**The hydraulic conductivity rate is based on Rawls Rate for Sandy Loam

PROJECT NAME: **South Street East / Old Colony Ave** PROJ NO. 10887
DESCRIPTION: **Standards 3 & 4 Worksheet** DATE 01/28/26
CALCULATED BY: **SLB** SHEET 1

Riprap Stone Size

$D_{50} = 0.2D(Q/(g)^{1/2}(D)^{2.5})^{4/3}(D/TW)$

D_{50} = riprap size (ft)
Q = design discharge (cfs) (10-year)
D = pipe diameter (ft)
TW = tailwater (ft) if unknown use 0.4D
g = acceleration due to gravity (32.2 ft/s^2)

Outfall No.	Q (cfs)	D (ft)	TW (ft)	$D^{2.5}$	D/TW	$g^{1/2}$	D_{50} (ft)
HW-1	16.14	1.5	0.6	2.76	2.5	5.67	**0.31**

*Flow rate is based on pipe flowing full

Riprap Parameters

Apply 1.5 Safety Factor to D50
Depth = 3.3*D50
Length = 4*D
Width (at pipe) = 3 * D
Width (Apron End) = 3 * D + 2/3 * Length

Outfall No.	1.5*D_{50} (in)	Approx. Weight (lb)	Minimum Dimensions			
			Depth (in)	Length (ft)	Width 1 (ft)	Width 2 (ft)
HW-1	5.57	37.73	18.39	6.00	4.50	8.50

Calculation Equations taken from:
HEC14 - Hydraulic Design for Energy Dissipators for Culverts and Channels
Equation 10.4

Proposal No. 613642 - 136413

NOAA Atlas 14, Volume 10, Version 3
Location name: East Taunton, Massachusetts, USA*
Latitude: 41.8856°, Longitude: -71.0294°
Elevation: 19 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.299 (0.240-0.369)	0.372 (0.299-0.460)	0.492 (0.394-0.610)	0.592 (0.470-0.736)	0.729 (0.559-0.945)	0.831 (0.623-1.10)	0.940 (0.685-1.29)	1.07 (0.726-1.48)	1.27 (0.824-1.80)	1.44 (0.909-2.07)
10-min	0.423 (0.340-0.522)	0.527 (0.423-0.651)	0.697 (0.558-0.864)	0.839 (0.666-1.04)	1.03 (0.792-1.34)	1.18 (0.883-1.56)	1.33 (0.970-1.82)	1.52 (1.03-2.09)	1.80 (1.17-2.55)	2.03 (1.29-2.93)
15-min	0.498 (0.400-0.614)	0.620 (0.498-0.766)	0.820 (0.656-1.02)	0.986 (0.784-1.23)	1.22 (0.932-1.58)	1.38 (1.04-1.83)	1.57 (1.14-2.15)	1.78 (1.21-2.46)	2.11 (1.37-3.00)	2.39 (1.52-3.45)
30-min	0.703 (0.565-0.868)	0.876 (0.704-1.08)	1.16 (0.928-1.44)	1.39 (1.11-1.74)	1.72 (1.32-2.23)	1.96 (1.47-2.59)	2.22 (1.61-3.04)	2.53 (1.71-3.48)	2.99 (1.94-4.24)	3.38 (2.14-4.88)
60-min	0.908 (0.730-1.12)	1.13 (0.909-1.40)	1.50 (1.20-1.86)	1.80 (1.43-2.24)	2.22 (1.70-2.88)	2.53 (1.90-3.35)	2.87 (2.09-3.92)	3.26 (2.22-4.50)	3.87 (2.51-5.48)	4.38 (2.77-6.30)
2-hr	1.16 (0.944-1.43)	1.47 (1.19-1.80)	1.98 (1.60-2.43)	2.40 (1.92-2.96)	2.97 (2.30-3.83)	3.40 (2.58-4.46)	3.86 (2.84-5.26)	4.42 (3.03-6.03)	5.28 (3.47-7.41)	6.02 (3.86-8.58)
3-hr	1.36 (1.10-1.65)	1.71 (1.39-2.09)	2.30 (1.86-2.81)	2.78 (2.24-3.42)	3.45 (2.69-4.43)	3.95 (3.01-5.16)	4.48 (3.32-6.08)	5.14 (3.54-6.97)	6.14 (4.06-8.56)	7.00 (4.51-9.91)
6-hr	1.78 (1.46-2.16)	2.22 (1.82-2.68)	2.92 (2.38-3.54)	3.51 (2.84-4.27)	4.31 (3.38-5.47)	4.91 (3.77-6.34)	5.55 (4.14-7.42)	6.32 (4.40-8.48)	7.48 (5.00-10.3)	8.46 (5.52-11.8)
12-hr	2.34 (1.94-2.81)	2.83 (2.34-3.40)	3.62 (2.98-4.36)	4.28 (3.50-5.17)	5.18 (4.09-6.49)	5.86 (4.53-7.46)	6.57 (4.92-8.63)	7.39 (5.21-9.81)	8.59 (5.81-11.7)	9.58 (6.32-13.3)
24-hr	2.86 (2.39-3.41)	3.42 (2.85-4.07)	4.33 (3.59-5.17)	5.08 (4.19-6.09)	6.12 (4.87-7.58)	6.90 (5.37-8.68)	7.71 (5.82-9.99)	8.63 (6.16-11.3)	9.94 (6.81-13.4)	11.0 (7.35-15.1)
2-day	3.25 (2.73-3.84)	3.91 (3.28-4.62)	4.99 (4.18-5.91)	5.89 (4.90-7.00)	7.12 (5.73-8.76)	8.05 (6.33-10.1)	9.02 (6.89-11.6)	10.1 (7.31-13.2)	11.8 (8.14-15.7)	13.1 (8.85-17.7)
3-day	3.54 (2.99-4.16)	4.24 (3.58-4.99)	5.39 (4.53-6.35)	6.34 (5.30-7.51)	7.65 (6.19-9.36)	8.64 (6.84-10.7)	9.68 (7.44-12.4)	10.9 (7.88-14.0)	12.6 (8.77-16.7)	14.0 (9.53-18.8)
4-day	3.80 (3.22-4.46)	4.53 (3.83-5.31)	5.71 (4.81-6.70)	6.69 (5.61-7.89)	8.04 (6.52-9.79)	9.05 (7.19-11.2)	10.1 (7.80-12.9)	11.3 (8.25-14.6)	13.1 (9.15-17.2)	14.5 (9.91-19.4)
7-day	4.53 (3.86-5.27)	5.28 (4.50-6.16)	6.52 (5.53-7.61)	7.55 (6.37-8.84)	8.96 (7.31-10.8)	10.0 (8.01-12.3)	11.1 (8.62-14.0)	12.3 (9.08-15.7)	14.1 (9.94-18.3)	15.4 (10.6-20.4)
10-day	5.23 (4.48-6.06)	6.01 (5.14-6.96)	7.28 (6.20-8.46)	8.34 (7.07-9.72)	9.79 (8.02-11.7)	10.9 (8.74-13.2)	12.0 (9.34-14.9)	13.2 (9.80-16.8)	14.9 (10.6-19.3)	16.2 (11.2-21.3)
20-day	7.33 (6.33-8.43)	8.18 (7.05-9.41)	9.56 (8.22-11.0)	10.7 (9.15-12.4)	12.3 (10.1-14.5)	13.5 (10.9-16.2)	14.7 (11.5-17.9)	15.9 (11.9-19.9)	17.4 (12.6-22.3)	18.5 (13.0-24.0)
30-day	9.08 (7.88-10.4)	9.98 (8.65-11.4)	11.5 (9.90-13.1)	12.7 (10.9-14.6)	14.4 (11.9-16.9)	15.7 (12.7-18.6)	17.0 (13.3-20.5)	18.1 (13.7-22.5)	19.6 (14.2-24.9)	20.5 (14.6-26.5)
45-day	11.2 (9.80-12.8)	12.2 (10.6-13.9)	13.8 (12.0-15.8)	15.1 (13.1-17.3)	17.0 (14.2-19.8)	18.4 (15.0-21.7)	19.8 (15.5-23.6)	21.0 (16.0-25.9)	22.4 (16.4-28.2)	23.2 (16.6-29.8)
60-day	13.0 (11.4-14.8)	14.1 (12.3-16.0)	15.8 (13.8-18.0)	17.2 (14.9-19.6)	19.2 (16.0-22.2)	20.7 (16.9-24.3)	22.2 (17.4-26.3)	23.4 (17.9-28.7)	24.8 (18.2-31.1)	25.6 (18.4-32.6)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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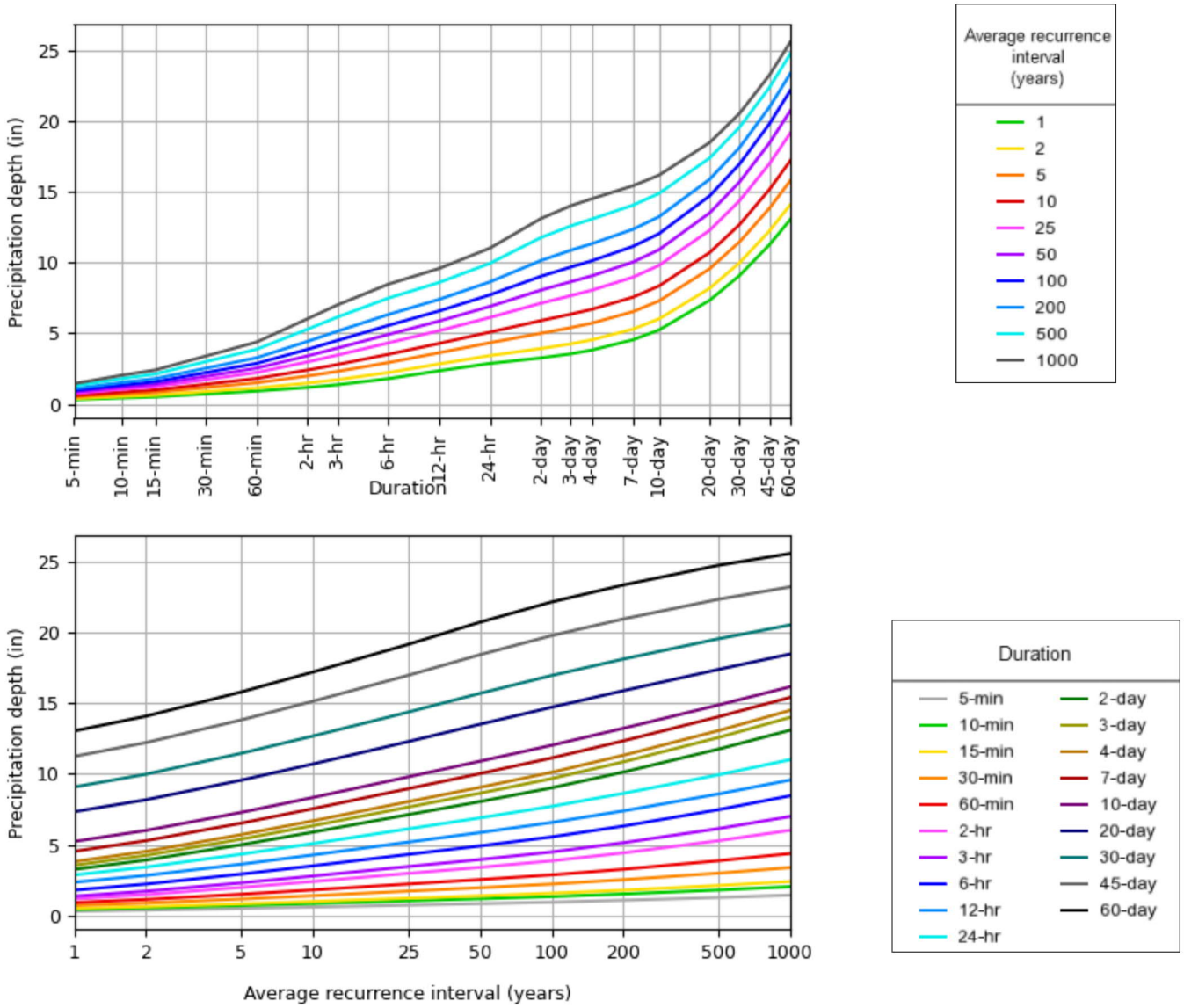
PF graphical

PDS-based depth-duration-frequency (DDF) curves
Latitude: 41.8856°, Longitude: -71.0294°



NOAA Atlas 14, Volume 10, Version 3 Created (GMT): Tue Aug 19 17:43:51 2025

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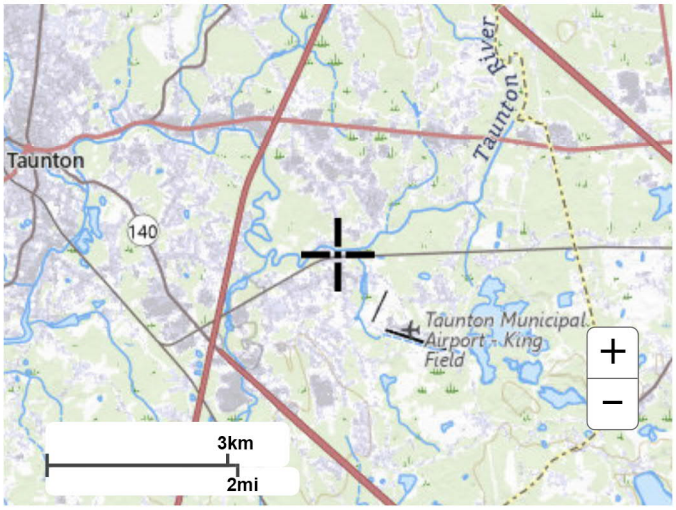
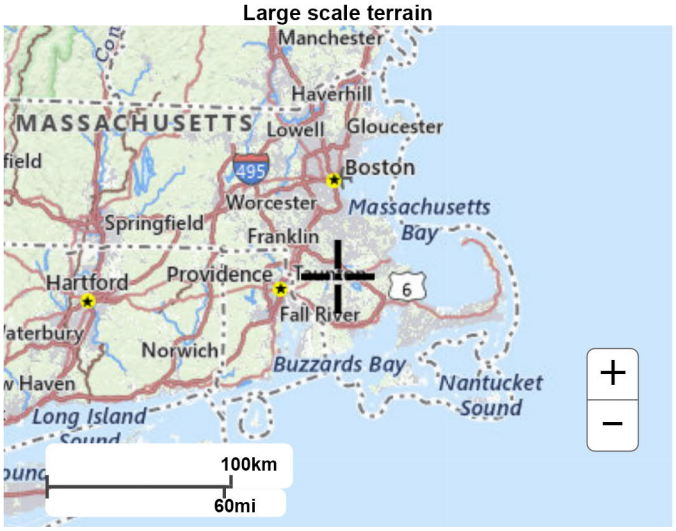
Maps & aerials

Small scale terrain

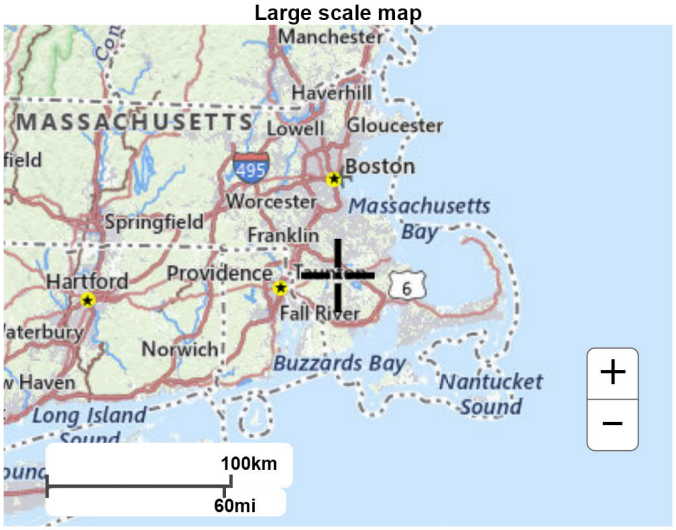
Proposal No. 613642 - 136413



Large scale terrain



Large scale map



Large scale aerial

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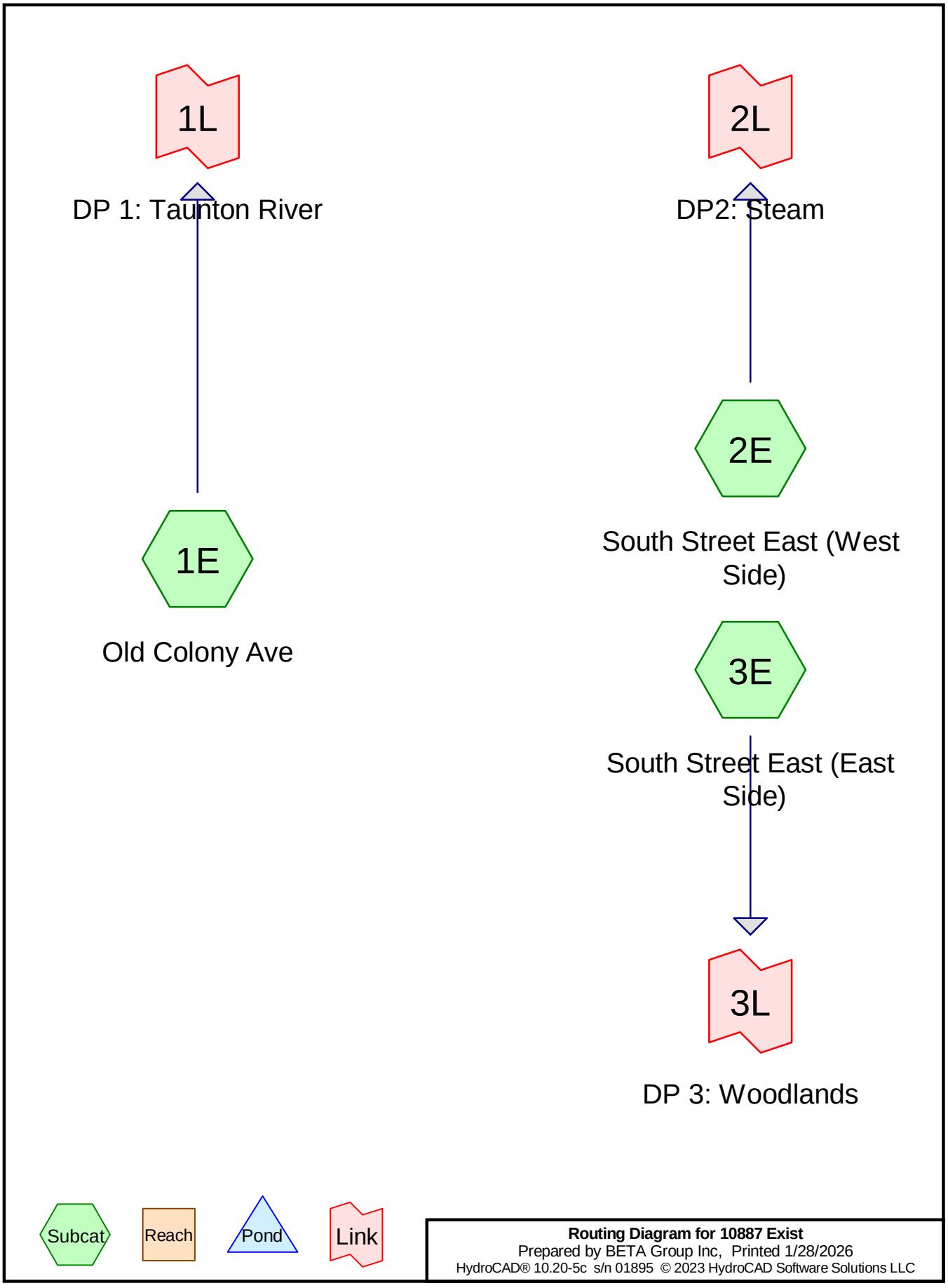
US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

Appendix D: Hydrologic Data


1L
DP 1: Taunton River
2L
DP2: Steam
2E
South Street East (West Side)
1E
Old Colony Ave
3E
South Street East (East Side)
3L
DP 3: Woodlands
Subcat
Reach
Pond
Link
Routing Diagram for 10887 Exist
Prepared by BETA Group Inc, Printed 1/28/2026
HydroCAD® 10.20-5c s/n 01895 © 2023 HydroCAD Software Solutions LLC

Summary for Subcatchment 1E: Old Colony Ave

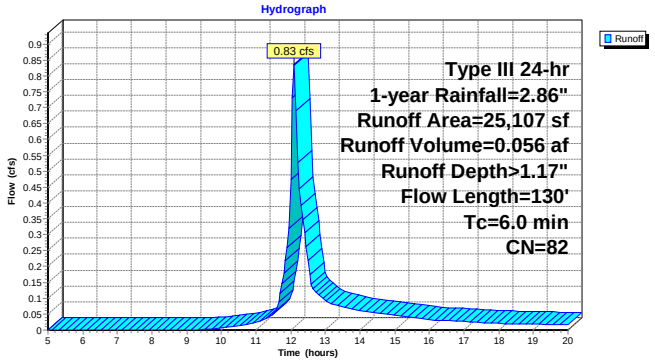
Runoff = 0.83 cfs @ 12.10 hrs, Volume= 0.056 af, Depth> 1.17"
Routed to Link 1L : DP 1: Taunton River

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-year Rainfall=2.86"

Area (sf)	CN	Description
3,592	39	>75% Grass cover, Good, HSG A
788	74	>75% Grass cover, Good, HSG C
145	80	>75% Grass cover, Good, HSG D
8,643	98	Paved roads w/curbs & sewers, HSG A
26	98	Paved roads w/curbs & sewers, HSG C
4	98	Paved roads w/curbs & sewers, HSG D
1,602	98	Water Surface, HSG A
915	98	Water Surface, HSG C
6,901	98	Water Surface, HSG D
2,491	30	Woods, Good, HSG A
25,107	82	Weighted Average
7,016		27.95% Pervious Area
18,091		72.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0340	1.53		**Sheet Flow, Sheet Flow** Smooth surfaces n= 0.011 P2= 3.42"
0.6	80	0.0130	2.31		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
1.1	130	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 1E: Old Colony Ave



Summary for Subcatchment 2E: South Street East (West Side)

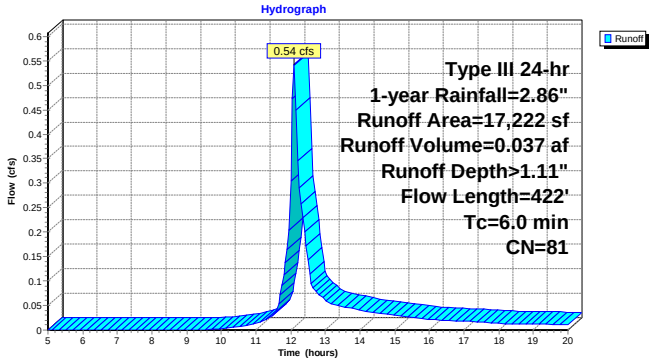
Runoff = 0.54 cfs @ 12.10 hrs, Volume= 0.037 af, Depth> 1.11"
Routed to Link 2L : DP2: Steam

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-year Rainfall=2.86"

Area (sf)	CN	Description
4,102	39	>75% Grass cover, Good, HSG A
0	80	>75% Grass cover, Good, HSG D
530	96	Gravel surface, HSG A
10,287	98	Paved roads w/curbs & sewers, HSG A
165	98	Paved roads w/curbs & sewers, HSG C
1,280	98	Paved roads w/curbs & sewers, HSG D
0	98	Water Surface, HSG A
1	98	Water Surface, HSG D
857	30	Woods, Good, HSG A
17,222	81	Weighted Average
5,489		31.87% Pervious Area
11,733		68.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	50	0.0070	0.81		**Sheet Flow, SF1** Smooth surfaces n= 0.011 P2= 3.42"
3.2	372	0.0090	1.93		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
4.2	422	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2E: South Street East (West Side)



Summary for Subcatchment 3E: South Street East (East Side)

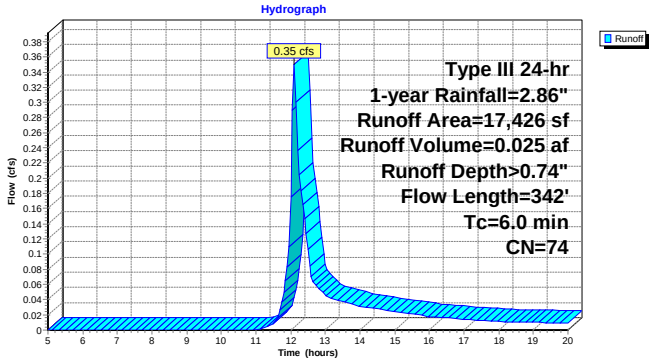
Runoff = 0.35 cfs @ 12.10 hrs, Volume= 0.025 af, Depth> 0.74"
Routed to Link 3L : DP 3: Woodlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-year Rainfall=2.86"

Area (sf)	CN	Description
3,738	39	>75% Grass cover, Good, HSG A
1,102	74	>75% Grass cover, Good, HSG C
0	80	>75% Grass cover, Good, HSG D
2,356	96	Gravel surface, HSG A
387	96	Gravel surface, HSG C
4,933	98	Paved roads w/curbs & sewers, HSG A
1,386	98	Paved roads w/curbs & sewers, HSG C
1,133	98	Paved roads w/curbs & sewers, HSG D
1	98	Water Surface, HSG A
3	98	Water Surface, HSG D
2,387	30	Woods, Good, HSG A
17,426	74	Weighted Average
9,970		57.21% Pervious Area
7,456		42.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	50	0.0070	0.81		**Sheet Flow, SF1** Smooth surfaces n= 0.011 P2= 3.42"
2.5	292	0.0090	1.93		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
3.5	342	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 3E: South Street East (East Side)

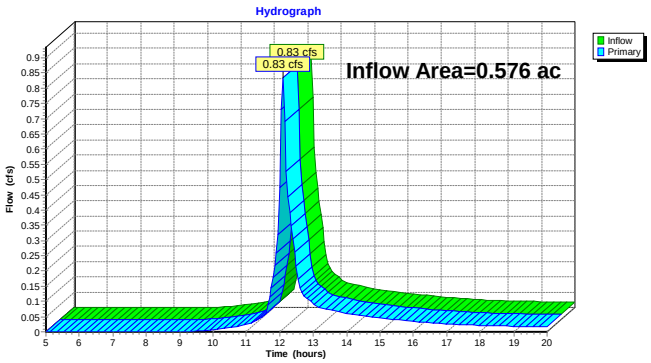


Summary for Link 1L: DP 1: Taunton River

Inflow Area = 0.576 ac, 72.05% Impervious, Inflow Depth > 1.17" for 1-year event
Inflow = 0.83 cfs @ 12.10 hrs, Volume= 0.056 af
Primary = 0.83 cfs @ 12.10 hrs, Volume= 0.056 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 1L: DP 1: Taunton River

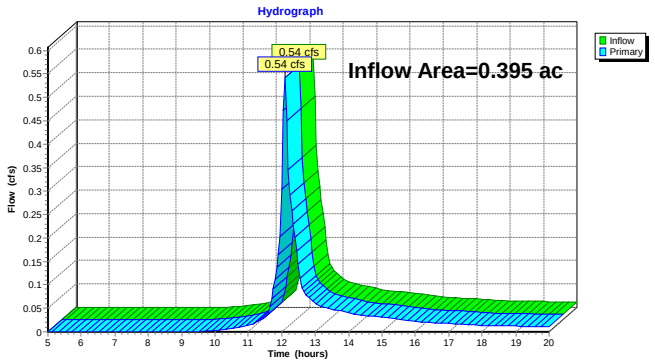


Summary for Link 2L: DP2: Steam

Inflow Area = 0.395 ac, 68.13% Impervious, Inflow Depth > 1.11" for 1-year event
Inflow = 0.54 cfs @ 12.10 hrs, Volume= 0.037 af
Primary = 0.54 cfs @ 12.10 hrs, Volume= 0.037 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 2L: DP2: Steam

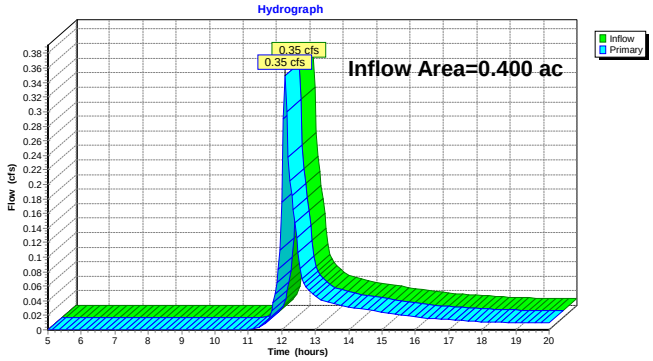


Summary for Link 3L: DP 3: Woodlands

Inflow Area = 0.400 ac, 42.79% Impervious, Inflow Depth > 0.74" for 1-year event
Inflow = 0.35 cfs @ 12.10 hrs, Volume= 0.025 af
Primary = 0.35 cfs @ 12.10 hrs, Volume= 0.025 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 3L: DP 3: Woodlands



Summary for Subcatchment 1E: Old Colony Ave

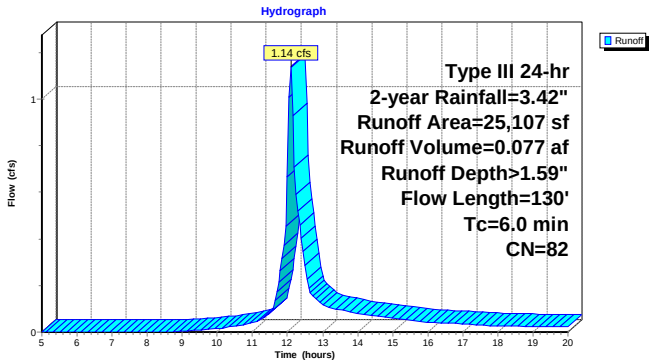
Runoff = 1.14 cfs @ 12.09 hrs, Volume= 0.077 af, Depth> 1.59"
Routed to Link 1L : DP 1: Taunton River

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.42"

Area (sf)	CN	Description
3,592	39	>75% Grass cover, Good, HSG A
788	74	>75% Grass cover, Good, HSG C
145	80	>75% Grass cover, Good, HSG D
8,643	98	Paved roads w/curbs & sewers, HSG A
26	98	Paved roads w/curbs & sewers, HSG C
4	98	Paved roads w/curbs & sewers, HSG D
1,602	98	Water Surface, HSG A
915	98	Water Surface, HSG C
6,901	98	Water Surface, HSG D
2,491	30	Woods, Good, HSG A
25,107	82	Weighted Average
7,016		27.95% Pervious Area
18,091		72.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0340	1.53		**Sheet Flow, Sheet Flow** Smooth surfaces n= 0.011 P2= 3.42"
0.6	80	0.0130	2.31		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
1.1	130	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 1E: Old Colony Ave



Summary for Subcatchment 2E: South Street East (West Side)

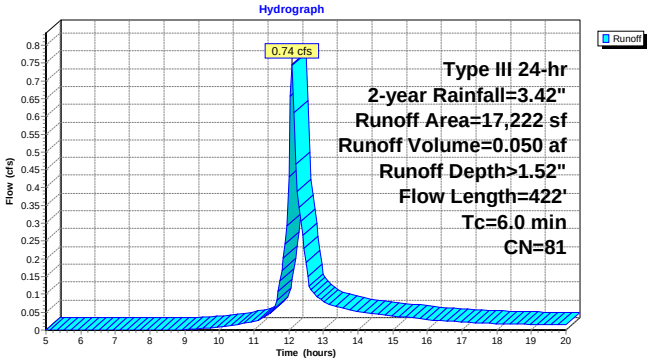
Runoff = 0.74 cfs @ 12.09 hrs, Volume= 0.050 af, Depth> 1.52"
Routed to Link 2L : DP2: Steam

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.42"

Area (sf)	CN	Description
4,102	39	>75% Grass cover, Good, HSG A
0	80	>75% Grass cover, Good, HSG D
530	96	Gravel surface, HSG A
10,287	98	Paved roads w/curbs & sewers, HSG A
165	98	Paved roads w/curbs & sewers, HSG C
1,280	98	Paved roads w/curbs & sewers, HSG D
0	98	Water Surface, HSG A
1	98	Water Surface, HSG D
857	30	Woods, Good, HSG A
17,222	81	Weighted Average
5,489		31.87% Pervious Area
11,733		68.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	50	0.0070	0.81		**Sheet Flow, SF1** Smooth surfaces n= 0.011 P2= 3.42"
3.2	372	0.0090	1.93		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
4.2	422	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2E: South Street East (West Side)



Summary for Subcatchment 3E: South Street East (East Side)

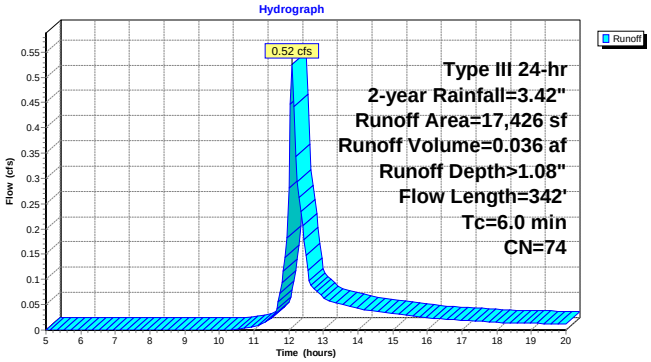
Runoff = 0.52 cfs @ 12.10 hrs, Volume= 0.036 af, Depth> 1.08"
Routed to Link 3L : DP 3: Woodlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.42"

Area (sf)	CN	Description
3,738	39	>75% Grass cover, Good, HSG A
1,102	74	>75% Grass cover, Good, HSG C
0	80	>75% Grass cover, Good, HSG D
2,356	96	Gravel surface, HSG A
387	96	Gravel surface, HSG C
4,933	98	Paved roads w/curbs & sewers, HSG A
1,386	98	Paved roads w/curbs & sewers, HSG C
1,133	98	Paved roads w/curbs & sewers, HSG D
1	98	Water Surface, HSG A
3	98	Water Surface, HSG D
2,387	30	Woods, Good, HSG A
17,426	74	Weighted Average
9,970		57.21% Pervious Area
7,456		42.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	50	0.0070	0.81		**Sheet Flow, SF1** Smooth surfaces n= 0.011 P2= 3.42"
2.5	292	0.0090	1.93		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
3.5	342	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 3E: South Street East (East Side)

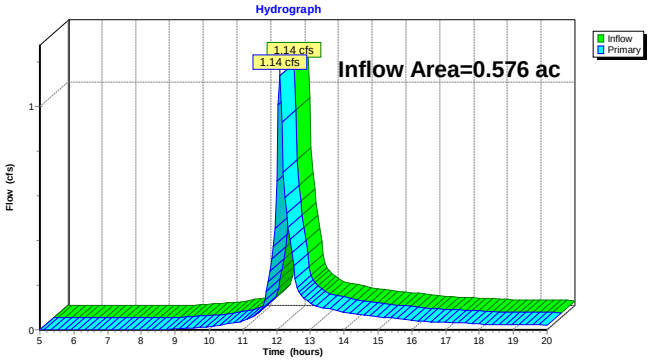


Summary for Link 1L: DP 1: Taunton River

Inflow Area = 0.576 ac, 72.05% Impervious, Inflow Depth > 1.59" for 2-year event
Inflow = 1.14 cfs @ 12.09 hrs, Volume= 0.077 af
Primary = 1.14 cfs @ 12.09 hrs, Volume= 0.077 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 1L: DP 1: Taunton River

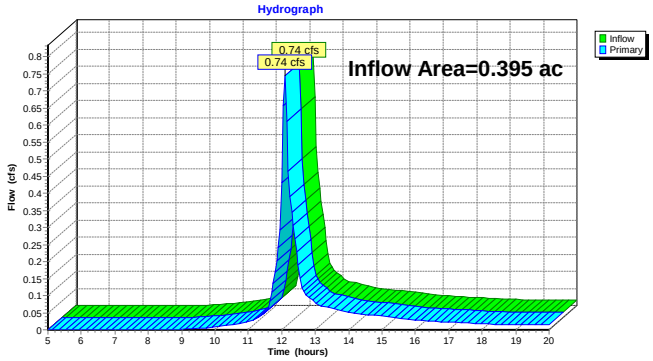


Summary for Link 2L: DP2: Steam

Inflow Area = 0.395 ac, 68.13% Impervious, Inflow Depth > 1.52" for 2-year event
Inflow = 0.74 cfs @ 12.09 hrs, Volume= 0.050 af
Primary = 0.74 cfs @ 12.09 hrs, Volume= 0.050 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 2L: DP2: Steam

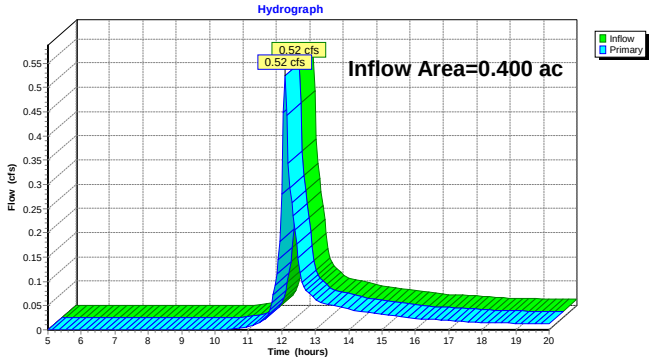


Summary for Link 3L: DP 3: Woodlands

Inflow Area = 0.400 ac, 42.79% Impervious, Inflow Depth > 1.08" for 2-year event
Inflow = 0.52 cfs @ 12.10 hrs, Volume= 0.036 af
Primary = 0.52 cfs @ 12.10 hrs, Volume= 0.036 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 3L: DP 3: Woodlands



Summary for Subcatchment 1E: Old Colony Ave

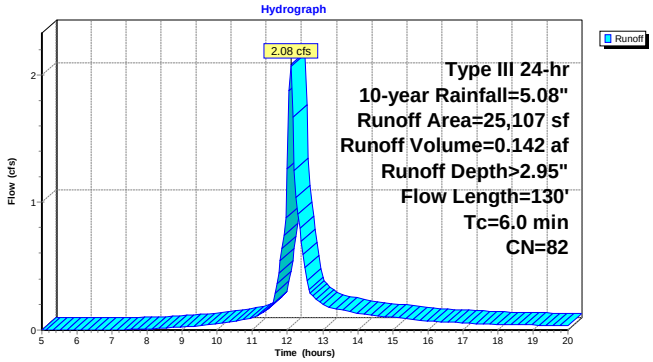
Runoff = 2.08 cfs @ 12.09 hrs, Volume= 0.142 af, Depth> 2.95"
Routed to Link 1L : DP 1: Taunton River

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=5.08"

Area (sf)	CN	Description
3,592	39	>75% Grass cover, Good, HSG A
788	74	>75% Grass cover, Good, HSG C
145	80	>75% Grass cover, Good, HSG D
8,643	98	Paved roads w/curbs & sewers, HSG A
26	98	Paved roads w/curbs & sewers, HSG C
4	98	Paved roads w/curbs & sewers, HSG D
1,602	98	Water Surface, HSG A
915	98	Water Surface, HSG C
6,901	98	Water Surface, HSG D
2,491	30	Woods, Good, HSG A
25,107	82	Weighted Average
7,016		27.95% Pervious Area
18,091		72.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0340	1.53		**Sheet Flow, Sheet Flow** Smooth surfaces n= 0.011 P2= 3.42"
0.6	80	0.0130	2.31		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
1.1	130	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 1E: Old Colony Ave



Summary for Subcatchment 2E: South Street East (West Side)

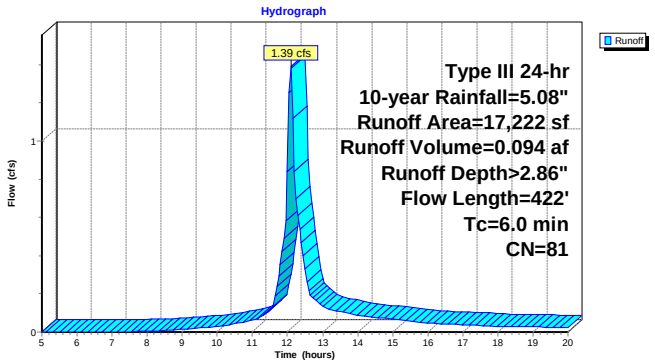
Runoff = 1.39 cfs @ 12.09 hrs, Volume= 0.094 af, Depth> 2.86"
Routed to Link 2L : DP2: Steam

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=5.08"

Area (sf)	CN	Description
4,102	39	>75% Grass cover, Good, HSG A
0	80	>75% Grass cover, Good, HSG D
530	96	Gravel surface, HSG A
10,287	98	Paved roads w/curbs & sewers, HSG A
165	98	Paved roads w/curbs & sewers, HSG C
1,280	98	Paved roads w/curbs & sewers, HSG D
0	98	Water Surface, HSG A
1	98	Water Surface, HSG D
857	30	Woods, Good, HSG A
17,222	81	Weighted Average
5,489		31.87% Pervious Area
11,733		68.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	50	0.0070	0.81		**Sheet Flow, SF1** Smooth surfaces n= 0.011 P2= 3.42"
3.2	372	0.0090	1.93		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
4.2	422	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2E: South Street East (West Side)



Summary for Subcatchment 3E: South Street East (East Side)

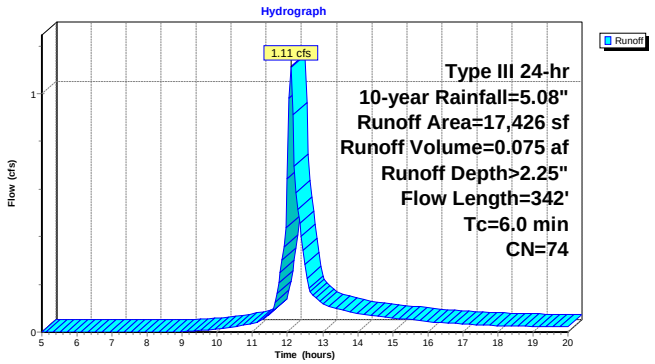
Runoff = 1.11 cfs @ 12.09 hrs, Volume= 0.075 af, Depth> 2.25"
Routed to Link 3L : DP 3: Woodlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=5.08"

Area (sf)	CN	Description
3,738	39	>75% Grass cover, Good, HSG A
1,102	74	>75% Grass cover, Good, HSG C
0	80	>75% Grass cover, Good, HSG D
2,356	96	Gravel surface, HSG A
387	96	Gravel surface, HSG C
4,933	98	Paved roads w/curbs & sewers, HSG A
1,386	98	Paved roads w/curbs & sewers, HSG C
1,133	98	Paved roads w/curbs & sewers, HSG D
1	98	Water Surface, HSG A
3	98	Water Surface, HSG D
2,387	30	Woods, Good, HSG A
17,426	74	Weighted Average
9,970		57.21% Pervious Area
7,456		42.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	50	0.0070	0.81		**Sheet Flow, SF1** Smooth surfaces n= 0.011 P2= 3.42"
2.5	292	0.0090	1.93		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
3.5	342	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 3E: South Street East (East Side)

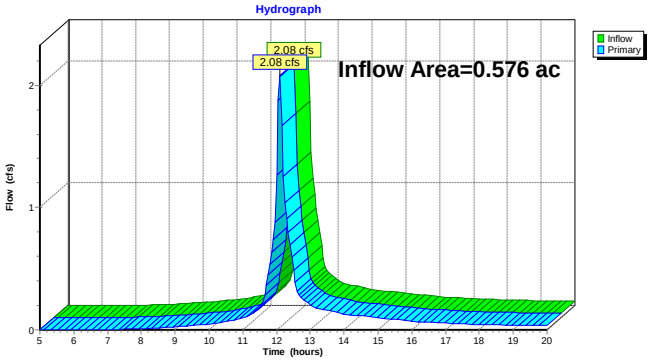


Summary for Link 1L: DP 1: Taunton River

Inflow Area = 0.576 ac, 72.05% Impervious, Inflow Depth > 2.95" for 10-year event
Inflow = 2.08 cfs @ 12.09 hrs, Volume= 0.142 af
Primary = 2.08 cfs @ 12.09 hrs, Volume= 0.142 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 1L: DP 1: Taunton River

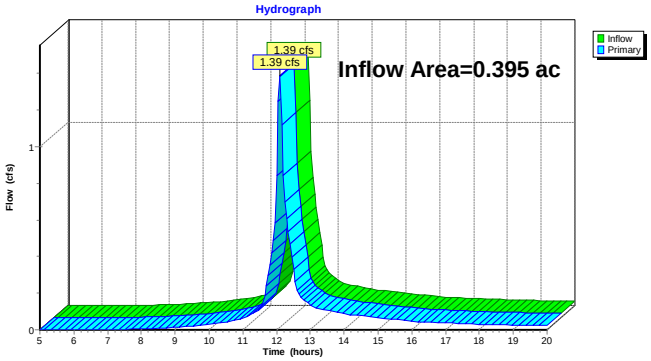


Summary for Link 2L: DP2: Steam

Inflow Area = 0.395 ac, 68.13% Impervious, Inflow Depth > 2.86" for 10-year event
Inflow = 1.39 cfs @ 12.09 hrs, Volume= 0.094 af
Primary = 1.39 cfs @ 12.09 hrs, Volume= 0.094 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 2L: DP2: Steam

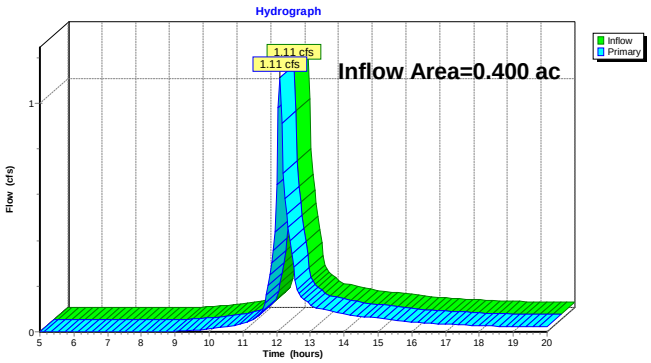


Summary for Link 3L: DP 3: Woodlands

Inflow Area = 0.400 ac, 42.79% Impervious, Inflow Depth > 2.25" for 10-year event
Inflow = 1.11 cfs @ 12.09 hrs, Volume= 0.075 af
Primary = 1.11 cfs @ 12.09 hrs, Volume= 0.075 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 3L: DP 3: Woodlands



Summary for Subcatchment 1E: Old Colony Ave

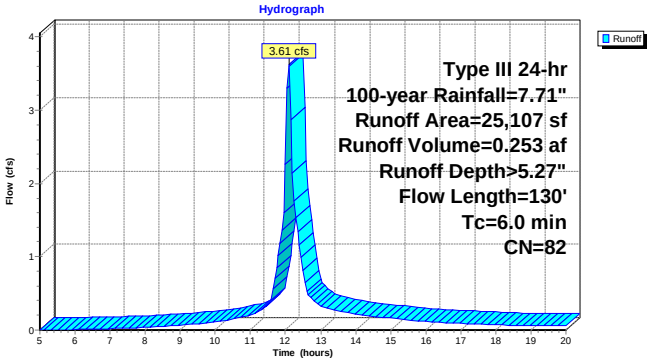
Runoff = 3.61 cfs @ 12.09 hrs, Volume= 0.253 af, Depth> 5.27"
Routed to Link 1L : DP 1: Taunton River

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=7.71"

Area (sf)	CN	Description
3,592	39	>75% Grass cover, Good, HSG A
788	74	>75% Grass cover, Good, HSG C
145	80	>75% Grass cover, Good, HSG D
8,643	98	Paved roads w/curbs & sewers, HSG A
26	98	Paved roads w/curbs & sewers, HSG C
4	98	Paved roads w/curbs & sewers, HSG D
1,602	98	Water Surface, HSG A
915	98	Water Surface, HSG C
6,901	98	Water Surface, HSG D
2,491	30	Woods, Good, HSG A
25,107	82	Weighted Average
7,016		27.95% Pervious Area
18,091		72.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0340	1.53		**Sheet Flow, Sheet Flow** Smooth surfaces n= 0.011 P2= 3.42"
0.6	80	0.0130	2.31		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
1.1	130	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 1E: Old Colony Ave



Summary for Subcatchment 2E: South Street East (West Side)

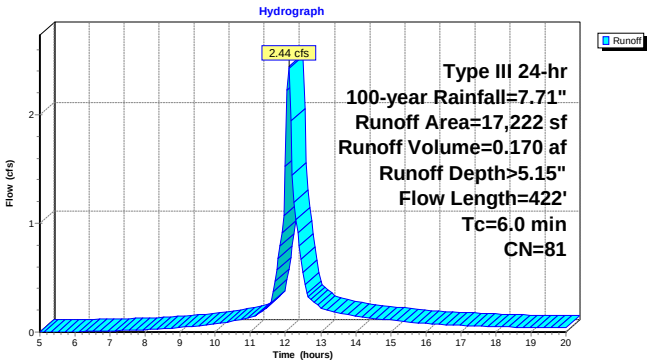
Runoff = 2.44 cfs @ 12.09 hrs, Volume= 0.170 af, Depth> 5.15"
Routed to Link 2L : DP2: Steam

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=7.71"

Area (sf)	CN	Description
4,102	39	>75% Grass cover, Good, HSG A
0	80	>75% Grass cover, Good, HSG D
530	96	Gravel surface, HSG A
10,287	98	Paved roads w/curbs & sewers, HSG A
165	98	Paved roads w/curbs & sewers, HSG C
1,280	98	Paved roads w/curbs & sewers, HSG D
0	98	Water Surface, HSG A
1	98	Water Surface, HSG D
857	30	Woods, Good, HSG A
17,222	81	Weighted Average
5,489		31.87% Pervious Area
11,733		68.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	50	0.0070	0.81		**Sheet Flow, SF1** Smooth surfaces n= 0.011 P2= 3.42"
3.2	372	0.0090	1.93		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
4.2	422	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2E: South Street East (West Side)



Summary for Subcatchment 3E: South Street East (East Side)

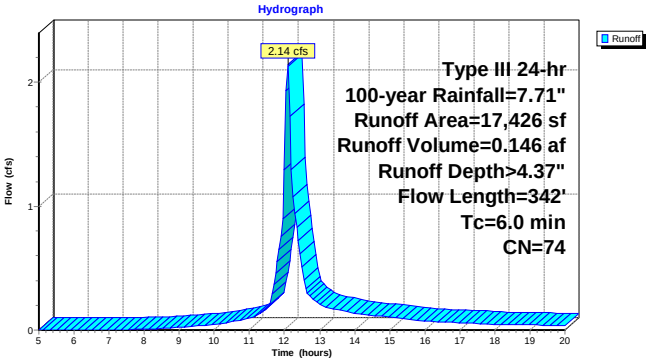
Runoff = 2.14 cfs @ 12.09 hrs, Volume= 0.146 af, Depth> 4.37"
Routed to Link 3L : DP 3: Woodlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=7.71"

Area (sf)	CN	Description
3,738	39	>75% Grass cover, Good, HSG A
1,102	74	>75% Grass cover, Good, HSG C
0	80	>75% Grass cover, Good, HSG D
2,356	96	Gravel surface, HSG A
387	96	Gravel surface, HSG C
4,933	98	Paved roads w/curbs & sewers, HSG A
1,386	98	Paved roads w/curbs & sewers, HSG C
1,133	98	Paved roads w/curbs & sewers, HSG D
1	98	Water Surface, HSG A
3	98	Water Surface, HSG D
2,387	30	Woods, Good, HSG A
17,426	74	Weighted Average
9,970		57.21% Pervious Area
7,456		42.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	50	0.0070	0.81		**Sheet Flow, SF1** Smooth surfaces n= 0.011 P2= 3.42"
2.5	292	0.0090	1.93		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
3.5	342	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 3E: South Street East (East Side)

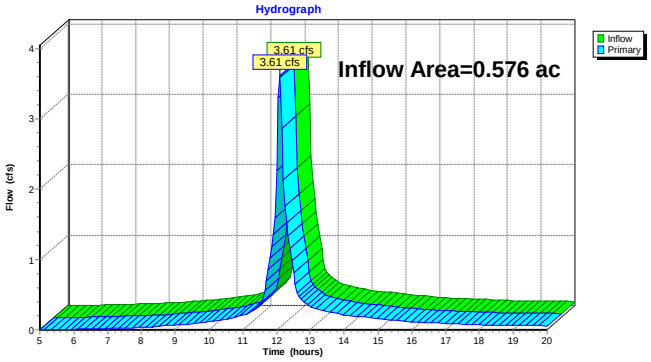


Summary for Link 1L: DP 1: Taunton River

Inflow Area = 0.576 ac, 72.05% Impervious, Inflow Depth > 5.27" for 100-year event
Inflow = 3.61 cfs @ 12.09 hrs, Volume= 0.253 af
Primary = 3.61 cfs @ 12.09 hrs, Volume= 0.253 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 1L: DP 1: Taunton River

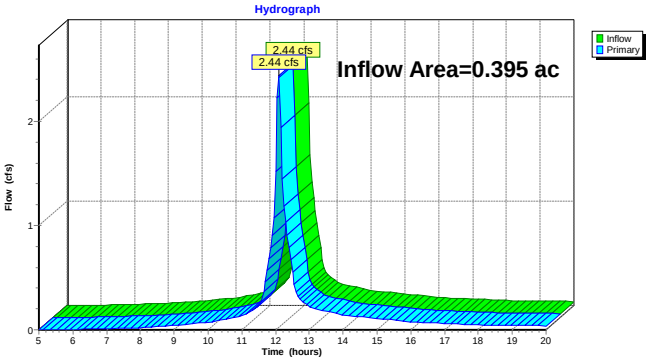


Summary for Link 2L: DP2: Steam

Inflow Area = 0.395 ac, 68.13% Impervious, Inflow Depth > 5.15" for 100-year event
Inflow = 2.44 cfs @ 12.09 hrs, Volume= 0.170 af
Primary = 2.44 cfs @ 12.09 hrs, Volume= 0.170 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 2L: DP2: Steam

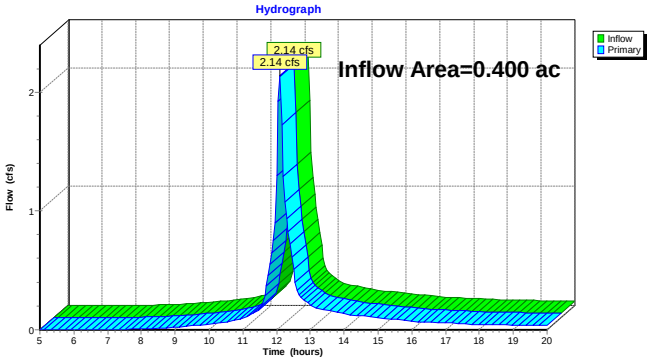


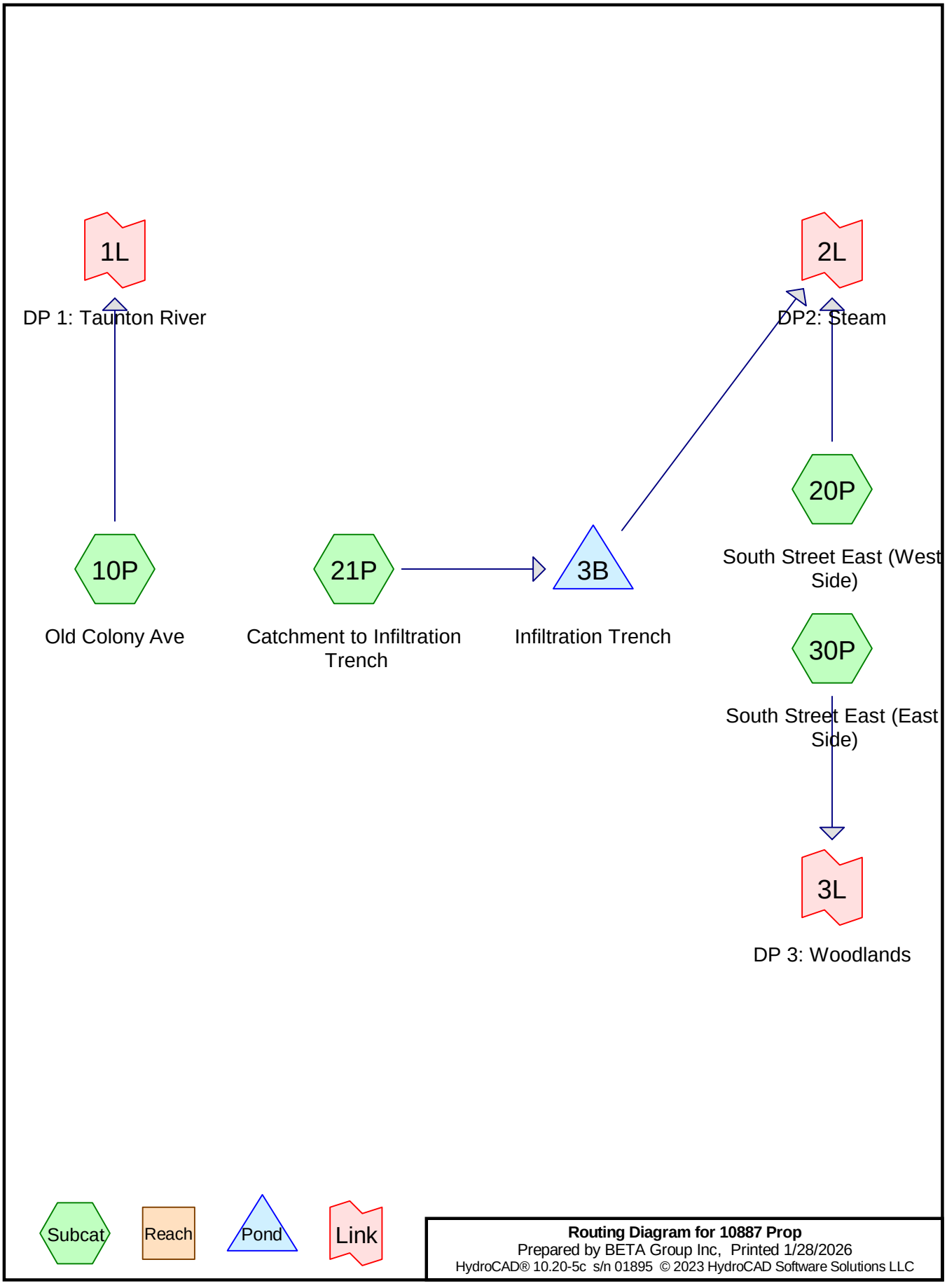
Summary for Link 3L: DP 3: Woodlands

Inflow Area = 0.400 ac, 42.79% Impervious, Inflow Depth > 4.37" for 100-year event
Inflow = 2.14 cfs @ 12.09 hrs, Volume= 0.146 af
Primary = 2.14 cfs @ 12.09 hrs, Volume= 0.146 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 3L: DP 3: Woodlands




1L
DP 1: Taunton River
2L
DP2: Steam
20P
South Street East (West Side)
10P
Old Colony Ave
21P
Catchment to Infiltration Trench
3B
Infiltration Trench
30P
South Street East (East Side)
3L
DP 3: Woodlands
Subcat
Reach
Pond
Link
Routing Diagram for 10887 Prop
Prepared by BETA Group Inc, Printed 1/28/2026
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Summary for Subcatchment 10P: Old Colony Ave

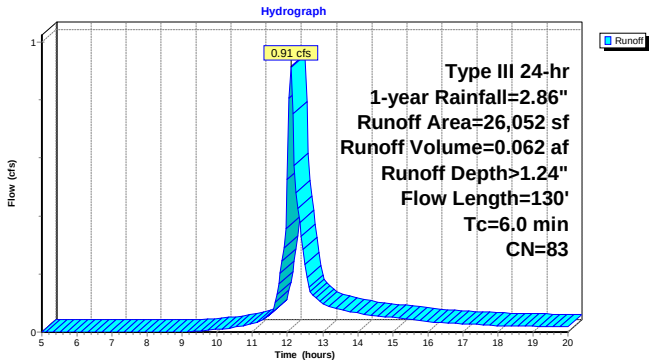
Runoff = 0.91 cfs @ 12.09 hrs, Volume= 0.062 af, Depth> 1.24"
Routed to Link 1L : DP 1: Taunton River

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-year Rainfall=2.86"

Area (sf)	CN	Description
4,934	39	>75% Grass cover, Good, HSG A
776	74	>75% Grass cover, Good, HSG C
135	80	>75% Grass cover, Good, HSG D
9,104	98	Paved roads w/curbs & sewers, HSG A
31	98	Paved roads w/curbs & sewers, HSG C
709	98	Paved roads w/curbs & sewers, HSG D
1,590	98	Water Surface, HSG A
906	98	Water Surface, HSG C
6,827	98	Water Surface, HSG D
1,039	30	Woods, Good, HSG A
26,052	83	Weighted Average
6,884		26.43% Pervious Area
19,168		73.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0340	1.53		**Sheet Flow, Sheet Flow** Smooth surfaces n= 0.011 P2= 3.42"
0.6	80	0.0130	2.31		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
1.1	130	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 10P: Old Colony Ave



Summary for Subcatchment 20P: South Street East (West Side)

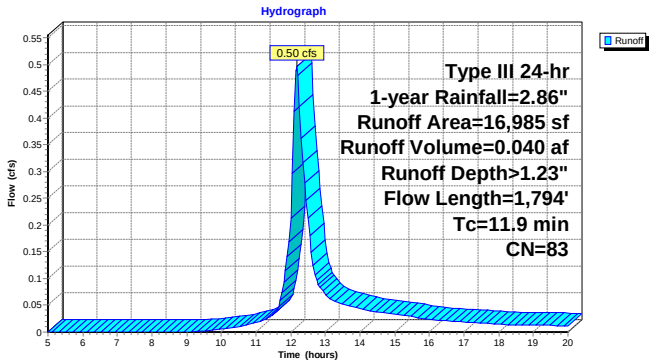
Runoff = 0.50 cfs @ 12.17 hrs, Volume= 0.040 af, Depth> 1.23"
Routed to Link 2L : DP2: Steam

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-year Rainfall=2.86"

Area (sf)	CN	Description
3,571	39	>75% Grass cover, Good, HSG A
366	96	Gravel surface, HSG A
11,263	98	Paved roads w/curbs & sewers, HSG A
165	98	Paved roads w/curbs & sewers, HSG C
1,085	98	Paved roads w/curbs & sewers, HSG D
0	98	Water Surface, HSG D
535	30	Woods, Good, HSG A
16,985	83	Weighted Average
4,472		26.33% Pervious Area
12,513		73.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0200	1.24		**Sheet Flow, SF1** Smooth surfaces n= 0.011 P2= 3.42"
3.2	372	0.0090	1.93		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
8.0	1,372	0.0200	2.87		**Shallow Concentrated Flow, SC2** Paved Kv= 20.3 fps
11.9	1,794	Total			

Subcatchment 20P: South Street East (West Side)



Summary for Subcatchment 21P: Catchment to Infiltration Trench

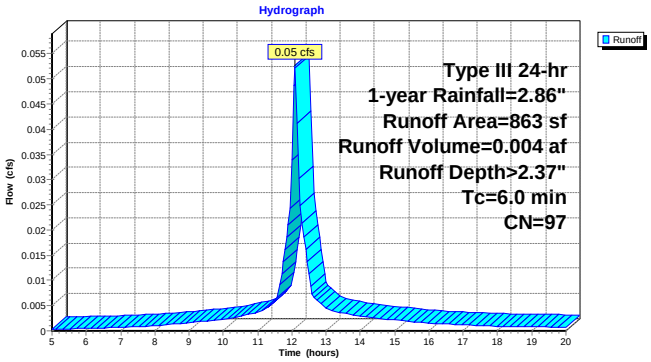
Runoff = 0.05 cfs @ 12.09 hrs, Volume= 0.004 af, Depth> 2.37"
Routed to Pond 3B : Infiltration Trench

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-year Rainfall=2.86"

Area (sf)	CN	Description
12	39	>75% Grass cover, Good, HSG A
851	98	Paved roads w/curbs & sewers, HSG A
863	97	Weighted Average
12		1.37% Pervious Area
851		98.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Assume Min. TC**

Subcatchment 21P: Catchment to Infiltration Trench



Summary for Subcatchment 30P: South Street East (East Side)

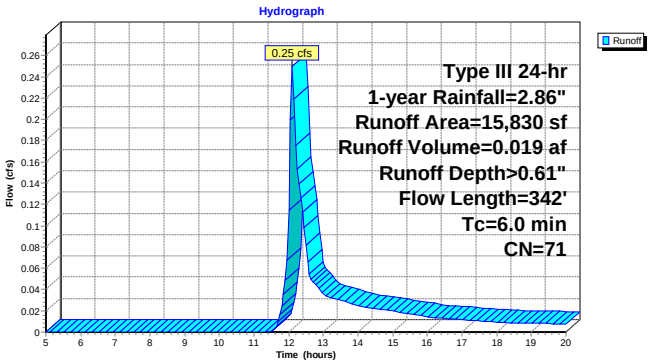
Runoff = 0.25 cfs @ 12.11 hrs, Volume= 0.019 af, Depth> 0.61"
Routed to Link 3L : DP 3: Woodlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-year Rainfall=2.86"

Area (sf)	CN	Description
4,195	39	>75% Grass cover, Good, HSG A
870	74	>75% Grass cover, Good, HSG C
1,421	96	Gravel surface, HSG A
387	96	Gravel surface, HSG C
4,275	98	Paved roads w/curbs & sewers, HSG A
1,630	98	Paved roads w/curbs & sewers, HSG C
704	98	Paved roads w/curbs & sewers, HSG D
4	98	Water Surface, HSG C
2	98	Water Surface, HSG D
2,343	30	Woods, Good, HSG A
15,830	71	Weighted Average
9,215		58.21% Pervious Area
6,615		41.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	50	0.0070	0.81		**Sheet Flow, SF1** Smooth surfaces n= 0.011 P2= 3.42"
2.5	292	0.0090	1.93		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
3.5	342	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 30P: South Street East (East Side)



Summary for Pond 3B: Infiltration Trench

Inflow Area = 0.020 ac, 98.63% Impervious, Inflow Depth > 2.37" for 1-year event
Inflow = 0.05 cfs @ 12.09 hrs, Volume= 0.004 af
Outflow = 0.00 cfs @ 13.62 hrs, Volume= 0.003 af, Atten= 94%, Lag= 91.8 min
Discarded = 0.00 cfs @ 13.62 hrs, Volume= 0.003 af
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af
Routed to Link 2L : DP2: Steam

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 11.80' @ 13.62 hrs Surf.Area= 90 sf Storage= 84 cf

Plug-Flow detention time= 175.7 min calculated for 0.003 af (73% of inflow)
Center-of-Mass det. time= 113.4 min (858.8 - 745.3)

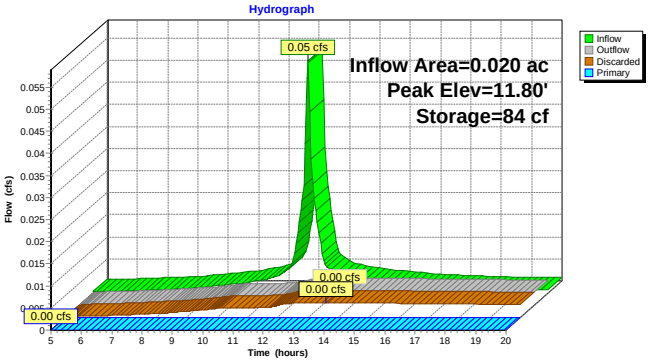
Volume	Invert	Avail.Storage	Storage Description
#1	10.00'	72 cf	**2.00'W x 45.00'L x 2.17'H Crushed Stone Trench** 195 cf Overall - 16 cf Embedded = 180 cf x 40.0% Voids
#2	11.00'	16 cf	**8.0" Round 8" Perforated Pipe** Inside #1 L= 45.0'
#3	11.00'	70 cf	**4.00'D x 5.57'H CB-6** -Impervious
		158 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	10.00'	**1.020 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 7.00'
#2	Primary	12.00'	**12.0" Vert. CB-6 Outlet** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.00 cfs @ 13.62 hrs HW=11.80' (Free Discharge)
↑**1=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=10.00' (Free Discharge)
↑**2=CB-6 Outlet** (Controls 0.00 cfs)

Pond 3B: Infiltration Trench

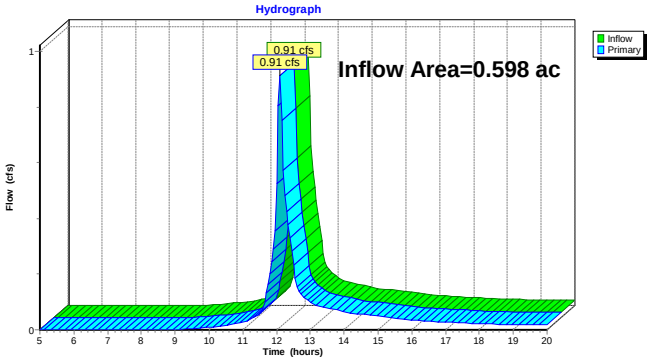


Summary for Link 1L: DP 1: Taunton River

Inflow Area = 0.598 ac, 73.57% Impervious, Inflow Depth > 1.24" for 1-year event
Inflow = 0.91 cfs @ 12.09 hrs, Volume= 0.062 af
Primary = 0.91 cfs @ 12.09 hrs, Volume= 0.062 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 1L: DP 1: Taunton River

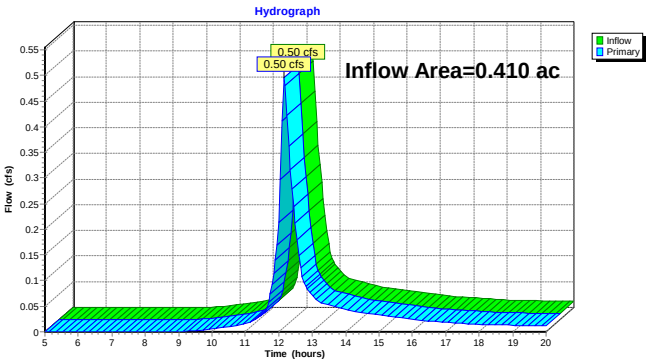


Summary for Link 2L: DP2: Steam

Inflow Area = 0.410 ac, 74.88% Impervious, Inflow Depth > 1.17" for 1-year event
Inflow = 0.50 cfs @ 12.17 hrs, Volume= 0.040 af
Primary = 0.50 cfs @ 12.17 hrs, Volume= 0.040 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 2L: DP2: Steam

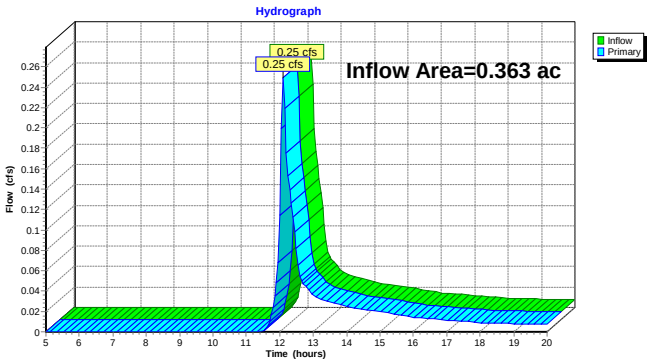


Summary for Link 3L: DP 3: Woodlands

Inflow Area = 0.363 ac, 41.79% Impervious, Inflow Depth > 0.61" for 1-year event
Inflow = 0.25 cfs @ 12.11 hrs, Volume= 0.019 af
Primary = 0.25 cfs @ 12.11 hrs, Volume= 0.019 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 3L: DP 3: Woodlands



Summary for Subcatchment 10P: Old Colony Ave

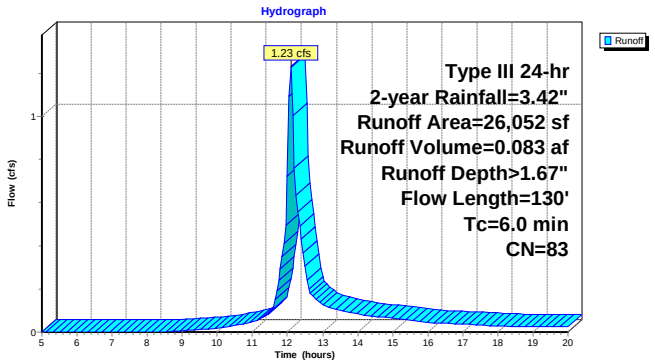
Runoff = 1.23 cfs @ 12.09 hrs, Volume= 0.083 af, Depth> 1.67"
Routed to Link 1L : DP 1: Taunton River

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.42"

Area (sf)	CN	Description
4,934	39	>75% Grass cover, Good, HSG A
776	74	>75% Grass cover, Good, HSG C
135	80	>75% Grass cover, Good, HSG D
9,104	98	Paved roads w/curbs & sewers, HSG A
31	98	Paved roads w/curbs & sewers, HSG C
709	98	Paved roads w/curbs & sewers, HSG D
1,590	98	Water Surface, HSG A
906	98	Water Surface, HSG C
6,827	98	Water Surface, HSG D
1,039	30	Woods, Good, HSG A
26,052	83	Weighted Average
6,884		26.43% Pervious Area
19,168		73.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0340	1.53		**Sheet Flow, Sheet Flow** Smooth surfaces n= 0.011 P2= 3.42"
0.6	80	0.0130	2.31		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
1.1	130	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 10P: Old Colony Ave



Summary for Subcatchment 20P: South Street East (West Side)

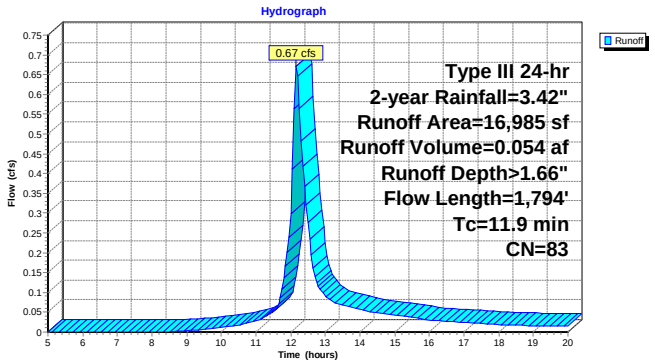
Runoff = 0.67 cfs @ 12.17 hrs, Volume= 0.054 af, Depth> 1.66"
Routed to Link 2L : DP2: Steam

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.42"

Area (sf)	CN	Description
3,571	39	>75% Grass cover, Good, HSG A
366	96	Gravel surface, HSG A
11,263	98	Paved roads w/curbs & sewers, HSG A
165	98	Paved roads w/curbs & sewers, HSG C
1,085	98	Paved roads w/curbs & sewers, HSG D
0	98	Water Surface, HSG D
535	30	Woods, Good, HSG A
16,985	83	Weighted Average
4,472		26.33% Pervious Area
12,513		73.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0200	1.24		**Sheet Flow, SF1** Smooth surfaces n= 0.011 P2= 3.42"
3.2	372	0.0090	1.93		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
8.0	1,372	0.0200	2.87		**Shallow Concentrated Flow, SC2** Paved Kv= 20.3 fps
11.9	1,794	Total			

Subcatchment 20P: South Street East (West Side)



Summary for Subcatchment 21P: Catchment to Infiltration Trench

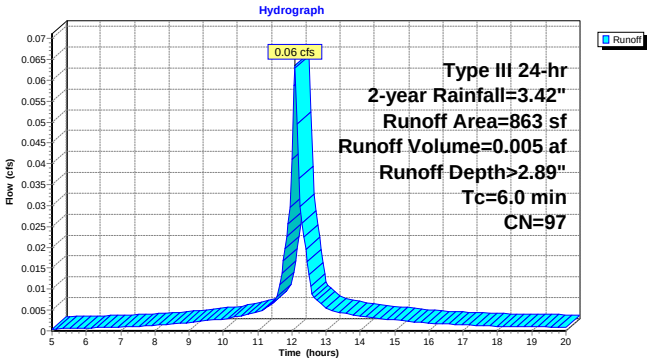
Runoff = 0.06 cfs @ 12.09 hrs, Volume= 0.005 af, Depth> 2.89"
Routed to Pond 3B : Infiltration Trench

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.42"

Area (sf)	CN	Description
12	39	>75% Grass cover, Good, HSG A
851	98	Paved roads w/curbs & sewers, HSG A
863	97	Weighted Average
12		1.37% Pervious Area
851		98.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Assume Min. TC**

Subcatchment 21P: Catchment to Infiltration Trench



Summary for Subcatchment 30P: South Street East (East Side)

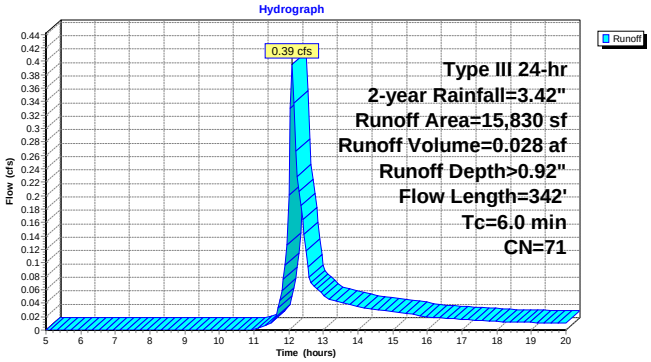
Runoff = 0.39 cfs @ 12.10 hrs, Volume= 0.028 af, Depth> 0.92"
Routed to Link 3L : DP 3: Woodlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.42"

Area (sf)	CN	Description
4,195	39	>75% Grass cover, Good, HSG A
870	74	>75% Grass cover, Good, HSG C
1,421	96	Gravel surface, HSG A
387	96	Gravel surface, HSG C
4,275	98	Paved roads w/curbs & sewers, HSG A
1,630	98	Paved roads w/curbs & sewers, HSG C
704	98	Paved roads w/curbs & sewers, HSG D
4	98	Water Surface, HSG C
2	98	Water Surface, HSG D
2,343	30	Woods, Good, HSG A
15,830	71	Weighted Average
9,215		58.21% Pervious Area
6,615		41.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	50	0.0070	0.81		**Sheet Flow, SF1** Smooth surfaces n= 0.011 P2= 3.42"
2.5	292	0.0090	1.93		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
3.5	342	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 30P: South Street East (East Side)



Summary for Pond 3B: Infiltration Trench

Inflow Area = 0.020 ac, 98.63% Impervious, Inflow Depth > 2.89" for 2-year event
Inflow = 0.06 cfs @ 12.09 hrs, Volume= 0.005 af
Outflow = 0.01 cfs @ 12.51 hrs, Volume= 0.003 af, Atten= 78%, Lag= 25.1 min
Discarded = 0.00 cfs @ 12.51 hrs, Volume= 0.003 af
Primary = 0.01 cfs @ 12.51 hrs, Volume= 0.000 af
Routed to Link 2L : DP2: Steam

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 12.04' @ 12.51 hrs Surf.Area= 90 sf Storage= 96 cf

Plug-Flow detention time= 162.7 min calculated for 0.003 af (72% of inflow)
Center-of-Mass det. time= 98.4 min (841.0 - 742.7)

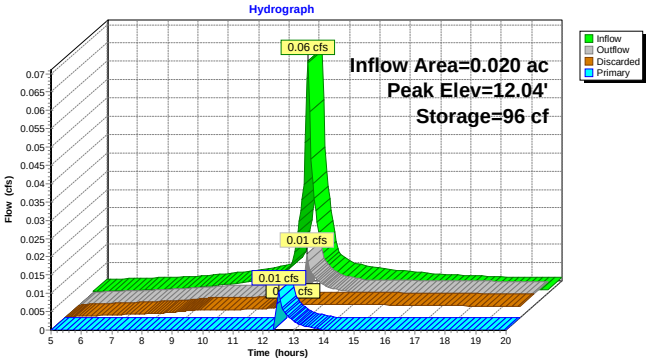
Volume	Invert	Avail.Storage	Storage Description
#1	10.00'	72 cf	**2.00'W x 45.00'L x 2.17'H Crushed Stone Trench** 195 cf Overall - 16 cf Embedded = 180 cf x 40.0% Voids
#2	11.00'	16 cf	**8.0" Round 8" Perforated Pipe** Inside #1 L= 45.0'
#3	11.00'	70 cf	**4.00'D x 5.57'H CB-6** -Impervious
		158 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	10.00'	**1.020 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 7.00'
#2	Primary	12.00'	**12.0" Vert. CB-6 Outlet** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.00 cfs @ 12.51 hrs HW=12.04' (Free Discharge)
↑**1=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=0.01 cfs @ 12.51 hrs HW=12.04' (Free Discharge)
↑**2=CB-6 Outlet** (Orifice Controls 0.01 cfs @ 0.71 fps)

Pond 3B: Infiltration Trench

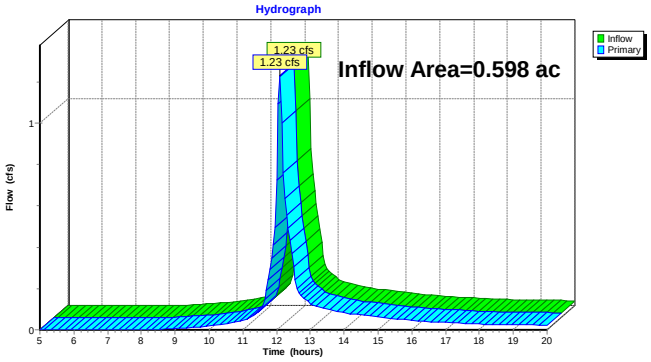


Summary for Link 1L: DP 1: Taunton River

Inflow Area = 0.598 ac, 73.57% Impervious, Inflow Depth > 1.67" for 2-year event
Inflow = 1.23 cfs @ 12.09 hrs, Volume= 0.083 af
Primary = 1.23 cfs @ 12.09 hrs, Volume= 0.083 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 1L: DP 1: Taunton River

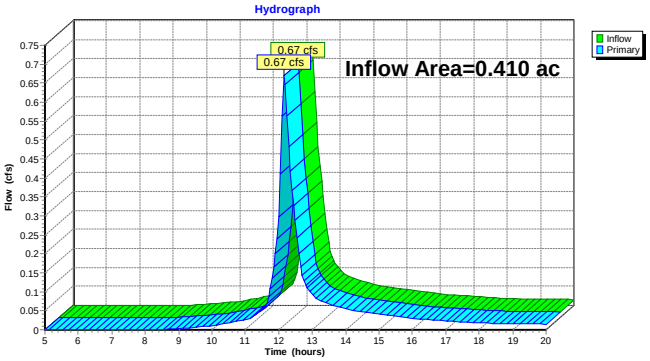


Summary for Link 2L: DP2: Steam

Inflow Area = 0.410 ac, 74.88% Impervious, Inflow Depth > 1.59" for 2-year event
Inflow = 0.67 cfs @ 12.17 hrs, Volume= 0.054 af
Primary = 0.67 cfs @ 12.17 hrs, Volume= 0.054 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 2L: DP2: Steam

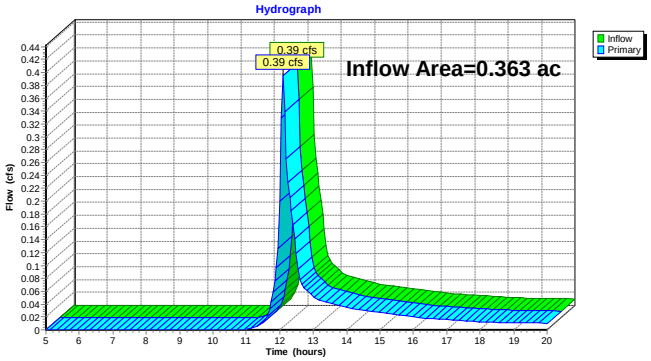


Summary for Link 3L: DP 3: Woodlands

Inflow Area = 0.363 ac, 41.79% Impervious, Inflow Depth > 0.92" for 2-year event
Inflow = 0.39 cfs @ 12.10 hrs, Volume= 0.028 af
Primary = 0.39 cfs @ 12.10 hrs, Volume= 0.028 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 3L: DP 3: Woodlands



Summary for Subcatchment 10P: Old Colony Ave

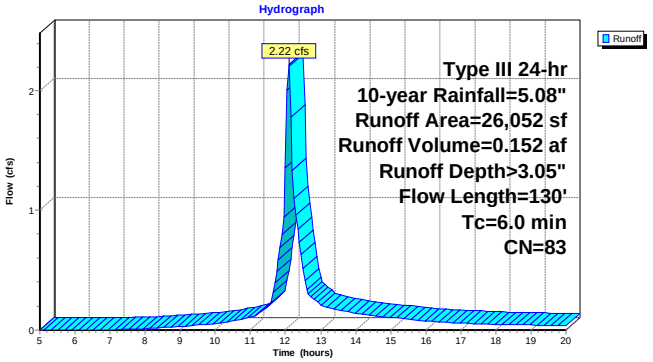
Runoff = 2.22 cfs @ 12.09 hrs, Volume= 0.152 af, Depth> 3.05"
Routed to Link 1L : DP 1: Taunton River

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=5.08"

Area (sf)	CN	Description
4,934	39	>75% Grass cover, Good, HSG A
776	74	>75% Grass cover, Good, HSG C
135	80	>75% Grass cover, Good, HSG D
9,104	98	Paved roads w/curbs & sewers, HSG A
31	98	Paved roads w/curbs & sewers, HSG C
709	98	Paved roads w/curbs & sewers, HSG D
1,590	98	Water Surface, HSG A
906	98	Water Surface, HSG C
6,827	98	Water Surface, HSG D
1,039	30	Woods, Good, HSG A
26,052	83	Weighted Average
6,884		26.43% Pervious Area
19,168		73.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0340	1.53		**Sheet Flow, Sheet Flow** Smooth surfaces n= 0.011 P2= 3.42"
0.6	80	0.0130	2.31		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
1.1	130	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 10P: Old Colony Ave



Summary for Subcatchment 20P: South Street East (West Side)

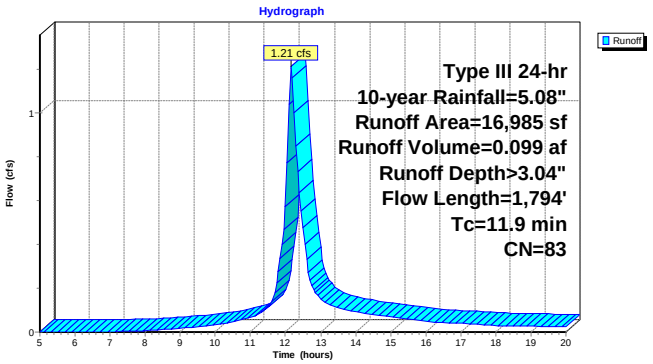
Runoff = 1.21 cfs @ 12.16 hrs, Volume= 0.099 af, Depth> 3.04"
Routed to Link 2L : DP2: Steam

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=5.08"

Area (sf)	CN	Description
3,571	39	>75% Grass cover, Good, HSG A
366	96	Gravel surface, HSG A
11,263	98	Paved roads w/curbs & sewers, HSG A
165	98	Paved roads w/curbs & sewers, HSG C
1,085	98	Paved roads w/curbs & sewers, HSG D
0	98	Water Surface, HSG D
535	30	Woods, Good, HSG A
16,985	83	Weighted Average
4,472		26.33% Pervious Area
12,513		73.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0200	1.24		**Sheet Flow, SF1** Smooth surfaces n= 0.011 P2= 3.42"
3.2	372	0.0090	1.93		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
8.0	1,372	0.0200	2.87		**Shallow Concentrated Flow, SC2** Paved Kv= 20.3 fps
11.9	1,794	Total			

Subcatchment 20P: South Street East (West Side)



Summary for Subcatchment 21P: Catchment to Infiltration Trench

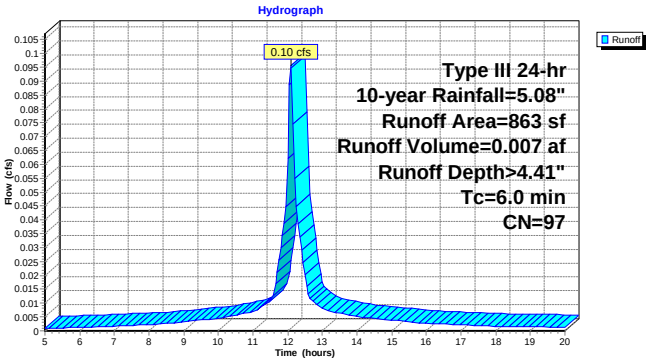
Runoff = 0.10 cfs @ 12.09 hrs, Volume= 0.007 af, Depth> 4.41"
Routed to Pond 3B : Infiltration Trench

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=5.08"

Area (sf)	CN	Description
12	39	>75% Grass cover, Good, HSG A
851	98	Paved roads w/curbs & sewers, HSG A
863	97	Weighted Average
12		1.37% Pervious Area
851		98.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Assume Min. TC**

Subcatchment 21P: Catchment to Infiltration Trench



Summary for Subcatchment 30P: South Street East (East Side)

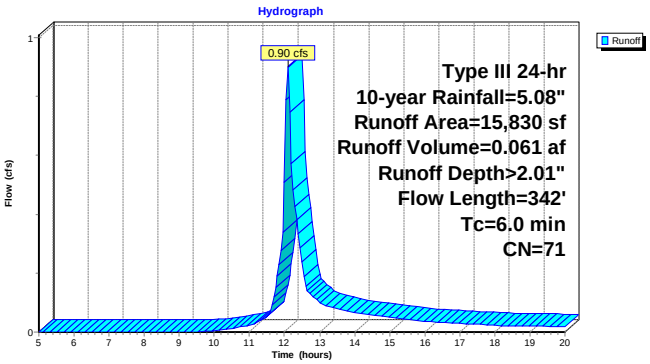
Runoff = 0.90 cfs @ 12.10 hrs, Volume= 0.061 af, Depth> 2.01"
Routed to Link 3L : DP 3: Woodlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=5.08"

Area (sf)	CN	Description
4,195	39	>75% Grass cover, Good, HSG A
870	74	>75% Grass cover, Good, HSG C
1,421	96	Gravel surface, HSG A
387	96	Gravel surface, HSG C
4,275	98	Paved roads w/curbs & sewers, HSG A
1,630	98	Paved roads w/curbs & sewers, HSG C
704	98	Paved roads w/curbs & sewers, HSG D
4	98	Water Surface, HSG C
2	98	Water Surface, HSG D
2,343	30	Woods, Good, HSG A
15,830	71	Weighted Average
9,215		58.21% Pervious Area
6,615		41.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	50	0.0070	0.81		**Sheet Flow, SF1** Smooth surfaces n= 0.011 P2= 3.42"
2.5	292	0.0090	1.93		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
3.5	342	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 30P: South Street East (East Side)



Summary for Pond 3B: Infiltration Trench

Inflow Area = 0.020 ac, 98.63% Impervious, Inflow Depth > 4.41" for 10-year event
Inflow = 0.10 cfs @ 12.09 hrs, Volume= 0.007 af
Outflow = 0.09 cfs @ 12.12 hrs, Volume= 0.006 af, Atten= 5%, Lag= 2.2 min
Discarded = 0.00 cfs @ 12.10 hrs, Volume= 0.003 af
Primary = 0.09 cfs @ 12.12 hrs, Volume= 0.002 af
Routed to Link 2L : DP2: Steam

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 12.13' @ 12.10 hrs Surf.Area= 90 sf Storage= 100 cf

Plug-Flow detention time= 114.1 min calculated for 0.006 af (78% of inflow)
Center-of-Mass det. time= 57.0 min (795.1 - 738.1)

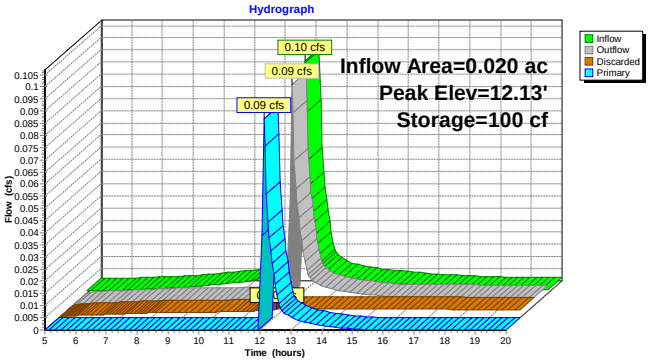
Volume	Invert	Avail.Storage	Storage Description
#1	10.00'	72 cf	**2.00'W x 45.00'L x 2.17'H Crushed Stone Trench** 195 cf Overall - 16 cf Embedded = 180 cf x 40.0% Voids
#2	11.00'	16 cf	**8.0" Round 8" Perforated Pipe** Inside #1 L= 45.0'
#3	11.00'	70 cf	**4.00'D x 5.57'H CB-6** -Impervious
		158 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	10.00'	**1.020 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 7.00'
#2	Primary	12.00'	**12.0" Vert. CB-6 Outlet** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.00 cfs @ 12.10 hrs HW=12.13' (Free Discharge)
↑**1=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=0.07 cfs @ 12.12 hrs HW=12.13' (Free Discharge)
↑**2=CB-6 Outlet** (Orifice Controls 0.07 cfs @ 1.22 fps)

Pond 3B: Infiltration Trench

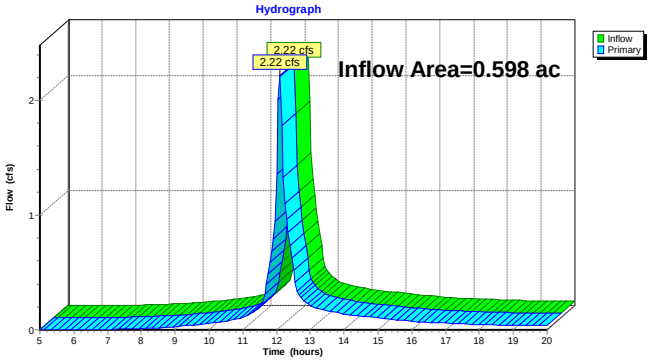


Summary for Link 1L: DP 1: Taunton River

Inflow Area = 0.598 ac, 73.57% Impervious, Inflow Depth > 3.05" for 10-year event
Inflow = 2.22 cfs @ 12.09 hrs, Volume= 0.152 af
Primary = 2.22 cfs @ 12.09 hrs, Volume= 0.152 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 1L: DP 1: Taunton River

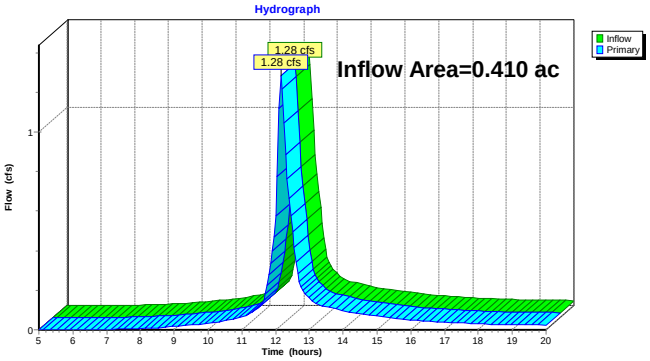


Summary for Link 2L: DP2: Steam

Inflow Area = 0.410 ac, 74.88% Impervious, Inflow Depth > 2.96" for 10-year event
Inflow = 1.28 cfs @ 12.16 hrs, Volume= 0.101 af
Primary = 1.28 cfs @ 12.16 hrs, Volume= 0.101 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 2L: DP2: Steam

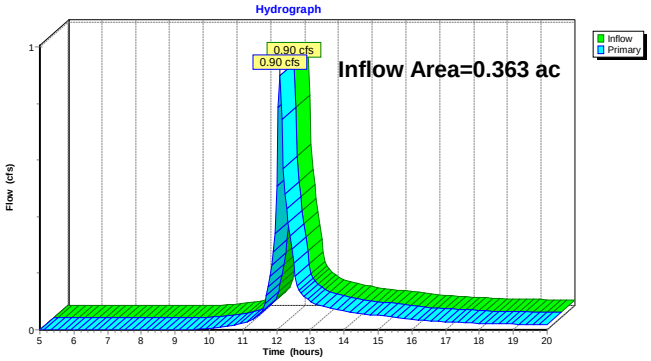


Summary for Link 3L: DP 3: Woodlands

Inflow Area = 0.363 ac, 41.79% Impervious, Inflow Depth > 2.01" for 10-year event
Inflow = 0.90 cfs @ 12.10 hrs, Volume= 0.061 af
Primary = 0.90 cfs @ 12.10 hrs, Volume= 0.061 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 3L: DP 3: Woodlands



Summary for Subcatchment 10P: Old Colony Ave

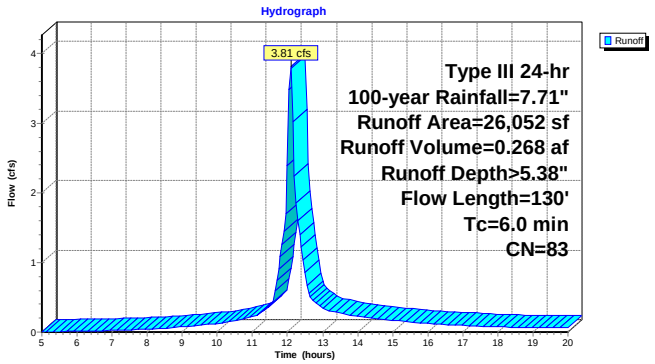
Runoff = 3.81 cfs @ 12.09 hrs, Volume= 0.268 af, Depth> 5.38"
Routed to Link 1L : DP 1: Taunton River

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=7.71"

Area (sf)	CN	Description
4,934	39	>75% Grass cover, Good, HSG A
776	74	>75% Grass cover, Good, HSG C
135	80	>75% Grass cover, Good, HSG D
9,104	98	Paved roads w/curbs & sewers, HSG A
31	98	Paved roads w/curbs & sewers, HSG C
709	98	Paved roads w/curbs & sewers, HSG D
1,590	98	Water Surface, HSG A
906	98	Water Surface, HSG C
6,827	98	Water Surface, HSG D
1,039	30	Woods, Good, HSG A
26,052	83	Weighted Average
6,884		26.43% Pervious Area
19,168		73.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0340	1.53		**Sheet Flow, Sheet Flow** Smooth surfaces n= 0.011 P2= 3.42"
0.6	80	0.0130	2.31		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
1.1	130	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 10P: Old Colony Ave



Summary for Subcatchment 20P: South Street East (West Side)

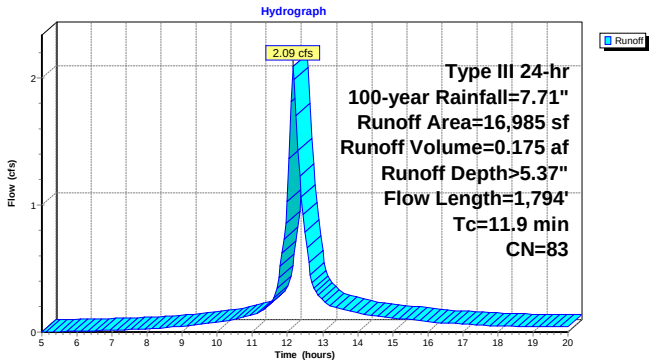
Runoff = 2.09 cfs @ 12.16 hrs, Volume= 0.175 af, Depth> 5.37"
Routed to Link 2L : DP2: Steam

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=7.71"

Area (sf)	CN	Description
3,571	39	>75% Grass cover, Good, HSG A
366	96	Gravel surface, HSG A
11,263	98	Paved roads w/curbs & sewers, HSG A
165	98	Paved roads w/curbs & sewers, HSG C
1,085	98	Paved roads w/curbs & sewers, HSG D
0	98	Water Surface, HSG D
535	30	Woods, Good, HSG A
16,985	83	Weighted Average
4,472		26.33% Pervious Area
12,513		73.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0200	1.24		**Sheet Flow, SF1** Smooth surfaces n= 0.011 P2= 3.42"
3.2	372	0.0090	1.93		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
8.0	1,372	0.0200	2.87		**Shallow Concentrated Flow, SC2** Paved Kv= 20.3 fps
11.9	1,794	Total			

Subcatchment 20P: South Street East (West Side)



Summary for Subcatchment 21P: Catchment to Infiltration Trench

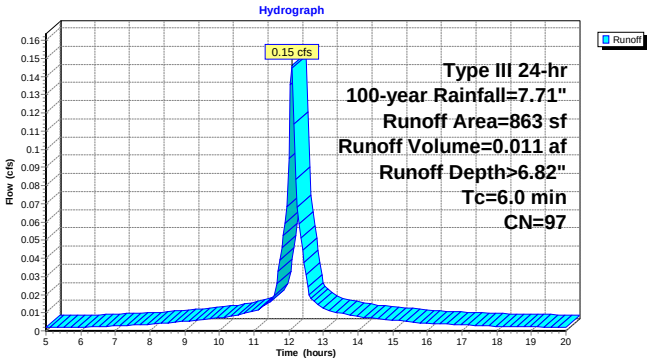
Runoff = 0.15 cfs @ 12.09 hrs, Volume= 0.011 af, Depth> 6.82"
Routed to Pond 3B : Infiltration Trench

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=7.71"

Area (sf)	CN	Description
12	39	>75% Grass cover, Good, HSG A
851	98	Paved roads w/curbs & sewers, HSG A
863	97	Weighted Average
12		1.37% Pervious Area
851		98.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Assume Min. TC**

Subcatchment 21P: Catchment to Infiltration Trench



Summary for Subcatchment 30P: South Street East (East Side)

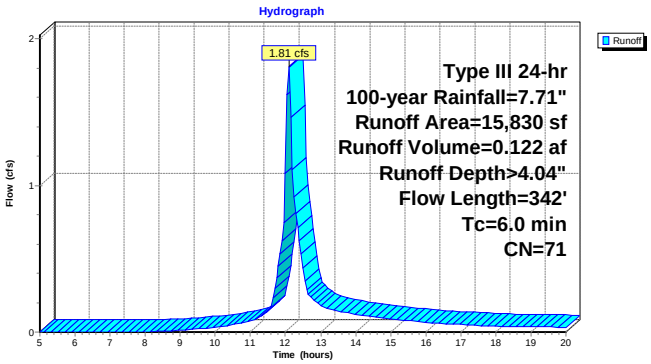
Runoff = 1.81 cfs @ 12.09 hrs, Volume= 0.122 af, Depth> 4.04"
Routed to Link 3L : DP 3: Woodlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=7.71"

Area (sf)	CN	Description
4,195	39	>75% Grass cover, Good, HSG A
870	74	>75% Grass cover, Good, HSG C
1,421	96	Gravel surface, HSG A
387	96	Gravel surface, HSG C
4,275	98	Paved roads w/curbs & sewers, HSG A
1,630	98	Paved roads w/curbs & sewers, HSG C
704	98	Paved roads w/curbs & sewers, HSG D
4	98	Water Surface, HSG C
2	98	Water Surface, HSG D
2,343	30	Woods, Good, HSG A
15,830	71	Weighted Average
9,215		58.21% Pervious Area
6,615		41.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	50	0.0070	0.81		**Sheet Flow, SF1** Smooth surfaces n= 0.011 P2= 3.42"
2.5	292	0.0090	1.93		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
3.5	342	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 30P: South Street East (East Side)



Summary for Pond 3B: Infiltration Trench

Inflow Area = 0.020 ac, 98.63% Impervious, Inflow Depth > 6.82" for 100-year event
Inflow = 0.15 cfs @ 12.09 hrs, Volume= 0.011 af
Outflow = 0.15 cfs @ 12.10 hrs, Volume= 0.009 af, Atten= 0%, Lag= 0.6 min
Discarded = 0.00 cfs @ 12.10 hrs, Volume= 0.004 af
Primary = 0.14 cfs @ 12.10 hrs, Volume= 0.006 af
Routed to Link 2L : DP2: Steam

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 12.18' @ 12.10 hrs Surf.Area= 90 sf Storage= 102 cf

Plug-Flow detention time= 86.6 min calculated for 0.009 af (83% of inflow)
Center-of-Mass det. time= 37.2 min (772.2 - 735.0)

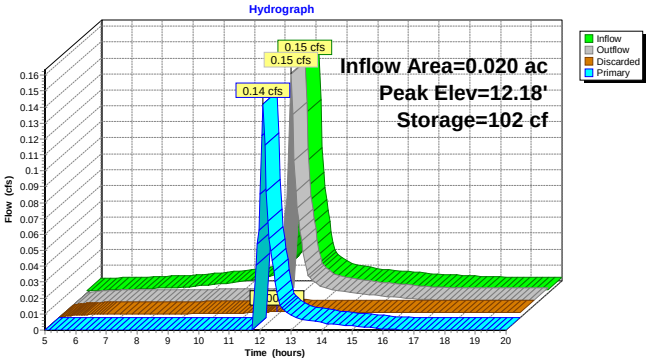
Volume	Invert	Avail.Storage	Storage Description
#1	10.00'	72 cf	**2.00'W x 45.00'L x 2.17'H Crushed Stone Trench** 195 cf Overall - 16 cf Embedded = 180 cf x 40.0% Voids
#2	11.00'	16 cf	**8.0" Round 8" Perforated Pipe** Inside #1 L= 45.0'
#3	11.00'	70 cf	**4.00'D x 5.57'H CB-6** -Impervious
		158 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	10.00'	**1.020 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 7.00'
#2	Primary	12.00'	**12.0" Vert. CB-6 Outlet** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.00 cfs @ 12.10 hrs HW=12.18' (Free Discharge)
↑**1=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=0.14 cfs @ 12.10 hrs HW=12.18' (Free Discharge)
↑**2=CB-6 Outlet** (Orifice Controls 0.14 cfs @ 1.44 fps)

Pond 3B: Infiltration Trench

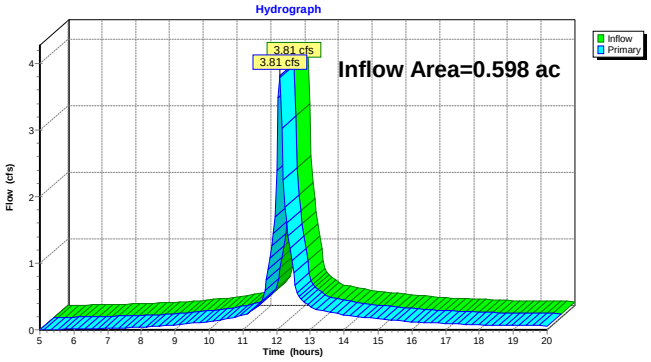


Summary for Link 1L: DP 1: Taunton River

Inflow Area = 0.598 ac, 73.57% Impervious, Inflow Depth > 5.38" for 100-year event
Inflow = 3.81 cfs @ 12.09 hrs, Volume= 0.268 af
Primary = 3.81 cfs @ 12.09 hrs, Volume= 0.268 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 1L: DP 1: Taunton River

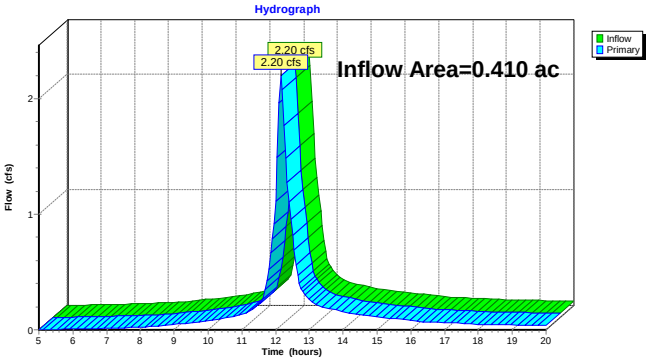


Summary for Link 2L: DP2: Steam

Inflow Area = 0.410 ac, 74.88% Impervious, Inflow Depth > 5.28" for 100-year event
Inflow = 2.20 cfs @ 12.16 hrs, Volume= 0.180 af
Primary = 2.20 cfs @ 12.16 hrs, Volume= 0.180 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 2L: DP2: Steam

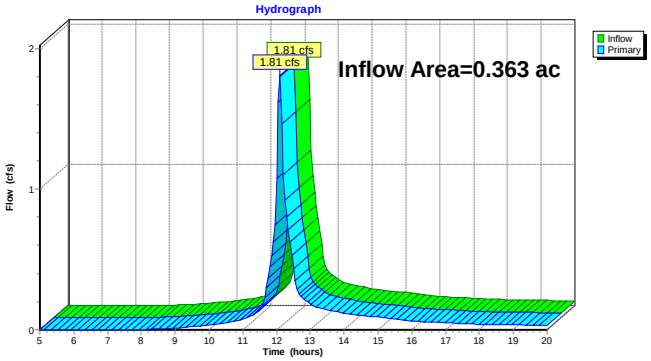


Summary for Link 3L: DP 3: Woodlands

Inflow Area = 0.363 ac, 41.79% Impervious, Inflow Depth > 4.04" for 100-year event
Inflow = 1.81 cfs @ 12.09 hrs, Volume= 0.122 af
Primary = 1.81 cfs @ 12.09 hrs, Volume= 0.122 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 3L: DP 3: Woodlands



Appendix E: O&M Plan and LTPPP

1

Stormwater Management System Operation and Maintenance (O&M) Plan

This Stormwater Management System Operation and Maintenance (O&M) Plan describes the approach for inspection and maintenance of drainage infrastructure and structural stormwater control measures (SCMs) to minimize contaminant loading for South Street East / Old Colony Ave in the Town of Raynham and City of Taunton, MA. In general, inspection and maintenance activities will be conducted consistent with the National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater Discharges from Small Municipal Separate Storm Sewer System (MS4).

This document has been prepared per the requirements of Massachusetts Department of Environmental Protection (MassDEP) Regulations 310 CMR 10.05 (6)(k)(9) and satisfies the requirements of Massachusetts Stormwater Standard 9.

1.1 Responsible Party

The Town of Raynham and City of Taunton will be responsible for the operation and maintenance of all stormwater management systems under their respective ownership within the project limits. Questions or concerns regarding activities associated with this O&M Plan should be addressed to the Raynham Highway Department located at 1555 King Phillip Street, Raynham, MA 02767, phone (508) 824-2718 and/or the Taunton Public Works Department located at 90 Ingell Street, Taunton, MA 02780, phone (508) 821-1431.

It shall be the responsibility of the Owner to provide a revised plan to the Conservation Commission indicating any change of ownership or responsible party. The responsible party shall also be responsible for financing maintenance and emergency repairs at the Site.

Project information is summarized in the following table:

Project Name:	South Street East / Old Colony Avenue
Project Type:	Transportation
Address:	Old Colony Ave, Taunton, MA, from approximately 75 feet north of Battle Row to the Taunton/Raynham Town Line South Street East , Raynham, MA, from the Taunton/Raynham Town Line to the north side of Sandy Hill Road.
SWMS Owner (Taunton):	Taunton Department of Public Works 90 Ingell Street, Taunton, MA
SWMS Owner (Raynham):	Raynham Highway Department 1555 King Phillip Street, Raynham, MA 02767
Responsible Party (Taunton):	Taunton Department of Public Works 90 Ingell Street, Taunton, MA
Responsible Party (Raynham):	Raynham Highway Department 1555 King Phillip Street, Raynham, MA 02767
Contact (Taunton):	Fred Cornaglia, Commissioner of Public Works (508) 821-1431
Contact (Raynham):	Norman Sturtevent, Superintendent (508) 824-2718

1.2 Inspection and Maintenance Measures and Record-Keeping

See Appendix F of the Stormwater Management Report for the proposed stormwater system within the project limits. The stormwater management system covered by this O&M Plan consists of the following measures:

- Deep Sump Catch Basins
- Infiltration Trench

The Town of Raynham and City of Taunton shall use a performance-based inspection and maintenance program for SCMs and catch basins. For SCMs, the overall approach is to inspect SCMs, and based on the results of the inspections, perform maintenance to preserve functionality. For catch basins, the overall approach is to perform maintenance at an interval that maintains the functionality of the catch basin (e.g., sump is less than 50% full of sediment). Catch basin inspections, including documentation of sediment accumulation, and maintenance will generally occur simultaneously.

The following table summarizes inspection requirements for each asset type.

Inspection Form	Applicable Stormwater Assets	Inspection Requirements
Inlets	› Catch basins	› Sediment accumulation › Trash/Debris accumulation › Signs of contamination › Frame and grate condition › Overall structure condition
SCMs	› Infiltration SCMs › Other SCMs	› SCM accessibility › Presence of standing water › Level of erosion › Sediment accumulation › Trash/Debris accumulation › Vegetation condition › Overall SCM condition
Storm Discharge Points	› Outlets to SCMs	› Presence of flow › Signs of contaminated flow › Sediment accumulation › Level of erosion › Pipe condition › Scour protection condition › Overall structure condition

Inspection and maintenance records can be made available by contacting the Town of Raynham Highway Department or the City of Taunton Department of Public Works. Representatives of each Town's Conservation Commission, MassDEP, and US EPA may obtain access to these records, upon request.

Maintenance actions will not occur at any set frequency, but rather will be based on condition and impact to functionality. Maintenance to be performed on the stormwater system includes:

Stormwater Feature	Potential Maintenance Actions	
Surface SCMs	• Remove and properly dispose of accumulated material (e.g., sediment, trash, leaf litter, debris) • Mow vegetated areas and remove and dispose of grass clippings • Regrade areas that show signs of unwanted ponding and channelization • Stabilize or reconstruct eroded areas and reseed • Replace stones/soil and/or replant vegetation	• Remove woody growth • Treat invasive plants • Address issues of standing water • Drain and reconstruct SCM • If rehabilitation is not possible, then retrofit to be a wet SCM while considering safety implications
Underground SCMs	• Remove and properly dispose of trash, sediment, debris, and root intrusions • Clean out sumps at an interval to maintain functionality (less than 50% full of sediment) • Jet and repair pipes	• Rehabilitate filtering and infiltration materials (e.g., geotextile fabric, crushed stone) • Stabilize and replace deteriorated structures • Perform evaluations (e.g., test pits) to evaluate subsurface conditions
Inlets and Outlets to SCMs	• Clear inlet and remove and properly dispose of sediment, trash, leaf litter, debris, and vegetation • Regrade areas that show signs of ponding and channelization • Repair or replace structural components • Repair damaged or eroded areas	• Provide or rehabilitate erosion control at the outlet • Regrade and replace the channel materials • Remove woody growth • Stabilize or reconstruct eroded areas • Treat invasive plants.

Based on the results of the inspection, repairs will be made in accordance with Town/City standard practices. Maintenance will be prioritized given the urgency of the required maintenance and availability of staff, contracts, etc. Maintenance may require contracting if existing maintenance personel are unavailable to perform the work. More intensive remedial activities may require permitting and/or an engineering solution.

Inspection, maintenance, and record keeping on will be performed in conjunction with the Town of Raynham / Taunton MS4 compliance requirements.

1.3 Erosion and Sediment Control Measures during Maintenance Activities

For maintenance activities that could result in discharges of sediments or other contaminants into wetlands, waterways, or other resource areas regulated under 310 CMR 10.00, the responsible maintenance personnel will employ measures to prevent migration of these sediments/contaminants. Such temporary measures may include, but are not necessarily limited to, the use of siltation barriers, catch basin silt sacks/filter bags, pipe plugs, cofferdams deployed within the stormwater structure, turbidity curtains, or other practices designed to prevent such discharges.

Where maintenance occurs in areas that are confined, with no risk of discharge to adjacent water bodies, no special measures may be needed. Examples include, but are not limited to: (1) cleaning of a forebay under dry conditions when the work can be completed and exposed surfaces stabilized prior to placing it back into service; and (2) catch basin cleaning where the activity is limited to removing material from a sump below the elevation of the outlet pipe.

1.4 O&M Budget

The Town of Raynham and City of Taunton perform maintenance for stormwater management systems as part of their routine operation and maintenance budget for roadways and bridges.

2

Long-Term Pollution Prevention Plan

This Long-Term Pollution Prevention Plan (LTPPP) describes the approach for pollution prevention and related maintenance activities for South Street East / Old Colony Ave in the Town of Raynham and City of Taunton, MA. In general, long-term pollution prevention and related maintenance activities will be conducted consistent with:

- The National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater Discharges from Small Municipal Separate Storm Sewer System (MS4),
- Measures outlined in the Town of Raynham's and City of Taunton's Stormwater Management Plans (SWMP).

This LTPPP satisfies the requirements related to pollution prevention under Massachusetts Stormwater Standards 4, 5, 6, and 10.

2.1 Practices for Long-Term Pollution Prevention

For the facilities covered, long-term pollution prevention includes the following measures.

2.1.1 Litter Pick-up

The municipalities will conduct litter pick-up from the stormwater management facilities in conjunction with routine road maintenance activities.

2.1.2 Material Storage and Handling

The following storage and handling practices shall be implemented at the Site:

- Avoid stockpiling of soil or materials within 100 feet of wetland resources and wellhead protection areas. If necessary, provide sufficient erosion controls to prevent migration of sediments.
- All materials shall be stored or disposed in accordance with all local, state, and federal regulations.
- All sand piles shall be contained and stabilized to prevent the discharge of sand to wetlands or water bodies and, where feasible, covered.
- Minimize hazardous materials stored on site. All materials stored on site shall be stored in original containers and sealed.
- All solid waste, if encountered, shall be handled and disposed of in accordance with all local, state, and federal regulations.
- No snow shall be stored within waterbodies, resource areas, wellhead protection areas, or associated buffer zones.

2.1.3 Inspection and Maintenance of Stormwater Assets

The municipalities will conduct inspection and maintenance of drainage infrastructure and the stormwater control measures (SCMs) in accordance with the O&M Plan, as described in Section 1.

2.1.4 Maintenance of Landscaped Areas

Routine mowing will be conducted according to standard Town practices. SCM basin bottoms and embankments designed to impound water should be mowed as required to prevent establishment of woody vegetation.

2.1.5 Snow and Ice Management

Snow and Ice Management will be conducted consistent with Town/City Snow and Ice Policy and Procedures.

2.1.6 Street Sweeping

Operations on Town-owned roadways with be conducted in accordance with Town Standard Operating Procedures.

2.1.7 Prohibition of Illicit Discharges

The MassDEP Stormwater Management Standard 10 prohibits illicit discharges to the stormwater management system. Illicit discharges are discharges that do not consist entirely of stormwater, except for certain specified non-stormwater discharges.

In accordance with the existing MS4 permit, examples of discharges from the following sources are not considered illicit discharges:

- Firefighting activities*
- Foundation drains
- Water line flushing
- Footing drains
- Landscape irrigation
- Individual residential car washing
- Uncontaminated groundwater
- Rising groundwater
- Diverted stream flows
- Flows from riparian habitats/wetlands
- Potable water sources
- Dechlorinated swimming pool water
- Street wash waters
- Wash water from residential buildings (no detergents)
- Condensation from air conditioning units
- Run-on from private driveways caused by precipitation
- Lawn watering
- Water from crawl space pumps

*Water from firefighting activities is allowed and need only be addressed where they are identified as significant sources of pollutants to waters of the United States.

Based on plan review and existing survey, there are no known or proposed illicit connections associated with the project. Should an interconnection to the stormwater management system be identified, the Town/City will determine if the connections are authorized. For unauthorized

connections, the Town/City will investigate the connections and if they are determined to be illicit, the connections will be managed through Town's/City's Illicit Discharge Detection and Elimination (IDDE) program.

2.1.8 Spill Prevention and Response

The following spill prevention and response measures shall be implemented at the Site:

- Refuel construction equipment off-site.
- Any spills of hazardous materials shall be reported, contained, and removed in accordance with local, State, and Federal regulations.
- Review on-site equipment and activities to ensure no illicit discharges are created.

3

Construction Period Pollution Prevention and Erosion and Sediment Control Plan

3.1.1 Introduction

The project is anticipated to disturb greater than one acre; therefore, filing a Notice of Intent with EPA and developing of a Stormwater Pollution Prevention Plan (SWPPP) is required. The SWPPP will be provided as part of the construction documents and will be submitted to the Town of Raynham and the City of Taunton Conservation Commission prior to commencement of construction. The following plan provides general guidance for the prevention of pollution and erosion and sedimentation during construction.

Potential Erosion and Sedimentation

Portions of the project involve soil disturbance in areas upgradient of stormwater collection systems and wetland resources. Site preparation, scheduling, and construction practices need to be carefully planned to prevent construction debris and erosion caused by stormwater runoff over exposed soils from causing degradation of downstream wetland resources. Although it is not always possible to avoid impacts from storm events, the following guidelines shall be followed:

- Minimize land disturbance area and soil exposure to stormwater and wind erosion.
- Minimize time that area is disturbed.
- Avoid routing stormwater runoff or dewatering flows through disturbed areas.
- Inspect and maintain erosion controls until all soils are stabilized.
- Maintain good housekeeping practices.
- Stabilize disturbed soils as soon as possible to limit exposure.

Erosion and Sedimentation Plan

This Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan has been prepared in accordance with the Department of Environmental Protection's Massachusetts Erosion and Sedimentation Guidelines for Urban and Suburban Areas.

Extent of Disturbance

The total area of disturbance is approximately 1.05± acres. The project has been designed to minimize disturbance to existing woodlands and the majority of proposed work is within an existing roadway and its associated right-of-way. The existing Site will be impacted by tree clearing/trimming, grading, roadway widening, sidewalk and shared use path construction, utility installation, and other associated activities. Off-site areas are not proposed to be

directly altered but may be impacted by erosion and sedimentation if the controls described in this plan are not followed. No off-site land disturbance is proposed.

Refer to construction drawings for locations of all proposed erosion and sedimentation controls and the proposed area of disturbance.

Pre-Construction and Site Preparation

- Install all erosion control barrier in accordance with the construction documents prior to commencing any land disturbance activity.
- Inspect and maintain erosion controls until all soils are stabilized.
- Monitor weather reports daily and stabilize/prepare site if storm event in excess of the 2-year storm is expected.
- Maintain an inspection logbook on-site at all times. The specific location of the logbook shall be conveyed to the Town.

3.1.2 Planned Erosion and Sedimentation Control Practices

Catch Basin Inlet Protection

Inlet protection is proposed at all existing and proposed drain inlets within the project area. Inlet protection shall also be provided at off-site drain inlets located immediately downgradient of the area of disturbance, pending coordination with the Town and/or abutting property owners.

The purpose of inlet protection is to intercept and capture sediment that would otherwise enter the drainage system. Inlet protection shall consist of manufactured polyproplylene fabric consistent with the construction details.

Inspection and maintenance shall consist of checking for sediment accumulation and removing sediment when the protection device is at least one-half full.

Sediment Control Barrier

Sediment control barrier is proposed along the downgradient limit of work, as depicted on the construction plans. Additional erosion control barrier may be required at other locations as needed.

The purpose of erosion control barrier is to intercept and capture sediment that would otherwise migrate off-site. Erosion control barrier shall consist of compost filter tubes, straw wattles, and silt fence.

Inspection and maintenance:

- Check for sedimentation accumulation and removing sediments when they reach excessive volumes (approximately 1/3 the height of the barrier).
- Remove sediments when runoff ponds for 24 or more hours to prevent potential mosquito breeding habitat. Restake/replace controls as necessary to maintain their effectiveness.

Control of Water

Control of water is proposed along the Taunton River upstream and downstream of the proposed bridge rehabilitation.

The purpose of control of water is redirect flows around the work area to prevent sedimentation transport downstream. The means and methods of the controls shall be the responsibility of contractor and will be based on their construction operations and the conditions at the site. Methods are anticipated to include temporary cofferdams and dewatering.

Inspection and maintenance, as applicable:

- Check for sediment accumulation, plant growth, or debris behind the control.
- Check for stability at anchoring points and identify any breaks in the control.
- Identify any areas where turbid water is passing through the control.
- Repair as necessary to maintain effectiveness.

Tree Protection

Tree protection is proposed at existing trees to remain near to the area of disturbance, as noted on the construction plans.

The purpose of tree protection is to minimize risk of damage to trees designated to remain. Tree protection shall consist of armoring, pruning, and/or fencing consistent with the construction details.

Temporary Seeding

Temporary seeding is proposed for disturbed areas which have remained exposed for more than 14 days.

The purpose of temporary seeding is to provide vegetative stabilization of loose soil to mitigate risk of erosion.

Inspection and maintenance:

- Confirm that vegetation has been established
- Provide additional seeding as needed

3.1.3 Additional Control Measures

Good Housekeeping

- Minimize hazardous materials stored on site. All materials stored on site shall be stored in original containers and sealed.
- Refuel construction equipment off-site.
- Any spills of hazardous materials shall be reported, contained, and removed in accordance with local, State, and Federal regulations.

Material Stockpiling

All construction materials shall be stored in designated stockpile areas. Stockpiles shall be surrounded with silt fence, straw wattles, and/or compost filter tubes to mitigate erosion potential. All waste materials shall be removed from the Site or placed in approved receptacles at the conclusion of each workday. Disposal of waste materials shall be in accordance with relevant local, state, and federal regulations.

Protection of Infiltration Areas

To protect the infiltrative capacity of proposed infiltration areas, SCMs shall be excavated as late as practicable in the construction sequence.

Potential Construction Site Pollutants

Pollutant-Generating Activity	Pollutants or Pollutant Constituents	Location on Site
Equipment Re-fueling	Diesel Fuel, Gasoline	Laydown Area
Leaking or Broken Hydraulic Lines	Hydraulic Oil	Building Work Areas and Laydown Area
Minor Equipment Maintenance	Diesel Fuel, Gasoline, Hydraulic Oil, Motor Oil, Anti-Freeze	Laydown Area
Applying Fertilizer	Nitrogen, Phosphorous	Newly Seeded Areas
Portable Sanitary Toilets	Bacteria, Parasites and Viruses	Laydown Area
Vehicle Accident	Diesel Fuel, Gasoline	Entire Site
Trash Containers/Dumpsters	Paper, Plastic, and Food Waste	Laydown Area

Refer to Long-Term Pollution Prevention Plan, included as Section 2, for measures to be implemented to minimize pollutant discharges.

Proposal No. 613642 - 136413

RAYNHAM / TAUNTON
SOUTH STREET EAST / OLD COLONY AVE

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA		1	1
PROJECT FILE NO.	613642		

OPERATION AND MAINTENANCE MAP

NAD 83

N

TAUNTON RIVER

SANDY HILL STREET

CATCH BASIN OR GUTTER INLET (TYP.)

EXISTING OUTFALL

RECONSTRUCTED OUTFALL

PROP INFILTRATION TRENCH

OLD COLONY AVE

SOUTH STREET EAST

TAUNTON RIVER

TAUNTON RAYNHAM

0+00

9+00

0 60 150

SCALE: 1" = 60'

10887_WATERSHED_O&M.DWG Plotted on 29-Jan-2026 10:36 AM

A00860 - 186

Appendix F: Watershed Plans

RAYNHAM / TAUNTON
SOUTH STREET EAST / OLD COLONY AVE

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA		1	2
PROJECT FILE NO.	613642		

WATERSHED PLAN - PRE DEVELOPMENT

NAD 83

N

TAUNTON RIVER

DP 1:
TAUNTON RIVER

APPROX. WATERSHED
BOUNDARY (TYP.)

SUBCATCHMENT 1E
OLD COLONY AVE
INCUDING AREAS
ALONG TAUNTON RIVER

1L

2L

DP 2:
STREAM

651
UDORTHENTS,
SMOOTHED
HSG A

SUBCATCHMENT 2E
SOUTH STREET EAST
(WEST SIDE)

SANDY HILL STREET

1E

2E

3E

3L

1

2

3

4

5

6

7

8

0+00

9+00

OLD COLONY AVE

SOUTH STREET EAST

APPROX.
FLOWPATH (TYP.)

602
URBAN LAND
ASSUME HSG A

DP 3:
WOODLANDS

SUBCATCHMENT 3E
SOUTH STREET EAST
(EAST SIDE)

TAUNTON RIVER

TAUNTON
RAYNHAM

SOIL GROUP
BOUNDARY (TYP.)

9A
BIRDSAIL SILT
LOAM
HSG C/D

1
WATER
USE HSG D

LEGEND

- APPROX. WATERSHED BOUNDARY
- SOIL GROUP BOUNDARY
- APPROX. FLOWPATH

0 60 150

SCALE: 1" = 60'

10887_WATERSHED_EXIST.DWG

Plotted on 29-Jan-2026 8:57 AM

RAYNHAM / TAUNTON
SOUTH STREET EAST / OLD COLONY AVE

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA		2	2
PROJECT FILE NO.	613642		

WATERSHED PLAN - POST DEVELOPMENT

Plotted on 29-Jan-2026 8:57 AM
10887_WATERSHED_PROP.DWG

NAD 83
N

TAUNTON RIVER

DP 1:
TAUNTON RIVER

1L

APPROX. WATERSHED
BOUNDARY (TYP.)

SUBCATCHMENT 10P
OLD COLONY AVE
INCUDING AREAS ALONG
TAUNTON RIVER

2L

DP 2:
STREAM

651
UDORTHENTS,
SMOOTHED
HSG A

SUBCATCHMENT 20P
SOUTH STREET EAST
(WEST SIDE)

SANDY HILL STREET

10P

20P

21P

30P

3L

0+00

OLD COLONY AVE

9+00

SOUTH STREET EAST

APPROX.
FLOWPATH (TYP.)

SUBCATCHMENT 21P
CATCHMENT TO
INFILTRATION TRENCH

PROP PAVEMENT
DISCONNECTION

DP 3:
WOODLANDS

SUBCATCHMENT 30P
SOUTH STREET EAST
(EAST SIDE)

602
URBAN LAND
ASSUME HSG A

TAUNTON RIVER

TAUNTON
RAYNHAM

SOIL GROUP
BOUNDARY (TYP.)

9A
BIRDSAIL SILT
LOAM
HSG C/D

1
WATER
USE HSG D

LEGEND

- APPROX. WATERSHED BOUNDARY
- SOIL GROUP BOUNDARY
- APPROX. FLOWPATH

0 60 150
SCALE: 1" = 60'

Appendix G: SCM Analysis Plan

RAYNHAM/TAUNTON
SOUTH STREET E./OLD COLONY AVE.

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	######	1	2
PROJECT FILE NO.	613642		

STORMWATER CONTROL MEASURE ANALYSIS PLAN

Plotted on 29-Jan-2026 10:44 AM

613642_HDI(10887 STORMWATER CONTROL MEASURE ANALYSIS).DWG

N

RIVER BEND CONDOMINIUMS
PARCEL ID: 95-203
MASTER DB/PG 3240/265
PB/PG 66/26-27 LOTS 10 & 2
96 OLD COLONY AVENUE – EAST TAUNTON,MA
AREA=753,970 S.F.

CITY OF TAUNTON BOARD OF SEWER COMMISSIONERS
EASEMENT – PLAN BOOK 99, PAGE 47
DEED BOOK 1467, PAGE 383 (1965)

COMMONWEALTH OF MASSACHUSETTS
(MASSACHUSETTS BAY TRANSPORTATION AUTHORITY)
PARCEL ID: 96-193
DB/PG 2264/52
0 RR – TAUNTON,MA

JAMES THOMAS & LISA B. DIFFLEY
PARCEL ID: 96-15
DB/PG 25685/348
88 OLD COLONY AVENUE – EAST TAUNTON,MA

MBTA PERMANENT EASEMENT
ORDER OF TAKING NO. 737
MS-31-PE
DB/PG 25571/41

TMLP
PARCEL ID: 96-34
DB/PG 1606/1047
91 OLD COLONY AVENUE – TAUNTON,MA

MBTA PERMANENT EASEMENT
ORDER OF TAKING NO. 753 MS-29-PE
DB/PG 25786/251

MBTA
ORDER OF TAKING NO. 753 – MS-29
DB/PG 25786/251

RR
PARCEL ID: 96-194
DB/PG 0/0
0 RR – TAUNTON,MA

103 COLONY LLC
PARCEL ID: 96-1
DB/PG 25006/40
103 OLD COLONY AVENUE – TAUNTON,MA
AREA=68,014 S.F.

CITY OF TAUNTON – BOARD OF SEWER COMMISSIONERS
EASEMENT – PLAN BOOK 99, PAGE 48
DEED BOOK 1467, PAGE 383 (1965)

DEED CALLS BOUNDING ON THE RIVER.
PLAN BOOK 70, PAGE 67
SHOWS TO WATER EDGE

OWNER UNKNOWN

OWNER UNKNOWN

RIGHT OF WAY – SEE PLAN BK. 66, PG. 70
NO GRANT FOUND
BENEFICIARY UNKNOWN

LINE AS SHOWN ON PLAN BK. 66, PG. 70
NORTHERLY BANK OF TAUNTON RIVER (DEED)

TOWN OF RAYNHAM
PARCEL ID: 17-151A
DB/PG 6266/303
PB/PG 342/58
9 SOUTH STREET EAST – RAYNHAM,MA

SELPAN ASSOCIATES LIMITED
PARCEL ID: 17-151
DB/PG 7993/68
0 SOUTH STREET EAST – RAYNHAM,MA
AREA=71,376 S.F.

TOWN OF RAYNHAM
PARCEL ID: 17-148
DB/PG 8016/190
PB/PG 66/70
0 SOUTH STREET EAST – RAYNHAM,MA

TOWN OF RAYNHAM – CONSERVATION COMMISSION
ASSESS. MAP 17 – PARCEL ID: 17-2
DB PG 8016/190
PB/PG 66/70
0 SOUTH STREET EAST – RAYNHAM,MA
AREA=167,683 S.F.

TOWN OF RAYNHAM –
BOARD OF SELECTMEN
PARCEL ID: 17-1
DB/PG 5117/145
0 SOUTH STREET EAST –
RAYNHAM,MA
AREA=14,102 S.F.

RIVER BEND CONDOMINIUMS
DWY (PRIVATE)

BATTLE ROW
(PRIVATE)

OLD COLONY AVE
(PUBLIC)

SOUTH STREET EAST
(PUBLIC)

TAUNTON RIVER

FEMA FLOOD ZONE
= 14.40'

APPROXIMATE BOUNDARY OF TOPOGRAPHY PROHIBITIVE TO INSTALLATION OF SCMS (TYP).

AREAS SOUTH OF BRIDGE EXCLUDED FROM SCM CONSIDERATION DUE TO LIMITED RIGHT-OF-WAY, PRESENCE OF UTILITIES, AND PROXIMITY OF PRIVATE FEATURES.

AREA CONSIDERED FOR SUBSURFACE LEACHING SYSTEM. EXCLUDED DUE TO SETTLEMENT CONCERNS WITHIN LIMIT OF SIDEWALK AND GREATER SUITABILITY PROVIDED WHERE SCMS ARE CURRENTLY PROPOSED.

AREAS CONSIDERED FOR SUBSURFACE LEACHING BASINS BUT EXCLUDED DO TO PROXIMITY TO EXISTING SEWER MAIN.

AREA CONSIDERED FOR SUBSURFACE LEACHING SYSTEM. EXCLUDED DUE TO LIMITED IMPERVIOUS CATCHMENT, INABILITY TO ADEQUATELY PROVIDE OUTLET, AND GREATER SUITABILITY WHERE SCMS ARE CURRENTLY PROPOSED.

APPROXIMATE BOUNDARY OF TOPOGRAPHY PROHIBITIVE TO INSTALLATION OF SCMS (TYP).

PROJECT BEGIN
N2783608.4781
E784198.0476
STA 1+10

BUILDING SET-BACK LINE – SEE PB. 14, PG. 72

SMH Rim=17.70
INV = 9.30 (A) 8" AC (ABAND)
INV= 17.70 (B) NOT VISIBLE

CB
Rim=17.73
INV=13.03 12" RCP
11.83 BOTTOM

CB
Rim=17.56
INV=12.66 (A) 12" RCP
13.26 (B) 12" RCP
13.36 (C) 12" CMP
13.01 (D) 15" RCP

SMH
Rim=21.05
INV=6.40 (A) 12" VC
INV=6.45 (B) 12" VC

SMH
Rim=20.34
INV=6.34 (A) 12" VC
INV=6.39 (B) 12" VC
INV=6.39 (C) 12" VC

SMH
Rim=18.43
INV=6.48 (A) 8" AC
INV=6.48 (B) 12" VC
INV=6.43 (C) 12" VC

SMH
Rim=18.56
INV=6.66 (A) 12" VC
INV= 6.66 (B) 12" VC

SMH
Rim=17.14
INV=0.54 BOTTOM
INV=17.14 NO PIPES VISIBLE

DMH
Rim=16.00
INV= 16.00 UNABLE TO OPEN

CONTINUED ON SHEET 2

NOT TO SCALE

RAYNHAM/TAUNTON
SOUTH STREET E./OLD COLONY AVE.

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	######	2	2
PROJECT FILE NO.	613642		

STORMWATER CONTROL MEASURE ANALYSIS PLAN

Plotted on 29-Jan-2026 10:44 AM

613642_HDI10887 STORMWATER CONTROL MEASURE ANALYSIS).DWG

RIVER BEND CONDOMINIUMS
PARCEL ID: 95-203
MASTER DB/PG 3240/265
PB/PG 66/26-27 LOTS 10 & 2
96 OLD COLONY AVENUE – EAST TAUNTON,MA
AREA=753,970 S.F.

TAUNTON RIVER

TOWN OF RAYNHAM – CONSERVATION COMMISSION
ASSESS. MAP 17 – PARCEL ID: 17-2
DB PG 8016/190
PB/PG 66/70
0 SOUTH STREET EAST – RAYNHAM,MA
AREA=167,683 S.F.

TOWN OF RAYNHAM –
BOARD OF SELECTMEN
PARCEL ID: 17-1
DB/PG 5117/145
0 SOUTH STREET EAST –
RAYNHAM,MA
AREA=14,102 S.F.

AREA CONSIDERED FOR SUBSURFACE LEACHING SYSTEM. EXCLUDED DUE TO SETTLEMENT CONCERNS WITHIN LIMIT OF SIDEWALK AND GREATER SUITABILITY PROVIDED WHERE SCMS ARE CURRENTLY PROPOSED.

APPROXIMATE BOUNDARY OF TOPOGRAPHY PROHIBITIVE TO INSTALLATION OF SCMS (TYP).

AREA EXCLUDED FROM SCM CONSIDERATION DUE TO POTENTIAL CLASSIFICATION OF ARTICLE 97 LAND.

SABA A. NESSRALLA AND AHLAM NESSRALLA
PARCEL ID: 17-37-3
DB/PG 4796/244
58 SOUTH STREET EAST – RAYNHAM,MA

LOIS A. HASKINS
PARCEL ID: 17-3
DB/PG 11594/76
40 SOUTH STREET
EAST – RAYNHAM,MA
AREA= 5,447 S.F.

SOUTH STREET EAST
(PUBLIC)

SANDY HILL STREET
(PUBLIC)

CONTINUED ON SHEET 1

AREAS CONSIDERED FOR SUBSURFACE LEACHING BASINS BUT EXCLUDED DO TO PROXIMITY TO EXISTING SEWER MAIN.

AREA CONSIDERED FOR LINEAR INFILTRATION BASIN AND EXCLUDED DUE TO PROXIMITY TO ROADWAY, UNDERGROUND UTILITY CONFLICTS, AND MAINTENANCE/FAILURE CONCERNS FROM PLOWING OPERATIONS. AREA IS CURRENTLY PROPOSED TO SERVE AS LID COUNTRY DRAINAGE AREA.

STREET LINE FROM PB 60, PG 70

PROJECT END
N2784340.0230
E784178.5228
STA 8+51

TOWN OF RAYNHAM
PARCEL ID: 17-151A
DB/PG 6266/303
PB/PG 342/58
9 SOUTH STREET EAST – RAYNHAM,MA

AREA CONSIDERED FOR SUBSURFACE LEACHING SYSTEM. EXCLUDED DUE TO LIMITED IMPERVIOUS CATCHMENT, INABILITY TO ADEQUATELY PROVIDE OUTLET, AND GREATER SUITABILITY WHERE SCMS ARE CURRENTLY PROPOSED.

APPROXIMATE BOUNDARY OF TOPOGRAPHY PROHIBITIVE TO INSTALLATION OF SCMS (TYP).

SELPAN ASSOCIATES LIMITED
PARCEL ID: 17-151
DB/PG 7993/68
0 SOUTH STREET EAST – RAYNHAM,MA
AREA=71,376 S.F.

TOWN OF RAYNHAM
PARCEL ID: 17-148
DB/PG 8016/190
PB/PG 66/70
0 SOUTH STREET EAST – RAYNHAM,MA

RIGHT OF WAY – SEE PLAN BK. 66, PG. 70

NOT TO SCALE

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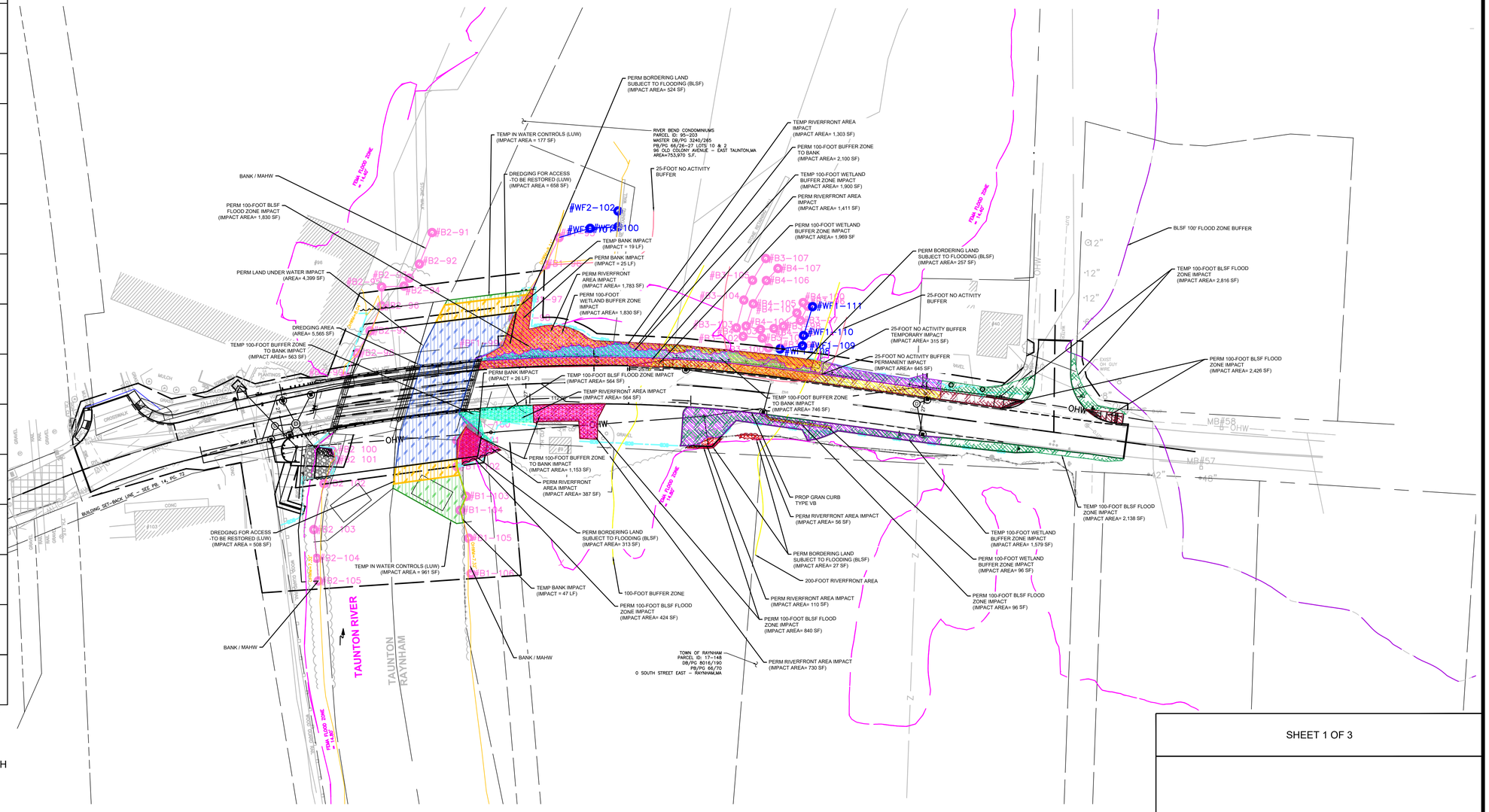
APPENDIX C – Project Plans

SUMMARY OF RESOURCE AREA IMPACTS		
LINETYPE/ HATCH	DESCRIPTION	IMPACT QUANTITY
	TEMPORARY BANK IMPACT	66 LF
	PERMANENT BANK IMPACT	51 LF
	TEMPORARY IN WATER CONTROLS IMPACT (LUW)	1,138 SF
	DREDGING FOR ACCESS - TO BE RESTORED (LUW)	1,166 SF
	PERMANENT LAND UNDER WATER IMPACT (LUW)	4,399 SF
	PERMANENT BORDERING LAND SUBJECT TO FLOODING IMPACT (BLSF)	1,121 SF
	TEMPORARY RIVERFRONT AREA IMPACT	1,867 SF
	PERMANENT RIVERFRONT AREA IMPACT	4,477 SF
	TEMPORARY 25' NO-IMPACT BUFFER	315 SF
	PERMANENT 25' NO-IMPACT BUFFER	645 SF
	TEMPORARY 100' WETLAND BUFFER	3,479 SF
	PERMANENT 100' WETLAND BUFFER	3,895 SF
	TEMPORARY 100' BUFFER ZONE TO BLSF	5,518 SF
	PERMANENT 100' BUFFER ZONE TO BLSF	5,616 SF
	TEMPORARY 100' BUFFER ZONE TO BANK	1,309 SF
	PERMANENT 100' BUFFER ZONE TO BANK	3,253 SF
	DREDGING*	1,052 CY

*LIMIT OF DREDGING IS COINCIDENT WITH THE BOUNDARY OF DREDGING FOR ACCESS (LUW) AND THE BOUNDARY OF PERMANENT LAND UNDER WATER (LUW).

*THE LIMIT OF STREAMBED RESTORATION IS COINCIDENT WITH THE BOUNDARY OF DREDGING FOR ACCESS (WOTUS), THE BOUNDARY OF THE TEMPORARY IN WATER CONTROLS IMPACTS (WOTUS) AND THE BOUNDARY OF THE PERMANENT WATERS OF THE US (WOTUS) IMPACTS.
TOTAL AREA OF STREAMBED RESTORATION = 13,269 SF


N
PERM BORDERING LAND SUBJECT TO FLOODING (BLSF) (IMPACT AREA= 524 SF)
TEMP IN WATER CONTROLS (LUW) (IMPACT AREA = 177 SF)
RIVER BEND CONDOMINIUMS PARCEL ID: 95-203 MASTER DB/PG 3240/265 PB/PG 66/26-27 LOTS 10 & 2 96 OLD COLONY AVENUE – EAST TAUNTON,MA AREA=753,970 S.F.
DREDGING FOR ACCESS -TO BE RESTORED (LUW) (IMPACT AREA = 658 SF)
25-FOOT NO ACTIVITY BUFFER
TEMP RIVERFRONT AREA IMPACT (IMPACT AREA= 1,303 SF)
PERM 100-FOOT BUFFER ZONE TO BANK (IMPACT AREA= 2,100 SF)
TEMP 100-FOOT WETLAND BUFFER ZONE IMPACT (IMPACT AREA= 1,900 SF)
PERM RIVERFRONT AREA IMPACT (IMPACT AREA= 1,411 SF)
PERM 100-FOOT WETLAND BUFFER ZONE IMPACT (IMPACT AREA= 1,969 SF)
BANK / MAHW
PERM 100-FOOT BLSF FLOOD ZONE IMPACT (IMPACT AREA= 1,830 SF)
PERM LAND UNDER WATER IMPACT (AREA= 4,399 SF)
TEMP BANK IMPACT (IMPACT = 19 LF)
PERM BANK IMPACT (IMPACT = 25 LF)
PERM RIVERFRONT AREA IMPACT (IMPACT AREA= 1,783 SF)
PERM 100-FOOT WETLAND BUFFER ZONE IMPACT (IMPACT AREA= 1,830 SF)
DREDGING AREA (AREA= 5,565 SF)
TEMP 100-FOOT BUFFER ZONE TO BANK IMPACT (IMPACT AREA= 563 SF)
PERM BORDERING LAND SUBJECT TO FLOODING (BLSF) (IMPACT AREA= 257 SF)
25-FOOT NO ACTIVITY BUFFER
25-FOOT NO ACTIVITY BUFFER TEMPORARY IMPACT (IMPACT AREA= 315 SF)
25-FOOT NO ACTIVITY BUFFER PERMANENT IMPACT (IMPACT AREA= 645 SF)
BLSF 100' FLOOD ZONE BUFFER
TEMP 100-FOOT BLSF FLOOD ZONE IMPACT (IMPACT AREA= 2,816 SF)
PERM 100-FOOT BLSF FLOOD ZONE IMPACT (IMPACT AREA= 2,426 SF)
PERM BANK IMPACT (IMPACT = 26 LF)
TEMP 100-FOOT BLSF FLOOD ZONE IMPACT (IMPACT AREA= 564 SF)
TEMP RIVERFRONT AREA IMPACT (IMPACT AREA= 564 SF)
TEMP 100-FOOT BUFFER ZONE TO BANK IMPACT (IMPACT AREA= 746 SF)
PERM 100-FOOT BUFFER ZONE TO BANK IMPACT (IMPACT AREA= 1,153 SF)
PERM RIVERFRONT AREA IMPACT (IMPACT AREA= 387 SF)
PROP GRAN CURB TYPE VB
PERM RIVERFRONT AREA IMPACT (IMPACT AREA= 56 SF)
TEMP 100-FOOT WETLAND BUFFER ZONE IMPACT (IMPACT AREA= 1,579 SF)
PERM 100-FOOT WETLAND BUFFER ZONE IMPACT (IMPACT AREA= 96 SF)
TEMP 100-FOOT BLSF FLOOD ZONE IMPACT (IMPACT AREA= 2,138 SF)
DREDGING FOR ACCESS -TO BE RESTORED (LUW) (IMPACT AREA = 508 SF)
TEMP IN WATER CONTROLS (LUW) (IMPACT AREA = 961 SF)
PERM BORDERING LAND SUBJECT TO FLOODING (BLSF) (IMPACT AREA= 313 SF)
PERM BORDERING LAND SUBJECT TO FLOODING (BLSF) (IMPACT AREA= 27 SF)
200-FOOT RIVERFRONT AREA
TEMP BANK IMPACT (IMPACT = 47 LF)
100-FOOT BUFFER ZONE
PERM 100-FOOT BLSF FLOOD ZONE IMPACT (IMPACT AREA= 424 SF)
PERM RIVERFRONT AREA IMPACT (IMPACT AREA= 110 SF)
PERM 100-FOOT BLSF FLOOD ZONE IMPACT (IMPACT AREA= 840 SF)
PERM 100-FOOT BLSF FLOOD ZONE IMPACT (IMPACT AREA= 96 SF)
TOWN OF RAYNHAM PARCEL ID: 17-148 DB/PG 8016/190 P9/PG 66/70 0 SOUTH STREET EAST – RAYNHAM,MA
PERM RIVERFRONT AREA IMPACT (IMPACT AREA= 730 SF)
TAUNTON RIVER
TAUNTON
RAYNHAM
100-YEAR FLOOD ZONE = 14.60'
#WF2-102
#WF2-100
#WF1-111
#WF1-110
#WF1-109
#B2-91
#B2-92
#B2-93
#B2-94
#B2-95
#B2-96
#B2-97
#B2-98
#B2-99
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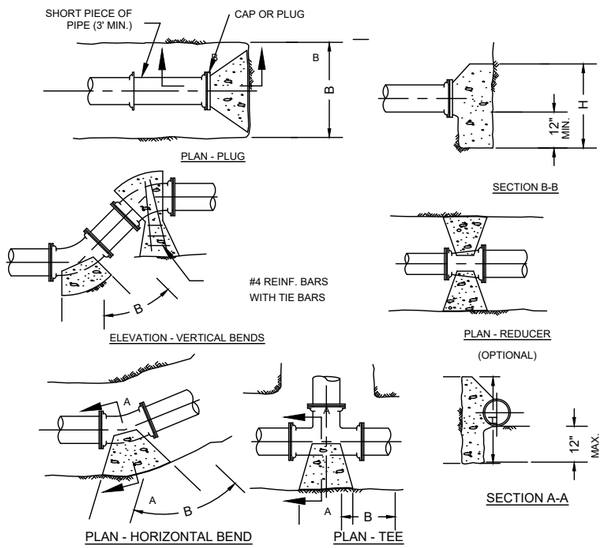
#B3-87
#B4-87
#B3-86
#B4-86
#B3-85
#B4-85
#B3-84

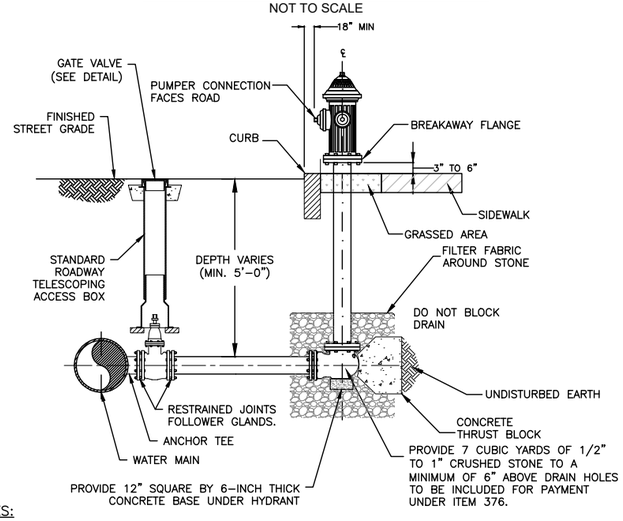
FITTING	MIN. BEARING AREA (H X B)
6" - 1/8 BEND	32" x 32"
8" - 1/8 BEND	24" x 24"
8" x 6" TEE	20" x 20"
12" - 1/8 BEND	32" x 32"
12" x 12" TEE	24" x 24"
12" x 6" TEE	24" x 24"
12" x 8" TEE	32" x 32"
16' x 12" TEE	24" x 24"
HYDRANT	24" x 24"
8" PLUG	32" x 32"
150 mm PLUG	24" x 24"
8" x 6" REDUCER	24" x 24"
8" - 1/16 BEND	20" x 20"
12' x 8" REDUCER	24" x 24"



NOTE:
ALL CONCRETE TO BE PLACED AGAINST UNDISTURBED EARTH

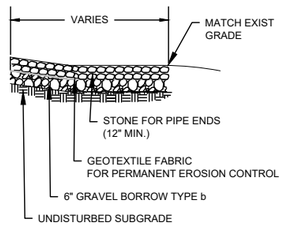
CONCRETE ANCHORAGE DETAILS

NOT TO SCALE



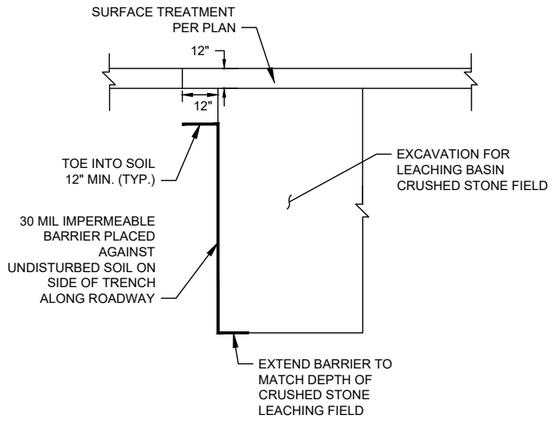
NOTES:

1. HYDRANTS SHALL BE OFFSET 1' FROM THE BACK OF SIDEWALK.
2. HYDRANTS SHALL BE PROVIDED BY THE CITY OF TAUNTON.
3. PROVIDE HYDRANT AND VALVE JOINTS WITH RESTRAINED MECHANICAL JOINTS.
4. ALL JOINTS BETWEEN ANCHOR TEE AND HYDRANT SHALL BE RESTRAINED.
5. SUPPORT BLOCKS TO BE CONCRETE MASONRY BLOCK.
6. SEE HYDRANT TABLE ON THRUST BLOCK BEARING AREAS FOR THE AREA OF CONCRETE REQUIRED.
7. ALL HYDRANTS OUT OF SERVICE MUST BE BAGGED.



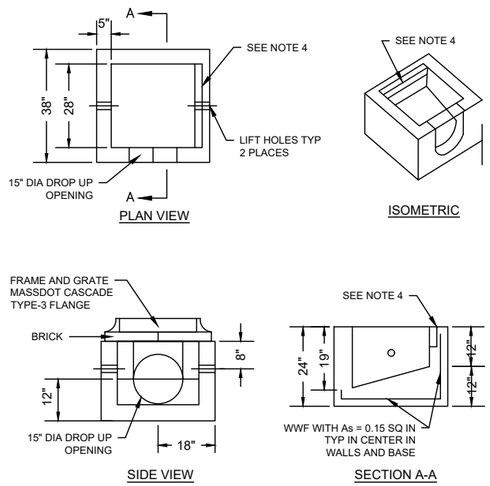
STONE FOR PIPE ENDS

NOT TO SCALE



DETAIL FOR IMPERMEABLE BARRIER INSTALLATION IN EXCAVATION WALL

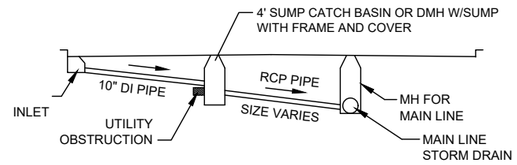
NOT TO SCALE



NOTES:

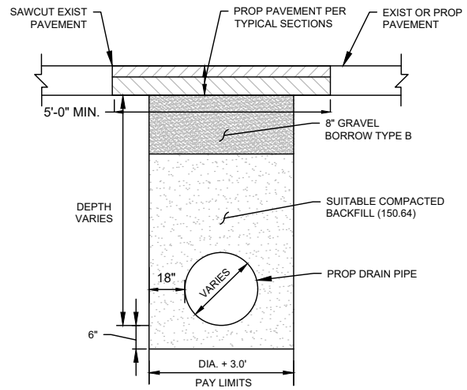
1. DESIGNED FOR AASHTO HS25-44 LOADING
2. CONCRETE STRENGTH fc=4000 PSI
3. REINFORCING STEEL: ASTM A185 (wwf) fy=60,000 PSI
4. CURB INLETS ARE REQUIRED WHEN GUTTER INLETS ARE INSTALLED AGAINST CURBING. PROVIDE 3"X6" OPENING WHERE CURB INLETS ARE PROPOSED.

SPECIAL GUTTER INLET (ITEM 204)



CONTINGENCY DETAIL FOR STORM DRAIN LATERAL LINES

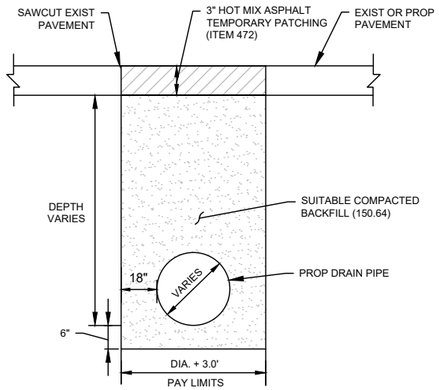
(USE ONLY IF OBSTRUCTION IS ENCOUNTERED)
NOT TO SCALE



NOTES:
1. ANY EXCAVATED MATERIALS DETERMINED BY THE ENGINEER TO BE UNSUITABLE FOR BACKFILL SHALL BE REPLACED WITH GRAVEL BORROW FOR BACKFILLING STRUCTURES AND PIPES AND PAID FOR UNDER ITEM 151.2.

PERMANENT DRAINAGE TRENCH IN MILL AND OVERLAY AREAS

NOT TO SCALE



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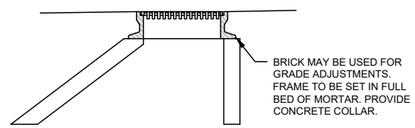
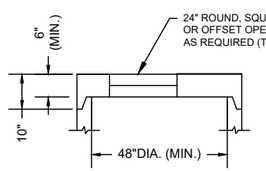
1. ANY EXCAVATED MATERIALS DETERMINED BY THE ENGINEER TO BE UNSUITABLE FOR BACKFILL SHALL BE REPLACED WITH GRAVEL BORROW FOR BACKFILLING STRUCTURES AND PIPES AND PAID FOR UNDER ITEM 151.2.

TEMPORARY DRAINAGE TRENCH IN FULL DEPTH AREAS

NOT TO SCALE



ALTERNATE ECCENTRIC CONE SECTION



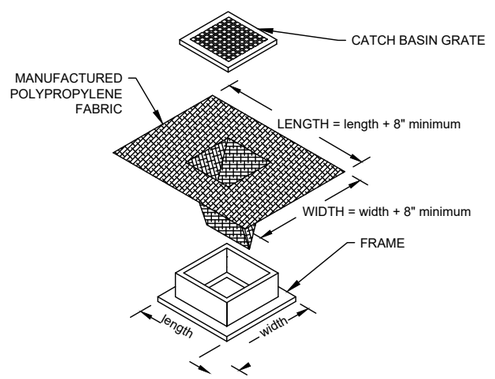
ALTERNATE FLAT TOP SLAB

NOTES:

1. BASED ON ACTUAL FIELD CONDITIONS; THE CONTRACTOR SHALL DETERMINE WHICH STYLE OF TOP SECTION SHOULD BE USED.

ALTERNATE DRAINAGE STRUCTURE TOP CONFIGURATIONS

NOT TO SCALE



NOTES
1. LENGTH AND WIDTH OF POLYPROPYLENE FABRIC MUST EXCEED EXISTING CATCH BASIN FRAME DIMENSIONS BY A MINIMUM OF 8".
2. REMOVE CATCH BASIN GRATE AND INSTALL POLYPROPYLENE FABRIC OVER CATCH BASIN FRAME. REPLACE CATCH BASIN GRATE TO SECURE POLYPROPYLENE FABRIC IN PLACE.
3. PROVIDE EROSION CONTROL PROTECTION AT ALL EXISTING AND PROPOSED CATCH BASINS WITHIN THE PROJECT LIMITS.

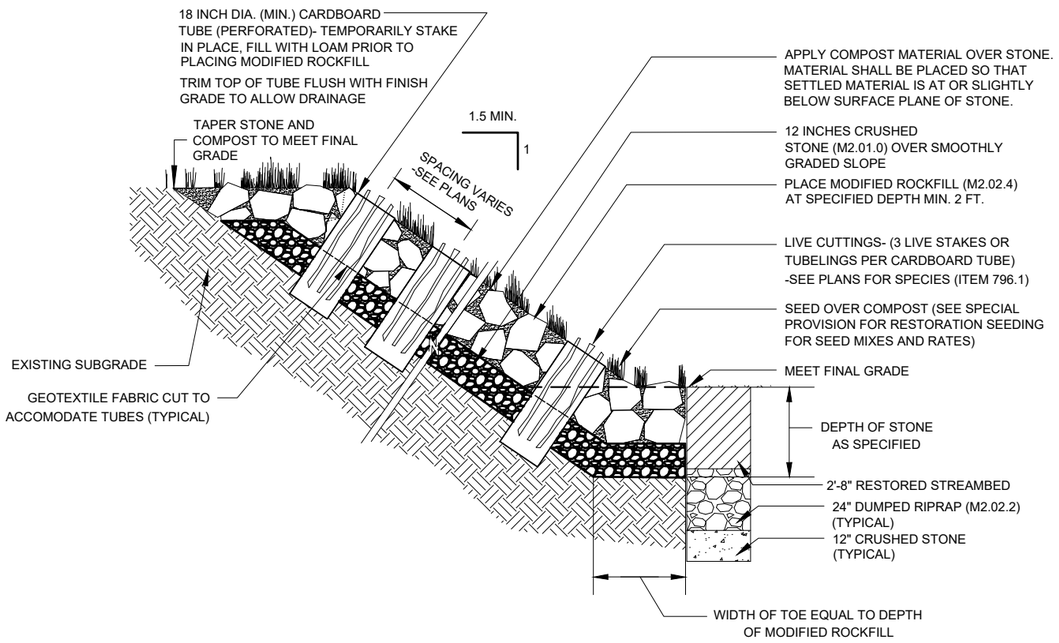
CATCH BASIN EROSION CONTROL PROTECTION (TYP)

NOT TO SCALE

Old Colony Avenue over Taunton River

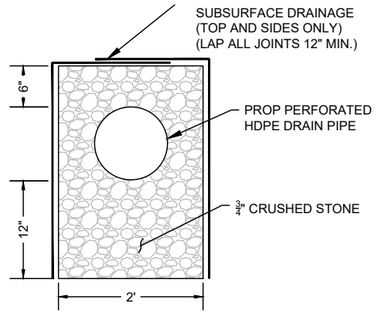
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	######	3	3
PROJECT FILE NO.	613642		

CONSTRUCTION DETAILS



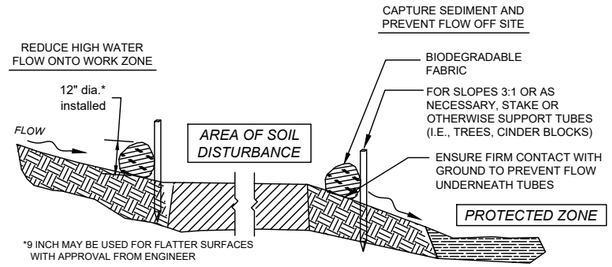
LIVE CUTTINGS IN MODIFIED ROCKFILL

NOT TO SCALE



PERFORATED HDPE INFILTRATION TRENCH

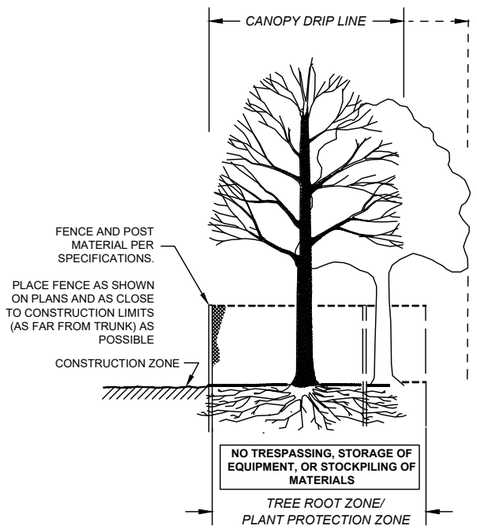
NOT TO SCALE



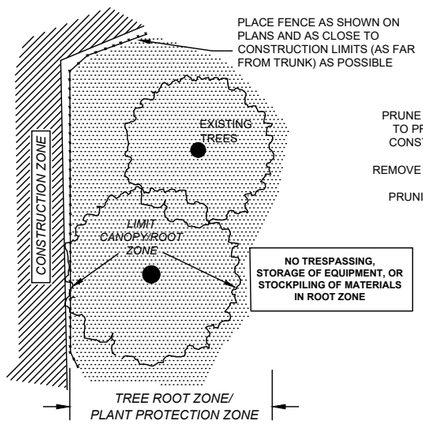
SECTION

SEDIMENT BARRIER - COMPOST FILTER TUBE

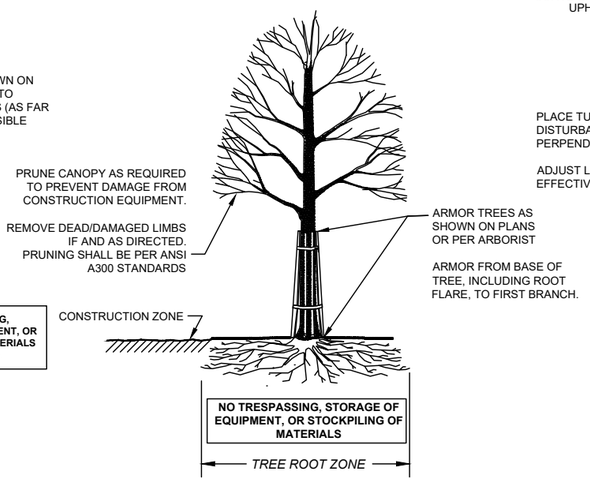
NOT TO SCALE



SECTION - FENCE PROTECTION OF ROOT ZONE

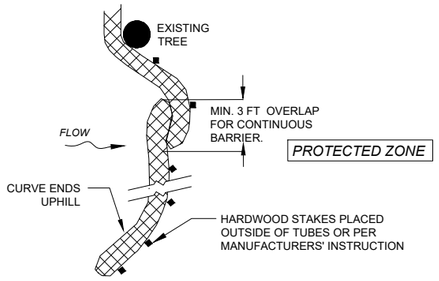


PLAN VIEW - FENCE PROTECTION OF ROOT ZONE



SECTION - TRUNK ARMORING & PRUNING

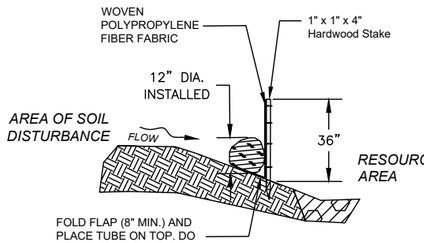
TREE PROTECTION DETAILS



PLACE TUBE AS CLOSE TO LIMIT OF SOIL DISTURBANCE AS POSSIBLE, ALONG CONTOURS, AND PERPENDICULAR TO FLOW.

ADJUST LOCATION AS REQUIRED FOR OPTIMUM EFFECTIVENESS. DO NOT INSTALL IN WATERWAYS.

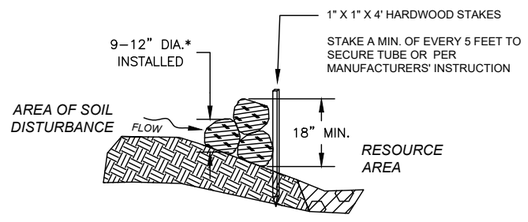
PLAN VIEW



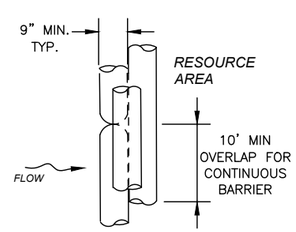
SECTION

COMPOST FILTER TUBE & SILT FENCE

NOT TO SCALE



SECTION



PLAN VIEW

COMPOST FILTER TUBE BERM (SLOPES 2:1 OR STEEPER)

NOT TO SCALE

APPENDIX D – Hydraulic and Scour Analysis Report

The Hydraulic and Scour Analysis Report will be made available upon request.

APPENDIX E – Emergency Certification Request

IMPROVING COMMUNITIES TOGETHER

July 31, 2025

City of Taunton
Taunton Conservation Commission
141 Oak Street
Taunton, MA 02780

Attn: Steven Turner, Chair

Re: Request for Emergency Certification for South St E / Taunton River Bridge Closure and Repairs
Raynham: South St E / Taunton River
Bridge No: R-02-003 = T-01-004
BIN No: 3M4
Structure No: R02003-3M4-MUN-NBI

Dear Mr. Steven Turner:

This letter serves to notify the Taunton Conservation Commission of proposed emergency repairs to the Old Colony Avenue Bridge (identified as South Street in Raynham) necessitated by unsafe structural conditions that pose immediate risk to public safety and access.

The Massachusetts Department of Transportation (MassDOT) – Highway Division has undertaken the inventory, inspection, and rating of locally owned bridges to assist the City of Taunton in complying with State and Federal Legislation. In accordance with the provisions of **M.G.L.C. 85, sub-section 35**, the MassDOT – Highway Division determined the maximum load which the subject bridge may safely carry. The structure was recently rated and it is recommended that the bridge be closed to vehicular traffic due to the poor condition of the ends of beams 1, 2, 5, and 7 at the South Abutment, and beam 2 at the North Abutment.

Pursuant to **310 CMR 10.06(1) and (2)** of the Massachusetts Wetlands Protection Act, this work qualifies as an emergency exempt from prior permitting requirements for the protection of the safety of the citizens of the Commonwealth. The poor condition of the bridge requires prompt action to prevent collapse, injury, and loss of access.

Proposed emergency work includes:

- Concrete repairs along beams 1, 2, 5, and 7 at the South Abutment;
- Concrete repairs along beam 2 at the North Abutment; and
- Temporary scaffolding / staging that will be partially located within Land Under Water (LUW) but will not require permanent alterations.

Work on the bridge will need to be performed in and around the Taunton River, within NFHL 100 Year Flood Zone AE (i.e., Bordering Land Subject to Flooding), and within the 100-foot Buffer Zone to two (2) Bordering Vegetated Wetlands. All reasonable measures will be taken to minimize impacts to resource areas. Emergency repair work shall not exceed thirty (30) days. Only work necessary to abate the emergency will be performed on the subject bridge. Following the completion of emergency repairs, documentation will be submitted as required, and coordination with the Commission will continue to ensure full compliance.

BETA GROUP, INC.
89 Shrewsbury Street, Suite 300, Worcester, MA 01604
P: 508.756.1600 | W: www.BETA-Inc.com

The City of Taunton Department of Public Works requests an Emergency Certification to complete the work described above in the interest of public safety and in accordance with 310 CMR 10.06. If we can be of any further assistance regarding this matter, please contact us at our office.

Very truly yours,
BETA Group, Inc.

Jonathan Niro, PWS
Project Manager

Christopher Jones, P.E.
Vice President

cc: Fred Cornaglia, Commissioner of Public Works

Attachments:
MassDOT Letter
Site Locus Figure

Job No: [23.10887.00]

Maura Healey, Governor
Kimberley Driscoll, Lieutenant Governor
Monica Tibbits-Nutt, Secretary & CEO
Jonathan L. Gulliver, Highway Administrator

MassDOT
Massachusetts Department of Transportation
Highway Division

July 18, 2025

City of Taunton
Mayor of Taunton
90 Ingell St.
Taunton, MA 02780

Attn: Fred Cornaglia, Commissioner of Public Works

SUBJECT: NATIONAL BRIDGE INSPECTION STANDARDS (NBIS)
BRIDGE CLOSURE

Raynham: SOUTH ST E / TAUNTON RIVER
Bridge No: R-02-003 = T-01-004
BIN No: 3M4
Structure No: R02003-3M4-MUN-NBI

Dear Select Board:

The Massachusetts Department of Transportation (MassDOT) - Highway Division has undertaken the inventory, inspection, and rating of locally owned bridges to assist the cities and towns in complying with State and Federal Legislation. In accordance with the provisions of **M.G.L.C 85, sub-section 35**, the MassDOT - Highway Division has determined the maximum load which the subject bridge may safely carry.

The above structure was recently rated, and it is recommended that the bridge be **CLOSED** to vehicular traffic.

The reason for this recommendation is due to the poor condition of the ends of beams 1, 2, 5 and 7 at the South Abutment, and beam 2 at the North Abutment.

Your immediate action is requested. Please coordinate with the District Bridge Engineer, Shane Sousa, at (781)853-7065 on your action taken so the Bridge Inspection Unit can document the closure.

A copy of the Rating Report regarding this recommendation is on file at our District office. Mary-Joe Perry, the District Highway Director, will be pleased to review the report with you and advise you of any programs available regarding this bridge.

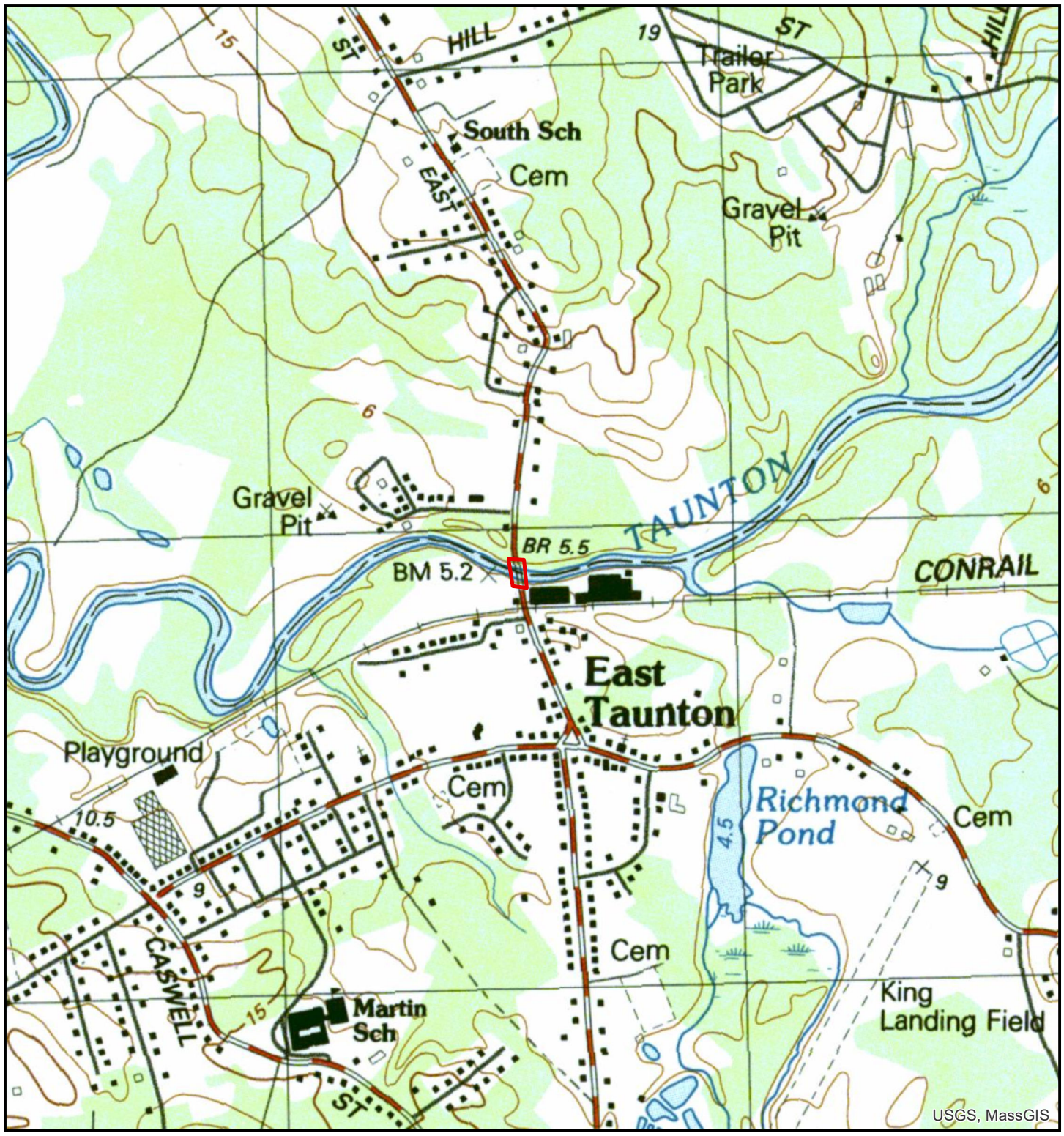
Thank you for your cooperation.

Sincerely,

Alexander K. Bardow, P.E.
State Bridge Engineer

SS/ss
cc: DHD, D-5 & DBIE, D-5, BIE

Ten Park Plaza, Suite 4160, Boston, MA 02116
Tel: 857-368-4636, TYY: 857-368-0655
www.mass.gov/massdot



BETA
IMPROVING COMMUNITIES TOGETHER

N
W E
S

0 1,000 2,000 Feet

1 inch = 1,000 feet

Figure 1
Site Locus
Old Colony Avenue Bridge
Taunton and Raynham, MA

Data Source: MassGIS USGS Topographic Quadrangle Images (2001)

IMPROVING COMMUNITIES TOGETHER

August 28, 2025

City of Raynham
Raynham Conservation Commission
Veterans Memorial Town Hall
558 South Main Street
Raynham, MA 02767

Attn: David McRae, Chair

Re: Request for Emergency Certification for South St E / Taunton River Bridge Closure and Repairs
Raynham: South St E / Taunton River
Bridge No: R-02-003 = T-01-004
BIN No: 3M4
Structure No: R02003-3M4-MUN-NBI

Dear Mr. David McRae:

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BETA GROUP, INC.
89 Shrewsbury Street, Suite 300, Worcester, MA 01604
P: 508.756.1600 | W: www.BETA-Inc.com

documentation will be submitted as required, and coordination with the Commission will continue to ensure full compliance.

If we can be of any further assistance regarding this matter, please contact us at our office.

Very truly yours,
BETA Group, Inc.

Jonathan Niro, PWS
Project Manager

Christopher Jones, P.E.
Vice President

cc: Lori Anderson, Public Works Specialist
Maissoun Reda, Chief of Wetlands Program - MassDEP Southeast Regional Office

Attachments:
MassDOT Letter
Site Locus Figure

Job No: [23.10887.00]

Maura Healey, Governor
Kimberley Driscoll, Lieutenant Governor
Monica Tibbits-Nutt, Secretary & CEO
Jonathan L. Gulliver, Highway Administrator

MassDOT
Massachusetts Department of Transportation
Highway Division

July 18, 2025

Town of Raynham
Board of Selectmen
558 South Main St.
Raynham, MA 02767

Attn: Norm Sturtevant, Highway Superintendent

SUBJECT: NATIONAL BRIDGE INSPECTION STANDARDS (NBIS)
BRIDGE CLOSURE

Raynham: SOUTH ST E / TAUNTON RIVER
Bridge No: R-02-003 = T-01-004
BIN No: 3M4
Structure No: R02003-3M4-MUN-NBI

Dear Select Board:

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The reason for this recommendation is due to the poor condition of the ends of beams 1, 2, 5 and 7 at the South Abutment, and beam 2 at the North Abutment.

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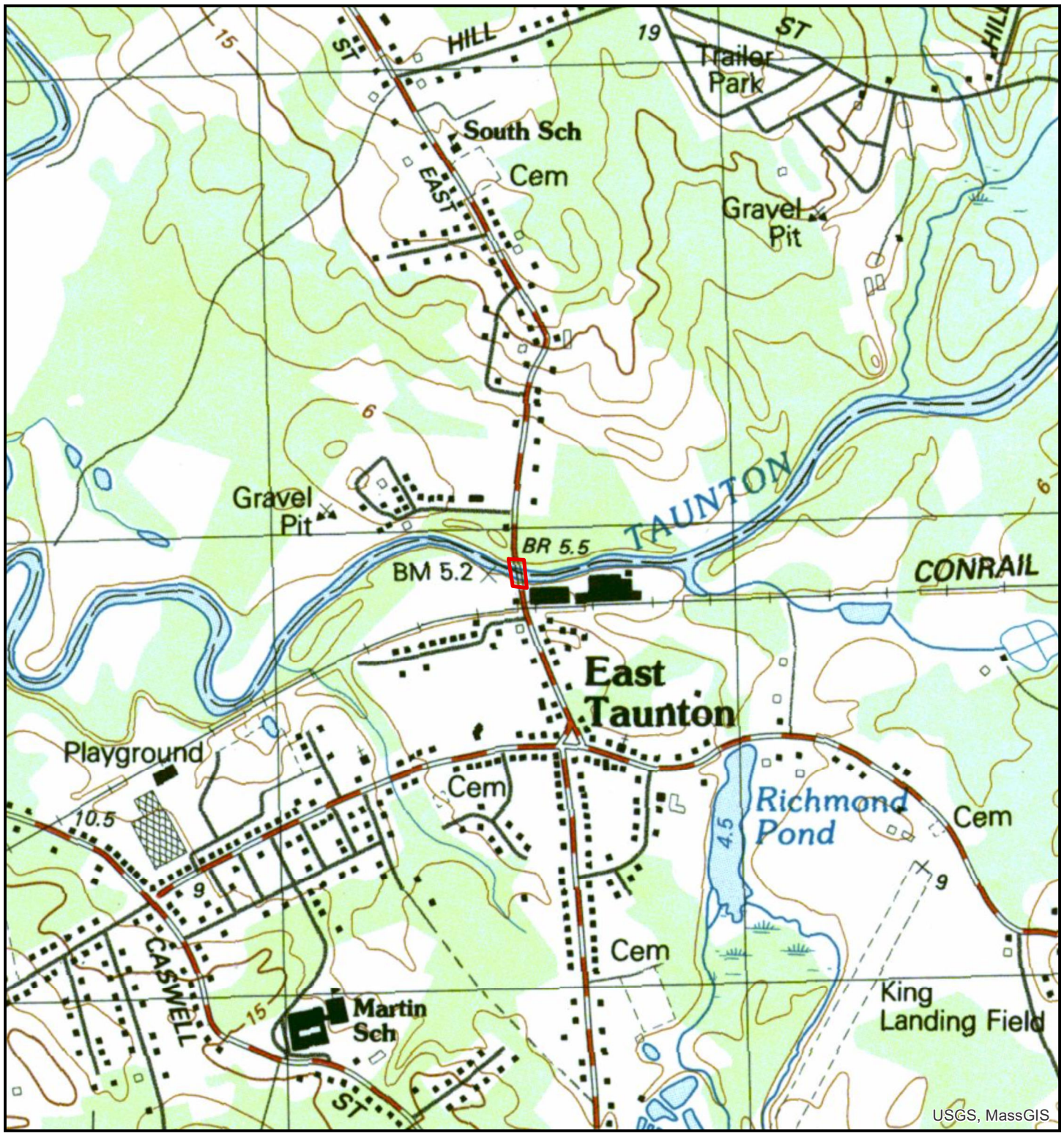
Alexander K. Bardow, P.E.
State Bridge Engineer

SS/ss
cc: DHD, D-5 & DBIE, D-5, BIE

Ten Park Plaza, Suite 4160, Boston, MA 02116
Tel: 857-368-4636, TYY: 857-368-0655
www.mass.gov/massdot



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IMPROVING COMMUNITIES TOGETHER

N
W E
S

0 1,000 2,000 Feet

1 inch = 1,000 feet

Figure 1
Site Locus
Old Colony Avenue Bridge
Taunton and Raynham, MA

Data Source: MassGIS USGS Topographic Quadrangle Images (2001)

APPENDIX F – Alternatives Analysis

Raynham/Taunton

Bridge Reconstruction R-02-003=T-01-004

MassDOT Project File # 613642

July 2024

ALTERNATIVES ANALYSIS

315 Norwood Park South
2nd Floor
Norwood, Massachusetts 02062
781.255.1982
www.BETA-Inc.com

Bridge Reconstruction R-02-003=T-01-004

Raynham/Taunton

MassDOT Project File # 613642

ALTERNATIVES ANALYSIS

Prepared by: BETA GROUP, INC.
Prepared for: MassDOT Highway Division

July 2024

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Appendix B: Draft Design Justification Workbook
Appendix C: Synchro Analysis

1.0 EXISTING CONDITIONS

1.1 STUDY AREA

The project is located at the bridge carrying South Street East / Old Colony Ave over the Taunton River in Raynham Taunton. The project limits are from the intersection with Sandy Hill Road approximately 380 feet north of the bridge to the railroad grade crossing approximately 200 feet south of the bridge.

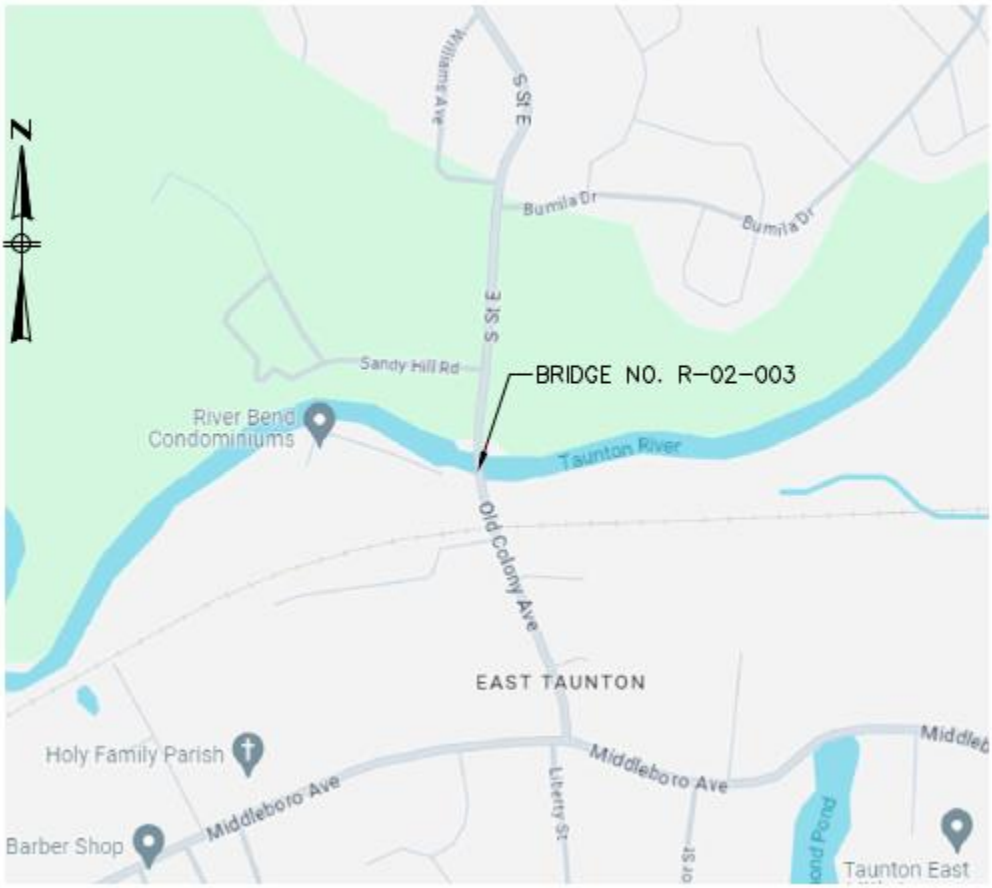

Figure 1 Location Map

1.2 BRIDGE

The existing structure is an approximately 89'-6" two span bridge with equal spans of approximately 44'-9", constructed in 1945. The structure consists of eight (8) 27 WF steel beams spaced at 4'-6 ½" on center supporting a 7" concrete deck and 2-1/4" of bituminous paving. The bridge is supported by unreinforced concrete gravity abutments and wingwalls and a reinforced concrete pier. The south abutment is founded on spread footings and the north abutment and pier are founded on timber piles. The bridge is 35'-0" wide, which includes a 26'-0" roadway, a 2'-6" safety walk and 5'-0" sidewalk with metal railing. The bridge has a skew angle of 23.6° and was designed for H20 loading.

1.3 ROADWAY

Old Colony Ave is a 0.3-mile-long (0.5 km) road in Taunton, Massachusetts, that runs north-south adjacent to the Taunton River. The roadway is under the jurisdiction of the City of Taunton. Old Colony Ave is classified as an Urban Collector.

Old Colony Ave within the study area consists of approximately (2) 13.5-foot-wide travel lanes with no shoulders on the approach to the bridge and over the bridge (2) 11.5-foot-wide travel lanes with 1 to 2-ft shoulders. Directional flow along the roadway is separated by a double yellow line and there are no bicycle accommodations within the project area. The legal speed regulation along the roadway in the study area is 30 miles per hour (mph).

South Street East is a 1.5-mile-long (2.4 km) road in Raynham, Massachusetts, that runs north-south adjacent to the Taunton River. The roadway is under the jurisdiction of the Town of Raynham. South Street East is classified as an Urban Collector.

South Street East within the study area consists of approximately (2) 11- to 11.5-foot-wide travel lanes with 1.5- to 2-ft shoulders. Guardrail exists on the southbound side of the roadway leading up to the bridge. Directional flow along the roadway is separated by a double yellow line and there are no bicycle accommodations within the project area. The legal speed regulation along the roadway in the study area is 30 miles per hour (mph).

1.4 SAFETY ANALYSIS

Crash data for the major intersections included within the detour limits was obtained for the five most recent years available, January 2019 through December 2023, from the MassDOT IMPACT Crash Portal. Refer to Section 3.0 of this report for further discussion of the four intersections used for the detour.

A review of the MassDOT crash data revealed that there were 49 crashes that occurred at the intersection of New State Hwy (Route 44) and Orchard St, 33 crashes at the intersection of New State Hwy (Route 44) and Church St, 31 crashes at the intersection of Middleboro Ave and Old Colony Ave/Liberty St and 6 crashes at the intersection of Middleboro Ave and Precinct St/South Precinct St. No fatalities were reported within the analysis limits. Most crashes within the intersections (95 out of 119) were either angle crashes or rear-end crashes. Furthermore, most crashes within the study area occurred during clear/dry weather. **Table 1** provides a summary of the roadway crash history.

Table 1: Roadway Crash Summary

	ROADWAY	New State Hwy (Route 44)@ Orchard St	New State Hwy (Route 44)@ Church St	Middleboro Ave @ Old Colony Ave/Liberty St	Middleboro Ave @ Precinct St/South Precinct St	TOTAL
Number of Crashes	Total	49	33	31	6	119
	Average Per Year	*9.8*	*6.6*	*6.2*	*1.2*	*23.8*
Severity	Fatal Injury	0	0	0	0	0
	Non-Fatal Injury	8	10	4	2	24
	Property Damage	41	23	27	4	95
Weather Condition	Clear/ Dry	39	25	26	6	96
	Cloudy/Rain/Snow	10	8	5	0	23
Crash Type	Angle	21	8	15	5	49
	Rear-End/Front to Rear	19	18	9	0	46
	Sideswipe	7	4	3	0	14
	Single Vehicle Crash	2	1	4	0	7
	Head On	0	2	0	1	3

2.0 ENVIRONMENTAL

2.1 ENVIRONMENTAL PERMITTING ASSESSMENT

The following Table is a list of applicable permits and reviews for the Project:

Table 2 Regulatory Permits and Reviews

Permit or Review	Yes	No	Notes:
Bridge Exempt	✓		The Project is considered "bridge exempt" and therefore does not require permitting under the Massachusetts Wetlands Protection Act, the Massachusetts Public Waterfront Act, or the Massachusetts Environmental Policy Act.
Wetlands Protection Act (WPA)		✓	
Chapter 91		✓	
Environmental Justice Community		✓	None mapped within 1 mile of the Site.
Massachusetts Environmental Policy Act (MEPA)		✓	

National Environmental Policy Act (NEPA)	✓		Categorical Exclusion (CE) required.
Section 401 Water Quality Certification (WQC)		✓	Should any wetland or waterway impacts be necessary based on Project scope revisions, a 401 WQC will be required if the "bridge exemption" is claimed for Massachusetts Wetlands Protection Act permitting. Otherwise, the Order of Conditions would serve as the 401 WQC.
Section 404 Army Corps General Permit		✓	
U.S. Coast Guard Bridge Permit		✓	
Coastal Zone Management (CZM) Federal Consistency Review		✓	
Essential Fish Habitat		✓	
Section 7 Endangered Species Act	✓		Consultation required.
Natural Heritage and Endangered Species Program (NHESP) Estimated or Priority Habitat		✓	
Section 106	✓		Project Notification Form required.
Adjacent Parkland or Wildlife Refuges for Section 4(f)	✓		Land to the north of the site is publicly owned and may be considered subject to Section 4(f); however, it does not appear to be protected open space based on cursory online research.
Wild and Scenic River	✓		Coordination with the National Parks Service will be required during design.
Adjacent Section 6(f) Properties		✓	
Article 97		✓	
Other		✓	

The differences in proposed work under the Alternatives presented in this report are related to striping and lane width; under either Alternative, the bridge superstructure will be replaced. Therefore, it is not anticipated that the selection of an Alternative will result in changes to the permitting requirements for the Project. The Project will not result in direct Resource Area impacts (e.g., fill and/or alteration). As summarized in Table 1 above, the following environmental permits/reviews are anticipated to be required under either Alternative:

Categorical Exclusion (MassDOT / FHWA)

The Project will be funded by a federal Community Project Funding Grant routed through the Federal Highway Administration (FHWA); therefore, documentation of compliance with the National Environmental Policy Act (NEPA) will be required. It is anticipated that the Project will require the

submission of a Categorical Exclusion (CE) pursuant to the FHWA's list of CE-eligible activities and that no Environmental Assessment or Environmental Impact Study will be required.

Section 7 – Endangered Species Act (USFWS)

As part of Project's environmental review process, coordination with the U.S. Fish and Wildlife Service (USFWS) under Section 7 of the federal Endangered Species Act will be undertaken. At a minimum, it is anticipated that the Project will require securing a "Not Likely to Adversely Affect" determination due to the Project Area being within the range of the Northern long-eared bat (*Myotis septentrionalis*), the Plymouth redbelly turtle (*Pseudemys rubriventris bangsi*), and the Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*).

Project Notification Form (State Historic Preservation Officer / Bureau of Underwater Archaeological Resources / Relevant Tribes)

Due to the use of federal funding, the Project will require the submission of a Project Notification Form (PNF) to the State Historic Preservation Officer (SHPO), Bureau of Underwater Archaeological Resources (BUAR), and all relevant Tribes to demonstrate compliance with Section 106 of the National Historic Preservation Act.

The Project will be constructed within/adjacent to the Old Colony Iron Works – Nemasket Mill Complex National Register Historic District (TAU.AA). Based on mapping reviewed via the Massachusetts Cultural Resources Information System (MACRIS), only roadway approach work within Taunton will be located within this Historic District. Both MACRIS mapping and the Massachusetts Historical Commission Inventory Form do not indicate that the bridge itself is a historic or cultural resource. Nearby historic and cultural resources associated with this Historic District include TAU.630 and TAU.628.

2.2 HAZMAT

The selection of a specific alternative will not affect the hazardous materials due diligence required for the Project.

2.2.1 HISTORIC AND CURRENT LAND USE

Historic and current land uses near the Project Area consist of residential and industrial properties to the south (within Taunton) and undeveloped woodlands and residential properties to the north (within Raynham).

2.2.2 ADJACENT RELEASE SITES AND CONTAMINATION SOURCES

According to the Massachusetts Underground Storage Tank (UST) Facility Search there is one (1) UST facilities within 0.25-miles of the Project Corridor, the Amaros Market Inc. (Facility ID #3854) located at 508 Middleboro Ave in Taunton.

According to MassDEP's Searchable Sites Database, the following releases have been reported within the vicinity of the Project Area:

RTN 4-0000160 – 103 Old Colony Avenue, Taunton

In July of 1992, a Phase I Environmental Site Assessment (ESA) was completed at the former Bacon Felt Facility located at 103 Old Colony Avenue in Taunton due to soil and groundwater contamination associated with a former leaching tank. Contaminants noted in the Phase 1 ESA included elevated levels of toluene and Volatile Organic Compounds (VOCs). Due to the limited vertical and horizontal spread of the contaminants per monitoring well data and surface water sampling, the property was assigned a Tier II classification.

Given the scope of the Project, there is currently no anticipated excavation of soils; therefore, management of contaminated media is unlikely.

2.2.3 Known or suspected Contamination Sites

A search for known oil and hazardous material releases in proximity of Project limits was conducted using online resources as noted above. No superfund sites are present within the Project Area.

2.2.4 Active Use Limitations (AUL)

There are no AUL Deed Restrictions within or adjacent to the Project limits that may be impacted by construction.

2.2.5 Excavation Work

The Project does not propose excavation into soils; only full-depth pavement construction will be conducted.

2.2.6 Excess Soil Generation

The Project does not propose activity that will generate excess soil.

2.2.7 Rail trail Projects

The Project is not a rail trail project.

2.2.8 Dewatering Contaminated groundwater

The Project does not propose any dewatering of polluted groundwater.

2.2.9 Hazardous Building Materials

Due to the age of the bridge, there is the potential for asbestos within concrete, joint caulking materials, gunite patches on the concrete, or the asphalt road surface. There is also potential for the presence of Polychlorinated biphenyls (PCBs) in paint and/or joint caulking materials. Lead paint may also be present on bridge surfaces.

3.0 Temporary Traffic Management

3.1 Detour Route

The construction staging alternative under consideration for the bridge and roadway construction involves a full bridge closure with traffic detours. Based on traffic counts conducted in May of 2024, the Old Colony Ave Bridge experiences a heavy vehicle percentage of approximately 0.8% in the northbound direction and 0.7% in the southbound direction.

The proposed detour would be via New State Highway (US Route 44), Church Street/Precinct Street and Middleboro Ave. Vehicles typically utilizing the Pleasant Street Bridge northbound approach would follow the detour route on Middleboro Ave and turn left onto Precinct Street, continue onto Church Street and turn left onto New State Highway. Vehicles destined in the southbound direction over the bridge would use the same route in the opposite direction. The two intersections on Middleboro Ave are stop controlled. The two study intersections on New State Highway (US Route 44) are signalized.

3.2 OPERATIONS ANALYSIS

Traffic Operations Analysis

Capacity analyses were conducted to assess the quality of traffic flow at four study intersections. This analysis was performed for existing Year 2024 volume conditions and Year 2024 detour volume conditions during the weekday AM and PM peak hours.

Capacity analysis was performed using Trafficware's Synchro software package (Version 12.0). The Synchro software analysis utilizes methodologies contained in the *Highway Capacity Manual, 7th Edition (HCM7)* published by the Transportation Research Board.

Six levels of service (LOS), "A"-"F", have been established with "A" representing very good operation and "F" representing very poor operation. For signalized and unsignalized intersections, level of service is defined in terms of total delay and is computed for individual intersection turning movements. Delay is a measure of driver discomfort, frustration, fuel consumption, and lost travel time. The relationship between LOS and delay for signalized intersections are summarized in Error! Reference source not found.**3**. The relationship between LOS and delay for unsignalized intersections are summarized in Error! Reference source not found.4. In addition to delay and level of service, the analysis examined the volume to capacity ratio (v/c) and 95th percentile queues for each lane group. Capacity analysis worksheets are provided in **Appendix C.**

Table 3: Signalized Intersection Level of Service Criteria

LOS	**Signalized Intersection Criteria Average Total Delay** (Seconds per Vehicle)	**General Description**
A	< 10.0	Free Flow
B	10.1 to 20.0	Stable flow (slight delays)
C	20.1 to 35.0	Stable flow (acceptable delays)
D	35.1 to 55.0	Approaching unstable flow (tolerable delay)
E	55.1 to 80.0	Unstable flow (intolerable delay)
F	> 80.0	Forced flow (jammed)

Table 4: Unsignalized Intersection Level of Service Criteria

LOS	Unsignalized Intersection Criteria Average Total Delay (Seconds per Vehicle)	General Description
A	< 10.0	Free Flow
B	10.1 to 15.0	Stable flow (slight delays)
C	15.1 to 25.0	Stable flow (acceptable delays)
D	25.1 to 35.0	Approaching unstable flow (tolerable delay)
E	35.1 to 50.0	Unstable flow (intolerable delay)
F	> 50.0	Forced flow (jammed)

Traffic Capacity Analysis Results

Intersection capacity and Level of Service (LOS) analysis was conducted for the Existing and Detour conditions for the AM and PM weekday commuting peak hours. Summaries of this analysis are provided in **Tables 5 and 6**.

Table 5: Level of Service Summary – Signalized Intersections

INTERSECTION	Existing				Detour			
	LOS	DEL[a]	v/c[b]	95%[c]	LOS	DEL[a]	v/c[b]	95%[c]
Route 44 at Orchard Street – Signalized Intersection								
OVERALL AM	**D**	**40.1**			**D**	**36.5**		
Route 44 – EBL - AM	F	216.5	1.17	89	E	66.8	0.52	64
Route 44 – EBT - AM	C	31.2	0.72	480	C	34.3	0.81	622
Route 44 – EBR - AM	A	1.4	0.19	24	A	1.1	0.07	11
Route 44 – WBL - AM	E	78.1	0.50	51	E	58.0	0.22	37
Route 44 – WBTR - AM	C	24.4	0.44	207	C	29.3	0.65	340
Orchard – NBL - AM	E	58.3	0.72	182	E	57.8	0.69	165
Orchard – NBTR - AM	F	104.6	0.96	204	E	63.5	0.72	154
Orchard – SBL - AM	E	55.6	0.57	184	E	60.8	0.69	242
Orchard – SBT - AM	D	53.3	0.33	87	D	45.5	0.09	40
Orchard – SBR - AM	B	12.4	0.50	54	B	11.2	0.44	55
OVERALL PM	**D**	**35.0**			**C**	**31.7**		
Route 44 – EBL - PM	F	81.6	0.71	123	E	76.7	0.67	113
Route 44 – EBT - PM	C	29.1	0.67	415	C	28.3	0.66	403
Route 44 – EBR - PM	A	3.6	0.35	55	A	2.3	0.35	28
Route 44 – WBL - PM	E	58.1	0.29	58	E	57.2	0.28	59
Route 44 – WBTR - PM	C	29.3	0.72	426	C	31.9	0.81	502
Orchard – NBL - PM	D	54.9	0.62	128	E	64.1	0.38	40
Orchard – NBTR - PM	E	64.1	0.71	183	D	40.6	0.16	44
Orchard – SBL - PM	E	65.3	0.70	191	E	70.6	0.75	202
Orchard – SBT - PM	F	89.1	0.89	261	D	49.7	0.52	186
Orchard – SBR - PM	B	11.5	0.46	31	A	7.9	0.35	28
Route 44 at Church Street – Signalized Intersection								
OVERALL AM	**C**	**24.5**			**F**	178.3		
Route 44 – EBLTR - AM	B	10.6	0.63	263	F	164.6	1.29	754
Route 44 – WBLTR - AM	B	13.5	0.74	350	F	145.4	1.24	671
Church – NBLTR - AM	E	74.1	0.97	98	F	271.2	1.53	301
Church – SBLTR - AM	D	45.6	0.77	182	B	13.3	0.37	96
OVERALL PM	**C**	**28.4**			**F**	**125.7**		
Route 44 – EBLTR - PM	C	21.0	0.87	624	F	106.6	1.16	772
Route 44 – WBLTR - PM	C	27.3	0.92	646	F	126.8	1.21	764
Church – NBLTR - PM	E	56.5	0.86	168	F	205.1	1.36	440
Church – SBLTR - PM	D	38.9	0.73	122	B	17.5	0.42	94

a. Delay measured in seconds per vehicle

b. v/c represents Volume to Capacity Ratio

c. 95th Percentile Queue measured in feet.

Table 6: Level of Service Summary – Unsignalized Intersections

INTERSECTION	Existing				Detour			
	LOS	DEL[a]	v/c[b]	95%[c]	LOS	DEL[a]	v/c[b]	95%[c]
Middleboro Ave at Old Colony Ave/Liberty Street – Unsignalized Intersection								
Liberty – NB - AM	F	176.8	1.18	11	C	21.4	0.52	3
Middleboro – EBL -AM	A	8.6	0.23	< 1	A	8.3	0.03	< 1
Middleboro – WBL - AM	A	8.9	0	< 1	B	10.2	0.01	< 1
Old Colony – SB - AM	F	273.5	1.43	15	B	14.8	0.09	1
Liberty – NB - PM	F	128.9	1.02	9	C	17.3	0.42	2
Middleboro – EBL - PM	A	8.8	0.17	< 1	A	8.0	0.01	< 1
Middleboro – WBL - PM	A	7.9	0.03	< 1	A	8.3	0.04	< 1
Old Colony – SB - PM	F	>300.0	>2.00	53	C	16.7	0.16	1
Middleboro Ave at Precinct Street/S Precinct Street – Unsignalized Intersection								
S Precinct – NB - AM	C	19.3	0.44	3	F	>300.0	>2.00	21
Middleboro – EBL -AM	A	7.8	0.04	< 1	A	9.5	0.41	2
Middleboro – WBL - AM	A	7.6	0.02	< 1	A	7.6	0.02	< 1
Precinct – SB - AM	B	13.4	0.14	< 1	F	90.9	1.02	12
S Precinct – NB - PM	D	33.1	0.50	3	F	>300.0	>2.00	17
Middleboro – EBL -PM	A	8.0	0.03	< 1	A	8.8	0.22	< 1
Middleboro – WBL -PM	A	7.9	0.06	< 1	A	7.9	0.06	< 1
Precinct – SB - PM	D	28.2	0.57	4	F	253.2	1.37	14

a. Delay measured in seconds per vehicle
b. v/c represents Volume to Capacity Ratio
c. 95th Percentile Queue measured in vehicles

Route 44 at Orchard Street

At the Route 44 signalized intersection with Orchard Street, the traffic operations with the proposed detour in place is projected to operate at a slightly improved level of service over existing conditions for the overall intersection. A few of the individual lane movements are projected to experience a slight increase in delay, but all will operate at LOS E or better.

Route 44 at Church Street

At the Route 44 signalized intersection with Church Street, the traffic operations with the proposed detour in place is projected to operate at a worse level of service over existing conditions for the overall intersection due to the additional traffic volume that will need to be processed by the traffic signal. The overall intersection and the EB, WB, and NB approaches are projected to operate at LOS F, have a volume to capacity ratio over 1.0 and have longer queues when compared with existing conditions. A potential mitigation measure is for a traffic control officer to be present to monitor peak time periods. An additional mitigation strategy is to adjust the traffic signal timing while the detour is in place.

Middleboro Ave at Old Colony Ave/Liberty Street

At the Middleboro Ave unsignalized intersection with Old Colony Ave/Liberty Street, the traffic operations with the proposed detour in place is projected to operate at significantly improved level of service over existing conditions for the overall intersection due to the full closure of the Old Colony Ave bridge over the Taunton River just north of this intersection. A few of the individual lane movements are projected to experience a slight increase in delay, but all will operate at LOS C or better.

Middleboro Ave at Precinct Street/S Precinct Street

At the Middleboro Ave unsignalized intersection with Precinct Street/ S Precinct Street, the traffic operations with the proposed detour in place is projected to operate at a worse level of service over existing conditions due to the additional traffic volume that will need to be processed through the intersection. The NB and SB stop-controlled approaches are projected to operate at LOS F, have a volume to capacity ratio well over 1.0 and have longer queues when compared with existing conditions. A potential mitigation measure is for a traffic control officer be present during peak time periods to mitigate the anticipated side street delay.

4.0 Utilities

Underground utilities within the project area include water, sewer, and gas. Gas and sewer are carried on the bridge superstructure and will be relocated from the east sidewalk to the west sidewalk so that service can be maintained during construction. An additional utility bay will be added to the bridge for a future water main.

Overhead utility poles will be permanently relocated from the west side of the roadway to the east side for bridge construction and for sidewalk clearance within project limits.

5.0 Right of Way

The existing Right of Way is municipal owned and varies in width starting from approximately 38’ at the beginning of the project and widening to up to 58’ over the bridge on the Taunton Side. On the Raynham side the Right of Way also varies in width. The Right of Way goes from 73’ by the sewer pump station. to 45’ wide by Sandy Hill Street.

Both alternatives presented below will have the same Right of Way impacts. A permanent easement will be required for proposed pedestrian curb ramp at #96 Old Colony Avenue. Permanent utility easements will be required for overhead wires that are being relocated from the west to the east side of the roadway. Temporary easements will be required for slope work, driveway work, sediment control barriers, and construction access.

6.0 Alternatives

6.1 General

There are two alternatives under consideration. Both alternatives were chosen based on the constraint that the existing bridge substructure be retained and only the superstructure be replaced. This restricts the cross-section of the roadway to approximately 26 ft curb to curb with a 6 ft sidewalk on one side of

the roadway. Both alternatives are proposing relocating the sidewalk from the east side to the west side of the roadway so that the sidewalk connects to the existing sidewalk at the condominium on the south side of the bridge. The sidewalk will be extended to Sandy Hill Street in Raynham.

The difference in the two alternatives are the lane and shoulder widths. Alternative 1 offers a narrower lane width with larger shoulder on the bridge curb side. Alternative 2 offers a more typical lane width with narrow shoulders on both sides of the roadway. Both alternatives will require design justifications for pedestrian and bicycle accommodation.

6.2 ALTERNATIVE 1

Alternative 1 features a cross-section with two 10-foot-wide travel lanes in each direction, accompanied by one 2-foot-wide shoulder on the sidewalk side and one 4-foot-wide shoulder on the safety curb side. Sidewalk is proposed on the west side of the roadway. The sidewalk is 6 feet wide from the condominium driveway to over the bridge. North of the bridge the sidewalk tapers down to 5.5 feet wide and terminates at Sandy Hill Street with reciprocal ramps. Vertical granite curb is proposed along the front of the sidewalk. Vertical granite curb is proposed at the back of sidewalk at Station 5+70 +/- to 6+32 +/- (LT) to avoid impacts to the wetlands. Alternative 1 will require a design justification for pedestrian accomodations because only one sidewalk is being proposed. The design does not allow for sidewalks on both sides of the road due to the width constraint of the existing bridge substructure. A design justification is also needed for the bicycle accomodations. Neither a shared use path or seperated bike lanes were able to fit within the existing bridge structure. Therefore, a 4-foot shoulder was provided on the east side, which is the minimum width for bicycle accomodation. A 2-foot shoulder was provided on the west side against the sidewalk for drainage, errant vehicles, and encroachment and off-tracking of wide vehicles. Sharrows can be added in the northbound lane.

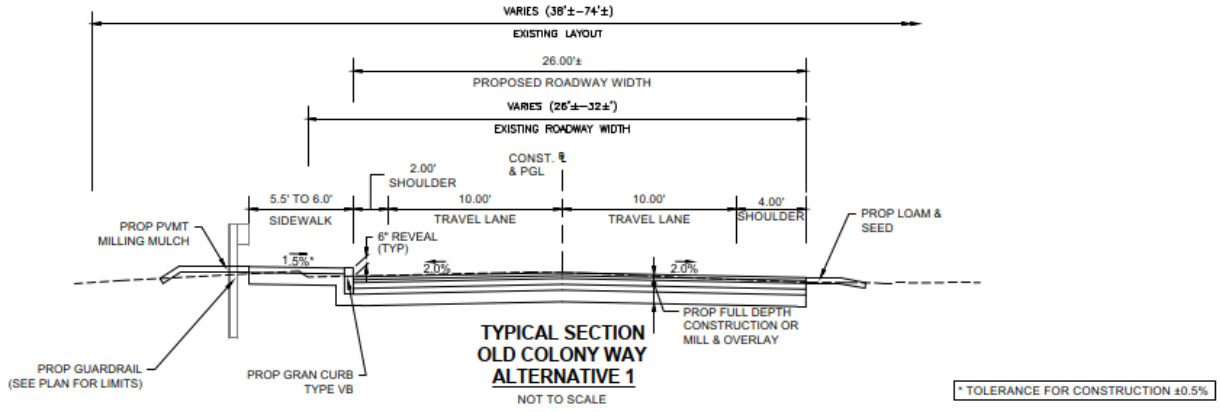

Figure 2 Typical Section Alternative 1

6.3 ALTERNATIVE 2

Alternative 2 features a cross-section with two 11-foot-wide travel lanes in each direction, accompanied by two 2-foot-wide shoulders. Vertical granite curbing lines both sides of the roadway. Sidewalk proposed on the west side of the roadway. The sidewalk is 6 feet wide from the condominium driveway to over the bridge. North of the bridge the sidewalk tapers down to 5.5 feet wide and terminates at Sandy Hill Street with reciprocal ramps. Vertical granite curb is proposed along the front of the sidewalk. Vertical granite curb is proposed at the back of sidewalk at Station 5+70 +/- to 6+32 +/- (LT) to avoid impacts to the wetlands. Alternative 2 will require a design justification for pedestrian

accomodations because only one sidewalk is being proposed. The design does not allow for sidewalks on both sides of the road due to the width constraint of the existing bridge substructure. A design justification is also needed for the bicycle accomodations. Neither a shared use path or seperated bike lanes were able to fit within the existing bridge structure. Therefore, 2- foot shoulders were provided on both sides of the roadway. Sharrows can be added to both travel lanes.

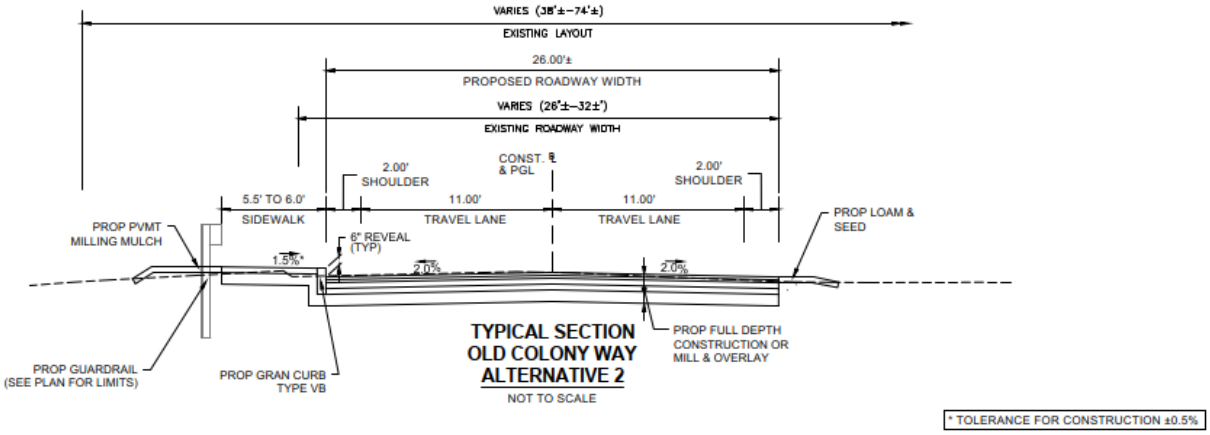

Figure 3 Typical Section Alternative 2

7.0 Opinion of Cost

The cost in both alternatives is the same because the cross-sectional width of the roadway, bridge, sidewalk and project limits are not different. The total estimated construction cost is $6,510,000.

8.0 Conclusion

Both alternatives require design justification for pedestrian and bicycle accommodation. Both have the same cost and impacts to utilities and properties. The only difference between the two are lane and shoulder configuration. Alternative 1 allows for bicycle accommodation southbound with a 4’ shoulder, while still maintaining the minimum lane width for a collector of 10-foot. Old Colony Avenue and South Street East is a bus route on the Greater Attleboro Taunton Regional Transit Authority. Bus lanes are permitted on 10’ travel lanes. The narrower 10’ roadway will help reduce speeds. Alternative 2 is like existing conditions where the lane widths are close to 11-feet and the shoulders are close 2-feet. Sharrows can be added to both lanes to signify that vehicles will be sharing the roadway with bicyclists.

APPENDIX G – EFH & USFWS Section 7 Documentation

- NOAA Section 7 Consultation
- USFWS Essential Fish Habitat Coordination Sediment Sample Test Results

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New England Ecological Services Field Office
70 Commercial Street, Suite 300
Concord, NH 3301-5094
Phone: (603) 223-2541 Fax: (603) 223-0104

In Reply Refer To: 12/18/2025 17:10:42 UTC
Project code: 2026-0024808
Project Name: 613642- RAYNHAM- TAUNTON- BRIDGE REPLACEMENT, R-02-003, SOUTH STREET EAST OVER THE TAUNTON RIVER

Subject: Not Likely to Adversely Affect Concurrence verification letter for the '613642- RAYNHAM- TAUNTON- BRIDGE REPLACEMENT, R-02-003, SOUTH STREET EAST OVER THE TAUNTON RIVER' project under the December 13, 2024, FHWA, FRA, FTA Programmatic Biological Opinion for Transportation Projects within the Range of the Indiana Bat, Northern Long-eared Bat, and Tricolored Bat.

To whom it may concern:

This letter records the determination of effects to federally listed (or proposed) bat species anticipated to result from the 613642- RAYNHAM- TAUNTON- BRIDGE REPLACEMENT, R-02-003, SOUTH STREET EAST OVER THE TAUNTON RIVER (the Project). This determination is based upon information you entered into the assisted determination key (Dkey) associated with the above referenced Programmatic Biological Opinion/Conference Opinion (PBO/PCO) in the U.S. Fish and Wildlife Service's (Service) Information for Planning and Consultation (IPaC) system on the date listed above to verify that the Project may rely on the concurrence provided in the PBO/PCO to satisfy requirements under section 7(a)(2) of the Endangered Species Act of 1973 (ESA) (16 USC 1536), as amended.

Ensuring Accurate Determinations When Using IPaC:

The Service developed the IPaC system and this Dkey in accordance with the ESA and based on the PBO/PCO. All information submitted by the project proponent into IPaC must accurately represent the full scope and details of the Project.

Failure to accurately represent or implement the Project as detailed in the Dkey invalidates this letter. Answers to certain questions in the Dkey commit the project proponent to implementation of conservation measures that must be followed for the ESA determinations to remain valid. Carefully review this letter, your ESA requirements are <u>NOT</u> yet complete.

Determinations:

Based on the information you provided (Project Description shown below), you have determined that the Project is within the scope and adheres to the criteria of the PBO/PCO, including the adoption of applicable avoidance and minimization measures. Based on your IPaC submission and the PBO/PCO, the Project is consistent with the following effect determinations:

Species	Listing Status	Determination
Northern Long-eared Bat (*Myotis septentrionalis*)	Endangered	NLAA
Tricolored Bat (*Perimyotis subflavus*)	Proposed Endangered	NLAA

The tricolored bat is proposed for listing as endangered under the ESA, but not yet listed. For actions that may affect a proposed species, agencies cannot consult, but they can confer under the authority of section 7(a)(4) of the ESA. Such conferences can follow the procedures for a consultation and be adopted as such if the proposed species is listed. Should the tricolored bat be listed, agencies must review projects that are not yet complete, or projects with ongoing effects within the tricolored bat range that previously received a no effect or not likely to adversely affect (NLAA) determination from the key to confirm that the determination is still accurate.

The Service has 14 calendar days to notify the lead Federal action agency or designated non-federal representative if we determine that the Project does not meet the criteria for a NLAA determination under the PBO/PCO. **If the Service does <u>not</u> notify the lead Federal action agency or designated non-federal representative within that timeframe, you may proceed with the Project under the terms of the NLAA concurrence provided in the PBO/PCO**. This verification period allows Service Field Offices to apply local knowledge to implementation of the PBO, as we may identify a small subset of actions having impacts that were unanticipated. In such instances, Service Field Offices may request additional information that is necessary to verify inclusion of the proposed action under the PBO/PCO.

If the Project is modified, or new information reveals that it may affect the Indiana bat, northern long-eared bat, or tricolored bat in a manner or to an extent not considered in the PBO/PCO, further review to conclude the requirements of ESA section 7(a)(2) may be required.

For Proposed Actions that include bridge/culvert or structure removal, replacement, and/or maintenance activities:

If your initial bridge, culvert, or structure assessment failed to detect Indiana bat, northern long-eared bat, or tricolored bat use or occupancy, yet bats are later detected prior to, or during construction, promptly notify the local Service Field Office within 2 working days of the discovery. In addition, please document whether incidental take occurred, and if so, the type (i.e. kill or harm) and amount (i.e. number of individuals) and submit documentation to the local Service Field Office within 5 working days from the completion of the bridge, culvert, or structure construction (use Appendix E - Post Assessment Discovery of Bats at Bridge/Culvert or Structure Form in the User's Guide). In these instances, potential incidental take of Indiana bats, northern long-eared bats, or tricolored bats may be exempted provided that the take is reported to

the Service. In these instances, potential incidental take of Indiana bats, northern long-eared bats, or tricolored bats may be exempted provided that the take is reported to the Service.

If the Project may affect any other federally listed or proposed species and/or designated critical habitat, additional consultation between the lead Federal action agency and this Service Field Office is required for those species/designated critical habitat. If the Project has the potential to take bald or golden eagles, additional coordination with the Service under the Bald and Golden Eagle Protection Act may also be required. In either of these circumstances, please advise the lead Federal action agency to contact this Service Field Office

The following species may occur in your project area and **are not** covered by this determination:

- Monarch Butterfly *Danaus plexippus* Proposed Threatened
- Plymouth Redbelly Turtle = Plymouth Redbelly Cooter *Pseudemys rubriventris bangsi* Endangered

PROJECT DESCRIPTION

The following project name and description was collected in IPaC as part of the endangered species review process.

NAME

613642- RAYNHAM- TAUNTON- BRIDGE REPLACEMENT, R-02-003, SOUTH STREET EAST OVER THE TAUNTON RIVER

DESCRIPTION

RAYNHAM- TAUNTON- BRIDGE REPLACEMENT, R-02-003=T-01-004 (3M4), SOUTH STREET EAST OVER THE TAUNTON RIVER

The proposed project consists of replacing the bridge deck, increasing safety, and improving operations of the roadway. The proposed design relocates the existing bridge sidewalk from the east to the west side of the bridge to connect to an existing sidewalk on the southwest approach. A 5-foot shoulder for a bike lane in the northbound direction improves safety by providing dedicated space for cyclists, separating them from vehicular traffic. This separation reduces the risk of conflicts between cyclists and vehicles.

Monarch Butterfly: Proposed Threatened Species only. The project action will not jeopardize the continued existence of the proposed species.

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@41.88630155,-71.03005054127355,14z

DETERMINATION KEY RESULT

Based on your answers provided, this project(s) may affect, but is not likely to adversely affect the Indiana bat, northern long-eared bat or tricolored bat, therefore, consultation with the U.S. Fish and Wildlife Service pursuant to Section 7(a)(2) of the Endangered Species Act of 1973 (ESA) (87 Stat. 884, as amended 16 U.S.C. 1531 et seq.) is required. However, also based on your answers provided, this project may rely on the concurrence provided in the Programmatic Biological Opinion/Conference Opinion for Transportation Projects in the Range of the Indiana bat, northern long-eared bat, and tricolored bat, dated December 13, 2024.

QUALIFICATION INTERVIEW

1. Which Federal Agency is the lead federal agency the action?

   A) Federal Highway Administration (FHWA)

2. Does the Action Area intersect the species list area of the Northern long-eared bat?

   Automatically answered
   Yes

3. Does the Action Area intersect the species list area of the tricolored Bat (TCB)?

   Automatically answered
   Yes

4. [Semantic] Is any portion of the action area within a 0.5 mile radius of an entrance/opening to any known NLEB or TCB hibernacula?

   Note: The map queried for this question contains proprietary information and cannot be displayed. If you need additional information, please contact the Field Office listed in the letterhead of this letter.

   Automatically answered
   No

5. Does your project's activities include raising the road profile above the tree canopy in documented habitat for the Indiana bat, NLEB, or TCB?

   Note: For the definition of documented habitat, refer to Appendix A: https://www.fws.gov/media/users-guide-range-wide-programmatic-consultation-indiana-bat-and-northern-long-eared-bat

   No

6. Is your project located within a karst area?

   No

7. Will the project include bridge, culvert, or structure removal, replacement, and/or alteration activities?

   Note: For definitions of bridge, culvert, and structure, refer to Appendix A: https://www.fws.gov/media/users-guide-range-wide-programmatic-consultation-indiana-bat-and-northern-long-eared-bat.

   Yes

8. Do your project's activities involve tree removal/trimming, temporary lighting, new/ additional permanent lighting, ground disturbance, percussives that involves noise/ vibration above existing background levels, vibrations, or slash pile burning?

   Yes

9. Is there suitable summer habitat for the Indiana bat, NLEB, or TCB within the project action area?

   Note: See the Service's summer survey guidance for current definitions of suitable habitat [https://www.fws.gov/midwest/endangered/mammals/inba/inbasummersurveyguidance.html].

   Yes

10. Have P/A surveys for the Indiana bat, NLEB, or TCB been conducted within the suitable summer habitat located within your project action area? This refers to mist-netting or acoustic surveys, not bridge assessments.

    Note: See the Service's survey guidance https://www.fws.gov/midwest/endangered/mammals/inba/inbasummersurveyguidance.html

    Yes

    SUBMITTED DOCUMENTS

    - *Raynham_613642_memo_20251027.pdf https://ipac.ecosphere.fws.gov/project/A3767GZ2FBHULEJFUCBVE3PERE/projectDocuments/173932326*

11. Did the P/A surveys detect Indiana bats, NLEBs, or TCBs?

    Note: If Indiana bats, NLEBs, or TCBs are detected, the action area is considered **documented habitat.**

    No

12. Did the local Service Field Office verify that this P/A survey can be used to determine Indiana bat, NLEB, and TCB are **not likely to be present** within the suitable summer habitat located within your project area?

    Yes

13. Will the project include **bridge** removal, replacement, and/or alteration activities?

    Yes

14. Has a Bridge Bat Assessment been conducted **within the last 24 months** to determine if the bridge is being used by the Indiana bat, NLEB, or TCB? If yes, upload assessment.

    Note: Refer to the Service's current survey guidance for acceptable assessment practices and validity timeframe of bridge/culvert and structure bat assessments: https://www.fws.gov/library/collections/range-wide-indiana-bat-and-northern-long-eared-bat-survey-guidelines.

    Yes

    SUBMITTED DOCUMENTS

    - *Raynham_613642_memo_20251027.pdf https://ipac.ecosphere.fws.gov/project/A3767GZ2FBHULEJFUCBVE3PERE/projectDocuments/173932326*

15. Please select one of the following results of the Bridge Bat Assessment:

    c) *Indicates the* ***absence*** *of Indiana bats, NLEBs, or TCBs roosting in/under the bridge (no bats, guano, etc.)?*

16. Does the project include **culvert** removal, replacement, and/or alteration activities?

    No

17. Does the project include **structure** removal, replacement, and/or alteration activities?

    No

18. Does the Action Area intersect the species list area of the tricolored Bat (TCB)?

    Automatically answered
    Yes

19. Does the Action Area intersect the species list area of the northern long-eared bat (NLEB)?

    Automatically answered
    Yes

PROJECT QUESTIONNAIRE

1. Have you made a No Effect determinations for all other species included on the FWS IPaC generated species list?

   Yes

2. Have you made a May Affect determination for any other species on the FWS IPaC generated list?

   No

3. Please enter the date of the bridge assessment.

   6/2/2025

AVOIDANCE AND MINIMIZATION MEASURES (AMMS)

This determination key result includes the commitment to implement the following Avoidance and Minimization Measures (AMMs):

GAMM1

Ensure all operators, employees, and contractors working in areas of Indiana bat, NLEB, or TCB suitable habitat are aware of all Transportation Agency environmental commitments, including all applicable AMMs.

DETERMINATION KEY DESCRIPTION: FHWA, FRA, FTA PROGRAMMATIC CONSULTATION FOR TRANSPORTATION PROJECTS AFFECTING IBAT, NLEB, OR TCB

This key was last updated in IPaC on September 11, 2025. Keys are subject to periodic revision.

This decision key is intended for projects/activities funded or authorized by the Federal Highway Administration (FHWA), Federal Railroad Administration (FRA), and/or Federal Transit Administration (FTA), which may require consultation with the U.S. Fish and Wildlife Service (Service) under Section 7 of the Endangered Species Act (ESA) and may affect the federally listed endangered Indiana bat (*Myotis sodalis*), northern long-eared bat (*Myotis septentrionalis*), and/or federally proposed endangered tricolored bat (*Perimyotis subflavus*).

This decision key should only be used to verify project applicability with the Service's Programmatic Biological Opinion/Conference Opinion for Transportation Projects in the Range of the Indiana bat, northern long-eared bat, and tricolored bat, dated December 13, 2024. The programmatic consultation limited transportation activities that may affect the covered bat species and addresses situations that are both likely and not likely to adversely affect the covered bat species. This decision key will assist in identifying the effect of a specific project/activity and the applicability of the programmatic consultation. The programmatic consultation is not intended to cover all types of transportation actions. Activities outside the scope of the programmatic consultation, or that may affect ESA-listed species other than the Indiana bat, northern long-eared bat, or tricolored bat, or their designated critical habitat, may require additional ESA Section 7 consultation.

IPAC USER CONTACT INFORMATION

Agency: Massachusetts Department of Transportation
Name: Stephanie Barton
Address: 10 Park Plaza
City: Boston
State: MA
Zip: 02116
Email stephanie.g.barton@dot.state.ma.us
Phone: 8572623378

Appendix A. Verification Form (updated January 2025)

Federal Highway Administration (FHWA) or the applicable state Department of Transportation (DOT) shall submit a signed version of this completed form, together with any project plans, maps, supporting analyses, etc., to NOAA's National Marine Fisheries Service (NMFS), Greater Atlantic Regional Fisheries Office, Protected Resources Division (GARFO PRD) at nmfs.gar.esa.section7@noaa.gov with "FHWA GARFO NLAA Program: [Project Title or Number]" in the subject line. **Note:** project design contractors and/or consultants may assist in preparing the form, but only FHWA/DOT staff shall sign off on it on the final page.

Project Activity Type (check all that apply to the entire action):

- [x] 1. Bridge repair, demolition, or replacement project
- [ ] 2. Culvert repair or replacement project
- [ ] 3. Dock, pier, or waterway access project (includes construction, demolition, and repairs)
- [ ] 4. Slope stabilization project

Transportation Project Information

Name of Project:	613642 RAYNHAM- TAUNTON- BRIDGE REPLACEMENT, R-02-003=T-01-004		
Reinitiation (Yes/No):	No		
State DOT/Program:	MassDOT		
DOT ID Code:	613642		
Contact Person:	Dave Paulson		
Phone:	+ 1 857 262 3378	Email:	david.j.paulson@dot.state.ma.
Project Latitude (e.g., 42.625884):		41.886006	
Project Longitude (e.g., -70.646114):		-71.030015	
Maximum Water Depth (m)		2.3	
Anticipated Project Start Date:	Decemeber 2026	Anticipated Project End Date:	October 2028
City/Town:	Taunton/ Raynham MA	Water body:	Taunton River
Project/Action Description and Purpose:	The Massachusetts Department of Transportation (MassDOT – Highway Division) Is proposing a reconstruction of the Old Colony Avenue Bridge over the Taunton River. The overall project limits extend 250' north of the intersection of Old Colony Avenue and Battle Row in Taunton, MA; along the Old Colony Avenue Bridge; and 370' to the intersection of South Street East and Sandy Hill Road, in Raynham, MA . The total length of the Project is approximately 790' along Old Colony Avenue and South Street East. The Project will consist of several activities including: Bridge deck replacement; Full depth pavement construction in the vicinity of the bridge; Pavement milling and overlay to the north and south of the bridge; Modifications to roadway geometry; Construction of a new sidewalk; New granite curbing; Striping of two travel lanes and a bike lane; Installation of Americans With Disabilities Act (ADA)-Compliant Ramps; Replacement of Guardrails; Paving of an existing town-owned gravel area associated with the pump station; Modifications to water, sewer, gas, electric and drainage utilities; Installation of a sediment forebay and leaching basins; Placement of riprap scour protection within the Taunton River; and Tree clearing and trimming. The Project only proposes the replacement of the superstructure and will maintain the existing substructure (i.e., piers and abutments). The project will result in temporary and permanent impacts to federally jurisdictional Waters of the U.S. including the land below Ordinary High Water (Streambank and Streambed) associated with the Taunton River. The Project will result in a total of 13,270		

ESA-listed species and/or critical habitats in the action area (Check all that apply)

☑	Atlantic sturgeon (all DPSs)	☐	Kemp's ridley sea turtle
☐	Atlantic sturgeon critical habitat Indicate which DPS (GOM, NYB, Chesapeake Bay DPSs): Select DPS	☐	Loggerhead sea turtle (Northwest Atlantic DPS)
☐	Shortnose sturgeon	☐	Leatherback sea turtle
☐	Atlantic salmon (GOM DPS)	☐	North Atlantic right whale
☐	Atlantic salmon critical habitat (GOM DPS)	☐	North Atlantic right whale critical habitat
☐	Green sea turtle (North Atlantic DPS)	☐	Fin whale

* Please consult GARFO PRD's ESA Section 7 Mapper for ESA-listed species and critical habitat information for your action area at: https://www.fisheries.noaa.gov/new-england-mid-atlantic/consultations/section-7-species-critical-habitat-information-maps-greater.

The following stressors are applicable to the action:

- ☐ Underwater Noise
- ■ Impingement/Entrainment and Entanglement
- ■ Water Quality/Turbidity
- ■ Habitat Alteration
- ☐ Vessel Traffic

Impacts Table

Habitat Alteration		
	Permanent (acres)	Temporary (acres)
Sand (saline)		
Silt/Mud/Clay (saline)		
Hard bottom (saline)		
Submerged Aquatic Vegetation (SAV) (saline)		
Sand (freshwater)		
Silt/Mud/Clay (freshwater)	0.19	0.10
Hard bottom (freshwater)		
Submerged Aquatic Vegetation (SAV) (freshwater)		
Total amount of habitat alteration	0.19	0.10

In-water Construction Impacts	
	Amount in meters
Width of water body in action area (m)	27.0
Stressor category that extends furthest distance into water body (e.g.; underwater noise, turbidity plume)	Turbidity
Maximum extent of stressor into the water body (m)	92.0

Project Design Criteria (PDC) Checklist
FHWA/DOT shall incorporate all general PDCs and all applicable PDCs in the appropriate stressor categories. For any PDCs that are not incorporated, additional justification is required for a project to be eligible for the NLAA Program. FHWA/DOT shall check the corresponding box for each PDC that is, or will be, incorporated into the project or indicate if not applicable.

GENERAL PDCs			
Yes	N/A	PDC #	PDC Description
☑	☐	1.	Ensure all operators, employees, and contractors are aware of all FHWA environmental commitments, including these PDC, when working in areas where ESA-listed species may be present or in critical habitat.
☑		2.	No portion of the proposed action will individually or cumulatively have an adverse effect on ESA-listed species or critical habitat.
☐	☑	3.	No portion of the proposed action that may affect the GOM DPS of Atlantic salmon will occur in the tidally influenced portion of rivers/streams where their presence is possible from April 10 through November 7. The range of the GOM DPS only occurs in Maine. **Note**: If the project will occur within the geographic range of the GOM DPS Atlantic salmon but their presence is not expected following the best available commercial scientific data, the work window does not need to be applied. Please attach best available information (i.e. local fisheries biologist correspondence).
☐	☑	4.	No portion of the proposed action that may affect shortnose or Atlantic sturgeon will occur in areas identified as spawning grounds as follows: i. Gulf of Maine: Apr 1-Aug 31 ii. Southern New England/New York Bight: Mar 15-Aug 31 iii. Chesapeake Bay: Mar 15-Jul 1 and Sep 15-Nov 1 **Note**: If river specific information exists that provides better or more refined time of year information, those dates may be substituted with NMFS approval.
☐	☑	5.	No portion of the proposed action that may affect shortnose or Atlantic sturgeon will occur in areas identified as overwintering grounds where dense aggregations are known to occur as follows: i. Gulf of Maine: Oct 15-Apr 30 ii. Southern New England/New York Bight: Nov 1-Mar 15 iii. Chesapeake Bay: Nov 1-Mar 15 **Note**: If river specific information exists that provides better or more refined time of year information, those dates may be substituted with NMFS approval.
☐	☑	6.	Within designated critical habitat for Atlantic sturgeon, no work will affect hard bottom substrate (e.g., rock, cobble, gravel, limestone, boulder, etc.) in low salinity waters (i.e., 0.0-0.5 parts per thousand) (PBF 1).
☑		7.	Work will result in no or only temporary/short-term changes in water temperature, water flow, salinity, or dissolved oxygen levels.

Yes	N/A	PDC #	PDC Description
☑		8.	If ESA-listed species are (a) likely to pass through the action area at the time of year when project activities occur; and/or (b) the project will create an obstruction to passage when in-water work is completed, then a zone of passage (~50% of water body) with appropriate habitat for ESA-listed species (e.g., depth, water velocity, etc.) must be maintained (i.e., physical or biological stressors such as turbidity and sound pressure must not create barrier to passage).
☑		9.	The project will not adversely impact any submerged aquatic vegetation (SAV) or oyster reefs.
☑		10.	No blasting or use of explosives will occur.
☑		11.	No in-water work on large dams or tide gates (small dam and tide gate repairs may be permitted with prior review and approval from NMFS).

UNDERWATER NOISE PDCs			
Yes	N/A	PDC #	PDC Description
☐	☑	12.	If pile driving is occurring during a time of year when ESA-listed species may be present, and the anticipated noise is above the behavioral noise threshold, a "soft start" is required to allow animals an opportunity to leave the project vicinity before sound pressure levels increase. *In addition to using a soft start at the beginning of the work day for pile driving, one must also be used at any time following cessation of pile driving for a period of 30 minutes or longer.* <u>For impact pile driving</u>: pile driving will commence with an initial set of three strikes by the hammer at 40% energy, followed by a one minute wait period, then two subsequent three-strike sets at 40% energy, with one-minute waiting periods, before initiating continuous impact driving. <u>For vibratory pile installation</u>: pile driving will be initiated for 15 seconds at reduced energy followed by a one-minute waiting period. This sequence of 15 seconds of reduced energy driving, one-minute waiting period will be repeated two additional times, followed immediately by pile-driving at full rate and energy.

Yes	N/A	PDC #	PDC Description
☐	☑	13.	All underwater noise is below the injury thresholds of ESA-listed species in the action area. Attach your calculations to this verification form supporting this.
☐	☑	14.	Any new pile-supported structure must involve the installation of no more than 50 piles (below MHW).

Information for Pile Driving:
If your project includes **pile driving of any kind**, please attach your calculation to this verification form to verify that it fits within the scope of the behavioral/injury threshold analysis for ESA-listed species in the action area. The NMFS Office of Protected Resources Acoustic Calculator is available as one source, should you not have other information:
https://www.fisheries.noaa.gov/new-england-mid-atlantic/consultations/section-7-effects-analysis-acoustics-greater-atlantic-region

Pile material (e.g., steel pipe, concrete)	Pile diameter/ width (in)	Number of piles	Installation method (e.g., impact hammer, vibratory start and then impact hammer to depth, drilling)

IMPINGEMENT/ENTRAINMENT AND ENTANGLEMENT PDCs			
Yes	N/A	PDC #	PDC Description
☑	☐	15.	If excavating or dredging, only mechanical buckets, hydraulic cutterheads, or low volume hopper dredges (e.g., CURRITUCK, ≤300 cubic yard maximum bin capacity) may be used. **Note**: We consider excavating a smaller scale form of mechanical dredging.
☑	☐	16.	No new excavation or dredging in Atlantic sturgeon or salmon critical habitat (excavation in a prior construction footprint or maintenance dredging is permitted, but still must meet all other PDCs). New excavation or dredging outside Atlantic sturgeon or salmon critical habitat is limited to one-time events (e.g., burying a cable or utility line) and minor (≤2 acres) expansions of areas already subject to prior excavation or maintenance dredging. Locating a replacement bridge within 250 feet (centerline to centerline) of an existing bridge and excavation of sediment around bridge piers are considered work in a previous construction footprint. **Note**: We consider excavating a smaller scale form of mechanical dredging.

Yes	N/A	PDC #	PDC Description
☑	☐	17.	Temporary intakes related to construction are prohibited in sturgeon and salmon spawning, rearing, or overwintering habitat during the time of year windows identified in General PDCs 3-5. If utilized outside those areas and times of year and in an area with anticipated sturgeon and salmon presence, temporary intakes must be equipped with 2-millimeter wedge wire mesh screening and must not have greater than 0.5 feet per second intake velocities, to prevent impingement or entrainment of juvenile and early life stages of these species.
☑	☐	18.	Work behind cofferdams, turbidity curtains, or other instruments that prevent access of animals to the project area is required when ESA-listed species are likely to be present (if presence is limited to rare, transient individuals, access control measures are not necessary). Once constructed, work inside a cofferdam at any time of year may be permitted with NMFS approval, provided the cofferdam is installed/removed outside the time-restricted period.
☑	☐	19.	No new permanent surface water withdrawal, water intakes, or water diversions.
☑	☐	20.	Turbidity control measures, including cofferdams, must be designed to not entangle or entrap ESA-listed species.
☐	☑	21.	Any in-water lines, ropes, or chains must be made of materials and installed in a manner to minimize or avoid the risk of entanglement by using thick, heavy, and taut lines that do not loop or entangle. Lines can be enclosed in a rigid sleeve.

WATER QUALITY/TURBIDITY PDCs			
Yes	N/A	PDC #	PDC Description
☐	☑	22.	In-water offshore disposal may only occur at designated disposal sites that have already been the subject of ESA section 7 consultation with NMFS and where a valid consultation is in place.
☐	☑	23.	Any temporary discharges must meet state water quality standards (e.g., no discharges of substances in concentrations that may cause acute or chronic adverse reactions, as defined by EPA water quality standards criteria).
☑	☐	24.	Only repair, upgrades, relocations, and improvements of existing discharge pipes or replacement in-kind are allowed; no new construction of untreated discharges.
☑	☐	25.	Work behind cofferdams, turbidity curtains, or other instruments to control turbidity is required when operationally feasible and ESA-listed species are likely to be present (if presence is limited to rare, transient individuals, turbidity control methods are not necessary).

HABITAT ALTERATION PDCs			
Yes	N/A	PDC #	PDC Description
☑	☐	26.	Minimize all new waterward encroachment and permanent fill.
☐	☑	27.	In Atlantic salmon critical habitat, stream simulation design with a minimum span of 1.2 bankfull width will be used in areas with minimal tidal influence. In tidal areas, a design that allows for unimpeded flow will be used (no delay in water entering or exiting the area upstream of the crossing).
☐	☑	28.	In Atlantic salmon critical habitat, no culvert end extensions, invert line culvert rehabilitation, or slipline culvert rehabilitation may occur.

VESSEL TRAFFIC PDCs			
Yes	N/A	PDC #	PDC Description
☐	☑	29.	Maintain project (i.e., construction) vessels operating within the action area to speed limits below 10 knots and dredge vessels to speeds of 4 knots maximum, while dredging.
☐	☑	30.	Maintain a 1,500-foot buffer between project (i.e., construction) vessels and ESA-listed whales and a 300-foot buffer between project vessels and sea turtles. This also applies to dredge vessels.
☐	☑	31.	The number of project (construction) vessels must be limited to the greatest extent possible, as appropriate to size and scale of project.
☐	☑	32.	The project must not result in the permanent net increase of commercial vessels.

Justification for NLAA Determination if not Incorporating All PDC
If the project is not in compliance with all of the general and stressor-based PDCs, but you can provide justification and/or special conditions to demonstrate why the project still meets the NLAA determination and is consistent with the aggregate effects considered in the programmatic consultation, you may still certify your project through the NLAA program using this verification form. Please identify which PDCs your project does not meet (e.g., PDC 9, PDC 15, PDC 22, etc.) and provide your rationale and justification for why the project is still eligible for the verification form. Project modifications must not result in different effects not already considered.

To demonstrate that the project is still NLAA, you must explain why the effects on ESA-listed species or critical habitat are **insignificant** (i.e., too small to be meaningfully measured or detected) or **discountable** (i.e., extremely unlikely to occur). **Please use this language in your justification.**

PDC#	Justification

FHWA/DOT Verification of Determination (To be filled out by FHWA/DOT staff only)
By submitting this Verification Form, FHWA, or the state DOT as FHWA's designated non-federal representative, indicates that they determined that the proposed activity described above is not likely to adversely affect (NLAA) ESA-listed species or designated critical habitat under NMFS jurisdiction in accordance with the Program, and all effects (direct, indirect, interrelated, and interdependent) are either insignificant (so small they cannot meaningfully be measured, detected, or evaluated) or discountable (extremely unlikely to occur).

☑	In accordance with the FHWA GARFO NLAA Program, we have determined that the action complies with all applicable PDCs and is not likely to adversely affect listed species.
☐	In accordance with the FHWA GARFO NLAA Program, we have determined that the action is not likely to adversely affect listed species per the justifications and/or special conditions provided above.

FHWA/DOT Signature:	Date:
	01/09/2026

By providing your determination and signature, you are certifying that to the best of your knowledge the information provided in this form is accurate and based upon the best available scientific information. This form must be filled out and signed by FHWA or state DOT staff, as an officially designated non-federal representative.

GARFO PRD Concurrence (To be filled out by GARFO PRD)
After receiving the Verification Form, GARFO PRD will contact FHWA/DOT with any concerns and indicate whether GARFO PRD concurs with FHWA/DOT's determination.

☑	In accordance with the FHWA GARFO NLAA Program, GARFO PRD concurs with FHWA/DOT's determination that the action complies with all applicable PDCs and is not likely to adversely affect listed species or critical habitat.
☐	In accordance with the FHWA GARFO NLAA Program, GARFO PRD concurs with FHWA/DOT's determination that the action is not likely to adversely affect listed species or critical habitat per the justifications and/or special conditions provided above.
☐	GARFO PRD does not concur with FHWA/DOT's determination that the action complies with the applicable PDCs (with or without justifications), and recommends an individual Section 7 consultation to be completed independent from the FHWA GARFO NLAA Program.

GARFO PRD Signature:	Date:
	01/12/2026

Appendix B. Verification Form

This form demonstrates compliance with the FHWA/NMFS GARFO EFH Programmatic Consultation dated 1/16/24. The applicable state Department of Transportation (state DOT) will complete this form and enter the project details into the ESA/EFH webtool (https://www.environment.fhwa.dot.gov/esawebtool/) to apply the programmatic consultation to a transportation project. FHWA will receive and review the completed forms before a final NEPA decision as part of the overall environmental review process. FHWA with the assistance of VOLPE will compile the information provided by all covered state DOTs on the completed Verification Forms and ESA/EFH webtool for the purposes of tracking and annual monitoring. FHWA/state DOT must include the completed Verification Form as part of a permit application with any other federal agency, such as U.S. Army Corps of Engineers or U.S. Coast Guard, to confirm that EFH consultation is complete.

Projects that are unable to meet the mandatory conservation recommendations in **bold** the state DOT will work with their FHWA Division Office to complete individual EFH consultation with NMFS.

Project Activity Type

1. ☒ Bridge repair, demolition, and replacement
2. ☐ Culvert repair and replacement
3. ☐ Docks, piers, and waterway access projects
4. ☐ Slope stabilization

Transportation Project Information

Project Name:	RAYNHAM- TAUNTON- BI	Project Number:	613642
Project Sponsor:	MassDOT	Contact Person:	Dave Paulson
Email:	david.j.paulson@dot.state.	Phone:	+ 1 857 262 3378
Latitude (e.g., 42.625884):		41.886005903543975	
Longitude (e.g., -70.646114):		71.0300152141668	
City/Town, State:	Taunton/ Raynham MA	Waterway:	Taunton River
Project Description and Purpose:	The Massachusetts Department of Transportation (MassDOT – Highway Division) Is proposing a reconstruction of the Old Colony Avenue Bridge over the Taunton River. The overall project limits extend 250' north of the intersection of Old Colony Avenue and Battle Row in Taunton, MA; along the Old Colony Avenue Bridge; and 370' to the intersection of South Street East and Sandy Hill Road in Raynham MA. The total length of the Project		
Anticipated Project Start Date:	Dec 2026	Anticipated Project End Date:	October 2028
Total area of impact to EFH (in acres): Include locus map with area of impact.		0.29	
Area of impacts to sensitive habitats (in square feet):		No impacts to submerged aquatic vegetation (SAV) or oyster reefs allowed.	
Natural rocky habitat (e.g., bedrock, boulders, cobble, and/or gravel):		0	
Salt marsh:		0	
Areas containing shellfish (excluding oyster reefs):		0	
Intertidal mudflats:		0	
Area of impact to diadromous fish habitat:		0.29	

Potential Stressors Caused by the Activity (Check all that apply based on activity type)

☐ Underwater Noise
☒ Impingement/Entrainment and Entanglement
☒ Water Quality/Turbidity
☒ Habitat Alteration
☐ Vessel Traffic

EFH Conservation Recommendation Checklist

FHWA/state DOT will indicate how the project addresses each of the programmatic EFH conservation recommendations, by selecting the appropriate check box and providing a brief explanation where necessary. **Bolded CRs are required.** If the project is not in compliance with any additional programmatic EFH conservation recommendation and FHWA/state DOT has still determined that the effects of a project on EFH are not substantial and the project is otherwise consistent with the FHWA programmatic EFH consultation, provide justification below under the conservation recommendations that are not included.

Underwater Noise

☒ Check here if the EFH conservation recommendations in this section are not applicable because the project will not create underwater noise as a stressor. Proceed to the next stressor.

1. Use a vibratory hammer to the maximum extent practicable.

☐ Not met:

☐ Not applicable, provide reasoning:

☐ Project is unable to accommodate, provide justification:

☐ Met:

☐ Shown on project plans
☐ Included in description, other terms and conditions

2. For impact driving, an initial set of three strikes would be made by the hammer at 40 percent energy, followed by a 1-minute wait period, then two subsequent 3-strike sets at 40 percent energy, with 1-minute waiting periods, before initiating continuous impact driving. In addition to a soft start at the beginning of the day for impact pile driving, a soft start must also be used at any time following cessation of impact pile driving for a period of thirty minutes or longer and if any increase in pile installation or removal intensity is required. Build up power slowly from a low energy start-up over a 20-minute period to warn fish to leave the vicinity. This buildup shall occur in uniform stages to provide a constant increase in output. This should be done in accordance with the methods outlined in the NMFS GARFO/FHWA Best Management Practices (BMP) Manual.

☐ Not met:

☐ Not applicable, provide reasoning:

☐ Project is unable to accommodate, provide justification:

☐ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

3. Avoid the use of hollow steel pipe piles when possible.

☐ Not met:
- ☐ Not applicable, provide reasoning:
- ☐ Project is unable to accommodate, provide justification:

☐ Met:
- ☐ Shown on project plans
- ☐ Included in description, other terms and conditions

4. Do not undertake noise-generating work in diadromous streams within the spring diadromous fish TOY restriction listed in Appendix C unless it is isolated behind sealed, dewatered cofferdams, to avoid impeding fish migration.

☐ Not met:
- ☐ Not applicable, provide reasoning:
- ☐ Project is unable to accommodate, provide justification:

☐ Met:
- ☐ Shown on project plans
- ☐ Included in description, other terms and condition

Impingement/Entrainment and Entanglement

☐ Check here if the EFH conservation recommendations in this section are not applicable because the project will not lead to impingement/entrainment and entanglement as a stressor. Proceed to the next stressor.

5. **Turbidity control measures must be properly installed, secured and regularly monitored to ensure aquatic species are not entangled or trapped in the project area.**

☐ Not met: Project requires individual consultation with NMFS

☒ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

6. **No new permanent surface water withdrawal, water intakes, or water diversions. (Permanent surface water intakes do not include dry hydrants.)**

☐ Not met: Project requires individual consultation with NMFS

☒ Met
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

7. Install and operate temporary intakes related to construction in accordance with the NMFS GARFO/FHWA Best Management Practices (BMP) Manual and equip intakes with mesh size screening and approach velocity appropriate for the species and life stage anticipated to be present during construction. Temporary pumping/intakes related to construction water handling will be based on the resource present and be in accordance with state fisheries consultation (with documentation provided) where such consultation is available. In addition,
   a) Per the NMFS Anadromous Salmonid Passage Facility Design manual, screen openings must not exceed 3/32 inch and screen approach velocity must be less than 0.25 feet per second (ft. /sec) in waters supporting anadromous salmonids.
   b) The use of 2 millimeter (mm) wedge wire screens must be used with a maximum intake velocity of 0.5 feet per second (ft. /sec).
   c) In Virginia, a 1 mm wedge wire screen with a maximum intake velocity of 0.25 ft. /sec) is required.

☐ Not met:
- ☐ Not applicable, provide reasoning:
- ☐ Project is unable to accommodate, provide justification:

☒ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

Water Quality/Turbidity

☐ Check here if the EFH conservation recommendations in this section are not applicable because the project will not negatively affect water quality or create turbidity. Proceed to the next stressor.

8. **Install soil erosion, sediment, and turbidity controls and maintain them in effective operating condition during construction. Remove controls upon completion of work, after all exposed soil and other fills, as well as any work waterward of ordinary high water or the high tide line, are permanently stabilized.**

☐ Not met: Project requires individual consultation with NMFS

☒ Met:
- ☒ Shown on project plans
- ☒ Included in description, other terms and conditions

9. **Prevent construction debris and sediment from entering aquatic areas and remove all construction debris and excess/deteriorated materials and dispose of in an appropriate upland area.**

☐ Not met: Project requires individual consultation with NMFS

☒ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

10. **Dredged and/or excavated materials, including any fine-grained materials removed from inside culverts, shall either be moved to an upland location and stabilized to prevent reentry into the waterway or disposed of at a previously approved disposal site.**

☐ Not met: Project requires individual consultation with NMFS

☒ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

11. **Completely remove and do not reuse existing creosote piles that are affected by project activities and do not install new creosote piles. Piles that break or cannot be removed due to site conditions must be cut off at the mudline.**

☐ Not met: Project requires individual consultation with NMFS

☒ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

12. **Ensure that raw concrete does not contact the water; wet pours of concrete must be confined within sealed forms until the concrete is set or pre-cast members installed. Ensure grout bags are watertight.**

☐ Not met: Project requires individual consultation with NMFS

☒ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

13. Install and remove any in-water soil erosion, sediment, and turbidity controls outside of the TOY restrictions listed in Appendix C.

☐ Not met:

☐ Not applicable, provide reasoning:

☐ Project is unable to accommodate, provide justification:

☒ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

14. Conduct in-water work that produces turbidity or sedimentation in diadromous streams or EFH outside of the TOY restriction(s) in Appendix C.

☐ Not met:
- ☐ Not applicable, provide reasoning:
- ☐ Project is unable to accommodate, provide justification:

☒ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

15. Do not use any creosote, coal tar epoxy, or other hydrocarbon-based coatings on any in-water structures or overwater structures. Dispose of any demolished structures treated with creosote, coal tar epoxy, or other hydrocarbon-based coatings in an approved upland disposal site.

☒ Not met:
- ☒ Not applicable, provide reasoning:

Project does not propose any hydrocarbon-based coatings

- ☐ Project is unable to accommodate, provide justification:

☐ Met:
- ☐ Shown on project plans
- ☐ Included in description, other terms and conditions

16. In NJ only, in areas mapped as shellfish beds pursuant to N.J.A.C 7:7-9.2
    - All structures should be constructed with alternative materials, such as plastic, natural cedar or other untreated wood, or pressure-treated wood, coated offsite with an impact resistant, biologically inert substance to minimize leachate into shellfish areas.

- Coat any chemically or pressure treated piles (CCA, ACQ, etc.) with an impact-resistant, biologically inert substance. Coating should be applied during the manufacturing process, not post-manufacturing by a third party or contractor.

☒ Not met:

☒ Not applicable, provide reasoning:

Project action area is not in New Jersey

☐ Project is unable to accommodate, provide justification:

☐ Met:

☐ Shown on project plans

☐ Included in description, other terms and conditions

Habitat Alteration

☐ Check here if the EFH conservation recommendations in this section are not applicable because the project will not cause habitat alteration. Proceed to the next stressor.

17. **Remove temporary and/or obsolete structures and fills in their entirety. Use geotextile barriers prior to placement of temporary fill material to ensure complete removal.**

☐ Not met: Project requires individual consultation with NMFS

☒ Met:

☐ Shown on project plans

☒ Included in description, other terms and conditions

18. **Return areas impacted by temporary activities, fills, or structures to pre-construction or better condition, including elevations and substrate, and replant with native species.**

☐ Not met: Project requires individual consultation with NMFS

☒ Met:

☐ Shown on project plans

☒ Included in description, other terms and conditions

19. **Temporary monitoring devices, if used in-water as part of an activity, shall be removed and the substrate restored to pre-construction elevations no later than 24 months from initial installation, or upon completion of data acquisition.**

☐ Not met: Project requires individual consultation with NMFS

☒ Met:

☐ Shown on project plans

☒ Included in description, other terms and conditions

20. **Pipelines and cables that cross a waterway must not rest on the substrate. They may be**

attached to an overwater structure or be buried to allow an area to return to preexisting conditions.

☐ Not met: Project requires individual consultation with NMFS

☒ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

21. **Any fill, including planting media and placement of any seed shellfish, spatted-shell, or cultch must be free of all non-native or invasive species and/or contaminants. An invasive species control plan must be part of the project if the transportation agency cannot guarantee this.**

☐ Not met: Project requires individual consultation with NMFS

☒ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

22. **Prevent dislodging of coir logs, mats, or native oyster shell.**

☐ Not met: Project requires individual consultation with NMFS

☒ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

23. **Lowermost section of floating docks and vessels must be ≥18 inches above the substrate at all times.**

☐ Not met: Project requires individual consultation with NMFS

☒ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

24. **Avoid propeller scour and grounding of all project vessels and floating docks.**

☐ Not met: Project requires individual consultation with NMFS

☒ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

25. Provide compensatory mitigation for all permanent impacts to aquatic habitats and for temporary impacts in place over 12 months to address the temporal loss of aquatic habitat functions. This could include a contribution to an existing in-lieu fee program. Because compensatory mitigation is intended to offset adverse effects of an action, it

cannot be viewed separately from an action causing the effect.

When impacts are unavoidable:

a) Conduct a pre-biological survey to map the coverage of the sensitive habitats;
b) Develop a compensatory mitigation plan for biological resource losses, including success criteria, monitoring and adaptive management plans, and long-term maintenance plan. Use the 2008 Final Rule, Compensatory Mitigation for Losses of Aquatic Resources under Clean Water Act Section 404 (33 CFR Parts 325 and 332, 40 CFR Part 230) and NOAA's Mitigation Policy as guides for the development of the compensatory mitigation plan.
c) Undertake compensatory mitigation prior to or concurrent with any impacts to sensitive habitat.

☒ Not met:

◉ Not applicable, provide reasoning:

The project does not propose any loss of aquatic resources

☐ Project is unable to accommodate, provide justification:

☐ Met:

☐ Shown on project plans
☐ Included in description, other terms and conditions

26. Prior to construction, identify and mark in the field any SAV and wetlands at the project site. An SAV survey is required for activities adjacent to mapped or known SAV if a survey has not been conducted in the previous three years.

☐ Not met:

☐ Not applicable, provide reasoning:

☐ Project is unable to accommodate, provide justification:

☒ Met:

☐ Shown on project plans
☒ Included in description, other terms and conditions

27. Locate temporary structures, anchors, spud barges, and construction, access, and dewatering activities outside of special aquatic sites.

☐ Not met:

☐ Not applicable, provide reasoning:

☐ Project is unable to accommodate, provide justification:

☒ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

28. All in-water work, including dredging or discharge of fill material will be undertaken at, or approximating, low tide and using low ground pressure equipment to prevent compaction. Low ground pressure is defined as < 3 psi. Where construction requires heavy equipment operation in or across wetlands or mudflats, the equipment shall be placed on construction timber mats that are adequate to support the equipment; be operated on dry or frozen wetlands such that shear pressure does not cause subsidence of the wetlands immediately beneath equipment and upheaval of adjacent wetlands. Construction mats must not be dragged into position.

☐ Not met:
- ☐ Not applicable, provide reasoning:
- ☐ Project is unable to accommodate, provide justification:

☒ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

29. Remove temporary and/or obsolete structures and fills in their entirety, unless the structure or fill is to be left in place in order to comply with conditions imposed by other state or federal permits. Obsolete structures do not include any structures that are repurposed or preserved to prevent habitat degradation (e.g., abutments or sheet piling that remain in place for habitat or scour protection).

☐ Not met:
- ☐ Not applicable, provide reasoning:
- ☐ Project is unable to accommodate, provide justification:

☒ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

30. If rock relocation is necessary, move them to an area of equivalent depth and substrate.

☐ Not met:

☐ Not applicable, provide reasoning:

☐ Project is unable to accommodate, provide justification:

☒ Met:

☐ Shown on project plans

☒ Included in description, other terms and conditions

31. The height of docks and piers must be at least four feet above salt marsh substrate and must be greater than or equal to the width of the deck to minimize shading impacts. The height must be measured from the marsh substrate to the bottom of the longitudinal support beam.

☐ Not met:

☐ Not applicable, provide reasoning:

☐ Project is unable to accommodate, provide justification:

☐ Met:

☐ Shown on project plans

☐ Included in description, other terms and conditions

32. The lowermost part of floating docks must be greater than or equal to 18 inches above the substrate at all times to avoid grounding and propeller scour and to provide adequate circulation and flushing.

☒ Not met:

☒ Not applicable, provide reasoning:

Floating docks not proposed

☐ Project is unable to accommodate, provide justification:

☐ Met:

☐ Shown on project plans

☐ Included in description, other terms and conditions

33. Habitat restoration or mitigation projects must not result in a permanent conversion or loss of sensitive habitats such as SAV, natural rocky habitats, areas containing shellfish, mudflats, and riffle and pool complexes.

☒ Not met:

☒ Not applicable, provide reasoning:

No SAS in action area

☐ Project is unable to accommodate, provide justification:

☐ Met:

☐ Shown on project plans

☐ Included in description, other terms and conditions

34. Grain size of any sediment used as part of habitat restoration must be the same size or larger than the native material at the site. Material must be free from toxic chemicals (in excess of ERM values in NOAA SQuiRT tables), asphalt, and other trash or anthropogenic debris.

☐ Not met:

☐ Not applicable, provide reasoning:

☐ Project is unable to accommodate, provide justification:

☒ Met:

☐ Shown on project plans

☒ Included in description, other terms and conditions

35. The following buffers apply between the following habitats and the top of slope of the area to be dredged/excavated.:

a) In New England, setbacks of 100 ft. from tidal SAV or 25 ft. from natural rocky habitats, Special Aquatic Sites (wetlands, mudflats, riffle/pool complexes) and areas containing shellfish.
b) In NY, NJ, DE and PA, dredging shall not occur within 25 ft. from the edge of vegetated wetlands.
c) In NY and NJ, dredging shall not occur within 500 ft. of SAV in sediments greater than or equal to 90% sand and 250 ft. of SAV if sediments are less than 90% sand during the growing season (April 15-October 15) to minimize impacts to SAV due to turbidity.
d) In Virginia and Maryland, dredging shall not occur in areas within the distance from wetlands equal to four times the depth of the dredging.
e) In Maryland, dredging shall not occur within 500 yds. of a natural oyster beds between December 16 to March 14 and June 1 to September 30.

☐ Not met:
☐ Not applicable, provide reasoning:

☐ Project is unable to accommodate, provide justification:

☒ Met:
☐ Shown on project plans
☒ Included in description, other terms and conditions

36. Do not discharge new or proposed outlets directly into sensitive habitats and redirect upgrades to existing outlets away from sensitive habitats.

☐ Not met:
☐ Not applicable, provide reasoning:

☐ Project is unable to accommodate, provide justification:

☒ Met:
☐ Shown on project plans
☒ Included in description, other terms and conditions

Fish Passage/Migration Habitat

37. Design replacement crossings to provide anadromous and resident fish and aquatic organism passage to the maximum extent possible. Use the Federal Interagency Nature-like Fishway Passage Design Guidelines for Atlantic Coast Diadromous Fishes and Culvert Design For Aquatic Organism Passage FHWA-HIF-11-008) for design guidance. In addition, structures must:
    - provide sufficient water depth and maintain suitable water velocities during migration periods; and
    - maintain or replicate natural stream channel and flow conditions.

☐ Not met:
☐ Not applicable, provide reasoning:

☐ Project is unable to accommodate, provide justification:

☒ Met:

☒ Shown on project plans
☒ Included in description, other terms and conditions

38. Replaced or upgraded crossings must be a similar or improved structure type and must be designed to provide diadromous and resident fish organism passage by providing sufficient water depth, maintaining suitable water velocities during migration periods, and maintaining or replicating natural stream channel and flow conditions. Upgraded crossings must be designed in accordance with the order of preference set out in NMFS' Anadromous Salmonid Passage Facility Design, unless such design is otherwise approved by the State Fisheries Agency.

☐ Not met:
☐ Not applicable, provide reasoning:

☐ Project is unable to accommodate, provide justification:

☒ Met:
☒ Shown on project plans
☒ Included in description, other terms and conditions

39. For activities that require soil erosion, sediment, and turbidity controls, prevent impeding the run by incorporating the following:
    a) in non-tidal streams containing diadromous fish
        i. the activities must not encroach >25% of the stream width measured from ordinary high water during the anadromous TOY restriction unless such encroachment is otherwise approved by State Fisheries; and
        ii. In waterways supporting diadromous fish, the activities must maintain safe, timely, and effective downstream fish passage throughout the project.
    b) in tidal waters:
        i. The activities must not encroach >50% of a tidal stream's width as measured from mean high water unless such encroachment is otherwise approved by the State Fisheries Agency.

☐ Not met:
☐ Not applicable, provide reasoning:

☐ Project is unable to accommodate, provide justification:

☒ Met:

☐ Shown on project plans
☒ Included in description, other terms and conditions

40. Incorporate climate change and sea level rise projections into the project design as appropriate to address changing hydrologic conditions (increased precipitation and stream flow, altered tidal regimes, etc.). Guidance can be found in NOAA Fisheries' national Procedure for Addressing Climate Change in NMFS Essential Fish Habitat Consultations and GARFO's Guidance for Integrating Climate Change Information in Greater Atlantic Region Habitat Conservation Division Consultation Processes, including the recommendation to use relevant local or regional climate prediction models where available as well as emission and climate projection scenarios on a global scale from the Intergovernmental Panel on Climate Change (IPCC). The use of a "high" (e.g., RCP/SSP8.5) and an "intermediate" (e.g., RCP/SSP 4.5 or RCP 6.0) scenario (IPCC 2021) is suggested. For SLR projections, at a minimum the 1.0 m mean global scenario is recommended with the relevant downscaled projections for the closest tide gauge location identified in Sweet et al. (2022).

☒ Not met:
☒ Not applicable, provide reasoning:

Climate change analysis was not done due to the project keeping existing abutments.

☐ Project is unable to accommodate, provide justification:

☐ Met:
☐ Shown on project plans
☐ Included in description, other terms and conditions

Vessel Interactions

☒ Check here if the EFH conservation recommendations in this section are not applicable because the project will not use vessels.

41. Project vessels shall be operated in adequate water depths in the action area to avoid propeller scour and grounding at all tides. Shallow draft vessels will be used in shallow areas to maximize the navigational clearance between the vessel and the bottom substrate. Spuds may be used to elevate the vessel.

☐ Not met:
☐ Not applicable, provide reasoning:

☐ Project is unable to accommodate, provide justification:

☐ Met:
- ☐ Shown on project plans
- ☐ Included in description, other terms and conditions

42. Project vessels shall not be moored in or use spuds in SAV or be located in such a way that the vessel could shade SAV.

☐ Not met:
- ☐ Not applicable, provide reasoning:
- ☐ Project is unable to accommodate, provide justification:

☐ Met:
- ☐ Shown on project plans
- ☐ Included in description, other terms and conditions

43. Vessels transit through SAV shall be done at high tide.

☐ Not met:
- ☐ Not applicable, provide reasoning:
- ☐ Project is unable to accommodate, provide justification:

☐ Met:
- ☐ Shown on project plans
- ☐ Included in description, other terms and conditions

Activities that Require Individual Consultation

1. Any work (including anchoring) that results in temporary or permanent impacts to:
    a) Existing or historically mapped submerged aquatic vegetation (SAV) beds or areas within 100 feet of existing or historically mapped SAV beds unless otherwise confirmed to be absent by survey.
    b) ≥ 1,000 SF of tidal SAS (except tidal SAV, see 1 above), natural rocky habitats, or freshwater SAV.
2. Stream channelization.
3. Any temporary structures, construction access, and dewatering activities proposed to be in place for ≥ two years
4. Slip-lining or invert lining existing culverts in tidal waters or non-tidal waters that support diadromous fishes. Resources to assist in the identification of these waters can be found in Appendix H and from State fishery agencies.
5. Structures (docks, piers, walkways) or temporary structures: Less than 1:1 height/width ratio or wider than 4 ft. over salt marsh waterward of MHW. The height should be measured from the substrate to the bottom of the longitudinal support beam lowermost portion of the deck structure.
6. Construction of new or expansion of existing boating facilities. For the purposes of this programmatic EFH consultation, a boating facility is boat docking or mooring space for more than two non-commercial vessels.
7. Excavation for the purpose of establishing new or improved navigation channels (e.g. dredging), exceeding the thresholds listed under number 1 above.
8. Any nearshore disposal or beach nourishment activities.
9. New fill or stabilization structures placed below mean low water in excess of 200 linear feet (lf).
10. Replacement of:
    a) slope stabilization structures > 200 lf. *and* waterward of the existing toe, or
    b) vertical structures > 18 inches waterward of the existing face *and* > 200 lf.
11. in layer deposition as a part of wetland restoration.
12. Placement of any seed shellfish, spatted-shell, or cultch in the following sensitive habitats: fish and wildlife sanctuaries and refuges, mudflats, SAV beds, riffle/pool complexes, natural rocky habitats, intertidal areas, and areas containing shellfish.
13. In-water utility lines ≥100 linear feet (LF) installed by trench excavation; or where installed by jet-plow, fluidization or other direct burial methods:
    a) installed in mud, clay, or silt substrates; or
    b) ≥200 LF when installed in sandy substrates (e.g. >/= 90% coarse grained sand habitats (Wentworth <35 ASTM No. US Standard)). Direct burial methods do not include jacking or directional drilling/boring.
14. Airgun seismic activities.
15. Any new permanent surface water withdrawal, water intakes, or water diversions.
16. All work to tide gates without a USACE-approved operation and maintenance plan or alterations to tide gates that will affect the hydraulic regime. This does not include work on tide gates (e.g., duckbills, flap gates, etc.) that solely convey stormwater and/or NPDES-permitted discharges. See The Effects of Tide Gates on New England Wetlands and Other Tidal Resources. Greater Atlantic Region Policy Series [23-01] for additional information on tide gates and associated BMPs.
17. In-water blasting that affects EFH or diadromous species habitat, or out-of-water blasting with the discharge of blasted material in water.

18. Construction of new bridges or culverts, where no crossing existed previously.
19. Any new or replacement causeways (raised roadways across waters or wetlands). Temporary causeways do not require project specific consultation (i.e., they are covered under the programmatic consultation), provided they do not exceed the above listed threshold or include other excluded activities.
20. Dam and flood control or levee repairs that will alter water levels or flood elevations during the diadromous time of year (TOY) restriction provided in App C.
21. Living shoreline >500 linear feet in length located below OHW or the HTL and/or includes beach nourishment/ land reclamation activities.
22. Living shorelines with structure and/or fill area that extends into the waterbody more than 30 FT from the MLW line, including sand fills, sills, breakwaters, or reefs, or any living shoreline that proposes to impact SAV.
23. Excavated materials, stored, deposited, and retained anywhere but an upland area that prevents sediments from reentering aquatic habitats, except as authorized/required by the terms of a USACE or USCG approval.

DOT Determination of Effects to Essential Fish Habitat and Signature
After reviewing the programmatic EFH conservation recommendations in Section 6.0 and Appendix B, state DOT will select the appropriate determination:

☒ The activity is in compliance with all programmatic EFH conservation recommendations in the FHWA programmatic EFH consultation and adverse effects to EFH will not be substantial.

☐ The activity is not in compliance with all of the programmatic EFH conservation recommendations in the FHWA programmatic EFH consultation and individual consultation with NMFS is needed.

Use the electronic fillable fields to include the name and signature of the state DOT preparing this Verification Form, along with the date.

State DOT Name Massachusetts Department of Transportation

Signature David Paulson

Digitally signed by David Paulson
Date: 2025.12.19 10:03:33 -05'00'

Date 12/19/2025

By providing your determination and signature, you are certifying that to the best of your knowledge the information provided in this form is accurate and based upon the best available scientific information. This form must be filled out and signed state DOT staff, as an officially designated non-federal representative. Email this Verification Form to your FHWA Division Office.

FHWA Review
After receiving the Verification Form, the FHWA Division Office will contact the state DOT with any concerns. FHWA will review this form before a final NEPA decision. FHWA will email the signed form back to the state DOT for record keeping.

☐ FHWA concurs with state DOT's determination that the proposed project is consistent with the programmatic EFH consultation (without the need for justification).

☒ FHWA concurs with state DOT's determination that the proposed project is consistent with the programmatic EFH consultation, with justification described above.

☐ FHWA does not concur with state DOT's determination that the project is consistent with the programmatic EFH consultation. FHWA/state DOT must conduct additional coordination with GARFO HCD and a separate individual EFH consultation may be required.

FHWA Reviewer

Name Signature

Date of Review

IMPROVING COMMUNITIES TOGETHER

February 9, 2026

Steven Turner, Chair
Taunton Conservation Commission
141 Oak Street South
Taunton, MA 02780

Re: Notice of Intent – Old Colony Avenue Bridge Replacement
Old Colony Avenue, Taunton, MA

Dear Mr. Turner and Commissioners:

On behalf of the City of Taunton, BETA Group, Inc. (BETA) is submitting this Notice of Intent (NOI) for the proposed Bridge Reconstruction of bridge R-02-003=T-01-004 (the Project) at Old Colony Avenue over the Taunton River in Taunton and Raynham, Massachusetts (the Site). The Project is being filed under the MassDOT bridge exemption as specified in the 2014 Transportation Bond Bill. The bridge replacement design is substantially the functional equivalent of and in similar alignment to, the existing bridge. Therefore, the Project is not subject to the Massachusetts Wetlands Protection Act (M.G.L. ch.131, s.40 – the Act) and this NOI is being filed under the Taunton Wetlands Protection Ordinance (Chapter 432 – the Ordinance) only.

The Project is necessary to improve safety and transportation infrastructure in Taunton and Raynham along the Taunton River. The existing bridge was constructed in 1945, and following a recent rating it was recommended the bridge be closed to vehicular traffic due to poor conditions along the bridge abutments. The Project will require demolition of the existing bridge superstructure, construction of the new bridge deck and associated structural appurtenances; installation of scour protection within the Taunton River; full depth pavement reconstruction; and grading. The Project proposes to retain the existing bridge substructure while replacing the superstructure with a deck that is one foot wider to allow for the addition of a bicycle lane. Ancillary Project facets including guardrails and a relocated sidewalk have also been incorporated into the design, and the Project will also address the addition of scour protection within the river during construction.

Portions of the Project are considered a limited project because they involve the maintenance and improvement of an existing public roadway limited to widening less than a single lane, adding shoulders, and improving the drainage system per 310 CMR 10.53(3)(f), and involve the repair and improvement of a bridge per 310 CMR 10.53(3)(i).

The Project will consist of the following:

- Bridge deck replacement;
- Installation of scour protection within the Taunton River;
- Full depth pavement construction in the vicinity of the bridge;
- Pavement milling and overlay to the north and south of the bridge;
- Modifications to roadway geometry;
- Construction of a new sidewalk;
- Installation of new granite curbing;
- Striping of two travel lanes and a bike lane;

BETA GROUP, INC.
89 Shrewsbury Street, Suite 300, Worcester, MA 01604
P: 508.756.1600 | W: www.BETA-Inc.com

- Installation of Americans With Disabilities Act (ADA)-Compliant curb ramps;
- Replacement of guardrails;
- Modifications to water, sewer, gas, electric and drainage utilities; and
- Tree clearing and trimming.

The Project only proposes the replacement of the superstructure and will maintain the existing substructure (i.e., piers and abutments). Accordingly, the Project will meet the Massachusetts Stream Crossing Standards to the maximum extent practicable because the existing conditions do not meet the Standards, and compliance of the existing bridge with the Standards will not change given the nature of work. Work associated with the Project will result in temporary and permanent impacts to Areas Subject to Protection under the Ordinance including Bank, Land Under Water (LUW), Bordering Land Subject to Flooding (BLSF), Wildlife Corridor, Wetland Protection Zone, and Riverfront Area (RA) associated with the Taunton River. The Project will result in a total of 12,776 square feet (sf) and 119 linear feet (lf) of impacts to Resource Areas with the City of Taunton, further broken down as follows:

- 98 linear feet (lf) of temporary and 21 lf of permanent impact to Bank;
- 2,395 square feet (sf) of temporary and 4,171 sf of permanent impact to LUW associated with a dredge volume of 1,003 cubic yards (cy);
- 1,039 sf of permanent impact to BLSF;
- 1,246 sf of permanent impact to Riverfront Area;
- 1,242 sf of permanent impact to Wildlife Corridor; and
- 1,273 sf of permanent and 705 sf of temporary impact to the Wetland Protection Zone.

As a municipal project, this filing is not subject to the fee requirements of the Ordinance. Abutters to the Project have been notified in accordance with Local requirements.

We trust that the following application provides adequate information to facilitate the issuance of an Order of Conditions approving the Project as presented. Should you have any additional questions, please do not hesitate to contact us.

Very truly yours,
BETA Group, Inc.

Hannah Davis
Staff Scientist

Jonathan Niro, PWS
Project Manager

cc:
Christopher Jones, PE (BETA)
Laura Krause (BETA)
Courtney Walker (MassDOT)
Lily Collins (MassDOT)

Job No: 23.10887.00

Taunton, Massachusetts

Old Colony Avenue Bridge Reconstruction
R-02-003=T-01-004

MassDOT Project Number 613642

February 2026

NOTICE OF INTENT

89 Shrewsbury Street
Suite 300
Worcester, MA 01604
508.756.1600
www.BETA-Inc.com

Old Colony Avenue Bridge Reconstruction
R-02-003=T-01-004

Taunton, Massachusetts

MassDOT Project Number 613642

NOTICE OF INTENT

Prepared by: BETA GROUP, INC.
Prepared for: City of Taunton

February 2026

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Bureau of Resource Protection - Wetlands

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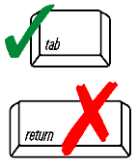
Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



Note: Before completing this form consult your local Conservation Commission regarding any municipal bylaw or ordinance.

A. General Information

1. Project Location (**Note:** electronic filers will click on button to locate project site):

Old Colony Avenue Bridge over Taunton River — a. Street Address
Taunton and Raynham — b. City/Town
02718 and 02767

Latitude and Longitude:
41°53'09.9"N — d. Latitude
71°01'48.1"W — e. Longitude

N/A Roadway ROW — f. Assessors Map/Plat Number
N/A — g. Parcel /Lot Number

2. Applicant:

Katherine — a. First Name
Nunes — b. Last Name
City of Taunton — c. Organization
90 Ingell Street — d. Street Address
Taunton — e. City/Town
MA — f. State
02780 — g. Zip Code
508-821-1431 — h. Phone Number
508-821-1059 — i. Fax Number
knunes@taunton-ma.gov — j. Email Address

3. Property owner (required if different from applicant): ☐ Check if more than one owner

a. First Name
b. Last Name
City of Taunton — c. Organization
15 Summer Street — d. Street Address
Taunton — e. City/Town
MA — f. State
02780 — g. Zip Code
(508) 821-1000 — h. Phone Number
i. Fax Number
j. Email address

4. Representative (if any):

Jonathan — a. First Name
Niro — b. Last Name
BETA Group Inc — c. Company
89 Shrewsbury Street — d. Street Address
Worcester — e. City/Town
MA — f. State
01604 — g. Zip Code
844.800.2382 x7141 — h. Phone Number
i. Fax Number
jniro@beta-inc.com — j. Email address

5. Total WPA Fee Paid (from NOI Wetland Fee Transmittal Form):

Fee Exempt — a. Total Fee Paid
Fee Exempt — b. State Fee Paid
Fee Exempt — c. City/Town Fee Paid

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A. General Information (continued)

6. General Project Description:

The purpose of the Project is to replace the existing superstructure that makes up bridge No. R-02-003=T-01-004 over the Taunton River to address deteriorating conditions, install scour protection and to improve pedestrian and bicycle accommodations.

7a. Project Type Checklist: (Limited Project Types see Section A. 7b.)

1. ☐ Single Family Home
2. ☐ Residential Subdivision
3. ☐ Commercial/Industrial
4. ☐ Dock/Pier
5. ☐ Utilities
6. ☐ Coastal engineering Structure
7. ☐ Agriculture (e.g., cranberries, forestry)
8. ☒ Transportation
9. ☐ Other

7b. Is any portion of the proposed activity eligible to be treated as a limited project (including Ecological Restoration Limited Project) subject to 310 CMR 10.24 (coastal) or 310 CMR 10.53 (inland)?

1. ☒ Yes ☐ No

If yes, describe which limited project applies to this project. (See 310 CMR 10.24 and 10.53 for a complete list and description of limited project types)

Inland limited project per 310 CMR 10.53(3)(f) and (i)
2. Limited Project Type

If the proposed activity is eligible to be treated as an Ecological Restoration Limited Project (310 CMR10.24(8), 310 CMR 10.53(4)), complete and attach Appendix A: Ecological Restoration Limited Project Checklist and Signed Certification.

8. Property recorded at the Registry of Deeds for:

N/A - Roadway ROW
a. County

b. Certificate # (if registered land)

c. Book

d. Page Number

B. Buffer Zone & Resource Area Impacts (temporary & permanent)

1. ☐ Buffer Zone Only – Check if the project is located only in the Buffer Zone of a Bordering Vegetated Wetland, Inland Bank, or Coastal Resource Area.
2. ☒ Inland Resource Areas (see 310 CMR 10.54-10.58; if not applicable, go to Section B.3, Coastal Resource Areas).

Check all that apply below. Attach narrative and any supporting documentation describing how the project will meet all performance standards for each of the resource areas altered, including standards requiring consideration of alternative project design or location.

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B. Buffer Zone & Resource Area Impacts (temporary & permanent) (cont'd)

For all projects affecting other Resource Areas, please attach a narrative explaining how the resource area was delineated.

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
a. ☒ Bank	21 PERM, 98 TEMP (1. linear feet)	98 REST (2. linear feet)
b. ☐ Bordering Vegetated Wetland	(1. square feet)	(2. square feet)
c. ☒ Land Under Waterbodies and Waterways	4,171 PERM, 2,395 TEMP (1. square feet); 1,003 (3. cubic yards dredged)	6,567 REST (2. square feet)

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
d. ☒ Bordering Land Subject to Flooding	1,039 PERM, 0 SF TEMP (1. square feet); (3. cubic feet of flood storage lost)	(2. square feet); (4. cubic feet replaced)
e. ☐ Isolated Land Subject to Flooding	(1. square feet); (2. cubic feet of flood storage lost)	(3. cubic feet replaced)
f. ☒ Riverfront Area	Taunton River (1. Name of Waterway (if available) - **specify coastal or inland**)	

2. Width of Riverfront Area (check one):

☐ 25 ft. - Designated Densely Developed Areas only

☐ 100 ft. - New agricultural projects only

☒ 200 ft. - All other projects

3. Total area of Riverfront Area on the site of the proposed project: 33,200 square feet

4. Proposed alteration of the Riverfront Area:

a. total square feet	b. square feet within 100 ft.	c. square feet between 100 ft. and 200 ft.
1,246	1,246	0

5. Has an alternatives analysis been done and is it attached to this NOI? ☒ Yes ☐ No

6. Was the lot where the activity is proposed created prior to August 1, 1996? ☐ Yes ☒ No

3. ☐ Coastal Resource Areas: (See 310 CMR 10.25-10.35)

Note: for coastal riverfront areas, please complete **Section B.2.f**. above.

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B. Buffer Zone & Resource Area Impacts (temporary & permanent) (cont'd)

Check all that apply below. Attach narrative and supporting documentation describing how the project will meet all performance standards for each of the resource areas altered, including standards requiring consideration of alternative project design or location.

Online Users: Include your document transaction number (provided on your receipt page) with all supplementary information you submit to the Department.

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
a. ☐ Designated Port Areas	Indicate size under Land Under the Ocean, below	
b. ☐ Land Under the Ocean	1. square feet 2. cubic yards dredged	
c. ☐ Barrier Beach	Indicate size under Coastal Beaches and/or Coastal Dunes below	
d. ☐ Coastal Beaches	1. square feet	2. cubic yards beach nourishment
e. ☐ Coastal Dunes	1. square feet	2. cubic yards dune nourishment

	Size of Proposed Alteration	Proposed Replacement (if any)
f. ☐ Coastal Banks	1. linear feet	
g. ☐ Rocky Intertidal Shores	1. square feet	
h. ☐ Salt Marshes	1. square feet	2. sq ft restoration, rehab., creation
i. ☐ Land Under Salt Ponds	1. square feet 2. cubic yards dredged	
j. ☐ Land Containing Shellfish	1. square feet	
k. ☐ Fish Runs	Indicate size under Coastal Banks, inland Bank, Land Under the Ocean, and/or inland Land Under Waterbodies and Waterways, above 1. cubic yards dredged	
l. ☐ Land Subject to Coastal Storm Flowage	1. square feet	

4. ☐ Restoration/Enhancement

If the project is for the purpose of restoring or enhancing a wetland resource area in addition to the square footage that has been entered in Section B.2.b or B.3.h above, please enter the additional amount here.

a. square feet of BVW

b. square feet of Salt Marsh

5. ☐ Project Involves Stream Crossings

a. number of new stream crossings

b. number of replacement stream crossings

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C. Other Applicable Standards and Requirements

☐ This is a proposal for an Ecological Restoration Limited Project. Skip Section C and complete Appendix A: Ecological Restoration Limited Project Checklists – Required Actions (310 CMR 10.11).

Streamlined Massachusetts Endangered Species Act/Wetlands Protection Act Review

1. Is any portion of the proposed project located in **Estimated Habitat of Rare Wildlife** as indicated on the most recent Estimated Habitat Map of State-Listed Rare Wetland Wildlife published by the Natural Heritage and Endangered Species Program (NHESP)? To view habitat maps, see the *Massachusetts Natural Heritage Atlas* or go to http://maps.massgis.state.ma.us/PRI_EST_HAB/viewer.htm.

a. ☐ Yes ☒ No

If yes, include proof of mailing or hand delivery of NOI to:

Natural Heritage and Endangered Species Program
Division of Fisheries and Wildlife
1 Rabbit Hill Road
Westborough, MA 01581

2023
b. Date of map

If *yes*, the project is also subject to Massachusetts Endangered Species Act (MESA) review (321 CMR 10.18). To qualify for a streamlined, 30-day, MESA/Wetlands Protection Act review, please complete Section C.1.c, and include requested materials with this Notice of Intent (NOI); *OR* complete Section C.2.f, if applicable. *If MESA supplemental information is not included with the NOI, by completing Section 1 of this form, the NHESP will require a separate MESA filing which may take up to 90 days to review (unless noted exceptions in Section 2 apply, see below).*

c. Submit Supplemental Information for Endangered Species Review*

1. ☐ Percentage/acreage of property to be altered:

(a) within wetland Resource Area _____ percentage/acreage

(b) outside Resource Area _____ percentage/acreage

2. ☐ Assessor's Map or right-of-way plan of site

2. ☐ Project plans for entire project site, including wetland resource areas and areas outside of wetlands jurisdiction, showing existing and proposed conditions, existing and proposed tree/vegetation clearing line, and clearly demarcated limits of work **

(a) ☐ Project description (including description of impacts outside of wetland resource area & buffer zone)

(b) ☐ Photographs representative of the site

* Some projects **not** in Estimated Habitat may be located in Priority Habitat, and require NHESP review (see https://www.mass.gov/ma-endangered-species-act-mesa-regulatory-review).
Priority Habitat includes habitat for state-listed plants and strictly upland species not protected by the Wetlands Protection Act.

** MESA projects may not be segmented (321 CMR 10.16). The applicant must disclose full development plans even if such plans are not required as part of the Notice of Intent process.

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C. Other Applicable Standards and Requirements (cont'd)

(c) ☐ MESA filing fee (fee information available at https://www.mass.gov/how-to/how-to-file-for-a-mesa-project-review).
Make check payable to "Commonwealth of Massachusetts - NHESP" and ***mail to NHESP*** at above address

*Projects altering **10 or more acres** of land, also submit:*

(d) ☐ Vegetation cover type map of site

(e) ☐ Project plans showing Priority & Estimated Habitat boundaries

(f) OR Check One of the Following

1. ☐ Project is exempt from MESA review.
Attach applicant letter indicating which MESA exemption applies. (See 321 CMR 10.14, https://www.mass.gov/service-details/exemptions-from-review-for-projectsactivities-in-priority-habitat; the NOI must still be sent to NHESP if the project is within estimated habitat pursuant to 310 CMR 10.37 and 10.59.)

2. ☐ Separate MESA review ongoing. a. NHESP Tracking # b. Date submitted to NHESP

3. ☐ Separate MESA review completed.
Include copy of NHESP "no Take" determination or valid Conservation & Management Permit with approved plan.

3. For coastal projects only, is any portion of the proposed project located below the mean high water line or in a fish run?

a. ☒ Not applicable – project is in inland resource area only b. ☐ Yes ☐ No

If yes, include proof of mailing, hand delivery, or electronic delivery of NOI to either:

South Shore - Bourne to Rhode Island border, and the Cape & Islands:

Division of Marine Fisheries -
Southeast Marine Fisheries Station
Attn: Environmental Reviewer
836 South Rodney French Blvd.
New Bedford, MA 02744
Email: dmf.envreview-south@mass.gov

North Shore - Plymouth to New Hampshire border:

Division of Marine Fisheries -
North Shore Office
Attn: Environmental Reviewer
30 Emerson Avenue
Gloucester, MA 01930
Email: dmf.envreview-north@mass.gov

Also if yes, the project may require a Chapter 91 license. For coastal towns in the Northeast Region, please contact MassDEP's Boston Office. For coastal towns in the Southeast Region, please contact MassDEP's Southeast Regional Office.

c. ☐ Is this an aquaculture project? d. ☐ Yes ☒ No

If yes, include a copy of the Division of Marine Fisheries Certification Letter (M.G.L. c. 130, § 57).

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C. Other Applicable Standards and Requirements (cont'd)

Online Users: Include your document transaction number (provided on your receipt page) with all supplementary information you submit to the Department.

4. Is any portion of the proposed project within an Area of Critical Environmental Concern (ACEC)?

   a. ☐ Yes ☒ No If yes, provide name of ACEC (see instructions to WPA Form 3 or MassDEP Website for ACEC locations). **Note:** electronic filers click on Website.

   b. ACEC

5. Is any portion of the proposed project within an area designated as an Outstanding Resource Water (ORW) as designated in the Massachusetts Surface Water Quality Standards, 314 CMR 4.00?

   a. ☐ Yes ☒ No

6. Is any portion of the site subject to a Wetlands Restriction Order under the Inland Wetlands Restriction Act (M.G.L. c. 131, § 40A) or the Coastal Wetlands Restriction Act (M.G.L. c. 130, § 105)?

   a. ☐ Yes ☒ No

7. Is this project subject to provisions of the MassDEP Stormwater Management Standards?

   a. ☒ Yes. Attach a copy of the Stormwater Report as required by the Stormwater Management Standards per 310 CMR 10.05(6)(k)-(q) and check if:
      1. ☒ Applying for Low Impact Development (LID) site design credits (as described in Stormwater Management Handbook Vol. 2, Chapter 3)
      2. ☒ A portion of the site constitutes redevelopment
      3. ☐ Proprietary BMPs are included in the Stormwater Management System.

   b. ☐ No. Check why the project is exempt:
      1. ☐ Single-family house
      2. ☐ Emergency road repair
      3. ☐ Small Residential Subdivision (less than or equal to 4 single-family houses or less than or equal to 4 units in multi-family housing project) with no discharge to Critical Areas.

D. Additional Information

☐ This is a proposal for an Ecological Restoration Limited Project. Skip Section D and complete Appendix A: Ecological Restoration Notice of Intent – Minimum Required Documents (310 CMR 10.12).

Applicants must include the following with this Notice of Intent (NOI). See instructions for details.

Online Users: Attach the document transaction number (provided on your receipt page) for any of the following information you submit to the Department.

1. ☒ USGS or other map of the area (along with a narrative description, if necessary) containing sufficient information for the Conservation Commission and the Department to locate the site. (Electronic filers may omit this item.)

2. ☒ Plans identifying the location of proposed activities (including activities proposed to serve as a Bordering Vegetated Wetland [BVW] replication area or other mitigating measure) relative to the boundaries of each affected resource area.

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D. Additional Information (cont'd)

3. ☒ Identify the method for BVW and other resource area boundary delineations (MassDEP BVW Field Data Form(s), Determination of Applicability, Order of Resource Area Delineation, etc.), and attach documentation of the methodology.

4. ☒ List the titles and dates for all plans and other materials submitted with this NOI.

Superstructure Replacement Plans
a. Plan Title

BETA Group, Inc.
b. Prepared By

Unsigned and unstamped
c. Signed and Stamped by

October 22, 2025
d. Final Revision Date

1" = 20'
e. Scale

Environmental Impacts Plan
f. Additional Plan or Document Title

October 22, 2025
g. Date

5. ☐ If there is more than one property owner, please attach a list of these property owners not listed on this form.

6. ☐ Attach proof of mailing for Natural Heritage and Endangered Species Program, if needed.

7. ☐ Attach proof of mailing for Massachusetts Division of Marine Fisheries, if needed.

8. ☐ Attach NOI Wetland Fee Transmittal Form

9. ☒ Attach Stormwater Report, if needed.

E. Fees

1. ☒ Fee Exempt: No filing fee shall be assessed for projects of any city, town, county, or district of the Commonwealth, federally recognized Indian tribe housing authority, municipal housing authority, or the Massachusetts Bay Transportation Authority.

Applicants must submit the following information (in addition to pages 1 and 2 of the NOI Wetland Fee Transmittal Form) to confirm fee payment:

N/A
2. Municipal Check Number

N/A
3. Check date

N/A
4. State Check Number

N/A
5. Check date

N/A
6. Payor name on check: First Name

N/A
7. Payor name on check: Last Name

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City/Town

F. Signatures and Submittal Requirements

I hereby certify under the penalties of perjury that the foregoing Notice of Intent and accompanying plans, documents, and supporting data are true and complete to the best of my knowledge. I understand that the Conservation Commission will place notification of this Notice in a local newspaper at the expense of the applicant in accordance with the wetlands regulations, 310 CMR 10.05(5)(a).

I further certify under penalties of perjury that all abutters were notified of this application, pursuant to the requirements of M.G.L. c. 131, § 40. Notice must be made by Certificate of Mailing or in writing by hand delivery or certified mail (return receipt requested) to all abutters within 100 feet of the property line of the project location.

1. Signature of Applicant	2. Date: 1/30/2026
3. Signature of Property Owner (if different)	4. Date
5. Signature of Representative (if any)	6. Date: 1/30/2026

For Conservation Commission:
Two copies of the completed Notice of Intent (Form 3), including supporting plans and documents, two copies of the NOI Wetland Fee Transmittal Form, and the city/town fee payment, to the Conservation Commission by certified mail or hand delivery.

For MassDEP:
One copy of the completed Notice of Intent (Form 3), including supporting plans and documents, one copy of the NOI Wetland Fee Transmittal Form, and a **copy** of the state fee payment to the MassDEP Regional Office (see Instructions) by certified mail or hand delivery.

Other:
If the applicant has checked the “yes” box in any part of Section C, Item 3, above, refer to that section and the Instructions for additional submittal requirements.

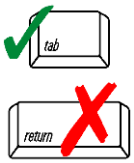
The original and copies must be sent simultaneously. Failure by the applicant to send copies in a timely manner may result in dismissal of the Notice of Intent.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

NOI Wetland Fee Transmittal Form

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A. Applicant Information

1. Location of Project:

FEE EXEMPT

a. Street Address | b. City/Town

c. Check number | d. Fee amount

2. Applicant Mailing Address:

a. First Name | b. Last Name

c. Organization

d. Mailing Address

e. City/Town | f. State | g. Zip Code

h. Phone Number | i. Fax Number | j. Email Address

3. Property Owner (if different):

a. First Name | b. Last Name

c. Organization

d. Mailing Address

e. City/Town | f. State | g. Zip Code

h. Phone Number | i. Fax Number | j. Email Address

B. Fees

To calculate filing fees, refer to the category fee list and examples in the instructions for filling out WPA Form 3 (Notice of Intent).

Fee should be calculated using the following process & worksheet. ***Please see Instructions before filling out worksheet.***

Step 1/Type of Activity: Describe each type of activity that will occur in wetland resource area and buffer zone.

Step 2/Number of Activities: Identify the number of each type of activity.

Step 3/Individual Activity Fee: Identify each activity fee from the six project categories listed in the instructions.

Step 4/Subtotal Activity Fee: Multiply the number of activities (identified in Step 2) times the fee per category (identified in Step 3) to reach a subtotal fee amount. Note: If any of these activities are in a Riverfront Area in addition to another Resource Area or the Buffer Zone, the fee per activity should be multiplied by 1.5 and then added to the subtotal amount.

Step 5/Total Project Fee: Determine the total project fee by adding the subtotal amounts from Step 4.

Step 6/Fee Payments: To calculate the state share of the fee, divide the total fee in half and subtract $12.50. To calculate the city/town share of the fee, divide the total fee in half and add $12.50.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

NOI Wetland Fee Transmittal Form

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

B. Fees (continued)

Step 1/Type of Activity	Step 2/Number of Activities	Step 3/Individual Activity Fee	Step 4/Subtotal Activity Fee

Step 5/Total Project Fee: _____

Step 6/Fee Payments:

Total Project Fee:	FEE EXEMPT a. Total Fee from Step 5
State share of filing Fee:	FEE EXEMPT b. 1/2 Total Fee **less $**12.50
City/Town share of filling Fee:	FEE EXEMPT c. 1/2 Total Fee **plus** $12.50

C. Submittal Requirements

a.) Complete pages 1 and 2 and send with a check or money order for the state share of the fee, payable to the Commonwealth of Massachusetts.

Department of Environmental Protection
Box 4062
Boston, MA 02211

b.) **To the Conservation Commission:** Send the Notice of Intent or Abbreviated Notice of Intent; a **copy** of this form; and the city/town fee payment.

To MassDEP Regional Office (see Instructions): Send a copy of the Notice of Intent or Abbreviated Notice of Intent; a **copy** of this form; and a **copy** of the state fee payment. (E-filers of Notices of Intent may submit these electronically.)

ABUTTERS INFORMATION

Affidavit of Service
Under the City of Taunton Wetlands Protection Ordinance

(to be submitted to the Conservation Commission when filing a Notice of Intent)

I, Hannah Davis, hereby certify under the pains and penalties of perjury that on or before February 9, 2026 I gave notification to abutters in compliance with the Ordinance, which is consistent with the second paragraph of Massachusetts General Laws Chapter 131, Section 40, and the DEP Guide to Abutter Notification dated April 8, 1994, in connection with the following matter:

A Notice of Intent filed under the Ordinance by The City of Taunton in conjunction with MassDOT – Highway Division with the City of Taunton Conservation Commission on or before February 9, 2026 for The Old Colony Avenue Bridge Reconstruction Project in Taunton, Massachusetts and Raynham, Massachusetts.

The form of notification, and a list of the abutters to whom it was given and their addresses, are attached to this Affidavit of Service.

Name

2/9/2026
Date

Notification to Abutters

By Hand Delivery, Certified Mail (return receipt requested), or Certificates of Mailing

This is a notification required by law. You are receiving this notification because you have been identified as the owner of land abutting another parcel of land for which certain activities are proposed. Those activities require a permit under the City of Taunton Wetlands Protection Ordinance.

In accordance with the Ordinance, which is consistent with the second paragraph of the Massachusetts Wetlands Protection Act, and 310 CMR 10.05(4)(a) of the Wetlands Regulations, you are hereby notified that:

A. A Notice of Intent was filed with the Taunton Conservation Commission on or before February 9, 2026 seeking permission to remove, fill, dredge, or alter an area subject to protection under the Ordinance. The following is a description of the proposed activity/activities:

The Project proposes the replacement of the bridge superstructure along Old Colony Avenue and installation of riprap scour protection within the Taunton River. In addition to the repair and improvement of the bridge, the Project will also consist of paving and construction of a new sidewalk.

B. The name of the applicant is: **The City of Taunton in conjunction with MassDOT – Highway Division.**

C. The address of the land where the activity is proposed is: **Old Colony Avenue (Right-of-Way)**

D. Copies of the Notice of Intent may be examined or obtained at the office of the Taunton Conservation Commission, located at 141 Oak Street, Taunton, MA 02780. The regular business hours of the Commission are Monday, Wednesday and Thursday from 8:00 am to 4:00 pm, Tuesday from 8:00 am to 7:00 pm and Friday from 8:00 am to 12:00 pm and the Commission may be reached at (508)-821-1051.

E. Copies of the Notice of Intent may be obtained from the applicant or their representative by contacting Hannah Davis, BETA Group, Inc. at (844)-800-2382 ext. 7241 or at hdavis@BETA-Inc.com. An administrative fee may be applied for providing copies of the NOI and plans.

F. Information regarding the date, time, and location of the public hearing regarding the Notice of Intent may be obtained from the Taunton Conservation Commission. Notice of the public hearing will be published at least five business days in advance, in the **Taunton Daily Gazette**.

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City of Taunton, MA Abutters Report

100ft. Abutters of Property 96-1-0
at 103 OLD COLONY AVENUE

Please be aware that the abutters list reflects mailing address for the real estate tax bills as requested by the property owners. Mortgage companies, banks and other financial institutions may be receiving the notification and not the homeowner as required. Please be sure you are complying with notification requirements. Property data updated 02/06/2025.

Abutter	Street Address	Account No.	Tax Bill Address
96-34-0 TMLP	91 OLD COLONY AVENUE	18358	TMLP 33 WEIR STREET TAUNTON, MA 02780
96-2-0 KOEHLER JANET K TR OF SHIMMO R c/o Hyde Properties	103R OLD COLONY AVENUE	639	KOEHLER JANET K TR OF SHIMMO R 840 SUMMER ST, #101 c/o BOSTON, MA 02127 Hyde Properties
96-6-0 RIZZO GUISEPPE	OLD COLONY AVENUE	103622	RIZZO GUISEPPE 12 BATTLE ROW E TAUNTON, MA 02718
95-203-60 FLAHERTY JOHN P	96 OLD COLONY AVENUE #228	5307	FLAHERTY JOHN P 96 OLD COLONY AVE UNIT 228 EAST TAUNTON, MA 02718
95-203-46 ROTHMAN JEFFREY	96 OLD COLONY AVENUE #213	5292	ROTHMAN JEFFREY 96 OLD COLONY AVE #213 EAST TAUNTON, MA 02718
95-203-70 BASLER ANDREW T & ASHELY M SIKES	96 OLD COLONY AVENUE #302	5327	BASLER ANDREW T & ASHELY M SIKES 96 OLD COLONY AVENUE 302 EAST TAUNTON, MA 02718
95-203-164 THOMPSON WILLIAM JR & MARIE R	96 OLD COLONY AVENUE #468	5395	THOMPSON WILLIAM JR & MARIE R 96 OLD COLONY AVENUE 468 EAST TAUNTON, MA 02718
95-203-145 DOUGLAS KENNETH J & EILEEN M KELLY-DOUGL	96 OLD COLONY AVENUE #359	5376	DOUGLAS KENNETH J & EILEEN M KELLY-DOUGL 96 OLD COLONY AVENUE 359 EAST TAUNTON, MA 02718

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City of Taunton, MA Abutters Report

100ft. Abutters of Property 96-1-0
at 103 OLD COLONY AVENUE

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95-203-24 RIVER BEND TAUNTON PROPERTIES LLC	96 OLD COLONY AVENUE #125	5252	RIVER BEND TAUNTON PROPERTIES LLC 15 TORREY STREET UNIT 3 BROCKTON, MA 02301
95-203-144 Rodrigues II Paul	96 OLD COLONY AVENUE #358	5375	Rodrigues II Paul 96 Old Colony Avenue #358 Taunton, MA 02780
95-203-175 DACEY MARGARET	96 OLD COLONY AVENUE #226	5305	DACEY MARGARET 96 OLD COLONY AVENUE 226 EAST TAUNTON, MA 02718
95-203-136 RUSSELL SEAN MICHAEL & LAURA BEATRIZ & DAVID	96 OLD COLONY AVENUE #268	5324	RUSSELL SEAN MICHAEL & LAURA BEATRIZ & DAVID 96 OLD COLONY AVENUE #268 EAST TAUNTON, MA 02718
95-203-73 HENDERSON STEVEN J	96 OLD COLONY AVENUE #305	5330	HENDERSON STEVEN J 96 OLD COLONY AVENUE #305 EAST TAUNTON, MA 02718
95-203-18 WASIAK STANISLAW J	96 OLD COLONY AVENUE #118	5245	WASIAK STANISLAW J 96 OLD COLONY AVE #118 E TAUNTON, MA 02718
95-203-174 VELEZ JUAN	96 OLD COLONY AVENUE #120	5247	VELEZ JUAN 96 OLD COLONY AVENUE #120 EAST TAUNTON, MA 02718
95-203-123 ZUMPFE OLGA	96 OLD COLONY AVENUE #165	5275	ZUMPFE OLGA 96 OLD COLONY AVENUE 165 EAST TAUNTON, MA 02718
95-203-112 CUSTER BRUCE R	96 OLD COLONY AVENUE #154	5264	CUSTER BRUCE R 96 OLD COLONY AVE UN 154 E TAUNTON, MA 02718

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City of Taunton, MA Abutters Report

100ft. Abutters of Property 96-1-0
at 103 OLD COLONY AVENUE

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95-203-52 LEDERMAN ROY I TR	96 OLD COLONY AVENUE #219	5298	LEDERMAN ROY I TR 96 OLD COLONY AVENUE #219 E TAUNTON, MA 02718
95-203-168 KERRIGAN LORRAINE V LI	96 OLD COLONY AVENUE #554	5407	KERRIGAN LORRAINE V LI 96 OLD COLONY AVENUE #554 EAST TAUNTON, MA 02718
95-203-42 MIXNER LYNNE B & PENELOPE J ACKLEY	96 OLD COLONY AVENUE #209	5288	MIXNER LYNNE B & PENELOPE J ACKLEY 96 OLD COLONY AVENUE #209 EAST TAUNTON, MA 02780
95-203-50 CROWNER LISA	96 OLD COLONY AVENUE #217	5296	CROWNER LISA 96 OLD COLONY AVENUE #217 EAST TAUNTON, MA 02718
95-203-84 BURNS DONALD M	96 OLD COLONY AVENUE #316	5341	BURNS DONALD M 96 OLD COLONY AVENUE #316 E TAUNTON, MA 02718
95-203-157 CURTIN JAMES W & ELAINE T TR + CURTIN Revocable TRUST	96 OLD COLONY AVENUE #451	5388	CURTIN JAMES W & ELAINE T TR + CURTIN 96 OLD COLONY AVENUE #451 Revocable EAST TAUNTON, MA 02718 TRUST
95-203-141 COYNE JAMES	96 OLD COLONY AVENUE #355	5372	COYNE JAMES 152 COUNTRY CLUB DRIVE BROCKTON, MA 02301
95-203-79 MITNICK MARIANNE L TRS + ROSEMARIE CURRAN IRREVocable TRUST	96 OLD COLONY AVENUE #311	5336	MITNICK MARIANNE L TRS + ROSEMARIE 96 OLD COLONY AVENUE #311 CURRAN EAST TAUNTON, MA 02718 IRREV. TRUST
95-203-40 MCHENRY MICHAEL	96 OLD COLONY AVENUE #207	5286	MCHENRY MICHAEL 96 OLD COLONY AVENUE #207 E TAUNTON, MA 02718

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City of Taunton, MA Abutters Report

100ft. Abutters of Property 96-1-0
at 103 OLD COLONY AVENUE

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95-203-39 COSTA MICHAEL	96 OLD COLONY AVENUE #206	5285	COSTA MICHAEL 96 OLD COLONY AVENUE 206 E.TAUNTON, MA 02718
95-203-72 KURLANSKY KEITH R	96 OLD COLONY AVENUE #304	5329	KURLANSKY KEITH R 96 OLD COLONY AVENUE 304 EAST TAUNTON, MA 02718
95-203-107 CROSBY Kimberly	96 OLD COLONY AVENUE #339	5365	CROSBY Kimberly 96 Old Colony Avenue #339 EAST TAUNTON, MA 02718
95-203-171 MASSOUD SUSAN & ROBERT	96 OLD COLONY AVENUE #557	5410	MASSOUD SUSAN & ROBERT 96 OLD COLONY AVENUE 557 EAST TAUNTON, MA 02718
95-203-117 HURLICH MICHAEL J + BRITTANY L SOBOLEWSKI	96 OLD COLONY AVENUE #159	5269	HURLICH MICHAEL J + BRITTANY L. 96 OLD COLONY AVENUE #159 SOBOLEWSKI EAST TAUNTON, MA 02718
95-203-37 WILLIAMS BRIAN J	96 OLD COLONY AVENUE #204	5283	WILLIAMS BRIAN J 96 OLD COLONY AVENUE #204 EAST TAUNTON, MA 02718
95-203-98 IPPOLITO LORI E	96 OLD COLONY AVENUE #330	5356	IPPOLITO LORI E 96 OLD COLONY AVENUE #330 EAST TAUNTON, MA 02718
95-203-33 GILMORE VALERIE	96 OLD COLONY AVENUE #134	5261	GILMORE VALERIE 96 OLD COLONY AVE #134 EAST TAUNTON, MA 02718
95-203-38 COMEDY ALAN V SR	96 OLD COLONY AVENUE #205	5284	COMEDY ALAN V SR 96 OLD COLONY AVENUE #205 E TAUNTON, MA 02718

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City of Taunton, MA Abutters Report

100ft. Abutters of Property 96-1-0
at 103 OLD COLONY AVENUE

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95-203-45 CALLAHAN DANIEL	96 OLD COLONY AVENUE #212	5291	CALLAHAN DANIEL 96 OLD COLONY AVENUE #212 EAST TAUNTON, MA 02718
95-203-134 HOBSON RONALD SCOTT SR	96 OLD COLONY AVENUE #264	5322	HOBSON RONALD SCOTT SR 96 OLD COLONY AVENUE #264 EAST TAUNTON, MA 02718
95-203-51 BOURGAULT NICHOLAS C	96 OLD COLONY AVENUE #218	5297	BOURGAULT NICHOLAS C 96 OLD COLONY AVENUE #218 EAST TAUNTON, MA 02718
95-203-74 TONER CHRISTINA M	96 OLD COLONY AVENUE #306	5331	TONER CHRISTINA M 96 OLD COLONY AVENUE 306 EAST TAUNTON, MA 02718
95-203-81 LARRIVEE MARC A	96 OLD COLONY AVENUE #313	5338	LARRIVEE MARC A 96 OLD COLONY AVENUE #313 E TAUNTON, MA 02718
95-203-154 SMITH DONNA M & SANDRA L	96 OLD COLONY AVENUE #368	5385	SMITH DONNA M & SANDRA L 96 OLD COLONY AVENUE #368 E TAUNTON, MA 02718
95-203-43 VILLA RUBEN L	96 OLD COLONY AVENUE #210	5289	VILLA RUBEN L 96 OLD COLONY AVENUE 210 EAST TAUNTON, MA 02718
95-203-49 CONLEY MICHELLE & YANOFF DARA	96 OLD COLONY AVENUE #216	5295	CONLEY MICHELLE & YANOFF DARA 96 OLD COLONY AVENUE #216 EAST TAUNTON, MA 02718
95-203-116 PARKER DAVID SR	96 OLD COLONY AVENUE #158	5268	PARKER DAVID SR 96 OLD COLONY AVENUE 158 EAST TAUNTON, MA 02718

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City of Taunton, MA Abutters Report

100ft. Abutters of Property 96-1-0
at 103 OLD COLONY AVENUE

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95-203-93 ANGLIN CRAIG	96 OLD COLONY AVENUE #325	5350	ANGLIN CRAIG 96 OLD COLONY AVENUE #325 EAST TAUNTON, MA 02718
95-203-169 CHASE ROBERT M JR	96 OLD COLONY AVENUE #555	5408	CHASE ROBERT M JR 96 OLD COLONY AVENUE #555 E TAUNTON, MA 02718
95-203-110 POKLAD ALINA+ ANNA+ LEONARD	96 OLD COLONY AVENUE #152	5262	POKLAD ALINA, ANNA, LEONARD 96 OLD COLONY AVENUE 152 EAST TAUNTON, MA 02718
95-203-127 BOUVE JO-ANN	96 OLD COLONY AVENUE #169	5279	BOUVE JO-ANN 96 OLD COLONY AVE #169 EAST TAUNTON, MA 02718
95-203-14 SILVA BRIAN	96 OLD COLONY AVENUE #114	5241	SILVA BRIAN 96 OLD COLONY AVENUE #114 EAST TAUNTON, MA 02718
95-203-23 MOORE STEVEN C	96 OLD COLONY AVENUE #124	5251	MOORE STEVEN C 96 OLD COLONY AVE #124 EAST TAUNTON, MA 02718
95-203-5 CHUBEI NATALIIA	96 OLD COLONY AVENUE #105	5419	CHUBEI NATALIIA 96 OLD COLONY AVENUE #105 EAST TAUNTON, MA 02718
95-203-8 HURLEY WILLIAM M	96 OLD COLONY AVENUE #108	5236	HURLEY WILLIAM M 96 OLD COLONY AVENUE #108 EAST TAUNTON, MA 02718
95-203-41 DUHAMEL JO-ANNE	96 OLD COLONY AVENUE #208	5287	DUHAMEL JO-ANNE 96 OLD COLONY AVENUE 208 EAST TAUNTON, MA 02718

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City of Taunton, MA Abutters Report

100ft. Abutters of Property 96-1-0
at 103 OLD COLONY AVENUE

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95-203-163 MCGUIRE TIMOTHY	96 OLD COLONY AVENUE #465	5394	MCGUIRE TIMOTHY 96 OLD COLONY AVENUE # 465 EAST TAUNTON, MA 02718
95-203-132 TAVARES MARGUERITE	96 OLD COLONY AVENUE #258	5320	TAVARES MARGUERITE 96 OLD COLONY AVENUE # 258 EAST TAUNTON, MA 02718
95-203-32 CARLIN GARY	96 OLD COLONY AVENUE #133	5260	CARLIN GARY 96 OLD COLONY AVE #133 E TAUNTON, MA 02718
95-203-53 POISSANT ERICA	96 OLD COLONY AVENUE #220	5299	POISSANT ERICA 96 OLD COLONY AVENUE #220 EAST TAUNTON, MA 02718
95-203-25 REARDON SUSAN MCCABE	96 OLD COLONY AVENUE #126	5253	REARDON SUSAN MCCABE 96 OLD COLONY AVENUE #126 EAST TAUNTON, MA 02718
95-203-44 TEDESCHI RAYMOND	96 OLD COLONY AVENUE #211	5290	TEDESCHI RAYMOND 63 HIDDEN VALLEY DRIVE RAYNHAM, MA 02767
95-203-64 JONES WALTER D JR	96 OLD COLONY AVENUE #232	5311	JONES WALTER D JR 96 OLD COLONY AVENUE #232 EAST TAUNTON, MA 02718
95-203-142 MONAHAN ROBERT T JR & ROSE-MARIE	96 OLD COLONY AVENUE #356	5373	MONAHAN ROBERT T JR & ROSE-MARIE 96 OLD COLONY AVENUE 356 EAST TAUNTON, MA 02718
95-203-65 QUINTANA IAN	96 OLD COLONY AVENUE #233	5312	QUINTANA IAN 96 OLD COLONY AVENUE #233 EAST TAUNTON, MA 02718

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City of Taunton, MA Abutters Report

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95-203-121 BUSHELL CHRISTOPHER & JACLYNNE CARIDEO	96 OLD COLONY AVENUE #163	5273	BUSHELL CHRISTOPHER & JACLYNNE CARIDEO
95-203-105 RIVER BEND TAUNTON PROPERTIES LLC	96 OLD COLONY AVENUE #337	5363	RIVER BEND TAUNTON PROPERTIES LLC 15 TORREY STREET UNIT 3 BROCKTON, MA 02301
95-203-19 BUCKLEY BRIAN J	96 OLD COLONY AVENUE #119	5246	BUCKLEY BRIAN J 96 OLD COLONY AVENUE #119 E TAUNTON, MA 02718
95-203-94 BRUNO JOHN	96 OLD COLONY AVENUE #326	5351	BRUNO JOHN 96 OLD COLONY AVENUE #326 EAST TAUNTON, MA 02718
95-203-139 THAYER EDWARD E	96 OLD COLONY AVENUE #353	5370	THAYER EDWARD E 96 OLD COLONY AVE #353 E TAUNTON, MA 02718
95-203-97 HENRIQUE JOHN M	96 OLD COLONY AVENUE #329	5354	HENRIQUE JOHN M 96 OLD COLONY AVENUE 329 EAST TAUNTON, MA 02718
95-203-158 DANAHY CHRISTOPHER M	96 OLD COLONY AVENUE #452	5389	DANAHY CHRISTOPHER M 96 OLD COLONY AVENUE #452 EAST TAUNTON, MA 02718
95-203-57 MAGOON JAMES & KAYLA	96 OLD COLONY AVENUE #224	5303	MAGOON JAMES & KAYLA 96 OLD COLONY AVENUE #224 EAST TAUNTON, MA 02718
95-203-166 FRENCH DAVID S	96 OLD COLONY AVENUE #552	5405	FRENCH DAVID S 96 OLD COLONY AVE UNIT 552R E TAUNTON, MA 02718

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City of Taunton, MA Abutters Report

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at 103 OLD COLONY AVENUE

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95-203-149 PYNN WENDY J TR	96 OLD COLONY AVENUE #363	5380	PYNN WENDY J TR 96 OLD COLONY AVE # 363 EAST TAUNTON, MA 02718
95-203-128 FADRIGALAN MARIJO C & THOMAS	96 OLD COLONY AVENUE #250	5316	FADRIGALAN MARIJO C & THOMAS 96 OLD COLONY AVENUE 250 EAST TAUNTON, MA 02718
95-203-111 SPEARIN JOHN T & ELYSE A DELUCIA	96 OLD COLONY AVENUE #153	5263	SPEARIN JOHN T & ELYSE A DELUCIA 96 OLD COLONY AVENUE 153 EAST TAUNTON, MA 02718
95-203-167 ZAITER TALAL TR OF CITRON R T	96 OLD COLONY AVENUE #553	5406	ZAITER TALAL TR OF CITRON R T 96 OLD COLONY AVE #553 E TAUNTON, MA 02718
95-203-162 CAJADO GEORGE	96 OLD COLONY AVENUE #464	5393	CAJADO GEORGE 96 OLD COLONY AVENUE 464 EAST TAUNTON, MA 02718
95-203-62 PODOGRODZK NICOLE MICHELLE	96 OLD COLONY AVENUE #230	5309	PODOGRODZK NICOLE MICHELLE 96 OLD COLONY AVENUE #230 EAST TAUNTON, MA 02718
95-203-87 ALEXANDRINO SANDRA	96 OLD COLONY AVENUE #319	5344	ALEXANDRINO SANDRA 96 OLD COLONY AVENUE #319 EAST TAUNTON, MA 02718
95-203-59 BAROT RAJ DIVYANGKUMAR	96 OLD COLONY AVENUE #227	5306	BAROT RAJ DIVYANGKUMAR 96 OLD COLONY AVENUE #227 EAST TAUNTON, MA 02718
95-203-68 TRUGMAN MICHELE	96 OLD COLONY AVENUE #236	5315	TRUGMAN MICHELE 96 OLD COLONY AVE UN 236 E TAUNTON, MA 02718

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City of Taunton, MA Abutters Report

100ft. Abutters of Property 96-1-0
at 103 OLD COLONY AVENUE

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95-203-170 NICKOU LORRIE M TRS + LORRIE M NICKOU REALTY TRUST	96 OLD COLONY AVENUE #556	5409	NICKOU LORRIE M TRS + LORRIE M NICKOU REALTY TRUST 96 OLD COLONY AVENUE 556 EAST TAUNTON, MA 02718
95-203-77 MATHIEU RASOUMIE P	96 OLD COLONY AVENUE #309	5334	MATHIEU RASOUMIE P 96 OLD COLONY AVENUE 309 EAST TAUNTON, MA 02718
95-203-83 BETTENCOURT BRIAN J & COUET REBECCA S TR + THE BETTENCOURT-COUET FAMILY TRUST	96 OLD COLONY AVENUE #315	5340	BETTENCOURT BRIAN J & COUET REBECCA S TR + THE BETTENCOURT-COUET FAMILY TRUST 96 OLD COLONY AVENUE #315 EAST TAUNTON, MA 02718
95-203-150 SIMMONS STACY	96 OLD COLONY AVENUE #364	5381	SIMMONS STACY 96 OLD COLONY AVENUE #364 EAST TAUNTON, MA 02718
95-203-76 FIENBERG KENNETH J	96 OLD COLONY AVENUE #308	5333	FIENBERG KENNETH J 96 OLD COLONY AVE UNIT 308 E TAUNTON, MA 02718
95-203-69 RIVER BEND TAUNTON PROPERTIES LLC	96 OLD COLONY AVENUE #301	5326	RIVER BEND TAUNTON PROPERTIES LLC 15 TORREY ST UNIT 3 BROCKTON, MA 02301
95-203-130 KEY MONICA E	96 OLD COLONY AVENUE #252	5318	KEY MONICA E 96 OLD COLONY AVENUE 252 E TAUNTON, MA 02718
95-203-100 BARLEY MICHELLE L	96 OLD COLONY AVENUE #332	5358	BARLEY MICHELLE L 96 OLD COLONY AVENUE #332 EAST TAUNTON, MA 02718
95-203-159 MCNAMARA MICHAEL JR	96 OLD COLONY AVENUE #453	5390	MCNAMARA MICHAEL JR 96 OLD COLONY AVE UNIT 453 E TAUNTON, MA 02718

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City of Taunton, MA Abutters Report

100ft. Abutters of Property 96-1-0
at 103 OLD COLONY AVENUE

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✓	95-203-85 KONDO MIWAKO	96 OLD COLONY AVENUE #317	5342	KONDO MIWAKO 96 OLD COLONY AVENUE #317 E TAUNTON, MA 02718
✓	95-203-4 WILLIAMS VICTOR D	96 OLD COLONY AVENUE #104	5418	WILLIAMS VICTOR D 96 OLD COLONY DRIVE UNIT 104 EAST TAUNTON, MA 02718
✓	95-203-21 BURNS MATTHEW J & DUSSEAULT CASSANDRA R	96 OLD COLONY AVENUE #122	5249	BURNS MATTHEW J & DUSSEAULT CASSANDRA R 96 OLD COLONY AVENUE #122 E TAUNTON, MA 02718
	95-203-165 HAWES TRACEY A TRACEY HAWES FAMILY NOMINEE TRUST	96 OLD COLONY AVENUE #469	5396	HAWES TRACEY A + TRACEY HAWES FAMILY 96 OLD COLONY AVE UNIT 469 NOMINEE TRUST E TAUNTON, MA 02718
✓	95-203-71 O'DONNELL KEVIN	96 OLD COLONY AVENUE #303	5328	O'DONNELL KEVIN 96 OLD COLONY AVENUE 303 EAST TAUNTON, MA 02718
✓	95-203-129 MARTIN SHANA & AMINE DASSOUKI	96 OLD COLONY AVENUE #251	5317	MARTIN SHANA & AMINE DASSOUKI 96 OLD COLONY AVENUE #251 EAST TAUNTON, MA 02718
✓	95-203-6 DACOSTA FERNANDO	96 OLD COLONY AVENUE #106	5420	DACOSTA FERNANDO 96 OLD COLONY AVENUE #106 E TAUNTON, MA 02718
✓	95-203-106 FRAPPIER JONATHAN A	96 OLD COLONY AVENUE #338	5364	FRAPPIER JONATHAN A 96 OLD COLONY AVENUE #338 EAST TAUNTON, MA 02718
	95-203-28 MAXWELL LEWELLYN J ANGELA J & ANGELA V TRUSTEES	96 OLD COLONY AVENUE #129	5256	MAXWELL LEWELLYN J ANGELA J & ANGELA V TRUSTEES 96 OLD COLONY AVENUE #129 E TAUNTON, MA 02718

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City of Taunton, MA Abutters Report

100ft. Abutters of Property 96-1-0
at 103 OLD COLONY AVENUE

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95-203-148 DAVIS LINDA	96 OLD COLONY AVENUE #362	5379	DAVIS LINDA 96 OLD COLONY AVENUE 362 EAST TAUNTON, MA 02718
95-203-2 MONTERIO JOACIR & ADRYANNA MONTEIRO	96 OLD COLONY AVENUE #102	5416	MONTERIO JOACIR & ADRYANNA MONTEIRO 96 OLD COLONY AVENUE #102 EAST TAUNTON, MA 02718
95-203-102 JOHNSON GREGORY S & RANDALL KENNETH A	96 OLD COLONY AVENUE #334	5360	JOHNSON GREGORY S & RANDALL KENNETH A 96 OLD COLONY AVENUE # 334 EAST TAUNTON, MA 02718
95-203-133 SLAVEN JODY	96 OLD COLONY AVENUE #259	5321	SLAVEN JODY 96 OLD COLONY AVENUE UNIT 259 EAST TAUNTON, MA 02718
95-203-151 TURNEY CAMERON	96 OLD COLONY AVENUE #365	5382	TURNEY CAMERON 96 OLD COLONY AVENUE #365 E TAUNTON, MA 20718
95-203-30 RIVER BEND TAUNTON PROPERTIES LLC	96 OLD COLONY AVENUE #131	5258	RIVER BEND TAUNTON PROPERTIES LLC 15 TORREY STREET UNIT 3 BROCKTON, MA 02301
95-203-92 MELEEDY GERALD E	96 OLD COLONY AVENUE #324	5349	MELEEDY GERALD E 96 OLD COLONY AVENUE 324 EAST TAUNTON, MA 02718
95-203-113 GEANGU JULIA C	96 OLD COLONY AVENUE #155	5265	GEANGU JULIA C 96 OLD COLONY AVENUE #155 EAST TAUNTON, MA 02718
95-203-55 PIERCE JOYCE	96 OLD COLONY AVENUE #222	5301	PIERCE JOYCE 96 OLD COLONY AVENUE #222 EAST TAUNTON, MA 02718

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City of Taunton, MA Abutters Report

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95-203-160 CONRAD DANIEL L & TRACY L TR	96 OLD COLONY AVENUE #458	5391	CONRAD DANIEL L & TRACY L TR THE CONRAD NOMINEE TRUST EAST TAUNTON, MA 02767
95-203-12 CATES AMANDA C/O AMANDA NARDI	96 OLD COLONY AVENUE #112	5239	CATES AMANDA C/O AMANDA NARDI 9 WOODVIEW DRIVE LAKEVILLE, MA 02347
95-203-143 TERRUSO JAMES J	96 OLD COLONY AVENUE #357	5374	TERRUSO JAMES J 96 OLD COLONY AVENUE 357 EAST TAUNTON, MA 02718
95-203-82 BAYLOR BRIAN M TR BAYLOR OLD COLONY AVENUE IRREVOCABLE TRUST	96 OLD COLONY AVENUE #314	5339	BAYLOR BRIAN M TR & BAYLOR 87 SUNSET DRIVE OLD COLONY AVENUE BRICKTON, MA 0230T IRREV. TRUST
95-203-58 STEWART ALYSON J	96 OLD COLONY AVENUE #225	5304	STEWART ALYSON J 96 OLD COLONY AVENUE #225 EAST TAUNTON, MA 02718
95-203-20 MACNEVIN BRYCE & MEGAN RIORDAN	96 OLD COLONY AVENUE #121	5248	MACNEVIN BRYCE & MEGAN RIORDAN 96 OLD COLONY AVENUE #121 EAST TAUNTON, MA 02718
95-203-108 GRADZIUK MAKSYMILIAN & PATRYCJA	96 OLD COLONY AVENUE #340	5366	GRADZIUK MAKSYMILIAN & PATRYCJA 110 Central Street SOUTH EASTON, MA 02375
95-203-96 PETERS JOHN W & A JEAN	96 OLD COLONY AVENUE #328	5353	PETERS JOHN W & A JEAN 977 MONTERROSA DRIVE MYRTLE BEACH, SC 29572
95-203-153 BOWYER RICHARD E LI Richard E. BOWYER Revocable TRUST	96 OLD COLONY AVENUE #367	5384	BOWYER RICHARD E LI + Richard E Bowyer 96 OLD COLONY AVENUE #367 Revocable EAST TAUNTON, MA 02718 TRUST

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City of Taunton, MA Abutters Report

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at 103 OLD COLONY AVENUE

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95-203-109 SOLOVYOV Dmitry	96 OLD COLONY AVENUE #341	5367	SOLOVYOV Dmitry 33 HAMIN LANE #338 Needham, MA 02492
95-203-155 GARVIN Denise Michelle TR + AJA Living Trust	96 OLD COLONY AVENUE #369	5386	GARVIN Denise Michelle TR AJA Living Trust 29 FILMORE Street Plymouth, MA 02360
95-203-56 DANIELS AAYDEN & ASHLYN ESTREMERA	96 OLD COLONY AVENUE #223	5302	DANIELS AAYDEN & ASHLYN ESTREMERA 96 OLD COLONY AVENUE #223 EAST TAUNTON, MA 02718
95-203-156 Kimbrel Devon	96 OLD COLONY AVENUE #450	5387	Kimbrel Devon 96 OLD COLONY AVENUE #450 E TAUNTON, MA 02718
95-203-131 BEAULIEU EDWARD J III	96 OLD COLONY AVENUE #253	5319	BEAULIEU EDWARD J III 96 OLD COLONY AVE UNIT 253 E TAUNTON, MA 02718
95-203-138 FERGUSON COURTNEY	96 OLD COLONY AVENUE #352	5369	FERGUSON COURTNEY 96 OLD COLONY AVENUE #352 EAST TAUNTON, MA 02718
95-203-26 ROCHA LEE K	96 OLD COLONY AVENUE #127	5254	ROCHA LEE K 96 OLD COLONY AVE UN 127 E TAUNTON, MA 02718
95-203-13 FADRIGALAN ANDRES & NARCISA	96 OLD COLONY AVENUE #113	5240	FADRIGALAN ANDRES & NARCISA 96 OLD COLONY AVENUE # 113 E TAUNTON, MA 02718
95-203-124 DECHRISTOPHER STACEY A TR + SA Dechristopher Realty	96 OLD COLONY AVENUE #166 TRUST	5276	DECHRISTOPHER STACEY A TR + SA 96 OLD COLONY AVE UNIT 166 Dechristopher EAST TAUNTON, MA 02718 Realty Trust

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City of Taunton, MA Abutters Report

100ft. Abutters of Property 96-1-0
at 103 OLD COLONY AVENUE

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95-203-61 LALIBERTE ROBERT & MAUREEN BROSNAN	96 OLD COLONY AVENUE #229	5308	LALIBERTE ROBERT & MAUREEN BROSNAN 96 OLD COLONY AVENUE #229 EAST TAUNTON, MA 02718
95-203-114 BRIDGESTOCK KATELYN R	96 OLD COLONY AVENUE #156	5266	BRIDGESTOCK KATELYN R 96 OLD COLONY AVE #156 EAST TAUNTON, MA 02718
95-203-66 CALIGUIRE SEAN	96 OLD COLONY AVENUE #234	5313	CALIGUIRE SEAN 96 OLD COLONY AVENUE # 234 EAST TAUNTON, MA 02718
95-203-126 ARRUDA CHASE	96 OLD COLONY AVENUE #168	5278	ARRUDA CHASE 96 OLD COLONY AVENUE #168 E TAUNTON, MA 02718
95-203-9 SCHIEVINK WILLIAM J JR	96 OLD COLONY AVENUE #109	5422	SCHIEVINK WILLIAM J JR 96 OLD COLONY AVENUE #109 EAST TAUNTON, MA 02718
95-203-147 DESCARTES JOSEPH OBED	96 OLD COLONY AVENUE #361	5378	DESCARTES JOSEPH OBED 96 OLD COLONY AVENUE #361 EAST TAUNTON, MA 02718
95-203-63 CURTIN KATHRYN M	96 OLD COLONY AVENUE #231	5310	CURTIN KATHRYN M 96 OLD COLONY AVENUE #231 EAST TAUNTON, MA 02718
95-203-173 MORRIS SAMIR & ALISON J	96 OLD COLONY AVENUE #559	5412	MORRIS SAMIR & ALISON J 96 OLD COLONY AVE #559 EAST TAUNTON, MA 02718
95-203-47 HARRIS MATTHEW J	96 OLD COLONY AVENUE #214	5293	HARRIS MATTHEW J 96 OLD COLONY AVENUE #214 EAST TAUNTON, MA 02718

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95-203-125 DURANTE CHRISTINE MARIE	96 OLD COLONY AVENUE #167	5277	DURANTE CHRISTINE MARIE 96 OLD COLONY AVENUE #167 EAST TAUNTON, MA 02718
95-203-29 SHERMAN WAYNE G	96 OLD COLONY AVENUE #130	5257	SHERMAN WAYNE G 96 OLD COLONY AVE #130 E TAUNTON, MA 02718
95-203-88 ZOMICK BRUCE M TR + THE 96-320 OLD COLONY AVENUE REALTY TRUST	96 OLD COLONY AVENUE #320	5345	ZOMICK BRUCE M TR + THE 96-320 OLD COLONY AVENUE REALTY TRUST 96 OLD COLONY AVENUE #320 EAST TAUNTON, MA 02718
95-203-1 FLYNN CHRISTINE N	96 OLD COLONY AVENUE #101	5415	FLYNN CHRISTINE N 96 OLD COLONY AVENUE #101 EAST TAUNTON, MA 02718
95-203-118 MORIN JEANNE A	96 OLD COLONY AVENUE #160	5270	MORIN JEANNE A 96 OLD COLONY AVENUE #160 E TAUNTON, MA 02718
95-203-16 STRANGIS ROSILDA A	96 OLD COLONY AVENUE #116	5243	STRANGIS ROSILDA A 96 OLD COLONY AVE #116 E TAUNTON, MA 02718
95-203-67 SULLIVAN ERIN J	96 OLD COLONY AVENUE #235	5314	SULLIVAN ERIN J 96 OLD COLONY AVENUE #235 EAST TAUNTON, MA 02718
95-203-31 ANG YUK YIU JADE & ZHENG ANDREW PING	96 OLD COLONY AVENUE #132	5259	ANG YUK YIU JADE & ZHENG ANDREW PING 96 OLD COLONY AVENUE #132 EAST TAUNTON, MA 02718
95-203-90 MORNEAU SEAN	96 OLD COLONY AVENUE #322	5347	MORNEAU SEAN 96 OLD COLONY AVENUE #322 EAST TAUNTON, MA 02718

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City of Taunton, MA Abutters Report

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95-203-99 OSSAI DANIEL U TR + THE UDOMA REALTY TRUST	96 OLD COLONY AVENUE #331	5357	OSSAI DANIEL U TR + THE Udoma Realty Trust EAST TAUNTON, MA 02718 96 old Colony Ave #331
95-203-48 Keough James + John M TRS. The Freeport Realty TRUST	96 OLD COLONY AVENUE #215	5294	Keough James + John M TRS The Freeport Realty Trust 337 Freeport Street Boston, MA 02122
95-203-146 FLAHERTY BRENDAN D & KIMBERLEE M	96 OLD COLONY AVENUE #360	5377	FLAHERTY BRENDAN D & KIMBERLEE M 96 OLD COLONY AVENUE 360 E TAUNTON, MA 02718
95-203-119 DONALSON DOROTHY	96 OLD COLONY AVENUE #161	5271	DONALSON DOROTHY 96 OLD COLONY AVENUE #161 EAST TAUNTON, MA 02718
95-203-3 WOODEN STEVEN K	96 OLD COLONY AVENUE #103	5417	WOODEN STEVEN K 96 OLD COLONY AVENUE #103 EAST TAUNTON, MA 02718
95-203-152 BASFORD ELIZABETH ANN TRS + Elizabeth Ann Basford Revocable Trust	96 OLD COLONY AVENUE #366	5383	BASFORD ELIZABETH ANN TRS + Elizabeth Ann Basford Revocable Trust 96 old Colony Avenue #366 EAST TAUNTON, MA 02718
95-203-172 STOWELL WILLIAM S TRS + William S Stowell Revocable Trust	96 OLD COLONY AVENUE #558	5411	STOWELL WILLIAM S TRS + William S Stowell 96 OLD COLONY AVEN #558 Revocable Trust EAST TAUNTON, MA 02718
95-203-91 SCHWAAB IAN W & REBECCA A	96 OLD COLONY AVENUE #323	5348	SCHWAAB IAN W & REBECCA A 96 OLD COLONY AVENUE 323 EAST TAUNTON, MA 02718
95-203-120 MENEELY ALWYN	96 OLD COLONY AVENUE #162	5272	MENEELY ALWYN 96 OLD COLONY AVE UNIT 162 E TAUNTON, MA 02718

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95-203-36 ARAUJO CARLOS A	96 OLD COLONY AVENUE #203	5282	ARAUJO CARLOS A 96 OLD COLONY AVENUE #203 E TAUNTON, MA 02718
95-203-22 RIVER BEND TAUNTON PROPERTIES LLC	96 OLD COLONY AVENUE #123	5250	RIVER BEND TAUNTON PROPERTIES LLC 15 TORREY ST UNIT 3 BROCKTON, MA 02301
95-203-10 MERRILL KATHLEEN M	96 OLD COLONY AVENUE #110	5423	MERRILL KATHLEEN M 96 OLD COLONY AVE #110 E TAUNTON, MA 02718
95-203-95 O'DONNELL SHAWN P	96 OLD COLONY AVENUE #327	5352	O'DONNELL SHAWN P 96 OLD COLONY AVENUE #327 E TAUNTON, MA 02718
95-203-115 BELTRAME GRACE J	96 OLD COLONY AVENUE #157	5267	BELTRAME GRACE J 96 OLD COLONY AVENUE 157 EAST TAUNTON, MA 02718
95-203-104 HAUGH RONALD P & DEBORAH I	96 OLD COLONY AVENUE #336	5362	HAUGH RONALD P & DEBORAH I 96 OLD COLONY AVENUE #336 EAST TAUNTON, MA 02718
95-203-89 GOODWIN KEITH & SEANA	96 OLD COLONY AVENUE #321	5346	GOODWIN KEITH & SEANA 96 OLD COLONY AVENUE #321 EAST TAUNTON, MA 02718
95-203-27 CLANCY SARAH + HELEN-MARIE	96 OLD COLONY AVENUE #128	5255	CLANCY SARAH + HELEN-MARIE 96 OLD COLONY AVENUE #128 EAST TAUNTON, MA 02718

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95-203-7 MAGUIRE LINDA J	96 OLD COLONY AVENUE #107	5421	MAGUIRE LINDA J 96 OLD COLONY AVENUE 107 EAST TAUNTON, MA 02718
95-203-54 LOMBARDI-MALVONE GINE	96 OLD COLONY AVENUE #221	5300	LOMBARDI-MALVONE GINE 96 OLD COLONY AVENUE #221 EAST TAUNTON, MA 02718
95-203-11 SMITH CODY & MCGILL ALEXANDRA	96 OLD COLONY AVENUE #111	5424	SMITH CODY & MCGILL ALEXANDRA 96 OLD COLONY AVENUE UNIT 111 EAST TAUNTON, MA 02718
95-203-101 BURNETT STEPHEN D	96 OLD COLONY AVENUE #333	5359	BURNETT STEPHEN D 96 OLD COLONY AVE #333 E TAUNTON, MA 02718
95-203-35 ROJAS DAVID	96 OLD COLONY AVENUE #202	5281	ROJAS DAVID 96 OLD COLONY AVENUE 202 EAST TAUNTON, MA 02718
95-203-75 Santos Claudia	96 OLD COLONY AVENUE #307	5332	Santos Claudia 96 OLD COLONY AVENUE #307 EAST TAUNTON, MA 02718
95-203-140 MACRINA JOSEPH M JR	96 OLD COLONY AVENUE #354	5371	MACRINA JOSEPH M JR 96 OLD COLONY AVENUE #354 EAST TAUNTON, MA 02718
95-203-34 JACQUES HENRY JEAN	96 OLD COLONY AVENUE #201	5280	JACQUES HENRY JEAN 96 OLD COLONY AVENUE 201 EAST TAUNTON, MA 02718
95-203-122 MOY HERBERT	96 OLD COLONY AVENUE #164	5274	MOY HERBERT 96 OLD COLONY AVENUE #164 E TAUNTON, MA 02718

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95-203-80 BOWEN SHEENA T	96 OLD COLONY AVENUE #312	5337	BOWEN SHEENA T 96 OLD COLONY AVENUE #312 EAST TAUNTON, MA 02718
95-203-17 HAPPNIE MICHAEL	96 OLD COLONY AVENUE #117	5244	HAPPNIE MICHAEL 96 OLD COLONY AVENUE #117 EAST TAUNTON, MA 02718
95-203-78 Lizotte Elizabeth F + Kearney Patrick B	96 OLD COLONY AVENUE #310	5335	Lizotte Elizabeth F + Kearney Patrick B 96 OLD COLONY AVENUE #310 EAST TAUNTON, MA 02718
95-203-86 LEUNG PATAGONIA O	96 OLD COLONY AVENUE #318	5343	LEUNG PATAGONIA O 22 WESTCLIFF DRIVE PLYMOUTH, MA 02360
95-203-15 DURYEA JOHN R JR	96 OLD COLONY AVENUE #115	5242	DURYEA JOHN R JR P.O. BOX 980 W TISBURY, MA 02575
95-203-103 GOMES RYAN CABRAL	96 OLD COLONY AVENUE #335	5361	GOMES RYAN CABRAL 96 OLD COLONY AVENUE #335 EAST TAUNTON, MA 02718
95-203-137 SADLER DANIELLE M & ROBERT	96 OLD COLONY AVENUE #269	5325	SADLER DANIELLE M & ROBERT 96 OLD COLONY AVENUE 269 EAST TAUNTON, MA 02718
95-203-135 KELLEY MAUREEN & MURRAY JAMES	96 OLD COLONY AVENUE #265	5323	KELLEY MAUREEN & MURRAY JAMES 96 OLD COLONY AVE UNIT #265 EAST TAUNTON, MA 02718
95-203-161 BACCHIOCCHI HEATHER	96 OLD COLONY AVENUE #459	5392	BACCHIOCCHI HEATHER 96 OLD COLONY AVENUE #459 EAST TAUNTON, MA 02718

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96-42-0 MACKIN JOHN	OLD COLONY AVENUE	5200	MACKIN JOHN 135 BELMONT STREET SO EASTON, MA 02375
96-15-0 DIFFLEY JAMES THOMAS & LISA B	88 OLD COLONY AVENUE	642	DIFFLEY JAMES THOMAS & LISA B 88 OLD COLONY AVENUE EAST TAUNTON, MA 02718

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I hereby certify that the names and mailing addresses of the persons shown on the above list are the names and addresses of the owners of record as shown on the most recent certified tax list dated 9-22-25.

Signed, Peggy Sylvia

Not official unless stamped by the Board of Assessors

BASED ON OUR CURRENT RECORDS,
THIS OFFICE CERTIFIES
THE ABOVE OWNERSHIP IS
CORRECT AS OF 09-22-25
AND WITHIN 100 FEET.
BOARD OF ASSESSORS

Name: PEGGY SYLVIA

Title: ASSESSORS

Date: 09-22-25

NARRATIVE

1.0 INTRODUCTION

On behalf of the City of Taunton, BETA Group, Inc. (BETA) is submitting this Notice of Intent (NOI) for the proposed Bridge Reconstruction of bridge R-02-003=T-01-004 (the Project) at Old Colony Avenue over the Taunton River in Taunton and Raynham, Massachusetts (the Site). The Project is being filed under the MassDOT bridge exemption as specified in the 2014 Transportation Bond Bill. The bridge replacement design is substantially the functional equivalent of and in similar alignment to, the existing bridge. Therefore, the Project is not subject to the Massachusetts Wetlands Protection Act (M.G.L. ch.131, s.40 – the Act) and this NOI is being filed under the Taunton Wetlands Protection Ordinance (Chapter 432 – the Ordinance) only.

The Project is necessary to improve safety and transportation infrastructure in Taunton and Raynham along the Taunton River. The existing bridge was constructed in 1945, and following a recent rating it was recommended the bridge be closed to vehicular traffic due to poor conditions along the bridge abutments. The Project will require demolition of the existing bridge superstructure, construction of the new bridge deck and associated structural appurtenances; installation of scour protection within the Taunton River; full depth pavement reconstruction; and grading. The Project proposes to retain the existing bridge substructure while replacing the superstructure with a deck that is one foot wider to allow for the addition of a bicycle lane. Ancillary Project facets including guardrails and a relocated sidewalk have also been incorporated into the design, and the Project will also address the addition of scour protection within the river during construction.

The Project is considered a limited project because it involves the maintenance and improvement of an existing public roadway limited to widening less than a single lane, adding shoulders, and improving the drainage system per 310 CMR 10.53(3)(f), and it involves the repair and improvement of a bridge and culvert per 310 CMR 10.53(3)(i).

The Project will consist of the following:

- Bridge deck replacement;
- Installation of scour protection within the Taunton River;
- Full depth pavement construction in the vicinity of the bridge;
- Pavement milling and overlay to the north and south of the bridge;
- Modifications to roadway geometry;
- Construction of a new sidewalk;
- Installation of new granite curbing;
- Striping of two travel lanes and a bike lane;
- Installation of Americans With Disabilities Act (ADA)-Compliant curb ramps;
- Replacement of guardrails;
- Modifications to water, sewer, gas, electric and drainage utilities; and
- Tree clearing and trimming.

The Project only proposes the replacement of the superstructure and will maintain the existing substructure (i.e., piers and abutments). Accordingly, the Project will meet the Massachusetts Stream Crossing Standards to the maximum extent practicable because the existing conditions do not meet the Standards, and compliance of the existing bridge with the Standards will not change given the nature of work. Work associated with the Project will result in temporary and permanent impacts to Areas Subject to Protection under the Ordinance including Bank, Land Under Water (LUW), Bordering Land Subject to

Flooding (BLSF), Wildlife Corridor, Wetland Protection Zone, and Riverfront Area (RA) associated with the Taunton River. The Project will result in a total of 12,776 square feet (sf) and 119 linear feet (lf) of impacts to Resource Areas with the City of Taunton, further broken down as follows:

- 98 linear feet (lf) of temporary and 21 lf of permanent impact to Bank;
- 2,395 square feet (sf) of temporary and 4,171 sf of permanent[1] impact to LUW associated with a dredge volume of 1,003 cubic yards (cy);
- 1,039 sf of permanent impact to BLSF;
- 1,246 sf of permanent impact to Riverfront Area;
- 1,242 sf of permanent impact to Wildlife Corridor; and
- 1,273 sf of permanent and 705 sf of temporary impact to the Wetland Protection Zone.

It is anticipated that this Project will address the existing safety concerns while also improving non-vehicular transportation accommodations. These accommodations associated with the Project have been designed to meet standards set forth by the ADA.

Given the nature of the bridge reconstruction work, there are no feasible alternatives that avoid the impacts to Resource Areas described herein. The Project has been designed to minimize impacts and restore altered areas following construction. During construction, erosion and sedimentation controls and in-water controls including compost filter tubes, siltation fencing, and cofferdams will be installed and maintained to prevent migration of sediment into the stream. Post-construction restoration activities include regrading and stabilizing Banks with a native seed mix and placing suitable streambed material over the proposed scour protection measures within the Taunton River.

The environmental permits and reviews required to construct the Project beyond the submission of this NOI include:

- A 401 Water Quality Certification (WQC) from MassDEP for impacts to Waters of the U.S. that exceed 5,000 sf of loss and 100 cy of dredging;
- Coverage under the U.S. Army Corps of Engineers (USACE) Section 404 Massachusetts General Permit including General Permits 23: Linear Transportation Projects and Wetland/Stream Crossings and 24: Temporary Construction, Access, and Dewatering;
- Order of Conditions under the Raynham Wetlands Protection Bylaw;
- Coverage under the National Pollutant Discharge Elimination Systems (NPDES) Construction General Permit (CGP);
- National Historic Preservation Act of 1966 Section 106 review;
- Coordination with the National Parks Service due to the status of the Taunton River as a Wild and Scenic River;
- National Oceanic and Atmospheric Administration (NOAA) Section 7 review;
- U.S. Fish and Wildlife Service (USFWS) Essential Fish Habitat (EFH) Section 7 review; and
- National Environmental Policy Act (NEPA) Review through preparation of a programmatic Categorical Exclusion.

The sediment Sampling and Analysis Plan prepared as part of the Section 401 Water Quality Certification that is being filed in addition to this NOI can be made available upon request.

[1] Permanent impacts denote areas which are subject to the placement of scour protection and covered with up to two feet of compatible sediment for restoration.

2.0 SITE DESCRIPTION

2.1 PROJECT LOCUS & EXISTING CONDITIONS

The Site is located along Old Colony Avenue approximately 250 linear feet north of its intersection with Battle Row (Figure 1 – Site Locus). The Taunton River flows east/northeast through the Site towards its confluence with Mount Hope Bay in Fall River, Massachusetts. The centerline of the Taunton River is the common boundary between Taunton and Raynham; therefore, the Site includes land in both municipalities. This NOI pertains to the work proposed within the City of Taunton only.

South Street East is a two-lane road oriented in a north to south direction adjacent to the Taunton River through undeveloped forest and residential properties (Figure 1 – Site Locus). The roadway is under the jurisdiction of the Town of Raynham and is classified as an Urban Collector. Old Colony Ave is a two-lane road oriented in a north to south direction adjacent to the Taunton River through multi-family and industrial properties (Figure 1 – Site Locus). The roadway is under the jurisdiction of the City of Taunton and is classified as an Urban Collector.

The existing structure is an approximately 90’ two-span bridge with equal spans of approximately 45’ 3.5”, constructed in 1945. The structure consists of eight (8) steel beams supporting a 7” concrete deck and 2-1/4” of bituminous paving. The bridge is supported by unreinforced concrete gravity abutments and wingwalls and a reinforced concrete pier. The south abutment is founded on spread footings and the north abutment and pier are founded on timber piles. The bridge is 35’-0” wide, which includes a 26’-0” roadway, a 2’-6” safety walk and 5’-0” sidewalk with metal railing. The bridge has a skew angle of 23.6° and was designed for H20 loading. Stormwater infrastructure in the vicinity of the bridge includes two closed catch basins at the southern end of the bridge that discharge to the Taunton River through a 12-inch reinforced concrete pipe (RCP) within the southeastern wingwall. The remainder of the Site, particularly the portion in Raynham, consists of “country drainage”. A 4” Cast-Iron (CI) and an 8” Asbestos Cement (AC) sewer pipe is located within the bridge superstructure. Additionally, a 6” gas main suspected to be Ductile Iron (DI) is located within the bridge superstructure.

According to the USDA Natural Resources Conservation Service – Soil Survey and the field delineation performed by BETA Group, Inc (BETA) in March 2023, the soils on the Site and in the vicinity of the Site are classified as Birdsall Silt Loam, Urban Land, and Smoothed Udorthents.

Temporary and permanent easements are required for work within and along the Taunton River on both municipal and private properties. A total of 12 easements are required in Taunton (6 temporary, 6 permanent).

2.2 WETLAND RESOURCE AREAS

A Site inspection was conducted by BETA Wetland Scientists on March 31st 2023, to review the previously delineated boundaries of existing Resource Areas within and in the immediate vicinity of the Site. LUW boundaries were identified and delineated in accordance with the methods developed by the *U.S. Army Corps of Engineers Wetland Delineation Manual; Northeast Region* (2009).

According to the July 16, 2015 FEMA Flood Insurance Rate Map (FIRM) Number 25005C0169G, the Site is within a National Flood Insurance Program (NFIP) Special Flood Hazard) Zone AE. Zone AE areas are considered to be within the 100-year floodplain. The base flood elevation onsite is 14.8’ on the upstream side of the Old Colony Ave Bridge and 14.4’ on the downstream side of the bridge. The Taunton River has a designated Regulatory Floodway at the Site.

The Taunton River is designated as a Wild and Scenic River by the United States Congress. Within the Site, the Taunton River is classified as a "Scenic River Area." Under Sec 2. [16 U.S.C 1273].b.(2) of the Wild and Scenic Rivers Act, Scenic River Areas is defined as "Those River or sections of rivers that are free of impoundments, with shorelines or watershed still largely primitive and shorelines undeveloped, but accessible in places by roads".

Wetland and Resource Areas identified on the Site include Bank, Bordering Vegetated Wetlands (BVWs), LUW, Bordering Land Subject to Flooding (BLSF), and Riverfront Area (RA). Areas Subject to Protection under the Taunton Wetlands Protection Ordinance that are present throughout the Site include:

- Bank – Bank at the Site is associated with one (1) perennial stream (the Taunton River) and one (1) unnamed intermittent stream.
- Bordering Vegetated Wetlands (BVW) – Two (2) areas of BVW are present at the Site. The WF1 Series BVW is a scrub shrub wetland that borders on the B3/B4 Series intermittent stream. The WF2 Series BVW is a scrub shrub wetland located along the northern bank of the perennial stream (the Taunton River).
- Land Under Water (LUW) – LUW exists between the Bank boundaries below the mean annual low water level (MLW) of the streams located at the Site and generally consist of muck and gravel. The boundary of LUW is the MLW, which was not field delineated by BETA.
- Bordering Land Subject to Flooding (BLSF) – BLSF at the Site exists in the Zone AE Flood Hazard associated with the Taunton River.
- Riverfront Area (RA) – RA is present at the Site associated with mean annual high water (MAHW).
- Wetland Protection Zone (WPZ) (the Ordinance) – WPZ at the Site is located 25' from BVWs.
- Wildlife Corridor (the Ordinance) – Wildlife Corridor at the Site is located along the southern (B2 Series) Bank to the Taunton River.

The Taunton River at the Site is also mapped as a diadromous fish run.

2.2.1 BANK

Banks were delineated by BETA in the field in March 2023 as described in Table 1: Bank Boundary Description and the Resource Area Boundary Delineation Report included in Appendix A.

Table 1: Bank Boundary Description

FLAG SERIES	LOCATION	DESCRIPTION / NOTES
B1 Series Flags B1-99 to 95 and B2 Series Flags B2-91 to 99 and B2-100 to 105	Taunton River, located east, under and west of the Old Colony Ave Bridge	The northern (*B1 Series*) and southern (*B2 Series*) Banks associated with the Taunton River, a perennial stream, that generally flows west were delineated in two (2) segments along the first observable break in slope consistent with the mean annual flood level. The Bank north of the Taunton River was delineated west (*B1-99 to B1-95*) and east (*B1-100 to B1-106*) of the Old Colony Avenue Bridge in Raynham. Banks west of the bridge were generally well defined and consisted of eroded soils. Banks east of the bridge were observed to be undercut and also consisted of eroded soils. Where vegetated, both Banks consist primarily of woody vegetation including bush honeysuckle (*Diervilla lonicera*), silky dogwood (*Cornus amomum*) and Norway maple (*Acer platanoides*). Populations of poison ivy (*Toxicodendron radicans*) were also

		observed. The Bank south of the Taunton River was delineated west (*B2-91 to 99*) and east (*B2-100 to 105*) of the Old Colony Avenue Bridge in Taunton. Banks west of the bridge were generally poorly defined and consisted of rocks and stones of various sizes. Banks east of the bridge were generally well defined and generally consisted of eroded soils. Where vegetated, both Banks consist primarily of woody vegetation including slippery elm (*Ulmus rubra*), Norway maple, and silky dogwood. Populations of poison ivy were also observed. The channel width downstream of the Old Colony Avenue bridge is between 95 to 110 feet wide with a mucky, gravel substrate. The channel width upstream is 90 to 100 feet wide with a mixed cobble, gravel, and mucky substrate. Water depths within the Taunton River could not be determined in the field. The Taunton River is mapped as perennial on USGS topographic maps; therefore, it meets the definition of a perennial stream (River) per 310 CMR 10.58(2).
B3/B4 Series Flags B3-96 to 107 and B4-96 to 107	Northwest of Old Colony Avenue Bridge at 0 South East Street	The interior (*B4 Series*) and exterior (*B3 Series*) Banks associated with a shallow, braided intermittent stream west of South Street East were delineated along the first observable break in slope (consistent with the mean annual flood level). The *B3/B4 Series* stream flows west out of a drainage outfall associated with the closed drainage system under South Street East in Raynham, where flow becomes braided prior to reaching a confluence west of the Site. The *B3/ B4 Series* Banks were primarily vegetated with silky dogwood. The channel is approximately 3 to 5 feet wide and 2 to 6 inches deep with a substrate of sand and muck. This stream is not depicted on current USGS topographic maps or on the StreamStats program; therefore, it is presumed to be intermittent.

2.2.2 Bordering Vegetated Wetland (BVW)

BVWs[2] were delineated by BETA in the field in March 2023 as described in Table 2: BVW Boundary Description and the Resource Area Boundary Delineation Report included in Appendix A.

[2] BVWs described herein are located within the Town of Raynham but included here for completeness.

Table 2: BVW Boundary Description

Flag Series	Location	Description / Notes
WF1 Series Flags WF1-108 to 111	Northwest of Old Colony Avenue Bridge at 0 South East Street	The *WF1 Series* BVW is a scrub shrub wetland bordering on the *B3/B4 Series* intermittent stream. The attached U.S. Army Corps of Engineers Field Data Sheets describe evidence of hydrophytic vegetation, hydric soils, and indicators of hydrology at a specific data plot.
WF2 Series Flags WF2-100 to 102	Along the northern Bank of the Taunton River	The *WF2 Series* BVW is a scrub shrub wetland located along the northern bank of the Taunton River, west of the *B1 Series* Bank. Dominant hydrophytic vegetation observed within the area includes silky dogwood. Evidence of hydrology observed in the field includes sediment deposition and stressed vegetation (buttressed roots), and hydric soils indicators including sandy soils with prominent redox concentrations. A formal data plot was not performed at this location.

The dominant plant species in the *WF1 Series* BVW include silky dogwood (*Cornus amomum*) and multiflora rose (*Rosa multiflora*).

2.2.3 Land Under Water (LUW)

LUW exists between the Bank boundaries below the mean annual low water levels of the streams delineated at the Site. The boundary of LUW is the mean annual low water level. This boundary was not field delineated by BETA and is described in the Resource Area Boundary Delineation Report included in Appendix A.

2.2.4 Bordering Land Subject to Flooding (BLSF)

According to the Federal Emergency Management Agency (FEMA) FIRM Number 25005C0169G, dated July 16, 2015, a Zone AE Flood Hazard associated with the Taunton River exists at the Site with Base Flood Elevations (BFE) ranging from 14.4 feet (NAVD88) downstream of the bridge and 14.8 feet (NAVD88) upstream of the bridge. The Site is also located within the Regulatory Floodway of the Taunton River. Any work performed within BLSF (i.e. areas with a 0.1% yearly chance of flooding) is Subject to Jurisdiction under the Ordinance.

2.2.5 Riverfront Area (RA)

According to 310 CMR 10.58(2), RA is defined as the area of land between a river's mean annual high water (MAHW) line and a parallel line measured 200' away horizontally. A River is any natural flowing body of water that empties to any ocean, lake, pond, or other River flowing throughout the year and is shown as perennial on the current United States Geological Survey or more recent map provided by the Department, or has a watershed size of at least 0.50 square miles and a predicted flow rate greater than or equal to 0.01 cubic feet per second at the 99% flow duration using the USGS Stream Stats Method.

As noted in Table 2 above, the B1/B2 Series stream qualifies as a perennial stream (River) and is therefore afforded a 200' RA. The RA at the Site would be measured 200' horizontally from the MAHW flags. Descriptions of the MAHW boundaries associated with the Taunton River are provided below in Table 3: MAHW Boundary Description and the Resource Area Boundary Delineation Report included in Appendix A.

Table 3: MAHW Boundary Description

Flag Series	Waterbody	Description / Notes
B1 Series Flags B1-99 to 95, and B1-100 to 106 *B2 Series Flags B2-91 to 99, and B2-100 to 105*	Taunton River	The northern (*B1 Series*) Banks were delineated at the mean annual flood level (coincident with the mean annual high-water mark – MAHW) approximately ten (10) feet upgradient of Bank. MAHW was determined based on observations of sediment accumulation and scour. The southern (*B2 Series*) Banks were delineated approximately ten (10) feet upgradient of Bank. MAHW was determined based on observations of sediment accumulation, scour and the presence of debris.

2.2.6 Wetland Protection Zone (WPZ) (The Ordinance)

The WPZ allows for limitations and prohibitions on activities that may negatively impact a Resource Area. It is assumed that a 25' WPZ would be established for the Site. WPZ is present at the Site 25' from the border of BVWs.

2.2.7 Wildlife Corridor (The Ordinance)

Wildlife Corridor is a contiguous area of land within the WPZ. Wildlife Corridor is located along the *B2 Series* Bank and extends into the Taunton River.

2.3 Buffer Zones

The Project is located within the 100' Buffer Zone to Bank; however, the Buffer Zone within the Project area overlaps entirely within RA of the Taunton River. There is no additional Buffer Zones provided via the Ordinance within Taunton at the Site. Buffer Zone on the Site consists of vegetated areas, the bituminous concrete roadway, and adjacent buildings.

2.4 NHESP-Mapped Habitat and Other Sensitive Areas

The Site is not located within Natural Heritage and Endangered Species Program (NHESP)-mapped Priority Habitat of Rare Species or Estimated Habitat of Rare Wildlife. No Certified or Potential Vernal Pools are present at the Site. In addition, according to the U.S. Fish and Wildlife Service (USFWS)'s Information for Planning and Consultation (IPaC) tool, the Site is located within the range of the northern long-eared bat (*Myotis septentrionalis*) and the Plymouth redbelly turtle/cooter (*Pseudemys rubriventris bangsi*), both endangered species under the federal Endangered Species Act (ESA). The Site is also within the range of the tricolored bat (*Perimyotis subflavus*), a proposed endangered species, and the monarch butterfly (*Danaus plexippus*), a proposed threatened species. The Site is not within the vicinity of any mapped Critical Habitats for the northern long-eared bat (*Myotis septentrionalis*) or the tricolored bat (*Perimyotis subflavus*). There is final critical habitat for the Plymouth redbelly turtle/cooter, but the Project is not within this habitat.

In addition, the Taunton River is a diadromous fish run and is habitat for the Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*), an endangered species. The Project is in mapped habitat of federally listed endangered species and therefore Endangered Species Act (ESA) Section 7 consultation with NOAA and USFWS for EFH is required (Appendix G).

A Time of Year (TOY) restriction will be observed within the Taunton River from March 15th to June 30th and from September 1st to November 15th per TR-47 (pending confirmation from NOAA) in order to achieve a "Not Likely To Adversely Affect" determination via the IPaC NLEB Determination Key and to protect rare species. Water controls will be installed and removed outside of this time period. Section 7 consultation has commenced with NOAA to confirm these TOY restrictions.

The Taunton River is designated as a Wild and Scenic River with the River Classification of being a "Scenic River Area" Under Sec 2. [16 U.S.C 1273].b.(2) of the Wild and Scenic Rivers Act, Scenic River Areas is defined as "Those River or sections of rivers that are free of impoundments, with shorelines or watershed still largely primitive and shorelines undeveloped, but accessible in places by roads". Coordination with the National Park Service through the interagency review process is anticipated.

According to the latest MassGIS data, the Site is not located within NHESP mapped Priority Habitat of Rare Species or Estimated Habitat of Rare Wildlife. The Site is not located within an Area of Critical Environmental Concern (ACEC), Outstanding Resource Water (ORW) or within 200 feet of mapped Certified or Potential Vernal Pools. There are no Zone I, Zone II or IWPA groundwater protection areas or Zone A, B or C surface water protection areas.

3.0 Work Description

The Project consists of replacing the bridge superstructure while retaining the existing bridge substructure. The Project proposes to widen the bridge by 1' for curb-to-curb width of 27', which will allow a bicycle lane to be added to the roadway. The proposed sidewalk will be relocated from the east side to the west side of the roadways to connect the existing sidewalk at the condominium building south of the bridge and to Sandy Hill Street in Raynham. While the substructure will be retained, it is anticipated that in-water work will be required for placement of scour protection. Dredging will be required to install the scour protection and cofferdams will be installed within the River for control of water. Scour protection will consist of a 2'-8" layer of streambed material over 2'-0" layer of dumped riprap, which will all be over 1' of crushed stone for a total depth of 5'-8". Water controls and a dewatering system will be installed to install a the scour protection in dry conditions. Additional details on anticipated dewatering and water controls are provided in Section 7.3 below.

Specific activities associated with the Project include:

- Implementation of traffic controls and installation of erosion and sedimentation controls.
- Bridge Replacement:
    - Removal of existing Bridge superstructure.
    - Replace superstructure with the following:
        - S3-MTL4 Bridge Barrier
        - 3" Wearing surface at the roadway over an 8" cast-in-place reinforced concrete deck support by (6) W27 steel stringers;
        - Proposed superstructure will utilize the existing substructure that will remain in place;
        - Proposed low chord will match the existing low chord elevation of 14.35' and the hydraulic opening will remain unchanged;
        - Removal of debris that has accumulated at the pier.
- Full depth pavement reconstruction in the vicinity of the bridge.
- Pavement mill and overlay to the north and the south of the bridge.

  - Establishment of two 13.5’ wide travel lanes with no shoulders south of the Bridge along Old Colony Avenue.
  - Establishment of two 11’ to 11.5’ wide travel lanes with 1.5’ to 2’ shoulders north of the Bridge along South Street East.
- Construction of a 6’-wide concrete sidewalk along the east side of Old Colony Avenue.
- Construction of a 5.5’-wide concrete sidewalk along the eastern side of the Old Colony Avenue Bridge.
- Construction a 5.5’-wide concrete sidewalk along the eastern side of South Street East.
- Installation of granite curbing.
- Striping for two (2) 10’ wide travel lanes and one (1) 2’ wide bicycle lane.
- Installation of ADA Compliant Ramps.
- Installation of guardrails.
- Modifications to water, sewer, gas, electric and drainage utilities.
- Dredging of 1,003 cy of LUW and subsequent LUW/Bank restoration:
  - Installation of 1’ crushed stone scour protection.
  - Installation of 2’-0” of riprap over 1’ crushed stone scour protection.
  - Installation of 2’-8” of streambed material over 2’-0” of riprap.
  - Placement of modified rockfill over permanently impacted segments of Bank.
- Clearing, grubbing, and grading.
- Stabilization of disturbed areas.

In order to complete the work outlined above, the bridge will be closed, and a detour will be implemented during construction. The 6.5-mile detour is proposed via New State Highway (Route 44) to Church Street/ Precinct Street to Middleboro Avenue. Erosion and sedimentation control measures will be implemented as discussed in Section 6.0 – Erosion and Sediment Controls to protect adjacent Resource Areas. Material stockpiles and staging areas will be located as far from the onsite resource areas as possible and will be placed on poly fabric and surrounded with erosion and sedimentation control measures. Stockpiling and equipment storage will occur on the adjacent paved surfaces of Old Colony Avenue and South Street East.

Cofferdams will be installed in two phases associated with dewatering and scour protection installation. Phase I covers the southern cell, diverting flow through the northern cell throughout construction. Phase II will cover the southern cell. A Time of Year (TOY) restriction will be observed within the Taunton River from March 15th to June 30th and from September 1st to November 15th per TR-47 (pending confirmation from NOAA) in order to achieve a “Not Likely To Adversely Affect” determination via the IPaC NLEB Determination Key and to protect rare species. Water controls will be installed and removed outside of this time period. Given the layout of the municipal boundary in relation to the River, water control efforts will span across both municipalities.

A Water Control Plan designed by a Mass. Registered PE is required to be submitted prior to starting work on the bridge replacement. The Water Control Plan will include a Sedimentation and Erosion Control Plan, as well as a Water Flow Diversion and Containment Plan. Work within Resource Areas, including placement of fill, will only occur within dewatered areas. Final streambed restoration will be overseen by a Fluvial Geomorphologist.

3.1 Work in Buffer Zones

The Project will occur within the 100’ Buffer Zone to the Bank of Taunton River. Due to the nature of bridge work, Buffer Zone impacts are unavoidable. The Project was designed to result in the least possible impacts to Buffer Zone as practicable while still accomplishing the Project goals.

Proposed work within the 100' Buffer Zone includes the following:

- Clearing and grubbing;
- Installation of guardrails;
- Roadway, sidewalk, and curb reconstruction;
- Drainage improvements; and
- Erosion control installation.

Erosion and sedimentation control measures will be implemented as discussed in Section 4.1 to protect adjacent Resource Areas. Material stockpiles and staging areas will be located as far from the onsite Resource Areas as possible and will be surrounded with erosion and sedimentation control measures.

3.2 WORK WITHIN JURISDICTIONAL RESOURCE AREAS

Due to the nature of bridge repair activities, the Project will result in unavoidable temporary and permanent impacts to Resource Areas Subject to Protection and Jurisdiction under the City of Taunton Wetlands Protection Ordinance (City of Taunton Code (2010) §§ 16-30 to 16-38 – the Ordinance). Construction activities, including staging, dewatering, and construction work, have been designed to minimize impacts to Resource Areas to the extent practical by using appropriate erosion and sedimentation controls described in Section 4.1 and by conducting work far from the roadway when possible.

3.2.1 BANK (TO PERENNIAL STREAM, 310 CMR 10.54)

Permanent and temporary impacts to Bank will result from scour protection, clearing and grubbing, cofferdam installation, and dewatering. Table 4: Bank Impacts Summary describes the locations and areal extents of impacts.

Table 4. Bank Impacts Summary

LOCATION	BANK SERIES	IMPACT TYPE*	LENGTH (LF)
East of Station 3+00, along flags B2-102 to B2-103	BF2	Erosion control installation *	47
East of Station 3+00, along flags B2-102 to B2-100	BF2	Riprap scour construction	21
West of Station 3+00, along flags B2-99 to B2-96	BF2	Erosion control installation *	51
		TOTAL PERMANENT BANK IMPACTS:	21
		TOTAL TEMPORARY BANK IMPACTS:	98

Denotes a temporary impact that will be restored in-place per Project Specifications.

The majority of permanent impacts to Bank result from dredging and construction of the riprap scour protection. Temporary impacts result from water control through cofferdam installation and dewatering. Although riprap scour construction is considered a permanent impact, all impacts to Bank will be restored in place as described in Section 5.0.

3.2.2 Land Under Water (310 CMR 10.56)

Permanent and temporary impacts to LUW that occur within and adjacent to the Site will result from installation of water control / diversion devices, scour protection, cofferdam installation, and dewatering. A total of 6,566 square feet (sf) of LUW alteration is proposed within the Taunton River. Table 5: LUW Impacts Summary describes the locations and areal extents of impacts.

Table 5: LUW Impacts Summary

LOCATION	IMPACT TYPE*	AREA (SF)
Western side of the bridge between B2-97 and B2-96	Cofferdam installation and dewatering *	141
Western side of the bridge between B2-97 and B2-96	Dredging for access *	595
Western side of the bridge between B2-97 and B2-102	Dredging and installation of riprap scour protection	4,171
Eastern side of the bridge between B2-102 and B2-103	Cofferdam installation and dewatering *	1089
Eastern side of the bridge at B2-102	Dredging for access *	570
	TOTAL PERMANENT LUW IMPACTS:	4,171
	TOTAL TEMPORARY LUW IMPACTS:	2,395

****Denotes a temporary impact that will be restored in-place per Project Specifications.***

Permanent impacts to LUW result from dredging and the installation of riprap scour protection. 1,003 cy of material will be dredged from the Taunton River to install scour protection. Although a suitable streambed material will be placed on these impacts areas, the presence of new riprap scour protection has resulted in these impacts being qualified as permanent with in-kind restoration. Temporary impacts result from the temporary control of water through the use of a cofferdam during construction that will be restored after work is completed. Dredging to access the area of scour protection installation will be restored and results in temporary impacts.

3.2.3 Bordering Land Subject to Flooding (310 CMR 10.57)

No permanent fill is proposed within BLSF. A total of 1,039 sf of permanent BLSF impact is proposed over the course of the Project. The majority of these impacts result from:

- Clearing and grubbing;
- Installation of riprap scour protection; and
- Updates to drainage outfalls.

3.2.4 Riverfront Area (310 CMR 10.58)

A total of 1,246 sf of permanent Riverfront Area impacts is proposed over the course of the Project. The majority of these impacts result from:

- Installation of riprap scour protection; and
- Installation of guardrails.

All temporary impacts will be restored in-place per the mitigation measures described in Section 4.0.

3.2.5 Wetland Protection Zone (The Ordinance)

A total of 705 sf of temporary and 1,273 sf of permanent impact to Wetland Protection Zone (WPZ) is proposed over the course of the Project. The majority of these impacts result from:

- Clearing and grubbing; and
- Installation of riprap scour protection.

3.2.6 Wildlife Corridors (The Ordinance)

A total of 1,242 sf of permanent Wildlife Corridor impacts is proposed over the course of the Project. The majority of these impacts result from:

- Clearing and grubbing;
- Installation of a new headwall and wingwalls for the existing 12" CMP outfall; and
- Installation of riprap scour protection.

3.2.7 100' Buffer Zone

A total of 705 sf of temporary impacts and 1,273 sf of permanent impacts to the 100' Buffer Zone is proposed over the course of the Project. The majority of these impacts result from:

- Clearing and grubbing;
- Installation of guardrails;
- Roadway, sidewalk, and curb reconstruction;
- Drainage improvements; and
- Erosion control installation.

4.0 Mitigation Measures

4.1 Erosion and Sedimentation Controls

Best Management Practices (BMPs) for erosion and sedimentation controls will be adhered to for all phases of construction to minimize erosion, sedimentation, and impacts on Resource Areas.

Due to the clearing of vegetation, removal of dredged sediment and installation of stone, dust management will be necessary. Water will likely be used by contractors to minimize airborne particulate matter during construction.

Prior to final completion of construction, areas of exposed soils will be present at the Site and will require temporary stabilization. Temporary stabilization methods may include temporary seeding, application of straw mulch, and use of erosion control blankets. Erosion and sedimentation controls will be installed before any land disturbance begins and will remain in place for the duration of the Project. These control measures will be used throughout construction to prevent impacts to downgradient Resource Areas and may include compost filter tubes and siltation fencing or similar controls at the Contractor's specification. Compost filter tubes will be placed as close to the limit of soil disturbance as possible, along contours, and perpendicular to flow. Silt sacks will be used in all existing catch basins within and near the limit of work.

Erosion and sedimentation control measures will be implemented along the limit of work downgradient of the disturbed areas during construction to minimize further resource area impacts and act as a visual limit of work. Erosion and sedimentation barriers will be installed to reduce the chance of soil or sediment migration beyond the limits of work. Temporarily impacted areas will be restored to existing conditions

upon completion of the Project. Erosion and sedimentation controls will remain in place and in proper working order until the Site is completely stabilized. A stockpile of approved erosion and sedimentation control materials will be kept on-site for emergency and routine replacement.

The Contractor will be responsible for obtaining coverage under the Construction General Permit (CGP) pursuant to the Environmental Protection Agency (EPA) National Pollutant Discharge Elimination Systems (NPDES). A Stormwater Pollution Prevention Plan (SWPPP) will be developed prior to any land disturbance. Per the SWPPP, the Contractor will monitor and assess conditions and identify problems in the field during and after construction activities.

4.2 Water Controls and Dewatering

The dredging of the streambed (LUW) and installation of riprap scour protection will require the implementation and maintenance of temporary water controls within the Taunton River so that the work can be completed in dry conditions. While the exact means and methods for water control will be determined by the contractor, it is anticipated that water controls will consist of cofferdams in the form of portadams or sandbags.

A Water Control Plan designed by a Massachusetts Registered Professional Engineer is required to be submitted prior to starting in-water work. The Water Control Plan will include a Sedimentation and Erosion Control Plan and a Water Flow Diversion and Containment plan. Work within Resource Areas, including placement of fill, will only occur within dewatered areas. Final LUW restoration will be overseen by a Fluvial Geomorphologist.

According to preliminary hydraulic studies performed for the Project, temporary closure of each half of the Taunton River will result in water levels remaining below bankfull conditions. Flow is expected to remain within the channel with no overbank flooding in response to a 2-year flood.

Cofferdams will be installed in two phases consistent with the phasing of the dredging work. Phase I addresses the southern half of the River and will divert flow through the northern cell, while Phase II addresses the northern half of the River and will divert flow through the southern cell. A Time of Year (TOY) restriction will be observed within the Taunton River from March 15th to June 30th and from September 1st to November 15th per TR-47 (pending confirmation from NOAA) to protect rare species habitat. Water controls will be installed and removed outside this period.

Dewatering of the work area will be completed to avoid an increase in turbidity over the baseline conditions. It is anticipated that the work area will be dewatered via pumping to a settling tank or dewatering system that filters the water prior to discharge back to the stream. The means and methods for dewatering will be determined by the Contractor at the time of construction based on Site-specific conditions and will be included in the prepared SWPPP which will be completed by the Contractor prior to the start of work.

4.3 Invasive Species Control

Invasive species observed at the Site by BETA include, Norway Maple (*Acer platanoides*), Garlic Mustard (*Alliera petiolata*), and Multiflora Rose (*Rosa multiflora*).

During or after construction, the contractor will employ BMPs designed to prevent further propagation of invasive plant species at the Site. These BMPs include proper disposal of any excavated invasive species, prevention of migration of rhizome fragments and seed pods, and cleaning vehicles of soil before and after accessing the Site. Any application of herbicides will be done in accordance with the practices set forth by the Massachusetts Department of Agricultural Resources.

4.4 STORMWATER MANAGEMENT

4.4.1 EXISTING STORMWATER MANAGEMENT

Stormwater runoff from the Site is described as Drainage Areas Ex-1E, Ex-2E, and Ex-3E in the Stormwater Report (Appendix B). Existing closed drainage systems are present along the roadway which convey stormwater runoff to two outfalls, one of which discharges to the Taunton River and one of which discharges to a nearby intermittent stream. No edge treatment is provided on the southern side of South Street East in Raynham, and stormwater runoff from this portion of the Site flows overland into a forested area.

4.4.2 PROPOSED STORMWATER MANAGEMENT

Stormwater management is proposed via modifications to the existing closed drainage system. Existing inlets will be replaced with deep-sump catch basins, and additional deep-sump catch basins will be installed throughout the corridor to provide more effective stormwater collection and treatment. New curbing is proposed to better direct stormwater runoff to catch basins. The majority of existing trunklines will be retained. The Project will retain existing drainage runoff patterns to the maximum extent practicable.

The Project will retain the existing outfall from the closed drainage system within the Town of Raynham and will replace the existing outfall associated with the closed drainage system within the City of Taunton. The new outfall will be increased in size from 12” to 18” and the existing headwall will be rebuilt at the same location.

The Project proposes a new 45’ 8” HDPE infiltration trench within the Town of Raynham near the northeastern limit of work. Stormwater runoff will be directed to this SCM through a new deep sump catch basin which will overflow into the existing closed drainage system.

Additionally, country drainage/pavement disconnection will be implemented for several portions of South Street East by excluding curbing to allow treatment in the grass/woodland area adjacent to the roadway. Of this, approximately 100’ of South Street East, on the eastern side of the roadway, drains to an area that meets the definition of qualifying pervious area and is comprised of approximately 1,500 sf of impervious area.

4.5 COMPLIANCE WITH STORMWATER STANDARDS

The Project complies with the MassDEP Stormwater Management Standards (the Standards).

The Project is classified as a Limited[3] and Redevelopment[4] project under section 310 CMR 10.53(3)(f) and (i). The proposed work within the roadway, such as replacing the existing catch basins with deep sump

[3]The following projects may be permitted as a limited project pursuant to 310 CMR 10.24(7) provided the project complies with all applicable provisions of 310 CMR 10.24(1) through (6) and (9) and (10): 1. Maintenance and improvement of existing public roadways, but limited to widening less than a single lane, adding shoulders, correcting substandard intersections, and improving drainage systems. 2. The maintenance, repair and improvement (but not substantial enlargement except when necessary to reduce or eliminate a tidal restriction) of structures, including buildings, piers, towers, headwalls, bridges and culverts which existed on November 1, 1987.

[4] Redevelopment means replacement, rehabilitation, or expansion of existing structures, improvement of existing roads or reuse of degraded or previously developed areas for purposes of 310 CMR 10.58, governing work in the riverfront area. For purpose of the Stormwater Management Standards as provided in 310 CMR 10.05(6)(k) through (q), redevelopment is defined to include the following projects: (a) maintenance and improvement of

catch basins, constitutes Redevelopment work because the work will substantially occur within an existing paved area. Redevelopment work is required to meet Standards 1 and 7 through 10 fully, and Standards 2 through 6 only to the maximum extent practicable.

This section details the regulatory framework for stormwater management, the existing impervious cover and stormwater system, an assessment of impacts, and the project's regulatory compliance with the Massachusetts Stormwater Standards.

4.5.1 Regulatory Framework

The Project consists of redevelopment of an existing / paved bridge and roadway, widening of roadway and installation of a bicycle pathway, relocation of an existing sidewalk from the eastern side of the bridge to the west, associate drainage infrastructure improvements, and installation of scour protection within the Taunton River. The Project complies with the MassDEP Stormwater management Standards that meets all standards to the maximum extent practicable.

The Project is classified as a Limited[5] and Redevelopment[6] project under section 310 CMR 10.53(3)(f) and (i). As a result, the Project is only required to meet Standards 1 and 7 through 10 fully, and Standards 2 through 6 only to the maximum extent practicable. The Stormwater design for these Standards is described in the following sections.

4.5.2 Regulatory Compliance

The Project will result in vegetative clearing, grading, and construction of 781 square feet of new impervious area. Accordingly, stormwater SCMs that comply with the Stormwater Management Standards are required.

The Project qualifies as Limited Redevelopment Project under the Stormwater Management Standards. This section provides a list of the Stormwater Management Standards and a brief description of the Project's compliance with the Standards to the maximum extent practicable.

LID Measures

Low Impact Development (LID) techniques utilized along portions of the Project include:

- Preservation of existing vegetation;
- Use of country drainage for portions of the Site; and
- Preservation of existing drainage patterns.

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existing roadways including widening less than a single lane, adding shoulders, correcting substandard intersections, improving existing drainage systems and repaving

[5]The following projects may be permitted as a limited project pursuant to 310 CMR 10.24(7) provided the project complies with all applicable provisions of 310 CMR 10.24(1) through (6) and (9) and (10): 1. Maintenance and improvement of existing public roadways, but limited to widening less than a single lane, adding shoulders, correcting substandard intersections, and improving drainage systems. 2. The maintenance, repair and improvement (but not substantial enlargement except when necessary to reduce or eliminate a tidal restriction) of structures, including buildings, piers, towers, headwalls, bridges and culverts which existed on November 1, 1987.

[6] Redevelopment means replacement, rehabilitation, or expansion of existing structures, improvement of existing roads or reuse of degraded or previously developed areas for purposes of 310 CMR 10.58, governing work in the riverfront area. For purpose of the Stormwater Management Standards as provided in 310 CMR 10.05(6)(k) through (q), redevelopment is defined to include the following projects: (a) maintenance and improvement of existing roadways including widening less than a single lane, adding shoulders, correcting substandard intersections, improving existing drainage systems and repaving

Standard 1: No New Untreated Discharges

No new stormwater conveyances (e.g. outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.

The Project has been designed to comply with Standard 1. The Project proposes to replace the existing outfall from the City of Taunton closed drainage system. This work will include replacing the existing 12" MTL and 12" CMP outfalls with a new 18" DI outfall at the same location, replacing the existing headwall, and providing stone for pipe ends as stabilization to prevent erosion to the Taunton River. The Project proposes to retain the existing outfall from the Town of Raynham closed drainage system.

The Stormwater Management Report (Appendix B) provides supporting calculations for the outlet protection design.

Stormwater runoff will be treated by deep sump catch basins, the infiltration trench, or country drainage before discharging off-site.

See Standard 4 for the water quality treatment provided by the Project.

Standard 2: Peak Rate Attenuation

Stormwater management systems shall be designed so that the post-development peak discharge rates do not exceed pre-development peak discharge rates.

The Project has been designed to comply with Standard 2 only to the maximum extent practicable as a Redevelopment / Limited Project. This Project reduces post development peak runoff rates to below pre-development peak runoff rates for DP 3 during the 2-year and 100-year 24-hour design storm events based on NOAA Atlas 14 precipitation data as shown in Table 6. Otherwise, a net increase in peak runoff rates is anticipated for all design points and design storm events.

Table 6: Rainfall Depths (in)

DESIGN STORM EVENTS	RAINFALL DEPTH (in)
2-Year	3.42
10-Year	5.08
100-Year	7.71

Table 7 provides a summary of peak rates for each design point under existing and proposed conditions. The Stormwater Management Report (Appendix B) provides computations and supporting information regarding the hydraulic and hydrologic modeling.

Table 7: Peak Discharge Rates (cfs)

DESIGN POINT	EXISTING RATE (cfs)			PROPOSED RATE (cfs)		
	2-Year	10-Year	100-Year	2-Year	10-Year	100-Year
DP 1	1.14	2.08	3.61	1.23	2.22	3.81
DP 2	0.74	1.39	2.44	0.67	1.28	2.20
DP 3	0.52	1.11	2.14	0.39	0.90	1.81
TOTAL	2.40	4.58	8.19	2.29	4.41	7.82

The Project is unable to fully meet this standard due to constraints including right-of-way, grades, and existing developed properties. This Project includes a net increase of 781± square feet of impervious surface, which will result in minor increases to the volume and rate of stormwater runoff from the Project area. This increase in impervious area is necessary to provide sidewalks where none currently exist. Despite Project constraints and an increase in peak flow rates, the proposed deep-sump catch basins and infiltration trench will improve existing conditions throughout the Project corridor. Refer to HydroCAD calculations provided in the Stormwater Management Report (Appendix B) for additional information.

Standard 3: Recharge

Loss of annual recharge to groundwater shall be eliminated or minimized through the use of infiltration measures, including environmentally sensitive site design, low impact development techniques, stormwater best management practices, and good operation and maintenance. At a minimum, the annual recharge from the post-development site shall approximate the annual recharge from pre-development conditions based on soil type. This Standard is met when the stormwater management system is designed to infiltrate the required recharge volume as determined in accordance with the Massachusetts Stormwater Handbook.

The Project has been designed to meet this standard on a Project-wide basis, as the Project is a Redevelopment / Limited Project. The Project has significant right-of-way constraints, which restrict opportunities for recharge on the southern portions of the Site. Despite constraints, the proposed infiltration trench has been designed to provide the sitewide required recharge volume for new and a portion of the existing impervious area. However, the required recharge volume will not be achieved for design points DP 1 and DP 2.

Table 8 provides the required recharge volume for the Project, and Table 9 provides the recharge volumes proposed for each design point.

Table 8: Required Recharge Volume for Project

	HSG A	HSG B	HSG C	HSG D	Total
Existing Impervious (sq. ft)	26,829		1,964	2,417	31,210
Proposed Impervious (sq. ft)	27,280		2,213	2,498	31,991
Net Impervious Area (sq. ft)	451		249	81	781
Target depth, F (in)	0.6	0.35	0.25	0.10	
Required Recharge Volume, ReV (cf)	22.55		5.19	0.68	28.41

Table 9: Provided Recharge Volumes at Each Design Point

	HSG A	HSG B	HSG C	HSG D	Total
DP-1					
Net Impervious Area (sq. ft)	461		5	705	9,844
Required Recharge Volume, ReV (cf)	23.05		0.10	5.88	29.03
Provided Recharge Volume (cf)	0		0		0.00
DP-2					
Net Impervious Area (sq. ft)	1,583		0	-195	1,388
Required Recharge Volume, ReV (cf)	79.15		0.00	-1.63	77.53
Provided Recharge Volume (cf)	81.42		0		81.42
DP-3					
Net Impervious Area (sq. ft)	-1593		244	-429	-1,778
Required Recharge Volume, ReV (cf)	-79.65		5.08	-3.58	-78.14
Provided Recharge Volume (cf)	0.00		0		0.00

The infiltration SCMs are designed to drain completely within 72 hours.

Standard 4: Water Quality Treatment

Stormwater management systems shall be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS)

The Project has been designed to comply with Standard 4 only to the maximum extent practicable as a

Redevelopment / Limited Project. Proposed drainage system improvements, including the installation of deep sump catch basins and an infiltration trench will provide treatment of stormwater runoff that does not currently exist and will improve existing conditions. The proposed Project will provide an average TSS removal rate of 20% for 31,991± sq. ft. of impervious surfaces.

The Project is located in an area with a rapid infiltration rate (>2.4 in/hr) and the required water quality volume has been calculated based on the 1.0" water quality depth.

Table 10 shows the WQV to be treated for both new and existing impervious area within each drainage area, organized by design point.

Table 10: WQV at Each Design Point

DESIGN POINT	WQV FOR NEW IA (cf)	WQV FOR EXISTING IA (cf)	TOTAL WQV (cf)
DP-1			
10P	*97.58*	*722.75*	*820.33*
Total	97.58	722.75	820.33
DP-2			
20P	*44.75*	*1,028.50*	*1,073.25*
21P	*70.92*	*0.00*	*70.92*
Total	115.67	1,028.50	1,144.17
DP-3			
30P	*-148.17*	*849.58*	*701.42*
Total	-148.17	849.58	701.42
Project Total	**65.08**	**2,600.83**	**2,665.92**

Table 11 shows the WQV provided by the SCMs at each design point.

Table 11: WQV by the SCMs at Each Design Point

DESIGN POINT	PRETREATMENT (Y/N)	*WQV PROVIDED (cf)*	*MEETS TOTAL WQV (cf)*	*MEETS REQUIRED WQV for NEW IA*
DP-1		0	No	No
DP-2			No	Yes
Linear Infiltration Practice	Y	81.42	No	Yes
Total	Y	81.42		
DP-3		0		
Project Total			***No***	***Yes***

Opportunities to install treatment and recharge SCMs are limited due to the aforementioned constraints. Despite Project constraints, the proposed deep sump catch basins and linear infiltration practice will improve existing conditions throughout the Project corridor. Refer to Appendix A in the Stormwater Management Report for calculations relating to TSS Removal. Refer to Illicit Discharge Compliance Statement under Standard 10.

Appendix B includes the Long Term Pollution Prevention Plan for this Project.

Standard 5: Land Uses with Higher Potential Pollutant Loads (LUHPPLs)

Land use with high potential pollutant loads must have source control and pollution prevention measures implemented in accordance with the Massachusetts Stormwater Handbook.

Standard 5 does not apply to the Project. There are no Land Uses with Higher Potential Pollutant Loads proposed as part of the Project.

Standard 6: Critical Areas

Stormwater discharges within the Zone II or Interim Wellhead Protection Area of a public water supply and stormwater discharges near or to any other critical area require the use of specific source control, pollution prevention measures.

Standard 6 does not apply to the Project. There are no Critical Areas near the Project area.

Standard 7: Redevelopment

A redevelopment project is required to meet certain Stormwater Management Standards only to the maximum extent practicable.

The Project is a Redevelopment Project under the first definition: “Maintenance and improvement of existing roadways, including widening less than a single lane, adding shoulders, correcting substandard intersections, improving existing drainage systems and repaving.” Proposed deep sump catch basins and infiltration trench will provide treatment to the maximum extent practicable and represent an improvement to the existing conditions. Standards 1, 8, 9, and 10 are met, Standards 3 and 4 are met on a Project-wide basis, and Standard 2 is met to the maximum extent practicable. Standards 5 and 6 are not applicable to this Project.

Standard 8: Construction Period Pollution Prevention and Erosion and Sediment Control

A plan to control construction related impacts, including erosion, sedimentation, and other pollutant sources during construction and land disturbance activities shall be developed and implemented.

The implementation of erosion and sedimentation (E&S) controls during construction is considered a standard practice for all City projects. E&S controls will be installed before any land disturbance begins for the Project and will remain in place for the duration of the Project. The E&S controls for the Project are shown on the Project plans and include perimeter sediment control barrier, tree protection, temporary cofferdam for water control, and dewatering.

The Project as currently design disturbs one or more acres of land; therefore, the Project contractor will request coverage under the NPDES Construction General Permit (CGP) and develop a Stormwater Pollution Prevention Plan (SWPPP). The SWPPP follows the requirements of this standard and complies with the NPDES CGP.

Standard 9: Long Term Operation and Maintenance Plan

A Long-Term Operation and Maintenance Plan shall be developed and implemented to ensure that stormwater management systems function as designed.

The roadway and bridge included in this Project are located in both the City of Taunton and the Town of Raynham. Ownership is divided between the City of Taunton and the Town of Raynham. The activities included in the O&M Plan will be implemented by the municipality. Appendix B of the Stormwater Management Report (Appendix B) includes the O&M Plan for this Project.

Standard 10: Prohibition of Illicit Discharges

All illicit discharges to the stormwater management system are prohibited.

The Project's stormwater management system, as shown on the plans submitted with this report, has been designed in full compliance with Standard 10. The Project area does not have any known illicit connections. Any illicit connections to the stormwater management system found in the Project limit of work during construction will be removed and/or resolved through the City's Illicit Discharge Detention and Elimination (IDDE) Program. The Long-Term Pollution Prevention Plan, provided in Appendix B of the Stormwater Report (Appendix B), includes measures to prevent illicit discharges.

For additional details see Stormwater Report in Appendix B– Stormwater Management Report details the stormwater management improvements proposed by the Project and describes the Project's relation to the Stormwater Management Standards.

The Contractor will be responsible for obtaining a National Pollutant Discharge Elimination Systems (NPDES) Dewatering and Remediation General Permit (DRGP). A Stormwater Pollution Prevention Plan (SWPPP) will be prepared prior to any land disturbance and will be submitted to the Conservation Commission for review and approval. Per the SWPPP, the Contractor will monitor and assess conditions and identify problems in the field during and after construction activities.

4.6 Resource Area Restoration and Replication

The Project was designed to avoid, minimize, and mitigate impacts to Resource Areas, wildlife habitat, and other sensitive areas. Due to the nature of the Project being a bridge replacement within a linear corridor, avoidance of impacts is infeasible; however, they have been minimized to the extent possible. Impacts will be mitigated with LUW and BVW restoration as described below.

4.6.1 LUW Restoration

To address the proposed permanent LUW impacts, the Project will restore the LUW conditions in place through the addition of native streambed material over installed scour protections. To restore LUW, 2'-8" layer of streambed material will be placed over a 2'-0" layer of dumped Class III riprap, which will all be over 1' of crushed stone for a total depth of 5'-8". The riprap will extend the length of the channel from each abutment and will extend 25' upstream and downstream of the embankment. All 6,566 sf of permanent and temporary LUW impacts will be restored in place.

4.6.2 Bank Restoration

To address the proposed temporary Bank impacts caused by the installation of erosion controls, all 98 lf of temporary Bank impacts and 21 lf of permanent Bank impacts will be restored through the application of a native roadside part-shade seed mix. Four inches (4") of loam and seed will be applied over pavement milling mulch.

Erosion and sedimentation controls will be 100% biodegradable and left in place at the conclusion of the Project. Compost filter tubes will be overlapped by a minimum of 3' for a continuous barrier and secured using hardwood stakes. Erosion and sedimentation controls will be used to reduce flow onto work and to prevent flow off-site by placing the controls as close to the area of disturbance as possible. Compost filter tube berms will be used for slopes 2:1 or steeper and will be staked every 5' to secure the tube or per the manufacturer's instructions. Any non-biodegradable material, if used, will be removed and disposed of off-site at the Contractor's expense. Filter tube compost will be spread or raked around to eliminate berm. The restored areas will be monitored over the course of two (2) years to document adequate hydrology and plant survivability.

BMPs will be employed by the Contractor to prevent further propagation of invasive plant species at the Site. These BMPs include proper disposal of any excavated invasive species, prevention of migration of rhizome fragments and seed pods, and cleaning vehicles of soil before and after accessing the Site. Any application of herbicides will be done in accordance with the practices set forth by the Massachusetts Department of Agricultural Resources. Further details regarding invasive species control can be found in Appendix D – Project Plans.

5.0 Alternatives Analysis

The purpose of this Project is to reconstruct a structurally deficient bridge, protect the bridge from scour, and improve safety for vehicles, cyclists, and pedestrians. As described in further detail within the Alternatives Analysis prepared for the Project (Appendix G), several factors were considered when determining the scope and approach of the Project design, including cost, construction constraints, and environmental concerns.

The intent of this analysis is to demonstrate that there is no alternative to the Project with less impacts on the environment that meets the Project purpose. Accordingly, this Alternatives Analysis focuses on the considerations made during the preparation of the Bridge Reconstruction R-02-003=T-01-004 Alternatives Analysis and were used to develop this Alternatives Analysis. This Alternatives Analysis assesses the following alternatives:

- No-Build Alternative;
- 10' Travel Lanes and 4' Shoulder on Safety Curb Side (Alternative #1 – Preferred);
- 12' Travel Lanes and 2' Shoulders on Either Side (Alternative #2);
- No Scour Protection (Alternative #3); and
- Embedment Below Scour Depths (Alternative #4).

5.1 Project Construction Alternatives

5.1.1 No-Build Alternative

The No-Build Alternative was assessed as a potential Project alternative. Under the No-Build Alternative, no aspect of the Project purpose as defined above is realized. While the No-Build Alternative would not result in a loss of Resource Areas the Old Colony Avenue Bridge would remain deteriorating and insufficient for safe public transportation. Pursuing the Non-Build Alternative is not consistent with the Project purpose and would not serve the needs of the City of Taunton or the Town of Raynham, therefore, this alternative was not selected.

5.1.2 Alternative #1: 10-Foot Travel Lanes and 4-Foot Shoulder on Safety Curb Side (Preferred)

Alternative #1 features a cross-section with two 10'-wide travel lanes in each direction, accompanied by one 2' -wide shoulder on the sidewalk side and one 4'-wide shoulder on the safety curb side. Sidewalk is proposed on the west side of the roadway. The sidewalk is 6' wide from the condominium driveway to over the bridge. North of the bridge the sidewalk tapers down to 5.5' wide and terminates at Sandy Hill Street with reciprocal ramps. Vertical granite curb is proposed along the front of the sidewalk. Vertical granite curb is proposed at the back of sidewalk at Station 5+70 +/- to 6+32 +/- (LT) to avoid impacts to the wetlands. Alternative #1 will require a design justification for pedestrian accomodations because only one sidewalk is being proposed. The design does not allow for sidewalks on both sides of the road due to the width constraint of the existing bridge substructure. A design justification is also needed for the bicycle accomodations. Neither a shared use path or seperated bike lanes were able to fit within the existing bridge structure. Therefore, a 4' shoulder was provided on the east side, which is the minimum width for bicycle accomodation. A 2' shoulder was provided on the west side against the sidewalk for drainage, errant vehicles, and encroachment and off-tracking of wide vehicles. Sharrows can be added in the northbound lane.

Alternative #1 results in impacts to LUW totaling 6,566 sf (4,171 sf permanent and 2,395 square feet temporary); and impacts to Bank totaling 119 lf (21 lf permanent and 98 lf temporary). Alternative #1 and Alternative #2 result in the same impacts to Resource Areas.

Alternative #1 allows for bicycle accommodation southbound with a 4' shoulder, while still maintaining the minimum lane width for a collector of 10'. Old Colony Avenue and South Street East is a bus route on the Greater Attleboro Taunton Regional Transit Authority. Bus lanes are permitted on 10' travel lanes. The narrower 10' roadway will help reduce speeds. Alternative #1 presents an improvement upon existing bridge conditions and achieves the Project's purpose and need with no increase in Resource Area impacts compared to Alternative #2. Therefore, Alternative #1 is the preferred alternative.

5.1.3 Alternative #2: 12-Foot Travel Lanes and 2-Foot Shoulders on Either Side

Alternative #2 features a cross-section with two 11'-wide travel lanes in each direction, accompanied by two 2'-wide shoulders. Vertical granite curbing lines both sides of the roadway. Sidewalk proposed on the west side of the roadway. The sidewalk is 6' wide from the condominium driveway to over the bridge. North of the bridge the sidewalk tapers down to 5.5' wide and terminates at Sandy Hill Street with reciprocal ramps. Vertical granite curb is proposed along the front of the sidewalk. Vertical granite curb is proposed at the back of sidewalk at Station 5+70 +/- to 6+32 +/- (LT) to avoid impacts to the wetlands. Alternative #2 will require a design justification for pedestrian accomodations because only one sidewalk is being proposed. The design does not allow for sidewalks on both sides of the road due to the width constraint of the existing bridge substructure. A design justification is also needed for the bicycle accomodations. Neither a shared use path or seperated bike lanes were able to fit within the existing bridge structure. Therefore, 2' shoulders were provided on both sides of the roadway. Sharrows can be added to both travel lanes.

Alternative #2 results in impacts to LUW totaling 6,566 sf (4,171 sf permanent and 2,395 square feet temporary); and impacts to Bank totaling 119 lf (21 lf permanent and 98 lf temporary). Alternative #1 and Alternative #2 result in the same impacts to Resource Areas.

Alternative #2 presents the same conditions as existing conditions, where the lane widths are 11' wide and the shoulders are 2' wide. Alternative #2 does not propose any pedestrian or bicycle improvements in addition to addressing unsafe bridge conditions, while providing no decrease in impacts to Resource Areas. Therefore, Alternative #2 was not selected.

5.1.4 Alternative #3: No Scour Protection

Alternative #3 includes the design provisions of the preferred Alternative #1 without the addition of scour protection. In Alternative #1, scour protection consists of a 2'-8" layer of streambed material over 2'-0" layer of dumped riprap, which will all be over 1' of crushed stone for a total depth of 5'-8". Constructing the Project without scour protection eliminates the need for dredging and dewatering, reducing impacts to Resource Areas. Although Alternative #3 results in less impacts to Resource Areas, scour protection has been determined as necessary to protect the Taunton River and bridge from scour and eventual compromising of the substructure. Therefore, Alternative #3 was not selected.

5.1.5 Alternative #4: Embedment Below Scour Depths

Alternative #4 proposes to lower the bridge footings below predicted scour depths. This alternative would require the substructure to be replaced in order to embed it below the level where scour would occur.

Hydraulic analysis confirms that scour countermeasures are required around the bridge to prevent erosion. Under proposed conditions, the scour analysis predicts contraction scour of approximately 2.6' to 2.7' and worst local abutment scour of approximately 13' during the 25-year and 50-year storm events. Total predicted scour exceeds 5'. These scour depths indicate that the existing bridge is vulnerable to scour without protection. Accordingly, riprap countermeasures are required to protect the substructure and reduce erosion risk during flood events. Dredging is only proposed to install scour countermeasures. An alternative to installing scour protection would be to replace the substructure and embed it to a depth below the level where scour would occur. However, this alternative would still result in significant impacts to LUW and Bank associated with water controls and pier removal/installation and would be cost-prohibitive to the City of Taunton based on current funding. Installation of scour protection is significantly less costly than substructure replacement and the proposed 2' of native streambed material proposed over the scour protection will provide appropriate restoration in the final condition.

Alternative #1 was selected because the installation of riprap countermeasures is necessary to protect the area around the bridge from scour and results in less disturbance than Alternative #4. The proposed riprap countermeasures are consistent with the MassDOT Bridge Manual - Hundredth Anniversary Edition.

6.0 Regulatory Compliance

The Project is proposed under the provisions specified under City of Taunton Wetlands Protection Ordinance, which builds upon the provisions of the Massachusetts Wetlands Protection Act pursuant to "Home Rule". The Project was designed to meet the Performance Standards of the Act, and where more stringent, the Ordinance.

The Project will result in the following impacts:

- 98 linear feet (lf) of temporary and 21 lf of permanent impact to Bank;
- 2,395 square feet (sf) of temporary and 4,171 sf of permanent[7] impact to LUW associated with a dredge volume of 1,003 cubic yards (cy);
- 1,039 sf of permanent impact to BLSF;
- 1,246 sf of permanent impact to Riverfront Area;
- 1,242 sf of permanent impact to Wildlife Corridor; and

[7] Permanent impacts denote areas which are subject to the placement of scour protection and covered with up to two feet of compatible sediment for restoration.

- 1,273 sf of permanent and 705 sf of temporary impact to the Wetland Protection Zone.

6.1 Massachusetts Stream Crossing Standards

The Project only proposes the replacement of the superstructure and will make no changes to the existing bridge substructure. While the existing conditions do not fully meet all Massachusetts Stream Crossing Standards, the proposed Project conditions meet the Standards to the maximum extent practicable. The compliance of the existing bridge with the Standards will not change given the nature of the work being applicable only to the superstructure. Proposing improvements to the bridge to meet the Standards would require a full bridge substructure replacement which is outside the scope of the Project.

The existing structure is an approximately 90' two-span bridge with equal spans of approximately 45'. The hydraulic opening of the existing bridge is 79' with a sharp nose pier that varies in width from 3' to 2.75'. The bankfull width of the Taunton River is estimated to be approximately 99.5'. Bankfull width was calculated in AutoCAD by measuring the width between flags of the B1/B2 Series, taking the average of three (3) bankfull widths upstream of the bridge and three (3) bankfull widths downstream of the bridge. Table 12: Stream Crossing Standards Compliance demonstrates the Project's ability to comply with the Massachusetts Stream Crossing Standards as follows:

Table 12: Stream Crossing Standards Compliance

Stream Information and Standards	Existing/Proposed Project
Standard 1 **Crossing Type**	Bridge – **Met** (**Optimal Standard Met)**
Standard 2 **Embedment > 2 feet**	Crossing type is a bridge. **Not Applicable**
Standard 3 **Crossing Span >1.2*BFW**	BFW = 99.5' 1.2*99.5' = 119.4' Span = 79.0' 79.0' < 119.4' **Not Met**
Standard 4 **Substrate Type**	Simulated natural substrate will be used to restore streambed (LUW) **Met**
Standard 5 **Water Depth and Velocity**	The Project will result in water depths and velocities equivalent to existing conditions during 25/50/100-year storm events at the location of the Bridge. **Met – proposed water depths and velocity are comparable to existing conditions upstream and downstream of the bridge. See Appendix H– Hydraulic Analysis and Scour Report.**
Standard 6 **Openness Ratio > 0.82**	$\frac{15.6' \; x \; 79.0'}{37.7'}$ = 32.69 Openness Ratio: 32.69 > 1.64 (Optimal) > 0.82 Height: 15.6' > 6' (Optimal)

	Met (Optimal Standard Met)

6.2 CITY OF TAUNTON WETLANDS PROTECTION ORDINANCE (THE ORDINANCE)

The City of Taunton has individual wetland protection regulations, which outline the specific wetland protections applied within its municipal boundaries. While some of these regulations are unique to the Ordinance, it relies on the Act for the majority of the wetland protection regulations. Therefore, references to the Act Performance Standards per 310 CMR 10.00 are included below as appropriate. The Project will fully adhere to Performance Standards for Bank, LUW, and BLSF.

6.2.1 INLAND BANK – GENERAL PERFORMANCE STANDARDS – 310 CMR 10.54(4)

Work impacting Inland Bank will fully meet the Performance Standards at 310 CMR 10.54(4). Permanent impacts to Bank result from scour protection that will not impair the capacity of the Bank to provide wildlife habitat, water carrying capacity, or physical stability of the Bank. Once scour protection is placed, a typical modified rockfill detail will be used (i.e., voids will be filled with loam/compost, seeded with a native seed mix, and covered with erosion control matting if necessary). Final grades will match existing conditions and there will be no change to the geometry of the River. Temporarily impacted banks will be restored to existing grade and stabilized with a native seed mix.

6.2.2 LUW – GENERAL PERFORMANCE STANDARDS – 310 CMR 10.56(4)

The Project will involve the loss of less than 5,000 sf of LUW (4,171 sf) that shall be mitigated in accordance with the Performance Standards listed at 310 CMR 10.56(4)(a)1. through 5. There will be no loss in capacity of LUW to support the interests of the Ordinance.

Dredging will remove 1,003 cy that will be restored in-place through the placement of streambed material over the proposed scour protection, which will protect ground and surface water quality following Project completion. Temporary impacts to LUW will be restored in-place following construction activities through then restoring with native streambed material over the proposed scour protection to reestablish existing wildlife habitat functions. All temporary LUW impacts will be restored upon completion of the Project. Therefore, work impacting LUW will meet the Performance Standards at 310 CMR 10.56(4) because impacted areas will be restored in-place and stream crossing conditions will not change from existing conditions. While areas with proposed scour protection are quantified as permanent impacts, conditions at the surface of the streambed will match existing conditions.

6.2.3 BORDERING LAND SUBJECT TO FLOODING – 310 CMR 10.57(4)

Work impacting BLSF will meet the Performance Standards at 310 CMR 10.57(4) fully, as the proposed permanent impacts will not impair the capacity of the BLSF to provide wildlife habitat or flood storage. No fill is proposed within BLSF, and all land disturbances will be restored and/or stabilized.

6.2.4 RIVERFRONT AREA – 310 CMR 10.58(4)

The Project proposes temporary and permanent impacts to the RA to the Taunton River; however, the Performance Standards will be met fully. There are no practicable or substantially equivalent alternatives that would result in less adverse effects on the interest of the Act as discussed in the Alternatives Analysis provided in Section 5. All alternatives for the Project result in the same impacts to RA with the exception of the No Build Alternative, which was not selected due to it being inconsistent with the Project purpose.

The bridge carrying Old Colony Avenue over the Taunton River was constructed in 1946. Proposed impacts total less than 5,000 sf, are primarily temporary, and are proposed within an area of maintained roadway. Due to the bridge's proximity to the roadway, a 100'-wide vegetated area does not exist between the

structure and the roadway. RA in the vicinity of the Project primarily consists of maintained road, road shoulder, and vegetated areas. Roadway resurfacing was not considered in impact calculations or the assessment of Performance Standards compliance, as this activity will only occur within an existing altered footprint and will not result in new encroachment into RA. Cleared areas of vegetation will be restored following completion of the work to replace any lost wildlife habitat. There are no vernal pools in the vicinity of the Project. Temporarily cleared vegetation adjacent to the roadway will be restored using native seed mix.

The Project qualifies as a Redevelopment Project under the Massachusetts Stormwater Management Standards and will meet Standards 1 and 7 through 10 fully. Erosion and sedimentation controls will be maintained throughout the Project, and work within the Taunton River will be conducted in the dry to prevent migration of sediment into the waterway. Erosion controls will only be removed once full stabilization of the Site is achieved. Therefore, work within Riverfront Area fully complies with the Performance Standards at 310 CMR 10.58(4).

6.2.5 Wetland Protection Zone (WPZ) (The Ordinance)

The WPZ allows for limitations and prohibitions on activities that may negatively impact a Resource Area. It is assumed that a 25' WPZ would be established for the Site.

Due to the proximity of the Project area to adjacent Bank, work will occur within the WPZ to Bank at the Site. Adjacent resources areas will be protected during construction via the proper installation and maintenance of erosion controls, and all disturbed areas will be restored following construction. Given that the Project consists of bridge work within and over the Taunton River, work within the WPZ is required to complete the Project.

6.2.6 Wildlife Corridor (The Ordinance)

The Ordinance defines Wildlife Corridors as: "*contiguous areas of land within a Wetlands Protection Zone, which provide feeding areas, breeding areas, and normal home range movement for wildlife. An area will be deemed a wildlife corridor upon presentation of credible evidence of the corridors and wildlife value. Wildlife corridors may be both narrow and vulnerable. Wildlife corridors can also contain core vegetative life, which make them sensitive and important for plant diversity*." A narrow strip of contiguous area is located along the southern (B2 Series) Bank to the Taunton River located within the City of Taunton. This area is primarily developed; however, it supports vegetation that may provide habitat for wildlife and therefore may be considered a Wildlife Corridor under the Ordinance.

A total of 1,242 sf of permanent Wildlife Corridor impacts is proposed over the course of the Project. The work within the Wildlife Corridor includes clearing and grubbing, installation of a new headwall and wingwalls for the existing 12" CMP outfall, and installation of scour protection. The streambed (LUW) and Banks will be restored with native streambed material and seed mix, respectively; therefore, wildlife habitat function is not anticipated to be impacted by the Project. In addition, the ability for wildlife to be able to pass through the crossing/bridge will not be permanently impacted by the Project.

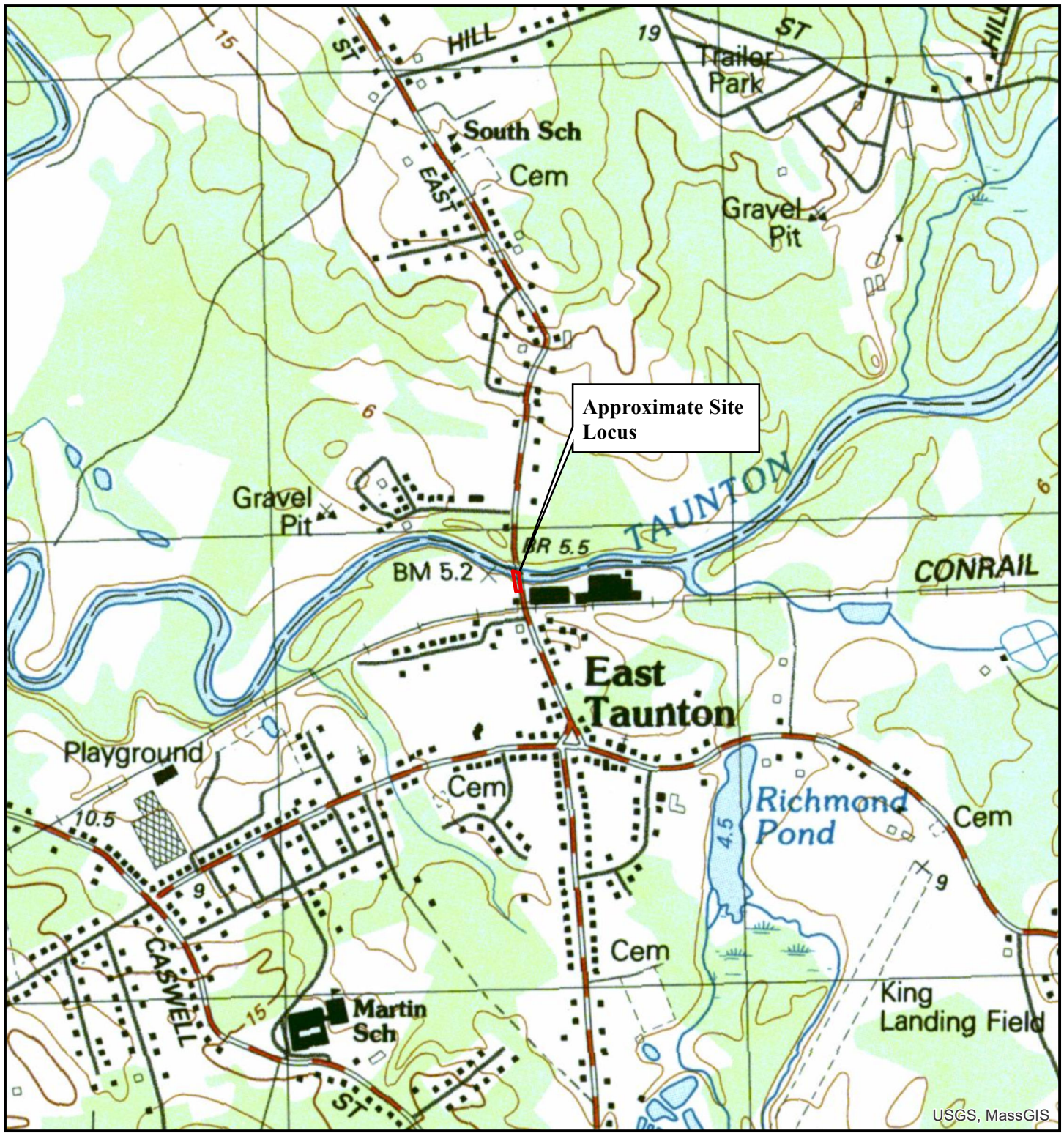
7.0 Summary

The proposed Project is anticipated to provide a critical bridge replacement to support motorist, cyclist, and pedestrian safety along Old Colony Avenue and South Street East. Construction of the Project will result in permanent and temporary impacts to jurisdictional Resource Areas, which have been minimized to the maximum extent possible and will be mitigated through in-kind restoration. The Project has been

designed to meet all local, state, and federal standards and comply with the regulations set forth in the Ordinance as described herein.

The City of Taunton respectfully requests that the Taunton Conservation Commission find these measures adequately protective of the interests of the Ordinance, the Order of Conditions approving the work as described in the Notice of Intent and accompanying plans.

FIGURES



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N
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0 1,000 2,000 Feet

1 inch = 1,000 feet

Figure 1a
USGS Site Locus
Old Colony Avenue Bridge
Taunton and Raynham, MA

Data Source: MassGIS USGS Topographic Quadrangle Images (2001)

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0 1,000 2,000 Feet

1 inch = 1,000 feet

Figure 1b
Aerial Site Locus
Old Colony Avenue Bridge
Taunton and Raynham, MA

Data Source: MassGIS USGS Topographic Quadrangle Images (2001)

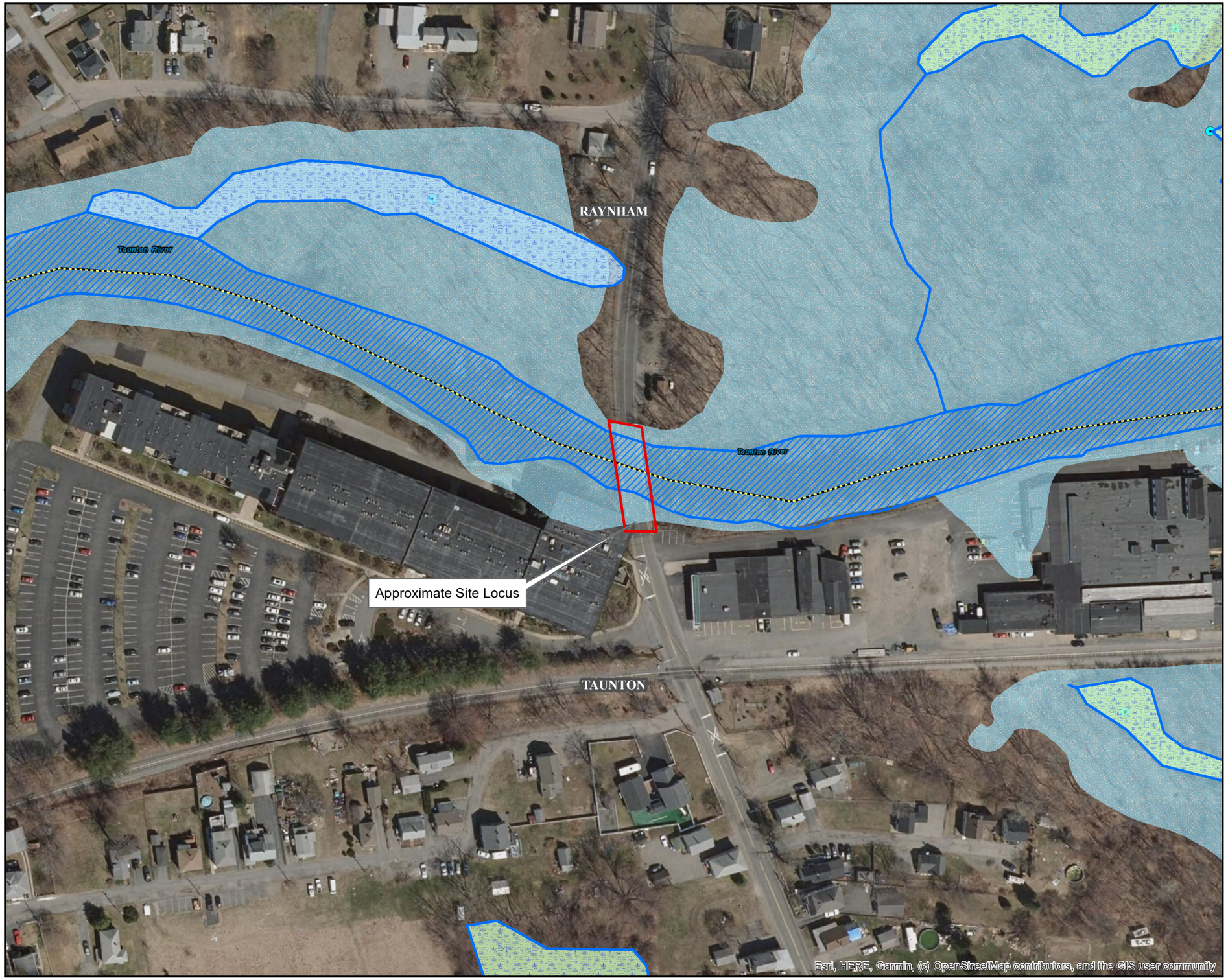

Figure 2
Environmental Resources Figure
Old Colony Avenue Bridge
Taunton and Raynham, MA

Environmental Resources Legend

- MassDEP Hydrologic Feature
- Marsh/Bog
- Wooded marsh
- Open Water
- NFHL 100 Year Flood Zone
- NHESP Potential Vernal Pool
- NHESP Certified Vernal Pool
- NHESP Priority Habitat of Rare Species
- NHESP Estimated Habitats of Rare Wildlife
- Zone A
- Zone B
- ZONE C
- MassDEP Zone I
- MassDEP Zone II
- MassDEP IWPA
- Outstanding Resource Water
- Area of Critical Environmental Concern (ACEC)
- Town Boundary

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0 125 250 Feet

1 inch = 125 feet

Data Source: MassGIS USGS Color Ortho Imagery (2014), MassDEP Wetlands (1:12000) (2009), NHESP Potential Vernal Pools (2000), NHESP Certified Vernal Pools, NHESP Priority Habitats of Rare Species (2008), NHESP Estimated Habitats of Rare Species (2008), Areas of Critical Environmental Concern (2009), FEMA National Flood Hazard Layer (2014),

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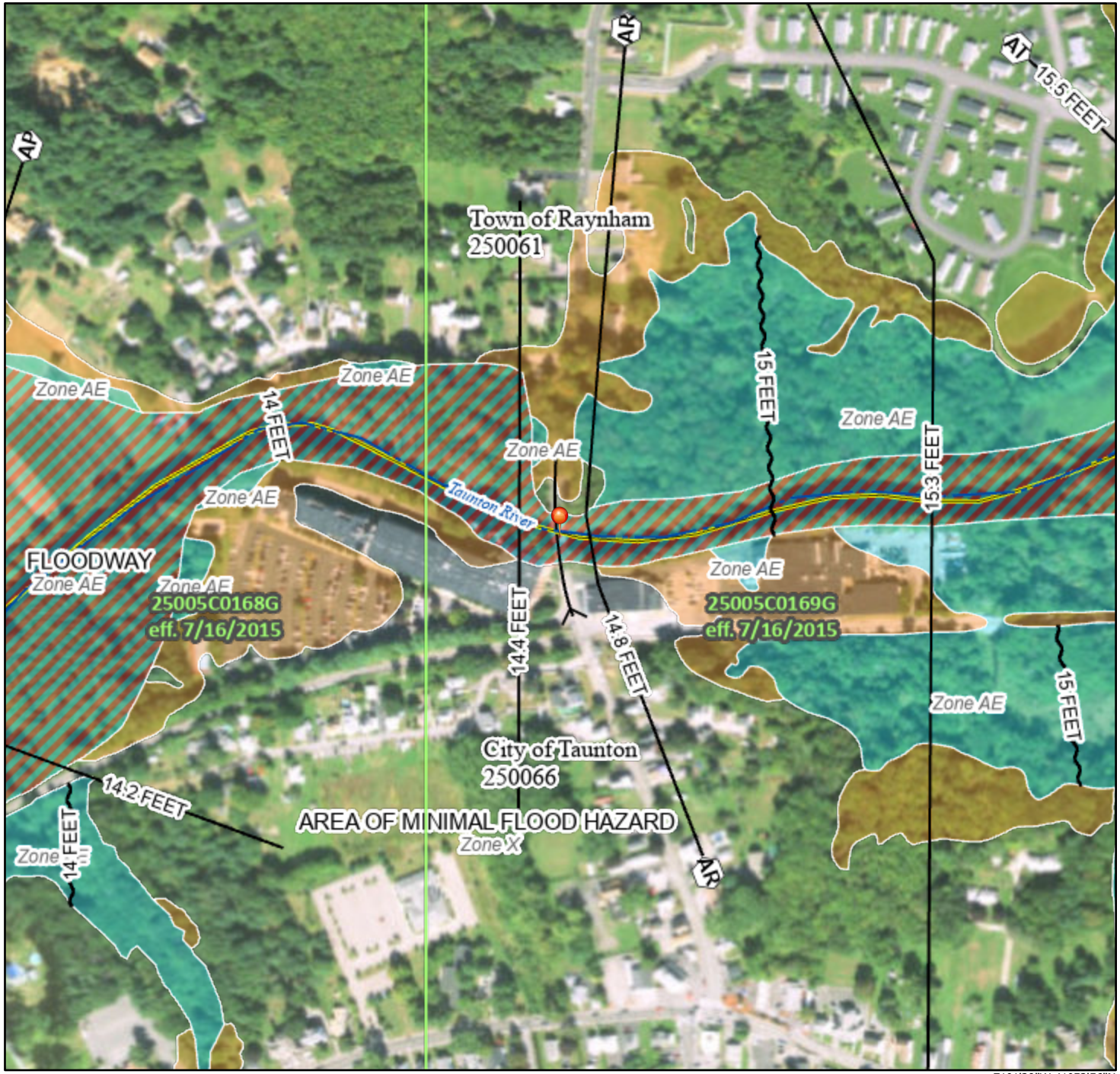
National Flood Hazard Layer FIRMette

FEMA

71°2'7"W 41°53'23"N



71°1'29"W 41°52'56"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

A00860 - 342

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 3/28/2023 at 3:27 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Figure 4
Historic Resources Map
Old Colony Avenue Bridge
Taunton and Raynham, MA

Legend

MassHistoric Commission Inventory (Points)

- Inventoried Property
- LHD
- MA/HL
- NRHP
- NRHP and LHD
- PR

MassHistoric Commission Inventory (Areas)

- Inventoried Property
- LHD
- MA/HL
- NRHP
- NRHP and LHD
- PR

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1 inch = 200 feet

Data Source: MassGIS USGS Color Ortho Imagery (2023), MHC Historic Inventory (2024)

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Figure 5
OpenSpace Resources Map
Old Colony Avenue Bridge
Taunton and Raynham, MA

Legend

ARTICLE97

- Yes
- No
- Unknown

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0 200 400 Feet

1 inch = 200 feet

Data Source: MassGIS USGS Color Ortho Imagery (2023), Protected and Recreational OpenSpace (2024). Land Use (2009).

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Figure 6
Soil Survey Map
Old Colony Avenue Bridge
Taunton and Raynham, MA

Legend

- Site Locus
- MassDEP Soils

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Feet
1 inch = 200 feet

Data Source: MassGIS USGS Color Ortho Imagery (2023), MassDEP Wetlands (2017), NHESP Potential Vernal Pools (2013), NHESP Certified Vernal Pools, NHESP Priority Habitats of Rare Species (2021), NHESP Estimated Habitats of Rare Species (2021), Areas of Critical Environmental Concern (2009), FEMA National Flood Hazard Layer (2014),

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PHOTOGRAPHIC DOCUMENTATION

Photo 1

View of the B1-100 Series Bank along the Taunton River—Facing west

Photo 2

View of the B1-99 Series Bank along the Taunton River—Facing east

PHOTOGRAPHIC DOCUMENTATION

Old Colony Avenue Bridge over the Taunton River

Taunton and Raynham, Massachusetts

Photographs Documented 3.31.2023

Photo 3

View of the B2-100 Series Bank along the Taunton River—Facing east

Photo 4

View of the B2-99 Series Bank along the Taunton River—Facing west

PHOTOGRAPHIC DOCUMENTATION
Old Colony Avenue Bridge over the Taunton River
Taunton and Raynham, Massachusetts
Photographs Documented 3.31.2023

Photo 5

View of the B3/B4 Series Intermittent Streams—facing west

Photo 6

View of the B3/B4 Series Intermittent Streams and headwall—facing south

PHOTOGRAPHIC DOCUMENTATION

Old Colony Avenue Bridge over the Taunton River

Taunton and Raynham, Massachusetts

Photographs Documented 3.31.2023

Photo 7

View of the WF1 Series BVW—facing west

Photo 8

View of the WF2 Series BVW—facing west

PHOTOGRAPHIC DOCUMENTATION

Old Colony Avenue Bridge over the Taunton River

Taunton and Raynham, Massachusetts

Photographs Documented 3.31.2023

APPENDIX A – Resource Area Boundary Delineation Report

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Resource Area Boundary Delineation
Old Colony Avenue Bridge
Taunton and Raynham, Massachusetts

July 01, 2024

On March 31, 2023, BETA Group, Inc. (BETA) Wetland Scientists performed Wetland Resource Area delineations near the bridge over the Taunton River along Old Colony Avenue in Taunton and South Street East in Raynham, Massachusetts (the Site). This report describes Wetland Resource Areas Subject to Protection under the Massachusetts Wetlands Protection Act (M.G.L. Chapter 131 Section 40 - the Act), the City of Taunton Wetlands Protection Ordinance (City of Taunton Code (2010) §§ 16-30 to 16-38 – the Ordinance), the Raynham Wetland Protection Bylaw (the Bylaw), the federal Clean Water Act (33 U.S.C. §1251 et seq (1972)), and the Massachusetts Clean Waters Act (MGL Chapter 21 Section 26-53) that exist on or within 100 feet of the Site as well as the methodologies used to delineate their boundaries.

Site Description

The Site consists of a two-lane bituminous concrete roadway and underlying bridge that spans the Taunton River at the municipal boundary between the City of Taunton and the Town of Raynham (Figure 1 – Site Locus). The bridge is a two-span reinforced concrete deck supported on reinforced concrete abutments and timber piles. The Site is bounded by undeveloped forest and residential housing to the north, multi-family residential and industrial properties to the south, and the Taunton River to the east and west (Figure 2 – Environmental Resources).

According to the USDA Natural Resources Conservation Service – Soil Survey, mapped soils on and within proximity to the Site are generally classified as Urban Land, Birdsall silt loam and Udorthents, smoothed. Field observations generally confirmed the soil types at the Site. The *Custom Soil Resource Report for Bristol County, Massachusetts, Northern Part* is attached.

State jurisdictional Resource Areas identified within 100 feet of the Site include Inland Bank (to perennial and intermittent streams), Bordering Vegetated Wetlands (BVW), Land Under Water (LUW), Bordering Land Subject to Flooding (BLSF), and Riverfront Area (RA). The MassGIS database was used as the initial step in identifying critical areas on or within proximity to the Site. The table below describes selected environmentally critical categories as determined through MassGIS.

Table 1. Selected MassGIS Environmental Data Layers

Mapped Resource On or Within Proximity to Site	Yes	No
Area of Critical Environmental Concern		✓
NHESP Certified Vernal Pool		✓
NHESP Potential Vernal Pool		✓
NHESP Estimated Habitat of Rare Wildlife		✓
NHESP Priority Habitat of Rare Species		✓
Outstanding Resource Waters		✓
FEMA Flood Zones	✓	
Surface Water Protection Area (Zones A and B)		✓
Interim Wellhead Protection Area		✓
Zone I Wellhead Protection Area		✓
Zone II Wellhead Protection Area		✓
Wild and Scenic River	✓	

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P: 508.756.1600 | W: www.BETA-Inc.com

Mapped Resource On or Within Proximity to Site	Yes	No
DCR Dams		✓
Coldwater Fisheries Resource		✓

Source: MassGIS

Jurisdictional Wetland Resource Areas – Massachusetts Wetlands Protection Act

A Site visit was conducted by BETA Wetland Scientists on March 31, 2023 to identify and delineate the boundaries of Wetland Resource Areas at and in the immediate vicinity to the Site. Resource Area boundaries were identified and delineated in accordance with methods developed by the Massachusetts Department of Environmental Protection's *Delineating Bordering Vegetated Wetlands Under the Massachusetts Wetlands Protection Act: Second Edition*, dated September 2022, as well as definitions set forth in the Wetland Regulations, 310 CMR 10.00. Several areas subject to Protection under the Act exist along the Site and are described below.

Inland Bank (to perennial and intermittent streams) – 310 CMR 10.54

According to 310 CMR 10.54(2), the definition of a Bank is the portion of the land surface which normally abuts and confines a water body, occurring between a water body and a vegetated bordering wetland and adjacent floodplain, or, in the absence of these, it occurs between a water body and an upland. The upper boundary of a Bank is the first observable break in the slope or the mean annual flood level, whichever is lower.

BETA identified the resource Bank to one (1) perennial stream (the Taunton River) and one (1) unnamed intermittent stream within and near the Site. Banks were delineated in the field with blue flagging as described in Table 2.

Table 2: Bank Boundary Description

Flag Series	Location	Description / Notes
B1 Series *Flags* *B1-99 to 95, and B1-100 to 106* *B2 Series* *Flags* *B2-91 to 99, and 100 to 105*	Taunton River, located east, under and west of the Old Colony Ave Bridge	The northern (*B1 Series*) and southern (*B2 Series*) Banks associated with the Taunton River, a perennial stream, that generally flows west were delineated in two (2) segments along the first observable break in slope consistent with the mean annual flood level. The Bank north of the Taunton River was delineated west (*B1-99 to B1-95*) and east (*B1-100 to B1-106*) of the Old Colony Avenue Bridge in Raynham. Banks west of the bridge were generally well defined and consisted of eroded soils. Banks east of the bridge were observed to be undercut and also consisted of eroded soils. Where vegetated, both Banks consist primarily of woody vegetation including bush honeysuckle (*Diervilla lonicera*), silky dogwood (*Cornus amomum*) and Norway maple (*Acer platanoides*). Populations of poison ivy (*Toxicodendron radicans*) were also observed. The Bank south of the Taunton River was delineated west (*B2-91 to 99*) and east (*B2-100 to 105*) of the Old Colony Avenue Bridge in Taunton. Banks west of the bridge were generally poorly defined and consisted of rocks and stones of various sizes. Banks east of the bridge were generally well defined and generally consisted of eroded soils. Where vegetated, both Banks consist primarily of woody vegetation including slippery elm (*Ulmus rubra*),

Flag Series	Location	Description / Notes
		Norway maple, and silky dogwood. Populations of poison ivy were also observed. The channel width downstream of the Old Colony Avenue bridge is between 95 to 110 feet wide with a mucky, gravel substrate. The channel width upstream is 90 to 100 feet wide with a mixed cobble, gravel, and mucky substrate. Water depths within the Taunton River could not be determined in the field. The Taunton River is mapped as perennial on USGS topographic maps; therefore, it meets the definition of a perennial stream (River) per 310 CMR 10.58(2).
B3/B4 Series *Flags* *B3-96 to 107 and B4-96 to 107*	Northwest of Old Colony Avenue Bridge at 0 South East Street	The interior (*B4 Series*) and exterior (*B3 Series*) Banks associated with a shallow, braided intermittent stream west of South Street East were delineated along the first observable break in slope (consistent with the mean annual flood level). The *B3/B4 Series* stream flows west out of a drainage outfall associated with the closed drainage system under South Street East in Raynham, where flow becomes braided prior to reaching a confluence west of the Site. The *B3/ B4 Series* Banks were primarily vegetated with silky dogwood. The channel is approximately 3 to 5 feet wide and 2 to 6 inches deep with a substrate of sand and muck. This stream is not depicted on current USGS topographic maps or on the StreamStats program; therefore, it is presumed to be intermittent.

Bordering Vegetated Wetlands – 310 CMR 10.55

According to 310 CMR 10.55(2), the definition of BVW are freshwater wetlands which border on creeks, Rivers, streams, ponds and lakes and are areas where the soils are saturated and/or inundated such that they support a predominance of wetland indicator plants. The boundary of BVW is the line within which 50% or more of the vegetation community consists of wetland indicator plants and saturated or inundated conditions exist.

BETA identified two (2) areas of BVW within and adjacent to the Site. US Army Corps of Engineers' *Vegetated Wetland Boundary Delineation Field Data Sheets* documenting BETA's observed evidence of hydrology, soils, and hydrophytic vegetation at specific data plots are attached.

Table 3: BVW Boundary Description

Flag Series	Location	Description / Notes
WF1 Series *Flags* *WF1-108 to 111*	Northwest of Old Colony Avenue Bridge at 0 South East Street	The *WF1 Series* BVW is a scrub shrub wetland bordering on the *B3/B4 Series* intermittent stream. The attached U.S. Army Corps of Engineers Field Data Sheets describe evidence of hydrophytic vegetation, hydric soils, and indicators of hydrology at a specific data plot.

Flag Series	Location	Description / Notes
WF2 Series *Flags* *WF2-100 to 102*	Along the northern Bank of the Taunton River	The *WF2 Series* BVW is a scrub shrub wetland located along the northern bank of the Taunton River, west of the *B1 Series* Bank. Dominant hydrophytic vegetation observed within the area includes silky dogwood. Evidence of hydrology observed in the field includes sediment deposition and stressed vegetation (buttressed roots), and hydric soils indicators including sandy soils with prominent redox concentrations. A formal data plot was not performed at this location.

Land Under Water – 310 CMR 10.56

According to 310 CMR 10.56(2), the definition of LUW is the land beneath any creek, river, stream, pond or lake and may be composed of organic muck or peat, fine sediments, rocks or bedrock. LUW exists between the Bank boundaries below the mean annual low water levels of the streams delineated at the Site (Table 2). The boundary of LUW is the mean annual low water level. This boundary was not delineated in the field.

Bordering Land Subject to Flooding – 310 CMR 10.57

According to the Federal Emergency Management Agency (FEMA) FIRM Number 25005C0169G, dated July 16, 2015, a Zone AE Flood Hazard associated with the Taunton River exists at the Site with Base Flood Elevations (BFE) ranging from 14.4 feet (NAVD88) downstream of the bridge and 14.8 feet (NAVD88) upstream of the bridge. The Site is also located within the Regulatory Floodway of the Taunton River. Any work performed within BLSF (i.e. areas with a 0.1% yearly chance of flooding) is Subject to Jurisdiction under the Act.

Riverfront Area – 310 CMR 10.58

According to 310 CMR 10.58(2), RA is defined as the area of land between a river's MAHW line and a parallel line measured 200' away horizontally. A River is any natural flowing body of water that empties to any ocean, lake, pond, or other River flowing throughout the year and is shown as perennial on the current United States Geological Survey or more recent map provided by the Department, or has a watershed size of at least 0.50 square miles and a predicted flow rate greater than or equal to 0.01 cubic feet per second at the 99% flow duration using the USGS Stream Stats Method.

As noted in Table 2 above, the B1/B2 Series stream qualifies as a perennial stream (River) and is therefore afforded a 200-foot RA. The RA at the Site would be measured 200 feet horizontally from the MAHW flags. Descriptions of the MAHW boundaries associated with the Taunton River are provided below in Table 4.

Table 4: MAHW Boundary Description

Flag Series	Waterbody	Description / Notes
B1 Series *Flags* *B1-99 to 95, and B1-100 to 106* *B2 Series* *Flags* *B2-91 to 99, and 100 to 105*	Taunton River	The northern (*B1 Series*) Banks were delineated at the mean annual flood level (coincident with the mean annual high-water mark – MAHW) approximately ten (10) feet upgradient of Bank. MAHW was determined based on observations of sediment accumulation and scour. The southern (*B2 Series*) Banks were delineated approximately ten (10) feet upgradient of Bank. MAHW was determined based on observations of sediment accumulation, scour and the presence of debris.

Jurisdictional Wetland Resource Areas – City of Taunton

The City of Taunton protects resource areas under the City of Taunton Wetlands Protection Ordinance and Conservation Ordinance Regulations. In some instances, these regulations provide additional jurisdiction and protection beyond what is set forth in the Wetlands Regulations at 310 CMR 10.00.

Freshwater Wetland

The Ordinance and Regulations defines a freshwater wetland per the definition presented in the Act, or if it meets two of three total criteria including vegetation within the community consisting of at least 50% wetland plant species, hydric soils are present, or hydrology or field indicators of hydrology are present. BVWs delineated at the Site (Table 3) meet the Ordinance definition of a freshwater wetland.

Vernal Pool

The Ordinance and Regulations consider vernal pools to be *"any confined basin depression that has been certified as such by the Natural Heritage and Endangered Species Program or has been demonstrated by credible proof to contain obligate vernal pool breeding species".* A potential vernal pool (PVP) is mapped interior to the *WF1 Series* BVW approximately 350 feet from the Site; however, it has not been certified, nor was the area reviewed for the presence of vernal pool breeding species.

Wetland Protection Zone (WPZ)

The WPZ as defined in the Ordinance and Regulations is *"an area of no less than 25 feet and no more than 100 feet from the border of BVWs, vernal pools, lakes, ponds and ILSFs larger than a quarter acre-foot in size".* The WPZ is measured from the boundary of Bank and BVW at the Site and allows for limitations and prohibitions on activities that may negatively impact a Resource Area.

Wildlife Corridors

The Ordinance defines Wildlife Corridors as: "*contiguous areas of land within a Wetlands Protection Zone, which provide feeding areas, breeding areas, and normal home range movement for wildlife. An area will be deemed a wildlife corridor upon presentation of credible evidence of the corridors and wildlife value. Wildlife corridors may be both narrow and vulnerable. Wildlife corridors can also contain core vegetative life, which make them sensitive and important for plant diversity*." A narrow strip of contiguous area is located along the southern (B2 Series) Bank to the Taunton River, located within the City of Taunton. This area is primarily developed however it supports vegetation that may provide habitat for wildlife therefore this area may be considered a Wildlife Corridor under the Ordinance.

Jurisdictional Wetland Resource Areas – Town of Raynham

The Town of Raynham protects resource areas under the Town of Raynham Conservation Bylaw. In some instances, these regulations provide additional jurisdiction and protection beyond what is set forth in the Wetlands Regulations at 310 CMR 10.00.

Land Subject to Flooding

The Town of Raynham provides a 100 foot buffer zone to any land subject to flooding or inundation by groundwater or surface water, where a buffer zone to these resource areas is not present under the Act. The area of BLSF associated with the Taunton River has a 100-foot buffer zone under the Bylaw.

25-foot No Activity Buffer

The Bylaw provides a 25-foot "No Activity Buffer" around bordering vegetated wetlands for all construction activities. This No Activity Buffer extends 25-feet upgradient of the delineated boundaries of the WF1 and WF2 Series BVW's.

Jurisdictional Wetland Resource Areas – Federal Clean Water Act (Section 404)

The wetlands and waterways located at the Site are "Waters of the United States," and are therefore subject to the federal Clean Water Act, 33 U.S.C. §1251 et seq (1972). The boundary to "Waters of the United States" is the vegetated wetlands boundary, or, in the absence of vegetated wetlands, is the Ordinary High Water Mark (OHWM) for non-tidal rivers and streams, as specified at 33 CFR §328.4.

According to 33 CFR §328.3(c)(4), vegetated wetlands are defined as "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions." The wetland boundary previously described in this report was delineated in accordance with this definition. US Army Corps vegetated wetland boundary delineation field data sheets are attached documenting BETA's observations of evidence of hydrology, soils, and hydrophytic vegetation at specific data plots.

Work conducted below the boundary of Vegetated Wetlands or the OHWM is Subject to Jurisdiction under Section 404 of the Clean Water Act. Where present, Vegetated Wetland boundaries (Table 3) are the extent of federal Jurisdiction. Where streams are present and upgradient Vegetated Wetlands are absent, the OHWM coincides with the delineated boundaries of the B1/B2 Series Banks. The OHWM for the unnamed intermittent stream coincides with the delineated boundaries of the B3/B4 Series Banks.

Jurisdictional Wetland Resource Areas – Massachusetts Clean Waters Act (Section 401)

The limit of jurisdiction under the Massachusetts Clean Waters Act (Section 401), as specified in 314 CMR 9.00, is the limit of Section 404 jurisdiction under the federal Clean Water Act. Exceedances of the jurisdictional threshold under 314 CMR 9.00 require filing for a Water Quality Certification under Section 401.

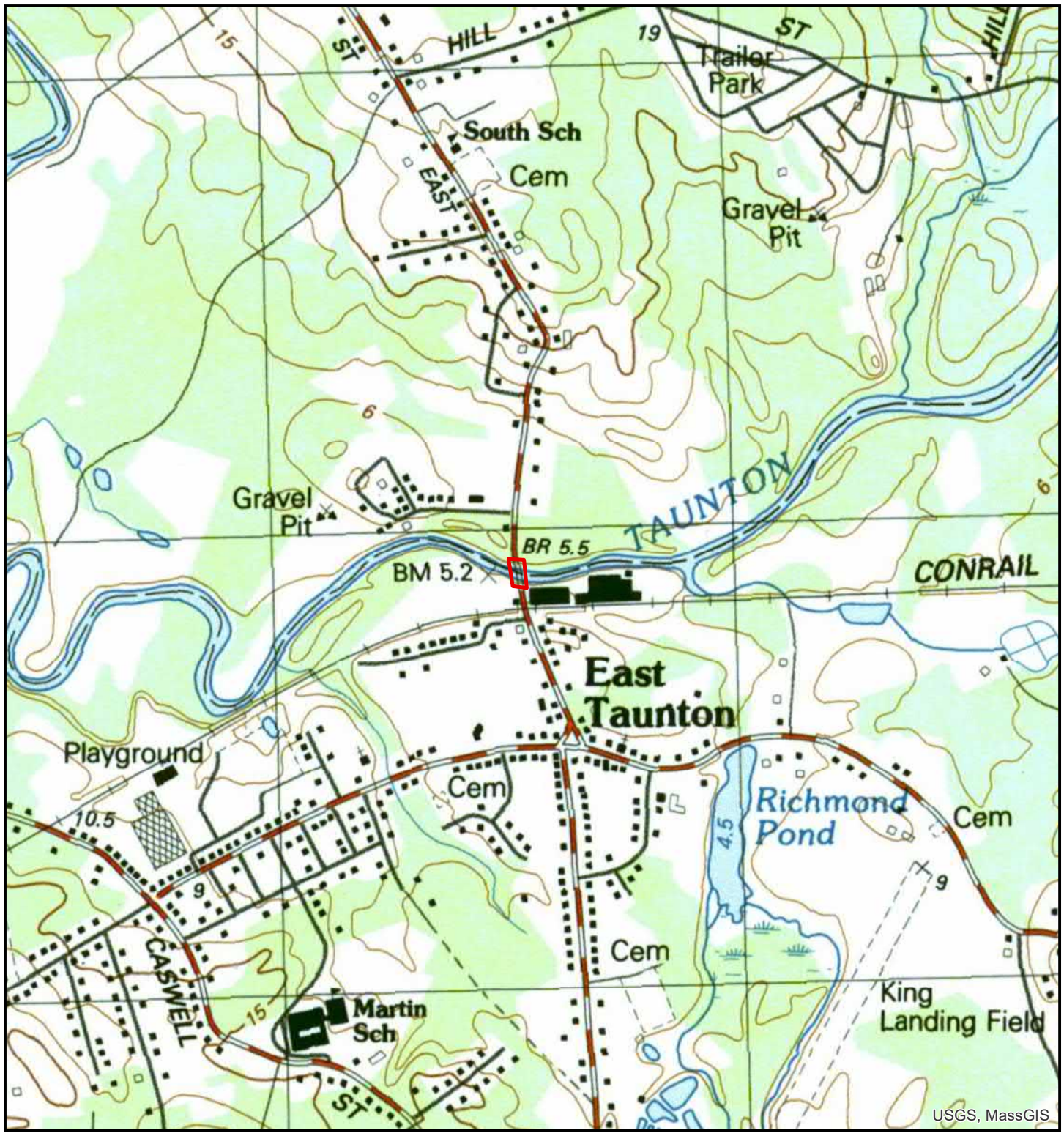
Findings and Recommendations

BETA has identified areas Subject to Protection and/or Jurisdiction under the Massachusetts Wetlands Protection Act, the Taunton Conservation Ordinance, the Town of Raynham Wetland Protection Bylaw, the federal Clean Water Act, and the Massachusetts Clean Waters Act located on or within 100 feet of the Site, and has delineated the boundaries of Bank, BVW, and MAHW that exist along the Site. In order to definitively determine the extent of Conservation Commission jurisdiction, Army Corps jurisdiction, and

MassDEP jurisdiction, the boundary flags would need to be located and depicted on a to-scale plan of the Site.

Attachments: Figure 1 – Site Locus
Figure 2 – Environmental Resources Map
Figure 3 – FEMA FIRMette
Photographic Documentation
US Army Corps of Engineers' *Vegetated Wetland Boundary Delineation Field Data Sheets*
Custom Soil Report for Bristol County, Massachusetts, Northern Part

Job No: 22.10887.00



BETA
IMPROVING COMMUNITIES TOGETHER

N
W E
S

0 1,000 2,000 Feet

1 inch = 1,000 feet

Figure 1
Site Locus
Old Colony Avenue Bridge
Taunton and Raynham, MA

Data Source: MassGIS USGS Topographic Quadrangle Images (2001)

Figure 2
Environmental Resources Figure
Old Colony Avenue Bridge
Taunton and Raynham, MA

RAYNHAM

TAUNTON

Taunton River

Taunton River

Approximate Site Locus

Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

Environmental Resources Legend

- MassDEP Hydrologic Feature
- Marsh/Bog
- Wooded marsh
- Open Water
- NFHL 100 Year Flood Zone
- NHESP Potential Vernal Pool
- NHESP Certified Vernal Pool
- NHESP Priority Habitat of Rare Species
- NHESP Estimated Habitats of Rare Wildlife
- Zone A
- Zone B
- ZONE C
- MassDEP Zone I
- MassDEP Zone II
- MassDEP IWPA
- Outstanding Resource Water
- Area of Critical Environmental Concern (ACEC)
- Town Boundary

N
W E
S

0 125 250 Feet

1 inch = 125 feet

Data Source: MassGIS USGS Color Ortho Imagery (2014), MassDEP Wetlands (1:12000) (2009), NHESP Potential Vernal Pools (2000), NHESP Certified Vernal Pools, NHESP Priority Habitats of Rare Species (2008), NHESP Estimated Habitats of Rare Species (2008), Areas of Critical Environmental Concern (2009), FEMA National Flood Hazard Layer (2014),

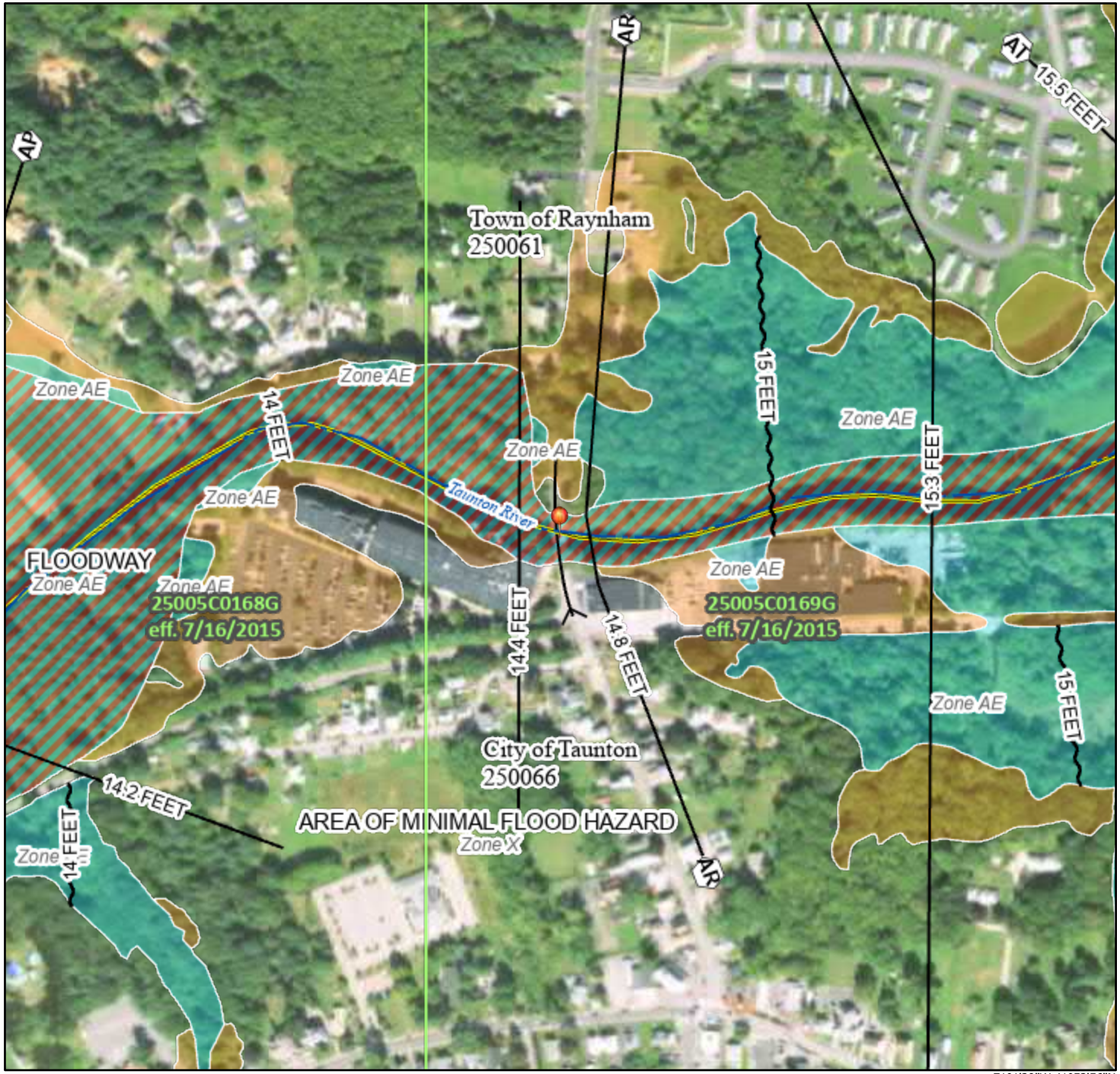
BETA
IMPROVING COMMUNITIES TOGETHER

Proposal No. 613642 - 136413

National Flood Hazard Layer FIRMette

FEMA

71°2'7"W 41°53'23"N



71°1'29"W 41°52'56"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

A00860 - 361

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 3/28/2023 at 3:27 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Photo 1

View of the B1-100 Series Bank along the Taunton River—Facing west

Photo 2

View of the B1-99 Series Bank along the Taunton River—Facing east

PHOTOGRAPHIC DOCUMENTATION

Old Colony Avenue Bridge over the Taunton River

Taunton and Raynham, Massachusetts

Photographs Documented 3.31.2023

Photo 3

View of the B2-100 Series Bank along the Taunton River—Facing east

Photo 4

View of the B2-99 Series Bank along the Taunton River—Facing west

PHOTOGRAPHIC DOCUMENTATION

Old Colony Avenue Bridge over the Taunton River

Taunton and Raynham, Massachusetts

Photographs Documented 3.31.2023

Photo 5

View of the B3/B4 Series Intermittent Streams—facing west

Photo 6

View of the B3/B4 Series Intermittent Streams and headwall—facing south

PHOTOGRAPHIC DOCUMENTATION

Old Colony Avenue Bridge over the Taunton River

Taunton and Raynham, Massachusetts

Photographs Documented 3.31.2023

Photo 7

View of the WF1 Series BVW—facing west

Photo 8

View of the WF2 Series BVW—facing west

PHOTOGRAPHIC DOCUMENTATION

Old Colony Avenue Bridge over the Taunton River

Taunton and Raynham, Massachusetts

Photographs Documented 3.31.2023

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Old Colony Avenue Bridge City/County: Taunton and Raynham Sampling Date: 3/31/23

Applicant/Owner: MassDOT State: MA Sampling Point: WF1-109 UP

Investigator(s): Tyler Drew, Jonathan Niro Section, Township, Range: Bristol County

Landform (hillside, terrace, etc.): Hillside Local relief (concave, convex, none): Convex Slope %: 10

Subregion (LRR or MLRA): LRR R, MLRA 144A Lat: 41.88676 Long: -71.03012 Datum: WGS84

Soil Map Unit Name: Udorthents, smoothed NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	**Is the Sampled Area**
Hydric Soil Present?	Yes ____	No X	**within a Wetland?** **Yes** ____ **No** X
Wetland Hydrology Present?	Yes ____	No X	If yes, optional Wetland Site ID: ____

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____
Water Table Present?	Yes ____	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ____	No X	Depth (inches): ____

Wetland Hydrology Present? **Yes** ____ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants. Sampling Point: WF1-109 UP

Tree Stratum (Plot size: 30' radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer platanoides*	50	Yes	UPL
2. *Ulmus rubra*	5	No	FAC
3.			
4.			
5.			
6.			
7.			
	55	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15' radius)			
1. *Rosa multiflora*	10	Yes	FACU
2.			
3.			
4.			
5.			
6.			
7.			
	10	=Total Cover	
Herb Stratum (Plot size: 5' radius)			
1. *Alliaria petiolata*	30	Yes	FACU
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	30	=Total Cover	
Woody Vine Stratum (Plot size: N/A)			
1.			
2.			
3.			
4.			
		=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	5	x 3 =	15
FACU species	40	x 4 =	160
UPL species	50	x 5 =	250
Column Totals:	95 (A)		425 (B)

Prevalence Index = B/A = 4.47

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ___ **No** X

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WF1-109 UP

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 2/1	100						Loamy Sand

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ High Chroma Sands (S11) (**LRR K, L)**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: Stoney Refusal (3 attempts)

Depth (inches): 4

Hydric Soil Present? **Yes** ___ **No** X

Remarks:

This data form is revised from Northcentral and Northeast Regional Supplement Version 2.0 to include the NRCS Field Indicators of Hydric Soils, Version 7.0, 2015 Errata. (http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_051293.docx)

Refusal at 4 inches. 3 Attempts.

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Old Colony Avenue Bridge City/County: Taunton and Raynham Sampling Date: 3/31/23

Applicant/Owner: MassDOT State: MA Sampling Point: WF1-109 WET

Investigator(s): Tyler Drew, Jonathan Niro Section, Township, Range: Bristol County

Landform (hillside, terrace, etc.): Toe of Slope Local relief (concave, convex, none): Concave Slope %: 0-5

Subregion (LRR or MLRA): LRR R, MLRA 144A Lat: 41.88676 Long: -71.03012 Datum: WGS84

Soil Map Unit Name: Udorthents, smoothed NWI classification: PEM1Fh

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area**
Hydric Soil Present?	Yes X	No ____	**within a Wetland?** **Yes** X **No** ____
Wetland Hydrology Present?	Yes X	No ____	If yes, optional Wetland Site ID: WF1

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- X Inundation Visible on Aerial Imagery (B7)
- X Sparsely Vegetated Concave Surface (B8)
- X Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- X Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____
Water Table Present?	Yes ____	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes X	No ____	Depth (inches): 1

Wetland Hydrology Present? **Yes** X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: WF1-109 WET

Tree Stratum (Plot size: N/A)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	=Total Cover		
Sapling/Shrub Stratum (Plot size: 15' radius)			
1. *Cornus amomum*	40	Yes	FACW
2. *Rosa multiflora*	10	Yes	FACU
3.			
4.			
5.			
6.			
7.			
	50 =Total Cover		
Herb Stratum (Plot size: N/A)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	=Total Cover		
Woody Vine Stratum (Plot size: N/A)			
1.			
2.			
3.			
4.			
	=Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	40	x 2 =	80
FAC species	0	x 3 =	0
FACU species	10	x 4 =	40
UPL species	0	x 5 =	0
Column Totals:	50 (A)		120 (B)

Prevalence Index = B/A = 2.40

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WF1-109 WET

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 2/2	100						Sandy Silt Loam
8-16	5Y 5/1	40	2.5Y 5/4	30	C	M		Loamy Sand
			5YR 4/6	30	C	M		

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- X Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ High Chroma Sands (S11) (**LRR K, L)**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** ___

Remarks:

This data form is revised from Northcentral and Northeast Regional Supplement Version 2.0 to include the NRCS Field Indicators of Hydric Soils, Version 7.0, 2015 Errata. (http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_051293.docx)

Refusal at 4 inches. 3 Attempts.

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Bristol County, Massachusetts, Northern Part

January 10, 2024

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

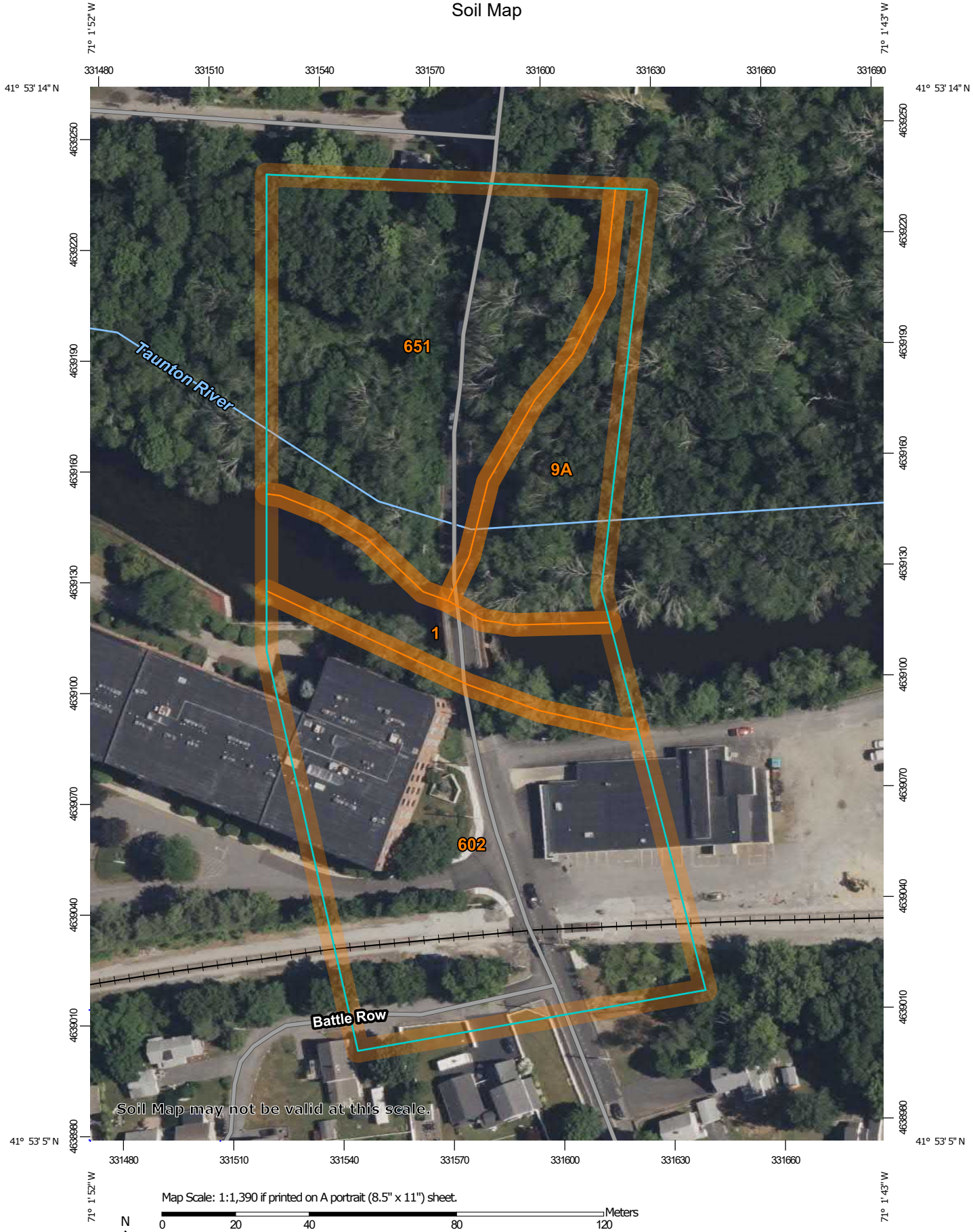
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:1,390 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 20 40 80 120

Feet: 0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Bristol County, Massachusetts, Northern Part
Survey Area Data: Version 16, Sep 10, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 14, 2022—Jul 1, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
1	Water	0.6	10.7%
9A	Birdsall silt loam, 0 to 3 percent slopes	0.7	12.5%
602	Urban land	2.3	41.8%
651	Udorthents, smoothed	1.9	35.0%
Totals for Area of Interest		**5.5**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The

delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Bristol County, Massachusetts, Northern Part

1—Water

Map Unit Setting

National map unit symbol: 997q
Frost-free period: 120 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

9A—Birdsall silt loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 997p
Elevation: 0 to 150 feet
Mean annual precipitation: 45 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 145 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Birdsall and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Birdsall

Setting

Landform: Depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Soft coarse-silty lacustrine deposits over hard coarse-silty lacustrine deposits

Typical profile

H1 - 0 to 7 inches: silt loam
H2 - 7 to 21 inches: silt loam
H3 - 21 to 60 inches: very fine sandy loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None

Frequency of ponding: Frequent
Available water supply, 0 to 60 inches: Very high (about 12.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: C/D
Ecological site: F144AY031MA - Very Wet Outwash
Hydric soil rating: Yes

Minor Components

Raynham

Percent of map unit: 10 percent
Landform: Depressions
Hydric soil rating: Yes

Swansea

Percent of map unit: 10 percent
Landform: Bogs
Hydric soil rating: Yes

602—Urban land

Map Unit Setting

National map unit symbol: 9999
Frost-free period: 120 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

651—Udorthents, smoothed

Map Unit Setting

National map unit symbol: v4w7
Elevation: 0 to 3,000 feet
Mean annual precipitation: 45 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 145 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Udorthents and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Udorthents

Setting

Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Excavated and filled land over loose sandy and gravelly glaciofluvial deposits and/or firm loamy basal till

Typical profile

H1 - 0 to 6 inches: variable
H2 - 6 to 60 inches: variable

Properties and qualities

Slope: 0 to 15 percent
Depth to restrictive feature: More than 80 inches
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to very high (0.06 to 20.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A
Hydric soil rating: Unranked

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

APPENDIX B – Stormwater Management Report

Raynham / Taunton, Massachusetts

South Street East / Old Colony Avenue

MassDOT Highway Division
Project File # 613642
January 2026

STORMWATER MANAGEMENT REPORT

PREPARED FOR

City of Taunton
Department of Public Works
90 Ingell Street
Taunton, MA 02780

PREPARED BY:

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1

Introduction

This Stormwater Management Report has been prepared to demonstrate compliance with the Massachusetts Stormwater Management Standards (the Standards) in accordance with the Massachusetts Wetlands Protection Act Regulations (310 CMR 10.00) and Water Quality Certification Regulations (314 CMR 9.00). Appendix A includes a completed Massachusetts Department of Environmental Protection (MassDEP) Checklist for Stormwater Report, stamped by a Massachusetts registered professional engineer.

The Project follows the guidance presented in the MassDOT Stormwater Design Guide (SDG), and stormwater management systems are designed in accordance with the Standards.

2

Project Summary

The Applicant, the City of Taunton, is proposing Project 613642 for the replacement of the Old Colony Avenue Bridge (Bridge #R-02-00=T-01-004) over the Taunton River, including work along adjacent roadways (the Project) located in Raynham, MA and Taunton, MA.

As proposed, the Project generally consists of bridge replacement, roadway paving, and new sidewalk, as more fully described in Section 4. The purpose of this project is to replace a structurally deficient bridge as well as improving safety for vehicles, cyclists, and pedestrians.

The project area is an approximately 0.14-mile-long section of a roadway which is identified as Old Colony Ave within the City of Taunton and South Street East within the Town of Raynham. Old Colony Ave crosses over the Taunton River and the work includes temporary and permanent work within the river's footprint. The project also includes portions of Sandy Hill Road, an intersecting side street, and the Riverbend Condominiums driveway.

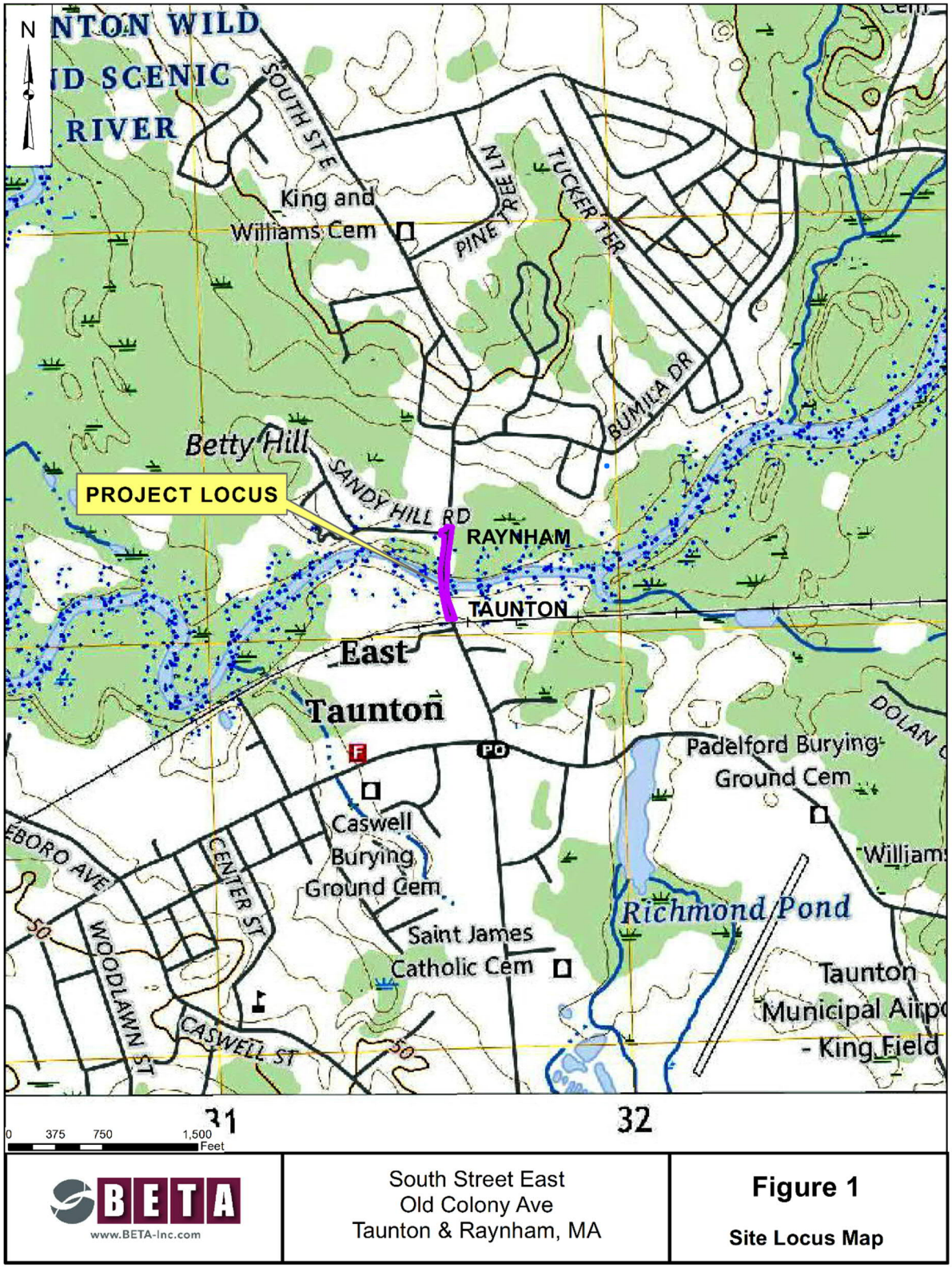
Land use on surrounding lots includes the River Bend Condominiums, several commercial properties, a pump station, a single family residence, and woodlands.

Wetland resource areas are located in proximity to the project area, notably including the Taunton River. Refer to Notice of Intent narrative for a summary of project compliance. The project is not considered a Land Use with Higher Potential Pollutant Loads (LUHPPL) and the project is not located within or near to a Zone II or Interim Wellhead Protection Area, any other critical areas, or a NHESP-mapped habitat.

This stormwater analysis has been prepared to support a bridge replacement and roadway reconstruction project and associated stormwater management measures, as more fully described in Section 3.0. A total disturbance of approximately 1.05± Acres is anticipated as a result of the proposed work.

See Figure 1 for the Project Locus Map.

Figure 1 Locus Figure



3

Existing Conditions

The project includes Old Colony Ave / South Street East, a two-lane, two-way Urban Collector roadway. A bridge carries Old Colony Avenue over the Taunton River. Within the project area, the width of the roadway generally varies from 27 to 35 feet, with one lane in each direction. A short sidewalk segment is provided on the north side of the road near Riverbend Condominiums and along the south side of the bridge. Otherwise, the roadway is bordered by grass or driveways. Granite curb is provided along the north side of the roadway and along the bridge; otherwise, no edge treatment is provided.

The project corridor generally consists of an impervious roadway and pervious grass/woodland side areas or impervious driveways. Topography is generally directed away from the roadway and towards the Taunton River, and the roadway is crowned throughout the entire project limits.

Resource Areas of Interest

Wetland resource areas are located (within or in proximity to) the project area. Refer to Notice of Intent narrative for a thorough description of these areas and a summary of project compliance. Notably, the project crosses over the Taunton River, which flows east to west. A stream is located in the northwestern portion of the project.

The project is located In the IWP Priority #2: Taunton Watershed. Waterbodies located immediately downgradient of the Site include the Taunton River, a Category 5 water, which is impaired for Dissolved Oxygen, Enterococcus, and E. Coli. The Taunton River eventually discharges to Mt. Hope Bay. Refer to Section 5 for discussion of impairments and TMDLs.

Existing Stormwater Characteristics

Topography in areas adjacent to the roadway is generally directed away from the roadway. Existing closed drainage systems are present along the roadway which convey stormwater runoff to two outfalls, one of which discharges to the Taunton River and one of which discharges to a stream. As no formal edge treatment is provided on the southern side of South Street East, stormwater runoff from this portion of the Site can flow overland into an area of woodlands.

Refer to the watershed plans in Appendix F for detailed delineation of pre-development flow patterns and watershed boundaries. Refer to Appendix D for hydrologic calculations relating to existing conditions.

Table 1 presents the existing drainage areas and their characteristics. See Figure 2 for existing drainages areas and existing SCMs by design point.

Table 1 Existing Drainage Areas

Drainage Area	Design Point	Area (acres)	Curve Number
Ex-1E	DP-1L	0.576	82
Ex-2E	DP-2L	0.395	81
Ex-3E	DP-3L	0.400	74

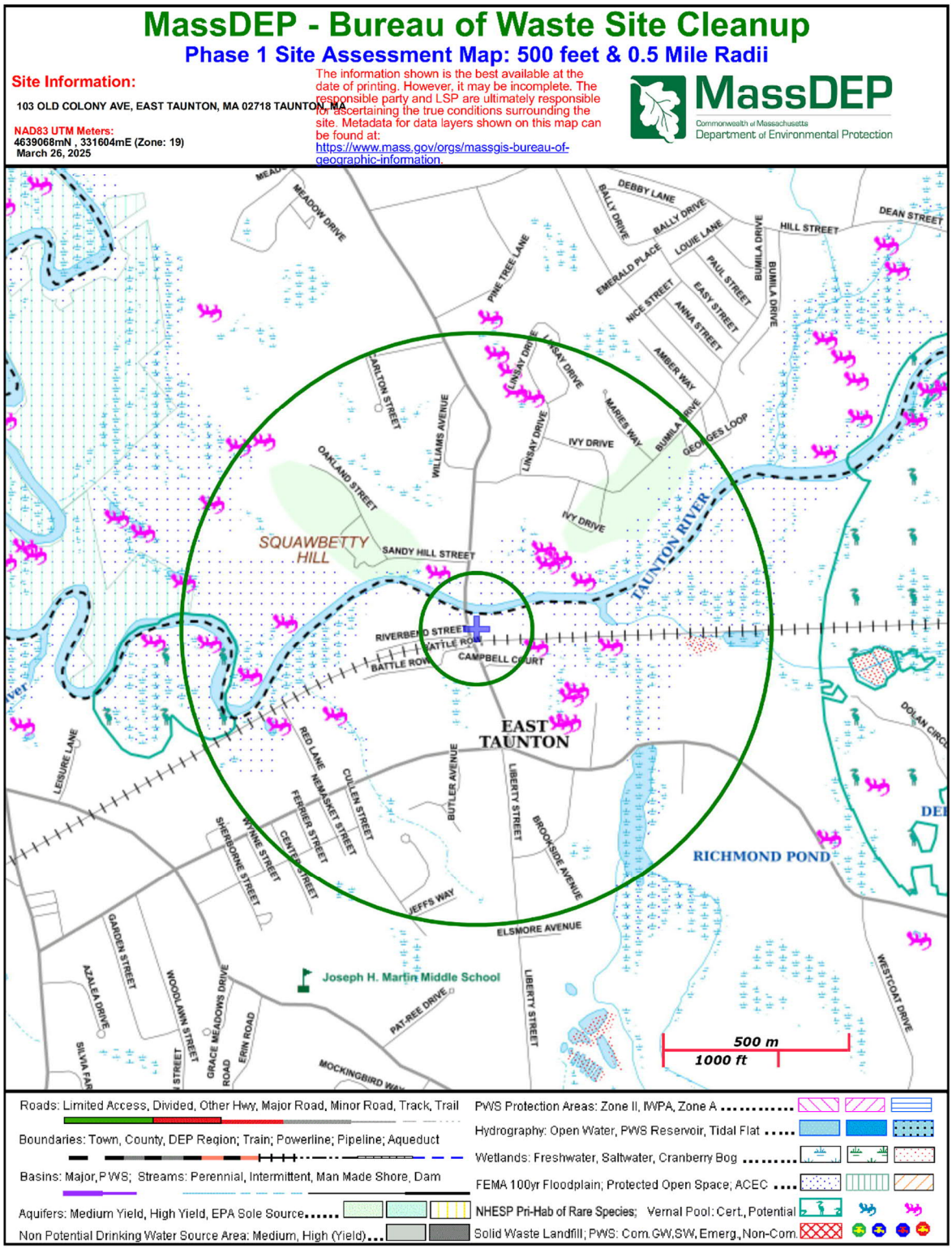
Key features in and around the project area include the Taunton River and associated riverfront area, a stream, and vegetated wetlands, as shown on Figure 2.

The Project is partially located within the 100-year floodplain as shown on FEMA map panel 25005C0169G eff. 7/16/2015. A FEMA flood map is included in Appendix B. 100-year flood areas included a Zone AE Floodway coincident with the Taunton River (Elev. 15 ft.) and a Zone AE (Elev. 15 ft.). Refer to the Notice of Intent for an evaluation of impact to flood zones.

Review of the NRCS Soil Survey map of the project area identified three major soil groups. South Street East is mapped as Unit 651: Udorthents with Hydrologic Soil Group Rating (HSGR) A and Unit 9A: Birdsall silt loam with HSGR C/D. Old Colony Ave is mapped as 602: Urban Land with no assigned HSGR. Additionally, the footprint of the Taunton River is mapped as Unit 1: Water with no assigned HSGR. NRCS soils information is shown on the plans in Appendix F and included in Appendix B.

Figure 2 Existing Key Features and Wetland Resource Areas

MassDEP Phase 1 Site Assessment Map https://maps.massgis.digital.mass.gov/images/dep/mcp/mcp.htm



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4

Proposed Conditions

Scope of Work

The scope of work generally consists of bridge replacement, full depth pavement construction in the vicinity of the bridge, pavement milling and overlay to the north and south of the bridge, modifications to roadway geometry (less than a single lane), construction of a sidewalk, new granite curbing, striping of two travel lanes and a bike lane, new ADA compliant ramps, replacement of guardrail, modifications to water, sewer, gas, electric, and drainage utilities, and restoration of disturbed areas.

Table 2 provides a breakdown of the impervious area for the Project.

Table 2 Impervious Area

Condition	Impervious Area (sq. ft)
Existing	31210
Proposed	31991
Net	781

Proposed Stormwater Management

Stormwater Management will be accomplished through modifications to the existing closed drainage systems. Existing inlets will be replaced, where necessary, with deep-sump catch basins, and additional deep-sump catch basins will be installed to provide more effective stormwater collection and treatment. New curbing is proposed to better direct stormwater runoff to catch basins. The majority of existing trunklines will be retained. The project will retain existing drainage grading patterns to the maximum extent practicable.

The project will retain the existing outfall from the closed drainage system within the Town of Raynham. The project will replace the existing outfall associated with the closed drainage system within the Town of Taunton. The new outfall will be increased in size from 12” to 18” and the existing headwall will be rebuilt at the same location.

The project proposes new stormwater control measures (SCM) including a new infiltration trench. This new practice is proposed within the Town of Raynham near the northeastern limit of work. Stormwater runoff will be directed to this SCM through a new deep sump catch basin which will overflow into the existing closed drainage system.

Additionally, country drainage/pavement disconnection will be implemented for several portions of South Street East by excluding curbing to allow treatment in the grass/woodland area adjacent to the roadway. Of this, approximately 100 ft. of South Street East, on the eastern side of the roadway, drains to an area that meets the definition of qualifying pervious area and is comprised of 1,500 ± sq. ft. of impervious area.

Table 3 presents the proposed drainage areas and their characteristics under proposed conditions. Refer to Appendix F for proposed drainage patterns and drainage area delineations by design point.

Table 3 Proposed Drainage Areas

Drainage Area	Design Point	Area (acres)	Curve Numbers
Pr-10P	DP-1L	0.598	83
Pr-20P/21P	DP-2L	0.410	83
Pr-30P	DP-3L	0.363	71

Project Constraints

The project is constrained by the presence of the Taunton River, presence of wetland resource areas, presence of private commercial and residential features within the Town of Taunton, and conflicts with existing utilities which restrict the opportunity to install substantial Stormwater Control Measures (SCMs). The project is also constrained by minimum required setbacks outlined in the MassDOT Stormwater Design Guide, namely the 10 foot setback to property lines, the 50 foot setback to surface waters, and the 50 foot setback to any slope greater than 15% for infiltration basins. The project area was evaluated for potential locations of SCMs and is summarized on the SCM Analysis Plan located in Appendix G. Despite constraints, the proposed stormwater management systems will provide an improvement to the existing conditions by installing deep sump catch basins and a new infiltration trench. Note the project is considered a redevelopment, as discussed in Section 7.0.

Table 4 lists the proposed SCMs and provides a description of each.

Table 4 Proposed SCMs

SCM	Description
Infiltration Trench	One infiltration trench consisting of a perforated pipe surrounded by crushed stone, located from STA 6+00 RT to STA 6+45 RT. A deep-sump catch basin is provided at STA 5+96 for pretreatment and conveyance to the infiltration trench as well to convey overflow.

LID measures incorporated at the project include the preservation of existing vegetation and maintaining pre-development drainage patterns. The use of country drainage/pavement disconnection is proposed for stormwater runoff from portions of the roadway by directing portions of South Street East to areas of pervious grass/woodlands. The reduction of impervious cover was considered; however, the introduction of new impervious area is required to replace the bridge and extend sidewalks to areas where none currently exist.

5

Impaired Waters and TMDLs

As described under the previous sections, the Project will discharge to the Taunton River, which is impaired based on the MassDEP Year 2023 Integrated List of Waters, also known as the 303(d) list.

Table 5 lists the receiving water bodies that are impaired and if the water body has a TMDL.

Table 5 Impaired Waters and TMDL Information

Water Body	303(d) Category	303(d) Impairments	TMDL	TMDL Pollutant	TMDL Report Name
Taunton River (MA62-01)	5 – Waters Requiring a TMDL	Dissolved Oxygen, Enterococcus, E. Coli	Yes	Pathogens (Fecal coliform, E. Coli, Enterococcus)	Final Pathogen TMDL for the Taunton River Watershed

Note that this segment of the Taunton River is not included in the TMDL. However, the downstream portions of the river are.

As stated in the Final Pathogen TMDL for the Taunton River Watershed, leading sources of bacterial surface water pollution include failing septic systems, combined sewer overflows (CSOs), sanitary sewer overflows (SSOs), sewer pipes connecting to storm drains, certain recreational activities, wildlife, and direct overland stormwater runoff.

The project includes relocation of a portion of the existing sanitary sewer force main. This work will not include any sanitary sewer discharges to the Taunton River. Any sanitary sewer pipes connecting to the storm drain will be eliminated, if identified. See Illicit Discharge Compliance Statement under Standard 10 in Section 6 below. All stormwater runoff discharged from the Site will receive additional treatment via deep sump catch basins, the new infiltration trench, or through country drainage. As a transportation facility, pathogen loads from the roadway surfaces are anticipated to be minimal.

The proposed infiltration trench has been selected for their capability to treat phosphorus, nitrogen, and total suspended solids. A load reduction of 0.03 lb/yr of phosphorus, 0.21 lb/yr of nitrogen, and 29 lb/yr of total suspended solids is anticipated for this SCM, as calculated based on EPA Water Quality Curves in the MassDOT Water Quality Date Form.

See Standard 4 in Section 6 below for more water quality calculations and discussion.

6

Stormwater Management Standards

As demonstrated below, the proposed Project complies with the MassDEP Stormwater Management Standards (the Standards).

The Project is classified as a limited, redevelopment under the first definition “Maintenance and improvement of existing roadways, including widening less than a single lane, adding shoulders, correcting substandard intersections, improving existing drainage systems and repaving.” Work related to the maintenance, repair, and improvement of the bridge is considered a Limited Project.

Standard 1: No New Untreated Discharges

No new stormwater conveyances may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.

The Project has been designed to comply with Standard 1. The project proposes to replace the existing outfall from the City of Taunton closed drainage system. This work will include replacing the existing 12” MTL and 12” CMP outfalls with a new 18” DI outfall at the same location, replacing the existing headwall, and providing stone for pipe ends as stabilization to prevent erosion to the Taunton River. The project proposes to retain the existing outfall from the Town of Raynham closed drainage system.

Appendix C provides supporting calculations for the outlet protection design.

Stormwater runoff will be treated by deep sump catch basins, the infiltration trench, or country drainage before discharging off-site.

See Standard 4 for the water quality treatment provided by the Project.

Standard 2: Peak Rate Attenuation

Stormwater management systems shall be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates. This Standard may be waived for discharges to land subject to coastal storm flowage as defined in 310 CMR 10.04.

The Project has been designed to comply with Standard 2 only to the maximum extent practicable as the project is a limited, redevelopment project. This project reduces post-development peak runoff rates to below pre-development peak runoff rates for DP-2 and DP-3, as well as on a site-wide basis, during the 1-year, 2-year, 10-year, and 100-year 24-hour

design storm events based on NOAA Atlas 14 precipitation data. Minor increases in peak runoff rates are anticipated for DP-1.

Table 6 Rainfall Depths (in)

Design Storm Event	Rainfall Depth (in)
2-year	3.42
10-year	5.08
100-year	7.71

Table 7 provides a summary of peak rates for each design point under existing and proposed conditions. Appendix D provides computations and supporting information regarding the hydrologic modeling.

Table 7 Peak Discharge Rates (cfs)

Design Point	Existing			Proposed		
	2-year	10-year	100-year	2-year	10-year	100-year
DP 1	1.14	2.08	3.61	1.23	2.22	3.81
DP 2	0.74	1.39	2.44	0.67	1.28	2.20
DP 3	0.52	1.11	2.14	0.39	0.90	1.81
Total	2.40	4.58	8.19	2.29	4.41	7.82

The project is unable to fully meet this standard due to constraints at the project site as described previously. This project includes a net increase of 781± sq. ft. of impervious surface, which will result in minor increases to the volume and rate of stormwater runoff from the project area. This increase in impervious area is necessary to provide sidewalks where none currently exist. Despite project constraints and an increase in peak flow rates, the proposed deep-sump catch basins and infiltration trench will improve existing conditions throughout the project corridor. Refer to HydroCAD calculations provided in Appendix D for additional information.

Standard 3: Recharge

Loss of annual recharge to groundwater shall be eliminated or minimized through the use of infiltration measures, including environmentally sensitive site design, low impact development techniques, stormwater best management practices, and good operation and maintenance. At a minimum, the annual recharge from the post-development site shall approximate the annual recharge from pre-development conditions based on soil type. This Standard is met when the stormwater management system is designed to infiltrate the required recharge volume as determined in accordance with the Massachusetts Stormwater Handbook.

The project has been designed to meet this standard on a project-wide basis. The project has significant right-of-way constraints as described previously, which restrict opportunities for recharge on the southern portions of the Site. Despite constraints, the proposed infiltration trench has been designed to provide the sitewide required recharge volume for new and a portion of the existing impervious area.

Table 8 provides the required recharge volume for the Project, and Table 9 provides the recharge volumes proposed for each design point.

Table 8 Required Recharge Volume for Project

	HSG A	HSG B	HSG C	HSG D	Total
Existing Impervious (sq. ft.)	26829		1964	2417	31210
Proposed Impervious (sq. ft.)	27280		2213	2498	31991
Net Impervious Area (sq. ft.)	451		249	81	781
Target depth, F (in)	0.6	0.35	0.25	0.1	-
Required Recharge Volume, ReV (cf)	22.55		5.19	0.68	28.41

Table 9 Provided Recharge Volumes at Each Design Point

	HSG A	HSG B	HSG C	HSG D	Total
DP-1					
Net Impervious Area (sf)	461		5	705	9844
Required Recharge Volume, ReV (cf)	23.05		0.10	5.88	29.03
Provided Recharge Volume (cf)	0		0		0.00
DP-2					
Net Impervious Area (sf)	1583		0	-195	1388
Required Recharge Volume, ReV (cf)	79.15		0.00	-1.63	77.53
Provided Recharge Volume (cf)	81.42		0		81.42
DP-3					
Net Impervious Area (sf)	-1593		244	-429	-1778
Required Recharge Volume, ReV (cf)	-79.65		5.08	-3.58	-78.14
Provided Recharge Volume (cf)	0.00		0		0.00

The infiltration SCM has been designed to drain completely within 72 hours.

Appendix B provides soil evaluation information (including the geotechnical report if applicable), and Appendix C provides computations, drawdown calculations, and supporting information regarding recharge.

Standard 4: Water Quality Treatment

Stormwater management systems shall be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS). This Standard is met when:

- Suitable practices for source control and pollution prevention are identified in a long-term pollution prevention plan, and thereafter are implemented and maintained.
- Structural stormwater best management practices are sized to capture the required water quality volume determined in accordance with the Massachusetts Stormwater Handbook.

› Pretreatment is provided in accordance with the Massachusetts Stormwater Handbook.

The Project has been designed to comply with Standard 4 on a project wide basis. Proposed drainage system improvements, including the installation of deep sump catch basins and an infiltration trench will provide treatment of stormwater runoff that does not currently exist and will improve existing conditions. The proposed project will provide an average TSS removal rate of 20% for 31,991± sq. ft. of impervious surfaces.

Note that the project is located in an area with a rapid infiltration rate (>2.4 in/hr) and the required water quality volume has been calculated based on the 1.0-inch water quality depth.

Table 10 shows the WQV to be treated for both new and existing impervious area within each drainage area, organized by design point.

Table 10 WQV at Each Design Point

Design Point	WQV for New IA (cf)	WQV for Existing IA (cf)	Total WQV (cf)
DP-1			
10P	97.58	722.75	820.33
Total	97.58	722.75	820.33
DP-2			
20P	44.75	1028.50	1073.25
21P	70.92	0.00	70.92
Total	115.67	1028.50	1144.17
DP-3			
30P	-148.17	849.58	701.42
Total	-148.17	849.58	701.42
Project Total	65.08	2600.83	2665.92

Table 11 shows the WQV provided by the SCMs at each design point.

Table 11 WQV Provided by the SCMs at Each Design Point

Design Point	Pretreatment (y/n)	WQV Provided (cf)	Meets Total WQV	Meets Required WQV for New IA
DP-1		0	No	No
DP-2			No	Yes
Linear Infiltration Practice	Y	81.42		
Total	Y	81.42		
DP-3		0	No	No
Project Total			No	Yes

As previously noted, the project is a limited, redevelopment project; therefore, the project is required to meet this standard only to the maximum extent practicable. Opportunities to install treatment and recharge SCMs are limited due to the constraints described previously. Despite project constraints, the proposed deep sump catch basins will improve existing

conditions throughout the project corridor and groundwater recharge will be provided via the new infiltration trench. Refer to Appendix C for calculations relating to TSS Removal. Refer to Illicit Discharge Compliance Statement under Standard 10.

Appendix E includes the Long Term Pollution Prevention Plan for this project.

Standard 5: Land Uses with Higher Potential Pollutant Loads

For Land Uses with Higher Potential Pollutant Loads (LUHPPLs), source control and pollution prevention shall be implemented in accordance with the Massachusetts Stormwater Handbook to eliminate or reduce the discharge of stormwater runoff from such land uses to the maximum extent practicable. If through source control and/or pollution prevention all LHPPLs cannot be completely protected from exposure to rain, snow, snow melt, and stormwater runoff, the proponent shall use the specific structural stormwater BMPs determined by the Department to be suitable for such uses as provided in the Massachusetts Stormwater Handbook. Stormwater discharges from LUHPPLs shall also comply with the requirements of the Massachusetts Clean Waters Act, M.G.L. c. 21, §§ 26-53 and the regulations promulgated thereunder at 314 CMR 3.00, 314 CMR 4.00 and 314 CMR 5.00.

Standard 5 does not apply to the Project. There are no Land Uses with Higher Potential Pollutant Loads within the project area.

Standard 6: Critical Areas

Stormwater discharges within the Zone II or Interim Wellhead Protection Area of a public water supply and stormwater discharges near or to any other critical area require the use of the specific source control and pollution prevention measures and the specific structural stormwater best management practices determined by the Department to be suitable for managing discharges to such areas as provided in the Massachusetts Stormwater Handbook. A discharge is near a critical area if there is a strong likelihood of a significant impact occurring to said area, taking into account site-specific factors. Stormwater discharges to Outstanding Resource Waters and Special Resource Waters shall be removed and set back from the receiving water or wetland and receive the highest and best practical method of treatment. A “stormwater discharge” as defined in 314 CMR 3.04(2)(a)1 or (b), to an Outstanding Resource Water or Special Resource Water shall comply with 314 CMR 3.00 and 314 CMR 4.00. Stormwater discharges to a Zone I or Zone A are prohibited unless essential to the operation of a public water supply.

Standard 6 does not apply to the Project. There are no Critical Areas near the project area.

Standard 7: Redevelopment

A redevelopment project is required to meet the following Stormwater Management Standards only to the maximum extent practicable: Standard 2, Standard 3, and the pretreatment and structural best management practice requirements of Standards 4, 5, and 6. Existing stormwater discharges shall comply with Standard 1 only to the maximum extent practicable. A redevelopment project shall also comply with all other requirements of the Stormwater Management Standards and improve existing conditions.

The Project is a limited, redevelopment project under the first definition: “Maintenance and improvement of existing roadways, including widening less than a single lane, adding shoulders, correcting substandard intersections, improving existing drainage systems and repaving.” Proposed deep sump catch basins and infiltration trench will provide treatment to the maximum extent practicable and represent an improvement to the existing conditions. Standards 1, 8, 9, and 10 are met, Standards 3 and 4 are met on a project wide basis, and Standard 2 is met to the maximum extent practicable. Standards 5 and 6 are not applicable to this project.

Standard 8: Erosion and Sediment Control

A plan to control construction related impacts, including erosion, sedimentation and other pollutant sources during construction and land disturbance activities (construction period erosion, sedimentation, and pollution prevention plan) shall be developed and implemented.

The implementation of erosion and sediment (E&S) controls during construction is considered a standard practice for all projects. E&S controls will be installed before any land disturbance begins for the Project and will remain in place for the duration of the Project. The E&S controls for the Project are shown on the project plans and include perimeter sediment control barrier, inlet protection, tree protection, temporary cofferdam for water control, and dewatering.

The Project disturbs one or more acres of land; therefore, the project contractor will request coverage under the NPDES Construction General Permit (CGP) and develop a Stormwater Pollution Prevention Plan (SWPPP). The SWPPP follows the requirements of this standard and complies with the NPDES CGP.

Standard 9: Operation and Maintenance Plan

A long-term operation and maintenance plan shall be developed and implemented to ensure that stormwater management systems function as designed.

The roadway and bridge included in this project are located in both the City of Taunton and the Toad of Raynham. Ownership is divided between the Town of Taunton and the Town of Raynham. The activities included in the O&M Plan will be implemented by the municipality. Appendix E includes the O&M Plan for this project.

Standard 10: Prohibition of Illicit Discharges

All illicit discharges to the stormwater management system are prohibited.

Illicit Discharge Statement

The project’s stormwater management system, as shown on the plans submitted with this report, have been designed in full compliance with Standard 10. The project area does not have any known illicit connections. Any illicit connections to the stormwater management system found in the project limit of work during construction will be removed and/or resolved through the City of Taunton’s or Town of Raynham’s Illicit Discharge Detention and Elimination (IDDE) Programs. The Long-Term Pollution Prevention Plan, provided in Appendix E, includes measures to prevent illicit discharges.

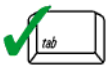
Appendix A: MassDEP Checklist for Stormwater Report

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

A. Introduction

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the Massachusetts Stormwater Handbook. The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.[1] This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8[2]
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

[1] The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

[2] For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature

01/30/26

Signature and Date

Checklist

Project Type: Is the application for new development, redevelopment, or a mix of new and redevelopment?

- ☐ New development
- ☒ Redevelopment
- ☐ Mix of New Development and Redevelopment

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

Checklist (continued)

LID Measures: Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

- ☐ No disturbance to any Wetland Resource Areas
- ☐ Site Design Practices (e.g. clustered development, reduced frontage setbacks)
- ☐ Reduced Impervious Area (Redevelopment Only)
- ☒ Minimizing disturbance to existing trees and shrubs
- ☐ LID Site Design Credit Requested:
  - ☐ Credit 1
  - ☐ Credit 2
  - ☐ Credit 3
- ☒ Use of “country drainage” versus curb and gutter conveyance and pipe
- ☐ Bioretention Cells (includes Rain Gardens)
- ☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)
- ☐ Treebox Filter
- ☐ Water Quality Swale
- ☐ Grass Channel
- ☐ Green Roof
- ☐ Other (describe): _____

Standard 1: No New Untreated Discharges

- ☒ No new untreated discharges
- ☒ Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth
- ☐ Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.

☐ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.

☐ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

☐ Soil Analysis provided.

☒ Required Recharge Volume calculation provided.

☐ Required Recharge volume reduced through use of the LID site Design Credits.

☒ Sizing the infiltration, BMPs is based on the following method: Check the method used.

☒ Static ☐ Simple Dynamic ☐ Dynamic Field[1]

☐ Runoff from all impervious areas at the site discharging to the infiltration BMP.

☐ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.

☒ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.

☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:

- ☐ Site is comprised solely of C and D soils and/or bedrock at the land surface
- ☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
- ☐ Solid Waste Landfill pursuant to 310 CMR 19.000
- ☒ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.

☒ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.

☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

[1] 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.

Massachusetts Department of Environmental Protection
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Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

☐ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.

☐ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:

- Good housekeeping practices;
- Provisions for storing materials and waste products inside or under cover;
- Vehicle washing controls;
- Requirements for routine inspections and maintenance of stormwater BMPs;
- Spill prevention and response plans;
- Provisions for maintenance of lawns, gardens, and other landscaped areas;
- Requirements for storage and use of fertilizers, herbicides, and pesticides;
- Pet waste management provisions;
- Provisions for operation and management of septic systems;
- Provisions for solid waste management;
- Snow disposal and plowing plans relative to Wetland Resource Areas;
- Winter Road Salt and/or Sand Use and Storage restrictions;
- Street sweeping schedules;
- Provisions for prevention of illicit discharges to the stormwater management system;
- Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
- Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
- List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.

☒ A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.

☒ Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:

- ☐ is within the Zone II or Interim Wellhead Protection Area
- ☐ is near or to other critical areas
- ☒ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
- ☐ involves runoff from land uses with higher potential pollutant loads.

☐ The Required Water Quality Volume is reduced through use of the LID site Design Credits.

☒ Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.

Massachusetts Department of Environmental Protection
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Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

☒ The BMP is sized (and calculations provided) based on:

- ☒ The ½" or 1" Water Quality Volume or
- ☐ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.

☐ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.

☐ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)

☐ The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.

☐ The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted ***prior to*** the discharge of stormwater to the post-construction stormwater BMPs.

☐ The NPDES Multi-Sector General Permit does ***not*** cover the land use.

☐ LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.

☐ All exposure has been eliminated.

☐ All exposure has ***not*** been eliminated and all BMPs selected are on MassDEP LUHPPL list.

☐ The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

☐ The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.

☐ Critical areas and BMPs are identified in the Stormwater Report.

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Checklist for Stormwater Report

Checklist (continued)

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

☒ The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:

- ☒ Limited Project
- ☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
- ☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
- ☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
- ☐ Bike Path and/or Foot Path
- ☒ Redevelopment Project
- ☐ Redevelopment portion of mix of new and redevelopment.

☒ Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.

☐ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
- Construction Period Operation and Maintenance Plan;
- Names of Persons or Entity Responsible for Plan Compliance;
- Construction Period Pollution Prevention Measures;
- Erosion and Sedimentation Control Plan Drawings;
- Detail drawings and specifications for erosion control BMPs, including sizing calculations;
- Vegetation Planning;
- Site Development Plan;
- Construction Sequencing Plan;
- Sequencing of Erosion and Sedimentation Controls;
- Operation and Maintenance of Erosion and Sedimentation Controls;
- Inspection Schedule;
- Maintenance Schedule;
- Inspection and Maintenance Log Form.

☐ A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.

Massachusetts Department of Environmental Protection
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Checklist for Stormwater Report

Checklist (continued)

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

☐ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has ***not*** been included in the Stormwater Report but will be submitted ***before*** land disturbance begins.

☐ The project is ***not*** covered by a NPDES Construction General Permit.

☐ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.

☒ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

☒ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:

- ☒ Name of the stormwater management system owners;
- ☒ Party responsible for operation and maintenance;
- ☒ Schedule for implementation of routine and non-routine maintenance tasks;
- ☒ Plan showing the location of all stormwater BMPs maintenance access areas;
- ☒ Description and delineation of public safety features;
- ☒ Estimated operation and maintenance budget; and
- ☒ Operation and Maintenance Log Form.

☐ The responsible party is ***not*** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:

- ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
- ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

☒ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;

☒ An Illicit Discharge Compliance Statement is attached;

☐ NO Illicit Discharge Compliance Statement is attached but will be submitted ***prior to*** the discharge of any stormwater to post-construction BMPs.

Appendix B: Soils and FEMA Information

Hydrologic Soil Group—Bristol County, Massachusetts, Northern Part

Hydrologic Soil Group—Bristol County, Massachusetts, Northern Part

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Bristol County, Massachusetts, Northern Part
Survey Area Data: Version 17, Aug 27, 2024

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 14, 2022—Jul 1, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
1	Water		0.7	9.0%
9A	Birdsall silt loam, 0 to 3 percent slopes	C/D	0.9	11.6%
256A	Deerfield loamy fine sand, 0 to 3 percent slopes	A	0.1	1.4%
602	Urban land		3.3	42.2%
651	Udorthents, smoothed	A	2.8	35.8%
Totals for Area of Interest			**7.9**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

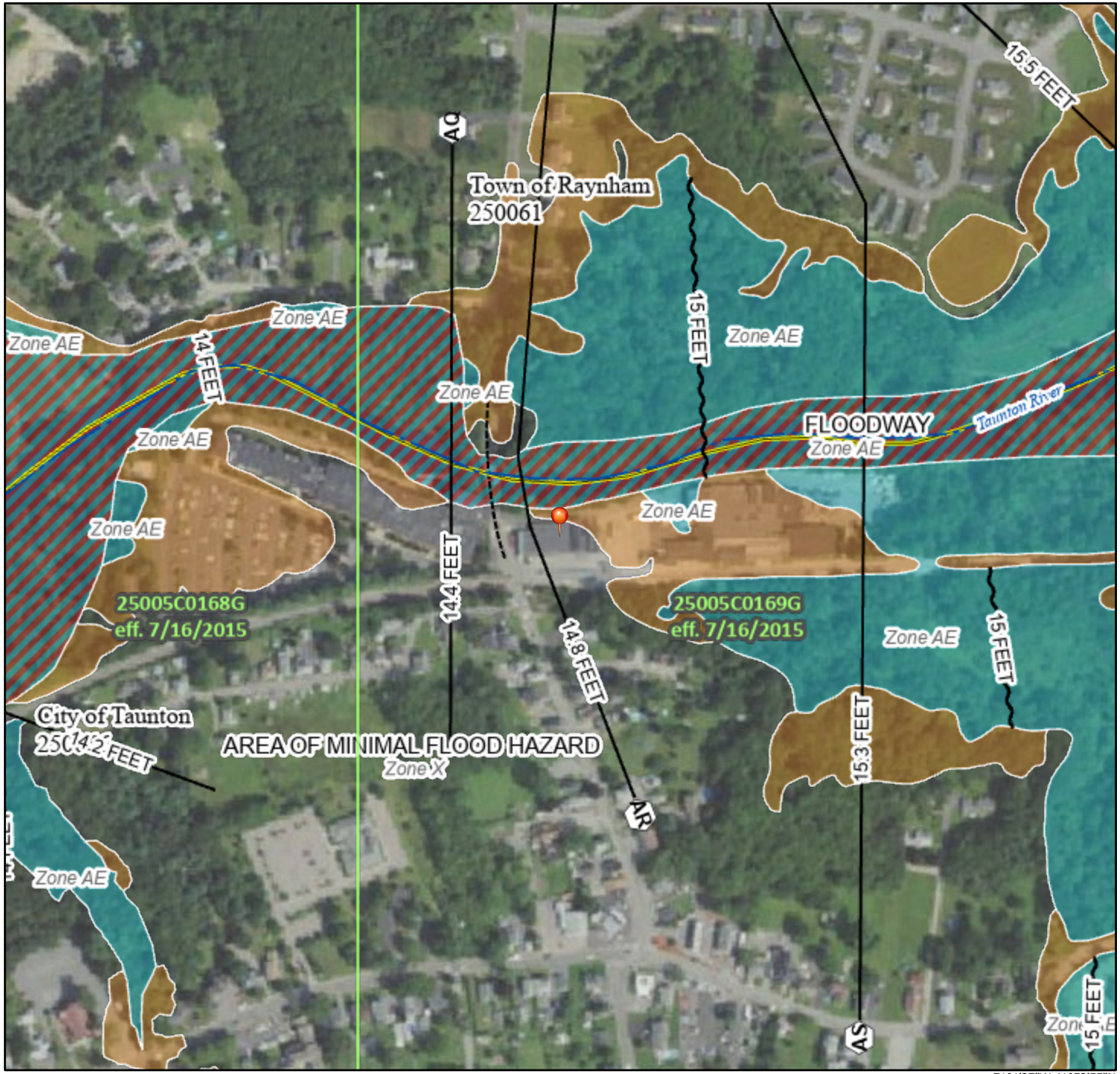
Component Percent Cutoff: None Specified

Tie-break Rule: Higher

National Flood Hazard Layer FIRMette

FEMA

71°2'4"W 41°53'22"N



71°1'27"W 41°52'55"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

A00860 - 422

Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 3/26/2025 at 11:50 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Appendix C: Supporting Calculations

PROJECT NAME:	**South Street East / Old Colony Ave**	PROJ NO.	**10887**
DESCRIPTION:	**Standards 3 & 4 Worksheet**	DATE	**01/30/26**
CALCULATED BY:	**SLB**	SHEET	**1**

Recharge Volume (Rv) and Water Quality Volume (WQv)
Provided Volumes Worksheet

Calculation of Required Recharge Volume

	Soil Group	Impervious Area (Sq. Ft.)	Runoff Depth (In.)	Recharge Volume (Cu. Ft.)
Pre-Development	Total	**31210**		
	HSG A	26829		
	HSG C	1964		
	HSG D	2417		
Post-Development	Total	**31991**		**1430.92**
	HSG A	27280	0.60	1364.00
	HSG C	2213	0.25	46.10
	HSG D	2498	0.10	20.82
Net Change	Total	**781**		**28.41**
	HSG A	451	0.60	22.55
	HSG C	249	0.25	5.19
	HSG D	81	0.10	0.68

Recharge Volume (R_V) Required = Impervious Area x Runoff Depth (from HSG)

Total Recharge Volume Required: **28 CF**

Total Recharge Volume Provided: **81 CF**

Calculation of Required Water Quality Volume

	Impervious Area (Sq. Ft.)	Runoff Depth (In.)	Water Quality Volume (Cu. Ft.)
Total Impervious Area	31991	1.0	2666
Net New Impervious Area Only	781	1.0	**65**

Water Quality Volume (WQ_V) Required = Impervious Area x Runoff Depth (0.5" or 1.0" Depth)

Total Water Quality Volume Provided: **81 CF**

PROJECT NAME:	**South Street East / Old Colony Ave**	PROJ NO.	**10887**
DESCRIPTION:	**Standards 3 & 4 Worksheet**	DATE	**01/30/26**
CALCULATED BY:	**SLB**	SHEET	**2**

Total Suspended Solids (TSS)
Provided Treatment Worksheet

Treatment Train	A: Total Removal Rate (%)	B: Total Treatment Area (Sq. Ft.)	C: A x B (Sq. Ft.)
No Treatment (30P)	0%	8417	0
Deep Sump Catch Basins (10P, 20P)	25%	22723	5681
Treatment Train - Infiltration Trench (21P)	80%	851	681
Totals:		31,991 SF	6,362 SF

Total Sitewide TSS Removal (C / B) 20%
Total of Column C divided by Total of Column B

Equivalent Area for 80% TSS Removal **7,952 SF**
Total of Column B x total TSS Rate divided by 80%

Proposed New Impervious Area: **781 SF**

PROJECT NAME:	**South Street East / Old Colony Ave**	PROJ NO.	**10887**
DESCRIPTION:	**Standards 3 & 4 Worksheet**	DATE	**01/30/26**
CALCULATED BY:	**SLB**	SHEET	**3**

Infiltration Trench
Provided Volumes & TSS Worksheet

Total Storage

Storage Within Basins	Length (Ft.)	Width (Ft.)	Depth (Ft.)	Volume - Perforated Pipe (Cu. Ft.)	Volume Stone (40% Voids) (Cu. Ft.)	Total Volume Provided (Cu. Ft.)
Infiltration Trench	45	2	2.00	15.7	65.7	81

Total Storage Volume Provided: **81 CF**

TSS Removal

Best Management Practice (BMP)	SCM Removal Rate (%)	Remaining TSS (%)	Cumulative Removal Rate (%)
Sediment Forebay (Pretreatment)	25%	75%	25%
Total Pretreatment Provided:			**25%**
Infiltration Trench	80%	20%	**80%**

Drawdown Calculations

BMP: **Infiltration Trench**

Rv (cu. ft.) =	81	Drawdown (hrs) =	**10.6**
K (in/hr) =	1.02		
Bottom Area (sq. ft.)	90	Less than 72 hrs?	**PASS**

**The hydraulic conductivity rate is based on Rawls Rate for Sandy Loam

PROJECT NAME: **South Street East / Old Colony Ave** PROJ NO. 10887
DESCRIPTION: **Standards 3 & 4 Worksheet** DATE 01/28/26
CALCULATED BY: **SLB** SHEET 1

Riprap Stone Size

$D_{50} = 0.2D(Q/(g)^{1/2}(D)^{2.5})^{4/3}(D/TW)$

D_{50} = riprap size (ft)
Q = design discharge (cfs) (10-year)
D = pipe diameter (ft)
TW = tailwater (ft) if unknown use 0.4D
g = acceleration due to gravity (32.2 ft/s^2)

Outfall No.	Q (cfs)	D (ft)	TW (ft)	$D^{2.5}$	D/TW	$g^{1/2}$	D_{50} (ft)
HW-1	16.14	1.5	0.6	2.76	2.5	5.67	**0.31**

*Flow rate is based on pipe flowing full

Riprap Parameters

Apply 1.5 Safety Factor to D50
Depth = 3.3*D50
Length = 4*D
Width (at pipe) = 3 * D
Width (Apron End) = 3 * D + 2/3 * Length

Outfall No.	1.5*D_{50} (in)	Approx. Weight (lb)	Minimum Dimensions			
			Depth (in)	Length (ft)	Width 1 (ft)	Width 2 (ft)
HW-1	5.57	37.73	18.39	6.00	4.50	8.50

Calculation Equations taken from:
HEC14 - Hydraulic Design for Energy Dissipators for Culverts and Channels
Equation 10.4

Proposal No. 613642 - 136413

NOAA Atlas 14, Volume 10, Version 3
Location name: East Taunton, Massachusetts, USA*
Latitude: 41.8856°, Longitude: -71.0294°
Elevation: 19 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.299** (0.240-0.369)	**0.372** (0.299-0.460)	**0.492** (0.394-0.610)	**0.592** (0.470-0.736)	**0.729** (0.559-0.945)	**0.831** (0.623-1.10)	**0.940** (0.685-1.29)	**1.07** (0.726-1.48)	**1.27** (0.824-1.80)	**1.44** (0.909-2.07)
10-min	**0.423** (0.340-0.522)	**0.527** (0.423-0.651)	**0.697** (0.558-0.864)	**0.839** (0.666-1.04)	**1.03** (0.792-1.34)	**1.18** (0.883-1.56)	**1.33** (0.970-1.82)	**1.52** (1.03-2.09)	**1.80** (1.17-2.55)	**2.03** (1.29-2.93)
15-min	**0.498** (0.400-0.614)	**0.620** (0.498-0.766)	**0.820** (0.656-1.02)	**0.986** (0.784-1.23)	**1.22** (0.932-1.58)	**1.38** (1.04-1.83)	**1.57** (1.14-2.15)	**1.78** (1.21-2.46)	**2.11** (1.37-3.00)	**2.39** (1.52-3.45)
30-min	**0.703** (0.565-0.868)	**0.876** (0.704-1.08)	**1.16** (0.928-1.44)	**1.39** (1.11-1.74)	**1.72** (1.32-2.23)	**1.96** (1.47-2.59)	**2.22** (1.61-3.04)	**2.53** (1.71-3.48)	**2.99** (1.94-4.24)	**3.38** (2.14-4.88)
60-min	**0.908** (0.730-1.12)	**1.13** (0.909-1.40)	**1.50** (1.20-1.86)	**1.80** (1.43-2.24)	**2.22** (1.70-2.88)	**2.53** (1.90-3.35)	**2.87** (2.09-3.92)	**3.26** (2.22-4.50)	**3.87** (2.51-5.48)	**4.38** (2.77-6.30)
2-hr	**1.16** (0.944-1.43)	**1.47** (1.19-1.80)	**1.98** (1.60-2.43)	**2.40** (1.92-2.96)	**2.97** (2.30-3.83)	**3.40** (2.58-4.46)	**3.86** (2.84-5.26)	**4.42** (3.03-6.03)	**5.28** (3.47-7.41)	**6.02** (3.86-8.58)
3-hr	**1.36** (1.10-1.65)	**1.71** (1.39-2.09)	**2.30** (1.86-2.81)	**2.78** (2.24-3.42)	**3.45** (2.69-4.43)	**3.95** (3.01-5.16)	**4.48** (3.32-6.08)	**5.14** (3.54-6.97)	**6.14** (4.06-8.56)	**7.00** (4.51-9.91)
6-hr	**1.78** (1.46-2.16)	**2.22** (1.82-2.68)	**2.92** (2.38-3.54)	**3.51** (2.84-4.27)	**4.31** (3.38-5.47)	**4.91** (3.77-6.34)	**5.55** (4.14-7.42)	**6.32** (4.40-8.48)	**7.48** (5.00-10.3)	**8.46** (5.52-11.8)
12-hr	**2.34** (1.94-2.81)	**2.83** (2.34-3.40)	**3.62** (2.98-4.36)	**4.28** (3.50-5.17)	**5.18** (4.09-6.49)	**5.86** (4.53-7.46)	**6.57** (4.92-8.63)	**7.39** (5.21-9.81)	**8.59** (5.81-11.7)	**9.58** (6.32-13.3)
24-hr	**2.86** (2.39-3.41)	**3.42** (2.85-4.07)	**4.33** (3.59-5.17)	**5.08** (4.19-6.09)	**6.12** (4.87-7.58)	**6.90** (5.37-8.68)	**7.71** (5.82-9.99)	**8.63** (6.16-11.3)	**9.94** (6.81-13.4)	**11.0** (7.35-15.1)
2-day	**3.25** (2.73-3.84)	**3.91** (3.28-4.62)	**4.99** (4.18-5.91)	**5.89** (4.90-7.00)	**7.12** (5.73-8.76)	**8.05** (6.33-10.1)	**9.02** (6.89-11.6)	**10.1** (7.31-13.2)	**11.8** (8.14-15.7)	**13.1** (8.85-17.7)
3-day	**3.54** (2.99-4.16)	**4.24** (3.58-4.99)	**5.39** (4.53-6.35)	**6.34** (5.30-7.51)	**7.65** (6.19-9.36)	**8.64** (6.84-10.7)	**9.68** (7.44-12.4)	**10.9** (7.88-14.0)	**12.6** (8.77-16.7)	**14.0** (9.53-18.8)
4-day	**3.80** (3.22-4.46)	**4.53** (3.83-5.31)	**5.71** (4.81-6.70)	**6.69** (5.61-7.89)	**8.04** (6.52-9.79)	**9.05** (7.19-11.2)	**10.1** (7.80-12.9)	**11.3** (8.25-14.6)	**13.1** (9.15-17.2)	**14.5** (9.91-19.4)
7-day	**4.53** (3.86-5.27)	**5.28** (4.50-6.16)	**6.52** (5.53-7.61)	**7.55** (6.37-8.84)	**8.96** (7.31-10.8)	**10.0** (8.01-12.3)	**11.1** (8.62-14.0)	**12.3** (9.08-15.7)	**14.1** (9.94-18.3)	**15.4** (10.6-20.4)
10-day	**5.23** (4.48-6.06)	**6.01** (5.14-6.96)	**7.28** (6.20-8.46)	**8.34** (7.07-9.72)	**9.79** (8.02-11.7)	**10.9** (8.74-13.2)	**12.0** (9.34-14.9)	**13.2** (9.80-16.8)	**14.9** (10.6-19.3)	**16.2** (11.2-21.3)
20-day	**7.33** (6.33-8.43)	**8.18** (7.05-9.41)	**9.56** (8.22-11.0)	**10.7** (9.15-12.4)	**12.3** (10.1-14.5)	**13.5** (10.9-16.2)	**14.7** (11.5-17.9)	**15.9** (11.9-19.9)	**17.4** (12.6-22.3)	**18.5** (13.0-24.0)
30-day	**9.08** (7.88-10.4)	**9.98** (8.65-11.4)	**11.5** (9.90-13.1)	**12.7** (10.9-14.6)	**14.4** (11.9-16.9)	**15.7** (12.7-18.6)	**17.0** (13.3-20.5)	**18.1** (13.7-22.5)	**19.6** (14.2-24.9)	**20.5** (14.6-26.5)
45-day	**11.2** (9.80-12.8)	**12.2** (10.6-13.9)	**13.8** (12.0-15.8)	**15.1** (13.1-17.3)	**17.0** (14.2-19.8)	**18.4** (15.0-21.7)	**19.8** (15.5-23.6)	**21.0** (16.0-25.9)	**22.4** (16.4-28.2)	**23.2** (16.6-29.8)
60-day	**13.0** (11.4-14.8)	**14.1** (12.3-16.0)	**15.8** (13.8-18.0)	**17.2** (14.9-19.6)	**19.2** (16.0-22.2)	**20.7** (16.9-24.3)	**22.2** (17.4-26.3)	**23.4** (17.9-28.7)	**24.8** (18.2-31.1)	**25.6** (18.4-32.6)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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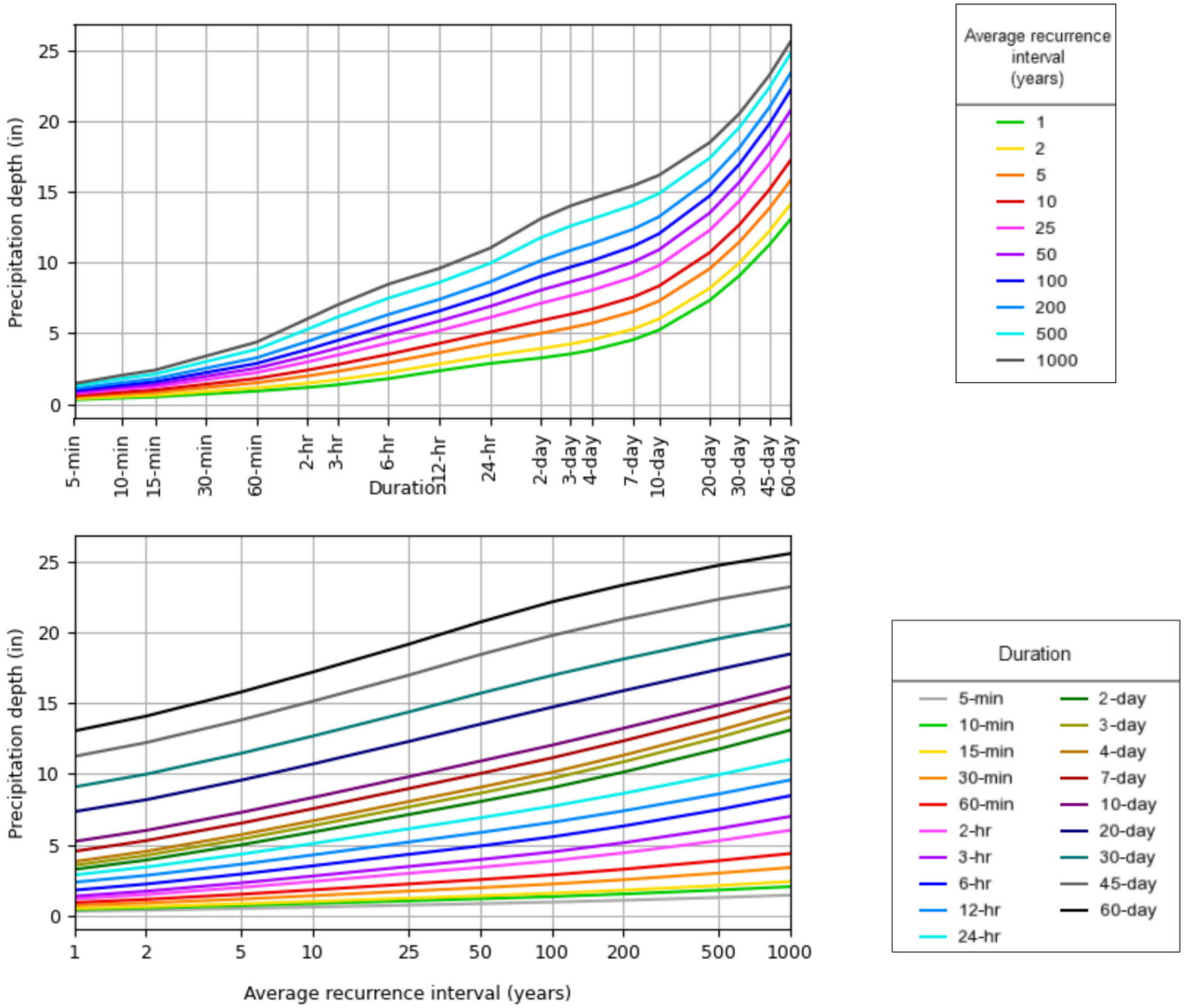
PF graphical

PDS-based depth-duration-frequency (DDF) curves
Latitude: 41.8856°, Longitude: -71.0294°



NOAA Atlas 14, Volume 10, Version 3

Created (GMT): Tue Aug 19 17:43:51 2025

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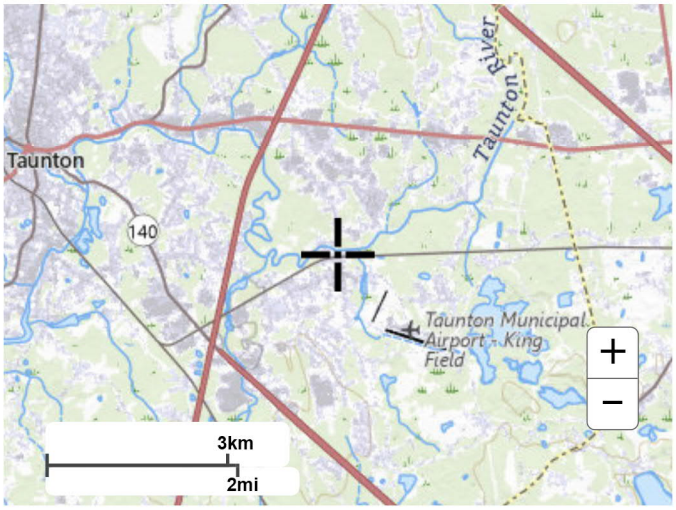
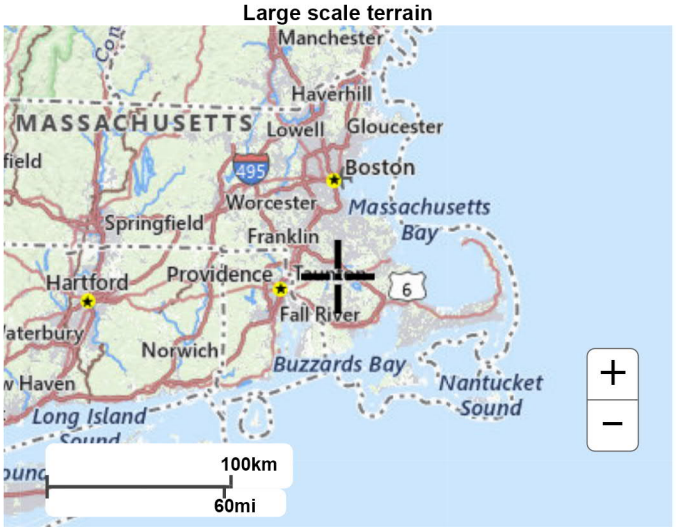
Maps & aerials

Small scale terrain

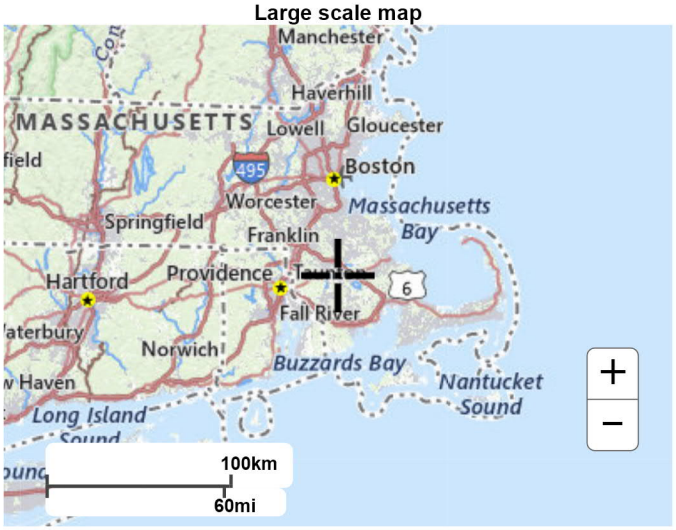
Proposal No. 613642 - 136413



Large scale terrain



Large scale map



Large scale aerial

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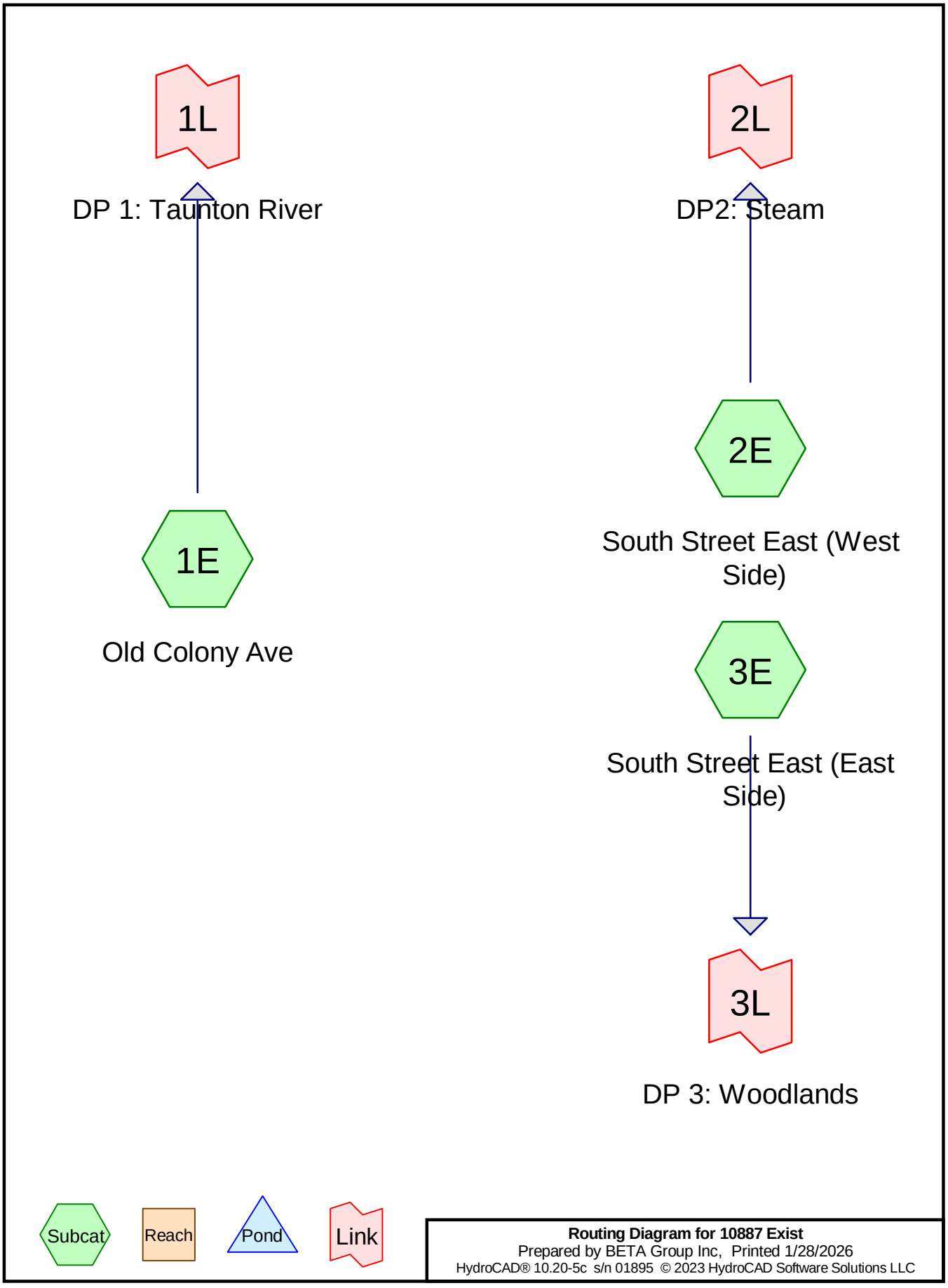
US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

Appendix D: Hydrologic Data


1L
DP 1: Taunton River
2L
DP2: Steam
2E
South Street East (West Side)
1E
Old Colony Ave
3E
South Street East (East Side)
3L
DP 3: Woodlands
Subcat
Reach
Pond
Link
Routing Diagram for 10887 Exist
Prepared by BETA Group Inc, Printed 1/28/2026
HydroCAD® 10.20-5c s/n 01895 © 2023 HydroCAD Software Solutions LLC

Summary for Subcatchment 1E: Old Colony Ave

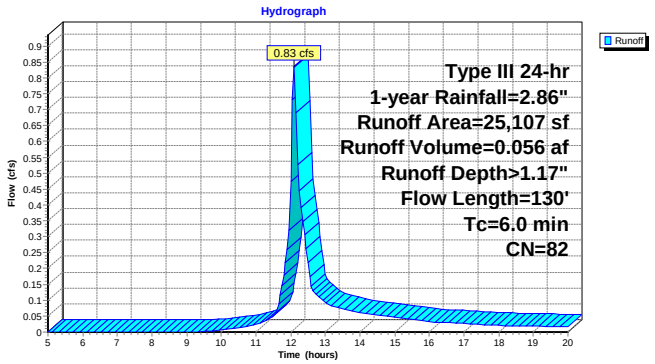
Runoff = 0.83 cfs @ 12.10 hrs, Volume= 0.056 af, Depth> 1.17"
Routed to Link 1L : DP 1: Taunton River

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-year Rainfall=2.86"

Area (sf)	CN	Description
3,592	39	>75% Grass cover, Good, HSG A
788	74	>75% Grass cover, Good, HSG C
145	80	>75% Grass cover, Good, HSG D
8,643	98	Paved roads w/curbs & sewers, HSG A
26	98	Paved roads w/curbs & sewers, HSG C
4	98	Paved roads w/curbs & sewers, HSG D
1,602	98	Water Surface, HSG A
915	98	Water Surface, HSG C
6,901	98	Water Surface, HSG D
2,491	30	Woods, Good, HSG A
25,107	82	Weighted Average
7,016		27.95% Pervious Area
18,091		72.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0340	1.53		**Sheet Flow, Sheet Flow** Smooth surfaces n= 0.011 P2= 3.42"
0.6	80	0.0130	2.31		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
1.1	130	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 1E: Old Colony Ave



Summary for Subcatchment 2E: South Street East (West Side)

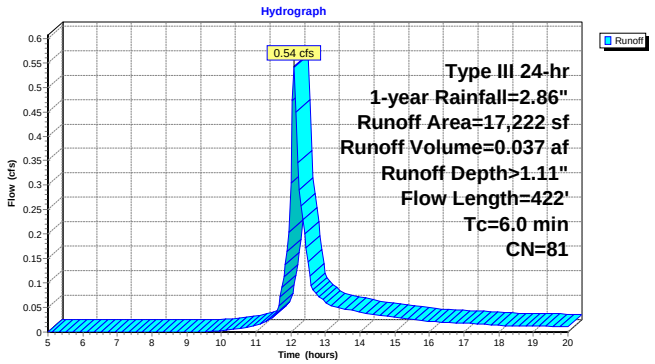
Runoff = 0.54 cfs @ 12.10 hrs, Volume= 0.037 af, Depth> 1.11"
Routed to Link 2L : DP2: Steam

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-year Rainfall=2.86"

Area (sf)	CN	Description
4,102	39	>75% Grass cover, Good, HSG A
0	80	>75% Grass cover, Good, HSG D
530	96	Gravel surface, HSG A
10,287	98	Paved roads w/curbs & sewers, HSG A
165	98	Paved roads w/curbs & sewers, HSG C
1,280	98	Paved roads w/curbs & sewers, HSG D
0	98	Water Surface, HSG A
1	98	Water Surface, HSG D
857	30	Woods, Good, HSG A
17,222	81	Weighted Average
5,489		31.87% Pervious Area
11,733		68.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	50	0.0070	0.81		**Sheet Flow, SF1** Smooth surfaces n= 0.011 P2= 3.42"
3.2	372	0.0090	1.93		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
4.2	422	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2E: South Street East (West Side)



Summary for Subcatchment 3E: South Street East (East Side)

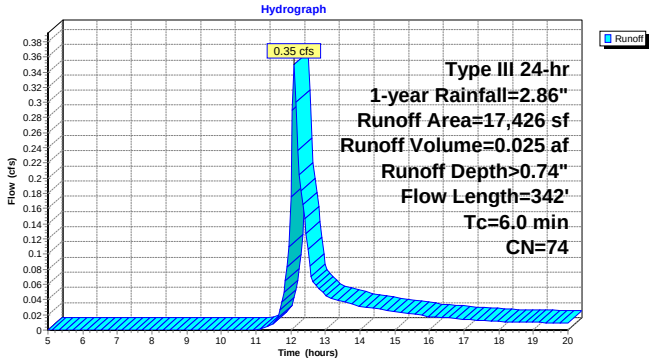
Runoff = 0.35 cfs @ 12.10 hrs, Volume= 0.025 af, Depth> 0.74"
Routed to Link 3L : DP 3: Woodlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-year Rainfall=2.86"

Area (sf)	CN	Description
3,738	39	>75% Grass cover, Good, HSG A
1,102	74	>75% Grass cover, Good, HSG C
0	80	>75% Grass cover, Good, HSG D
2,356	96	Gravel surface, HSG A
387	96	Gravel surface, HSG C
4,933	98	Paved roads w/curbs & sewers, HSG A
1,386	98	Paved roads w/curbs & sewers, HSG C
1,133	98	Paved roads w/curbs & sewers, HSG D
1	98	Water Surface, HSG A
3	98	Water Surface, HSG D
2,387	30	Woods, Good, HSG A
17,426	74	Weighted Average
9,970		57.21% Pervious Area
7,456		42.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	50	0.0070	0.81		**Sheet Flow, SF1** Smooth surfaces n= 0.011 P2= 3.42"
2.5	292	0.0090	1.93		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
3.5	342	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 3E: South Street East (East Side)

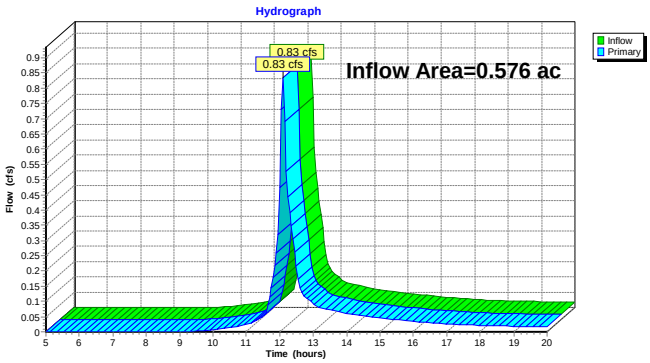


Summary for Link 1L: DP 1: Taunton River

Inflow Area = 0.576 ac, 72.05% Impervious, Inflow Depth > 1.17" for 1-year event
Inflow = 0.83 cfs @ 12.10 hrs, Volume= 0.056 af
Primary = 0.83 cfs @ 12.10 hrs, Volume= 0.056 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 1L: DP 1: Taunton River

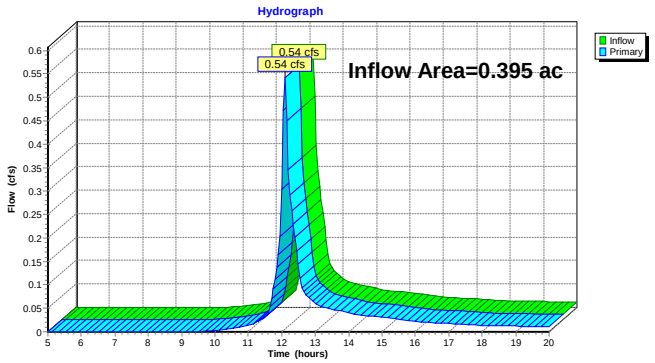


Summary for Link 2L: DP2: Steam

Inflow Area = 0.395 ac, 68.13% Impervious, Inflow Depth > 1.11" for 1-year event
Inflow = 0.54 cfs @ 12.10 hrs, Volume= 0.037 af
Primary = 0.54 cfs @ 12.10 hrs, Volume= 0.037 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 2L: DP2: Steam

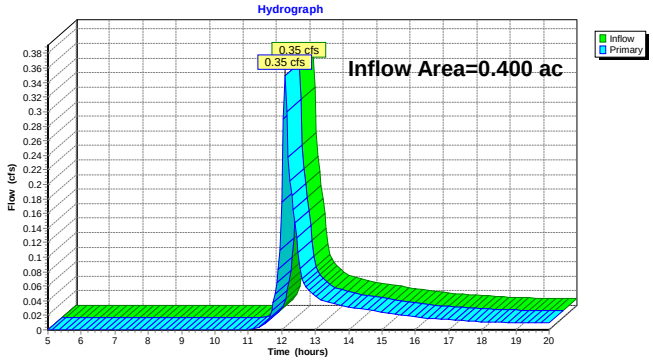


Summary for Link 3L: DP 3: Woodlands

Inflow Area = 0.400 ac, 42.79% Impervious, Inflow Depth > 0.74" for 1-year event
Inflow = 0.35 cfs @ 12.10 hrs, Volume= 0.025 af
Primary = 0.35 cfs @ 12.10 hrs, Volume= 0.025 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 3L: DP 3: Woodlands



Summary for Subcatchment 1E: Old Colony Ave

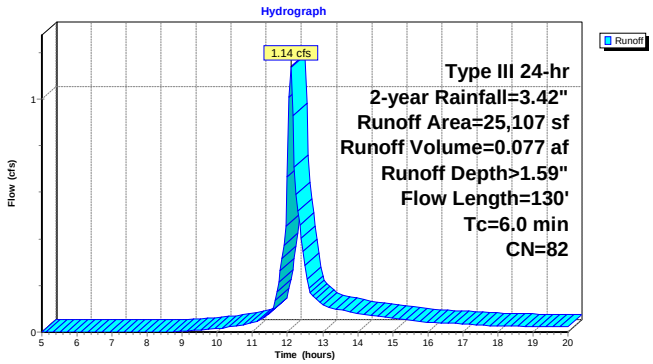
Runoff = 1.14 cfs @ 12.09 hrs, Volume= 0.077 af, Depth> 1.59"
Routed to Link 1L : DP 1: Taunton River

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.42"

Area (sf)	CN	Description
3,592	39	>75% Grass cover, Good, HSG A
788	74	>75% Grass cover, Good, HSG C
145	80	>75% Grass cover, Good, HSG D
8,643	98	Paved roads w/curbs & sewers, HSG A
26	98	Paved roads w/curbs & sewers, HSG C
4	98	Paved roads w/curbs & sewers, HSG D
1,602	98	Water Surface, HSG A
915	98	Water Surface, HSG C
6,901	98	Water Surface, HSG D
2,491	30	Woods, Good, HSG A
25,107	82	Weighted Average
7,016		27.95% Pervious Area
18,091		72.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0340	1.53		**Sheet Flow, Sheet Flow** Smooth surfaces n= 0.011 P2= 3.42"
0.6	80	0.0130	2.31		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
1.1	130	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 1E: Old Colony Ave



Summary for Subcatchment 2E: South Street East (West Side)

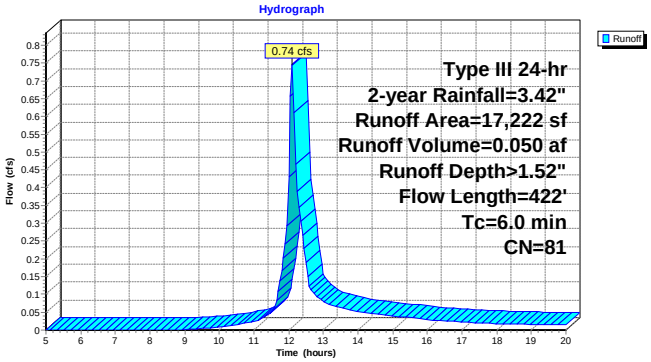
Runoff = 0.74 cfs @ 12.09 hrs, Volume= 0.050 af, Depth> 1.52"
Routed to Link 2L : DP2: Steam

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.42"

Area (sf)	CN	Description
4,102	39	>75% Grass cover, Good, HSG A
0	80	>75% Grass cover, Good, HSG D
530	96	Gravel surface, HSG A
10,287	98	Paved roads w/curbs & sewers, HSG A
165	98	Paved roads w/curbs & sewers, HSG C
1,280	98	Paved roads w/curbs & sewers, HSG D
0	98	Water Surface, HSG A
1	98	Water Surface, HSG D
857	30	Woods, Good, HSG A
17,222	81	Weighted Average
5,489		31.87% Pervious Area
11,733		68.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	50	0.0070	0.81		**Sheet Flow, SF1** Smooth surfaces n= 0.011 P2= 3.42"
3.2	372	0.0090	1.93		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
4.2	422	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2E: South Street East (West Side)



Summary for Subcatchment 3E: South Street East (East Side)

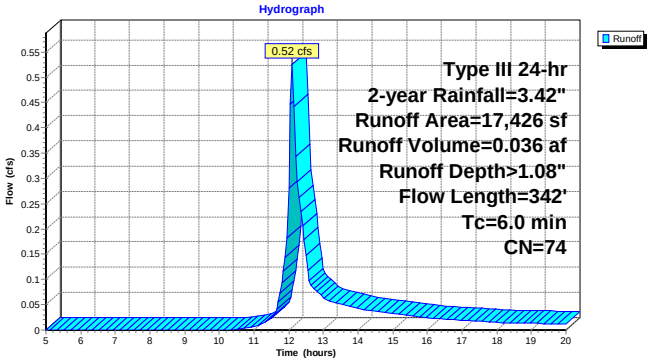
Runoff = 0.52 cfs @ 12.10 hrs, Volume= 0.036 af, Depth> 1.08"
Routed to Link 3L : DP 3: Woodlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.42"

Area (sf)	CN	Description
3,738	39	>75% Grass cover, Good, HSG A
1,102	74	>75% Grass cover, Good, HSG C
0	80	>75% Grass cover, Good, HSG D
2,356	96	Gravel surface, HSG A
387	96	Gravel surface, HSG C
4,933	98	Paved roads w/curbs & sewers, HSG A
1,386	98	Paved roads w/curbs & sewers, HSG C
1,133	98	Paved roads w/curbs & sewers, HSG D
1	98	Water Surface, HSG A
3	98	Water Surface, HSG D
2,387	30	Woods, Good, HSG A
17,426	74	Weighted Average
9,970		57.21% Pervious Area
7,456		42.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	50	0.0070	0.81		**Sheet Flow, SF1** Smooth surfaces n= 0.011 P2= 3.42"
2.5	292	0.0090	1.93		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
3.5	342	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 3E: South Street East (East Side)

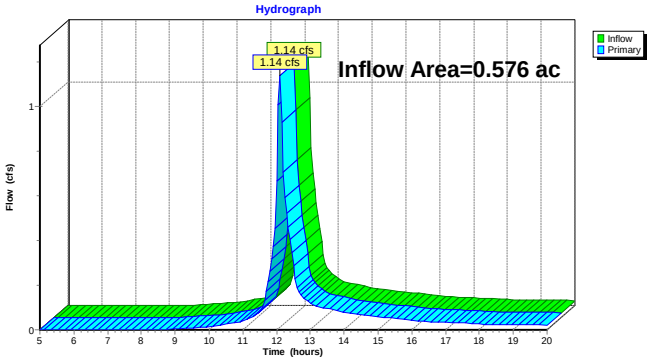


Summary for Link 1L: DP 1: Taunton River

Inflow Area = 0.576 ac, 72.05% Impervious, Inflow Depth > 1.59" for 2-year event
Inflow = 1.14 cfs @ 12.09 hrs, Volume= 0.077 af
Primary = 1.14 cfs @ 12.09 hrs, Volume= 0.077 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 1L: DP 1: Taunton River

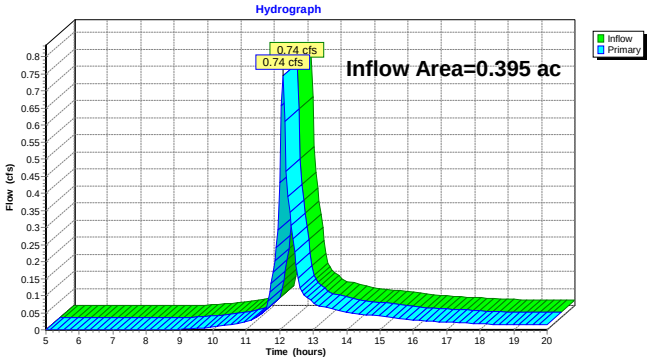


Summary for Link 2L: DP2: Steam

Inflow Area = 0.395 ac, 68.13% Impervious, Inflow Depth > 1.52" for 2-year event
Inflow = 0.74 cfs @ 12.09 hrs, Volume= 0.050 af
Primary = 0.74 cfs @ 12.09 hrs, Volume= 0.050 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 2L: DP2: Steam

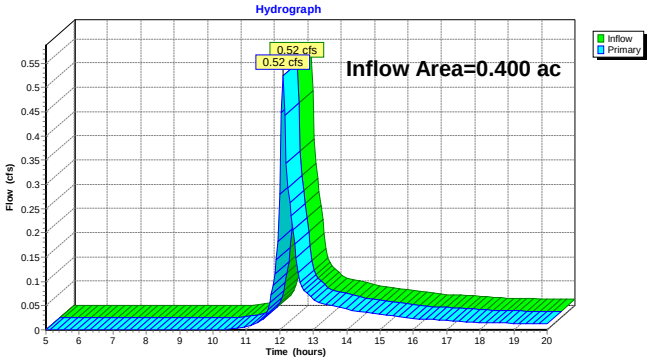


Summary for Link 3L: DP 3: Woodlands

Inflow Area = 0.400 ac, 42.79% Impervious, Inflow Depth > 1.08" for 2-year event
Inflow = 0.52 cfs @ 12.10 hrs, Volume= 0.036 af
Primary = 0.52 cfs @ 12.10 hrs, Volume= 0.036 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 3L: DP 3: Woodlands



Summary for Subcatchment 1E: Old Colony Ave

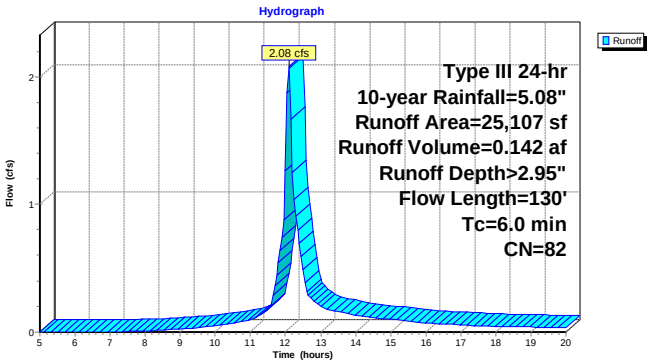
Runoff = 2.08 cfs @ 12.09 hrs, Volume= 0.142 af, Depth> 2.95"
Routed to Link 1L : DP 1: Taunton River

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=5.08"

Area (sf)	CN	Description
3,592	39	>75% Grass cover, Good, HSG A
788	74	>75% Grass cover, Good, HSG C
145	80	>75% Grass cover, Good, HSG D
8,643	98	Paved roads w/curbs & sewers, HSG A
26	98	Paved roads w/curbs & sewers, HSG C
4	98	Paved roads w/curbs & sewers, HSG D
1,602	98	Water Surface, HSG A
915	98	Water Surface, HSG C
6,901	98	Water Surface, HSG D
2,491	30	Woods, Good, HSG A
25,107	82	Weighted Average
7,016		27.95% Pervious Area
18,091		72.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0340	1.53		**Sheet Flow, Sheet Flow** Smooth surfaces n= 0.011 P2= 3.42"
0.6	80	0.0130	2.31		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
1.1	130	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 1E: Old Colony Ave



Summary for Subcatchment 2E: South Street East (West Side)

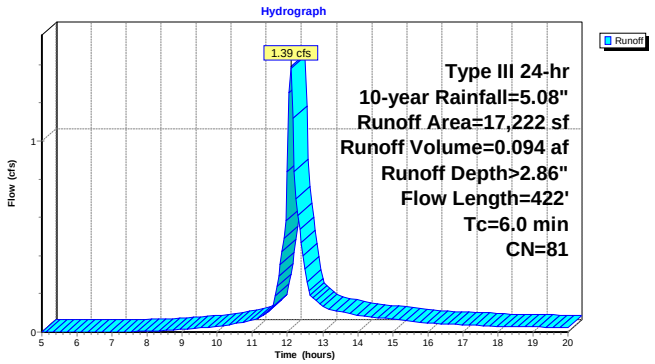
Runoff = 1.39 cfs @ 12.09 hrs, Volume= 0.094 af, Depth> 2.86"
Routed to Link 2L : DP2: Steam

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=5.08"

Area (sf)	CN	Description
4,102	39	>75% Grass cover, Good, HSG A
0	80	>75% Grass cover, Good, HSG D
530	96	Gravel surface, HSG A
10,287	98	Paved roads w/curbs & sewers, HSG A
165	98	Paved roads w/curbs & sewers, HSG C
1,280	98	Paved roads w/curbs & sewers, HSG D
0	98	Water Surface, HSG A
1	98	Water Surface, HSG D
857	30	Woods, Good, HSG A
17,222	81	Weighted Average
5,489		31.87% Pervious Area
11,733		68.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	50	0.0070	0.81		**Sheet Flow, SF1** Smooth surfaces n= 0.011 P2= 3.42"
3.2	372	0.0090	1.93		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
4.2	422	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2E: South Street East (West Side)



Summary for Subcatchment 3E: South Street East (East Side)

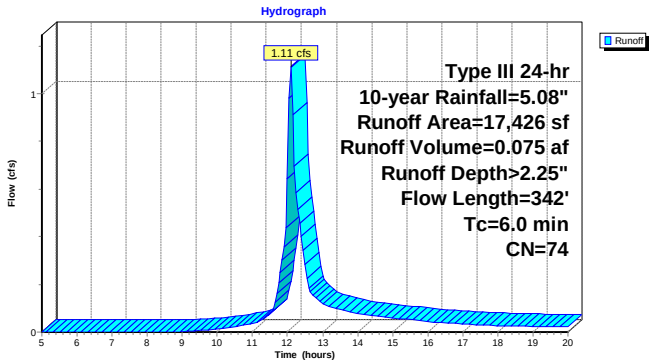
Runoff = 1.11 cfs @ 12.09 hrs, Volume= 0.075 af, Depth> 2.25"
Routed to Link 3L : DP 3: Woodlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=5.08"

Area (sf)	CN	Description
3,738	39	>75% Grass cover, Good, HSG A
1,102	74	>75% Grass cover, Good, HSG C
0	80	>75% Grass cover, Good, HSG D
2,356	96	Gravel surface, HSG A
387	96	Gravel surface, HSG C
4,933	98	Paved roads w/curbs & sewers, HSG A
1,386	98	Paved roads w/curbs & sewers, HSG C
1,133	98	Paved roads w/curbs & sewers, HSG D
1	98	Water Surface, HSG A
3	98	Water Surface, HSG D
2,387	30	Woods, Good, HSG A
17,426	74	Weighted Average
9,970		57.21% Pervious Area
7,456		42.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	50	0.0070	0.81		**Sheet Flow, SF1** Smooth surfaces n= 0.011 P2= 3.42"
2.5	292	0.0090	1.93		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
3.5	342	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 3E: South Street East (East Side)

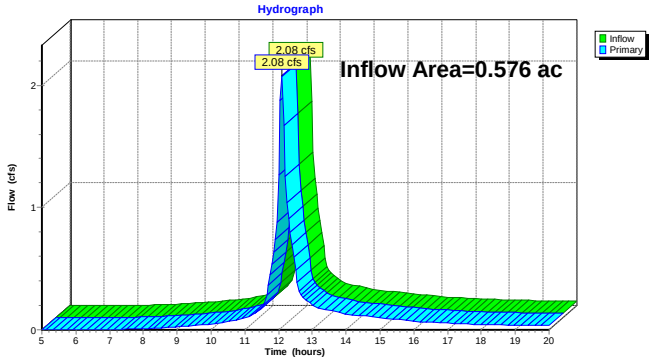


Summary for Link 1L: DP 1: Taunton River

Inflow Area = 0.576 ac, 72.05% Impervious, Inflow Depth > 2.95" for 10-year event
Inflow = 2.08 cfs @ 12.09 hrs, Volume= 0.142 af
Primary = 2.08 cfs @ 12.09 hrs, Volume= 0.142 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 1L: DP 1: Taunton River

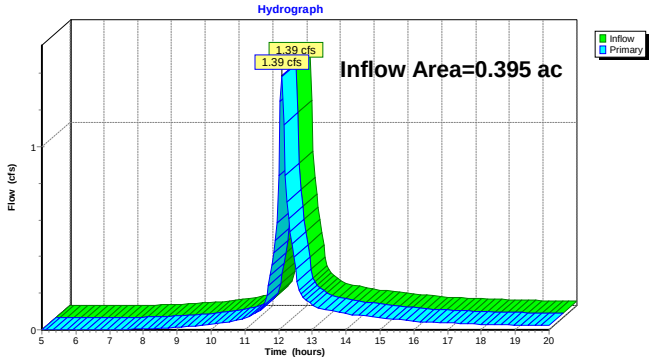


Summary for Link 2L: DP2: Steam

Inflow Area = 0.395 ac, 68.13% Impervious, Inflow Depth > 2.86" for 10-year event
Inflow = 1.39 cfs @ 12.09 hrs, Volume= 0.094 af
Primary = 1.39 cfs @ 12.09 hrs, Volume= 0.094 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 2L: DP2: Steam

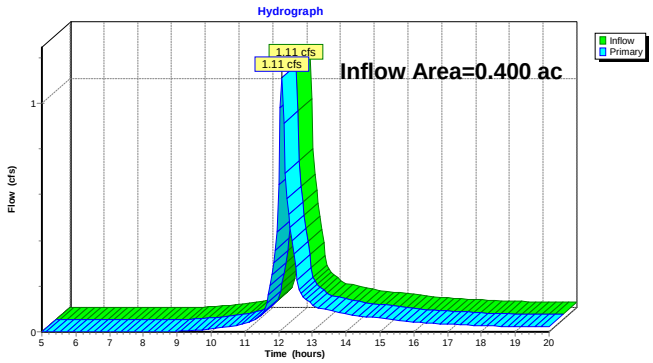


Summary for Link 3L: DP 3: Woodlands

Inflow Area = 0.400 ac, 42.79% Impervious, Inflow Depth > 2.25" for 10-year event
Inflow = 1.11 cfs @ 12.09 hrs, Volume= 0.075 af
Primary = 1.11 cfs @ 12.09 hrs, Volume= 0.075 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 3L: DP 3: Woodlands



Summary for Subcatchment 1E: Old Colony Ave

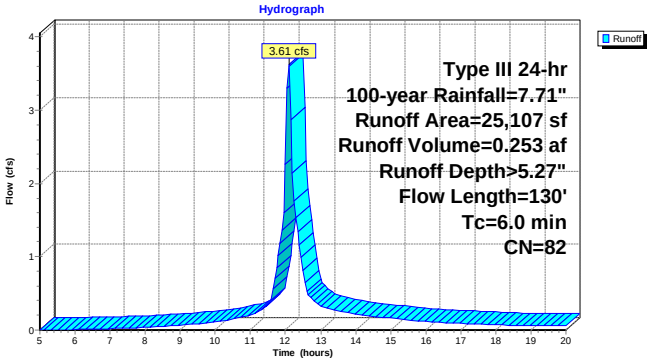
Runoff = 3.61 cfs @ 12.09 hrs, Volume= 0.253 af, Depth> 5.27"
Routed to Link 1L : DP 1: Taunton River

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=7.71"

Area (sf)	CN	Description
3,592	39	>75% Grass cover, Good, HSG A
788	74	>75% Grass cover, Good, HSG C
145	80	>75% Grass cover, Good, HSG D
8,643	98	Paved roads w/curbs & sewers, HSG A
26	98	Paved roads w/curbs & sewers, HSG C
4	98	Paved roads w/curbs & sewers, HSG D
1,602	98	Water Surface, HSG A
915	98	Water Surface, HSG C
6,901	98	Water Surface, HSG D
2,491	30	Woods, Good, HSG A
25,107	82	Weighted Average
7,016		27.95% Pervious Area
18,091		72.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0340	1.53		**Sheet Flow, Sheet Flow** Smooth surfaces n= 0.011 P2= 3.42"
0.6	80	0.0130	2.31		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
1.1	130	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 1E: Old Colony Ave



Summary for Subcatchment 2E: South Street East (West Side)

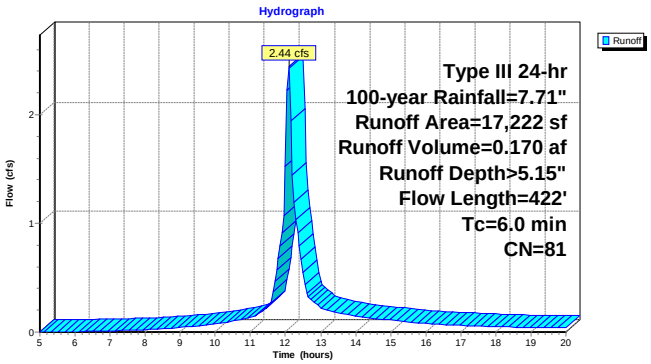
Runoff = 2.44 cfs @ 12.09 hrs, Volume= 0.170 af, Depth> 5.15"
Routed to Link 2L : DP2: Steam

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=7.71"

Area (sf)	CN	Description
4,102	39	>75% Grass cover, Good, HSG A
0	80	>75% Grass cover, Good, HSG D
530	96	Gravel surface, HSG A
10,287	98	Paved roads w/curbs & sewers, HSG A
165	98	Paved roads w/curbs & sewers, HSG C
1,280	98	Paved roads w/curbs & sewers, HSG D
0	98	Water Surface, HSG A
1	98	Water Surface, HSG D
857	30	Woods, Good, HSG A
17,222	81	Weighted Average
5,489		31.87% Pervious Area
11,733		68.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	50	0.0070	0.81		**Sheet Flow, SF1** Smooth surfaces n= 0.011 P2= 3.42"
3.2	372	0.0090	1.93		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
4.2	422	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2E: South Street East (West Side)



Summary for Subcatchment 3E: South Street East (East Side)

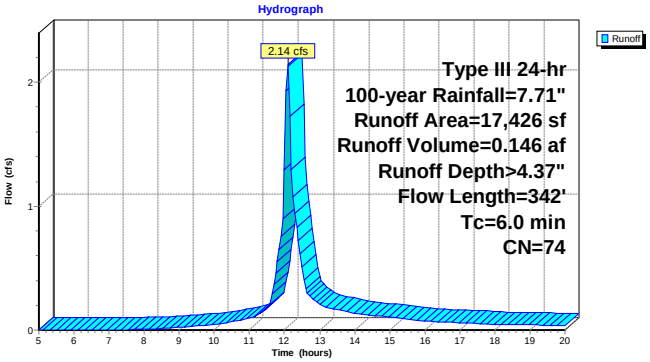
Runoff = 2.14 cfs @ 12.09 hrs, Volume= 0.146 af, Depth> 4.37"
Routed to Link 3L : DP 3: Woodlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=7.71"

Area (sf)	CN	Description
3,738	39	>75% Grass cover, Good, HSG A
1,102	74	>75% Grass cover, Good, HSG C
0	80	>75% Grass cover, Good, HSG D
2,356	96	Gravel surface, HSG A
387	96	Gravel surface, HSG C
4,933	98	Paved roads w/curbs & sewers, HSG A
1,386	98	Paved roads w/curbs & sewers, HSG C
1,133	98	Paved roads w/curbs & sewers, HSG D
1	98	Water Surface, HSG A
3	98	Water Surface, HSG D
2,387	30	Woods, Good, HSG A
17,426	74	Weighted Average
9,970		57.21% Pervious Area
7,456		42.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	50	0.0070	0.81		**Sheet Flow, SF1** Smooth surfaces n= 0.011 P2= 3.42"
2.5	292	0.0090	1.93		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
3.5	342	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 3E: South Street East (East Side)

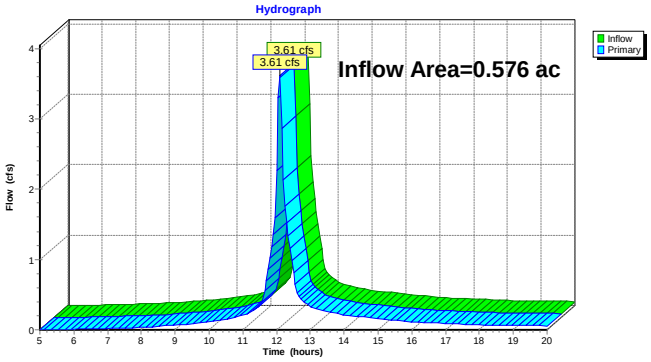


Summary for Link 1L: DP 1: Taunton River

Inflow Area = 0.576 ac, 72.05% Impervious, Inflow Depth > 5.27" for 100-year event
Inflow = 3.61 cfs @ 12.09 hrs, Volume= 0.253 af
Primary = 3.61 cfs @ 12.09 hrs, Volume= 0.253 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 1L: DP 1: Taunton River

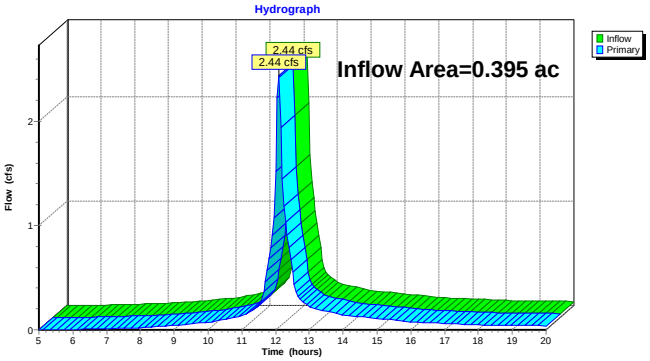


Summary for Link 2L: DP2: Steam

Inflow Area = 0.395 ac, 68.13% Impervious, Inflow Depth > 5.15" for 100-year event
Inflow = 2.44 cfs @ 12.09 hrs, Volume= 0.170 af
Primary = 2.44 cfs @ 12.09 hrs, Volume= 0.170 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 2L: DP2: Steam

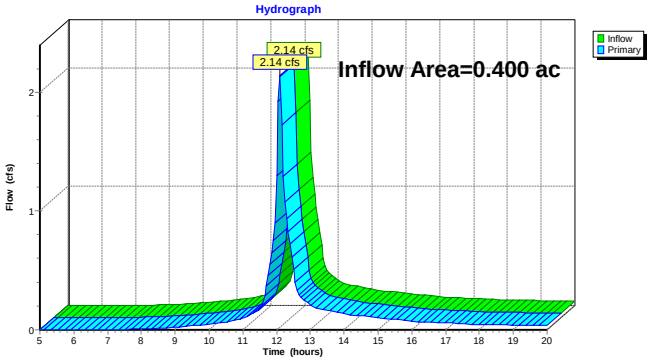


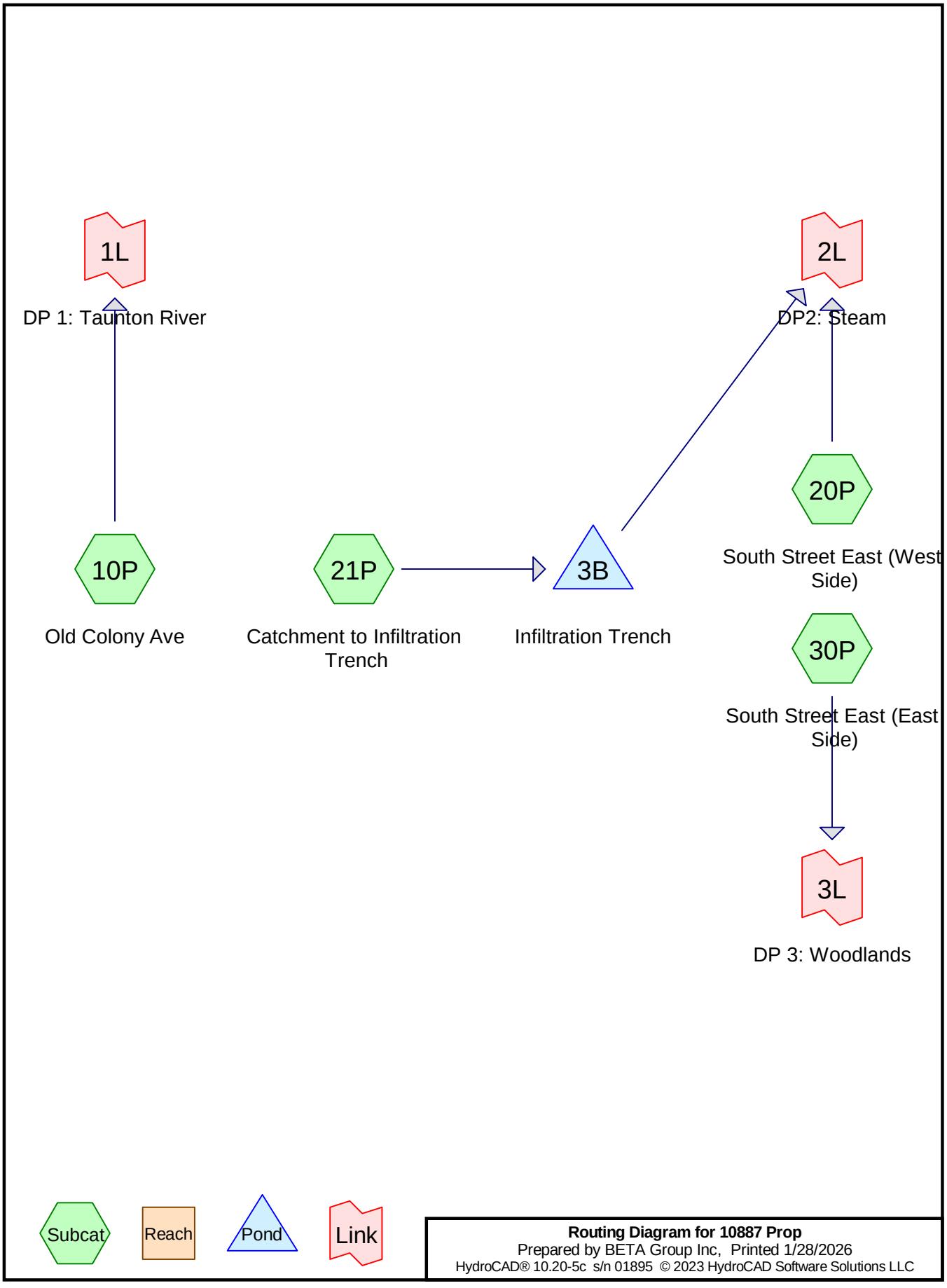
Summary for Link 3L: DP 3: Woodlands

Inflow Area = 0.400 ac, 42.79% Impervious, Inflow Depth > 4.37" for 100-year event
Inflow = 2.14 cfs @ 12.09 hrs, Volume= 0.146 af
Primary = 2.14 cfs @ 12.09 hrs, Volume= 0.146 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 3L: DP 3: Woodlands




1L
DP 1: Taunton River
2L
DP2: Steam
20P
South Street East (West Side)
10P
Old Colony Ave
21P
Catchment to Infiltration Trench
3B
Infiltration Trench
30P
South Street East (East Side)
3L
DP 3: Woodlands
Subcat
Reach
Pond
Link
Routing Diagram for 10887 Prop
Prepared by BETA Group Inc, Printed 1/28/2026
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Summary for Subcatchment 10P: Old Colony Ave

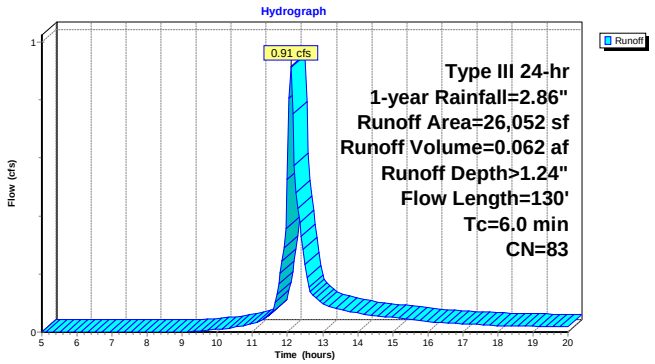
Runoff = 0.91 cfs @ 12.09 hrs, Volume= 0.062 af, Depth> 1.24"
Routed to Link 1L : DP 1: Taunton River

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-year Rainfall=2.86"

Area (sf)	CN	Description
4,934	39	>75% Grass cover, Good, HSG A
776	74	>75% Grass cover, Good, HSG C
135	80	>75% Grass cover, Good, HSG D
9,104	98	Paved roads w/curbs & sewers, HSG A
31	98	Paved roads w/curbs & sewers, HSG C
709	98	Paved roads w/curbs & sewers, HSG D
1,590	98	Water Surface, HSG A
906	98	Water Surface, HSG C
6,827	98	Water Surface, HSG D
1,039	30	Woods, Good, HSG A
26,052	83	Weighted Average
6,884		26.43% Pervious Area
19,168		73.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0340	1.53		**Sheet Flow, Sheet Flow** Smooth surfaces n= 0.011 P2= 3.42"
0.6	80	0.0130	2.31		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
1.1	130	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 10P: Old Colony Ave



Summary for Subcatchment 20P: South Street East (West Side)

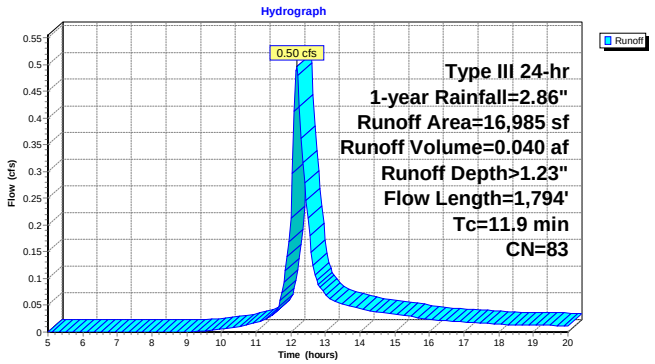
Runoff = 0.50 cfs @ 12.17 hrs, Volume= 0.040 af, Depth> 1.23"
Routed to Link 2L : DP2: Steam

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-year Rainfall=2.86"

Area (sf)	CN	Description
3,571	39	>75% Grass cover, Good, HSG A
366	96	Gravel surface, HSG A
11,263	98	Paved roads w/curbs & sewers, HSG A
165	98	Paved roads w/curbs & sewers, HSG C
1,085	98	Paved roads w/curbs & sewers, HSG D
0	98	Water Surface, HSG D
535	30	Woods, Good, HSG A
16,985	83	Weighted Average
4,472		26.33% Pervious Area
12,513		73.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0200	1.24		**Sheet Flow, SF1** Smooth surfaces n= 0.011 P2= 3.42"
3.2	372	0.0090	1.93		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
8.0	1,372	0.0200	2.87		**Shallow Concentrated Flow, SC2** Paved Kv= 20.3 fps
11.9	1,794	Total			

Subcatchment 20P: South Street East (West Side)



Summary for Subcatchment 21P: Catchment to Infiltration Trench

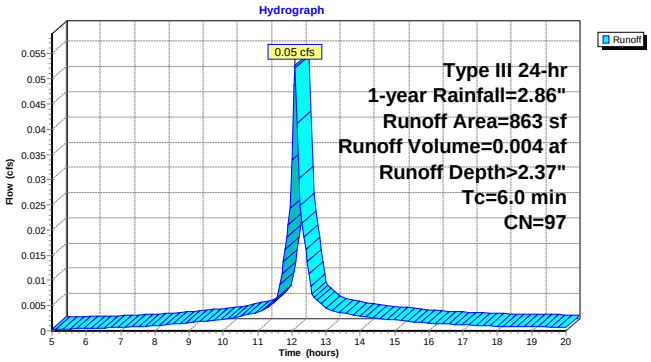
Runoff = 0.05 cfs @ 12.09 hrs, Volume= 0.004 af, Depth> 2.37"
Routed to Pond 3B : Infiltration Trench

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-year Rainfall=2.86"

Area (sf)	CN	Description
12	39	>75% Grass cover, Good, HSG A
851	98	Paved roads w/curbs & sewers, HSG A
863	97	Weighted Average
12		1.37% Pervious Area
851		98.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Assume Min. TC**

Subcatchment 21P: Catchment to Infiltration Trench



Summary for Subcatchment 30P: South Street East (East Side)

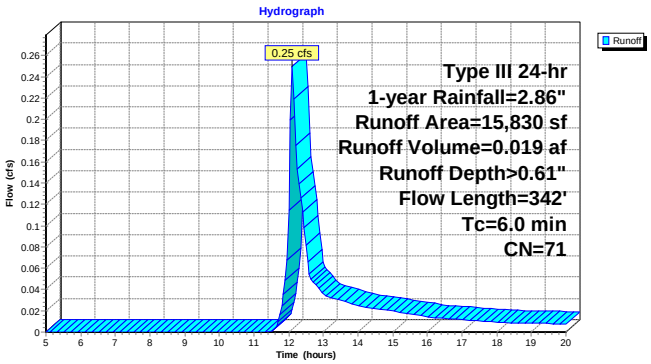
Runoff = 0.25 cfs @ 12.11 hrs, Volume= 0.019 af, Depth> 0.61"
Routed to Link 3L : DP 3: Woodlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-year Rainfall=2.86"

Area (sf)	CN	Description
4,195	39	>75% Grass cover, Good, HSG A
870	74	>75% Grass cover, Good, HSG C
1,421	96	Gravel surface, HSG A
387	96	Gravel surface, HSG C
4,275	98	Paved roads w/curbs & sewers, HSG A
1,630	98	Paved roads w/curbs & sewers, HSG C
704	98	Paved roads w/curbs & sewers, HSG D
4	98	Water Surface, HSG C
2	98	Water Surface, HSG D
2,343	30	Woods, Good, HSG A
15,830	71	Weighted Average
9,215		58.21% Pervious Area
6,615		41.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	50	0.0070	0.81		**Sheet Flow, SF1** Smooth surfaces n= 0.011 P2= 3.42"
2.5	292	0.0090	1.93		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
3.5	342	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 30P: South Street East (East Side)



Summary for Pond 3B: Infiltration Trench

Inflow Area = 0.020 ac, 98.63% Impervious, Inflow Depth > 2.37" for 1-year event
Inflow = 0.05 cfs @ 12.09 hrs, Volume= 0.004 af
Outflow = 0.00 cfs @ 13.62 hrs, Volume= 0.003 af, Atten= 94%, Lag= 91.8 min
Discarded = 0.00 cfs @ 13.62 hrs, Volume= 0.003 af
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af
Routed to Link 2L : DP2: Steam

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 11.80' @ 13.62 hrs Surf.Area= 90 sf Storage= 84 cf

Plug-Flow detention time= 175.7 min calculated for 0.003 af (73% of inflow)
Center-of-Mass det. time= 113.4 min (858.8 - 745.3)

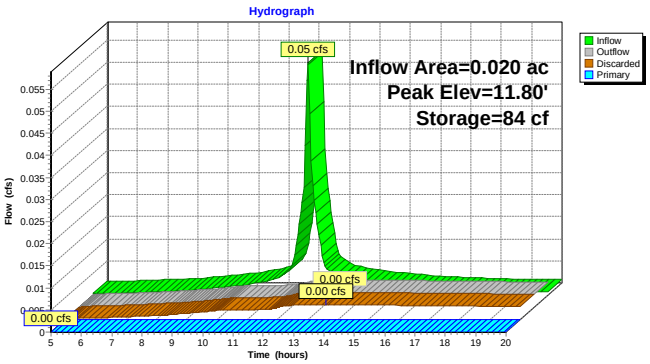
Volume	Invert	Avail.Storage	Storage Description
#1	10.00'	72 cf	**2.00'W x 45.00'L x 2.17'H Crushed Stone Trench** 195 cf Overall - 16 cf Embedded = 180 cf x 40.0% Voids
#2	11.00'	16 cf	**8.0" Round 8" Perforated Pipe** Inside #1 L= 45.0'
#3	11.00'	70 cf	**4.00'D x 5.57'H CB-6** -Impervious
		158 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	10.00'	**1.020 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 7.00'
#2	Primary	12.00'	**12.0" Vert. CB-6 Outlet** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.00 cfs @ 13.62 hrs HW=11.80' (Free Discharge)
↑**1=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=10.00' (Free Discharge)
↑**2=CB-6 Outlet** (Controls 0.00 cfs)

Pond 3B: Infiltration Trench

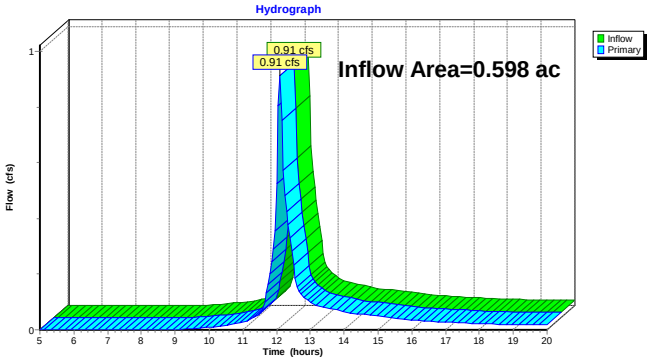


Summary for Link 1L: DP 1: Taunton River

Inflow Area = 0.598 ac, 73.57% Impervious, Inflow Depth > 1.24" for 1-year event
Inflow = 0.91 cfs @ 12.09 hrs, Volume= 0.062 af
Primary = 0.91 cfs @ 12.09 hrs, Volume= 0.062 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 1L: DP 1: Taunton River

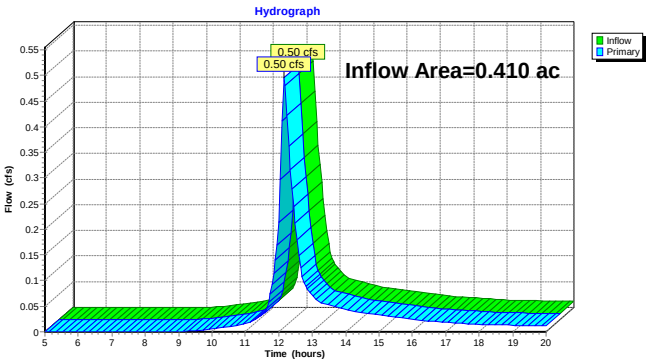


Summary for Link 2L: DP2: Steam

Inflow Area = 0.410 ac, 74.88% Impervious, Inflow Depth > 1.17" for 1-year event
Inflow = 0.50 cfs @ 12.17 hrs, Volume= 0.040 af
Primary = 0.50 cfs @ 12.17 hrs, Volume= 0.040 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 2L: DP2: Steam

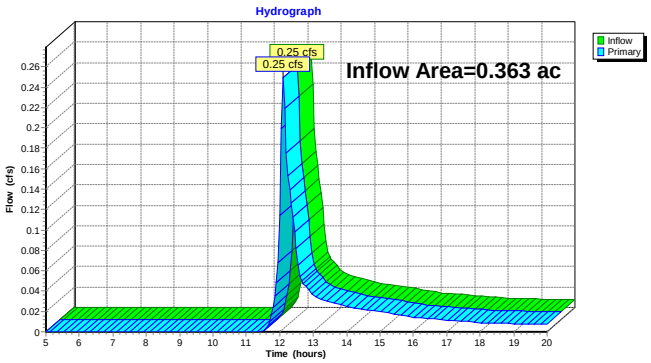


Summary for Link 3L: DP 3: Woodlands

Inflow Area = 0.363 ac, 41.79% Impervious, Inflow Depth > 0.61" for 1-year event
Inflow = 0.25 cfs @ 12.11 hrs, Volume= 0.019 af
Primary = 0.25 cfs @ 12.11 hrs, Volume= 0.019 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 3L: DP 3: Woodlands



Summary for Subcatchment 10P: Old Colony Ave

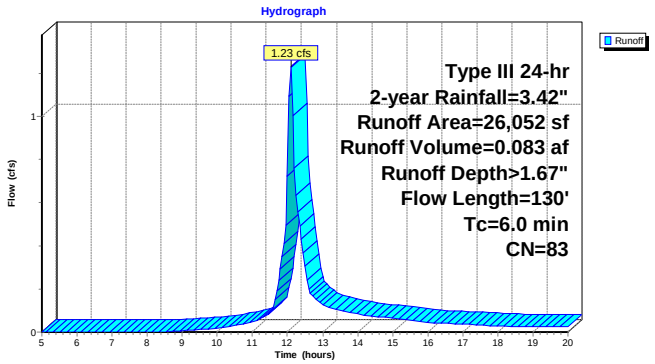
Runoff = 1.23 cfs @ 12.09 hrs, Volume= 0.083 af, Depth> 1.67"
Routed to Link 1L : DP 1: Taunton River

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.42"

Area (sf)	CN	Description
4,934	39	>75% Grass cover, Good, HSG A
776	74	>75% Grass cover, Good, HSG C
135	80	>75% Grass cover, Good, HSG D
9,104	98	Paved roads w/curbs & sewers, HSG A
31	98	Paved roads w/curbs & sewers, HSG C
709	98	Paved roads w/curbs & sewers, HSG D
1,590	98	Water Surface, HSG A
906	98	Water Surface, HSG C
6,827	98	Water Surface, HSG D
1,039	30	Woods, Good, HSG A
26,052	83	Weighted Average
6,884		26.43% Pervious Area
19,168		73.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0340	1.53		**Sheet Flow, Sheet Flow** Smooth surfaces n= 0.011 P2= 3.42"
0.6	80	0.0130	2.31		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
1.1	130	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 10P: Old Colony Ave



Summary for Subcatchment 20P: South Street East (West Side)

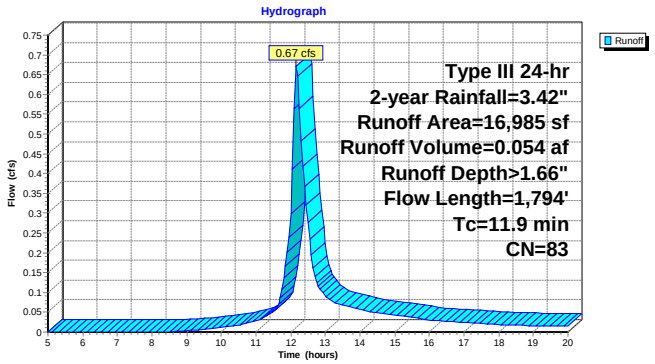
Runoff = 0.67 cfs @ 12.17 hrs, Volume= 0.054 af, Depth> 1.66"
Routed to Link 2L : DP2: Steam

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.42"

Area (sf)	CN	Description
3,571	39	>75% Grass cover, Good, HSG A
366	96	Gravel surface, HSG A
11,263	98	Paved roads w/curbs & sewers, HSG A
165	98	Paved roads w/curbs & sewers, HSG C
1,085	98	Paved roads w/curbs & sewers, HSG D
0	98	Water Surface, HSG D
535	30	Woods, Good, HSG A
16,985	83	Weighted Average
4,472		26.33% Pervious Area
12,513		73.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0200	1.24		**Sheet Flow, SF1** Smooth surfaces n= 0.011 P2= 3.42"
3.2	372	0.0090	1.93		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
8.0	1,372	0.0200	2.87		**Shallow Concentrated Flow, SC2** Paved Kv= 20.3 fps
11.9	1,794	Total			

Subcatchment 20P: South Street East (West Side)



Summary for Subcatchment 21P: Catchment to Infiltration Trench

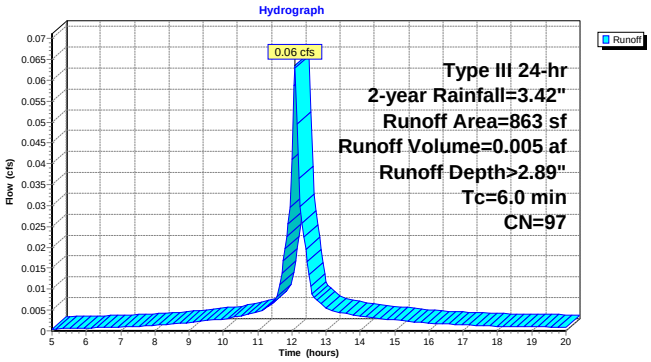
Runoff = 0.06 cfs @ 12.09 hrs, Volume= 0.005 af, Depth> 2.89"
Routed to Pond 3B : Infiltration Trench

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.42"

Area (sf)	CN	Description
12	39	>75% Grass cover, Good, HSG A
851	98	Paved roads w/curbs & sewers, HSG A
863	97	Weighted Average
12		1.37% Pervious Area
851		98.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Assume Min. TC**

Subcatchment 21P: Catchment to Infiltration Trench



Summary for Subcatchment 30P: South Street East (East Side)

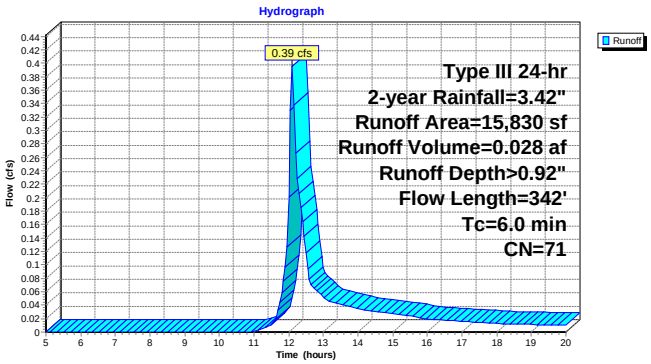
Runoff = 0.39 cfs @ 12.10 hrs, Volume= 0.028 af, Depth> 0.92"
Routed to Link 3L : DP 3: Woodlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.42"

Area (sf)	CN	Description
4,195	39	>75% Grass cover, Good, HSG A
870	74	>75% Grass cover, Good, HSG C
1,421	96	Gravel surface, HSG A
387	96	Gravel surface, HSG C
4,275	98	Paved roads w/curbs & sewers, HSG A
1,630	98	Paved roads w/curbs & sewers, HSG C
704	98	Paved roads w/curbs & sewers, HSG D
4	98	Water Surface, HSG C
2	98	Water Surface, HSG D
2,343	30	Woods, Good, HSG A
15,830	71	Weighted Average
9,215		58.21% Pervious Area
6,615		41.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	50	0.0070	0.81		**Sheet Flow, SF1** Smooth surfaces n= 0.011 P2= 3.42"
2.5	292	0.0090	1.93		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
3.5	342	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 30P: South Street East (East Side)



Summary for Pond 3B: Infiltration Trench

Inflow Area = 0.020 ac, 98.63% Impervious, Inflow Depth > 2.89" for 2-year event
Inflow = 0.06 cfs @ 12.09 hrs, Volume= 0.005 af
Outflow = 0.01 cfs @ 12.51 hrs, Volume= 0.003 af, Atten= 78%, Lag= 25.1 min
Discarded = 0.00 cfs @ 12.51 hrs, Volume= 0.003 af
Primary = 0.01 cfs @ 12.51 hrs, Volume= 0.000 af
Routed to Link 2L : DP2: Steam

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 12.04' @ 12.51 hrs Surf.Area= 90 sf Storage= 96 cf

Plug-Flow detention time= 162.7 min calculated for 0.003 af (72% of inflow)
Center-of-Mass det. time= 98.4 min (841.0 - 742.7)

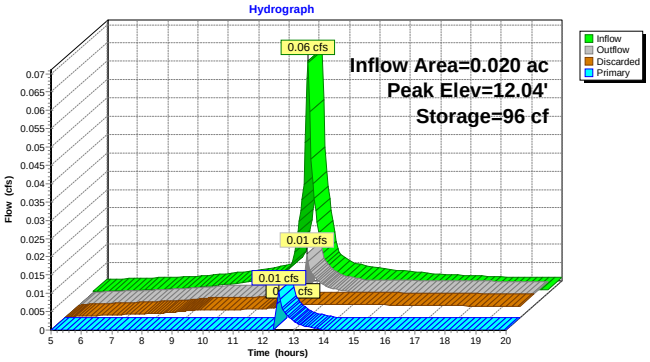
Volume	Invert	Avail.Storage	Storage Description
#1	10.00'	72 cf	**2.00'W x 45.00'L x 2.17'H Crushed Stone Trench** 195 cf Overall - 16 cf Embedded = 180 cf x 40.0% Voids
#2	11.00'	16 cf	**8.0" Round 8" Perforated Pipe** Inside #1 L= 45.0'
#3	11.00'	70 cf	**4.00'D x 5.57'H CB-6** -Impervious
		158 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	10.00'	**1.020 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 7.00'
#2	Primary	12.00'	**12.0" Vert. CB-6 Outlet** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.00 cfs @ 12.51 hrs HW=12.04' (Free Discharge)
↑**1=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=0.01 cfs @ 12.51 hrs HW=12.04' (Free Discharge)
↑**2=CB-6 Outlet** (Orifice Controls 0.01 cfs @ 0.71 fps)

Pond 3B: Infiltration Trench

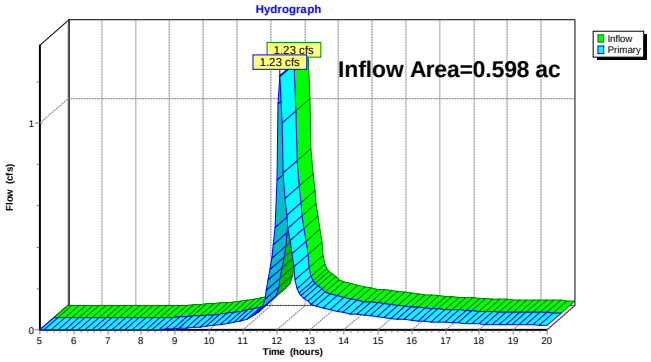


Summary for Link 1L: DP 1: Taunton River

Inflow Area = 0.598 ac, 73.57% Impervious, Inflow Depth > 1.67" for 2-year event
Inflow = 1.23 cfs @ 12.09 hrs, Volume= 0.083 af
Primary = 1.23 cfs @ 12.09 hrs, Volume= 0.083 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 1L: DP 1: Taunton River

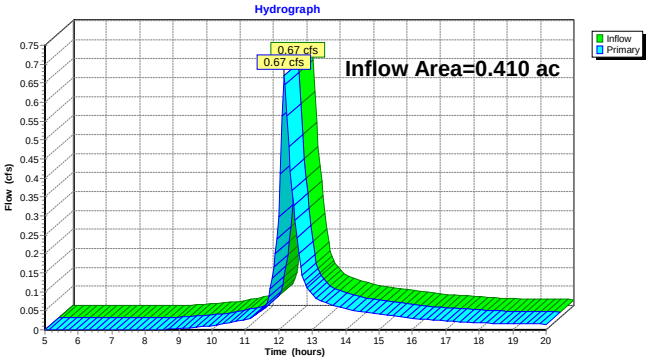


Summary for Link 2L: DP2: Steam

Inflow Area = 0.410 ac, 74.88% Impervious, Inflow Depth > 1.59" for 2-year event
Inflow = 0.67 cfs @ 12.17 hrs, Volume= 0.054 af
Primary = 0.67 cfs @ 12.17 hrs, Volume= 0.054 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 2L: DP2: Steam

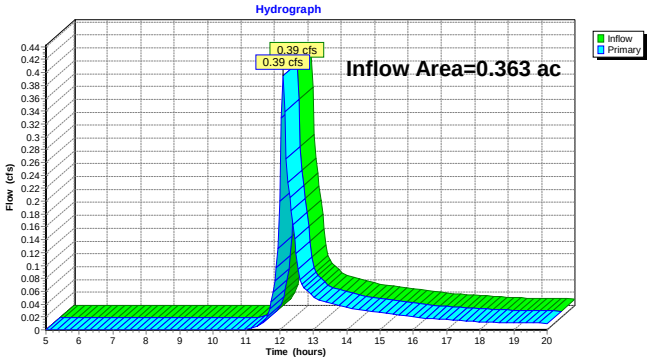


Summary for Link 3L: DP 3: Woodlands

Inflow Area = 0.363 ac, 41.79% Impervious, Inflow Depth > 0.92" for 2-year event
Inflow = 0.39 cfs @ 12.10 hrs, Volume= 0.028 af
Primary = 0.39 cfs @ 12.10 hrs, Volume= 0.028 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 3L: DP 3: Woodlands



Summary for Subcatchment 10P: Old Colony Ave

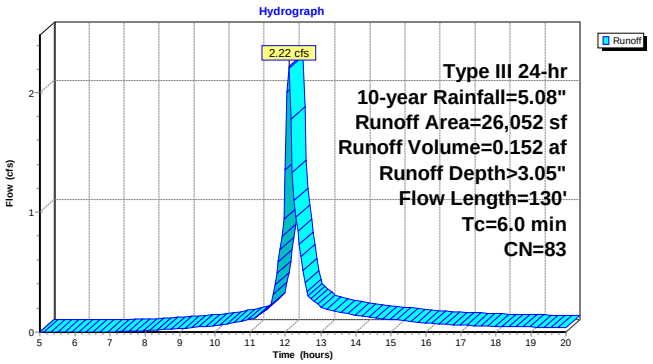
Runoff = 2.22 cfs @ 12.09 hrs, Volume= 0.152 af, Depth> 3.05"
Routed to Link 1L : DP 1: Taunton River

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=5.08"

Area (sf)	CN	Description
4,934	39	>75% Grass cover, Good, HSG A
776	74	>75% Grass cover, Good, HSG C
135	80	>75% Grass cover, Good, HSG D
9,104	98	Paved roads w/curbs & sewers, HSG A
31	98	Paved roads w/curbs & sewers, HSG C
709	98	Paved roads w/curbs & sewers, HSG D
1,590	98	Water Surface, HSG A
906	98	Water Surface, HSG C
6,827	98	Water Surface, HSG D
1,039	30	Woods, Good, HSG A
26,052	83	Weighted Average
6,884		26.43% Pervious Area
19,168		73.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0340	1.53		**Sheet Flow, Sheet Flow** Smooth surfaces n= 0.011 P2= 3.42"
0.6	80	0.0130	2.31		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
1.1	130	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 10P: Old Colony Ave



Summary for Subcatchment 20P: South Street East (West Side)

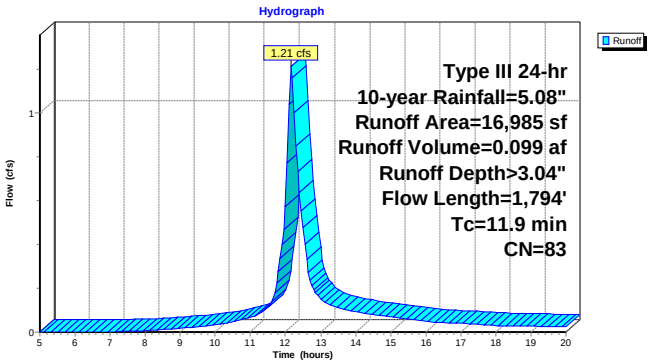
Runoff = 1.21 cfs @ 12.16 hrs, Volume= 0.099 af, Depth> 3.04"
Routed to Link 2L : DP2: Steam

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=5.08"

Area (sf)	CN	Description
3,571	39	>75% Grass cover, Good, HSG A
366	96	Gravel surface, HSG A
11,263	98	Paved roads w/curbs & sewers, HSG A
165	98	Paved roads w/curbs & sewers, HSG C
1,085	98	Paved roads w/curbs & sewers, HSG D
0	98	Water Surface, HSG D
535	30	Woods, Good, HSG A
16,985	83	Weighted Average
4,472		26.33% Pervious Area
12,513		73.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0200	1.24		**Sheet Flow, SF1** Smooth surfaces n= 0.011 P2= 3.42"
3.2	372	0.0090	1.93		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
8.0	1,372	0.0200	2.87		**Shallow Concentrated Flow, SC2** Paved Kv= 20.3 fps
11.9	1,794	Total			

Subcatchment 20P: South Street East (West Side)



Summary for Subcatchment 21P: Catchment to Infiltration Trench

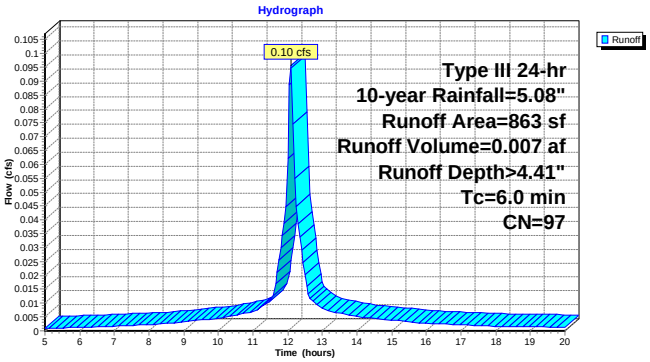
Runoff = 0.10 cfs @ 12.09 hrs, Volume= 0.007 af, Depth> 4.41"
Routed to Pond 3B : Infiltration Trench

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=5.08"

Area (sf)	CN	Description
12	39	>75% Grass cover, Good, HSG A
851	98	Paved roads w/curbs & sewers, HSG A
863	97	Weighted Average
12		1.37% Pervious Area
851		98.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Assume Min. TC**

Subcatchment 21P: Catchment to Infiltration Trench



Summary for Subcatchment 30P: South Street East (East Side)

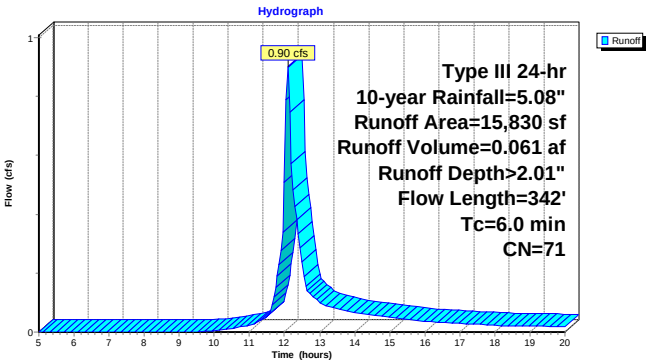
Runoff = 0.90 cfs @ 12.10 hrs, Volume= 0.061 af, Depth> 2.01"
Routed to Link 3L : DP 3: Woodlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=5.08"

Area (sf)	CN	Description
4,195	39	>75% Grass cover, Good, HSG A
870	74	>75% Grass cover, Good, HSG C
1,421	96	Gravel surface, HSG A
387	96	Gravel surface, HSG C
4,275	98	Paved roads w/curbs & sewers, HSG A
1,630	98	Paved roads w/curbs & sewers, HSG C
704	98	Paved roads w/curbs & sewers, HSG D
4	98	Water Surface, HSG C
2	98	Water Surface, HSG D
2,343	30	Woods, Good, HSG A
15,830	71	Weighted Average
9,215		58.21% Pervious Area
6,615		41.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	50	0.0070	0.81		**Sheet Flow, SF1** Smooth surfaces n= 0.011 P2= 3.42"
2.5	292	0.0090	1.93		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
3.5	342	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 30P: South Street East (East Side)



Summary for Pond 3B: Infiltration Trench

Inflow Area = 0.020 ac, 98.63% Impervious, Inflow Depth > 4.41" for 10-year event
Inflow = 0.10 cfs @ 12.09 hrs, Volume= 0.007 af
Outflow = 0.09 cfs @ 12.12 hrs, Volume= 0.006 af, Atten= 5%, Lag= 2.2 min
Discarded = 0.00 cfs @ 12.10 hrs, Volume= 0.003 af
Primary = 0.09 cfs @ 12.12 hrs, Volume= 0.002 af
Routed to Link 2L : DP2: Steam

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 12.13' @ 12.10 hrs Surf.Area= 90 sf Storage= 100 cf

Plug-Flow detention time= 114.1 min calculated for 0.006 af (78% of inflow)
Center-of-Mass det. time= 57.0 min (795.1 - 738.1)

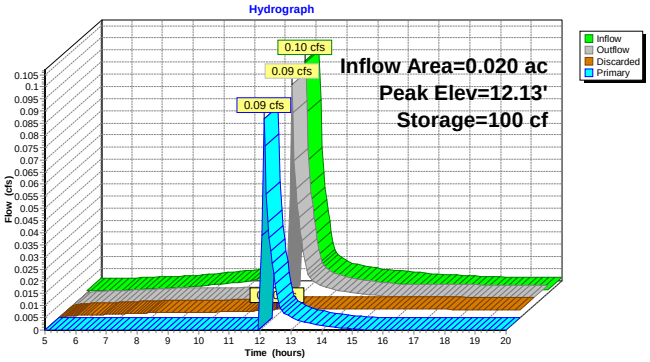
Volume	Invert	Avail.Storage	Storage Description
#1	10.00'	72 cf	**2.00'W x 45.00'L x 2.17'H Crushed Stone Trench** 195 cf Overall - 16 cf Embedded = 180 cf x 40.0% Voids
#2	11.00'	16 cf	**8.0" Round 8" Perforated Pipe** Inside #1 L= 45.0'
#3	11.00'	70 cf	**4.00'D x 5.57'H CB-6** -Impervious
		158 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	10.00'	**1.020 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 7.00'
#2	Primary	12.00'	**12.0" Vert. CB-6 Outlet** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.00 cfs @ 12.10 hrs HW=12.13' (Free Discharge)
↳**1=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=0.07 cfs @ 12.12 hrs HW=12.13' (Free Discharge)
↳**2=CB-6 Outlet** (Orifice Controls 0.07 cfs @ 1.22 fps)

Pond 3B: Infiltration Trench

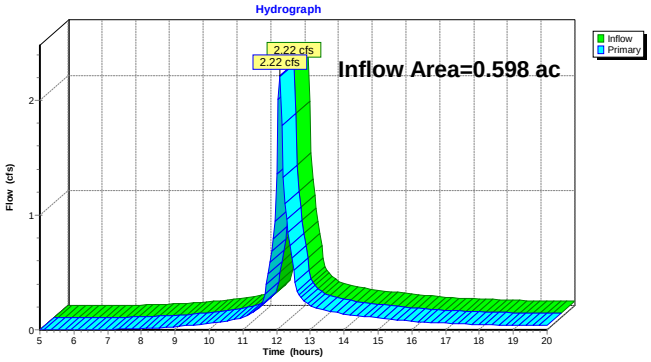


Summary for Link 1L: DP 1: Taunton River

Inflow Area = 0.598 ac, 73.57% Impervious, Inflow Depth > 3.05" for 10-year event
Inflow = 2.22 cfs @ 12.09 hrs, Volume= 0.152 af
Primary = 2.22 cfs @ 12.09 hrs, Volume= 0.152 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 1L: DP 1: Taunton River

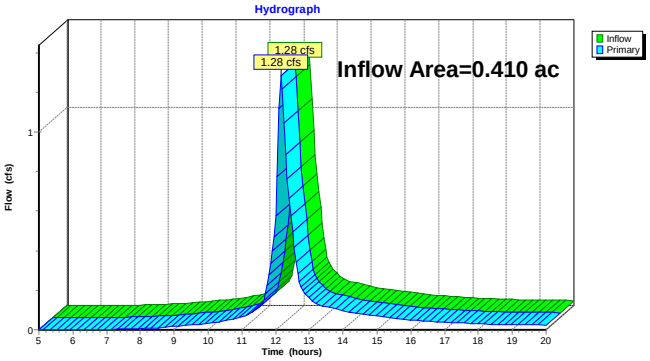


Summary for Link 2L: DP2: Steam

Inflow Area = 0.410 ac, 74.88% Impervious, Inflow Depth > 2.96" for 10-year event
Inflow = 1.28 cfs @ 12.16 hrs, Volume= 0.101 af
Primary = 1.28 cfs @ 12.16 hrs, Volume= 0.101 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 2L: DP2: Steam

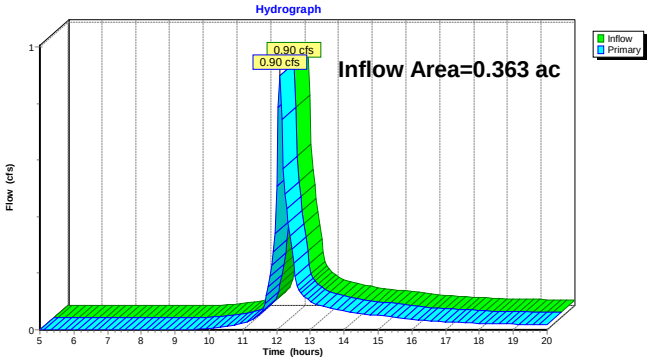


Summary for Link 3L: DP 3: Woodlands

Inflow Area = 0.363 ac, 41.79% Impervious, Inflow Depth > 2.01" for 10-year event
Inflow = 0.90 cfs @ 12.10 hrs, Volume= 0.061 af
Primary = 0.90 cfs @ 12.10 hrs, Volume= 0.061 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 3L: DP 3: Woodlands



Summary for Subcatchment 10P: Old Colony Ave

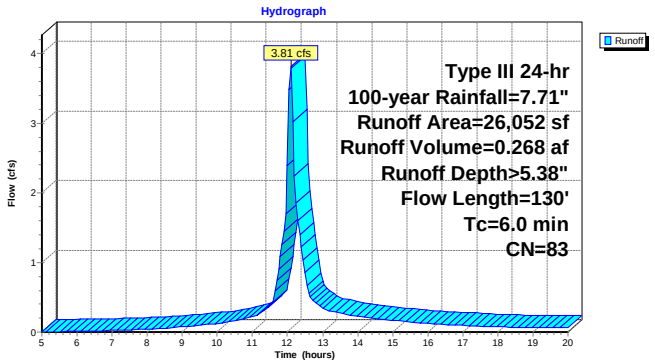
Runoff = 3.81 cfs @ 12.09 hrs, Volume= 0.268 af, Depth> 5.38"
Routed to Link 1L : DP 1: Taunton River

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=7.71"

Area (sf)	CN	Description
4,934	39	>75% Grass cover, Good, HSG A
776	74	>75% Grass cover, Good, HSG C
135	80	>75% Grass cover, Good, HSG D
9,104	98	Paved roads w/curbs & sewers, HSG A
31	98	Paved roads w/curbs & sewers, HSG C
709	98	Paved roads w/curbs & sewers, HSG D
1,590	98	Water Surface, HSG A
906	98	Water Surface, HSG C
6,827	98	Water Surface, HSG D
1,039	30	Woods, Good, HSG A
26,052	83	Weighted Average
6,884		26.43% Pervious Area
19,168		73.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0340	1.53		**Sheet Flow, Sheet Flow** Smooth surfaces n= 0.011 P2= 3.42"
0.6	80	0.0130	2.31		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
1.1	130	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 10P: Old Colony Ave



Summary for Subcatchment 20P: South Street East (West Side)

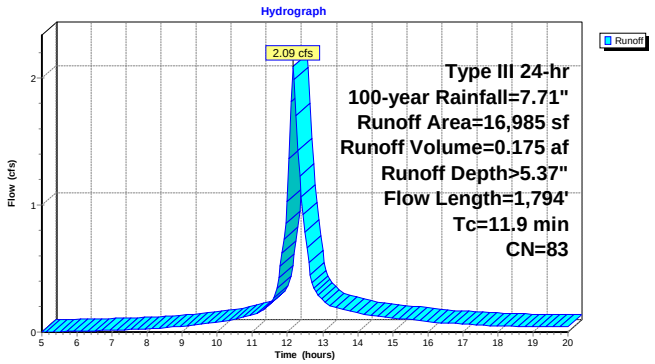
Runoff = 2.09 cfs @ 12.16 hrs, Volume= 0.175 af, Depth> 5.37"
Routed to Link 2L : DP2: Steam

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=7.71"

Area (sf)	CN	Description
3,571	39	>75% Grass cover, Good, HSG A
366	96	Gravel surface, HSG A
11,263	98	Paved roads w/curbs & sewers, HSG A
165	98	Paved roads w/curbs & sewers, HSG C
1,085	98	Paved roads w/curbs & sewers, HSG D
0	98	Water Surface, HSG D
535	30	Woods, Good, HSG A
16,985	83	Weighted Average
4,472		26.33% Pervious Area
12,513		73.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0200	1.24		**Sheet Flow, SF1** Smooth surfaces n= 0.011 P2= 3.42"
3.2	372	0.0090	1.93		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
8.0	1,372	0.0200	2.87		**Shallow Concentrated Flow, SC2** Paved Kv= 20.3 fps
11.9	1,794	Total			

Subcatchment 20P: South Street East (West Side)



Summary for Subcatchment 21P: Catchment to Infiltration Trench

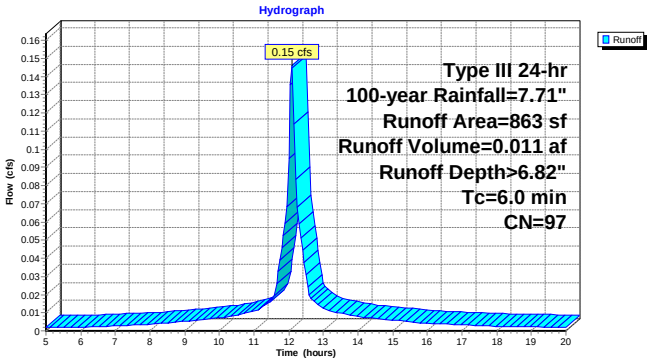
Runoff = 0.15 cfs @ 12.09 hrs, Volume= 0.011 af, Depth> 6.82"
Routed to Pond 3B : Infiltration Trench

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=7.71"

Area (sf)	CN	Description
12	39	>75% Grass cover, Good, HSG A
851	98	Paved roads w/curbs & sewers, HSG A
863	97	Weighted Average
12		1.37% Pervious Area
851		98.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Assume Min. TC**

Subcatchment 21P: Catchment to Infiltration Trench



Summary for Subcatchment 30P: South Street East (East Side)

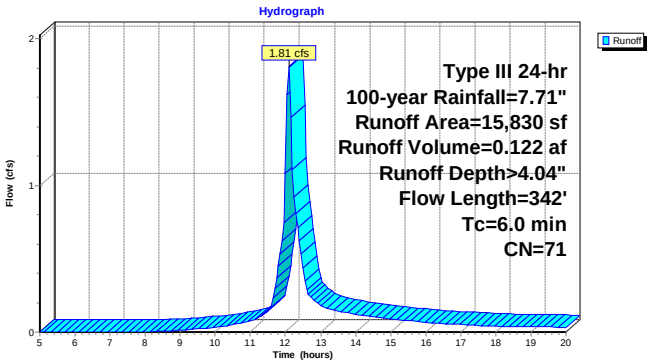
Runoff = 1.81 cfs @ 12.09 hrs, Volume= 0.122 af, Depth> 4.04"
Routed to Link 3L : DP 3: Woodlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=7.71"

Area (sf)	CN	Description
4,195	39	>75% Grass cover, Good, HSG A
870	74	>75% Grass cover, Good, HSG C
1,421	96	Gravel surface, HSG A
387	96	Gravel surface, HSG C
4,275	98	Paved roads w/curbs & sewers, HSG A
1,630	98	Paved roads w/curbs & sewers, HSG C
704	98	Paved roads w/curbs & sewers, HSG D
4	98	Water Surface, HSG C
2	98	Water Surface, HSG D
2,343	30	Woods, Good, HSG A
15,830	71	Weighted Average
9,215		58.21% Pervious Area
6,615		41.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	50	0.0070	0.81		**Sheet Flow, SF1** Smooth surfaces n= 0.011 P2= 3.42"
2.5	292	0.0090	1.93		**Shallow Concentrated Flow, SC1** Paved Kv= 20.3 fps
3.5	342	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 30P: South Street East (East Side)



Summary for Pond 3B: Infiltration Trench

Inflow Area = 0.020 ac, 98.63% Impervious, Inflow Depth > 6.82" for 100-year event
Inflow = 0.15 cfs @ 12.09 hrs, Volume= 0.011 af
Outflow = 0.15 cfs @ 12.10 hrs, Volume= 0.009 af, Atten= 0%, Lag= 0.6 min
Discarded = 0.00 cfs @ 12.10 hrs, Volume= 0.004 af
Primary = 0.14 cfs @ 12.10 hrs, Volume= 0.006 af
Routed to Link 2L : DP2: Steam

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 12.18' @ 12.10 hrs Surf.Area= 90 sf Storage= 102 cf

Plug-Flow detention time= 86.6 min calculated for 0.009 af (83% of inflow)
Center-of-Mass det. time= 37.2 min (772.2 - 735.0)

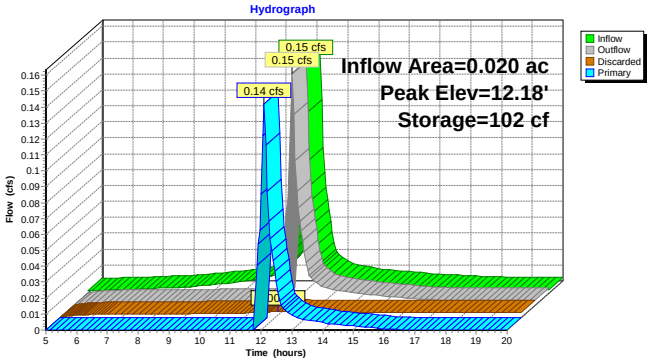
Volume	Invert	Avail.Storage	Storage Description
#1	10.00'	72 cf	**2.00'W x 45.00'L x 2.17'H Crushed Stone Trench** 195 cf Overall - 16 cf Embedded = 180 cf x 40.0% Voids
#2	11.00'	16 cf	**8.0" Round 8" Perforated Pipe** Inside #1 L= 45.0'
#3	11.00'	70 cf	**4.00'D x 5.57'H CB-6** -Impervious
		158 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	10.00'	**1.020 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 7.00'
#2	Primary	12.00'	**12.0" Vert. CB-6 Outlet** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.00 cfs @ 12.10 hrs HW=12.18' (Free Discharge)
↑**1=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=0.14 cfs @ 12.10 hrs HW=12.18' (Free Discharge)
↑**2=CB-6 Outlet** (Orifice Controls 0.14 cfs @ 1.44 fps)

Pond 3B: Infiltration Trench

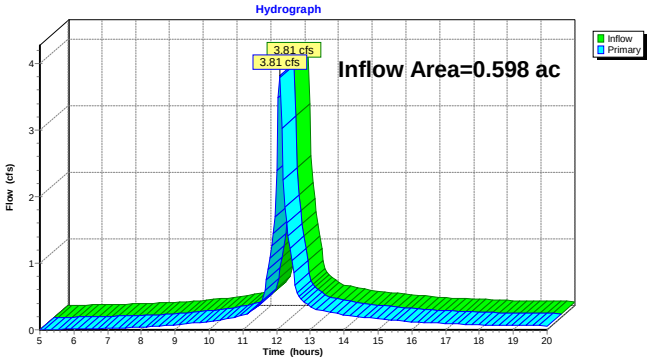


Summary for Link 1L: DP 1: Taunton River

Inflow Area = 0.598 ac, 73.57% Impervious, Inflow Depth > 5.38" for 100-year event
Inflow = 3.81 cfs @ 12.09 hrs, Volume= 0.268 af
Primary = 3.81 cfs @ 12.09 hrs, Volume= 0.268 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 1L: DP 1: Taunton River

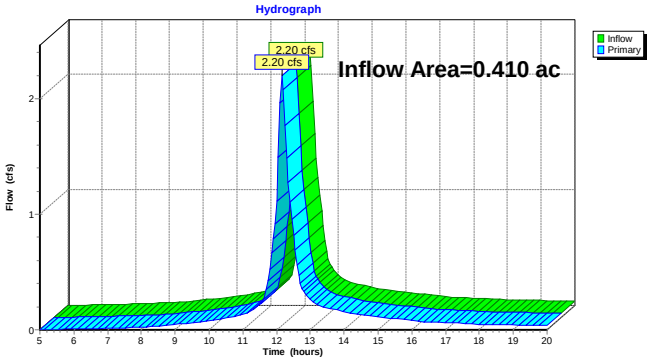


Summary for Link 2L: DP2: Steam

Inflow Area = 0.410 ac, 74.88% Impervious, Inflow Depth > 5.28" for 100-year event
Inflow = 2.20 cfs @ 12.16 hrs, Volume= 0.180 af
Primary = 2.20 cfs @ 12.16 hrs, Volume= 0.180 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 2L: DP2: Steam

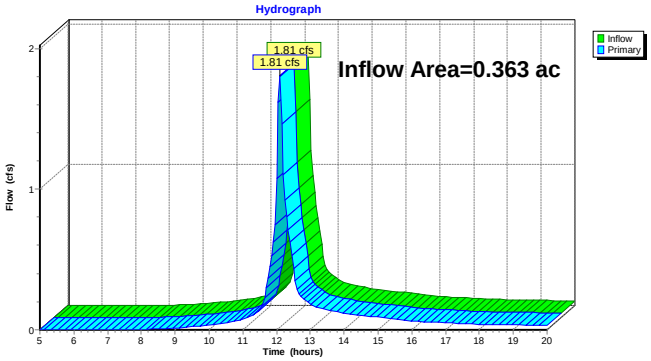


Summary for Link 3L: DP 3: Woodlands

Inflow Area = 0.363 ac, 41.79% Impervious, Inflow Depth > 4.04" for 100-year event
Inflow = 1.81 cfs @ 12.09 hrs, Volume= 0.122 af
Primary = 1.81 cfs @ 12.09 hrs, Volume= 0.122 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 3L: DP 3: Woodlands



Appendix E: O&M Plan and LTPPP

1

Stormwater Management System Operation and Maintenance (O&M) Plan

This Stormwater Management System Operation and Maintenance (O&M) Plan describes the approach for inspection and maintenance of drainage infrastructure and structural stormwater control measures (SCMs) to minimize contaminant loading for South Street East / Old Colony Ave in the Town of Raynham and City of Taunton, MA. In general, inspection and maintenance activities will be conducted consistent with the National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater Discharges from Small Municipal Separate Storm Sewer System (MS4).

This document has been prepared per the requirements of Massachusetts Department of Environmental Protection (MassDEP) Regulations 310 CMR 10.05 (6)(k)(9) and satisfies the requirements of Massachusetts Stormwater Standard 9.

1.1 Responsible Party

The Town of Raynham and City of Taunton will be responsible for the operation and maintenance of all stormwater management systems under their respective ownership within the project limits. Questions or concerns regarding activities associated with this O&M Plan should be addressed to the Raynham Highway Department located at 1555 King Phillip Street, Raynham, MA 02767, phone (508) 824-2718 and/or the Taunton Public Works Department located at 90 Ingell Street, Taunton, MA 02780, phone (508) 821-1431.

It shall be the responsibility of the Owner to provide a revised plan to the Conservation Commission indicating any change of ownership or responsible party. The responsible party shall also be responsible for financing maintenance and emergency repairs at the Site.

Project information is summarized in the following table:

Project Name:	South Street East / Old Colony Avenue
Project Type:	Transportation
Address:	Old Colony Ave, Taunton, MA, from approximately 75 feet north of Battle Row to the Taunton/Raynham Town Line South Street East , Raynham, MA, from the Taunton/Raynham Town Line to the north side of Sandy Hill Road.
SWMS Owner (Taunton):	Taunton Department of Public Works 90 Ingell Street, Taunton, MA
SWMS Owner (Raynham):	Raynham Highway Department 1555 King Phillip Street, Raynham, MA 02767
Responsible Party (Taunton):	Taunton Department of Public Works 90 Ingell Street, Taunton, MA
Responsible Party (Raynham):	Raynham Highway Department 1555 King Phillip Street, Raynham, MA 02767
Contact (Taunton):	Fred Cornaglia, Commissioner of Public Works (508) 821-1431
Contact (Raynham):	Norman Sturtevent, Superintendent (508) 824-2718

1.2 Inspection and Maintenance Measures and Record-Keeping

See Appendix F of the Stormwater Management Report for the proposed stormwater system within the project limits. The stormwater management system covered by this O&M Plan consists of the following measures:

- Deep Sump Catch Basins
- Infiltration Trench

The Town of Raynham and City of Taunton shall use a performance-based inspection and maintenance program for SCMs and catch basins. For SCMs, the overall approach is to inspect SCMs, and based on the results of the inspections, perform maintenance to preserve functionality. For catch basins, the overall approach is to perform maintenance at an interval that maintains the functionality of the catch basin (e.g., sump is less than 50% full of sediment). Catch basin inspections, including documentation of sediment accumulation, and maintenance will generally occur simultaneously.

The following table summarizes inspection requirements for each asset type.

Inspection Form	Applicable Stormwater Assets	Inspection Requirements
Inlets	› Catch basins	› Sediment accumulation › Trash/Debris accumulation › Signs of contamination › Frame and grate condition › Overall structure condition
SCMs	› Infiltration SCMs › Other SCMs	› SCM accessibility › Presence of standing water › Level of erosion › Sediment accumulation › Trash/Debris accumulation › Vegetation condition › Overall SCM condition
Storm Discharge Points	› Outlets to SCMs	› Presence of flow › Signs of contaminated flow › Sediment accumulation › Level of erosion › Pipe condition › Scour protection condition › Overall structure condition

Inspection and maintenance records can be made available by contacting the Town of Raynham Highway Department or the City of Taunton Department of Public Works. Representatives of each Town's Conservation Commission, MassDEP, and US EPA may obtain access to these records, upon request.

Maintenance actions will not occur at any set frequency, but rather will be based on condition and impact to functionality. Maintenance to be performed on the stormwater system includes:

Stormwater Feature	Potential Maintenance Actions	
Surface SCMs	• Remove and properly dispose of accumulated material (e.g., sediment, trash, leaf litter, debris) • Mow vegetated areas and remove and dispose of grass clippings • Regrade areas that show signs of unwanted ponding and channelization • Stabilize or reconstruct eroded areas and reseed • Replace stones/soil and/or replant vegetation	• Remove woody growth • Treat invasive plants • Address issues of standing water • Drain and reconstruct SCM • If rehabilitation is not possible, then retrofit to be a wet SCM while considering safety implications
Underground SCMs	• Remove and properly dispose of trash, sediment, debris, and root intrusions • Clean out sumps at an interval to maintain functionality (less than 50% full of sediment) • Jet and repair pipes	• Rehabilitate filtering and infiltration materials (e.g., geotextile fabric, crushed stone) • Stabilize and replace deteriorated structures • Perform evaluations (e.g., test pits) to evaluate subsurface conditions
Inlets and Outlets to SCMs	• Clear inlet and remove and properly dispose of sediment, trash, leaf litter, debris, and vegetation • Regrade areas that show signs of ponding and channelization • Repair or replace structural components • Repair damaged or eroded areas	• Provide or rehabilitate erosion control at the outlet • Regrade and replace the channel materials • Remove woody growth • Stabilize or reconstruct eroded areas • Treat invasive plants.

Based on the results of the inspection, repairs will be made in accordance with Town/City standard practices. Maintenance will be prioritized given the urgency of the required maintenance and availability of staff, contracts, etc. Maintenance may require contracting if existing maintenance personel are unavailable to perform the work. More intensive remedial activities may require permitting and/or an engineering solution.

Inspection, maintenance, and record keeping on will be performed in conjunction with the Town of Raynham / Taunton MS4 compliance requirements.

1.3 Erosion and Sediment Control Measures during Maintenance Activities

For maintenance activities that could result in discharges of sediments or other contaminants into wetlands, waterways, or other resource areas regulated under 310 CMR 10.00, the responsible maintenance personnel will employ measures to prevent migration of these sediments/contaminants. Such temporary measures may include, but are not necessarily limited to, the use of siltation barriers, catch basin silt sacks/filter bags, pipe plugs, cofferdams deployed within the stormwater structure, turbidity curtains, or other practices designed to prevent such discharges.

Where maintenance occurs in areas that are confined, with no risk of discharge to adjacent water bodies, no special measures may be needed. Examples include, but are not limited to: (1) cleaning of a forebay under dry conditions when the work can be completed and exposed surfaces stabilized prior to placing it back into service; and (2) catch basin cleaning where the activity is limited to removing material from a sump below the elevation of the outlet pipe.

1.4 O&M Budget

The Town of Raynham and City of Taunton perform maintenance for stormwater management systems as part of their routine operation and maintenance budget for roadways and bridges.

2

Long-Term Pollution Prevention Plan

This Long-Term Pollution Prevention Plan (LTPPP) describes the approach for pollution prevention and related maintenance activities for South Street East / Old Colony Ave in the Town of Raynham and City of Taunton, MA. In general, long-term pollution prevention and related maintenance activities will be conducted consistent with:

- The National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater Discharges from Small Municipal Separate Storm Sewer System (MS4),
- Measures outlined in the Town of Raynham's and City of Taunton's Stormwater Management Plans (SWMP).

This LTPPP satisfies the requirements related to pollution prevention under Massachusetts Stormwater Standards 4, 5, 6, and 10.

2.1 Practices for Long-Term Pollution Prevention

For the facilities covered, long-term pollution prevention includes the following measures.

2.1.1 Litter Pick-up

The municipalities will conduct litter pick-up from the stormwater management facilities in conjunction with routine road maintenance activities.

2.1.2 Material Storage and Handling

The following storage and handling practices shall be implemented at the Site:

- Avoid stockpiling of soil or materials within 100 feet of wetland resources and wellhead protection areas. If necessary, provide sufficient erosion controls to prevent migration of sediments.
- All materials shall be stored or disposed in accordance with all local, state, and federal regulations.
- All sand piles shall be contained and stabilized to prevent the discharge of sand to wetlands or water bodies and, where feasible, covered.
- Minimize hazardous materials stored on site. All materials stored on site shall be stored in original containers and sealed.
- All solid waste, if encountered, shall be handled and disposed of in accordance with all local, state, and federal regulations.
- No snow shall be stored within waterbodies, resource areas, wellhead protection areas, or associated buffer zones.

2.1.3 Inspection and Maintenance of Stormwater Assets

The municipalities will conduct inspection and maintenance of drainage infrastructure and the stormwater control measures (SCMs) in accordance with the O&M Plan, as described in Section 1.

2.1.4 Maintenance of Landscaped Areas

Routine mowing will be conducted according to standard Town practices. SCM basin bottoms and embankments designed to impound water should be mowed as required to prevent establishment of woody vegetation.

2.1.5 Snow and Ice Management

Snow and Ice Management will be conducted consistent with Town/City Snow and Ice Policy and Procedures.

2.1.6 Street Sweeping

Operations on Town-owned roadways with be conducted in accordance with Town Standard Operating Procedures.

2.1.7 Prohibition of Illicit Discharges

The MassDEP Stormwater Management Standard 10 prohibits illicit discharges to the stormwater management system. Illicit discharges are discharges that do not consist entirely of stormwater, except for certain specified non-stormwater discharges.

In accordance with the existing MS4 permit, examples of discharges from the following sources are not considered illicit discharges:

- Firefighting activities*
- Foundation drains
- Water line flushing
- Footing drains
- Landscape irrigation
- Individual residential car washing
- Uncontaminated groundwater
- Rising groundwater
- Diverted stream flows
- Flows from riparian habitats/wetlands
- Potable water sources
- Dechlorinated swimming pool water
- Street wash waters
- Wash water from residential buildings (no detergents)
- Condensation from air conditioning units
- Run-on from private driveways caused by precipitation
- Lawn watering
- Water from crawl space pumps

*Water from firefighting activities is allowed and need only be addressed where they are identified as significant sources of pollutants to waters of the United States.

Based on plan review and existing survey, there are no known or proposed illicit connections associated with the project. Should an interconnection to the stormwater management system be identified, the Town/City will determine if the connections are authorized. For unauthorized

connections, the Town/City will investigate the connections and if they are determined to be illicit, the connections will be managed through Town's/City's Illicit Discharge Detection and Elimination (IDDE) program.

2.1.8 Spill Prevention and Response

The following spill prevention and response measures shall be implemented at the Site:

- Refuel construction equipment off-site.
- Any spills of hazardous materials shall be reported, contained, and removed in accordance with local, State, and Federal regulations.
- Review on-site equipment and activities to ensure no illicit discharges are created.

3

Construction Period Pollution Prevention and Erosion and Sediment Control Plan

3.1.1 Introduction

The project is anticipated to disturb greater than one acre; therefore, filing a Notice of Intent with EPA and developing of a Stormwater Pollution Prevention Plan (SWPPP) is required. The SWPPP will be provided as part of the construction documents and will be submitted to the Town of Raynham and the City of Taunton Conservation Commission prior to commencement of construction. The following plan provides general guidance for the prevention of pollution and erosion and sedimentation during construction.

Potential Erosion and Sedimentation

Portions of the project involve soil disturbance in areas upgradient of stormwater collection systems and wetland resources. Site preparation, scheduling, and construction practices need to be carefully planned to prevent construction debris and erosion caused by stormwater runoff over exposed soils from causing degradation of downstream wetland resources. Although it is not always possible to avoid impacts from storm events, the following guidelines shall be followed:

- Minimize land disturbance area and soil exposure to stormwater and wind erosion.
- Minimize time that area is disturbed.
- Avoid routing stormwater runoff or dewatering flows through disturbed areas.
- Inspect and maintain erosion controls until all soils are stabilized.
- Maintain good housekeeping practices.
- Stabilize disturbed soils as soon as possible to limit exposure.

Erosion and Sedimentation Plan

This Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan has been prepared in accordance with the Department of Environmental Protection's Massachusetts Erosion and Sedimentation Guidelines for Urban and Suburban Areas.

Extent of Disturbance

The total area of disturbance is approximately 1.05± acres. The project has been designed to minimize disturbance to existing woodlands and the majority of proposed work is within an existing roadway and its associated right-of-way. The existing Site will be impacted by tree clearing/trimming, grading, roadway widening, sidewalk and shared use path construction, utility installation, and other associated activities. Off-site areas are not proposed to be

directly altered but may be impacted by erosion and sedimentation if the controls described in this plan are not followed. No off-site land disturbance is proposed.

Refer to construction drawings for locations of all proposed erosion and sedimentation controls and the proposed area of disturbance.

Pre-Construction and Site Preparation

- Install all erosion control barrier in accordance with the construction documents prior to commencing any land disturbance activity.
- Inspect and maintain erosion controls until all soils are stabilized.
- Monitor weather reports daily and stabilize/prepare site if storm event in excess of the 2-year storm is expected.
- Maintain an inspection logbook on-site at all times. The specific location of the logbook shall be conveyed to the Town.

3.1.2 Planned Erosion and Sedimentation Control Practices

Catch Basin Inlet Protection

Inlet protection is proposed at all existing and proposed drain inlets within the project area. Inlet protection shall also be provided at off-site drain inlets located immediately downgradient of the area of disturbance, pending coordination with the Town and/or abutting property owners.

The purpose of inlet protection is to intercept and capture sediment that would otherwise enter the drainage system. Inlet protection shall consist of manufactured polyproplylene fabric consistent with the construction details.

Inspection and maintenance shall consist of checking for sediment accumulation and removing sediment when the protection device is at least one-half full.

Sediment Control Barrier

Sediment control barrier is proposed along the downgradient limit of work, as depicted on the construction plans. Additional erosion control barrier may be required at other locations as needed.

The purpose of erosion control barrier is to intercept and capture sediment that would otherwise migrate off-site. Erosion control barrier shall consist of compost filter tubes, straw wattles, and silt fence.

Inspection and maintenance:

- Check for sedimentation accumulation and removing sediments when they reach excessive volumes (approximately 1/3 the height of the barrier).
- Remove sediments when runoff ponds for 24 or more hours to prevent potential mosquito breeding habitat. Restake/replace controls as necessary to maintain their effectiveness.

Control of Water

Control of water is proposed along the Taunton River upstream and downstream of the proposed bridge rehabilitation.

The purpose of control of water is redirect flows around the work area to prevent sedimentation transport downstream. The means and methods of the controls shall be the responsibility of contractor and will be based on their construction operations and the conditions at the site. Methods are anticipated to include temporary cofferdams and dewatering.

Inspection and maintenance, as applicable:

- Check for sediment accumulation, plant growth, or debris behind the control.
- Check for stability at anchoring points and identify any breaks in the control.
- Identify any areas where turbid water is passing through the control.
- Repair as necessary to maintain effectiveness.

Tree Protection

Tree protection is proposed at existing trees to remain near to the area of disturbance, as noted on the construction plans.

The purpose of tree protection is to minimize risk of damage to trees designated to remain. Tree protection shall consist of armoring, pruning, and/or fencing consistent with the construction details.

Temporary Seeding

Temporary seeding is proposed for disturbed areas which have remained exposed for more than 14 days.

The purpose of temporary seeding is to provide vegetative stabilization of loose soil to mitigate risk of erosion.

Inspection and maintenance:

- Confirm that vegetation has been established
- Provide additional seeding as needed

3.1.3 Additional Control Measures

Good Housekeeping

- Minimize hazardous materials stored on site. All materials stored on site shall be stored in original containers and sealed.
- Refuel construction equipment off-site.
- Any spills of hazardous materials shall be reported, contained, and removed in accordance with local, State, and Federal regulations.

Material Stockpiling

All construction materials shall be stored in designated stockpile areas. Stockpiles shall be surrounded with silt fence, straw wattles, and/or compost filter tubes to mitigate erosion potential. All waste materials shall be removed from the Site or placed in approved receptacles at the conclusion of each workday. Disposal of waste materials shall be in accordance with relevant local, state, and federal regulations.

Protection of Infiltration Areas

To protect the infiltrative capacity of proposed infiltration areas, SCMs shall be excavated as late as practicable in the construction sequence.

Potential Construction Site Pollutants

Pollutant-Generating Activity	Pollutants or Pollutant Constituents	Location on Site
Equipment Re-fueling	Diesel Fuel, Gasoline	Laydown Area
Leaking or Broken Hydraulic Lines	Hydraulic Oil	Building Work Areas and Laydown Area
Minor Equipment Maintenance	Diesel Fuel, Gasoline, Hydraulic Oil, Motor Oil, Anti-Freeze	Laydown Area
Applying Fertilizer	Nitrogen, Phosphorous	Newly Seeded Areas
Portable Sanitary Toilets	Bacteria, Parasites and Viruses	Laydown Area
Vehicle Accident	Diesel Fuel, Gasoline	Entire Site
Trash Containers/Dumpsters	Paper, Plastic, and Food Waste	Laydown Area

Refer to Long-Term Pollution Prevention Plan, included as Section 2, for measures to be implemented to minimize pollutant discharges.

RAYNHAM / TAUNTON
SOUTH STREET EAST / OLD COLONY AVE

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA		1	1
PROJECT FILE NO.	613642		

OPERATION AND MAINTENANCE MAP

NAD 83

N

TAUNTON RIVER

SANDY HILL STREET

CATCH BASIN OR GUTTER INLET (TYP.)

EXISTING OUTFALL

RECONSTRUCTED OUTFALL

PROP INFILTRATION TRENCH

OLD COLONY AVE

SOUTH STREET EAST

0+00

9+00

TAUNTON RIVER

TAUNTON RAYNHAM

0 60 150

SCALE: 1" = 60'

10887_WATERSHED_O&M.DWG Plotted on 29-Jan-2026 10:36 AM

Appendix F: Watershed Plans

RAYNHAM / TAUNTON
SOUTH STREET EAST / OLD COLONY AVE

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA		1	2
PROJECT FILE NO.	613642		

WATERSHED PLAN - PRE DEVELOPMENT

NAD 83

N

TAUNTON RIVER

1L

DP 1:
TAUNTON RIVER

APPROX. WATERSHED
BOUNDARY (TYP.)

SUBCATCHMENT 1E
OLD COLONY AVE
INCUDING AREAS
ALONG TAUNTON RIVER

651
UDORTHENTS,
SMOOTHED
HSG A

2L

DP 2:
STREAM

SUBCATCHMENT 2E
SOUTH STREET EAST
(WEST SIDE)

SANDY HILL STREET

1E

2E

3E

3L

1

2

3

4

5

6

7

8

0+00

9+00

OLD COLONY AVE

SOUTH STREET EAST

APPROX.
FLOWPATH (TYP.)

602
URBAN LAND
ASSUME HSG A

DP 3:
WOODLANDS

SUBCATCHMENT 3E
SOUTH STREET EAST
(EAST SIDE)

TAUNTON RIVER

TAUNTON
RAYNHAM

SOIL GROUP
BOUNDARY (TYP.)

9A
BIRDSAIL SILT
LOAM
HSG C/D

1
WATER
USE HSG D

LEGEND

- APPROX. WATERSHED BOUNDARY
- SOIL GROUP BOUNDARY
- APPROX. FLOWPATH

0 60 150

SCALE: 1" = 60'

10887_WATERSHED_EXIST.DWG

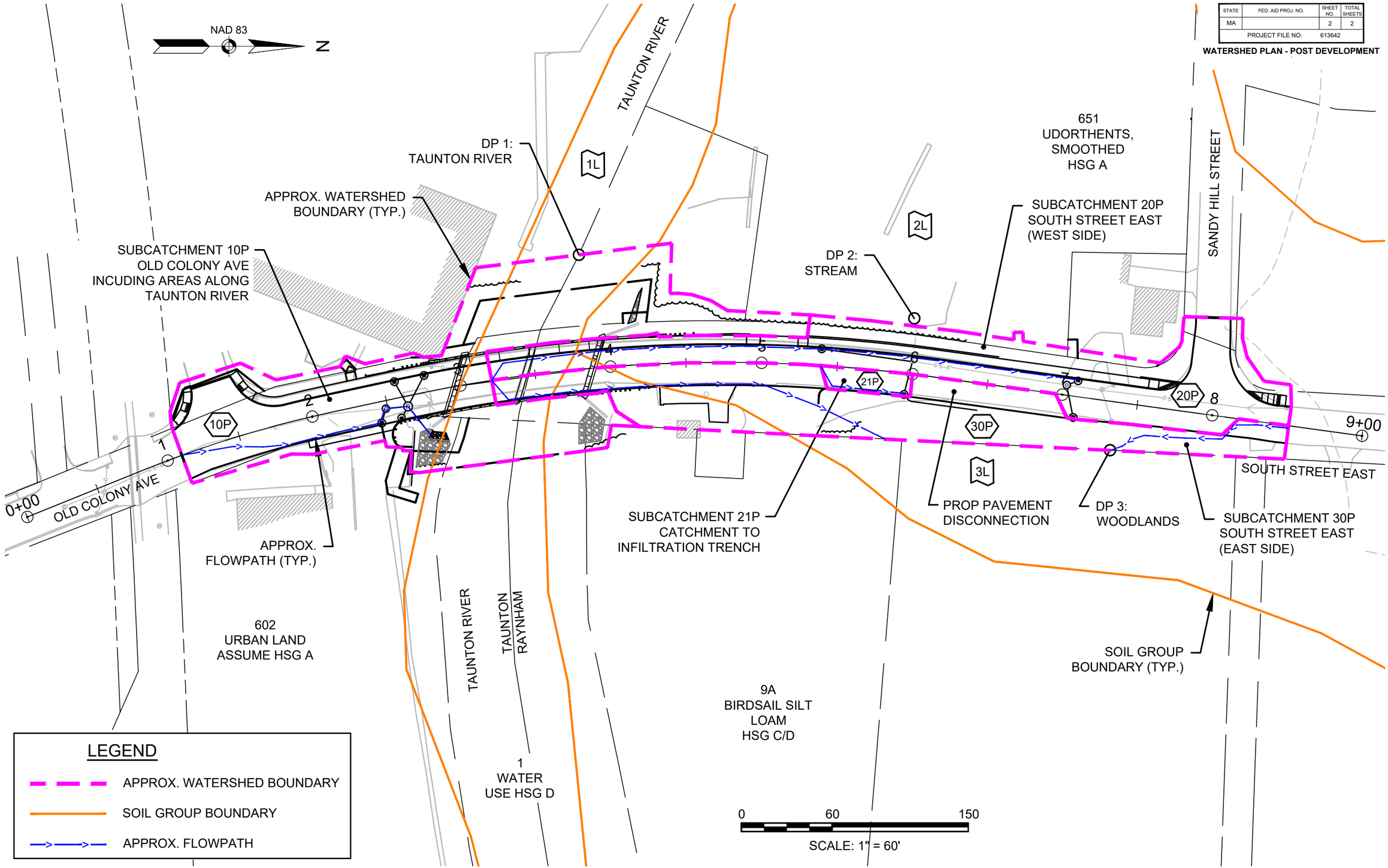
Plotted on 29-Jan-2026 8:57 AM

RAYNHAM / TAUNTON
SOUTH STREET EAST / OLD COLONY AVE

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA		2	2
PROJECT FILE NO.	613642		

WATERSHED PLAN - POST DEVELOPMENT

Plotted on 29-Jan-2026 8:57 AM
10887_WATERSHED_PROP.DWG



Appendix G: SCM Analysis Plan

RAYNHAM/TAUNTON
SOUTH STREET E./OLD COLONY AVE.

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	######	1	2
PROJECT FILE NO.	613642		

STORMWATER CONTROL MEASURE ANALYSIS PLAN

Plotted on 29-Jan-2026 10:44 AM

613642_HDI10887 STORMWATER CONTROL MEASURE ANALYSIS).DWG

N

RIVER BEND CONDOMINIUMS
PARCEL ID: 95-203
MASTER DB/PG 3240/265
PB/PG 66/26-27 LOTS 10 & 2
96 OLD COLONY AVENUE – EAST TAUNTON,MA
AREA=753,970 S.F.

CITY OF TAUNTON BOARD OF SEWER COMMISSIONERS
EASEMENT – PLAN BOOK 99, PAGE 47
DEED BOOK 1467, PAGE 383 (1965)

COMMONWEALTH OF MASSACHUSETTS
(MASSACHUSETTS BAY TRANSPORTATION AUTHORITY)
PARCEL ID: 96-193
DB/PG 2264/52
0 RR – TAUNTON,MA

JAMES THOMAS & LISA B. DIFFLEY
PARCEL ID: 96-15
DB/PG 25685/348
88 OLD COLONY AVENUE – EAST TAUNTON,MA

MBTA PERMANENT EASEMENT
ORDER OF TAKING NO. 737
MS-31-PE
DB/PG 25571/41

BATTLE ROW
(PRIVATE)

RIVER BEND CONDOMINIUMS DWY (PRIVATE)

OLD COLONY AVE
(PUBLIC)

BUILDING SET-BACK LINE – SEE PB. 14, PG. 72

PROJECT BEGIN
N2783608.4781
E784198.0476
STA 1+10

MBTA PERMANENT EASEMENT
ORDER OF TAKING NO. 753 MS-29-PE
DB/PG 25786/251

MBTA
ORDER OF TAKING NO. 753 – MS-29
DB/PG 25786/251

RR
PARCEL ID: 96-194
DB/PG 0/0
0 RR – TAUNTON,MA

TMLP
PARCEL ID: 96-34
DB/PG 1606/1047
91 OLD COLONY AVENUE – TAUNTON,MA

103 COLONY LLC
PARCEL ID: 96-1
DB/PG 25006/40
103 OLD COLONY AVENUE – TAUNTON,MA
AREA=68,014 S.F.

CITY OF TAUNTON – BOARD OF SEWER COMMISSIONERS
EASEMENT – PLAN BOOK 99, PAGE 48
DEED BOOK 1467, PAGE 383 (1965)

DEED CALLS BOUNDING ON THE RIVER.
PLAN BOOK 70, PAGE 67
SHOWS TO WATER EDGE

TAUNTON RIVER

OWNER UNKNOWN

OWNER UNKNOWN

RIGHT OF WAY – SEE PLAN BK. 66, PG. 70
NO GRANT FOUND
BENEFICIARY UNKNOWN

LINE AS SHOWN ON PLAN BK. 66, PG. 70
NORTHERLY BANK OF TAUNTON RIVER (DEED)

TAUNTON RIVER

OF RIVER PER PLAN BK. 66, PG. 26

FEMA FLOOD ZONE
= 14.40'

APPROXIMATE BOUNDARY OF TOPOGRAPHY PROHIBITIVE TO INSTALLATION OF SCMS (TYP).

AREAS SOUTH OF BRIDGE EXCLUDED FROM SCM CONSIDERATION DUE TO LIMITED RIGHT-OF-WAY, PRESENCE OF UTILITIES, AND PROXIMITY OF PRIVATE FEATURES.

TOWN OF RAYNHAM – BOARD OF SELECTMEN
PARCEL ID: 17-1
DB/PG 5117/145
0 SOUTH STREET EAST – RAYNHAM,MA
AREA=14,102 S.F.

TOWN OF RAYNHAM – CONSERVATION COMMISSION
ASSESS. MAP 17 – PARCEL ID: 17-2
DB PG 8016/190
PB/PG 66/70
0 SOUTH STREET EAST – RAYNHAM,MA
AREA=167,683 S.F.

AREA CONSIDERED FOR SUBSURFACE LEACHING SYSTEM. EXCLUDED DUE TO SETTLEMENT CONCERNS WITHIN LIMIT OF SIDEWALK AND GREATER SUITABILITY PROVIDED WHERE SCMS ARE CURRENTLY PROPOSED.

SOUTH STREET EAST
(PUBLIC)

CONTINUED ON SHEET 2

AREAS CONSIDERED FOR SUBSURFACE LEACHING BASINS BUT EXCLUDED DO TO PROXIMITY TO EXISTING SEWER MAIN.

TOWN OF RAYNHAM
PARCEL ID: 17-151A
DB/PG 6266/303
PB/PG 342/58
9 SOUTH STREET EAST – RAYNHAM,MA

AREA CONSIDERED FOR SUBSURFACE LEACHING SYSTEM. EXCLUDED DUE TO LIMITED IMPERVIOUS CATCHMENT, INABILITY TO ADEQUATELY PROVIDE OUTLET, AND GREATER SUITABILITY WHERE SCMS ARE CURRENTLY PROPOSED.

APPROXIMATE BOUNDARY OF TOPOGRAPHY PROHIBITIVE TO INSTALLATION OF SCMS (TYP).

NOT TO SCALE

SELPAN ASSOCIATES LIMITED
PARCEL ID: 17-151
DB/PG 7993/68
0 SOUTH STREET EAST – RAYNHAM,MA
AREA=71,376 S.F.

TOWN OF RAYNHAM
PARCEL ID: 17-148
DB/PG 8016/190
PB/PG 66/70
0 SOUTH STREET EAST – RAYNHAM,MA

RAYNHAM/TAUNTON
SOUTH STREET E./OLD COLONY AVE.

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	######	2	2
PROJECT FILE NO.	613642		

STORMWATER CONTROL MEASURE ANALYSIS PLAN

Plotted on 29-Jan-2026 10:44 AM

613642_HDI10887 STORMWATER CONTROL MEASURE ANALYSIS).DWG

RIVER BEND CONDOMINIUMS
PARCEL ID: 95-203
MASTER DB/PG 3240/265
PB/PG 66/26-27 LOTS 10 & 2
96 OLD COLONY AVENUE – EAST TAUNTON,MA
AREA=753,970 S.F.

TAUNTON RIVER

TOWN OF RAYNHAM – CONSERVATION COMMISSION
ASSESS. MAP 17 – PARCEL ID: 17-2
DB PG 8016/190
PB/PG 66/70
0 SOUTH STREET EAST – RAYNHAM,MA
AREA=167,683 S.F.

TOWN OF RAYNHAM –
BOARD OF SELECTMEN
PARCEL ID: 17-1
DB/PG 5117/145
0 SOUTH STREET EAST –
RAYNHAM,MA
AREA=14,102 S.F.

AREA CONSIDERED FOR SUBSURFACE LEACHING SYSTEM. EXCLUDED DUE TO SETTLEMENT CONCERNS WITHIN LIMIT OF SIDEWALK AND GREATER SUITABILITY PROVIDED WHERE SCMS ARE CURRENTLY PROPOSED.

APPROXIMATE BOUNDARY OF TOPOGRAPHY PROHIBITIVE TO INSTALLATION OF SCMS (TYP).

AREA EXCLUDED FROM SCM CONSIDERATION DUE TO POTENTIAL CLASSIFICATION OF ARTICLE 97 LAND.

LOIS A. HASKINS
PARCEL ID: 17-3
DB/PG 11594/76
40 SOUTH STREET
EAST – RAYNHAM,MA
AREA= 5,447 S.F.

SABA A. NESSRALLA AND AHLAM NESSRALLA
PARCEL ID: 17-37-3
DB/PG 4796/244
58 SOUTH STREET EAST – RAYNHAM,MA

SANDY HILL STREET
(PUBLIC)

SOUTH STREET EAST
(PUBLIC)

CONTINUED ON SHEET 1

AREAS CONSIDERED FOR SUBSURFACE LEACHING BASINS BUT EXCLUDED DO TO PROXIMITY TO EXISTING SEWER MAIN.

AREA CONSIDERED FOR LINEAR INFILTRATION BASIN AND EXCLUDED DUE TO PROXIMITY TO ROADWAY, UNDERGROUND UTILITY CONFLICTS, AND MAINTENANCE/FAILURE CONCERNS FROM PLOWING OPERATIONS. AREA IS CURRENTLY PROPOSED TO SERVE AS LID COUNTRY DRAINAGE AREA.

STREET LINE FROM PB 60, PG 70

PROJECT END
N2784340.0230
E784178.5228
STA 8+51

TOWN OF RAYNHAM
PARCEL ID: 17-151A
DB/PG 6266/303
PB/PG 342/58
9 SOUTH STREET EAST – RAYNHAM,MA

AREA CONSIDERED FOR SUBSURFACE LEACHING SYSTEM. EXCLUDED DUE TO LIMITED IMPERVIOUS CATCHMENT, INABILITY TO ADEQUATELY PROVIDE OUTLET, AND GREATER SUITABILITY WHERE SCMS ARE CURRENTLY PROPOSED.

APPROXIMATE BOUNDARY OF TOPOGRAPHY PROHIBITIVE TO INSTALLATION OF SCMS (TYP).

SELPAN ASSOCIATES LIMITED
PARCEL ID: 17-151
DB/PG 7993/68
0 SOUTH STREET EAST – RAYNHAM,MA
AREA=71,376 S.F.

TOWN OF RAYNHAM
PARCEL ID: 17-148
DB/PG 8016/190
PB/PG 66/70
0 SOUTH STREET EAST – RAYNHAM,MA

RIGHT OF WAY – SEE PLAN BK. 66, PG. 70

NOT TO SCALE

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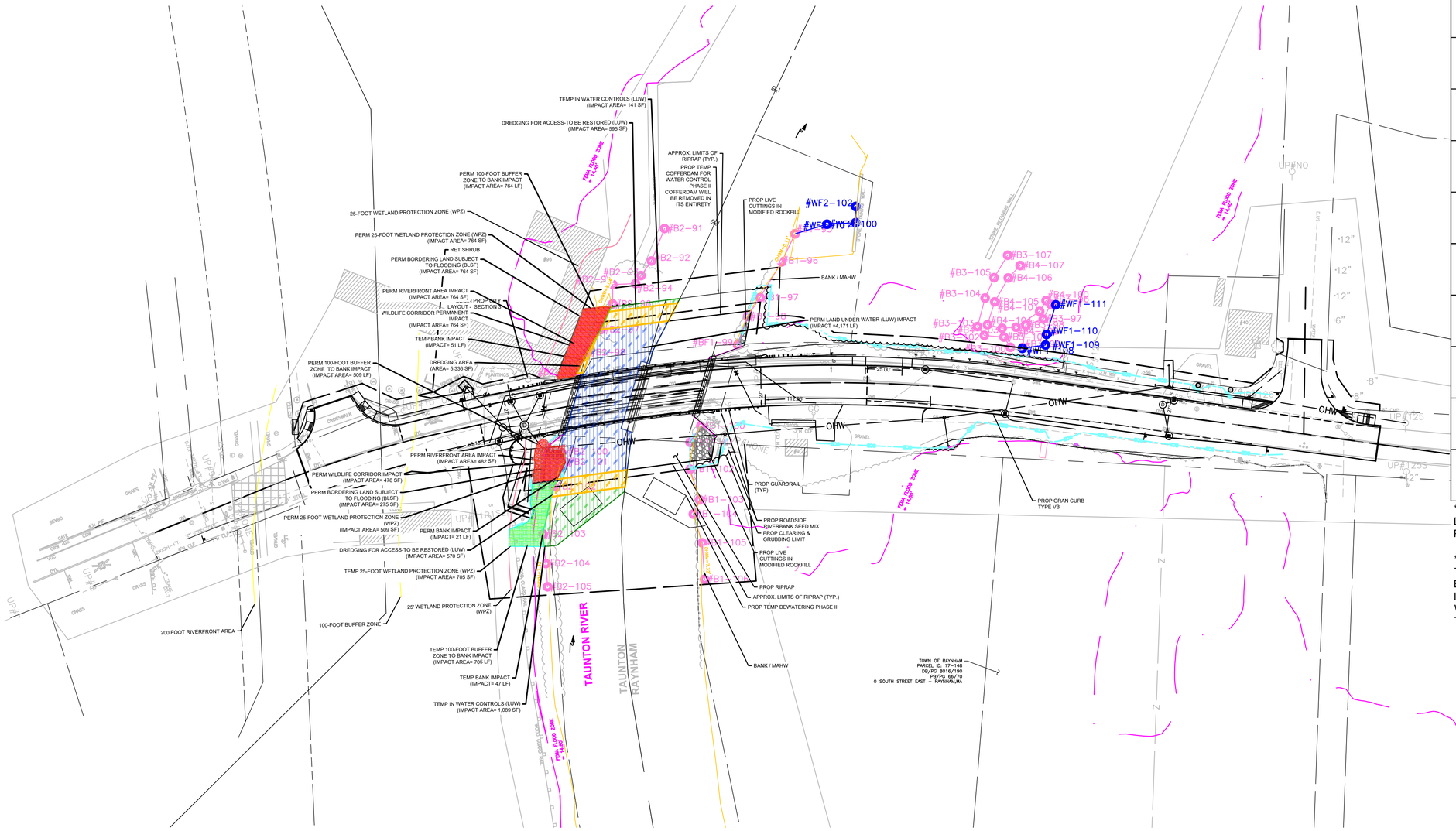
APPENDIX C – Project Plans


N
TEMP IN WATER CONTROLS (LUW) (IMPACT AREA= 141 SF)
DREDGING FOR ACCESS-TO BE RESTORED (LUW) (IMPACT AREA= 595 SF)
APPROX. LIMITS OF RIPRAP (TYP.)
PROP TEMP. COFFERDAM FOR WATER CONTROL PHASE II
COFFERDAM WILL BE REMOVED IN ITS ENTIRETY
PROP LIVE CUTTINGS IN MODIFIED ROCKFILL
PERM 100-FOOT BUFFER ZONE TO BANK IMPACT (IMPACT AREA= 764 LF)
25-FOOT WETLAND PROTECTION ZONE (WPZ)
PERM 25-FOOT WETLAND PROTECTION ZONE (WPZ) (IMPACT AREA= 764 SF)
RET SHRUB
PERM BORDERING LAND SUBJECT TO FLOODING (BLSF) (IMPACT AREA= 764 SF)
PERM RIVERFRONT AREA IMPACT (IMPACT AREA= 764 SF)
PROP UTILITY LAYOUT - SECTION 3
WILDLIFE CORRIDOR PERMANENT IMPACT (IMPACT AREA= 764 SF)
TEMP BANK IMPACT (IMPACT= 51 LF)
DREDGING AREA (AREA= 5,336 SF)
PERM 100-FOOT BUFFER ZONE TO BANK IMPACT (IMPACT AREA= 509 LF)
PERM RIVERFRONT AREA IMPACT (IMPACT AREA= 482 SF)
PERM WILDLIFE CORRIDOR IMPACT (IMPACT AREA= 478 SF)
PERM BORDERING LAND SUBJECT TO FLOODING (BLSF) (IMPACT AREA= 275 SF)
PERM 25-FOOT WETLAND PROTECTION ZONE (WPZ) (IMPACT AREA= 509 SF)
PERM BANK IMPACT (IMPACT= 21 LF)
DREDGING FOR ACCESS-TO BE RESTORED (LUW) (IMPACT AREA= 570 SF)
TEMP 25-FOOT WETLAND PROTECTION ZONE (WPZ) (IMPACT AREA= 705 SF)
25' WETLAND PROTECTION ZONE (WPZ)
100-FOOT BUFFER ZONE
200 FOOT RIVERFRONT AREA
TEMP 100-FOOT BUFFER ZONE TO BANK IMPACT (IMPACT AREA= 705 LF)
TEMP BANK IMPACT (IMPACT= 47 LF)
TEMP IN WATER CONTROLS (LUW) (IMPACT AREA= 1,089 SF)
PERM LAND UNDER WATER (LUW) IMPACT (IMPACT =4,171 LF)
BANK / MAHW
PROP GUARDRAIL (TYP)
PROP ROADSIDE RIVERBANK SEED MIX
PROP CLEARING & GRUBBING LIMIT
PROP LIVE CUTTINGS IN MODIFIED ROCKFILL
PROP RIPRAP
APPROX. LIMITS OF RIPRAP (TYP.)
PROP TEMP DEWATERING PHASE II
PROP GRAN CURB TYPE VB
TOWN OF RAYNHAM PARCEL ID: 17-148 DB/PG 8016/190 PB/PG 66/70 0 SOUTH STREET EAST - RAYNHAM,MA
TAUNTON RIVER
TAUNTON
RAYNHAM
OHW
FEMA FLOOD ZONE AE EL 14.0
FEMA FLOOD ZONE AE EL 16.0
#WF2-102
#WF2-100
#B2-91
#B2-92
#B2-93
#B2-94
#B1-96
#B1-97
#BF1-99
#B2-103
#B2-104
#B2-105
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#B4-106
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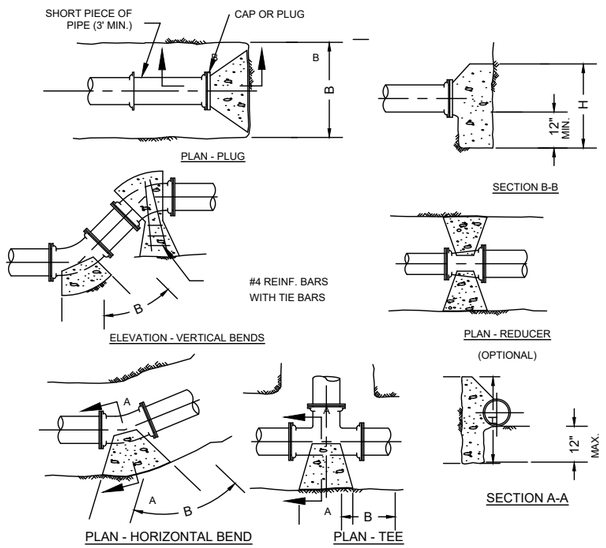
#B5-133
#B5-134
#B5-135
#B5-136
#B5-137
#B5-138
#B5-139
#B5-140

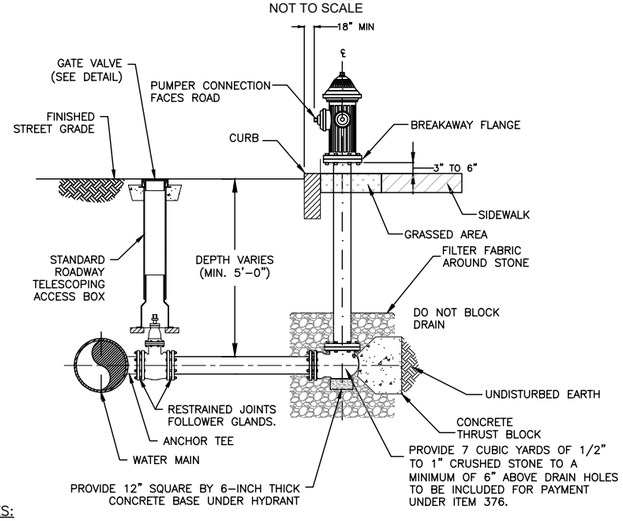
FITTING	MIN. BEARING AREA (H X B)
6" - 1/8 BEND	32" x 32"
8" - 1/8 BEND	24" x 24"
8" x 6" TEE	20" x 20"
12" - 1/8 BEND	32" x 32"
12" x 12" TEE	24" x 24"
12" x 6" TEE	24" x 24"
12" x 8" TEE	32" x 32"
16' x 12" TEE	24" x 24"
HYDRANT	24" x 24"
8" PLUG	32" x 32"
150 mm PLUG	24" x 24"
8" x 6" REDUCER	24" x 24"
8" - 1/16 BEND	20" x 20"
12' x 8" REDUCER	24" x 24"



NOTE:
ALL CONCRETE TO BE PLACED AGAINST UNDISTURBED EARTH

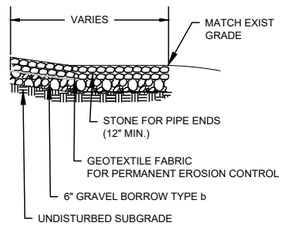
CONCRETE ANCHORAGE DETAILS

NOT TO SCALE



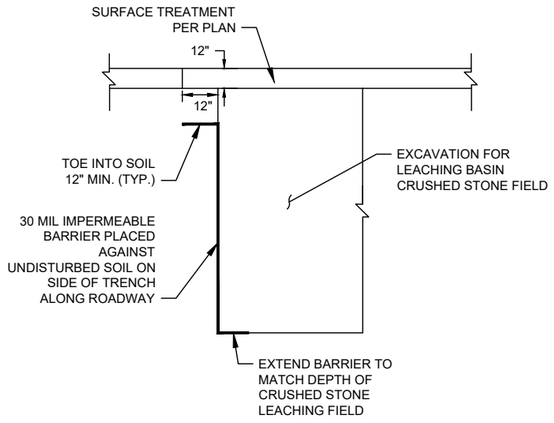
NOTES:

1. HYDRANTS SHALL BE OFFSET 1' FROM THE BACK OF SIDEWALK.
2. HYDRANTS SHALL BE PROVIDED BY THE CITY OF TAUNTON.
3. PROVIDE HYDRANT AND VALVE JOINTS WITH RESTRAINED MECHANICAL JOINTS.
4. ALL JOINTS BETWEEN ANCHOR TEE AND HYDRANT SHALL BE RESTRAINED.
5. SUPPORT BLOCKS TO BE CONCRETE MASONRY BLOCK.
6. SEE HYDRANT TABLE ON THRUST BLOCK BEARING AREAS FOR THE AREA OF CONCRETE REQUIRED.
7. ALL HYDRANTS OUT OF SERVICE MUST BE BAGGED.



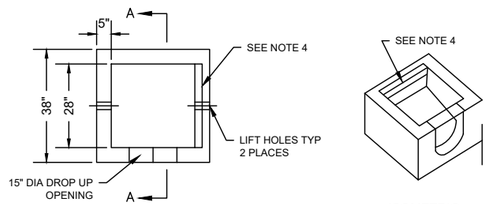
STONE FOR PIPE ENDS

NOT TO SCALE



DETAIL FOR IMPERMEABLE BARRIER INSTALLATION IN EXCAVATION WALL

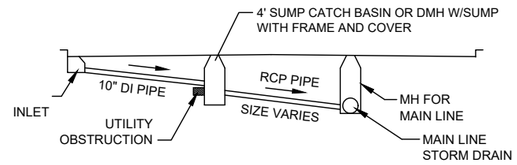
NOT TO SCALE



NOTES:

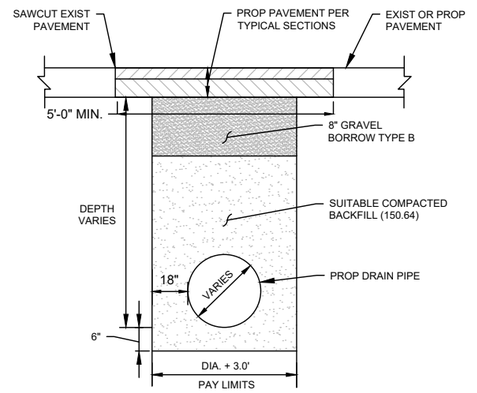
1. DESIGNED FOR AASHTO HS25-44 LOADING
2. CONCRETE STRENGTH fc=4000 PSI
3. REINFORCING STEEL: ASTM A185 (wwf) fy=60,000 PSI
4. CURB INLETS ARE REQUIRED WHEN GUTTER INLETS ARE INSTALLED AGAINST CURBING. PROVIDE 3"X6" OPENING WHERE CURB INLETS ARE PROPOSED.

SPECIAL GUTTER INLET (ITEM 204)



CONTINGENCY DETAIL FOR STORM DRAIN LATERAL LINES

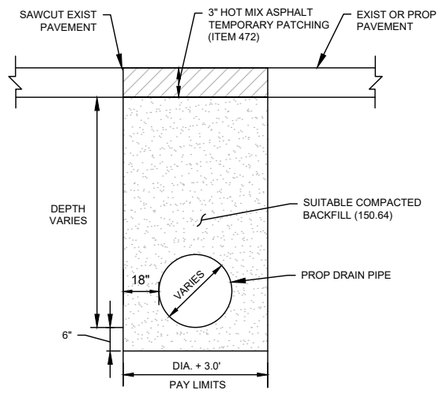
(USE ONLY IF OBSTRUCTION IS ENCOUNTERED)
NOT TO SCALE



NOTES:
1. ANY EXCAVATED MATERIALS DETERMINED BY THE ENGINEER TO BE UNSUITABLE FOR BACKFILL SHALL BE REPLACED WITH GRAVEL BORROW FOR BACKFILLING STRUCTURES AND PIPES AND PAID FOR UNDER ITEM 151.2.

PERMANENT DRAINAGE TRENCH IN MILL AND OVERLAY AREAS

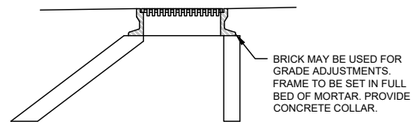
NOT TO SCALE



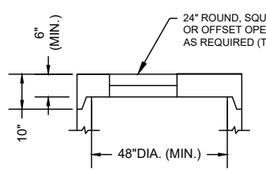
NOTES:
1. ANY EXCAVATED MATERIALS DETERMINED BY THE ENGINEER TO BE UNSUITABLE FOR BACKFILL SHALL BE REPLACED WITH GRAVEL BORROW FOR BACKFILLING STRUCTURES AND PIPES AND PAID FOR UNDER ITEM 151.2.

TEMPORARY DRAINAGE TRENCH IN FULL DEPTH AREAS

NOT TO SCALE



ALTERNATE ECCENTRIC CONE SECTION



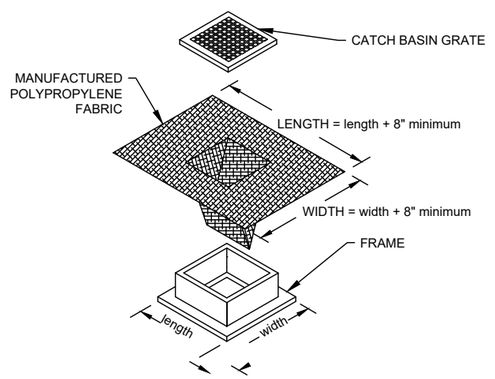
ALTERNATE FLAT TOP SLAB

NOTES:

1. BASED ON ACTUAL FIELD CONDITIONS; THE CONTRACTOR SHALL DETERMINE WHICH STYLE OF TOP SECTION SHOULD BE USED.

ALTERNATE DRAINAGE STRUCTURE TOP CONFIGURATIONS

NOT TO SCALE



NOTES
1. LENGTH AND WIDTH OF POLYPROPYLENE FABRIC MUST EXCEED EXISTING CATCH BASIN FRAME DIMENSIONS BY A MINIMUM OF 8".
2. REMOVE CATCH BASIN GRATE AND INSTALL POLYPROPYLENE FABRIC OVER CATCH BASIN FRAME. REPLACE CATCH BASIN GRATE TO SECURE POLYPROPYLENE FABRIC IN PLACE.
3. PROVIDE EROSION CONTROL PROTECTION AT ALL EXISTING AND PROPOSED CATCH BASINS WITHIN THE PROJECT LIMITS.

CATCH BASIN EROSION CONTROL PROTECTION (TYP)

NOT TO SCALE

Old Colony Avenue over Taunton River

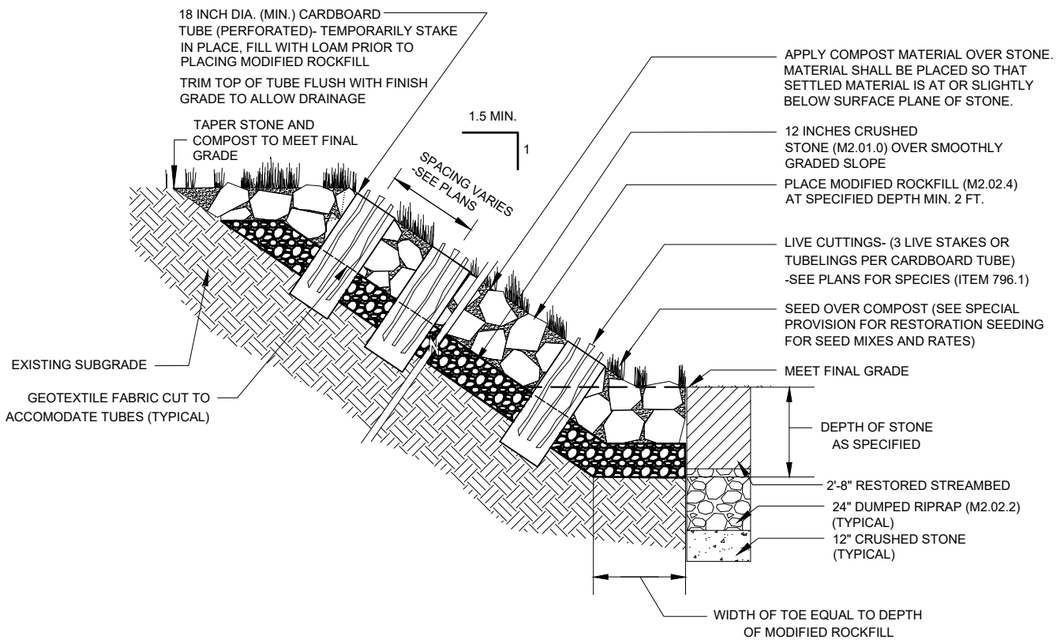
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	######	2	3
PROJECT FILE NO.	613642		

CONSTRUCTION DETAILS

Old Colony Avenue over Taunton River

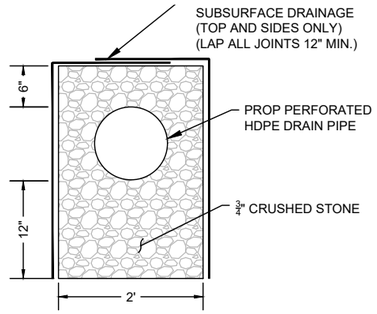
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	######	3	3
PROJECT FILE NO.	613642		

CONSTRUCTION DETAILS



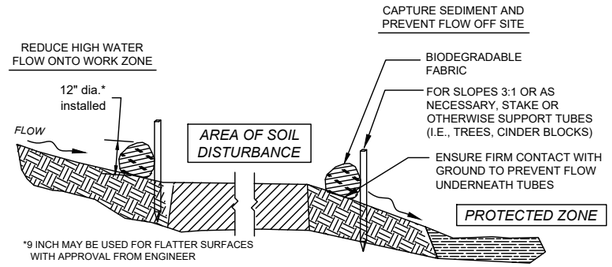
LIVE CUTTINGS IN MODIFIED ROCKFILL

NOT TO SCALE



PERFORATED HDPE INFILTRATION TRENCH

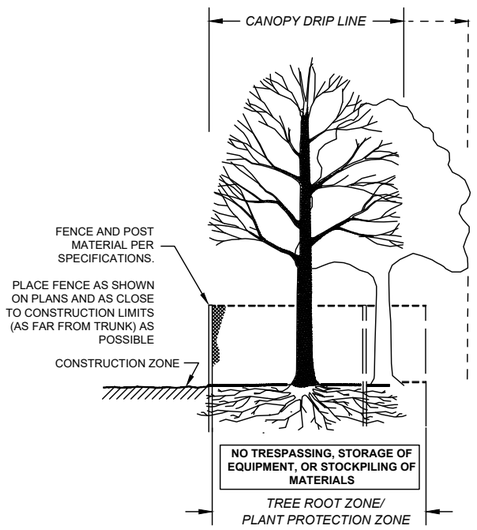
NOT TO SCALE



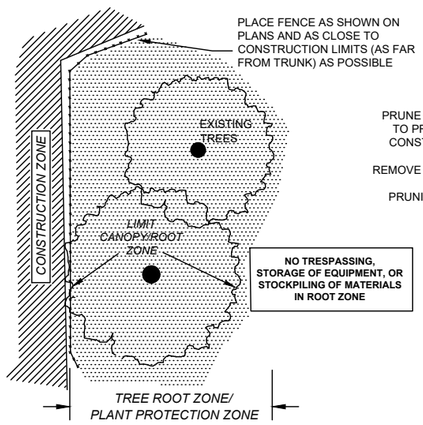
SECTION

SEDIMENT BARRIER - COMPOST FILTER TUBE

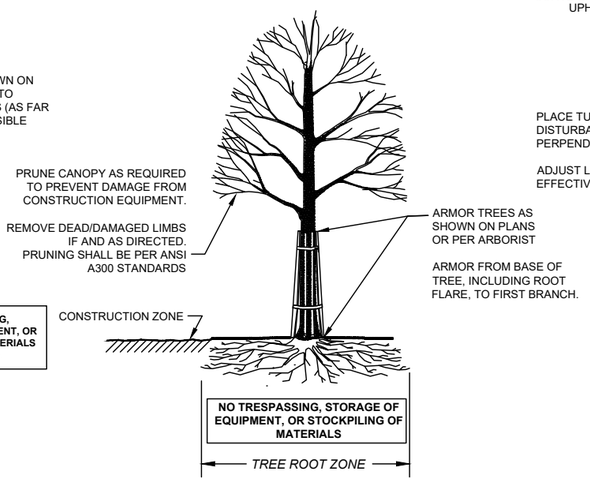
NOT TO SCALE



SECTION - FENCE PROTECTION OF ROOT ZONE

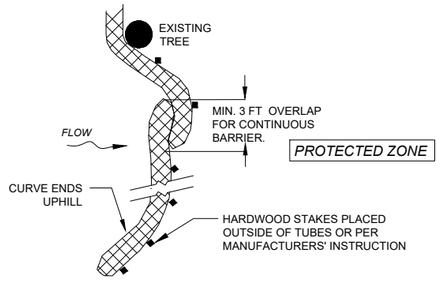


PLAN VIEW - FENCE PROTECTION OF ROOT ZONE



SECTION - TRUNK ARMORING & PRUNING

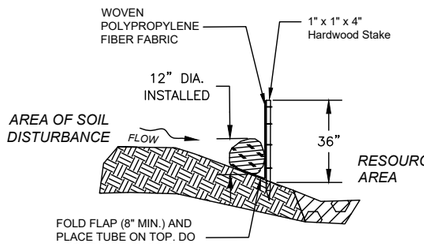
TREE PROTECTION DETAILS



PLACE TUBE AS CLOSE TO LIMIT OF SOIL DISTURBANCE AS POSSIBLE, ALONG CONTOURS, AND PERPENDICULAR TO FLOW.

ADJUST LOCATION AS REQUIRED FOR OPTIMUM EFFECTIVENESS. DO NOT INSTALL IN WATERWAYS.

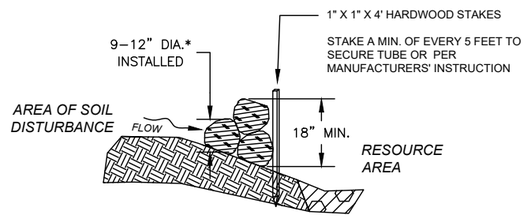
PLAN VIEW



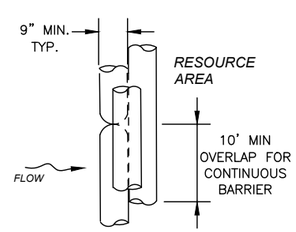
SECTION

COMPOST FILTER TUBE & SILT FENCE

NOT TO SCALE



SECTION



PLAN VIEW

COMPOST FILTER TUBE BERM (SLOPES 2:1 OR STEEPER)

NOT TO SCALE

APPENDIX D – Hydraulic and Scour Analysis Report

The Hydraulic and Scour Analysis Report will be made available upon request.

APPENDIX E – Emergency Certification Request

IMPROVING COMMUNITIES TOGETHER

July 31, 2025

City of Taunton
Taunton Conservation Commission
141 Oak Street
Taunton, MA 02780

Attn: Steven Turner, Chair

Re: Request for Emergency Certification for South St E / Taunton River Bridge Closure and Repairs
Raynham: South St E / Taunton River
Bridge No: R-02-003 = T-01-004
BIN No: 3M4
Structure No: R02003-3M4-MUN-NBI

Dear Mr. Steven Turner:

This letter serves to notify the Taunton Conservation Commission of proposed emergency repairs to the Old Colony Avenue Bridge (identified as South Street in Raynham) necessitated by unsafe structural conditions that pose immediate risk to public safety and access.

The Massachusetts Department of Transportation (MassDOT) – Highway Division has undertaken the inventory, inspection, and rating of locally owned bridges to assist the City of Taunton in complying with State and Federal Legislation. In accordance with the provisions of **M.G.L.C. 85, sub-section 35**, the MassDOT – Highway Division determined the maximum load which the subject bridge may safely carry. The structure was recently rated and it is recommended that the bridge be closed to vehicular traffic due to the poor condition of the ends of beams 1, 2, 5, and 7 at the South Abutment, and beam 2 at the North Abutment.

Pursuant to **310 CMR 10.06(1) and (2)** of the Massachusetts Wetlands Protection Act, this work qualifies as an emergency exempt from prior permitting requirements for the protection of the safety of the citizens of the Commonwealth. The poor condition of the bridge requires prompt action to prevent collapse, injury, and loss of access.

Proposed emergency work includes:

- Concrete repairs along beams 1, 2, 5, and 7 at the South Abutment;
- Concrete repairs along beam 2 at the North Abutment; and
- Temporary scaffolding / staging that will be partially located within Land Under Water (LUW) but will not require permanent alterations.

Work on the bridge will need to be performed in and around the Taunton River, within NFHL 100 Year Flood Zone AE (i.e., Bordering Land Subject to Flooding), and within the 100-foot Buffer Zone to two (2) Bordering Vegetated Wetlands. All reasonable measures will be taken to minimize impacts to resource areas. Emergency repair work shall not exceed thirty (30) days. Only work necessary to abate the emergency will be performed on the subject bridge. Following the completion of emergency repairs, documentation will be submitted as required, and coordination with the Commission will continue to ensure full compliance.

BETA GROUP, INC.
89 Shrewsbury Street, Suite 300, Worcester, MA 01604
P: 508.756.1600 | W: www.BETA-Inc.com

The City of Taunton Department of Public Works requests an Emergency Certification to complete the work described above in the interest of public safety and in accordance with 310 CMR 10.06. If we can be of any further assistance regarding this matter, please contact us at our office.

Very truly yours,
BETA Group, Inc.

Jonathan Niro, PWS
Project Manager

Christopher Jones, P.E.
Vice President

cc: Fred Cornaglia, Commissioner of Public Works

Attachments:
MassDOT Letter
Site Locus Figure

Job No: [23.10887.00]

Maura Healey, Governor
Kimberley Driscoll, Lieutenant Governor
Monica Tibbits-Nutt, Secretary & CEO
Jonathan L. Gulliver, Highway Administrator

MassDOT
Massachusetts Department of Transportation
Highway Division

July 18, 2025

City of Taunton
Mayor of Taunton
90 Ingell St.
Taunton, MA 02780

Attn: Fred Cornaglia, Commissioner of Public Works

SUBJECT: NATIONAL BRIDGE INSPECTION STANDARDS (NBIS)
BRIDGE CLOSURE

Raynham: SOUTH ST E / TAUNTON RIVER
Bridge No: R-02-003 = T-01-004
BIN No: 3M4
Structure No: R02003-3M4-MUN-NBI

Dear Select Board:

The Massachusetts Department of Transportation (MassDOT) - Highway Division has undertaken the inventory, inspection, and rating of locally owned bridges to assist the cities and towns in complying with State and Federal Legislation. In accordance with the provisions of **M.G.L.C 85, sub-section 35**, the MassDOT - Highway Division has determined the maximum load which the subject bridge may safely carry.

The above structure was recently rated, and it is recommended that the bridge be **CLOSED** to vehicular traffic.

The reason for this recommendation is due to the poor condition of the ends of beams 1, 2, 5 and 7 at the South Abutment, and beam 2 at the North Abutment.

Your immediate action is requested. Please coordinate with the District Bridge Engineer, Shane Sousa, at (781)853-7065 on your action taken so the Bridge Inspection Unit can document the closure.

A copy of the Rating Report regarding this recommendation is on file at our District office. Mary-Joe Perry, the District Highway Director, will be pleased to review the report with you and advise you of any programs available regarding this bridge.

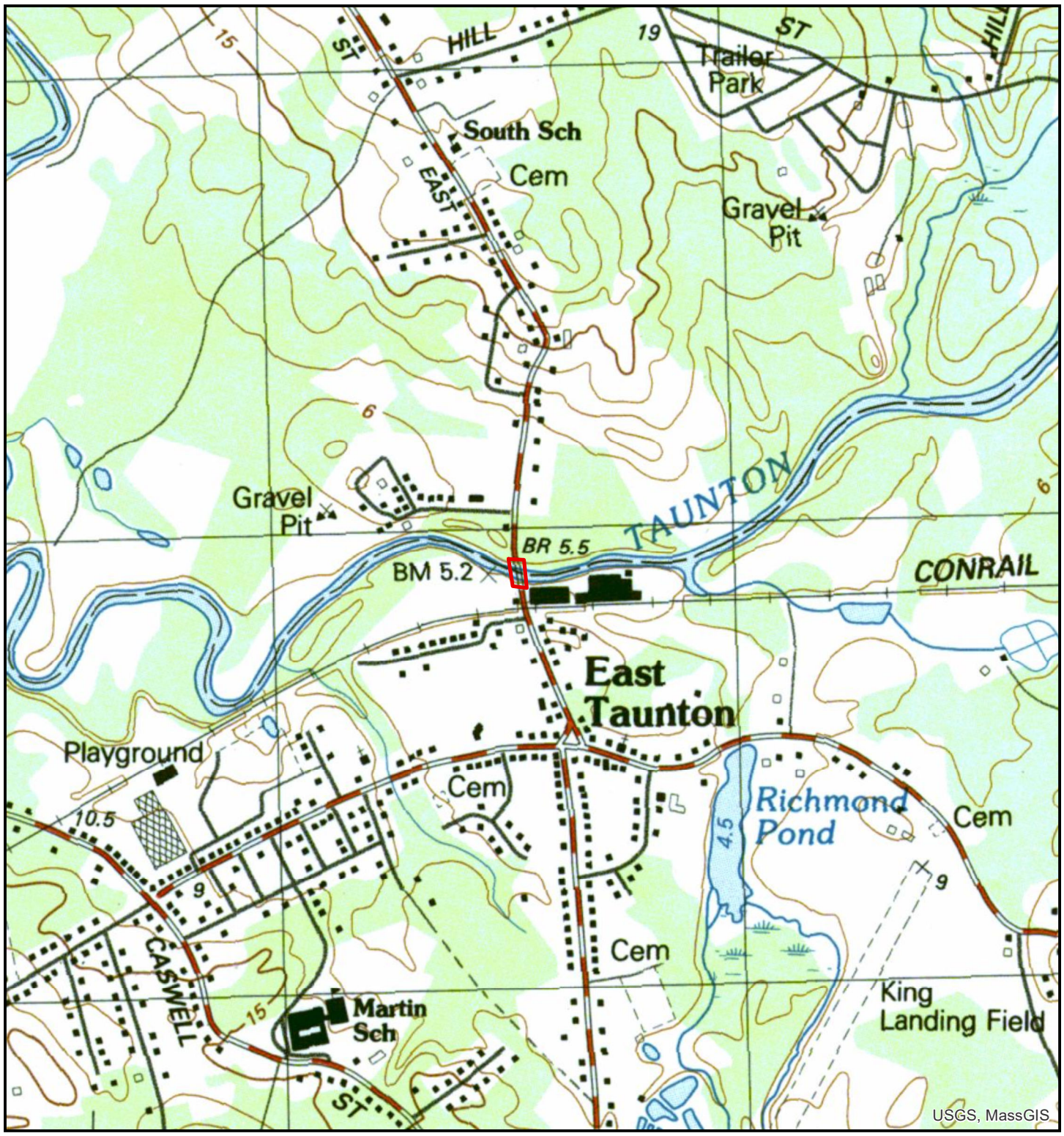
Thank you for your cooperation.

Sincerely,

Alexander K. Bardow, P.E.
State Bridge Engineer

SS/ss
cc: DHD, D-5 & DBIE, D-5, BIE

Ten Park Plaza, Suite 4160, Boston, MA 02116
Tel: 857-368-4636, TYY: 857-368-0655
www.mass.gov/massdot



BETA
IMPROVING COMMUNITIES TOGETHER

N
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0 1,000 2,000 Feet

1 inch = 1,000 feet

Figure 1
Site Locus
Old Colony Avenue Bridge
Taunton and Raynham, MA

Data Source: MassGIS USGS Topographic Quadrangle Images (2001)

IMPROVING COMMUNITIES TOGETHER

August 28, 2025

City of Raynham
Raynham Conservation Commission
Veterans Memorial Town Hall
558 South Main Street
Raynham, MA 02767

Attn: David McRae, Chair

Re: Request for Emergency Certification for South St E / Taunton River Bridge Closure and Repairs
Raynham: South St E / Taunton River
Bridge No: R-02-003 = T-01-004
BIN No: 3M4
Structure No: R02003-3M4-MUN-NBI

Dear Mr. David McRae:

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BETA GROUP, INC.
89 Shrewsbury Street, Suite 300, Worcester, MA 01604
P: 508.756.1600 | W: www.BETA-Inc.com

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If we can be of any further assistance regarding this matter, please contact us at our office.

Very truly yours,
BETA Group, Inc.

Jonathan Niro, PWS
Project Manager

Christopher Jones, P.E.
Vice President

cc: Lori Anderson, Public Works Specialist
Maissoun Reda, Chief of Wetlands Program - MassDEP Southeast Regional Office

Attachments:
MassDOT Letter
Site Locus Figure

Job No: [23.10887.00]

Maura Healey, Governor
Kimberley Driscoll, Lieutenant Governor
Monica Tibbits-Nutt, Secretary & CEO
Jonathan L. Gulliver, Highway Administrator

MassDOT
Massachusetts Department of Transportation
Highway Division

July 18, 2025

Town of Raynham
Board of Selectmen
558 South Main St.
Raynham, MA 02767

Attn: Norm Sturtevant, Highway Superintendent

SUBJECT: NATIONAL BRIDGE INSPECTION STANDARDS (NBIS)
BRIDGE CLOSURE

Raynham: SOUTH ST E / TAUNTON RIVER
Bridge No: R-02-003 = T-01-004
BIN No: 3M4
Structure No: R02003-3M4-MUN-NBI

Dear Select Board:

The Massachusetts Department of Transportation (MassDOT) - Highway Division has undertaken the inventory, inspection, and rating of locally owned bridges to assist the cities and towns in complying with State and Federal Legislation. In accordance with the provisions of **M.G.L.C 85, sub-section 35**, the MassDOT - Highway Division has determined the maximum load which the subject bridge may safely carry.

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The reason for this recommendation is due to the poor condition of the ends of beams 1, 2, 5 and 7 at the South Abutment, and beam 2 at the North Abutment.

Your immediate action is requested. Please coordinate with the District Bridge Engineer, Shane Sousa, at (781)853-7065 on your action taken so the Bridge Inspection Unit can document the closure.

A copy of the Rating Report regarding this recommendation is on file at our District office. Mary-Joe Perry, the District Highway Director, will be pleased to review the report with you and advise you of any programs available regarding this bridge.

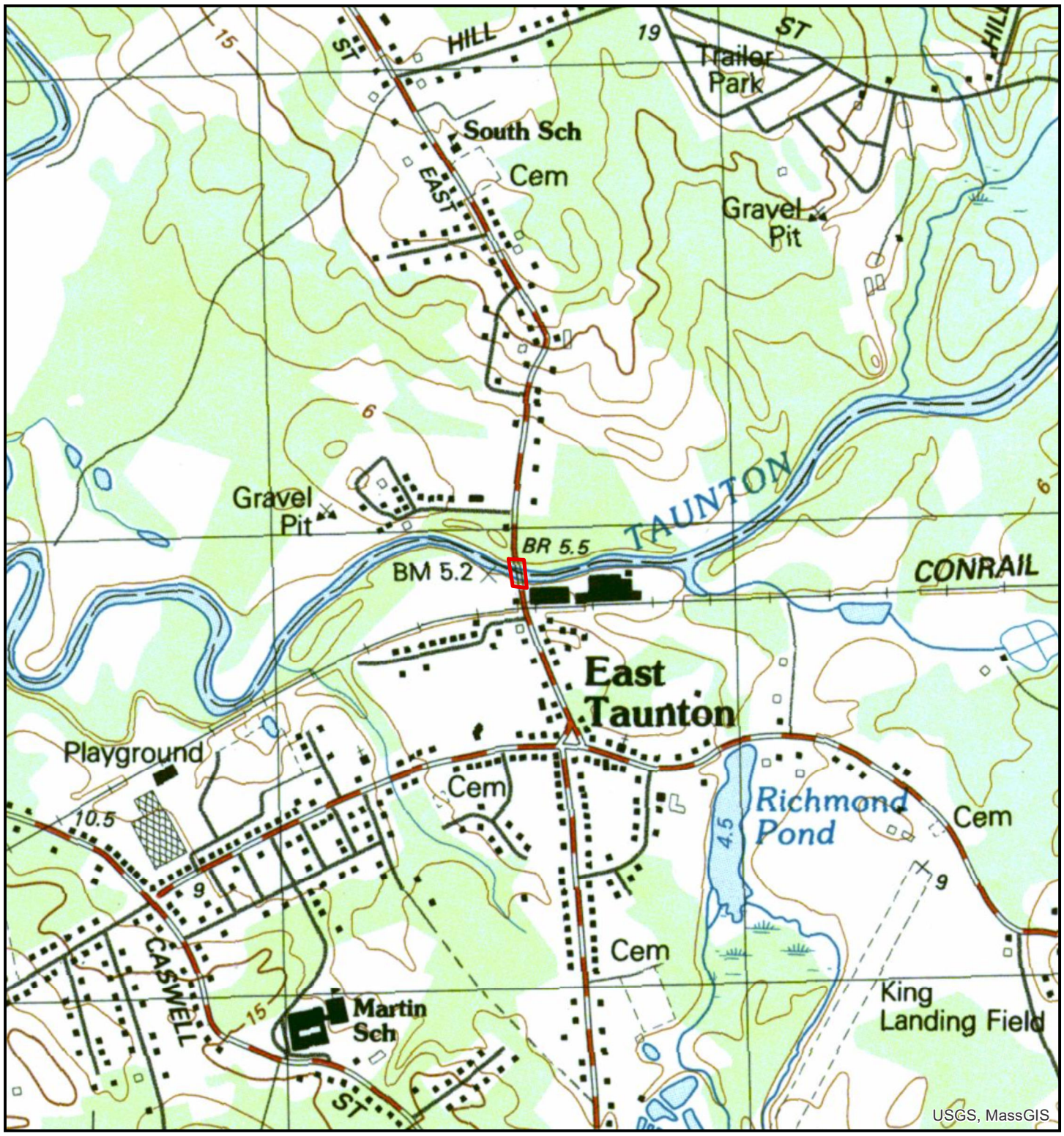
Thank you for your cooperation.

Sincerely,

Alexander K. Bardow, P.E.
State Bridge Engineer

SS/ss
cc: DHD, D-5 & DBIE, D-5, BIE

Ten Park Plaza, Suite 4160, Boston, MA 02116
Tel: 857-368-4636, TYY: 857-368-0655
www.mass.gov/massdot



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IMPROVING COMMUNITIES TOGETHER

N
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0 1,000 2,000 Feet

1 inch = 1,000 feet

Figure 1
Site Locus
Old Colony Avenue Bridge
Taunton and Raynham, MA

Data Source: MassGIS USGS Topographic Quadrangle Images (2001)

APPENDIX F – Alternatives Analysis

Raynham/Taunton

Bridge Reconstruction R-02-003=T-01-004

MassDOT Project File # 613642

July 2024

ALTERNATIVES ANALYSIS

315 Norwood Park South
2nd Floor
Norwood, Massachusetts 02062
781.255.1982
www.BETA-Inc.com

Bridge Reconstruction R-02-003=T-01-004

Raynham/Taunton

MassDOT Project File # 613642

ALTERNATIVES ANALYSIS

Prepared by: BETA GROUP, INC.
Prepared for: MassDOT Highway Division

July 2024

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Appendix A: Conceptual Construction Plans, Profiles & Typical Sections
Appendix B: Draft Design Justification Workbook
Appendix C: Synchro Analysis

1.0 EXISTING CONDITIONS

1.1 STUDY AREA

The project is located at the bridge carrying South Street East / Old Colony Ave over the Taunton River in Raynham Taunton. The project limits are from the intersection with Sandy Hill Road approximately 380 feet north of the bridge to the railroad grade crossing approximately 200 feet south of the bridge.

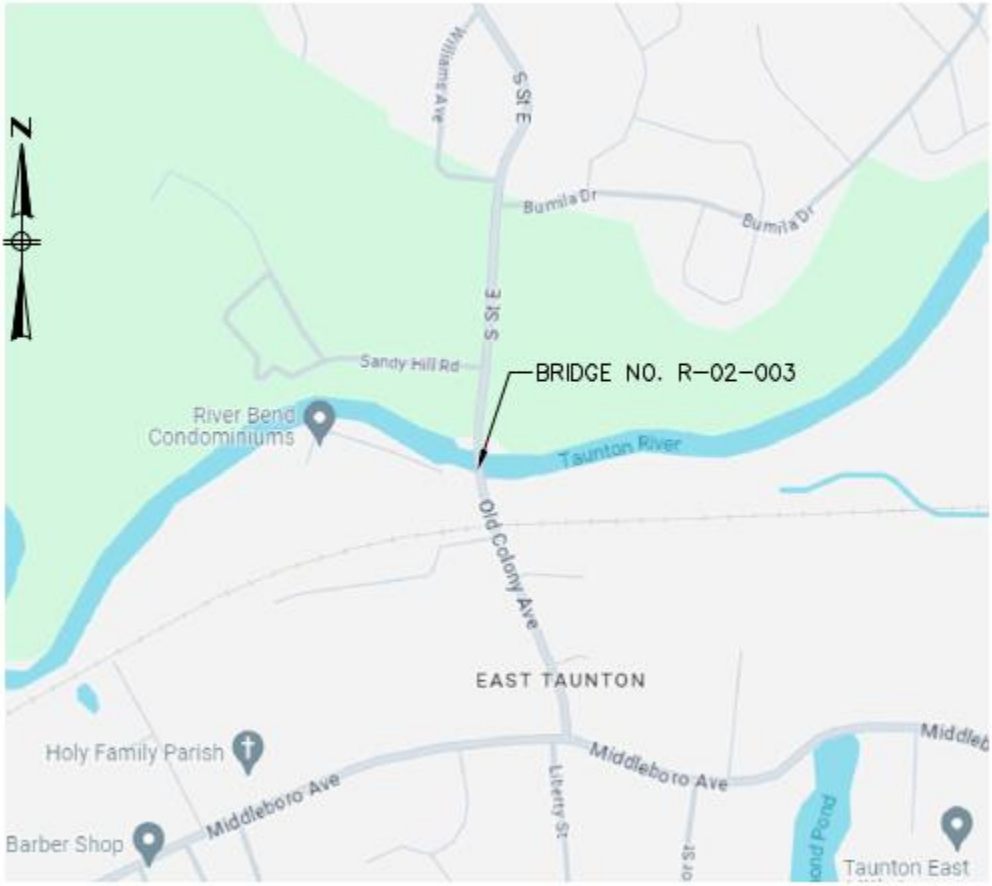

Figure 1 Location Map

1.2 BRIDGE

The existing structure is an approximately 89'-6" two span bridge with equal spans of approximately 44'-9", constructed in 1945. The structure consists of eight (8) 27 WF steel beams spaced at 4'-6 ½" on center supporting a 7" concrete deck and 2-1/4" of bituminous paving. The bridge is supported by unreinforced concrete gravity abutments and wingwalls and a reinforced concrete pier. The south abutment is founded on spread footings and the north abutment and pier are founded on timber piles. The bridge is 35'-0" wide, which includes a 26'-0" roadway, a 2'-6" safety walk and 5'-0" sidewalk with metal railing. The bridge has a skew angle of 23.6° and was designed for H20 loading.

1.3 ROADWAY

Old Colony Ave is a 0.3-mile-long (0.5 km) road in Taunton, Massachusetts, that runs north-south adjacent to the Taunton River. The roadway is under the jurisdiction of the City of Taunton. Old Colony Ave is classified as an Urban Collector.

Old Colony Ave within the study area consists of approximately (2) 13.5-foot-wide travel lanes with no shoulders on the approach to the bridge and over the bridge (2) 11.5-foot-wide travel lanes with 1 to 2-ft shoulders. Directional flow along the roadway is separated by a double yellow line and there are no bicycle accommodations within the project area. The legal speed regulation along the roadway in the study area is 30 miles per hour (mph).

South Street East is a 1.5-mile-long (2.4 km) road in Raynham, Massachusetts, that runs north-south adjacent to the Taunton River. The roadway is under the jurisdiction of the Town of Raynham. South Street East is classified as an Urban Collector.

South Street East within the study area consists of approximately (2) 11- to 11.5-foot-wide travel lanes with 1.5- to 2-ft shoulders. Guardrail exists on the southbound side of the roadway leading up to the bridge. Directional flow along the roadway is separated by a double yellow line and there are no bicycle accommodations within the project area. The legal speed regulation along the roadway in the study area is 30 miles per hour (mph).

1.4 SAFETY ANALYSIS

Crash data for the major intersections included within the detour limits was obtained for the five most recent years available, January 2019 through December 2023, from the MassDOT IMPACT Crash Portal. Refer to Section 3.0 of this report for further discussion of the four intersections used for the detour.

A review of the MassDOT crash data revealed that there were 49 crashes that occurred at the intersection of New State Hwy (Route 44) and Orchard St, 33 crashes at the intersection of New State Hwy (Route 44) and Church St, 31 crashes at the intersection of Middleboro Ave and Old Colony Ave/Liberty St and 6 crashes at the intersection of Middleboro Ave and Precinct St/South Precinct St. No fatalities were reported within the analysis limits. Most crashes within the intersections (95 out of 119) were either angle crashes or rear-end crashes. Furthermore, most crashes within the study area occurred during clear/dry weather. **Table 1** provides a summary of the roadway crash history.

Table 1: Roadway Crash Summary

	ROADWAY	New State Hwy (Route 44)@ Orchard St	New State Hwy (Route 44)@ Church St	Middleboro Ave @ Old Colony Ave/Liberty St	Middleboro Ave @ Precinct St/South Precinct St	TOTAL
Number of Crashes	Total	49	33	31	6	119
	Average Per Year	*9.8*	*6.6*	*6.2*	*1.2*	*23.8*
Severity	Fatal Injury	0	0	0	0	0
	Non-Fatal Injury	8	10	4	2	24
	Property Damage	41	23	27	4	95
Weather Condition	Clear/ Dry	39	25	26	6	96
	Cloudy/Rain/Snow	10	8	5	0	23
Crash Type	Angle	21	8	15	5	49
	Rear-End/Front to Rear	19	18	9	0	46
	Sideswipe	7	4	3	0	14
	Single Vehicle Crash	2	1	4	0	7
	Head On	0	2	0	1	3

2.0 ENVIRONMENTAL

2.1 ENVIRONMENTAL PERMITTING ASSESSMENT

The following Table is a list of applicable permits and reviews for the Project:

Table 2 Regulatory Permits and Reviews

Permit or Review	Yes	No	Notes:
Bridge Exempt	✓		The Project is considered "bridge exempt" and therefore does not require permitting under the Massachusetts Wetlands Protection Act, the Massachusetts Public Waterfront Act, or the Massachusetts Environmental Policy Act.
Wetlands Protection Act (WPA)		✓	
Chapter 91		✓	
Environmental Justice Community		✓	None mapped within 1 mile of the Site.
Massachusetts Environmental Policy Act (MEPA)		✓	

National Environmental Policy Act (NEPA)	✓		Categorical Exclusion (CE) required.
Section 401 Water Quality Certification (WQC)		✓	Should any wetland or waterway impacts be necessary based on Project scope revisions, a 401 WQC will be required if the "bridge exemption" is claimed for Massachusetts Wetlands Protection Act permitting. Otherwise, the Order of Conditions would serve as the 401 WQC.
Section 404 Army Corps General Permit		✓	
U.S. Coast Guard Bridge Permit		✓	
Coastal Zone Management (CZM) Federal Consistency Review		✓	
Essential Fish Habitat		✓	
Section 7 Endangered Species Act	✓		Consultation required.
Natural Heritage and Endangered Species Program (NHESP) Estimated or Priority Habitat		✓	
Section 106	✓		Project Notification Form required.
Adjacent Parkland or Wildlife Refuges for Section 4(f)	✓		Land to the north of the site is publicly owned and may be considered subject to Section 4(f); however, it does not appear to be protected open space based on cursory online research.
Wild and Scenic River	✓		Coordination with the National Parks Service will be required during design.
Adjacent Section 6(f) Properties		✓	
Article 97		✓	
Other		✓	

The differences in proposed work under the Alternatives presented in this report are related to striping and lane width; under either Alternative, the bridge superstructure will be replaced. Therefore, it is not anticipated that the selection of an Alternative will result in changes to the permitting requirements for the Project. The Project will not result in direct Resource Area impacts (e.g., fill and/or alteration). As summarized in Table 1 above, the following environmental permits/reviews are anticipated to be required under either Alternative:

Categorical Exclusion (MassDOT / FHWA)

The Project will be funded by a federal Community Project Funding Grant routed through the Federal Highway Administration (FHWA); therefore, documentation of compliance with the National Environmental Policy Act (NEPA) will be required. It is anticipated that the Project will require the

submission of a Categorical Exclusion (CE) pursuant to the FHWA's list of CE-eligible activities and that no Environmental Assessment or Environmental Impact Study will be required.

Section 7 – Endangered Species Act (USFWS)

As part of Project's environmental review process, coordination with the U.S. Fish and Wildlife Service (USFWS) under Section 7 of the federal Endangered Species Act will be undertaken. At a minimum, it is anticipated that the Project will require securing a "Not Likely to Adversely Affect" determination due to the Project Area being within the range of the Northern long-eared bat (*Myotis septentrionalis*), the Plymouth redbelly turtle (*Pseudemys rubriventris bangsi*), and the Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*).

Project Notification Form (State Historic Preservation Officer / Bureau of Underwater Archaeological Resources / Relevant Tribes)

Due to the use of federal funding, the Project will require the submission of a Project Notification Form (PNF) to the State Historic Preservation Officer (SHPO), Bureau of Underwater Archaeological Resources (BUAR), and all relevant Tribes to demonstrate compliance with Section 106 of the National Historic Preservation Act.

The Project will be constructed within/adjacent to the Old Colony Iron Works – Nemasket Mill Complex National Register Historic District (TAU.AA). Based on mapping reviewed via the Massachusetts Cultural Resources Information System (MACRIS), only roadway approach work within Taunton will be located within this Historic District. Both MACRIS mapping and the Massachusetts Historical Commission Inventory Form do not indicate that the bridge itself is a historic or cultural resource. Nearby historic and cultural resources associated with this Historic District include TAU.630 and TAU.628.

2.2 HAZMAT

The selection of a specific alternative will not affect the hazardous materials due diligence required for the Project.

2.2.1 HISTORIC AND CURRENT LAND USE

Historic and current land uses near the Project Area consist of residential and industrial properties to the south (within Taunton) and undeveloped woodlands and residential properties to the north (within Raynham).

2.2.2 ADJACENT RELEASE SITES AND CONTAMINATION SOURCES

According to the Massachusetts Underground Storage Tank (UST) Facility Search there is one (1) UST facilities within 0.25-miles of the Project Corridor, the Amaros Market Inc. (Facility ID #3854) located at 508 Middleboro Ave in Taunton.

According to MassDEP's Searchable Sites Database, the following releases have been reported within the vicinity of the Project Area:

RTN 4-0000160 – 103 Old Colony Avenue, Taunton

In July of 1992, a Phase I Environmental Site Assessment (ESA) was completed at the former Bacon Felt Facility located at 103 Old Colony Avenue in Taunton due to soil and groundwater contamination associated with a former leaching tank. Contaminants noted in the Phase 1 ESA included elevated levels of toluene and Volatile Organic Compounds (VOCs). Due to the limited vertical and horizontal spread of the contaminants per monitoring well data and surface water sampling, the property was assigned a Tier II classification.

Given the scope of the Project, there is currently no anticipated excavation of soils; therefore, management of contaminated media is unlikely.

2.2.3 Known or suspected Contamination Sites

A search for known oil and hazardous material releases in proximity of Project limits was conducted using online resources as noted above. No superfund sites are present within the Project Area.

2.2.4 Active Use Limitations (AUL)

There are no AUL Deed Restrictions within or adjacent to the Project limits that may be impacted by construction.

2.2.5 Excavation Work

The Project does not propose excavation into soils; only full-depth pavement construction will be conducted.

2.2.6 Excess Soil Generation

The Project does not propose activity that will generate excess soil.

2.2.7 Rail trail Projects

The Project is not a rail trail project.

2.2.8 Dewatering Contaminated groundwater

The Project does not propose any dewatering of polluted groundwater.

2.2.9 Hazardous Building Materials

Due to the age of the bridge, there is the potential for asbestos within concrete, joint caulking materials, gunite patches on the concrete, or the asphalt road surface. There is also potential for the presence of Polychlorinated biphenyls (PCBs) in paint and/or joint caulking materials. Lead paint may also be present on bridge surfaces.

3.0 Temporary Traffic Management

3.1 Detour Route

The construction staging alternative under consideration for the bridge and roadway construction involves a full bridge closure with traffic detours. Based on traffic counts conducted in May of 2024, the Old Colony Ave Bridge experiences a heavy vehicle percentage of approximately 0.8% in the northbound direction and 0.7% in the southbound direction.

The proposed detour would be via New State Highway (US Route 44), Church Street/Precinct Street and Middleboro Ave. Vehicles typically utilizing the Pleasant Street Bridge northbound approach would follow the detour route on Middleboro Ave and turn left onto Precinct Street, continue onto Church Street and turn left onto New State Highway. Vehicles destined in the southbound direction over the bridge would use the same route in the opposite direction. The two intersections on Middleboro Ave are stop controlled. The two study intersections on New State Highway (US Route 44) are signalized.

3.2 OPERATIONS ANALYSIS

Traffic Operations Analysis

Capacity analyses were conducted to assess the quality of traffic flow at four study intersections. This analysis was performed for existing Year 2024 volume conditions and Year 2024 detour volume conditions during the weekday AM and PM peak hours.

Capacity analysis was performed using Trafficware's Synchro software package (Version 12.0). The Synchro software analysis utilizes methodologies contained in the *Highway Capacity Manual, 7th Edition (HCM7)* published by the Transportation Research Board.

Six levels of service (LOS), "A"-"F", have been established with "A" representing very good operation and "F" representing very poor operation. For signalized and unsignalized intersections, level of service is defined in terms of total delay and is computed for individual intersection turning movements. Delay is a measure of driver discomfort, frustration, fuel consumption, and lost travel time. The relationship between LOS and delay for signalized intersections are summarized in Error! Reference source not found.**3**. The relationship between LOS and delay for unsignalized intersections are summarized in Error! Reference source not found.4. In addition to delay and level of service, the analysis examined the volume to capacity ratio (v/c) and 95th percentile queues for each lane group. Capacity analysis worksheets are provided in **Appendix C.**

Table 3: Signalized Intersection Level of Service Criteria

LOS	**Signalized Intersection Criteria Average Total Delay** (Seconds per Vehicle)	**General Description**
A	< 10.0	Free Flow
B	10.1 to 20.0	Stable flow (slight delays)
C	20.1 to 35.0	Stable flow (acceptable delays)
D	35.1 to 55.0	Approaching unstable flow (tolerable delay)
E	55.1 to 80.0	Unstable flow (intolerable delay)
F	> 80.0	Forced flow (jammed)

Table 4: Unsignalized Intersection Level of Service Criteria

LOS	Unsignalized Intersection Criteria Average Total Delay (Seconds per Vehicle)	General Description
A	< 10.0	Free Flow
B	10.1 to 15.0	Stable flow (slight delays)
C	15.1 to 25.0	Stable flow (acceptable delays)
D	25.1 to 35.0	Approaching unstable flow (tolerable delay)
E	35.1 to 50.0	Unstable flow (intolerable delay)
F	> 50.0	Forced flow (jammed)

Traffic Capacity Analysis Results

Intersection capacity and Level of Service (LOS) analysis was conducted for the Existing and Detour conditions for the AM and PM weekday commuting peak hours. Summaries of this analysis are provided in **Tables 5 and 6**.

Table 5: Level of Service Summary – Signalized Intersections

INTERSECTION	Existing				Detour			
	LOS	DEL[a]	v/c[b]	95%[c]	LOS	DEL[a]	v/c[b]	95%[c]
Route 44 at Orchard Street – Signalized Intersection								
OVERALL AM	**D**	**40.1**			**D**	**36.5**		
Route 44 – EBL - AM	F	216.5	1.17	89	E	66.8	0.52	64
Route 44 – EBT - AM	C	31.2	0.72	480	C	34.3	0.81	622
Route 44 – EBR - AM	A	1.4	0.19	24	A	1.1	0.07	11
Route 44 – WBL - AM	E	78.1	0.50	51	E	58.0	0.22	37
Route 44 – WBTR - AM	C	24.4	0.44	207	C	29.3	0.65	340
Orchard – NBL - AM	E	58.3	0.72	182	E	57.8	0.69	165
Orchard – NBTR - AM	F	104.6	0.96	204	E	63.5	0.72	154
Orchard – SBL - AM	E	55.6	0.57	184	E	60.8	0.69	242
Orchard – SBT - AM	D	53.3	0.33	87	D	45.5	0.09	40
Orchard – SBR - AM	B	12.4	0.50	54	B	11.2	0.44	55
OVERALL PM	**D**	**35.0**			**C**	**31.7**		
Route 44 – EBL - PM	F	81.6	0.71	123	E	76.7	0.67	113
Route 44 – EBT - PM	C	29.1	0.67	415	C	28.3	0.66	403
Route 44 – EBR - PM	A	3.6	0.35	55	A	2.3	0.35	28
Route 44 – WBL - PM	E	58.1	0.29	58	E	57.2	0.28	59
Route 44 – WBTR - PM	C	29.3	0.72	426	C	31.9	0.81	502
Orchard – NBL - PM	D	54.9	0.62	128	E	64.1	0.38	40
Orchard – NBTR - PM	E	64.1	0.71	183	D	40.6	0.16	44
Orchard – SBL - PM	E	65.3	0.70	191	E	70.6	0.75	202
Orchard – SBT - PM	F	89.1	0.89	261	D	49.7	0.52	186
Orchard – SBR - PM	B	11.5	0.46	31	A	7.9	0.35	28
Route 44 at Church Street – Signalized Intersection								
OVERALL AM	**C**	**24.5**			**F**	178.3		
Route 44 – EBLTR - AM	B	10.6	0.63	263	F	164.6	1.29	754
Route 44 – WBLTR - AM	B	13.5	0.74	350	F	145.4	1.24	671
Church – NBLTR - AM	E	74.1	0.97	98	F	271.2	1.53	301
Church – SBLTR - AM	D	45.6	0.77	182	B	13.3	0.37	96
OVERALL PM	**C**	**28.4**			**F**	**125.7**		
Route 44 – EBLTR - PM	C	21.0	0.87	624	F	106.6	1.16	772
Route 44 – WBLTR - PM	C	27.3	0.92	646	F	126.8	1.21	764
Church – NBLTR - PM	E	56.5	0.86	168	F	205.1	1.36	440
Church – SBLTR - PM	D	38.9	0.73	122	B	17.5	0.42	94

a. Delay measured in seconds per vehicle

b. v/c represents Volume to Capacity Ratio

c. 95th Percentile Queue measured in feet.

Table 6: Level of Service Summary – Unsignalized Intersections

INTERSECTION	Existing				Detour			
	LOS	DEL[a]	v/c[b]	95%[c]	LOS	DEL[a]	v/c[b]	95%[c]
Middleboro Ave at Old Colony Ave/Liberty Street – Unsignalized Intersection								
Liberty – NB - AM	F	176.8	1.18	11	C	21.4	0.52	3
Middleboro – EBL -AM	A	8.6	0.23	< 1	A	8.3	0.03	< 1
Middleboro – WBL - AM	A	8.9	0	< 1	B	10.2	0.01	< 1
Old Colony – SB - AM	F	273.5	1.43	15	B	14.8	0.09	1
Liberty – NB - PM	F	128.9	1.02	9	C	17.3	0.42	2
Middleboro – EBL - PM	A	8.8	0.17	< 1	A	8.0	0.01	< 1
Middleboro – WBL - PM	A	7.9	0.03	< 1	A	8.3	0.04	< 1
Old Colony – SB - PM	F	>300.0	>2.00	53	C	16.7	0.16	1
Middleboro Ave at Precinct Street/S Precinct Street – Unsignalized Intersection								
S Precinct – NB - AM	C	19.3	0.44	3	F	>300.0	>2.00	21
Middleboro – EBL -AM	A	7.8	0.04	< 1	A	9.5	0.41	2
Middleboro – WBL - AM	A	7.6	0.02	< 1	A	7.6	0.02	< 1
Precinct – SB - AM	B	13.4	0.14	< 1	F	90.9	1.02	12
S Precinct – NB - PM	D	33.1	0.50	3	F	>300.0	>2.00	17
Middleboro – EBL -PM	A	8.0	0.03	< 1	A	8.8	0.22	< 1
Middleboro – WBL -PM	A	7.9	0.06	< 1	A	7.9	0.06	< 1
Precinct – SB - PM	D	28.2	0.57	4	F	253.2	1.37	14

a. Delay measured in seconds per vehicle
b. v/c represents Volume to Capacity Ratio
c. 95th Percentile Queue measured in vehicles

Route 44 at Orchard Street

At the Route 44 signalized intersection with Orchard Street, the traffic operations with the proposed detour in place is projected to operate at a slightly improved level of service over existing conditions for the overall intersection. A few of the individual lane movements are projected to experience a slight increase in delay, but all will operate at LOS E or better.

Route 44 at Church Street

At the Route 44 signalized intersection with Church Street, the traffic operations with the proposed detour in place is projected to operate at a worse level of service over existing conditions for the overall intersection due to the additional traffic volume that will need to be processed by the traffic signal. The overall intersection and the EB, WB, and NB approaches are projected to operate at LOS F, have a volume to capacity ratio over 1.0 and have longer queues when compared with existing conditions. A potential mitigation measure is for a traffic control officer to be present to monitor peak time periods. An additional mitigation strategy is to adjust the traffic signal timing while the detour is in place.

Middleboro Ave at Old Colony Ave/Liberty Street

At the Middleboro Ave unsignalized intersection with Old Colony Ave/Liberty Street, the traffic operations with the proposed detour in place is projected to operate at significantly improved level of service over existing conditions for the overall intersection due to the full closure of the Old Colony Ave bridge over the Taunton River just north of this intersection. A few of the individual lane movements are projected to experience a slight increase in delay, but all will operate at LOS C or better.

Middleboro Ave at Precinct Street/S Precinct Street

At the Middleboro Ave unsignalized intersection with Precinct Street/ S Precinct Street, the traffic operations with the proposed detour in place is projected to operate at a worse level of service over existing conditions due to the additional traffic volume that will need to be processed through the intersection. The NB and SB stop-controlled approaches are projected to operate at LOS F, have a volume to capacity ratio well over 1.0 and have longer queues when compared with existing conditions. A potential mitigation measure is for a traffic control officer be present during peak time periods to mitigate the anticipated side street delay.

4.0 Utilities

Underground utilities within the project area include water, sewer, and gas. Gas and sewer are carried on the bridge superstructure and will be relocated from the east sidewalk to the west sidewalk so that service can be maintained during construction. An additional utility bay will be added to the bridge for a future water main.

Overhead utility poles will be permanently relocated from the west side of the roadway to the east side for bridge construction and for sidewalk clearance within project limits.

5.0 Right of Way

The existing Right of Way is municipal owned and varies in width starting from approximately 38’ at the beginning of the project and widening to up to 58’ over the bridge on the Taunton Side. On the Raynham side the Right of Way also varies in width. The Right of Way goes from 73’ by the sewer pump station. to 45’ wide by Sandy Hill Street.

Both alternatives presented below will have the same Right of Way impacts. A permanent easement will be required for proposed pedestrian curb ramp at #96 Old Colony Avenue. Permanent utility easements will be required for overhead wires that are being relocated from the west to the east side of the roadway. Temporary easements will be required for slope work, driveway work, sediment control barriers, and construction access.

6.0 Alternatives

6.1 General

There are two alternatives under consideration. Both alternatives were chosen based on the constraint that the existing bridge substructure be retained and only the superstructure be replaced. This restricts the cross-section of the roadway to approximately 26 ft curb to curb with a 6 ft sidewalk on one side of

the roadway. Both alternatives are proposing relocating the sidewalk from the east side to the west side of the roadway so that the sidewalk connects to the existing sidewalk at the condominium on the south side of the bridge. The sidewalk will be extended to Sandy Hill Street in Raynham.

The difference in the two alternatives are the lane and shoulder widths. Alternative 1 offers a narrower lane width with larger shoulder on the bridge curb side. Alternative 2 offers a more typical lane width with narrow shoulders on both sides of the roadway. Both alternatives will require design justifications for pedestrian and bicycle accommodation.

6.2 ALTERNATIVE 1

Alternative 1 features a cross-section with two 10-foot-wide travel lanes in each direction, accompanied by one 2-foot-wide shoulder on the sidewalk side and one 4-foot-wide shoulder on the safety curb side. Sidewalk is proposed on the west side of the roadway. The sidewalk is 6 feet wide from the condominium driveway to over the bridge. North of the bridge the sidewalk tapers down to 5.5 feet wide and terminates at Sandy Hill Street with reciprocal ramps. Vertical granite curb is proposed along the front of the sidewalk. Vertical granite curb is proposed at the back of sidewalk at Station 5+70 +/- to 6+32 +/- (LT) to avoid impacts to the wetlands. Alternative 1 will require a design justification for pedestrian accomodations because only one sidewalk is being proposed. The design does not allow for sidewalks on both sides of the road due to the width constraint of the existing bridge substructure. A design justification is also needed for the bicycle accomodations. Neither a shared use path or seperated bike lanes were able to fit within the existing bridge structure. Therefore, a 4-foot shoulder was provided on the east side, which is the minimum width for bicycle accomodation. A 2-foot shoulder was provided on the west side against the sidewalk for drainage, errant vehicles, and encroachment and off-tracking of wide vehicles. Sharrows can be added in the northbound lane.

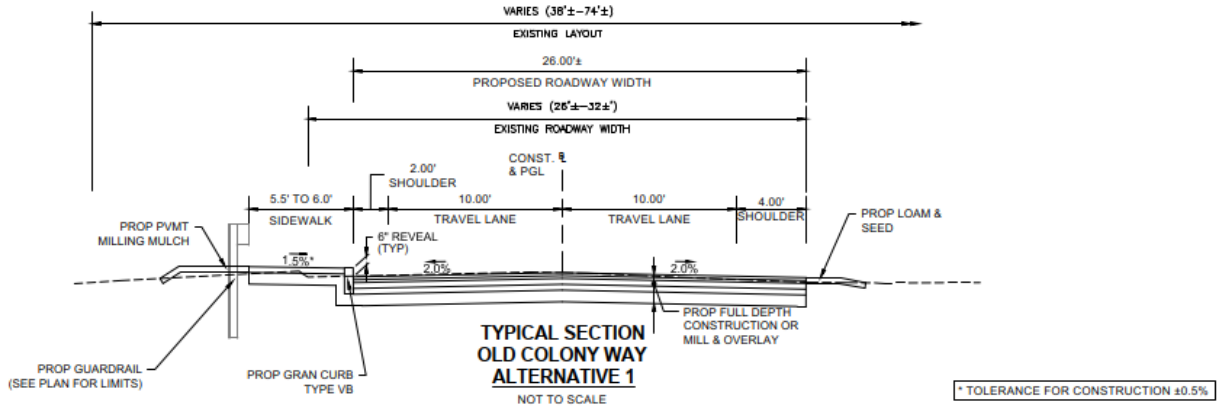

Figure 2 Typical Section Alternative 1

6.3 ALTERNATIVE 2

Alternative 2 features a cross-section with two 11-foot-wide travel lanes in each direction, accompanied by two 2-foot-wide shoulders. Vertical granite curbing lines both sides of the roadway. Sidewalk proposed on the west side of the roadway. The sidewalk is 6 feet wide from the condominium driveway to over the bridge. North of the bridge the sidewalk tapers down to 5.5 feet wide and terminates at Sandy Hill Street with reciprocal ramps. Vertical granite curb is proposed along the front of the sidewalk. Vertical granite curb is proposed at the back of sidewalk at Station 5+70 +/- to 6+32 +/- (LT) to avoid impacts to the wetlands. Alternative 2 will require a design justification for pedestrian

accomodations because only one sidewalk is being proposed. The design does not allow for sidewalks on both sides of the road due to the width constraint of the existing bridge substructure. A design justification is also needed for the bicycle accomodations. Neither a shared use path or seperated bike lanes were able to fit within the existing bridge structure. Therefore, 2- foot shoulders were provided on both sides of the roadway. Sharrows can be added to both travel lanes.

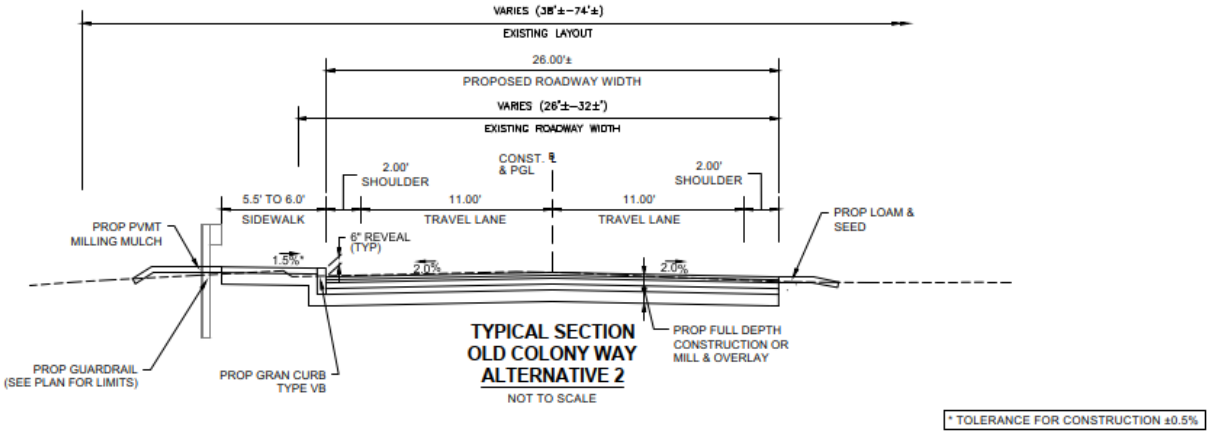

Figure 3 Typical Section Alternative 2

7.0 Opinion of Cost

The cost in both alternatives is the same because the cross-sectional width of the roadway, bridge, sidewalk and project limits are not different. The total estimated construction cost is $6,510,000.

8.0 Conclusion

Both alternatives require design justification for pedestrian and bicycle accommodation. Both have the same cost and impacts to utilities and properties. The only difference between the two are lane and shoulder configuration. Alternative 1 allows for bicycle accommodation southbound with a 4’ shoulder, while still maintaining the minimum lane width for a collector of 10-foot. Old Colony Avenue and South Street East is a bus route on the Greater Attleboro Taunton Regional Transit Authority. Bus lanes are permitted on 10’ travel lanes. The narrower 10’ roadway will help reduce speeds. Alternative 2 is like existing conditions where the lane widths are close to 11-feet and the shoulders are close 2-feet. Sharrows can be added to both lanes to signify that vehicles will be sharing the roadway with bicyclists.

APPENDIX G – EFH & USFWS Section 7 Documentation

- NOAA Section 7 Consultation
- USFWS Essential Fish Habitat Coordination Sediment Sample Test Results

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New England Ecological Services Field Office
70 Commercial Street, Suite 300
Concord, NH 3301-5094
Phone: (603) 223-2541 Fax: (603) 223-0104

In Reply Refer To: 12/18/2025 17:10:42 UTC
Project code: 2026-0024808
Project Name: 613642- RAYNHAM- TAUNTON- BRIDGE REPLACEMENT, R-02-003, SOUTH STREET EAST OVER THE TAUNTON RIVER

Subject: Not Likely to Adversely Affect Concurrence verification letter for the '613642- RAYNHAM- TAUNTON- BRIDGE REPLACEMENT, R-02-003, SOUTH STREET EAST OVER THE TAUNTON RIVER' project under the December 13, 2024, FHWA, FRA, FTA Programmatic Biological Opinion for Transportation Projects within the Range of the Indiana Bat, Northern Long-eared Bat, and Tricolored Bat.

To whom it may concern:

This letter records the determination of effects to federally listed (or proposed) bat species anticipated to result from the 613642- RAYNHAM- TAUNTON- BRIDGE REPLACEMENT, R-02-003, SOUTH STREET EAST OVER THE TAUNTON RIVER (the Project). This determination is based upon information you entered into the assisted determination key (Dkey) associated with the above referenced Programmatic Biological Opinion/Conference Opinion (PBO/PCO) in the U.S. Fish and Wildlife Service's (Service) Information for Planning and Consultation (IPaC) system on the date listed above to verify that the Project may rely on the concurrence provided in the PBO/PCO to satisfy requirements under section 7(a)(2) of the Endangered Species Act of 1973 (ESA) (16 USC 1536), as amended.

Ensuring Accurate Determinations When Using IPaC:

The Service developed the IPaC system and this Dkey in accordance with the ESA and based on the PBO/PCO. All information submitted by the project proponent into IPaC must accurately represent the full scope and details of the Project.

Failure to accurately represent or implement the Project as detailed in the Dkey invalidates this letter. Answers to certain questions in the Dkey commit the project proponent to implementation of conservation measures that must be followed for the ESA determinations to remain valid. Carefully review this letter, your ESA requirements are <u>NOT</u> yet complete.

Determinations:

Based on the information you provided (Project Description shown below), you have determined that the Project is within the scope and adheres to the criteria of the PBO/PCO, including the adoption of applicable avoidance and minimization measures. Based on your IPaC submission and the PBO/PCO, the Project is consistent with the following effect determinations:

Species	Listing Status	Determination
Northern Long-eared Bat (*Myotis septentrionalis*)	Endangered	NLAA
Tricolored Bat (*Perimyotis subflavus*)	Proposed Endangered	NLAA

The tricolored bat is proposed for listing as endangered under the ESA, but not yet listed. For actions that may affect a proposed species, agencies cannot consult, but they can confer under the authority of section 7(a)(4) of the ESA. Such conferences can follow the procedures for a consultation and be adopted as such if the proposed species is listed. Should the tricolored bat be listed, agencies must review projects that are not yet complete, or projects with ongoing effects within the tricolored bat range that previously received a no effect or not likely to adversely affect (NLAA) determination from the key to confirm that the determination is still accurate.

The Service has 14 calendar days to notify the lead Federal action agency or designated non-federal representative if we determine that the Project does not meet the criteria for a NLAA determination under the PBO/PCO. **If the Service does <u>not</u> notify the lead Federal action agency or designated non-federal representative within that timeframe, you may proceed with the Project under the terms of the NLAA concurrence provided in the PBO/PCO**. This verification period allows Service Field Offices to apply local knowledge to implementation of the PBO, as we may identify a small subset of actions having impacts that were unanticipated. In such instances, Service Field Offices may request additional information that is necessary to verify inclusion of the proposed action under the PBO/PCO.

If the Project is modified, or new information reveals that it may affect the Indiana bat, northern long-eared bat, or tricolored bat in a manner or to an extent not considered in the PBO/PCO, further review to conclude the requirements of ESA section 7(a)(2) may be required.

For Proposed Actions that include bridge/culvert or structure removal, replacement, and/or maintenance activities:

If your initial bridge, culvert, or structure assessment failed to detect Indiana bat, northern long-eared bat, or tricolored bat use or occupancy, yet bats are later detected prior to, or during construction, promptly notify the local Service Field Office within 2 working days of the discovery. In addition, please document whether incidental take occurred, and if so, the type (i.e. kill or harm) and amount (i.e. number of individuals) and submit documentation to the local Service Field Office within 5 working days from the completion of the bridge, culvert, or structure construction (use Appendix E - Post Assessment Discovery of Bats at Bridge/Culvert or Structure Form in the User's Guide). In these instances, potential incidental take of Indiana bats, northern long-eared bats, or tricolored bats may be exempted provided that the take is reported to

the Service. In these instances, potential incidental take of Indiana bats, northern long-eared bats, or tricolored bats may be exempted provided that the take is reported to the Service.

If the Project may affect any other federally listed or proposed species and/or designated critical habitat, additional consultation between the lead Federal action agency and this Service Field Office is required for those species/designated critical habitat. If the Project has the potential to take bald or golden eagles, additional coordination with the Service under the Bald and Golden Eagle Protection Act may also be required. In either of these circumstances, please advise the lead Federal action agency to contact this Service Field Office

The following species may occur in your project area and **are not** covered by this determination:

- Monarch Butterfly *Danaus plexippus* Proposed Threatened
- Plymouth Redbelly Turtle = Plymouth Redbelly Cooter *Pseudemys rubriventris bangsi* Endangered

PROJECT DESCRIPTION

The following project name and description was collected in IPaC as part of the endangered species review process.

NAME

613642- RAYNHAM- TAUNTON- BRIDGE REPLACEMENT, R-02-003, SOUTH STREET EAST OVER THE TAUNTON RIVER

DESCRIPTION

RAYNHAM- TAUNTON- BRIDGE REPLACEMENT, R-02-003=T-01-004 (3M4), SOUTH STREET EAST OVER THE TAUNTON RIVER

The proposed project consists of replacing the bridge deck, increasing safety, and improving operations of the roadway. The proposed design relocates the existing bridge sidewalk from the east to the west side of the bridge to connect to an existing sidewalk on the southwest approach. A 5-foot shoulder for a bike lane in the northbound direction improves safety by providing dedicated space for cyclists, separating them from vehicular traffic. This separation reduces the risk of conflicts between cyclists and vehicles.

Monarch Butterfly: Proposed Threatened Species only. The project action will not jeopardize the continued existence of the proposed species.

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@41.88630155,-71.03005054127355,14z

DETERMINATION KEY RESULT

Based on your answers provided, this project(s) may affect, but is not likely to adversely affect the Indiana bat, northern long-eared bat or tricolored bat, therefore, consultation with the U.S. Fish and Wildlife Service pursuant to Section 7(a)(2) of the Endangered Species Act of 1973 (ESA) (87 Stat. 884, as amended 16 U.S.C. 1531 et seq.) is required. However, also based on your answers provided, this project may rely on the concurrence provided in the Programmatic Biological Opinion/Conference Opinion for Transportation Projects in the Range of the Indiana bat, northern long-eared bat, and tricolored bat, dated December 13, 2024.

QUALIFICATION INTERVIEW

1. Which Federal Agency is the lead federal agency the action?

   A) Federal Highway Administration (FHWA)

2. Does the Action Area intersect the species list area of the Northern long-eared bat?

   Automatically answered
   Yes

3. Does the Action Area intersect the species list area of the tricolored Bat (TCB)?

   Automatically answered
   Yes

4. [Semantic] Is any portion of the action area within a 0.5 mile radius of an entrance/opening to any known NLEB or TCB hibernacula?

   Note: The map queried for this question contains proprietary information and cannot be displayed. If you need additional information, please contact the Field Office listed in the letterhead of this letter.

   Automatically answered
   No

5. Does your project's activities include raising the road profile above the tree canopy in documented habitat for the Indiana bat, NLEB, or TCB?

   Note: For the definition of documented habitat, refer to Appendix A: https://www.fws.gov/media/users-guide-range-wide-programmatic-consultation-indiana-bat-and-northern-long-eared-bat

   No

6. Is your project located within a karst area?

   No

7. Will the project include bridge, culvert, or structure removal, replacement, and/or alteration activities?

   Note: For definitions of bridge, culvert, and structure, refer to Appendix A: https://www.fws.gov/media/users-guide-range-wide-programmatic-consultation-indiana-bat-and-northern-long-eared-bat.

   Yes

8. Do your project's activities involve tree removal/trimming, temporary lighting, new/ additional permanent lighting, ground disturbance, percussives that involves noise/ vibration above existing background levels, vibrations, or slash pile burning?

   Yes

9. Is there suitable summer habitat for the Indiana bat, NLEB, or TCB within the project action area?

   Note: See the Service's summer survey guidance for current definitions of suitable habitat [https://www.fws.gov/midwest/endangered/mammals/inba/inbasummersurveyguidance.html].

   Yes

10. Have P/A surveys for the Indiana bat, NLEB, or TCB been conducted within the suitable summer habitat located within your project action area? This refers to mist-netting or acoustic surveys, not bridge assessments.

    Note: See the Service's survey guidance https://www.fws.gov/midwest/endangered/mammals/inba/inbasummersurveyguidance.html

    Yes

    SUBMITTED DOCUMENTS

    - *Raynham_613642_memo_20251027.pdf https://ipac.ecosphere.fws.gov/project/A3767GZ2FBHULEJFUCBVE3PERE/projectDocuments/173932326*

11. Did the P/A surveys detect Indiana bats, NLEBs, or TCBs?

    Note: If Indiana bats, NLEBs, or TCBs are detected, the action area is considered **documented habitat.**

    No

12. Did the local Service Field Office verify that this P/A survey can be used to determine Indiana bat, NLEB, and TCB are **not likely to be present** within the suitable summer habitat located within your project area?

    Yes

13. Will the project include **bridge** removal, replacement, and/or alteration activities?

    Yes

14. Has a Bridge Bat Assessment been conducted **within the last 24 months** to determine if the bridge is being used by the Indiana bat, NLEB, or TCB? If yes, upload assessment.

    Note: Refer to the Service's current survey guidance for acceptable assessment practices and validity timeframe of bridge/culvert and structure bat assessments: https://www.fws.gov/library/collections/range-wide-indiana-bat-and-northern-long-eared-bat-survey-guidelines.

    Yes

    SUBMITTED DOCUMENTS

    - *Raynham_613642_memo_20251027.pdf https://ipac.ecosphere.fws.gov/project/A3767GZ2FBHULEJFUCBVE3PERE/projectDocuments/173932326*

15. Please select one of the following results of the Bridge Bat Assessment:

    c) *Indicates the* ***absence*** *of Indiana bats, NLEBs, or TCBs roosting in/under the bridge (no bats, guano, etc.)?*

16. Does the project include **culvert** removal, replacement, and/or alteration activities?

    No

17. Does the project include **structure** removal, replacement, and/or alteration activities?

    No

18. Does the Action Area intersect the species list area of the tricolored Bat (TCB)?

    Automatically answered
    Yes

19. Does the Action Area intersect the species list area of the northern long-eared bat (NLEB)?

    Automatically answered
    Yes

PROJECT QUESTIONNAIRE

1. Have you made a No Effect determinations for all other species included on the FWS IPaC generated species list?

   Yes

2. Have you made a May Affect determination for any other species on the FWS IPaC generated list?

   No

3. Please enter the date of the bridge assessment.

   6/2/2025

AVOIDANCE AND MINIMIZATION MEASURES (AMMS)

This determination key result includes the commitment to implement the following Avoidance and Minimization Measures (AMMs):

GAMM1

Ensure all operators, employees, and contractors working in areas of Indiana bat, NLEB, or TCB suitable habitat are aware of all Transportation Agency environmental commitments, including all applicable AMMs.

DETERMINATION KEY DESCRIPTION: FHWA, FRA, FTA PROGRAMMATIC CONSULTATION FOR TRANSPORTATION PROJECTS AFFECTING IBAT, NLEB, OR TCB

This key was last updated in IPaC on September 11, 2025. Keys are subject to periodic revision.

This decision key is intended for projects/activities funded or authorized by the Federal Highway Administration (FHWA), Federal Railroad Administration (FRA), and/or Federal Transit Administration (FTA), which may require consultation with the U.S. Fish and Wildlife Service (Service) under Section 7 of the Endangered Species Act (ESA) and may affect the federally listed endangered Indiana bat (*Myotis sodalis*), northern long-eared bat (*Myotis septentrionalis*), and/or federally proposed endangered tricolored bat (*Perimyotis subflavus*).

This decision key should only be used to verify project applicability with the Service's Programmatic Biological Opinion/Conference Opinion for Transportation Projects in the Range of the Indiana bat, northern long-eared bat, and tricolored bat, dated December 13, 2024. The programmatic consultation limited transportation activities that may affect the covered bat species and addresses situations that are both likely and not likely to adversely affect the covered bat species. This decision key will assist in identifying the effect of a specific project/activity and the applicability of the programmatic consultation. The programmatic consultation is not intended to cover all types of transportation actions. Activities outside the scope of the programmatic consultation, or that may affect ESA-listed species other than the Indiana bat, northern long-eared bat, or tricolored bat, or their designated critical habitat, may require additional ESA Section 7 consultation.

IPAC USER CONTACT INFORMATION

Agency: Massachusetts Department of Transportation
Name: Stephanie Barton
Address: 10 Park Plaza
City: Boston
State: MA
Zip: 02116
Email stephanie.g.barton@dot.state.ma.us
Phone: 8572623378

Appendix A. Verification Form (updated January 2025)

Federal Highway Administration (FHWA) or the applicable state Department of Transportation (DOT) shall submit a signed version of this completed form, together with any project plans, maps, supporting analyses, etc., to NOAA's National Marine Fisheries Service (NMFS), Greater Atlantic Regional Fisheries Office, Protected Resources Division (GARFO PRD) at nmfs.gar.esa.section7@noaa.gov with "FHWA GARFO NLAA Program: [Project Title or Number]" in the subject line. **Note:** project design contractors and/or consultants may assist in preparing the form, but only FHWA/DOT staff shall sign off on it on the final page.

Project Activity Type (check all that apply to the entire action):

- [x] 1. Bridge repair, demolition, or replacement project
- [ ] 2. Culvert repair or replacement project
- [ ] 3. Dock, pier, or waterway access project (includes construction, demolition, and repairs)
- [ ] 4. Slope stabilization project

Transportation Project Information

Name of Project:	613642 RAYNHAM- TAUNTON- BRIDGE REPLACEMENT, R-02-003=T-01-004		
Reinitiation (Yes/No):	No		
State DOT/Program:	MassDOT		
DOT ID Code:	613642		
Contact Person:	Dave Paulson		
Phone:	+ 1 857 262 3378	Email:	david.j.paulson@dot.state.ma.
Project Latitude (e.g., 42.625884):		41.886006	
Project Longitude (e.g., -70.646114):		-71.030015	
Maximum Water Depth (m)		2.3	
Anticipated Project Start Date:	Decemeber 2026	Anticipated Project End Date:	October 2028
City/Town:	Taunton/ Raynham MA	Water body:	Taunton River
Project/Action Description and Purpose:	The Massachusetts Department of Transportation (MassDOT – Highway Division) Is proposing a reconstruction of the Old Colony Avenue Bridge over the Taunton River. The overall project limits extend 250' north of the intersection of Old Colony Avenue and Battle Row in Taunton, MA; along the Old Colony Avenue Bridge; and 370' to the intersection of South Street East and Sandy Hill Road, in Raynham, MA . The total length of the Project is approximately 790' along Old Colony Avenue and South Street East. The Project will consist of several activities including: Bridge deck replacement; Full depth pavement construction in the vicinity of the bridge; Pavement milling and overlay to the north and south of the bridge; Modifications to roadway geometry; Construction of a new sidewalk; New granite curbing; Striping of two travel lanes and a bike lane; Installation of Americans With Disabilities Act (ADA)-Compliant Ramps; Replacement of Guardrails; Paving of an existing town-owned gravel area associated with the pump station; Modifications to water, sewer, gas, electric and drainage utilities; Installation of a sediment forebay and leaching basins; Placement of riprap scour protection within the Taunton River; and Tree clearing and trimming. The Project only proposes the replacement of the superstructure and will maintain the existing substructure (i.e., piers and abutments). The project will result in temporary and permanent impacts to federally jurisdictional Waters of the U.S. including the land below Ordinary High Water (Streambank and Streambed) associated with the Taunton River. The Project will result in a total of 13,270		

ESA-listed species and/or critical habitats in the action area (Check all that apply)

☑	Atlantic sturgeon (all DPSs)	☐	Kemp's ridley sea turtle
☐	Atlantic sturgeon critical habitat Indicate which DPS (GOM, NYB, Chesapeake Bay DPSs): Select DPS	☐	Loggerhead sea turtle (Northwest Atlantic DPS)
☐	Shortnose sturgeon	☐	Leatherback sea turtle
☐	Atlantic salmon (GOM DPS)	☐	North Atlantic right whale
☐	Atlantic salmon critical habitat (GOM DPS)	☐	North Atlantic right whale critical habitat
☐	Green sea turtle (North Atlantic DPS)	☐	Fin whale

* Please consult GARFO PRD's ESA Section 7 Mapper for ESA-listed species and critical habitat information for your action area at: https://www.fisheries.noaa.gov/new-england-mid-atlantic/consultations/section-7-species-critical-habitat-information-maps-greater.

The following stressors are applicable to the action:

- ☐ Underwater Noise
- ■ Impingement/Entrainment and Entanglement
- ■ Water Quality/Turbidity
- ■ Habitat Alteration
- ☐ Vessel Traffic

Impacts Table

Habitat Alteration		
	Permanent (acres)	Temporary (acres)
Sand (saline)		
Silt/Mud/Clay (saline)		
Hard bottom (saline)		
Submerged Aquatic Vegetation (SAV) (saline)		
Sand (freshwater)		
Silt/Mud/Clay (freshwater)	0.19	0.10
Hard bottom (freshwater)		
Submerged Aquatic Vegetation (SAV) (freshwater)		
Total amount of habitat alteration	0.19	0.10

In-water Construction Impacts	
	Amount in meters
Width of water body in action area (m)	27.0
Stressor category that extends furthest distance into water body (e.g.; underwater noise, turbidity plume)	Turbidity
Maximum extent of stressor into the water body (m)	92.0

Project Design Criteria (PDC) Checklist
FHWA/DOT shall incorporate all general PDCs and all applicable PDCs in the appropriate stressor categories. For any PDCs that are not incorporated, additional justification is required for a project to be eligible for the NLAA Program. FHWA/DOT shall check the corresponding box for each PDC that is, or will be, incorporated into the project or indicate if not applicable.

GENERAL PDCs			
Yes	N/A	PDC #	PDC Description
☑	☐	1.	Ensure all operators, employees, and contractors are aware of all FHWA environmental commitments, including these PDC, when working in areas where ESA-listed species may be present or in critical habitat.
☑		2.	No portion of the proposed action will individually or cumulatively have an adverse effect on ESA-listed species or critical habitat.
☐	☑	3.	No portion of the proposed action that may affect the GOM DPS of Atlantic salmon will occur in the tidally influenced portion of rivers/streams where their presence is possible from April 10 through November 7. The range of the GOM DPS only occurs in Maine. **Note**: If the project will occur within the geographic range of the GOM DPS Atlantic salmon but their presence is not expected following the best available commercial scientific data, the work window does not need to be applied. Please attach best available information (i.e. local fisheries biologist correspondence).
☐	☑	4.	No portion of the proposed action that may affect shortnose or Atlantic sturgeon will occur in areas identified as spawning grounds as follows: i. Gulf of Maine: Apr 1-Aug 31 ii. Southern New England/New York Bight: Mar 15-Aug 31 iii. Chesapeake Bay: Mar 15-Jul 1 and Sep 15-Nov 1 **Note**: If river specific information exists that provides better or more refined time of year information, those dates may be substituted with NMFS approval.
☐	☑	5.	No portion of the proposed action that may affect shortnose or Atlantic sturgeon will occur in areas identified as overwintering grounds where dense aggregations are known to occur as follows: i. Gulf of Maine: Oct 15-Apr 30 ii. Southern New England/New York Bight: Nov 1-Mar 15 iii. Chesapeake Bay: Nov 1-Mar 15 **Note**: If river specific information exists that provides better or more refined time of year information, those dates may be substituted with NMFS approval.
☐	☑	6.	Within designated critical habitat for Atlantic sturgeon, no work will affect hard bottom substrate (e.g., rock, cobble, gravel, limestone, boulder, etc.) in low salinity waters (i.e., 0.0-0.5 parts per thousand) (PBF 1).
☑		7.	Work will result in no or only temporary/short-term changes in water temperature, water flow, salinity, or dissolved oxygen levels.

Yes	N/A	PDC #	PDC Description
☑		8.	If ESA-listed species are (a) likely to pass through the action area at the time of year when project activities occur; and/or (b) the project will create an obstruction to passage when in-water work is completed, then a zone of passage (~50% of water body) with appropriate habitat for ESA-listed species (e.g., depth, water velocity, etc.) must be maintained (i.e., physical or biological stressors such as turbidity and sound pressure must not create barrier to passage).
☑		9.	The project will not adversely impact any submerged aquatic vegetation (SAV) or oyster reefs.
☑		10.	No blasting or use of explosives will occur.
☑		11.	No in-water work on large dams or tide gates (small dam and tide gate repairs may be permitted with prior review and approval from NMFS).

UNDERWATER NOISE PDCs			
Yes	N/A	PDC #	PDC Description
☐	☑	12.	If pile driving is occurring during a time of year when ESA-listed species may be present, and the anticipated noise is above the behavioral noise threshold, a "soft start" is required to allow animals an opportunity to leave the project vicinity before sound pressure levels increase. *In addition to using a soft start at the beginning of the work day for pile driving, one must also be used at any time following cessation of pile driving for a period of 30 minutes or longer.* <u>For impact pile driving</u>: pile driving will commence with an initial set of three strikes by the hammer at 40% energy, followed by a one minute wait period, then two subsequent three-strike sets at 40% energy, with one-minute waiting periods, before initiating continuous impact driving. <u>For vibratory pile installation</u>: pile driving will be initiated for 15 seconds at reduced energy followed by a one-minute waiting period. This sequence of 15 seconds of reduced energy driving, one-minute waiting period will be repeated two additional times, followed immediately by pile-driving at full rate and energy.

Yes	N/A	PDC #	PDC Description
☐	☑	13.	All underwater noise is below the injury thresholds of ESA-listed species in the action area. Attach your calculations to this verification form supporting this.
☐	☑	14.	Any new pile-supported structure must involve the installation of no more than 50 piles (below MHW).

Information for Pile Driving:
If your project includes **pile driving of any kind**, please attach your calculation to this verification form to verify that it fits within the scope of the behavioral/injury threshold analysis for ESA-listed species in the action area. The NMFS Office of Protected Resources Acoustic Calculator is available as one source, should you not have other information:
https://www.fisheries.noaa.gov/new-england-mid-atlantic/consultations/section-7-effects-analysis-acoustics-greater-atlantic-region

Pile material (e.g., steel pipe, concrete)	Pile diameter/ width (in)	Number of piles	Installation method (e.g., impact hammer, vibratory start and then impact hammer to depth, drilling)

IMPINGEMENT/ENTRAINMENT AND ENTANGLEMENT PDCs			
Yes	N/A	PDC #	PDC Description
☑	☐	15.	If excavating or dredging, only mechanical buckets, hydraulic cutterheads, or low volume hopper dredges (e.g., CURRITUCK, ≤300 cubic yard maximum bin capacity) may be used. **Note**: We consider excavating a smaller scale form of mechanical dredging.
☑	☐	16.	No new excavation or dredging in Atlantic sturgeon or salmon critical habitat (excavation in a prior construction footprint or maintenance dredging is permitted, but still must meet all other PDCs). New excavation or dredging outside Atlantic sturgeon or salmon critical habitat is limited to one-time events (e.g., burying a cable or utility line) and minor (≤2 acres) expansions of areas already subject to prior excavation or maintenance dredging. Locating a replacement bridge within 250 feet (centerline to centerline) of an existing bridge and excavation of sediment around bridge piers are considered work in a previous construction footprint. **Note**: We consider excavating a smaller scale form of mechanical dredging.

Yes	N/A	PDC #	PDC Description
☑	☐	17.	Temporary intakes related to construction are prohibited in sturgeon and salmon spawning, rearing, or overwintering habitat during the time of year windows identified in General PDCs 3-5. If utilized outside those areas and times of year and in an area with anticipated sturgeon and salmon presence, temporary intakes must be equipped with 2-millimeter wedge wire mesh screening and must not have greater than 0.5 feet per second intake velocities, to prevent impingement or entrainment of juvenile and early life stages of these species.
☑	☐	18.	Work behind cofferdams, turbidity curtains, or other instruments that prevent access of animals to the project area is required when ESA-listed species are likely to be present (if presence is limited to rare, transient individuals, access control measures are not necessary). Once constructed, work inside a cofferdam at any time of year may be permitted with NMFS approval, provided the cofferdam is installed/removed outside the time-restricted period.
☑	☐	19.	No new permanent surface water withdrawal, water intakes, or water diversions.
☑	☐	20.	Turbidity control measures, including cofferdams, must be designed to not entangle or entrap ESA-listed species.
☐	☑	21.	Any in-water lines, ropes, or chains must be made of materials and installed in a manner to minimize or avoid the risk of entanglement by using thick, heavy, and taut lines that do not loop or entangle. Lines can be enclosed in a rigid sleeve.

WATER QUALITY/TURBIDITY PDCs			
Yes	N/A	PDC #	PDC Description
☐	☑	22.	In-water offshore disposal may only occur at designated disposal sites that have already been the subject of ESA section 7 consultation with NMFS and where a valid consultation is in place.
☐	☑	23.	Any temporary discharges must meet state water quality standards (e.g., no discharges of substances in concentrations that may cause acute or chronic adverse reactions, as defined by EPA water quality standards criteria).
☑	☐	24.	Only repair, upgrades, relocations, and improvements of existing discharge pipes or replacement in-kind are allowed; no new construction of untreated discharges.
☑	☐	25.	Work behind cofferdams, turbidity curtains, or other instruments to control turbidity is required when operationally feasible and ESA-listed species are likely to be present (if presence is limited to rare, transient individuals, turbidity control methods are not necessary).

HABITAT ALTERATION PDCs			
Yes	N/A	PDC #	PDC Description
☑	☐	26.	Minimize all new waterward encroachment and permanent fill.
☐	☑	27.	In Atlantic salmon critical habitat, stream simulation design with a minimum span of 1.2 bankfull width will be used in areas with minimal tidal influence. In tidal areas, a design that allows for unimpeded flow will be used (no delay in water entering or exiting the area upstream of the crossing).
☐	☑	28.	In Atlantic salmon critical habitat, no culvert end extensions, invert line culvert rehabilitation, or slipline culvert rehabilitation may occur.

VESSEL TRAFFIC PDCs			
Yes	N/A	PDC #	PDC Description
☐	☑	29.	Maintain project (i.e., construction) vessels operating within the action area to speed limits below 10 knots and dredge vessels to speeds of 4 knots maximum, while dredging.
☐	☑	30.	Maintain a 1,500-foot buffer between project (i.e., construction) vessels and ESA-listed whales and a 300-foot buffer between project vessels and sea turtles. This also applies to dredge vessels.
☐	☑	31.	The number of project (construction) vessels must be limited to the greatest extent possible, as appropriate to size and scale of project.
☐	☑	32.	The project must not result in the permanent net increase of commercial vessels.

Justification for NLAA Determination if not Incorporating All PDC
If the project is not in compliance with all of the general and stressor-based PDCs, but you can provide justification and/or special conditions to demonstrate why the project still meets the NLAA determination and is consistent with the aggregate effects considered in the programmatic consultation, you may still certify your project through the NLAA program using this verification form. Please identify which PDCs your project does not meet (e.g., PDC 9, PDC 15, PDC 22, etc.) and provide your rationale and justification for why the project is still eligible for the verification form. Project modifications must not result in different effects not already considered.

To demonstrate that the project is still NLAA, you must explain why the effects on ESA-listed species or critical habitat are **insignificant** (i.e., too small to be meaningfully measured or detected) or **discountable** (i.e., extremely unlikely to occur). **Please use this language in your justification.**

PDC#	Justification

FHWA/DOT Verification of Determination (To be filled out by FHWA/DOT staff only)
By submitting this Verification Form, FHWA, or the state DOT as FHWA's designated non-federal representative, indicates that they determined that the proposed activity described above is not likely to adversely affect (NLAA) ESA-listed species or designated critical habitat under NMFS jurisdiction in accordance with the Program, and all effects (direct, indirect, interrelated, and interdependent) are either insignificant (so small they cannot meaningfully be measured, detected, or evaluated) or discountable (extremely unlikely to occur).

☑	In accordance with the FHWA GARFO NLAA Program, we have determined that the action complies with all applicable PDCs and is not likely to adversely affect listed species.
☐	In accordance with the FHWA GARFO NLAA Program, we have determined that the action is not likely to adversely affect listed species per the justifications and/or special conditions provided above.

FHWA/DOT Signature:	Date:
	01/09/2026

By providing your determination and signature, you are certifying that to the best of your knowledge the information provided in this form is accurate and based upon the best available scientific information. This form must be filled out and signed by FHWA or state DOT staff, as an officially designated non-federal representative.

GARFO PRD Concurrence (To be filled out by GARFO PRD)
After receiving the Verification Form, GARFO PRD will contact FHWA/DOT with any concerns and indicate whether GARFO PRD concurs with FHWA/DOT's determination.

☑	In accordance with the FHWA GARFO NLAA Program, GARFO PRD concurs with FHWA/DOT's determination that the action complies with all applicable PDCs and is not likely to adversely affect listed species or critical habitat.
☐	In accordance with the FHWA GARFO NLAA Program, GARFO PRD concurs with FHWA/DOT's determination that the action is not likely to adversely affect listed species or critical habitat per the justifications and/or special conditions provided above.
☐	GARFO PRD does not concur with FHWA/DOT's determination that the action complies with the applicable PDCs (with or without justifications), and recommends an individual Section 7 consultation to be completed independent from the FHWA GARFO NLAA Program.

GARFO PRD Signature:	Date:
	01/12/2026

Appendix B. Verification Form

This form demonstrates compliance with the FHWA/NMFS GARFO EFH Programmatic Consultation dated 1/16/24. The applicable state Department of Transportation (state DOT) will complete this form and enter the project details into the ESA/EFH webtool (https://www.environment.fhwa.dot.gov/esawebtool/) to apply the programmatic consultation to a transportation project. FHWA will receive and review the completed forms before a final NEPA decision as part of the overall environmental review process. FHWA with the assistance of VOLPE will compile the information provided by all covered state DOTs on the completed Verification Forms and ESA/EFH webtool for the purposes of tracking and annual monitoring. FHWA/state DOT must include the completed Verification Form as part of a permit application with any other federal agency, such as U.S. Army Corps of Engineers or U.S. Coast Guard, to confirm that EFH consultation is complete.

Projects that are unable to meet the mandatory conservation recommendations in **bold** the state DOT will work with their FHWA Division Office to complete individual EFH consultation with NMFS.

Project Activity Type

1. ☒ Bridge repair, demolition, and replacement
2. ☐ Culvert repair and replacement
3. ☐ Docks, piers, and waterway access projects
4. ☐ Slope stabilization

Transportation Project Information

Project Name:	RAYNHAM- TAUNTON- BI	Project Number:	613642
Project Sponsor:	MassDOT	Contact Person:	Dave Paulson
Email:	david.j.paulson@dot.state.	Phone:	+ 1 857 262 3378
Latitude (e.g., 42.625884):		41.886005903543975	
Longitude (e.g., -70.646114):		71.0300152141668	
City/Town, State:	Taunton/ Raynham MA	Waterway:	Taunton River
Project Description and Purpose:	The Massachusetts Department of Transportation (MassDOT – Highway Division) Is proposing a reconstruction of the Old Colony Avenue Bridge over the Taunton River. The overall project limits extend 250' north of the intersection of Old Colony Avenue and Battle Row in Taunton, MA; along the Old Colony Avenue Bridge; and 370' to the intersection of South Street East and Sandy Hill Road in Raynham MA. The total length of the Project		
Anticipated Project Start Date:	Dec 2026	Anticipated Project End Date:	October 2028
Total area of impact to EFH (in acres): Include locus map with area of impact.		0.29	
Area of impacts to sensitive habitats (in square feet):		No impacts to submerged aquatic vegetation (SAV) or oyster reefs allowed.	
Natural rocky habitat (e.g., bedrock, boulders, cobble, and/or gravel):		0	
Salt marsh:		0	
Areas containing shellfish (excluding oyster reefs):		0	
Intertidal mudflats:		0	
Area of impact to diadromous fish habitat:		0.29	

Potential Stressors Caused by the Activity (Check all that apply based on activity type)

☐ Underwater Noise
☒ Impingement/Entrainment and Entanglement
☒ Water Quality/Turbidity
☒ Habitat Alteration
☐ Vessel Traffic

EFH Conservation Recommendation Checklist

FHWA/state DOT will indicate how the project addresses each of the programmatic EFH conservation recommendations, by selecting the appropriate check box and providing a brief explanation where necessary. **Bolded CRs are required.** If the project is not in compliance with any additional programmatic EFH conservation recommendation and FHWA/state DOT has still determined that the effects of a project on EFH are not substantial and the project is otherwise consistent with the FHWA programmatic EFH consultation, provide justification below under the conservation recommendations that are not included.

Underwater Noise

☒ Check here if the EFH conservation recommendations in this section are not applicable because the project will not create underwater noise as a stressor. Proceed to the next stressor.

1. Use a vibratory hammer to the maximum extent practicable.

☐ Not met:

☐ Not applicable, provide reasoning:

☐ Project is unable to accommodate, provide justification:

☐ Met:

☐ Shown on project plans
☐ Included in description, other terms and conditions

2. For impact driving, an initial set of three strikes would be made by the hammer at 40 percent energy, followed by a 1-minute wait period, then two subsequent 3-strike sets at 40 percent energy, with 1-minute waiting periods, before initiating continuous impact driving. In addition to a soft start at the beginning of the day for impact pile driving, a soft start must also be used at any time following cessation of impact pile driving for a period of thirty minutes or longer and if any increase in pile installation or removal intensity is required. Build up power slowly from a low energy start-up over a 20-minute period to warn fish to leave the vicinity. This buildup shall occur in uniform stages to provide a constant increase in output. This should be done in accordance with the methods outlined in the NMFS GARFO/FHWA Best Management Practices (BMP) Manual.

☐ Not met:

☐ Not applicable, provide reasoning:

☐ Project is unable to accommodate, provide justification:

☐ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

3. Avoid the use of hollow steel pipe piles when possible.

☐ Not met:
- ☐ Not applicable, provide reasoning:
- ☐ Project is unable to accommodate, provide justification:

☐ Met:
- ☐ Shown on project plans
- ☐ Included in description, other terms and conditions

4. Do not undertake noise-generating work in diadromous streams within the spring diadromous fish TOY restriction listed in Appendix C unless it is isolated behind sealed, dewatered cofferdams, to avoid impeding fish migration.

☐ Not met:
- ☐ Not applicable, provide reasoning:
- ☐ Project is unable to accommodate, provide justification:

☐ Met:
- ☐ Shown on project plans
- ☐ Included in description, other terms and condition

Impingement/Entrainment and Entanglement

☐ Check here if the EFH conservation recommendations in this section are not applicable because the project will not lead to impingement/entrainment and entanglement as a stressor. Proceed to the next stressor.

5. **Turbidity control measures must be properly installed, secured and regularly monitored to ensure aquatic species are not entangled or trapped in the project area.**

☐ Not met: Project requires individual consultation with NMFS

☒ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

6. **No new permanent surface water withdrawal, water intakes, or water diversions. (Permanent surface water intakes do not include dry hydrants.)**

☐ Not met: Project requires individual consultation with NMFS

☒ Met
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

7. Install and operate temporary intakes related to construction in accordance with the NMFS GARFO/FHWA Best Management Practices (BMP) Manual and equip intakes with mesh size screening and approach velocity appropriate for the species and life stage anticipated to be present during construction. Temporary pumping/intakes related to construction water handling will be based on the resource present and be in accordance with state fisheries consultation (with documentation provided) where such consultation is available. In addition,
   a) Per the NMFS Anadromous Salmonid Passage Facility Design manual, screen openings must not exceed 3/32 inch and screen approach velocity must be less than 0.25 feet per second (ft. /sec) in waters supporting anadromous salmonids.
   b) The use of 2 millimeter (mm) wedge wire screens must be used with a maximum intake velocity of 0.5 feet per second (ft. /sec).
   c) In Virginia, a 1 mm wedge wire screen with a maximum intake velocity of 0.25 ft. /sec) is required.

☐ Not met:
- ☐ Not applicable, provide reasoning:
- ☐ Project is unable to accommodate, provide justification:

☒ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

Water Quality/Turbidity

☐ Check here if the EFH conservation recommendations in this section are not applicable because the project will not negatively affect water quality or create turbidity. Proceed to the next stressor.

8. **Install soil erosion, sediment, and turbidity controls and maintain them in effective operating condition during construction. Remove controls upon completion of work, after all exposed soil and other fills, as well as any work waterward of ordinary high water or the high tide line, are permanently stabilized.**

☐ Not met: Project requires individual consultation with NMFS

☒ Met:
- ☒ Shown on project plans
- ☒ Included in description, other terms and conditions

9. **Prevent construction debris and sediment from entering aquatic areas and remove all construction debris and excess/deteriorated materials and dispose of in an appropriate upland area.**

☐ Not met: Project requires individual consultation with NMFS

☒ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

10. **Dredged and/or excavated materials, including any fine-grained materials removed from inside culverts, shall either be moved to an upland location and stabilized to prevent reentry into the waterway or disposed of at a previously approved disposal site.**

☐ Not met: Project requires individual consultation with NMFS

☒ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

11. **Completely remove and do not reuse existing creosote piles that are affected by project activities and do not install new creosote piles. Piles that break or cannot be removed due to site conditions must be cut off at the mudline.**

☐ Not met: Project requires individual consultation with NMFS

☒ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

12. **Ensure that raw concrete does not contact the water; wet pours of concrete must be confined within sealed forms until the concrete is set or pre-cast members installed. Ensure grout bags are watertight.**

☐ Not met: Project requires individual consultation with NMFS

☒ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

13. Install and remove any in-water soil erosion, sediment, and turbidity controls outside of the TOY restrictions listed in Appendix C.

☐ Not met:

☐ Not applicable, provide reasoning:

☐ Project is unable to accommodate, provide justification:

☒ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

14. Conduct in-water work that produces turbidity or sedimentation in diadromous streams or EFH outside of the TOY restriction(s) in Appendix C.

☐ Not met:
- ☐ Not applicable, provide reasoning:
- ☐ Project is unable to accommodate, provide justification:

☒ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

15. Do not use any creosote, coal tar epoxy, or other hydrocarbon-based coatings on any in-water structures or overwater structures. Dispose of any demolished structures treated with creosote, coal tar epoxy, or other hydrocarbon-based coatings in an approved upland disposal site.

☒ Not met:
- ☒ Not applicable, provide reasoning:
  Project does not propose any hydrocarbon-based coatings
- ☐ Project is unable to accommodate, provide justification:

☐ Met:
- ☐ Shown on project plans
- ☐ Included in description, other terms and conditions

16. In NJ only, in areas mapped as shellfish beds pursuant to N.J.A.C 7:7-9.2
    - All structures should be constructed with alternative materials, such as plastic, natural cedar or other untreated wood, or pressure-treated wood, coated offsite with an impact resistant, biologically inert substance to minimize leachate into shellfish areas.

- Coat any chemically or pressure treated piles (CCA, ACQ, etc.) with an impact-resistant, biologically inert substance. Coating should be applied during the manufacturing process, not post-manufacturing by a third party or contractor.

☒ Not met:

☒ Not applicable, provide reasoning:

Project action area is not in New Jersey

☐ Project is unable to accommodate, provide justification:

☐ Met:

☐ Shown on project plans

☐ Included in description, other terms and conditions

Habitat Alteration

☐ Check here if the EFH conservation recommendations in this section are not applicable because the project will not cause habitat alteration. Proceed to the next stressor.

17. **Remove temporary and/or obsolete structures and fills in their entirety. Use geotextile barriers prior to placement of temporary fill material to ensure complete removal.**

☐ Not met: Project requires individual consultation with NMFS

☒ Met:

☐ Shown on project plans

☒ Included in description, other terms and conditions

18. **Return areas impacted by temporary activities, fills, or structures to pre-construction or better condition, including elevations and substrate, and replant with native species.**

☐ Not met: Project requires individual consultation with NMFS

☒ Met:

☐ Shown on project plans

☒ Included in description, other terms and conditions

19. **Temporary monitoring devices, if used in-water as part of an activity, shall be removed and the substrate restored to pre-construction elevations no later than 24 months from initial installation, or upon completion of data acquisition.**

☐ Not met: Project requires individual consultation with NMFS

☒ Met:

☐ Shown on project plans

☒ Included in description, other terms and conditions

20. **Pipelines and cables that cross a waterway must not rest on the substrate. They may be**

attached to an overwater structure or be buried to allow an area to return to preexisting conditions.

☐ Not met: Project requires individual consultation with NMFS

☒ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

21. **Any fill, including planting media and placement of any seed shellfish, spatted-shell, or cultch must be free of all non-native or invasive species and/or contaminants. An invasive species control plan must be part of the project if the transportation agency cannot guarantee this.**

☐ Not met: Project requires individual consultation with NMFS

☒ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

22. **Prevent dislodging of coir logs, mats, or native oyster shell.**

☐ Not met: Project requires individual consultation with NMFS

☒ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

23. **Lowermost section of floating docks and vessels must be ≥18 inches above the substrate at all times.**

☐ Not met: Project requires individual consultation with NMFS

☒ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

24. **Avoid propeller scour and grounding of all project vessels and floating docks.**

☐ Not met: Project requires individual consultation with NMFS

☒ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

25. Provide compensatory mitigation for all permanent impacts to aquatic habitats and for temporary impacts in place over 12 months to address the temporal loss of aquatic habitat functions. This could include a contribution to an existing in-lieu fee program. Because compensatory mitigation is intended to offset adverse effects of an action, it

cannot be viewed separately from an action causing the effect.

When impacts are unavoidable:

a) Conduct a pre-biological survey to map the coverage of the sensitive habitats;
b) Develop a compensatory mitigation plan for biological resource losses, including success criteria, monitoring and adaptive management plans, and long-term maintenance plan. Use the 2008 Final Rule, Compensatory Mitigation for Losses of Aquatic Resources under Clean Water Act Section 404 (33 CFR Parts 325 and 332, 40 CFR Part 230) and NOAA's Mitigation Policy as guides for the development of the compensatory mitigation plan.
c) Undertake compensatory mitigation prior to or concurrent with any impacts to sensitive habitat.

☒ Not met:

◉ Not applicable, provide reasoning:

The project does not propose any loss of aquatic resources

☐ Project is unable to accommodate, provide justification:

☐ Met:

☐ Shown on project plans
☐ Included in description, other terms and conditions

26. Prior to construction, identify and mark in the field any SAV and wetlands at the project site. An SAV survey is required for activities adjacent to mapped or known SAV if a survey has not been conducted in the previous three years.

☐ Not met:

☐ Not applicable, provide reasoning:

☐ Project is unable to accommodate, provide justification:

☒ Met:

☐ Shown on project plans
☒ Included in description, other terms and conditions

27. Locate temporary structures, anchors, spud barges, and construction, access, and dewatering activities outside of special aquatic sites.

☐ Not met:

☐ Not applicable, provide reasoning:

☐ Project is unable to accommodate, provide justification:

☒ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

28. All in-water work, including dredging or discharge of fill material will be undertaken at, or approximating, low tide and using low ground pressure equipment to prevent compaction. Low ground pressure is defined as < 3 psi. Where construction requires heavy equipment operation in or across wetlands or mudflats, the equipment shall be placed on construction timber mats that are adequate to support the equipment; be operated on dry or frozen wetlands such that shear pressure does not cause subsidence of the wetlands immediately beneath equipment and upheaval of adjacent wetlands. Construction mats must not be dragged into position.

☐ Not met:
- ☐ Not applicable, provide reasoning:
- ☐ Project is unable to accommodate, provide justification:

☒ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

29. Remove temporary and/or obsolete structures and fills in their entirety, unless the structure or fill is to be left in place in order to comply with conditions imposed by other state or federal permits. Obsolete structures do not include any structures that are repurposed or preserved to prevent habitat degradation (e.g., abutments or sheet piling that remain in place for habitat or scour protection).

☐ Not met:
- ☐ Not applicable, provide reasoning:
- ☐ Project is unable to accommodate, provide justification:

☒ Met:
- ☐ Shown on project plans
- ☒ Included in description, other terms and conditions

30. If rock relocation is necessary, move them to an area of equivalent depth and substrate.

☐ Not met:

☐ Not applicable, provide reasoning:

☐ Project is unable to accommodate, provide justification:

☒ Met:

☐ Shown on project plans

☒ Included in description, other terms and conditions

31. The height of docks and piers must be at least four feet above salt marsh substrate and must be greater than or equal to the width of the deck to minimize shading impacts. The height must be measured from the marsh substrate to the bottom of the longitudinal support beam.

☐ Not met:

☐ Not applicable, provide reasoning:

☐ Project is unable to accommodate, provide justification:

☐ Met:

☐ Shown on project plans

☐ Included in description, other terms and conditions

32. The lowermost part of floating docks must be greater than or equal to 18 inches above the substrate at all times to avoid grounding and propeller scour and to provide adequate circulation and flushing.

☒ Not met:

☒ Not applicable, provide reasoning:

Floating docks not proposed

☐ Project is unable to accommodate, provide justification:

☐ Met:

☐ Shown on project plans

☐ Included in description, other terms and conditions

33. Habitat restoration or mitigation projects must not result in a permanent conversion or loss of sensitive habitats such as SAV, natural rocky habitats, areas containing shellfish, mudflats, and riffle and pool complexes.

☒ Not met:

☒ Not applicable, provide reasoning:

No SAS in action area

☐ Project is unable to accommodate, provide justification:

☐ Met:

☐ Shown on project plans

☐ Included in description, other terms and conditions

34. Grain size of any sediment used as part of habitat restoration must be the same size or larger than the native material at the site. Material must be free from toxic chemicals (in excess of ERM values in NOAA SQuiRT tables), asphalt, and other trash or anthropogenic debris.

☐ Not met:

☐ Not applicable, provide reasoning:

☐ Project is unable to accommodate, provide justification:

☒ Met:

☐ Shown on project plans

☒ Included in description, other terms and conditions

35. The following buffers apply between the following habitats and the top of slope of the area to be dredged/excavated.:

a) In New England, setbacks of 100 ft. from tidal SAV or 25 ft. from natural rocky habitats, Special Aquatic Sites (wetlands, mudflats, riffle/pool complexes) and areas containing shellfish.
b) In NY, NJ, DE and PA, dredging shall not occur within 25 ft. from the edge of vegetated wetlands.
c) In NY and NJ, dredging shall not occur within 500 ft. of SAV in sediments greater than or equal to 90% sand and 250 ft. of SAV if sediments are less than 90% sand during the growing season (April 15-October 15) to minimize impacts to SAV due to turbidity.
d) In Virginia and Maryland, dredging shall not occur in areas within the distance from wetlands equal to four times the depth of the dredging.
e) In Maryland, dredging shall not occur within 500 yds. of a natural oyster beds between December 16 to March 14 and June 1 to September 30.

☐ Not met:
☐ Not applicable, provide reasoning:

☐ Project is unable to accommodate, provide justification:

☒ Met:
☐ Shown on project plans
☒ Included in description, other terms and conditions

36. Do not discharge new or proposed outlets directly into sensitive habitats and redirect upgrades to existing outlets away from sensitive habitats.

☐ Not met:
☐ Not applicable, provide reasoning:

☐ Project is unable to accommodate, provide justification:

☒ Met:
☐ Shown on project plans
☒ Included in description, other terms and conditions

Fish Passage/Migration Habitat

37. Design replacement crossings to provide anadromous and resident fish and aquatic organism passage to the maximum extent possible. Use the Federal Interagency Nature-like Fishway Passage Design Guidelines for Atlantic Coast Diadromous Fishes and Culvert Design For Aquatic Organism Passage FHWA-HIF-11-008) for design guidance. In addition, structures must:
    - provide sufficient water depth and maintain suitable water velocities during migration periods; and
    - maintain or replicate natural stream channel and flow conditions.

☐ Not met:
☐ Not applicable, provide reasoning:

☐ Project is unable to accommodate, provide justification:

☒ Met:

☒ Shown on project plans
☒ Included in description, other terms and conditions

38. Replaced or upgraded crossings must be a similar or improved structure type and must be designed to provide diadromous and resident fish organism passage by providing sufficient water depth, maintaining suitable water velocities during migration periods, and maintaining or replicating natural stream channel and flow conditions. Upgraded crossings must be designed in accordance with the order of preference set out in NMFS' Anadromous Salmonid Passage Facility Design, unless such design is otherwise approved by the State Fisheries Agency.

☐ Not met:
☐ Not applicable, provide reasoning:

☐ Project is unable to accommodate, provide justification:

☒ Met:
☒ Shown on project plans
☒ Included in description, other terms and conditions

39. For activities that require soil erosion, sediment, and turbidity controls, prevent impeding the run by incorporating the following:
    a) in non-tidal streams containing diadromous fish
        i. the activities must not encroach >25% of the stream width measured from ordinary high water during the anadromous TOY restriction unless such encroachment is otherwise approved by State Fisheries; and
        ii. In waterways supporting diadromous fish, the activities must maintain safe, timely, and effective downstream fish passage throughout the project.
    b) in tidal waters:
        i. The activities must not encroach >50% of a tidal stream's width as measured from mean high water unless such encroachment is otherwise approved by the State Fisheries Agency.

☐ Not met:
☐ Not applicable, provide reasoning:

☐ Project is unable to accommodate, provide justification:

☒ Met:

☐ Shown on project plans
☒ Included in description, other terms and conditions

40. Incorporate climate change and sea level rise projections into the project design as appropriate to address changing hydrologic conditions (increased precipitation and stream flow, altered tidal regimes, etc.). Guidance can be found in NOAA Fisheries' national Procedure for Addressing Climate Change in NMFS Essential Fish Habitat Consultations and GARFO's Guidance for Integrating Climate Change Information in Greater Atlantic Region Habitat Conservation Division Consultation Processes, including the recommendation to use relevant local or regional climate prediction models where available as well as emission and climate projection scenarios on a global scale from the Intergovernmental Panel on Climate Change (IPCC). The use of a "high" (e.g., RCP/SSP8.5) and an "intermediate" (e.g., RCP/SSP 4.5 or RCP 6.0) scenario (IPCC 2021) is suggested. For SLR projections, at a minimum the 1.0 m mean global scenario is recommended with the relevant downscaled projections for the closest tide gauge location identified in Sweet et al. (2022).

☒ Not met:
☒ Not applicable, provide reasoning:

Climate change analysis was not done due to the project keeping existing abutments.

☐ Project is unable to accommodate, provide justification:

☐ Met:
☐ Shown on project plans
☐ Included in description, other terms and conditions

Vessel Interactions

☒ Check here if the EFH conservation recommendations in this section are not applicable because the project will not use vessels.

41. Project vessels shall be operated in adequate water depths in the action area to avoid propeller scour and grounding at all tides. Shallow draft vessels will be used in shallow areas to maximize the navigational clearance between the vessel and the bottom substrate. Spuds may be used to elevate the vessel.

☐ Not met:
☐ Not applicable, provide reasoning:

☐ Project is unable to accommodate, provide justification:

☐ Met:
- ☐ Shown on project plans
- ☐ Included in description, other terms and conditions

42. Project vessels shall not be moored in or use spuds in SAV or be located in such a way that the vessel could shade SAV.

☐ Not met:
- ☐ Not applicable, provide reasoning:
- ☐ Project is unable to accommodate, provide justification:

☐ Met:
- ☐ Shown on project plans
- ☐ Included in description, other terms and conditions

43. Vessels transit through SAV shall be done at high tide.

☐ Not met:
- ☐ Not applicable, provide reasoning:
- ☐ Project is unable to accommodate, provide justification:

☐ Met:
- ☐ Shown on project plans
- ☐ Included in description, other terms and conditions

Activities that Require Individual Consultation

1. Any work (including anchoring) that results in temporary or permanent impacts to:
    a) Existing or historically mapped submerged aquatic vegetation (SAV) beds or areas within 100 feet of existing or historically mapped SAV beds unless otherwise confirmed to be absent by survey.
    b) ≥ 1,000 SF of tidal SAS (except tidal SAV, see 1 above), natural rocky habitats, or freshwater SAV.
2. Stream channelization.
3. Any temporary structures, construction access, and dewatering activities proposed to be in place for ≥ two years
4. Slip-lining or invert lining existing culverts in tidal waters or non-tidal waters that support diadromous fishes. Resources to assist in the identification of these waters can be found in Appendix H and from State fishery agencies.
5. Structures (docks, piers, walkways) or temporary structures: Less than 1:1 height/width ratio or wider than 4 ft. over salt marsh waterward of MHW. The height should be measured from the substrate to the bottom of the longitudinal support beam lowermost portion of the deck structure.
6. Construction of new or expansion of existing boating facilities. For the purposes of this programmatic EFH consultation, a boating facility is boat docking or mooring space for more than two non-commercial vessels.
7. Excavation for the purpose of establishing new or improved navigation channels (e.g. dredging), exceeding the thresholds listed under number 1 above.
8. Any nearshore disposal or beach nourishment activities.
9. New fill or stabilization structures placed below mean low water in excess of 200 linear feet (lf).
10. Replacement of:
    a) slope stabilization structures > 200 lf. *and* waterward of the existing toe, or
    b) vertical structures > 18 inches waterward of the existing face *and* > 200 lf.
11. in layer deposition as a part of wetland restoration.
12. Placement of any seed shellfish, spatted-shell, or cultch in the following sensitive habitats: fish and wildlife sanctuaries and refuges, mudflats, SAV beds, riffle/pool complexes, natural rocky habitats, intertidal areas, and areas containing shellfish.
13. In-water utility lines ≥100 linear feet (LF) installed by trench excavation; or where installed by jet-plow, fluidization or other direct burial methods:
    a) installed in mud, clay, or silt substrates; or
    b) ≥200 LF when installed in sandy substrates (e.g. >/= 90% coarse grained sand habitats (Wentworth <35 ASTM No. US Standard)). Direct burial methods do not include jacking or directional drilling/boring.
14. Airgun seismic activities.
15. Any new permanent surface water withdrawal, water intakes, or water diversions.
16. All work to tide gates without a USACE-approved operation and maintenance plan or alterations to tide gates that will affect the hydraulic regime. This does not include work on tide gates (e.g., duckbills, flap gates, etc.) that solely convey stormwater and/or NPDES-permitted discharges. See The Effects of Tide Gates on New England Wetlands and Other Tidal Resources. Greater Atlantic Region Policy Series [23-01] for additional information on tide gates and associated BMPs.
17. In-water blasting that affects EFH or diadromous species habitat, or out-of-water blasting with the discharge of blasted material in water.

18. Construction of new bridges or culverts, where no crossing existed previously.
19. Any new or replacement causeways (raised roadways across waters or wetlands). Temporary causeways do not require project specific consultation (i.e., they are covered under the programmatic consultation), provided they do not exceed the above listed threshold or include other excluded activities.
20. Dam and flood control or levee repairs that will alter water levels or flood elevations during the diadromous time of year (TOY) restriction provided in App C.
21. Living shoreline >500 linear feet in length located below OHW or the HTL and/or includes beach nourishment/ land reclamation activities.
22. Living shorelines with structure and/or fill area that extends into the waterbody more than 30 FT from the MLW line, including sand fills, sills, breakwaters, or reefs, or any living shoreline that proposes to impact SAV.
23. Excavated materials, stored, deposited, and retained anywhere but an upland area that prevents sediments from reentering aquatic habitats, except as authorized/required by the terms of a USACE or USCG approval.

DOT Determination of Effects to Essential Fish Habitat and Signature
After reviewing the programmatic EFH conservation recommendations in Section 6.0 and Appendix B, state DOT will select the appropriate determination:

☒ The activity is in compliance with all programmatic EFH conservation recommendations in the FHWA programmatic EFH consultation and adverse effects to EFH will not be substantial.

☐ The activity is not in compliance with all of the programmatic EFH conservation recommendations in the FHWA programmatic EFH consultation and individual consultation with NMFS is needed.

Use the electronic fillable fields to include the name and signature of the state DOT preparing this Verification Form, along with the date.

State DOT Name Massachusetts Department of Transportation

Signature David Paulson

Digitally signed by David Paulson
Date: 2025.12.19 10:03:33 -05'00'

Date 12/19/2025

By providing your determination and signature, you are certifying that to the best of your knowledge the information provided in this form is accurate and based upon the best available scientific information. This form must be filled out and signed state DOT staff, as an officially designated non-federal representative. Email this Verification Form to your FHWA Division Office.

FHWA Review
After receiving the Verification Form, the FHWA Division Office will contact the state DOT with any concerns. FHWA will review this form before a final NEPA decision. FHWA will email the signed form back to the state DOT for record keeping.

☐ FHWA concurs with state DOT's determination that the proposed project is consistent with the programmatic EFH consultation (without the need for justification).

☒ FHWA concurs with state DOT's determination that the proposed project is consistent with the programmatic EFH consultation, with justification described above.

☐ FHWA does not concur with state DOT's determination that the project is consistent with the programmatic EFH consultation. FHWA/state DOT must conduct additional coordination with GARFO HCD and a separate individual EFH consultation may be required.

FHWA Reviewer

Name Signature

Date of Review

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DOCUMENT A00861

MASSACHUSETTS

DEPARTMENT OF ENVIRONMENTAL PROTECTION

ORDER OF CONDITIONS

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Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 5 – Order of Conditions

Raynham Wetlands Protection Bylaws Ch. 336

Provided by MassDEP: N/A
MassDEP File #

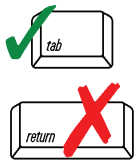
eDEP Transaction #

Raynham
City/Town

A. General Information

Please note: this form has been modified with added space to accommodate the Registry of Deeds Requirements

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



1. From: Raynham
Conservation Commission

2. This issuance is for (check one): a. ☒ Order of Conditions b. ☐ Amended Order of Conditions

3. To: Applicant:

Katherine — a. First Name
Nunes — b. Last Name
City of Taunton — c. Organization
90 Ingell St. — d. Mailing Address
Taunton — e. City/Town
MA — f. State
02767 — g. Zip Code

4. Property Owner (if different from applicant):

a. First Name
b. Last Name
Town of Raynham — c. Organization
558 South Main St. — d. Mailing Address
Raynham — e. City/Town
MA — f. State
02767 — g. Zip Code

5. Project Location:

Old Colony Ave Bridge over Taunton River — a. Street Address
Raynham — b. City/Town
N/A Roadway ROW — c. Assessors Map/Plat Number
N/A — d. Parcel/Lot Number

Latitude and Longitude, if known: d m s — d. Latitude; d m s — e. Longitude

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands
WPA Form 5 – Order of Conditions
Raynham Wetlands Protection Bylaws Ch. 336

Provided by MassDEP: N/A
MassDEP File #
eDEP Transaction #
Raynham
City/Town

A. General Information (cont.)

6. Property recorded at the Registry of Deeds for (attach additional information if more than one parcel):
N/A - Roadway ROW
a. County | b. Certificate Number (if registered land)
c. Book | d. Page

7. Dates: 2/9/2026 a. Date Notice of Intent Filed | 4/15/2026 b. Date Public Hearing Closed | 4/27/2026 c. Date of Issuance

8. Final Approved Plans and Other Documents (attach additional plan or document references as needed):
Raynham Conservation Commission Notice of Intent (NOI), Raynham, MA, Old Colony Avenue Over Taunton River
a. Plan Title
BETA Group, Inc. b. Prepared By | Christopher W. Jones, P.E. Structural #41025 c. Signed and Stamped by
October 2025 d. Final Revision Date | 1" = 40' e. Scale
See Attachment B
f. Additional Plan or Document Title | g. Date

B. Findings

1. Findings pursuant to the Massachusetts Wetlands Protection Act:

Following the review of the above-referenced Notice of Intent and based on the information provided in this application and presented at the public hearing, this Commission finds that the areas in which work is proposed is significant to the following interests of the Wetlands Protection Act (the Act). Check all that apply:

a. ☐ Public Water Supply b. ☐ Land Containing Shellfish c. ☒ Prevention of Pollution
d. ☐ Private Water Supply e. ☒ Fisheries f. ☒ Protection of Wildlife Habitat
g. ☒ Groundwater Supply h. ☒ Storm Damage Prevention i. ☒ Flood Control

2. This Commission hereby finds the project, as proposed, is: (check one of the following boxes)

Approved subject to:

a. ☒ the following conditions which are necessary in accordance with the performance standards set forth in the wetlands regulations. This Commission orders that all work shall be performed in accordance with the Notice of Intent referenced above, the following General Conditions, and any other special conditions attached to this Order. To the extent that the following conditions modify or differ from the plans, specifications, or other proposals submitted with the Notice of Intent, these conditions shall control.

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Bureau of Resource Protection - Wetlands
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Raynham Wetlands Protection Bylaws Ch. 336

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B. Findings (cont.)

Denied because:

b. ☐ the proposed work cannot be conditioned to meet the performance standards set forth in the wetland regulations. Therefore, work on this project may not go forward unless and until a new Notice of Intent is submitted which provides measures which are adequate to protect the interests of the Act, and a final Order of Conditions is issued. **A description of the performance standards which the proposed work cannot meet is attached to this Order.**

c. ☐ the information submitted by the applicant is not sufficient to describe the site, the work, or the effect of the work on the interests identified in the Wetlands Protection Act. Therefore, work on this project may not go forward unless and until a revised Notice of Intent is submitted which provides sufficient information and includes measures which are adequate to protect the Act's interests, and a final Order of Conditions is issued. **A description of the specific information which is lacking and why it is necessary is attached to this Order as per 310 CMR 10.05(6)(c).**

3. ☐ Buffer Zone Impacts: Shortest distance between limit of project disturbance and the wetland resource area specified in 310 CMR 10.02(1)(a) — a. linear feet

Inland Resource Area Impacts: Check all that apply below. (For Approvals Only)

Resource Area	Proposed Alteration	Permitted Alteration	Proposed Replacement	Permitted Replacement
4. ☒ Bank	51 perm 66 temp a. linear feet	51 perm 66 temp b. linear feet	66 rest. c. linear feet	66 rest. d. linear feet
5. ☐ Bordering Vegetated Wetland	a. square feet	b. square feet	c. square feet	d. square feet
6. ☒ Land Under Waterbodies and Waterways	4,399 perm 2,304 temp a. square feet 1,052 e. c/y dredged	4,399 perm 2,304 temp b. square feet 1,052 f. c/y dredged	6,703 rest. c. square feet	6,703 rest. d. square feet
7. ☒ Bordering Land Subject to Flooding	1,121 a. square feet	1,121 b. square feet	c. square feet	d. square feet
Cubic Feet Flood Storage	e. cubic feet	f. cubic feet	g. cubic feet	h. cubic feet
8. ☐ Isolated Land Subject to Flooding	a. square feet	b. square feet		
Cubic Feet Flood Storage	c. cubic feet	d. cubic feet	e. cubic feet	f. cubic feet
9. ☒ Riverfront Area	6,344 a. total sq. feet	6,344 b. total sq. feet		
Sq ft within 100 ft	6,344 c. square feet	6,344 d. square feet	e. square feet	f. square feet
Sq ft between 100-200 ft	0 g. square feet	h. square feet	i. square feet	j. square feet

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B. Findings (cont.)

Coastal Resource Area Impacts: Check all that apply below. (For Approvals Only)

	Proposed Alteration	Permitted Alteration	Proposed Replacement	Permitted Replacement
10. ☐ Designated Port Areas	Indicate size under Land Under the Ocean, below			
11. ☐ Land Under the Ocean	a. square feet	b. square feet		
	c. c/y dredged	d. c/y dredged		
12. ☐ Barrier Beaches	Indicate size under Coastal Beaches and/or Coastal Dunes below			
13. ☐ Coastal Beaches	a. square feet	b. square feet	c. nourishment cu yd	d. nourishment cu yd
14. ☐ Coastal Dunes	a. square feet	b. square feet	c. nourishment cu yd	d. nourishment cu yd
15. ☐ Coastal Banks	a. linear feet	b. linear feet		
16. ☐ Rocky Intertidal Shores	a. square feet	b. square feet		
17. ☐ Salt Marshes	a. square feet	b. square feet	c. square feet	d. square feet
18. ☐ Land Under Salt Ponds	a. square feet	b. square feet		
	c. c/y dredged	d. c/y dredged		
19. ☐ Land Containing Shellfish	a. square feet	b. square feet	c. square feet	d. square feet
20. ☐ Fish Runs	Indicate size under Coastal Banks, Inland Bank, Land Under the Ocean, and/or inland Land Under Waterbodies and Waterways, above			
	a. c/y dredged	b. c/y dredged		
21. ☐ Land Subject to Coastal Storm Flowage	a. square feet	b. square feet		
22. ☐ Riverfront Area	a. total sq. feet	b. total sq. feet		
Sq ft within 100 ft	c. square feet	d. square feet	e. square feet	f. square feet
Sq ft between 100-200 ft	g. square feet	h. square feet	i. square feet	j. square feet

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B. Findings (cont.)

* **#23**. If the project is for the purpose of restoring or enhancing a wetland resource area in addition to the square footage that has been entered in Section B.5.c (BVW) or B.17.c (Salt Marsh) above, please enter the additional amount here.

23. ☐ Restoration/Enhancement *:

a. square feet of BVW | b. square feet of salt marsh

24. ☐ Stream Crossing(s):

a. number of new stream crossings | b. number of replacement stream crossings

C. General Conditions Under Massachusetts Wetlands Protection Act

The following conditions are only applicable to Approved projects.

1. Failure to comply with all conditions stated herein, and with all related statutes and other regulatory measures, shall be deemed cause to revoke or modify this Order.
2. The Order does not grant any property rights or any exclusive privileges; it does not authorize any injury to private property or invasion of private rights.
3. This Order does not relieve the permittee or any other person of the necessity of complying with all other applicable federal, state, or local statutes, ordinances, bylaws, or regulations.
4. The work authorized hereunder shall be completed within three years from the date of this Order unless either of the following apply:
   a. The work is a maintenance dredging project as provided for in the Act; or
   b. The time for completion has been extended to a specified date more than three years, but less than five years, from the date of issuance. If this Order is intended to be valid for more than three years, the extension date and the special circumstances warranting the extended time period are set forth as a special condition in this Order.
   c. If the work is for a Test Project, this Order of Conditions shall be valid for no more than one year.
5. This Order may be extended by the issuing authority for one or more periods of up to three years each upon application to the issuing authority at least 30 days prior to the expiration date of the Order. An Order of Conditions for a Test Project may be extended for one additional year only upon written application by the applicant, subject to the provisions of 310 CMR 10.05(11)(f).
6. If this Order constitutes an Amended Order of Conditions, this Amended Order of Conditions does not extend the issuance date of the original Final Order of Conditions and the Order will expire on _____ unless extended in writing by the Department.
7. Any fill used in connection with this project shall be clean fill. Any fill shall contain no trash, refuse, rubbish, or debris, including but not limited to lumber, bricks, plaster, wire, lath, paper, cardboard, pipe, tires, ashes, refrigerators, motor vehicles, or parts of any of the foregoing.

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C. General Conditions Under Massachusetts Wetlands Protection Act

8. This Order is not final until all administrative appeal periods from this Order have elapsed, or if such an appeal has been taken, until all proceedings before the Department have been completed.

9. No work shall be undertaken until the Order has become final and then has been recorded in the Registry of Deeds or the Land Court for the district in which the land is located, within the chain of title of the affected property. In the case of recorded land, the Final Order shall also be noted in the Registry's Grantor Index under the name of the owner of the land upon which the proposed work is to be done. In the case of the registered land, the Final Order shall also be noted on the Land Court Certificate of Title of the owner of the land upon which the proposed work is done. The recording information shall be submitted to the Conservation Commission on the form at the end of this Order, which form must be stamped by the Registry of Deeds, prior to the commencement of work.

10. A sign shall be displayed at the site not less then two square feet or more than three square feet in size bearing the words,

"Massachusetts Department of Environmental Protection" [or, "MassDEP"]

"File Number N/A"

11. Where the Department of Environmental Protection is requested to issue a Superseding Order, the Conservation Commission shall be a party to all agency proceedings and hearings before MassDEP.

12. Upon completion of the work described herein, the applicant shall submit a Request for Certificate of Compliance (WPA Form 8A) to the Conservation Commission.

13. The work shall conform to the plans and special conditions referenced in this order.

14. Any change to the plans identified in Condition #13 above shall require the applicant to inquire of the Conservation Commission in writing whether the change is significant enough to require the filing of a new Notice of Intent.

15. The Agent or members of the Conservation Commission and the Department of Environmental Protection shall have the right to enter and inspect the area subject to this Order at reasonable hours to evaluate compliance with the conditions stated in this Order, and may require the submittal of any data deemed necessary by the Conservation Commission or Department for that evaluation.

16. This Order of Conditions shall apply to any successor in interest or successor in control of the property subject to this Order and to any contractor or other person performing work conditioned by this Order.

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C. General Conditions Under Massachusetts Wetlands Protection Act (cont.)

17. Prior to the start of work, and if the project involves work adjacent to a Bordering Vegetated Wetland, the boundary of the wetland in the vicinity of the proposed work area shall be marked by wooden stakes or flagging. Once in place, the wetland boundary markers shall be maintained until a Certificate of Compliance has been issued by the Conservation Commission.

18. All sedimentation barriers shall be maintained in good repair until all disturbed areas have been fully stabilized with vegetation or other means. At no time shall sediments be deposited in a wetland or water body. During construction, the applicant or his/her designee shall inspect the erosion controls on a daily basis and shall remove accumulated sediments as needed. The applicant shall immediately control any erosion problems that occur at the site and shall also immediately notify the Conservation Commission, which reserves the right to require additional erosion and/or damage prevention controls it may deem necessary. Sedimentation barriers shall serve as the limit of work unless another limit of work line has been approved by this Order.

19. The work associated with this Order (the “Project”)
    (1) ☒ is subject to the Massachusetts Stormwater Standards
    (2) ☐ is NOT subject to the Massachusetts Stormwater Standards

    If the work is subject to the Stormwater Standards, then the project is subject to the following conditions:

    a) All work, including site preparation, land disturbance, construction and redevelopment, shall be implemented in accordance with the construction period pollution prevention and erosion and sedimentation control plan and, if applicable, the Stormwater Pollution Prevention Plan required by the National Pollution Discharge Elimination System Construction General Permit as required by Stormwater Condition 8. Construction period erosion, sedimentation and pollution control measures and best management practices (BMPs) shall remain in place until the site is fully stabilized.

    b) No stormwater runoff may be discharged to the post-construction stormwater BMPs unless and until a Registered Professional Engineer provides a Certification that:

    i. all construction period BMPs have been removed or will be removed by a date certain specified in the Certification. For any construction period BMPs intended to be converted to post construction operation for stormwater attenuation, recharge, and/or treatment, the conversion is allowed by the MassDEP Stormwater Handbook BMP specifications and that the BMP has been properly cleaned or prepared for post construction operation, including removal of all construction period sediment trapped in inlet and outlet control structures;

    ii. as-built final construction BMP plans are included, signed and stamped by a Registered Professional Engineer, certifying the site is fully stabilized;

    iii. any illicit discharges to the stormwater management system have been removed, as per the requirements of Stormwater Standard 10;

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C. General Conditions Under Massachusetts Wetlands Protection Act (cont.)

iv. all post-construction stormwater BMPs are installed in accordance with the plans (including all planting plans) approved by the issuing authority, and have been inspected to ensure that they are not damaged and that they are in proper working condition;

v. any vegetation associated with post-construction BMPs is suitably established to withstand erosion.

c) The landowner is responsible for BMP maintenance until the issuing authority is notified that another party has legally assumed responsibility for BMP maintenance. Prior to requesting a Certificate of Compliance, or Partial Certificate of Compliance, the responsible party (defined in General Condition 18(e)) shall execute and submit to the issuing authority an Operation and Maintenance Compliance Statement ("O&M Statement) for the Stormwater BMPs identifying the party responsible for implementing the stormwater BMP Operation and Maintenance Plan ("O&M Plan") and certifying the following:

i.) the O&M Plan is complete and will be implemented upon receipt of the Certificate of Compliance, and

ii.) the future responsible parties shall be notified in writing of their ongoing legal responsibility to operate and maintain the stormwater management BMPs and implement the Stormwater Pollution Prevention Plan.

d) Post-construction pollution prevention and source control shall be implemented in accordance with the long-term pollution prevention plan section of the approved Stormwater Report and, if applicable, the Stormwater Pollution Prevention Plan required by the National Pollution Discharge Elimination System Multi-Sector General Permit.

e) Unless and until another party accepts responsibility, the landowner, or owner of any drainage easement, assumes responsibility for maintaining each BMP. To overcome this presumption, the landowner of the property must submit to the issuing authority a legally binding agreement of record, acceptable to the issuing authority, evidencing that another entity has accepted responsibility for maintaining the BMP, and that the proposed responsible party shall be treated as a permittee for purposes of implementing the requirements of Conditions 19(f) through 19(k) with respect to that BMP. Any failure of the proposed responsible party to implement the requirements of Conditions 19(f) through 19(k) with respect to that BMP shall be a violation of the Order of Conditions or Certificate of Compliance. In the case of stormwater BMPs that are serving more than one lot, the legally binding agreement shall also identify the lots that will be serviced by the stormwater BMPs. A plan and easement deed that grants the responsible party access to perform the required operation and maintenance must be submitted along with the legally binding agreement.

f) The responsible party shall operate and maintain all stormwater BMPs in accordance with the design plans, the O&M Plan, and the requirements of the Massachusetts Stormwater Handbook.

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C. General Conditions Under Massachusetts Wetlands Protection Act (cont.)

g) The responsible party shall:
1. Maintain an operation and maintenance log for the last three (3) consecutive calendar years of inspections, repairs, maintenance and/or replacement of the stormwater management system or any part thereof, and disposal (for disposal the log shall indicate the type of material and the disposal location);
2. Make the maintenance log available to MassDEP and the Conservation Commission ("Commission") upon request; and
3. Allow members and agents of the MassDEP and the Commission to enter and inspect the site to evaluate and ensure that the responsible party is in compliance with the requirements for each BMP established in the O&M Plan approved by the issuing authority.

h) All sediment or other contaminants removed from stormwater BMPs shall be disposed of in accordance with all applicable federal, state, and local laws and regulations.

i) Illicit discharges to the stormwater management system as defined in 310 CMR 10.04 are prohibited.

j) The stormwater management system approved in the Order of Conditions shall not be changed without the prior written approval of the issuing authority.

k) Areas designated as qualifying pervious areas for the purpose of the Low Impact Site Design Credit (as defined in the MassDEP Stormwater Handbook, Volume 3, Chapter 1, Low Impact Development Site Design Credits) shall not be altered without the prior written approval of the issuing authority.

l) Access for maintenance, repair, and/or replacement of BMPs shall not be withheld. Any fencing constructed around stormwater BMPs shall include access gates and shall be at least six inches above grade to allow for wildlife passage.

Special Conditions (if you need more space for additional conditions, please attach a text document):

Attachment A

20. For Test Projects subject to 310 CMR 10.05(11), the applicant shall also implement the monitoring plan and the restoration plan submitted with the Notice of Intent. If the conservation commission or Department determines that the Test Project threatens the public health, safety or the environment, the applicant shall implement the removal plan submitted with the Notice of Intent or modify the project as directed by the conservation commission or the Department.

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D. Findings Under Municipal Wetlands Bylaw or Ordinance

1. Is a municipal wetlands bylaw or ordinance applicable? ☒ Yes ☐ No

2. The Raynham Conservation Commission hereby finds (check one that applies):

   a. ☐ that the proposed work cannot be conditioned to meet the standards set forth in a municipal ordinance or bylaw, specifically:

   1. Municipal Ordinance or Bylaw | 2. Citation

   Therefore, work on this project may not go forward unless and until a revised Notice of Intent is submitted which provides measures which are adequate to meet these standards, and a final Order of Conditions is issued.

   b. ☐ that the following additional conditions are necessary to comply with a municipal ordinance or bylaw:

   1. Municipal Ordinance or Bylaw | 2. Citation

3. The Commission orders that all work shall be performed in accordance with the following conditions and with the Notice of Intent referenced above. To the extent that the following conditions modify or differ from the plans, specifications, or other proposals submitted with the Notice of Intent, the conditions shall control.

   The special conditions relating to municipal ordinance or bylaw are as follows (if you need more space for additional conditions, attach a text document):

   Attachment A

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E. Signatures

This Order is valid for three years, unless otherwise specified as a special condition pursuant to General Conditions #4, from the date of issuance.

4/27/2026
1. Date of Issuance

Please indicate the number of members who will sign this form.
This Order must be signed by a majority of the Conservation Commission.

3
2. Number of Signers

The Order must be mailed by certified mail (return receipt requested) or hand delivered to the applicant. A copy also must be mailed or hand delivered at the same time to the appropriate Department of Environmental Protection Regional Office, if not filing electronically, and the property owner, if different from applicant.

Signature	Printed Name
	David M McRae
	William A Reynolds
	William K Campbell

☐ by hand delivery on

Date

☒ by certified mail, return receipt requested, on 4/27/2026

Date

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F. Appeals

The applicant, the owner, any person aggrieved by this Order, any owner of land abutting the land subject to this Order, or any ten residents of the city or town in which such land is located, are hereby notified of their right to request the appropriate MassDEP Regional Office to issue a Superseding Order of Conditions. The request must be made by certified mail or hand delivery to the Department, with the appropriate filing fee and a completed Request for Departmental Action Fee Transmittal Form, as provided in 310 CMR 10.03(7) within ten business days from the date of issuance of this Order. A copy of the request shall at the same time be sent by certified mail or hand delivery to the Conservation Commission and to the applicant, if he/she is not the appellant.

Any appellants seeking to appeal the Department's Superseding Order associated with this appeal will be required to demonstrate prior participation in the review of this project. Previous participation in the permit proceeding means the submission of written information to the Conservation Commission prior to the close of the public hearing, requesting a Superseding Order, or providing written information to the Department prior to issuance of a Superseding Order.

The request shall state clearly and concisely the objections to the Order which is being appealed and how the Order does not contribute to the protection of the interests identified in the Massachusetts Wetlands Protection Act (M.G.L. c. 131, § 40), and is inconsistent with the wetlands regulations (310 CMR 10.00). To the extent that the Order is based on a municipal ordinance or bylaw, and not on the Massachusetts Wetlands Protection Act or regulations, the Department has no appellate jurisdiction.

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G. Recording Information

Prior to commencement of work, this Order of Conditions must be recorded in the Registry of Deeds or the Land Court for the district in which the land is located, within the chain of title of the affected property. In the case of recorded land, the Final Order shall also be noted in the Registry's Grantor Index under the name of the owner of the land subject to the Order. In the case of registered land, this Order shall also be noted on the Land Court Certificate of Title of the owner of the land subject to the Order of Conditions. The recording information on this page shall be submitted to the Conservation Commission listed below.

Conservation Commission

Detach on dotted line, have stamped by the Registry of Deeds and submit to the Conservation Commission.

To:

Conservation Commission

Please be advised that the Order of Conditions for the Project at:

Project Location | MassDEP File Number

Has been recorded at the Registry of Deeds of:

County | Book | Page

for: Property Owner

and has been noted in the chain of title of the affected property in:

Book | Page

In accordance with the Order of Conditions issued on:

Date

If recorded land, the instrument number identifying this transaction is:

Instrument Number

If registered land, the document number identifying this transaction is:

Document Number

Signature of Applicant

DEP FILE #: **N/A**
APPLICANT: **KATHERINE NUNES, CITY OF TAUNTON**
PROJECT: **OLD COLONY AVE. BRIDGE RECONSTRUCTION**

TOWN OF RAYNHAM
CONSERVATION COMMISSION

ATTACHMENT A

ORDER OF CONDITIONS REPORTING, MONITORING, AND RECORDING INFORMATION:

1. All work must conform to the plan referenced in this Order of Conditions (OR any subsequent revisions as approved by the Raynham Conservation Commission) and the Notice of Intent. The provisions of this Order shall apply to and be binding upon the applicant, its employees, and all successors and assigns in interest or control.

2. **This Order of Conditions must be recorded at the Registry of Deeds, a copy of the receipt providing the recording information shall be submitted to the Conservation Commission prior to the receiving a signature on the building permit and commencement of construction, or within sixty (60) days of the issuance of this Order if construction is not commenced.**

3. **The Raynham Conservation Commission shall be notified in writing at least forty-eight (48) hours prior to the start of any construction.**

4. Members of the Conservation Commission or its Agent shall have the right to enter and inspect the property to determine and evaluate compliance with this Order.

5. Issuance of this Order does not in any way imply or certify that the site or downstream areas will not be subject to flooding, storm damage, or any other form of damage due to wetness.

6. Site Work shall not commence until all federal, state and local permits are issued including without limitation NPDES permits.

7. **The applicant shall photocopy a copy of the Order of Conditions and add it to the set of project plan sheets prior to a sign off on the Building Permit by the Conservation Agent and prior to breaking ground on the project IF A BUILDING PERMIT IS REQUIRED.**

8. There shall be no increase in the post-development discharges from the storm drainage system or any other changes in post-development conditions that alter the post-development watershed boundaries as currently depicted in the Notice of Intent and approved by this Order of Conditions, unless specifically approved in writing by the Commission.

9. A **copy of this Order shall be on-site** while activities regulated by this Order are being performed.

10. The applicant or its successors shall notify the Conservation Commission **in writing of the identity of the on-site construction supervisor hired to coordinate construction** during the work on the site and to ensure compliance with this Order.

11. **Commencing with the issuance of this Order, and continuing through the existence of the same, the applicant shall submit to the Conservation Commission written progress reports each month detailing what work has been done.**

12. A **Massachusetts registered professional engineer must submit written certification to the Conservation Commission that all erosion control measures are properly installed** before the beginning of any work. The location of the erosion control measures shall be certified by a Massachusetts registered land surveyor prior to star of any site work.

13. The applicant shall designate an Erosion Control Monitor to oversee any emergency placement of controls and regular inspection or replacement of erosion and sedimentation control devices. **The name and phone number of the Monitor must be provided to the Commission in the event that this person has to be contacted, due to an emergency at the site, during any 24 hour period, including weekends.** This Monitor shall be given authority to stop construction for erosion control purposes. The erosion control Monitor will be required to inspect all such erosion control measures and oversee cleaning and the proper disposal of waste products. Cleaning shall include removal of any entrapped silt. The provisions of this Order shall apply to and be binding upon the applicant, its employees, and all successors and assigns in interest or control.

14. ~~**In conjunction with the sale of any lot governed by this Order the applicant shall submit to the Conservation Commission a signed statement by the buyer that he/she is aware of an outstanding Order of Conditions on the development and has received a copy of this Order of Conditions.**~~

15. In advance of any work on this project, the applicant shall notify the Raynham Conservation Commission, **and at the request of the Raynham Conservation** Commission, shall arrange an on-site conference among the Conservation Commission, the contractor and the applicant to ensure that all of the conditions of this Order are understood. This Order shall also be made a part of the contractor's written contract.

ORDER OF CONDITIONS EROSION CONTROL AND SOILSTABILIZATION:

16. Prior to any construction on site, the approved erosion control barrier shall be placed between all construction areas and wetland areas and as defined within the approved plan of record. This barrier shall be inspected and approved by the Conservation Commission or its Agent prior to the start of construction. The approved erosion control barrier shall be placed end to end and double staked. The approved erosion control barrier shall remain intact until all disturbed areas have been mulched, seeded and stabilized to prevent erosion.

17. There shall be **NO** disturbance of any wetland areas past the approved erosion control barrier, unless approved through a special condition.

18. Any additional erosion prevention and sedimentation protection measures found necessary during construction, by the Conservation Commission, will be implemented at the discretion of the Commission or its Agent(s).

19. **Upon completion of the work described herein, the applicant shall submit a Request for Certificate of Compliance (WPA Form 8) to the Conservation Commission. This request shall include a letter to the RCC with an original seal and signature of a registered professional**

engineer certifying that the work is in compliance with the plans and conditions thereof. The request for Certificate of Compliance shall be submitted along with two copies of an as-built topographic site plan certified by a registered professional engineer and a registered professional land surveyor.

20. The provision of the Order of Conditions shall apply to and be binding upon its applicant, its employees, and any successor in interest or successor in control of the property subject to this Order and to any contractor or other person performing work conditioned by this Order.

~~21. Prior to the start of work, any required permanent markers for the wetlands and the 25 foot no activity boundary shall be installed by the applicant and inspected by the Conservation Commission or its authorized agent.~~

22. In advance of any work on the project the applicant shall notify the Raynham Conservation Commission (RCC), and at the request of the RCC, shall arrange an on-site conference among the RCC, the contractor and the applicant to ensure that the conditions of this Order are understood. This Order also shall also be made a part of the contractor's written contract.

23. The applicant or its successors, shall notify the RCC in writing of the identity of the on-site construction supervisor hired to coordinate construction during the work on the site and to ensure compliance with this Order.

~~24. Prior to construction, permanent 3-foot schedule PVC pipes will be driven into the ground at 30 foot intervals along the wetlands line as indicated on the plan. The pipes will remain exposed 1 foot above the ground and the tops shall be capped and spray painted green for future reference. (Not applicable for this project.)~~

25. Any replication area is to be prepared prior to the destruction of the resource area being replicated. (Not applicable for this project.)

~~26. All detention basins and/or retention areas are to be completed before installation of any impervious material or structures discharging surface water runoff.~~

27. There shall be no stockpiling of soil or other materials within 25 feet of the resource area.

28. Upon completion of construction and grading, all disturbed areas located outside the resource areas shall be stabilized permanently against erosion. This shall be done either by sodding or by loaming, seeding and mulching according to Soil Conservation Standards. If the latter is chosen, stabilization will be considered once the surface shows complete vegetative cover has been achieved.

29. After proper grading, all disturbed areas located within a resource area, except those areas designated as compensatory wetlands, shall be loamed and seeded with not less than four (4) inches of good quality loam and a vegetated cover established.

30. No earthen embankment in the Buffer Zone shall have a slope steeper than 2:1.

31. All facilities and equipment used within or as part of this project shall be continually maintained and operated so as to comply with this Order and the Wetlands Protection Act. No equipment refueling or servicing shall be conducted within 25 linear feet of the project locus.

32. Any errors found in the plans or information submitted by the applicant shall be considered as changes, and the aforementioned procedures outlined for changes shall be followed.

33. The Conservation Commission shall be notified in writing of any lot line or lot number changes with a copy of the plan showing these changes prior to any work on these lots.

34. All conditions are ongoing and do not expire at the end of three years or with the issuance of a Certificate of Compliance.

35. In the opinion of the Raynham Conservation Commission, the information submitted with the Notice of Intent for this project along with the results of field inspections and evaluation of the site by members of the Commission and/or its agent(s) justify issuance of this Order of Conditions. The Raynham Conservation Commission does, however, reserve the right to raise additional issues and present further evidence as may be appropriate should there be further proceedings pertaining to the Notice of Intent filing for which the Commission has issued this Order of Conditions.

36. Noncompliance with or violation of this Order of Conditions or any part thereof may be deemed reasonable cause by the Raynham Conservation Commission to issue a Notice of Noncompliance and/or an Enforcement Order to the applicant/owner. Continued violation of, or noncompliance with the Order of Conditions shall constitute adequate basis for the imposition of the maximum penalty allowed under the law and the Raynham Conservation Commission may take any other actions necessary to ensure compliance with the Order of Conditions by the applicant.

37. **Special conditions**

    a. The Water Quality Certification issued by the DEP, along with any conditions of approval appended thereto are incorporated herein by reference and made part of this Order of Conditions.

DEP FILE #: **N/A**
APPLICANT: **KATHERINE NUNES, CITY OF TAUNTON**
PROJECT: **OLD COLONY AVE. BRIDGE RECONSTRUCTION**

TOWN OF RAYNHAM
CONSERVATION COMMISSION

ATTACHMENT B
DOCUMENTS RECEIVED AND REVIEWED

- **Appendix A – Resource Area Boundary Delineation Report**
  Dated: July 1, 2024
- **Appendix B – Stormwater Management Report**
  Dated: January 2026, Prepared by: BETA Group, Inc.
  Certification stamped and signed by: Matthew J. Crowley, PE #51325
- **Appendix C – Project Plans**
  - Sheet 1 – Environmental Impacts Plans
  - Sheet 2 – Construction Details
  - Sheet 3 – Construction Details
- **Appendix D – Hydraulic and Scour Analysis Report**
  (available upon request – not reviewed)
- **Appendix E – Emergency Certification Request**
  Dated: January 2024, Prepared by: BETA Group, Inc.
- **Appendix F – Alternatives Analysis**
- **Appendix G – EFH & USFWS Section 7 Documentation**

- **Letter from MassDEP addressed to Massachusetts Department of Transportation Highway Division**
  Re: 401 Water Quality Certification; Administrative Completeness and Technical Deficiency Review
  Dated: February 24, 2026, Signed: Heidi M. Davis, Highway Unit Supervisor, MassDEP

- **Letter from BETA Group, Inc. addressed to Heidi Davis, MassDEP *(including attachments)***
  Re: 401 Water Quality Certification; Response to MassDEP Comments
  Dated: March 20, 2026, From: Jonathan Niro, PWS, Project Manager & Hannah Davis, Staff Scientist

- **Letter from MassDOT addressed to Raynham Conservation Commission**
  Re: Bridge Exemption
  Dated: March 20, 2026
  Signed: Melissa Lenker, Wetlands & Water Resources Supervisor, MassDOT Highway Division, Environ. Services

- **Letter from MassDEP addressed to Raynham Conservation Commission**
  Re: Transportation Bond Bill, Section 24 of Chapter 79 of the Acts of 2014
  Dated: April 7, 2026, Signed: Heidi M. Davis, Highway Unit Supervisor, MassDEP

- **Email Correspondence from MassDEP addressed to Jonathan Niro, BETA Group, Inc.**
  Re: Water Quality Certification application complete & notice of issuance
  Dated: April 10, 2026, From: Tyler Lewis, Environmental Engineer IV, Highway Unit, MassDEP

- **401 Water Quality Certification issued to BETA Group, Inc.**
  Dated: April 17, 2026, Signed: Heidi M. Davis, Highway Unit Supervisor, MassDEP

From: Amy Engelhardt <aengelhardt@Town.raynham.ma.us>
Sent: Friday, June 26, 2026 12:09 PM
To: Jonathan Niro <jniro@beta-inc.com>
Cc: Katherine Nunes <knunes@taunton-ma.gov>; Jenna Freitas <jfreitas@taunton-ma.gov>; Lenker, Melissa (DOT) <Melissa.Lenker@dot.state.ma.us>; Lamothe, Herrio (DOT) <Herrio.Lamothe@dot.state.ma.us>; Walker, Courtney L. (DOT) <Courtney.L.Walker@dot.state.ma.us>; Collins, Lily R. (DOT) <lily.r.collins@dot.state.ma.us>; Lewis, Tyler (DEP) <Tyler.Lewis@mass.gov>
Subject: RE: Raynham Taunton Project 613642

CAUTION: This email originated from a sender outside of the Commonwealth of Massachusetts mail system. Do not click on links or open attachments unless you recognize the sender and know the content is safe.

Hi Jonathan,

Thank you for the email and confirmations. I will forward this along to the Commission.

Have a great weekend!

Amy Engelhardt
Admin. Asst., Assessor's Office
Clerk, Conservation Commission
Town of Raynham
Ph: 508-824-2704 | Fax: 508-823-1812
aengelhardt@town.raynham.ma.us

From: Jonathan Niro <JNiro@BETA-Inc.com>
Sent: Friday, June 26, 2026 8:56 AM

To: Amy Engelhardt <aengelhardt@Town.raynham.ma.us>
Cc: Katherine Nunes <knunes@taunton-ma.gov>; Jenna Freitas <jfreitas@taunton-ma.gov>; Lenker, Melissa (DOT) <Melissa.Lenker@dot.state.ma.us>; Lamothe, Herrio (DOT) <Herrio.Lamothe@dot.state.ma.us>; Walker, Courtney L. (DOT) <Courtney.L.Walker@dot.state.ma.us>; Collins, Lily R. (DOT) <lily.r.collins@dot.state.ma.us>; Lewis, Tyler (DEP) <Tyler.Lewis@mass.gov>
Subject: RE: Raynham Taunton Project 613642

Hi Amy,

It has been a bit, but I just wanted to confirm receipt of these comments and provide some acknowledgement/notes below. We will send over proof of recording once the Order is recorded. Thank you.

Jonathan Niro, PWS
Project Manager
BETA Group, Inc. | 844.800.2382 x7141

Build your future at BETA. ***Apply now!***

From: Amy Engelhardt <aengelhardt@Town.raynham.ma.us>
Sent: Thursday, May 21, 2026 10:16 AM
To: Jonathan Niro <JNiro@BETA-Inc.com>
Cc: Katherine Nunes <knunes@taunton-ma.gov>; Jenna Freitas <jfreitas@taunton-ma.gov>; Lenker, Melissa (DOT) <Melissa.Lenker@dot.state.ma.us>; Lamothe, Herrio (DOT) <Herrio.Lamothe@dot.state.ma.us>; Walker, Courtney L. (DOT) <Courtney.L.Walker@dot.state.ma.us>; Collins, Lily R. (DOT) <lily.r.collins@dot.state.ma.us>; Lewis, Tyler (DEP) <Tyler.Lewis@mass.gov>
Subject: RE: Raynham Taunton Project 613642

CAUTION: *ALERT* This email originated from outside of BETA. Do not click any links or open attachments unless you recognize the sender and know the content is safe. Hover over any links before clicking them and forward questionable emails to BETA IT if you are unsure. NEVER enter your BETA password to open ANY attachment or link. Use the Phish Alert button for potential phishing and forward any spam to AppRiver. *ALERT*

Good Morning,

Please see the responses in red below.

- SC #27: With regard to the condition requiring stockpiles be maintained at least 25 feet away from resource areas, we respectfully request that this be revised to state *"…as feasible"*. Given the constraints at the site, stockpiling within 25 feet of resource areas will likely be unavoidable for the project to be constructable; however, they can be sited as far from Resource Areas as feasible. In addition, supplemental protections for stockpiles can be provided (e.g., use of surrounding compost filter tubes and installation of tarps when piles are

not in use).

Material stockpiling can be reviewed and reviewed on site by the Commission without any need for modification of the approval.

Acknowledged.

- SC #13: For the Erosion Control Monitor condition, we respectfully request that the Commission finds and approves the SWPPP Inspector as a suitable alternative to an Erosion Control Monitor. We would like to request that SC 13, as well as SC 12, be revised to reflect that the SWPPP Inspector will fulfill this role and would be the individual to certify to the Commission that all controls are properly in place (in lieu of a P.E.).

  The requirement for PE certification needs to remain because of the scale of the project - as a PE would be an individual who has demonstrated technical skills, training and expertise.

  Acknowledged. We will plan to have the SWPPP Inspector monitor erosion controls, but are including a requirement in the Special Provisions stating that the Contractor is responsible for hiring a P.E. to certify erosion and sedimentation controls.

- The OOC states "N/A" under the DEP File #, but we wanted to inquire about how the Commission would like to identify the Project under the Bylaw. Taunton provided us with a file number under the local approval so that we could install signage at the site, similar to a DEP file # sign. Please advise.

  Conservation does not currently have a numbering system in place since this is the first time an Order of Conditions was issued only for reasons of Town Bylaw and not DEP. An opinion I received in feedback was to put something along the lines of "Approved by Town of Raynham Wetlands Protection Bylaw Ch. 336 on date: 4-27-2026". If any further comments come in on my end about that I will let you know.

Acknowledged. The Project Special provisions currently provide this language for the signage.

- SC #4: MassDOT and the City of Taunton respects the Commission's right to inspect the site. However, we respectfully request that the Commission gives a 24-hour notice before any personnel visit the site. Due to the use of heavy equipment and other threats to safety, we want to ensure that the open construction site is safe for Commission members.

  The Commission has no problem providing at least 24 hour notice before any scheduled inspection. Please provide specific information of who is to be contacted and how.

  Acknowledged. We can provide the contact information prior to construction.

Amy Engelhardt
Admin. Asst., Assessor's Office
Clerk, Conservation Commission
Town of Raynham
Ph: 508-824-2704 | Fax: 508-823-1812
aengelhardt@town.raynham.ma.us

From: Amy Engelhardt
Sent: Friday, May 15, 2026 11:06 AM
To: 'Jonathan Niro' <JNiro@BETA-Inc.com>
Cc: Katherine Nunes <knunes@taunton-ma.gov>; Jenna Freitas <jfreitas@taunton-ma.gov>; Lenker, Melissa (DOT) <Melissa.Lenker@dot.state.ma.us>; Lamothe, Herrio (DOT) <Herrio.Lamothe@dot.state.ma.us>; Walker, Courtney L. (DOT) <Courtney.L.Walker@dot.state.ma.us>; Collins, Lily R. (DOT) <lily.r.collins@dot.state.ma.us>; Lewis, Tyler (DEP) <Tyler.Lewis@mass.gov>
Subject: RE: Raynham Taunton Project 613642

Hello,

I forwarded your email to Azu and will be in touch with his responses as soon as I hear back. He is out of the state at the moment so I am not sure if he will be able to answer while away or if it will be when he returns.

I will be in touch. Thanks!

Amy Engelhardt
Admin. Asst., Assessor's Office
Clerk, Conservation Commission
Town of Raynham
Ph: 508-824-2704 | Fax: 508-823-1812
aengelhardt@town.raynham.ma.us

From: Jonathan Niro <JNiro@BETA-Inc.com>
Sent: Friday, May 15, 2026 9:05 AM
To: Amy Engelhardt <aengelhardt@Town.raynham.ma.us>
Cc: Katherine Nunes <knunes@taunton-ma.gov>; Jenna Freitas <jfreitas@taunton-ma.gov>; Lenker, Melissa (DOT) <Melissa.Lenker@dot.state.ma.us>; Lamothe, Herrio (DOT) <Herrio.Lamothe@dot.state.ma.us>; Walker, Courtney L. (DOT) <Courtney.L.Walker@dot.state.ma.us>; Collins, Lily R. (DOT) <lily.r.collins@dot.state.ma.us>; Lewis, Tyler (DEP) <Tyler.Lewis@mass.gov>
Subject: RE: Raynham Taunton Project 613642

Hi Amy,

City of Taunton, Massachusetts
CONSERVATION COMMISSION

Office: 141 Oak Street
Mailing: 15 Summer Street
Taunton, Massachusetts 02780

Conservation Commissioners

Steven Turner, Chair
Debra Botellio, Vice Chair
Joshua Borden
Richard Enos
Luis Freitas
Jan Rego
Scott Collette

Phone 508-821-1095

April 2, 2026

Jonathan Niro
BETA Group Inc.
89 Shrewsbury Street
Worcester, MA 01604

RE: Old Colony Avenue Bridge over the Taunton River, NOI, N1394 LOCAL ONLY

Attached you will find the **original** Order of Conditions for the location noted above **which needs to be recorded at the Registry of Deeds within 40 days of receipt.** Upon recording, please forward a copy of the receipt showing date, book, and page to this office for our records. Be sure to also include the DEP number listed above. You can email a copy to Jenna Freitas at jfreitas@taunton-ma.gov.
(If you ask the registry to make a photocopy of the front page after they stamp it in this will have the information we need to close the filing.)
Attached are the Standard Conditions (see pages 5-9) and Special Conditions (see end of decision) to be complied with for this Order of Conditions.

This must be recorded before the start of any work onsite and applying for any needed building permits/accessory structure applications. This approval is based on the site plan titled "Old Colony Avenue over Taunton River Bridge" created on 01/28/2026. Once work is completed a Certificate of Compliance must be filed to close this Order of Conditions with the Conservation Commission.

If you have any questions please do not hesitate to give this office a call. Thanks for your assistance in this matter.

Sincerely,

Jenna Freitas

Jenna Freitas
Conservation Agent

Cc: DEP
Katherine Nunes

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 5 – Order of Conditions

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:
N1394 LOCAL ONLY
MassDEP File #

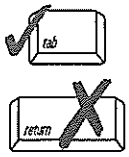
eDEP Transaction #

TAUNTON
City/Town

A. General Information

Please note: this form has been modified with added space to accommodate the Registry of Deeds Requirements

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



1. From: TAUNTON
Conservation Commission

2. This issuance is for (check one): a. ■ Order of Conditions b. ☐ Amended Order of Conditions

3. To: Applicant:

KATERINE	NUNES	
a. First Name	b. Last Name	
CITY OF TAUNTON		
c. Organization		
90 INGELL STREET		
d. Mailing Address		
TAUNTON	MA	02780
e. City/Town	f. State	g. Zip Code

4. Property Owner (if different from applicant):

a. First Name	b. Last Name	
CITY OF TAUNTON		
c. Organization		
15 SUMMER STREET		
d. Mailing Address		
TAUNTON	MA	02780
e. City/Town	f. State	g. Zip Code

5. Project Location:

Old Colony Avenue Bridge over the Taunton River	TAUNTON AND RAYNHAM	
a. Street Address	b. City/Town	
N/A ROADWAY ROW	N/A	
c. Assessors Map/Plat Number	d. Parcel/Lot Number	

Latitude and Longitude, if known: d m s (d. Latitude) d m s (e. Longitude)

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands
WPA Form 5 – Order of Conditions
Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:
N1394 LOCAL ONLY
MassDEP File #

eDEP Transaction #
TAUNTON
City/Town

A. General Information (cont.)

6. Property recorded at the Registry of Deeds for (attach additional information if more than one parcel):

N/A- ROADWAY ROW	
a. County	b. Certificate Number (if registered land)
c. Book	d. Page

7. Dates:

02/09/26	03/30/26	03/30/26
a. Date Notice of Intent Filed	b. Date Public Hearing Closed	c. Date of Issuance

8. Final Approved Plans and Other Documents (attach additional plan or document references as needed):

SUPERSTRUCTURE REPLACEMENT PLANS	
a. Plan Title	
BETA GROUP, INC	UNSIGNED AND UNSTAMPED
b. Prepared By	c. Signed and Stamped by
OCTOBER 22, 2025	1" = 20'
d. Final Revision Date	e. Scale
ENVIRONMENTAL IMPACTS PLAN	10/22/25
f. Additional Plan or Document Title	g. Date

B. Findings

1. Findings pursuant to the Massachusetts Wetlands Protection Act:

Following the review of the above-referenced Notice of Intent and based on the information provided in this application and presented at the public hearing, this Commission finds that the areas in which work is proposed is significant to the following interests of the Wetlands Protection Act (the Act). Check all that apply:

a. ☐ Public Water Supply b. ☐ Land Containing Shellfish c. ■ Prevention of Pollution
d. ■ Private Water Supply e. ☐ Fisheries f. ☐ Protection of Wildlife Habitat
g. ■ Groundwater Supply h. ■ Storm Damage Prevention i. ■ Flood Control

2. This Commission hereby finds the project, as proposed, is: (check one of the following boxes)

Approved subject to:

a. ■ the following conditions which are necessary in accordance with the performance standards set forth in the wetlands regulations. This Commission orders that all work shall be performed in accordance with the Notice of Intent referenced above, the following General Conditions, and any other special conditions attached to this Order. To the extent that the following conditions modify or differ from the plans, specifications, or other proposals submitted with the Notice of Intent, these conditions shall control.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands
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Provided by MassDEP:
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TAUNTON
City/Town

B. Findings (cont.)

Denied because:

b. ☐ the proposed work cannot be conditioned to meet the performance standards set forth in the wetland regulations. Therefore, work on this project may not go forward unless and until a new Notice of Intent is submitted which provides measures which are adequate to protect the interests of the Act, and a final Order of Conditions is issued. **A description of the performance standards which the proposed work cannot meet is attached to this Order.**

c. ☐ the information submitted by the applicant is not sufficient to describe the site, the work, or the effect of the work on the interests identified in the Wetlands Protection Act. Therefore, work on this project may not go forward unless and until a revised Notice of Intent is submitted which provides sufficient information and includes measures which are adequate to protect the Act's interests, and a final Order of Conditions is issued. **A description of the specific information which is lacking and why it is necessary is attached to this Order as per 310 CMR 10.05(6)(c).**

3. ☐ Buffer Zone Impacts: Shortest distance between limit of project disturbance and the wetland resource area specified in 310 CMR 10.02(1)(a) — a. linear feet

Inland Resource Area Impacts: Check all that apply below. (For Approvals Only)

Resource Area	Proposed Alteration	Permitted Alteration	Proposed Replacement	Permitted Replacement
4. ■ Bank	21 PERM, 98 TEMP a. linear feet	21 PERM, 98 TEMP b. linear feet	98 REST c. linear feet	98 REST d. linear feet
5. ☐ Bordering Vegetated Wetland	a. square feet	b. square feet	c. square feet	d. square feet
6. ■ Land Under Waterbodies and Waterways	4,171 PERM, 2,395 TEMP a. square feet 1,003 e. c/y dredged	4,171 PERM, 2,395 TEMP b. square feet 1,003 f. c/y dredged	6,567 REST c. square feet	6,567 REST d. square feet
7. ■ Bordering Land Subject to Flooding	1,039 PERM a. square feet	1,039 PERM b. square feet	c. square feet	d. square feet
Cubic Feet Flood Storage	e. cubic feet	f. cubic feet	g. cubic feet	h. cubic feet
8. ☐ Isolated Land Subject to Flooding	a. square feet	b. square feet		
Cubic Feet Flood Storage	c. cubic feet	d. cubic feet	e. cubic feet	f. cubic feet
9. ■ Riverfront Area	33,200 a. total sq. feet	33,200 b. total sq. feet		
Sq ft within 100 ft	1,246 c. square feet	1,246 d. square feet	e. square feet	f. square feet
Sq ft between 100-200 ft	g. square feet	h. square feet	i. square feet	j. square feet

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands
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City/Town

B. Findings (cont.)

Coastal Resource Area Impacts: Check all that apply below. (For Approvals Only)

	Proposed Alteration	Permitted Alteration	Proposed Replacement	Permitted Replacement
10. ☐ Designated Port Areas	Indicate size under Land Under the Ocean, below			
11. ☐ Land Under the Ocean	a. square feet	b. square feet		
	c. c/y dredged	d. c/y dredged		
12. ☐ Barrier Beaches	Indicate size under Coastal Beaches and/or Coastal Dunes below			
13. ☐ Coastal Beaches	a. square feet	b. square feet	c. nourishment (cu yd)	d. nourishment (cu yd)
14. ☐ Coastal Dunes	a. square feet	b. square feet	c. nourishment (cu yd)	d. nourishment (cu yd)
15. ☐ Coastal Banks	a. linear feet	b. linear feet		
16. ☐ Rocky Intertidal Shores	a. square feet	b. square feet		
17. ☐ Salt Marshes	a. square feet	b. square feet	c. square feet	d. square feet
18. ☐ Land Under Salt Ponds	a. square feet	b. square feet		
	c. c/y dredged	d. c/y dredged		
19. ☐ Land Containing Shellfish	a. square feet	b. square feet	c. square feet	d. square feet
20. ☐ Fish Runs	Indicate size under Coastal Banks, Inland Bank, Land Under the Ocean, and/or inland Land Under Waterbodies and Waterways, above			
	a. c/y dredged	b. c/y dredged		
21. ☐ Land Subject to Coastal Storm Flowage	a. square feet	b. square feet		
22. ☐ Riverfront Area	a. total sq. feet	b. total sq. feet		
Sq ft within 100 ft	c. square feet	d. square feet	e. square feet	f. square feet
Sq ft between 100-200 ft	g. square feet	h. square feet	i. square feet	j. square feet

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands
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B. Findings (cont.)

* **#23.** If the project is for the purpose of restoring or enhancing a wetland resource area in addition to the square footage that has been entered in Section B.5.c (BVW) or B.17.c (Salt Marsh) above, please enter the additional amount here.

23. ☐ Restoration/Enhancement *:

a. square feet of BVW _____ b. square feet of salt marsh _____

24. ☐ Stream Crossing(s):

a. number of new stream crossings _____ b. number of replacement stream crossings _____

C. General Conditions Under Massachusetts Wetlands Protection Act

The following conditions are only applicable to Approved projects.

1. Failure to comply with all conditions stated herein, and with all related statutes and other regulatory measures, shall be deemed cause to revoke or modify this Order.
2. The Order does not grant any property rights or any exclusive privileges; it does not authorize any injury to private property or invasion of private rights.
3. This Order does not relieve the permittee or any other person of the necessity of complying with all other applicable federal, state, or local statutes, ordinances, bylaws, or regulations.
4. The work authorized hereunder shall be completed within three years from the date of this Order unless either of the following apply:
   a. The work is a maintenance dredging project as provided for in the Act; or
   b. The time for completion has been extended to a specified date more than three years, but less than five years, from the date of issuance. If this Order is intended to be valid for more than three years, the extension date and the special circumstances warranting the extended time period are set forth as a special condition in this Order.
   c. If the work is for a Test Project, this Order of Conditions shall be valid for no more than one year.
5. This Order may be extended by the issuing authority for one or more periods of up to three years each upon application to the issuing authority at least 30 days prior to the expiration date of the Order. An Order of Conditions for a Test Project may be extended for one additional year only upon written application by the applicant, subject to the provisions of 310 CMR 10.05(11)(f).
6. If this Order constitutes an Amended Order of Conditions, this Amended Order of Conditions does not extend the issuance date of the original Final Order of Conditions and the Order will expire on _____ unless extended in writing by the Department.
7. Any fill used in connection with this project shall be clean fill. Any fill shall contain no trash, refuse, rubbish, or debris, including but not limited to lumber, bricks, plaster, wire, lath, paper, cardboard, pipe, tires, ashes, refrigerators, motor vehicles, or parts of any of the foregoing.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands
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City/Town

C. General Conditions Under Massachusetts Wetlands Protection Act

8. This Order is not final until all administrative appeal periods from this Order have elapsed, or if such an appeal has been taken, until all proceedings before the Department have been completed.

9. No work shall be undertaken until the Order has become final and then has been recorded in the Registry of Deeds or the Land Court for the district in which the land is located, within the chain of title of the affected property. In the case of recorded land, the Final Order shall also be noted in the Registry's Grantor Index under the name of the owner of the land upon which the proposed work is to be done. In the case of the registered land, the Final Order shall also be noted on the Land Court Certificate of Title of the owner of the land upon which the proposed work is done. The recording information shall be submitted to the Conservation Commission on the form at the end of this Order, which form must be stamped by the Registry of Deeds, prior to the commencement of work.

10. A sign shall be displayed at the site not less then two square feet or more than three square feet in size bearing the words,

"Massachusetts Department of Environmental Protection" [or, "MassDEP"]

"File Number N1394 LOCAL ONLY "

11. Where the Department of Environmental Protection is requested to issue a Superseding Order, the Conservation Commission shall be a party to all agency proceedings and hearings before MassDEP.

12. Upon completion of the work described herein, the applicant shall submit a Request for Certificate of Compliance (WPA Form 8A) to the Conservation Commission.

13. The work shall conform to the plans and special conditions referenced in this order.

14. Any change to the plans identified in Condition #13 above shall require the applicant to inquire of the Conservation Commission in writing whether the change is significant enough to require the filing of a new Notice of Intent.

15. The Agent or members of the Conservation Commission and the Department of Environmental Protection shall have the right to enter and inspect the area subject to this Order at reasonable hours to evaluate compliance with the conditions stated in this Order, and may require the submittal of any data deemed necessary by the Conservation Commission or Department for that evaluation.

16. This Order of Conditions shall apply to any successor in interest or successor in control of the property subject to this Order and to any contractor or other person performing work conditioned by this Order.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands
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C. General Conditions Under Massachusetts Wetlands Protection Act (cont.)

17. Prior to the start of work, and if the project involves work adjacent to a Bordering Vegetated Wetland, the boundary of the wetland in the vicinity of the proposed work area shall be marked by wooden stakes or flagging. Once in place, the wetland boundary markers shall be maintained until a Certificate of Compliance has been issued by the Conservation Commission.

18. All sedimentation barriers shall be maintained in good repair until all disturbed areas have been fully stabilized with vegetation or other means. At no time shall sediments be deposited in a wetland or water body. During construction, the applicant or his/her designee shall inspect the erosion controls on a daily basis and shall remove accumulated sediments as needed. The applicant shall immediately control any erosion problems that occur at the site and shall also immediately notify the Conservation Commission, which reserves the right to require additional erosion and/or damage prevention controls it may deem necessary. Sedimentation barriers shall serve as the limit of work unless another limit of work line has been approved by this Order.

19. The work associated with this Order (the "Project")
    (1) ■ is subject to the Massachusetts Stormwater Standards
    (2) ☐ is NOT subject to the Massachusetts Stormwater Standards

    If the work is subject to the Stormwater Standards, then the project is subject to the following conditions:

    a) All work, including site preparation, land disturbance, construction and redevelopment, shall be implemented in accordance with the construction period pollution prevention and erosion and sedimentation control plan and, if applicable, the Stormwater Pollution Prevention Plan required by the National Pollution Discharge Elimination System Construction General Permit as required by Stormwater Condition 8. Construction period erosion, sedimentation and pollution control measures and best management practices (BMPs) shall remain in place until the site is fully stabilized.

    b) No stormwater runoff may be discharged to the post-construction stormwater BMPs unless and until a Registered Professional Engineer provides a Certification that:
    i. all construction period BMPs have been removed or will be removed by a date certain specified in the Certification. For any construction period BMPs intended to be converted to post construction operation for stormwater attenuation, recharge, and/or treatment, the conversion is allowed by the MassDEP Stormwater Handbook BMP specifications and that the BMP has been properly cleaned or prepared for post construction operation, including removal of all construction period sediment trapped in inlet and outlet control structures;
    ii. as-built final construction BMP plans are included, signed and stamped by a Registered Professional Engineer, certifying the site is fully stabilized;
    iii. any illicit discharges to the stormwater management system have been removed, as per the requirements of Stormwater Standard 10;

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands
WPA Form 5 – Order of Conditions
Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:
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C. General Conditions Under Massachusetts Wetlands Protection Act (cont.)

iv. all post-construction stormwater BMPs are installed in accordance with the plans (including all planting plans) approved by the issuing authority, and have been inspected to ensure that they are not damaged and that they are in proper working condition;

v. any vegetation associated with post-construction BMPs is suitably established to withstand erosion.

c) The landowner is responsible for BMP maintenance until the issuing authority is notified that another party has legally assumed responsibility for BMP maintenance. Prior to requesting a Certificate of Compliance, or Partial Certificate of Compliance, the responsible party (defined in General Condition 18(e)) shall execute and submit to the issuing authority an Operation and Maintenance Compliance Statement ("O&M Statement) for the Stormwater BMPs identifying the party responsible for implementing the stormwater BMP Operation and Maintenance Plan ("O&M Plan") and certifying the following:

i.) the O&M Plan is complete and will be implemented upon receipt of the Certificate of Compliance, and

ii.) the future responsible parties shall be notified in writing of their ongoing legal responsibility to operate and maintain the stormwater management BMPs and implement the Stormwater Pollution Prevention Plan.

d) Post-construction pollution prevention and source control shall be implemented in accordance with the long-term pollution prevention plan section of the approved Stormwater Report and, if applicable, the Stormwater Pollution Prevention Plan required by the National Pollution Discharge Elimination System Multi-Sector General Permit.

e) Unless and until another party accepts responsibility, the landowner, or owner of any drainage easement, assumes responsibility for maintaining each BMP. To overcome this presumption, the landowner of the property must submit to the issuing authority a legally binding agreement of record, acceptable to the issuing authority, evidencing that another entity has accepted responsibility for maintaining the BMP, and that the proposed responsible party shall be treated as a permittee for purposes of implementing the requirements of Conditions 19(f) through 19(k) with respect to that BMP. Any failure of the proposed responsible party to implement the requirements of Conditions 19(f) through 19(k) with respect to that BMP shall be a violation of the Order of Conditions or Certificate of Compliance. In the case of stormwater BMPs that are serving more than one lot, the legally binding agreement shall also identify the lots that will be serviced by the stormwater BMPs. A plan and easement deed that grants the responsible party access to perform the required operation and maintenance must be submitted along with the legally binding agreement.

f) The responsible party shall operate and maintain all stormwater BMPs in accordance with the design plans, the O&M Plan, and the requirements of the Massachusetts Stormwater Handbook.

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C. General Conditions Under Massachusetts Wetlands Protection Act (cont.)

g) The responsible party shall:
1. Maintain an operation and maintenance log for the last three (3) consecutive calendar years of inspections, repairs, maintenance and/or replacement of the stormwater management system or any part thereof, and disposal (for disposal the log shall indicate the type of material and the disposal location);
2. Make the maintenance log available to MassDEP and the Conservation Commission ("Commission") upon request; and
3. Allow members and agents of the MassDEP and the Commission to enter and inspect the site to evaluate and ensure that the responsible party is in compliance with the requirements for each BMP established in the O&M Plan approved by the issuing authority.

h) All sediment or other contaminants removed from stormwater BMPs shall be disposed of in accordance with all applicable federal, state, and local laws and regulations.

i) Illicit discharges to the stormwater management system as defined in 310 CMR 10.04 are prohibited.

j) The stormwater management system approved in the Order of Conditions shall not be changed without the prior written approval of the issuing authority.

k) Areas designated as qualifying pervious areas for the purpose of the Low Impact Site Design Credit (as defined in the MassDEP Stormwater Handbook, Volume 3, Chapter 1, Low Impact Development Site Design Credits) shall not be altered without the prior written approval of the issuing authority.

l) Access for maintenance, repair, and/or replacement of BMPs shall not be withheld. Any fencing constructed around stormwater BMPs shall include access gates and shall be at least six inches above grade to allow for wildlife passage.

Special Conditions (if you need more space for additional conditions, please attach a text document):

20. For Test Projects subject to 310 CMR 10.05(11), the applicant shall also implement the monitoring plan and the restoration plan submitted with the Notice of Intent. If the conservation commission or Department determines that the Test Project threatens the public health, safety or the environment, the applicant shall implement the removal plan submitted with the Notice of Intent or modify the project as directed by the conservation commission or the Department.

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D. Findings Under Municipal Wetlands Bylaw or Ordinance

1. Is a municipal wetlands bylaw or ordinance applicable? ■ Yes ☐ No

2. The TAUNTON Conservation Commission hereby finds (check one that applies):

   a. ☐ that the proposed work cannot be conditioned to meet the standards set forth in a municipal ordinance or bylaw, specifically:

   _____ (1. Municipal Ordinance or Bylaw) _____ (2. Citation)

   Therefore, work on this project may not go forward unless and until a revised Notice of Intent is submitted which provides measures which are adequate to meet these standards, and a final Order of Conditions is issued.

   b. ■ that the following additional conditions are necessary to comply with a municipal ordinance or bylaw:

   TAUNTON CONSERVATION ORDINANCE (1. Municipal Ordinance or Bylaw) CHAP. 16 SEC. 30-38 (2. Citation)

3. The Commission orders that all work shall be performed in accordance with the following conditions and with the Notice of Intent referenced above. To the extent that the following conditions modify or differ from the plans, specifications, or other proposals submitted with the Notice of Intent, the conditions shall control.

   The special conditions relating to municipal ordinance or bylaw are as follows (if you need more space for additional conditions, attach a text document):

   SEE ATTACHED SPECIAL CONDITIONS

Local only

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 5 – Order of Conditions

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

* Local Only *

Provided by MassDEP: N1394
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TAUNTON
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E. Signatures

This Order is valid for three years, unless otherwise specified as a special condition pursuant to General Conditions #4, from the date of issuance.

3/30/26
1. Date of Issuance

Please indicate the number of members who will sign this form.
This Order must be signed by a majority of the Conservation Commission.

7
2. Number of Signers

The Order must be mailed by certified mail (return receipt requested) or hand delivered to the applicant. A copy also must be mailed or hand delivered at the same time to the appropriate Department of Environmental Protection Regional Office, if not filing electronically, and the property owner, if different from applicant.

Signature	STEVEN TURNER Printed Name
Signature	DEBRA BOTELLIO Printed Name
Signature	JOSHUA BORDEN Printed Name
Signature	RICHARD ENOS Printed Name
Signature	LUIS FREITAS Printed Name
Signature	JAN REGO Printed Name
Signature	SCOTT COLLETTE Printed Name
Signature	Printed Name
Signature	Printed Name

☐ by hand delivery on

Date

☑ by certified mail, return receipt requested, on

4/2/26
Date

9589 0710 5270 2253 6089 79

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands
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Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:
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F. Appeals

The applicant, the owner, any person aggrieved by this Order, any owner of land abutting the land subject to this Order, or any ten residents of the city or town in which such land is located, are hereby notified of their right to request the appropriate MassDEP Regional Office to issue a Superseding Order of Conditions. The request must be made by certified mail or hand delivery to the Department, with the appropriate filing fee and a completed Request for Departmental Action Fee Transmittal Form, as provided in 310 CMR 10.03(7) within ten business days from the date of issuance of this Order. A copy of the request shall at the same time be sent by certified mail or hand delivery to the Conservation Commission and to the applicant, if he/she is not the appellant.

Any appellants seeking to appeal the Department's Superseding Order associated with this appeal will be required to demonstrate prior participation in the review of this project. Previous participation in the permit proceeding means the submission of written information to the Conservation Commission prior to the close of the public hearing, requesting a Superseding Order, or providing written information to the Department prior to issuance of a Superseding Order.

The request shall state clearly and concisely the objections to the Order which is being appealed and how the Order does not contribute to the protection of the interests identified in the Massachusetts Wetlands Protection Act (M.G.L. c. 131, § 40), and is inconsistent with the wetlands regulations (310 CMR 10.00). To the extent that the Order is based on a municipal ordinance or bylaw, and not on the Massachusetts Wetlands Protection Act or regulations, the Department has no appellate jurisdiction.

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G. Recording Information

Prior to commencement of work, this Order of Conditions must be recorded in the Registry of Deeds or the Land Court for the district in which the land is located, within the chain of title of the affected property. In the case of recorded land, the Final Order shall also be noted in the Registry's Grantor Index under the name of the owner of the land subject to the Order. In the case of registered land, this Order shall also be noted on the Land Court Certificate of Title of the owner of the land subject to the Order of Conditions. The recording information on this page shall be submitted to the Conservation Commission listed below.

TAUNTON
Conservation Commission

Detach on dotted line, have stamped by the Registry of Deeds and submit to the Conservation Commission.

To:

TAUNTON
Conservation Commission

Please be advised that the Order of Conditions for the Project at:

Old Colony Avenue Bridge over the Taunton River — Project Location
N1394 LOCAL ONLY — MassDEP File Number

Has been recorded at the Registry of Deeds of:

BRISTOL — County
Book
Page

for: Property Owner

and has been noted in the chain of title of the affected property in:

Book
Page

In accordance with the Order of Conditions issued on:

Date

If recorded land, the instrument number identifying this transaction is:

Instrument Number

If registered land, the document number identifying this transaction is:

Document Number

Signature of Applicant

SPECIAL CONDITIONS FOR ORDERS OF CONDITIONS

Address: Old Colony Avenue Bridge **Parcel ID:** Roadway **LOCAL#: N1394**
Plan: "OLD COLONY AVENUE OVER TAUNTON RIVER BRIDGE" plotted on 01/28/2026.

- ✓ SC1 – Any change in the plans or any change in construction from the proposed plans shall require the Applicant to file a notice of project change with this Commission via a written inquiry as to whether the change is significant enough to require filing an amendment or a new Notice of Intent. If a minor/insignificant revision, no meeting will be required. Should the house footprint be changed without permission, or found by TCC to be changed in any way from the approved plan, all work shall immediately cease until approved by the TCC. Noncompliance with this condition shall automatically stop any permit process by this office for this Applicant.
- ✓ SC2 – A copy of this Order of Conditions and the Plans of Record shall be available on site at all times until the project is completed.
- ✓ SC3 – Best management practices as referenced by the Commission and the City Engineer shall be used to prevent any form of flooding to adjacent properties, wetlands, or watersheds as a result of this project's work. The Applicant shall be fully responsible for any damage due to improper construction or poor engineering on the site, and shall take immediate steps to correct any flooding problems resulting from work on this project. Corrective measures shall be approved by this Commission on an emergency basis if needed.
- ✓ SC4 – Any debris, fill, or excavated material shall be stockpiled on the upland side of the siltation barriers and at a location which prevents sediment from entering the wetlands.
- ✓ SC5 – All disturbed areas on this site shall be permanently stabilized either by sodding, loaming and seeding, loaming and hydro-seeding, mulching and planting, or by stone placement or other method approved by the Commission. Vegetative or other site stabilization must be uniform and complete before a final Certificate of Compliance is issued.
- ✓ SC6 - All road construction should be timed so that the binder coat can be in place prior to the closing of the asphalt plants of the winter.
- ☐ SC7 - Storm drains and catch basins must be protected from silt during the construction phase of the project.
- ☐ SC8 - An acceptable dewatering plan must be submitted and approved by the Director of Conservation Services prior to the beginning of work.
- ☐ SC9 - No water resulting from dewatering may be discharged into the Resource Area.
- ✓ SC10 - All hazardous materials on site must be disposed of properly and evidence of such disposal presented for the COC.
- ☐ SC11 - No water may be discharged into the detention structures until those structures have been fully stabilized (Growth has been established)
- ☐ SC12 - A fence must be installed between the limit of work and Resource Area.
- ☐ SC13 - Any pre-existing violations must be repaired.
- ☐ SC14 –The following replication area conditions shall apply:
  a) Replication areas must be completed first in sequence prior to construction.
  b) Replication areas should be in place and functional for two growing seasons prior to the issuance of a Certificate of Compliance.
  c) Replication area must be at least twice as large as the disturbed wetlands they are intended to replace (2:1 replication).

d) Replication area must reflect the characteristics of the displaced wetland area.
e) An acceptable Replication Plan must be on file with the Taunton Conservation Commission Office.
f) Wetlands replication area must be located in the same Bordering Vegetated Wetlands system as the altered wetlands.
g) Wetlands replication area must be on the property owned by the applicant.
h) Replication construction must be supervised by a certified wetland biologist/specialist.

- ☐ SC15 - TCC to inspect proposed washout area.
- ☐ SC16 - TCC to be notified when ownership of the property changes.
- ☐ SC17 - New owners to made aware of the Order of Conditions.
- ☐ SC18 - Deed Restriction. Homeowner Association responsible for detention basin maintenance.
- ✓ SC19 – Siltation barrier to be installed and inspected prior to construction.
- ☐ SC20 - Ongoing maintenance for all conservation structures.
- ☐ SC21 - Evidence of recording within 40 days of issuance.
- ☐ SC22- 6" of topsoil required around conservation structures.
- ☐ SC23 - Roof drains into dry wells.
- ☐ SC24 - Keep washout area outside of buffer zone.
- ✓ SC25 – The Applicant shall notify this Commission in writing of the name, address, business and home telephone numbers of the Project Supervisor and/or Contractor who shall be responsible for ensuring compliance with this Order, and who shall notify this Commission in writing at least three (3) days before any activity commences on the project site.
- ✓ SC26 – A PDF file of the plans should be submitted prior to the release of the Order of Conditions.
- ✓ SC27 – A PDF file of the AS-Built plan should be submitted when submitting a Request for Certificate of Compliance.
- ☐ SC28 – Provide a copy of each deed for the file.
- ☐ SC29 – Operations and Maintenance Plan to be followed in perpetuity.
- ☐ SC30 – Snow to be remove from site for large storm events of 3" or more.
- ☐ SC31 – Only environmentally friendly chemicals be used on site in perpetuity.
- ☐ SC32 – Police area for trash.
- ☐ SC33 – Updated plan (PDF and 1 hard copy) to be submitted prior to receipt of Amended OOC.
- ☐ SC34 – Copy of the NPDES permit to be submitted for the file.
- ☐ SC35 – Copy of the Homeowner's Association Agreement to be submitted for the file.
- ☐ SC36 – All current pervious areas are to remain pervious.
- ☐ SC37 – ZBA decisions to be submitted prior to any sign-offs.
- ☐ SC38 – No additional structures are to be built/added in perpetuity.
- ☐ SC39 – Snow storage area to be outside the 100-foot buffer zone.
- ☐ SC40 – NHESP letter to be received prior to issuance of Order of Conditions.
- ✓ SC41 – Refresh Wetland Flags prior to commencement of work.
- ☐ SC42- Compensatory storage details to be shown on plan or in separate documentation.
- ✓ SC43 – Provide Conservation Office monthly updates of the actions going on, along with anything else that happens in the meantime that is pertinent to keep the Office posted

DOCUMENT A00875

POLICY DIRECTIVE P-22-001
AND
POLICY DIRECTIVE P-22-002

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massDOT Massachusetts Department of Transportation Highway Division

Number: P-22-001
Date: 9/23/22

POLICY DIRECTIVE

Jonathan Gulliver (signature on original)
HIGHWAY ADMINISTRATOR

Off-Site Stockpiling of Soil from MassDOT Construction Projects

Purpose

The purpose of this Policy Directive is to formally establish a policy and procedures for managing and stockpiling soil generated and transported from MassDOT construction projects. This Policy Directive does not supersede any Federal, State, or Local regulations.

Date of Effect

This Policy Directive is effective immediately for all projects, including active construction projects.

For active construction projects and for other projects advertised prior to October 15, 2022, changes to the contract documents needed to implement the requirements of this Policy Directive will be considered on a case-by-case basis and shall be approved by the District Highway Director, as necessary.

For projects advertised on or after October 15, 2022, MassDOT will include the requirements and implementation procedures of this Policy Directive in the construction contract documents.

Policy Requirements

This policy is intended to prevent the off-site relocation of excavated soil generated from MassDOT projects to areas near residential receptors and to control potential fugitive dusts and/or contaminants. To that end, excavated soil may not be moved from the project site without knowledge of the content of the material. Knowledge may include visual field observations for presence of staining, odor, and/or debris, screening with a photoionization detector (PID), laboratory analysis, and/or site history. Pavement millings and other non-soil materials are not subject to the requirements of this Policy Directive.

Moving soil from a MassDOT project site to a temporary off-site storage location must be approved in writing by the District Highway Director.

The Contractor must select a storage location that is at least 500 feet away from residential receptors, as defined herein to include, but not be limited to, residential dwellings, residentially

zoned property, schools, daycare facilities, playgrounds, parks, recreational areas, hospitals, elderly housing and convalescent facilities.

Temporary off-site storage of excavated soil from a MassDOT project is only permissible at a location approved and permitted by MassDOT. The temporary storage location should be located within the same municipality where the soil was excavated, where possible. Stockpiled soil must be securely covered, and appropriate measures must be taken to minimize fugitive dust and erosion.

Signs indicating the source of the soil, the date the soil was generated, and contact information must be erected and maintained until the stockpiled soils are transported to a disposal facility or reused on the project site.

Implementation Procedures

To ensure that off-site storage of excavated soils is managed properly on MassDOT projects, this policy requires the following:

1. **Off-Site Stockpile Storage Locations**
    a. The Contractor shall provide proposed off-site storage locations to the Engineer for approval at least 30 days prior to transporting soil off site. Off-site storage locations should be in the same municipality as the work site.
    b. The Contractor shall keep excavated soil on site until adequately characterized to the satisfaction of the Engineer.
    c. The Contractor shall provide notification of the approved off-site storage location to the local Board of Health and the Town Manager's/Mayor's Office at least 7-days prior to transporting soil off site.
    d. The Contractor shall provide the Engineer with at least 3-days' notice prior to transporting soil off site.
    e. For off-site storage locations on MassDOT property, the Contractor is required to obtain an Access Permit through the District Permits Office prior to storage of soil or other materials. MassDOT will issue these permits at no cost to the Contractor. Information to be submitted by the Contractor as part of the permit application shall include:
        i. A description of material to be stored off-site, including available analytical data;
        ii. A figure of the location with distances to residences and residential receptors; and
        iii. Anticipated duration of temporary storage.
    f. Stockpile locations should not be within 500 feet of residential receptors (e.g., residential dwellings, residentially zoned property, schools, daycare facilities, playgrounds, parks, recreational areas, hospitals, elderly housing and convalescent facilities).
        i. If the stockpile location must be within 500 feet of residential receptors, then soil must be less than RCS-1 (per 310 CMR 40.1600) and free of potentially hazardous or regulated items.

g. For off-site storage locations on non-MassDOT property, the Contractor must notify the property owner(s) at least 7 days prior to transporting material.
h. Exceptions to these rules will be reviewed by MassDOT and may be approved by the District Highway Director on a case-by-case basis.

2. Off-Site Stockpile Management

a. The Contractor shall keep soil stockpiles on impermeable surfaces (e.g., asphalt or concrete) or on 10-mil polyethylene sheeting.
b. The Contractor shall cover soil stockpiles with 10-mil polyethylene sheeting and surround with a berm made of hay bales, straw wattles, or similar.
    i. Piles that are actively being worked on must be covered and re-secured at the end of the work shift.
c. The Contractor shall label stockpiles with signs, including:
    i. Location of origin (including any Release Tracking Numbers)
    ii. Stockpile ID number (including MassDOT District office-assigned tracking ID, if different)
    iii. Date of initial accumulation
    iv. Applicable telephone numbers for the Contractor and MassDOT.
d. The Contractor shall mitigate fugitive dust at storage locations under the direction of an appropriately trained/certified environmental professional.
e. The Contractor shall remedy noncompliance with this policy within 48 hours.
f. The Contractor shall remedy noncompliance with this policy on the SAME DAY for potentially hazardous material, as determined by the Engineer.
g. The Contractor shall handle excavated soil according to federal, state, and local regulations.
h. The Contractor shall use appropriate shipping documents for all movements of excavated soil on public roadways (e.g., Bill of Lading, Material Shipping Record, Manifest, Asbestos Waste Shipment Record, etc.).

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massDOT Massachusetts Department of Transportation Highway Division

Number: P-22-002
Date: 9/23/22

POLICY DIRECTIVE

Jonathan Gulliver (signature on original)
HIGHWAY ADMINISTRATOR

Use of MassDOT Property for Staging and other Construction-Related Operations

Purpose

This Policy Directive is intended to address the use of MassDOT property by MassDOT Contractors for construction staging and other construction-related operations that are not specifically defined in the construction contract. Such use of MassDOT property will only be allowed if permitted by the District Office in accordance with 700 CMR 13.00, Approval of Access to MassDOT Highways and Other Property. This includes the use of MassDOT property for staging, laydown, and storage of equipment and materials, including soil excavated from a project site.

This Policy Directive requires the Contractor/applicant to obtain a Non-Vehicular Access Permit from MassDOT to use MassDOT property for these purposes.

This Policy Directive is effective immediately and applies to all MassDOT construction projects.

General Permit Considerations and Conditions

In addition to other normal MassDOT Access Permit procedures, MassDOT shall consider the following during the application, review, implementation and monitoring processes of Access Permits required by this Policy Directive:

- Storage and placement of the Contractor's equipment and materials should not be allowed within the clear zone of the roadway.
- Stockpiled soils should not be located within 500 feet of residential receptors, as defined herein to include, but not be limited to, residential dwellings, residentially zoned property, schools, daycare facilities, playgrounds, parks, recreational areas, hospitals, elderly housing and convalescent facilities.
- The Contractor/applicant shall identify the access/egress locations of the proposed storage areas. MassDOT will only approve locations determined to be safe for roadway users, construction workers and the general public.
- The Contractor may be required to submit a Traffic Management Plan and/or Lighting Plan for MassDOT review and approval as part of the permit application, depending on the proposed use of the area.

- The Contractor shall submit the permit application through MassDOT's online State Highway Access Permit System (SHAPS).
- MassDOT will waive the permit application fee for any application received from a MassDOT Contractor for any permit required by this Policy Directive and will waive any subsequent amendment and extension fees that may otherwise be required.
- MassDOT will review the permit application in accordance with applicable standard procedures and will apply standard permit terms and conditions, as necessary.
- The Resident Engineer will verify that the permit is approved before allowing the Contractor to use the affected area for the requested purpose.
- Areas permitted are for use by the approved applicant only and are not to be shared with or used by other vendors. Subcontractors specifically engaged with the applicant working on the specific MassDOT project will be allowed to use the area in accordance with the terms of the permit.
- Permits are issued on an annual basis and will require the Contractor to file for an extension each year to continue use.

Exemptions from Permit Requirements

Equipment and materials being used for active construction operations and located within the work zone of the construction contract are exempt from this permit requirement, provided they do not interfere with the safety or operation of the roadway or the work zone. Examples of these types of exempt uses are:

- Equipment and materials parked or stored within a protected (barriered) work zone.
- Materials placed in the work zone prior to same-day installation or use.
- Soils excavated temporarily and scheduled to be replaced, such as for trenching operations or for installation of drainage structures.

DOCUMENT A00881

INSPECTION REPORTS

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MASSACHUSETTS DEPARTMENT OF TRANSPORTATION

STRUCTURES INSPECTION FIELD REPORT

SPECIAL MEMBER INSPECTION

2-DIST	B.I.N.	BR. DEPT. NO.
05	3M4	R-02-003=T-01-004

CITY/TOWN	8.-STRUCTURE NO.	11-Kilo. POINT	90-ROUTINE INSP. DATE	93*-SPEC. MEMB. INSP. DATE
RAYNHAM=TAUNTON	R02003-3M4-MUN-NBI	000.000	May 24, 2024	Oct 10, 2025

07-FACILITY CARRIED	MEMORIAL NAME/LOCAL NAME	27-YR BUILT	106-YR REBUILT	*YR REHAB'D (NON 106)
HWY SOUTH ST E		1945	0000	0000

06-FEATURES INTERSECTED	26-FUNCTIONAL CLASS	DIST. BRIDGE INSPECTION ENGINEER	
WATER TAUNTON RIVER	Urban Collector		G. Simpson

43-STRUCTURE TYPE	22-OWNER	21-MAINTAINER	TEAM LEADER
302 : Steel Stringer/Girder	Town Agency	Town Agency	A. Marlin

107-DECK TYPE	WEATHER	TEMP. (air)	TEAM MEMBERS
1 : Concrete Cast-in-Place	Sunny	15°C	N. L. EICHMAN

WEIGHT POSTING — *Not Applicable* ☐

	H	3	3S2	Single
Actual Posting	20	21	21	N
Recommended Posting	N	N	N	N

Waived Date: 00/00/0000 EJDMT Date: 00/00/0000

Signs In Place (Y=Yes,N=No, NR=Not Required)

Legibility/ Visibility

	At bridge N	At bridge S	Advance N	Advance S
Signs In Place	Y	Y	Y	Y
Legibility/ Visibility	6/6	7/7	7/7	7/6

PLANS (Y/N): Y

(V.C.R.) (Y/N): N

TAPE#:

RATING

Rating Report (Y/N): Y Date: 08/01/2024

Recommend for Rating or Rerating (Y/N): Y

If YES please give priority: HIGH (X) MEDIUM ( ) LOW ( )

REASON: Repairs made to superstructure since last load rating.

Inspection data at time of existing rating

I 58: 5 I 59: 4 I 60: 6 I 62: - Date : 05/24/2024

SPECIAL MEMBER(S):

	MEMBER	CRACK (Y/N):	WELD'S CONDITION (0-9)	LOCATION OF CORROSION, SECTION LOSS (%), CRACKS, COLLISION DAMAGE, STRESS CONCENTRATION, ETC.	CONDITION PREVIOUS (0-9)	CONDITION PRESENT (0-9)	INV. RATING OF MEMBER FROM RATING ANALYSIS H-20	3	3S2	Deficiencies
A	Item 59.4 - Girders or Beams	N		See remarks in comments section.	4	5	0	0	0	S-A
B										
C										
D										
E										

List of field tests performed:
Visual, Hands On, and Non Destructive Testing.

	I-58	I-59	I-60	I-62
(Overall Previous Condition)	5	4	6	-
(Overall Current Condition)	5	5	6	-

DEFICIENCY: A defect in a structure that requires corrective action.

CATEGORIES OF DEFICIENCIES:

M= Minor Deficiency — Deficiencies which are minor in nature, generally do not impact the structural integrity of the bridge and could easily be repaired. Examples include but are not limited to: Spalled concrete, Minor pot holes, Minor corrosion of steel, Minor scouring, Clogged drainage, etc.

S= Severe/Major Deficiency — Deficiencies which are more extensive in nature and need more planning and effort to repair. Examples include but are not limited to: Moderate to major deterioration in concrete, Exposed and corroded rebars, Considerable settlement, Considerable scouring or undermining, Moderate to extensive corrosion to structural steel with measurable loss of section, etc.

C-S= Critical Structural Deficiency — A deficiency in a structural element of a bridge that poses an extreme unsafe condition due to the failure or imminent failure of the element which will affect the structural integrity of the bridge.

C-H= Critical Hazard Deficiency — A deficiency in a component or element of a bridge that poses an extreme hazard or unsafe condition to the public, but does not impair the structural integrity of the bridge. Examples include but are not limited to: Loose concrete hanging down over traffic or pedestrians, A hole in a sidewalk that may cause injuries to pedestrians, Missing section of bridge railing, etc.

URGENCY OF REPAIR:

I = Immediate- [Inspector(s) immediately contact District Bridge Inspection Engineer (DBIE) to report the Deficiency and to receive further instruction from him/her].

A = ASAP- [Action/Repair should be initiated by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) upon receipt of the Inspection Report].

P = Prioritize- [Shall be prioritized by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) and repairs made when funds and/or manpower is available].

X=UNKNOWN **N=NOT APPLICABLE** **H=HIDDEN/INACCESSIBLE** **R=REMOVED**

F.C.(1)7-96

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
RAYNHAM=TAUNTON	**3M4**	**R-02-003=T-01-004**	**R02003-3M4-MUN-NBI**	**OCT 10, 2025**

REMARKS

BRIDGE ORIENTATION

This two span structure carries South Street East over the Taunton River (flows tidally from east to west). According to the bridge design plans the abutments are labeled north and south. The eight beams are numbered from west to east (see sketches 1 and 2). For this report the seven bays are numbered from west to east and the two spans are numbered from south to north.

GENERAL REMARKS

Structure was recently opened to traffic after repairs had been made to the beams at both abutments. The purpose of this inspection was to document the repairs made to the beams since the previous inspection and their current condition.

Access:

A lightweight B - 32 Aspen was used for this inspection.

ITEM 59 - SUPERSTRUCTURE

Item 59.4 - Girders or Beams

The beams consist of rolled 27 WF 91 with an original web thickness of 0.483'' and an original bottom flange thickness of 0.712''.

Since the previous inspection there have been numerous beam end repairs with encased concrete at both abutments (encasement was measured at approximately 2' long from the end of each beam) (see sketch 3 for locations and photos 1 - 2).

There are areas of moderate corrosion/pitting (typically 1/16'' - 1/8'' deep) throughout with several areas having heavy to severe corrosion (worse at Beam 7) (see sketch 3 and photo 3).

Specific deficiencies are listed below:

South Abutment:

- Beam 1, corrosion at encased beam end with 0.47'' remaining at web (see sketch 4 and photo 4).

- Beam 2, corrosion at encased beam end with 0.43'' remaining at web (see sketch 4 and photo 5).

- Beam 6, corrosion at encased beam end with 0.46'' remaining at web (see sketch 4 and photo 6).

- Beam 7, heavy corrosion at encased beam end with corrosion holes at web and bottom flange and at least 0.18'' remaining at web (see sketch 5 and photos 7 - 8).

Span 1 Mid Span:

- Beam 1 bottom flange at 11.5' from Pier, moderate to heavy corrosion with at least 0.57'' remaining.

- Beam 7 West Face, heavy corrosion along the upper web, lower web, and bottom flange (see photo 9).

Pier:

- Beam 5 West Face, corrosion with area of web section loss along the top and lower edge measuring approximately 5' long x up to 2'' high x at least 0.35'' remaining. Bottom flange has section loss with at least 0.50'' remaining adjacent to the bearing.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
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REMARKS

- Beam 7 West Face, corrosion with area of web section loss along the top and lower edge measuring approximately 12' long x up to 5" high x at least 0.37" remaining. Bottom flange has section loss with at least 0.25" remaining adjacent to the bearing (see photo 10).

Span 2 Mid Span:

- Beam 7 West Face adjacent to Splice Plate Connection, severe corrosion along the web and flanges with web section loss measuring approximately 21' long x full height with at least 0.141" remaining (see photos 11 and 12 and sketch 6).

- Beam 7 splice plate, minor corrosion along the lower edge and rivets.

- Beam 8 splice plate, east face, moderate corrosion along the lower edge and rivets.

North Abutment:

- Beam 1, corrosion at encased beam end with 0.31" remaining at web (see sketch 5 and photo 13).

- Beam 2, corrosion at encased beam end with 0.483" remaining at web (see sketch 5).

- Beam 3, corrosion with area of web section loss measuring approximately 1' long x up to 4" high x at least 0.42" remaining. West face is encased in concrete (see photo 14).

- Beam 7, corrosion with area of web section loss with at least 0.257" remaining (see sketch 4 and photo 15).

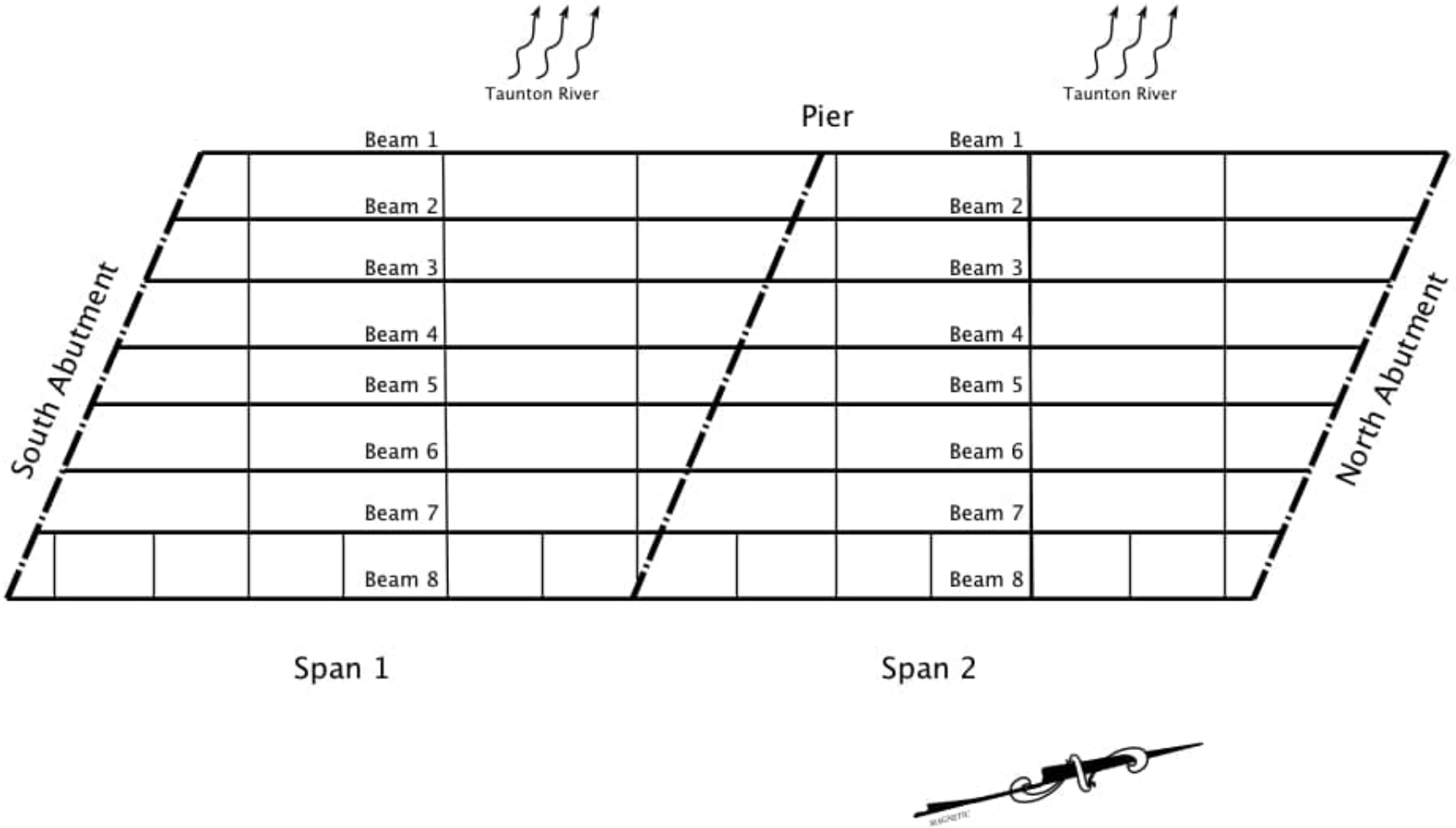
- Beam 8, corrosion with area of web section loss measuring approximately 1.5' long x 2" high x at least 0.28" remaining.

Sketch / Photo Log

Sketch 1 : Framing Plan (Not to Scale).
Sketch 2 : Cross section looking north with the deck drains and sidewalk highlighted (Not to Scale).
Sketch 3 : Framing Plan with areas of section loss (Not to Scale).
Sketch 4 : Beam Section Losses (Not to Scale).
Sketch 5 : Beam Section Losses (Not to Scale).
Sketch 6 : Span 2 west face Beam 7, section losses north and south of beam splice (Not to Scale).
Photo 1 : South Abutment, typical condition of encased beam ends.
Photo 2 : North Abutment, typical condition of encased beam ends.
Photo 3 : Span 1 looking north, typical condition of beams with corrosion.
Photo 4 : Beam 1 South Abutment, corrosion at encased beam end.
Photo 5 : Beam 2 South Abutment, corrosion at encased beam end.
Photo 6 : Beam 6 South Abutment, corrosion at encased beam end.
Photo 7 : Beam 7 South Abutment West Face, corrosion at encased beam end.
Photo 8 : Beam 7 South Abutment East Face, corrosion at encased beam end.
Photo 9 : Span 1 Beam 7 West Face looking north, areas of corrosion.
Photo 10 : Beam 7 Pier, area of corrosion.
Photo 11 : Span 2 Beam 7 south of splice plate, area of corrosion.
Photo 12 : Span 2 Beam 7 north of splice plate, area of corrosion.
Photo 13 : Beam 1 North Abutment, corrosion at encased beam end.
Photo 14 : Beam 3 North Abutment, partially encased beam end with corrosion.
Photo 15 : Beam 7 North Abutment, area of corrosion.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
RAYNHAM=TAUNTON	3M4	R-02-003=T-01-004	R02003-3M4-MUN-NBI	OCT 10, 2025

SKETCHES



Sketch 1: Framing Plan (Not to Scale).

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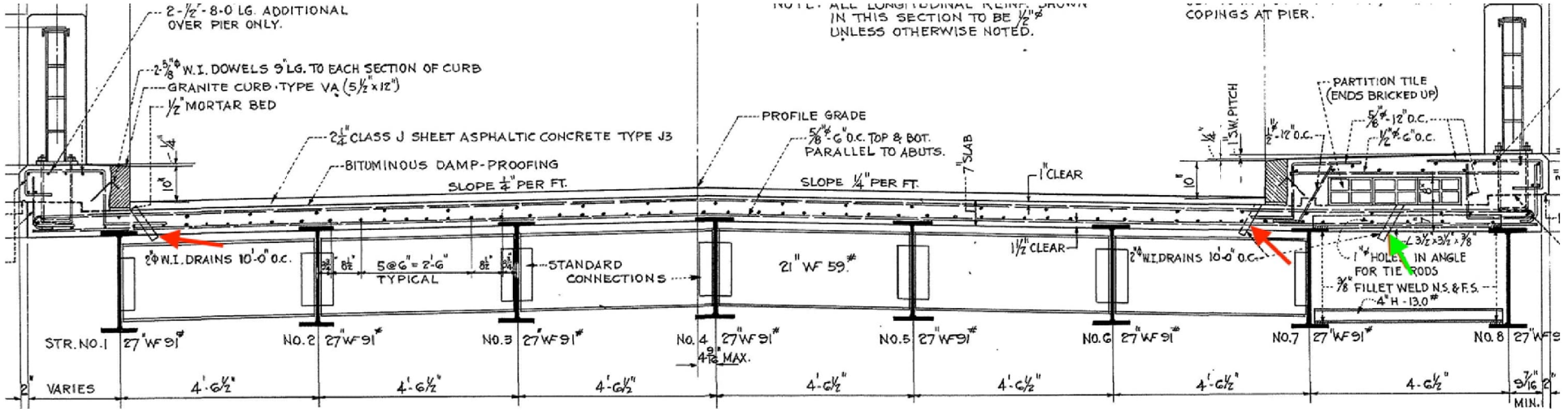
Proposal No. 613642 - 136413

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
RAYNHAM=TAUNTON	3M4	R-02-003=T-01-004	R02003-3M4-MUN-NBI	OCT 10, 2025

SKETCHES



Sketch 2: **Cross section looking north with the deck drains and sidewalk highlighted (Not to Scale).**

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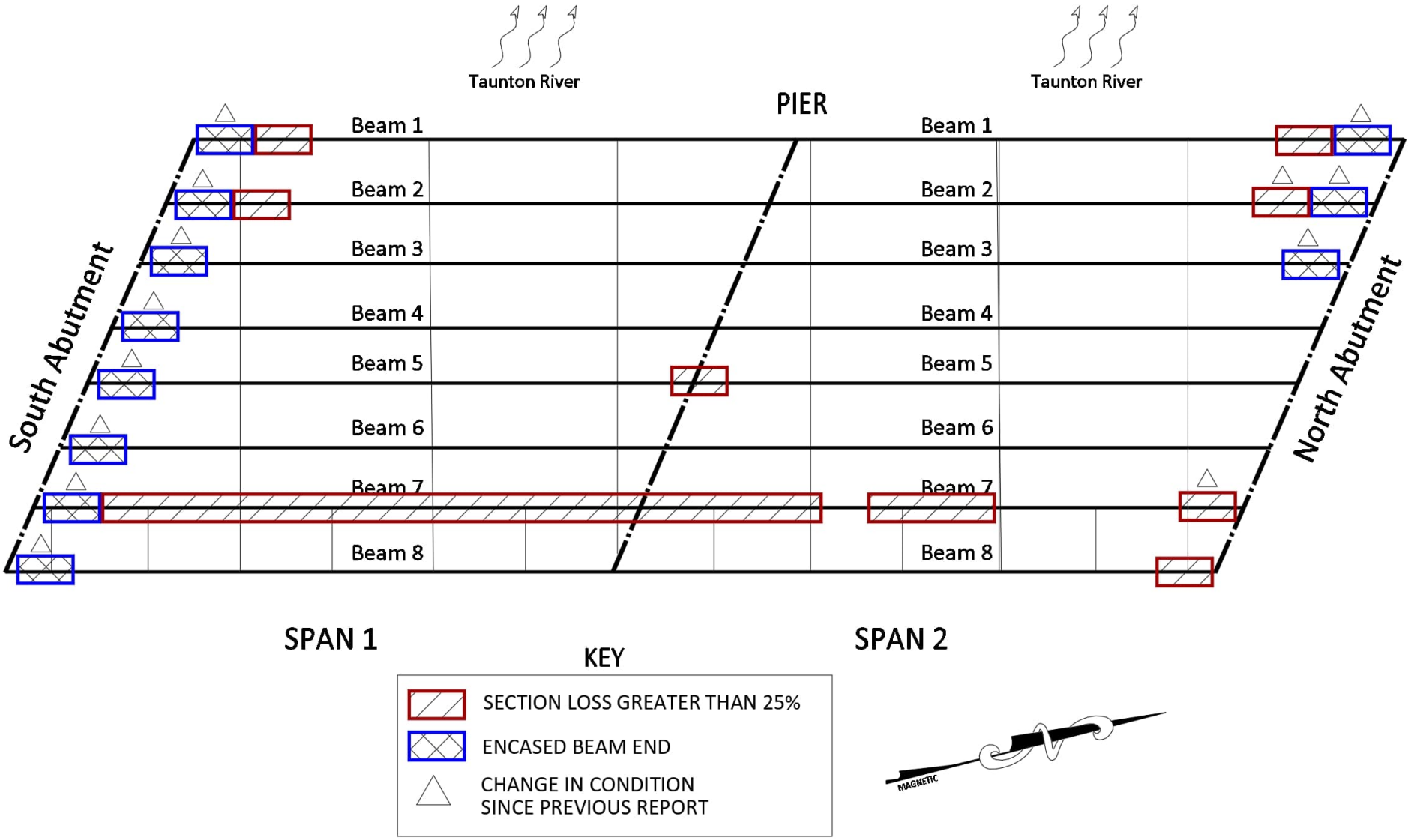
Proposal No. 613642 - 136413

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
RAYNHAM=TAUNTON	3M4	R-02-003=T-01-004	R02003-3M4-MUN-NBI	OCT 10, 2025

SKETCHES



Sketch 3: **Framing Plan with areas of section loss (Not to Scale).**

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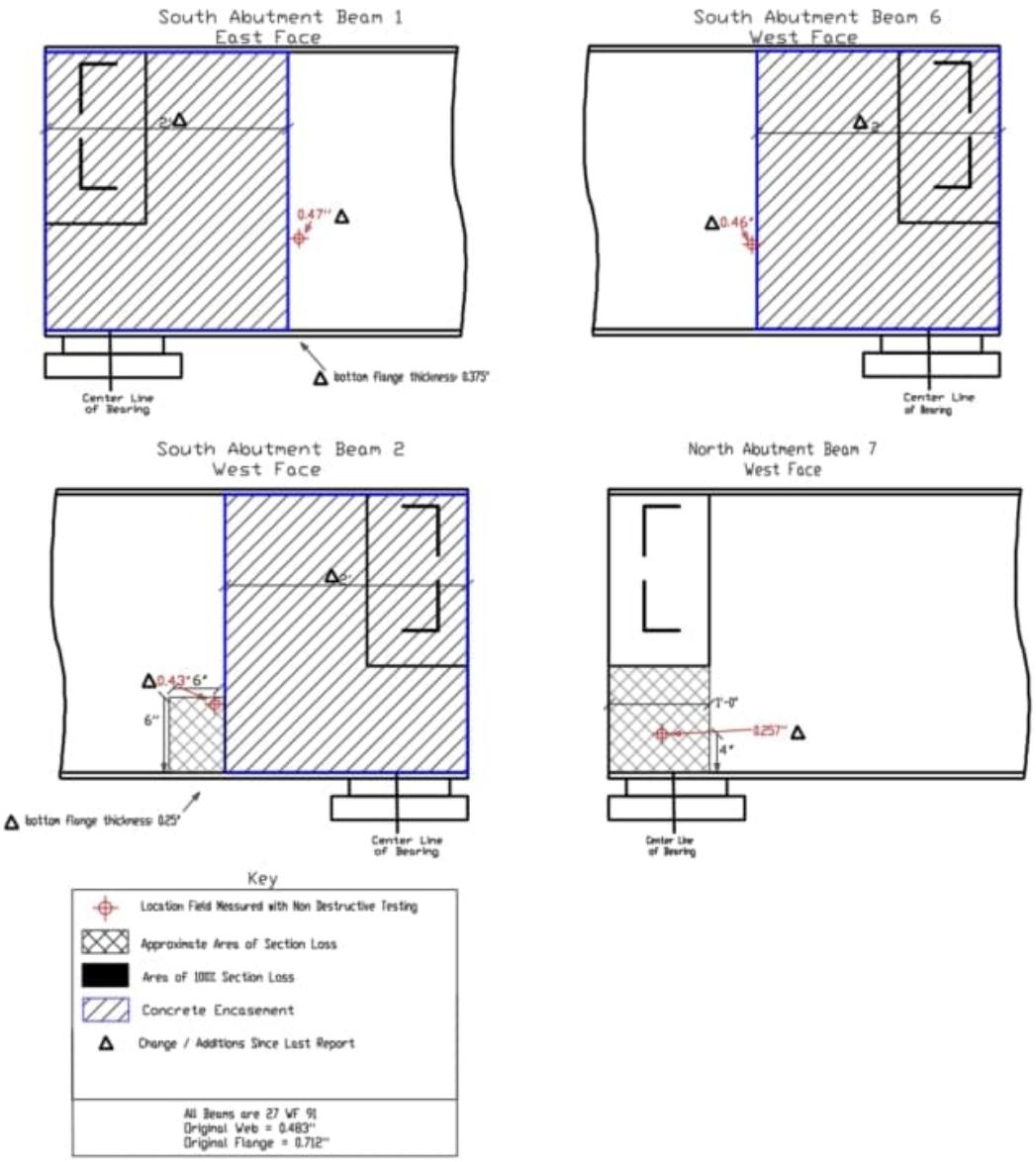
Proposal No. 613642 - 136413

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
RAYNHAM=TAUNTON	3M4	R-02-003=T-01-004	R02003-3M4-MUN-NBI	OCT 10, 2025

SKETCHES



Sketch 4: Beam Section Losses (Not to Scale).

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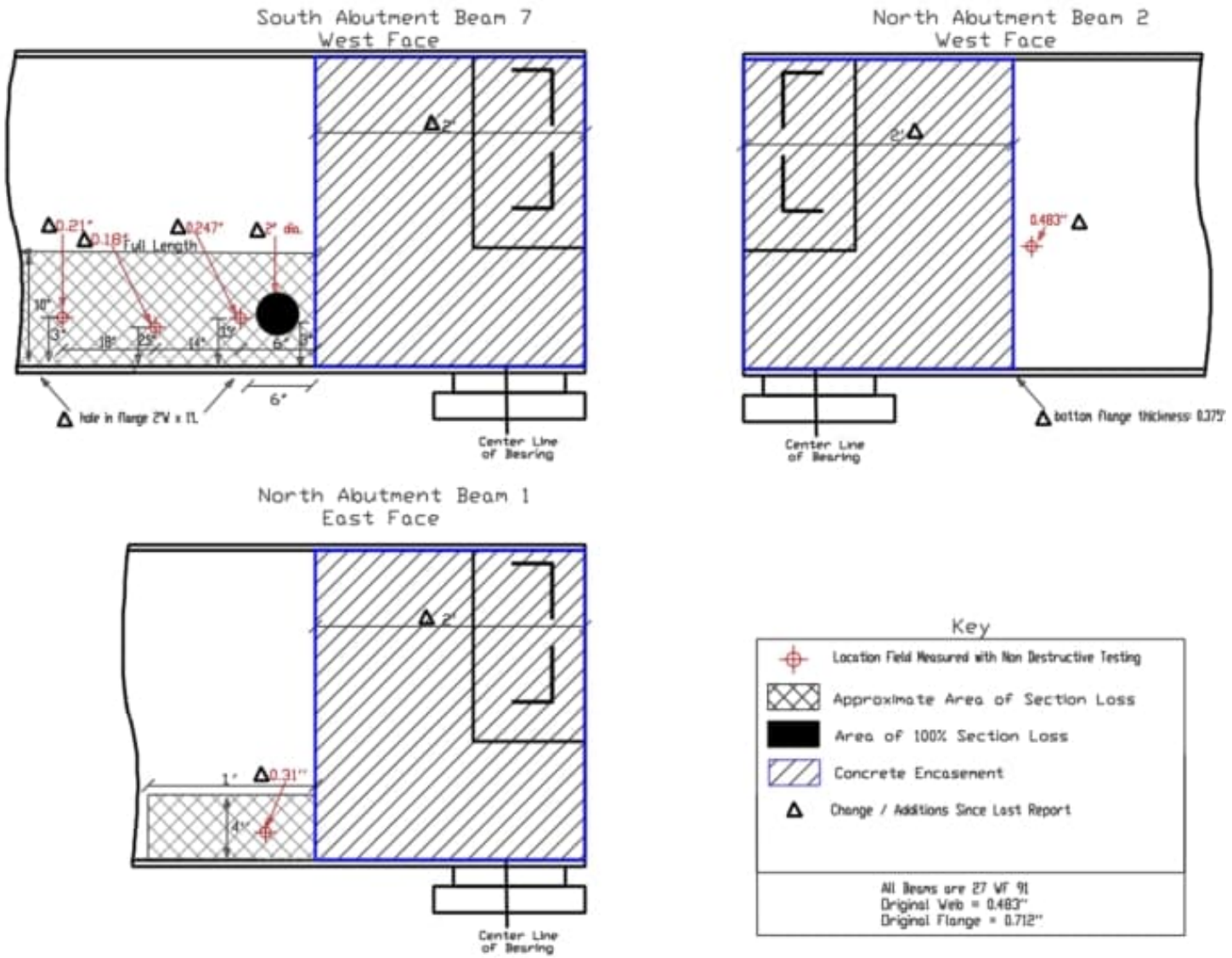
Proposal No. 613642 - 136413

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
RAYNHAM=TAUNTON	3M4	R-02-003=T-01-004	R02003-3M4-MUN-NBI	OCT 10, 2025

SKETCHES



Sketch 5: Beam Section Losses (Not to Scale).

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Proposal No. 613642 - 136413

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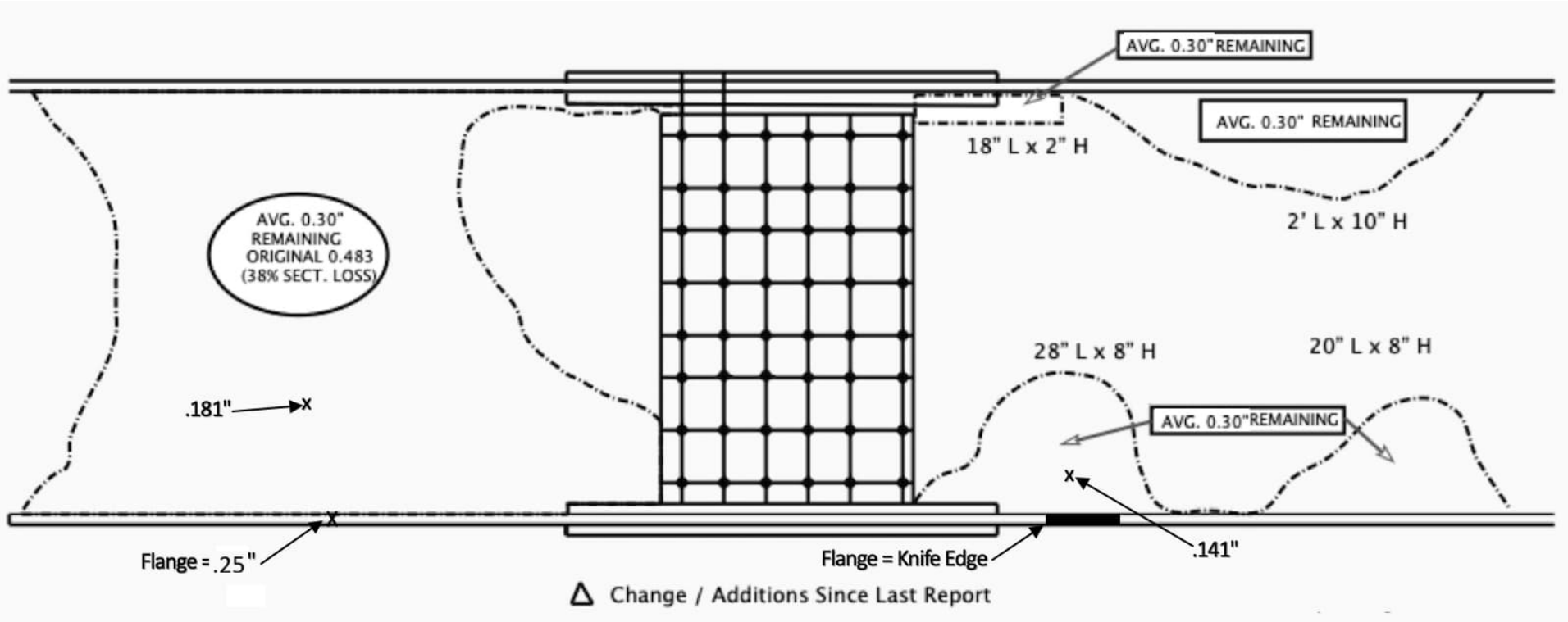
RAYNHAM=TAUNTON	3M4	R-02-003=T-01-004	R02003-3M4-MUN-NBI	OCT 10, 2025

SKETCHES



Sketch 6: **Span 2 west face Beam 7, section losses north and south of beam splice (Not to Scale).**

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Proposal No. 613642 - 136413

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
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PHOTOS

Photo 1: South Abutment, typical condition of encased beam ends.

Photo 2: North Abutment, typical condition of encased beam ends.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
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PHOTOS

Photo 3: **Span 1 looking north, typical condition of beams with corrosion.**

Photo 4: **Beam 1 South Abutment, corrosion at encased beam end.**

REM.(2)7-96

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
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PHOTOS

Photo 5: **Beam 2 South Abutment, corrosion at encased beam end.**

Photo 6: **Beam 6 South Abutment, corrosion at encased beam end.**

REM.(2)7-96

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
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PHOTOS

Photo 7: **Beam 7 South Abutment West Face, corrosion at encased beam end.**

Photo 8: **Beam 7 South Abutment East Face, corrosion at encased beam end.**

REM.(2)7-96

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
RAYNHAM=TAUNTON	3M4	R-02-003=T-01-004	R02003-3M4-MUN-NBI	OCT 10, 2025

PHOTOS

Photo 9: **Span 1 Beam 7 West Face looking north, areas of corrosion.**

Photo 10: **Beam 7 Pier, area of corrosion.**

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
RAYNHAM=TAUNTON	3M4	R-02-003=T-01-004	R02003-3M4-MUN-NBI	OCT 10, 2025

PHOTOS

Photo 11: Span 2 Beam 7 south of splice plate, area of corrosion.

Photo 12: Span 2 Beam 7 north of splice plate, area of corrosion.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
RAYNHAM=TAUNTON	3M4	R-02-003=T-01-004	R02003-3M4-MUN-NBI	OCT 10, 2025

PHOTOS

Photo 13: Beam 1 North Abutment, corrosion at encased beam end.

Photo 14: Beam 3 North Abutment, partially encased beam end with corrosion.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
RAYNHAM=TAUNTON	3M4	R-02-003=T-01-004	R02003-3M4-MUN-NBI	OCT 10, 2025

PHOTOS

Photo 15: Beam 7 North Abutment, area of corrosion.

REM.(2)7-96

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2-DIST	B.I.N.
05	3M4

UNDERWATER OPERATIONS TEAM
ROUTINE UNDERWATER INSPECTION REPORT

BR. DEPT. NO. **R-02-003=T-01-004**

CITY/TOWN	8-STRUCTURE NO.	LEVEL OF INSPECTION	93B-DATE INSPECTED
RAYNHAM=TAUNTON	R02003-3M4-MUN-NBI	II	APR 28, 2026

07-FACILITY CARRIED	ACCESS TO BRIDGE	UNDERWATER OPERATIONS ENGINEER
HWY SOUTH ST E	EMBANKMENT	WILLIAM J. COLLERAN

06-FEATURES INTERSECTED	DEPTH	VISIBILITY	TEAM LEADER (DIVE MASTER)	*Report submitted by:*
WATER TAUNTON RIVER	2.5 m	1.5 m	WILLIAM FERRY	

BOTTOM CONDITION	CURRENT	TEAM MEMBERS
BOULDERS, GRAVEL & SAND	TIDAL/SWIFT	W. J. COLLERAN, J. A. MANKOWSKY, E. HOGAN, B. FITZGERALD, Z. GIKAS, M. LEMIRE

ITEM 60 *SUBSTRUCTURE* — **6**

		DEF
1. Abutments	7	
a. Pedestals	N	-
b. Bridge Seats	N	-
c. Backwalls	N	-
d. Breastwalls	7	-
e. Wingwalls	7	-
f. Slope Paving/Rip-Rap	6	-
g. Pointing	N	-
h. Footings	H	-
i. Piles	H	-
j. Scour	7	-
k. Settlement	8	-
l.	N	-
2. Piers or Bents	6	
a. Pedestals	N	-
b. Caps	N	-
c. Columns	N	-
d. Stems/Webs/Pierwalls	6	M-P
e. Pointing	N	-
f. Footing	7	-
g. Piles	H	-
h. Scour	6	-
i. Settlement	8	-
j.	N	-
k.	N	-
3. Pile Bents	N	
a. Pile Caps	N	-
b. Piles	N	-
c. Diagonal Bracing	N	-
d. Horizontal Bracing	N	-
e. Fasteners	N	-
UNDERMINING (Y/N)		N

ITEM 61 *CHANNEL & CHANNEL PROTECTION* — **6**

		DEF
1. Channel Scour	6	-
2. Embankment Erosion	6	-
3. Debris	7	-
4. Vegetation	7	-
5. Utilities	N	-
6. Rip-Rap/Slope Protection	6	-
7. Aggradation	7	-
8. Fender System	N	-
a. Piles	N	-
b. Diagonal Bracing	N	-
c. Horizontal Bracing	N	-
d. Wales	N	-
e. Fasteners	N	-
f. Ladders	N	-
9.	N	-

ITEM 59 *SUPERSTRUCTURE*

		DEF
	N	-
	N	-
	N	-

ITEM 62 *CULVERTS* — **N**

		DEF
1. Roof	N	-
2. Floor	N	-
3. Walls	N	-
4. Headwall	N	-
5. Wingwall	N	-
6. Pipe	N	-
7. Protective Coating	N	-
8. Embankment	N	-
9. Wearing Surface	N	-
10. Railing	N	-
11. Sidewalks	N	-
12. Utilities	N	-
13. Member Alignment	N	-
14. Deformation	N	-
15. Scour	N	-
16. Settlement	N	-
17.	N	-
18.	N	-
UNDERMINING (Y/N)		N

DEFICIENCY REPORTING GUIDE

DEFICIENCY: A defect in a structure that requires corrective action.

CATEGORIES OF DEFICIENCIES:

M= Minor — Deficiencies which are minor in nature, generally do not impact the structural integrity of the bridge and could easily be repaired. Examples include but are not limited to: Spalled concrete, Minor scouring, etc.

S= Severe/Major Deficiency- — Deficiencies which are more extensive in nature and need more planning and effort to repair. Examples include but are not limited to: Moderate to major deterioration in concrete, Exposed and corroding rebars, Deteriorated timber piles, Considerable settlement, Considerable scouring or undermining, etc.

C-S= Critical Structural Deficiency- A deficiency in a structural element of a bridge that poses an extreme unsafe condition due to the failure or imminent failure of the element which will affect the structural integrity of the bridge.

C-H= Critical Hazard Deficiency- A deficiency in a component or element of a bridge that poses an extreme hazard or unsafe condition to the public, but does not impair the structural integrity of the bridge. Examples include but are not limited to: Any part of piles or fender system which are projecting outward and may become a safety hazard for the navigational traffic, etc.

URGENCY OF REPAIR:

I=Immediate- [Inspector(s) immediately contact District Bridge Inspection Engineer (DBIE) to report the Deficiency and to receive further instruction from him/her.]

A=ASAP- [Action/Repair should be initiated by District Maintenance Engineer or the responsible party (if not a State owned bridge) upon receipt of the Inspection Report.]

P=Prioritize- [Shall be prioritized by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) and repairs made when funds and/or manpower is available.]

X=UNKNOWN **N=NOT APPLICABLE** **H=HIDDEN/INACCESSIBLE** **R=REMOVED**

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
RAYNHAM=TAUNTON	**3M4**	**R-02-003=T-01-004**	**R02003-3M4-MUN-NBI**	**APR 28, 2026**

REMARKS

GENERAL REMARKS
This bridge is a two-span structure with concrete abutments and pier, dated 1945. It is on the Raynham/ Taunton town line.

Orientation:
1. Abutments are labeled left and right, looking downstream.
2. Sta 10+00 is at the upstream end. Sta 10+40 is at the downstream end.

ITEM 60 - SUBSTRUCTURE

Item 60.1 - Abutments
Item 60.1.d - Breastwalls
Right Abutment:
There is minor concrete abrasion approximately 5' high in the vicinity of the waterline.

Left Abutment:
There is minor concrete abrasion approximately 3' high from the mudline up.

Item 60.1.f - Slope Paving/Rip-Rap
The riprap is slumped and displaced at both abutments.

Item 60.1.i - Piles
According to plans dated April, 1945 the Right Abutment is pile supported and the Left Abutment is not pile supported.

Item 60.1.j - Scour
Left Abutment:
From Sta 10+16 to Sta 10+42 there is zig-zag steel sheeting exposed with a toe of 1.5’ (Inside zig-zag distance) and a maximum outside height of 1.1’.

Item 60.2 - Piers or Bents
Item 60.2.d - Stems/Webs/Pierwalls
There is minor concrete abrasion approximately 5' high in the vicinity of the waterline.
A steel angle plate with 0.5' wide legs extends down the nose at the upstream end.

Left Side:
There is concrete deterioration at the upstream end at the mudline, beginning at the upstream nose at the steel angle. The deterioration measures 3.0' Long along the upstream angle (from the nose of the pier to the angle point). This void goes behind the steel angle plate into the void described on the right side.
Starting at the angle point, concrete deterioration measures 1.0' Long, 1.2' High and 0.7' Penetration.
At Sta 10+09 there is concrete deterioration 1.5' above the mudline measuring 1.8' Long, 0.5' High and 0.2' Penetration.

Right Side:
There is concrete deterioration at the upstream end at the mudline beginning at the upstream nose at the steel angle. The deterioration measure 3.0' Long along the upstream angle (from the nose of the pier to the angle point). The void went behind the steel angle plate into the void described on the left side.
Starting at the angle point, concrete deterioration measures 2.9' Long, 0.8' High and 0.6' Penetration.
At Sta 10+22 there is concrete deterioration at the mudline measuring 1.5' Long, 1.2' High and 0.3' Penetration.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
RAYNHAM=TAUNTON	**3M4**	**R-02-003=T-01-004**	**R02003-3M4-MUN-NBI**	**APR 28, 2026**

REMARKS

Item 60.2.f - Footing
Left Side:
No footing is exposed.

Right Side:
The footing is exposed from Sta 10+28 to Sta 10+42 with a maximum exposed height of 1.5'. The toe width varies from 1.7' to 2.4'. According to plans dated April, 1945 the footing height is 3.0'.

Item 60.2.g - Piles
According to plans dated April, 1945 the Pier is pile supported.

Item 60.2.h - Scour
Left Side:
No footing is exposed.

Right Side:
The footing is exposed from Sta 10+28 to Sta 10+42 with a maximum exposed height of 1.5'. The toe width varies from 1.7' to 2.4'. According to plans dated April, 1945 the footing height is 3.0'.

ITEM 61 - CHANNEL AND CHANNEL PROTECTION

Item 61.1 - Channel Scour
Left Abutment:
From Sta 10+16 to Sta 10+42 there is zig-zag steel sheeting exposed with a toe of 1.5' (Inside zig-zag distance) and a maximum outside height of 1.1'.

Pier:
Left Side:
No footing is exposed.

Right Side:
The footing is exposed from Sta 10+28 to Sta 10+42 with a maximum exposed height of 1.5'. The toe width varies from 1.7' to 2.4'. According to plans dated April, 1945 the footing height is 3.0'.

Item 61.2 - Embankment Erosion
There is slope erosion at the upstream right embankment.

Item 61.3 - Debris
There are some old piles 2.6' above the mudline which are trapping debris along both sides of the pier.
A large amount of debris consisting of branches, trees and auto parts along both sides of the pier had been building up since the 8/11/92 inspection. The heavy tree debris across the upstream nose was making the upstream right side of the nose and angle point inaccessible to divers. Divers removed most of the debris in order to fully inspect the underwater elements.
See Photos 1-5.

Item 61.6 - Rip-Rap/Slope Protection
The riprap is slumped and displaced at both the upstream and downstream embankments.

Sketch / Chart / Photo Log
Sketch 1 : PLAN VIEW - NOT TO SCALE
Chart 1 : SCOUR MONITORING CHART AT DOWNSTREAM AND UPSTREAM ENDS

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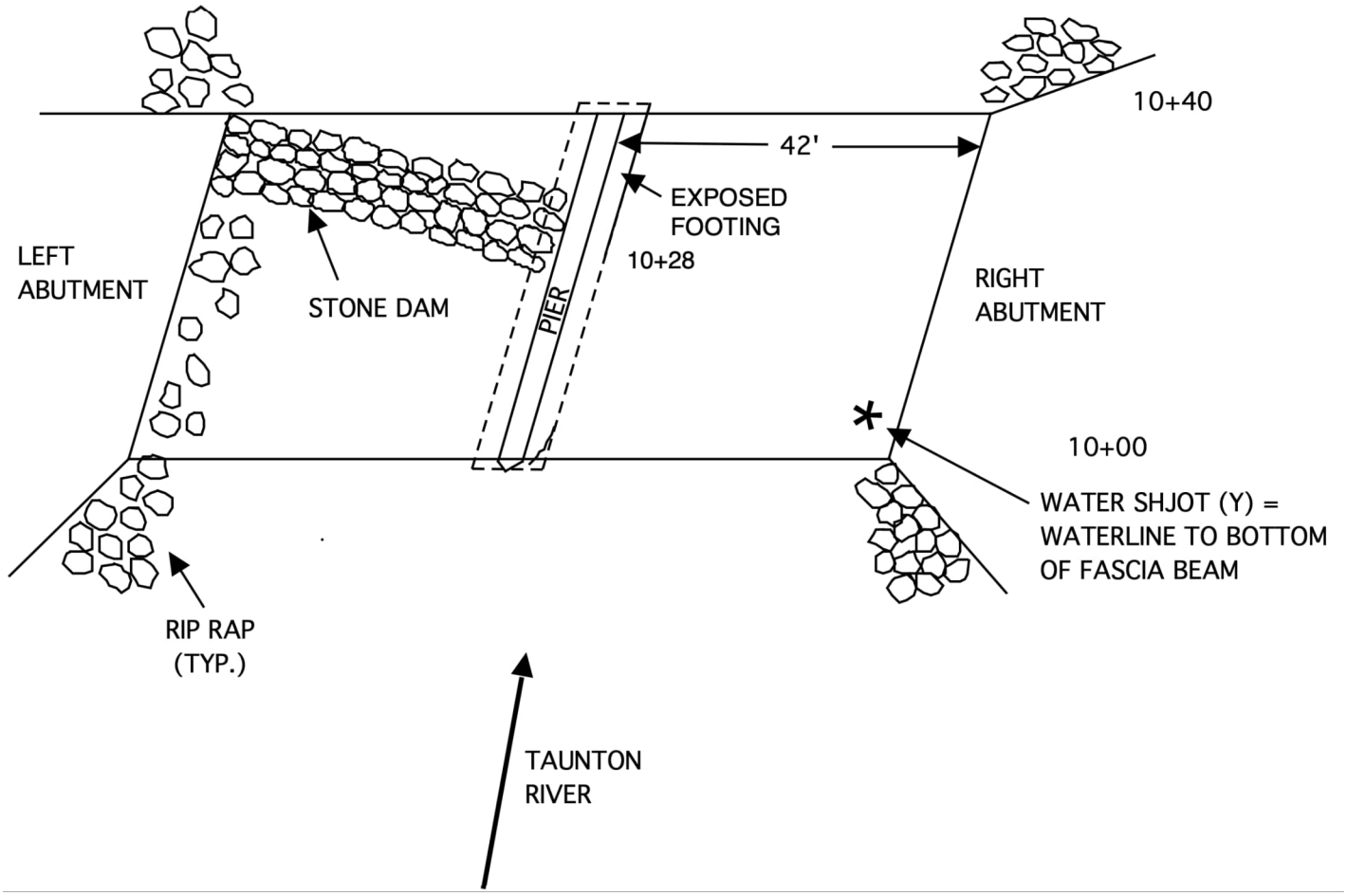
REMARKS

Chart 2 : ELEMENT LEVEL CHART
Photo 1 : TIMBER DEBRIS BUILD-UP VIEWED FROM UPSTREAM RIGHT
Photo 2 : TIMBER DEBRIS BUILD-UP VIEWED FROM UPSTREAM LEFT
Photo 3 : TIMBER DEBRIS BUILD-UP VIEWED FROM UPSTREAM OVERHEAD
Photo 4 : TIMBER DEBRIS BUILD-UP VIEWED FROM UPSTREAM OVERHEAD WHILE BEING REMOVED
Photo 5 : AFTER REMOVAL OF TIMBER DEBRIS BUILD-UP VIEWED FROM UPSTREAM LEFT

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
RAYNHAM=TAUNTON	3M4	R-02-003=T-01-004	R02003-3M4-MUN-NBI	APR 28, 2026

SKETCHES



Sketch 1: PLAN VIEW - NOT TO SCALE

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
RAYNHAM=TAUNTON	3M4	R-02-003=T-01-004	R02003-3M4-MUN-NBI	APR 28, 2026

CHARTS

	9/14/89		1/3/17	2/11/20	3/1/23	4/28/26	
DOWNSTREAM END							
RIGHT SPAN							
RIGHT ABUTMENT	0.5'		1.1'	1.5'	2.3'	1.4'	
10' OFF RIGHT ABUT.	-		2.7'	2.8'	3.2'	2.8'	
C/L RIGHT SPAN	3.8'		3.1'	3.0'	3.4'	3.1'	
10' OFF RT. SIDE PIER	-		3.8'	3.7'	3.2'	3.9'	
PIER - RIGHT SIDE							
ON FOOTING	-		2.8'	2.6'	2.9'	3.9'	
OFF FOOTING	3.0'		5.4'	3.9'	3.4'	4.3'	
LEFT SPAN							
PIER - LEFT SIDE			2.5'	2.9'	3.0'	2.8'	
10' OFF LT. SIDE PIER	-		2.2'	2.6'	3.3'	1.8'	
C/L LEFT SPAN	-	**SEE**	+0.1'	0.0'	+0.2'	0.4'	
10' OFF LEFT ABUT.	-	**PREVIOUS**	-	+1.3'	+0.6'	+1.0'	
LEFT ABUTMENT	-	**REPORTS**	DRY	DRY	+3.9'	+4.3'	
		FOR					
UPSTREAM END		**ADDITIONAL**					
RIGHT SPAN		**SOUNDINGS**					
RIGHT ABUTMENT	-		-	-	-	1.1'	
10' OFF RIGHT ABUT.	-		-	-	-	1.9'	
C/L RIGHT SPAN	-		-	-	-	1.9'	
10' OFF RT. SIDE PIER	-		-	-	-	3.0'	
PIER - RIGHT SIDE	-		-	-	-	2.6'	
LEFT SPAN							
PIER - LEFT SIDE	-		-	-	-	2.2'	
10' OFF LT. SIDE PIER	-		-	-	-	2.7'	
C/L LEFT SPAN	-		-	-	-	1.6'	
10' OFF LEFT ABUT.	-		-	-	-	+0.6'	
LEFT ABUTMENT	-		-	-	-	+4.3'	
Y	12.5'		11.6'	9.4'	10.4'	11.4'	
CORRECTION FACTOR	-		-0.9'	-3.1'	-2.1'	-1.1'	

NOTES:

1. WATER SHOT (Y)=WATERLINE TO BOTTOM OF FASCIA BEAM, UPSTREAM END, RIGHT ABUTMENT.
2. SOUNDINGS ADJUSTED TO 9/14/89 WATERLINE WITH CORRECTION FACTOR.
3. STA 10+00 IS AT THE UPSTREAM END. STA 10+40 IS AT THE DOWNSTREAM END.

Chart 1: SCOUR MONITORING CHART AT DOWNSTREAM AND UPSTREAM ENDS

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
RAYNHAM=TAUNTON	3M4	R-02-003=T-01-004	R02003-3M4-MUN-NBI	APR 28, 2026

CHARTS

National Bridge Element Inspection

UNDERWATER OPERATIONS MASSDOT

		Month	Day	Year
Bridge Number	R-02-003	4	28	2026
BIN	3M4	Town	RAYNHAM	
Structure Number	R02003 3M4 MUN NBI	District	5	
Inspectors	FERRY (Leader)	COLLERAN, HOGAN, MANKOWSKY, FITZGERALD, GIKAS, LEMIRE (Member(s))		

Element #	Element Name	Units	Env-iron.	Total Quantity	Q or %	Condition States (Quantity or Percent) * 1	2	3	4
210	**PIERWALL**	**FEET**	**2**	**40**	**Q**		**40**		
1080	*SPALL*	*FEET*	*2*	*10*	*Q*		*10*		
1190	*ABRASION*	*FEET*	*2*	*34*	*Q*		*34*		
215	**ABUTMENT**	**FEET**	**2**	**80**	**Q**		**80**		
1190	*ABRASION*	*FEET*	*2*	*80*	*Q*		*80*		
220	**FOOTING**	**FEET**	**2**	**14**	**Q**		**14**		
6000	*SCOUR*	*FEET*	*2*	*14*	*Q*		*14*		

** It is okay to switch between Quantity and Percent for different Elements.*

Chart 2: ELEMENT LEVEL CHART

REM.(2)7-96

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
RAYNHAM=TAUNTON	3M4	R-02-003=T-01-004	R02003-3M4-MUN-NBI	APR 28, 2026

PHOTOS

Photo 1: TIMBER DEBRIS BUILD-UP VIEWED FROM UPSTREAM RIGHT

Photo 2: TIMBER DEBRIS BUILD-UP VIEWED FROM UPSTREAM LEFT

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
RAYNHAM=TAUNTON	3M4	R-02-003=T-01-004	R02003-3M4-MUN-NBI	APR 28, 2026

PHOTOS

Photo 3: TIMBER DEBRIS BUILD-UP VIEWED FROM UPSTREAM OVERHEAD

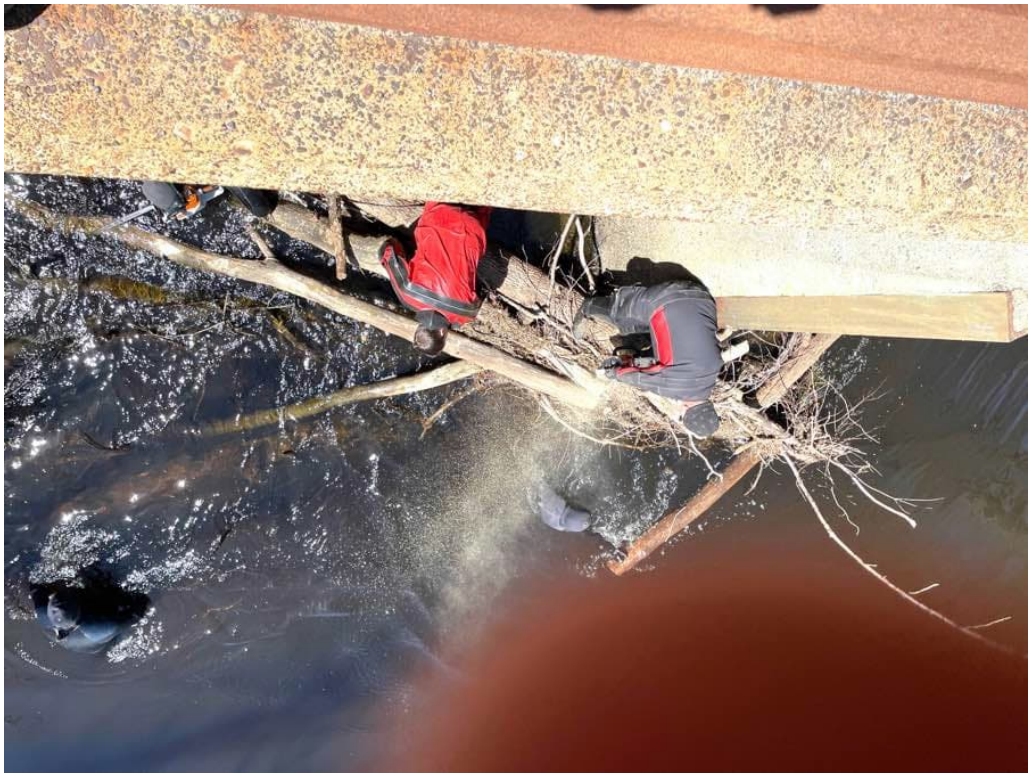


Photo 4: TIMBER DEBRIS BUILD-UP VIEWED FROM UPSTREAM OVERHEAD WHILE BEING REMOVED

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
RAYNHAM=TAUNTON	3M4	R-02-003=T-01-004	R02003-3M4-MUN-NBI	APR 28, 2026

PHOTOS

Photo 5: **AFTER REMOVAL OF TIMBER DEBRIS BUILD-UP VIEWED FROM UPSTREAM LEFT**

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION

STRUCTURES INSPECTION FIELD REPORT

ROUTINE & SPECIAL MEMBER INSPECTION

2-DIST	B.I.N.	BR. DEPT. NO.
05	3M4	R-02-003=T-01-004

CITY/TOWN	8.-STRUCTURE NO.	11-Kilo. POINT	41-STATUS	90-ROUTINE INSP. DATE
RAYNHAM=TAUNTON	R02003-3M4-MUN-NBI	000.000	P:POSTED	MAY 24, 2024

07-FACILITY CARRIED	MEMORIAL NAME/LOCAL NAME	27-YR BUILT	106-YR REBUILT	YR REHAB'D (NON 106)
HWY SOUTH ST E		1945	0000	0000

06-FEATURES INTERSECTED	26-FUNCTIONAL CLASS	DIST. BRIDGE INSPECTION ENGINEER
WATER TAUNTON RIVER	Urban Collector	G. Simpson

43-STRUCTURE TYPE	22-OWNER	21-MAINTAINER	TEAM LEADER
302 : Steel Stringer/Girder	Town Agency	Town Agency	J. Hanley

107-DECK TYPE	WEATHER	TEMP. (air)	TEAM MEMBERS
1 : Concrete Cast-in-Place	Partly Sur	21°C	J. MARMELO, M. EMMONS

ITEM 58 — 5

DECK

		DEF
1. Wearing surface	5	S-P
2. Deck Condition	5	S-P
3. Stay in Place Forms	N	-
4. Curbs	6	M-P
5. Median	N	-
6. Sidewalks	6	M-P
7. Parapets	N	-
8. Railing	4	S-A
9. Anti Missile Fence	N	-
10. Drainage System	3	S-A
11. Lighting Standards	N	-
12. Utilities	6	-
13. Deck Joints	N	-
14.	N	-
15.	N	-
16.	N	-

CURB REVEAL (In millimeters)	E	W
	250	230

APPROACHES

		DEF
a. Appr. pavement condition	5	S-P
b. Appr. Roadway Settlement	5	S-P
c. Appr. Sidewalk Settlement	5	S-P
d.	N	-

OVERHEAD SIGNS (Attached to bridge) (Y/N) N

		DEF
a. Condition of Welds	N	-
b. Condition of Bolts	N	-
c. Condition of Signs	N	-

ITEM 59 — 4

SUPERSTRUCTURE

		DEF
1. Stringers	N	-
2. Floorbeams	N	-
3. Floor System Bracing	N	-
4. Girders or Beams	4	S-A
5. Trusses - General	N	-
a. Upper Chords	N	-
b. Lower Chords	N	-
c. Web Members	N	-
d. Lateral Bracing	N	-
e. Sway Bracings	N	-
f. Portals	N	-
g. End Posts	N	-
6. Pin & Hangers	N	-
7. Conn Plt's, Gussets & Angles	N	-
8. Cover Plates	N	-
9. Bearing Devices	5	S-P
10. Diaphragms/Cross Frames	7	-
11. Rivets & Bolts	6	M-P
12. Welds	N	-
13. Member Alignment	7	-
14. Paint/Coating	3	S-A
15.	N	-

Year Painted	1945

COLLISION DAMAGE: *Please explain*
None (X) Minor ( ) Moderate ( ) Severe ( )

LOAD DEFLECTION: *Please explain*
None (X) Minor ( ) Moderate ( ) Severe ( )

LOAD VIBRATION: *Please explain*
None (X) Minor ( ) Moderate ( ) Severe ( )

Any Fracture Critical Member: (Y/N) N

Any Cracks: (Y/N) N

ITEM 60 — 6

SUBSTRUCTURE

	Dive	Cur		DEF
1. Abutments			7	
a. Pedestals	N	N		-
b. Bridge Seats	N	7		M-P
c. Backwalls	N	6		M-P
d. Breastwalls	7	7		-
e. Wingwalls	7	6		S-P
f. Slope Paving/Rip-Rap	6	6		M-P
g. Pointing	N	N		-
h. Footings	H	6		-
i. Piles	H	H		-
j. Scour	7	7		-
k. Settlement	8	7		-
l.	N	N		-
m.	N	N		-
2. Piers or Bents			6	
a. Pedestals	N	N		-
b. Caps	N	N		-
c. Columns	N	N		-
d. Stems/Webs/Pierwalls	6	6		-
e. Pointing	N	N		-
f. Footing	7	H		-
g. Piles	H	H		-
h. Scour	6	H		-
i. Settlement	8	7		-
j.	N	N		-
k.	N	N		-
3. Pile Bents			N	
a. Pile Caps	N	N		-
b. Piles	N	N		-
c. Diagonal Bracing	N	N		-
d. Horizontal Bracing	N	N		-
e. Fasteners	N	N		-

UNDERMINING (Y/N) If YES please explain: N

COLLISION DAMAGE:
None (X) Minor ( ) Moderate ( ) Severe ( )

SCOUR: *Please explain*
None ( ) Minor (X) Moderate ( ) Severe ( )

I-60 (Dive Report): 6 *I-60 (This Report):* 6

93B-U/W (DIVE) Insp 03/01/2023

X=UNKNOWN N=NOT APPLICABLE H=HIDDEN/INACCESSIBLE R=REMOVED

RTN(1)7-96

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
RAYNHAM=TAUNTON	3M4	R-02-003=T-01-004	R02003-3M4-MUN-NBI	MAY 24, 2024

ITEM 61 — CHANNEL & CHANNEL PROTECTION: 6

	Dive	Cur	DEF
1.Channel Scour	6	H	-
2.Embankment Erosion	6	7	-
3.Debris	5	5	S-A
4.Vegetation	7	7	-
5.Utilities	N	X	-
6.Rip-Rap/Slope Protection	6	6	-
7.Aggradation	7	7	-
8.Fender System	N	N	-

STREAM FLOW VELOCITY:

Tidal (X) High ( ) Moderate ( ) Low ( ) None ( )

ITEM 61 (Dive Report): 6 ***ITEM 61 (This Report):*** 6

93b-U/W INSP. DATE: 03/01/2023

ITEM 36 — *TRAFFIC SAFETY*

	36	COND	DEF
A. Bridge Railing	0	4	S-A
B. Transitions	0	N	-
C. Approach Guardrail	0	7	-
D. Approach Guardrail Ends	0	7	M-P

WEIGHT POSTING — *Not Applicable*

	H	3	3S2	Single
Actual Posting	20	21	21	N
Recommended Posting	20	21	21	N

Waived Date: 00/00/0000 **EJDMT Date:** 00/00/0000

Signs In Place (Y=Yes,N=No, NR=NotRequired) / Legibility/ Visibility	At bridge N	At bridge S	Other Advance N	Other Advance S
	Y	Y	Y	Y
	6 / 6	7 / 7	7 / 7	7 / 6

CLEARANCE POSTING

Not Actual Field Measurement X

Posted Clearance

	E ft	E in	W ft	W in	meter
		0		0	
		0		0	

Signs In Place (Y=Yes,N=No, NR=Not Required) / Legibility/ Visibility	At bridge E	At bridge W	Advance E	Advance W

ACCESSIBILITY (Y/N/P)

	Needed	Used
Lift Bucket	N	N
Ladder	P	N
Boat	N	N
Waders	N	N
Inspector 50	Y	Y
Rigging	N	N
Staging	N	N
Traffic Control	P	N
RR Flagger	N	N
Police	Y	Y
Other:		
BISETUP	P	Y

TOTAL HOURS 64

PLANS (Y/N): Y

(V.C.R.) (Y/N): N

TAPE#: _____

List of field tests performed:
Visual, Tactile, and Non Destructive Testing.

RATING

Rating Report (Y/N): Y

Date: 07/01/2015

Inspection data at time of existing rating

I 58: **6** I 59: **5** I 60: **6** Date : 05/30/2014

Recommend for Rating or Rerating (Y/N): N

If YES please give priority: HIGH ( ) MEDIUM ( ) LOW ( )

REASON: _____

CONDITION RATING GUIDE

(For Items 58, 59, 60 and 61)

	CODE	CONDITION	DEFECTS
	N	NOT APPLICABLE	
G	9	EXCELLENT	Excellent condition.
G	8	VERY GOOD	No problem noted.
G	7	GOOD	Some minor problems.
F	6	SATISFACTORY	Structural elements show some minor deterioration.
F	5	FAIR	All primary structural elements are sound but may have minor section loss, cracking, spalling or scour.
P	4	POOR	Advanced section loss, deterioration, spalling or scour.
P	3	SERIOUS	Loss of section, deterioration, spalling or scour have seriously affected primary structural components. Local failures are possible. Fatigue cracks in steel or shear cracks in concrete may be present.
C	2	CRITICAL	Advanced deterioration of primary structural elements. Fatigue cracks in steel or shear cracks in concrete may be present or scour may have removed substructure support. Unless closely monitored it may be necessary to close the bridge until corrective action is taken.
C	1	"IMMINENT" FAILURE	Major deterioration or section loss present in critical structural components or obvious vertical or horizontal movement affecting structure stablility. Bridge is closed to traffic but corrective action may put it back in light service.
	0	FAILED	Out of service - beyond corrective action.

DEFICIENCY REPORTING GUIDE

DEFICIENCY: A defect in a structure that requires corrective action.

CATEGORIES OF DEFICIENCIES:

M= Minor Deficiency — Deficiencies which are minor in nature, generally do not impact the structural integrity of the bridge and could easily be repaired. Examples include but are not limited to: Spalled concrete, Minor pot holes, Minor corrosion of steel, Minor scouring, Clogged drainage, etc.

S= Severe/Major Deficiency — Deficiencies which are more extensive in nature and need more planning and effort to repair. Examples include but are not limited to: Moderate to major deterioration in concrete, Exposed and corroded rebars, Considerable settlement, Considerable scouring or undermining, Moderate to extensive corrosion to structural steel with measurable loss of section, etc.

C-S= Critical Structural Deficiency — A deficiency in a structural element of a bridge that poses an extreme unsafe condition due to the failure or imminent failure of the element which will affect the structural integrity of the bridge.

C-H= Critical Hazard Deficiency — A deficiency in a component or element of a bridge that poses an extreme hazard or unsafe condition to the public, but does not impair the structural integrity of the bridge. Examples include but are not limited to: Loose concrete hanging down over traffic or pedestrians, A hole in a sidewalk that may cause injuries to pedestrians, Missing section of bridge railing, etc.

URGENCY OF REPAIR:

I = Immediate- [Inspector(s) immediately contact District Bridge Inspection Engineer (DBIE) to report the Deficiency and to receive further instruction from him/her].

A = ASAP- [Action/Repair should be initiated by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) upon receipt of the Inspection Report].

P = Prioritize- [Shall be prioritized by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) and repairs made when funds and/or manpower is available].

STRUCTURES INSPECTION FIELD REPORT

ROUTINE & SPECIAL MEMBER INSPECTION

2-DIST	B.I.N.	BR. DEPT. NO.
05	3M4	R-02-003=T-01-004

CITY/TOWN	8.-STRUCTURE NO.	11-Kilo. POINT	90-ROUTINE INSP. DATE	93*-SPEC. MEMB. INSP. DATE
RAYNHAM=TAUNTON	R02003-3M4-MUN-NBI	000.000	May 24, 2024	May 24, 2024

07-FACILITY CARRIED	MEMORIAL NAME/LOCAL NAME	27-YR BUILT	106-YR REBUILT	*YR REHAB'D (NON 106)
HWY SOUTH ST E		1945	0000	0000

06-FEATURES INTERSECTED	26-FUNCTIONAL CLASS	DIST. BRIDGE INSPECTION ENGINEER
WATER TAUNTON RIVER	Urban Collector	G. Simpson

43-STRUCTURE TYPE	22-OWNER	21-MAINTAINER	TEAM LEADER
302 : Steel Stringer/Girder	Town Agency	Town Agency	J. Hanley

107-DECK TYPE	WEATHER	TEMP. (air)	TEAM MEMBERS
1 : Concrete Cast-in-Place	Partly Sui	21°C	J. MARMELO, M. EMMONS

WEIGHT POSTING — *Not Applicable* ☐

	H	3	3S2	Single
Actual Posting	20	21	21	N
Recommended Posting	20	21	21	N

Waived Date: 00/00/0000 EJDMT Date: 00/00/0000

Signs In Place (Y=Yes,N=No, NR=Not Required) / Legibility/ Visibility

	At bridge N	At bridge S	Advance N	Advance S
Signs In Place	Y	Y	Y	Y
Legibility/ Visibility	6/6	7/7	7/7	7/6

PLANS (Y/N): Y

(V.C.R.) (Y/N): N

TAPE#:

RATING

Rating Report (Y/N): Y Date: 07/01/2015

Recommend for Rating or Rerating (Y/N): N

If YES please give priority: HIGH ( ) MEDIUM ( ) LOW ( )

REASON:

Inspection data at time of existing rating

I 58: 6 I 59: 5 I 60: 6 I 62: - Date : 05/30/2014

SPECIAL MEMBER(S):

	MEMBER	CRACK (Y/N):	WELD'S CONDITION (0-9)	LOCATION OF CORROSION, SECTION LOSS (%), CRACKS, COLLISION DAMAGE, STRESS CONCENTRATION, ETC.	CONDITION PREVIOUS (0-9)	CONDITION PRESENT (0-9)	INV. RATING OF MEMBER FROM RATING ANALYSIS H-20	3	3S2	Deficiencies
A	Item 59.4 - Girders or Beams	N		See remarks in comments section.	4	4	27	30	29	S-A
B										
C										
D										
E										

List of field tests performed:
Visual, Tactile, and Non Destructive Testing.

	I-58	I-59	I-60	I-62
(Overall Previous Condition)	5	4	6	-
(Overall Current Condition)	5	4	6	-

DEFICIENCY: A defect in a structure that requires corrective action.

CATEGORIES OF DEFICIENCIES:

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C-H= Critical Hazard Deficiency — A deficiency in a component or element of a bridge that poses an extreme hazard or unsafe condition to the public, but does not impair the structural integrity of the bridge. Examples include but are not limited to: Loose concrete hanging down over traffic or pedestrians, A hole in a sidewalk that may cause injuries to pedestrians, Missing section of bridge railing, etc.

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P = Prioritize- [Shall be prioritized by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) and repairs made when funds and/or manpower is available].

X=UNKNOWN **N=NOT APPLICABLE** **H=HIDDEN/INACCESSIBLE** **R=REMOVED**

F.C.(1)7-96

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
RAYNHAM=TAUNTON	**3M4**	**R-02-003=T-01-004**	**R02003-3M4-MUN-NBI**	**MAY 24, 2024**

REMARKS

BRIDGE ORIENTATION
This two span structure carries South Street East over the Taunton River (flows tidally from east to west). According to the bridge design plans the abutments are labeled north and south. The eight beams are numbered from west to east, see sketches 1 and 2. For this report the seven bays are numbered from west to east and the two spans are numbered from south to north.

GENERAL REMARKS
For underwater deficiencies see the latest underwater inspection dated 3/1/2023.

Access:
District 3 Aspen-62 was used for this inspection.

ITEM 58 - DECK

Item 58.1 - Wearing surface
See photo 1 for general topside.

There are areas of minor wheel rutting throughout both travel lanes, minor to moderate debris along both curb lines with evidence of ponding in span 1 at the SW and SE gutters. Numerous partially settled asphalt patches in span 1, **see photos 2, 3, 4, and 5.**

Adjacent to both curb lines the wearing surface is delaminated along the full length of the structure with areas of heaving up to 1' wide.

Specific deficiencies are listed below:

Span 1:
- Northbound travel lane adjacent to the south abutment and SE curb, partially settled asphalt patches and heaving, cracking (up to 1/8"W) measuring 3' x 5' long, **see photo 2.** Previously exposed deck has been patched since the last inspection.

- Northbound shoulder over the south abutment, a thru hole up to 3" in diameter, **see photo 3.**

- Northbound travel lane adjacent to the pier, several partially settled asphalt patches each up to 1.5' in diameter, **see photo 4.**

- Southbound travel lane adjacent to the south abutment, area of partially settled asphalt patches measuring up to 4' wide x 10' wide with a 1' diameter pothole x 2" deep, **see photo 5.**

- Southbound travel lane at mid span, several partially settled asphalt patches each measuring up to 1.5' in diameter, **see photo 5.**

Item 58.2 - Deck Condition
There are areas of minor to heavy hairline diagonal transverse cracking with minor to heavy efflorescence and rust bleed along top flanges.

See item 58.1 Wearing Surface for associated deficiencies.

Specific deficiencies are listed below:

Span 1:

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
RAYNHAM=TAUNTON	**3M4**	**R-02-003=T-01-004**	**R02003-3M4-MUN-NBI**	**MAY 24, 2024**

REMARKS

- West deck overhang, longitudinal hairline cracking with efflo throughout with areas of scale and spalls with exposed rebar at midspan and near south abutment, respectively, **see photo 6** for general underside. Scale at midspan up to 8'L x 10"H x 8"W x 3"D. Spall near south abutment up to 4'L x 10"H x 8"W x 3"D with exposed rebar, **see photo 7.**

- **See photo 8** for general underside of bays 1 through 4.

- S/P - Bays 1 and 2 have minor to heavy hairline diagonal transverse cracking with minor to heavy efflorescence and rust bleed along top flanges at southern ends of the bays, heaviest at the south abutment with evidence of active leakage, **see photos 9, 10, and 11.**

- **See photo 12** for general underside of bays 4 through 7.

- S/P - Bay 7 has irregular moderate hairline cracking with minor to heavy efflorescence and rust bleed along the top flange of beam 7 throughout with evidence of some active leakage, **see photos 13 and 14.**

- East deck overhang has hairline map cracking along east face with areas of longitudinal hairline cracking with efflo on the underside, **see photo 15** for general underside.

Pier:
- Bay 2 spall with exposed rebar measuring 1' in diameter x up to 2" deep, **see photo 16.**

- Bay 4 small spall (6" diameter x 2"D) with exposed rebar with adjacent associated delamination up to 2' diameter, **see photo 17.**

- Bay 5 has a partial width hairline transverse crack with efflo adjacent to deck construction joint, **see photo 18.**

Span 2:
- West deck overhang, has longitudinal hairline cracking with efflo throughout. Adjacent to the north abutment, spall/delamination with exposed rebar measuring 4' long x 5" high & wide x up to 2" deep, **see photo 19.**

- **See photos 20 and 21** for general underside of span 2.

- Bay 6 has irregular longitudinal and diagonal hairline cracking with minor to heavy efflorescence and rust bleed along beam top flanges, **see photo 22 for example.**

- Bay 7 has several transverse spalled areas with exposed sidewalk angles, up to 6" long x full width x 1.5" deep, **see photo 23.**

Item 58.4 - Curbs
Both curbs have minor areas chipping and rust staining.

Item 58.6 - Sidewalks
See photo 4 for and overview of the east sidewalk.

There is some scattered minor hairline cracking along the curb.

There is an isolated spall along the east edge over the pier measuring 1' in diameter x 2" deep, **see photo 24.**

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Item 58.8 - Railing
There is moderate to heavy corrosion throughout both railings with areas of severe corrosion and section loss.

West Railing lower horizontal rail has failed between the 3rd and 4th posts and between the 6th and 7th posts (counted from the south abutment) see photo 2 for an overview.

The steel endposts at both rails have severe corrosion and losses at the bases, see photo 25 for worst example at the SW endpost.

Throughout both railings at majority of the connection of the horizontal rails and posts there are corrosion holes measuring up to 6" in diameter, see photos 27 and 28 for overview examples.

Item 58.10 - Drainage System
All deck drains lack extensions and have up to 100% section loss, see photo 14 for typical example and sketch 2 for design locations.

Deck drain locations and deficiencies are a main contributor to the severe active corrosion and section loss along beam 7 in both spans and some associated beam ends at the abutments. See Item 59.4 - Girders or Beams.

Item 58.12 - Utilities
There are areas of active leakage onto the utilities with areas of minor corrosion.

APPROACHES

Approaches a - Appr. pavement condition
Both approaches have minor to moderate wheel rutting and random areas of minor to moderate partially sealed cracking (up to 1/8" wide). **See photo 1** for an overview of the south approach.

At both abutments there is transverse partially sealed cracking measuring full width x 1/8" wide, **see photos 2 and 29** for overview of the south and north approaches, respectively. In addition at the south abutment there are some asphalt patches each measuring up to 1.5' in diameter overlapping into the wearing surface.

Approaches b - Appr. Roadway Settlement
There are areas of minor settlement along both approaches.

S/P - At the south approach of the NB lane there is general settlement along the SE approach curb and catch basin that extends out to a manhole in the NB lane, **see photos 1 and 28** for overviews.

Approaches c - Appr. Sidewalk Settlement
S/P - The east approach sidewalks and curbs have settled up to 2-1/2". In addition at the SE there is 2" diameter thru hole at the curb, **see photo 30.**

The west approach safetywalk curbs are settled up to 4" lower than the bridge curbs, **see photo 29** for example.

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REMARKS

ITEM 59 - SUPERSTRUCTURE

Item 59.4 - Girders or Beams
The beams consist of rolled 27 WF 91 with an original web thickness of 0.483'' and an original bottom flange thickness of 0.712''.

There are areas of moderate corrosion throughout with several areas having heavy to severe active corrosion (see photos 12, 20, and sketch 3).

The worst locations are typically located at both abutments and along the west face of Beam 7 below the deck drains.

At the Pier typical section losses/pitting are typically 1/16'' to 1/8'' deep along the lower and upper web.

Specific deficiencies are listed below:

South Abutment:
- Beam 1, heavy corrosion with area of web section loss measuring approximately 3' long x 6'' high with previously 0.25'' remaining. Currently there are three holes up to 1'' diameter above the bearing, see sketch 4 and photos 31, 32, and 33.

- Beam 2, heavy corrosion with area of web section loss measuring approximately 2.5' long x 6'' high with 0.235'' of the web left over the bearing, see sketch 4 and photos 34 and 35. There is several linear feet of heavy laminated rust in the web and top & bottom flanges extending to north along the east face, see photo 36.

- Beams 3 and 4, minor to moderate corrosion with area of web section loss measuring up to 2' long x up to 4'' high with at least 0.32'' remaining.

- Beam 5, heavy corrosion with area of web section loss measuring approximately 2' long x 6'' high with 0.141'' remaining over the bearing see photo 39.

- Beam 6, heavy corrosion with area of web section loss measuring approximately 3' long x 6'' high along west face with previously 0.28'' remaining. Currently there is a hole up to 3.5''L x 1''H above the bearing, see sketch 4 and photos 40 and 41. Heavy corrosion in the web and top & bottom flanges extends several feet to the north along the west face, see photo 42 and sketch 3.

- Beam 7, heavy to severe corrosion with area of web section loss measuring approximately the full length of the beam x 8'' high with typically 0.17'' remaining. Above the bearing there is 1.5'' long x 1.5'' high corrosion hole with a 3'' long x 1'' high corrosion hole beyond the bearing. The east bottom flange has a knifed edge up to 4' long with at least 0.43'' remaining. The west bottom flange has section loss measuring approximately 13.5' long with typically 0.17'' remaining and a corrosion hole at 2' from the bearing measuring 1.5' long x 2'' wide, see sketch 5 and photos 43 and 44.
In addition, heavy corrosion with laminated rust in the web and top & bottom flanges extends throughout span 1 and into span 2 along the west face, see photo 45 and sketch 3.

- Beam 8, minor to moderate corrosion with area of web section loss measuring approximately 8'' long x 3'' high with at least 0.37'' remaining, see photo 46.

Span 1 Mid Span:

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- Beam 1 west face, bottom flange has moderate to heavy corrosion with at least 0.57'' remaining at midspan, see photo 47.

- Beam 7 West Face, heavy corrosion along the upper web, lower web, and bottom flange see photo 45.

Pier:
- Beam 1, minor to moderate corrosion and laminated rust along lower web and bottom flange, see photo 48.

- Beam 5 west face, moderate corrosion with area of web section loss along the top and lower edge measuring approximately 5' long x up to 2'' high with at least 0.35'' remaining, see photo 49. The west bottom flange has section loss with at least 0.50'' remaining adjacent to the bearing. Beam 6 has similar corrosion.

- Beam 7 West Face, moderate corrosion with area of web section loss along the top and lower edge measuring approximately 12' long x up to 5'' high with at least 0.37'' remaining. The west bottom flange (north of bearing) has section loss with at least 0.25'' remaining adjacent to the bearing, see photo 50.

Span 2 Mid Span:
- Beam 7 west face adjacent to splice plate connection (north and south), severe corrosion along the web and flanges with web section loss measuring approximately 21' long x full height with generally 0.30'' remaining. However at 11' from the pier web measured .141 remaining and at midspan measured .181'' remaining. The west bottom flange has section loss with at least 0.25'' remaining measuring approximately 13' long, however at 11' from the pier there is an area of the flange that is knifing, see sketch 6 and photos 51, 52, and 53.

- Beam 7 splice plate, minor corrosion along the lower edge and rivets.

- Beam 8 splice plate, east face, moderate corrosion along the lower edge and rivets, **see photo 54.**

North Abutment:
- Beam 1, heavy corrosion with area of web section loss measuring approximately 2.5' long x 4'' high with at least 0.28'' remaining, see sketch 5 and photos 55, 56, 57, and 58.

- Beam 2, heavy corrosion with area of web section loss measuring approximately 1.5' long x 4'' high with .122'' remaining over the bearing, see sketch 5 and photos 59 and 60.

- Beam 3, moderate corrosion with area of web section loss measuring approximately 1' long x up to 4'' high with at least 0.42'' remaining.

- Interior beam ends 4 through 7 have minor surface corrosion **see photo 61** for an overview

- Beam 8, moderate corrosion with area of web section loss measuring approximately 1.5' long x 2'' high with at least 0.28'' remaining, see photo 62.

Item 59.9 - Bearing Devices
The bearing have minor to moderate corrosion with the worst areas at the beam ends with significant section loss.

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REMARKS

Item 59.11 - Rivets & Bolts
See Item 59.4 - Girder or Beams - Splice plates rivets comments.

Item 59.14 - Paint/Coating
The paint system has failed throughout the superstructure. See Item 59.4 - Girder or Beams.

ITEM 60 - SUBSTRUCTURE

Item 60.1 - Abutments
Item 60.1.b - Bridge Seats
Both bridge seats have areas of moderate to heavy sand/debris with the worst areas adjacent to the facia beams.

Along the north abutment there is some scattered collapsed timber formwork.

Item 60.1.c - Backwalls
Both backwalls have random honeycombing and moderate deterioration of the utility block outs (see photo 23).

At the south abutment there is heavy scaling/honeycombing in bays 3 and 4, **see photo 63.**

Item 60.1.d - Breastwalls
Both abutments have minor abrasion along the waterline, **see photos 64 and 65** for overviews of the south and north breastwalls, respectively.

At the north abutment there is an area of honey combing at the east corner.

Item 60.1.e - Wingwalls
At the southwest wingwall along the top edge there is a spall with exposed rebar measuring 4' long x 1' high x up to 4" deep, **see photo 31.**

Item 60.1.f - Slope Paving/Rip-Rap
The rip rap at the south abutment has minor to moderate settlement/shifting, **see photo 64** for an overview.

The riprap along the north abutment was not visible during this inspection, **see photo 65** for an overview. See Underwater Inspection report dated 3/1/23.

Item 60.1.h - Footings
The top of PZ steel sheeting is exposed along the south abutment, **see photo 64.**
See Underwater Inspection report dated 3/1/23.

Item 60.1.j - Scour
See Underwater Inspection report dated 3/1/23.

Item 60.2 - Piers or Bents
Item 60.2.d - Stems/Webs/Pierwalls
There is minor to moderate abrasion along the waterline, **see photo 66** for an overview.

Item 60.2.f - Footing
See Underwater Inspection report dated 3/1/23.

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Item 60.2.g - Piles
See Underwater Inspection report dated 3/1/23.

Item 60.2.h - Scour
See Underwater Inspection report dated 3/1/23.

SubStructure Scour Notes
See Underwater Inspection dated 2/11/2020 for deficiencies.

ITEM 61 - CHANNEL AND CHANNEL PROTECTION

Item 61.1 - Channel Scour
See Underwater Inspection report dated 3/1/23.

Item 61.2 - Embankment Erosion
See Underwater Inspection report dated 3/1/23.

Item 61.3 - Debris
Upstream at the pier and in span 1 there is an area of heavy debris that extends up to 2/3 of the way across the width of the channel, see photo 67.

Item 61.6 - Rip-Rap/Slope Protection
The rip rap at the south abutment has minor to moderate settlement/shifting.

TRAFFIC SAFETY

Item 36a - Bridge Railing
The bridge railing consists of four horizontal steel rails mounted on steel posts (Type B), non standard.

See item 58.8 Railing for condition.

Item 36b - Transitions
There are no transitions for this structure (non standard).

Item 36c - Approach Guardrail
The northern approach guardrails consist of W beam mounted on timber posts and spacers with gloved ends at the bridge rail end posts (non standard).

The southeastern transition consists of W beam panels mounted on steel posts and spacers with no connection to the bridge rail end post (non standard).

There are no traffic safety feature at the southwestern corner.

Item 36d - Approach Guardrail Ends
The approach guardrail ends are gloved (non standard).

The northeastern approach guardrail is sloped away from traffic.

The southeastern guardrail end has some minor damage.

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REMARKS

Sketch / Photo Log

Sketch 1 : Framing Plan (Not to Scale).
Sketch 2 : Cross Section looking north. Note deck drains (R) located along beams 1 and 7. Also sidewalk drains (G) located in bay 7.
Sketch 3 : Framing Plan with areas of section loss (Not to Scale).
Sketch 4 : Beam Section Losses (Not to Scale).
Sketch 5 : Beam Section Losses (Not to Scale).
Sketch 6 : Span 2 west face Beam 7, section losses north and south (L to R) of beam splice (Not to Scale).
Photo 1 : General topside looking north. South approach pavement in the foreground. General settlement (Y) along SE curb.
Photo 2 : Overview of wearing surface looking north. Numerous settled patches and deficiencies at and adjacent to south abutment in the foreground. In the background, west rail deficiencies (Y).
Photo 3 : Close up of previous photo - NB wearing surface with a thru hole located over the south abutment below the east curb.
Photo 4 : NB lane wearing surface patches over the pier. Surface is delaminated and heaved along curb.
Photo 5 : Overview of SB lane (left) wearing surface deficiencies looking north. Surface is delaminated and heaved along curb. Evidence of ponding along SW gutter.
Photo 6 : Span 1 general underside of west deck overhang deficiencies looking south.
Photo 7 : Close up of previous photo - Span 1 west deck overhang edge spall with exposed rebar looking south.
Photo 8 : General underside of span 1 bays 4 through 1 (L to R) looking south.
Photo 9 : Close up of previous photo - Bay 1 diagonal cracking with efflo and rust bleed along top flanges looking south.
Photo 10 : Close up of previous photo - Bay 1 diagonal cracking with efflo and rust bleed along top flanges at south abutment. Deck drain (Y) at beam 1 on the right - Typical.
Photo 11 : Close up of previous photo 8 - Bay 2 diagonal cracking with efflo and rust bleed along top flanges at south abutment.
Photo 12 : General underside of span 1 bays 7 through 4 (L to R) looking south.
Photo 13 : Close up of previous photo - Bay 6 cracking with efflo and rust bleed along top flange of beam 7 looking north towards pier.
Photo 14 : Close up of previous photo 12 - Bay 6 irregular cracking with efflo and rust bleed along top flange of beam 7 looking south towards south abutment. Deck drains (Y) - Typical.
Photo 15 : Span 1 general underside of east deck overhang deficiencies looking north.
Photo 16 : Bay 2 spall with exposed rebar along construction deck joint over pier looking north.
Photo 17 : Bay 4 spall (R) with exposed rebar and adjacent delam (Y) along deck construction joint over pier looking north.
Photo 18 : Bay 5 cracking with efflo along deck construction joint over pier looking north.
Photo 19 : Span 2 west deck overhang edge spall with exposed rebar at north abutment.
Photo 20 : General underside of span 2 bays 1 through 5 (L to R) looking north.
Photo 21 : General underside of span 2 bays 5 through 7 (L to R) looking north.
Photo 22 : Close up of previous photo - Bay 6 irregular cracking with efflo and rust bleed along top flanges looking south towards pier.
Photo 23 : General underside of span 2, bay 7 (east sidewalk bay) looking north. Spalls with exposed steel angles (Y) - Typical.
Photo 24 : Isolated east outside face sidewalk spall (R) over pier.
Photo 25 : West bridge rail - SE steel endpost with advance section loss at base of flange (G) and throughout web (Y). Other steel endpost have similar corrosion and section loss.
Photo 26 : Overview of span 1 east bridge rail corrosion looking north.
Photo 27 : Overview of span 2 east bridge rail corrosion looking north.

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Photo 28 : Overview of south approach pavement deficiencies and general settlement (Y) looking northwest.
Photo 29 : Overview of north approach pavement cracking over the north abutment looking south. Settled approach curb (R) on the right.
Photo 30 : Overview of SE approach sidewalk settlement and thru hole at curb.
Photo 31 : Beam 1 west face corrosion at south abutment. To the right SW wingwall spall (Y).
Photo 32 : Beam 1 east face corrosion at south abutment. To the right, deck drain (Y).
Photo 33 : Close up of previous photo - Beam 1 east face of three corrosion holes (Y) at south abutment.
Photo 34 : Beam 2 west face corrosion at south abutment.
Photo 35 : Beam 2 east face corrosion at south abutment.
Photo 36 : Beam 2 east face corrosion just north of previous photo.
Photo 37 : Beam 3 west face corrosion at south abutment.
Photo 38 : Beam 4 west face corrosion at south abutment.
Photo 39 : Beam 5 east face corrosion at south abutment.
Photo 40 : Beam 6 east face corrosion hole at south abutment.
Photo 41 : Beam 6 west face corrosion and hole at south abutment.
Photo 42 : Overview of beam 6 west face corrosion looking north.
Photo 43 : Beam 7 east face corrosion and holes at south abutment.
Photo 44 : Beam 7 west face corrosion and holes at south abutment. On the left, area of west flange with 100% loss. Deck drain above (G).
Photo 45 : Overview of beam 7 west face corrosion looking north.
Photo 46 : Beam 8 east face surface corrosion at south abutment.
Photo 47 : Beam 1 west face corrosion at midspan of span 1.
Photo 48 : Beam 1 west face corrosion at the pier.
Photo 49 : Beam 5 west face corrosion at the pier.
Photo 50 : Beam 7 west face corrosion at the pier. Flange loss (Y) at north and south end of bearing.
Photo 51 : Overview of beam 7, span 2 west face corrosion and section losses north and south of beam splice.
Photo 52 : Close up of previous photo - Beam 7, span 2 west face corrosion and section losses (south of beam splice) at 11' from the pier. Area of bottom flange has a knife edge (R).
Photo 53 : Close up of previous photo 51 - Beam 7, span 2 west face corrosion and section losses (north of beam splice) near midspan.
Photo 54 : Beam 8, span 1 lower east face corrosion of plate and rivets at beam splice.
Photo 55 : Beam 1 west face corrosion at north abutment.
Photo 56 : Overview of beam 1 west face corrosion looking south.
Photo 57 : Beam 1 east face corrosion at north abutment.
Photo 58 : Overview of beam 1 east face corrosion looking south.
Photo 59 : Beam 2 west face corrosion at north abutment.
Photo 60 : Beam 2 east face corrosion at north abutment.
Photo 61 : Overview of interior beams 4 through 7 (L to R) west face surface corrosion at north abutment.
Photo 62 : Beam 8 east face corrosion at north abutment.
Photo 63 : Bay 4 and 3 backwall honeycombing at the south abutment.
Photo 64 : Overview of the south breastwall, riprap, and top of steel sheeting.
Photo 65 : Overview of the north breastwall.
Photo 66 : Overview of the pier, south face.
Photo 67 : Span 1 upstream debris extending from the pier southward into the channel, looking east.
Photo 68 : SE damaged guardrail end.

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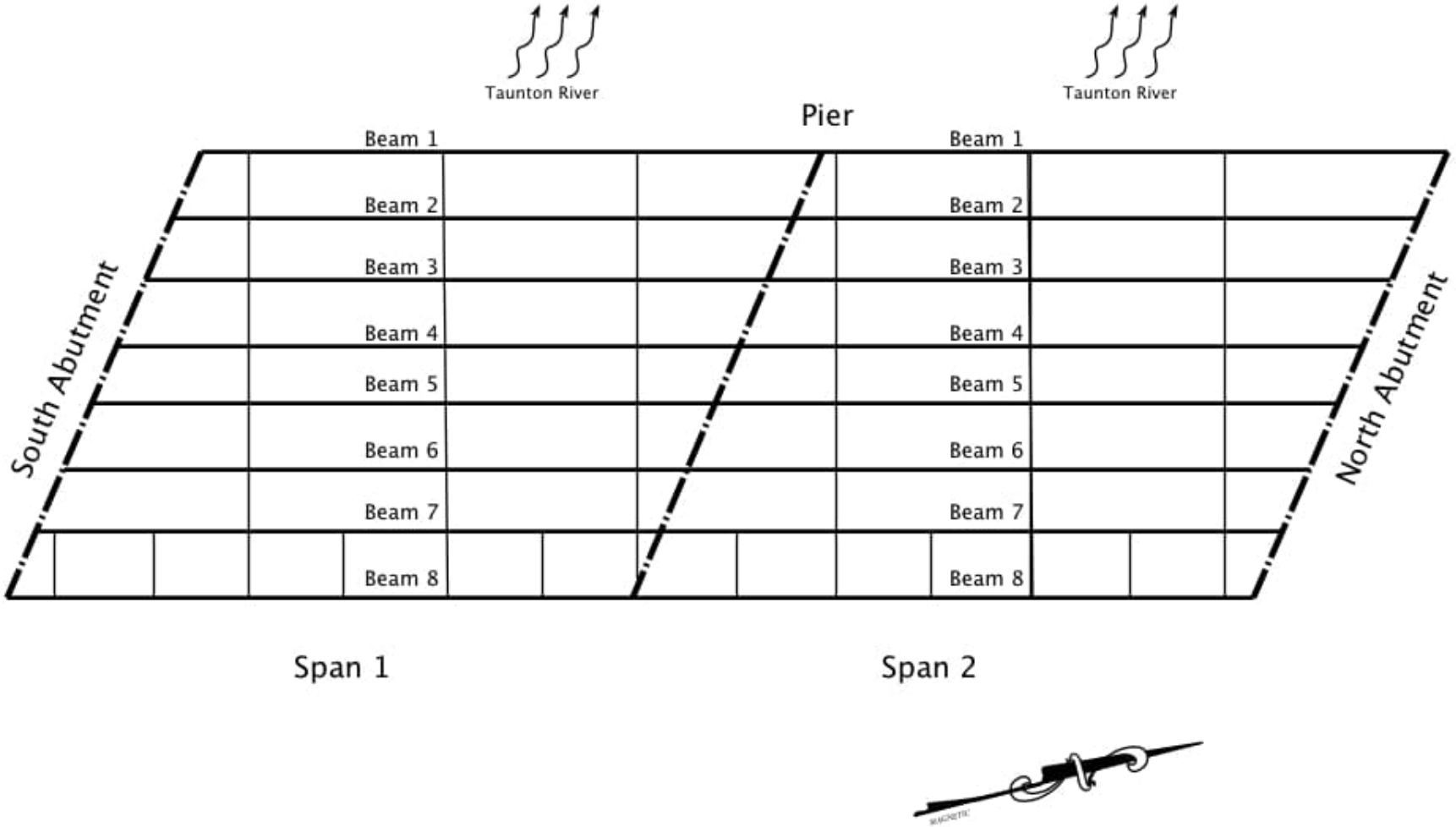
SKETCHES



Sketch 1: **Framing Plan (Not to Scale).**

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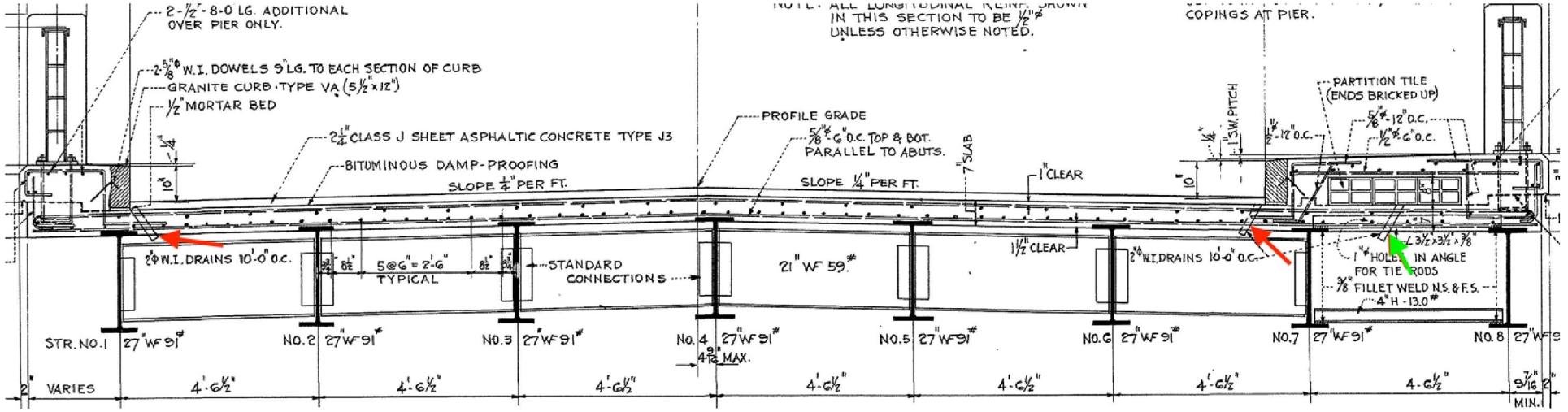
SKETCHES



Sketch 2: **Cross Section looking north. Note deck drains (R) located along beams 1 and 7. Also sidewalk drains (G) located in bay 7.**

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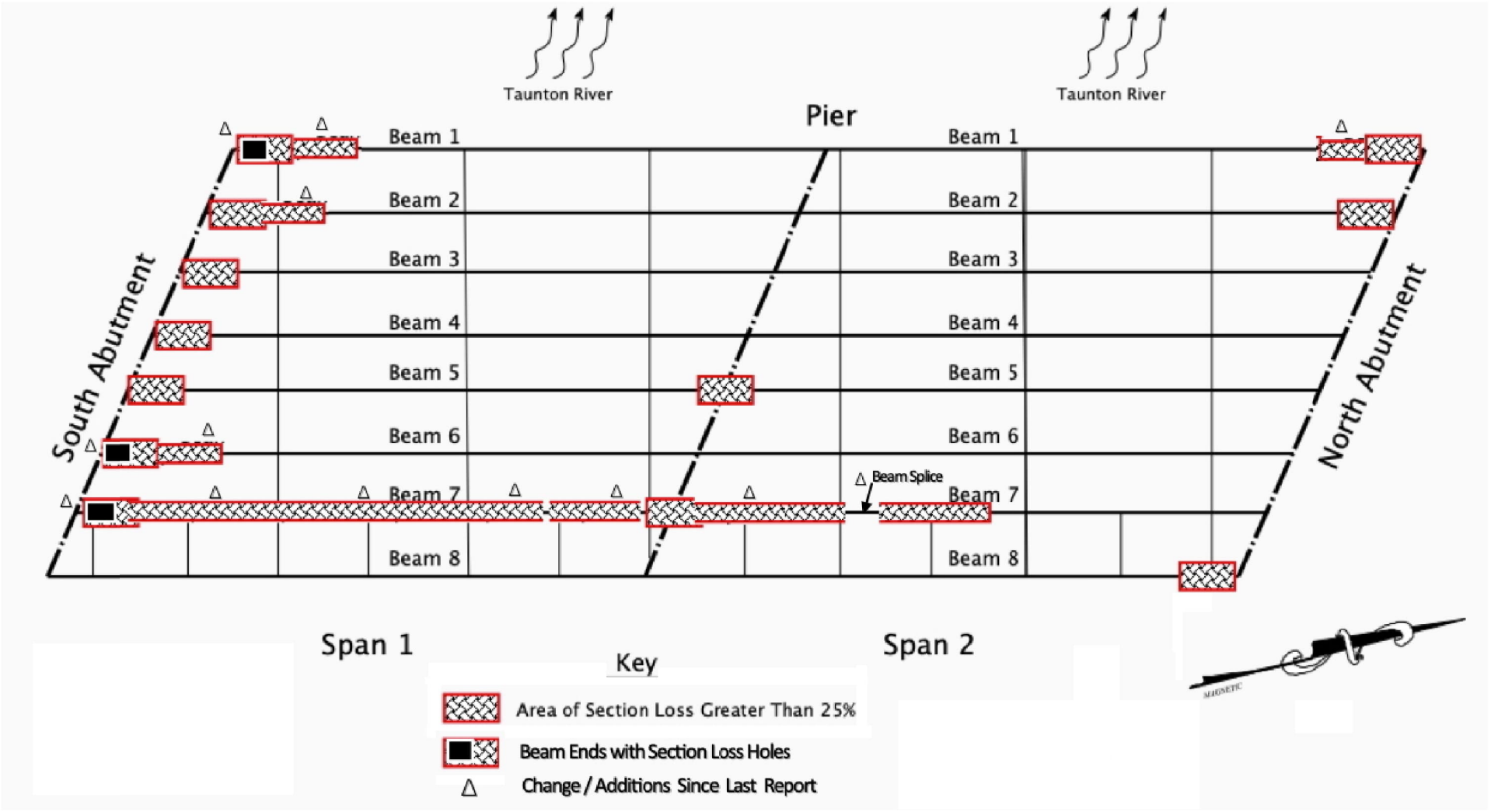
SKETCHES



Sketch 3: **Framing Plan with areas of section loss (Not to Scale).**

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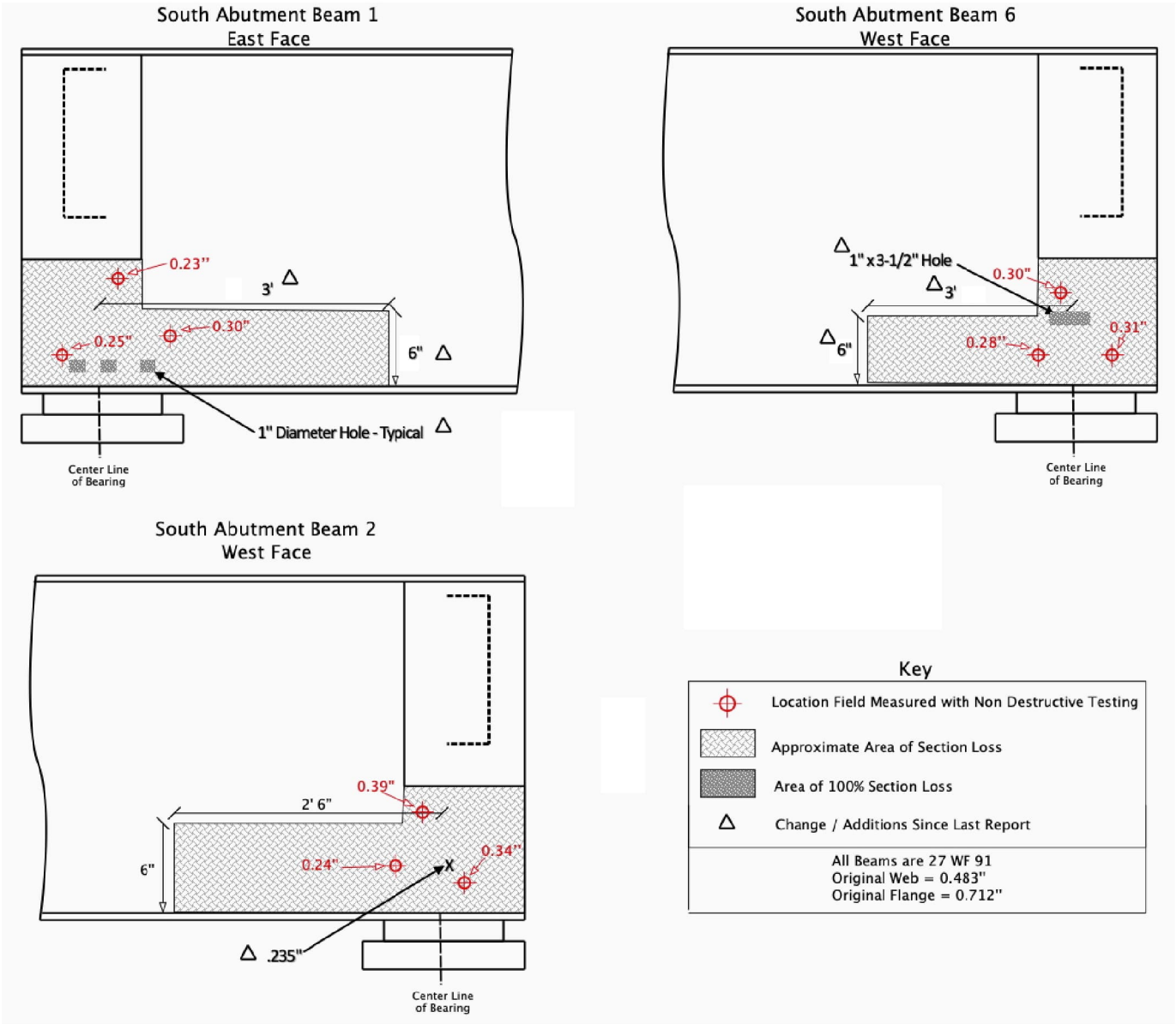
SKETCHES



Sketch 4: Beam Section Losses (Not to Scale).

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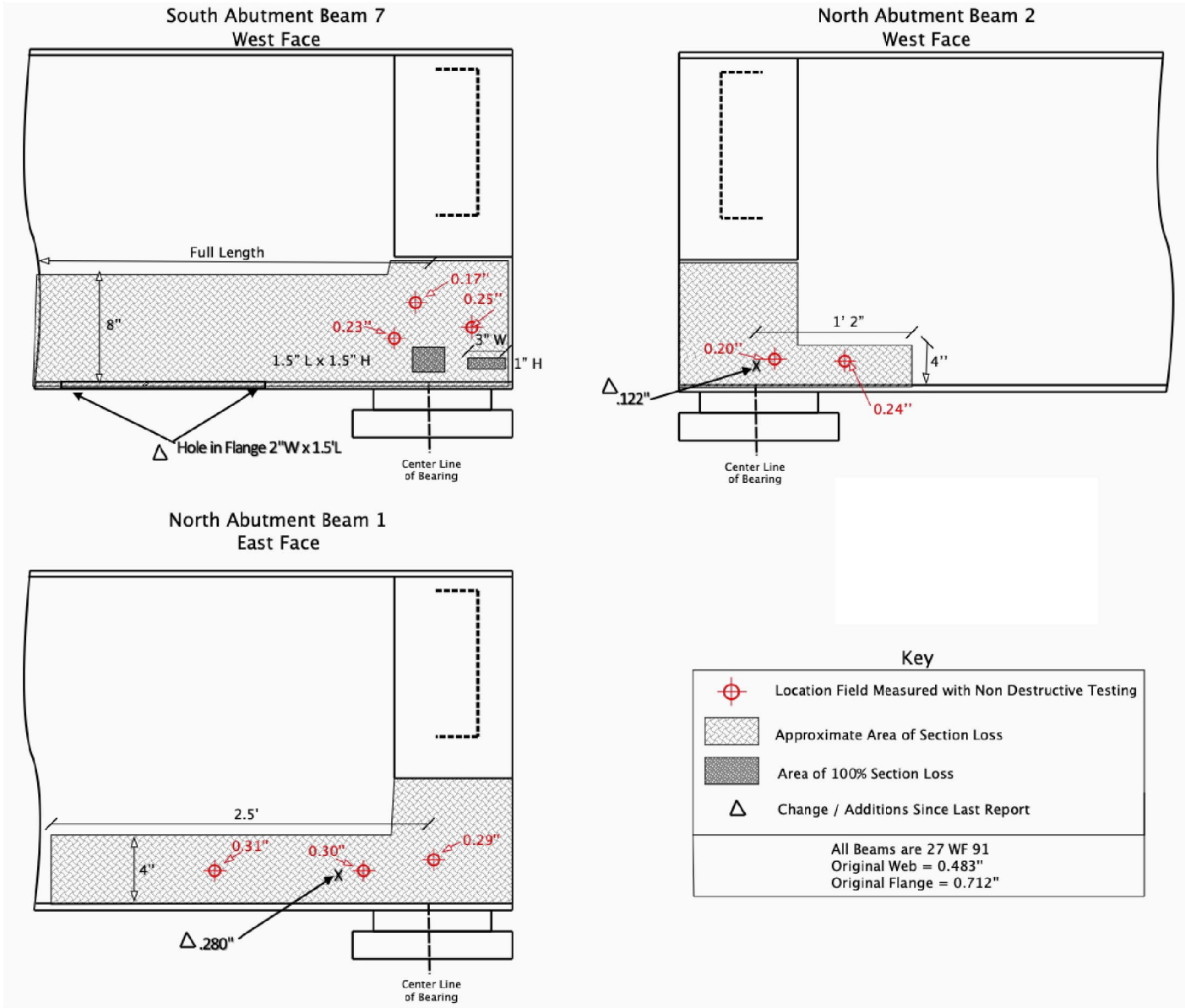
SKETCHES



Sketch 5: Beam Section Losses (Not to Scale).

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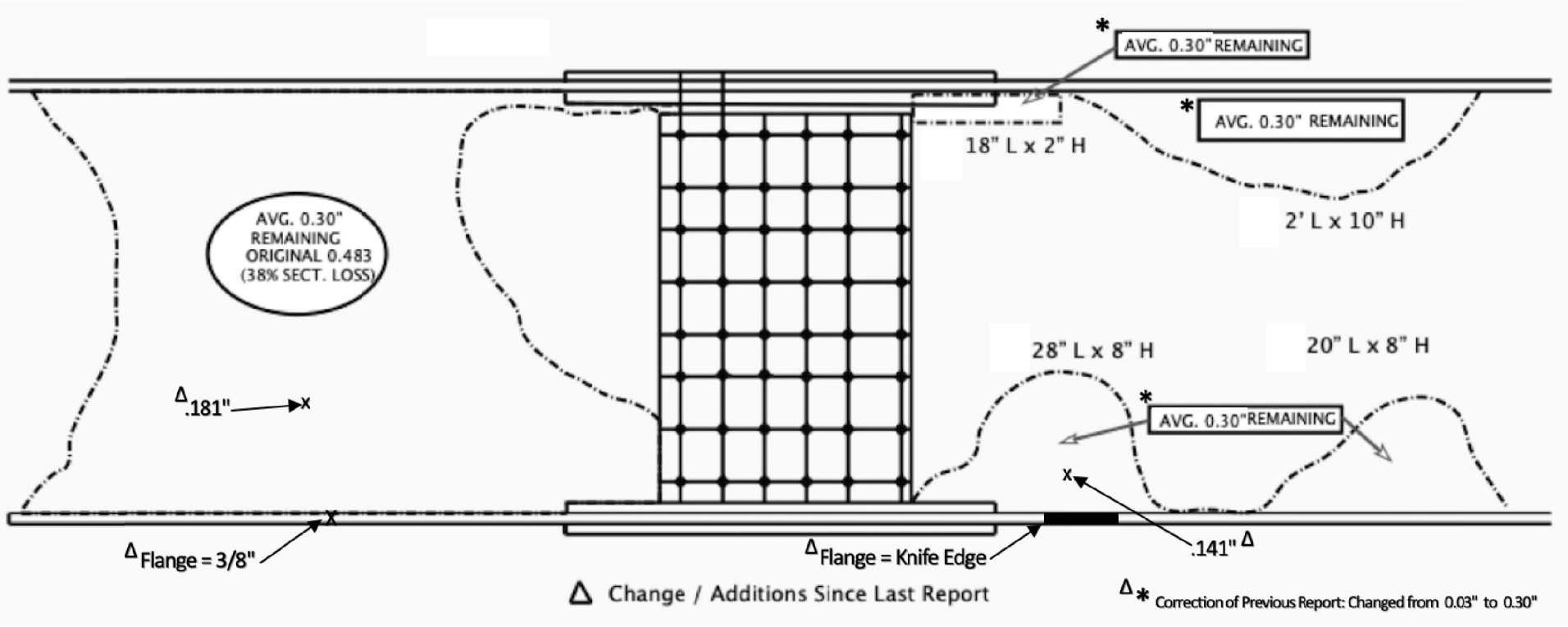
SKETCHES



Sketch 6: **Span 2 west face Beam 7, section losses north and south (L to R) of beam splice (Not to Scale).**

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PHOTOS

Photo 1: General topside looking north. South approach pavement in the foreground. General settlement (Y) along SE curb.

Photo 2: Overview of wearing surface looking north. Numerous settled patches and deficiencies at and adjacent to south abutment in the foreground. In the background, west rail deficiencies (Y).

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PHOTOS

Photo 3: **Close up of previous photo - NB wearing surface with a thru hole located over the south abutment below the east curb.**

Photo 4: **NB lane wearing surface patches over the pier. Surface is delaminated and heaved along curb.**

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PHOTOS

Photo 5: **Overview of SB lane (left) wearing surface deficiencies looking north. Surface is delaminated and heaved along curb. Evidence of ponding along SW gutter.**

Photo 6: **Span 1 general underside of west deck overhang deficiencies looking south.**

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PHOTOS

Photo 7: **Close up of previous photo - Span 1 west deck overhang edge spall with exposed rebar looking south.**

Photo 8: **General underside of span 1 bays 4 through 1 (L to R) looking south.**

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PHOTOS

Photo 9: **Close up of previous photo - Bay 1 diagonal cracking with efflo and rust bleed along top flanges looking south.**

Photo 10: **Close up of previous photo - Bay 1 diagonal cracking with efflo and rust bleed along top flanges at south abutment. Deck drain (Y) at beam 1 on the right - Typical.**

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PHOTOS

Photo 11: **Close up of previous photo 8 - Bay 2 diagonal cracking with efflo and rust bleed along top flanges at south abutment.**

Photo 12: **General underside of span 1 bays 7 through 4 (L to R) looking south.**

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PHOTOS

Photo 13: **Close up of previous photo - Bay 6 cracking with efflo and rust bleed along top flange of beam 7 looking north towards pier.**

Photo 14: **Close up of previous photo 12 - Bay 6 irregular cracking with efflo and rust bleed along top flange of beam 7 looking south towards south abutment. Deck drains (Y) - Typical.**

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
RAYNHAM=TAUNTON	3M4	R-02-003=T-01-004	R02003-3M4-MUN-NBI	MAY 24, 2024

PHOTOS

Photo 15: **Span 1 general underside of east deck overhang deficiencies looking north.**

Photo 16: **Bay 2 spall with exposed rebar along construction deck joint over pier looking north.**

REM.(2)7-96

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
RAYNHAM=TAUNTON	3M4	R-02-003=T-01-004	R02003-3M4-MUN-NBI	MAY 24, 2024

PHOTOS

Photo 17: **Bay 4 spall (R) with exposed rebar and adjacent delam (Y) along deck construction joint over pier looking north.**

Photo 18: **Bay 5 cracking with efflo along deck construction joint over pier looking north.**

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
RAYNHAM=TAUNTON	3M4	R-02-003=T-01-004	R02003-3M4-MUN-NBI	MAY 24, 2024

PHOTOS

Photo 19: **Span 2 west deck overhang edge spall with exposed rebar at north abutment.**

Photo 20: **General underside of span 2 bays 1 through 5 (L to R) looking north.**

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
RAYNHAM=TAUNTON	3M4	R-02-003=T-01-004	R02003-3M4-MUN-NBI	MAY 24, 2024

PHOTOS

Photo 21: General underside of span 2 bays 5 through 7 (L to R) looking north.

Photo 22: Close up of previous photo - Bay 6 irregular cracking with efflo and rust bleed along top flanges looking south towards pier.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
RAYNHAM=TAUNTON	3M4	R-02-003=T-01-004	R02003-3M4-MUN-NBI	MAY 24, 2024

PHOTOS

Photo 23: General underside of span 2, bay 7 (east sidewalk bay) looking north. Spalls with exposed steel angles (Y) - Typical.

Photo 24: Isolated east outside face sidewalk spall (R) over pier.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
RAYNHAM=TAUNTON	3M4	R-02-003=T-01-004	R02003-3M4-MUN-NBI	MAY 24, 2024

PHOTOS

Photo 25: **West bridge rail - SE steel endpost with advance section loss at base of flange (G) and throughout web (Y). Other steel endpost have similar corrosion and section loss.**

Photo 26: **Overview of span 1 east bridge rail corrosion looking north.**

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
RAYNHAM=TAUNTON	3M4	R-02-003=T-01-004	R02003-3M4-MUN-NBI	MAY 24, 2024

PHOTOS

Photo 27: **Overview of span 2 east bridge rail corrosion looking north.**

Photo 28: **Overview of south approach pavement deficiencies and general settlement (Y) looking northwest.**

REM.(2)7-96

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
RAYNHAM=TAUNTON	3M4	R-02-003=T-01-004	R02003-3M4-MUN-NBI	MAY 24, 2024

PHOTOS

Photo 29: **Overview of north approach pavement cracking over the north abutment looking south. Settled approach curb (R) on the right.**

Photo 30: **Overview of SE approach sidewalk settlement and thru hole at curb.**

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
RAYNHAM=TAUNTON	3M4	R-02-003=T-01-004	R02003-3M4-MUN-NBI	MAY 24, 2024

PHOTOS

Photo 31: **Beam 1 west face corrosion at south abutment. To the right SW wingwall spall (Y).**

Photo 32: **Beam 1 east face corrosion at south abutment. To the right, deck drain (Y).**

REM.(2)7-96

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
RAYNHAM=TAUNTON	3M4	R-02-003=T-01-004	R02003-3M4-MUN-NBI	MAY 24, 2024

PHOTOS

Photo 33: **Close up of previous photo - Beam 1 east face of three corrosion holes (Y) at south abutment.**

Photo 34: **Beam 2 west face corrosion at south abutment.**

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
RAYNHAM=TAUNTON	3M4	R-02-003=T-01-004	R02003-3M4-MUN-NBI	MAY 24, 2024

PHOTOS

Photo 35: Beam 2 east face corrosion at south abutment.

Photo 36: Beam 2 east face corrosion just north of previous photo.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
RAYNHAM=TAUNTON	3M4	R-02-003=T-01-004	R02003-3M4-MUN-NBI	MAY 24, 2024

PHOTOS

Photo 37: **Beam 3 west face corrosion at south abutment.**

Photo 38: **Beam 4 west face corrosion at south abutment.**

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
RAYNHAM=TAUNTON	3M4	R-02-003=T-01-004	R02003-3M4-MUN-NBI	MAY 24, 2024

PHOTOS

Photo 39: **Beam 5 east face corrosion at south abutment.**

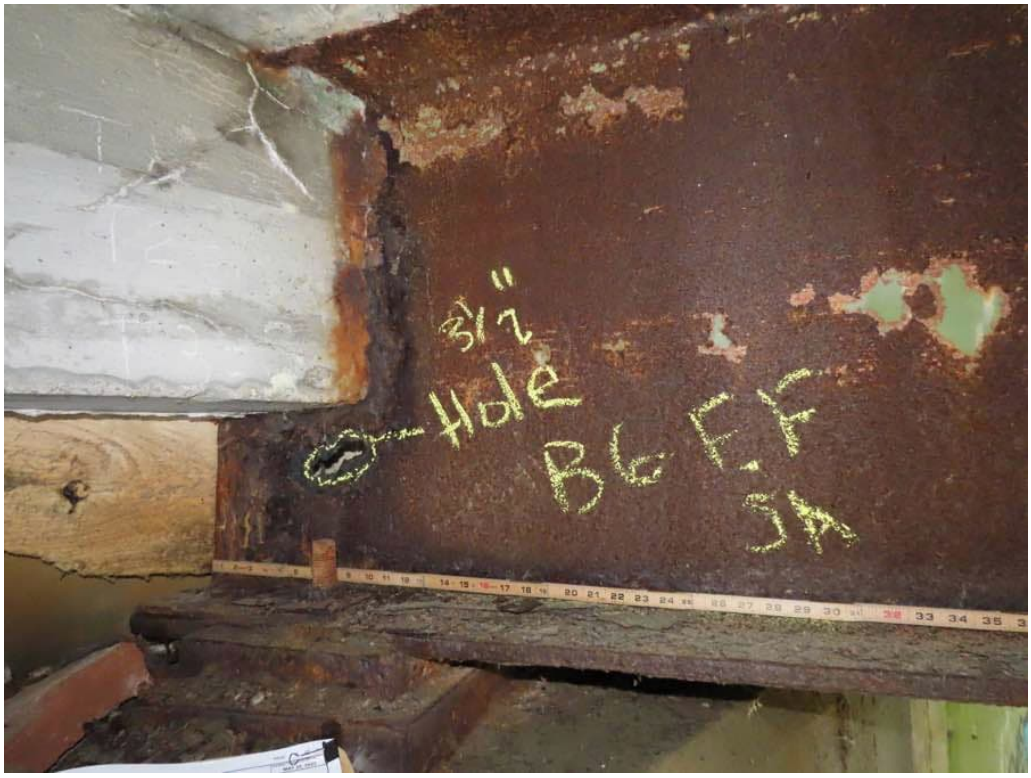

Photo 40: **Beam 6 east face corrosion hole at south abutment.**

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CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
RAYNHAM=TAUNTON	3M4	R-02-003=T-01-004	R02003-3M4-MUN-NBI	MAY 24, 2024

PHOTOS

Photo 41: **Beam 6 west face corrosion and hole at south abutment.**

Photo 42: **Overview of beam 6 west face corrosion looking north.**

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
RAYNHAM=TAUNTON	3M4	R-02-003=T-01-004	R02003-3M4-MUN-NBI	MAY 24, 2024

PHOTOS

Photo 43: Beam 7 east face corrosion and holes at south abutment.

Photo 44: Beam 7 west face corrosion and holes at south abutment. On the left, area of west flange with 100% loss. Deck drain above (G).

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
RAYNHAM=TAUNTON	3M4	R-02-003=T-01-004	R02003-3M4-MUN-NBI	MAY 24, 2024

PHOTOS

Photo 45: Overview of beam 7 west face corrosion looking north.

Photo 46: Beam 8 east face surface corrosion at south abutment.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
RAYNHAM=TAUNTON	3M4	R-02-003=T-01-004	R02003-3M4-MUN-NBI	MAY 24, 2024

PHOTOS

Photo 47: Beam 1 west face corrosion at midspan of span 1.

Photo 48: Beam 1 west face corrosion at the pier.

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CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
RAYNHAM=TAUNTON	3M4	R-02-003=T-01-004	R02003-3M4-MUN-NBI	MAY 24, 2024

PHOTOS

Photo 49: **Beam 5 west face corrosion at the pier.**

Photo 50: **Beam 7 west face corrosion at the pier. Flange loss (Y) at north and south end of bearing.**

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
RAYNHAM=TAUNTON	3M4	R-02-003=T-01-004	R02003-3M4-MUN-NBI	MAY 24, 2024

PHOTOS

Photo 51: **Overview of beam 7, span 2 west face corrosion and section losses north and south of beam splice.**

Photo 52: **Close up of previous photo - Beam 7, span 2 west face corrosion and section losses (south of beam splice) at 11' from the pier. Area of bottom flange has a knife edge (R).**

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
RAYNHAM=TAUNTON	3M4	R-02-003=T-01-004	R02003-3M4-MUN-NBI	MAY 24, 2024

PHOTOS

Photo 53: **Close up of previous photo 51 - Beam 7, span 2 west face corrosion and section losses (north of beam splice) near midspan.**

Photo 54: **Beam 8, span 1 lower east face corrosion of plate and rivets at beam splice.**

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CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
RAYNHAM=TAUNTON	3M4	R-02-003=T-01-004	R02003-3M4-MUN-NBI	MAY 24, 2024

PHOTOS

Photo 55: Beam 1 west face corrosion at north abutment.

Photo 56: Overview of beam 1 west face corrosion looking south.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
RAYNHAM=TAUNTON	3M4	R-02-003=T-01-004	R02003-3M4-MUN-NBI	MAY 24, 2024

PHOTOS

Photo 57: **Beam 1 east face corrosion at north abutment.**

Photo 58: **Overview of beam 1 east face corrosion looking south.**

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
RAYNHAM=TAUNTON	3M4	R-02-003=T-01-004	R02003-3M4-MUN-NBI	MAY 24, 2024

PHOTOS

Photo 59: Beam 2 west face corrosion at north abutment.

Photo 60: Beam 2 east face corrosion at north abutment.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
RAYNHAM=TAUNTON	3M4	R-02-003=T-01-004	R02003-3M4-MUN-NBI	MAY 24, 2024

PHOTOS

Photo 61: **Overview of interior beams 4 through 7 (L to R) west face surface corrosion at north abutment.**

Photo 62: **Beam 8 east face corrosion at north abutment.**

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CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
RAYNHAM=TAUNTON	3M4	R-02-003=T-01-004	R02003-3M4-MUN-NBI	MAY 24, 2024

PHOTOS

Photo 63: Bay 4 and 3 backwall honeycombing at the south abutment.

Photo 64: Overview of the south breastwall, riprap, and top of steel sheeting.

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CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
RAYNHAM=TAUNTON	3M4	R-02-003=T-01-004	R02003-3M4-MUN-NBI	MAY 24, 2024

PHOTOS

Photo 65: Overview of the north breastwall.

Photo 66: Overview of the pier, south face.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
RAYNHAM=TAUNTON	3M4	R-02-003=T-01-004	R02003-3M4-MUN-NBI	MAY 24, 2024

PHOTOS

Photo 67: **Span 1 upstream debris extending from the pier southward into the channel, looking east.**

Photo 68: **SE damaged guardrail end.**

DOCUMENT A00882

SAMPLING AND ANALYSIS PLAN

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Taunton and Raynham, Massachusetts

Bridge Reconstruction R-02-003=T-01-004 over Taunton River

MassDOT Project File 613642

October 2025

SAMPLING AND ANALYSIS PLAN

BETA
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Bridge Reconstruction R-02-003=T-01-004 over Taunton River

Taunton and Raynham, Massachusetts

MassDOT Project File 613642

SAMPLING AND ANALYSIS PLAN

Prepared by: BETA GROUP, INC.
Prepared for: City of Taunton and Massachusetts Department of Transportation (MassDOT)

October 2025

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Figure 1 – Site Locus
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Figure 4 - Sampling Plan

1.0 INTRODUCTION AND PURPOSE

This Sampling and Analysis Plan (SAP) was prepared in support of the Taunton & Raynham – Superstructure Replacement Project, South Street East Over the Taunton River (the Project) (MassDOT Project #613642), which proposes to replace the superstructure and perform substructure repairs of the bridge carrying South Street East/ Old Colony Avenue over the Taunton River in Raynham and Taunton, Massachusetts (Figure 1). As outlined in 314 CMR 9.07(1)C, the Project anticipates removing and disposing of up to **2,000 cubic yards (cy)** of dredged material and is subsequently required to conduct sediment sample collection and analysis to ensure the protection of human health, public safety, public welfare, and the environment.

In total, three (3) composite samples and four (4) grab samples will be collected for analysis. The samples will be collected by TG&B Marine Services, Inc. and overseen by a BETA scientist. Each sample will be advanced to the proposed dredging depth within the river (6 feet) using geoprobe hand tools and a sediment samplers. Sampling locations are identified on the Sediment Sampling Plan (Figure 4) and will be GPS located at time of sampling. Following collection, the samples will be sent to ESS Laboratory **|** A division of the RISE Group in Cranston, RI.

The composite samples will be tested for the following:

- Conductivity
- MCP 14 Metals (includes arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc as required by 314 CMR 9.07))
- Ignitability
- Reactive Sulfide/cyanides
- Pesticides/herbicides to meet Aggregate reporting limits
- VOCs (volatile organic compounds) (Grab sample based upon highest PID)
- PCBs (polychlorinated biphenyls by EPA Method 8082 and NOAA analysis for congeners) **
- Total SVOCs (semi-volatile organic compounds)
    - (PAH (polynuclear aromatic hydrocarbons) results will be a subset of the total SVOC results; Total SVOC results to conform with MassDEP Policy # Comm-97-001)
- Extractable Petroleum Hydrocarbons (EPH)
- TPH (total petroleum hydrocarbons)
- Total Organic Carbon
- volatile solids (percent)
- water (percent)
- TCLP, as applicable

** PCB analysis will be conducted using EPA Method 8270C Modified (EPA Method 680); results will include the “NOAA” list of 22 congeners.

Additionally, each composite sediment sample will be analyzed for cyanide.

The grab samples will be tested for:

- VOCs
- EPH with PAHs

The Sediment Sampling Figure showing the sampling locations and a description of any compositing or subsampling conducted will be submitted along with the analytical results. In addition, a copy of the report

of sample analysis from the performing laboratory will be provided including quality assurance/quality control information and methods of analysis used.

1.1 Sampling Equipment & Additional Materials Required

The sampling will be conducted using the following equipment:

- Geoprobe hand tools;
- Sediment Sampler;
- Chest waders or equivalent wet weather gear;
- Small watercraft;
- Disposable Nitrile Gloves;
- GPS Unit
- Plastic Zip-lock bags or glass jars depending on lab requirements.

1.2 Site Contacts

The consultant Project Manager (PM) from BETA Group Inc will be Chistopher Jones, PE. They can be contacted at the phone number and email listed below:

Phone Number: 781.255.1982 x. 7017

Email: cjones@beta-inc.com

In the event of “suspect” contamination or previously unknown condition, contact the Project Manager.

1.3 Health and Safety

Field personnel assigned to conduct or inspect drilling and sampling operations shall be appropriately trained for the subject investigation and shall have successfully completed health and safety training in accordance with the "HAZWOPER" Standard promulgated by the Occupational Safety and Health Administration (OSHA) as 29 CFR Part 1910.120(e). Documentation shall include the initial 40-hour training and 8-hour annual refresher training demonstrating compliance within the current work period.

2.0 Sediment Sampling Oversight

2.1 Sediment Sampling Scope

The total volume of sediment to be dredged from below the Mean High-Water elevation of the Taunton River is estimated to be approximately 2,000 cubic yards. BETA is proposing sampling for parameters outlined in the Water Quality Certification regulation and COMM-97 disposal parameters to evaluate likely off-site disposal alternatives for the generated sediment.

The samples submitted for analysis will be a combination of composite and grab samples, based upon the sample location. Based upon the dredging depth within the stream and in order to provide sufficient information to evaluate sediment volume and off-site management options, BETA has proposed collection of 9 sediment cores to a depth of 6 feet (three from upstream of the bridge, three from the area underneath the bridge, and three from downstream of the bridge) which will be composited to create three composite samples. One grab sample will also be collected in an area underneath the CMP drainage outfall, and three additional grab samples will be collected (one from upstream of the bridge, one from the area underneath the bridge, and one from downstream of the bridge). The location of all sediment sampling locations is available in the attached Sediment Sampling Plan (Figure 4).

The sediment samples will be analyzed based on the requirements for the 401 Water Quality Certification (WQC), as well as COMM-97 standards to evaluate potential off-site management alternatives as described in Section III below.

Each sample will be advanced to a depth representative of the sediment depth within the River using geoprobe hand tools and a sediment sampler. Sampling locations will be GPS located at time of sampling.

3.0 SAMPLING PLAN

The application for a 401 Water Quality Certification (WQC) for Dredging requires the physical and chemical analysis of sediment samples. Samples will be collected to adequately represent the sediment to be dredged and evaluate off-site management alternatives. The locations of the cores from which WQC samples will be collected are shown on Figure 4.

One (1) grab sample from each of the 3 sample areas (upstream, underneath the bridge and downstream) shown in Figure 4 will be collected, 1 grab sample from the area below the drainage outfall, and 3 composite samples made up of 3 core samples collected from each sample area, as depicted on Figure 4 will be collected and submitted for laboratory analysis, as described below.

If a 0–6-foot depth is infeasible at any of the identified sampling sites, the field personnel responsible for taking the sample will find a representative site as close as possible to the identified site. The Field personnel is responsible for noting the change in sampling location, the impetuous for that change, and the distance of the new location from the previously identified one.

Sample Collection and Analysis will be performed in accordance with MassDEP standard operating procedures. The analytical laboratory will be instructed that the testing must meet the reporting limits indicated in the table above and can also be found under Section 9.07(2)(b)6 of the 401 Water Quality Certification Regulations [314 CMR 9.07(2)(b)6].

A plan showing the sampling locations and a description of any compositing or subsampling conducted will be submitted along with the analytical results. In addition, a copy of the report of sample analysis from the performing laboratory will be provided including quality assurance/quality control information and methods of analysis used.

3.1 GRAB SAMPLES

Grab Samples will be collected in compliance with WQC and COMM-97 standards. Four (4) grab samples will be collected including:

- One sample upstream of the bridge (GS1);
- One sample underneath the bridge (GS2);
- One sample downstream of the bridge (GS3); and,
- One outfall sample (GS 4).

According to 314 CMR 9.07(2) - Sampling and Analysis Requirements, samples collected for analysis of volatile organic compounds are obtained from an individual core and not composited from multiple cores. In areas adjacent to the , the core selected for VOC analysis will be selected based upon the highest field PID reading of the two cores collected from each sample area. If all PID readings are 0, VOC samples will be selected to be spatially representative of the future dredging area.

3.2 COMPOSITE SAMPLES

Composite samples will be collected in accordance with 314 CMR 9.07(b)(4), which states:

> "*For projects up to 10,000 cubic yards, one core for every 1000 cubic yards of dredged material shall be collected. Up to three cores may be composited to create a single sample, provided:*
>
> *a. The grain-size distribution and likelihood of contamination are similar based on depositional characteristics, spill history, and location of point source discharges;*
> *b. Cores are composited from the same reach; and*
> *c. Samples collected for analysis of volatile compounds are obtained from an individual core and not composited from multiple cores.*
>
> *For all projects, a minimum of two representative samples shall be characterized physically and chemically."*

The limits of dredging have been subdivided into 3 distinct composite areas that correlate with the downstream, upstream, and below-bridge reaches. Within each composite area, the streambed has consistent grain size distribution, likelihood of contamination, and location of point source discharges. All samples submitted for volatile compounds are to be obtained from an individual core sample and will not be composited from multiple cores.

In total, 3 composite samples will be submitted for WQC parameters and reporting limits in accordance with 314 CMR 9.07. These composite samples will be collected downstream of the bridge (CS1), in the area underneath the bridge (CS2) and upstream (CS3) of the bridge. Each composite sample will consist of 3 core samples located within their respective composite area as designated on the included Sampling and Analysis Plan.

Composite samples will be composed of the following core samples:

- Composite Sample 1 (CS1);
  - Core Sample 1 (S1)
  - Core Sample 2 (S2)
  - Core Sample 3 (S3)
- Composite Sample 2 (CS2);
  - Core Sample 4 (S4)
  - Core Sample 5 (S5)
  - Core Sample 6 (S6)
- Composite Sample 3 (CS3);
  - Core Sample 7 (S7)
  - Core Sample 8 (S8)
  - Core Sample 9 (S9)

In total, 9 core samples will be collected in their respective locations. Each set of three cores, (S1-S3, S4-S6, and S7-S9) will be combined to create the three composite samples (CS1, CS2, and CS3) respectively. Under no circumstances are the three composite samples (CS1, CS2, and CS3) to be combined. All 3 shall be submitted separately for chemical analysis.

The composite sediment samples will also be analyzed for chemical constituents required by Section D of the WQC Application, and COMM-97 parameters. The COMM-97 parameters is one sample per 500 CY of material so three samples composited from each of the 9 core samples should be sufficient for evaluating disposal options.

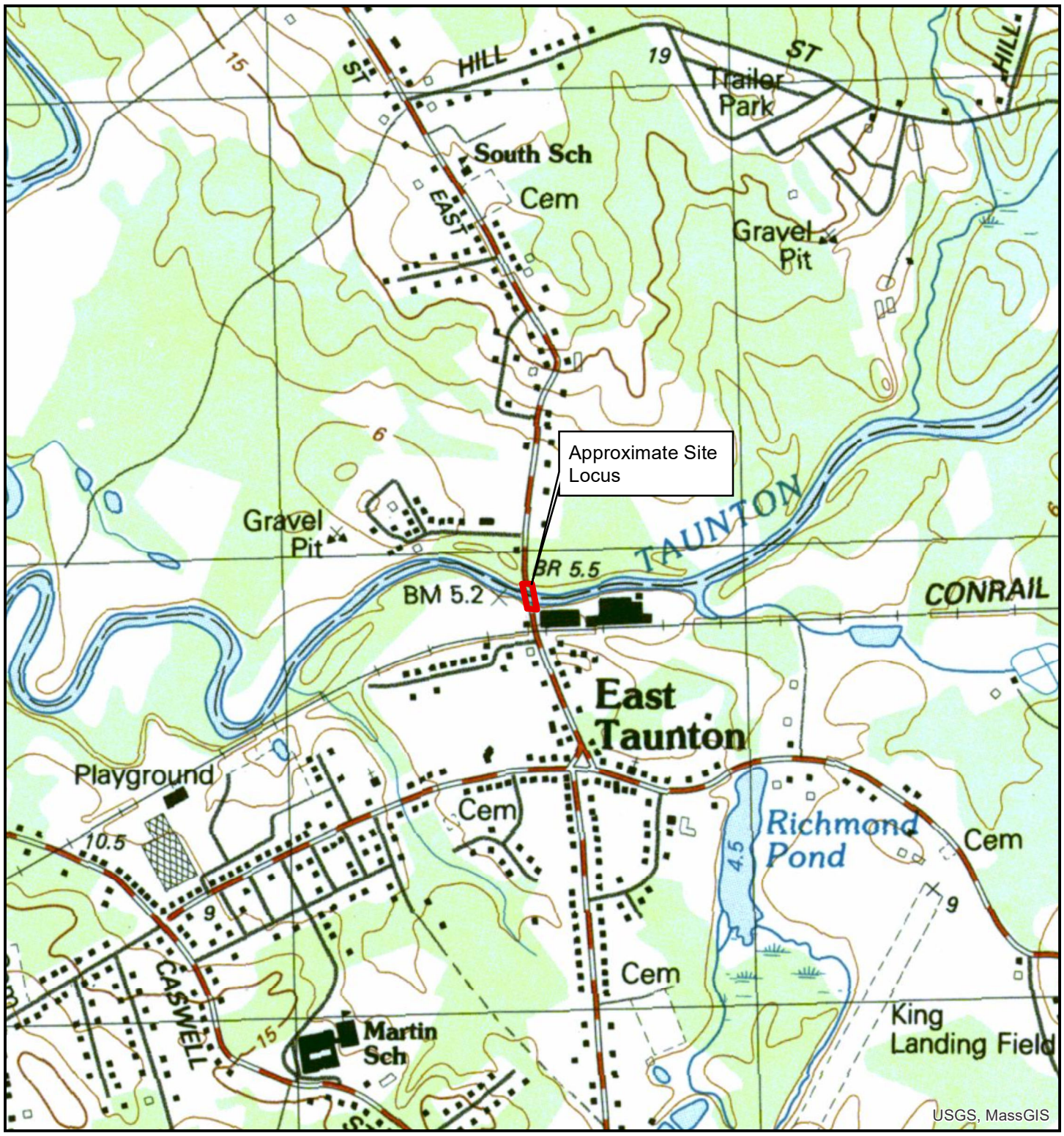
3.3 SEDIMENT SAMPLING PARAMETERS

The results of analysis will be reported in units of mg/kg (ppm) dry weight. The table below is a list following of the constituents that all sediment samples will be analyzed for:

Sample Locations	Parameter	Reporting Limit mg/kg (dry weight)	Method
GS4, CS1, CS2, CS3	Arsenic	0.5	6010B
GS4, CS1, CS2, CS3	Cadmium	0.1	6010B
GS4, CS1, CS2, CS3	Chromium	1.0	6010B
GS4, CS1, CS2, CS3	Copper	1.0	6010B
GS4, CS1, CS2, CS3	Lead	1.0	6010B
GS4, CS1, CS2, CS3	Mercury	0.02	6010B
GS4, CS1, CS2, CS3	Nickel	1.0	6010B
GS4, CS1, CS2, CS3	Zinc	1.0	6010B
CS1, CS2, CS3	Polycyclic Aromatic Hydrocarbons (PAHs)	0.02	8270
CS1, CS2, CS3	Polychlorinated Biphenyls (PCBs) – by NOAA Summation of Congeners	0.01	NOAA
GS4, CS1, CS2, CS3	Extractable Petroleum Hydrocarbons	25	MassDEP EPH
CS1, CS2, CS3	Total Semi-Volatile Organic compounds (SVOCs)		8270
CS1, CS2, CS3	Total Petroleum Hydrocarbons (TPH)		8100
CS1, CS2, CS3	Percent Volatile Solids		
GS1, GS2, GS3, GS4	Volatile Organic Compounds (VOCs)	0.1	8260
CS1, CS2, CS3	Total Organic Carbon	0.1%	
CS1, CS2, CS3	Percent Water	1.0%	
CS1, CS2, CS3	Toxicity Characteristic Leaching Procedure	As applicable	
CS1, CS2, CS3	Conductivity		General Chemistry
CS1, CS2, CS3	Ignitability		General Chemistry
CS1, CS2, CS3	Reactive Sulfide/Cyanides		
CS1, CS2, CS3	Pesticides/Herbicides		

CS1	Particle Size Analysis		ASTM D6913

Figures



IMPROVING COMMUNITIES TOGETHER

N
W E
S

0 1,000 2,000 Feet

1 inch = 1,000 feet

Figure 1
Site Locus
Old Colony Avenue Bridge
Taunton and Raynham, MA

Data Source: MassGIS USGS Topographic Quadrangle Images (2001)

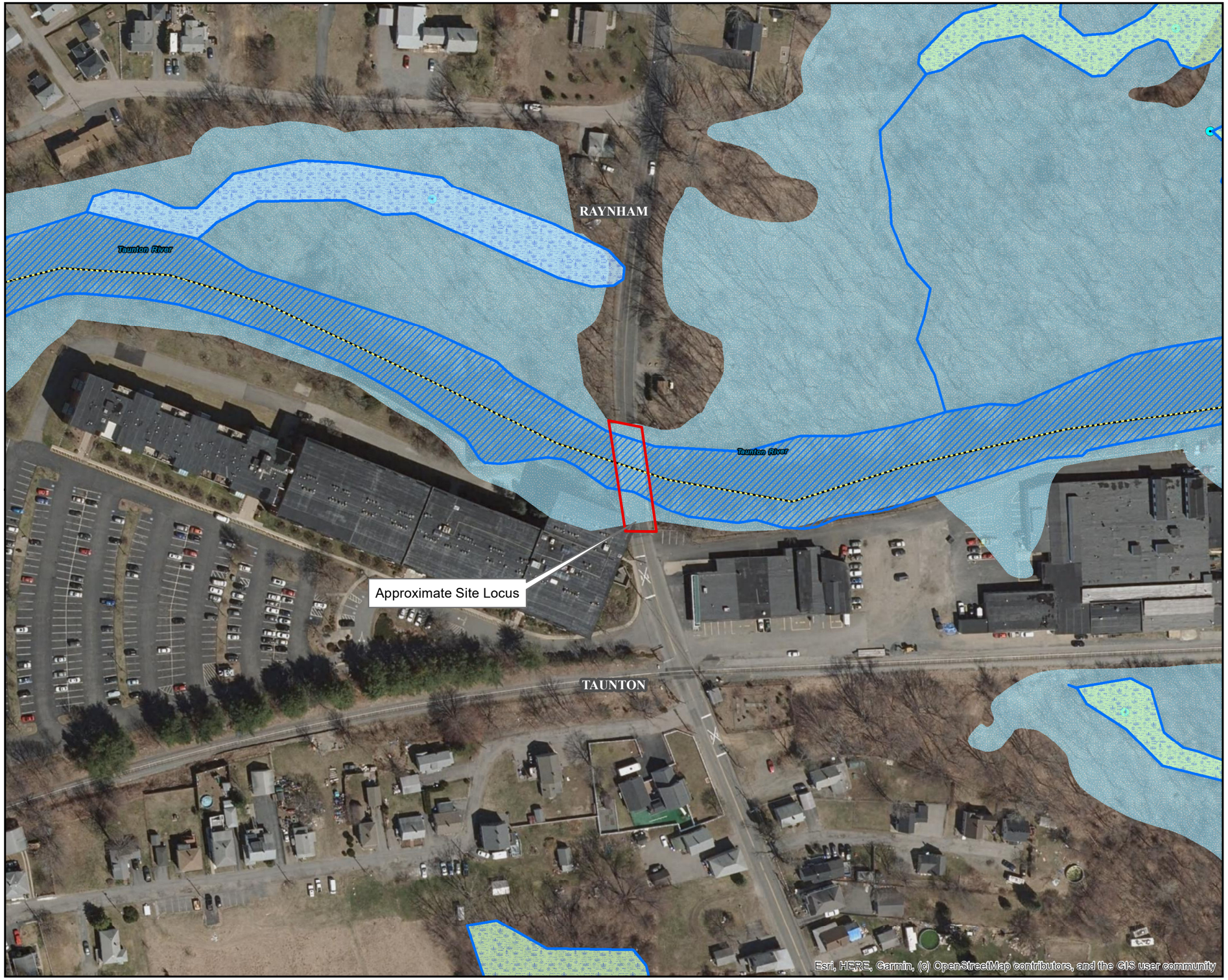


Figure 2
Environmental Resources Figure
Old Colony Avenue Bridge
Taunton and Raynham, MA

Environmental Resources Legend

- MassDEP Hydrologic Feature
- Marsh/Bog
- Wooded marsh
- Open Water
- NFHL 100 Year Flood Zone
- NHESP Potential Vernal Pool
- NHESP Certified Vernal Pool
- NHESP Priority Habitat of Rare Species
- NHESP Estimated Habitats of Rare Wildlife
- Zone A
- Zone B
- ZONE C
- MassDEP Zone I
- MassDEP Zone II
- MassDEP IWPA
- Outstanding Resource Water
- Area of Critical Environmental Concern (ACEC)
- Town Boundary

N
W E
S

0 125 250 Feet

1 inch = 125 feet

Data Source: MassGIS USGS Color Ortho Imagery (2014), MassDEP Wetlands (1:12000) (2009), NHESP Potential Vernal Pools (2000), NHESP Certified Vernal Pools, NHESP Priority Habitats of Rare Species (2008), NHESP Estimated Habitats of Rare Species (2008), Areas of Critical Environmental Concern (2009), FEMA National Flood Hazard Layer (2014),

BETA
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Hazardous Materials Map
Old Colony Avenue Bridge
Taunton and Raynham, MA

Legend

Chapter 21E Tier Classified Sites - Currently Active

Regulated Status

- TIER I
- TIER II
- TIER1D

N
W E
S

0 200 400 Feet

1 inch = 200 feet

Data Source: MassGIS Orthophoto (2013/2014); MassGIS Data: MHC Historic Inventory

BETA
IMPROVING COMMUNITIES TOGETHER

1. THE "LIMITS OF DREDGING" DEPICTED ON THIS PLAN IS FOR INFORMATIONAL PURPOSES ONLY AND WILL BE PERMITTED SEPARATELY.
2. HORIZONTAL DATUM IS BASED UPON THE MASSACHUSETTS MAINLAND STATE PLANE COORDINATE SYSTEM, NAD83 IN US SURVEY FEET.
3. VERTICAL DATUM IS BASED UPON NAVD88 IN US SURVEY FEET.
4. CONTOURS AND ELEVATIONS REFERENCED FROM BATHYMETRIC SURVEY DATA OBTAINED BY GM2 ASSOCIATES, CONDUCTED BETWEEN MAY 2023 AND JUNE 2024.
5. SITE IS LOCATED IN FEMA FLOOD ZONE AE AS SHOWN ON FIRM 25005C0169G, EFFECTIVE 7/16/2015 BASE FLOOD ELEVATION RANGE = 14.4'-14.8'

LEGEND

- CONTOUR-MAJOR
- CONTOUR-MINOR
- EDGE OF WATER
- GRAB SAMPLE LOCATION
- SAMPLE LOCATION
- COMPOSITE SEDIMENT SAMPLE LOCATION

NUMBER	DATE	MADE BY	CHECKED BY	REVISIONS

DRAWN BY: ML
DESIGNED BY:
CHECKED BY:

REGISTERED PROFESSIONAL
For Review Only

PREPARED BY
BETA
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SUBCONSULTANT

SCALE
HOR. SCALE IN FEET: 1"=20'
20 0 20 40
4 0 4 8
VER. SCALE IN FEET: 1"=4'
UNLESS OTHERWISE NOTED OR CHANGED BY REPRODUCTION

TITLE
OLD COLONY AVE BRIDGE
TAUNTON, MA 02718

SEDIMENT SAMPLING PLAN

BETA JOB NO. 10887
ISSUE DATE 9/15/2025 12:25 PM
SHEET NO. 1

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ESS Laboratory

CERTIFICATE OF ANALYSIS

Jonathan Niro
Beta Engineering
315 Norwood Park South
Norwood, MA 02062

RE: Bridge Reconstruction Over Taunton River (10887)
ESS Laboratory Work Order Number: 25L0055

This signed Certificate of Analysis is our approved release of your analytical results. These results are only representative of sample aliquots received at the laboratory. ESS Laboratory expects its clients to follow all regulatory sampling guidelines. Beginning with this page, the entire report has been paginated. This report should not be copied except in full without the approval of the laboratory. Samples will be disposed of thirty days after the final report has been delivered. If you have any questions or concerns, please feel free to call our Customer Service Department.

Laurel Stoddard
Laboratory Director

REVIEWED
By ESS Laboratory at 5:08 pm, Dec 19, 2025

Analytical Summary
The project as described above has been analyzed in accordance with the ESS Quality Assurance Plan. This plan utilizes the following methodologies: US EPA SW-846, US EPA Methods for Chemical Analysis of Water and Wastes per 40 CFR Part 136, APHA Standard Methods for the Examination of Water and Wastewater, American Society for Testing and Materials (ASTM), and other recognized methodologies. The analyses with these noted observations are in conformance to the Quality Assurance Plan. In chromatographic analysis, manual integration is frequently used instead of automated integration because it produces more accurate results.

The test results present in this report are in compliance with TNI and relative state standards, and/or client Quality Assurance Project Plans (QAPP). The laboratory has reviewed the following: Sample Preservations, Hold Times, Initial Calibrations, Continuing Calibrations, Method Blanks, Blank Spikes, Blank Spike Duplicates, Duplicates, Matrix Spikes, Matrix Spike Duplicates, Surrogates and Internal Standards. Any results which were found to be outside of the recommended ranges stated in our SOPs will be noted in the Project Narrative.

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CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Bridge Reconstruction Over Taunton River ESS Laboratory Work Order: 25L0055

Sample Receipt

The following samples were received on December 01, 2025 for the analyses specified on the enclosed Chain of Custody Record.

Samples 25L0055-01 and 25L0055-02 for Metals were oven dried at 60 degrees Celsius prior to digestion and relogged in as samples 25L0055-04 and 25L0055-05. This was done to increase the dry weight of the sample digested which decreases variability of results and lowers the detection limits for samples with high water content.

Lab Number	Sample Name	Matrix	Analysis
25L0055-01	CS1	Soil	1010A, 2540 G, 2540G, 7.3.3.2, 7.3.4.1, 8081B, 8082A Cong, 8100M, 8151A, 8270E, 9050A, EPH8270, EPH8270SIM, LK, MADEP-EPH
25L0055-02	GS4	Soil	8260D Low, EPH8270, EPH8270SIM, MADEP-EPH
25L0055-03	GS1	Soil	8260D Low
25L0055-04	CS1 - OVEN DRIED	Soil	6010D, 7471B
25L0055-05	GS4 - OVEN DRIED	Soil	6010D, 7471B

Subcontracted Analyses

Eurofins New England - North Kingstown, RI (M-PA009) Herbicides

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CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Bridge Reconstruction Over Taunton River ESS Laboratory Work Order: 25L0055

Project Narrative

MADEP-EPH Extractable Petroleum Hydrocarbons

25L0055-01 **Elevated Method Reporting Limits due to sample matrix (EL).**

25L0055-02 **Elevated Method Reporting Limits due to sample matrix (EL).**

25L0055-02 **Present in Method Blank (B).**
Naphthalene

DL51501-BSD2 **Relative percent difference for duplicate is outside of criteria (D+).**
C11-C22 Unadjusted Aromatics1 (30% @ 25%)

DL51501-BSD4 **Relative percent difference for duplicate is outside of criteria (D+).**
2-Methylnaphthalene (32% @ 30%)

Semi-Volatile Organic Compounds

D5L0088-CCV1 **Calibration required quadratic regression (Q).**
2,4-Dinitrophenol (97% @ 40-160%)

D5L0088-CCV1 **Continuing Calibration %Diff/Drift is above control limit (CD+).**
2,4,6-Tribromophenol (24% @ 20%), Hexachlorobutadiene (30% @ 20%)

D5L0088-CCV1 **Continuing Calibration %Diff/Drift is below control limit (CD-).**
2-Fluorophenol (23% @ 20%), Azobenzene (29% @ 20%), bis(2-Ethylhexyl)phthalate (23% @ 20%), Butylbenzylphthalate (22% @ 20%), Di-n-octylphthalate (28% @ 20%), N-Nitrosodimethylamine (31% @ 20%), Phenol-d6 (22% @ 20%)

D5L0116-CCV1 **Calibration required quadratic regression (Q).**
2,4-Dinitrophenol (97% @ 40-160%)

D5L0116-CCV1 **Continuing Calibration %Diff/Drift is above control limit (CD+).**
2,4,6-Tribromophenol (25% @ 20%), Hexachlorobutadiene (37% @ 20%)

D5L0116-CCV1 **Continuing Calibration %Diff/Drift is below control limit (CD-).**
2-Fluorophenol (23% @ 20%), Azobenzene (32% @ 20%), bis(2-Ethylhexyl)phthalate (23% @ 20%), Butylbenzylphthalate (23% @ 20%), Di-n-octylphthalate (28% @ 20%), N-Nitrosodimethylamine (40% @ 20%), Phenol-d6 (23% @ 20%)

DL50244-BSD1 **Blank Spike recovery is below lower control limit (B-).**
Aniline (38% @ 40-140%)

Total Metals

25L0055-04 **RSD of replicate analysis > 20%. Reanalysis produced similar results.**
Arsenic

Volatile Organics Low Level

D5L0058-CCV1 **Continuing Calibration %Diff/Drift is below control limit (CD-).**
1,2-Dibromo-3-Chloropropane (21% @ 20%), Tetrahydrofuran (30% @ 20%)

DL50212-BS1 **Blank Spike recovery is below lower control limit (B-).**
Tetrahydrofuran (64% @ 70-130%)

DL50212-BSD1 **Relative percent difference for duplicate is outside of criteria (D+).**
2-Butanone (24% @ 20%), 2-Hexanone (24% @ 20%), Acetone (65% @ 20%)

No other observations noted.

End of Project Narrative.

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CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Bridge Reconstruction Over Taunton River ESS Laboratory Work Order: 25L0055

Current SW-846 Methodology Versions

Analytical Methods

1010A - Flashpoint
6010D - ICP
6020B - ICP MS
7010 - Graphite Furnace
7196A - Hexavalent Chromium
7470A - Aqueous Mercury
7471B - Solid Mercury
8011 - EDB/DBCP/TCP
8015C - GRO/DRO
8081B - Pesticides
8082A - PCB
8100M - TPH
8151A - Herbicides
8260D - VOA
8270E - SVOA
8270E SIM - SVOA Low Level
9014 - Cyanide
9038 - Sulfate
9040C - Aqueous pH
9045D - Solid pH (Corrosivity)
9050A - Specific Conductance
9056A - Anions (IC)
9060A - TOC
9095B - Paint Filter
MADEP 19-2.1 - EPH
MADEP 18-2.1 - VPH

Prep Methods

3005A - Aqueous ICP Digestion
3020A - Aqueous Graphite Furnace / ICP MS Digestion
3050B - Solid ICP / Graphite Furnace / ICP MS Digestion
3060A - Solid Hexavalent Chromium Digestion
3510C - Separatory Funnel Extraction
3520C - Liquid / Liquid Extraction
3540C - Manual Soxhlet Extraction
3546 - Microwave Extraction
3580A - Waste Dilution
5030B - Aqueous Purge and Trap
5030C - Aqueous Purge and Trap
5035A - Solid Purge and Trap

SW846 Reactivity Methods 7.3.3.2 (Reactive Cyanide) and 7.3.4.1 (Reactive Sulfide) have been withdrawn by EPA. These methods are reported per client request and are not NELAP accredited.

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CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Bridge Reconstruction Over Taunton River
Client Sample ID: CS1
Date Sampled: 12/01/25 03:46
Percent Solids: 90
Initial Volume: 20.5g
Final Volume: 1ml
Extraction Method: 3546

ESS Laboratory Work Order: 25L0055
ESS Laboratory Sample ID: 25L0055-01
Sample Matrix: Soil
Units: mg/kg dry
Analyst: TJ
Prepared: 12/3/25 19:03

Semi-Volatile Organic Compounds

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	Sequence	Batch
1,1-Biphenyl	ND (0.027)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
1,2,4-Trichlorobenzene	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
1,2-Dichlorobenzene	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
1,3-Dichlorobenzene	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
1,4-Dichlorobenzene	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
2,4,5-Trichlorophenol	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
2,4,6-Trichlorophenol	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
2,4-Dichlorophenol	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
2,4-Dimethylphenol	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
2,4-Dinitrophenol	ND (1.09)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
2,4-Dinitrotoluene	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
2,6-Dinitrotoluene	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
2-Chloronaphthalene	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
2-Chlorophenol	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
2-Methylnaphthalene	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
2-Methylphenol	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
2-Nitrophenol	ND (0.545)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
3,3′-Dichlorobenzidine	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
3+4-Methylphenol	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
4-Bromophenyl-phenylether	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
4-Chloroaniline	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
4-Nitrophenol	ND (1.09)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
Acenaphthene	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
Acenaphthylene	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
Acetophenone	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
Aniline	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
Anthracene	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
Azobenzene	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
Benzo(a)anthracene	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244

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CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Bridge Reconstruction Over Taunton River
Client Sample ID: CS1
Date Sampled: 12/01/25 03:46
Percent Solids: 90
Initial Volume: 20.5g
Final Volume: 1ml
Extraction Method: 3546

ESS Laboratory Work Order: 25L0055
ESS Laboratory Sample ID: 25L0055-01
Sample Matrix: Soil
Units: mg/kg dry
Analyst: TJ
Prepared: 12/3/25 19:03

Semi-Volatile Organic Compounds

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	Sequence	Batch
Benzo(a)pyrene	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
Benzo(b)fluoranthene	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
Benzo(g,h,i)perylene	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
Benzo(k)fluoranthene	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
bis(2-Chloroethoxy)methane	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
bis(2-Chloroethyl)ether	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
bis(2-chloroisopropyl)Ether	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
bis(2-Ethylhexyl)phthalate	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
Butylbenzylphthalate	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
Chrysene	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
Dibenzo(a,h)Anthracene	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
Dibenzofuran	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
Diethylphthalate	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
Dimethylphthalate	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
Di-n-butylphthalate	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
Di-n-octylphthalate	ND (0.545)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
Fluoranthene	**0.423** (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
Fluorene	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
Hexachlorobenzene	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
Hexachlorobutadiene	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
Hexachloroethane	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
Indeno(1,2,3-cd)Pyrene	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
Isophorone	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
Naphthalene	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
Nitrobenzene	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
N-Nitrosodimethylamine	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
Pentachlorophenol	ND (1.09)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
Phenanthrene	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244
Phenol	ND (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244

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CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Bridge Reconstruction Over Taunton River
Client Sample ID: CS1
Date Sampled: 12/01/25 03:46
Percent Solids: 90
Initial Volume: 20.5g
Final Volume: 1ml
Extraction Method: 3546

ESS Laboratory Work Order: 25L0055
ESS Laboratory Sample ID: 25L0055-01
Sample Matrix: Soil
Units: mg/kg dry
Analyst: TJ
Prepared: 12/3/25 19:03

Semi-Volatile Organic Compounds

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	Sequence	Batch
Pyrene	**0.329** (0.272)	---	8270E	---	1	TJ	12/05/25 16:36	D5L0116	DL50244

	%Recovery	Qualifier	Limits
Surrogate: 1,2-Dichlorobenzene-d4	*72 %*		*30-130*
Surrogate: 2,4,6-Tribromophenol	*108 %*		*30-130*
Surrogate: 2-Chlorophenol-d4	*67 %*		*30-130*
Surrogate: 2-Fluorobiphenyl	*78 %*		*30-130*
Surrogate: 2-Fluorophenol	*59 %*		*30-130*
Surrogate: Nitrobenzene-d5	*62 %*		*30-130*
Surrogate: Phenol-d6	*59 %*		*30-130*
Surrogate: p-Terphenyl-d14	*76 %*		*30-130*

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CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Bridge Reconstruction Over Taunton River
Client Sample ID: CS1
Date Sampled: 12/01/25 03:46
Percent Solids: 90
Initial Volume: 15g
Final Volume: 1ml
Extraction Method: 3546

ESS Laboratory Work Order: 25L0055
ESS Laboratory Sample ID: 25L0055-01
Sample Matrix: Soil
Units: mg/kg dry

Prepared: 12/3/25 14:35

MADEP-EPH Extractable Petroleum Hydrocarbons

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	Sequence	Batch
C9-C18 Aliphatics1	ND (18.6)	---	MADEP-EPH	---	1	JDN	12/11/25 15:56	D5L0231	DL50324
C19-C36 Aliphatics1	**23.3** (18.6)	---	MADEP-EPH	---	1	JDN	12/11/25 15:56	D5L0231	DL50324
C11-C22 Unadjusted Aromatics1	ND (18.6)	---	EPH8270	---	1	JEL	12/11/25 20:36	D5L0242	DL50324
C11-C22 Aromatics1,2	ND (18.9)	---	EPH8270	---		TJ	12/12/25 0:36	---	[CALC]
2-Methylnaphthalene	**0.020** (0.015)	---	EPH8270SIM	---	1	TJ	12/12/25 0:36	D5L0252	DL50324
Acenaphthene	**0.096** (0.015)	---	EPH8270SIM	---	1	TJ	12/12/25 0:36	D5L0252	DL50324
Naphthalene	**0.050** (0.015)	---	EPH8270SIM	---	1	TJ	12/12/25 0:36	D5L0252	DL50324
Phenanthrene	**0.775** (0.015)	---	EPH8270SIM	---	1	TJ	12/12/25 0:36	D5L0252	DL50324
Acenaphthylene	ND (0.015)	---	EPH8270SIM	---	1	TJ	12/12/25 0:36	D5L0252	DL50324
Anthracene	**0.218** (0.015)	---	EPH8270SIM	---	1	TJ	12/12/25 0:36	D5L0252	DL50324
Benzo(a)anthracene	**0.337** (0.015)	---	EPH8270SIM	---	1	TJ	12/12/25 0:36	D5L0252	DL50324
Benzo(a)pyrene	**0.347** (0.015)	---	EPH8270SIM	---	1	TJ	12/12/25 0:36	D5L0252	DL50324
Benzo(b)fluoranthene	**0.390** (0.015)	---	EPH8270SIM	---	1	TJ	12/12/25 0:36	D5L0252	DL50324
Benzo(g,h,i)perylene	**0.230** (0.015)	---	EPH8270SIM	---	1	TJ	12/12/25 0:36	D5L0252	DL50324
Benzo(k)fluoranthene	**0.165** (0.015)	---	EPH8270SIM	---	1	TJ	12/12/25 0:36	D5L0252	DL50324
Chrysene	**0.327** (0.015)	---	EPH8270SIM	---	1	TJ	12/12/25 0:36	D5L0252	DL50324
Dibenzo(a,h)Anthracene	**0.081** (0.015)	---	EPH8270SIM	---	1	TJ	12/12/25 0:36	D5L0252	DL50324
Fluoranthene	**0.944** (0.015)	---	EPH8270SIM	---	1	TJ	12/12/25 0:36	D5L0252	DL50324
Fluorene	**0.119** (0.015)	---	EPH8270SIM	---	1	TJ	12/12/25 0:36	D5L0252	DL50324
Indeno(1,2,3-cd)Pyrene	**0.184** (0.015)	---	EPH8270SIM	---	1	TJ	12/12/25 0:36	D5L0252	DL50324
Pyrene	**0.736** (0.015)	---	EPH8270SIM	---	1	TJ	12/12/25 0:36	D5L0252	DL50324

	%Recovery	Qualifier	Limits
Surrogate: 1-Chlorooctadecane	*51 %*		*40-140*
Surrogate: 2-Bromonaphthalene	*86 %*		*40-140*
Surrogate: 2-Fluorobiphenyl	*85 %*		*40-140*
Surrogate: O-Terphenyl	*78 %*		*40-140*

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CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Bridge Reconstruction Over Taunton River
Client Sample ID: CS1
Date Sampled: 12/01/25 03:46
Percent Solids: 90
Initial Volume: 19.9g
Final Volume: 5ml
Extraction Method: 3546

ESS Laboratory Work Order: 25L0055
ESS Laboratory Sample ID: 25L0055-01
Sample Matrix: Soil
Units: mg/kg dry
Analyst: DMC
Prepared: 12/4/25 12:50

8081B Organochlorine Pesticides

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
4,4′-DDD	ND (0.0028)	---	8081B	---	1	12/04/25 16:09	D5L0097	DL50310
4,4′-DDE	ND (0.0028)	---	8081B	---	1	12/04/25 16:09	D5L0097	DL50310
4,4′-DDT	ND (0.0028)	---	8081B	---	1	12/04/25 16:09	D5L0097	DL50310
Aldrin	ND (0.0028)	---	8081B	---	1	12/04/25 16:09	D5L0097	DL50310
alpha-BHC	ND (0.0028)	---	8081B	---	1	12/04/25 16:09	D5L0097	DL50310
alpha-Chlordane	ND (0.0028)	---	8081B	---	1	12/04/25 16:09	D5L0097	DL50310
beta-BHC	ND (0.0028)	---	8081B	---	1	12/04/25 16:09	D5L0097	DL50310
Chlordane (Total)	ND (0.0224)	---	8081B	---	1	12/04/25 16:09	D5L0097	DL50310
delta-BHC	ND (0.0028)	---	8081B	---	1	12/04/25 16:09	D5L0097	DL50310
Dieldrin	ND (0.0028)	---	8081B	---	1	12/04/25 16:09	D5L0097	DL50310
Endosulfan I	ND (0.0028)	---	8081B	---	1	12/04/25 16:09	D5L0097	DL50310
Endosulfan II	ND (0.0028)	---	8081B	---	1	12/04/25 16:09	D5L0097	DL50310
Endosulfan Sulfate	ND (0.0028)	---	8081B	---	1	12/04/25 16:09	D5L0097	DL50310
Endrin	ND (0.0028)	---	8081B	---	1	12/04/25 16:09	D5L0097	DL50310
Endrin Ketone	ND (0.0028)	---	8081B	---	1	12/04/25 16:09	D5L0097	DL50310
gamma-BHC (Lindane)	ND (0.0017)	---	8081B	---	1	12/04/25 16:09	D5L0097	DL50310
gamma-Chlordane	ND (0.0028)	---	8081B	---	1	12/04/25 16:09	D5L0097	DL50310
Heptachlor	ND (0.0028)	---	8081B	---	1	12/04/25 16:09	D5L0097	DL50310
Heptachlor Epoxide	ND (0.0028)	---	8081B	---	1	12/04/25 16:09	D5L0097	DL50310
Hexachlorobenzene	ND (0.0028)	---	8081B	---	1	12/04/25 16:09	D5L0097	DL50310
Methoxychlor	ND (0.0028)	---	8081B	---	1	12/04/25 16:09	D5L0097	DL50310

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*55 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*61 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*53 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*53 %*		*30-150*

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CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Bridge Reconstruction Over Taunton River
Client Sample ID: CS1
Date Sampled: 12/01/25 03:46
Percent Solids: 90
Initial Volume: 20.2g
Final Volume: 1ml
Extraction Method: 3546

ESS Laboratory Work Order: 25L0055
ESS Laboratory Sample ID: 25L0055-01
Sample Matrix: Soil
Units: mg/kg dry
Analyst: JDN
Prepared: 12/3/25 9:52

8100M Total Petroleum Hydrocarbons

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Total Petroleum Hydrocarbons (C9-C36)	**44.9** (11.1)	---	8100M	---	1	12/03/25 23:13	---	DL50204

	%Recovery	Qualifier	Limits
Surrogate: O-Terphenyl	*72 %*		*40-140*

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CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Bridge Reconstruction Over Taunton River
Client Sample ID: CS1
Date Sampled: 12/01/25 03:46
Percent Solids: 90

ESS Laboratory Work Order: 25L0055
ESS Laboratory Sample ID: 25L0055-01
Sample Matrix: Soil

Classical Chemistry

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	Units	Batch
Conductivity	**WL 52** (5)	---	9050A	---	1	CCP	12/01/25 21:30	umhos/cm	DL50142
Flashpoint	**> 200** (N/A)	---	1010A	---	1	EAM	12/03/25 15:10	°F	DL50333
Percent Moisture	**10** (1)	---	2540G	---	1	EAM	12/03/25 16:02	%	DL50315
Reactive Cyanide	ND (2.0)	---	7.3.3.2	---	1	EAM	12/03/25 14:58	mg/kg	DL50222
Reactive Sulfide	ND (2.0)	---	7.3.4.1	---	1	EAM	12/03/25 14:58	mg/kg	DL50222
Total Organic Carbon (Average)	**12500** (500)	---	LK	---	1	CCP	12/10/25 14:54	mg/kg	[CALC]
Total Volatile Solids	**3** (1)	---	2540 G	---	1	EEM	12/03/25 16:02	%	DL50424

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CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Bridge Reconstruction Over Taunton River
Client Sample ID: CS1
Date Sampled: 12/01/25 03:46
Percent Solids: 90
Initial Volume: 30.4g
Final Volume: 2ml
Extraction Method: 3540C

ESS Laboratory Work Order: 25L0055
ESS Laboratory Sample ID: 25L0055-01
Sample Matrix: Soil
Units: mg/kg dry
Analyst: DMC
Prepared: 12/5/25 13:01

8082 Polychlorinated Biphenyls (PCB) / Congeners

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
BZ#8	ND (0.00030)	---	8082A Cong	---	1	12/08/25 14:05	D5L0163	DL50503
BZ#18	ND (0.00030)	---	8082A Cong	---	1	12/08/25 14:05	D5L0163	DL50503
BZ#28	ND (0.00030)	---	8082A Cong	---	1	12/08/25 14:05	D5L0163	DL50503
BZ#44	ND (0.00030)	---	8082A Cong	---	1	12/08/25 14:05	D5L0163	DL50503
BZ#52	ND (0.00030)	---	8082A Cong	---	1	12/08/25 14:05	D5L0163	DL50503
BZ#66	ND (0.00030)	---	8082A Cong	---	1	12/08/25 14:05	D5L0163	DL50503
BZ#101	ND (0.00030)	---	8082A Cong	---	1	12/08/25 14:05	D5L0163	DL50503
BZ#105	ND (0.00030)	---	8082A Cong	---	1	12/08/25 14:05	D5L0163	DL50503
BZ#118	ND (0.00030)	---	8082A Cong	---	1	12/08/25 14:05	D5L0163	DL50503
BZ#128	ND (0.00030)	---	8082A Cong	---	1	12/08/25 14:05	D5L0163	DL50503
BZ#138	ND (0.00030)	---	8082A Cong	---	1	12/08/25 14:05	D5L0163	DL50503
BZ#153 [2C]	ND (0.00030)	---	8082A Cong	---	1	12/08/25 14:05	D5L0163	DL50503
BZ#170	ND (0.00030)	---	8082A Cong	---	1	12/08/25 14:05	D5L0163	DL50503
BZ#180	ND (0.00030)	---	8082A Cong	---	1	12/08/25 14:05	D5L0163	DL50503
BZ#187	ND (0.00030)	---	8082A Cong	---	1	12/08/25 14:05	D5L0163	DL50503
BZ#195	ND (0.00030)	---	8082A Cong	---	1	12/08/25 14:05	D5L0163	DL50503
BZ#206	ND (0.00030)	---	8082A Cong	---	1	12/08/25 14:05	D5L0163	DL50503
BZ#209	ND (0.00030)	---	8082A Cong	---	1	12/08/25 14:05	D5L0163	DL50503

	%Recovery	Qualifier	Limits
Surrogate: Tetrachloro-m-xylene	*86 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*92 %*		*30-150*

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CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Bridge Reconstruction Over Taunton River
Client Sample ID: CS1
Date Sampled: 12/01/25 03:46
Percent Solids: 83
Initial Volume:
Final Volume:
Extraction Method: 8151A SP

ESS Laboratory Work Order: 25L0055
ESS Laboratory Sample ID: 25L0055-01
Sample Matrix: Soil
Units: mg/Kg dry
Analyst: OXG
Prepared: 12/10/25 19:15

8151MCP Herbicides (GC)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Dicamba	ND (0.040)	0.0059	8151A	---	1	12/11/25 9:57		1079332
2,4-D	ND (0.040)	0.015	8151A	---	1	12/11/25 9:57		1079332
Dalapon	ND (0.040)	0.013	8151A	---	1	12/11/25 9:57		1079332
Dinoseb	ND (0.040)	0.016	8151A	---	1	12/11/25 9:57		1079332
2,4,5-T	ND (0.040)	0.0085	8151A	---	1	12/11/25 9:57		1079332
Silvex (2,4,5-TP)	ND (0.040)	0.0042	8151A	---	1	12/11/25 9:57		1079332
2,4-DB	ND (0.040)	0.015	8151A	---	1	12/11/25 9:57		1079332
Dichlorprop	ND (0.040)	0.012	8151A	---	1	12/11/25 9:57		1079332
MCPA	ND (4.0)	2.0	8151A	---	1	12/11/25 9:57		1079332
MCPP	ND (7.2)	6.4	8151A	---	1	12/11/25 9:57		1079332

	%Recovery	Qualifier	Limits
Surrogate: 2,4-Dichlorophenylacetic acid	*117 %*		*30-150*

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CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Bridge Reconstruction Over Taunton River
Client Sample ID: GS4
Date Sampled: 12/01/25 12:14
Percent Solids: 86
Initial Volume: 5.1g
Final Volume: 10ml
Extraction Method: 5035

ESS Laboratory Work Order: 25L0055
ESS Laboratory Sample ID: 25L0055-02
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK
Prepared: 12/2/25 8:00

Volatile Organics Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	Sequence	Batch
1,1,1,2-Tetrachloroethane	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
1,1,1-Trichloroethane	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
1,1,2,2-Tetrachloroethane	ND (0.0023)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
1,1,2-Trichloroethane	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
1,1-Dichloroethane	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
1,1-Dichloroethene	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
1,1-Dichloropropene	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
1,2,3-Trichlorobenzene	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
1,2,3-Trichloropropane	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
1,2,4-Trichlorobenzene	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
1,2,4-Trimethylbenzene	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
1,2-Dibromo-3-Chloropropane	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
1,2-Dibromoethane	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
1,2-Dichlorobenzene	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
1,2-Dichloroethane	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
1,2-Dichloropropane	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
1,3,5-Trimethylbenzene	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
1,3-Dichlorobenzene	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
1,3-Dichloropropane	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
1,4-Dichlorobenzene	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
1,4-Dioxane	ND (0.114)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
2,2-Dichloropropane	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
2-Butanone	ND (0.0571)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
2-Chlorotoluene	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
2-Hexanone	ND (0.0571)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
4-Chlorotoluene	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
4-Isopropyltoluene	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
4-Methyl-2-Pentanone	ND (0.0571)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Acetone	ND (0.0571)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212

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CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Bridge Reconstruction Over Taunton River
Client Sample ID: GS4
Date Sampled: 12/01/25 12:14
Percent Solids: 86
Initial Volume: 5.1g
Final Volume: 10ml
Extraction Method: 5035

ESS Laboratory Work Order: 25L0055
ESS Laboratory Sample ID: 25L0055-02
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK
Prepared: 12/2/25 8:00

Volatile Organics Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	Sequence	Batch
Benzene	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Bromobenzene	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Bromochloromethane	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Bromodichloromethane	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Bromoform	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Bromomethane	ND (0.0114)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Carbon Disulfide	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Carbon Tetrachloride	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Chlorobenzene	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Chloroethane	ND (0.0114)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Chloroform	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Chloromethane	ND (0.0114)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
cis-1,2-Dichloroethene	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
cis-1,3-Dichloropropene	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Dibromochloromethane	ND (0.0023)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Dibromomethane	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Dichlorodifluoromethane	ND (0.0114)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Diethyl Ether	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Di-isopropyl ether	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Ethyl tertiary-butyl ether	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Ethylbenzene	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Hexachlorobutadiene	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Isopropylbenzene	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Methyl tert-Butyl Ether	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Methylene Chloride	ND (0.0286)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Naphthalene	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
n-Butylbenzene	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
n-Propylbenzene	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
sec-Butylbenzene	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212

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CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Bridge Reconstruction Over Taunton River
Client Sample ID: GS4
Date Sampled: 12/01/25 12:14
Percent Solids: 86
Initial Volume: 5.1g
Final Volume: 10ml
Extraction Method: 5035

ESS Laboratory Work Order: 25L0055
ESS Laboratory Sample ID: 25L0055-02
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK
Prepared: 12/2/25 8:00

Volatile Organics Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	Sequence	Batch
Styrene	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
tert-Butylbenzene	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Tertiary-amyl methyl ether	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Tetrachloroethene	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Tetrahydrofuran	ND (0.0228)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Toluene	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
trans-1,2-Dichloroethene	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
trans-1,3-Dichloropropene	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Trichloroethene	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Trichlorofluoromethane	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Vinyl Chloride	ND (0.0114)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Xylene O	ND (0.0057)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Xylene P,M	ND (0.0114)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212
Xylenes (Total)	ND (0.0114)	---	8260D Low	---	1	MEK	12/02/25 11:28	D5L0058	DL50212

	%Recovery	Qualifier	Limits
Surrogate: 1,2-Dichloroethane-d4	*104 %*		*70-130*
Surrogate: 4-Bromofluorobenzene	*96 %*		*70-130*
Surrogate: Dibromofluoromethane	*103 %*		*70-130*
Surrogate: Toluene-d8	*95 %*		*70-130*

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CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Bridge Reconstruction Over Taunton River
Client Sample ID: GS4
Date Sampled: 12/01/25 12:14
Percent Solids: 86
Initial Volume: 15g
Final Volume: 1ml
Extraction Method: 3546

ESS Laboratory Work Order: 25L0055
ESS Laboratory Sample ID: 25L0055-02
Sample Matrix: Soil
Units: mg/kg dry

Prepared: 12/15/25 13:16

MADEP-EPH Extractable Petroleum Hydrocarbons

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	Sequence	Batch
C9-C18 Aliphatics1	ND (19.4)	---	MADEP-EPH	---	1	JDN	12/17/25 1:07	D5L0279	DL51501
C19-C36 Aliphatics1	**98.3** (19.4)	---	MADEP-EPH	---	1	JDN	12/17/25 1:07	D5L0279	DL51501
C11-C22 Unadjusted Aromatics1	**49.6** (19.4)	---	EPH8270	---	1	JEL	12/16/25 22:20	D5L0319	DL51501
C11-C22 Aromatics1,2	**44.5** (19.7)	---	EPH8270	---		TJ	12/17/25 22:06	---	[CALC]
2-Methylnaphthalene	ND (0.016)	---	EPH8270SIM	---	1	TJ	12/17/25 22:06	D5L0340	DL51501
Acenaphthene	ND (0.016)	---	EPH8270SIM	---	1	TJ	12/17/25 22:06	D5L0340	DL51501
Naphthalene	**B 0.026** (0.016)	---	EPH8270SIM	---	1	TJ	12/17/25 22:06	D5L0340	DL51501
Phenanthrene	**0.357** (0.016)	---	EPH8270SIM	---	1	TJ	12/17/25 22:06	D5L0340	DL51501
Acenaphthylene	ND (0.016)	---	EPH8270SIM	---	1	TJ	12/17/25 22:06	D5L0340	DL51501
Anthracene	**0.087** (0.016)	---	EPH8270SIM	---	1	TJ	12/17/25 22:06	D5L0340	DL51501
Benzo(a)anthracene	**0.336** (0.016)	---	EPH8270SIM	---	1	TJ	12/17/25 22:06	D5L0340	DL51501
Benzo(a)pyrene	**0.437** (0.016)	---	EPH8270SIM	---	1	TJ	12/17/25 22:06	D5L0340	DL51501
Benzo(b)fluoranthene	**0.614** (0.016)	---	EPH8270SIM	---	1	TJ	12/17/25 22:06	D5L0340	DL51501
Benzo(g,h,i)perylene	**0.330** (0.016)	---	EPH8270SIM	---	1	TJ	12/17/25 22:06	D5L0340	DL51501
Benzo(k)fluoranthene	**0.249** (0.016)	---	EPH8270SIM	---	1	TJ	12/17/25 22:06	D5L0340	DL51501
Chrysene	**0.461** (0.016)	---	EPH8270SIM	---	1	TJ	12/17/25 22:06	D5L0340	DL51501
Dibenzo(a,h)Anthracene	**0.112** (0.016)	---	EPH8270SIM	---	1	TJ	12/17/25 22:06	D5L0340	DL51501
Fluoranthene	**1.04** (0.016)	---	EPH8270SIM	---	1	TJ	12/17/25 22:06	D5L0340	DL51501
Fluorene	**0.016** (0.016)	---	EPH8270SIM	---	1	TJ	12/17/25 22:06	D5L0340	DL51501
Indeno(1,2,3-cd)Pyrene	**0.267** (0.016)	---	EPH8270SIM	---	1	TJ	12/17/25 22:06	D5L0340	DL51501
Pyrene	**0.756** (0.016)	---	EPH8270SIM	---	1	TJ	12/17/25 22:06	D5L0340	DL51501

	%Recovery	Qualifier	Limits
Surrogate: 1-Chlorooctadecane	*54 %*		*40-140*
Surrogate: 2-Bromonaphthalene	*92 %*		*40-140*
Surrogate: 2-Fluorobiphenyl	*92 %*		*40-140*
Surrogate: O-Terphenyl	*81 %*		*40-140*

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CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Bridge Reconstruction Over Taunton River
Client Sample ID: GS1
Date Sampled: 12/01/25 12:14
Percent Solids: 86
Initial Volume: 6.5g
Final Volume: 10ml
Extraction Method: 5035

ESS Laboratory Work Order: 25L0055
ESS Laboratory Sample ID: 25L0055-03
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK
Prepared: 12/2/25 8:00

Volatile Organics Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	Sequence	Batch
1,1,1,2-Tetrachloroethane	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
1,1,1-Trichloroethane	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
1,1,2,2-Tetrachloroethane	ND (0.0018)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
1,1,2-Trichloroethane	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
1,1-Dichloroethane	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
1,1-Dichloroethene	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
1,1-Dichloropropene	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
1,2,3-Trichlorobenzene	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
1,2,3-Trichloropropane	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
1,2,4-Trichlorobenzene	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
1,2,4-Trimethylbenzene	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
1,2-Dibromo-3-Chloropropane	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
1,2-Dibromoethane	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
1,2-Dichlorobenzene	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
1,2-Dichloroethane	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
1,2-Dichloropropane	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
1,3,5-Trimethylbenzene	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
1,3-Dichlorobenzene	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
1,3-Dichloropropane	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
1,4-Dichlorobenzene	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
1,4-Dioxane	ND (0.0896)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
2,2-Dichloropropane	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
2-Butanone	ND (0.0448)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
2-Chlorotoluene	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
2-Hexanone	ND (0.0448)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
4-Chlorotoluene	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
4-Isopropyltoluene	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
4-Methyl-2-Pentanone	ND (0.0448)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Acetone	ND (0.0448)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212

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CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Bridge Reconstruction Over Taunton River
Client Sample ID: GS1
Date Sampled: 12/01/25 12:14
Percent Solids: 86
Initial Volume: 6.5g
Final Volume: 10ml
Extraction Method: 5035

ESS Laboratory Work Order: 25L0055
ESS Laboratory Sample ID: 25L0055-03
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK
Prepared: 12/2/25 8:00

Volatile Organics Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	Sequence	Batch
Benzene	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Bromobenzene	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Bromochloromethane	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Bromodichloromethane	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Bromoform	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Bromomethane	ND (0.0090)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Carbon Disulfide	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Carbon Tetrachloride	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Chlorobenzene	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Chloroethane	ND (0.0090)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Chloroform	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Chloromethane	ND (0.0090)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
cis-1,2-Dichloroethene	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
cis-1,3-Dichloropropene	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Dibromochloromethane	ND (0.0018)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Dibromomethane	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Dichlorodifluoromethane	ND (0.0090)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Diethyl Ether	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Di-isopropyl ether	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Ethyl tertiary-butyl ether	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Ethylbenzene	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Hexachlorobutadiene	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Isopropylbenzene	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Methyl tert-Butyl Ether	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Methylene Chloride	ND (0.0224)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Naphthalene	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
n-Butylbenzene	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
n-Propylbenzene	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
sec-Butylbenzene	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212

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CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Bridge Reconstruction Over Taunton River
Client Sample ID: GS1
Date Sampled: 12/01/25 12:14
Percent Solids: 86
Initial Volume: 6.5g
Final Volume: 10ml
Extraction Method: 5035

ESS Laboratory Work Order: 25L0055
ESS Laboratory Sample ID: 25L0055-03
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK
Prepared: 12/2/25 8:00

Volatile Organics Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	Sequence	Batch
Styrene	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
tert-Butylbenzene	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Tertiary-amyl methyl ether	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Tetrachloroethene	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Tetrahydrofuran	ND (0.0179)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Toluene	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
trans-1,2-Dichloroethene	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
trans-1,3-Dichloropropene	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Trichloroethene	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Trichlorofluoromethane	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Vinyl Chloride	ND (0.0090)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Xylene O	ND (0.0045)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Xylene P,M	ND (0.0090)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212
Xylenes (Total)	ND (0.0090)	---	8260D Low	---	1	MEK	12/02/25 11:54	D5L0058	DL50212

	%Recovery	Qualifier	Limits
Surrogate: 1,2-Dichloroethane-d4	*104 %*		*70-130*
Surrogate: 4-Bromofluorobenzene	*97 %*		*70-130*
Surrogate: Dibromofluoromethane	*101 %*		*70-130*
Surrogate: Toluene-d8	*95 %*		*70-130*

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CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Bridge Reconstruction Over Taunton River
Client Sample ID: CS1 - OVEN DRIED
Date Sampled: 12/01/25 03:46
Percent Solids: 100

ESS Laboratory Work Order: 25L0055
ESS Laboratory Sample ID: 25L0055-04
Sample Matrix: Soil
Units: mg/kg dry

Extraction Method: 3050B

Total Metals

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	IV / FV	Batch
Arsenic	**X* 1.01** (0.35)	---	6010D	---	1	CEV	12/10/25 14:02	5.67 100	DL50454
Cadmium	**0.19** (0.18)	---	6010D	---	1	CEV	12/08/25 19:05	5.67 100	DL50454
Chromium	**11.7** (0.35)	---	6010D	---	1	CEV	12/08/25 19:05	5.67 100	DL50454
Copper	**16.6** (0.88)	---	6010D	---	1	CEV	12/08/25 19:05	5.67 100	DL50454
Lead	**19.9** (1.76)	---	6010D	---	1	CEV	12/08/25 19:05	5.67 100	DL50454
Mercury	**0.012** (0.012)	---	7471B	---	1	RAP	12/08/25 17:00	1.68 40	DL50525
Nickel	**7.24** (0.88)	---	6010D	---	1	CEV	12/08/25 19:05	5.67 100	DL50454
Zinc	**62.5** (1.76)	---	6010D	---	1	CEV	12/08/25 19:05	5.67 100	DL50454

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CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Bridge Reconstruction Over Taunton River
Client Sample ID: GS4 - OVEN DRIED
Date Sampled: 12/01/25 12:14
Percent Solids: 100

ESS Laboratory Work Order: 25L0055
ESS Laboratory Sample ID: 25L0055-05
Sample Matrix: Soil
Units: mg/kg dry

Extraction Method: 3050B

Total Metals

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	IV / FV	Batch
Arsenic	**1.94** (0.40)	---	6010D	---	1	CEV	12/10/25 14:07	5.06 100	DL50454
Cadmium	**0.27** (0.20)	---	6010D	---	1	CEV	12/08/25 19:07	5.06 100	DL50454
Chromium	**17.0** (0.40)	---	6010D	---	1	CEV	12/08/25 19:07	5.06 100	DL50454
Copper	**33.3** (0.99)	---	6010D	---	1	CEV	12/08/25 19:07	5.06 100	DL50454
Lead	**36.4** (1.98)	---	6010D	---	1	CEV	12/08/25 19:07	5.06 100	DL50454
Mercury	ND (0.013)	---	7471B	---	1	RAP	12/08/25 17:02	1.55 40	DL50525
Nickel	**7.06** (0.99)	---	6010D	---	1	CEV	12/08/25 19:07	5.06 100	DL50454
Zinc	**100** (1.98)	---	6010D	---	1	CEV	12/08/25 19:07	5.06 100	DL50454

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CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Bridge Reconstruction Over Taunton River ESS Laboratory Work Order: 25L0055

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Total Metals										
Batch DL50454 - 3050B										
Blank										
Arsenic	ND	0.85	mg/kg wet							
Cadmium	ND	0.43	mg/kg wet							
Chromium	ND	0.85	mg/kg wet							
Copper	ND	2.13	mg/kg wet							
Lead	ND	4.26	mg/kg wet							
Nickel	ND	2.13	mg/kg wet							
Zinc	ND	4.26	mg/kg wet							
LCS										
Arsenic	53.4	3.33	mg/kg wet	63.55		84	63-137			
Cadmium	171	1.67	mg/kg wet	180.0		95	80-120			
Chromium	58.8	3.33	mg/kg wet	59.83		98	80-120			
Copper	60.0	8.33	mg/kg wet	63.17		95	80-120			
Lead	170	16.7	mg/kg wet	208.0		82	64-136			
Nickel	117	8.33	mg/kg wet	124.9		93	80-120			
Zinc	490	16.7	mg/kg wet	516.0		95	80-120			
LCS Dup										
Arsenic	47.0	3.12	mg/kg wet	63.55		74	63-137	13	30	
Cadmium	148	1.56	mg/kg wet	180.0		82	80-120	14	30	
Chromium	50.8	3.12	mg/kg wet	59.83		85	80-120	15	30	
Copper	52.1	7.81	mg/kg wet	63.17		83	80-120	14	30	
Lead	151	15.6	mg/kg wet	208.0		72	64-136	12	30	
Nickel	101	7.81	mg/kg wet	124.9		81	80-120	14	30	
Zinc	424	15.6	mg/kg wet	516.0		82	80-120	14	30	
Batch DL50525 - 7471B										
Blank										
Mercury	ND	0.028	mg/kg wet							
LCS										
Mercury	14.8	3.25	mg/kg wet	15.90		93	80-120			
LCS Dup										
Mercury	15.7	3.00	mg/kg wet	15.90		98	80-120	5	30	
Volatile Organics Low Level										
Batch DL50212 - 5035										
Blank										
1,1,1,2-Tetrachloroethane	ND	0.0050	mg/kg wet							
1,1,1-Trichloroethane	ND	0.0050	mg/kg wet							
1,1,2,2-Tetrachloroethane	ND	0.0020	mg/kg wet							
1,1,2-Trichloroethane	ND	0.0050	mg/kg wet							
1,1-Dichloroethane	ND	0.0050	mg/kg wet							
1,1-Dichloroethene	ND	0.0050	mg/kg wet							
1,1-Dichloropropene	ND	0.0050	mg/kg wet							
1,2,3-Trichlorobenzene	ND	0.0050	mg/kg wet							
1,2,3-Trichloropropane	ND	0.0050	mg/kg wet							

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CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Bridge Reconstruction Over Taunton River ESS Laboratory Work Order: 25L0055

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Volatile Organics Low Level										
Batch DL50212 - 5035										
1,2,4-Trichlorobenzene	ND	0.0050	mg/kg wet							
1,2,4-Trimethylbenzene	ND	0.0050	mg/kg wet							
1,2-Dibromo-3-Chloropropane	ND	0.0050	mg/kg wet							
1,2-Dibromoethane	ND	0.0050	mg/kg wet							
1,2-Dichlorobenzene	ND	0.0050	mg/kg wet							
1,2-Dichloroethane	ND	0.0050	mg/kg wet							
1,2-Dichloropropane	ND	0.0050	mg/kg wet							
1,3,5-Trimethylbenzene	ND	0.0050	mg/kg wet							
1,3-Dichlorobenzene	ND	0.0050	mg/kg wet							
1,3-Dichloropropane	ND	0.0050	mg/kg wet							
1,4-Dichlorobenzene	ND	0.0050	mg/kg wet							
1,4-Dioxane	ND	0.100	mg/kg wet							
2,2-Dichloropropane	ND	0.0050	mg/kg wet							
2-Butanone	ND	0.0500	mg/kg wet							
2-Chlorotoluene	ND	0.0050	mg/kg wet							
2-Hexanone	ND	0.0500	mg/kg wet							
4-Chlorotoluene	ND	0.0050	mg/kg wet							
4-Isopropyltoluene	ND	0.0050	mg/kg wet							
4-Methyl-2-Pentanone	ND	0.0500	mg/kg wet							
Acetone	ND	0.0500	mg/kg wet							
Benzene	ND	0.0050	mg/kg wet							
Bromobenzene	ND	0.0050	mg/kg wet							
Bromochloromethane	ND	0.0050	mg/kg wet							
Bromodichloromethane	ND	0.0050	mg/kg wet							
Bromoform	ND	0.0050	mg/kg wet							
Bromomethane	ND	0.0100	mg/kg wet							
Carbon Disulfide	ND	0.0050	mg/kg wet							
Carbon Tetrachloride	ND	0.0050	mg/kg wet							
Chlorobenzene	ND	0.0050	mg/kg wet							
Chloroethane	ND	0.0100	mg/kg wet							
Chloroform	ND	0.0050	mg/kg wet							
Chloromethane	ND	0.0100	mg/kg wet							
cis-1,2-Dichloroethene	ND	0.0050	mg/kg wet							
cis-1,3-Dichloropropene	ND	0.0050	mg/kg wet							
Dibromochloromethane	ND	0.0020	mg/kg wet							
Dibromomethane	ND	0.0050	mg/kg wet							
Dichlorodifluoromethane	ND	0.0100	mg/kg wet							
Diethyl Ether	ND	0.0050	mg/kg wet							
Di-isopropyl ether	ND	0.0050	mg/kg wet							
Ethyl tertiary-butyl ether	ND	0.0050	mg/kg wet							
Ethylbenzene	ND	0.0050	mg/kg wet							
Hexachlorobutadiene	ND	0.0050	mg/kg wet							
Isopropylbenzene	ND	0.0050	mg/kg wet							
Methyl tert-Butyl Ether	ND	0.0050	mg/kg wet							
Methylene Chloride	ND	0.0250	mg/kg wet							
Naphthalene	ND	0.0050	mg/kg wet							

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CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Bridge Reconstruction Over Taunton River ESS Laboratory Work Order: 25L0055

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
				Volatile Organics Low Level						
Batch DL50212 - 5035										
n-Butylbenzene	ND	0.0050	mg/kg wet							
n-Propylbenzene	ND	0.0050	mg/kg wet							
sec-Butylbenzene	ND	0.0050	mg/kg wet							
Styrene	ND	0.0050	mg/kg wet							
tert-Butylbenzene	ND	0.0050	mg/kg wet							
Tertiary-amyl methyl ether	ND	0.0050	mg/kg wet							
Tetrachloroethene	ND	0.0050	mg/kg wet							
Tetrahydrofuran	ND	0.0200	mg/kg wet							
Toluene	ND	0.0050	mg/kg wet							
trans-1,2-Dichloroethene	ND	0.0050	mg/kg wet							
trans-1,3-Dichloropropene	ND	0.0050	mg/kg wet							
Trichloroethene	ND	0.0050	mg/kg wet							
Trichlorofluoromethane	ND	0.0050	mg/kg wet							
Vinyl Chloride	ND	0.0100	mg/kg wet							
Xylene O	ND	0.0050	mg/kg wet							
Xylene P,M	ND	0.0100	mg/kg wet							
Surrogate: 1,2-Dichloroethane-d4	*0.0503*		mg/kg wet	*0.05000*		*101*	*70-130*			
Surrogate: 4-Bromofluorobenzene	*0.0478*		mg/kg wet	*0.05000*		*96*	*70-130*			
Surrogate: Dibromofluoromethane	*0.0491*		mg/kg wet	*0.05000*		*98*	*70-130*			
Surrogate: Toluene-d8	*0.0479*		mg/kg wet	*0.05000*		*96*	*70-130*			
LCS										
1,1,1,2-Tetrachloroethane	0.0453	0.0050	mg/kg wet	0.05000		91	70-130			
1,1,1-Trichloroethane	0.0446	0.0050	mg/kg wet	0.05000		89	70-130			
1,1,2,2-Tetrachloroethane	0.0382	0.0020	mg/kg wet	0.05000		76	40-160			
1,1,2-Trichloroethane	0.0438	0.0050	mg/kg wet	0.05000		88	70-130			
1,1-Dichloroethane	0.0412	0.0050	mg/kg wet	0.05000		82	70-130			
1,1-Dichloroethene	0.0446	0.0050	mg/kg wet	0.05000		89	70-130			
1,1-Dichloropropene	0.0449	0.0050	mg/kg wet	0.05000		90	70-130			
1,2,3-Trichlorobenzene	0.0479	0.0050	mg/kg wet	0.05000		96	70-130			
1,2,3-Trichloropropane	0.0348	0.0050	mg/kg wet	0.05000		70	70-130			
1,2,4-Trichlorobenzene	0.0471	0.0050	mg/kg wet	0.05000		94	70-130			
1,2,4-Trimethylbenzene	0.0423	0.0050	mg/kg wet	0.05000		85	70-130			
1,2-Dibromo-3-Chloropropane	0.0365	0.0050	mg/kg wet	0.05000		73	70-130			
1,2-Dibromoethane	0.0444	0.0050	mg/kg wet	0.05000		89	70-130			
1,2-Dichlorobenzene	0.0434	0.0050	mg/kg wet	0.05000		87	70-130			
1,2-Dichloroethane	0.0450	0.0050	mg/kg wet	0.05000		90	70-130			
1,2-Dichloropropane	0.0399	0.0050	mg/kg wet	0.05000		80	70-130			
1,3,5-Trimethylbenzene	0.0427	0.0050	mg/kg wet	0.05000		85	70-130			
1,3-Dichlorobenzene	0.0436	0.0050	mg/kg wet	0.05000		87	70-130			
1,3-Dichloropropane	0.0426	0.0050	mg/kg wet	0.05000		85	70-130			
1,4-Dichlorobenzene	0.0440	0.0050	mg/kg wet	0.05000		88	70-130			
1,4-Dioxane	0.859	0.100	mg/kg wet	1.000		86	70-130			
2,2-Dichloropropane	0.0381	0.0050	mg/kg wet	0.05000		76	70-130			
2-Butanone	0.165	0.0500	mg/kg wet	0.2500		66	40-160			
2-Chlorotoluene	0.0409	0.0050	mg/kg wet	0.05000		82	70-130			

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Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Volatile Organics Low Level										
Batch DL50212 - 5035										
2-Hexanone	0.135	0.0500	mg/kg wet	0.2500		54	40-160			
4-Chlorotoluene	0.0405	0.0050	mg/kg wet	0.05000		81	70-130			
4-Isopropyltoluene	0.0420	0.0050	mg/kg wet	0.05000		84	70-130			
4-Methyl-2-Pentanone	0.145	0.0500	mg/kg wet	0.2500		58	40-160			
Acetone	0.136	0.0500	mg/kg wet	0.2500		55	40-160			
Benzene	0.0422	0.0050	mg/kg wet	0.05000		84	70-130			
Bromobenzene	0.0431	0.0050	mg/kg wet	0.05000		86	70-130			
Bromochloromethane	0.0455	0.0050	mg/kg wet	0.05000		91	70-130			
Bromodichloromethane	0.0448	0.0050	mg/kg wet	0.05000		90	70-130			
Bromoform	0.0408	0.0050	mg/kg wet	0.05000		82	40-160			
Bromomethane	0.0428	0.0100	mg/kg wet	0.05000		86	40-160			
Carbon Disulfide	0.0424	0.0050	mg/kg wet	0.05000		85	70-130			
Carbon Tetrachloride	0.0459	0.0050	mg/kg wet	0.05000		92	70-130			
Chlorobenzene	0.0438	0.0050	mg/kg wet	0.05000		88	70-130			
Chloroethane	0.0439	0.0100	mg/kg wet	0.05000		88	40-160			
Chloroform	0.0446	0.0050	mg/kg wet	0.05000		89	70-130			
Chloromethane	0.0405	0.0100	mg/kg wet	0.05000		81	40-160			
cis-1,2-Dichloroethene	0.0456	0.0050	mg/kg wet	0.05000		91	70-130			
cis-1,3-Dichloropropene	0.0404	0.0050	mg/kg wet	0.05000		81	40-160			
Dibromochloromethane	0.0435	0.0020	mg/kg wet	0.05000		87	40-160			
Dibromomethane	0.0438	0.0050	mg/kg wet	0.05000		88	70-130			
Dichlorodifluoromethane	0.0520	0.0100	mg/kg wet	0.05000		104	40-160			
Diethyl Ether	0.0384	0.0050	mg/kg wet	0.05000		77	70-130			
Di-isopropyl ether	0.0365	0.0050	mg/kg wet	0.05000		73	70-130			
Ethyl tertiary-butyl ether	0.0378	0.0050	mg/kg wet	0.05000		76	70-130			
Ethylbenzene	0.0425	0.0050	mg/kg wet	0.05000		85	70-130			
Hexachlorobutadiene	0.0490	0.0050	mg/kg wet	0.05000		98	40-160			
Isopropylbenzene	0.0414	0.0050	mg/kg wet	0.05000		83	70-130			
Methyl tert-Butyl Ether	0.0386	0.0050	mg/kg wet	0.05000		77	70-130			
Methylene Chloride	0.0425	0.0250	mg/kg wet	0.05000		85	70-130			
Naphthalene	0.0452	0.0050	mg/kg wet	0.05000		90	40-160			
n-Butylbenzene	0.0431	0.0050	mg/kg wet	0.05000		86	70-130			
n-Propylbenzene	0.0410	0.0050	mg/kg wet	0.05000		82	70-130			
sec-Butylbenzene	0.0381	0.0050	mg/kg wet	0.05000		76	70-130			
Styrene	0.0425	0.0050	mg/kg wet	0.05000		85	40-160			
tert-Butylbenzene	0.0424	0.0050	mg/kg wet	0.05000		85	70-130			
Tertiary-amyl methyl ether	0.0378	0.0050	mg/kg wet	0.05000		76	70-130			
Tetrachloroethene	0.0386	0.0050	mg/kg wet	0.05000		77	70-130			
Tetrahydrofuran	0.0321	0.0200	mg/kg wet	0.05000		64	70-130			B-
Toluene	0.0434	0.0050	mg/kg wet	0.05000		87	70-130			
trans-1,2-Dichloroethene	0.0439	0.0050	mg/kg wet	0.05000		88	70-130			
trans-1,3-Dichloropropene	0.0398	0.0050	mg/kg wet	0.05000		80	70-130			
Trichloroethene	0.0457	0.0050	mg/kg wet	0.05000		91	70-130			
Trichlorofluoromethane	0.0496	0.0050	mg/kg wet	0.05000		99	40-160			
Vinyl Chloride	0.0459	0.0100	mg/kg wet	0.05000		92	70-130			
Xylene O	0.0427	0.0050	mg/kg wet	0.05000		85	70-130			

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Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Volatile Organics Low Level										
Batch DL50212 - 5035										
Xylene P,M	0.0874	0.0100	mg/kg wet	0.1000		87	70-130			
Surrogate: 1,2-Dichloroethane-d4	*0.0490*		mg/kg wet	*0.05000*		*98*	*70-130*			
Surrogate: 4-Bromofluorobenzene	*0.0480*		mg/kg wet	*0.05000*		*96*	*70-130*			
Surrogate: Dibromofluoromethane	*0.0510*		mg/kg wet	*0.05000*		*102*	*70-130*			
Surrogate: Toluene-d8	*0.0473*		mg/kg wet	*0.05000*		*95*	*70-130*			
LCS Dup										
1,1,1,2-Tetrachloroethane	0.0496	0.0050	mg/kg wet	0.05000		99	70-130	9	20	
1,1,1-Trichloroethane	0.0485	0.0050	mg/kg wet	0.05000		97	70-130	8	20	
1,1,2,2-Tetrachloroethane	0.0414	0.0020	mg/kg wet	0.05000		83	40-160	8	20	
1,1,2-Trichloroethane	0.0473	0.0050	mg/kg wet	0.05000		95	70-130	8	20	
1,1-Dichloroethane	0.0449	0.0050	mg/kg wet	0.05000		90	70-130	8	20	
1,1-Dichloroethene	0.0492	0.0050	mg/kg wet	0.05000		98	70-130	10	20	
1,1-Dichloropropene	0.0489	0.0050	mg/kg wet	0.05000		98	70-130	9	20	
1,2,3-Trichlorobenzene	0.0520	0.0050	mg/kg wet	0.05000		104	70-130	8	20	
1,2,3-Trichloropropane	0.0379	0.0050	mg/kg wet	0.05000		76	70-130	8	20	
1,2,4-Trichlorobenzene	0.0512	0.0050	mg/kg wet	0.05000		102	70-130	8	20	
1,2,4-Trimethylbenzene	0.0466	0.0050	mg/kg wet	0.05000		93	70-130	10	20	
1,2-Dibromo-3-Chloropropane	0.0394	0.0050	mg/kg wet	0.05000		79	70-130	8	20	
1,2-Dibromoethane	0.0484	0.0050	mg/kg wet	0.05000		97	70-130	9	20	
1,2-Dichlorobenzene	0.0475	0.0050	mg/kg wet	0.05000		95	70-130	9	20	
1,2-Dichloroethane	0.0485	0.0050	mg/kg wet	0.05000		97	70-130	7	20	
1,2-Dichloropropane	0.0438	0.0050	mg/kg wet	0.05000		88	70-130	9	20	
1,3,5-Trimethylbenzene	0.0470	0.0050	mg/kg wet	0.05000		94	70-130	9	20	
1,3-Dichlorobenzene	0.0475	0.0050	mg/kg wet	0.05000		95	70-130	9	20	
1,3-Dichloropropane	0.0471	0.0050	mg/kg wet	0.05000		94	70-130	10	20	
1,4-Dichlorobenzene	0.0486	0.0050	mg/kg wet	0.05000		97	70-130	10	20	
1,4-Dioxane	0.905	0.100	mg/kg wet	1.000		91	70-130	5	20	
2,2-Dichloropropane	0.0415	0.0050	mg/kg wet	0.05000		83	70-130	8	20	
2-Butanone	0.211	0.0500	mg/kg wet	0.2500		84	40-160	24	20	D+
2-Chlorotoluene	0.0450	0.0050	mg/kg wet	0.05000		90	70-130	10	20	
2-Hexanone	0.171	0.0500	mg/kg wet	0.2500		68	40-160	24	20	D+
4-Chlorotoluene	0.0447	0.0050	mg/kg wet	0.05000		89	70-130	10	20	
4-Isopropyltoluene	0.0458	0.0050	mg/kg wet	0.05000		92	70-130	9	20	
4-Methyl-2-Pentanone	0.156	0.0500	mg/kg wet	0.2500		63	40-160	8	20	
Acetone	0.266	0.0500	mg/kg wet	0.2500		107	40-160	65	20	D+
Benzene	0.0461	0.0050	mg/kg wet	0.05000		92	70-130	9	20	
Bromobenzene	0.0481	0.0050	mg/kg wet	0.05000		96	70-130	11	20	
Bromochloromethane	0.0499	0.0050	mg/kg wet	0.05000		100	70-130	9	20	
Bromodichloromethane	0.0487	0.0050	mg/kg wet	0.05000		97	70-130	8	20	
Bromoform	0.0450	0.0050	mg/kg wet	0.05000		90	40-160	10	20	
Bromomethane	0.0464	0.0100	mg/kg wet	0.05000		93	40-160	8	20	
Carbon Disulfide	0.0465	0.0050	mg/kg wet	0.05000		93	70-130	9	20	
Carbon Tetrachloride	0.0501	0.0050	mg/kg wet	0.05000		100	70-130	9	20	
Chlorobenzene	0.0478	0.0050	mg/kg wet	0.05000		96	70-130	9	20	
Chloroethane	0.0480	0.0100	mg/kg wet	0.05000		96	40-160	9	20	

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Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Volatile Organics Low Level										
Batch DL50212 - 5035										
Chloroform	0.0484	0.0050	mg/kg wet	0.05000		97	70-130	8	20	
Chloromethane	0.0443	0.0100	mg/kg wet	0.05000		89	40-160	9	20	
cis-1,2-Dichloroethene	0.0498	0.0050	mg/kg wet	0.05000		100	70-130	9	20	
cis-1,3-Dichloropropene	0.0438	0.0050	mg/kg wet	0.05000		88	40-160	8	20	
Dibromochloromethane	0.0475	0.0020	mg/kg wet	0.05000		95	40-160	9	20	
Dibromomethane	0.0471	0.0050	mg/kg wet	0.05000		94	70-130	7	20	
Dichlorodifluoromethane	0.0558	0.0100	mg/kg wet	0.05000		112	40-160	7	20	
Diethyl Ether	0.0418	0.0050	mg/kg wet	0.05000		84	70-130	8	20	
Di-isopropyl ether	0.0401	0.0050	mg/kg wet	0.05000		80	70-130	9	20	
Ethyl tertiary-butyl ether	0.0411	0.0050	mg/kg wet	0.05000		82	70-130	8	20	
Ethylbenzene	0.0464	0.0050	mg/kg wet	0.05000		93	70-130	9	20	
Hexachlorobutadiene	0.0531	0.0050	mg/kg wet	0.05000		106	40-160	8	20	
Isopropylbenzene	0.0454	0.0050	mg/kg wet	0.05000		91	70-130	9	20	
Methyl tert-Butyl Ether	0.0418	0.0050	mg/kg wet	0.05000		84	70-130	8	20	
Methylene Chloride	0.0463	0.0250	mg/kg wet	0.05000		93	70-130	8	20	
Naphthalene	0.0487	0.0050	mg/kg wet	0.05000		97	40-160	8	20	
n-Butylbenzene	0.0472	0.0050	mg/kg wet	0.05000		94	70-130	9	20	
n-Propylbenzene	0.0453	0.0050	mg/kg wet	0.05000		91	70-130	10	20	
sec-Butylbenzene	0.0419	0.0050	mg/kg wet	0.05000		84	70-130	10	20	
Styrene	0.0466	0.0050	mg/kg wet	0.05000		93	40-160	9	20	
tert-Butylbenzene	0.0467	0.0050	mg/kg wet	0.05000		93	70-130	10	20	
Tertiary-amyl methyl ether	0.0412	0.0050	mg/kg wet	0.05000		82	70-130	9	20	
Tetrachloroethene	0.0444	0.0050	mg/kg wet	0.05000		89	70-130	14	20	
Tetrahydrofuran	0.0351	0.0200	mg/kg wet	0.05000		70	70-130	9	20	
Toluene	0.0475	0.0050	mg/kg wet	0.05000		95	70-130	9	20	
trans-1,2-Dichloroethene	0.0484	0.0050	mg/kg wet	0.05000		97	70-130	10	20	
trans-1,3-Dichloropropene	0.0432	0.0050	mg/kg wet	0.05000		86	70-130	8	20	
Trichloroethene	0.0501	0.0050	mg/kg wet	0.05000		100	70-130	9	20	
Trichlorofluoromethane	0.0541	0.0050	mg/kg wet	0.05000		108	40-160	9	20	
Vinyl Chloride	0.0428	0.0100	mg/kg wet	0.05000		86	70-130	7	20	
Xylene O	0.0471	0.0050	mg/kg wet	0.05000		94	70-130	10	20	
Xylene P,M	0.0956	0.0100	mg/kg wet	0.1000		96	70-130	9	20	
Surrogate: 1,2-Dichloroethane-d4	*0.0474*		mg/kg wet	*0.05000*		*95*	*70-130*			
Surrogate: 4-Bromofluorobenzene	*0.0476*		mg/kg wet	*0.05000*		*95*	*70-130*			
Surrogate: Dibromofluoromethane	*0.0503*		mg/kg wet	*0.05000*		*101*	*70-130*			
Surrogate: Toluene-d8	*0.0472*		mg/kg wet	*0.05000*		*94*	*70-130*			
Semi-Volatile Organic Compounds										
Batch DL50244 - 3546										
Blank										
1,1-Biphenyl	ND	0.025	mg/kg wet							
1,2,4-Trichlorobenzene	ND	0.250	mg/kg wet							
1,2-Dichlorobenzene	ND	0.250	mg/kg wet							
1,3-Dichlorobenzene	ND	0.250	mg/kg wet							

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Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Semi-Volatile Organic Compounds										
Batch DL50244 - 3546										
1,4-Dichlorobenzene	ND	0.250	mg/kg wet							
2,4,5-Trichlorophenol	ND	0.250	mg/kg wet							
2,4,6-Trichlorophenol	ND	0.250	mg/kg wet							
2,4-Dichlorophenol	ND	0.250	mg/kg wet							
2,4-Dimethylphenol	ND	0.250	mg/kg wet							
2,4-Dinitrophenol	ND	1.00	mg/kg wet							
2,4-Dinitrotoluene	ND	0.250	mg/kg wet							
2,6-Dinitrotoluene	ND	0.250	mg/kg wet							
2-Chloronaphthalene	ND	0.250	mg/kg wet							
2-Chlorophenol	ND	0.250	mg/kg wet							
2-Methylnaphthalene	ND	0.250	mg/kg wet							
2-Methylphenol	ND	0.250	mg/kg wet							
2-Nitrophenol	ND	0.500	mg/kg wet							
3,3´-Dichlorobenzidine	ND	0.250	mg/kg wet							
3+4-Methylphenol	ND	0.250	mg/kg wet							
4-Bromophenyl-phenylether	ND	0.250	mg/kg wet							
4-Chloroaniline	ND	0.250	mg/kg wet							
4-Nitrophenol	ND	1.00	mg/kg wet							
Acenaphthene	ND	0.250	mg/kg wet							
Acenaphthylene	ND	0.250	mg/kg wet							
Acetophenone	ND	0.250	mg/kg wet							
Aniline	ND	0.250	mg/kg wet							
Anthracene	ND	0.250	mg/kg wet							
Azobenzene	ND	0.250	mg/kg wet							
Benzo(a)anthracene	ND	0.250	mg/kg wet							
Benzo(a)pyrene	ND	0.250	mg/kg wet							
Benzo(b)fluoranthene	ND	0.250	mg/kg wet							
Benzo(g,h,i)perylene	ND	0.250	mg/kg wet							
Benzo(k)fluoranthene	ND	0.250	mg/kg wet							
bis(2-Chloroethoxy)methane	ND	0.250	mg/kg wet							
bis(2-Chloroethyl)ether	ND	0.250	mg/kg wet							
bis(2-chloroisopropyl)Ether	ND	0.250	mg/kg wet							
bis(2-Ethylhexyl)phthalate	ND	0.250	mg/kg wet							
Butylbenzylphthalate	ND	0.250	mg/kg wet							
Chrysene	ND	0.250	mg/kg wet							
Dibenzo(a,h)Anthracene	ND	0.250	mg/kg wet							
Dibenzofuran	ND	0.250	mg/kg wet							
Diethylphthalate	ND	0.250	mg/kg wet							
Dimethylphthalate	ND	0.250	mg/kg wet							
Di-n-butylphthalate	ND	0.250	mg/kg wet							
Di-n-octylphthalate	ND	0.500	mg/kg wet							
Fluoranthene	ND	0.250	mg/kg wet							
Fluorene	ND	0.250	mg/kg wet							
Hexachlorobenzene	ND	0.250	mg/kg wet							
Hexachlorobutadiene	ND	0.250	mg/kg wet							
Hexachloroethane	ND	0.250	mg/kg wet							

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CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Bridge Reconstruction Over Taunton River ESS Laboratory Work Order: 25L0055

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Semi-Volatile Organic Compounds										
Batch DL50244 - 3546										
Indeno(1,2,3-cd)Pyrene	ND	0.250	mg/kg wet							
Isophorone	ND	0.250	mg/kg wet							
Naphthalene	ND	0.250	mg/kg wet							
Nitrobenzene	ND	0.250	mg/kg wet							
N-Nitrosodimethylamine	ND	0.250	mg/kg wet							
Pentachlorophenol	ND	1.00	mg/kg wet							
Phenanthrene	ND	0.250	mg/kg wet							
Phenol	ND	0.250	mg/kg wet							
Pyrene	ND	0.250	mg/kg wet							
Pyridine	ND	0.250	mg/kg wet							
Surrogate: 1,2-Dichlorobenzene-d4	*1.75*		mg/kg wet	*2.500*		*70*	*30-130*			
Surrogate: 2,4,6-Tribromophenol	*3.85*		mg/kg wet	*3.750*		*103*	*30-130*			
Surrogate: 2-Chlorophenol-d4	*2.33*		mg/kg wet	*3.750*		*62*	*30-130*			
Surrogate: 2-Fluorobiphenyl	*1.70*		mg/kg wet	*2.500*		*68*	*30-130*			
Surrogate: 2-Fluorophenol	*2.19*		mg/kg wet	*3.750*		*58*	*30-130*			
Surrogate: Nitrobenzene-d5	*1.48*		mg/kg wet	*2.500*		*59*	*30-130*			
Surrogate: Phenol-d6	*2.19*		mg/kg wet	*3.750*		*58*	*30-130*			
Surrogate: p-Terphenyl-d14	*1.68*		mg/kg wet	*2.500*		*67*	*30-130*			
LCS										
1,1-Biphenyl	1.88	0.025	mg/kg wet	2.500		75	40-140			
1,2,4-Trichlorobenzene	2.13	0.250	mg/kg wet	2.500		85	40-140			
1,2-Dichlorobenzene	1.96	0.250	mg/kg wet	2.500		78	40-140			
1,3-Dichlorobenzene	1.94	0.250	mg/kg wet	2.500		78	40-140			
1,4-Dichlorobenzene	1.98	0.250	mg/kg wet	2.500		79	40-140			
2,4,5-Trichlorophenol	2.37	0.250	mg/kg wet	2.500		95	30-130			
2,4,6-Trichlorophenol	2.32	0.250	mg/kg wet	2.500		93	30-130			
2,4-Dichlorophenol	2.10	0.250	mg/kg wet	2.500		84	30-130			
2,4-Dimethylphenol	1.58	0.250	mg/kg wet	2.500		63	30-130			
2,4-Dinitrophenol	2.10	1.00	mg/kg wet	2.500		84	15-140			
2,4-Dinitrotoluene	2.12	0.250	mg/kg wet	2.500		85	40-140			
2,6-Dinitrotoluene	2.15	0.250	mg/kg wet	2.500		86	40-140			
2-Chloronaphthalene	1.90	0.250	mg/kg wet	2.500		76	40-140			
2-Chlorophenol	1.88	0.250	mg/kg wet	2.500		75	30-130			
2-Methylnaphthalene	1.98	0.250	mg/kg wet	2.500		79	40-140			
2-Methylphenol	1.73	0.250	mg/kg wet	2.500		69	15-140			
2-Nitrophenol	1.99	0.500	mg/kg wet	2.500		80	30-130			
3,3´-Dichlorobenzidine	1.92	0.250	mg/kg wet	2.500		77	40-140			
3+4-Methylphenol	3.71	0.250	mg/kg wet	5.000		74	15-140			
4-Bromophenyl-phenylether	2.24	0.250	mg/kg wet	2.500		90	40-140			
4-Chloroaniline	1.33	0.250	mg/kg wet	2.500		53	15-140			
4-Nitrophenol	1.53	1.00	mg/kg wet	2.500		61	15-140			
Acenaphthene	1.86	0.250	mg/kg wet	2.500		75	40-140			
Acenaphthylene	1.76	0.250	mg/kg wet	2.500		70	40-140			
Acetophenone	1.76	0.250	mg/kg wet	2.500		70	40-140			
Aniline	1.23	0.250	mg/kg wet	2.500		49	40-140			

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CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Bridge Reconstruction Over Taunton River ESS Laboratory Work Order: 25L0055

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Semi-Volatile Organic Compounds										
Batch DL50244 - 3546										
Anthracene	1.85	0.250	mg/kg wet	2.500		74	40-140			
Azobenzene	1.28	0.250	mg/kg wet	2.500		51	40-140			
Benzo(a)anthracene	1.89	0.250	mg/kg wet	2.500		76	40-140			
Benzo(a)pyrene	1.91	0.250	mg/kg wet	2.500		77	40-140			
Benzo(b)fluoranthene	1.70	0.250	mg/kg wet	2.500		68	40-140			
Benzo(g,h,i)perylene	1.92	0.250	mg/kg wet	2.500		77	40-140			
Benzo(k)fluoranthene	1.84	0.250	mg/kg wet	2.500		74	40-140			
bis(2-Chloroethoxy)methane	1.54	0.250	mg/kg wet	2.500		61	40-140			
bis(2-Chloroethyl)ether	1.53	0.250	mg/kg wet	2.500		61	40-140			
bis(2-chloroisopropyl)Ether	1.87	0.250	mg/kg wet	2.500		75	40-140			
bis(2-Ethylhexyl)phthalate	1.63	0.250	mg/kg wet	2.500		65	40-140			
Butylbenzylphthalate	1.62	0.250	mg/kg wet	2.500		65	40-140			
Chrysene	1.96	0.250	mg/kg wet	2.500		78	40-140			
Dibenzo(a,h)Anthracene	1.77	0.250	mg/kg wet	2.500		71	40-140			
Dibenzofuran	1.91	0.250	mg/kg wet	2.500		77	40-140			
Diethylphthalate	1.79	0.250	mg/kg wet	2.500		72	40-140			
Dimethylphthalate	1.83	0.250	mg/kg wet	2.500		73	15-140			
Di-n-butylphthalate	1.69	0.250	mg/kg wet	2.500		67	40-140			
Di-n-octylphthalate	1.50	0.500	mg/kg wet	2.500		60	40-140			
Fluoranthene	1.99	0.250	mg/kg wet	2.500		80	40-140			
Fluorene	1.87	0.250	mg/kg wet	2.500		75	40-140			
Hexachlorobenzene	2.22	0.250	mg/kg wet	2.500		89	40-140			
Hexachlorobutadiene	2.37	0.250	mg/kg wet	2.500		95	40-140			
Hexachloroethane	1.69	0.250	mg/kg wet	2.500		68	40-140			
Indeno(1,2,3-cd)Pyrene	1.92	0.250	mg/kg wet	2.500		77	40-140			
Isophorone	1.37	0.250	mg/kg wet	2.500		55	40-140			
Naphthalene	1.76	0.250	mg/kg wet	2.500		71	40-140			
Nitrobenzene	1.49	0.250	mg/kg wet	2.500		60	40-140			
N-Nitrosodimethylamine	1.25	0.250	mg/kg wet	2.500		50	40-140			
Pentachlorophenol	2.05	1.00	mg/kg wet	2.500		82	15-140			
Phenanthrene	1.81	0.250	mg/kg wet	2.500		72	40-140			
Phenol	1.66	0.250	mg/kg wet	2.500		66	15-140			
Pyrene	1.92	0.250	mg/kg wet	2.500		77	40-140			
Pyridine	1.33	0.250	mg/kg wet	2.500		53	40-140			
Surrogate: 1,2-Dichlorobenzene-d4	*2.03*		mg/kg wet	*2.500*		*81*	*30-130*			
Surrogate: 2,4,6-Tribromophenol	*3.86*		mg/kg wet	*3.750*		*103*	*30-130*			
Surrogate: 2-Chlorophenol-d4	*2.64*		mg/kg wet	*3.750*		*70*	*30-130*			
Surrogate: 2-Fluorobiphenyl	*1.94*		mg/kg wet	*2.500*		*78*	*30-130*			
Surrogate: 2-Fluorophenol	*2.46*		mg/kg wet	*3.750*		*66*	*30-130*			
Surrogate: Nitrobenzene-d5	*1.52*		mg/kg wet	*2.500*		*61*	*30-130*			
Surrogate: Phenol-d6	*2.45*		mg/kg wet	*3.750*		*65*	*30-130*			
Surrogate: p-Terphenyl-d14	*1.90*		mg/kg wet	*2.500*		*76*	*30-130*			
LCS Dup										
1,1-Biphenyl	1.71	0.025	mg/kg wet	2.500		68	40-140	9	30	
1,2,4-Trichlorobenzene	1.85	0.250	mg/kg wet	2.500		74	40-140	14	30	

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CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Bridge Reconstruction Over Taunton River ESS Laboratory Work Order: 25L0055

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Semi-Volatile Organic Compounds										
Batch DL50244 - 3546										
1,2-Dichlorobenzene	1.59	0.250	mg/kg wet	2.500		64	40-140	20	30	
1,3-Dichlorobenzene	1.63	0.250	mg/kg wet	2.500		65	40-140	17	30	
1,4-Dichlorobenzene	1.67	0.250	mg/kg wet	2.500		67	40-140	17	30	
2,4,5-Trichlorophenol	2.15	0.250	mg/kg wet	2.500		86	30-130	9	30	
2,4,6-Trichlorophenol	2.09	0.250	mg/kg wet	2.500		84	30-130	10	30	
2,4-Dichlorophenol	1.86	0.250	mg/kg wet	2.500		75	30-130	12	30	
2,4-Dimethylphenol	1.47	0.250	mg/kg wet	2.500		59	30-130	8	30	
2,4-Dinitrophenol	1.68	1.00	mg/kg wet	2.500		67	15-140	22	30	
2,4-Dinitrotoluene	2.08	0.250	mg/kg wet	2.500		83	40-140	2	30	
2,6-Dinitrotoluene	2.00	0.250	mg/kg wet	2.500		80	40-140	7	30	
2-Chloronaphthalene	1.68	0.250	mg/kg wet	2.500		67	40-140	12	30	
2-Chlorophenol	1.64	0.250	mg/kg wet	2.500		65	30-130	14	30	
2-Methylnaphthalene	1.76	0.250	mg/kg wet	2.500		71	40-140	12	30	
2-Methylphenol	1.49	0.250	mg/kg wet	2.500		59	15-140	15	30	
2-Nitrophenol	1.85	0.500	mg/kg wet	2.500		74	30-130	7	30	
3,3´-Dichlorobenzidine	1.58	0.250	mg/kg wet	2.500		63	40-140	19	30	
3+4-Methylphenol	3.27	0.250	mg/kg wet	5.000		65	15-140	12	30	
4-Bromophenyl-phenylether	2.00	0.250	mg/kg wet	2.500		80	40-140	11	30	
4-Chloroaniline	1.21	0.250	mg/kg wet	2.500		48	15-140	9	30	
4-Nitrophenol	1.45	1.00	mg/kg wet	2.500		58	15-140	5	30	
Acenaphthene	1.75	0.250	mg/kg wet	2.500		70	40-140	6	30	
Acenaphthylene	1.65	0.250	mg/kg wet	2.500		66	40-140	6	30	
Acetophenone	1.51	0.250	mg/kg wet	2.500		61	40-140	15	30	
Aniline	0.945	0.250	mg/kg wet	2.500		38	40-140	26	30	B-
Anthracene	1.72	0.250	mg/kg wet	2.500		69	40-140	7	30	
Azobenzene	1.18	0.250	mg/kg wet	2.500		47	40-140	9	30	
Benzo(a)anthracene	1.73	0.250	mg/kg wet	2.500		69	40-140	9	30	
Benzo(a)pyrene	1.73	0.250	mg/kg wet	2.500		69	40-140	10	30	
Benzo(b)fluoranthene	1.53	0.250	mg/kg wet	2.500		61	40-140	11	30	
Benzo(g,h,i)perylene	1.73	0.250	mg/kg wet	2.500		69	40-140	10	30	
Benzo(k)fluoranthene	1.68	0.250	mg/kg wet	2.500		67	40-140	9	30	
bis(2-Chloroethoxy)methane	1.40	0.250	mg/kg wet	2.500		56	40-140	9	30	
bis(2-Chloroethyl)ether	1.26	0.250	mg/kg wet	2.500		50	40-140	19	30	
bis(2-chloroisopropyl)Ether	1.58	0.250	mg/kg wet	2.500		63	40-140	17	30	
bis(2-Ethylhexyl)phthalate	1.48	0.250	mg/kg wet	2.500		59	40-140	10	30	
Butylbenzylphthalate	1.58	0.250	mg/kg wet	2.500		63	40-140	3	30	
Chrysene	1.77	0.250	mg/kg wet	2.500		71	40-140	10	30	
Dibenzo(a,h)Anthracene	1.62	0.250	mg/kg wet	2.500		65	40-140	9	30	
Dibenzofuran	1.79	0.250	mg/kg wet	2.500		72	40-140	7	30	
Diethylphthalate	1.75	0.250	mg/kg wet	2.500		70	40-140	2	30	
Dimethylphthalate	1.71	0.250	mg/kg wet	2.500		68	15-140	7	30	
Di-n-butylphthalate	1.52	0.250	mg/kg wet	2.500		61	40-140	10	30	
Di-n-octylphthalate	1.33	0.500	mg/kg wet	2.500		53	40-140	12	30	
Fluoranthene	1.87	0.250	mg/kg wet	2.500		75	40-140	6	30	
Fluorene	1.75	0.250	mg/kg wet	2.500		70	40-140	7	30	
Hexachlorobenzene	2.02	0.250	mg/kg wet	2.500		81	40-140	10	30	

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Client Name: Beta Engineering
Client Project ID: Bridge Reconstruction Over Taunton River ESS Laboratory Work Order: 25L0055

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Semi-Volatile Organic Compounds										
Batch DL50244 - 3546										
Hexachlorobutadiene	2.04	0.250	mg/kg wet	2.500		82	40-140	15	30	
Hexachloroethane	1.50	0.250	mg/kg wet	2.500		60	40-140	12	30	
Indeno(1,2,3-cd)Pyrene	1.75	0.250	mg/kg wet	2.500		70	40-140	9	30	
Isophorone	1.22	0.250	mg/kg wet	2.500		49	40-140	11	30	
Naphthalene	1.59	0.250	mg/kg wet	2.500		63	40-140	11	30	
Nitrobenzene	1.25	0.250	mg/kg wet	2.500		50	40-140	18	30	
N-Nitrosodimethylamine	1.09	0.250	mg/kg wet	2.500		43	40-140	14	30	
Pentachlorophenol	1.84	1.00	mg/kg wet	2.500		74	15-140	11	30	
Phenanthrene	1.63	0.250	mg/kg wet	2.500		65	40-140	10	30	
Phenol	1.45	0.250	mg/kg wet	2.500		58	15-140	13	30	
Pyrene	1.68	0.250	mg/kg wet	2.500		67	40-140	13	30	
Pyridine	1.09	0.250	mg/kg wet	2.500		44	40-140	20	30	
Surrogate: 1,2-Dichlorobenzene-d4	*1.65*		mg/kg wet	*2.500*		*66*	*30-130*			
Surrogate: 2,4,6-Tribromophenol	*3.40*		mg/kg wet	*3.750*		*91*	*30-130*			
Surrogate: 2-Chlorophenol-d4	*2.24*		mg/kg wet	*3.750*		*60*	*30-130*			
Surrogate: 2-Fluorobiphenyl	*1.79*		mg/kg wet	*2.500*		*72*	*30-130*			
Surrogate: 2-Fluorophenol	*2.02*		mg/kg wet	*3.750*		*54*	*30-130*			
Surrogate: Nitrobenzene-d5	*1.32*		mg/kg wet	*2.500*		*53*	*30-130*			
Surrogate: Phenol-d6	*2.01*		mg/kg wet	*3.750*		*54*	*30-130*			
Surrogate: p-Terphenyl-d14	*1.66*		mg/kg wet	*2.500*		*66*	*30-130*			
MADEP-EPH Extractable Petroleum Hydrocarbons										
Batch DL50324 - 3546										
Blank										
C19-C36 Aliphatics1	ND	10.0	mg/kg wet							
C9-C18 Aliphatics1	ND	10.0	mg/kg wet							
Surrogate: 1-Chlorooctadecane	*1.05*		mg/kg wet	*2.000*		*52*	*40-140*			
Blank										
C11-C22 Unadjusted Aromatics1	ND	10.0	mg/kg wet							
Surrogate: 2-Bromonaphthalene	*1.57*		mg/kg wet	*2.000*		*78*	*40-140*			
Surrogate: 2-Fluorobiphenyl	*1.56*		mg/kg wet	*2.000*		*78*	*40-140*			
Surrogate: O-Terphenyl	*1.35*		mg/kg wet	*2.000*		*68*	*40-140*			
Blank										
2-Methylnaphthalene	ND	0.008	mg/kg wet							
Acenaphthene	ND	0.008	mg/kg wet							
Acenaphthylene	ND	0.008	mg/kg wet							
Anthracene	ND	0.008	mg/kg wet							
Benzo(a)anthracene	ND	0.008	mg/kg wet							
Benzo(a)pyrene	ND	0.008	mg/kg wet							
Benzo(b)fluoranthene	ND	0.008	mg/kg wet							
Benzo(g,h,i)perylene	ND	0.008	mg/kg wet							
Benzo(k)fluoranthene	ND	0.008	mg/kg wet							
Chrysene	ND	0.008	mg/kg wet							

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Client Name: Beta Engineering
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Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
MADEP-EPH Extractable Petroleum Hydrocarbons										
Batch DL50324 - 3546										
Dibenzo(a,h)Anthracene	ND	0.008	mg/kg wet							
Fluoranthene	ND	0.008	mg/kg wet							
Fluorene	ND	0.008	mg/kg wet							
Indeno(1,2,3-cd)Pyrene	ND	0.008	mg/kg wet							
Naphthalene	ND	0.008	mg/kg wet							
Phenanthrene	ND	0.008	mg/kg wet							
Pyrene	ND	0.008	mg/kg wet							
LCS										
C19-C36 Aliphatics1	12.8	10.0	mg/kg wet	16.00		80	40-140			
C9-C18 Aliphatics1	6.4	10.0	mg/kg wet	12.00		53	40-140			
Surrogate: 1-Chlorooctadecane	*1.17*		mg/kg wet	*2.000*		*59*	*40-140*			
LCS										
C11-C22 Unadjusted Aromatics1	25.3	10.0	mg/kg wet	34.00		74	40-140			
Surrogate: 2-Bromonaphthalene	*1.81*		mg/kg wet	*2.000*		*90*	*40-140*			
Surrogate: 2-Fluorobiphenyl	*1.78*		mg/kg wet	*2.000*		*89*	*40-140*			
Surrogate: O-Terphenyl	*1.54*		mg/kg wet	*2.000*		*77*	*40-140*			
LCS										
2-Methylnaphthalene Breakthrough	0.0		%				0-5			
Naphthalene Breakthrough	0.0		%				0-5			
LCS										
2-Methylnaphthalene	1.21	0.040	mg/kg wet	2.000		60	40-140			
Acenaphthene	1.23	0.040	mg/kg wet	2.000		61	40-140			
Acenaphthylene	1.29	0.040	mg/kg wet	2.000		64	40-140			
Anthracene	1.43	0.040	mg/kg wet	2.000		71	40-140			
Benzo(a)anthracene	1.35	0.040	mg/kg wet	2.000		68	40-140			
Benzo(a)pyrene	1.52	0.040	mg/kg wet	2.000		76	40-140			
Benzo(b)fluoranthene	1.38	0.040	mg/kg wet	2.000		69	40-140			
Benzo(g,h,i)perylene	1.43	0.040	mg/kg wet	2.000		72	40-140			
Benzo(k)fluoranthene	1.48	0.040	mg/kg wet	2.000		74	40-140			
Chrysene	1.41	0.040	mg/kg wet	2.000		71	40-140			
Dibenzo(a,h)Anthracene	1.48	0.040	mg/kg wet	2.000		74	40-140			
Fluoranthene	1.54	0.040	mg/kg wet	2.000		77	40-140			
Fluorene	1.32	0.040	mg/kg wet	2.000		66	40-140			
Indeno(1,2,3-cd)Pyrene	1.49	0.040	mg/kg wet	2.000		75	40-140			
Naphthalene	1.04	0.040	mg/kg wet	2.000		52	40-140			
Phenanthrene	1.31	0.040	mg/kg wet	2.000		66	40-140			
Pyrene	1.51	0.040	mg/kg wet	2.000		76	40-140			
LCS Dup										
C19-C36 Aliphatics1	12.2	10.0	mg/kg wet	16.00		76	40-140	5	25	
C9-C18 Aliphatics1	6.2	10.0	mg/kg wet	12.00		52	40-140	3	25	
Surrogate: 1-Chlorooctadecane	*1.08*		mg/kg wet	*2.000*		*54*	*40-140*			
LCS Dup										

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Client Project ID: Bridge Reconstruction Over Taunton River ESS Laboratory Work Order: 25L0055

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
MADEP-EPH Extractable Petroleum Hydrocarbons										
Batch DL50324 - 3546										
C11-C22 Unadjusted Aromatics1	25.0	10.0	mg/kg wet	34.00		74	40-140	1	25	
Surrogate: 2-Bromonaphthalene	*1.64*		mg/kg wet	*2.000*		*82*	*40-140*			
Surrogate: 2-Fluorobiphenyl	*1.61*		mg/kg wet	*2.000*		*80*	*40-140*			
Surrogate: O-Terphenyl	*1.42*		mg/kg wet	*2.000*		*71*	*40-140*			
LCS Dup										
2-Methylnaphthalene Breakthrough	0.0		%				0-5		200	
Naphthalene Breakthrough	0.0		%				0-5		200	
LCS Dup										
2-Methylnaphthalene	1.23	0.040	mg/kg wet	2.000		62	40-140	2	30	
Acenaphthene	1.25	0.040	mg/kg wet	2.000		62	40-140	2	30	
Acenaphthylene	1.32	0.040	mg/kg wet	2.000		66	40-140	2	30	
Anthracene	1.44	0.040	mg/kg wet	2.000		72	40-140	1	30	
Benzo(a)anthracene	1.35	0.040	mg/kg wet	2.000		67	40-140	0.2	30	
Benzo(a)pyrene	1.52	0.040	mg/kg wet	2.000		76	40-140	0.2	30	
Benzo(b)fluoranthene	1.38	0.040	mg/kg wet	2.000		69	40-140	0.1	30	
Benzo(g,h,i)perylene	1.45	0.040	mg/kg wet	2.000		73	40-140	2	30	
Benzo(k)fluoranthene	1.48	0.040	mg/kg wet	2.000		74	40-140	0.4	30	
Chrysene	1.43	0.040	mg/kg wet	2.000		72	40-140	1	30	
Dibenzo(a,h)Anthracene	1.49	0.040	mg/kg wet	2.000		75	40-140	1	30	
Fluoranthene	1.55	0.040	mg/kg wet	2.000		78	40-140	1	30	
Fluorene	1.33	0.040	mg/kg wet	2.000		66	40-140	0.4	30	
Indeno(1,2,3-cd)Pyrene	1.51	0.040	mg/kg wet	2.000		75	40-140	0.9	30	
Naphthalene	1.07	0.040	mg/kg wet	2.000		53	40-140	3	30	
Phenanthrene	1.33	0.040	mg/kg wet	2.000		66	40-140	1	30	
Pyrene	1.53	0.040	mg/kg wet	2.000		76	40-140	0.9	30	
Batch DL51501 - 3546										
Blank										
C19-C36 Aliphatics1	ND	10.0	mg/kg wet							
C9-C18 Aliphatics1	ND	10.0	mg/kg wet							
Surrogate: 1-Chlorooctadecane	*0.869*		mg/kg wet	*2.000*		*43*	*40-140*			
Blank										
C11-C22 Unadjusted Aromatics1	ND	10.0	mg/kg wet							
Surrogate: 2-Bromonaphthalene	*1.74*		mg/kg wet	*2.000*		*87*	*40-140*			
Surrogate: 2-Fluorobiphenyl	*1.59*		mg/kg wet	*2.000*		*80*	*40-140*			
Surrogate: O-Terphenyl	*1.24*		mg/kg wet	*2.000*		*62*	*40-140*			
Blank										
2-Methylnaphthalene	ND	0.008	mg/kg wet							
Acenaphthene	ND	0.008	mg/kg wet							
Acenaphthylene	ND	0.008	mg/kg wet							
Anthracene	ND	0.008	mg/kg wet							
Benzo(a)anthracene	ND	0.008	mg/kg wet							
Benzo(a)pyrene	ND	0.008	mg/kg wet							

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Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
MADEP-EPH Extractable Petroleum Hydrocarbons										
Batch DL51501 - 3546										
Benzo(b)fluoranthene	ND	0.008	mg/kg wet							
Benzo(g,h,i)perylene	ND	0.008	mg/kg wet							
Benzo(k)fluoranthene	ND	0.008	mg/kg wet							
Chrysene	ND	0.008	mg/kg wet							
Dibenzo(a,h)Anthracene	ND	0.008	mg/kg wet							
Fluoranthene	ND	0.008	mg/kg wet							
Fluorene	ND	0.008	mg/kg wet							
Indeno(1,2,3-cd)Pyrene	ND	0.008	mg/kg wet							
Naphthalene	0.011	0.008	mg/kg wet							
Phenanthrene	ND	0.008	mg/kg wet							
Pyrene	ND	0.008	mg/kg wet							
LCS										
C19-C36 Aliphatics1	12.3	10.0	mg/kg wet	16.00		77	40-140			
C9-C18 Aliphatics1	7.1	10.0	mg/kg wet	12.00		59	40-140			
Surrogate: 1-Chlorooctadecane	*1.13*		mg/kg wet	*2.000*		*57*	*40-140*			
LCS										
C11-C22 Unadjusted Aromatics1	25.6	10.0	mg/kg wet	34.00		75	40-140			
Surrogate: 2-Bromonaphthalene	*1.64*		mg/kg wet	*2.000*		*82*	*40-140*			
Surrogate: 2-Fluorobiphenyl	*1.45*		mg/kg wet	*2.000*		*73*	*40-140*			
Surrogate: O-Terphenyl	*1.55*		mg/kg wet	*2.000*		*77*	*40-140*			
LCS										
2-Methylnaphthalene Breakthrough	0.0		%				0-5			
Naphthalene Breakthrough	0.0		%				0-5			
LCS										
2-Methylnaphthalene	1.46	0.040	mg/kg wet	2.000		73	40-140			
Acenaphthene	1.47	0.040	mg/kg wet	2.000		74	40-140			
Acenaphthylene	1.61	0.040	mg/kg wet	2.000		81	40-140			
Anthracene	1.70	0.040	mg/kg wet	2.000		85	40-140			
Benzo(a)anthracene	1.57	0.040	mg/kg wet	2.000		78	40-140			
Benzo(a)pyrene	1.78	0.040	mg/kg wet	2.000		89	40-140			
Benzo(b)fluoranthene	1.62	0.040	mg/kg wet	2.000		81	40-140			
Benzo(g,h,i)perylene	1.66	0.040	mg/kg wet	2.000		83	40-140			
Benzo(k)fluoranthene	1.82	0.040	mg/kg wet	2.000		91	40-140			
Chrysene	1.68	0.040	mg/kg wet	2.000		84	40-140			
Dibenzo(a,h)Anthracene	1.67	0.040	mg/kg wet	2.000		84	40-140			
Fluoranthene	1.78	0.040	mg/kg wet	2.000		89	40-140			
Fluorene	1.56	0.040	mg/kg wet	2.000		78	40-140			
Indeno(1,2,3-cd)Pyrene	1.71	0.040	mg/kg wet	2.000		86	40-140			
Naphthalene	1.33	0.040	mg/kg wet	2.000		66	40-140			
Phenanthrene	1.49	0.040	mg/kg wet	2.000		74	40-140			
Pyrene	1.78	0.040	mg/kg wet	2.000		89	40-140			
LCS Dup										
C19-C36 Aliphatics1	10.8	10.0	mg/kg wet	16.00		67	40-140	14	25	

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Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
MADEP-EPH Extractable Petroleum Hydrocarbons										
Batch DL51501 - 3546										
C9-C18 Aliphatics1	6.5	10.0	mg/kg wet	12.00		54	40-140	9	25	
Surrogate: 1-Chlorooctadecane	*0.909*		mg/kg wet	*2.000*		*45*	*40-140*			
LCS Dup										
C11-C22 Unadjusted Aromatics1	18.9	10.0	mg/kg wet	34.00		55	40-140	30	25	D+
Surrogate: 2-Bromonaphthalene	*1.83*		mg/kg wet	*2.000*		*92*	*40-140*			
Surrogate: 2-Fluorobiphenyl	*1.68*		mg/kg wet	*2.000*		*84*	*40-140*			
Surrogate: O-Terphenyl	*1.16*		mg/kg wet	*2.000*		*58*	*40-140*			
LCS Dup										
2-Methylnaphthalene Breakthrough	0.0		%				0-5		200	
Naphthalene Breakthrough	0.0		%				0-5		200	
LCS Dup										
2-Methylnaphthalene	1.06	0.040	mg/kg wet	2.000		53	40-140	32	30	D+
Acenaphthene	1.07	0.040	mg/kg wet	2.000		54	40-140	32	30	
Acenaphthylene	1.17	0.040	mg/kg wet	2.000		58	40-140	32	30	
Anthracene	1.23	0.040	mg/kg wet	2.000		61	40-140	32	30	
Benzo(a)anthracene	1.10	0.040	mg/kg wet	2.000		55	40-140	35	30	
Benzo(a)pyrene	1.25	0.040	mg/kg wet	2.000		63	40-140	35	30	
Benzo(b)fluoranthene	1.12	0.040	mg/kg wet	2.000		56	40-140	36	30	
Benzo(g,h,i)perylene	1.16	0.040	mg/kg wet	2.000		58	40-140	35	30	
Benzo(k)fluoranthene	1.35	0.040	mg/kg wet	2.000		67	40-140	30	30	
Chrysene	1.23	0.040	mg/kg wet	2.000		61	40-140	31	30	
Dibenzo(a,h)Anthracene	1.15	0.040	mg/kg wet	2.000		58	40-140	37	30	
Fluoranthene	1.27	0.040	mg/kg wet	2.000		64	40-140	33	30	
Fluorene	1.12	0.040	mg/kg wet	2.000		56	40-140	32	30	
Indeno(1,2,3-cd)Pyrene	1.19	0.040	mg/kg wet	2.000		59	40-140	36	30	
Naphthalene	0.974	0.040	mg/kg wet	2.000		49	40-140	31	30	
Phenanthrene	1.07	0.040	mg/kg wet	2.000		53	40-140	33	30	
Pyrene	1.29	0.040	mg/kg wet	2.000		65	40-140	32	30	
8081B Organochlorine Pesticides										
Batch DL50310 - 3546										
Blank										
4,4´-DDD	ND	0.0025	mg/kg wet							
4,4´-DDD [2C]	ND	0.0025	mg/kg wet							
4,4´-DDE	ND	0.0025	mg/kg wet							
4,4´-DDE [2C]	ND	0.0025	mg/kg wet							
4,4´-DDT	ND	0.0025	mg/kg wet							
4,4´-DDT [2C]	ND	0.0025	mg/kg wet							
Aldrin	ND	0.0012	mg/kg wet							
Aldrin [2C]	ND	0.0012	mg/kg wet							
alpha-BHC	ND	0.0025	mg/kg wet							
alpha-BHC [2C]	ND	0.0025	mg/kg wet							
alpha-Chlordane	ND	0.0025	mg/kg wet							

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Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
8081B Organochlorine Pesticides										
Batch DL50310 - 3546										
alpha-Chlordane [2C]	ND	0.0025	mg/kg wet							
beta-BHC	ND	0.0025	mg/kg wet							
beta-BHC [2C]	ND	0.0025	mg/kg wet							
Chlordane (Total)	ND	0.0200	mg/kg wet							
Chlordane (Total) [2C]	ND	0.0200	mg/kg wet							
delta-BHC	ND	0.0025	mg/kg wet							
delta-BHC [2C]	ND	0.0025	mg/kg wet							
Dieldrin	ND	0.0012	mg/kg wet							
Dieldrin [2C]	ND	0.0012	mg/kg wet							
Endosulfan I	ND	0.0025	mg/kg wet							
Endosulfan I [2C]	ND	0.0025	mg/kg wet							
Endosulfan II	ND	0.0025	mg/kg wet							
Endosulfan II [2C]	ND	0.0025	mg/kg wet							
Endosulfan Sulfate	ND	0.0025	mg/kg wet							
Endosulfan Sulfate [2C]	ND	0.0025	mg/kg wet							
Endrin	ND	0.0025	mg/kg wet							
Endrin [2C]	ND	0.0025	mg/kg wet							
Endrin Ketone	ND	0.0025	mg/kg wet							
Endrin Ketone [2C]	ND	0.0025	mg/kg wet							
gamma-BHC (Lindane)	ND	0.0015	mg/kg wet							
gamma-BHC (Lindane) [2C]	ND	0.0015	mg/kg wet							
gamma-Chlordane	ND	0.0025	mg/kg wet							
gamma-Chlordane [2C]	ND	0.0025	mg/kg wet							
Heptachlor	ND	0.0025	mg/kg wet							
Heptachlor [2C]	ND	0.0025	mg/kg wet							
Heptachlor Epoxide	ND	0.0025	mg/kg wet							
Heptachlor Epoxide [2C]	ND	0.0025	mg/kg wet							
Hexachlorobenzene	ND	0.0025	mg/kg wet							
Hexachlorobenzene [2C]	ND	0.0025	mg/kg wet							
Methoxychlor	ND	0.0025	mg/kg wet							
Methoxychlor [2C]	ND	0.0025	mg/kg wet							
Toxaphene	ND	0.125	mg/kg wet							
Toxaphene [2C]	ND	0.125	mg/kg wet							
Surrogate: Decachlorobiphenyl	*0.00910*		mg/kg wet	*0.01250*		*73*	*30-150*			
Surrogate: Decachlorobiphenyl [2C]	*0.00978*		mg/kg wet	*0.01250*		*78*	*30-150*			
Surrogate: Tetrachloro-m-xylene	*0.00897*		mg/kg wet	*0.01250*		*72*	*30-150*			
Surrogate: Tetrachloro-m-xylene [2C]	*0.00932*		mg/kg wet	*0.01250*		*75*	*30-150*			
LCS										
4,4´-DDD	0.0092	0.0025	mg/kg wet	0.01250		74	40-140			
4,4´-DDD [2C]	0.0099	0.0025	mg/kg wet	0.01250		79	40-140			
4,4´-DDE	0.0090	0.0025	mg/kg wet	0.01250		72	40-140			
4,4´-DDE [2C]	0.0097	0.0025	mg/kg wet	0.01250		77	40-140			
4,4´-DDT	0.0099	0.0025	mg/kg wet	0.01250		79	40-140			
4,4´-DDT [2C]	0.0106	0.0025	mg/kg wet	0.01250		85	40-140			
Aldrin	0.0086	0.0012	mg/kg wet	0.01250		69	40-140			

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Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
8081B Organochlorine Pesticides										
Batch DL50310 - 3546										
Aldrin [2C]	0.0088	0.0012	mg/kg wet	0.01250		71	40-140			
alpha-BHC	0.0081	0.0025	mg/kg wet	0.01250		65	40-140			
alpha-BHC [2C]	0.0089	0.0025	mg/kg wet	0.01250		71	40-140			
alpha-Chlordane	0.0080	0.0025	mg/kg wet	0.01250		64	40-140			
alpha-Chlordane [2C]	0.0093	0.0025	mg/kg wet	0.01250		74	40-140			
beta-BHC	0.0077	0.0025	mg/kg wet	0.01250		62	40-140			
beta-BHC [2C]	0.0075	0.0025	mg/kg wet	0.01250		60	40-140			
delta-BHC	0.0100	0.0025	mg/kg wet	0.01250		80	40-140			
delta-BHC [2C]	0.0091	0.0025	mg/kg wet	0.01250		72	40-140			
Dieldrin	0.0092	0.0012	mg/kg wet	0.01250		73	40-140			
Dieldrin [2C]	0.0097	0.0012	mg/kg wet	0.01250		78	40-140			
Endosulfan I	0.0081	0.0025	mg/kg wet	0.01250		65	40-140			
Endosulfan I [2C]	0.0085	0.0025	mg/kg wet	0.01250		68	40-140			
Endosulfan II	0.0093	0.0025	mg/kg wet	0.01250		75	40-140			
Endosulfan II [2C]	0.0098	0.0025	mg/kg wet	0.01250		79	40-140			
Endosulfan Sulfate	0.0093	0.0025	mg/kg wet	0.01250		74	40-140			
Endosulfan Sulfate [2C]	0.0100	0.0025	mg/kg wet	0.01250		80	40-140			
Endrin	0.0095	0.0025	mg/kg wet	0.01250		76	40-140			
Endrin [2C]	0.0105	0.0025	mg/kg wet	0.01250		84	40-140			
Endrin Ketone	0.0089	0.0025	mg/kg wet	0.01250		71	40-140			
Endrin Ketone [2C]	0.0096	0.0025	mg/kg wet	0.01250		77	40-140			
gamma-BHC (Lindane)	0.0084	0.0015	mg/kg wet	0.01250		67	40-140			
gamma-BHC (Lindane) [2C]	0.0090	0.0015	mg/kg wet	0.01250		72	40-140			
gamma-Chlordane	0.0086	0.0025	mg/kg wet	0.01250		69	40-140			
gamma-Chlordane [2C]	0.0090	0.0025	mg/kg wet	0.01250		72	40-140			
Heptachlor	0.0085	0.0025	mg/kg wet	0.01250		68	40-140			
Heptachlor [2C]	0.0094	0.0025	mg/kg wet	0.01250		75	40-140			
Heptachlor Epoxide	0.0090	0.0025	mg/kg wet	0.01250		72	40-140			
Heptachlor Epoxide [2C]	0.0095	0.0025	mg/kg wet	0.01250		76	40-140			
Hexachlorobenzene	0.0077	0.0025	mg/kg wet	0.01250		61	40-140			
Hexachlorobenzene [2C]	0.0082	0.0025	mg/kg wet	0.01250		65	40-140			
Methoxychlor	0.0102	0.0025	mg/kg wet	0.01250		82	40-140			
Methoxychlor [2C]	0.0109	0.0025	mg/kg wet	0.01250		87	40-140			
Surrogate: Decachlorobiphenyl	*0.00904*		mg/kg wet	*0.01250*		*72*	*30-150*			
Surrogate: Decachlorobiphenyl [2C]	*0.00973*		mg/kg wet	*0.01250*		*78*	*30-150*			
Surrogate: Tetrachloro-m-xylene	*0.00763*		mg/kg wet	*0.01250*		*61*	*30-150*			
Surrogate: Tetrachloro-m-xylene [2C]	*0.00815*		mg/kg wet	*0.01250*		*65*	*30-150*			
LCS Dup										
4,4´-DDD	0.0096	0.0025	mg/kg wet	0.01250		77	40-140	4	30	
4,4´-DDD [2C]	0.0101	0.0025	mg/kg wet	0.01250		81	40-140	2	30	
4,4´-DDE	0.0093	0.0025	mg/kg wet	0.01250		75	40-140	3	30	
4,4´-DDE [2C]	0.0092	0.0025	mg/kg wet	0.01250		74	40-140	5	30	
4,4´-DDT	0.0100	0.0025	mg/kg wet	0.01250		80	40-140	0.7	30	
4,4´-DDT [2C]	0.0108	0.0025	mg/kg wet	0.01250		86	40-140	2	30	
Aldrin	0.0086	0.0012	mg/kg wet	0.01250		69	40-140	0.3	30	

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Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
8081B Organochlorine Pesticides										
Batch DL50310 - 3546										
Aldrin [2C]	0.0089	0.0012	mg/kg wet	0.01250		71	40-140	0.9	30	
alpha-BHC	0.0083	0.0025	mg/kg wet	0.01250		66	40-140	2	30	
alpha-BHC [2C]	0.0090	0.0025	mg/kg wet	0.01250		72	40-140	1	30	
alpha-Chlordane	0.0081	0.0025	mg/kg wet	0.01250		65	40-140	2	30	
alpha-Chlordane [2C]	0.0093	0.0025	mg/kg wet	0.01250		75	40-140	0.8	30	
beta-BHC	0.0082	0.0025	mg/kg wet	0.01250		65	40-140	6	30	
beta-BHC [2C]	0.0077	0.0025	mg/kg wet	0.01250		62	40-140	4	30	
delta-BHC	0.0105	0.0025	mg/kg wet	0.01250		84	40-140	5	30	
delta-BHC [2C]	0.0094	0.0025	mg/kg wet	0.01250		76	40-140	4	30	
Dieldrin	0.0093	0.0012	mg/kg wet	0.01250		74	40-140	1	30	
Dieldrin [2C]	0.0087	0.0012	mg/kg wet	0.01250		70	40-140	11	30	
Endosulfan I	0.0084	0.0025	mg/kg wet	0.01250		67	40-140	3	30	
Endosulfan I [2C]	0.0085	0.0025	mg/kg wet	0.01250		68	40-140	0.4	30	
Endosulfan II	0.0095	0.0025	mg/kg wet	0.01250		76	40-140	2	30	
Endosulfan II [2C]	0.0101	0.0025	mg/kg wet	0.01250		80	40-140	2	30	
Endosulfan Sulfate	0.0092	0.0025	mg/kg wet	0.01250		74	40-140	0.7	30	
Endosulfan Sulfate [2C]	0.0101	0.0025	mg/kg wet	0.01250		81	40-140	2	30	
Endrin	0.0095	0.0025	mg/kg wet	0.01250		76	40-140	0.06	30	
Endrin [2C]	0.0105	0.0025	mg/kg wet	0.01250		84	40-140	0.5	30	
Endrin Ketone	0.0091	0.0025	mg/kg wet	0.01250		73	40-140	2	30	
Endrin Ketone [2C]	0.0099	0.0025	mg/kg wet	0.01250		79	40-140	3	30	
gamma-BHC (Lindane)	0.0085	0.0015	mg/kg wet	0.01250		68	40-140	0.9	30	
gamma-BHC (Lindane) [2C]	0.0092	0.0015	mg/kg wet	0.01250		74	40-140	3	30	
gamma-Chlordane	0.0088	0.0025	mg/kg wet	0.01250		70	40-140	2	30	
gamma-Chlordane [2C]	0.0090	0.0025	mg/kg wet	0.01250		72	40-140	0.2	30	
Heptachlor	0.0089	0.0025	mg/kg wet	0.01250		71	40-140	4	30	
Heptachlor [2C]	0.0094	0.0025	mg/kg wet	0.01250		75	40-140	0.01	30	
Heptachlor Epoxide	0.0090	0.0025	mg/kg wet	0.01250		72	40-140	0.6	30	
Heptachlor Epoxide [2C]	0.0096	0.0025	mg/kg wet	0.01250		77	40-140	1	30	
Hexachlorobenzene	0.0080	0.0025	mg/kg wet	0.01250		64	40-140	4	30	
Hexachlorobenzene [2C]	0.0087	0.0025	mg/kg wet	0.01250		70	40-140	6	30	
Methoxychlor	0.0105	0.0025	mg/kg wet	0.01250		84	40-140	3	30	
Methoxychlor [2C]	0.0114	0.0025	mg/kg wet	0.01250		91	40-140	5	30	
Surrogate: Decachlorobiphenyl	*0.00947*		mg/kg wet	*0.01250*		*76*	*30-150*			
Surrogate: Decachlorobiphenyl [2C]	*0.0102*		mg/kg wet	*0.01250*		*82*	*30-150*			
Surrogate: Tetrachloro-m-xylene	*0.00825*		mg/kg wet	*0.01250*		*66*	*30-150*			
Surrogate: Tetrachloro-m-xylene [2C]	*0.00838*		mg/kg wet	*0.01250*		*67*	*30-150*			
8100M Total Petroleum Hydrocarbons										
Batch DL50204 - 3546										
Blank										
Decane (C10)	ND	0.2	mg/kg wet							
Docosane (C22)	ND	0.2	mg/kg wet							
Dodecane (C12)	ND	0.2	mg/kg wet							

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Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
8100M Total Petroleum Hydrocarbons										
Batch DL50204 - 3546										
Eicosane (C20)	ND	0.2	mg/kg wet							
Hexacosane (C26)	ND	0.2	mg/kg wet							
Hexadecane (C16)	ND	0.2	mg/kg wet							
Hexatriacontane (C36)	ND	0.2	mg/kg wet							
Nonadecane (C19)	ND	0.2	mg/kg wet							
Nonane (C9)	ND	0.2	mg/kg wet							
Octacosane (C28)	ND	0.2	mg/kg wet							
Octadecane (C18)	ND	0.2	mg/kg wet							
Tetracosane (C24)	ND	0.2	mg/kg wet							
Tetradecane (C14)	ND	0.2	mg/kg wet							
Total Petroleum Hydrocarbons (C9-C36)	ND	10.0	mg/kg wet							
Triacontane (C30)	ND	0.2	mg/kg wet							
Surrogate: O-Terphenyl	*3.69*		mg/kg wet	*5.000*		*74*	*40-140*			
LCS										
Decane (C10)	1.3	0.2	mg/kg wet	2.500		52	40-140			
Docosane (C22)	1.5	0.2	mg/kg wet	2.500		59	40-140			
Dodecane (C12)	1.4	0.2	mg/kg wet	2.500		54	40-140			
Eicosane (C20)	1.4	0.2	mg/kg wet	2.500		58	40-140			
Hexacosane (C26)	1.4	0.2	mg/kg wet	2.500		57	40-140			
Hexadecane (C16)	1.5	0.2	mg/kg wet	2.500		58	40-140			
Hexatriacontane (C36)	1.5	0.2	mg/kg wet	2.500		58	40-140			
Nonadecane (C19)	1.4	0.2	mg/kg wet	2.500		58	40-140			
Nonane (C9)	1.2	0.2	mg/kg wet	2.500		46	30-140			
Octacosane (C28)	1.4	0.2	mg/kg wet	2.500		58	40-140			
Octadecane (C18)	1.4	0.2	mg/kg wet	2.500		57	40-140			
Tetracosane (C24)	1.4	0.2	mg/kg wet	2.500		58	40-140			
Tetradecane (C14)	1.4	0.2	mg/kg wet	2.500		56	40-140			
Total Petroleum Hydrocarbons (C9-C36)	19.7	10.0	mg/kg wet	35.00		56	40-140			
Triacontane (C30)	1.4	0.2	mg/kg wet	2.500		58	40-140			
Surrogate: O-Terphenyl	*3.08*		mg/kg wet	*5.000*		*62*	*40-140*			
LCS Dup										
Decane (C10)	1.5	0.2	mg/kg wet	2.500		58	40-140	11	25	
Docosane (C22)	1.7	0.2	mg/kg wet	2.500		66	40-140	12	25	
Dodecane (C12)	1.5	0.2	mg/kg wet	2.500		61	40-140	12	25	
Eicosane (C20)	1.6	0.2	mg/kg wet	2.500		65	40-140	12	25	
Hexacosane (C26)	1.6	0.2	mg/kg wet	2.500		65	40-140	12	25	
Hexadecane (C16)	1.6	0.2	mg/kg wet	2.500		65	40-140	12	25	
Hexatriacontane (C36)	1.7	0.2	mg/kg wet	2.500		66	40-140	13	25	
Nonadecane (C19)	1.6	0.2	mg/kg wet	2.500		65	40-140	12	25	
Nonane (C9)	1.3	0.2	mg/kg wet	2.500		51	30-140	10	25	
Octacosane (C28)	1.6	0.2	mg/kg wet	2.500		66	40-140	13	25	
Octadecane (C18)	1.6	0.2	mg/kg wet	2.500		64	40-140	12	25	
Tetracosane (C24)	1.6	0.2	mg/kg wet	2.500		65	40-140	12	25	
Tetradecane (C14)	1.6	0.2	mg/kg wet	2.500		64	40-140	12	25	

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Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
8100M Total Petroleum Hydrocarbons										
Batch DL50204 - 3546										
Total Petroleum Hydrocarbons (C9-C36)	22.4	10.0	mg/kg wet	35.00		64	40-140	13	25	
Triacontane (C30)	1.6	0.2	mg/kg wet	2.500		65	40-140	13	25	
Surrogate: O-Terphenyl	*3.40*		mg/kg wet	*5.000*		*68*	*40-140*			
Classical Chemistry										
Batch DL50142 - General Preparation										
Blank										
Conductivity	ND	5	umhos/cm							
LCS										
Conductivity	1350		umhos/cm	1411		96	90-110			
Batch DL50222 - General Preparation										
Blank										
Reactive Cyanide	ND	2.0	mg/kg							
Reactive Sulfide	ND	2.0	mg/kg							
LCS										
Reactive Cyanide	4.1	2.0	mg/kg	100.3		4	0.68-5.41			
Reactive Sulfide	2.2	2.0	mg/kg	10.00		22	0-44			
Batch DL50333 - General Preparation										
Reference										
Flashpoint	81		°F	81.00		100	97.9-102.1			
Batch DL50424 - General Preparation										
Blank										
Total Volatile Solids	ND	1	%							
Batch DL50941 - General Preparation										
Blank										
Total Organic Carbon (1)	ND	500	mg/kg							
Total Organic Carbon (2)	ND	500	mg/kg							
LCS										
Total Organic Carbon (1)	10300	500	mg/kg	10010		103	80-120			
Total Organic Carbon (2)	10200	500	mg/kg	10010		101	80-120			
LCS Dup										
Total Organic Carbon (1)	11100	500	mg/kg	10010		111	80-120	8	25	
Total Organic Carbon (2)	10300	500	mg/kg	10010		103	80-120	2	25	
8082 Polychlorinated Biphenyls (PCB) / Congeners										
Batch DL50503 - 3540C										
Blank										
BZ#101	ND	0.00027	mg/kg wet							
BZ#101 [2C]	ND	0.00027	mg/kg wet							
BZ#105	ND	0.00027	mg/kg wet							
BZ#105 [2C]	ND	0.00027	mg/kg wet							

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Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
8082 Polychlorinated Biphenyls (PCB) / Congeners										
Batch DL50503 - 3540C										
BZ#118	ND	0.00027	mg/kg wet							
BZ#118 [2C]	ND	0.00027	mg/kg wet							
BZ#128	ND	0.00027	mg/kg wet							
BZ#128 [2C]	ND	0.00027	mg/kg wet							
BZ#138	ND	0.00027	mg/kg wet							
BZ#138 [2C]	ND	0.00027	mg/kg wet							
BZ#153	ND	0.00027	mg/kg wet							
BZ#153 [2C]	ND	0.00027	mg/kg wet							
BZ#170	ND	0.00027	mg/kg wet							
BZ#170 [2C]	ND	0.00027	mg/kg wet							
BZ#18	ND	0.00027	mg/kg wet							
BZ#18 [2C]	ND	0.00027	mg/kg wet							
BZ#180	ND	0.00027	mg/kg wet							
BZ#180 [2C]	ND	0.00027	mg/kg wet							
BZ#187	ND	0.00027	mg/kg wet							
BZ#187 [2C]	ND	0.00027	mg/kg wet							
BZ#195	ND	0.00027	mg/kg wet							
BZ#195 [2C]	ND	0.00027	mg/kg wet							
BZ#206	ND	0.00027	mg/kg wet							
BZ#206 [2C]	ND	0.00027	mg/kg wet							
BZ#209	ND	0.00027	mg/kg wet							
BZ#209 [2C]	ND	0.00027	mg/kg wet							
BZ#28	ND	0.00027	mg/kg wet							
BZ#28 [2C]	ND	0.00027	mg/kg wet							
BZ#44	ND	0.00027	mg/kg wet							
BZ#44 [2C]	ND	0.00027	mg/kg wet							
BZ#52	ND	0.00027	mg/kg wet							
BZ#52 [2C]	ND	0.00027	mg/kg wet							
BZ#66	ND	0.00027	mg/kg wet							
BZ#66 [2C]	ND	0.00027	mg/kg wet							
BZ#8	ND	0.00027	mg/kg wet							
BZ#8 [2C]	ND	0.00027	mg/kg wet							
Surrogate: Tetrachloro-m-xylene	*0.00245*		mg/kg wet	*0.003333*		*74*	*30-150*			
Surrogate: Tetrachloro-m-xylene [2C]	*0.00267*		mg/kg wet	*0.003333*		*80*	*30-150*			
LCS										
BZ#101	0.00269	0.00027	mg/kg wet	0.003333		81	40-140			
BZ#101 [2C]	0.00258	0.00027	mg/kg wet	0.003333		77	40-140			
BZ#105	0.00282	0.00027	mg/kg wet	0.003333		85	40-140			
BZ#105 [2C]	0.00301	0.00027	mg/kg wet	0.003333		90	40-140			
BZ#118	0.00267	0.00027	mg/kg wet	0.003333		80	40-140			
BZ#118 [2C]	0.00275	0.00027	mg/kg wet	0.003333		82	40-140			
BZ#128	0.00241	0.00027	mg/kg wet	0.003333		72	40-140			
BZ#128 [2C]	0.00263	0.00027	mg/kg wet	0.003333		79	40-140			
BZ#138	0.00265	0.00027	mg/kg wet	0.003333		80	40-140			
BZ#138 [2C]	0.00279	0.00027	mg/kg wet	0.003333		84	40-140			

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Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
8082 Polychlorinated Biphenyls (PCB) / Congeners										
Batch DL50503 - 3540C										
BZ#153	0.00260	0.00027	mg/kg wet	0.003333		78	40-140			
BZ#153 [2C]	0.00275	0.00027	mg/kg wet	0.003333		82	40-140			
BZ#170	0.00258	0.00027	mg/kg wet	0.003333		77	40-140			
BZ#170 [2C]	0.00269	0.00027	mg/kg wet	0.003333		81	40-140			
BZ#18	0.00273	0.00027	mg/kg wet	0.003333		82	40-140			
BZ#18 [2C]	0.00262	0.00027	mg/kg wet	0.003333		79	40-140			
BZ#180	0.00261	0.00027	mg/kg wet	0.003333		78	40-140			
BZ#180 [2C]	0.00287	0.00027	mg/kg wet	0.003333		86	40-140			
BZ#187	0.00256	0.00027	mg/kg wet	0.003333		77	40-140			
BZ#187 [2C]	0.00274	0.00027	mg/kg wet	0.003333		82	40-140			
BZ#195	0.00248	0.00027	mg/kg wet	0.003333		74	40-140			
BZ#195 [2C]	0.00271	0.00027	mg/kg wet	0.003333		81	40-140			
BZ#206	0.00243	0.00027	mg/kg wet	0.003333		73	40-140			
BZ#206 [2C]	0.00264	0.00027	mg/kg wet	0.003333		79	40-140			
BZ#209	0.00237	0.00027	mg/kg wet	0.003333		71	40-140			
BZ#209 [2C]	0.00255	0.00027	mg/kg wet	0.003333		77	40-140			
BZ#28	0.00257	0.00027	mg/kg wet	0.003333		77	40-140			
BZ#28 [2C]	0.00285	0.00027	mg/kg wet	0.003333		85	40-140			
BZ#44	0.00272	0.00027	mg/kg wet	0.003333		81	40-140			
BZ#44 [2C]	0.00263	0.00027	mg/kg wet	0.003333		79	40-140			
BZ#52	0.00260	0.00027	mg/kg wet	0.003333		78	40-140			
BZ#52 [2C]	0.00263	0.00027	mg/kg wet	0.003333		79	40-140			
BZ#66	0.00270	0.00027	mg/kg wet	0.003333		81	40-140			
BZ#66 [2C]	0.00274	0.00027	mg/kg wet	0.003333		82	40-140			
BZ#8	0.00316	0.00027	mg/kg wet	0.003333		95	40-140			
BZ#8 [2C]	0.00281	0.00027	mg/kg wet	0.003333		84	40-140			
Surrogate: Tetrachloro-m-xylene	*0.00267*		mg/kg wet	*0.003333*		*80*	*30-150*			
Surrogate: Tetrachloro-m-xylene [2C]	*0.00282*		mg/kg wet	*0.003333*		*85*	*30-150*			
LCS Dup										
BZ#101	0.00254	0.00027	mg/kg wet	0.003333		76	40-140	5	30	
BZ#101 [2C]	0.00244	0.00027	mg/kg wet	0.003333		73	40-140	6	30	
BZ#105	0.00248	0.00027	mg/kg wet	0.003333		74	40-140	13	30	
BZ#105 [2C]	0.00266	0.00027	mg/kg wet	0.003333		80	40-140	12	30	
BZ#118	0.00236	0.00027	mg/kg wet	0.003333		71	40-140	12	30	
BZ#118 [2C]	0.00248	0.00027	mg/kg wet	0.003333		75	40-140	10	30	
BZ#128	0.00239	0.00027	mg/kg wet	0.003333		72	40-140	0.5	30	
BZ#128 [2C]	0.00256	0.00027	mg/kg wet	0.003333		77	40-140	3	30	
BZ#138	0.00240	0.00027	mg/kg wet	0.003333		72	40-140	10	30	
BZ#138 [2C]	0.00252	0.00027	mg/kg wet	0.003333		76	40-140	10	30	
BZ#153	0.00239	0.00027	mg/kg wet	0.003333		72	40-140	9	30	
BZ#153 [2C]	0.00253	0.00027	mg/kg wet	0.003333		76	40-140	8	30	
BZ#170	0.00230	0.00027	mg/kg wet	0.003333		69	40-140	11	30	
BZ#170 [2C]	0.00241	0.00027	mg/kg wet	0.003333		72	40-140	11	30	
BZ#18	0.00249	0.00027	mg/kg wet	0.003333		75	40-140	9	30	
BZ#18 [2C]	0.00252	0.00027	mg/kg wet	0.003333		76	40-140	4	30	

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Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
8082 Polychlorinated Biphenyls (PCB) / Congeners										
Batch DL50503 - 3540C										
BZ#180	0.00234	0.00027	mg/kg wet	0.003333		70	40-140	11	30	
BZ#180 [2C]	0.00259	0.00027	mg/kg wet	0.003333		78	40-140	10	30	
BZ#187	0.00239	0.00027	mg/kg wet	0.003333		72	40-140	7	30	
BZ#187 [2C]	0.00255	0.00027	mg/kg wet	0.003333		76	40-140	7	30	
BZ#195	0.00228	0.00027	mg/kg wet	0.003333		68	40-140	8	30	
BZ#195 [2C]	0.00249	0.00027	mg/kg wet	0.003333		75	40-140	9	30	
BZ#206	0.00223	0.00027	mg/kg wet	0.003333		67	40-140	9	30	
BZ#206 [2C]	0.00242	0.00027	mg/kg wet	0.003333		72	40-140	9	30	
BZ#209	0.00222	0.00027	mg/kg wet	0.003333		67	40-140	6	30	
BZ#209 [2C]	0.00237	0.00027	mg/kg wet	0.003333		71	40-140	7	30	
BZ#28	0.00227	0.00027	mg/kg wet	0.003333		68	40-140	12	30	
BZ#28 [2C]	0.00265	0.00027	mg/kg wet	0.003333		80	40-140	7	30	
BZ#44	0.00258	0.00027	mg/kg wet	0.003333		77	40-140	5	30	
BZ#44 [2C]	0.00249	0.00027	mg/kg wet	0.003333		75	40-140	5	30	
BZ#52	0.00246	0.00027	mg/kg wet	0.003333		74	40-140	5	30	
BZ#52 [2C]	0.00250	0.00027	mg/kg wet	0.003333		75	40-140	5	30	
BZ#66	0.00245	0.00027	mg/kg wet	0.003333		73	40-140	10	30	
BZ#66 [2C]	0.00251	0.00027	mg/kg wet	0.003333		75	40-140	9	30	
BZ#8	0.00264	0.00027	mg/kg wet	0.003333		79	40-140	18	30	
BZ#8 [2C]	0.00242	0.00027	mg/kg wet	0.003333		73	40-140	15	30	
Surrogate: Tetrachloro-m-xylene	*0.00252*		mg/kg wet	*0.003333*		*76*	*30-150*			
Surrogate: Tetrachloro-m-xylene [2C]	*0.00262*		mg/kg wet	*0.003333*		*79*	*30-150*			

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
8151MCP Herbicides (GC)										
Batch 1079332 - 8151A_SP										
LCS										
2,4,5-T	0.0410	0.033	mg/Kg	0.0417		98	40-140			
2,4-D	0.145	0.033	mg/Kg	0.167		87	40-140			
2,4-DB	0.121	0.033	mg/Kg	0.167		73	40-140			
Dalapon	0.100	0.033	mg/Kg	0.167		60	40-140			
Dicamba	0.0845	0.033	mg/Kg	0.0833		101	40-140			
Dichlorprop	0.147	0.033	mg/Kg	0.167		88	40-140			
Dinoseb	0.131	0.033	mg/Kg	0.167		79	42-140			
MCPA	14.7	3.3	mg/Kg	16.7		88	40-140			
MCPP	18.1	6.0	mg/Kg	16.7		108	40-140			
Silvex (2,4,5-TP)	0.0424	0.033	mg/Kg	0.0417		102	40-140			
Surrogate: 2,4-Dichlorophenylacetic acid	*0.191*		mg/Kg	*0.167*		*115*	*30-150*			
LCS Dup										
2,4,5-T	0.0334	0.033	mg/Kg	0.0417		80	40-140	20	30	

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Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
				8151MCP Herbicides (GC)						
Batch 1079332 - 8151A_SP										
2,4-D	0.111	0.033	mg/Kg	0.167		67	40-140	24	30	
2,4-DB	0.0726	0.033	mg/Kg	0.167		44	40-140	28	30	
Dalapon	0.0831	0.033	mg/Kg	0.167		50	40-140	19	30	
Dicamba	0.0638	0.033	mg/Kg	0.0833		77	40-140	22	30	
Dichlorprop	0.118	0.033	mg/Kg	0.167		71	40-140	22	30	
Dinoseb	0.116	0.033	mg/Kg	0.167		70	42-140	22	30	
MCPA	11.7	3.3	mg/Kg	16.7		70	40-140	23	30	
MCPP	14.8	6.0	mg/Kg	16.7		89	40-140	20	30	
Silvex (2,4,5-TP)	0.0370	0.033	mg/Kg	0.0417		89	40-140	19	30	
Surrogate: 2,4-Dichlorophenylacetic acid	*0.185*		mg/Kg	*0.167*		*111*	*30-150*			
Blank										
2,4,5-T	ND	0.033	mg/Kg			0	-			
2,4-D	ND	0.033	mg/Kg			0	-			
2,4-DB	ND	0.033	mg/Kg			0	-			
Dalapon	ND	0.033	mg/Kg			0	-			
Dicamba	ND	0.033	mg/Kg			0	-			
Dichlorprop	ND	0.033	mg/Kg			0	-			
Dinoseb	ND	0.033	mg/Kg			0	-			
MCPA	ND	3.3	mg/Kg			0	-			
MCPP	ND	6.0	mg/Kg			0	-			
Silvex (2,4,5-TP)	ND	0.033	mg/Kg			0	-			
Surrogate: 2,4-Dichlorophenylacetic acid	*0.202*		mg/Kg	*0.167*		*121*	*30-150*			

eurofins | Environment Testing
ESS Laboratory

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Bridge Reconstruction Over Taunton River ESS Laboratory Work Order: 25L0055

Notes and Definitions

X*	RSD of replicate analysis > 20%. Reanalysis produced similar results.
WL	Results obtained from a deionized water leach of the sample.
U	Analyte included in the analysis, but not detected
Q	Calibration required quadratic regression (Q).
EL	Elevated Method Reporting Limits due to sample matrix (EL).
D+	Relative percent difference for duplicate is outside of criteria (D+).
D	Diluted.
CD+	Continuing Calibration %Diff/Drift is above control limit (CD+).
CD-	Continuing Calibration %Diff/Drift is below control limit (CD-).
B-	Blank Spike recovery is below lower control limit (B-).
B	Present in Method Blank (B).
>	Greater than.
ND	Analyte NOT DETECTED at or above the MRL (LOQ), LOD for DoD Reports, MDL for J-Flagged Analytes
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
MDL	Method Detection Limit
MRL	Method Reporting Limit
LOD	Limit of Detection
LOQ	Limit of Quantitation
DL	Detection Limit
I/V	Initial Volume
F/V	Final Volume
§	Subcontracted analysis; see attached report
1	Range result excludes concentrations of surrogates and/or internal standards eluting in that range.
2	Range result excludes concentrations of target analytes eluting in that range.
3	Range result excludes the concentration of the C9-C10 aromatic range.
Avg	Results reported as a mathematical average.
NR	No Recovery
[CALC]	Calculated Analyte
SUB	Subcontracted analysis; see attached report
RL	Reporting Limit
EDL	Estimated Detection Limit
MF	Membrane Filtration
MPN	Most Probable Number
TNTC	Too numerous to Count
CFU	Colony Forming Units

eurofins | Environment Testing ESS Laboratory

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Bridge Reconstruction Over Taunton River

ESS Laboratory Work Order: 25L0055

ESS Laboratory Certifications and Accreditations

Environmental

Rhode Island Potable and Non Potable Water: LAI00179
http://www.health.ri.gov/find/labs/analytical/ESS.pdf

Connecticut Potable and Non Potable Water, Solid and Hazardous Waste: PH-0750
http://www.ct.gov/dph/lib/dph/environmental_health/environmental_laboratories/pdf/OutofStateCommercialLaboratories.pdf

Maine Potable and Non Potable Water, and Solid and Hazardous Waste: RI00002
http://www.maine.gov/dhhs/mecdc/environmental-health/dwp/partners/labCert.shtml

Massachusetts Potable and Non Potable Water: M-RI002
http://public.dep.state.ma.us/Labcert/Labcert.aspx

New Hampshire (NELAP accredited) Potable and Non Potable Water, Solid and Hazardous Waste: 2424
http://des.nh.gov/organization/divisions/water/dwgb/nhelap/index.htm

New York (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: 11313
http://www.wadsworth.org/labcert/elap/comm.html

New Jersey (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: RI006
http://datamine2.state.nj.us/DEP_OPRA/OpraMain/pi_main?mode=pi_by_site&sort_order=PI_NAMEA&Select+a+Site:=58715

Pennsylvania: 68-01752
http://www.dep.pa.gov/Business/OtherPrograms/Labs/Pages/Laboratory-Accreditation-Program.aspx

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ANALYTICAL REPORT

PREPARED FOR

Attn: Marc Levesque
Eurofins Environment Testing Northeast LLC
185 Frances Avenue
Cranston, Rhode Island 02910

Generated 12/15/2025 9:11:18 AM

JOB DESCRIPTION

25L0055

JOB NUMBER

620-31612-1

Eurofins Rhode Island
646 Camp Ave
North Kingstown RI 02852

See page two for job notes and contact information.

my EOL

Eurofins Rhode Island

Job Notes

This report may not be reproduced except in full, and with written approval from the laboratory. The results relate only to the samples tested. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

The test results in this report relate only to the samples as received by the laboratory and will meet all requirements of the methodology, with any exceptions noted. This report shall not be reproduced except in full, without the express written approval of the laboratory. All questions should be directed to the Eurofins Environment Testing Northeast, LLC Project Manager.

Authorization

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Authorized for release by
Michael Chang, Project Manager II
Michael.Chang@et.eurofinsus.com
(774)562-0566

Client: Eurofins Environment Testing Northeast LLC
Project/Site: 25L0055

Laboratory Job ID: 620-31612-1

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Definitions/Glossary

Client: Eurofins Environment Testing Northeast LLC
Project/Site: 25L0055

Job ID: 620-31612-1

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
☼	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

MassDEP Analytical Protocol Certfication Form

Laboratory Name: Eurofins Rhode Island | Project #: 620-31612-1

Project Location: 25L0055 | RTN:

This Form provides certifications for the following data set: list Laboratory Sample ID Number(s):
620-31612-1

Matrices: ☐ Groundwater/Surface Water ☑ Soil/Sediment ☐ Drinking Water ☐ Air ☐ Other:

CAM Protocol (check all that apply below:)

8260 VOC CAM II A ☐	7470/7471 Hg CAM III B ☐	MassDEP VPH (GC/PID/FID) CAM IV A ☐	8082 PCB CAM V A ☐	9014 Total Cyanide/PAC CAM VI A ☐	6860 Perchlorate CAM VIII B ☐
8270 SVOC CAM II B ☐	7010 Metals CAM III C ☐	MassDEP VPH (GC/MS) CAM IV C ☐	8081 Pesticides CAM V B ☐	7196 Hex Cr CAM VI B ☐	MassDEP APH CAM IX A ☐
6010 Metals CAM III A ☐	6020 Metals CAM III D ☐	MassDEP EPH CAM IV B ☐	8151 Herbicides CAM V C ☑	8330 Explosives CAM VIII A ☐	TO-15 VOC CAM IX B ☐

Affirmative Responses to Questions A through F are required for "Presumptive Certainty" status

A	Were all samples received in a condition consistent with those described on the Chain-of-Custody, properly preserved (including temperature) in the field or laboratory, and prepared/analyzed within method holding times?	☑ Yes ☐ No
B	Were the analytical method(s) and all associated QC requirements specified in the selected CAM protocol(s) followed?	☑ Yes ☐ No
C	Were all required corrective actions and analytical response actions specified in the selected CAM protocol(s) implemented for all identified performance standard non-conformances?	☑ Yes ☐ No
D	Does the laboratory report comply with all the reporting requirements specified in CAM VII A, "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data"?	☑ Yes ☐ No
E	VPH, EPH, APH, and TO-15 only a. VPH, EPH, and APH Methods only: Was each method conducted without significant modification(s)? (Refer to the individual method(s) for a list of significant modifications). b. APH and TO-15 Methods only: Was the complete analyte list reported for each method?	☐ Yes ☐ No ☐ Yes ☐ No
F	Were all applicable CAM protocol QC and performance standard non-conformances identified and evaluated in a laboratory narrative (including all "No" responses to Questions A through E)?	☑ Yes ☐ No

Responses to Questions G, H and I below are required for "Presumptive Certainty" status

G	Were the reporting limits at or below all CAM reporting limits specified in the selected CAM protocol(s)?	☑ Yes ☐ No[1]

Data User Note: Data that achieve "Presumptive Certainty" status may not necessarily meet the data usability and representativeness requirements described in 310 CMR 40. 1056 (2)(k) and WSC-07-350.

H	Were **all** QC performance standards specified in the CAM protocol(s) achieved?	☐ Yes ☑ No[1]
I	Were results reported for the complete analyte list specified in the selected CAM protocol(s)?	☑ Yes ☐ No[1]

1 All negative responses must be addressed in an attached laboratory narrative.

I, the undersigned, attest under the pains and penalties of perjury that, based upon my personal inquiry of those responsible for obtaining the information, the material contained in this analytical report is, to the best of my knowledge and belief, is accurate and complete.

Signature: Michael Chang | **Position:** Project Manager II

Printed Name: Michael Chang | **Date:** 12/15/2025

Case Narrative

Client: Eurofins Environment Testing Northeast LLC
Project: 25L0055

Job ID: 620-31612-1

Job ID: 620-31612-1 — Eurofins Rhode Island

Job Narrative
620-31612-1

The analytical test results presented in this report meet all requirements of the associated regulatory program listed on the Accreditation/Certification Summary Page, unless otherwise noted. Data qualifiers and/or narrative comments are included to explain any exceptions, if applicable. Regulated compliance samples (e.g. SDWA, NPDES) must comply with associated agency requirements/permits.

- Matrix-specific batch QC (e.g., MS, MSD, SD) may not be reported when insufficient sample volume is available or when site-specific QC samples are not submitted. In such cases, a Laboratory Control Sample Duplicate (LCSD) may be analyzed to provide precision data for the batch.
- For samples analyzed using surrogate and/or isotope dilution analytes, any recoveries falling outside of established acceptance criteria are re-prepared and/or re-analyzed to confirm results, unless the deviation is due to sample dilution or otherwise explained in the case narrative.

Receipt
The sample was received on 12/5/2025 9:30 AM. Unless otherwise noted below, the sample arrived in good condition, and, where required, properly preserved and on ice. The temperature of the cooler at receipt time was 4.0°C.

Herbicides
Method 8151MCP: The continuing calibration verification (CCV) associated with batch 460-1079381 recovered outside acceptance criteria, low biased, for Dalapon. A reporting limit (RL) standard was analyzed, and the target analytes are detected. Since the associated samples were non-detect for the analyte, the data are reported.

Method 8151MCP: The continuing calibration verification (CCV) associated with batch 460-1079381 recovered above the upper control limit for Dinoseb and Dalapon. The samples associated with this CCV were non-detects for the affected analytes; therefore, the data have been reported. The associated sample is:(CCV 460-1079381/25).

Method 8151MCP: The continuing calibration verification (CCV) associated with batch 460-1079381 recovered above the upper control limit for 2,4,5-T. The samples associated with this CCV were non-detects for the affected analytes; therefore, the data have been reported. The associated sample is:(CCV 460-1079381/35).

Method 8151MCP: The continuing calibration verification (CCV) associated with batch 460-1079381 recovered above the upper control limit for Dalapon, Dicamba, Dichlorprop and Dinoseb. The samples associated with this CCV were non-detects for the affected analytes; therefore, the data have been reported. The associated sample is:(CCV 460-1079381/35).

Method 8151MCP: The continuing calibration verification (CCV) associated with batch 460-1079656 recovered outside acceptance criteria, low biased, for Dalapon. A reporting limit (RL) standard was analyzed, and the target analytes are detected. Since the associated samples were non-detect for the analyte(s), the data are reported.

Method 8151MCP: The continuing calibration verification (CCV) associated with batch 460-1079656 recovered above the upper control limit for MCPP. The samples associated with this CCV were non-detects for the affected analytes; therefore, the data have been reported. The associated sample is:(CCVRT 460-1079656/2).

Method 8151MCP: The continuing calibration verification (CCV) for Dalapon recovered outside the lower control limit on the primary column but within control limits on the secondary column. The samples associated with this CCV were non-detects for the affected analytes; therefore, the data have been reported for Dalapon on the secondary column. (CCV 460-1079656/18)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

General Chemistry
No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Detection Summary

Client: Eurofins Environment Testing Northeast LLC
Project/Site: 25L0055

Job ID: 620-31612-1

Client Sample ID: 25L0055-01

Lab Sample ID: 620-31612-1

No Detections.

This Detection Summary does not include radiochemical test results.

Client Sample Results

Client: Eurofins Environment Testing Northeast LLC
Project/Site: 25L0055

Job ID: 620-31612-1

Client Sample ID: 25L0055-01
Date Collected: 12/01/25 03:46
Date Received: 12/05/25 09:30

Lab Sample ID: 620-31612-1
Matrix: Solid
Percent Solids: 83.3

Method: SW846 8151A - Herbicides (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dicamba	ND		0.040	0.0059	mg/Kg	☼	12/10/25 19:15	12/11/25 09:57	1
2,4-D	ND		0.040	0.015	mg/Kg	☼	12/10/25 19:15	12/11/25 09:57	1
Dalapon	ND		0.040	0.013	mg/Kg	☼	12/10/25 19:15	12/11/25 09:57	1
Dinoseb	ND		0.040	0.016	mg/Kg	☼	12/10/25 19:15	12/11/25 09:57	1
2,4,5-T	ND		0.040	0.0085	mg/Kg	☼	12/10/25 19:15	12/11/25 09:57	1
Silvex (2,4,5-TP)	ND		0.040	0.0042	mg/Kg	☼	12/10/25 19:15	12/11/25 09:57	1
2,4-DB	ND		0.040	0.015	mg/Kg	☼	12/10/25 19:15	12/11/25 09:57	1
Dichlorprop	ND		0.040	0.012	mg/Kg	☼	12/10/25 19:15	12/11/25 09:57	1
MCPA	ND		4.0	2.0	mg/Kg	☼	12/10/25 19:15	12/11/25 09:57	1
MCPP	ND		7.2	6.4	mg/Kg	☼	12/10/25 19:15	12/11/25 09:57	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2,4-Dichlorophenylacetic acid	*117*		*30 - 150*	*12/10/25 19:15*	*12/11/25 09:57*	*1*

Surrogate Summary

Client: Eurofins Environment Testing Northeast LLC
Project/Site: 25L0055

Job ID: 620-31612-1

Method: 8151A - Herbicides (GC)

Matrix: Solid

Prep Type: Total/NA

		Percent Surrogate Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	DCPAA2 (30-150)							
620-31612-1	25L0055-01	117							
LCS 460-1079332/2-A	Lab Control Sample	115							

Surrogate Legend

DCPAA = 2,4-Dichlorophenylacetic acid

Method: 8151A - Herbicides (GC)

Matrix: Solid

Prep Type: Total/NA

		Percent Surrogate Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	DCPAA1 (30-150)							
LCSD 460-1079332/3-A	Lab Control Sample Dup	111							
MB 460-1079332/1-A	Method Blank	121							

Surrogate Legend

DCPAA = 2,4-Dichlorophenylacetic acid

QC Sample Results

Client: Eurofins Environment Testing Northeast LLC
Project/Site: 25L0055

Job ID: 620-31612-1

Method: 8151A - Herbicides (GC)

Lab Sample ID: MB 460-1079332/1-A
Matrix: Solid
Analysis Batch: 1079381

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 1079332

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dicamba	ND		0.033	0.0049	mg/Kg		12/09/25 19:36	12/10/25 15:31	1
2,4-D	ND		0.033	0.012	mg/Kg		12/09/25 19:36	12/10/25 15:31	1
Dalapon	ND		0.033	0.011	mg/Kg		12/09/25 19:36	12/10/25 15:31	1
Dinoseb	ND		0.033	0.014	mg/Kg		12/09/25 19:36	12/10/25 15:31	1
2,4,5-T	ND		0.033	0.0071	mg/Kg		12/09/25 19:36	12/10/25 15:31	1
Silvex (2,4,5-TP)	ND		0.033	0.0035	mg/Kg		12/09/25 19:36	12/10/25 15:31	1
2,4-DB	ND		0.033	0.012	mg/Kg		12/09/25 19:36	12/10/25 15:31	1
Dichlorprop	ND		0.033	0.0098	mg/Kg		12/09/25 19:36	12/10/25 15:31	1
MCPA	ND		3.3	1.6	mg/Kg		12/09/25 19:36	12/10/25 15:31	1
MCPP	ND		6.0	5.3	mg/Kg		12/09/25 19:36	12/10/25 15:31	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2,4-Dichlorophenylacetic acid	*121*		*30 - 150*	*12/09/25 19:36*	*12/10/25 15:31*	*1*

Lab Sample ID: LCS 460-1079332/2-A
Matrix: Solid
Analysis Batch: 1079381

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 1079332

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Dicamba	0.0833	0.0798		mg/Kg		96	40 - 140
2,4-D	0.167	0.142		mg/Kg		85	40 - 140
Dalapon	0.167	0.100		mg/Kg		60	40 - 140
Dinoseb	0.167	0.131		mg/Kg		79	42 - 140
2,4,5-T	0.0417	0.0418		mg/Kg		100	40 - 140
Silvex (2,4,5-TP)	0.0417	0.0424		mg/Kg		102	40 - 140
2,4-DB	0.167	0.121		mg/Kg		73	40 - 140
Dichlorprop	0.167	0.147		mg/Kg		88	40 - 140
MCPA	16.7	14.7		mg/Kg		88	40 - 140
MCPP	16.7	14.8		mg/Kg		89	40 - 140

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
2,4-Dichlorophenylacetic acid	*115*		*30 - 150*

Lab Sample ID: LCSD 460-1079332/3-A
Matrix: Solid
Analysis Batch: 1079381

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 1079332

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Dicamba	0.0833	0.0638		mg/Kg		77	40 - 140	22	30
2,4-D	0.167	0.111		mg/Kg		67	40 - 140	24	30
Dalapon	0.167	0.0831		mg/Kg		50	40 - 140	19	30
Dinoseb	0.167	0.106		mg/Kg		64	42 - 140	21	30
2,4,5-T	0.0417	0.0330		mg/Kg		79	40 - 140	23	30
Silvex (2,4,5-TP)	0.0417	0.0340		mg/Kg		82	40 - 140	22	30
2,4-DB	0.167	0.0921		mg/Kg		55	40 - 140	27	30
Dichlorprop	0.167	0.118		mg/Kg		71	40 - 140	22	30
MCPA	16.7	11.7		mg/Kg		70	40 - 140	23	30
MCPP	16.7	12.0		mg/Kg		72	40 - 140	21	30

QC Sample Results

Client: Eurofins Environment Testing Northeast LLC
Project/Site: 25L0055

Job ID: 620-31612-1

Method: 8151A - Herbicides (GC) (Continued)

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
2,4-Dichlorophenylacetic acid	111		30 - 150

QC Association Summary

Client: Eurofins Environment Testing Northeast LLC
Job ID: 620-31612-1
Project/Site: 25L0055

GC Semi VOA

Prep Batch: 1079332

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
620-31612-1	25L0055-01	Total/NA	Solid	8151A	
MB 460-1079332/1-A	Method Blank	Total/NA	Solid	8151A	
LCS 460-1079332/2-A	Lab Control Sample	Total/NA	Solid	8151A	
LCSD 460-1079332/3-A	Lab Control Sample Dup	Total/NA	Solid	8151A	

Analysis Batch: 1079381

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 460-1079332/1-A	Method Blank	Total/NA	Solid	8151A	1079332
LCS 460-1079332/2-A	Lab Control Sample	Total/NA	Solid	8151A	1079332
LCSD 460-1079332/3-A	Lab Control Sample Dup	Total/NA	Solid	8151A	1079332

Analysis Batch: 1079656

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
620-31612-1	25L0055-01	Total/NA	Solid	8151A	1079332

General Chemistry

Analysis Batch: 1079536

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
620-31612-1	25L0055-01	Total/NA	Solid	Moisture	
620-31612-1 DU	25L0055-01	Total/NA	Solid	Moisture	

Lab Chronicle

Client: Eurofins Environment Testing Northeast LLC
Project/Site: 25L0055

Job ID: 620-31612-1

Client Sample ID: 25L0055-01
Date Collected: 12/01/25 03:46
Date Received: 12/05/25 09:30

Lab Sample ID: 620-31612-1
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	Moisture		1	1079536	CJC	EET EDI	12/10/25 16:15

Client Sample ID: 25L0055-01
Date Collected: 12/01/25 03:46
Date Received: 12/05/25 09:30

Lab Sample ID: 620-31612-1
Matrix: Solid
Percent Solids: 83.3

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	8151A			1079332	JMS	EET EDI	12/10/25 19:15
Total/NA	Analysis	8151A		1	1079656	OXG	EET EDI	12/11/25 09:57

Laboratory References:

EET EDI = Eurofins Edison, 777 New Durham Road, Edison, NJ 08817, TEL (732)549-3900

Accreditation/Certification Summary

Client: Eurofins Environment Testing Northeast LLC
Job ID: 620-31612-1
Project/Site: 25L0055

Laboratory: Eurofins Edison

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Connecticut	State	PH-0818	09-30-26
DE Haz. Subst. Cleanup Act (HSCA)	State	N/A	01-03-26
Georgia	State	12028 (NJ)	06-30-26
Illinois	NELAP	2000942025-2	04-30-26
Massachusetts	State	M-NJ312	06-30-26
New Jersey	NELAP	12028	06-30-26
New York	NELAP	11452	04-01-26
Pennsylvania	NELAP	68-00522	02-28-26
Rhode Island	State	LAO00376	12-23-25
USDA	US Federal Programs	525-24-149-77606	05-21-27

Method Summary

Client: Eurofins Environment Testing Northeast LLC
Project/Site: 25L0055

Job ID: 620-31612-1

Method	Method Description	Protocol	Laboratory
8151A	Herbicides (GC)	SW846	EET EDI
Moisture	Percent Moisture	EPA	EET EDI
8151A	Extraction (Herbicides)	SW846	EET EDI

Protocol References:

EPA = US Environmental Protection Agency

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

EET EDI = Eurofins Edison, 777 New Durham Road, Edison, NJ 08817, TEL (732)549-3900

Sample Summary

Client: Eurofins Environment Testing Northeast LLC
Project/Site: 25L0055

Job ID: 620-31612-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Sample Origin
620-31612-1	25L0055-01	Solid	12/01/25 03:46	12/05/25 09:30	Rhode Island

eurofins

31612

Subcontract Order

25L0055

Sending Laboratory

Eurofins Providence
185 Frances Avenue
Cranston, RI 02910
Phone. (401) 461-7181

Receiving Laboratory

Eurofins New England
646 Camp Avenue
North Kingstown, RI 02852
Phone: (413) 789-9018

☐ **These samples require MCL exceedance reporting**

Project Notes

Project Name: 25L0055
Project Location: MA
Project PO Number: 10887
Due Date: Standard
Send Report To: smorrell@thielsch.com; MDean@thielsch.com; ESSProjectManagement@thielsch com

MA REM - 401WQ 20x on Metals

Report to MDL & MyLG

Sample ID: 25L0055-01
Sample Matrix: Soil
Sampled: 12/01/25 03:46
Sample Type: Composite
Sampled By: Client

Container - Preservation: 1 x Other
Analysis Herbicides
Analysis Comments: N/A
Hold Time Expires 12/15/2025

-1

620-31612 COC

Released By	Date	Received By	Date
M	12/5/25 0824		8:30
	12/5/25 8:26		12/5/25 0930

3.8 +0.2 4.0 #6

Eurofins Rhode Island
646 Camp Ave
North Kingstown, RI 02852
Phone: 413-789-9018 Fax: 413-506-3830

Chain of Custody Record

eurofins | Environment Testing

Client Information (Sub Contract Lab)	Sampler: N/A	Lab PM: Chang, Michael T	Carrier Tracking No(s): N/A	COC No: 620-26495.1
Client Contact: Shipping/Receiving	Phone: N/A	E-Mail: Michael.Chang@et.eurofinsus.com	State of Origin: Rhode Island	Page: Page 1 of 1
Company: Eurofins Environment Testing Northeast L		Accreditations Required (See note): State Massachusetts		Job #: 620-31612-1
Address: 777 New Durham Road,	Due Date Requested: 12/11/2025			
City: Edison	TAT Requested (days): N/A			
State, Zip: NJ 08817				
Phone: 732-549-3900(Tel) 732-549-3679(Fax)	PO #: N/A			
Email: N/A	WO #: N/A			
Project Name: 25L0055	Project #: 62002228			
Site: N/A	SSOW#: N/A			

Analysis Requested

Preservation Codes:

Other: N/A

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	8151MCP/8151A_SP	Moisture	Total Number of containers	Special Instructions/Note:
			Preservation Code:							
25L0055-01 (620-31612-1)	12/1/25	03:46 Eastern	G	Solid			X	X	1	

Note: Since laboratory accreditations are subject to change, Eurofins Environment Testing Northeast, LLC places the ownership of method, analyte & accreditation compliance upon our subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/tests/matrix being analyzed, the samples must be shipped back to the Eurofins Environment Testing Northeast, LLC laboratory or other instructions will be provided. Any changes to accreditation status should be brought to Eurofins Environment Testing Northeast, LLC attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said compliance to Eurofins Environment Testing Northeast, LLC.

Possible Hazard Identification	*Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)*
Unconfirmed	☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For* _____ *Months*
Deliverable Requested: I II III, IV Other (specify) Primary Deliverable Rank: 2	Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
					12/5/25 2330	ETA
	Relinquished by:	Date/Time: 12/5/25 2330	Company ETA	Received by:	Date/Time: 12/5 2330	Company ETA
	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: △ Yes △ No	Custody Seal No.	Cooler Temperature(s) °C and Other Remarks: 18/13

Ver 10/10/2024

Proposal No. 613642 - 136413

Login Sample Receipt Checklist

Client: Eurofins Environment Testing Northeast LLC

Job Number: 620-31612-1

Login Number: 31612
List Number: 1
Creator: Scott, Krishnan F

List Source: Eurofins Rhode Island

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Login Sample Receipt Checklist

Client: Eurofins Environment Testing Northeast LLC

Job Number: 620-31612-1

Login Number: 31612
List Number: 2
Creator: Armbruster, Chris

List Source: Eurofins Edison
List Creation: 12/10/25 12:55 PM

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	1.8/1.3°C IR9
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Proposal No. 613642 - 136413

ESS Laboratory Sample and Cooler Receipt Checklist

Client: Beta Engineering - ML/TB

Shipped/Delivered Via: Client

ESS Project ID: 25L0055
Date Received: 12/1/2025
Project Due Date: 12/8/2025
Days for Project: 5 Day

1. Air bill manifest present? No
   Air No.: NA
2. Were custody seals present? No
3. Is radiation count <100 CPM? Yes
4. Is a Cooler Present? Yes
   Temp (°C): 10 Iced with: Ice
5. Was COC signed and dated by client? Yes
6. Does COC match bottles? Yes
7. Is COC complete and correct? Yes
8. Were samples received intact? Yes
9. **Were labs informed about short holds & rushes?** (Yes) / No / NA
10. Were any analyses received outside of hold time? Yes / (No)

11. Any Subcontracting needed? (Yes) / No
    ESS Sample IDs: (illegible)
    Analysis: (illegible)
    TAT: STD
12. Were VOAs received? (Yes) / No
    a. Air bubbles in aqueous VOAs? Yes / (No)
    b. Does methanol cover soil completely? (Yes) / No / NA
13. Are the samples properly preserved? (Yes) / No
    a. If metals preserved upon receipt: Date: _____ Time: _____ By/Acid Lot#: _____
    b. If dissolved metals are requested, are they: Field Filtered / To Be Lab Filtered
    c. Low Level VOA vials frozen: Date: 12/1/25 Time: 1848 By: AD

Sample Receiving Notes:

14. Was there a need to contact Project Manager? Yes / (No)
    a. Was there a need to contact the client? Yes / No
    Who was contacted? _____ Date: _____ Time: _____ By: _____

Resolution:

Sample Number	Container ID	Proper Container	Air Bubbles Present	Sufficient Volume	Container Type	Preservative	Record pH (Cyanide and 608 Pesticides)
1	732065	Yes	N/A	Yes	4 oz. Jar	NP	
1	732066	Yes	N/A	Yes	4 oz. Jar	NP	
1	732067	Yes	N/A	Yes	4 oz. Jar	NP	
1	732068	Yes	N/A	Yes	4 oz. Jar	NP	
1	732069	Yes	N/A	Yes	4 oz. Jar	NP	
1	732070	Yes	N/A	Yes	4 oz. Jar	NP	
1	732071	Yes	N/A	Yes	4 oz. Jar	NP	
1	732072	Yes	N/A	Yes	4 oz. Jar	NP	
1	732073	Yes	N/A	Yes	4 oz. Jar	NP	
2	732074	Yes	N/A	Yes	4 oz. Jar	NP	
2	732075	Yes	N/A	Yes	4 oz. Jar	NP	
2	732076	Yes	N/A	Yes	VOA Vial	MeOH	
2	732078	Yes	N/A	Yes	VOA Vial	DI Water	
2	732079	Yes	N/A	Yes	VOA Vial	DI Water	
3	732077	Yes	N/A	Yes	VOA Vial	MeOH	
3	732080	Yes	N/A	Yes	VOA Vial	DI Water	
3	732081	Yes	N/A	Yes	VOA Vial	DI Water	

2nd Review
Were all containers scanned into storage/lab? Initials: _____

Control #: 10.0035_Rev0

ESS Laboratory Sample and Cooler Receipt Checklist

Client: Beta Engineering - ML/TB

ESS Project ID: 25L0055

Date Received: 12/1/2025

Are barcode labels on correct containers?	Yes / No
Are all Flashpoint stickers attached/container ID # circled?	Yes / No / NA
Are all Hex Chrome stickers attached?	Yes / No / NA
Are all QC stickers attached?	Yes / No / NA
Are VOA stickers attached if bubbles noted?	Yes / No / NA

Completed By: _____ Date & Time: 12/1/25 17:46

Reviewed By: AO Date & Time: 12/1/25 18:48

ESS Laboratory
Analytical Balance BAL Laboratory
185 Frances Avenue, Cranston, RI 02910
Phone: 401-461-7181
www.esslaboratory.com

Work Order # 2510055 Page 1 of 1

Turn Time (Days): ☑ Standard ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐ SameDay
Regulatory State: MA Criteria: 401 WQC
PROJECT TYPE: ☐ CT RCP ☐ MA MCP ☐ RGP ☐ Permit ☑ 401 WQ ☐ Drinking Water

PAYMENT: Amount $ ____ Check # ____ V MC D AmEx Cash

ELECTRONIC DELIVERABLES (Final Reports are PDF): ☐ EQuIS ☐ State Upload ☐ Enviro Data ☐ CLP-Like Package ☐ Other (Specify) →

CLIENT INFORMATION

Client: BETA Group
Address: 701 George Washington Highway, Lincoln, RI, 02865
Phone: 207-513-9917
Persons Authorized to Receive Data: Mlambert@BETA-Inc.com; JNiro@BETA-Inc.com

PROJECT INFORMATION

Project Name: Bridge Reconstruction Over Taunton River
Project Location: Old Colony Avenue, Taunton, MA
Project Number: 10887
Project Manager: Jonathan Niro
Bill to: BETA
PO#:
Quote#:

Client acknowledges that sampling is compliant with all EPA / State regulatory programs.

REQUESTED ANALYSES

Laboratory ID	Collection Date	Collection Time	Sample Type	Sample Matrix	Sample ID	VOC (Low level)	Total metals	PAH	PCB (NoDA)	EPH	Total SVOC (SIM)	TPH	Dissolved metals	Total cyanide	Hexavalent chromium	Ignitability	Reactive sulfide	Reactive cyanide	Pesticides (TCLP)	Herbicides	Total Number of Bottles
1	12/1/25	3:46	Composite	Sed/Soil	CS1		+	+	+	+	+	+	+	+	+	+	+	+	+	+	
2	12/1/25	12:14	Grab	Sed/Soil	GS4	X	X			X											
3	12/1/25	~~12:16~~	Grab	Sed/Soil	GS1	X				X											
						X															

Container Type:	AC-Air Cassette	AG-Amber Glass	B-BOD Bottle	C-Cubitainer	J-Jar	O-Other	P-Poly	S-Sterile	V-Vial		V	J	J	J	J	J	J	J	J	J	J	J	J	J	J	
Container Volume:	1-100 mL	2-2.5 gal	3-250 mL	4-300 mL	5-500 mL	6-1L	7-VOA	8-2 oz	9-4 oz	10-8 oz	11-Other*	11	6	6	4	4	4	4	9	9	9	9	9	4	4	1	
Preservation Code:	1-Non Preserved	2-HCl	3-H2SO4	4-HNO3	5-NaOH	6-Methanol	7-Na2S2O3	8-ZnAce, NaOH	9-NH4Cl	10-DI H2O	11-Other*	10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Number of Bottles per Sample:												3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	

Shipping Conditions (circle one): Ice / Iced / Ambient
Cooler Temperature (°C): 10.0 IKI
Client approval required for temperature >6°C
☐ Approved by Client (initials/date →)

Sampled by :

Comments: * Please specify "Other" preservative and containers types in this space

Total ~~metals~~ metals (~~As~~ Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Nickel and Zinc) Run TCLP Analysis if metals exceed 20 times rule.

Chain needs to be filled out neatly and completely for on time delivery.

All samples submitted are subject to ESS Laboratory's payment terms and conditions.

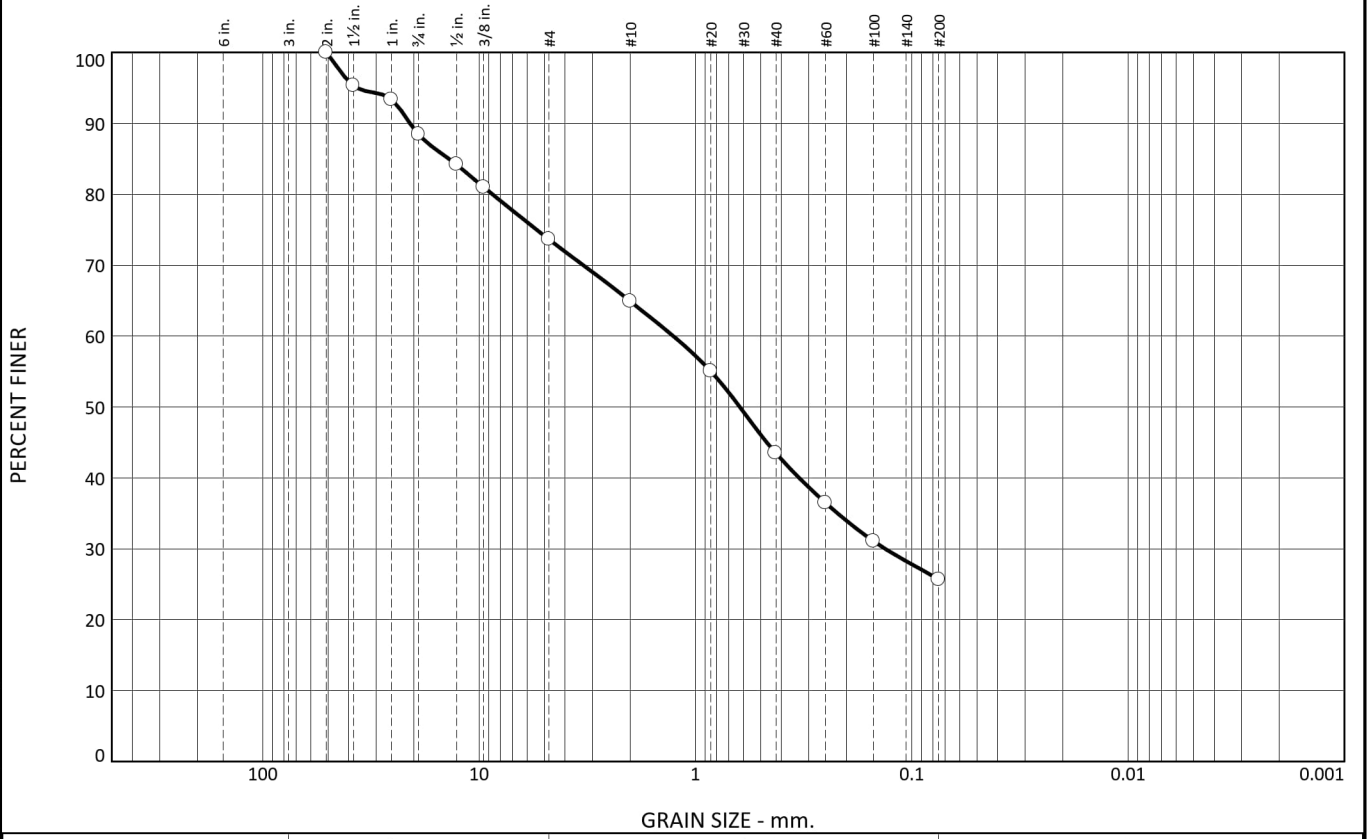
Dissolved Filtration: ☐ Laboratory Filter ☐ Field Filter

Relinquished by (Signature)	Date	Time	Received By (Signature)	Relinquished by (Signature)	Date	Time	Received by (Signature)
[signature]	12/1/25	5:07	[signature]		12/1/25	1707	
Relinquished by (Signature)	**Date**	**Time**	**Received By (Signature)**	**Relinquished by (Signature)**	**Date**	**Time**	**Received by (Signature)**

* General chemistry in this case refers to Corrosivity, Ignitability, Reactive sulfide/cyanide, Pesticides,

These results are for the exclusive use of the client for whom they were obtained. This report only relates to items inspect and/or tested. No warranty, expressed or implied, is made.

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	11.6	14.8	8.7	21.4	17.8	25.7	

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2"	100.0		
1 1/2"	95.3		
1"	93.4		
3/4"	88.4		
1/2"	84.2		
3/8"	81.0		
#4	73.6		
#10	64.9		
#20	55.1		
#40	43.5		
#60	36.5		
#100	31.1		
#200	25.7		

* (no specification provided)

Soil Description

Grey silty sand with gravel

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 20.8817 D_{85}= 13.7665 D_{60}= 1.2641
D_{50}= 0.6231 D_{30}= 0.1325 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

Source of Sample: Sediment/Soil **Depth:** 6'
Sample Number: CS1 **Date:** 12.08.25

Thielsch Engineering Inc.

Cranston, RI

Client: BETA Group
Project: Old Colony Ave Bridge Reconstruction
Taunton, MA
Project No: 10887 **Figure** 25-S-4470

Tested By: RKO/TG **Checked By:** Andrew Vanasse

DOCUMENT B00420

PROPOSAL

RAYNHAM-TAUNTON

For: **Bridge Replacement, R-02-003=T-01-004 (3M4), South Street East over the Taunton River**

COMMONWEALTH OF MASSACHUSETTS

LOCATION

The work referred to herein is in the Town of RAYNHAM and City of TAUNTON in Bristol County, in the Commonwealth of Massachusetts, and is shown by the locus map (Document 00331) in the Proposal Pamphlet, the work locations extend as follows:

Old Colony Avenue (Taunton)	**South Street East (Raynham)**
Beginning – Station 1+10.00 +/-	**Taunton**
Bridge # R-02-003 = T-01-004	
Ending –Station 8+51.00 +/-	**Raynham**

The contract prices shall include the furnishing of all materials (except as otherwise herein specified), the performing of all the labor requisite or proper, the providing of all necessary machinery, tools, apparatus and other means of construction, the doing of all the abovementioned work in the manner set forth, described and shown in the specifications and on the drawings for the work, and in the form of contract, and the completion thereof within **1,310 CALENDAR DAYS** upon receipt of a Notice to Proceed, except that if the completion date falls between December 1 and March 15 then the same number of days beyond December 1st will be extended after March 15th.

The Work of this project is described by the following Items and quantities.

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Project # 613642	Contract # 136413			
Location : RAYNHAM - TAUNTON				
Description : Bridge Replacement, R-02-003=T-01-004 (3M4), South Street East over the Taunton River				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
101.	0.2	CLEARING AND GRUBBING AT _____ PER ACRE		
102.2	1	TREE TRIMMING AT _____ LUMP SUM		
102.3	20	HERBICIDE TREATMENT OF INVASIVE PLANTS AT _____ PER HOUR		
102.33	10	INVASIVE PLANT MANAGEMENT STRATEGY AT _____ PER HOUR		
102.511	2	TREE PROTECTION - ARMORING AND PRUNING AT _____ EACH		
102.521	50	TREE AND PLANT PROTECTION FENCE AT _____ PER FOOT		
105.	1	STUMP REMOVED AT _____ EACH		
106.29	340	GRAFFITI REMOVAL BY APPLICATION OF COATING AT _____ PER SQUARE FOOT		
107.855	30	PRESSURE INJECTION OF CRACKS AT _____ PER FOOT		

Project # 613642	Contract # 136413			
Location : RAYNHAM - TAUNTON				
Description : Bridge Replacement, R-02-003=T-01-004 (3M4), South Street East over the Taunton River				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
114.2	1	DEMOLITION OF SUPERSTRUCTURE OF BRIDGE NO. R-02-003=T-01-004 (3M4) AT _____ LUMP SUM		
120.1	700	UNCLASSIFIED EXCAVATION AT _____ PER CUBIC YARD		
123.	350	MUCK EXCAVATION AT _____ PER CUBIC YARD		
127.1	80	REINFORCED CONCRETE EXCAVATION AT _____ PER CUBIC YARD		
127.122	30	REINFORCED CONCRETE EXCAVATION FOR REPAIRS AT _____ PER CUBIC FOOT		
140.	380	BRIDGE EXCAVATION AT _____ PER CUBIC YARD		
141.	40	CLASS A TRENCH EXCAVATION AT _____ PER CUBIC YARD		
141.1	30	TEST PIT FOR EXPLORATION AT _____ PER CUBIC YARD		
142.	10	CLASS B TRENCH EXCAVATION AT _____ PER CUBIC YARD		

Project # 613642	Contract # 136413			
Location : RAYNHAM - TAUNTON				
Description : Bridge Replacement, R-02-003=T-01-004 (3M4), South Street East over the Taunton River				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
143.	2,090	CHANNEL EXCAVATION AT _____ PER CUBIC YARD		
144.	5	CLASS B ROCK EXCAVATION AT _____ PER CUBIC YARD		
146.	2	DRAINAGE STRUCTURE REMOVED AT _____ EACH		
151.	420	GRAVEL BORROW AT _____ PER CUBIC YARD		
151.1	10	GRAVEL BORROW FOR BRIDGE FOUNDATION AT _____ PER CUBIC YARD		
151.2	130	GRAVEL BORROW FOR BACKFILLING STRUCTURES AND PIPES AT _____ PER CUBIC YARD		
151.9	880	STREAMBED RESTORATION AT _____ PER CUBIC YARD		
156.	670	CRUSHED STONE AT _____ PER TON		
163.1	1	DEFORMATION AND VIBRATION MONITORING AT _____ LUMP SUM		

Project # 613642	Contract # 136413			
Location : RAYNHAM - TAUNTON				
Description : Bridge Replacement, R-02-003=T-01-004 (3M4), South Street East over the Taunton River				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
164.	6	PRE- AND POST-CONSTRUCTION CONDITION SURVEYS AT _____ EACH		
170.	1,500	FINE GRADING AND COMPACTING - SUBGRADE AREA AT _____ PER SQUARE YARD		
180.01	1	ENVIRONMENTAL HEALTH AND SAFETY PROGRAM AT _____ LUMP SUM		
180.02	10	PERSONAL PROTECTION LEVEL C UPGRADE AT _____ PER HOUR		
180.03	60	LICENSED SITE PROFESSIONAL SERVICES AT _____ PER HOUR		
181.01	1	PHASE II SAMPLING AND ANALYSIS PLAN AT _____ LUMP SUM		
181.11	1,930	DISPOSAL OF UNREGULATED SOIL AT _____ PER TON		
181.12	260	DISPOSAL OF REGULATED SOIL - IN-STATE FACILITY AT _____ PER TON		
181.13	260	DISPOSAL OF REGULATED SOIL - OUT-OF-STATE FACILITY AT _____ PER TON		

Project # 613642	Contract # 136413			
Location : RAYNHAM - TAUNTON				
Description : Bridge Replacement, R-02-003=T-01-004 (3M4), South Street East over the Taunton River				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
181.14	130	DISPOSAL OF HAZARDOUS WASTE AT _____ PER TON		
182.1	1	INSPECTION AND TESTING FOR ASBESTOS AT _____ LUMP SUM		
182.2	30	REMOVAL OF ASBESTOS AT _____ PER FOOT		
184.1	1	DISPOSAL OF TREATED WOOD PRODUCTS AT _____ PER TON		
201.	8	CATCH BASIN AT _____ EACH		
202.	2	MANHOLE AT _____ EACH		
202.15	1	MANHOLE - 5 FOOT DIAMETER AT _____ EACH		
204.11	1	GUTTER INLET - SPECIAL AT _____ EACH		
210.02	1	SANITARY SEWER MANHOLE REMOVED AT _____ EACH		

Project # 613642	Contract # 136413			
Location : RAYNHAM - TAUNTON				
Description : Bridge Replacement, R-02-003=T-01-004 (3M4), South Street East over the Taunton River				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
220.	17	DRAINAGE STRUCTURE ADJUSTED AT _____ EACH		
220.2	10	DRAINAGE STRUCTURE REBUILT AT _____ PER FOOT		
220.5	1	DRAINAGE STRUCTURE REMODELED AT _____ EACH		
222.3	13	FRAME AND GRATE (OR COVER) MUNICIPAL STANDARD AT _____ EACH		
223.2	4	FRAME AND GRATE (OR COVER) REMOVED AND DISCARDED AT _____ EACH		
227.3	34	REMOVAL OF DRAINAGE STRUCTURE SEDIMENT AT _____ PER CUBIC YARD		
227.31	100	REMOVAL OF DRAINAGE PIPE SEDIMENT AT _____ PER FOOT		
227.4	5	MASONRY PLUG AT _____ PER SQUARE FOOT		
238.10	5	10 INCH DUCTILE IRON PIPE AT _____ PER FOOT		

Project # 613642	Contract # 136413			
Location : RAYNHAM - TAUNTON				
Description : Bridge Replacement, R-02-003=T-01-004 (3M4), South Street East over the Taunton River				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
238.18	30	18 INCH DUCTILE IRON PIPE AT _____ PER FOOT		
241.15	5	15 INCH REINFORCED CONCRETE PIPE CLASS III AT _____ PER FOOT		
241.18	15	18 INCH REINFORCED CONCRETE PIPE CLASS III AT _____ PER FOOT		
243.12	170	12 INCH REINFORCED CONCRETE PIPE CLASS IV AT _____ PER FOOT		
258.	10	STONE FOR PIPE ENDS AT _____ PER SQUARE YARD		
269.08	45	8 INCH SLOT-PERFORATED CORRUGATED PLASTIC PIPE (SUBDRAIN) AT _____ PER FOOT		
271.1	60	DRAINAGE PIPE REMOVED AND DISCARDED AT _____ PER FOOT		
302.041	200	4 INCH DUCTILE IRON SEWER PIPE (RUBBER GASKET) AT _____ PER FOOT		
302.06	10	6 INCH DUCTILE IRON WATER PIPE (RUBBER GASKET) AT _____ PER FOOT		

Project # 613642	Contract # 136413			
Location : RAYNHAM - TAUNTON				
Description : Bridge Replacement, R-02-003=T-01-004 (3M4), South Street East over the Taunton River				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
309.	700	DUCTILE IRON FITTINGS FOR WATER PIPE AT _____ PER POUND		
336.1	20	1 INCH PLASTIC WATER PIPE AT _____ PER FOOT		
349.04	2	4 INCH GATE VALVE AT _____ EACH		
350.06	1	6 INCH GATE AND GATE BOX AT _____ EACH		
372.02	120	2 INCH SEWER PIPE INSULATION AT _____ PER FOOT		
376.1	1	HYDRANT - EXCLUDING COST OF HYDRANT AT _____ EACH		
376.3	1	HYDRANT - REMOVED AND STACKED AT _____ EACH		
390.01	100	IRRIGATION SYSTEM REMOVED AND RESET AT _____ PER FOOT		
402.1	170	DENSE GRADED CRUSHED STONE FOR SUB-BASE AT _____ PER TON		

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ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
402.13	310	PAVEMENT MILLING MULCH FOR SHOULDERS AT _____ PER FOOT		
415.2	1,400	PAVEMENT FINE MILLING AT _____ PER SQUARE YARD		
431.	110	HIGH EARLY STRENGTH CEMENT CONCRETE BASE COURSE AT _____ PER SQUARE YARD		
443.	10	WATER FOR ROADWAY DUST CONTROL AT _____ PER 1000 GALLONS		
450.23	250	SUPERPAVE SURFACE COURSE - 12.5 (SSC - 12.5) AT _____ PER TON		
450.32	200	SUPERPAVE INTERMEDIATE COURSE - 19.0 (SIC - 19.0) AT _____ PER TON		
450.42	200	SUPERPAVE BASE COURSE - 37.5 (SBC - 37.5) AT _____ PER TON		
450.601	26	SUPERPAVE BRIDGE SURFACE COURSE - 9.5 POLYMER (SSC-B - 9.5 - P) AT _____ PER TON		
450.701	26	SUPERPAVE BRIDGE PROTECTIVE COURSE - 9.5 POLYMER (SPC-B - 9.5 - P) AT _____ PER TON		

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ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
451.	20	HMA FOR PATCHING AT _____ PER TON		
452.	200	ASPHALT EMULSION FOR TACK COAT AT _____ PER GALLON		
453.	1,700	HMA JOINT ADHESIVE AT _____ PER FOOT		
472.	32	TEMPORARY ASPHALT PATCHING AT _____ PER TON		
482.5	320	SAWCUTTING ASPHALT PAVEMENT FOR BOX WIDENING AT _____ PER FOOT		
504.2	4	GRANITE CURB TYPE VA4 - SPLAYED END AT _____ EACH		
504.3	50	GRANITE CURB TYPE VA4 - SLOPED AT _____ PER FOOT		
506.	550	GRANITE CURB TYPE VB - STRAIGHT AT _____ PER FOOT		
506.1	50	GRANITE CURB TYPE VB - CURVED AT _____ PER FOOT		

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ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
509.	30	GRANITE TRANSITION CURB FOR PEDESTRIAN CURB RAMPS - STRAIGHT AT _____ PER FOOT		
509.1	40	GRANITE TRANSITION CURB FOR PEDESTRIAN CURB RAMPS - CURVED AT _____ PER FOOT		
514.	4	GRANITE CURB INLET - STRAIGHT AT _____ EACH		
580.	20	CURB REMOVED AND RESET AT _____ PER FOOT		
594.	580	CURB REMOVED AND DISCARDED AT _____ PER FOOT		
620.13	80	GUARDRAIL, TL-3 (SINGLE FACED) AT _____ PER FOOT		
620.131	60	GUARDRAIL, DEEP POST (SINGLE FACED) AT _____ PER FOOT		
627.1	3	TRAILING ANCHORAGE AT _____ EACH		
627.83	2	GUARDRAIL TANGENT END TREATMENT, TL-3 AT _____ EACH		

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ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
628.24	4	TRANSITION TO BRIDGE RAIL AT _____ EACH		
630.2	305	HIGHWAY GUARD REMOVED AND DISCARDED AT _____ PER FOOT		
657.	200	TEMPORARY FENCE AT _____ PER FOOT		
669.	65	FENCE REMOVED AND STACKED AT _____ PER FOOT		
697.1	19	SILT SACK AT _____ EACH		
698.1	1,164	GEOTEXTILE FABRIC FOR STABILIZATION AT _____ PER SQUARE YARD		
698.4	90	GEOTEXTILE FABRIC FOR PERMANENT EROSION CONTROL AT _____ PER SQUARE YARD		
701.	310	CEMENT CONCRETE SIDEWALK AT _____ PER SQUARE YARD		
701.1	60	CEMENT CONCRETE SIDEWALK AT DRIVEWAYS AT _____ PER SQUARE YARD		

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ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
701.2	60	CEMENT CONCRETE PEDESTRIAN CURB RAMP AT _____ PER SQUARE YARD		
702.	40	HOT MIX ASPHALT SIDEWALK OR DRIVEWAY AT _____ PER TON		
722.2	1	SCHEDULE OF OPERATIONS (TYPE B) - FIXED PRICE $43,500 AT Forty Three Thousand Five Hundred Dollars LUMP SUM	$43,500.00	$43,500.00
740.	44	ENGINEER'S FIELD OFFICE AND EQUIPMENT (TYPE A) AT _____ PER MONTH		
748.	1	MOBILIZATION AT _____ LUMP SUM		
751.	120	LOAM FOR ROADSIDES AT _____ PER CUBIC YARD		
751.765	80	COMPOST AND SEED OVER MODIFIED ROCKFILL AT _____ PER CUBIC YARD		
756.	1	NPDES STORMWATER POLLUTION PREVENTION PLAN AT _____ LUMP SUM		
765.	380	SEEDING AT _____ PER SQUARE YARD		

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ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
765.442	5	ROADSIDE RIVERBANK MIX AT _____ PER POUND		
765.635	600	NATIVE SEEDING AND ESTABLISHMENT AT _____ PER SQUARE YARD		
767.121	1,100	SEDIMENT CONTROL BARRIER AT _____ PER FOOT		
767.6	75	AGED PINE BARK MULCH AT _____ PER CUBIC YARD		
769.	360	PAVEMENT MILLING MULCH UNDER GUARD RAIL AT _____ PER FOOT		
796.1	45	LIVE CUTTINGS AT _____ EACH		
832.	40	WARNING-REGULATORY AND ROUTE MARKER - ALUMINUM PANEL (TYPE A) AT _____ PER SQUARE FOOT		
847.1	11	SIGN SUP (N/GUIDE)+RTE MKR W/1 BRKWAY POST ASSEMBLY - STEEL AT _____ EACH		
850.41	40	ROADWAY FLAGGER AT _____ PER HOUR		

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ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
852.	500	SAFETY SIGNING FOR TRAFFIC MANAGEMENT AT _____ PER SQUARE FOOT		
853.1	10	PORTABLE BREAKAWAY BARRICADE TYPE III AT _____ EACH		
853.2	60	TEMPORARY BARRIER (TL-2) AT _____ PER FOOT		
853.21	30	TEMPORARY BARRIER REMOVED AND RESET AT _____ PER FOOT		
853.403	2,000	TRUCK MOUNTED ATTENUATOR AT _____ PER DAY		
854.016	2,000	TEMPORARY PAVING MARKINGS - 6 INCH (PAINTED) AT _____ PER FOOT		
854.036	200	TEMPORARY PAVING MARKINGS - 6 INCH (TAPE) AT _____ PER FOOT		
856.12	4,800	PORTABLE CHANGEABLE MESSAGE SIGN AT _____ PER DAY		
859.	14,400	REFLECTORIZED DRUM AT _____ PER DAY		

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ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
864.04	75	PAVEMENT ARROWS AND LEGENDS REFLECTORIZED WHITE (THERMOPLASTIC) AT _____ PER SQUARE FOOT		
866.106	1,100	6 INCH REFLECTORIZED WHITE LINE (THERMOPLASTIC) AT _____ PER FOOT		
866.112	410	12 INCH REFLECTORIZED WHITE LINE (THERMOPLASTIC) AT _____ PER FOOT		
867.106	1,350	6 INCH REFLECTORIZED YELLOW LINE (THERMOPLASTIC) AT _____ PER FOOT		
874.	4	STREET NAME SIGN AT _____ EACH		
874.45	4	MISCELLANEOUS SIGNS REMOVED AND RESET AT _____ EACH		
874.51	5	MISCELLANEOUS SIGNS REMOVED AND DISCARDED AT _____ EACH		
874.7	1	MISCELLANEOUS SIGNS REMOVED AND STACKED AT _____ EACH		
901.	2	4000 PSI, 1.5 INCH, 565 CEMENT CONCRETE AT _____ PER CUBIC YARD		

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903.	5	3000 PSI, 1.5 INCH, 470 CEMENT CONCRETE AT _____ PER CUBIC YARD		
905.2	1.5	5000 PSI, 3/8 INCH, 710 HP CEMENT CONCRETE AT _____ PER CUBIC YARD		
909.2	240	CEMENTITIOUS MORTAR FOR PATCHING AT _____ PER SQUARE FOOT		
910.1	135	STEEL REINFORCEMENT FOR STRUCTURES - EPOXY COATED AT _____ PER POUND		
912.	324	DRILLING AND GROUTING DOWELS AT _____ EACH		
912.01	71	DRILLING AND ADHESIVE ANCHORING DOWELS AT _____ EACH		
950.1	1	TEMPORARY SHORING AT _____ LUMP SUM		
970.	80	DAMP-PROOFING AT _____ PER SQUARE FOOT		
983.	1,530	DUMPED RIPRAP AT _____ PER TON		

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986.	100	MODIFIED ROCKFILL AT _____ PER TON		
991.1	1	CONTROL OF WATER - STRUCTURE NO. R-02-003=T-01-004 (3M4) AT _____ LUMP SUM		
994.01	1	TEMPORARY PROTECTIVE SHIELDING BRIDGE NO. R-02-003=T-01-004 (3M4) AT _____ LUMP SUM		
995.	1	BRIDGE SUPERSTRUCTURE, BRIDGE NO.R-02-003=T-01-004 (3M4) AT _____ LUMP SUM		
997.	125	EXPANDED POLYSTYRENE (EPS) GEOFOAM AT _____ PER CUBIC YARD		
997.1	1,470	GASOLINE RESISTANT GEOMEMBRANE FOR EPS AT _____ PER SQUARE FOOT		
Total Qty:	54,868.7			