CS

COMMONWEALTH OF MASSACHUSETTS



CONTRACT DOCUMENTS AND SPECIAL PROVISIONS

PROPOSAL NO.	612159-136484
P.V. =	$33,315,000.00
PLANS	YES

FOR

Federal Aid Project No. HIP(NGB)/FHG(BIP2)-003S(915)

Bridge Replacement, B-10-001, Route 10 over Fall River and Deck Replacement, B-10-018, Route 10 over I-91

in the Town of

BERNARDSTON

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

This Proposal to be opened and read: **TUESDAY, OCTOBER 6, 2026 at 2:00 P.M.**

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NOTICE TO CONTRACTORS

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

TUESDAY, OCTOBER 6, 2026 at 2:00 P.M. **
BERNARDSTON
Federal Aid Project No. HIP(NGB)/FHG(BIP2)-003S(915)
Bridge Replacement, B-10-001, Route 10 over Fall River
and Deck Replacement, B-10-018, Route 10 over I-91
****Date Subject to Change**

PROJECT VALUE = $33,315,000.00

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

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

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

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

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

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

NOTICE TO CONTRACTORS (Continued)

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

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

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

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

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

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

NOTICE TO CONTRACTORS (Continued)

PRICE ADJUSTMENTS

This Contract contains price adjustments for hot mix asphalt and Portland cement mixtures, diesel fuel, and gasoline. For reference the base prices are as follows: liquid asphalt $712.50 per ton, Portland cement $452.13 per ton, diesel fuel $4.372 per gallon, and gasoline $3.335 per gallon, and Steel Base Price Index 378.1. MassDOT posts the **Price Adjustments** on their Highway Division's website at
https://www.mass.gov/massdot-contract-price-adjustments

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

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

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

BY: Phillip Eng, Interim MassDOT Secretary
Jonathan L. Gulliver, Undersecretary and Highway Administrator
SATURDAY, AUGUST 22, 2026

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DOCUMENT 00210

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

July 1, 1981, updated October 2016

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(2) transactions are recorded as necessary

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

ii. to maintain accountability for assets;

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

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

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

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

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

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

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

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

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

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

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

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

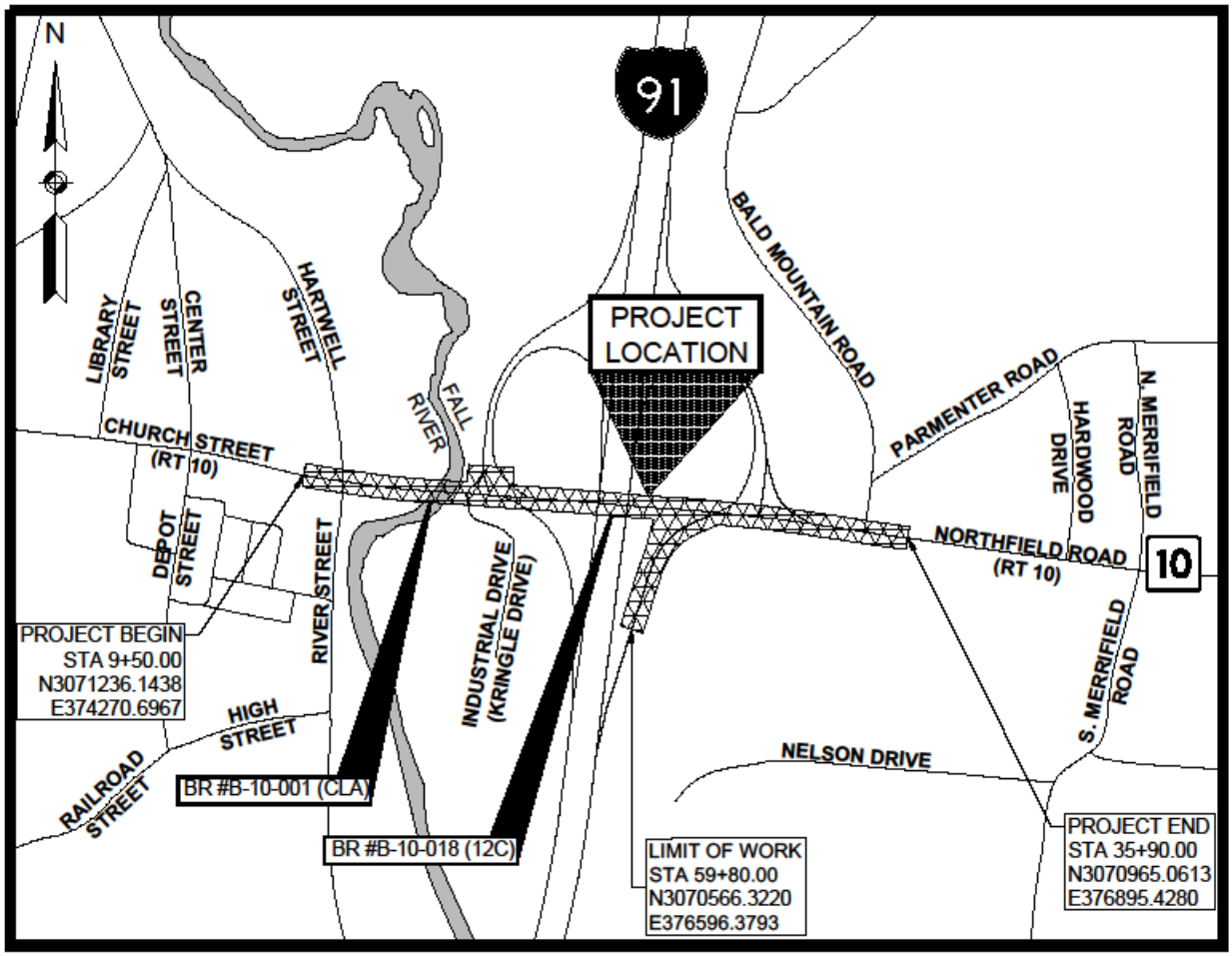
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DOCUMENT 00331

LOCUS MAP

BERNARDSTON
Federal Aid Project No. HIP(NGB)/FHG(BIP2)-003S(915)
Bridge Replacement, B-10-001, Route 10 over Fall River
and Deck Replacement, B-10-018, Route 10 over I-91



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DOCUMENT 00439

Final Report ☐

Interim Report ☐

CONTRACTOR PROJECT EVALUATION FORM

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

Date: _____

City/Town: _____ Contractor: _____

Project: _____ Address: _____

F.A. No. _____ Contract Number: _____

Bid Price: _____ Notice to Proceed: _____

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

Date Work Started: _____ Date Work Completed*: _____

Contractor's Superintendent: _____

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

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

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

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

_____ _____

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

_____

Contractor's Signature Acknowledging Report/Date

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

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

_____

_____

CONTRACTOR PROJECT EVALUATION FORM (Continued)

Date: _____ Contract Number: _____

INFORMATION FOR DISTRICT HIGHWAY DIRECTORS RELATING TO PREQUALIFICATION

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

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

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

I recommend a deduction for project completed late: _____

Signed: _____
District Highway Director

EXPLANATION OF RATINGS 1 – 9: _____

WORK NOT COMPLETED WITHIN SPECIFIED TIME: _____

Revised: 04/28/17

*** END OF DOCUMENT ***

DOCUMENT 00440

Final Report ☐

Interim Report ☐

SUBCONTRACTOR PROJECT EVALUATION FORM

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

Date: _____

City/Town: _____ Subcontractor: _____

Project: _____ Address: _____

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

Prime Contractor _____ Current Contract Completion Date: _____

Date Work Started: _____ Date Work Completed*: _____

Subcontractor's Superintendent: _____

Type of Work Performed by Subcontractor: _____

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

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

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

_____ _____

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

_____ _____

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

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

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

_____

_____

Contractor's Comments: _____

_____

SUBCONTRACTOR PROJECT EVALUATION FORM (Continued)

Date: _____ Contract Number:_____

INFORMATION FOR DISTRICT HIGHWAY DIRECTORS RELATING TO PREQUALIFICATION

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

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

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

I recommend a deduction for project completed late:_____

Signed: _____
District Highway Director

EXPLANATION OF RATINGS 1 – 8: _____

WORK NOT COMPLETED WITHIN SPECIFIED TIME: _____

Revised: 04/28/17

*** END OF DOCUMENT ***

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

NOTICE OF AVAILABILITY

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

SPECIAL PROVISIONS FOR RIGHT-TO-KNOW ACT REQUIREMENTS

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

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

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

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

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

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

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

ALTERNATIVE DISPUTE RESOLUTION
Forum, Choice of Law and Mediations:

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

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DOCUMENT 00715

SUPPLEMENTAL SPECIFICATIONS

JUNE 30, 2026

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

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

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

DIVISION I

GENERAL REQUIREMENTS AND COVENANTS

SECTION 5.00: CONTROL OF WORK

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

DIVISION II

CONSTRUCTION DETAILS

SECTION 200: DRAINAGE

SUBSECTION 227: DRAINAGE SYSTEM SEDIMENT

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

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

Subsection 227.31, Payment Items
Change the subsection number to 227.82

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

SUBSECTION 430: CEMENT CONCRETE BASE COURSE

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

SUBSECTION 476: CEMENT CONCRETE PAVEMENT

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

Preformed Expansion Joint Filler	M9.14.0

SUBSECTION 477: MILLED RUMBLE STRIPS

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

DESCRIPTION

477.20: General

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

CONSTRUCTION METHODS

477.61: Equipment

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

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

477.62: Installation of Rumble Strips

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

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

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

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

477.63: Control of the Work Area

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

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

COMPENSATION

477.80: Method of Measurement

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

477.81: Basis of Payment

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

477.82: Payment Items

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

SUBSECTION 482: SAWCUTTING

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

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

SECTION 600: HIGHWAY GUARD, FENCES AND WALLS

SUBSECTION 628: IMPACT ATTENUATORS

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

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

SECTION 800: TRAFFIC CONTROL DEVICES

SUBSECTION 813: WIRING, GROUNDING AND SERVICE CONNECTIONS

Subsection 813.20: General
Replace this subsection with the following:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

No work shall commence until Shop Drawings have been approved.

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

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

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

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

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

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

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

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

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

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

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

Add the following payment item:

813.90	Power Pedestal	Each

SUBSECTION 819: TRAFFIC SIGNAL DETECTION

Subsection 819: Traffic Signal Detection
Add this subsection:

DESCRIPTION

819.20: General

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

MATERIALS

819.40: General

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

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

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

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

819.40.A: Vehicle Detection Systems

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

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

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

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

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

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

819.40.B: Pedestrian Detectors

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

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

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

819.41: Video Monitoring System

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

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

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

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

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

Table 819.41-1: Minimum Camera Requirements

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

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

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

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

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

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

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

819.42: Material Warranties

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

Construction Methods

819.60: General

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

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

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

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

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

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

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

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

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

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

819.61: Programming APS Pushbuttons

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

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

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

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

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

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

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

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

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

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

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

*Note: See Plans for Street Name information.

The vibrotactile arrow shall vibrate during the walk interval.

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

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

819.62: VDS Testing and Evaluation

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

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

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

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

Compensation

819.80: Method of Measurement

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

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

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

819.81: Basis of Payment

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

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

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

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

819.82: Payment Items

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

SUBSECTION 850: TRAFFIC CONTROLS FOR CONSTRUCTION AND MAINTENANCE OPERATIONS

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

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

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

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

SUBSECTION 856: CONNECTED WORK ZONE NOTIFICATION SYSTEM AND ASSOCIATED DEVICES

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

DESCRIPTION

856.20: General

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

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

MATERIALS

856.40: General

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

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

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

856.41: Arrow Board

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

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

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

Table 856.41-1: Arrow Board Dimensions and Elements

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

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

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

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

856.42: Shop Drawings

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

CONSTRUCTION METHODS

856.60: General

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

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

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

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

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

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

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

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

COMPENSATION

856.80: Method of Measurement

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

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

856.81: Basis of Payment

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

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

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

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

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

856.82: Payment Items

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

SECTION 900: STRUCTURES

SUBSECTION 901: CEMENT CONCRETE

Subsection 901.20: Materials

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

Preformed Expansion Joint Filler	M9.14.0

SUBSECTION 983: REVETMENT

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

Preformed Expansion Joint Filler	M9.14.0

DIVISION III

MATERIALS SPECIFICATIONS

SECTION M3: ASPHALTIC MATERIALS

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

SECTION M9: MISCELLANEOUS MATERIALS

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

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

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

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

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

M10.03.1: Field Monitoring Unit

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

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

SECTION M10: TRAFFIC CONTROL DEVICES

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

M10.03.1: Field Monitoring Unit

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

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

M10.03.1.A: Hardware

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

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

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

M10.03.1.B: Software

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

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

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

M10.03.1.C: Wireless Connectivity

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

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

M10.03.1.D: Remote Access

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

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

M10.08.0: Vehicle Detection Systems

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

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

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

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

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

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

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

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

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

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

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

M10.08.1: Passive Stop Line Detectors

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

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

M10.08.2: Passive Advanced Detectors

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

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

M10.09.0: Pedestrian Detectors

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

Pedestrian Detectors may be pushbuttons or passive detection devices.

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

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

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

M10.09.1: Pedestrian Pushbutton Assembly

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

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

The pushbutton shall meet one of the following criteria:

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

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

The housing shall be yellow.

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

M10.09.2: APS Pushbutton Assembly

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

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

APS Pushbutton Assembly shall be capable of the following:

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

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

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

M10.18.0: Connected Work Zone Notification System Devices

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

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

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

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

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

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

M10.18.1: Location Marker

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

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

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END OF SUPPLEMENTAL SPECIFICATIONS

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

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

ATTACHMENTS

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

I. GENERAL

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

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

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

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

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

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

II. NONDISCRIMINATION

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

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

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

1.Assurances Required:

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

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

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

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

III. DAVIS-BACON AND RELATED ACT PROVISIONS

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

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

1. Minimum wages (29 CFR 5.5)

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

2. Withholding (29 CFR 5.5)

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

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

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

(2) A contracting agency for its reprocurement costs;

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

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

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

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

3. Records and certified payrolls (29 CFR 5.5)

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

IV. CONTRACT WORK HOURS AND SAFETY STANDARDS ACT

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

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

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

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

3. Withholding for unpaid wages and liquidated damages

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

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

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

(2) A contracting agency for its reprocurement costs;

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

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

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

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

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

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

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

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

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

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

V. SUBLETTING OR ASSIGNING THE CONTRACT

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

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

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

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

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

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

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

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

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

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

VI. SAFETY: ACCIDENT PREVENTION

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

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

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

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

VII. FALSE STATEMENTS CONCERNING HIGHWAY PROJECTS

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

* * * * *

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

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

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

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

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

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

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

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

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

* * * * *

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

* * * * *

X. CERTIFICATION REGARDING USE OF CONTRACT FUNDS FOR LOBBYING

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

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

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

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

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

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

XI. USE OF UNITED STATES-FLAG VESSELS:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

DOCUMENT 00811

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

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

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

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

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

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

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

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

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

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

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

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DOCUMENT 00812

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

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

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

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

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

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

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

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

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

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

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DOCUMENT 00813

SPECIAL PROVISIONS

PRICE ADJUSTMENTS FOR STRUCTURAL STEEL AND REINFORCING STEEL

August 19, 2026

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

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

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

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

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

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

Base Prices and Period Prices are defined as follows:

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

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

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

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

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

Period Prices are determined as follows:

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

Example of a Period Price Calculation:

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

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

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

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

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

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

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

End of example.

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

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

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

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

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

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

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

TABLE

Steel Type		Price per Pound
1	ASTM A615/A615M Grade 60 (AASHTO M31 Grade 60 or 420) Reinforcing Steel	$0.58
2	ASTM A27 (AASHTO M103) Steel Castings, H-Pile Points & Pipe Pile Shoes (See Note below.)	$0.81
3	ASTM A668 / A668M (AASHTO M102) Steel Forgings	$0.81
4	ASTM A108 (AASHTO M169) Steel Forgings for Shear Studs	$0.84
5	ASTM A709/A709M Grade 36 / AASHTO M270M/M270 Grade 36 or 250 Structural Steel Plate	$0.88
6	ASTM A709/A709M Grade 36 / AASHTO M270M/M270 Grade 36 or 250 Structural Steel Shapes	$0.83
7	ASTM A709/A709M Grade 50 / AASHTO M270M/M270 Grade 50 or 345 Structural Steel Plate	$0.88
8	ASTM A709/A709M Grade 50 / AASHTO M270M/M270 Grade 50 or 345 Structural Steel Shapes	$0.83
9	ASTM A709/A709M Grade 50WT / AASHTO M270M/M270 Grade 50WT or 345WT Structural Steel Plate	$0.91
10	ASTM A709/A709M Grade 50WT / AASHTO M270M/M270 Grade 50WT or 345WT Structural Steel Shapes	$0.84
11	ASTM A709/A709M Grade 50W / AASHTO M270M/M270 Grade 50W 345W Structural Steel Plate	$0.91
12	ASTM A709/A709M Grade 50W / AASHTO M270M/M270 Grade 50W or 345W Structural Steel Shapes	$0.84
13	ASTM A709/A709M Grade HPS 50W / AASHTO M270M/M270 Grade HPS 50W or 345W Structural Steel Plate	$0.95
14	ASTM A709/A709M Grade HPS 70W / AASHTO M270M/M270 Grade HPS 70W or 485W Structural Steel Plate	$1.03
15	ASTM A514/A514M-05 Grade HPS 100W / AASHTO M270M/M270 Grade HPS 100W or 690W Structural Steel Plate	$1.57
16	ASTM A992/A992M Grade 50S / AASHTO M270M/M270 Grade 50S or 345S Structural Steel Plate	$0.91
17	ASTM A992/A992M Grade 50S / AASHTO M270M/M270 Grade 50S or 345S Structural Steel Shapes	$0.84
18	ASTM A276 Type 316 Stainless Steel	$4.71
19	ASTM A240 Type 316 Stainless Steel	$4.71
20	ASTM A148 Grade 80/50 Steel Castings (See Note below.)	$1.62
21	ASTM A53 Grade B Structural Steel Pipe	$1.03
22	ASTM A500 Grades A, B, 36 & 50 Structural Steel Pipe	$1.03
23	ASTM A252, Grades 240 (36 KSI) & 414 (60 KSI) Pipe Pile	$0.81
24	ASTM 252, Grade 2 Permanent Steel Casing	$0.81
25	ASTM A36 (AASHTO M183) for H-piles, steel supports and sign supports	$0.86
26	ASTM A328 / A328M, Grade 50 (AASHTO M202) Steel Sheetpiling	$1.54
27	ASTM A572 / A572M, Grade 50 Sheetpiling	$1.54
28	ASTM A36/36M, Grade 50	$0.88
29	ASTM A570, Grade 50	$0.86
30	ASTM A572 (AASHTO M223), Grade 50 H-Piles	$0.88
31	ASTM A1085 Grade A (50 KSI) Steel Hollow Structural Sections (HSS), heat-treated per ASTM A1085 Supplement S1	$1.03
32	AREA 140 LB Rail and Track Accessories	$0.53

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

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DOCUMENT 00814

SPECIAL PROVISIONS
PRICE ADJUSTMENT FOR PORTLAND CEMENT CONCRETE MIXES

January 12, 2009

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

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

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

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

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

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

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

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

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

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DOCUMENT 00820

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

I. Definitions

For purposes of this contract,

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

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

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

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

II. Equal Opportunity, Non-Discrimination and Affirmative Action

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

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

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

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

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

III. Minority and Women Workforce Participation

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

IV. Liaison Committee

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

V. Reports and Records

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

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

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

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

VI. Access to Work Site

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

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

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

VIII. Sanctions

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

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

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

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

IX. Severability

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

X. Contractor's Certification

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

XI. Subcontractor Requirements

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

Rev'd 03/07/14

*** END OF DOCUMENT ***

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DOCUMENT 00821

ELECTRONIC REPORTING REQUIREMENTS
CIVIL RIGHTS PROGRAMS AND CERTIFIED PAYROLL

Implemented on March 2, 2009 Revised June 04, 2019

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

Contractor and Sub-Contractor EBO User Certification

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

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

Vetting of Firms and Designated Firm Individuals

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

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

Interim Reporting Requirements

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

*** END OF DOCUMENT ***

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DOCUMENT 00859

CONTRACTOR/SUBCONTRACTOR CERTIFICATION FORM ‡

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

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

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

Contract No: 136484 **Project No.** 612159 **Federal Aid No.:** HIP(NGB)/FHG(BIP2)-003S(915)

Location: BARNARDSTON

Project Description: Bridge Replacement, B-10-001, Route 10 over Fall River and Deck Replacement, B-10-018, Route 10 over I-91

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

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

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

Document #

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

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

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

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

Document #

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

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

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

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

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

PART 2

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

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

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

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

_____
(Print Name and Title)

_____
(Authorized Signature)

_____
(Date)

Rev'd 09/02/22

*** END OF DOCUMENT ***

DOCUMENT 00860

COMMONWEALTH OF MASSACHUSETTS PUBLIC EMPLOYMENT LAWS

Revised February 20, 2019

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

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

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

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

The Prevailing Wage Rate generally includes the following:

Minimum Hourly Wage + Employer Contributions to Benefit Plans = Prevailing Wage Rate or Total Rate

Any employer who does not make contributions to Benefit Plans must pay the total Prevailing Wage Rate directly to the employee.

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

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

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

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

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

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

STATEMENT OF COMPLIANCE

Date: _____

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

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

_____
(Contractor or Subcontractor)

on the _____
(MassDOT Project Location and Contract Number)

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

Signature _____

Title _____

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

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

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

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

*** END OF DOCUMENT ***

DOCUMENT 00861

STATE PREVAILING WAGE RATES

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

MAURA HEALEY
Governor
KIM DRISCOLL
Lt. Governor

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

LAUREN JONES
Secretary
MICHAEL FLANAGAN
Director

Awarding Authority:	Massachusetts Highway	**City/Town:**	BERNARDSTON
Wage Request No:	20260820185412	**Job Location:**	Route 10 over I-91
Description of Work:	BERNARDSTON – FAP No. HIP(NGB)/FHG(BIP2)-003S(915) Bridge Replacement, B-10-001, Route 10 over Fall River and Deck Replacement, B-10-018, Route 10 over I-91		
Contract Number:	136484		

§§ 26-27D Construction Project

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

Awarding Authority Responsibilities

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

Contractor Responsibilities

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

Employees who are **not** paid the wage listed on the Prevailing Wage Schedule (PWS) may file a complaint with the Attorney General's Fair Labor

Division: **www.mass.gov/ago/fld**; **(617) 727-3465.**

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
(2 AXLE) DRIVER - EQUIPMENT TEAMSTERS JOINT COUNCIL NO. 10 TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	6/1/2026	$41.95	$16.17	$21.78	$0.00	$0.00	$79.90
	12/1/2026	$41.95	$16.17	$23.52	$0.00	$0.00	$81.64
	1/1/2027	$41.95	$16.77	$23.52	$0.00	$0.00	$82.24
(3 AXLE) DRIVER - EQUIPMENT TEAMSTERS JOINT COUNCIL NO. 10 TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	6/1/2026	$42.02	$16.17	$21.78	$0.00	$0.00	$79.97
	12/1/2026	$42.02	$16.17	$23.52	$0.00	$0.00	$81.71
	1/1/2027	$42.02	$16.77	$23.52	$0.00	$0.00	$82.31
(4 & 5 AXLE) DRIVER - EQUIPMENT TEAMSTERS JOINT COUNCIL NO. 10 TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	6/1/2026	$42.14	$16.17	$21.78	$0.00	$0.00	$80.09
	12/1/2026	$42.14	$16.17	$23.52	$0.00	$0.00	$81.83
	1/1/2027	$42.14	$16.77	$23.52	$0.00	$0.00	$82.43
ADS/SUBMERSIBLE PILOT PILE DRIVER LOCAL 56 PILE DRIVER LOCAL 56 (ZONE 3) For apprentice rates see "Apprentice- PILE DRIVER"	8/1/2024	$117.16	$10.08	$11.62	$12.67	$0.00	$151.53
AIR TRACK OPERATOR LABORERS LABORERS - ZONE 3 (BUILDING & SITE) For apprentice rates see "Apprentice- LABORER"	6/1/2026	$37.75	$10.90	$9.75	$8.62	$0.00	$67.02
	12/7/2026	$39.05	$10.90	$9.75	$8.62	$0.00	$68.32
	6/7/2027	$40.45	$10.90	$9.75	$8.62	$0.00	$69.72
	12/6/2027	$41.85	$10.90	$9.75	$8.62	$0.00	$71.12
	6/5/2028	$43.35	$10.90	$9.75	$8.62	$0.00	$72.62
	12/4/2028	$44.85	$10.90	$9.75	$8.62	$0.00	$74.12
AIR TRACK OPERATOR (HEAVY & HIGHWAY) LABORERS LABORERS - ZONE 3 (HEAVY & HIGHWAY) For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"	6/1/2026	$37.74	$10.90	$9.75	$6.60	$0.00	$64.99
	12/1/2026	$39.03	$10.90	$9.75	$6.60	$0.00	$66.28
ASBESTOS WORKER (PIPES & TANKS) HEAT & FROST INSULATORS LOCAL 6 HEAT & FROST INSULATORS LOCAL 6 (SPRINGFIELD)	12/1/2025	$40.32	$14.50	$4.30	$6.25	$0.00	$65.37
ASPHALT RAKER LABORERS LABORERS - ZONE 3 (BUILDING & SITE) For apprentice rates see "Apprentice- LABORER"	6/1/2026	$37.25	$10.90	$9.75	$8.62	$0.00	$66.52
	12/7/2026	$38.55	$10.90	$9.75	$8.62	$0.00	$67.82
	6/7/2027	$39.95	$10.90	$9.75	$8.62	$0.00	$69.22
	12/6/2027	$41.35	$10.90	$9.75	$8.62	$0.00	$70.62
	6/5/2028	$42.85	$10.90	$9.75	$8.62	$0.00	$72.12
	12/4/2028	$44.35	$10.90	$9.75	$8.62	$0.00	$73.62
ASPHALT RAKER (HEAVY & HIGHWAY) LABORERS LABORERS - ZONE 3 (HEAVY & HIGHWAY) For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"	6/1/2026	$37.24	$10.90	$9.75	$6.60	$0.00	$64.49
	12/1/2026	$38.53	$10.90	$9.75	$6.60	$0.00	$65.78
AUTOMATIC GRADER-EXCAVATOR (RECLAIMER) OPERATING ENGINEERS LOCAL 98 OPERATING ENGINEERS LOCAL 98 For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/1/2023	$39.56	$13.78	$12.15	$3.00	$0.00	$68.49

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
BACKHOE/FRONT-END LOADER OPERATOR OPERATING ENGINEERS LOCAL 98 OPERATING ENGINEERS LOCAL 98	12/1/2023	$39.56	$13.78	$12.15	$3.00	$0.00	$68.49
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
BARCO-TYPE JUMPING TAMPER LABORERS LABORERS - ZONE 3 (BUILDING & SITE)	6/1/2026	$37.25	$10.90	$9.75	$8.62	$0.00	$66.52
	12/7/2026	$38.55	$10.90	$9.75	$8.62	$0.00	$67.82
	6/7/2027	$39.95	$10.90	$9.75	$8.62	$0.00	$69.22
	12/6/2027	$41.35	$10.90	$9.75	$8.62	$0.00	$70.62
	6/5/2028	$42.85	$10.90	$9.75	$8.62	$0.00	$72.12
	12/4/2028	$44.35	$10.90	$9.75	$8.62	$0.00	$73.62
For apprentice rates see "Apprentice- LABORER"							
BATCH/CEMENT PLANT - ON SITE OPERATING ENGINEERS LOCAL 98 OPERATING ENGINEERS LOCAL 98	12/1/2023	$39.03	$13.78	$12.15	$3.00	$0.00	$67.96
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
BLOCK PAVER, RAMMER / CURB SETTER LABORERS LABORERS - ZONE 3 (BUILDING & SITE)	6/1/2026	$37.75	$10.90	$9.75	$8.62	$0.00	$67.02
	12/7/2026	$39.05	$10.90	$9.75	$8.62	$0.00	$68.32
	6/7/2027	$40.45	$10.90	$9.75	$8.62	$0.00	$69.72
	12/6/2027	$41.85	$10.90	$9.75	$8.62	$0.00	$71.12
	6/5/2028	$43.35	$10.90	$9.75	$8.62	$0.00	$72.62
	12/4/2028	$44.85	$10.90	$9.75	$8.62	$0.00	$74.12
For apprentice rates see "Apprentice- LABORER"							
BLOCK PAVER, RAMMER / CURB SETTER (HEAVY & HIGHWAY) LABORERS LABORERS - ZONE 3 (HEAVY & HIGHWAY)	6/1/2026	$37.74	$10.90	$9.75	$6.60	$0.00	$64.99
	12/1/2026	$39.03	$10.90	$9.75	$6.60	$0.00	$66.28
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"							
BOILER MAKER BOILERMAKERS LOCAL 29 BOILERMAKERS LOCAL 29	1/1/2024	$48.12	$7.07	$14.60	$6.00	$0.00	$75.79

Apprentice: BOILER MAKER

Effective Date: 1/1/2024

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

Apprentice to Journeyworker Ratio: 1:4

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
BRICK/STONE/ARTIFICIAL MASONRY (INCL. MASONRY WATERPROOFING) BRICKLAYERS LOCAL 3 BRICKLAYERS LOCAL 3 (SPRINGFIELD/PITTSFIELD)	8/1/2026	$58.56	$12.84	$15.57	$5.89	$0.00	$92.86
	2/1/2027	$59.96	$12.84	$15.57	$5.89	$0.00	$94.26

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

Effective Date: 8/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$29.28	$12.84	$15.57	$5.89	$0.00	$63.58
2	60.00	$35.14	$12.84	$15.57	$5.89	$0.00	$69.44
3	70.00	$40.99	$12.84	$15.57	$5.89	$0.00	$75.29
4	80.00	$46.85	$12.84	$15.57	$5.89	$0.00	$81.15
5	90.00	$52.70	$12.84	$15.57	$5.89	$0.00	$87.00

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

Effective Date: 2/1/2027

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$29.98	$12.84	$15.57	$5.89	$0.00	$64.28
2	60.00	$35.98	$12.84	$15.57	$5.89	$0.00	$70.28
3	70.00	$41.97	$12.84	$15.57	$5.89	$0.00	$76.27
4	80.00	$47.97	$12.84	$15.57	$5.89	$0.00	$82.27
5	90.00	$53.96	$12.84	$15.57	$0.00	$0.00	$82.37

Apprentice to Journeyworker Ratio: 1:5

BULLDOZER/POWER SHOVEL/TREE SHREDDER /CLAM SHELL OPERATING ENGINEERS LOCAL 98 OPERATING ENGINEERS LOCAL 98 For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/1/2023	$39.56	$13.78	$12.15	$3.00	$0.00	$68.49
CAISSON & UNDERPINNING BOTTOM MAN LABORERS LABORERS - FOUNDATION AND MARINE For apprentice rates see "Apprentice- LABORER"	6/1/2026	$50.40	$10.90	$9.75	$9.80	$0.00	$80.85
	12/1/2026	$51.90	$10.90	$9.75	$9.80	$0.00	$82.35
CAISSON & UNDERPINNING LABORER LABORERS LABORERS - FOUNDATION AND MARINE For apprentice rates see "Apprentice- LABORER"	6/1/2026	$49.25	$10.90	$9.75	$9.80	$0.00	$79.70
	12/1/2026	$50.75	$10.90	$9.75	$9.80	$0.00	$81.20
CAISSON & UNDERPINNING TOP MAN LABORERS LABORERS - FOUNDATION AND MARINE For apprentice rates see "Apprentice- LABORER"	6/1/2026	$49.58	$10.90	$9.75	$9.80	$0.00	$80.03
	12/1/2026	$51.08	$10.90	$9.75	$9.80	$0.00	$81.53
CARBIDE CORE DRILL OPERATOR LABORERS LABORERS - ZONE 3 (BUILDING & SITE)	6/1/2026	$37.25	$10.90	$9.75	$8.62	$0.00	$66.52
	12/7/2026	$38.55	$10.90	$9.75	$8.62	$0.00	$67.82
	6/7/2027	$39.95	$10.90	$9.75	$8.62	$0.00	$69.22

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
	12/6/2027	$41.35	$10.90	$9.75	$8.62	$0.00	$70.62
	6/5/2028	$42.85	$10.90	$9.75	$8.62	$0.00	$72.12
	12/4/2028	$44.35	$10.90	$9.75	$8.62	$0.00	$73.62

For apprentice rates see "Apprentice- LABORER"

CARPENTER	3/1/2026	$43.81	$9.19	$11.25	$6.90	$0.00	$71.15
CARPENTERS	9/1/2026	$44.76	$9.19	$11.25	$6.90	$0.00	$72.10
CARPENTERS LOCAL 336 - HAMPDEN HAMPSHIRE FRANKLIN	3/1/2027	$45.66	$9.19	$11.25	$6.90	$0.00	$73.00

Apprentice: CARPENTER

Effective Date: 3/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	45.00	$19.71	$9.19	$0.00	$1.38	$0.00	$30.28
2	45.00	$19.71	$1.28	$0.00	$1.38	$0.00	$22.37
3	55.00	$24.10	$9.19	$0.00	$2.76	$0.00	$36.05
4	55.00	$24.10	$9.19	$0.00	$2.76	$0.00	$36.05
5	70.00	$30.67	$9.19	$11.25	$4.14	$0.00	$55.25
6	70.00	$30.67	$9.19	$11.25	$4.14	$0.00	$55.25
7	80.00	$35.05	$9.19	$11.25	$5.52	$0.00	$61.01
8	80.00	$35.05	$9.19	$11.25	$5.52	$0.00	$61.01

Apprentice: CARPENTER

Effective Date: 9/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	45.00	$20.14	$9.19	$0.00	$1.38	$0.00	$30.71
2	45.00	$20.14	$9.19	$0.00	$1.38	$0.00	$30.71
3	55.00	$24.62	$9.19	$0.00	$2.76	$0.00	$36.57
4	55.00	$24.62	$9.19	$0.00	$2.76	$0.00	$36.57
5	70.00	$31.33	$9.19	$11.25	$4.14	$0.00	$55.91
6	70.00	$31.33	$9.19	$11.25	$4.14	$0.00	$55.91
7	80.00	$35.81	$9.19	$11.25	$5.52	$0.00	$61.77
8	80.00	$35.81	$9.19	$11.25	$5.52	$0.00	$61.77

Apprentice to Journeyworker Ratio: 1:5

CARPENTER WOOD FRAME	10/1/2025	$27.37	$7.38	$4.47	$1.00	$0.00	$40.22
CARPENTERS	10/1/2026	$28.47	$7.38	$4.47	$1.00	$0.00	$41.32
CARPENTERS-ZONE 3 (Wood Frame)							

All Aspects of New Wood Frame Work

Apprentice: CARPENTER WOOD FRAME

Effective Date: 10/1/2025

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	60.00	$16.42	$7.38	$0.00	$0.00	$0.00	$23.80

Construction

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

Apprentice: CARPENTER WOOD FRAME

Effective Date: 10/1/2025

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
2	60.00	$16.42	$7.38	$0.00	$0.00	$0.00	$23.80
3	65.00	$17.79	$7.38	$0.00	$1.00	$0.00	$26.17
4	70.00	$19.16	$7.38	$0.00	$1.00	$0.00	$27.54
5	75.00	$20.53	$7.38	$3.80	$1.00	$0.00	$32.71
6	80.00	$21.90	$7.38	$3.80	$1.00	$0.00	$34.08
7	85.00	$23.26	$7.38	$3.80	$1.00	$0.00	$35.44
8	90.00	$24.63	$7.38	$3.80	$1.00	$0.00	$36.81

Apprentice: CARPENTER WOOD FRAME

Effective Date: 10/1/2026

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

Apprentice to Journeyworker Ratio: 1:5

CEMENT MASONRY/PLASTERING	7/1/2026	$49.32	$13.20	$16.30	$2.93	$1.69	$83.44
PLASTERERS AND CEMENT MASONS LOCAL 534	1/1/2027	$50.51	$13.20	$16.30	$2.93	$1.69	$84.63
Plasterers and Cement Masons - Zone 2	7/1/2027	$51.70	$13.20	$16.30	$2.93	$1.69	$85.82
	1/1/2028	$52.89	$13.20	$16.30	$2.93	$1.69	$87.01

Apprentice: CEMENT MASONRY/PLASTERING

Effective Date: 7/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$24.66	$13.20	$16.30	$0.00	$0.00	$54.16
2	60.00	$29.59	$13.20	$16.30	$2.93	$1.69	$63.71
3	65.00	$32.06	$13.20	$16.30	$2.93	$1.69	$66.18
4	70.00	$34.52	$13.20	$16.30	$2.93	$1.69	$68.64
5	75.00	$36.99	$13.20	$16.30	$2.93	$1.69	$71.11
6	80.00	$39.46	$13.20	$16.30	$2.93	$1.69	$73.58
7	90.00	$44.39	$13.20	$16.30	$2.93	$0.00	$76.82

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
Apprentice: CEMENT MASONRY/PLASTERING							
Effective Date: 1/1/2027							

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$25.26	$16.30	$16.30	$0.00	$0.00	$57.86
2	60.00	$30.31	$16.30	$16.30	$2.93	$1.69	$67.53
3	65.00	$32.83	$16.30	$16.30	$2.93	$1.69	$70.05
4	70.00	$35.36	$16.30	$16.30	$2.93	$1.69	$72.58
5	75.00	$37.88	$16.30	$16.30	$2.93	$1.69	$75.10
6	80.00	$40.41	$16.30	$16.30	$2.93	$1.69	$77.63
7	90.00	$45.46	$16.30	$16.30	$2.93	$0.00	$80.99

Apprentice to Journeyworker Ratio: 1:5

CHAIN SAW OPERATOR LABORERS LABORERS - ZONE 3 (BUILDING & SITE)	6/1/2026	$37.25	$10.90	$9.75	$8.62	$0.00	$66.52
	12/7/2026	$38.55	$10.90	$9.75	$8.62	$0.00	$67.82
	6/7/2027	$39.95	$10.90	$9.75	$8.62	$0.00	$69.22
	12/6/2027	$41.35	$10.90	$9.75	$8.62	$0.00	$70.62
	6/5/2028	$42.85	$10.90	$9.75	$8.62	$0.00	$72.12
	12/4/2028	$44.35	$10.90	$9.75	$8.62	$0.00	$73.62
For apprentice rates see "Apprentice- LABORER"							
COMPRESSOR OPERATOR OPERATING ENGINEERS LOCAL 98 OPERATING ENGINEERS LOCAL 98	12/1/2023	$39.03	$13.78	$12.15	$3.00	$0.00	$67.96
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
CRANE OPERATOR OPERATING ENGINEERS LOCAL 98 OPERATING ENGINEERS LOCAL 98	12/1/2023	$43.06	$13.78	$12.15	$3.00	$0.00	$71.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
DELEADER (BRIDGE) PAINTERS LOCAL 35 PAINTERS LOCAL 35 - ZONE 3	1/1/2026	$59.56	$10.35	$12.00	$12.60	$0.00	$94.51

Apprentice: DELEADER (BRIDGE)

Effective Date: 1/1/2026

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

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
Apprentice to Journeyworker Ratio: 1:1							
DEMO: ADZEMAN LABORERS LABORERS - ZONE 3 (BUILDING & SITE)	6/1/2026	$49.30	$10.90	$9.75	$9.65	$0.00	$79.60
	12/7/2026	$50.80	$10.90	$9.75	$9.65	$0.00	$81.10
	6/7/2027	$52.40	$10.90	$9.75	$9.65	$0.00	$82.70
	12/6/2027	$54.00	$10.90	$9.75	$9.65	$0.00	$84.30
	6/5/2028	$55.68	$10.90	$9.75	$9.65	$0.00	$85.98
	12/4/2028	$57.35	$10.90	$9.75	$9.65	$0.00	$87.65
For apprentice rates see "Apprentice- LABORER"							
DEMO: BACKHOE/LOADER/HAMMER OPERATOR LABORERS LABORERS - ZONE 3 (BUILDING & SITE)	6/1/2026	$50.30	$10.90	$9.75	$9.65	$0.00	$80.60
	12/7/2026	$51.80	$10.90	$9.75	$9.65	$0.00	$82.10
	6/7/2027	$53.40	$10.90	$9.75	$9.65	$0.00	$83.70
	12/6/2027	$55.00	$10.90	$9.75	$9.65	$0.00	$85.30
	6/5/2028	$56.68	$10.90	$9.75	$9.65	$0.00	$86.98
	12/4/2028	$58.35	$10.90	$9.75	$9.65	$0.00	$88.65
For apprentice rates see "Apprentice- LABORER"							
DEMO: BURNERS LABORERS LABORERS - ZONE 3 (BUILDING & SITE)	6/1/2026	$50.05	$10.90	$9.75	$9.65	$0.00	$80.35
	12/7/2026	$51.55	$10.90	$9.75	$9.65	$0.00	$81.85
	6/7/2027	$53.15	$10.90	$9.75	$9.65	$0.00	$83.45
	12/6/2027	$54.75	$10.90	$9.75	$9.65	$0.00	$85.05
	6/5/2028	$56.43	$10.90	$9.75	$9.65	$0.00	$86.73
	12/4/2028	$58.10	$10.90	$9.75	$9.65	$0.00	$88.40
For apprentice rates see "Apprentice- LABORER"							
DEMO: CONCRETE CUTTER/SAWYER LABORERS LABORERS - ZONE 3 (BUILDING & SITE)	6/1/2026	$50.30	$10.90	$9.75	$9.65	$0.00	$80.60
	12/7/2026	$51.80	$10.90	$9.75	$9.65	$0.00	$82.10
	6/7/2027	$53.40	$10.90	$9.75	$9.65	$0.00	$83.70
	12/6/2027	$55.00	$10.90	$9.75	$9.65	$0.00	$85.30
	6/5/2028	$56.68	$10.90	$9.75	$9.65	$0.00	$86.98
	12/4/2028	$58.35	$10.90	$9.75	$9.65	$0.00	$88.65
For apprentice rates see "Apprentice- LABORER"							
DEMO: JACKHAMMER OPERATOR LABORERS LABORERS - ZONE 3 (BUILDING & SITE)	6/1/2026	$50.05	$10.90	$9.75	$9.65	$0.00	$80.35
	12/7/2026	$51.55	$10.90	$9.75	$9.65	$0.00	$81.85
	6/7/2027	$53.15	$10.90	$9.75	$9.65	$0.00	$83.45
	12/6/2027	$54.75	$10.90	$9.75	$9.65	$0.00	$85.05
	6/5/2028	$56.43	$10.90	$9.75	$9.65	$0.00	$86.73
	12/4/2028	$58.10	$10.90	$9.75	$9.65	$0.00	$88.40
For apprentice rates see "Apprentice- LABORER"							
DEMO: WRECKING LABORER LABORERS LABORERS - ZONE 3 (BUILDING & SITE)	6/1/2026	$49.30	$10.90	$9.75	$9.65	$0.00	$79.60
	12/7/2026	$50.80	$10.90	$9.75	$9.65	$0.00	$81.10
	6/7/2027	$52.40	$10.90	$9.75	$9.65	$0.00	$82.70
	12/6/2027	$54.00	$10.90	$9.75	$9.65	$0.00	$84.30
	6/5/2028	$55.68	$10.90	$9.75	$9.65	$0.00	$85.98
	12/4/2028	$57.35	$10.90	$9.75	$9.65	$0.00	$87.65
For apprentice rates see "Apprentice- LABORER"							

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
DIVER PILE DRIVER LOCAL 56 PILE DRIVER LOCAL 56 (ZONE 3)	8/1/2024	$78.11	$10.08	$11.62	$12.67	$0.00	$112.48
as of 8-1-24, Apprentices with diving licenses begin at second year. % of Diver wage 70/80/90 2A $69.83, 3A $91.79,4A $102.14 Total Rate							
DIVER TENDER PILE DRIVER LOCAL 56 PILE DRIVER LOCAL 56 (ZONE 3)	8/1/2024	$49.19	$10.08	$11.62	$12.67	$0.00	$83.56
as of 8-1-24, Apprentices with diving licenses begin at second year. % of Piledriver wage 70/80/90 2A $54.20, 3A $73.93,4A $82.05 Total Rate							
DIVER TENDER (EFFLUENT) PILE DRIVER LOCAL 56 PILE DRIVER LOCAL 56 (ZONE 3)	8/1/2024	$83.69	$10.08	$11.62	$12.67	$0.00	$118.06
For apprentice rates see "Apprentice- PILE DRIVER"							
DIVER/SLURRY (EFFLUENT) PILE DRIVER LOCAL 56 PILE DRIVER LOCAL 56 (ZONE 3)	8/1/2024	$117.16	$10.08	$11.62	$12.67	$0.00	$151.53
For apprentice rates see "Apprentice- PILE DRIVER"							
DRAWBRIDGE OPERATOR (Construction) DRAWBRIDGE - SEIU LOCAL 888 DRAWBRIDGE - SEIU LOCAL 888	7/1/2020	$26.77	$6.67	$3.93	$0.00	$0.16	$37.53
ELECTRICIAN (Including Core Drilling) ELECTRICIANS LOCAL 7	6/28/2026	$54.41	$14.00	$8.43	$7.03	$0.00	$83.87
ELECTRICIANS LOCAL 7	1/3/2027	$55.56	$14.25	$8.47	$7.09	$0.00	$85.37

Apprentice: ELECTRICIAN (Including Core Drilling)

Effective Date: 6/28/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	40.00	$21.76	$7.80	$0.63	$0.00	$0.00	$30.19
2	45.00	$24.48	$7.80	$0.70	$0.00	$0.00	$32.98
3	50.00	$27.21	$14.00	$7.53	$0.00	$0.00	$48.74
4	55.00	$29.93	$14.00	$7.61	$0.00	$0.00	$51.54
5	65.00	$35.37	$14.00	$9.84	$0.00	$0.00	$59.21
6	70.00	$38.09	$14.00	$11.30	$0.00	$0.00	$63.39

Apprentice: ELECTRICIAN (Including Core Drilling)

Effective Date: 1/3/2027

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	40.00	$22.22	$7.95	$0.63	$0.00	$0.00	$30.80
2	45.00	$25.00	$7.95	$0.70	$0.00	$0.00	$33.65
3	50.00	$27.78	$14.25	$7.53	$0.00	$0.00	$49.56
4	55.00	$30.56	$14.25	$7.61	$0.00	$0.00	$52.42
5	65.00	$36.11	$14.25	$9.84	$0.00	$0.00	$60.20
6	70.00	$38.89	$14.25	$11.30	$0.00	$0.00	$64.44

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
Apprentice to Journeyworker Ratio: 2:3							
ELEVATOR CONSTRUCTOR ELEVATOR CONSTRUCTORS LOCAL 41 ELEVATOR CONSTRUCTORS LOCAL 41	1/1/2026	$69.23	$16.38	$11.06	$10.70	$0.00	$107.37
	1/1/2027	$72.23	$16.48	$11.16	$11.00	$0.00	$110.87

Apprentice: ELEVATOR CONSTRUCTOR

Effective Date: 1/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$34.62	$16.38	$0.00	$0.00	$0.00	$51.00
2	55.00	$38.08	$16.38	$11.06	$10.70	$0.00	$76.22
3	65.00	$45.00	$16.38	$11.06	$10.70	$0.00	$83.14
4	70.00	$48.46	$16.38	$11.06	$10.70	$0.00	$86.60
5	80.00	$55.38	$16.38	$11.06	$10.70	$0.00	$93.52

Apprentice: ELEVATOR CONSTRUCTOR

Effective Date: 1/1/2027

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$36.12	$16.48	$0.00	$0.00	$0.00	$52.60
2	55.00	$39.73	$16.48	$11.16	$11.00	$0.00	$78.37
3	65.00	$46.95	$16.48	$11.16	$11.00	$0.00	$85.59
4	70.00	$50.56	$16.48	$11.16	$11.00	$0.00	$89.20
5	80.00	$57.78	$16.48	$11.16	$11.00	$0.00	$96.42

Apprentice to Journeyworker Ratio: 1:1							
ELEVATOR CONSTRUCTOR HELPER ELEVATOR CONSTRUCTORS LOCAL 41 ELEVATOR CONSTRUCTORS LOCAL 41	1/1/2026	$48.46	$16.38	$11.06	$10.70	$0.00	$86.60
	1/1/2027	$50.56	$16.48	$11.16	$11.00	$0.00	$89.20
For apprentice rates see "Apprentice - ELEVATOR CONSTRUCTOR"							
FENCE & GUARD RAIL ERECTOR (HEAVY & HIGHWAY) LABORERS LABORERS - ZONE 3 (HEAVY & HIGHWAY)	6/1/2026	$37.24	$10.90	$9.75	$6.60	$0.00	$64.49
	12/1/2026	$38.53	$10.90	$9.75	$6.60	$0.00	$65.78
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"							
FIELD ENG.INST/ROD-BLDG,SITE,HVY/HWY OPERATING ENGINEERS LOCAL 98 OPERATING ENGINEERS LOCAL 98	6/1/1999	$18.84	$4.80	$4.10	$0.00	$0.00	$27.74
FIELD ENG.PARTY CHIEF:BLDG,SITE,HVY/HWY OPERATING ENGINEERS LOCAL 98 OPERATING ENGINEERS LOCAL 98	6/1/1999	$21.33	$4.80	$4.10	$0.00	$0.00	$30.23
FIELD ENG.SURVEY CHIEF-BLDG,SITE,HVY/HWY OPERATING ENGINEERS LOCAL 98 OPERATING ENGINEERS LOCAL 98	6/1/1999	$22.33	$4.80	$4.10	$0.00	$0.00	$31.23

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
FIRE ALARM INSTALLER	6/28/2026	$54.41	$14.00	$8.43	$7.03	$0.00	$83.87
ELECTRICIANS LOCAL 7	1/3/2027	$55.56	$14.25	$8.47	$7.09	$0.00	$85.37
ELECTRICIANS LOCAL 7							
For apprentice rates see "Apprentice- ELECTRICIAN"							
FIRE ALARM REPAIR / MAINTENANCE	6/28/2026	$54.41	$14.00	$8.43	$7.03	$0.00	$83.87
/ COMMISSIONING	1/3/2027	$55.56	$14.25	$8.47	$7.09	$0.00	$85.37
ELECTRICIANS LOCAL 7							
ELECTRICIANS LOCAL 7							
For apprentice rates see "Apprentice- TELECOMMUNICATIONS TECHNICIAN"							
FIREMAN	12/1/2023	$39.03	$13.78	$12.15	$3.00	$0.00	$67.96
OPERATING ENGINEERS LOCAL 98							
OPERATING ENGINEERS LOCAL 98							

Apprentice: FIREMAN

Effective Date: 12/1/2023

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	60.00	$23.42	$13.78	$12.15	$3.00	$0.00	$52.35
2	70.00	$27.32	$13.78	$12.15	$3.00	$0.00	$56.25
3	80.00	$31.22	$13.78	$12.15	$3.00	$0.00	$60.15
4	90.00	$35.13	$13.78	$12.15	$3.00	$0.00	$64.06

Apprentice to Journeyworker Ratio: 1:6

FLAGGER & SIGNALER (HEAVY & HIGHWAY)	6/1/2026	$29.21	$10.90	$9.75	$6.60	$0.00	$56.46
LABORERS	12/1/2026	$29.21	$10.90	$9.75	$6.60	$0.00	$56.46
LABORERS - ZONE 3 (HEAVY & HIGHWAY)							
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)							
FLOORCOVERER	3/1/2026	$44.34	$8.56	$11.25	$6.90	$0.00	$71.05
FLOORCOVERERS LOCAL 2168	9/1/2026	$45.29	$8.56	$11.25	$6.90	$0.00	$72.00
FLOORCOVERERS LOCAL 2168 ZONE III	3/1/2027	$46.19	$8.56	$11.25	$6.90	$0.00	$72.90

Apprentice: FLOORCOVERER

Effective Date: 3/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	45.00	$19.95	$8.56	$0.00	$1.38	$0.00	$29.89
2	45.00	$19.95	$8.56	$0.00	$1.38	$0.00	$29.89
3	55.00	$24.39	$8.56	$0.00	$2.76	$0.00	$35.71
4	55.00	$24.39	$8.56	$0.00	$2.76	$0.00	$35.71
5	70.00	$31.04	$8.56	$11.25	$4.14	$0.00	$54.99
6	70.00	$31.04	$8.56	$11.25	$4.14	$0.00	$54.99
7	80.00	$35.47	$8.56	$11.25	$5.52	$0.00	$60.80
8	80.00	$35.47	$8.56	$11.25	$5.52	$0.00	$60.80

Construction

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

Apprentice: FLOORCOVERER

Effective Date: 9/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	45.00	$20.38	$8.56	$0.00	$1.38	$0.00	$30.32
2	45.00	$20.38	$8.56	$0.00	$1.38	$0.00	$30.32
3	55.00	$24.91	$8.56	$0.00	$2.76	$0.00	$36.23
4	55.00	$24.91	$8.56	$0.00	$2.76	$0.00	$36.23
5	70.00	$31.70	$8.56	$11.25	$4.14	$0.00	$55.65
6	70.00	$31.70	$8.56	$11.25	$4.14	$0.00	$55.65
7	80.00	$36.23	$8.56	$11.25	$5.52	$0.00	$61.56
8	80.00	$36.23	$8.56	$11.25	$5.52	$0.00	$61.56

Apprentice Notes

Steps are 750 hrs.

Apprentice to Journeyworker Ratio: 1:1

FORK LIFT OPERATING ENGINEERS LOCAL 98 OPERATING ENGINEERS LOCAL 98	12/1/2023	$39.25	$13.78	$12.15	$3.00	$0.00	$68.18

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

GENERATORS/LIGHTING PLANTS OPERATING ENGINEERS LOCAL 98 OPERATING ENGINEERS LOCAL 98	12/1/2023	$35.80	$13.78	$12.15	$3.00	$0.00	$64.73

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

GLAZIER (GLASS PLANK/AIR BARRIER/INTERIOR SYSTEMS) GLAZIERS LOCAL 1333 GLAZIERS LOCAL 1333	6/1/2026	$44.73	$11.20	$8.40	$6.05	$0.00	$70.38
	6/1/2027	$46.73	$11.60	$8.55	$6.60	$0.00	$73.48
	6/1/2028	$48.73	$12.00	$8.70	$7.20	$0.00	$76.63

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

Effective Date: 6/1/2026

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

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
Apprentice: GLAZIER (GLASS PLANK/AIR BARRIER/INTERIOR SYSTEMS)							
Effective Date: 6/1/2027							
Step / Percent		**Apprentice Base Wage**	**Health**	**Pension**	**Annuity**	**Supplemental Unemployment**	**Total Rate**
1 / 50.00		$23.37	$11.60	$8.55	$6.60	$0.00	$50.12
2 / 56.25		$26.29	$11.60	$8.55	$6.60	$0.00	$53.04
3 / 62.50		$29.21	$11.60	$8.55	$6.60	$0.00	$55.96
4 / 68.75		$32.13	$11.60	$8.55	$6.60	$0.00	$58.88
5 / 75.00		$35.05	$11.60	$8.55	$6.60	$0.00	$61.80
6 / 81.25		$37.97	$11.60	$8.55	$6.60	$0.00	$64.72
7 / 87.50		$40.89	$11.60	$8.55	$6.60	$0.00	$67.64
8 / 93.75		$43.81	$11.60	$8.55	$6.60	$0.00	$70.56
Apprentice to Journeyworker Ratio: 3:1							
GRADER/TRENCHING MACHINE/DERRICK OPERATING ENGINEERS LOCAL 98 OPERATING ENGINEERS LOCAL 98	12/1/2023	$39.56	$13.78	$12.15	$3.00	$0.00	$68.49
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
HVAC (DUCTWORK) SHEETMETAL WORKERS LOCAL 63 SHEETMETAL WORKERS LOCAL 63	7/1/2026	$43.48	$13.24	$11.01	$9.92	$2.13	$79.78
	1/1/2027	$43.48	$13.54	$11.01	$11.12	$2.13	$81.28
	7/1/2027	$44.98	$13.54	$11.01	$11.12	$2.13	$82.78
	1/1/2028	$46.48	$13.54	$11.01	$11.12	$2.13	$84.28
For apprentice rates see "Apprentice- SHEET METAL WORKER"							
HVAC (ELECTRICAL CONTROLS) ELECTRICIANS LOCAL 7 ELECTRICIANS LOCAL 7	6/28/2026	$54.41	$14.00	$8.43	$7.03	$0.00	$83.87
	1/3/2027	$55.56	$14.25	$8.47	$7.09	$0.00	$85.37
For apprentice rates see "Apprentice- ELECTRICIAN"							
HVAC (TESTING AND BALANCING - AIR) SHEETMETAL WORKERS LOCAL 63 SHEETMETAL WORKERS LOCAL 63	7/1/2026	$43.48	$13.24	$11.01	$9.92	$2.13	$79.78
	1/1/2027	$43.48	$13.54	$11.01	$11.12	$2.13	$81.28
	7/1/2027	$44.98	$13.54	$11.01	$11.12	$2.13	$82.78
	1/1/2028	$46.48	$13.54	$11.01	$11.12	$2.13	$84.28
For apprentice rates see "Apprentice- SHEET METAL WORKER"							
HVAC (TESTING AND BALANCING -WATER) PLUMBERS & PIPEFITTERS LOCAL 104 PLUMBERS & PIPEFITTERS LOCAL 104	3/17/2026	$52.76	$13.50	$10.85	$7.10	$0.00	$84.21
	9/17/2026	$54.76	$13.50	$10.85	$7.10	$0.00	$86.21
	3/17/2027	$58.26	$12.00	$10.85	$7.10	$0.00	$88.21
	9/17/2027	$60.26	$12.00	$10.85	$7.10	$0.00	$90.21
	3/17/2028	$62.26	$12.00	$10.85	$7.10	$0.00	$92.21
	9/17/2028	$64.26	$12.00	$10.85	$7.10	$0.00	$94.21
	3/17/2029	$66.26	$12.00	$10.85	$7.10	$0.00	$96.21
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"							
HVAC MECHANIC PLUMBERS & PIPEFITTERS LOCAL 104 PLUMBERS & PIPEFITTERS LOCAL 104	3/17/2026	$52.76	$13.50	$10.85	$7.10	$0.00	$84.21
	9/17/2026	$54.76	$13.50	$10.85	$7.10	$0.00	$86.21
	3/17/2027	$58.26	$12.00	$10.85	$7.10	$0.00	$88.21

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
	9/17/2027	$60.26	$12.00	$10.85	$7.10	$0.00	$90.21
	3/17/2028	$62.26	$12.00	$10.85	$7.10	$0.00	$92.21
	9/17/2028	$64.26	$12.00	$10.85	$7.10	$0.00	$94.21
	3/17/2029	$66.26	$12.00	$10.85	$7.10	$0.00	$96.21
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"							
HYDRAULIC DRILLS (HEAVY & HIGHWAY)	6/1/2026	$37.74	$10.90	$9.75	$6.60	$0.00	$64.99
LABORERS LABORERS - ZONE 3 (HEAVY & HIGHWAY)	12/1/2026	$39.03	$10.90	$9.75	$6.60	$0.00	$66.28
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"							
INSULATOR (PIPES & TANKS) HEAT & FROST INSULATORS LOCAL 6 HEAT & FROST INSULATORS LOCAL 6 (SPRINGFIELD)	9/1/2025	$48.27	$14.75	$9.52	$10.09	$0.00	$82.63
	9/1/2026	$51.01	$14.75	$9.52	$10.09	$0.00	$85.37

Apprentice: INSULATOR (PIPES & TANKS)

Effective Date: 9/1/2025

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$24.14	$14.75	$9.27	$5.05	$0.00	$53.21
2	60.00	$28.96	$14.75	$9.32	$6.05	$0.00	$59.08
3	70.00	$33.79	$14.75	$9.37	$7.06	$0.00	$64.97
4	80.00	$38.62	$14.75	$9.42	$8.07	$0.00	$70.86

Apprentice: INSULATOR (PIPES & TANKS)

Effective Date: 9/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$25.51	$14.75	$9.27	$5.05	$0.00	$54.58
2	60.00	$30.61	$14.75	$9.32	$6.05	$0.00	$60.73
3	70.00	$35.71	$14.75	$9.37	$7.06	$0.00	$66.89
4	80.00	$40.81	$14.75	$9.42	$8.07	$0.00	$73.05

Apprentice to Journeyworker Ratio: 1:4

IRONWORKER/WELDER IRONWORKERS LOCAL 7 IRONWORKERS LOCAL 7 (SPRINGFIELD AREA)	3/16/2026	$42.46	$9.25	$12.75	$11.25	$0.00	$75.71

Apprentice: IRONWORKER/WELDER

Effective Date: 3/16/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	70.00	$29.72	$9.25	$12.75	$1.25	$0.00	$52.97
2	80.00	$33.97	$9.25	$12.75	$1.25	$0.00	$57.22
3	90.00	$38.21	$9.25	$12.75	$1.25	$0.00	$61.46
4	0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
5	0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
Apprentice: IRONWORKER/WELDER							
Effective Date: 3/16/2026							
Step 6 — Percent 0.00		**Apprentice Base Wage** $0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Apprentice to Journeyworker Ratio: 1:4							
JACKHAMMER & PAVING BREAKER OPERATOR LABORERS LABORERS - ZONE 3 (BUILDING & SITE)	6/1/2026	$37.25	$10.90	$9.75	$8.62	$0.00	$66.52
	12/7/2026	$38.55	$10.90	$9.75	$8.62	$0.00	$67.82
	6/7/2027	$39.95	$10.90	$9.75	$8.62	$0.00	$69.22
	12/6/2027	$41.35	$10.90	$9.75	$8.62	$0.00	$70.62
	6/5/2028	$42.85	$10.90	$9.75	$8.62	$0.00	$72.12
	12/4/2028	$44.35	$10.90	$9.75	$8.62	$0.00	$73.62
For apprentice rates see "Apprentice- LABORER"							
LABORER LABORERS LABORERS - ZONE 3 (BUILDING & SITE)	6/1/2026	$37.00	$10.90	$9.75	$8.62	$0.00	$66.27
	12/7/2026	$38.30	$10.90	$9.75	$8.62	$0.00	$67.57
	6/7/2027	$39.70	$10.90	$9.75	$8.62	$0.00	$68.97
	12/6/2027	$41.10	$10.90	$9.75	$8.62	$0.00	$70.37
	6/5/2028	$42.60	$10.90	$9.75	$8.62	$0.00	$71.87
	12/4/2028	$44.10	$10.90	$9.75	$8.62	$0.00	$73.37

Apprentice: LABORER

Effective Date: 6/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	60.00	$22.20	$10.90	$9.75	$8.62	$0.00	$51.47
2	70.00	$25.90	$10.90	$9.75	$8.62	$0.00	$55.17
3	80.00	$29.60	$10.90	$9.75	$8.62	$0.00	$58.87
4	90.00	$33.30	$10.90	$9.75	$8.62	$0.00	$62.57

Apprentice: LABORER

Effective Date: 12/7/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	60.00	$22.98	$10.90	$9.75	$8.62	$0.00	$52.25
2	70.00	$26.81	$10.90	$9.75	$8.62	$0.00	$56.08
3	80.00	$30.64	$10.90	$9.75	$8.62	$0.00	$59.91
4	90.00	$34.47	$10.90	$9.75	$8.62	$0.00	$63.74

Apprentice to Journeyworker Ratio: 1:5

LABORER (HEAVY & HIGHWAY) LABORERS LABORERS - ZONE 3 (HEAVY & HIGHWAY)	6/1/2026	$36.99	$10.90	$9.75	$6.60	$0.00	$64.24
	12/1/2026	$38.28	$10.90	$9.75	$6.60	$0.00	$65.53

Construction

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

Apprentice: LABORER (HEAVY & HIGHWAY)

Effective Date: 6/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	60.00	$22.19	$10.90	$9.75	$6.60	$0.00	$49.44
2	70.00	$25.89	$10.90	$9.75	$6.60	$0.00	$53.14
3	80.00	$29.59	$10.90	$9.75	$6.60	$0.00	$56.84
4	90.00	$33.29	$10.90	$9.75	$6.60	$0.00	$60.54

Apprentice: LABORER (HEAVY & HIGHWAY)

Effective Date: 12/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	60.00	$22.97	$10.90	$9.75	$6.60	$0.00	$50.22
2	70.00	$26.80	$10.90	$9.75	$6.60	$0.00	$54.05
3	80.00	$30.62	$10.90	$9.75	$6.60	$0.00	$57.87
4	90.00	$34.45	$10.90	$9.75	$6.60	$0.00	$61.70

Apprentice to Journeyworker Ratio: 1:5

LABORER: CARPENTER TENDER LABORERS LABORERS - ZONE 3 (BUILDING & SITE)	6/1/2026	$37.00	$10.90	$9.75	$8.62	$0.00	$66.27
	12/7/2026	$38.30	$10.90	$9.75	$8.62	$0.00	$67.57
	6/7/2027	$39.70	$10.90	$9.75	$8.62	$0.00	$68.97
	12/6/2027	$41.10	$10.90	$9.75	$8.62	$0.00	$70.37
	6/5/2028	$42.60	$10.90	$9.75	$8.62	$0.00	$71.87
	12/4/2028	$44.10	$10.90	$9.75	$8.62	$0.00	$73.37
For apprentice rates see "Apprentice- LABORER"							
LABORER: CEMENT FINISHER TENDER LABORERS LABORERS - ZONE 3 (BUILDING & SITE)	6/1/2026	$37.00	$10.90	$9.75	$8.62	$0.00	$66.27
	12/7/2026	$38.30	$10.90	$9.75	$8.62	$0.00	$67.57
	6/7/2027	$39.70	$10.90	$9.75	$8.62	$0.00	$68.97
	12/6/2027	$41.10	$10.90	$9.75	$8.62	$0.00	$70.37
	6/5/2028	$42.60	$10.90	$9.75	$8.62	$0.00	$71.87
	12/4/2028	$44.10	$10.90	$9.75	$8.62	$0.00	$73.37
For apprentice rates see "Apprentice- LABORER"							
LABORER: HAZARDOUS WASTE/ASBESTOS REMOVER LABORERS LABORERS - ZONE 3 (BUILDING & SITE)	6/1/2026	$36.92	$10.90	$9.75	$8.75	$0.00	$66.32
	12/7/2026	$38.22	$10.90	$9.75	$8.75	$0.00	$67.62
	6/7/2027	$39.62	$10.90	$9.75	$8.75	$0.00	$69.02
	12/6/2027	$41.02	$10.90	$9.75	$8.75	$0.00	$70.42
	6/5/2028	$42.52	$10.90	$9.75	$8.75	$0.00	$71.92
	12/4/2028	$44.02	$10.90	$9.75	$8.75	$0.00	$73.42
For apprentice rates see "Apprentice- LABORER"							
LABORER: MASON TENDER LABORERS LABORERS - ZONE 3 (BUILDING & SITE)	6/1/2026	$40.00	$10.90	$9.75	$8.62	$0.00	$69.27
	12/7/2026	$41.30	$10.90	$9.75	$8.62	$0.00	$70.57
	6/7/2027	$42.70	$10.90	$9.75	$8.62	$0.00	$71.97

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
	12/6/2027	$44.10	$10.90	$9.75	$8.62	$0.00	$73.37
	6/5/2028	$45.60	$10.90	$9.75	$8.62	$0.00	$74.87
	12/4/2028	$47.10	$10.90	$9.75	$8.62	$0.00	$76.37
For apprentice rates see "Apprentice- LABORER"							
LABORER: MASON TENDER (HEAVY & HIGHWAY) LABORERS LABORERS - ZONE 3 (HEAVY & HIGHWAY)	6/1/2026	$37.24	$10.90	$9.75	$6.60	$0.00	$64.49
	12/1/2026	$38.53	$10.90	$9.75	$6.60	$0.00	$65.78
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"							
LABORER: MULTI-TRADE TENDER LABORERS LABORERS - ZONE 3 (BUILDING & SITE)	6/1/2026	$37.00	$10.90	$9.75	$8.62	$0.00	$66.27
	12/7/2026	$38.30	$10.90	$9.75	$8.62	$0.00	$67.57
	6/7/2027	$39.70	$10.90	$9.75	$8.62	$0.00	$68.97
	12/6/2027	$41.10	$10.90	$9.75	$8.62	$0.00	$70.37
	6/5/2028	$42.60	$10.90	$9.75	$8.62	$0.00	$71.87
	12/4/2028	$44.10	$10.90	$9.75	$8.62	$0.00	$73.37
For apprentice rates see "Apprentice- LABORER"							
LABORER: TREE REMOVER LABORERS LABORERS - ZONE 3 (BUILDING & SITE)	6/1/2026	$37.00	$10.90	$9.75	$8.62	$0.00	$66.27
	12/7/2026	$38.30	$10.90	$9.75	$8.62	$0.00	$67.57
	6/7/2027	$39.70	$10.90	$9.75	$8.62	$0.00	$68.97
	12/6/2027	$41.10	$10.90	$9.75	$8.62	$0.00	$70.37
	6/5/2028	$42.60	$10.90	$9.75	$8.62	$0.00	$71.87
	12/4/2028	$44.10	$10.90	$9.75	$8.62	$0.00	$73.37
This classification applies to the removal of standing trees, and the trimming and removal of branches and limbs when related to public works construction or site clearance incidental to construction . For apprentice rates see "Apprentice- LABORER"							
LASER BEAM OPERATOR LABORERS LABORERS - ZONE 3 (BUILDING & SITE)	6/1/2026	$37.25	$10.90	$9.75	$8.62	$0.00	$66.52
	12/7/2026	$38.55	$10.90	$9.75	$8.62	$0.00	$67.82
	6/7/2027	$39.95	$10.90	$9.75	$8.62	$0.00	$69.22
	12/6/2027	$41.35	$10.90	$9.75	$8.62	$0.00	$70.62
	6/5/2028	$42.85	$10.90	$9.75	$8.62	$0.00	$72.12
	12/4/2028	$44.35	$10.90	$9.75	$8.62	$0.00	$73.62
For apprentice rates see "Apprentice- LABORER"							
LASER BEAM OPERATOR (HEAVY & HIGHWAY) LABORERS LABORERS - ZONE 3 (HEAVY & HIGHWAY)	6/1/2026	$37.24	$10.90	$9.75	$6.60	$0.00	$64.49
	12/1/2026	$38.53	$10.90	$9.75	$6.60	$0.00	$65.78
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"							
MARBLE & TILE FINISHERS BRICKLAYERS LOCAL 3 BRICKLAYERS LOCAL 3 (SPR/PITT) - MARBLE & TILE	8/1/2026	$47.32	$12.84	$15.10	$5.41	$0.00	$80.67
	2/1/2027	$48.44	$12.84	$15.10	$5.41	$0.00	$81.79

Apprentice: MARBLE & TILE FINISHERS

Effective Date: 8/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$23.66	$12.84	$15.10	$5.41	$0.00	$57.01
2	60.00	$28.39	$12.84	$15.10	$5.41	$0.00	$61.74

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
Apprentice: MARBLE & TILE FINISHERS							
Effective Date: 8/1/2026							
Step / Percent		**Apprentice Base Wage**					
3 / 70.00		$33.12	$12.84	$15.10	$5.41	$0.00	$66.47
4 / 80.00		$37.86	$12.84	$15.10	$5.41	$0.00	$71.21
5 / 90.00		$42.59	$12.84	$15.10	$5.41	$0.00	$75.94
Apprentice to Journeyworker Ratio: 1:5							
MECH. SWEEPER OPERATOR (ON CONST. SITES) OPERATING ENGINEERS LOCAL 98 OPERATING ENGINEERS LOCAL 98	12/1/2023	$39.56	$13.78	$12.15	$3.00	$0.00	$68.49
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
MECHANIC/WELDER/BOOM TRUCK OPERATING ENGINEERS LOCAL 98 OPERATING ENGINEERS LOCAL 98	12/1/2023	$39.03	$13.78	$12.15	$3.00	$0.00	$67.96
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
MILLWRIGHT (Zone 3) MILLWRIGHTS LOCAL 1121 MILLWRIGHTS LOCAL 1121 - Zone 3	1/5/2026	$45.20	$10.58	$11.47	$9.75	$0.00	$77.00
Apprentice: MILLWRIGHT (Zone 3)							
Effective Date: 1/5/2026							
Step / Percent		**Apprentice Base Wage**					
1 / 55.00		$24.86	$10.58	$0.00	$5.36	$0.00	$40.80
2 / 65.00		$29.38	$10.58	$0.00	$6.34	$0.00	$46.30
3 / 75.00		$33.90	$10.58	$11.47	$7.31	$0.00	$63.26
4 / 85.00		$38.42	$10.58	$11.47	$8.29	$0.00	$68.76
Apprentice Notes							
Step 1&2 Appr. indentured after 1/6/2020 receive no pension,							
Apprentice to Journeyworker Ratio: 1:4							
MORTAR MIXER LABORERS LABORERS - ZONE 3 (BUILDING & SITE)	6/1/2026	$37.25	$10.90	$9.75	$8.62	$0.00	$66.52
	12/7/2026	$38.55	$10.90	$9.75	$8.62	$0.00	$67.82
	6/7/2027	$39.95	$10.90	$9.75	$8.62	$0.00	$69.22
	12/6/2027	$41.35	$10.90	$9.75	$8.62	$0.00	$70.62
	6/5/2028	$42.85	$10.90	$9.75	$8.62	$0.00	$72.12
	12/4/2028	$44.35	$10.90	$9.75	$8.62	$0.00	$73.62
For apprentice rates see "Apprentice- LABORER"							
OILER OPERATING ENGINEERS LOCAL 98 OPERATING ENGINEERS LOCAL 98	12/1/2023	$35.02	$13.78	$12.15	$3.00	$0.00	$63.95
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
OTHER POWER DRIVEN EQUIPMENT - CLASS VI OPERATING ENGINEERS LOCAL 98 OPERATING ENGINEERS LOCAL 98	12/1/2023	$32.74	$13.78	$12.15	$3.00	$0.00	$61.67
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
PAINTER (BRIDGES/TANKS) PAINTERS LOCAL 35 PAINTERS LOCAL 35 - ZONE 3	1/1/2026	$59.56	$10.35	$12.00	$12.60	$0.00	$94.51

Apprentice: PAINTER (BRIDGES/TANKS)

Effective Date: 1/1/2026

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

Apprentice to Journeyworker Ratio: 1:1

PAINTER (SPRAY OR SANDBLAST, NEW) * * If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used. PAINTERS LOCAL 35 PAINTERS LOCAL 35 - ZONE 3	1/1/2026	$42.03	$10.35	$12.00	$8.35	$0.00	$72.73

Apprentice: PAINTER (SPRAY OR SANDBLAST, NEW) *

Effective Date: 1/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$21.02	$10.35	$0.00	$0.00	$0.00	$31.37
2	55.00	$23.12	$10.35	$0.00	$4.59	$0.00	$38.06
3	60.00	$25.22	$10.35	$0.00	$5.01	$0.00	$40.58
4	65.00	$27.32	$10.35	$0.00	$5.43	$0.00	$43.10
5	70.00	$29.42	$10.35	$12.00	$5.85	$0.00	$57.62
6	75.00	$31.52	$10.35	$12.00	$6.26	$0.00	$60.13
7	80.00	$33.62	$10.35	$12.00	$6.68	$0.00	$62.65
8	90.00	$37.83	$10.35	$12.00	$7.52	$0.00	$67.70

Apprentice to Journeyworker Ratio: 1:1

PAINTER (SPRAY OR SANDBLAST, REPAINT) PAINTERS LOCAL 35 PAINTERS LOCAL 35 - ZONE 3	1/1/2026	$39.35	$10.35	$12.00	$8.35	$0.00	$70.05

Construction

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

Apprentice: PAINTER (SPRAY OR SANDBLAST, REPAINT)

Effective Date: 1/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$19.68	$10.35	$0.00	$0.00	$0.00	$30.03
2	55.00	$21.64	$10.35	$0.00	$4.59	$0.00	$36.58
3	60.00	$23.61	$10.35	$0.00	$5.01	$0.00	$38.97
4	65.00	$25.58	$10.35	$0.00	$5.43	$0.00	$41.36
5	70.00	$27.55	$10.35	$12.00	$5.85	$0.00	$55.75
6	75.00	$29.51	$10.35	$12.00	$6.26	$0.00	$58.12
7	80.00	$31.48	$10.35	$12.00	$6.68	$0.00	$60.51
8	90.00	$35.42	$10.35	$12.00	$7.52	$0.00	$65.29

Apprentice to Journeyworker Ratio: 1:1

PAINTER / TAPER (BRUSH, NEW) *	1/1/2026	$40.63	$10.35	$12.00	$8.35	$0.00	$71.33

* If 30% or more of surfaces to be painted are new construction,
NEW paint rate shall be used.
PAINTERS LOCAL 35
PAINTERS LOCAL 35 - ZONE 3

Apprentice: PAINTER / TAPER (BRUSH, NEW) *

Effective Date: 1/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$20.32	$10.35	$0.00	$0.00	$0.00	$30.67
2	55.00	$22.35	$10.35	$0.00	$4.59	$0.00	$37.29
3	60.00	$24.38	$10.35	$0.00	$5.01	$0.00	$39.74
4	65.00	$26.41	$10.35	$0.00	$5.43	$0.00	$42.19
5	70.00	$28.44	$10.35	$12.00	$5.85	$0.00	$56.64
6	75.00	$30.47	$10.35	$12.00	$6.26	$0.00	$59.08
7	80.00	$32.50	$10.35	$12.00	$6.68	$0.00	$61.53
8	90.00	$36.57	$10.35	$12.00	$7.52	$0.00	$66.44

Apprentice to Journeyworker Ratio: 1:1

PAINTER / TAPER (BRUSH, REPAINT)	1/1/2026	$37.95	$10.35	$12.00	$8.35	$0.00	$68.65

PAINTERS LOCAL 35
PAINTERS LOCAL 35 - ZONE 3

Apprentice: PAINTER / TAPER (BRUSH, REPAINT)

Effective Date: 1/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$18.98	$10.35	$0.00	$0.00	$0.00	$29.33
2	55.00	$20.87	$10.35	$0.00	$4.59	$0.00	$35.81
3	60.00	$22.77	$10.35	$0.00	$5.01	$0.00	$38.13

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
Apprentice: PAINTER / TAPER (BRUSH, REPAINT)							
Effective Date: 1/1/2026							
Step / Percent		**Apprentice Base Wage**					
4 / 65.00		$24.67	$10.35	$0.00	$5.43	$0.00	$40.45
5 / 70.00		$26.57	$10.35	$12.00	$5.85	$0.00	$54.77
6 / 75.00		$28.46	$10.35	$12.00	$6.26	$0.00	$57.07
7 / 80.00		$30.36	$10.35	$12.00	$6.68	$0.00	$59.39
8 / 90.00		$34.16	$10.35	$12.00	$7.52	$0.00	$64.03
Apprentice to Journeyworker Ratio: 1:1							
PAINTER TRAFFIC MARKINGS (HEAVY/HIGHWAY) LABORERS LABORERS - ZONE 3 (HEAVY & HIGHWAY)	6/1/2026	$36.99	$10.90	$9.75	$6.60	$0.00	$64.24
	12/1/2026	$38.28	$10.90	$9.75	$6.60	$0.00	$65.53
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)							
PANEL & PICKUP TRUCKS DRIVER TEAMSTERS JOINT COUNCIL NO. 10 TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	6/1/2026	$41.78	$16.17	$21.78	$0.00	$0.00	$79.73
	12/1/2026	$41.78	$16.17	$23.52	$0.00	$0.00	$81.47
	1/1/2027	$41.78	$16.77	$23.52	$0.00	$0.00	$82.07
PIER AND DOCK CONSTRUCTOR (UNDERPINNING AND DECK) PILE DRIVER LOCAL 56 PILE DRIVER LOCAL 56 (ZONE 3)	8/1/2024	$49.19	$10.08	$11.62	$12.67	$0.00	$83.56
For apprentice rates see "Apprentice- PILE DRIVER"							
PILE DRIVER PILE DRIVER LOCAL 56 PILE DRIVER LOCAL 56 (ZONE 3)	8/1/2024	$49.19	$10.08	$11.62	$12.67	$0.00	$83.56
Apprentice: PILE DRIVER							
Effective Date: 8/1/2024							
Step / Percent		**Apprentice Base Wage**					
1 / 45.00		$22.14	$10.08	$0.00	$2.53	$0.00	$34.75
2 / 55.00		$27.05	$10.08	$0.00	$5.07	$0.00	$42.20
3 / 70.00		$34.43	$10.08	$11.62	$7.60	$0.00	$63.73
4 / 80.00		$39.35	$10.08	$11.62	$10.14	$0.00	$71.19
Apprentice to Journeyworker Ratio: 1:5							
PIPELAYER LABORERS LABORERS - ZONE 3 (BUILDING & SITE)	6/1/2026	$37.25	$10.90	$9.75	$8.62	$0.00	$66.52
	12/7/2026	$38.55	$10.90	$9.75	$8.62	$0.00	$67.82
	6/7/2027	$39.95	$10.90	$9.75	$8.62	$0.00	$69.22
	12/6/2027	$41.35	$10.90	$9.75	$8.62	$0.00	$70.62
	6/5/2028	$42.85	$10.90	$9.75	$8.62	$0.00	$72.12
	12/4/2028	$44.35	$10.90	$9.75	$8.62	$0.00	$73.62
For apprentice rates see "Apprentice- LABORER"							

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
PIPELAYER (HEAVY & HIGHWAY)	6/1/2026	$37.24	$10.90	$9.75	$6.60	$0.00	$64.49
LABORERS LABORERS - ZONE 3 (HEAVY & HIGHWAY)	12/1/2026	$38.53	$10.90	$9.75	$6.60	$0.00	$65.78
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)							
PLUMBER & PIPEFITTER	3/17/2026	$52.76	$13.50	$10.85	$7.10	$0.00	$84.21
PLUMBERS & PIPEFITTERS LOCAL 104 PLUMBERS & PIPEFITTERS LOCAL 104	9/17/2026	$54.76	$13.50	$10.85	$7.10	$0.00	$86.21
	3/17/2027	$58.26	$12.00	$10.85	$7.10	$0.00	$88.21
	9/17/2027	$60.26	$12.00	$10.85	$7.10	$0.00	$90.21
	3/17/2028	$62.26	$12.00	$10.85	$7.10	$0.00	$92.21
	9/17/2028	$64.26	$12.00	$10.85	$7.10	$0.00	$94.21
	3/17/2029	$66.26	$12.00	$10.85	$7.10	$0.00	$96.21

Apprentice: PLUMBER & PIPEFITTER

Effective Date: 3/17/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	45.00	$23.74	$13.50	$10.85	$0.00	$0.00	$48.09
2	50.00	$26.38	$13.50	$10.85	$0.00	$0.00	$50.73
3	55.00	$29.02	$13.50	$10.85	$0.00	$0.00	$53.37
4	60.00	$31.66	$13.50	$10.85	$0.00	$0.00	$56.01
5	65.00	$34.29	$13.50	$10.85	$0.00	$0.00	$58.64
6	70.00	$36.93	$13.50	$10.85	$0.00	$0.00	$61.28
7	75.00	$39.57	$13.50	$10.85	$0.00	$0.00	$63.92
8	80.00	$42.21	$13.50	$10.85	$0.00	$0.00	$66.56
9	85.00	$44.85	$13.50	$10.85	$7.10	$0.00	$76.30
10	85.00	$44.85	$13.50	$10.85	$7.10	$0.00	$76.30

Apprentice: PLUMBER & PIPEFITTER

Effective Date: 9/17/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	45.00	$24.64	$13.50	$10.85	$0.00	$0.00	$48.99
2	50.00	$27.38	$13.50	$10.85	$0.00	$0.00	$51.73
3	55.00	$30.12	$13.50	$10.85	$0.00	$0.00	$54.47
4	60.00	$32.86	$13.50	$10.85	$0.00	$0.00	$57.21
5	65.00	$35.59	$13.50	$10.85	$0.00	$0.00	$59.94
6	70.00	$38.33	$13.50	$10.85	$0.00	$0.00	$62.68
7	75.00	$41.07	$13.50	$10.85	$0.00	$0.00	$65.42
8	80.00	$43.81	$13.50	$10.85	$0.00	$0.00	$68.16
9	85.00	$46.55	$13.50	$10.85	$7.10	$0.00	$78.00
10	85.00	$46.55	$13.50	$10.85	$7.10	$0.00	$78.00

Apprentice Notes

**1:1,2:5,3:9,4:12

Apprentice to Journeyworker Ratio: 1:1

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
PNEUMATIC CONTROLS (TEMP.) PLUMBERS & PIPEFITTERS LOCAL 104 PLUMBERS & PIPEFITTERS LOCAL 104	3/17/2026	$52.76	$13.50	$10.85	$7.10	$0.00	$84.21
	9/17/2026	$54.76	$13.50	$10.85	$7.10	$0.00	$86.21
	3/17/2027	$58.26	$12.00	$10.85	$7.10	$0.00	$88.21
	9/17/2027	$60.26	$12.00	$10.85	$7.10	$0.00	$90.21
	3/17/2028	$62.26	$12.00	$10.85	$7.10	$0.00	$92.21
	9/17/2028	$64.26	$12.00	$10.85	$7.10	$0.00	$94.21
	3/17/2029	$66.26	$12.00	$10.85	$7.10	$0.00	$96.21
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"							
PNEUMATIC DRILL/TOOL OPERATOR (HEAVY & HIGHWAY) LABORERS LABORERS - ZONE 3 (HEAVY & HIGHWAY)	6/1/2026	$37.24	$10.90	$9.75	$6.60	$0.00	$64.49
	12/1/2026	$38.53	$10.90	$9.75	$6.60	$0.00	$65.78
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)							
POWDERMAN & BLASTER LABORERS LABORERS - ZONE 3 (BUILDING & SITE)	6/1/2026	$38.00	$10.90	$9.75	$8.62	$0.00	$67.27
	12/7/2026	$39.30	$10.90	$9.75	$8.62	$0.00	$68.57
	6/7/2027	$40.70	$10.90	$9.75	$8.62	$0.00	$69.97
	12/6/2027	$42.10	$10.90	$9.75	$8.62	$0.00	$71.37
	6/5/2028	$43.60	$10.90	$9.75	$8.62	$0.00	$72.87
	12/4/2028	$45.10	$10.90	$9.75	$8.62	$0.00	$74.37
For apprentice rates see "Apprentice- LABORER"							
POWDERMAN & BLASTER (HEAVY & HIGHWAY) LABORERS LABORERS - ZONE 3 (HEAVY & HIGHWAY)	6/1/2026	$37.99	$10.90	$9.75	$6.60	$0.00	$65.24
	12/1/2026	$39.28	$10.90	$9.75	$6.60	$0.00	$66.53
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)							
PUMP OPERATOR (CONCRETE) OPERATING ENGINEERS LOCAL 98 OPERATING ENGINEERS LOCAL 98	12/1/2023	$39.56	$13.78	$12.15	$3.00	$0.00	$68.49
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
PUMP OPERATOR (DEWATERING, OTHER) OPERATING ENGINEERS LOCAL 98 OPERATING ENGINEERS LOCAL 98	12/1/2023	$39.03	$13.78	$12.15	$3.00	$0.00	$67.96
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
READY-MIX CONCRETE DRIVER TEAMSTERS 404 - Construction Service (Northampton) TEAMSTERS 404 - Construction Service (Northampton)	5/1/2024	$26.14	$11.82	$7.25	$0.00	$0.00	$45.21
RIDE-ON MOTORIZED BUGGY OPERATOR LABORERS LABORERS - ZONE 3 (BUILDING & SITE)	6/1/2026	$37.25	$10.90	$9.75	$8.62	$0.00	$66.52
	12/7/2026	$38.55	$10.90	$9.75	$8.62	$0.00	$67.82
	6/7/2027	$39.95	$10.90	$9.75	$8.62	$0.00	$69.22
	12/6/2027	$41.35	$10.90	$9.75	$8.62	$0.00	$70.62
	6/5/2028	$42.85	$10.90	$9.75	$8.62	$0.00	$72.12
	12/4/2028	$44.35	$10.90	$9.75	$8.62	$0.00	$73.62
For apprentice rates see "Apprentice- LABORER"							
ROLLER OPERATOR OPERATING ENGINEERS LOCAL 98 OPERATING ENGINEERS LOCAL 98	12/1/2023	$38.42	$13.78	$12.15	$3.00	$0.00	$67.35
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
ROOFER (Coal tar pitch) ROOFERS LOCAL 248 ROOFERS LOCAL 248 For apprentice rates see "Apprentice- ROOFER"	7/16/2026	$46.73	$10.60	$8.70	$10.00	$0.00	$76.03
ROOFER (Inc.Roofer Waterproofng &Roofer Damproofg) ROOFERS LOCAL 248 ROOFERS LOCAL 248	7/16/2026	$46.23	$10.60	$8.70	$10.00	$0.00	$75.53
ROOFER SLATE / TILE / PRECAST CONCRETE ROOFERS LOCAL 248 ROOFERS LOCAL 248 For apprentice rates see "Apprentice- ROOFER"	7/16/2026	$46.73	$10.60	$8.70	$10.00	$0.00	$76.03
SCRAPER OPERATING ENGINEERS LOCAL 98 OPERATING ENGINEERS LOCAL 98 For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/1/2023	$39.03	$13.78	$12.15	$3.00	$0.00	$67.96
SELF-POWERED ROLLERS AND COMPACTORS (TAMPERS) OPERATING ENGINEERS LOCAL 98 OPERATING ENGINEERS LOCAL 98 For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/1/2023	$38.42	$13.78	$12.15	$3.00	$0.00	$67.35
SELF-PROPELLED POWER BROOM OPERATING ENGINEERS LOCAL 98 OPERATING ENGINEERS LOCAL 98 For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/1/2023	$35.80	$13.78	$12.15	$3.00	$0.00	$64.73
SHEETMETAL WORKER SHEETMETAL WORKERS LOCAL 63 SHEETMETAL WORKERS LOCAL 63	7/1/2026	$43.48	$13.24	$11.01	$9.92	$2.13	$79.78
	1/1/2027	$43.48	$13.54	$11.01	$11.12	$2.13	$81.28
	7/1/2027	$44.98	$13.54	$11.01	$11.12	$2.13	$82.78
	1/1/2028	$46.48	$13.54	$11.01	$11.12	$2.13	$84.28

Apprentice: SHEETMETAL WORKER

Effective Date: 7/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	45.00	$19.57	$5.96	$4.95	$0.00	$0.85	$31.33
2	50.00	$21.74	$6.62	$5.51	$0.00	$0.94	$34.81
3	55.00	$23.91	$7.28	$9.91	$0.00	$1.15	$42.25
4	60.00	$26.09	$7.94	$9.91	$0.00	$1.23	$45.17
5	65.00	$28.26	$8.60	$9.91	$0.00	$1.31	$48.08
6	70.00	$30.44	$9.27	$9.91	$0.00	$1.39	$51.01
7	75.00	$32.61	$9.93	$9.91	$0.00	$1.47	$53.92
8	80.00	$34.78	$10.59	$9.91	$9.92	$1.78	$66.98
9	85.00	$36.96	$11.25	$9.91	$9.92	$1.86	$69.90
10	90.00	$39.13	$11.92	$9.91	$9.92	$1.94	$72.82

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
Apprentice: SHEETMETAL WORKER							
Effective Date: 1/1/2027							
Step / Percent		**Apprentice Base Wage**					
1 / 45.00		$19.57	$6.09	$4.95	$0.00	$0.85	$31.46
2 / 50.00		$21.74	$6.77	$5.51	$0.00	$0.94	$34.96
3 / 55.00		$23.91	$7.45	$9.91	$0.00	$1.15	$42.42
4 / 60.00		$26.09	$8.36	$9.91	$0.00	$1.23	$45.59
5 / 65.00		$28.26	$8.86	$9.91	$0.00	$1.31	$48.34
6 / 70.00		$30.44	$9.48	$9.91	$0.00	$1.39	$51.22
7 / 75.00		$32.61	$10.15	$9.91	$0.00	$1.47	$54.14
8 / 80.00		$34.78	$10.83	$9.91	$11.12	$1.78	$68.42
9 / 85.00		$36.96	$11.51	$9.91	$11.12	$1.86	$71.36
10 / 90.00		$39.13	$12.18	$9.91	$11.12	$1.94	$74.28
Apprentice to Journeyworker Ratio: 1:3							
SPECIALIZED EARTH MOVING EQUIP < 35 TONS	6/1/2026	$42.24	$16.17	$21.78	$0.00	$0.00	$80.19
TEAMSTERS JOINT COUNCIL NO. 10	12/1/2026	$42.24	$16.17	$23.52	$0.00	$0.00	$81.93
TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	1/1/2027	$42.24	$16.77	$23.52	$0.00	$0.00	$82.53
SPECIALIZED EARTH MOVING EQUIP > 35 TONS	6/1/2026	$42.53	$16.17	$21.78	$0.00	$0.00	$80.48
TEAMSTERS JOINT COUNCIL NO. 10	12/1/2026	$42.53	$16.17	$23.52	$0.00	$0.00	$82.22
TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	1/1/2027	$42.53	$16.77	$23.52	$0.00	$0.00	$82.82
SPRINKLER FITTER	7/1/2026	$56.54	$13.60	$7.45	$9.41	$0.00	$87.00
SPRINKLER FITTERS LOCAL 669	10/1/2026	$56.54	$13.60	$7.45	$9.41	$0.00	$87.00
SPRINKLER FITTERS LOCAL 669	1/1/2027	$56.54	$14.55	$7.50	$9.41	$0.00	$88.00
	4/1/2027	$59.83	$14.55	$7.50	$9.41	$0.00	$91.29
	7/1/2027	$59.83	$14.55	$7.50	$9.41	$0.00	$91.29
	10/1/2027	$59.83	$14.55	$7.50	$9.41	$0.00	$91.29
	1/1/2028	$59.83	$15.50	$7.55	$9.41	$0.00	$92.29
Apprentice: SPRINKLER FITTER							
Effective Date: 7/1/2026							
Step / Percent		**Apprentice Base Wage**					
1 / 43.00		$28.36	$9.64	$0.00	$0.00	$0.00	$38.00
2 / 48.00		$31.66	$9.64	$0.00	$0.00	$0.00	$41.30
3 / 52.00		$34.29	$13.60	$7.45	$1.15	$0.00	$56.49
4 / 56.00		$36.93	$13.60	$7.45	$1.15	$0.00	$59.13
5 / 59.00		$38.91	$13.60	$7.45	$1.40	$0.00	$61.36
6 / 64.00		$42.21	$13.60	$7.45	$1.40	$0.00	$64.66
7 / 68.00		$44.85	$13.60	$7.45	$1.40	$0.00	$67.30
8 / 72.00		$47.48	$13.60	$7.45	$1.40	$0.00	$69.93
9 / 76.00		$50.12	$13.60	$7.45	$1.40	$0.00	$72.57
10 / 80.00		$52.76	$13.60	$7.45	$1.40	$0.00	$75.21

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
TELECOMMUNICATION TECHNICIAN TELECOMMUNICATION TECHNICIAN ELECTRICIANS LOCAL 7 ELECTRICIANS LOCAL 7	6/28/2026 1/3/2027	$54.41 $55.56	$14.00 $14.25	$8.43 $8.47	$7.03 $7.09	$0.00 $0.00	$83.87 $85.37

Apprentice: SPRINKLER FITTER

Effective Date: 10/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	43.00	$28.36	$0.00	$0.00	$0.00	$0.00	$28.36
2	48.00	$31.66	$0.00	$0.00	$0.00	$0.00	$31.66
3	52.00	$34.29	$0.00	$0.00	$1.15	$0.00	$35.44
4	56.00	$36.93	$0.00	$0.00	$1.15	$0.00	$38.08
5	59.00	$38.91	$0.00	$0.00	$1.40	$0.00	$40.31
6	64.00	$42.21	$0.00	$0.00	$1.40	$0.00	$43.61
7	68.00	$44.85	$0.00	$0.00	$1.40	$0.00	$46.25
8	72.00	$47.48	$0.00	$0.00	$1.40	$0.00	$48.88
9	76.00	$50.12	$0.00	$0.00	$1.40	$0.00	$51.52
10	80.00	$52.76	$0.00	$0.00	$1.40	$0.00	$54.16

Apprentice to Journeyworker Ratio: 1:1

For apprentice rates and ratios see "Apprentice- ELECTRICIAN"

Apprentice: TELECOMMUNICATION TECHNICIAN

Effective Date: 6/28/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	40.00	$21.76	$7.80	$0.63	$0.00	$0.00	$30.19
2	45.00	$24.48	$7.80	$0.70	$0.00	$0.00	$32.98
3	50.00	$27.21	$14.00	$7.53	$0.00	$0.00	$48.74
4	55.00	$29.93	$14.00	$7.61	$0.00	$0.00	$51.54
5	65.00	$35.37	$14.00	$9.84	$0.00	$0.00	$59.21
6	70.00	$38.09	$14.00	$11.30	$0.00	$0.00	$63.39

Apprentice: TELECOMMUNICATION TECHNICIAN

Effective Date: 1/3/2027

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	40.00	$22.22	$7.95	$0.63	$0.00	$0.00	$30.80
2	45.00	$25.00	$7.95	$0.70	$0.00	$0.00	$33.65
3	50.00	$27.78	$14.25	$7.53	$0.00	$0.00	$49.56
4	55.00	$30.56	$14.25	$7.61	$0.00	$0.00	$52.42
5	65.00	$36.11	$14.25	$9.84	$0.00	$0.00	$60.20
6	70.00	$38.89	$14.25	$11.30	$0.00	$0.00	$64.44

Apprentice to Journeyworker Ratio: 1:1

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
TERRAZZO FINISHERS	8/1/2026	$69.09	$12.84	$15.57	$8.02	$0.00	$105.52
BRICKLAYERS LOCAL 3 BRICKLAYERS LOCAL 3 (SPR/PITT) - MARBLE & TILE	2/1/2027	$70.49	$12.84	$15.57	$8.02	$0.00	$106.92

Apprentice: TERRAZZO FINISHERS

Effective Date: 8/1/2026

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

Apprentice: TERRAZZO FINISHERS

Effective Date: 2/1/2027

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

Apprentice to Journeyworker Ratio: 1:5

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
TERRAZZO MECHANIC	8/1/2026	$70.17	$12.84	$15.57	$7.99	$0.00	$106.57
BRICKLAYERS LOCAL 3 BRICKLAYERS LOCAL 3 (SPR/PITT) - MARBLE & TILE	2/1/2027	$71.57	$12.84	$15.57	$7.99	$0.00	$107.97

Apprentice: TERRAZZO MECHANIC

Effective Date: 8/1/2026

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$35.09	$12.84	$15.57	$7.99	$0.00	$71.49
2	60.00	$42.10	$12.84	$15.57	$7.99	$0.00	$78.50
3	70.00	$49.12	$12.84	$15.57	$7.99	$0.00	$85.52
4	80.00	$56.14	$12.84	$15.57	$7.99	$0.00	$92.54
5	90.00	$63.15	$12.84	$15.57	$7.99	$0.00	$99.55

Apprentice: TERRAZZO MECHANIC

Effective Date: 2/1/2027

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	50.00	$35.79	$12.84	$15.57	$7.99	$0.00	$72.19
2	60.00	$42.94	$12.84	$15.57	$7.99	$0.00	$79.34

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
Apprentice: TERRAZZO MECHANIC							
Effective Date: 2/1/2027							
Step / Percent		**Apprentice Base Wage**	**Health**	**Pension**	**Annuity**	**Supplemental Unemployment**	**Total Rate**
3 / 70.00		$50.10	$12.84	$15.57	$7.99	$0.00	$86.50
4 / 80.00		$57.26	$12.84	$15.57	$7.99	$0.00	$93.66
5 / 90.00		$64.41	$12.84	$15.57	$7.99	$0.00	$100.81
Apprentice to Journeyworker Ratio: 1:5							
TEST BORING DRILLER	6/1/2026	$53.25	$10.90	$9.75	$9.80	$0.00	$83.70
LABORERS LABORERS - FOUNDATION AND MARINE	12/1/2026	$54.75	$10.90	$9.75	$9.80	$0.00	$85.20
For apprentice rates see "Apprentice- LABORER"							
TEST BORING DRILLER HELPER	6/1/2026	$49.37	$10.90	$9.75	$9.80	$0.00	$79.82
LABORERS LABORERS - FOUNDATION AND MARINE	12/1/2026	$50.87	$10.90	$9.75	$9.80	$0.00	$81.32
For apprentice rates see "Apprentice- LABORER"							
TEST BORING LABORER	6/1/2026	$49.25	$10.90	$9.75	$9.80	$0.00	$79.70
LABORERS LABORERS - FOUNDATION AND MARINE	12/1/2026	$50.75	$10.90	$9.75	$9.80	$0.00	$81.20
For apprentice rates see "Apprentice- LABORER"							
TRACTORS	12/1/2023	$38.42	$13.78	$12.15	$3.00	$0.00	$67.35
OPERATING ENGINEERS LOCAL 98 OPERATING ENGINEERS LOCAL 98							
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
TRAILERS FOR EARTH MOVING EQUIPMENT	6/1/2026	$42.82	$16.17	$21.78	$0.00	$0.00	$80.77
TEAMSTERS JOINT COUNCIL NO. 10 TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	12/1/2026	$42.82	$16.17	$23.52	$0.00	$0.00	$82.51
	1/1/2027	$42.82	$16.77	$23.52	$0.00	$0.00	$83.11
TUNNEL WORK - COMPRESSED AIR	6/1/2026	$61.48	$10.90	$9.75	$10.25	$0.00	$92.38
LABORERS LABORERS (COMPRESSED AIR)	12/1/2026	$62.98	$10.90	$9.75	$10.25	$0.00	$93.88
For apprentice rates see "Apprentice- LABORER"							
TUNNEL WORK - COMPRESSED AIR (HAZ. WASTE)	6/1/2026	$63.48	$10.90	$9.75	$10.25	$0.00	$94.38
LABORERS LABORERS (COMPRESSED AIR)	12/1/2026	$64.98	$10.90	$9.75	$10.25	$0.00	$95.88
For apprentice rates see "Apprentice- LABORER"							
TUNNEL WORK - FREE AIR	6/1/2026	$53.55	$10.90	$9.75	$10.25	$0.00	$84.45
LABORERS LABORERS (FREE AIR TUNNEL)	12/1/2026	$55.05	$10.90	$9.75	$10.25	$0.00	$85.95
For apprentice rates see "Apprentice- LABORER"							
TUNNEL WORK - FREE AIR (HAZ. WASTE)	6/1/2026	$55.55	$10.90	$9.75	$10.25	$0.00	$86.45
LABORERS LABORERS (FREE AIR TUNNEL)	12/1/2026	$57.05	$10.90	$9.75	$10.25	$0.00	$87.95
For apprentice rates see "Apprentice- LABORER"							

Construction

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
VAC-HAUL TEAMSTERS JOINT COUNCIL NO. 10 TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	6/1/2026	$42.24	$16.17	$21.78	$0.00	$0.00	$80.19
	12/1/2026	$42.24	$16.17	$23.52	$0.00	$0.00	$81.93
	1/1/2027	$42.24	$16.77	$23.52	$0.00	$0.00	$82.53
WAGON DRILL OPERATOR LABORERS LABORERS - ZONE 3 (BUILDING & SITE)	6/1/2026	$37.25	$10.90	$9.75	$8.62	$0.00	$66.52
	12/7/2026	$38.55	$10.90	$9.75	$8.62	$0.00	$67.82
	6/7/2027	$39.95	$10.90	$9.75	$8.62	$0.00	$69.22
	12/6/2027	$41.35	$10.90	$9.75	$8.62	$0.00	$70.62
	6/5/2028	$42.85	$10.90	$9.75	$8.62	$0.00	$72.12
	12/4/2028	$44.35	$10.90	$9.75	$8.62	$0.00	$73.62
For apprentice rates see "Apprentice- LABORER"							
WAGON DRILL OPERATOR (HEAVY & HIGHWAY) LABORERS LABORERS - ZONE 3 (HEAVY & HIGHWAY)	6/1/2026	$37.24	$10.90	$9.75	$6.60	$0.00	$64.49
	12/1/2026	$38.53	$10.90	$9.75	$6.60	$0.00	$65.78
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"							
WATER METER INSTALLER PLUMBERS & PIPEFITTERS LOCAL 104 PLUMBERS & PIPEFITTERS LOCAL 104	3/17/2026	$52.76	$13.50	$10.85	$7.10	$0.00	$84.21
	9/17/2026	$56.26	$12.00	$10.85	$7.10	$0.00	$86.21
	3/17/2027	$58.26	$12.00	$10.85	$7.10	$0.00	$88.21
	9/17/2027	$60.26	$12.00	$10.85	$7.10	$0.00	$90.21
	3/17/2028	$62.26	$12.00	$10.85	$7.10	$0.00	$92.21
	9/17/2028	$64.26	$12.00	$10.85	$7.10	$0.00	$94.21
	3/17/2029	$66.26	$12.00	$10.85	$7.10	$0.00	$96.21
For apprentice rates see "Apprentice- PLUMBER/PIPEFITTER" or "PLUMBER/GASFITTER"							

Marine Drilling

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

Op Eng Marine (Dredging Work)

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

Outside Electrical

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
EQUIPMENT OPERATOR OUTSIDE ELECTRICAL WORKERS - WEST LOCAL 42 OUTSIDE ELECTRICAL WORKERS - WEST LOCAL 42 For apprentice rates see "Apprentice- LINEMAN"	9/1/2019	$44.67	$8.00	$12.55	$0.00	$0.00	$65.22
GROUNDMAN OUTSIDE ELECTRICAL WORKERS - WEST LOCAL 42 OUTSIDE ELECTRICAL WORKERS - WEST LOCAL 42 For apprentice rates see "Apprentice- LINEMAN"	9/1/2019	$30.58	$8.00	$5.48	$0.00	$0.00	$44.06
GROUNDMAN / TRUCK DRIVER OUTSIDE ELECTRICAL WORKERS - WEST LOCAL 42 OUTSIDE ELECTRICAL WORKERS - WEST LOCAL 42 For apprentice rates see "Apprentice- LINEMAN"	9/1/2019	$39.97	$8.00	$10.96	$0.00	$0.00	$58.93
HEAVY EQUIPMENT OPERATOR OUTSIDE ELECTRICAL WORKERS - WEST LOCAL 42 OUTSIDE ELECTRICAL WORKERS - WEST LOCAL 42 For apprentice rates see "Apprentice- LINEMAN"	9/1/2019	$47.01	$8.00	$13.22	$0.00	$0.00	$68.23
JOURNEYMAN LINEMAN OUTSIDE ELECTRICAL WORKERS - WEST LOCAL 42 OUTSIDE ELECTRICAL WORKERS - WEST LOCAL 42	9/1/2019	$51.71	$8.00	$15.55	$0.00	$0.00	$75.26

Apprentice: JOURNEYMAN LINEMAN

Effective Date: 9/1/2019

Step	Percent	Apprentice Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
1	60.00	$31.03	$8.00	$3.43	$0.00	$0.00	$42.46
2	65.00	$33.61	$8.00	$3.51	$0.00	$0.00	$45.12
3	70.00	$36.20	$8.00	$3.59	$0.00	$0.00	$47.79
4	75.00	$38.78	$8.00	$5.16	$0.00	$0.00	$51.94
5	80.00	$41.37	$8.00	$5.24	$0.00	$0.00	$54.61
6	85.00	$43.95	$8.00	$5.32	$0.00	$0.00	$57.27
7	90.00	$46.54	$8.00	$7.40	$0.00	$0.00	$61.94

Apprentice to Journeyworker Ratio: 1:2

TELEDATA CABLE SPLICER OUTSIDE ELECTRICAL WORKERS - WEST LOCAL 42 OUTSIDE ELECTRICAL WORKERS - WEST LOCAL 42	2/4/2019	$30.73	$4.70	$0.92	$2.25	$0.00	$38.60
TELEDATA LINEMAN/EQUIPMENT OPERATOR OUTSIDE ELECTRICAL WORKERS - WEST LOCAL 42 OUTSIDE ELECTRICAL WORKERS - WEST LOCAL 42	2/4/2019	$28.93	$4.70	$0.89	$2.25	$0.00	$36.77
TELEDATA WIREMAN/INSTALLER/TECHNICIAN OUTSIDE ELECTRICAL WORKERS - WEST LOCAL 42 OUTSIDE ELECTRICAL WORKERS - WEST LOCAL 42	2/4/2019	$28.93	$4.70	$0.89	$2.25	$0.00	$36.77
TRACTOR-TRAILER DRIVER OUTSIDE ELECTRICAL WORKERS - WEST LOCAL 42	9/1/2019	$44.67	$8.00	$12.55	$0.00	$0.00	$65.22

Outside Electrical

Classification	Effective Date	Base Wage	Health	Pension	Annuity	Supplemental Unemployment	Total Rate
OUTSIDE ELECTRICAL WORKERS - WEST LOCAL 42							

Additional Apprentice Information

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

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

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

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STANDARD FEDERAL EQUAL EMPLOYMENT OPPORTUNITY CONSTRUCTION CONTRACT SPECIFICATIONS

Revised August 19, 2026

1. As used in these specifications:

   a. "Covered area" means the geographical area described in the solicitation from which this contract resulted:

   b. "Director" means Director, Office of Federal Contract Compliance Programs, United States Department of Labor, or any person to whom the Director delegates authority.

   c. "Employer identification number" means the Federal Social Security number used on the Employer's Quarterly Federal Tax Return, U.S. Treasury Department Form 941.

   d. "Minority" includes:

      (i) Black (all persons having origins in any of the black African racial groups not of Hispanic origin);
      (ii) Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American or other Spanish Culture or origin, regardless of race);
      (iii) Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands); and
      (iv) American Indian or Alaskan Native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).

2. Whenever the Contractor, or any Subcontractor at any tier, subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of $ 10,000 the provisions of the specifications and the Notice which contains the applicable goals for minority and female participation and which is set forth in the solicitations from which this contract resulted.

3. If the Contractor is participating (41 CFR 60-4.5 and 23 CFR Part 230) in a Hometown Plan approved by the U.S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the Plan area (including goals and timetables) shall be in accordance with that Plan for those trades which have unions participating in the Plan. Contractors must be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each Contractor or Subcontractor participating in an approved Plan is individually required to comply with its obligations under the EEO clause, and to make a good faith effort to achieve each goal under the plan in each trade in which it has employees. The overall good faith performance by other Contractors or Subcontractors toward a goal in an approved Plan does not excuse any covered Contractor's or Subcontractor's failure to take good faith efforts to achieve the Plan goals and timetables.

4. The Contractor shall implement the specific affirmative action standards provided in Paragraphs 7a through p of these specifications. The goals set forth in the solicitation from which this contract resulted are expressed as percentages of the total hours of employment and training of minority and female utilization the Contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. The Contractor is expected to make substantially uniform progress toward its goals in each craft during the period specified.

5. Neither the provisions of any collective bargaining agreement, nor the failure by a union with whom the Contractor has a collective bargaining agreement, to refer either minorities or women shall excuse the Contractor's obligations under these specifications.

6. In order for the nonworking training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees must be employed by the Contractor during the training period, and the Contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U.S. Department of Labor.

7. The Contractor shall take specific affirmative actions to ensure equal employment opportunity. The evaluation of the Contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. The Contractor shall document these efforts fully, and shall implement affirmative action steps at least as extensive as the following:

   a. Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites, and all facilities at which the Contractor's employees are assigned to work. The Contractor, where possible, will assign two or more women to each construction project. The Contractor shall specifically ensure that all foremen, superintendents, and other on-site supervisory personnel are aware of and carry out the Contractor's obligation to maintain such a working environment, with specific attention to minority or female individuals working at such sites or in such facilities.

   b. Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when the Contractor or its unions have employment opportunities available, and maintain a record of the organizations' responses.

   c. Maintain a current file of the names, addresses and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the Contractor by the union or, if referred, not employed by the Contractor, this shall be documented in the file with the reason therefor, along with whatever additional actions the Contractor may have taken.

   d. Provide immediate written notification to the Director when the union or unions with which the Contractor has a collective bargaining agreement has not referred to the Contractor a minority person or woman sent by the Contractor, or when the Contractor has other information that the union referral process has impeded the Contractor's efforts to meet its obligations.

   e. Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the Contractor's employment needs, especially those programs funded or approved by the Department of Labor. The Contractor shall provide notice of these programs to the sources compiled under 7b above.

   f. Disseminate the Contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the Contractor in meeting its EEO obligations; by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc; by specific review of the policy with all management personnel and with all minority and female employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.

   g. Review, at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination or other employment decisions including specific review of these items with on-site supervisory personnel such as Superintendents, General Foremen, etc., prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.

   h. Disseminate the Contractor's EEO policy externally by including it in any advertising in the news media, specifically including minority and female news media, and providing written notification to and discussing the Contractor's EEO policy with other Contractors and Subcontractors with whom the Contractor does or anticipates doing business.

i. Direct its recruitment efforts both oral and written, to minority, female and community organizations, to schools with minority and female students and to minority and female recruitment and training organizations serving the Contractor's recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, the Contractor shall send written notification to organizations such as the above, describing the openings, screening procedures, and tests to be used in the selection process.

j. Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer and vacation employment to minority and female youth both on the site and in other areas of a Contractor's work force.

k. Validate all tests and other selection requirements are in compliance with 41 CFR Part 60-3 and 23 CFR Part 230.

l. Conduct, at least annually, an inventory and evaluation at least of all minority and female personnel for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., such opportunities.

m. Ensure that seniority practices, job classifications, work assignments and other personnel practices, do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that the EEO policy and the Contractor's obligations under these specifications are being carried out.

n. Ensure that all facilities and company activities are nonsegregated except that separate or single-user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.

o. Document and maintain a record of all solicitations of offers for subcontracts from minority and female construction contractors and suppliers, including circulation of solicitations to minority and female contractor associations and other business associations.

p. Conduct a review, at least annually, of all supervisor's adherence to and performance under the Contractor's EEO policies and affirmative action obligations.

8. Contractors are encouraged to participate in voluntary associations which assist in fulfilling one or more of their affirmative action obligations (7a through p). The efforts of a contractor association, joint contractor-union, contractor-community, or other similar group of which the contractor is a member and participant, may be asserted as fulfilling any one or more of its obligations under 7a through p of these Specifications provided that the Contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in the Contractor's minority and female work force participation, makes a good faith effort to meet its individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the Contractor. The obligation to comply, however, is the Contractor's and failure of such a group to fulfill an obligation shall not be a defense for the Contractor's noncompliance.

9. A single goal for minorities and a separate single goal for women have been established. The Contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and non-minority. Consequently, the Contractor may be in violation of the Executive Order if a particular group is employed in a substantially disparate manner (for example, even though the Contractor has achieved its goals for women generally, the Contractor may be in violation of the Executive Order if a specific minority group of women is underutilized).

10. The Contractor shall not use the goals and timetables of affirmative action standards to discriminate against any person because of race, color, religion, sex, or national origin.

11 The Contractor shall not enter into any Subcontract with any person or firm debarred from Government contracts.

12. The Contractor shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, including suspension, termination and cancellation of existing subcontracts as may be imposed or ordered by the Office of Federal Contract Compliance programs. Any Contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications.

13. The Contractor, in fulfilling its obligations under these specifications, shall implement specific affirmative action steps, at least as extensive as those standards prescribed in paragraph 7 of these specifications so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the Contractor fails to comply with the requirements of the Executive Order, the implementing regulations, or these specifications, the Director shall proceed in accordance with 41 CFR 60-4.8 and 23 CFR Part 230.

14. The Contractor shall designate a responsible official to monitor all employment related activity to ensure that the company EEO policy is being carried out, to submit reports relating to the provisions hereof as many be required by the Government and keep records. Records shall at least include for each employee the name, address, telephone numbers, construction trade, union affiliation if any, employee identification number when assigned, social security number, race, sex, status (e.g., mechanic, apprentice, trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, contractors shall not be required to maintain separate records.

15. Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon the application of requirements for the hiring of local or other area residents (e.g., those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).

APPENDIX A

The following goals and timetables for female utilization shall be included in all Federal and federally assisted construction contracts and subcontracts in excess of $ 10,000. The goals are applicable to the Contractor's aggregate on-site construction workforce whether or not part of that workforce is performing work on a Federal or federally-assisted construction contract or subcontract.

Area covered: Goal for Women apply nationwide

Goals and Timetables

Timetable	Goals (percent)
From Apr. 1, 1980 until further notice	6.9

APPENDIX B-80

Until further notice, the following goals for minority utilization in each construction craft and trade shall included in all Federal or federally assisted construction contracts and subcontracts in excess of $ 10,000 to be performed in the respective geographical areas. The goals are applicable to each nonexempt contractor's total on- site construction workforce, regardless of whether or not part of that workforce is performing work on a Federal, federally assisted or nonfederally related project, contract or subcontract.

Construction contractors participating in an approved Hometown Plan (see 41 CFR 6-4.5) are required to comply with the goals of the Hometown Plan with regard to construction work they perform in the area covered by the Hometown Plan. With regard to all their other covered construction work, such contractors are required to comply with the applicable SMSA or EA goal contained in this Appendix B-80.

Economic Areas

STATE:	Goals (percent)
MASSACHUSETTS	
004 Boston MA: SMSA Counties: 1123 Boston-Lowell-Brockton-Lawrence-Haverhill, MA-NH	4.0
MA Essex, MA Middlesex, MA Norfolk, MA Plymouth, MA Suffolk, NH Rockingham.	
5403 Fall River- New Bedford MA, Bristol	1.6
9243 Worcester-Fitchburg-Leominster, MA	1.6
6323 Springfield-Chicopee-Holyoke MA-CT MA Hampden, MA Hampshire	4.8
Non-SMSA Counties: MA Barnstable, MA Dukes, MA Nantucket	3.6
Non-SMSA Counties: MA Franklin	5.9

APPENDIX C

During the performance of this contract, the contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the "contractor") agrees as follows:

1. **Compliance with Regulations:** The contractor (hereinafter includes consultants) will comply with the Acts and Regulations relative to Non-discrimination in Federally-assisted programs of the U.S. Department of Transportation, Federal Highway Administration (FHWA), as they may be amended from time to time, which are herein incorporated by reference and made a part of this contract.

2. **Non-discrimination:** The contractor, with regard to the work performed by it during the contract, will not discriminate on the grounds of race, color, national origin (including limited English proficiency), age, sex, disability, or low-income status in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The contractor will not participate directly or indirectly in the discrimination prohibited by the Acts and the Regulations, including employment practices when the contract covers any activity, project, or program set forth in Appendix B of 49 CFR Part 21.

3. **Solicitations for Subcontractors, including Procurements of Materials and Equipment:** In all solicitations, either by competitive bidding, or negotiation made by the contractor for work to be performed under a subcontract, including procurements of materials, or leases of equipment, each potential subcontractor or supplier will be notified by the contractor of the contractor's obligations under this contract and the Acts and the Regulations relative to nondiscrimination on the grounds of race, color, national origin (including limited English proficiency), age, sex, disability, or low-income status.

4. **Information and Reports:** The contractor will provide all information and reports required by the Acts, the Regulations, and directives issued pursuant thereto, and will permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the Massachusetts Department of Transportation (MassDOT) or FHWA to be pertinent to ascertain compliance with such Acts, Regulations, and instructions. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish this information, the contractor will so certify to MassDOT or FHWA, as appropriate, and will set forth what efforts it has made to obtain the information.

5. **Sanctions for Noncompliance:** In the event of a contractor's noncompliance with the Nondiscrimination provisions of this contract, MassDOT will impose such contract sanctions as it or FHWA may determine to be appropriate, including, but not limited to:

    a. withholding payments to the contractor under the contract until the contractor complies; and/or
    b. cancelling, terminating, or suspending a control, in whole or in part.

6. **Incorporation of Provisions:** The contractor will include the provisions of paragraphs one through six in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Acts, the Regulations, and directives issued pursuant thereto. The contractor will take action with respect to any subcontract or procurement as MassDOT or FHWA may direct as a means of enforcing such provisions including sanctions for noncompliance. Provided, that if the contractor becomes involved in, or is threatened with litigation by a subcontractor, or supplier because of such direction, the contractor may request MassDOT to enter into any litigation to protect the interests of MassDOT. In addition, the contractor may request the United States to enter into the litigation to protect the interests of the United States.

APPENDIX D

During the performance of this contact, the contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the "contractor," which includes consultants) agrees to comply with the following non-discrimination statutes and authorities; including but not limited to:

PERTINENT NON-DISCRIMINATION AUTHORITIES:

- Title VI of the Civil Rights Act of 1964 (42 U.S.C. § 2000d *et seq.*, 78 stat. 252) (prohibits discrimination on the basis of race, color, national origin); and 49 CFR Part 21

- The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (42 U.S.C. § 4601) (prohibits unfair treatment of persons displaced or whose property has been acquired because of Federal or Federal-Aid programs and projects)

- Federal-Aid Highway Act of 1973 (23 U.S.C. § 324 *et seq.*) (prohibits discrimination on the basis of sex)

- Section 504 of the Rehabilitation Act of 1973 (29 U.S.C. § 794 *et seq.*), as amended (prohibits discrimination on the basis of disability) and 49 CFR Part 27

- The Age Discrimination Act of 1975, as amended (42 U.S.C. § 6101 *et seq.*) (prohibits discrimination on the basis of age)

- Airport and Airway Improvement Act of 1982 (49 U.S.C. § 471, Section 47123), as amended (prohibits discrimination based on race, creed, color, national origin, or sex)

- The Civil Rights Restoration Act of 1987 (PL 100-209) (broadened the scope, coverage, and applicability of Title VI of the Civil Rights Act of 1964, the Age Discrimination Act of 1975, and Section 504 of the Rehabilitation Act of 1973, by expanding the definition of the terms "programs or activities" to include all of the programs or activities of Federal-Aid recipients, sub-recipients, and contractors, whether such programs or activities are Federally funded or not)

- Titles II and III of the Americans with Disabilities Act (42 U.S.C. §§ 12131-12189), as implemented by Department of Transportation regulations at 49 CFR parts 37 and 38 (prohibits discrimination on the basis of disability in the operation of public entities, public and private transportation systems, places of public accommodation, and certain testing entities)

- The Federal Aviation Administration's Non-Discrimination Statute (49 U.S.C. § 47123) (prohibits discrimination on the basis of race, color, national origin, and sex)

- Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (ensures discrimination against minority populations by discouraging programs, policies, and activities with disproportionately high and adverse human health or environmental effects on minority and low-income populations)

- Executive Order 13166, Improving Access to Services for People with Limited English Proficiency, and resulting agency guidance, national origin discrimination includes discrimination because of limited English proficiency (LEP). To ensure compliance with Title VI, you must take reasonable steps to ensure that LEP persons have meaningful access to your programs (70 Fed. Reg. at 74087 to 74100)

- Title IX of the Education Amendments Act of 1972, as amended (20 U.S.C. 1681 *et seq.*) (prohibits discrimination on the basis of sex in education programs or activities)

*** END OF DOCUMENT ***

DOCUMENT 00880

Revised January 12, 2022

DEPARTMENT OF LABOR

Employment Standards Administration

MINIMUM WAGES FOR FEDERAL AND FEDERALLY ASSISTED CONTRACTS

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"General Decision Number: MA20260007 05/18/2026

State: Massachusetts

Construction Types: Highway

Counties: Massachusetts Counties of
Franklin

Modification Number	Publication Date
0	01/02/2026
1	05/18/2026

CARP0336-015 09/01/2025

	Rates	Fringes
CARPENTER	$ 43.33	27.82

ENGI0098-006 12/01/2024

	Rates	Fringes
POWER EQUIPMENT OPERATORS: CRANE A. PAID HOLIDAYS: NEW YEAR'S DAY, WASHINGTON'S BIRTHDAY, MEMORIAL DAY, INDEPENDENCE DAY, LABOR DAY, COLUMBUS DAY, VETERANS DAY, THANKSGIVING DAY AND CHRISTMAS DAY	$ 46.38	31.04
POWER EQUIPMENT OPERATORS: (4) ROLLER A. PAID HOLIDAYS: NEW YEAR'S DAY, WASHINGTON'S BIRTHDAY, MEMORIAL DAY, INDEPENDENCE DAY, LABOR DAY, COLUMBUS DAY, VETERANS DAY, THANKSGIVING DAY AND CHRISTMAS DAY	$ 39.12	31.04
POWER EQUIPMENT OPERATORS: (1) LOADER A. PAID HOLIDAYS: NEW YEAR'S DAY, WASHINGTON'S BIRTHDAY, MEMORIAL DAY, INDEPENDENCE DAY, LABOR DAY, COLUMBUS DAY, VETERANS DAY, THANKSGIVING DAY AND CHRISTMAS		

DAY.....$ 42.88
31.04
POWER EQUIPMENT OPERATORS: (1)
BACKHOE/EXCAVATOR/TRACKHOE A. PAID HOLIDAYS:
NEW YEAR'S DAY, WASHINGTON'S BIRTHDAY, MEMORIAL
DAY, INDEPENDENCE DAY, LABOR DAY, COLUMBUS DAY,
VETERANS DAY, THANKSGIVING DAY AND CHRISTMAS DAY....$ 42.88
31.04

IRON0007-025 09/16/2025

Rates
Fringes
IRONWORKER (REINFORCING AND STRUCTURAL).....$ 41.89
33.90

LABO0596-002 06/01/2025

Rates
Fringes
LABORER: COMMON OR GENERAL.....$ 35.00
26.91
LABORER (LANDSCAPE).....$ 35.00
26.91
LABORER (GUARDRAIL INSTALLATION).....$ 33.99
26.91
LABORER (ASPHALT, INCLUDES RAKER, SHOVELER,
SPREADER, AND DISTRIBUTOR).....$ 38.95
26.91

SUMA2014-003 01/11/2017

Rates
Fringes
PAINTER: SPRAY (LINESTRIPING).....$ 38.85
0.00

WELDERS - Receive rate prescribed for craft performing
operation to which welding is incidental.
==========
Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year.

Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at https://www.dol.gov/agencies/whd/government-contracts.

Note: Executive Order 13658 generally applies to contracts subject to the Davis-Bacon Act that were awarded on or between January 1, 2015 and January 29, 2022, and that have not been renewed or extended on or after January 30, 2022. Executive Order 13658 does not apply to contracts subject only to the Davis-Bacon Related Acts regardless of when they were awarded. If a contract is subject to Executive Order 13658, the contractor must pay all covered workers at least $13.65 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract from May 11, 2026, through December 31, 2026. The applicable Executive Order minimum wage rate will be adjusted annually. Additional information on contractor requirements and worker protections under Executive Order 13658 is available at www.dol.gov/whd/govcontracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (iii)).

The body of each wage determination lists the classifications and wage rates that have been found to be prevailing for the type(s) of construction and geographic area covered by the wage determination. The classifications are listed in alphabetical order under rate identifiers indicating whether the particular rate is a union rate (current union negotiated rate), a survey rate, a weighted union average rate, a state adopted rate, or a supplemental classification rate.

Union Rate Identifiers

A four-letter identifier beginning with characters other than "SU", "UAVG", "SA", or "SC" denotes that a union rate was prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2024. PLUM is an identifier of the union whose collectively bargained rate prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. The date, 07/01/2024 in the example, is the effective date of the most current negotiated rate.

Union prevailing wage rates are updated to reflect all changes over time that are reported to WHD in the rates in the collective bargaining agreement (CBA) governing the classification.

Union Average Rate Identifiers

The UAVG identifier indicates that no single rate prevailed for those classifications, but that 100% of the data reported for the classifications reflected union rates. EXAMPLE: UAVG-OH-0010 01/01/2024. UAVG indicates that the rate is a weighted union average rate. OH indicates the State of Ohio. The next number, 0010 in the example, is an internal number used in producing the wage determination. The date, 01/01/2024 in the example, indicates the date the wage determination was updated to reflect the most current union average rate.

A UAVG rate will be updated once a year, usually in January, to reflect a weighted average of the current rates in the collective bargaining agreements on which the rate is based.

Survey Rate Identifiers

The "SU" identifier indicates that either a single non-union rate prevailed (as defined in 29 CFR 1.2) for this classification in the survey or that the rate was derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As a weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SUFL2022-007 6/27/2024. SU indicates the rate is a single non-union prevailing rate or a weighted average of survey data for that classification. FL indicates the State of Florida. 2022 is the year of the survey on which these classifications and rates are

based. The next number, 007 in the example, is an internal number used in producing the wage determination. The date, 6/27/2024 in the example, indicates the survey completion date for the classifications and rates under that identifier.

"SU" wage rates typically remain in effect until a new survey is conducted. However, the Wage and Hour Division (WHD) has the discretion to update such rates under 29 CFR 1.6(c)(1).

State Adopted Rate Identifiers

The "SA" identifier indicates that the classifications and prevailing wage rates set by a state (or local) government were adopted under 29 C.F.R 1.3(g)-(h). Example: SAME2023-007 01/03/2024. SA reflects that the rates are state adopted. ME refers to the State of Maine. 2023 is the year during which the state completed the survey on which the listed classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. The date, 01/03/2024 in the example, reflects the date on which the classifications and rates under the "SA" identifier took effect under state law in the state from which the rates were adopted.

WAGE DETERMINATION APPEALS PROCESS

1) Has there been an initial decision in the matter? This can be:

a) a survey underlying a wage determination
b) an existing published wage determination
c) an initial WHD letter setting forth a position on a wage determination matter
d) an initial conformance (additional classification and rate) determination

On survey related matters, initial contact, including requests for summaries of surveys, should be directed to the WHD Branch of Wage Surveys. Requests can be submitted via email to davisbaconinfo@dol.gov or by mail to:

Branch of Wage Surveys
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

Regarding any other wage determination matter such as conformance decisions, requests for initial decisions should be directed to the WHD Branch of Construction Wage Determinations. Requests can be submitted via email to BCWD-Office@dol.gov or by mail to:

Branch of Construction Wage Determinations
Wage and Hour Division

U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2) If an initial decision has been issued, then any interested party (those affected by the action) that disagrees with the decision can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Requests for review and reconsideration can be submitted via email to dba.reconsideration@dol.gov or by mail to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210.

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END OF GENERAL DECISION

"

"General Decision Number: MA20260010 05/18/2026

State: Massachusetts

Construction Types: Heavy

Counties: Massachusetts Counties of
Berkshire, Franklin, Hampden and
Hampshire

Heavy and Marine Construction Projects

Modification Number	Publication Date
0	01/02/2026
1	05/18/2026

BOIL0029-001 01/01/2025

	Rates	Fringes
BOILERMAKER	$ 50.62	28.82

BRMA0001-005 08/01/2023

	Rates	Fringes
BRICKLAYERS; CEMENT MASONS; PLASTERERS; STONE MASONS; MARBLE, TILE & TERRAZZO WORKERS (SPRINGFIELD CHAPTER)	$ 50.81	32.27

BRMA0001-007 08/01/2023

	Rates	Fringes
BRICKLAYER: BRICKLAYERS; CEMENT MASONS; PLASTERERS; STONE MASONS; MARBLE, TILE & TERRAZZO WORKERS (SPRINGFIELD/PITTSFIELD CHAPTER BERKSHIRE COUNTY)	$ 50.81	32.27

CARP0056-004 08/01/2024

	Rates	Fringes
DIVER TENDER	$ 61.70	35.47
DIVER	$ 78.11	35.47

CARP0056-009 08/01/2024

	Rates	Fringes
PILEDRIVERMAN	$ 51.97	35.47

CARP0336-005 09/01/2025

	Rates	Fringes
CARPENTER (FRANKLIN COUNTY (ERVING, ORANGE, NORTH ORANGE, AND WARWICK))	$ 43.33	27.82

CARP0336-010 09/01/2025

	Rates	Fringes
CARPENTER (BERKSHIRE)	$ 43.33	27.82

CARP0336-012 09/01/2025

	Rates	Fringes
CARPENTER (HAMPDEN; HAMPSHIRE; AND FRANKLIN (REMAINDER OF COUNTY))	$ 43.33	27.82

CARP1121-004 04/21/2025

	Rates	Fringes
MILLWRIGHT	$ 43.42	33.00

ELEC0007-002 06/29/2025

	Rates	Fringes
ELECTRICIAN (HAMPDEN (EXCEPT CHESTER & HOLYOKE);		

HAMPSHIRE (BELCHERTOWN, WARE))....................$ 52.16
29.56

ELEC0007-003 06/29/2025

Rates
Fringes
ELECTRICIAN (BERKSHIRE; FRANKLIN; HAMPDEN (CHESTER,
HOLYOKE); HAMPSHIRE (EXCEPT BELCHERTOWN, WARE)).....$ 52.16
29.56

ENGI0098-007 12/01/2024

Rates
Fringes
POWER EQUIPMENT OPERATORS: GROUP 15 BOOM LENGTHS
OVER 350 FEET INCLUDING JIB HAZARDOUS WASTE
PREMIUM $2.00 FOOTNOTE FOR POWER EQUIPMENT
OPERATORS: A. PAID HOLIDAYS: NEW YEAR'S DAY,
WASHINGTON'S BIRTHDAY, MEMORIAL DAY, INDEPENDENCE
DAY, LABOR DAY, COLUMBUS DAY, VETERANS DAY,
THANKSGIVING DAY AND CHRISTMAS DAY.................$ 52.38
31.04
POWER EQUIPMENT OPERATORS: GROUP 14 BOOM LENGTHS
OVER 300 FEET INCLUDING JIB HAZARDOUS WASTE
PREMIUM $2.00 FOOTNOTE FOR POWER EQUIPMENT
OPERATORS: A. PAID HOLIDAYS: NEW YEAR'S DAY,
WASHINGTON'S BIRTHDAY, MEMORIAL DAY, INDEPENDENCE
DAY, LABOR DAY, COLUMBUS DAY, VETERANS DAY,
THANKSGIVING DAY AND CHRISTMAS DAY.................$ 50.88
31.04
POWER EQUIPMENT OPERATORS: GROUP 13 BOOM LENGTHS
OVER 250 FEET INCLUDING JIB HAZARDOUS WASTE
PREMIUM $2.00 FOOTNOTE FOR POWER EQUIPMENT
OPERATORS: A. PAID HOLIDAYS: NEW YEAR'S DAY,
WASHINGTON'S BIRTHDAY, MEMORIAL DAY, INDEPENDENCE
DAY, LABOR DAY, COLUMBUS DAY, VETERANS DAY,
THANKSGIVING DAY AND CHRISTMAS DAY.................$ 49.88
31.04
POWER EQUIPMENT OPERATORS: GROUP 12 BOOM LENGTHS
OVER 200 FEET INCLUDING JIB HAZARDOUS WASTE
PREMIUM $2.00 FOOTNOTE FOR POWER EQUIPMENT
OPERATORS: A. PAID HOLIDAYS: NEW YEAR'S DAY,
WASHINGTON'S BIRTHDAY, MEMORIAL DAY, INDEPENDENCE
DAY, LABOR DAY, COLUMBUS DAY, VETERANS DAY,
THANKSGIVING DAY AND CHRISTMAS DAY.................$ 48.88
31.04
POWER EQUIPMENT OPERATORS: GROUP 11 BOOM LENGTHS
OVER 150 FEET INCLUDING JIB HAZARDOUS WASTE
PREMIUM $2.00 FOOTNOTE FOR POWER EQUIPMENT

OPERATORS: A. PAID HOLIDAYS: NEW YEAR'S DAY, WASHINGTON'S BIRTHDAY, MEMORIAL DAY, INDEPENDENCE DAY, LABOR DAY, COLUMBUS DAY, VETERANS DAY, THANKSGIVING DAY AND CHRISTMAS DAY.....$ 47.38
31.04
POWER EQUIPMENT OPERATORS: GROUP 10 MASTER MECHANIC HAZARDOUS WASTE PREMIUM $2.00 FOOTNOTE FOR POWER EQUIPMENT OPERATORS: A. PAID HOLIDAYS: NEW YEAR'S DAY, WASHINGTON'S BIRTHDAY, MEMORIAL DAY, INDEPENDENCE DAY, LABOR DAY, COLUMBUS DAY, VETERANS DAY, THANKSGIVING DAY AND CHRISTMAS DAY.....$ 46.38
31.04
POWER EQUIPMENT OPERATORS: GROUP 9 OILER HAZARDOUS WASTE PREMIUM $2.00 FOOTNOTE FOR POWER EQUIPMENT OPERATORS: A. PAID HOLIDAYS: NEW YEAR'S DAY, WASHINGTON'S BIRTHDAY, MEMORIAL DAY, INDEPENDENCE DAY, LABOR DAY, COLUMBUS DAY, VETERANS DAY, THANKSGIVING DAY AND CHRISTMAS DAY.....$ 44.37
31.04
POWER EQUIPMENT OPERATORS: GROUP 8 TRUCK CRANE CREWS HAZARDOUS WASTE PREMIUM $2.00 FOOTNOTE FOR POWER EQUIPMENT OPERATORS: A. PAID HOLIDAYS: NEW YEAR'S DAY, WASHINGTON'S BIRTHDAY, MEMORIAL DAY, INDEPENDENCE DAY, LABOR DAY, COLUMBUS DAY, VETERANS DAY, THANKSGIVING DAY AND CHRISTMAS DAY....$ 44.06
31.04
POWER EQUIPMENT OPERATORS: GROUP 7 COMPRESSORS UP TO 315 CU FT; SMALL MIXERS WITH SKIP; PUMPS UP TO 4 INCHES; POWER HEATERS; OILER; A-FRAME TRUCKS; FORKLIFTS-UP TO 7 FT. LIFT AND UP TO 3 TON CAPACITY; HYDRO BROOM; STUD WELDER. HAZARDOUS WASTE PREMIUM $2.00 FOOTNOTE FOR POWER EQUIPMENT OPERATORS: A. PAID HOLIDAYS: NEW YEAR'S DAY, WASHINGTON'S BIRTHDAY, MEMORIAL DAY, INDEPENDENCE DAY, LABOR DAY, COLUMBUS DAY, VETERANS DAY, THANKSGIVING DAY AND CHRISTMAS DAY.....$ 54.38
31.04
POWER EQUIPMENT OPERATORS: GROUP 6 COMPRESSOR (ONE OR TWO) 315 CU FT TO 900 CU FT; PUMPS 4 INCHES TO 16 INCHES (TOTAL DISCHARGE). HAZARDOUS WASTE PREMIUM $2.00 FOOTNOTE FOR POWER EQUIPMENT OPERATORS: A. PAID HOLIDAYS: NEW YEAR'S DAY, WASHINGTON'S BIRTHDAY, MEMORIAL DAY, INDEPENDENCE DAY, LABOR DAY, COLUMBUS DAY, VETERANS DAY, THANKSGIVING DAY AND CHRISTMAS DAY.....$ 36.06
31.04
POWER EQUIPMENT OPERATORS: GROUP 5 HOISTS; CONVEYORS; POWER PAVEMENT BREAKERS; SELF-POWERED CONCRETE PAVEMENT FINISHING MACHINES; TWO BAG MIXERS WITH SKIP; MCCARTHY AND SIMILAR DRILLS;

BATCH PLANTS (NOT SELF LOADING); BULK CEMENT PLANTS; SELF-PROPELLED MATERIAL SPREADERS; THREE OR MORE 10 KW LIGHT PLANTS; 30 KW OR MORE GENERATORS; POWER BROOM. HAZARDOUS WASTE PREMIUM $2.00 FOOTNOTE FOR POWER EQUIPMENT OPERATORS: A. PAID HOLIDAYS: NEW YEAR'S DAY, WASHINGTON'S BIRTHDAY, MEMORIAL DAY, INDEPENDENCE DAY, LABOR DAY, COLUMBUS DAY, VETERANS DAY, THANKSGIVING DAY AND CHRISTMAS DAY.....$ 38.00
31.04
POWER EQUIPMENT OPERATORS: GROUP 4 ASPHALT ROLLERS; SELF-POWERED ROLLERS AND COMPACTORS; TRACTOR WITHOUT BLADE DRAWING SHEEPSFOOT ROLLER; RUBBER TIRE ROLLER; VIBRATORY ROLLER OR OTHER TYPE OF COMPACTORS INCLUDING MACHINES FOR PULVERIZING AND AERATING SOIL; YORK RAKE. HAZARDOUS WASTE PREMIUM $2.00 FOOTNOTE FOR POWER EQUIPMENT OPERATORS: A. PAID HOLIDAYS: NEW YEAR'S DAY, WASHINGTON'S BIRTHDAY, MEMORIAL DAY, INDEPENDENCE DAY, LABOR DAY, COLUMBUS DAY, VETERANS DAY, THANKSGIVING DAY AND CHRISTMAS DAY.....$ 39.12
31.04
POWER EQUIPMENT OPERATORS: GROUP 3 COMBINATION BACKHOE/LOADER UP TO 3/4 CU YD; SCRAPERS UP TO 21 CU YD (STRUCK LOAD, SELF PROPELLED OR TRACTOR DRAWN); TIREMAN; FRONT END LOADERS UP TO 4 YDS; WELL DRILLERS; ENGINEER OR FIREMAN ON HIGH PRESSURE BOILER; SELF-LOADING BATCH PLANT; WELL POINT OPERATORS ELECTRIC PUMPS USED IN WELL POINT SYSTEM; PUMPS, 16 INCHES AND OVER (TOTAL DISCHARGE); COMPRESSOR, ONE OR TWO 900 CU FT AND OVER; POWERED GREASE TRUCK; TUNNEL LOCOMOTIVES AND DINGYS; GROUT PUMPS; HYDRAULIC JACKS; BOOM TRUCK; HYDRAULIC CRANES- UP TO 10 TON. HAZARDOUS WASTE PREMIUM $2.00 FOOTNOTE FOR POWER EQUIPMENT OPERATORS: A. PAID HOLIDAYS: NEW YEAR'S DAY, WASHINGTON'S BIRTHDAY, MEMORIAL DAY, INDEPENDENCE DAY, LABOR DAY, COLUMBUS DAY, VETERANS DAY, THANKSGIVING DAY AND CHRISTMAS DAY.....$ 42.35
31.04
POWER EQUIPMENT OPERATORS: GROUP 2 ROTARY DRILL WITH MOUNTED COMPRESSOR; COMPRESSOR HOUSE (3 TO 6 COMPRESSORS); ROCK AND EARTH BORING MACHINES (EXCLUDING MCCARTHY AND SIMILAR DRILLS); FRONT END LOADERS 4 CU YDS TO 5 1/2 CU YDS); FORKLIFTS-7 FT LIFT AND OVER 3 TON CAPACITY; SCRAPER 21 YDS AND OVER (STRUCK LOAD); SONIC HAMMER CONSOLE; RECLAIMERS ROAD PLANER/MILLING MACHINE; CAL TRACKS; BALLAST REGULATORS; RAIL ANCHOR MACHINES; SWITCH TAMPERS, ASPHALT PAVERS; MECHANIC; WELDER AND

TRANSFER MACHINE. HAZARDOUS WASTE PREMIUM $2.00
FOOTNOTE FOR POWER EQUIPMENT OPERATORS: A. PAID
HOLIDAYS: NEW YEAR'S DAY, WASHINGTON'S BIRTHDAY,
MEMORIAL DAY, INDEPENDENCE DAY, LABOR DAY, COLUMBUS
DAY, VETERANS DAY, THANKSGIVING DAY AND CHRISTMAS
DAY.....$ 42.57
31.04
POWER EQUIPMENT OPERATORS: GROUP 1 SHOVELS;
CRAWLERS AND TRUCK CRANES INCLUDING ALL TOWER;
SELF-PROPELLED HYDRAULIC CRANES 10 TONS AND OVER;
DRAGLINES; CLAM SHELLS; CABLEWAYS; SHAFT HOISTS;
MUCKING MACHINES DERRICKS; BACKHOES; BULLDOZERS;
GRADALLS; ELEVATING GRADERS; PILE DRIVERS; CONCRETE
PAVERS; TRENCHING MACHINES; FRONT END LOADERS- 5
1/2 CU YDS AND OVER; DUAL DRUM PAVER; AUTOMATIC
GRADER-EXCAVATOR(C.M.I. OR EQUAL); SCRAPERS TOWING
PAN OR WAGON; TANDEM DOZERS OR PUSH CATS(2 UNITS IN
TANDEM); SHOTCRETE MACHINE; TUNNEL BORING MACHINE;
COMBINATION BACKHOE/LOADER 3/4 CU YD HOE OR OVER;
JET ENGINE DRYER; TREE SHREDDER; POST HOLE DIGGER;
POST HOLE HAMMER; POST EXTRACTOR; TRUCK MOUNTED
CONCRETE PUMP WITH BOOM; ROTO-MILL; GRADER;
HORIZONTAL DRILLING MACHINE; JOHN HENRY ROCK DRILL
AND SIMILAR EQUIPMENT. HAZARDOUS WASTE PREMIUM
$2.00 FOOTNOTE FOR POWER EQUIPMENT OPERATORS:
A. PAID HOLIDAYS: NEW YEAR'S DAY, WASHINGTON'S
BIRTHDAY, MEMORIAL DAY, INDEPENDENCE DAY, LABOR
DAY, COLUMBUS DAY, VETERANS DAY, THANKSGIVING DAY
AND CHRISTMAS DAY.....$ 42.88
31.04

IRON0007-014 09/16/2025

Rates
Fringes
IRONWORKER (BERKSHIRE (BECKET, EAST OTIS, HINSDALE,
MONTEREY, NEW MARLBORO, NORTH OTIS, OTIS, PERU,
SANDISFIELD, SAVOY, SHEFFIELD, WASHINGTON,
WINDSOR); FRANKLIN; HAMPDEN; HAMPSHIRE).....$ 41.89
33.90

IRON0012-003 07/01/2025

Rates
Fringes
IRONWORKER (BERKSHIRE (LEE)).....$ 40.75
31.91

IRON0012-004 07/01/2025

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                                                                Rates
Fringes
IRONWORKERS: STRUCTURAL, ORNAMENTAL, REINFORCING,
FENCE ERECTOR, MACHINERY MOVER, RIGGER, RODMAN,
STONE DERRICKMAN (BERKSHIRE (REMAINDER OF COUNTY))..$ 40.75
31.91
IRONWORKERS: SHEETER (BERKSHIRE (REMAINDER OF
COUNTY))..........................................$ 41.00
31.91
----------------------------------------------------------------

 LABO0022-002 12/01/2024
                                                                Rates
Fringes
LABORERS: GROUP 6 ASBESTOS ABATEMENT, TOXIC AND
HAZARDOUS WASTE LABORERS (FRANKLIN (ORANGE,
WARWICK))..........................................$ 40.95
29.70
LABORERS: GROUP 5 PRECAST FLOOR AND ROOF, PLANK
ERECTOR (FRANKLIN (ORANGE, WARWICK))...............$ 39.70
29.70
LABORERS: GROUP 4 BLASTER; POWDERMAN (FRANKLIN
(ORANGE, WARWICK))................................$ 39.95
29.70
LABORERS: GROUP 3 AIR TRACK OPERATOR; BLOCK PAVER;
RAMMER; CURB SETTER, HYDRAULIC AND SIMILAR
SELF-POWERED DRILLS (FRANKLIN (ORANGE, WARWICK))....$ 39.70
29.70
LABORERS: GROUP 2 ASPHALT RAKER; FENCE AND GUARD
RAIL ERECTOR; LASER BEAM OPERATOR; MASON TENMDER;
PIPELAYER; PNEUMATIC DRILL OPERATOR; PNEUMATIC TOOL
OPERATOR; WAGON DRILL OPERATORM JACKHAMMER
OPERATOR, PAVEMENT BREAKER, CARBIDE CORE DRILLING
MACHINE, CHAIN SAW OPERATOR, BARCO TYPE JUMPING
TAMPERS, CONCRETE PUMP, MOTORIZED MORTAR MINER,
RIDE-ON MOTORIZED BUGGY (FRANKLIN (ORANGE,
WARWICK))..........................................$ 39.20
29.70
LABORERS: GROUP 1 LABORERS; CARPENTER TENDERS;
CEMENT FINISHER TENDERS, PLASTERER TENDERS
(FRANKLIN (ORANGE, WARWICK))......................$ 38.95
29.70
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 LABO0473-005 12/01/2024
                                                                Rates
Fringes
LABORERS: GROUP 6 ASBESTOS ABATEMENT, TOXIC AND
HAZARDOUS WASTE LABORERS  (FRANKLIN (EXCEPT ORANGE
AND WARRICK); HAMPDEN AND HAMPSHIRE COUNTIES (WITH
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THE EXCEPTION OF CHESTERFIELD, CUMMINGTON, GOSHEN, MIDDLEFIELD, PLAINFIELD, AND WORTHINGTON)).....$ 35.00
29.70
LABORERS: GROUP 5 FLAGGERS (FRANKLIN (EXCEPT ORANGE AND WARRICK); HAMPDEN AND HAMPSHIRE COUNTIES (WITH THE EXCEPTION OF CHESTERFIELD, CUMMINGTON, GOSHEN, MIDDLEFIELD, PLAINFIELD, AND WORTHINGTON))..$ 27.01
29.70
LABORERS: GROUP 4 BLASTERS, POWDERMEN (FRANKLIN (EXCEPT ORANGE AND WARRICK); HAMPDEN AND HAMPSHIRE COUNTIES (WITH THE EXCEPTION OF CHESTERFIELD, CUMMINGTON, GOSHEN, MIDDLEFIELD, PLAINFIELD, AND WORTHINGTON))..$ 35.00
29.70
LABORERS: GROUP 3 AIR TRACK OPERATOR, BLOCK PAVERS, RAMMERS, CURB SETTERS (FRANKLIN (EXCEPT ORANGE AND WARRICK); HAMPDEN AND HAMPSHIRE COUNTIES (WITH THE EXCEPTION OF CHESTERFIELD, CUMMINGTON, GOSHEN, MIDDLEFIELD, PLAINFIELD, AND WORTHINGTON)).....$ 35.00
29.70
LABORERS: GROUP 2 ASPHALT RAKERS, FENCE AND GUARD RAIL ERECTORS, LASER BEAM OPERATOR, MASON TENDER, PIPELAYER, PNEUMATIC DRILL OPERATOR, PNEUMATIC TOOL OPERATOR, WAGON DRILL OPERATOR (FRANKLIN (EXCEPT ORANGE AND WARRICK); HAMPDEN AND HAMPSHIRE COUNTIES (WITH THE EXCEPTION OF CHESTERFIELD, CUMMINGTON, GOSHEN, MIDDLEFIELD, PLAINFIELD, AND WORTHINGTON))..$ 35.00
29.70
LABORERS: GROUP 1 CARPENTER TENDERS, CEMENT FINISHER TENDERS, LABORERS, WRECKING LABORERS (FRANKLIN (EXCEPT ORANGE AND WARRICK); HAMPDEN AND HAMPSHIRE COUNTIES (WITH THE EXCEPTION OF CHESTERFIELD, CUMMINGTON, GOSHEN, MIDDLEFIELD, PLAINFIELD, AND WORTHINGTON))..$ 35.00
29.70

LABO0473-006 12/01/2024

Rates
Fringes
LABORERS: GROUP 6 ASBESTOS ABATEMENT, TOXIC AND HAZARDOUS WASTE LABORERS (BERKSHIRE; HAMPSHIRE COUNTIES (THE TOWNS OF CHESTERFIELD, CUMMINGTON, GOSHEN, MIDDLEFIELD, PLAINFIELD, AND WORTHINGTON ONLY))..$ 33.99
26.65
LABORERS: GROUP 5 FLAGGERS (BERKSHIRE; HAMPSHIRE COUNTIES (THE TOWNS OF CHESTERFIELD, CUMMINGTON, GOSHEN, MIDDLEFIELD, PLAINFIELD, AND WORTHINGTON

ONLY))..... $ 27.01
26.65
LABORERS: GROUP 4 BLASTERS, POWDERMEN (BERKSHIRE;
HAMPSHIRE COUNTIES (THE TOWNS OF CHESTERFIELD,
CUMMINGTON, GOSHEN, MIDDLEFIELD, PLAINFIELD, AND
WORTHINGTON ONLY))..... $ 33.99
26.65
LABORERS: GROUP 3 AIR TRACK OPERATOR, BLOCK PAVERS,
RAMMERS, CURB SETTERS (BERKSHIRE; HAMPSHIRE
COUNTIES (THE TOWNS OF CHESTERFIELD, CUMMINGTON,
GOSHEN, MIDDLEFIELD, PLAINFIELD, AND WORTHINGTON
ONLY))..... $ 33.99
26.65
LABORERS: GROUP 2 ASPHALT RAKERS, FENCE AND GUARD
RAIL ERECTORS, LASER BEAM OPERATOR, MASON TENDER,
PIPELAYER, PNEUMATIC DRILL OPERATOR, PNEUMATIC TOOL
OPERATOR, WAGON DRILL OPERATOR (BERKSHIRE;
HAMPSHIRE COUNTIES (THE TOWNS OF CHESTERFIELD,
CUMMINGTON, GOSHEN, MIDDLEFIELD, PLAINFIELD, AND
WORTHINGTON ONLY))..... $ 33.99
26.65
LABORERS: GROUP 1 CARPENTER TENDERS, CEMENT
FINISHER TENDERS, LABORERS, WRECKING LABORERS
(BERKSHIRE; HAMPSHIRE COUNTIES (THE TOWNS OF
CHESTERFIELD, CUMMINGTON, GOSHEN, MIDDLEFIELD,
PLAINFIELD, AND WORTHINGTON ONLY))..... $ 33.99
26.65

LABO1421-002 12/02/2024

Rates
Fringes
LABORERS: GROUP 6 ASBESTOS, LEAD PAINT, TOXIC AND
HAZARDOUS WASTE..... $ 46.25
29.70
LABORERS: GROUP 5 YARDMAN, BURNERS, SAWYERS..... $ 45.35
29.70
LABORERS: GROUP 4 YARDMAN (SALVAGE YARD ONLY)..... $ 42.25
29.70
LABORERS: GROUP 3 SMALL BACKHOES, LOADERS ON
TRACKS, BOBCAT TYPE LOADERS, HYDRAULIC ""BROCK"" TYPE
HAMMER OPERATORS, CONCRETE CUTTING SAWS..... $ 47.25
29.70
LABORERS: GROUP 2 BURNERS, JACKHAMMERS..... $ 47.00
29.70
LABORERS: GROUP 1 ADZEMAN, WRECKING LABORER..... $ 46.25
29.70

PAIN0035-010 07/01/2024

	Rates	Fringes
PAINTER: SPRAY, SANDBLAST (NEW CONSTRUCTION)	$ 39.48	31.85
PAINTER: BRUSH, TAPER (NEW CONSTRUCTION)	$ 38.78	31.85
PAINTER REPAINT: SPRAY, SANDBLAST	$ 36.80	31.85
PAINTER REPAINT: BRUSH, TAPER	$ 35.40	31.85
PAINTER REPAINT: BRIDGE	$ 56.76	31.85

PLUM0004-003 09/01/2025

	Rates	Fringes
PLUMBER AND STEAMFITTER (FRANKLIN (ORANGE))	$ 55.00	31.57

PLUM0104-004 09/17/2025

	Rates	Fringes
PLUMBERS AND PIPEFITTERS (BERKSHIRE (BECKET, OTIS, SANDISFIELD); FRANKLIN (EXCEPT MONROE, ROWE, AND THE WESTERN PART OF CHARLEMONT); HAMPDEN; HAMPSHIRE)	$ 52.26	31.05

PLUM0104-009 09/17/2025

	Rates	Fringes
PLUMBER AND STEAMFITTER (BERKSHIRE (EXCEPT OTIS, BECKET, SANDISFIELD); FRANKLIN (MONROE, ROWE AND THE WESTERN PART OF CHARLEMONT))	$ 52.26	31.05

TEAM0379-001 06/01/2025

	Rates	Fringes
TRUCK DRIVERS: GROUP 7 TRAILERS FOR EARTH MOVING EQUIPMENT (DOUBLE HOOKUP) POWER TRUCKS $.25 DIFFERENTIAL BY AXLE TUNNEL WORK (UNDERGROUND ONLY) $.40 DIFFERENTIAL BY AXLE HAZARDOUS MATERIALS (IN HOT ZONE ONLY) $2.00 PREMIUM FOOTNOTES: A. PAID HOLIDAYS: NEW YEAR'S DAY, WASHINGTON'S BIRTHDAY, MEMORIAL DAY, INDEPENDENCE		

DAY, LABOR DAY, PATRIOT'S DAY, COLUMBUS DAY, VETERAN'S DAY, THANKSGIVING DAY AND CHRISTMAS DAY
B. PAID VACATION: EMPLOYEES WITH 4 MONTHS TO 1 YEAR OF SERVICE RECEIVE 1/2 DAY'S PAY PER MONTH; 1 WEEK VACATION FOR 1 - 5 YEARS OF SERVICE; 2 WEEKS VACATION FOR 5 - 10 YEARS OF SERVICE; AND 3 WEEKS VACATION FOR MORE THAN 10 YEARS OF SERVICE.....$ 41.82
37.35
TRUCK DRIVERS: GROUP 6 SPECIALIZED EARTH MOVING EQUIPMENT OVER 35 TONS POWER TRUCKS $.25 DIFFERENTIAL BY AXLE TUNNEL WORK (UNDERGROUND ONLY) $.40 DIFFERENTIAL BY AXLE HAZARDOUS MATERIALS (IN HOT ZONE ONLY) $2.00 PREMIUM
FOOTNOTES: A. PAID HOLIDAYS: NEW YEAR'S DAY, WASHINGTON'S BIRTHDAY, MEMORIAL DAY, INDEPENDENCE DAY, LABOR DAY, PATRIOT'S DAY, COLUMBUS DAY, VETERAN'S DAY, THANKSGIVING DAY AND CHRISTMAS DAY
B. PAID VACATION: EMPLOYEES WITH 4 MONTHS TO 1 YEAR OF SERVICE RECEIVE 1/2 DAY'S PAY PER MONTH; 1 WEEK VACATION FOR 1 - 5 YEARS OF SERVICE; 2 WEEKS VACATION FOR 5 - 10 YEARS OF SERVICE; AND 3 WEEKS VACATION FOR MORE THAN 10 YEARS OF SERVICE.....$ 41.53
37.35
TRUCK DRIVERS: GROUP 5 SPECIALIZED EARTH MOVING EQUIPMENT UNDER 35 TONS OTHER THAN CONVENTIONAL TYPE TRUCKS; LOW BED; VACHUAL; MECHANICS, PAVING RESTORATION EQUIPMENT POWER TRUCKS $.25 DIFFERENTIAL BY AXLE TUNNEL WORK (UNDERGROUND ONLY) $.40 DIFFERENTIAL BY AXLE HAZARDOUS MATERIALS (IN HOT ZONE ONLY) $2.00 PREMIUM
FOOTNOTES: A. PAID HOLIDAYS: NEW YEAR'S DAY, WASHINGTON'S BIRTHDAY, MEMORIAL DAY, INDEPENDENCE DAY, LABOR DAY, PATRIOT'S DAY, COLUMBUS DAY, VETERAN'S DAY, THANKSGIVING DAY AND CHRISTMAS DAY
B. PAID VACATION: EMPLOYEES WITH 4 MONTHS TO 1 YEAR OF SERVICE RECEIVE 1/2 DAY'S PAY PER MONTH; 1 WEEK VACATION FOR 1 - 5 YEARS OF SERVICE; 2 WEEKS VACATION FOR 5 - 10 YEARS OF SERVICE; AND 3 WEEKS VACATION FOR MORE THAN 10 YEARS OF SERVICE.....$ 41.24
37.35
TRUCK DRIVERS: GROUP 4 FOUR AND FIVE AXLE EQUIPMENT POWER TRUCKS $.25 DIFFERENTIAL BY AXLE TUNNEL WORK (UNDERGROUND ONLY) $.40 DIFFERENTIAL BY AXLE HAZARDOUS MATERIALS (IN HOT ZONE ONLY) $2.00 PREMIUM FOOTNOTES: A. PAID HOLIDAYS: NEW YEAR'S DAY, WASHINGTON'S BIRTHDAY, MEMORIAL DAY, INDEPENDENCE DAY, LABOR DAY, PATRIOT'S DAY, COLUMBUS DAY, VETERAN'S DAY, THANKSGIVING DAY AND CHRISTMAS DAY B. PAID VACATION: EMPLOYEES WITH 4 MONTHS TO 1 YEAR OF SERVICE RECEIVE 1/2

DAY'S PAY PER MONTH; 1 WEEK VACATION FOR 1 - 5
YEARS OF SERVICE; 2 WEEKS VACATION FOR 5 - 10 YEARS
OF SERVICE; AND 3 WEEKS VACATION FOR MORE THAN 10
YEARS OF SERVICE.....$ 41.14
37.35
TRUCK DRIVERS: GROUP 3 THREE AXLE EQUIPMENT AND
TIREMAN POWER TRUCKS $.25 DIFFERENTIAL BY AXLE
TUNNEL WORK (UNDERGROUND ONLY) $.40 DIFFERENTIAL BY
AXLE HAZARDOUS MATERIALS (IN HOT ZONE ONLY) $2.00
PREMIUM FOOTNOTES: A. PAID HOLIDAYS: NEW
YEAR'S DAY, WASHINGTON'S BIRTHDAY, MEMORIAL DAY,
INDEPENDENCE DAY, LABOR DAY, PATRIOT'S DAY,
COLUMBUS DAY, VETERAN'S DAY, THANKSGIVING DAY AND
CHRISTMAS DAY B. PAID VACATION: EMPLOYEES
WITH 4 MONTHS TO 1 YEAR OF SERVICE RECEIVE 1/2
DAY'S PAY PER MONTH; 1 WEEK VACATION FOR 1 - 5
YEARS OF SERVICE; 2 WEEKS VACATION FOR 5 - 10 YEARS
OF SERVICE; AND 3 WEEKS VACATION FOR MORE THAN 10
YEARS OF SERVICE.....$ 41.02
37.35
TRUCK DRIVERS: GROUP 2 TWO AXLE EQUIPMENT; &
FORKLIFT OPERATOR POWER TRUCKS $.25 DIFFERENTIAL
BY AXLE TUNNEL WORK (UNDERGROUND ONLY) $.40
DIFFERENTIAL BY AXLE HAZARDOUS MATERIALS (IN HOT
ZONE ONLY) $2.00 PREMIUM FOOTNOTES: A.
PAID HOLIDAYS: NEW YEAR'S DAY, WASHINGTON'S
BIRTHDAY, MEMORIAL DAY, INDEPENDENCE DAY, LABOR
DAY, PATRIOT'S DAY, COLUMBUS DAY, VETERAN'S DAY,
THANKSGIVING DAY AND CHRISTMAS DAY B. PAID
VACATION: EMPLOYEES WITH 4 MONTHS TO 1 YEAR OF
SERVICE RECEIVE 1/2 DAY'S PAY PER MONTH; 1 WEEK
VACATION FOR 1 - 5 YEARS OF SERVICE; 2 WEEKS
VACATION FOR 5 - 10 YEARS OF SERVICE; AND 3 WEEKS
VACATION FOR MORE THAN 10 YEARS OF SERVICE.....$ 40.95
37.35
TRUCK DRIVERS: GROUP 1 STATION WAGONS; PANEL
TRUCKS; AND PICKUP TRUCKS POWER TRUCKS $.25
DIFFERENTIAL BY AXLE TUNNEL WORK (UNDERGROUND
ONLY) $.40 DIFFERENTIAL BY AXLE HAZARDOUS
MATERIALS (IN HOT ZONE ONLY) $2.00 PREMIUM
FOOTNOTES: A. PAID HOLIDAYS: NEW YEAR'S DAY,
WASHINGTON'S BIRTHDAY, MEMORIAL DAY, INDEPENDENCE
DAY, LABOR DAY, PATRIOT'S DAY, COLUMBUS DAY,
VETERAN'S DAY, THANKSGIVING DAY AND CHRISTMAS DAY
  B. PAID VACATION: EMPLOYEES WITH 4 MONTHS TO 1
YEAR OF SERVICE RECEIVE 1/2 DAY'S PAY PER MONTH; 1
WEEK VACATION FOR 1 - 5 YEARS OF SERVICE; 2 WEEKS
VACATION FOR 5 - 10 YEARS OF SERVICE; AND 3 WEEKS
VACATION FOR MORE THAN 10 YEARS OF SERVICE.....$ 40.78
37.35

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at https://www.dol.gov/agencies/whd/government-contracts.

Note: Executive Order 13658 generally applies to contracts subject to the Davis-Bacon Act that were awarded on or between January 1, 2015 and January 29, 2022, and that have not been renewed or extended on or after January 30, 2022. Executive Order 13658 does not apply to contracts subject only to the Davis-Bacon Related Acts regardless of when they were awarded. If a contract is subject to Executive Order 13658, the contractor must pay all covered workers at least $13.65 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract from May 11, 2026, through December 31, 2026. The applicable Executive Order minimum wage rate will be adjusted annually. Additional information on contractor requirements and worker protections under Executive Order 13658 is available at www.dol.gov/whd/govcontracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (iii)).

The body of each wage determination lists the classifications and wage rates that have been found to be prevailing for the type(s) of construction and geographic area covered by the wage determination. The classifications are listed in alphabetical order under rate identifiers indicating whether the particular rate is a union rate (current union negotiated rate), a survey rate, a weighted union average rate, a state adopted rate, or a supplemental classification rate.

Union Rate Identifiers

A four-letter identifier beginning with characters other than "SU", "UAVG", "SA", or "SC" denotes that a union rate was prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2024. PLUM is an identifier of the union whose collectively bargained rate prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. The date, 07/01/2024 in the example, is the effective date of the most current negotiated rate.

Union prevailing wage rates are updated to reflect all changes over time that are reported to WHD in the rates in the collective bargaining agreement (CBA) governing the classification.

Union Average Rate Identifiers

The UAVG identifier indicates that no single rate prevailed for those classifications, but that 100% of the data reported for the classifications reflected union rates. EXAMPLE: UAVG-OH-0010 01/01/2024. UAVG indicates that the rate is a weighted union average rate. OH indicates the State of Ohio. The next number, 0010 in the example, is an internal number used in producing the wage determination. The date, 01/01/2024 in the example, indicates the date the wage determination was updated to reflect the most current union average rate.

A UAVG rate will be updated once a year, usually in January, to reflect a weighted average of the current rates in the collective bargaining agreements on which the rate is based.

Survey Rate Identifiers

The "SU" identifier indicates that either a single non-union rate prevailed (as defined in 29 CFR 1.2) for this classification in the survey or that the rate was derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As a weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SUFL2022-007 6/27/2024. SU indicates the rate is a single non-union prevailing rate or a weighted average of survey data for that classification. FL indicates the State of Florida. 2022 is the year of the survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. The date, 6/27/2024 in the example, indicates the survey completion date for the classifications and rates under that identifier.

"SU" wage rates typically remain in effect until a new survey is conducted. However, the Wage and Hour Division (WHD) has the discretion to update such rates under 29 CFR 1.6(c)(1).

State Adopted Rate Identifiers

The "SA" identifier indicates that the classifications and prevailing wage rates set by a state (or local) government were adopted under 29 C.F.R 1.3(g)-(h). Example: SAME2023-007 01/03/2024. SA reflects that the rates are state adopted. ME refers to the State of Maine. 2023 is the year during which the state completed the survey on which the listed classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. The date, 01/03/2024 in the example, reflects the date on which the classifications and rates under the "SA" identifier took effect under state law in the state from which the rates were adopted.

WAGE DETERMINATION APPEALS PROCESS

1) Has there been an initial decision in the matter? This can be:

a) a survey underlying a wage determination
b) an existing published wage determination
c) an initial WHD letter setting forth a position on a wage determination matter
d) an initial conformance (additional classification and rate) determination

On survey related matters, initial contact, including requests for summaries of surveys, should be directed to the WHD Branch

of Wage Surveys. Requests can be submitted via email to davisbaconinfo@dol.gov or by mail to:

Branch of Wage Surveys
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

Regarding any other wage determination matter such as conformance decisions, requests for initial decisions should be directed to the WHD Branch of Construction Wage Determinations. Requests can be submitted via email to BCWD-Office@dol.gov or by mail to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2) If an initial decision has been issued, then any interested party (those affected by the action) that disagrees with the decision can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Requests for review and reconsideration can be submitted via email to dba.reconsideration@dol.gov or by mail to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210.

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END OF GENERAL DECISION

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"General Decision Number: MA20260006 05/18/2026

State: Massachusetts

Construction Types: Heavy

Counties: Massachusetts Counties of
Barnstable, Berkshire, Bristol, Dukes,
Essex, Franklin, Hampden, Hampshire,
Middlesex, Nantucket, Norfolk, Plymouth,
Suffolk and Worcester

Massachusetts All Dredging, except self-propelled hopper dredges, on the Atlantic Coast & tributary waters emptying into the Atlantic Ocean

Modification Number	Publication Date
1	01/30/2026
2	05/18/2026

ENGI0025-001 10/01/2025

	Rates	Fringes
DREDGING: CLASS D: OILER, DECKHAND, SHOREMAN, RODMAN, SCOWMAN, COOK, MESSMAN, PORTER/JANITOR. INCENTIVE PAY: (ADD TO HOURLY RATE) OPERATOR (NCCCO LICENSE/CERTIFICATION) $1.80 LICENSED TUG OPERATOR OVER 1000 HP (ASSIGNED AS MASTER) (USCG LICENSED MASTER OF TOWING VESSELS (MOTV) $1.80; LICENSED BOAT OPERATOR (ASSIGNED AS LEAD BOAT CAPTAIN) USCG LICENSED BOAT OPERATOR $1.30; ENGINEER (QMED AND TANKERMAN ENDORSEMENT OR LICENSED ENGINEER (USCG) $1.80 OILER (QMED AND TANKERMAN ENDORSEMENT (USCG) $1.80; ALL CLASSIFICATIONS (TANKERMAN ENDORSEMENT ONLY) USCG $1.55; DECKHAND OR MATE (AB WITH LIFEBOATMAN ENDORSEMENT (USCG) $1.80; ALL CLASSIFICATIONS (LIFEBOATMAN ENDORSEMENT ONLY (USCG) $1.55; WELDER (ABS CERTIFICATION) $1.55 FOOTNOTES APPLICABLE TO ABOVE CRAFTS: A. PAID HOLIDAYS: NEW YEAR'S DAY, MARTIN LUTHER KING, JR.'S BIRTHDAY, MEMORIAL		

DAY, GOOD FRIDAY, INDEPENDENCE DAY, LABOR DAY, VETERANS' DAY, THANKSGIVING DAY AND CHRISTMAS DAY B. VACATION: EIGHT PERCENT (8%) OF THE STRAIGHT TIME RATE, MULTIPLIED BY THE TOTAL HOURS WORKED.....$ 30.86
14.15
DREDGING: CLASS C2: BOAT OPERATOR. INCENTIVE PAY: (ADD TO HOURLY RATE) OPERATOR (NCCCO LICENSE/CERTIFICATION) $1.80 LICENSED TUG OPERATOR OVER 1000 HP (ASSIGNED AS MASTER) (USCG LICENSED MASTER OF TOWING VESSELS (MOTV) $1.80; LICENSED BOAT OPERATOR (ASSIGNED AS LEAD BOAT CAPTAIN) USCG LICENSED BOAT OPERATOR $1.30; ENGINEER (QMED AND TANKERMAN ENDORSEMENT OR LICENSED ENGINEER (USCG) $1.80 OILER (QMED AND TANKERMAN ENDORSEMENT (USCG) $1.80; ALL CLASSIFICATIONS (TANKERMAN ENDORSEMENT ONLY) USCG $1.55; DECKHAND OR MATE (AB WITH LIFEBOATMAN ENDORSEMENT (USCG) $1.80; ALL CLASSIFICATIONS (LIFEBOATMAN ENDORSEMENT ONLY (USCG) $1.55; WELDER (ABS CERTIFICATION) $1.55 FOOTNOTES APPLICABLE TO ABOVE CRAFTS: A. PAID HOLIDAYS: NEW YEAR'S DAY, MARTIN LUTHER KING, JR.'S BIRTHDAY, MEMORIAL DAY, GOOD FRIDAY, INDEPENDENCE DAY, LABOR DAY, VETERANS' DAY, THANKSGIVING DAY AND CHRISTMAS DAY B. VACATION: EIGHT PERCENT (8%) OF THE STRAIGHT TIME RATE, MULTIPLIED BY THE TOTAL HOURS WORKED.....$ 37.15
14.57
DREDGING: CLASS C1: MATE, DRAG BARGE OPERATOR, ASSISTANT FILL PLACER, WELDER, STEWARD. INCENTIVE PAY: (ADD TO HOURLY RATE) OPERATOR (NCCCO LICENSE/CERTIFICATION) $1.80 LICENSED TUG OPERATOR OVER 1000 HP (ASSIGNED AS MASTER) (USCG LICENSED MASTER OF TOWING VESSELS (MOTV) $1.80; LICENSED BOAT OPERATOR (ASSIGNED AS LEAD BOAT CAPTAIN) USCG LICENSED BOAT OPERATOR $1.30; ENGINEER (QMED AND TANKERMAN ENDORSEMENT OR LICENSED ENGINEER (USCG) $1.80 OILER (QMED AND TANKERMAN ENDORSEMENT (USCG) $1.80; ALL CLASSIFICATIONS (TANKERMAN ENDORSEMENT ONLY) USCG $1.55; DECKHAND OR MATE (AB WITH LIFEBOATMAN ENDORSEMENT (USCG) $1.80; ALL CLASSIFICATIONS (LIFEBOATMAN ENDORSEMENT ONLY (USCG) $1.55; WELDER (ABS CERTIFICATION) $1.55 FOOTNOTES APPLICABLE TO ABOVE CRAFTS: A. PAID HOLIDAYS: NEW YEAR'S DAY, MARTIN LUTHER KING, JR.'S BIRTHDAY, MEMORIAL DAY, GOOD FRIDAY, INDEPENDENCE DAY, LABOR DAY, VETERANS' DAY, THANKSGIVING DAY AND CHRISTMAS DAY B. VACATION: EIGHT PERCENT (8%) OF THE STRAIGHT TIME RATE, MULTIPLIED BY THE TOTAL HOURS WORKED.....$ 38.38
14.66

DREDGING: CLASS B2: CERTIFIED WELDER. INCENTIVE PAY: (ADD TO HOURLY RATE) OPERATOR (NCCCO LICENSE/CERTIFICATION) $1.80 LICENSED TUG OPERATOR OVER 1000 HP (ASSIGNED AS MASTER) (USCG LICENSED MASTER OF TOWING VESSELS (MOTV) $1.80; LICENSED BOAT OPERATOR (ASSIGNED AS LEAD BOAT CAPTAIN) USCG LICENSED BOAT OPERATOR $1.30; ENGINEER (QMED AND TANKERMAN ENDORSEMENT OR LICENSED ENGINEER (USCG) $1.80 OILER (QMED AND TANKERMAN ENDORSEMENT (USCG) $1.80; ALL CLASSIFICATIONS (TANKERMAN ENDORSEMENT ONLY) USCG $1.55; DECKHAND OR MATE (AB WITH LIFEBOATMAN ENDORSEMENT (USCG) $1.80; ALL CLASSIFICATIONS (LIFEBOATMAN ENDORSEMENT ONLY (USCG) $1.55; WELDER (ABS CERTIFICATION) $1.55 FOOTNOTES APPLICABLE TO ABOVE CRAFTS: A. PAID HOLIDAYS: NEW YEAR'S DAY, MARTIN LUTHER KING, JR.'S BIRTHDAY, MEMORIAL DAY, GOOD FRIDAY, INDEPENDENCE DAY, LABOR DAY, VETERANS' DAY, THANKSGIVING DAY AND CHRISTMAS DAY B. VACATION: EIGHT PERCENT (8%) OF THE STRAIGHT TIME RATE, MULTIPLIED BY THE TOTAL HOURS WORKED.....$ 39.46
14.73
DREDGING: CLASS B1: DERRICK OPERATOR (180 SWING), SPIDER/SPILL BARGE OPERATOR, ENGINEER, ELECTRICIAN, CHIEF WELDER, CHIEF MATE, FILL PLACER, OPERATOR II, MAINTENANCE ENGINEER, LICENSED BOAT OPERATOR, LICENSED CREW BOAT OPERATOR. INCENTIVE PAY: (ADD TO HOURLY RATE) OPERATOR (NCCCO LICENSE/CERTIFICATION) $1.80 LICENSED TUG OPERATOR OVER 1000 HP (ASSIGNED AS MASTER) (USCG LICENSED MASTER OF TOWING VESSELS (MOTV) $1.80; LICENSED BOAT OPERATOR (ASSIGNED AS LEAD BOAT CAPTAIN) USCG LICENSED BOAT OPERATOR $1.30; ENGINEER (QMED AND TANKERMAN ENDORSEMENT OR LICENSED ENGINEER (USCG) $1.80 OILER (QMED AND TANKERMAN ENDORSEMENT (USCG) $1.80; ALL CLASSIFICATIONS (TANKERMAN ENDORSEMENT ONLY) USCG $1.55; DECKHAND OR MATE (AB WITH LIFEBOATMAN ENDORSEMENT (USCG) $1.80; ALL CLASSIFICATIONS (LIFEBOATMAN ENDORSEMENT ONLY (USCG) $1.55; WELDER (ABS CERTIFICATION) $1.55 FOOTNOTES APPLICABLE TO ABOVE CRAFTS: A. PAID HOLIDAYS: NEW YEAR'S DAY, MARTIN LUTHER KING, JR.'S BIRTHDAY, MEMORIAL DAY, GOOD FRIDAY, INDEPENDENCE DAY, LABOR DAY, VETERANS' DAY, THANKSGIVING DAY AND CHRISTMAS DAY B. VACATION: EIGHT PERCENT (8%) OF THE STRAIGHT TIME RATE, MULTIPLIED BY THE TOTAL HOURS WORKED.....$ 41.93
14.90
DREDGING: CLASS A2: CRANE OPERATOR (360 SWING) INCENTIVE PAY: (ADD TO HOURLY RATE) OPERATOR

(NCCCO LICENSE/CERTIFICATION) $1.80 LICENSED TUG OPERATOR OVER 1000 HP (ASSIGNED AS MASTER) (USCG LICENSED MASTER OF TOWING VESSELS (MOTV) $1.80; LICENSED BOAT OPERATOR (ASSIGNED AS LEAD BOAT CAPTAIN) USCG LICENSED BOAT OPERATOR $1.30; ENGINEER (QMED AND TANKERMAN ENDORSEMENT OR LICENSED ENGINEER (USCG) $1.80 OILER (QMED AND TANKERMAN ENDORSEMENT (USCG) $1.80; ALL CLASSIFICATIONS (TANKERMAN ENDORSEMENT ONLY) USCG $1.55; DECKHAND OR MATE (AB WITH LIFEBOATMAN ENDORSEMENT (USCG) $1.80; ALL CLASSIFICATIONS (LIFEBOATMAN ENDORSEMENT ONLY (USCG) $1.55; WELDER (ABS CERTIFICATION) $1.55 FOOTNOTES APPLICABLE TO ABOVE CRAFTS: A. PAID HOLIDAYS: NEW YEAR'S DAY, MARTIN LUTHER KING, JR.'S BIRTHDAY, MEMORIAL DAY, GOOD FRIDAY, INDEPENDENCE DAY, LABOR DAY, VETERANS' DAY, THANKSGIVING DAY AND CHRISTMAS DAY B. VACATION: EIGHT PERCENT (8%) OF THE STRAIGHT TIME RATE, MULTIPLIED BY THE TOTAL HOURS WORKED.....$ 43.20
14.99
DREDGING: CLASS A1: DECK CAPTAIN; MECHANICAL DREDGE OPERATOR, LEVERMAN, LICENSED TUG OPERATOR OVER 1000 HP. INCENTIVE PAY: (ADD TO HOURLY RATE) OPERATOR (NCCCO LICENSE/CERTIFICATION) $1.80
LICENSED TUG OPERATOR OVER 1000 HP (ASSIGNED AS MASTER) (USCG LICENSED MASTER OF TOWING VESSELS (MOTV) $1.80; LICENSED BOAT OPERATOR (ASSIGNED AS LEAD BOAT CAPTAIN) USCG LICENSED BOAT OPERATOR $1.30; ENGINEER (QMED AND TANKERMAN ENDORSEMENT OR LICENSED ENGINEER (USCG) $1.80 OILER (QMED AND TANKERMAN ENDORSEMENT (USCG) $1.80; ALL CLASSIFICATIONS (TANKERMAN ENDORSEMENT ONLY) USCG $1.55; DECKHAND OR MATE (AB WITH LIFEBOATMAN ENDORSEMENT (USCG) $1.80; ALL CLASSIFICATIONS (LIFEBOATMAN ENDORSEMENT ONLY (USCG) $1.55; WELDER (ABS CERTIFICATION) $1.55 FOOTNOTES APPLICABLE TO ABOVE CRAFTS: A. PAID HOLIDAYS: NEW YEAR'S DAY, MARTIN LUTHER KING, JR.'S BIRTHDAY, MEMORIAL DAY, GOOD FRIDAY, INDEPENDENCE DAY, LABOR DAY, VETERANS' DAY, THANKSGIVING DAY AND CHRISTMAS DAY B. VACATION: EIGHT PERCENT (8%) OF THE STRAIGHT TIME RATE, MULTIPLIED BY THE TOTAL HOURS WORKED.....$ 48.48
15.34

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.
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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at https://www.dol.gov/agencies/whd/government-contracts.

Note: Executive Order 13658 generally applies to contracts subject
to the Davis-Bacon Act that were awarded on or between January 1,
2015 and January 29, 2022, and that have not been renewed or extended on or after January 30, 2022. Executive Order 13658 does
not apply to contracts subject only to the Davis-Bacon Related Acts
regardless of when they were awarded. If a contract is subject to
Executive Order 13658, the contractor must pay all covered workers
at least $13.65 per hour (or the applicable wage rate listed on this
wage determination, if it is higher) for all hours spent performing on
the contract from May 11, 2026, through December 31, 2026. The applicable Executive Order minimum wage rate will be adjusted annually.
Additional information on contractor requirements and worker protections under Executive Order 13658 is available at www.dol.gov/whd/govcontracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (iii)).

The body of each wage determination lists the classifications

and wage rates that have been found to be prevailing for the type(s) of construction and geographic area covered by the wage determination. The classifications are listed in alphabetical order under rate identifiers indicating whether the particular rate is a union rate (current union negotiated rate), a survey rate, a weighted union average rate, a state adopted rate, or a supplemental classification rate.

Union Rate Identifiers

A four-letter identifier beginning with characters other than "SU", "UAVG", "SA", or "SC" denotes that a union rate was prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2024. PLUM is an identifier of the union whose collectively bargained rate prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. The date, 07/01/2024 in the example, is the effective date of the most current negotiated rate.

Union prevailing wage rates are updated to reflect all changes over time that are reported to WHD in the rates in the collective bargaining agreement (CBA) governing the classification.

Union Average Rate Identifiers

The UAVG identifier indicates that no single rate prevailed for those classifications, but that 100% of the data reported for the classifications reflected union rates. EXAMPLE: UAVG-OH-0010 01/01/2024. UAVG indicates that the rate is a weighted union average rate. OH indicates the State of Ohio. The next number, 0010 in the example, is an internal number used in producing the wage determination. The date, 01/01/2024 in the example, indicates the date the wage determination was updated to reflect the most current union average rate.

A UAVG rate will be updated once a year, usually in January, to reflect a weighted average of the current rates in the collective bargaining agreements on which the rate is based.

Survey Rate Identifiers

The "SU" identifier indicates that either a single non-union rate prevailed (as defined in 29 CFR 1.2) for this classification in the survey or that the rate was derived by computing a weighted average rate based on all the rates

reported in the survey for that classification. As a weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SUFL2022-007 6/27/2024. SU indicates the rate is a single non-union prevailing rate or a weighted average of survey data for that classification. FL indicates the State of Florida. 2022 is the year of the survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. The date, 6/27/2024 in the example, indicates the survey completion date for the classifications and rates under that identifier.

"SU" wage rates typically remain in effect until a new survey is conducted. However, the Wage and Hour Division (WHD) has the discretion to update such rates under 29 CFR 1.6(c)(1).

State Adopted Rate Identifiers

The "SA" identifier indicates that the classifications and prevailing wage rates set by a state (or local) government were adopted under 29 C.F.R 1.3(g)-(h). Example: SAME2023-007 01/03/2024. SA reflects that the rates are state adopted. ME refers to the State of Maine. 2023 is the year during which the state completed the survey on which the listed classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. The date, 01/03/2024 in the example, reflects the date on which the classifications and rates under the "SA" identifier took effect under state law in the state from which the rates were adopted.

WAGE DETERMINATION APPEALS PROCESS

1) Has there been an initial decision in the matter? This can be:

a) a survey underlying a wage determination
b) an existing published wage determination
c) an initial WHD letter setting forth a position on a wage determination matter
d) an initial conformance (additional classification and rate) determination

On survey related matters, initial contact, including requests for summaries of surveys, should be directed to the WHD Branch of Wage Surveys. Requests can be submitted via email to davisbaconinfo@dol.gov or by mail to:

Branch of Wage Surveys
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

Regarding any other wage determination matter such as conformance decisions, requests for initial decisions should be directed to the WHD Branch of Construction Wage Determinations. Requests can be submitted via email to BCWD-Office@dol.gov or by mail to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2) If an initial decision has been issued, then any interested party (those affected by the action) that disagrees with the decision can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Requests for review and reconsideration can be submitted via email to dba.reconsideration@dol.gov or by mail to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210.

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END OF GENERAL DECISION

"

DOCUMENT A00801

SPECIAL PROVISIONS

BERNARDSTON

Federal Aid Project No. HIP(NGB)/FHG(BIP2)-003S(915)
Bridge Replacement, B-10-001, Route 10 over Fall River and Deck Replacement, B-10-018, Route 10 over I-91

Labor participation goals for this Project shall be 15.3% for minorities and 6.9% for women for each job category. The goals are applicable to both Contractor's and Subcontractor's on-site construction workforce. Refer to Document 00820 for details.

SCOPE OF WORK

All work under this Contract shall be done in conformance with the *2026 Standard Specifications for Highways and Bridges, the Supplemental Specifications* contained in this book, the *Construction Standard Details* in effect as of July 2026, the *1990 Standard Drawings for Signs and Supports*, the 2015 *Overhead Signal Structure and Foundation Standard Drawings*, the *11th Edition of the Manual on Uniform Traffic Control Devices (MUTCD)* and the *January 2026 Massachusetts Amendments to the MUTCD*, *the 1968 Standard Drawings for Traffic Signals and Highway Lighting*, the latest edition of The *American Standard for Nursery Stock*, the Plans and these Special Provisions.

The work under this contract consists of the proposed bridge replacement of State Route 10 (Church Street) over the Fall River (Bridge No. B-10-001) and the proposed deck replacement of State Route 10 (Northfield Road) over Interstate 91 (Bridge No. B-10-018), along with the roadway reconstruction of approximately 2,640 feet of State Route 10 in the Town of Bernardston.

The proposed improvements are needed to address the existing failing deck and substructure of the Fall River Bridge (B-10-001) and failing deck of the I-91 bridge (B-10-018). The proposed Fall River bridge will consist of a single span with continuous steel plate girders supported on spread footing abutments founded on bedrock. Painted buffered bicycle lanes and a painted median have been proposed for increased safety. The project also includes construction of a temporary access driveway for construction of B-10-001, realignment of the I-91 northbound off-ramp (SE) and the temporary relocation and construction of the I-91 southbound off-ramp (NW) to ease construction staging.

The improvements also include stage construction sequencing, control of water, earth excavation, ADA / AAB compliant sidewalk and pedestrian curb ramps, driveway reconstruction, full depth pavement, pavement fine milling and overlay, superpave asphalt pavement, bridge rail and highway guardrail, granite curb, utility relocations, riprap, pavement markings, signs, installation of Rectangular Rapid Flashing Beacons, water and drainage improvements, and other incidental work. Deck shoring and protective bridge shielding will be used to facilitate the staged demolition of both bridges and provide protection of falling or flying debris.

SUBSECTION 7.05 INSURANCE REQUIREMENTS

The insurance requirements set forth in this subsection are in addition to the requirements of the Standard Specifications.

7.05.B: Public Liability Insurance 4.

Asbestos Liability Insurance shall be obtained for this project.

CONTRACTOR QUESTIONS AND ADDENDUM ACKNOWLEDGEMENTS

Prospective bidders are required to submit all questions to the Construction Contracts Engineer by 3:00 P.M. on the Tuesday of the previous week before the scheduled bid opening date. Any questions received after this time will not be considered for review by the Department.

Contractors should email questions and addendum acknowledgements to the following email address massdotspecifications@dot.state.ma.us The MassDOT proposal number and municipality is to be placed in the subject line.

HOLIDAY WORK RESTRICTIONS

(Supplementing Subsection 7.09)

The District Highway Director (DHD) may authorize work to continue during these specified time periods if it is determined by the District that the work will not negatively impact the traveling public. DHD may allow work in those areas on a case by case basis and where work is behind barrier and will not impact traffic

Below are the holiday work restrictions:

New Years Day (Federal Holiday)
No work on major arterial roadways from 5:00 AM on the day before until the normal start of business on the next subsequent business day. No work on local roadways on the holiday without permission by the DHD and the local police chief.

Martin Luther King's Birthday (Federal Holiday)
No work restrictions due to traffic concerns, however work on local roadways requires permission by the DHD and local police chief.

President's Day (Federal Holiday)
No work restrictions due to traffic concerns, however work on local roadways requires permission by the DHD and local police chief.

Evacuation Day (Suffolk County State Holiday)
No work restrictions due to traffic concerns.

Patriot's Day (State Holiday)
Work restrictions will be in place for Districts 3 and 6 along the entire Boston Marathon route and any other locations that the DHD in those districts determine are warranted so as to not to impact the marathon. All other districts work restrictions will be as per DHD.

HOLIDAY WORK RESTRICTIONS (Continued)

Mother's Day
No work on Western Turnpike and Metropolitan Highway System from 5:00 AM on the Friday before, until the normal start of business on the following day.

Memorial Day (Federal Holiday)
No work on major arterial roadways from 5:00 AM on the Friday before, until the normal start of business on the following day.

Bunker Hill Day (Suffolk County State Holiday)
No work restrictions due to traffic concerns.

Juneteenth
No work restrictions due to traffic concerns, however work on local roadways requires permission by the DHD and local police chief.

Independence Day (Federal Holiday)
No work on major arterial roadways from 5:00 AM on the day before until the normal start of business on the next subsequent business day. No work on local roadways on the holiday without permission by the DHD and the local police chief.

Labor Day (Federal Holiday)
No work on major arterial roadways from 5:00 AM on the Friday before, until the normal start of business on the following day.

Columbus Day (Federal Holiday)
No work on major arterials from 5:00 AM on the Friday before, until the normal start of business on the following day

Veterans' Day (Federal Holiday)
No work restrictions due to traffic concerns.

Thanksgiving Day (Federal Holiday)
No work on major arterials from 5:00 AM two days before until the normal start of business on the following Monday.

Christmas Day (Federal Holiday)
No work on major arterial roadways from 5:00 AM on the day before until the normal start of business on the next subsequent business day.

NIGHTTIME WORK RESTRICTIONS
(Supplementing Subsection 7.09)

Route 10 shall be closed at the location of Fall River Bridge during nighttime / weekend work. Full weekend closures are anticipated to be required for deck pours during stages 2 and 3 of construction. The full weekend closure detour shall only be implemented from 9:00PM Friday night until 5:00AM Monday morning. Nighttime (non-full weekend) closures are anticipated for beam erection and demolition. Nighttime closures for beam erection and demolition shall only be implemented from 9:00PM to 5:00AM.

NONCONFORMING COMPRESSIVE STRENGTH OF CEMENT CONCRETE

Concrete with compressive strength test results failing to attain the limits specified in Table 901.64-3 of 901.64.B: Acceptance Testing shall be evaluated for structural adequacy and serviceability at the Contractors' expense. The Department will review all production records, the concrete test records, petrographic analysis report, field notes, and the placement records for the concrete in question. If the Engineer determines the material is found to be adequate to remain in place, payment shall be adjusted in accordance with the following formula:

$$P = \frac{2(fc - f'c)(UP)(Q)}{f'c}$$

Where:

P = pay adjustment for substandard concrete
$f'c$ = specified minimum compressive strength at 28 days
fc = substandard concrete cylinder compressive strength at 56 days
Q = quantity of concrete represented by the acceptance cylinders tested
UP = unit contract price or the lump sum breakdown price per cubic yard for the class of concrete involved complete in place

WORK SCHEDULE

(Supplementing Subsection 8.02)

The Contractor shall perform all work in accordance with work hours as follows: Monday through Friday (Excluding Holidays) 7:00 AM to 3:00 PM.

No work that impacts the traveled way shall be permitted during peak hour traffic (7:00 AM to 9:00 AM and 3:00 PM to 6:00 PM).

Contractual Milestones:

MS #01 – Contractor Field Completion – The Contractor shall achieve Contractor Field Completion within **1958 calendar days from Notice to Proceed**.

MS #02 – Substantial Completion – The Contractor shall achieve Substantial Completion within **1813 calendar days from Notice to Proceed**.

MS #03 – Full Beneficial Use – The Contractor shall achieve Full Beneficial Use within **1790 calendar days from Notice to Proceed.**

Access Restraints:

Access restraint, AR01 - OHW Relocation Completion, has been identified by the PUC Form. The contractor will be restricted from starting any physical bridge work **until 208 calendar days** after NTP to allow for the overhead wires to be relocated.

SOIL STOCKPILING DIRECTIVE P-22-001

Any stockpiling of soil must be performed in compliance with Policy Directive P-22-001, Off-Site Stockpiling of Soil from MassDOT Construction Projects. This directive limits the allowable locations for off-site stockpiling of soil generated during MassDOT projects and includes various requirements that must be satisfied by the contractor prior to off-site stockpiling. The Contractor is responsible for identifying a suitable stockpile location.

SUBSECTION 8.02 SCHEDULE OF OPERATIONS

Replace this subsection with the following:

An integrated cost and schedule controls program shall be implemented by the Contractor to track and document the progress of the Work from Notice to Proceed (NTP) through the Contractor Field Completion (CFC) Milestone. The Contractor's schedules will be used by the Engineer to monitor project progress, plan the level-of-effort required by the Department's work force and consultants and as a critical decision-making tool. Accordingly, the Contractor shall ensure that it complies fully with the requirements specified herein and that its schedules are both accurate and updated as required by the specification throughout the life of the project. Detailed requirements are provided in Division II, Section 722 Construction Scheduling.

TRUCK SAFETY DEVICES

(Supplementing Subsection 7.04: Motor Vehicles)

All motor vehicles subject to Section 7 of Chapter 90 to be operated under this Contract shall be equipped with safety devices as provided therein and in 540 CMR 4.00.

The Contractor shall certify to the Registry of Motor Vehicles, in a manner prescribed by the Registrar, that all applicable vehicles are equipped with Lateral Protective Devices, Convex Mirrors, Cross Over Mirror(s) and Back Up Cameras in accordance with the requirements of 540 CMR 4.00.

The Contractor shall provide evidence satisfactory to the Department to demonstrate compliance with the above certification requirement for all applicable vehicles operated under this Contract by the Contractor and its subcontractors and vendors in a manner set forth by the Department. Thereafter, the Contractor shall have an affirmative obligation to continue to provide such evidence of compliance on an ongoing basis and no later than 7 days after certification with the Registry of Motor Vehicles of any additional vehicles operated under this Contract by the Contractor and its subcontractors and vendors.

Non-compliance with respect to a vehicle that is subject to 540 CMR 4.00 may subject the Contractor to statutory fines as established in M.G.L. c. 90, § 7 and/or contractual remedies up to and including termination of the Contract.

SUBSECTION 7.24 SENSITIVE RESOURCE AREA

Add this subsection:

7.24 Removing and Resetting Stone Wall at 68 Church Street

The Contractor is hereby alerted to the presence of a "Sensitive Resource Area" located at 68 Church Street in Bernardston: **Dr. Elijah Carpenter House.** The Contractor shall remove and reset the existing stone wall in kind along the limits of the state highway layout from approximately Station 10 + 25 LT to Station 10 + 75 LT.

SUBSECTION 8.14 UTILITY COORDINATION, DOCUMENTATION, AND MONITORING RESPONSIBILITIES

A. GENERAL

In accordance with the provisions of Section 8.00 Prosecution and Progress, utility coordination is a critical aspect to this Contract. This section defines the responsibility of the Contractor and MassDOT, with regard to the initial utility relocation plan and changes that occur as the prosecution of the Work progresses. The Engineer, with assistance from the Contractor shall coordinate with Utility companies that are impacted by the Contractor's operations. To support this effort, the Contractor shall provide routine and accurate schedule updates, provide notification of delays, and provide documentation of the steps taken to resolve any conflicts for the temporary and/or permanent relocations of the impacted utilities. The Contractor shall provide copies to the Engineer of the Contractor communication with the Utility companies, including but not limited to:

- Providing advanced notice, for all utility-related meetings initiated by the Contractor.
- Providing meeting minutes for all utility-related meetings that the Contractor attends.
- Providing all test pit records.
- Request for Early Utility work requirements of this section (see below).
- Notification letters for any proposed changes to Utility start dates and/or sequencing.
- Written notification to the Engineer of all apparent utility delays within seven (7) Calendar Days after a recognized delay to actual work in the field – either caused by a Utility or the Contractor.
- Any communication, initiated by the Contractor, associated with additional Right-of-Way needs in support of utility work.
- Submission of completed Utility Completion Forms.

B. PROJECT UTILITY COORDINATION (PUC) FORM

The utility schedule and sequence information provided in the Project Utility Coordination Form (if applicable) is the best available information at the time of the bid and has been considered in setting the contract duration. The Contractor shall use all of this information in developing the bid price and the Baseline Schedule Submission, inclusive of the individual utility durations sequencing requirements, and any work that has been noted as potentially concurrent utility installations.

C. INITIATION OF UTILITY WORK

The Engineer will issue all initial notice-to-proceed dates to each Utility company based on either the:

1) Contractor's accepted Baseline Schedule
2) An approved Early Utility Request in the form of an Early Utility sub-net schedule (in accordance with the requirements of this Subsection)
3) An approved Proposal Schedule

SUBSECTION 8.14 (Continued)

C.1 - BASELINE SCHEDULE – UTILITY BASIS
The Contractor shall provide a Baseline Schedule submission in accordance with the requirements of Subsection 8.02 and inclusive of all of the information provided in the PUC Form that has been issued in the Contract documents. This is to include the utility durations, sequencing of work, allowable concurrent work, and all applicable considerations that have been depicted on the PUC Form.

C.2 – EARLY UTILITY REQUEST – (aka SUBNET SCHEDULE) PRIOR TO THE BASELINE
All early utility work is defined as any anticipated/required utility relocations that need to occur prior to the Baseline Schedule acceptance. In all cases of proposed early utility relocation, the Contractor shall present all known information at the pre-construction conference in the form of a 'sub-net' schedule showing when each early utility activity needs to be issued a notice-to-proceed. The Contractor shall provide advance notification of this intent to request early utility work in writing at or prior to the Pre-Construction meeting. Prior to officially requesting approval for early utility work, the Contractor shall also coordinate with MassDOT and all utility companies (private, state or municipal) which may be impacted by the Contract. If this request is acceptable to the Utilities and to MassDOT, the Engineer will issue a notice-to-proceed to the affected Utilities, based on these accepted dates.

C.3 – PROPOSAL SCHEDULE - CHANGES TO THE PUC FORM
If the Contractor intends to submit a schedule (in accordance with MassDOT Standard Specifications, Division I, Subsection 8.02) that contains durations or sequencing that vary from those provided in the Project Utility Coordination (PUC) Form, the Contactor must submit this as an intended change, in the form of a Proposal Schedule and in accordance with MassDOT Standard Specifications, Division I, Subsection 8.02. These proposed changes are subject to the approval of the Engineer and the impacted utilities, in the form of this Proposal Schedule and a proposed revision to the PUC form. The Contractor shall not proceed with any changes of this type without written authorization from the Engineer, that references the approved Proposal Schedule and PUC form changes. The submission of the Baseline Schedule should not include any of these types of proposed utility changes and should not delay the submission of the Baseline Schedule. As a prerequisite to the Proposal Schedule submission, and in advance of the utility notification(s) period, the Contractor shall coordinate the proposed utility changes with the Engineer and the utility companies, to develop a mutually agreed upon schedule, prior to the start of construction.

D. UTILITY DELAYS
The Contractor shall notify the Engineer upon becoming aware that a Utility owner is not advancing the work in accordance with the approved utility schedule. Such notice shall be provided to the Engineer no later than seven (7) calendar days after the occurrence of the event that the Contractor believes to be a utility delay. After such notice, the Engineer and the Contractor shall continue to diligently seek the Utility Owner's cooperation in performing their scope of Work.

In order to demonstrate that a critical path delay has been caused by a third-party Utility, the Contractor must demonstrate, through the requirements of the monthly Progress Schedule submissions and the supporting contract records associated with Subsection 8.02, 8.10 and 8.14, that the delays were beyond the control of the Contractor.

All documentation provided in this section is subject to the review and verification of the Engineer and, if required, the Utility Owner. In accordance with MassDOT Specifications, Division I, Subsection 8.10, a Time Extension will be granted for a delay caused by a Utility, only if the actual duration of the utility work is in excess of that shown on the Project Utility Coordination Form, and only if;

SUBSECTION 8.14 (Continued)

1) proper Notification of Delay was provided to MassDOT in accordance with the time requirements that are specified in this Section
2) the utility delay is a critical path impact to the Baseline Schedule (or most recently approved Progress Schedule)

E. LOCATION OF UTILITIES

The locations of existing utilities are shown on the Contract drawings as an approximation only. The Contractor shall perform a pre-construction utility survey, including any required test pits, to determine the location of all known utilities no later than thirty (30) calendar days before commencing physical site work in the affected area.

F. POST UTILITY SURVEY – NOTIFICATION

Following completion of a utility survey of existing locations, the Contractor will be responsible to notify the Engineer of any known conflicts associated with the actual location of utilities prior to the start of the work. The Engineer and the Contractor will coordinate with any utility whose assets are to be affected by the Work of this Contract. A partial list of utility contact information is provided in the Project Utility Coordination Form.

G. MEETINGS AND COOPERATION WITH UTILITY OWNERS

The Contractor shall notify the Engineer in advance of any meeting they initiate with a Utility Owner's representative to allow MassDOT to participate in the meeting if needed.

Prior to the Pre-Construction Meeting, the Contractor should meet with all Utility Owners who will be required to perform utility relocations within the first 6 months of the project, to update the affected utilities of the Project Utility Coordination Form and all other applicable Contract requirements that impact the Utilities. The Contractor shall copy the Engineer on any correspondence between the Utility Owner and the Contractor.

H. FORCE ACCOUNT / UTILITY MONITORING REQUIREMENTS

The Engineer will be responsible for recording daily Utility work force reports. The start, suspension, re-start, and completion dates of each of the Utilities, within each phase of the utility relocation work, will be monitored and agreed to by the Engineer and the Contractor as the work progresses.

I. ACCESS AND INSPECTION

The Contractor shall be responsible for allowing Utility owners access to their own utilities to perform the relocations and/or inspections. The Contractor shall schedule their work accordingly so as not to delay or prevent each utility from maintaining their relocation schedule.

BIDDERS LIST

Pursuant to the provisions of 49 CFR Part 26.11 all official bidders will be required to report the names, addresses and telephone numbers of all firms that submitted bids or quotes in connection with this project. Failure to comply with a written request for this information within 15 business days may result in a recommendation to the Prequalification Committee that prequalification status be suspended until the information is received.

The Department will survey all firms that have submitted bids or quotes during the previous year prior to setting the annual goal and shall request that each firm report its age and gross receipts for the year.

COMPLIANCE WITH THE NATIONAL DEFENSE AUTHORIZATION ACT

(Supplementing Subsection 7.01)

On all projects, the "Prohibition on Certain Telecommunications and Video Surveillance Services or Equipment" Regulation (2 CFR 200.216) prohibits the Contractor from using or furnishing the following telecommunications equipment or services:

- Telecommunications equipment produced by Huawei Technologies Company or ZTE Corporation (or any subsidiary or affiliate of such entities).
- For the purpose of public safety, security of government facilities, physical security surveillance of critical infrastructure, and other national security purposes, video surveillance and telecommunications equipment produced by Hytera Communications Corporation, Hangzhou Hikvision Digital Technology Company, or Dahua Technology Company (or any subsidiary or affiliate of such entities).
- Telecommunications or video surveillance services provided by such entities or using such equipment.
- Telecommunications or video surveillance equipment or services produced or provided by an entity that the Secretary of Defense, in consultation with the Director of the National Intelligence or the Director of the Federal Bureau of Investigation, reasonably believes to be an entity owned or controlled by, or otherwise connected to, the government of a covered foreign country.

This prohibition applies to all products manufactured by the aforementioned companies, including any individual components or parts.

By submitting a bid on a project, the Contractor certifies that all work will be in compliance with the terms of 2 CFR 200.216. The Contractor shall submit a COC indicating compliance with the above provisions for all telecommunications equipment or services included in the Contract.

Payment for the item in which the materials are incorporated may be withheld until these COCs are received. Any cost involved in furnishing the certificate(s) shall be borne by the Contractor.

PIGEON WASTE

The Contractor shall remove and dispose of the pigeon waste and any other debris accumulated on the steel members and bridge seats in areas where work is being performed. Pigeon waste and debris material contaminants will require special handling and disposal in accordance with all Federal, state, and local requirements. No separate payment will be made for removal and disposal of pigeon waste. Cost shall be incidental to the contract pay items.

EMERALD ASH BORER ADVISORY

To the extent possible, all trees and brush shall be disposed on site, typically chipped and spread in place. When trees or brush must be removed, such as in urban, or otherwise populated areas, Contractor shall identify proposed location for disposal, and provide written notification to the Engineer for approval. Disposal shall be in city or town of project, or at minimum, within county, of construction operations.

BUILD AMERICA BUY AMERICA PREFERENCE

On Federally-aid projects the Buy America (23.CFR § 635.410) and Build America, Buy America Act. requires the following,

(1) all iron and steel used in the project are produced in the United States--this means all manufacturing processes, from the initial melting stage through the application of coatings, must occur in the United States. Foreign steel and iron can be used if the cost of the materials does not exceed 0.1% of the total Contract cost or $2,500, whichever is greater. The action of applying a coating to a covered material (i.e., steel and iron) is deemed a manufacturing process subject to Buy America. Coating includes epoxy coating, galvanizing, painting and any other coating that protects or enhances the value of a material subject to requirements of Build America, Buy America. Steel used for temporary support of excavation, including H piles, soldier piles, and sheeting when the steel is required to be left in place is subject to requirements of Build America, Buy America. Temporary steel, shall remain in place when it falls within the influence zone of the soil supporting any structure or railroad tracks.

(2) all manufactured products used in the project are produced in the United States—this means the manufactured product was manufactured in the United States and

(3) all construction materials are manufactured in the United States—this means that all manufacturing processes for the construction material occurred in the United States. "Construction materials" includes an article, material, or supply—other than an item of primarily iron or steel; a manufactured product; cement and cementitious materials; aggregates such as stone, sand, or gravel; or aggregate binding agents or additives—that is or consists primarily of:
   - non-ferrous metals,
   - plastic and polymer-based products (including polyvinylchloride, composite building materials, and polymers used in fiber optic cables),
   - glass (including optic glass),
   - lumber; or
   - drywall.

The Buy America preference only applies to articles, materials, and supplies that are consumed in, incorporated into, or affixed to an infrastructure project. As such, it does not apply to tools, equipment, and supplies, such as temporary scaffolding, brought to the construction site and removed at or before the completion of the infrastructure project. Nor does a Buy America preference apply to equipment and furnishings, such as movable chairs, desks, and portable computer equipment, that are used at or within the finished infrastructure project but are not an integral part of the structure or permanently affixed to the infrastructure project.

All articles, materials, and supplies should be classified as an iron or steel product, a manufactured product, or another product as specified by law or in 2 CFR part 184 (such other products specified by law or in 2 CFR part 184 include "excluded materials" and "construction materials"); an article, material, or supply must not be considered to fall into multiple categories.

EQUIVALENT SINGLE AXLE LOADS (ESALS)

The estimated traffic level to be used for SUPERPAVE HMA mixture designs for this contract, expressed in Equivalent Single Axle Loads (ESALs) for the design travel lane over a 20-year period, is 1.5 Million 18-kip (80-kn) ESALs.

NORTHERN LONG-EARED BAT PROTECTION

The northern long-eared bat (*Myotis septentrionalis*; NLEB) and tricolored bat (*Perimyotis subflavus*; TCB) are listed as federally endangered or proposed endangered, respectfully, under the Endangered Species Act (ESA). The U.S. Fish and Wildlife Service (USFWS) developed this guidance to address ESA compliance and promote conservation of NLEB and TCB. This project has been consulted with the USFWS through the Federal Highway Administration (FHWA), Federal Railroad Administration (FRA), and Federal Transit Administration (FTA) Programmatic Biological Opinion/Conference Opinion for Transportation Projects in the Range of the Indiana bat, northern long-eared bat, and tricolored bat, dated December 13, 2024. and generated a May Affect, Not Likely to Adversely Affect (NLAA) determination (see Document A00871 USFWS NLAA). Subsequently, the project has completed Section 7 consultation under the ESA.

In advance of the uplisting of the TCB to endangered under the ESA, the following Avoidance and Minimization Measures (AMMs) must be strictly adhered to in order to protect NLEB and TCB and to be in compliance with the ESA. Contact MassDOT Environmental Services - Wildlife Unit Supervisor for questions about project limits, restrictions, or conservation measures.

General AMM

- The Contractor shall ensure all personnel working in on the project site are aware of all environmental commitments related to NLEB and TCB, including all applicable AMMs. NLEB and TCB information (https://www.fws.gov/midwest/endangered/mammals/nleb/ and https://www.fws.gov/species/tricolored-bat-perimyotis-subflavus) shall be made available to all personnel.
- On 6/1/2023, MassDOT Highway Division Environmental Services conducted a northern long-eared bat summer presence/absence survey, in accordance with the 2023 survey guidelines. The survey did not confirm the presence of NLEB and/or TCB. If work is proposed by the Contractor past 6/1/2028, additional review is required by the MassDOT Highway Division's Environmental Services Section, and additional review and restrictions may be required by the USFWS.

Tree Removal AMMs

- *If additional cutting is proposed by the Contractor that is outside the scope of this contract, additional review is required by the MassDOT Highway Division's Environmental Services Section, and additional review and restrictions may be required by the USFWS.*

Bridge AMM

- On 8/6/2025, MassDOT Highway Division Environmental Services, conducted a northern long-eared bat bridge/structure bat assessment, in accordance with the USFWS guidelines. The assessment did not find presence of, or evidence of use by bats, and as stated within the guidelines, the assessment is valid for two years. If bridge work is not complete before 8/6/2027, assessment of the bridge for the presence of, or evidence of use by, bats shall be completed by the MassDOT Wildlife Unit prior to continuing bridge work. The Contractor shall notify the MassDOT Wildlife Unit no later than fourteen (14) days prior to 8/6/2027 to provide adequate time for inspection. If bats are found to be present, or, if there is evidence of bat usage, work at the bridge shall not commence until after the MassDOT Wildlife Unit has completed coordination with the US Fish and Wildlife Service to determine the appropriate follow up or mitigation actions.

EVERSOURCE EMERGENCY TELEPHONE NUMBERS

ELECTRIC:
Outage/ Emergency: 800-592-2000 or 844-726-7562
New Service: 1-888-633-3797 (1-888-need pwr)
Customer Support: 1-800-340-9822

ENVIRONMENTAL PERMITTING

The proposed work occurs in jurisdictional wetland resources subject to section 401 or section 404 of the Clean Water Act; therefore, a Water Quality Certification from the Massachusetts Department of Environmental Protection and authorization from the US Army Corps of Engineers has been obtained. The Contractor is advised that all terms and conditions within said permits shall be strictly adhered to. The proposed work qualifies for the bridge exemption authorized in the Transportation Bond Bill and is therefore not subject to the Massachusetts Wetlands Protection Act, the Massachusetts Public Waterfront Act (Chapter 91), or the Massachusetts Environmental Policy Act.

If field conditions and/or Contractor-proposed erection, demolition, storage or other procedures not originally allowed by existing environmental permits require work to occur or otherwise impact water or wetland resource areas, the Contractor is advised that no associated work can occur until all required environmental permits have been either amended or obtained allowing such work. The Contractor must notify the District 2 Highway Director and Resident Engineer in writing at least 60 days prior to desired commencement of the proposed activity. All environmental submittals, including any contact with Local, State, or Federal environmental agencies, must be coordinated with District 2 Environmental Engineer. The Contractor is expected to fully cooperate with requests for information and provide same in a timely manner. The Contractor is further advised that the Department will not entertain a delay claim due to the time required to modify or obtain the environmental permits.

NOTICE TO OWNERS OF UTILITIES

(Supplementing Subsection 7.13)

Written notice shall be given by the Contractor to all public service corporations or municipal and State officials owning or having charge of publicly or privately owned utilities of its intention to commence operations affecting such utilities at least one week in advance of the commencement of such operations. The Contractor shall, at the same time, file a copy of such notice with the Engineer.

Before commencing work on service connections, the Contractor shall be responsible for contacting the Electric Company servicing the area to obtain construction requirements, standards, and to give notice of commencement of work in accordance with the respective utility company policy. The Contractor's attention is further directed to the requirements of work in the immediate vicinity of certain underground structures and poles herein included in these Special Provisions.

A list of public and private utilities can be found on the MassDOT website at:

https://www.mass.gov/info-details/utility-contacts-by-district-and-municipality

NOTICE TO OWNERS OF UTILITIES (Continued)

Select District 2 on top of the webpage, select the Town of Bernardston and then locate the utility.

The Contractor shall inform the following officials in each area that he is assigned to work:

Superintendent, Department of Public Works or Town Engineer,
Police and Fire Department,
Electric Department

Town officials are shown at website http://www.mass.gov/portal/government/cities-and-towns.html

Select "Bernardston" from alphabetized listed.

Select the official Municipality Home Page.

The following are the names of owners and representatives of the principal utilities affected, but completeness of this list is not guaranteed by the Department:

Eversource Electric West 300 Cadwell Drive Springfield, MA 01104	Nicholas Langone 417-787-9022 nicholas.langone@eversource.com
Verizon 385 Myles Standish Boulevard Taunton, MA 02780	Paul Styspeck 413-787-1845 paul.m.styspeck@verizon.com
Bernardston Fire & Water District PO Box 504 Bernardston, MA 01337	Marc Abraston 413-648-0131
Bernardston Highway Department 256 South Street Bernardston, MA 01337	Brian Miner 413-648-5424 dpw@townofbernardston.org
Comcast Cable Corporation PO Box 6505 5 Omni Way Chelmsford, MA 01824	Michael Cook Michael_Cook7@comcast.com
Local Linx 30 Elmview Circle Dover, NH 03820	Jason Wing 403-538-4545 jason.wing@locallinx.com
Verizon Wireless Small Cell 20 Alexander Drive Wallingford, CT 06492	Elizabeth Glidden elizabeth.glidden@vzw.com

GENERAL UTILITY REQUIREMENTS

WATER:

The Contractor shall be responsible for coordinating with the Town of Bernardston on all water related work. A deck replacement is proposed for Route 10 over I-91 (#B-10-018 (12C)). The existing waterline shall remain active during construction. A full bridge replacement is proposed for Route 10 over the Fall River (#B-10-001 (CLA)). The existing water line shall be cut and capped as shown on the plans. The Contractor shall maintain all water services during construction.

VERIZON:

The contractor shall be responsible for coordinating with Verizon and/or Verizon's subcontractors in regard to work on Verizon-owned conduits under the I-91 bridge prior to the existing bridge deck being demolished adjacent to the conduit location. The Contractor shall be responsible for supporting and protecting the conduits in place during demolition. Once the existing bridge deck is removed, Verizon shall be notified and given the opportunity to repair the conduits. The utility brackets for the final location of the conduits shall be procured and installed by the Contractor with oversight from American U-Tel.

CONTAMINATED SOIL

Soil to be removed from the project area shall not be assumed to be uncontaminated and must be evaluated prior to off-site management for potential contamination with hazardous materials. No soil may be disposed of off-site without proper assessment by the contractor and approval from the Resident Engineer (RE), District Environmental Engineer (DEE), or the project designee.

The following address is within the project limits:

RTN 1-11285, MA Highway #16, Northfield Rd Rte 10

- The site is currently occupied by a MassDOT maintenance depot, as it has been since at least 1996, and likely considerably longer. No information on previous uses of the site is available.
- RTN 1-11285 was assigned to the site in 1996, after environmental sampling identified concentrations of arsenic in soil above applicable regulatory standards. Volatile organic compounds (VOCs), metals, and total petroleum hydrocarbons (TPH) were also identified in soil, but at levels below applicable regulatory standards.
- Arsenic was found in soil at depths ranging from six inches to 21 feet below ground surface (bgs). The concentration of arsenic increased with depth. Surficial soils up to six inches bgs did not contain arsenic. Based on this information and the geology of the site, it is believed that arsenic is naturally-occurring.
- A B-1 RAO was submitted for the site in 1997.
- The site is adjacent to but does not overlap with the project area. However, given that the arsenic is likely naturally-occurring, the contractor must be made aware of the potential to encounter arsenic in soil throughout the project area.

GENERAL REQUIREMENTS FOR DEMOLITION AND WORK INVOLVING PAINTED STEEL

(02/06/2020)

Demolition and work involving painted steel shall conform to the requirements of Subsection 961 of the Standard Specifications.

Work Involving Painted Steel

Hazardous materials shall be removed in the immediate area of any intended welding, heating, saw cutting or burning of steel. Hazardous material removal is required to allow the demolition of structural steel, railings, drainage systems, utility supports, steel lamp posts, etc.

The contractor shall assume that the coatings on the steel contain lead (Pb), unless otherwise determined by testing. The contractor shall certify in writing to the Engineer the results of all testing, and shall also certify that any lead (Pb) coated steel removed from the project was not reused or buried, but was sent to a scrap metal recycling facility.

Implement and maintain programs and procedures, which comply with the requirements of this specification and all applicable standards and regulations. Comply with all applicable regulations even if the regulation is not specifically referenced herein. If a state or local regulation is more restrictive than the regulation of this specification, follow the more restrictive requirements.

This requirement is intended only for the demolition and preparation prior to repair and does not include provisions for recoating of steel.

Environmental

All applicable portions of Subsections 961.65 “Worker Protection” and 961.66 “Environmental Protection and Monitoring” shall be followed when performing this work.

During chemical stripping a hand washing facility may be used in lieu of a decontamination/changing facility.

Hazardous material shall be collected during the disassembly and disposed of as outlined in Subsection 961.68 “Handling of Hazardous Waste and Reporting Release Programs”.

The applicable submittals shall be according to Subsection 961.69 “Submittals”.

Cleaning/Removal

Cutting Or Burning Of Steel

All surfaces to be welded, heated, saw cut or burned shall be cleaned so as to remove all contaminants and/or hazardous materials, which could be discharged to the environment as a function of the subsequent operations.

GENERAL REQUIREMENTS FOR DEMOLITION AND WORK INVOLVING PAINTED STEEL (Continued)

Lead paint shall be removed in its entirety in an area prescribed by a 6 inch (15 cm) minimum offset from the required work. The paint removal operation may be dry abrasive blasting, wet abrasive blasting or chemical stripping.

Proper level of containment shall be used when performing this work in accordance with Subsection 961.67 "Containment". Full containment is not required during chemical stripping operation however; the Contractor shall install proper shielding and/or tarpaulins under the chemical stripping operations in order to catch all debris generated during this procedure. A cleaned area must be inspected and approved before the demolition operations are started.

During cleaning operations the Contractor shall be required to furnish and erect temporary floodlights illuminating the steel surface at a minimum of 30-foot candles. This lighting shall be used in areas where there is insufficient lighting for proper cleaning operations and inspection. The Contractor shall supply electrical power.

The Contractor shall provide support for interim and final inspection of the bridge during cleaning operations. This support shall include the necessary traffic controls and safe access to the work.

Mechanical Disassembly Of Steel

All surfaces to be mechanically disassembled by shear cutting or removing bolts or rivets shall not require deleading. When shear cutting or removing bolts or rivets, the Contractor shall not use any method that will cause dust and/or particles to be emitted and/or dispersed into the environment to an extent that would expose the workers above the Action Levels of 30µg/m3.

For purposes of limiting the lead (Pb) dust, the Contractor will be required to dampen the lead paint work areas.

The contractor shall install a proper shielding and/or tarpaulins under all lead-paint-coated surfaces to be shear cut or bolts or rivets ordered removed in order to catch any loose lead paint chips, dust or particles.

VALUE ENGINEERING CHANGE PROPOSAL

This Subsection defines the conditions and requirements which apply to Value Engineering Change Proposals ("VECPs"). The purpose of this provision is to encourage the Contractor to propose changes in certain project requirements that will maintain the project's functional requirements at a savings in contract time, contract price, or both. The net savings obtained by using a VECP that meets the conditions and requirements set forth here will be shared by the Contractor and MassDOT.

VECP's under this provision are to be initiated, developed and submitted to MassDOT by the Contractor. The VECP must show the contemplated changes to the Drawings, Specifications and other requirements in the Contract.

VALUE ENGINEERING CHANGE PROPOSAL (Continued)

When a VECP submitted pursuant to this section is fully accepted by MassDOT, the VECP will be implemented by the Contractor and paid using the current cost and resource loaded schedule. Contractor shall demonstrate that the VECP is equal to, or better than, the original design or material; that there is an interest in public safety within the VECP; that there is a life-cycle cost benefit; and/or that end users will benefit from the shortened schedule. VECPs shall be consistent with the MassHighway/MassDOT Standard Specifications for Highways and Bridges and other applicable reference documents and directives. Any proposed deviation from these documents will need to be clearly identified in the VECP Proposal Documents, and must be approved by MassDOT's Chief Engineer before accepting this VECP.

A. In order to be considered for MassDOT review each VECP shall:
   1. Be clearly labeled pursuant to this Subsection;

   2. Yield a net savings at least two hundred and fifty thousand (250,000.00) Dollars and/or a net saving of contract completion duration of at least three (3) months;

   3. The proposed changes to contract items must:

      a. maintain the specified items' required functions (service life, reliability);

      b. meet applicable safety regulations and codes;

      c. material substitutions must be in accordance with DOT prequalified/preapproved products and must be tested in accordance with standard material specs/testing methods (and considering all relevant environmental, load, and other relevant factors);

      d. show economy of operation, ease of maintenance, ease of construction, and necessary standardized features and appearance; and

   4. Shall not require an extension of Contract Time or Contract Milestones, with the exception of cases when there are anticipated significant cost saving.

The thresholds above are considered to be a general guideline. MassDOT will consider VECPs outside of these thresholds if a significant benefit is demonstrated. Additionally, notwithstanding this VECP process, MassDOT will consider minor revisions in the form of a Contract Modification.

Further, any VECP submitted shall be in sufficient detail to clearly define the proposed change. The Contractor's failure to provide information of the type, detail and in a format to facilitate the MassDOT's review, may be grounds for rejection of the VECP. Additionally, the Contractor will not be entitled to any equitable adjustment or increased Time, due to any aspect of any of the proposed VECP including permitting, right of way, utility coordination or delayed responses by MassDOT. If, after the progression of the work associated with the executed Contract Modification for the VECP, any additional costs are realized by the Contractor or any of the sub- consultants, sub-contractors, or suppliers, the Contractor shall be obligated to pay for any and all costs.

VALUE ENGINEERING CHANGE PROPOSAL (Continued)

B. The following initial items shall be provided by the Contractor for MassDOT's review. *Items 1-6 need to be submitted prior to the start of MassDOT's review of the VECP and item 7 is an important consideration for the pricing of the VECP and the timeline of the proposed VECP schedule.*

1. ***VECP Description***: A description of the difference between the existing and the proposed Contract requirements, and the comparative advantages and disadvantages of each;

2. ***VECP Change Listing***: A listing of the Contract requirements that will need to be changed, modified, or reviewed as well as the proposed Contract document changes in the Instructions to Bidders, Contract, Standard Specifications, General Requirements and Special Provisions required by the VECP.

3. ***Construction Schedule Update*****:** Any changes in the Contract Time(s) or Contract Milestone(s), that will result from acceptance of the VECP, shall be accompanied by a contemporaneous schedule analysis *(i.e, the Contractor's baseline schedule submission, all past/required monthly schedule updates, a detailed assessment of all past delays, and a resource loaded Critical Path Method schedule as specified in Section 8.0 / Subsection 8.02 of this Contract)* of the projected Work that remains including the proposed VECP related schedule changes *(inclusive of the timeline to review accept the VECP and the timeline for implementing the design changes)* in the remaining work. This shall be submitted in the form of a Proposal Schedule until the VECP has been formally accepted. Note: All of this information is to be updated, recertified, and formally accepted by MassDOT before final acceptance of this this VECP is issued.

4. ***Date for MassDOT's Acceptance***: A statement that clearly justifies the date by which the VECP must be accepted to obtain the maximum price reduction, noting any effect upon the Contract Time(s) and/or Contract Milestone(s). This statement must include a narrative that demonstrates the most recent construction schedule has been utilized to justify that proposed acceptance date *(e.g. "in order to start to fabricate critical materials, authorization must be provided to work on the shop drawings by no later than [date]").* The Contractor should allow for at least sixty (60) to ninety (90) days for acceptance by MassDOT once all of the VECP documentation has been provided. Acceptance shall mean that MassDOT has received a finalized and executed contract modification. However, this is a proposed Contract change.

   The Contractor is fully obligated to progress the Work of the original Contract and MassDOT is not liable for any delays or costs that may occur in the review phase of any VECP proposal.

5. ***Cost and Savings Estimates***: A detailed estimate of the anticipated net savings, calculated as follows:

VALUE ENGINEERING CHANGE PROPOSAL (Continued)

a. ***Original Scope:*** Isolate the cost of performing the original contract construction activities, in accordance with the original Contract Documents, as originally bid by the Contractor, that are anticipated to be superseded by the VECP. *This cost is to include any original contract scope that is anticipated to be altered or eliminated by the VECP such as, shop drawing preparation, inspection work, testing, maintenance of traffic, or any other original contract costs, that have yet to have been performed at the time of this VECP submission.*

b. ***New VECP Scope:*** Calculate the cost of performing the comparable construction activities associated with the VECP.

c. ***Contractor's Engineer & Inspection***: Calculate the cost of engineering, inspection, and design work by the Contractor's Engineer/Designer. This should be a realistic estimate of the costs of any required engineering, design and review work by the Contractor's Engineer.

d. ***MassDOT's Costs:*** MassDOT's estimate of costs to perform engineering/design reviews, cost estimate reviews, schedule reviews, and any other administrative costs to review and recommend implementation of the proposed VECP. *(including all anticipated increased costs to MassDOT on other Contracts and all anticipated follow-on increased costs to MassDOT, if any)* as provided by MassDOT. MassDOT's estimated costs must be included the VECP calculation and will be provided by MassDOT in support of the VECP evaluation process.

e. ***Other Costs:*** Estimated costs associated with any revisions to other project related costs, such as Environmental Permits or Right of Way acquisitions, including other agency or municipality costs, as provided by MassDOT.

Net Savings:
The net savings to be split between MassDOT and the Contractor shall be calculated using the items above as follows: a - (b+c+d+e) = net savings

6. *The Contractor shall also provide:*

a. A proposed Change Order, which explains and justifies any required Equitable Adjustment in the Contract Price.

b. The Contractor's actual costs expended for developing the VECP as of the date of the VECP submission;

***7. Design Changes and Drawings*:** The costs that are outlined above should be inclusive of the following design and engineering responsibilities.

a. Design changes shall be prepared and stamped by the Contractor's professional designer and/or engineer. In addition, in the development of the VECP; the Contractor is responsible for anticipating and managing all aspects associated with any VECP design work that must be performed by a licensed Engineer.

VALUE ENGINEERING CHANGE PROPOSAL (Continued)

b. The Contractor's engineer must analyze and stamp all components of any aspect of the project that has been redesigned, changed, or altered as a result of this VECP.

c. The Contractor's engineer shall provide all calculations and supporting design/engineering documentation that was utilized to develop the changes and stamped drawings. These will be used by MassDOT's Designer-of-Record to review the VECP changes. The Contractor is limited to selecting only those engineer's that have been pre-qualified by MassDOT's A&E Board.

d. MassDOT's Designer-of-Record will review and respond to all completed design submissions related to this VECP within thirty (30) calendar days, unless determined to be a non-critical path item.

e. MassDOT will be responsible for estimating and managing MassDOT's Designer-of-Record during the VECP review and implementation. Should any significant conflicts arise, between the Contractor's Engineer and MassDOT's Designer-of-Record, the DOT and the Contractor will work expeditiously to resolve the conflict. Should this type of conflict continue for greater than five (5) days, the Contractor is to bear all financial and time related impacts of such delay and must seek to resolve the design conflict, in an acceptable manner to MassDOT. The resolution of this conflict will be funded at the Contractor's expense – exclusive of the net saving that was agreed to at the execution of the contract modification for this VECP.

f. The Contractor's Engineer may also be required to inspect the construction work. The Contractor is to include such anticipated inspection costs in the initial VECP.

g. MassDOT's Designer of Record will remain the Designer-of-Record for the entire Project. Any costs incurred in the use of MassDOT's Designer-of-Record by MassDOT or Contractor associated with the review of a VECP are to be included in the calculated net savings.

C. Approval of the VECP shall not occur until a Contract Modification, incorporating the VECP, is issued by MassDOT and properly executed by the Contractor. MassDOT may accept or reject part or all of any VECP at any time prior to an executed Contract Modification for the applicable VECP. The decision of MassDOT, concerning acceptance or rejection of any VECP, shall be final and shall not be subject to dispute resolution.

It is expected that several weeks may go by before the final VECP documentation has been executed with a Contract Modification. Therefore, MassDOT intends to make certain that the initial cost estimate information has not changed before entering into a Contract Modification. As the VECP evaluation process is finalized, and prior to the signed Contract Modification for the VECP, the Contractor and MassDOT must re-certify the current status of the originally proposed cost and/or schedule savings.

VALUE ENGINEERING CHANGE PROPOSAL (Continued)

Until a contract modification is issued and schedule and cost/savings re-certification is complete and accepted by MassDOT, the Contractor shall remain obligated to perform the Work in accordance with the terms and conditions of the original Contract Documents.

Upon completion of the work associated with the VECP, MassDOT may require verification that the VECP savings has been achieved.

D. VECPs will be processed (distributed, reviewed, commented upon, accepted or rejected) expeditiously (pursuant to M.G.L. c. 30, § 39R); however, as this is an elective modification to the contract, MassDOT shall not be liable for any delay or cost in the review and acceptance of the VECP. During the review of the VECP, the Contractor remains obligated to progress the original Contract scope, and schedule, as planned; until a Contract Modification, accepting the Contractor re-certified VECP, has been executed by MassDOT.

The Contractor has the right to withdraw part, or all of any VECP, prior to acceptance by MassDOT. Such withdrawal shall be made in writing to the Engineer. The Contractor shall state the period of time, from the date of the initial VECP submittal, that the VECP shall remain valid and feasible. Revision of this validity and feasibility period shall be allowed only by mutual agreement of the Contractor and the Engineer in writing.

If the Contractor desires to withdraw the proposal prior to the expiration of this period for non-technical reason, MassDOT reserves the right to recover all actual costs that have been incurred to MassDOT.

If the Contractor withdraws the VEC Proposal, MassDOT reserves the right to proceed with the VECP or any portion of the VECP as a normal change and the Contractor waives any right it may have had to share in net savings thereunder.

For purposes of this provision, expiration of the time established by the Contractor for approval shall be considered as withdrawal by the Contractor if MassDOT requests an extension of that time and the Contractor does not provide a written extension.

E. With regard to unknown conditions or sub-surface work, in general, the expectation is that the Contractor and MassDOT will strive to gain enough knowledge about the risks in order to provide a forward-priced Change Proposal. Therefore, any costs to fully evaluate the proposal, such as additional borings and/or test pits, must be considered in the cost evaluation of whether the VECP is worth pursuing. However, if it is impractical to gather conclusive exploratory information, before the VECP is executed, MassDOT may consider provisions in the VECP that clearly identifies the risk sharing (cost and time) related specifically to the unknown/sub-surface conditions. If these VECP provisions are acceptable to MassDOT they are to include supplemental language to provide a determination of the final savings/cost, and time impacts, no later than 45 days after the sub-surface work is completed. All other aspects of the VECP, unrelated to these Provisions, will be binding upon execution of the VECP.

ITEM 100.9 PRE AND POST-CONSTRUCTION SURVEY AND GEOTECHNICAL MONITORING AND INSTRUMENTATION **LUMP SUM**

The work under this item shall include, but not be limited to, all materials, equipment, labor, and services required to install, protect, replace, monitor, and report on geotechnical instrumentation specified herein.

LIST OF NEARBY STRUCTURES AND/OR UTILITIES:

1. Existing building at the northwest corner of Bridge No. B-10-001: 90 Church St Bernardston, MA
2. Shed structure at 31 Kringle Dr Bernardston, MA 01337
3. Proposed Excavation Support System at the northeast corner of Bridge No. B-10-001
4. Existing Overhead Utility Lines South of Bridge B-10-001
5. Buried Water Utility Lines South of the Bridge B-10-001

The work under this Item includes the following:

1. Pre-construction site walk with the Engineer at least two weeks prior to the start if construction to determine locations of ground, surface and utility monitoring points.
2. Preparation and implementation of a geotechnical monitoring and implementation plan with the following requirements:
    a. Pre-construction and post-construction visual examination of adjacent structures which shall include photographs or narrated videos and written reports. Adjacent structures to be examined include but are not limited to the following:
        i. Existing building: 90 Church St Bernardston, MA 01337
        ii. Existing building: Shed structure at 31 Kringle Dr Bernardston, MA 01337
    b. Vibration monitoring shall be performed continuously during all excavation, backfill, compaction, installation of piles and installation of temporary support of excavation. The Contractor shall install at minimum, two (2) seismographs, at 90 Church Street (MACRIS - BER.27) and at least one (1) at the site near the Excavation Support System. The contractor should consider additional monitoring at the overhead wires and buried water line south of the bridge that are to remain. Vibration levels at the monitoring locations shall not exceed the criteria indicated herein.
    c. Furnish, install, protect replace, monitor and report on ground surface and building deformation monitoring points. The Engineer will assist the Contractor in determining final locations.
    d. At locations where structure and/ or monitoring points are required on private property, the Contractor shall obtain a right of entry to obtain access. A Right of Entry form shall be obtained from the property owner prior to conducting an internal building inspection.
    e. Contractor shall retain the services of Geotechnical Monitoring Consultant and Surveyor to install, monitor, maintain and report on geotechnical instrumentation that includes but is not limited to ground surface, building, deformation monitoring points, Utility Monitoring Points, crack gauges and vibrations. The Contractor shall replace instrumentation damaged or made inaccessible by the construction operations at no additional cost to the Department.

ITEM 100.9 (Continued)

MATERIALS

All materials shall be new. The Contractor shall protect all monitoring instruments from damage due to construction operations, weather, traffic, and vandalism. If any monitoring instrument is damaged or inoperative due to inadequate protection by the Contractor, the Contractor's instrumentation personnel shall repair or replace the damaged or inoperative instrument shall be replaced within 72 hrs. at no additional cost to the Project. The Contractor shall notify the EOR at least 24 hrs. prior to repairing or replacing a damaged or inoperative monitoring instrument. The EOR will be the sole judge of whether repair or replacement is required. The EOR may impose a work stoppage in the vicinity of the damaged or inoperative instrument until it is again operational, at no additional cost to the Project.

SURVEY MONITORING POINTS

The following type of Deformation Monitoring Points (DMP) shall be used to monitor deformation:

1. DMP shall consist of a stainless steel PK nail driven into concrete or asphalt surfaces for vertical and horizontal movement. The nail shall be domed at top and manufactured from hardened, zinc-plated steel. It shall also have an indent in the center of its head. Alternative and equal DMPs may be utilized at the expressed approval of the Engineer and Owner.
2. Install DMPs at a spacing no greater than 10 feet. Install DMP's at the top of the structure and near the exposed ground surface.

The following type of Building Monitoring Points (BMP) shall be used to monitor deformation:

1. BMP shall consist of a non-destructive and stable element that firmly attaches to the structure.
2. Install BMPs at a spacing no greater than 10 feet along the exterior walls to be monitored.

VIBRATION MONITORING

Construction vibrations shall be monitored as described in the Contract Specifications in terms of peak particle velocity using a seismograph with continuous recording capability. The Contractor shall install at minimum, two (2) seismographs, at 90 Church Street (MACRIS - BER.27) and at least one (1) at the site near the Excavation Support System. The contractor should consider additional monitoring at the overhead wires and buried water line south of the bridge that are to remain.

Capability to record vibrations at multiple locations simultaneously is required. Additional requirements must be met as follows:

- Seismic Range – 0.01 to 4.00 inches per second, with an accuracy of ±5% of the measured peak particle velocity or better, at frequencies between 10 to 100 Hertz, and with a resolution of 0.01 inches per second or less;
- The vibration sensors shall be capable of recording three orthogonal components of vibration;

ITEM 100.9 (Continued)

- Power Sources – an internal rechargeable battery with a charger. The battery must be of appropriate size and type to supply continuous power to the monitor for a minimum of 24 hours;
- Instruments must be capable of producing chart recordings and readings on site, within one hour of recorded readings;
- The Contractor shall provide the appropriate computer and software to perform the analysis and produce reports for the continuous monitoring; and,
- Continuous monitoring must be capable of recording single-component peak particle velocities and the frequency of the peaks shall have an interval of one (1) minute or less.

UTILITY MONITORING POINTS

1. Provide 2-inch PVC casing, threaded and coupled, as needed.
2. Provide No. 4 rebar, threaded and coupled, as needed.
3. If necessary, installation borehole shall be backfilled with cement-bentonite grout.

CRACK GAUGES

Use crack gauges with a minimum of 1mm horizontal and vertical accuracy. Crack gauges shall be installed using non-destructive methods. Provide a calibrated direct read building crack monitor consisting of overlapping glass or acrylic Plates, as needed. The crack monitor shall be waterproof and weather resistant and shall be capable of being read to a resolution of 0.02-inch with a maximum horizontal range of at least 0.75-inch and a vertical range of at least 0.375-inch, and shall be bolted or epoxied to the surface. For uneven surfaces, such as stone, pairs of flat washers should be used, with the distance between the washers measured with a caliper.

SUBMITTALS

The contractor shall submit to the Engineer the following prior to commencement of the Work:

1. QUALIFICATIONS:

Firm qualifications, both individual(s) and organization, including approval by the Contractor's insurance carrier shall be submitted.

Qualifications must meet the requirements noted below:

a. Instrumentation Engineer: Contractor's Instrumentation engineer shall be responsible for furnishing, installing, monitoring, maintaining and reporting of all vibration monitoring equipment and measurements, shall have 5 yrs. of direct field experience with the types of instruments specified herein.
b. Surveyor: All surveying activities shall be performed under the direct supervision of a licensed Professional Land Surveyor registered in the Commonwealth of Massachusetts and shall have experience in measurements of the types and accuracies specified herein. The field survey party chief shall also have experience in survey measurements of the types and accuracies specified herein.

ITEM 100.9 (Continued)

2. **MONITORING PLAN:** Prior to installation of the equipment, the Contractor shall submit for approval to the Engineer a monitoring plan outlining his proposed monitoring procedures and information regarding the equipment to be used at least fifteen (15) days prior to the start of monitoring. Certifications shall be provided to the Engineer that all monitoring equipment is calibrated and maintained in accordance with the manufacturer's requirements. The monitoring plan, which shall also include, at a minimum, the following:
    a. Manufacturers' product data sheets and calibration certifications describing all instruments to be installed, including requests for consideration of substitutes.
    b. Detailed step-by-step procedure for installation, together with a sample installation record sheet, for each instrument to be installed, including:
        i. Survey Monitoring Points: Installation on adjacent buildings within the excavation zone of influence.
        ii. Vibration Monitoring Points: Installation at each corner of the bridge on top of the existing stone abutment.
    c. Detailed step-by-step procedures for conducting all measurements, including baseline measurements and measurements during construction, to the specified accuracies, including types of surveying instruments or measurement devices (e.g., data loggers), type of monitoring devices, data reduction procedures, summary, data plotting procedures and frequency for checking survey and seismograph readings. Provide sample of summary plots for all anticipated data.
        i. The Contractor shall obtain a baseline vibration level by operating the equipment for a minimum of five (5) consecutive 24-hour periods prior to start of construction activities. The Contractor shall submit a report to the Engineer, documenting the results of the baseline reading for record keeping, and at least one copy shall be kept on -site at the construction trailer at all times The plan shall be submitted at least 15 calendar days prior to the start of the baseline monitoring period.
    d. Location plan of monitoring points.
    e. A schedule indicating the proposed contractor's construction schedule, instrument installation sequence, the proposed monitoring and reporting frequencies for all instruments specified herein.
    f. Access to database with example data showing how data from all monitoring points will be displayed and reported to the various parties involved.

3. Reports: Documents of the results of the baseline monitoring to the Engineer for record keeping. At least one copy shall be kept in the construction trailer at all times. Data obtained during and post-construction shall be promptly delivered to the Engineer. Digital photographic images shall be stored on a USB. Digital format video recordings shall be stored on a USB and viewable by standard video software.

QUALITY CONTROL

1. The Contractor shall provide sufficient notice to the Engineer to allow the Engineer to be present to observe the Work. Cooperate with the Engineer in all respects to facilitate any testing or observations.
2. The Contractor may conduct additional testing or monitoring for its own information, at no additional cost to the Department.

ITEM 100.9 (Continued)

3. The presence of the Engineer (including observations and review of test results) shall not relieve the Contractor of their sole responsibility to perform the work in accordance with the Contract Documents, nor shall they be construed to relieve the Contractor from full responsibility for the means and methods of construction and for safety on the construction site.
4. Work not in conformance with the specified requirements shall be improved, or removed and replaced, at no additional cost to the Department. All costs related to testing of nonconforming Work or materials shall be paid for by the Contractor, at no additional cost to the Department.
5. Measure and report all data on movements of all instrumentation monitoring points to the nearest 0.01 ft.

Retain the services of a Geotechnical Monitoring Consultant to monitor the geotechnical instrumentation specified herein, which includes and is not limited to vibration monitoring. The Contractor's Surveyor shall be registered in the Commonwealth of Massachusetts and shall have demonstrated at least five years' experience and at least three projects

a. of similar type, size, and complexity including installation and monitoring of surface vertical and horizontal displacement points.
b. The Contractor's Surveyor shall be approved by the Engineer and must be approved two weeks prior to construction.
c. The Contractor's Surveyor shall adhere to all methods and standards described in this Specification.

EXECUTION

A. GENERAL

Do not install any instruments until the Engineer has been properly notified. Contractor shall coordinate with owner and gain access as needed and notify the Resident Engineer accordingly.

B. PRE-CONSTRUCTION SITE WALK/ MEETING

PRE-CONSTRUCTION SITE WALK

The Contractor, Engineer, and Geotechnical Monitoring Consultant shall perform a detailed visual examination of the Site and surrounding properties and document by photograph or narrated video the condition of existing retaining walls, on- and off-site buildings and improvements, including but not limited to:

1. Exterior facades
2. Locations of cracks, missing plaster, and damaged masonry
3. Damaged roofing
4. Walls or other features that are not vertical or out of plumb
5. Damaged foundations
6. Other damage that could be misconstrued as damage cause by the Contractor.

Conduct the site walk at the project site at least thirty (30) days prior to installation of monitoring equipment.

ITEM 100.9 (Continued)

The Contractor shall retain and pay an experienced Professional Engineer registered in the Commonwealth of Massachusetts to perform a pre-construction survey of the two structures (item 2.a.) listed above to document the existing condition of the structures prior to start of any construction activity near the proposed structures. This survey, as a minimum, shall locate, measure, photograph and otherwise document any visible checks, defects, distortions, settlement, and other signs of distress on the existing components to the greatest extent possible. The product shall be an original written report stamped and signed by the Professional Engineer performing the survey and four (4) copies, including photographs, digital files, sketches, and attachments, which shall be submitted to the Engineer a minimum of five days prior to commencement of any construction activity. A copy of the report shall be distributed to the MassDOT Engineer.

The Contractor shall prepare a Geotechnical Monitoring Plan as described above based on the findings of the pre-construction site walk which shall include at a minimum:

1. Locations of ground and surface monitoring points.
2. Review condition of site for installation of all geotechnical instrumentation, including coordination with temporary measures and temporary controls and protections.
3. Review proposed site clearing, excavation construction schedule, and demolition.

C. INSTALLATION

BUILDING OR STRUCTURE MONITORING (SMPS)

1. SMPs shall be installed at the locations and depths as determined by the Geotechnical Monitoring Consultant during site walks prior to construction.
2. All SMPs shall have the horizontal as-built location determined to an accuracy of 0.5-feet and the elevation to an accuracy of 0.01-feet.

UTILITY MONITORING POINTS (UMPS)

1. UMPs shall be installed at the locations and depths as determined by the Geotechnical Monitoring Consultant during site walks prior to construction and as required by the utility owner.
2. Where necessary, the Contractor shall install the UMPs by the use of vacuum excavation exercising due diligence not to disturb or damage the utility being monitored and to minimize disruption and damage to adjacent areas.
3. The location of the utility in plan shall be determined and the borehole advanced to within a maximum of 2-feet above the utility. The Contractor shall be responsible for any damage to the utility during installation of the utility monitoring points. Drill casing may be used during the installation.
4. After completion of installation, the as-built location in horizontal position shall be determined to an accuracy of 1-foot and in elevation to an accuracy of 0.01-feet.

GROUND SURFACE MONITORING POINTS (GMPS)

1. GMPs shall be installed at the locations and depths as determined by the Geotechnical Monitoring Consultant during site walks prior to construction.

ITEM 100.9 (Continued)

2. All GMPs shall have the horizontal as-built location determined to an accuracy of 0.5-feet and the elevation to an accuracy of 0.01-feet.

SEISMOGRAPHS

1. The Contractor shall install at minimum, two (2) seismographs, at 90 Church Street (MACRIS - BER.27) and at least one (1) at the site near the Excavation Support System. Vibration sensors shall be firmly mounted on the surface of concrete or asphalt, or firmly on undisturbed soil.
2. The daily report shall clearly describe the location of the seismograph relative to the work zone and the work performed on that date.

CRACK GAUGES

1. Locations of existing building cracks shall be identified prior to the construction. For bidding purposes, the Contractor shall assume a minimum of 15 existing and new cracks will need to be monitored as part of the work of this Section.

D. MONITORING

Monitoring frequency may be increased as required by the Engineer for some or all of the monitoring points if the threshold or limiting response values are approached or exceeded during the Work, at no additional cost to the Department.

1. Seismographs shall be set up to monitor vibrations continuously during all excavation, backfill, compaction, pile installation operations and installation of temporary earth support. Two seismographs shall monitor vibrations at locations as described in Section C. Installation, Seismographs. Vibration levels shall not exceed the criteria indicated herein.

2. Ground surface, building deformation monitoring points, Utility Monitoring Points, and crack gauges shall be monitored twice a week for all points located within 100 feet from the edge of the excavation, during all excavation, backfill, compaction, driven pile operations and installation of temporary earth support unless otherwise required by the Engineer or specified.

THRESHOLD AND LIMIT LEVELS

The table provided below establishes the Threshold and Limit levels as defined herein.

Instrument	Threshold	Limit Level
Building monitoring Points (Vertical and Horizontal)	0.25 in.	0.5 in.
Vibration Monitoring Points	0.5 in./sec.	1.0 in/sec

ITEM 100.9 (Continued)

After each set of readings is obtained, the data shall be sent to the Engineer, where the data will be reviewed and interpreted. The Contractor shall make its own interpretations of the data. The Contractor shall monitor and interpret data from additional instrumentation that it deems necessary to ensure the safety of its work. The Engineer is not responsible for the safety of the work based on its review of the instrumentation data.

E. POST-CONSTRUCTION SITE WALK

The Contractor shall retain and pay an experienced Professional Engineer registered in the Commonwealth of Massachusetts to perform a post-construction survey of the existing two structures (item 2.a.) listed above to document the existing condition of the structures prior to the completion of construction activities. The purpose of the post-construction survey is to document any changes in the structures condition that may have occurred during the construction period. This survey, as a minimum, shall locate, measure, photograph and otherwise document any visible checks, defects, distortions, settlement, and other signs of distress on the existing structures, including the post-construction condition of items noted during the pre-construction survey to the greatest extent possible. The product shall be an original written report stamped and signed by the Professional Engineer performing the survey and four (4) copies, including photographs, digital files, sketches, and attachments, which shall be submitted to the Engineer no later than two weeks after pavement and finishes are installed on the new roadway. A copy of the report shall be distributed to the MassDOT Engineer.

F. REPORTING

1. A plan showing location and numbering system for monitoring points shall be submitted to the Engineer prior to start of excavation or other vibration-causing activities, along with results of two initial baseline surveys.
2. Tables of results of surveys shall be submitted prior to the beginning of work the following day. The table of survey results shall include the initial measurement, the current measurement, and the amount of movement since start of excavation.
3. Survey data shall be depicted graphically on plots and submitted with the tabular results to show incremental and cumulative movement since the start of excavation.
4. Criteria for "threshold" and "limiting" vibration acceptance measured from seismographs during demolition, construction of temporary excavation support, excavation and backfilling, and pile installation shall be as listed above (Execution, Part D Monitoring, Threshold and Limit Values).
5. Criteria for "threshold" and "limiting" settlement of GMP’s located on the sidewalk or paved roadway areas adjacent to the temporary lateral support systems have been established as follows:
    a. "Threshold" Settlement: No greater than 0.25 inch.
    b. “Limiting" Settlement: No greater than 0.50 inch.
6. Criteria for "threshold" and "limiting" settlement of UMPs adjacent to the temporary lateral support systems have been established as follows:
    a. "Threshold" Settlement: No greater than 0.25 inch.
    b. “Limiting" Settlement: No greater than 0.50 inch.

ITEM 100.9 (Continued)

7. Criteria for "threshold" and "limiting" angular distortion (measure of building rotation due to vertical settlement) of SMP' on adjacent buildings have been established as follows:
    a. "Threshold" Angular Distortion: No greater than 1/1000 for wood, steel and brick buildings. No greater than 1/1200 for historical stone structures. Where the angular distortion is defined as the ratio of the differential elevation between any two building points over the horizontal distance between those points.
    b. "Limiting" Angular Distortion: No greater than 1/750 for wood, steel and brick buildings. No greater than 1/900 for historical stone structures. Where the angular distortion is defined as the ratio of the differential elevation between any two building points over the horizontal distance between those points.
8. The Contractor shall immediately notify the Engineer and shall take immediate steps to control further movement by revising construction procedures, providing supplemental bracing or other measures (working extended hours as approved or temporarily terminating work in the area of movement if necessary) as required if any of the following occur:
    a. Field measurements indicate that any of the "threshold" movement criteria are reached or exceeded.
    b. Field measurements or observations indicate that significant or sustained wall
    c. movements, beyond those reasonably expected, are occurring (total movement may be less than the "Limiting" movement criteria).
    d. Movements of adjacent structures, utilities or other facilities are detected.
9. If "Limiting" movements are being approached or reached, the Engineer and/or the Department may require the Contractor to temporarily suspend the work in the area where such movement is occurring and implement all necessary mitigation measures which are satisfactory to the Engineer, to arrest the movements, at no cost to the Department.
10. Installation of Work in the area where the Limiting Values had been reached shall not be permitted until the results of optical surveys indicate no increase in lateral movement of the earth support system and adjacent surface and building settlement for the one-week period immediately prior to resuming construction.
11. These criteria are intended to establish a minimum basis for the Contractor's design and procedures and do not relieve the Contractor of its responsibility for preventing detrimental movements and damage to adjacent structures, utilities or other work.
12. The Contractor shall be responsible for repairing all property damage caused by construction activities.
13. In the event the Contractor does not comply with the approved mitigation plan or continues to work in violation of threshold or limiting values being reached or exceeded, the Contractor shall not be allowed to continue work until proper mitigation procedures and corrections have been made as required by the Engineer and the Department.

G. PROTECTION OF INSTRUMENTATION

Protect all instruments during the course of the Work. Any damage or loss of function caused by the Contractors operations, or by any other cause, to new or existing instrumentation devices, shall be immediately repaired or the equipment replaced at no additional cost to the Department.

ITEM 100.9 (Continued)

BASIS OF PAYMENT

Item 100.9 will be paid for at the Contract unit price per Lump Sum, which shall include all labor, equipment, materials, engineering services, submittals, and all incidentals required to complete the work. No additional payments will be considered for re-mobilizing the surveyor for additional shots to monitor movement.

1. The first payment of 50% of the Lump Sum Contract price for the Pre-Construction Survey and Vibration Monitoring – Bridge B-10-001 (CLA) will be made upon the completion of the baseline survey and installation of seismographs, as described above.
2. The second payment of 50% of the Lump Sum Contract price for Pre-Construction Survey and Vibration Monitoring – Bridge B-10-001 (CLA) will be made upon Substantial Completion.

ITEM 102.3 HERBICIDE TREATMENT OF INVASIVE PLANTS HOUR

This work must be performed by persons who meet the qualifications below and are approved by the Landscape Design Section.

Work under this item consists of herbicide treatment of invasive plants currently existing within the project limits and as directed. An Invasive Plant Management Strategy (IPMS) shall be submitted to the Engineer for review and approval and the IPMS shall be implemented on-site. The IPMS shall be written and submitted per Item 102.33 Invasive Plant Management Strategy and shall be measured and paid for under that Item.

Work under this item shall be coordinated with work and schedule for Selective Clearing, Clearing and Grubbing, Mowing, Tree Removal, Planting, and Wetland Mitigation items.

Payment is per hour on-site and shall be compensation for a minimum crew of 2 licensed applicators, 2 back-pack sprayers and mist-blowers, a properly equipped spray truck with spray hoses, and a tank with sufficient capacity for a full day of work. If there is only one applicator, hourly payment shall be adjusted to 50 percent of the unit price.

Date and time stamped photos indicating start and stop time of work must be submitted if requested.

This item is not intended for manual removal of plants.

Management of plants determined to have been introduced to the site via imported loam, compost, mulch, plants, equipment, or other construction activities will be the Contractor's responsibility and at the Contractor's expense.

Herbicide shall be applied during daytime hours only.

Measures to prevent the introduction of invasive plant species to the site and to address introduction due to construction-related activities shall be covered under the Standard Specifications, Division I - Subsections 7.01(D) Plant Pest Control and 7.13 Protection and Restoration of Property as amended in these Special Provisions.

Plant species targeted for management under this item shall be as determined in the field per the site walk and as specified in the IPMS.

The definition of invasive plant species shall be as described by Massachusetts Invasive Plant Advisory Group (MIPAG): "non-native species that have spread into native or minimally managed plant systems in Massachusetts, causing economic or environmental harm by developing self-sustaining populations and becoming dominant and/or disruptive to those systems."

Control of invasive plants shall begin immediately with the initiation of construction activities and prior to any clearing or site disturbance. Treatment areas shall include stockpile locations and may, upon approval of the Engineer, extend outside the project limit. Treatment shall be done each consecutive year for the duration of the contract unless specified otherwise in the IMPS or unless directed otherwise by the MassDOT invasive species contact. Work shall be done during the growing season from May – October unless otherwise specified in the IPMS.

ITEM 102.3 (Continued)

Areas identified for vegetation control measures shall be as shown on the plans and as determined in the field by the Engineer and a MassDOT Landscape Architect. Contact at MassDOT Landscape Design Section may be contacted at: tara.mitchell@dot.state.ma.us.

QUALIFICATIONS

The applicators shall submit and meet the qualifications outlined below. A list of contractors specializing in invasive management and approved by MassDOT Landscape Design Section is available on the following website: https://www.mass.gov/lists/landscape-design-and-roadside-maintenance under Invasive Plant Management.

REQUIREMENTS

1. Company must provide proof of qualifications by providing the following:
   a. Narrative describing company, its expertise and experience with invasive plant control.
   b. Demonstrate experience with herbicide treatment as part of restorations and in sensitive areas.
   c. Describe company's technical qualifications and past performance.

2. Company must meet licensing requirements:
   a. All crew applicators must have a Massachusetts Commercial Applicator License (CORE).
   b. At least one or more applicator must have a ROW certification, if required for work.
   c. Company must provide name(s) of applicator(s) and Applicator License/Certification number for all contractor crew leaders working on the project.
   d. Company must provide documentation of any warnings, penalties or fines received in the last three (3) years.

3. Company must provide proof of experience with invasive plant control and include following:
   1) At least five (5) references from prior invasive plant control work completed in last five (5) years. Provide contact information including address, phone number and email.
   2) Provide a summary of each of these projects including nature of the problem, specific invasive vegetation treated, dates and period of treatment, methodologies used, and summary of success or not in terms of meeting performance objectives. Include summary of equipment used.
   3) Photo documentation of these projects.
   4) GPS coordinates of project locations, if available.

4. Crew leader must have expertise with invasive plant control and provide the following:
   a. Have held Core license for at least five (5) years.
   b. Resume listing five (5) or more years of experience applying pesticides with the company or with another company specializing in vegetation management.

SUBMITTALS

No work shall begin without approval of the submittals.

ITEM 102.3 (Continued)

Submittals include the following items:

INVASIVE PLANT MANAGEMENT STRATEGY (IPMS)

At least thirty (30) days prior to proposed treatment the IPMS shall be submitted for approval by the Engineer and MassDOT Landscape Architect. All chemicals, methods and work done under this item shall be consistent with the IPMS. The IPMS shall be as described under Item 102.33.

HERBICIDE USE REPORT

Within two (2) weeks after each application, the Contractor shall provide to the Engineer and the MassDOT Landscape Architect a completed and signed MassDOT Herbicide Use Report.

PHOTO DOCUMENTATION

Digital photos with date and time of herbicide application work, showing start time and completion time, are required and must be submitted for measurement of payment upon request.

MATERIALS

All proposed herbicides shall be as approved in the IPMS. Herbicides shall be labeled for the method of treatment and shall meet all federal, state and local regulation requirements. Application rates will depend on herbicide proposed and shall be per the manufacturer's label for specific application.

METHODS

All methods used shall be as approved in the IPMS which shall be determined during the Initial Site Walk as described under Item 102.33 Invasive Plant Management Strategy.

The Contractor shall be responsible for marking delineated areas and plants to be preserved, removed, or otherwise treated. Fencing or other materials needed for marking and delineating protected areas shall be incidental to this item.

The Contractor shall notify the Engineer a minimum of 3 days prior to date of expected herbicide application. Applicators shall notify the Engineer upon arriving on-site and upon leaving the site.

HERBICIDE APPLICATIONS

All herbicide application shall conform to Massachusetts Pesticide Laws and Regulations per the Massachusetts Department of Agricultural Resources (MDAR) Pesticide Bureau.

Mixing, applying and/or disposing of herbicides shall always be in accordance with instructions on their labels and all applicable federal, state, and local regulations. Mixing shall not occur within sensitive areas, wetlands, or buffer zones.

ITEM 102.3 (Continued)

Contractor shall not spray 2 hours prior to precipitation, during rain, or during windy conditions. The Contractor shall be responsible for monitoring weather conditions and adjusting the work schedule as appropriate for the herbicide and application method to be used.

Targeted vegetation shall be identified and marked prior to treatment. Plants treated by foliar spray, injection or glove application or other methods that leave standing vegetation, as opposed to cut-stump application, shall remain clearly marked for identification through the contract period.

Desirable vegetation shall be protected from both spray and other physical damage.

Contractor is responsible for any damage to vegetation not designated for removal or treatment. Vegetation damaged shall be restored. Cost of replacement plants and/or restoration shall be borne by the Contractor.

Contractor shall ensure that the public does not enter a work area while herbicide application or spraying is underway.

DISPOSAL OF INVASIVE PLANT MATERIAL

All material to be cleared shall become the property of the Contractor. The satisfactory disposal of all cleared plant material (seeds, roots, woody vegetation, associated soils, etc.) shall be the Contractor's responsibility.

The Contractor shall take measures to prevent viable plant material from leading to further infestations (seeds, roots, woody material, etc.) while stockpiled, in transit, or at final disposal locations. All precautions shall be taken to avoid contamination of natural landscapes with invasive plants or invasive plant material.

Chipping, shredding, or on-site burning of plant material must be approved by the Engineer and included in the IMPS.

For plant material taken to an incinerating facility per the IPMS, a receipt from that facility shall be submitted to the Engineer as proof of disposal.

Where feasible, it is preferable to dispose of plants on-site or to bury them on-site with on-going monitoring for re-sprouting. Disposal locations and methods must be approved and included in the IPMS. Site work such as grading and seeding to stabilize and restore disposal area shall be incidental to this item.

The Contractor shall be responsible for treating or otherwise managing areas of re-growth due to improper disposal. Treatment shall be at the Contractor's expense.

FOLLOW-UP TREATMENT

Plants and areas shall be re-treated as necessary and as appropriate to the time of year. Treatment shall be for the duration of the contract and per the IPMS.

ITEM 102.3 (Continued)

MEASURE OF SUCCESS

The expectation is a minimum of 85-95 percent control achieved after the first treatment, depending on plants targeted and extent of population, and based on the expectations laid out in the IPMS. The expectation for the contract duration is 95-100% eradication by the end of the treatment period, unless otherwise specified in the IPMS.

METHOD OF MEASUREMENT

Item 102.3 will be measured for payment by the Hour of verified crew time spent on the project doing herbicide application as and where specified herein and in the IPMS. A crew shall be defined as a minimum of two licensed applicators each equipped with (at minimum) back-pack sprayer and mist blower. The crew shall also have a properly equipped spray truck with hoses and a tank with sufficient capacity for a full day of work.

BASIS OF PAYMENT

Item 102.3 will be paid at the contract unit price per Hour, which price shall include all labor, materials, equipment, tools, and all incidentals required to complete the work.

Payment will be based upon verified time spent on the project doing herbicide application as and where specified in the IPMS and upon receipt and approval of submittals. Payment will not include travel time to and from the Contractor's place of business and nor time for investigative field trips.

If there is only one applicator, hourly payment shall be adjusted to 50 percent of the unit price.

The Invasive Plant Management Strategy will be paid for under Item 102.33.

ITEM 102.33 INVASIVE PLANT MANAGEMENT STRATEGY HOUR

This item consists of providing an Invasive Plant Management Strategy (IPMS) for the control of invasive plants currently existing on the project site and/or as directed and shall be coordinated with Item 102.3 Herbicide Treatment of Invasive Plants. Unless otherwise approved, the IPMS shall be submitted in the form of the MassDOT Invasive Plant Management Strategy Report Form.

The IPMS shall be submitted for review and approval by the MassDOT Landscape Design Section or their representative, and the IPMS shall be implemented on-site.

The Invasive Plant Management Strategy Report Form is available online at https://www.mass.gov/lists/landscape-design-and-roadside-maintenance under Invasive Plant Management.

Herbicide treatment for invasive plants shall be as described under Item 102.3 Herbicide Treatment of Invasive Plants and shall be compensated per that Item.

Work under this item shall be coordinated with work and schedule for Selective Clearing, Clearing and Grubbing, Mowing, Tree Removal, Planting, and Wetland Mitigation as relevant to the project.

Individual attending the site walk and determining the Invasive Plant Management Strategy must demonstrate expertise with vegetation management and invasive plant control and submit qualifications as described below.

QUALIFICATIONS

Individual shall be from the same company as that providing services for Item 102.3 Herbicide Treatment of Invasive Plants and shall submit the following, if not submitted under Item 102.3:

- Submit copy of current Core license.
- Submit a resume listing five (5) or more years of experience managing invasive plants with a company specializing in vegetation management.
- References shall be submitted if requested.

SUBMITTALS

Task Summary & Reports

For measurement of payment, the contractor shall submit the total sum and a breakdown of hours for the tasks performed. At a minimum, the tasks shall include the Initial Site Walk, submittal of an approved IPMS, and if requested to accommodate project or site changes, a Follow-up Site Inspection and accompanying IPMS Amendment.

Interim Site Monitoring Reports and/or a Final Report shall be submitted if requested by the MassDOT Landscape Design contact. The MassDOT Landscape Design contact must be notified to attend the site inspection walk when an Interim or Final Report has been requested.

ITEM 102.33 (Continued)

INVASIVE PLANT MANAGEMENT STRATEGY (IPMS)

At least thirty (30) days prior to construction activities and/or any proposed treatment, the contractor shall submit the IPMS for approval by the Engineer and MassDOT Landscape Architect. All chemicals and methods proposed shall be consistent with applicable Massachusetts Wetlands Protection Act Order of Conditions.

The IPMS shall be completed in coordination with the Prime Contractor and the Engineer and shall include the following as appropriate and applicable to the project and to the IPMS Report Form questions and Guidance:

I. Project Information

a. Company writing the IPMS and performing the herbicide application.
b. Date of site walk
c. Attendees at site walk
d. Expected end date of contract and expected last treatment (month/season)

II. Brief Description of Conditions

a. Provide a free-hand sketch on construction plans or aerial image showing species, location, and as relevant, show or note extent of population as relevant to Strategy (i.e., population extends off ROW preventing eradication, small population and eradication deemed feasible within contract schedule, etc.).

III. Coordination with Roadway Contractor regarding other work

a. Tree Work: Note coordination to be implemented with tree removal, clearing, and clearing and grubbing as applicable to the project.
b. Wetland Mitigation - Include management proposed for wetland mitigation areas in the IPMS, if and as required.
c. Planting: If there will be planting in areas proposed for treatment, propose treatment and schedule to avoid herbicide damage to plants.
d. Mowing: If coordination is required with state mowers, note need in IPMS.

IV. Soil Management

a. Provide specifics on how soil with invasive plant roots (in particular) or seeds will be handled (i.e., separate stockpiles, plant material will be buried on-site, re-used on-site, disposed off-site and if so, where?).
b. Show stockpile locations on plan and include treatment schedule.
c. Note measures that will be implemented to avoid spread through equipment, including how and where equipment will be cleaned.

V. Invasive Plant Treatment & Management

a. Proposed chemical and methods of treatment for each species or area.
b. Time of treatment based on target plant species.
c. Submit product label including application methods and rates (entire MSDS information need not be submitted if available online).
d. Proposed performance metrics or measure of treatment success if different from that specified under Item 102.3.
e. Method for disposing invasive plant material. This includes material that may result in spread (i.e., seeds, roots) and material that has been treated and/or is not viable (foliage, dead wood, etc.). Methods may include grinding in place, stockpiling and treating, and incinerating offsite.
f. Expected follow-up treatment for duration of contract.

ITEM 102.33 (Continued)

VI. Monitoring Schedule if requested by MassDOT.

Note: The IPMS is critical for identifying pre-construction conditions as well as strategies for minimizing import or spread of invasive plants. Failure to provide an approved IPMS may jeopardize this item, in which case, the contractor will be responsible for management of invasive plants found on-site at no cost to the contract.

PHOTO DOCUMENTATION

Digital photos of site conditions, typical species, and extent of infestation must be provided with the IPMS and with any follow-up monitoring or reporting. Photos of follow-up monitoring and reporting must be date and time stamped for acceptance.

METHODS

INITIAL SITE WALK

Prior to any construction activities and soil disturbance, the Contractor shall walk the site with the Engineer and the MassDOT Landscape Architect to determine the IPMS. During the site walk the Contractor shall identify limits of work and, as necessary, mark locations of areas designated for treatment and individual plants targeted for treatment or removal. The Contractor shall be responsible for marking delineated areas and plants to be preserved, removed, or otherwise treated. Fencing or other materials needed for marking and delineating protected areas shall be incidental to this item.

IPMS FOLLOW-UP AMENDMENT

The IPMS may be amended to address additional concerns or adjust to conditions if required by the MassDOT Landscape Architect. The amended IPMS shall be submitted to the Engineer and MassDOT Landscape Architect for approval at least fourteen (14) days prior to any proposed treatment.

INTERIM SITE MONITORING INSPECTION REPORTS

If required by the MassDOT Landscape Architect and Engineer, Interim Site Monitoring and an accompanying report shall be conducted. Interim Reports must include time and date stamped photos showing treated locations and species.

FINAL INSPECTION

A final inspection and report documenting the status of the invasive control may be required for regulatory purposes or for instances where control will be continued by others. The report shall include photo documentation of pre-construction (existing) and post-treatment conditions, notations on a plan or aerial image of area treated, summary of treatment performed, and control achieved. Final reports submittal must include time and date stamped photos.

ITEM 102.33 (Continued)

METHOD OF MEASUREMENT

Item 102.33 will be measured for payment by the Hour. The basis for measurement shall be per the completion of tasks as approved under the Task Summary submittal and acceptance of submittals and photos described above.

BASIS OF PAYMENT

Item 102.33 will be paid at the contract unit price per Hour, which price shall include all labor, materials, equipment, tools, and all incidentals required to complete the work. Payment shall not include travel time to and from the Contractor's place of business.

ITEM 102.511 TREE PROTECTION – ARMORING AND PRUNING EACH

The work under this item shall conform to the relevant provisions of Subsection 771 of the Standard Specifications and the following:

Tree protection – armoring and pruning shall be used for instances where construction activity (the use of heavy equipment), comes within proximity to potentially damage tree trunk(s) or limbs.

The work shall include the furnishing and installing of temporary tree trunk protection, minor limb pruning, or removal of lower tree limbs to prevent injury to the tree from construction equipment and activities; as shown on the Drawings; and/or as required by the Engineer.

REFERENCES

If requested, the Contractor shall provide to the Engineer one copy of the latest edition of the American National Standards Institute (ANSI) A300 Standard Practices for Tree, Shrub, and Other Woody Plant Maintenance: Part 1-Pruning and Part 5-Construction Management Standard. Provision of reference shall be incidental to this item.

MATERIALS

Trunk armoring shall be such that it prevents damage to the trunk from construction equipment. Material used for trunk armoring or mounting shall be such that installation and removal shall not damage the trunk.

Acceptable trunk armoring materials shall include two by four (2x4) wood cladding, mounted with wire or metal strapping, or when duration of construction activities is less than three months, slotted corrugated plastic pipe, mounted with duct tape. Eight (8) once untreated burlap shall be used to wrap the tree trunk prior to installation of cladding.

Alternative armoring methods or materials may be acceptable if approved by the Engineer.

The height of tree trunk cladding shall be measured from the base of the tree (including root flare) to the bottom of the first branch, or to a height of eight (8) feet, or as may be required by the Engineer.

METHODS OF WORK

Prior to construction activities, the Engineer, Contractor, and the Arborist (if item is included in the contract), shall review trees noted on the Drawings to be protected. Final decision and selection of trees to be armored and/or pruned shall be per the Engineer.

Care shall be taken to avoid damage to the bark during installation and removal of armoring. Trunk armoring shall be maintained such that it is effective for as long as required or replaced when materials are found to be damaged or ineffective, as determined by the Engineer. Replacement, if required, shall be incidental to the work. Armoring shall be removed immediately upon completion of work activities adjacent to the protected tree(s).

ITEM 102.511 (Continued)

Pruning of limbs shall conform to the techniques and standards of the most recent ANSI A300 standards.

DAMAGES OR LOSS

If trees designated for protection under this item are damaged, including root damage from unapproved trespassing onto the root zone, the Contractor shall, at his own expense, secure the services of an Arborist, described in Item 102.55. The Arborist shall be approved by MassDOT.

If, based on the recommendation of the Arborist, the Engineer determines that damages can be remedied by corrective measures, such as repairing trunk or limb injury; soil compaction remediation; pruning; soil injection fertilization; and/or watering; the damage shall be repaired as soon as possible, within the appropriate season for such work and according to industry standards.

If, based on the recommendation of the Arborist, the Engineer determines that damages are irreparable, or that the damages are such that the tree is sufficiently compromised to pose a future safety hazard, the tree shall be removed. Tree removal shall include cleanup of all wood, grinding of the stump to a depth sufficient to plant a replacement tree or plant, removal of all chips from the stump site, and filling the resulting hole with topsoil. Such tree removal(s), grinding, debris removal, and topsoil filling, shall be at the Contractor's expense.

Tree removal from improper or inadequate tree protection shall result in the Engineer assessing the Contractor monetary damages consistent with industry standards for assessed value and/or replacement.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 102.511 will be measured and paid at the contract unit price per EACH tree to be armored and pruned. This will include full compensation for all labor, equipment, materials, and incidentals for the satisfactory completion of the work and the subsequent removal and satisfactory disposal of the protective materials upon completion of the contract or as required by the Engineer.

Payment for work under this item will be scheduled as follows:

- 40% of the value shall be paid upon installation of trunk armoring and completion of pruning work, if required.

- 60% of the value shall be paid at the end of construction operations that would potentially damage the tree and after protection materials have been removed and properly disposed of by the Contractor. In the event of repairable damages, payment shall be made after the completion of remediation measures.

No separate payment will be made for costs of remedial actions, including Arborist services, tree removal, but all costs in connection therewith shall be included in the Contract unit price bid.

Tree damages assessed, due to lack of or improper tree and plant protective measures being taken, shall be deducted from the contract price of the work.

ITEM 102.521 TREE AND PLANT PROTECTION FENCE FOOT

The work under this Item shall conform to the relevant provisions of Subsections 644 and 771 of the Standard Specifications and the following:

Work under this item shall consist of furnishing, installing, and maintaining tree and plant protection fence(s) in a vertical and taut position; removing and resetting fencing as may be required; and final removal of protection fence(s) at the completion of construction activities, or as otherwise required by the Engineer.

The purpose of the fencing is to signify a construction work-free zone and physical barrier, thereby preventing damage to tree roots, tree trunks, soil, and all other vegetation within this delineated Tree and Plant Protection Zone (TPPZ), as shown on the Drawings, as required by the Engineer, and as described herein.

Protection shall be for the duration of the construction activities unless otherwise required by the Engineer.

MATERIALS

Tree and plant protection fence(s) shall provide a minimum forty-eight (48) inch tall barrier, that remains vertical and taut. The Fence shall be orange plastic safety fence (recommended where high visibility is necessary), or wooden snow fencing, or other approved material. Posts and anchoring materials shall be incidental to the work.

Per requirements of the Engineer, additional posts, deeper post depths, and/or additional attachments shall be used if the fabric or fence sags, leans or otherwise is not providing visible or physical protection to the TPPZ.

REFERENCES

If requested, the Contractor shall provide to the Engineer one copy of the American National Standards Institute (ANSI) A300 Standard Practices for Tree, Shrub, and Other Woody Plant Maintenance Part 1, Pruning and Part 5, Construction Management Standard. Provision of reference shall be incidental to this item.

Establishment of THE TPPZ

Fencing shall be used to delineate and establish the TPPZ, adjacent to construction areas, staging areas, stockpile areas, as shown on the Drawings, and/or as required by the Engineer.

Fencing shall be located as close to the work zone limit and as far from tree trunk(s) and plants as possible to maximize the area to be protected. Fence shall run parallel and adjacent to construction activity to create a barrier between the work zone and the root zone or designated limit of plants and soils to be protected.

When construction activities surround (or have the potential to surround) trees or plants to be protected, a circular enclosure shall be used.

ITEM 102.521 (Continued)

In these instances, the TPPZ limit shall be the drip line of each tree or as close as possible to the drip line, and/or as shown on the Drawings. The drip line is defined as the outermost limit of tree canopy.

The Contractor shall not engage in any construction activity within the TPPZ without the approval of the Engineer. Activities may including operating, moving, or storing equipment, supplies, or materials; and locating temporary facilities, including trailers or portable toilets, Accessing or traversing the TPPZ shall not be permitted.

METHOD OF WORK

TPPZ fencing shall be installed prior to any construction work or staging activities. Fence(s) shall be repositioned where and as necessary for optimum tree and plant protection. Repositioning shall be incidental to this item. TPPZ fencing shall not be moved without prior approval by the Engineer.

The TPPZ shall be protected at all times from compaction of the soil; damage of any kind to trunks, bark, branches, leaves, and roots of all plants; and contamination of the soil with construction materials, debris, silt, fuels, oils, and any chemicals substance.

After construction activities are completed, or when required by the Engineer, fencing, stakes, and other anchoring materials, if any, shall be removed and disposed off-site by the Contractor.

REQUIRED WORK WITHIN THE TPPZ

In the event that grading, trenching, utility work, or storage is unavoidable within the TPPZ, the Engineer shall be notified. Measures may be required for tree protection and preservations, including air spading; the use of six (6) inch depth of wood chips or approved matting for root protection; pruning of branches; and/or trunk protection. These protection measures shall be paid under applicable contract items.

Landscaping work specified within the TPPZ shall be accomplished by hand tools. Where handwork is not feasible, with permission of the Engineer, work shall be conducted with the smallest mechanized equipment necessary.

TREE AND PLANT Injury or loss

If the TPPZ is encroached by construction activity without approval, at the discretion of the Engineer, the Contractor may be required to provide a more durable barrier (e.g., Jersey Barriers, chain link fence (if not already in use) to secure the area. Costs of furnishing and installing additional or more durable barrier(s) shall be borne by the Contractor.
In such cases of encroachment, soils shall be considered compacted and tree root injury will be assumed. Action shall be taken as specified below.

In the event that trees designated for protection under this item are injured, including root injury from unapproved trespassing onto the root zone, the Contractor shall, at his own expense, secure the services of an Arborist, described under Item 102.55. The Arborist shall be approved by MassDOT.

ITEM 102.521 (Continued)

In the event of spills, compaction or injury, the Contractor shall take corrective action immediately using methods approved by the Engineer, in coordination with the Arborist.

If, based on the recommendations of the Arborist, the Engineer determines that injuries can be remedied by corrective measures, such as repairing trunk or limb injury, soil compaction remediation, pruning, and/or watering; the injury shall be repaired as soon as possible, within the appropriate season for such work, and according to industry standards.

If, based on the recommendations of the Arborist, the Engineer determines that injuries are irreparable, or that the injuries are such that the tree is sufficiently compromised to pose a future safety hazard, the tree shall be removed. Tree removal shall include cleanup of all wood, grinding of the stump to a depth sufficient to plant a replacement tree or plant, removal of all chips from the stump site, and filling the resulting hole with topsoil. Such tree removal(s), grinding, debris removal, and filling, shall be at the Contractor's expense.

Tree removal from improper or inadequate protection of the TPPZ shall result in the Engineer assessing the Contractor monetary damages consistent with industry standards for assessed value and/or replacement.

Shrubs removals from improper or inadequate protection of the TPPZ shall be replaced with plants of similar species and equal size or the largest size plants reasonably available. The Engineer shall approve the size, quality, and quantity of the replacement plant(s). Each replacement shall include a minimum of one year of watering and establishment care, specified under Section 771.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Tree and Plant Protection Fence will be measured by the FOOT, complete in place, by the length along the top of the fence.

Tree and plant protection fence will be paid for under the contract unit price per FOOT, complete in place and shall include all materials, labor, and equipment required to furnish, install, anchor, maintain, and remove the fence upon completion, as described herein. Posts, temporary footings, anchoring and removal upon completion, shall be incidental to this item.

No separate payment will be made for costs of remedial actions, including addition of more durable barriers, Arborist services, tree or plant removal, shrub replacement and establishment, but all costs in connection therewith shall be included in the Contract unit price bid.

Tree damages assessed, due to lack of or improper tree and plant protective measures being taken, shall be deducted from the contract price of the work.

Payment for work under this item will be scheduled as follows:

- Forty (40) percent of the value payment will be made upon installation of fencing.
- Sixty (60) percent of the value payment will be made when fencing materials have been maintained to function as specified, for the intended duration, and removed and disposed off-site at the completion of protection measure requirement.

ITEM 106.88 JACKING AND SHORING EACH

The work under this Item consists of jacking and supporting existing stringers as required by the Contract plans and details and/or as required by the Engineer at Bridge B-10-018 (12C).

Shoring materials may be new or second hand. The Contractor shall submit a plan of the proposed work showing the details and indicating the materials to be used. The submittal shall include the jacking load calculations and shoring design computations, based on the bridge configurations and the working stresses of the materials used, sequence of operations, and all details incidental thereto. Unless otherwise required by the Engineer, the proposed jacking and shoring system shall be designed to apply force in increments to the existing stringers to relieve load from the existing substructure. The jack(s) shall have a locking mechanism preventing the stringer from lowering in the event of loss of hydraulic pressure. All components of the system shall have load capacity greater than the total calculated load carried by the existing stringer during normal traffic operation, which includes but is not limited to, dead load, live load, and impact load.

BRIDGE LOADS:

The Contractor shall be responsible for designing the jacking and shoring system in accordance with the jacking loads provided on the Plans, and sequencing noted in this specification item. The provided loads do not include additional construction dead loads or live loads. If the Contractor opts to jack in a different sequence, he/she shall be responsible for calculating all loads necessary to design jacking and shoring in accordance with their proposed sequencing.

All materials (except jacks) shall be designed by working stress design (ASD). The type of jacks used, and factor of safety shall be per industry standards.

Approval of this submission shall be obtained prior to the commencement of any work under this item. The above plan and computations shall bear the seal and signature of a Professional Engineer of the appropriate discipline registered in Massachusetts.

Materials shall meet the following:

Wood Products:	M9.05.1
Fastenings:	M8.01.5
Structural Steel:	M8.05.0

All treated wood supplied by the Contractor shall meet the requirements of M9.05.1 for Wood Products, including the most recent versions of AWPA U1 and M4 which are incorporated by reference. No new wood shall be treated with inorganic arsenic (including chromated copper arsenate (CCA), ammoniacal copper arsenate (ACA), ammoniacal copper zinc arsenate (ACZA)), creosote or pentachlorophenol in all project construction.

The work shall be performed as follows:

The Contractor shall install end diaphragms as detailed on sheet 21 of 25 of the B-10-018 Bridge Plans prior to jacking operations. Diaphragms for jacking will be paid for under Item 992.1 – Alteration to Bridge Structure, Bridge No. B-10-018. It was assumed that the existing water main will remain in service during jacking operations. Should utility coordination require utility replacement prior to or during bearing replacement, the Contractor is responsible for the design and detailing of a jacking plan that fit geometrically with the location of the proposed water main.

ITEM 106.88 (Continued)

Bearing replacement shall be completed and jacking diaphragms shall be removed from the water utility bay prior to initiation of beam end repairs on beam lines supporting the water utility.

If the Contractor elects to perform jacking and bearing replacement in distinct phases together with the bridge construction stages, differential jack heights shall be limited to 1/8". The contractor is alerted to fact that intermediate diaphragms are welded to the connection plates per the existing plans. The jacking and shoring submittal shall include the intended means and methods of accommodating differential movement between beam lines, as well as the intended configurations of the proposed end diaphragms with the existing diaphragms/jacking layout at the phase boundary.

In the event that there is adequate space to jack from in front of the bearing, the Contractor may opt to omit the diaphragm retrofits for jacking as noted in the plans. If jacking diaphragms are omitted, the Contractor must retrofit the existing end diaphragms in accordance with Item 992.1 and Item 107.97 and as detailed on sheet 14 of 25 of the B-10-018 Bridge Plans. The Contractor shall clarify their intended method of jacking and shoring in the jacking and shoring submittal.

The successful prosecution, safety, and completion of the work in an acceptable manner is the responsibility of the Contractor. In the event of any damage to the structure due to inadequate supports, or Contractor negligence, the Contractor shall repair or replace any such damaged components at no cost to the department.

When the repairs are completed and the supports are no longer needed as determined by the Engineer, all supporting materials shall be removed and become the property of the Contractor unless other prior arrangements were previously made with MassDOT.

The bridge shall be kept open to traffic while the stringers are supported. The bridge shall be temporarily closed to traffic while jacking is in progress. The Contractor's attention is directed to the fact that the expressways and some other roads are heavily traveled high-speed roads with high volumes of truck traffic.

Bid pricing for this Item should be predicated on a typical shoring design.

METHOD OF MEASUREMENT

Item 106.88 will be measured for payment by the Each steel stringer end jacked and shored temporarily, complete in place.

BASIS OF PAYMENT

Item 106.88 will be paid for at the Contract unit price per Each, which price shall include all labor, materials, tools, equipment, engineering services and all incidentals required to complete the work. The Contractor shall only be compensated once per jacking and shoring location and shall sequence the work accordingly.

Removal of Shoring is included under this Item and will not be paid for separately.

ITEM 107.97 STRUCTURAL STEEL REPAIRS POUND

The work under this Item shall conform to the relevant provisions of Subsections 960 and 961 of the Standard Specifications and the following:

The work shall include repair of steel beam ends and bottom flanges with section loss as required by the Engineer and as shown in the Plans. Additional steel repairs may be required following completion of the cleaning and priming of the steel. An inspection shall be performed by the Engineer following cleaning and priming of the steel and all limits confirmed at the time of inspection. The final limits of each of the repairs and any in-kind replacement of deteriorated bracing and/or utility supports will be provided by the Engineer after the inspection.

The Contractor shall retain existing diaphragms and incorporate new connection plates and diagrams as specified in the Contract Plans and Details. All end diaphragms shall be retrofitted as noted on the plans. Proposed retrofit channels shall be paid for under Item 992.1, except in cases where the existing channel is deemed unsuitable for reuse. Existing channels deemed as unsuitable for re-use shall be replaced in kind as shown in the Contract Plans and Details. The costs associated with the replacement of damaged end diaphragms will be considered incidental to this item.

End diaphragms required for jacking and shoring activities shall be paid for under item 992.1.

The Contractor shall note that certain repair locations are known to have obstacles that are in conflict with the work that is to be performed. Work required to move, remove, replace, work around, or modify any obstacles interfering with the structural steel repair work, such as utilities and diaphragms, shall be included in this item and be performed with no additional compensation, and shall be deemed incidental to the unit price bid for this item.

Structural steel components damaged by the Contractor’s operation shall be repaired in conformance with these specifications. The costs of such repairs shall be borne by the Contractor.

The Contractor shall submit to the Engineer a plan of the proposed repairs, showing the methods of procedures, materials, and equipment they intend to use. Approval of this submission shall be obtained prior to the commencement of any work under this item.

All work shall be done per the contract plans and as required by and to the satisfaction of the Engineer and in accordance with the details and sequence of construction supplied by the Contractor and approved by the Engineer.

MATERIALS

All new structural steel and new high strength bolts shall conform to the requirements of Sections M8.05.0 and M8.04.3 of the Specifications, respectively. All structural steel shall be AASHTO M270, Grade 36 or Grade 50 steel.

Repair steel for beam ends shall be considered main member and conform to the Charpy V - notch impact test requirements for AASHTO Temperature Zone T2.

ITEM 107.97 (Continued)

Prior to installing steel repair components, an epoxy-based metal filler compound shall be applied to existing deteriorated steel web surfaces and flanges in a manner which restores deteriorated sections to their original thicknesses to prevent voids between the filler surface and proposed repair plates. Filler material shall be applied as shown in the plans and as required by the Engineer. Epoxy filler compound shall be "ITW Philadelphia Resin Repair Compound (RRC)" (web site: http://chockfast.com/products/repair-and-accessory-products/itw-repair-compound/), or Sikadur 31, Hi-Mod Gel (web site: http://usa.sika.com), or Adhesives Technology Ultrabond 2100, Class C (web site: http://atcepoxy.com/medium-viscosity-bonding-agent-ultrabond-2100/), or an approved equal. The filler compound shall be applied in strict accordance with the manufacturer's specifications.

The Contractor is alerted that the existing paint is likely lead-based. Any removal and disposal of paint for the operations described herein shall be performed in strict conformance with all State and Federal health and environmental regulations, as stipulated in these specifications.

CONSTRUCTION METHODS

All work shall be done as required by and to the satisfaction of the Engineer and in accordance with the details approved by the Engineer.

The methods of procedures, materials, equipment, or anchorage proposed by the Contractor shall be submitted on a standard shop drawing for approval by the Engineer prior to the beginning of work for each location. All steel repair dimensions shall be field verified by the Contractor prior to developing shop drawings. Approval shall not relieve the Contractor of responsibility for the successful completion of the work.

Gouges in the steel shall be ground smooth on a slope of 1:10. All grinding shall be in the direction of stress (along the length of the beam). Gouges greater than 1/4 inch deep in edges of beams or plates shall be repaired by welding. Gouges greater than 1/16 inch on surfaces of the steel shall be repaired by welding. The filler metal shall extend 1/16 inch above the surface and shall then be ground smooth.

All steel superstructure members shall be cleaned to meet the requirements of SSPC SP-10, Near-White Blast Cleaning and receive a prime coat prior to beginning steel repairs, in accordance with Subsection 961, "Maintenance Painting of Steel Bridges". The Engineer shall verify the deterioration extents prior to fabrication of repair components. Subsequent to successful steel repairs at each span and primer touch up of repair areas, the superstructure steel shall be painted with the intermediate and final coats. All costs of cleaning, prime coating, and painting will be paid for under Item 961.201.

WELDING

All welding shall conform to the latest edition of the Bridge Welding Code AASHTO/AWS D1.5 and shall meet the following requirements unless specified otherwise:

All welding required to complete the repairs will be considered incidental to the repair and no separate compensation will be allowed.

ITEM 107.97 (Continued)

All welders shall be certified. Welders' qualifications certificates must be submitted to the Engineer for approval. Electroslag and electro gas welding will not be permitted. Welding will not be permitted when the air temperature is below 35 F or when the surfaces to be welded are wet from condensation, rain, snow, or ice. When the temperature is between 35 F and 45 F, the surface within 3" of the point where the weld is to be started shall be heated to a temperature of approximately 100 F, and this temperature shall be maintained as a minimum within this distance until the bead is completed.

The Contractor shall submit for approval by the Engineer a welding procedure for each of the repair areas that will require welding.

INSPECTION AND NON-DESTRUCTIVE WELD TESTING

All welds are to be inspected and tested (non-destructively) in accordance with latest addition of AASHTO/AWS D1.5 and the applicable provisions of the Standard Specifications Subsection 960, and the specifications stipulated in these special provisions.

Inspection shall consist of checking the type, location, size, length, returns and profile of field welds and shop welds. Welds will be evaluated by their surface appearance, completeness for penetration and fusion, avoidance of undercutting, freedom from slag, inclusions, porosity, cracks and general appearance.

All welds that are found to be defective shall be corrected in accordance with the AWS procedures and to the satisfaction of the Engineer and shall then be re-inspected as outlined above. The expense of such corrective work shall be borne by the Contractor.

The Contractor shall be responsible for Quality Control Inspection and Non-Destructive Weld Testing of all shop welding and field welding of non-fracture-critical members in accordance with the requirements herein specified. These costs shall be considered incidental to the various steel repair pay items.

CUTTING OF STEEL

Existing steel components that are required for replacement by the Engineer shall be carefully removed by dismantling existing connections. Cutting of existing steel shall be performed with care to avoid undercutting, overheating, notching or other damage of the material which is to remain. The Contractor shall use temperature-indicating crayons which meet the approval of the Engineer for 275 degrees Fahrenheit and 300 degrees Fahrenheit. These indicator crayons shall be used on surfaces of the web and beam adjacent to an area undergoing a process of cutting or grinding as ordered by the Engineer.

Cutting or grinding shall be discontinued temporarily, to allow cooling, if the temperature of the base steel in the girder web or flange exceeds 275 degrees Fahrenheit.

If the Contractor damages materials to remain during cutting operations, he shall replace, repair, or reinforce the damaged area as may be needed to restore the materials to existing condition prior to damage.

ITEM 107.97 (Continued)

This work shall be performed by the Contractor as ordered by the Engineer at no additional cost to MassDOT, and to the satisfaction of the Engineer.

ENVIRONMENTAL

All applicable portions of Sections 961.65 "Worker Protection" and 961.66 "Environmental Protection and Monitoring" shall be followed when performing this work.

During chemical stripping, a hand washing facility may be used in lieu of a decontamination/changing facility. Hazardous material shall be collected during the disassembly and disposed of as outlined in Section 961.68 "Handling of Hazardous Waste and Reporting Release Programs". Submittals shall be according to Section 961.69 "Submittals".

ADDITIONAL REQUIREMENTS

The edges of the existing steel to be repaired, as well as the faces that will meet the new steel, shall be ground smooth and primed prior to the installation of the new plates or shapes. Holes in steel shall be drilled, not punched or burned. Rust holes +/- 3" in diameters shall be drilled through prior to installation of repair plates. Isolated rust holes in the girder web panel shall be drilled through or coped to a consistent web thickness of 1/8". Edges of the holes or copes are to be ground smooth to the satisfaction of the Engineer. Filler plates cut to fit shall be install in places of severe rust holes and drilled through prior to installation of repair plates. Filler plates are incidental to this Item with no additional compensation.

The Contractor is fully responsible for the accuracy and fit of the work and thus shall determine what measurements are required and shall allow adequate time and resources for obtaining field measurements in developing the fabrication and construction.

The Contractor shall submit shop drawings utilizing the field measurements of the replacement/repair areas to verify fit of bridge components and all other repair dimensions. Fabrication shall not start prior to acceptance of shop drawings.

The Contractor shall provide support for interim and final inspection of the bridge during cleaning operations. This support shall include the necessary traffic controls (if required) and safe access to the work.

When it is necessary to temporarily support utility lines/pipes to perform steel repairs, the Contractor shall consult with the affected utility owners with respect to timing and extents of utility impacts. Any damages to the utilities caused by the Contractor's operations shall be repaired by the Contractor to the satisfaction of the Engineer and the affected utilities, at the Contractor's own expense. The cost for any temporary utility supports will be paid for under Item 113.1.

Adequate measures shall be taken by the Contractor to prevent work generated debris, tools, and/or materials from entering adjacent roadway lanes or dropping to the ground below the structure. All debris and any materials which accidentally fall into such areas shall be removed immediately at the Contractor's expense. Any damage from falling debris shall be repaired by the Contractor to the satisfaction of the Engineer, at the Contractor's own expense.

ITEM 107.97 (Continued)

Except as otherwise specified, all removed steel and appurtenances shall become the property of the Contractor and shall be recycled, reused, or disposed of in accordance with all applicable local, State, and Federal Requirements.

The Contractor shall take the necessary precautions such as flaggers, warning signs and/or temporary protective structures for the safety of vehicles or pedestrians using any area adjacent to or under the work areas. Any such structure shall be adequate for the purpose and shall be approved by the Engineer.

METHOD OF MEASUREMENT

Item 107.97 will be measured for payment by the actual net weight of new steel in Pounds, including nuts, bolt heads and permanent washers installed in the structure, complete in place.

BASIS OF PAYMENT

Item 107.97 will be paid for at the Contract unit price per Pound, which price shall include all materials, labor, submittal preparation, equipment, scaffolding, welding, tools, field inspection, utility support, localized cleaning and paint removal required to perform repair, and all incidentals required to complete the work.

ITEM 113.1 **DEMOLITION OF DECK OF BRIDGE NO. B-10-018 (12C)** **LUMP SUM**

The work under this item shall conform to the relevant provision of Subsection 112 of the Standard Specifications and the following:

The Contractor is advised to conduct a field investigation prior to bidding. The Department makes no assurances regarding the presented conditions, dimensions, and materials of the existing structure as shown on the Contract Plans. The Contractor shall verify all existing conditions and construction features of the structure to be demolished, as necessary, for the proper planning and completion of the work. The Contractor shall base its bid on his/her own findings without any additional compensation for variances from the Plans or these Special Provisions regarding actual conditions for the items to be removed. The Contractor and his assigns shall not damage the steel beams or accessories beneath the deck. If the beams are damaged the Contractor shall repair them as soon as practical prior to re-loading the steel bridge beams.

The work under this item shall consist of furnishing all labor, materials and equipment necessary to perform the staged demolition and removal of the existing Northfield Road Bridge decking, concrete encased end diaphragms, bridge sidewalk, bridge safety curbs, bridge rail, safety fencing, existing utility diaphragms and existing water line for Bridge No. B-10-018 (12C) over I-91. Except as specified, all material and debris shall become the property of the Contractor, and shall be recycled, reused, or disposed of in accordance with all applicable local, State, and Federal requirements.

The Contractor shall provide any reinforcement to the existing structures as required for support of construction equipment during staged construction. The Contractor shall also provide temporary utility supports as required for the replacement of utility support diaphragms. The work shall be considered incidental to this Lump Sum Item.

EXISTING SHEAR STUDS:

Plans of the existing bridge show shear studs or optional spiral reinforcement on the top flanges of the existing beams in spans 2 through 4. If shear studs or spiral reinforcement are damaged beyond repair during demolition, they shall be replaced in accordance with the requirements of Subsection 960 of the Standard Specifications. All costs associated with the repair and/or replacement of the existing shear studs will be paid for under Item 911.1.

Studs/Spirals in the link slab debonded length shall be removed by burning off to within 1/8 to 1/16 of an inch above the top flange. After removal, the top flange surface shall be ground smooth in the direction of stress (longitudinal direction of the flange) and be Magnetic Particle (MT) tested. Testing shall meet the requirements of Subsection 960.61; Nondestructive Testing; of the Standard Specifications. Cost for removal of the shear studs within the link slab shall be incidental to this item.

STRUCTURAL STEEL AND UTILITIES:

The Contractor shall take care not to damage the existing structural steel, water lines and telecommunication lines and any concrete to remain.

ITEM 113.1 (Continued)

Any of the above items damaged or otherwise made unsatisfactory for continued use by the Contractor's operations, shall be repaired or replaced at his/her own expense, as required by the Engineer.

Refer to the General Utility Requirements section of this Contract for a description of all work involving the water line and telecommunication lines.

The Contractor shall be responsible for consulting with the affected utility owners prior to demolition on the proposed sequencing and support of the conduits in place as needed. Any damages to the conduits caused by the Contractors operations shall be repaired to the satisfaction of the engineer and the affected utility owners at the Contractors own expense. The costs for temporary utility supports shall be considered incidental to this item.

The Contractor shall take care not to damage any newly constructed structural components as shown on the Plans. Any structural components so designated that are damaged or otherwise made unsatisfactory for continued use by the Contractor's operations, as determined by the Engineer, shall be replaced or repaired to the satisfactory of the Engineer by the Contractor at their own expense.

METHODS

In no event shall any pneumatic or power hammers used for the removal of concrete over steel stringers be larger than the chipping hammer type of the 25 pound class.

During the prosecution of the work under this Item, the Engineer may reject the use of any method or equipment which causes undue vibration or possible damage to the remaining structure or any part thereof.

The work under this Item also includes sawcuts at all limits of concrete excavation. Sawcuts shall be provided to a depth of ½" where practical to provide a neat edge.

The Contractor shall make adequate provisions, including the erection of a temporary protective shielding, for the protection of traffic and personnel from damage and injury due to excavation operations and debris removal. Said shielding shall be in accordance with and paid for under Item 994.02. The Contractor shall thoroughly clean the bridge seats and bearings of all debris and other deleterious material. The Contractor will not be paid for the removal of any concrete beyond the limits described under this Item.

SUBMITTALS

Prior to commencing work on this Item, the Contractor shall prepare and submit to the Engineer for approval a Demolition Plan, indicating the proposed demolition procedures and methods to be used and methods to ensure that the demolition materials will be prevented from falling into the roadway below.

ITEM 113.1 (Continued)

The Demolition Plan and any necessary calculations and drawings shall be stamped by a Professional Engineer registered in the Commonwealth of Massachusetts and shall certify that all existing members and elements are suitably braced and supported throughout the demolition process.

The following information shall be included in the submittal:

1. Plan showing the location of all roadways, utilities and other appurtenances in the area of demolition.
2. The location of cranes, excavators, or other machinery to be used and their operating radii.
3. Lifting equipment information, including rating data and pick weight computations. Information shall include counterweights to be used and boom capability. Crane capacity shall be adequate for 150% of the total pick weight.
4. The type, size and arrangement of slings, shackles or other lifting and connecting devices, including relative technical data.
5. Schedule of operations.
6. Methods, materials, and design calculations for temporary supports for demolition purposes.
7. Methods of preventing damage to bridge elements to remain.
8. Methods of utility protection and temporary supports.
9. Methods to ensure that demolition materials will be prevented from falling onto the roadway below.

Any change to this demolition procedure will require prior review by the Engineer. No demolition material shall be allowed to fall onto the roadway. Any demolition materials fallen onto the roadway below shall be removed immediately by the Contractor at his/her own expense.

Work under this item may not commence until the Engineer has given written approval.

CONSTRUCTION METHODS

At least 30 days prior to the start of demolition work, notify the Engineer and each Utility having services connection to, or immediately adjacent to, or overhead of, the structure to be demolished. The Contractor shall exercise caution in the areas of any existing utilities to avoid damage to such. Any damage shall be repaired at the Contractor's expense.

The Contractor shall be solely responsible for maintaining the stability of the existing structure at all times during the demolition and construction operations. Any support of excavation or temporary shoring of the existing structure required during demolition and construction operations shall be considered incidental to this lump sum Item.

BASIS OF PAYMENT

Item 113.1 will be paid for at the Contract unit price per Lump Sum, which shall include all labor, tools, materials, equipment, handling, and all incidentals required to complete the work.

ITEM 113.1 (Continued)

Miscellaneous removals and disposals related to Bridge No. B-10-018 that are not specifically listed for payment under another item shall be deemed included under this Item. Shielding shall be in accordance with and paid for under Item 994.02 - Temporary Protective Shielding Bridge No. B-10-018 (12C).

The Contractor will make his/her own investigation of the structure to be demolished, including materials that are part of, or may be stored in the structure. No increase will be made to the bid price due to the nature of the materials involved in the demolition. All costs for permits, dump fees, testing, and special handling of hazardous materials, etcetera, shall be included in the bid price of the demolition item.

For Item 113.1 three payments will be made per the following:

1. The first payment of 25% of this lump sum bid price Item will be made upon completion of the partial demolition of the bridge deck under Stage 1 demolition to the satisfaction of the Engineer
2. The second payment of 25% of this lump sum bid price Item will be made upon completion of the demolition of the bridge deck under Stage 2 demolition to the satisfaction of the Engineer.
3. The third payment of 50% of this lump sum bid price Item will be made upon completion of the demolition of the rest of the bridge deck under Stage 3 demolition to the satisfaction of the Engineer.

ITEM 114.11 DEMOLITION OF SUPERSTRUCTURE OF BRIDGE NO. B-10-001 LUMP SUM

The work under this item shall conform to the relevant provisions of Subsection 112 of the Standard Specifications and the following:

The Contractor is advised to conduct a field investigation prior to bidding. The Department makes no assurances regarding the presented conditions, dimensions, and materials of the existing structure as shown on the Contract Plans. The Contractor shall verify all existing conditions and construction features of the structure to be demolished, as necessary, for the proper planning and completion of the work. The Contractor shall base its bid on his/her own findings without any additional compensation for variances from the Plans or these Special Provisions regarding actual conditions for the items to be removed.

The work includes furnishing all labor, materials, and equipment necessary to perform the staged demolition and removal of the existing bridge superstructure as shown on the Plans or as required by the Engineer. Except as specified, all material and debris shall become the property of the Contractor, and shall be recycled, reused, or disposed of in accordance with all applicable local, State, and Federal Requirements.

The Contractor shall provide any reinforcement to the existing structures as required for support of construction equipment during staged construction. The work shall be considered incidental to this Lump Sum Item.

Refer to the General Utility Requirements section of this Contract for a description of all work involving the water line and overhead lines. The removal of the water line on the bridge shall be considered incidental to this item.

SUBMITTALS

Prior to commencing work on this Item, the Contractor shall prepare and submit to the Engineer for approval a Demolition Plan, indicating the proposed demolition procedures and methods to be used and methods to ensure that the demolition materials will be prevented from falling into the river below.

The Demolition Plan and any necessary calculations and drawings shall be stamped by a Professional Engineer registered in the Commonwealth of Massachusetts and shall certify that all existing members and elements are suitably braced and supported throughout the demolition process.

The following information shall be included in the submittal:

1. Plan showing the location of all roadways, utilities and other appurtenances in the area of demolition.
2. The location of cranes, excavators, or other machinery to be used and their operating radii.
3. Lifting equipment information, including rating data and pick weight computations. Information shall include counterweights to be used and boom capability. Crane capacity shall be adequate for 150% of the total pick weight.

ITEM 114.11 (Continued)

4. The type, size and arrangement of slings, shackles or other lifting and connecting devices, including relative technical data.
5. Schedule of operations.
6. Methods, materials, and design calculations for temporary supports for demolition purposes.
7. Methods of preventing damage to bridge elements to remain.
8. Methods of utility protection.
9. Methods to ensure that demolition materials will be prevented from falling onto the river below.

Any change to this demolition procedure will require prior review by the Engineer. No demolition material shall be allowed to fall into the river. Any demolition materials fallen into the river below shall be removed immediately by the Contractor at his/her own expense.

Work under this item may not commence until the Engineer has given written approval.

The Contractor shall take care not to damage any newly constructed structural components as shown on the Plans. Any structural components so designated that are damaged or otherwise made unsatisfactory for continued use by the Contractor's operations, as determined by the Engineer, shall be replaced or repaired to the satisfactory of the Engineer by the Contractor at their own expense.

CONSTRUCTION METHODS

At least 30 days prior to the start of demolition work, notify the Engineer and each Utility having services connection to, or immediately adjacent to, or overhead of, the structure to be demolished. The Contractor shall exercise caution in the areas of any existing utilities to avoid damage to such. Any damage shall be repaired at the Contractor's expense.

The Contractor shall be solely responsible for maintaining the stability of the existing structure at all times during the demolition and construction operations. Any support of excavation or temporary shoring of the existing structure required during demolition and construction operations shall be considered incidental to this lump sum Item.

BASIS OF PAYMENT

Item 114.11 will be paid for at the Contract unit price per Lump Sum, which shall include all labor, tools, materials, equipment, handling and all incidentals required to complete the work. Miscellaneous removals and disposals related to Bridge No. B-10-001 that are not specifically listed for payment under another item shall be deemed included under this Item. Shielding shall be in accordance with and paid for under Item 994.01 – Temporary Protective Shielding Bridge No. B-10-001.

The Contractor will make his/her own investigation of the structure to be demolished, including materials that are part of, or may be stored in the structure. No increase will be made to the bid price due to the nature of the materials involved in the demolition. All costs for permits, dump fees, testing, and special handling of hazardous materials, etcetera, shall be included in the bid price of the demolition item.

ITEM 114.11 (Continued)

Temporary sedimentation and de-watering basins and control of water, if required for work under this item, will be paid for under Item 991.1 Control of Water - Structure No. B-10-001 (CLA).

For Item 114.11 three payments will be made per the following:

1. The first payment of 25% of this lump sum bid price Item will be made upon completion of the demolition of the existing bridge structure under Stage 1 demolition to the satisfaction of the Engineer.
2. The second payment of 25% of this lump sum bid price Item will be made upon completion of the demolition of the existing bridge structure under Stage 2 demolition to the satisfaction of the Engineer.
3. The third payment of 50% of this lump sum bid price Item will be made upon completion of the demolition of the rest of the bridge structure under Stage 3 demolition to the satisfaction of the Engineer.

ITEM 127.12 REINFORCED CONCRETE EXCAVATION - BRIDGE NO. B-10-018 CUBIC YARD

ITEM 127.13 REINFORCED CONCRETE EXCAVATION - BRIDGE NO. B-10-001 CUBIC YARD

The work under these items shall conform to the relevant provisions of Subsections 120 and 140 of the Standard Specifications and the following:

The work under Item 127.12 shall include the partial depth removal and satisfactory disposal of the existing abutment backwalls, wingwall copings and highway guardrail end posts of Bridge No. B-10-018.

The work under Item 127.13 shall include the removal and satisfactory disposal of the 2 piers and 2 abutments of Bridge No. B-10-001 including the footings, piles to 2 ft below bottom of excavation, wingwalls, guardrail end posts, and approach slabs as indicated on the Plans. Additionally, reinforced concrete excavation necessary to complete patch repairs on the piers shall be included under this item. Concrete for patch repairs shall be paid under Item 905.

MassDOT does not guarantee or represent that the existing bridge materials will coincide with any descriptions contained herein or represented on plans. The Contractor must satisfy themself by their own investigation and research regarding all conditions and materials affecting the work to be done.

Any reinforcing and all concrete encountered during excavation shall be removed from the site and disposed of off-site by the Contractor.

The Contractor will not be paid for the excavation of any concrete beyond the limits described under this item and approved by the Engineer.

METHODS

As part of the demolition plan under Item 114.11, the Contractor shall submit a means and methods for reinforced concrete excavation for Item 127.13.

As part of the demolition plan under Item 113.1, the Contractor shall submit a means and methods for reinforced concrete excavation for Item 127.12.

The submittals shall include equipment, surface preparation procedures, and final cleaning procedures which are in accordance with the following requirements:

1. **EQUIPMENT:**
    a. Pneumatic and Power Driven Chipping Hammers: In no event shall any pneumatic or power hammer weighing in excess of twenty-five (25) pounds be used for the removal of concrete. Pneumatic power hammers heavier than the nominal fifteen (15) pound class shall not be used for removing concrete from below any reinforcing bar.

ITEMS 127.12 & 127.13 (Continued)

b. Abrasive Blasting Equipment: Abrasive Blasting Equipment shall be capable of removing rust and old concrete from exposed reinforcing steel when deemed necessary.

2. PREPARATION OF SURFACE:

a. All existing reinforcement bars and concrete surfaces exposed shall be cleaned by abrasive blasting. No grease, dust, rust, or laitance will be allowed to remain.
b. The Contractor shall take all precautions necessary so as not to damage that portion of the abutments, piers and wingwalls which are to remain.
c. Existing reinforcing shall be cut to the limits shown on the plans. No existing reinforcing steel shall be removed and re-used.
d. For the patch repairs on the piers only: Any steel damaged or otherwise made unsatisfactory for continued use, by the Contractor's operation, shall be replaced at his/her own expense. All reinforcing steel that is loose shall be tied tightly together using wire ties.
e. For the patch repairs on the piers only: Existing reinforcing that is deteriorated and is unsuitable for continued use through no fault of the Contractor shall be paid under Item 910.1.

3. FINAL CLEANING

a. Immediately before preparation for placement of new concrete, the exposed area of the surface of the construction joint shall be free of all oil, grease, rust or other foreign material. These materials shall be removed by abrasive blasting and by the use of oil free compressed air at a minimum pressure of 100 psi.
b. The Contractor shall take all measures necessary to protect pedestrian and vehicular traffic from construction operations. No debris, tools, or incidental equipment of any kind will be permitted to fall into areas where vehicular or pedestrian traffic exists.
c. Any material that accidentally falls into such areas shall be removed immediately. All materials removed under this Item shall be removed from the job site and disposed of in a proper manner.

During the prosecution of work under this Item for the removal of disintegrated concrete, the Engineer may reject the use of any method or equipment which causes undue vibration or possible damage to the structure or any part thereof.

METHOD OF MEASUREMENT

Items 127.12 and 127.13 will be measured for payment respectively by the Cubic yard of reinforced concrete excavated and properly disposed of. Only the actual quantities of materials ordered removed by the Engineer will be measured for payment.

BASIS OF PAYMENT

Items 127.12 and 127.13 will be paid for at the respective Contract unit price per Cubic yard, which price shall include all labor, tools, materials, equipment and all incidentals required to complete the work.

ITEM 127.4 **REINFORCED CONCRETE DECK EXCAVATION (FULL DEPTH)** **SQUARE YARD**

ITEM 127.41 **REINFORCED CONCRETE DECK EXCAVATION (PARTIAL DEPTH)** **CUBIC YARD**

The work under these Items shall conform to the relevant provisions of Subsections 120 and 482 of the Standard Specifications and the following:

The work shall consist of full and/or partial depth removal and disposal of all disintegrated or otherwise unsatisfactory reinforced concrete from the bridge deck at locations where temporary bolt-down barriers are installed for stage construction. The Contractor will not be paid for the excavation of any concrete beyond the limits described under this item and approved by the Engineer. This Item is included as a contingency in the event that deck areas supporting temporary traffic barriers are insufficient per the barrier manufacturer's requirements.

Partial depth excavation will be defined as areas where deteriorated concrete extends less than 50% of the deck slab thickness. Full depth excavation will be defined as areas where deteriorated concrete extends greater than 50% of the deck slab thickness.

Prior to excavation, the Contractor shall cover all drainage structures that may be affected by the work. The structures shall remain covered until the new concrete has set and the area has been cleaned.

The Contractor shall perform independent and individual investigations to evaluate and mark out the surfaces of the concrete to determine the areas for repairs. Methods for evaluation shall include non-destructive methods such as visual observations and acoustic impact method using a hammer. The Contractor is referenced to ACI Report 201.1R-92 "Guide for Making a Condition Survey of Concrete in Service" and ACI Report 364.1R-94 "Guide for Evaluation of Concrete Structures Prior to Rehabilitation" in regards to evaluation methods. Before any existing concrete is removed, the Contractor will provide the Engineer clear access to the areas designated for repair. During this time, the Engineer will perform an inspection of the areas and will approve and/or designate the areas where concrete removal and repair will be required. It shall be the responsibility of the Contractor to give at least seven (7) days prior notice to the Engineer, in writing, of the date that a structure will be available for inspection.

Repair areas shall be limited to existing deck areas supporting the temporary traffic barriers and any other areas in the travel way that are to remain in service temporarily during staged construction that the Engineer deems necessary for temporary repair.

The Contractor shall be responsible for coordinating patch repairs with the locations of the anchors for the Temporary Bolt-Down barriers which are paid for under Items 853.33 and 853.34. The Contractor must coordinate repair locations with the barrier manufacturer to ensure that the manufacturers requirements for the bolt-down barriers are being met.

The Contractor shall take all precautions necessary not to damage that portion of the deck, including reinforcing steel, which is to remain. This includes determining the concrete cover to the steel bars at the edge of each patch prior to excavating concrete.

ITEMS 127.4 & 127.41 (Continued)

The edges of all areas where concrete is removed under Items 127.4 and 127.41 shall be cut to neat lines by saw cutting or by methods approved by the Engineer, to a depth of 3/4 inch, and all costs in connection with such work shall be incidental to the pertinent item. Excavated areas shall be made rectangular in shape [as much as possible], with horizontal and vertical edges and square corners.

In case the reinforcing bars are exposed, the minimum depth of all cement concrete areas to be excavated shall be one (1) inch below the bottom of the top layer of longitudinal reinforcing steel throughout the entire excavated area.

The cost for the removal of hot mix asphalt and any membrane waterproofing above the area of reinforced concrete excavation shall be incidental to respective Items 127.4 and 127.41.

Concrete removal equipment shall be of the following types:

Pneumatic and Power-Driven Chipping Hammers: In no event shall any pneumatic or power hammer weighing in excess of twenty-five (25) pounds be used for the removal of concrete.

Abrasive Blasting Equipment: Abrasive blasting equipment shall be capable of removing rust and old concrete from exposed reinforcing steel when required by the Engineer.

During the prosecution of this work, the Engineer may reject the use of any method or equipment which causes undue vibration or possible damage to the structure or any part thereof.

Bobcats/Skid Steers will be allowed only to collect debris from the deck surface and will not be allowed to remove concrete from the patch area. All concrete debris shall be removed by hand or by using hand tools. The smaller pieces may be blown out using an oil free compressed air after first being wetted with water to control airborne particulates.

Also, included under these Items are all costs in connection with the cleaning, cutting, and bending of the existing reinforcing steel designated to be retained in the proposed construction. Any existing reinforcing steel damaged or otherwise made unsatisfactory for continued use as a result of the Contractor's operations shall be replaced at the Contractor's expense. All reinforcing steel with active rusting encountered in the excavation shall be thoroughly cleaned by abrasive blasting. Any reinforcing steel that is unsuitable for further use through no fault of the Contractor shall be replaced under Item 910.1. All reinforcing steel that is loose shall be tied tightly together using wire ties. Ties are required at every other intersection of transverse and longitudinal reinforcing.

Temporary Protective Shielding must be used on bridges over the roadway or waterway during full depth excavation and when, in the opinion of the Engineer, there is the possibility of dislodging concrete from the bottom of the deck.

The Contractor shall take all measures necessary to protect pedestrian, vehicular traffic, or waterway below from the construction operations.

ITEMS 127.4 & 127.41 (Continued)

Additionally, all necessary utility protection shall be in place prior to beginning any excavation. No debris, tools or incidental equipment of any kind will be permitted to fall into the waterway below Bridge No. B-10-001 (CLA) or onto the roadway below Bridge No. B-10-018 (12C). Any material that accidentally falls into such areas shall be removed immediately at the expense of the Contractor.

MassDOT does not guarantee or represent that the existing bridge materials will coincide with any descriptions contained herein or represented on plans. The Contractor must satisfy himself/herself by his/her own investigation and research regarding all conditions and materials affecting the work to be done.

METHOD OF MEASUREMENT

Item 127.4 will be measured for payment by the Square Yard of reinforced concrete excavated and properly disposed of. Item 127.41 will be measured for payment by the Cubic Yard of reinforced concrete excavated and properly disposed of.

BASIS OF PAYMENT

Item 127.4 will be paid for at the respective Contract unit price per Square Yard, which price shall include all labor, materials, equipment, sawcutting, removal of any HMA pavement, waterproof membrane, cleaning, cutting, and bending of the existing reinforcing steel designated to be retained, and all incidentals required to complete the work.

Item 127.41 will be paid for at the respective contract unit price per Cubic Yard, which price shall include all labor, materials, equipment, sawcutting, removal of any HMA pavement, waterproof membrane, cleaning, cutting, and bending of the existing reinforcing steel designated to be retained, and all incidentals required to complete the work.

Items 127.4 and 127.41 will compensate the contractor for excavation performed on the bridge deck (full depth or partial depth). The Contractor will be paid under either Item 127.4 or 127.41 for excavated concrete. In no case will the Contractor be paid under more than one Item for the same excavated material.

Concrete for patching and new reinforcing steel will be paid for under Item 909.5.

Temporary protective shielding will be paid under Items 994.01 and 994.02.

ITEM 140.2 TIMBER SHORING REMOVED AND STACKED LUMP SUM

The work under this item shall include the removal of the timber shoring towers to be stacked at a location agreed upon between MassDOT and the Contractor.

Existing shoring towers at the piers for Bridge B-10-001 (CLA) shall be removed in stages as shown in the Plans. Shoring towers shall not be removed until the entire superstructure has been demolished for the respective stages.

BASIS OF PAYMENT

Item 140.2 will be paid for at the Contract unit price per LUMP SUM, which price shall include all labor, materials, equipment, and all incidentals required to complete the work.

1. The first payment of 25% of this lump sum bid price Item will be made upon completion of the removal of the shoring towers under Stage 1 demolition to the satisfaction of the Engineer.
2. The second payment of 25% of this lump sum bid price Item will be made upon completion of the removal of the shoring towers under Stage 2 demolition to the satisfaction of the Engineer.
3. The third payment of 50% of this lump sum bid price Item will be made upon completion of the removal of the shoring towers under Stage 3 demolition to the satisfaction of the Engineer.

ITEM 148 DREDGING AND DISPOSAL OF MATERIAL CUBIC YARD

The work under this item shall conform to the relevant provisions of Subsection 148 of the Standard Specifications and the following:

The work shall include the dredging of material as shown on the Contract Plans.

METHOD OF MEASUREMENT

Item 148 will be measured for payment per 148.80 of the Standard Specifications.

BASIS OF PAYMENT

Item 148 will be paid for per 148.81 of the Standard Specifications. Disposal of material will be paid for under items 181.11, 181.12, 181.13, and 181.14.

ITEM 148.01 DREDGING AND STOCKPILING OF MATERIAL CUBIC YARD

The work under this item shall conform to the relevant provisions of Subsection 148 of the Standard Specifications and the following:

The work under this item shall include dredging of approved native streambed material to be stockpiled for re-use as shown on the Plans and as required by the Engineer. Any material which is deemed not suitable for reuse shall be disposed of under item 148.

Streambed material may be stockpiled on site at a location determined by the Contractor. The stockpiled material will be reused on site for streambed restoration. The placement of this material will be paid for under Item 983.521.

When the Contractor is not actively working with the dredged and stockpiled material, the stockpile shall be protected to prevent damage. Providing, installing, adjusting, protecting, and all other work required to cover the stockpiled material shall be considered incidental to this Item.

METHOD OF MEASUREMENT

Item 148.01 will be measured for payment per Cubic Yard of material dredged and stockpiled within the specified limits as required by the Engineer.

BASIS OF PAYMENT

Item 148.01 will be paid for at the Contract unit price per Cubic Yard, which price shall include all labor, materials, equipment, and all incidentals required to complete the work.

The replacement of the stockpiled material shall be included in the bid price for Item 983.521 – Streambed Restoration.

ITEM 180.01 ENVIRONMENTAL HEALTH AND SAFETY PROGRAM LUMP SUM

The work shall consist of ensuring the health and safety of the Contractor's employees and subcontracting personnel, the Engineer, their representatives, the environment, and public welfare from any on-site chemical contamination present in air, soil, water and sediment.

The Contractor shall prepare and implement a site-specific Environmental Health and Safety Plan (EHASP) which has been approved and stamped by a Certified Industrial Hygienist (CIH) and includes the preparer's name and work experience. The EHASP shall include appropriate components required by OSHA Standard 29 CFR 1910.120(b) and the Massachusetts Contingency plan (MCP) 310 CMR 40.0018 and must comply with all applicable state and federal laws, regulations, standards and guidelines, and provide a degree of protection and training appropriate for implementation on the project. The EHASP shall be a dynamic document with provision for change to reflect new information, new practices or procedures, changing site environmental conditions or other situations which may affect site workers and the public. The EHASP shall be developed and implemented independently from the standard construction HASP required to work on all MassDOT construction projects.

Health and safety procedures provided by the Contractor shall comply with all the appropriate regulations that address employee working conditions, including but not limited to standards established by OSHA and National Institute for Occupational Safety and Health (NIOSH). Equipment used for the purpose of health and safety shall be approved by and meet pertinent standards and specifications of the appropriate regulatory agencies.

A copy of the most up-to-date version of the EHASP shall be maintained on-site at all times by the Contractor. The on-site copy shall contain the signature of the Engineer and each on-site employee of the MassDOT, Contractor, and Subcontractors involved with on-site activities. The employee's signature on the EHASP shall be deemed prima facie evidence that the employee has read and understands the plan. Updated copies of signature sheets shall be submitted to the Engineer.

The EHASP shall specify a Contractor Site Safety and Health Officer responsible for implementation of the EHASP and to oversee all construction activities, including handling, storage, sampling and transport, which require contact with or exposure to potentially hazardous materials.

The level of protection, required to ensure the health and safety of on-site personnel will be stipulated in the EHASP. The Site Safety and Health Officer shall implement the EHASP based on changing site and weather conditions, type of operation or activity, chemical compounds identified on-site, concentration of the chemicals, air monitoring data, physical state of the hazardous materials, potential duration of exposure to hazardous materials, dexterity required to perform work, decontamination procedures, necessary personnel and type of equipment to be utilized.

During implementation of the EHASP, a daily log shall be kept by the Site Safety and Health Officer and a copy shall be provided weekly to the Engineer. This log shall be used to record a description of the weather conditions, levels of personal protection being employed, screening data and any other information relevant to on-site environmental safety conditions. The Site Safety and Health Officer shall sign and date the daily log.

ITEM 180.01 (Continued)

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Preparation and implementation of the Environmental Health and Safety Program, including the monitoring, protection and storage of all contaminated materials, as well as subsequent modifications to the EHASP, will be measured and paid for at the Lump Sum Bid Price.

Payment of 50% of the Environmental Health and Safety Program contract price will be made upon the initial acceptance of the EHASP by the Engineer. Payment of the remaining 50% of the Environmental Health and Safety Program contract price will be made upon completion of the work. The bid price shall include preparation and implementation of the EHASP as well as the cost for its enforcement by the Site Safety and Health Officer along with any necessary revisions and updates. The work of implementing the Environmental Health and Safety Program includes work involving, but not limited to, the monitoring, protection, and storage of all contaminated materials.

ITEM 180.02 PERSONAL PROTECTION LEVEL C UPGRADE HOUR

The work shall consist of providing appropriate personal protective equipment (PPE) for all personnel in an area either containing or suspected of containing a hazardous environment.

Contingencies for upgrading the level of protection for on-site workers will be identified in the EHASP and the Contractor shall have the capability to implement the personal protection upgrade in a timely manner. The protective equipment and its use shall be in compliance with the EHASP and all appropriate regulations and/or standards for employee working conditions.

Personal Protection Level C Upgrade will be measured and paid only upon upgrade to Level C and will be at the contract unit price, per hour, per worker, required in Level C personal protection. No payment will be made to the Contractor to provide Level D PPE.

ITEM 180.03 LICENSED SITE PROFESSIONAL SERVICES HOUR

Within limited areas of the project site, media (i.e. soils, sediments, surface water and/or groundwater) requiring evaluation and/or management under the Massachusetts Contingency Plan (MCP) may be encountered. A Licensed Site Professional (LSP) shall be required to provide the services necessary to comply with the requirements of the MCP. These services may include a site walk, field screening, sampling, analysis and characterization of potentially contaminated media, preparation and implementation of Immediate Response Action (IRA) Plans, Utility-Related Abatement Measure (URAM) and Release Abatement Measure (RAM) Plans, Imminent Hazard Evaluations, status reports, transmittal forms, release notification forms, risk assessments, completion statements, and related documents required pursuant to the MCP. LSP services shall also be necessary to temporarily move material generated on the project to an off-site storage location.

The name and qualifications of the LSP and all environmental technicians to be assigned to the project shall be submitted to the Engineer for approval at least four weeks prior to initial site activities. The LSP shall have a current, valid license issued by the Massachusetts Board of Registration of Hazardous Waste Site Cleanup Professionals. The LSP shall have significant experience in the oversight of MCP activities at active construction sites. Qualification packages for the LSP and each technician shall include a resume, all recent work assignments with responsibilities identified (previous 5 years), and applicable training and certifications. A list of all Notices of Noncompliance, Notice of Audit Findings and Enforcement Orders issued by the Massachusetts Department of Environmental Protection (DEP) shall be submitted for all work assignments listed for the LSP and environmental technicians. Upon approval of the LSP Qualifications, the LSP will be designated as the LSP of Record unless MassDOT designates in writing otherwise. The LSP of Record will serve as the primary point of contact for all hazardous material matters on the project.

The LSP shall evaluate soil and/or sediment with discoloration, odor, elevated field screening results, presence of petroleum liquid or sheen on the groundwater surface, or any abnormal gas or materials in the ground which are known or suspected to be oil or hazardous materials. Excavated soil and sediment which is suspected of petroleum contamination shall be field screened using the jar headspace procedures according to established DEP Guidance. All field screening equipment must be pre-approved by the Engineer. The LSP shall ensure proper on-site calibration of all field screening instrumentation.

The Engineer shall be contacted immediately when observations or any field screening results verify contamination requiring further analysis, and/or enhanced management of suspect media. Any enhanced management of contaminated soil to ensure proper stockpiling and storage is incidental to the LSP Services item. The LSP shall evaluate the need for confirmatory sampling prior to backfill in areas where contaminated material has been excavated and disposed off-site for compliance with applicable regulatory requirements. The Engineer shall approve the locations of the testing sites prior to the sampling.

Contaminated media shall be handled in accordance with all applicable state and federal statutes, regulations, and policies. The LSP shall adequately evaluate contaminated media for compliance with the requirements of the MCP and Department Policies.

ITEM 180.03 (Continued)

The Contractor and the LSP shall be aware of the reporting requirements for releases of oil and/or other hazardous material (OHM) as set forth in federal and state laws and regulations and both shall be held responsible for performing the work in accordance with all applicable Federal and State laws and regulations. The LSP shall maintain written records in a clear and concise tabular format which tracks the excavation, stockpiling, analysis and reuse/disposal of all known/suspect contaminated media. These records shall be up-to-date and submitted to the Engineer on a bi-weekly basis. The LSP shall review and summarize the laboratory data from any analyses performed on contaminated media in a tabular format and compare the results to applicable reporting thresholds. A report shall be delivered to the Engineer outlining the material sampling methods, laboratory analysis results, evaluation of applicable regulatory exemptions, reporting obligations, and proposed course of action. The laboratory report together with Chain of Custody forms for all analytical results shall be submitted to the Engineer within 14 days after completion of such analyses.

The LSP and Contractor shall be held responsible for the submission of all MCP-related documents to the Engineer at least 14 days in advance of any timeframe specified in the MCP and for the timely submission of data and tracking information as noted within this Item. All documents prepared under this Item must be reviewed and signed by the approved LSP. The Contractor and LSP shall be responsible for all fines, damages, and enforcement requirements imposed by applicable regulatory agencies for failure to meet regulatory and contract timeframes. No compensation will be provided for such fines, damages, and enforcement actions.

The Contractor and the LSP shall be aware of the reporting requirements for releases of oil and/or other hazardous material (OHM) as set forth in federal and state laws and regulations and shall both be held responsible for performing the work in accordance with all applicable Federal and State laws and regulations.

If the Contractor causes a release of OHM, the Contractor shall be responsible for assessing and remediating the release in accordance with all pertinent State and Federal regulations, including securing the services of a LSP, at his own expense.

The LSP shall coordinate all activities involving both MassDOT and the DEP through the Engineer. Any notification of release shall be approved by the Engineer before submittal to the DEP, except if an imminent hazard condition exists as defined in 309 CMR 4.03(4)(b).

LABORATORY TESTING IN SUPPORT OF LSP SERVICES

Laboratory testing provides for analytical testing in support of LSP services related to maintaining MCP compliance, such as delineating the extent and type of contamination present. Sampling and testing for disposal purposes are not included and are incidental to Items 181.11-181.14.

In order to maintain compliance with the MCP and Department Policies or other regulatory requirements, the LSP shall request approval from the Engineer to obtain samples from various locations and depths within the project area and to perform laboratory analyses on those samples. No sampling shall be conducted without prior approval from the Engineer.

ITEM 180.03 (Continued)

The samples shall be delivered to a DEP-certified laboratory using proper chain-of-custody documentation for analyses which, depending upon site conditions and suspected and/or identified contaminants of concern, may include, but are not limited to, metals, polychlorinated biphenyls (PCBs), volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides, polycyclic aromatic hydrocarbons (PAHs), extractable petroleum hydrocarbons (EPHs) and volatile petroleum hydrocarbons (VPHs). Subsequent testing, depending upon initial results, may be required for Toxicity Characteristic Leaching Procedure (TCLP) analyses (EPA Method 1311) for metals.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

LSP Services for work under this item will be measured per person, per hour of service provided by LSP, Environmental Technicians and other approved personnel. Travel time shall not be included in the billable hours.

The quantity and type of laboratory tests must be approved by the Engineer beforehand. The Contractor will be reimbursed upon satisfactory written evidence of payment. The Contractor may be required to obtain cost estimates from three DEP certified laboratories for the Engineer to choose the service provider.

LSP Services will be paid at the Contractor bid price for each hour, or fraction thereof, spent to perform the work as described above. The bid price shall be a blended rate that includes the cost of the LSP, environmental technicians and other personnel, the performance of all work tasks and field screening, including required equipment, materials and instrumentation, and production of all documentation described above. All requests for payment must be accompanied by the following information: the names of the personnel associated with the work charged under LSP Services, dates and hours worked, work conducted, including, where appropriate, locations as identified on the construction plans, and a copy of the field diary for the dates submitted.

Laboratory testing will be reimbursed upon receipt of paid invoices for testing approved by the Engineer.

This item is for LSP work for compliance with the MCP and Department Policies. LSP hours and any laboratory testing related to off-site disposal of excess soil and sediment is incidental to Items 181.11-181.14 (including, but not limited to, disposal characterization, disposal package preparation, landfill acceptance, shipment paperwork preparation, field screening, and tracking).

ITEM 181.11	**DISPOSAL OF UNREGULATED SOIL**	**TON**
ITEM 181.12	**DISPOSAL OF REGULATED SOIL IN-STATE FACILITY**	**TON**
ITEM 181.13	**DISPOSAL OF REGULATED SOIL OUT-OF-STATE FACILITY**	**TON**
ITEM 181.14	**DISPOSAL OF HAZARDOUS WASTE**	**TON**

Soil to be removed from the project area shall not be assumed to be uncontaminated and must be evaluated prior to off-site management for potential contamination with hazardous materials. No soil may be disposed of off-site without proper assessment by the contractor and approval from the Resident Engineer (RE), or the project designee. The following address is within the project limits:

RTN 1-11285, MA Highway #16, Northfield Rd Rte 10

- The site is currently occupied by a MassDOT maintenance depot, as it has been since at least 1996, and likely considerably longer. No information on previous uses of the site is available.
- RTN 1-11285 was assigned to the site in 1996, after environmental sampling identified concentrations of arsenic in soil above applicable regulatory standards. Volatile organic compounds (VOCs), metals, and total petroleum hydrocarbons (TPH) were also identified in soil, but at levels below applicable regulatory standards.
- Arsenic was found in soil at depths ranging from six inches to 21 feet below ground surface (bgs). The concentration of arsenic increased with depth. Surficial soils up to six inches bgs did not contain arsenic. Based on this information and the geology of the site, it is believed that arsenic is naturally-occurring.
- A B-1 RAO was submitted for the site in 1997.
- The site is adjacent to but does not overlap with the project area. However, given that the arsenic is likely naturally-occurring, the contractor must be made aware of the potential to encounter arsenic in soil throughout the project area. The work under these items shall include the transportation and disposal of contaminated material excavated, or excavated and stockpiled. It shall also include the cost of any additional laboratory analyses required by a particular disposal facility beyond the standard disposal test set.

Excavation of existing subsurface materials may include the excavation of contaminated soils. The Contractor shall be responsible for the proper coordination of characterization, transport and disposal, recycling or reuse of contaminated soils. Disposal, recycling or reuse will be referred to as “disposal” for the purposes of this specification. However, regardless of the use of the term herein, there will be no compensation under these items for reuse within the project limits. The Contractor will be responsible for coordinating the activities required for characterization, transport and disposal of contaminated soils. Such coordination will include the Engineer and his/her designee overseeing management of contaminated materials. Contaminated soils shall be disposed of in a manner appropriate for the soil classification as described below and in accordance with the applicable laws of local, state and federal authorities.

ITEMS 181.11, 181.12, 181.13 and 181.14 (Continued)

The Contractor shall be responsible for identifying disposal facility(ies) licensed to accept the class of contaminated soils to be managed and assure that the facility can accept the anticipated volume of soil contemplated by the project. The Contractor shall be responsible for hiring a Licensed Site Professional (LSP) and all ancillary professional services including laboratories as needed for this work.

The Contractor will be responsible for obtaining all permits, approvals, manifests, waste profiles, Bills of Lading, etc. subject to the approval of the Engineer prior to the removal of the contaminated soil from the site. The Contractor and LSP shall prepare and submit to the Engineer for approval all documents required under the Massachusetts Contingency Plan (MCP) and related laws and environmental regulations to conduct characterization, transport, and disposal of contaminated materials.

CLASSES OF CONTAMINATED SOILS

The Contractor and its LSP shall determine if soil excavated or soil to be excavated is unregulated soil or contaminated soil as defined in this section. Such materials shall be given a designation for purposes of reuse or disposal based on the criteria of the MCP. Soils and sediments which are not suitable for reuse will be given a designation for purposes of off-site disposal based on the characterization data and disposal facility license requirements. The Classes of Contaminated Soils are defined as follows:

UNREGULATED SOIL consists of soil, fill and dredged material with measured levels of oil and hazardous material (OHM) contamination at concentrations below the applicable Reportable Concentrations (RCs) presented in the MCP. Unregulated soil consists of material which may be reused (or otherwise disposed) as fill within the Commonwealth of Massachusetts subject to the non-degradation criteria of the MCP (310 CMR 40.0032(3), in a restricted manner, such that they are sent to a location with equal or higher concentrations of similar contaminants. Disposal areas include licensed disposal facilities, approved industrial settings in areas which will be capped or covered with pavement or loamed and seeded, and for purposes of this project shall be reused as fill within the project site construction corridor whenever possible. The material cannot be placed in residential and/or environmentally sensitive (e.g. wetlands) areas. Under no circumstances shall contaminated soils be placed in an uncontaminated or less contaminated area (including the area above the groundwater table if this area shows no sign of contamination).

The Contractor shall submit to MassDOT the proposed disposal location for unregulated soils for approval. If such a disposal location is not a licensed disposal facility, the Contractor shall submit to the Engineer analytical data to characterize the disposal area sufficiently to verify that the unregulated material generated within the MassDOT construction project limits is equal to or less than the contaminant levels at the disposal site and meets the non-degradation requirements of the MCP. In addition, the Contractor shall provide written confirmation from the owner of the proposed disposal location that they have been provided with the analytical data for both the materials to be disposed as well as the disposal site characterization and that s/he agrees to accept this material. A Material Shipping Record or Bill of Lading, as appropriate, shall be used to track the off-site disposal of unregulated soil and a copy, signed by the disposal facility or property owner, shall be provided to the Engineer to document legal disposal of the unregulated material.

ITEMS 181.11, 181.12, 181.13 and 181.14 (Continued)

The cost of on-site disposal of unregulated soil within the project area will be considered incidental to the item of work to which it pertains.

REGULATED SOIL consists of materials containing measurable levels of OHM that are equal to or exceed the applicable Reportable Concentrations for the site as defined by the MCP, 310 CMR 40.0000. Regulated soil which meets the MCP reuse criteria of the applicable soil/groundwater category for this project area may be reused on site provided that it meets the appropriate geotechnical criteria established by the Engineer. Regulated Soil may be reused (as daily or intermediate cover or pre-cap contouring material) or disposed (as buried waste) at lined landfills within the Commonwealth of Massachusetts or at an unlined landfill that is approved by the Massachusetts Department of Environmental Protection (DEP) for accepting such material, in accordance with DEP Policy #COMM-97-001, or at a similar out-of-state facility. It should be noted that soils which exceed the levels and criteria for disposal at in-state landfills, as outlined in COMM-97-001, may be shipped to an in-state landfill, but require approval from the DEP Division of Solid Waste Management and receiving facility. An additional management alternative for this material is recycling into asphalt. Regulated Soils may also be recycled at a DEP approved recycling facility possessing a Class A recycling permit subject to acceptance by the facility and compliance with DEP Policy #BWSC-94-400. Regulated Soil removed from the site for disposal or treatment shall be removed via an LSP approved Bill of Lading, Manifest or applicable material tracking form. This type of facility shall be approved/permitted by the State in which it operates to accept the class of contaminated soil in accordance with all applicable local, state and federal regulations.

HAZARDOUS WASTE consists of materials which shall be disposed of at a facility permitted and operated in full compliance with Federal Regulation 40 CFR 260-265, Massachusetts Regulation 310 CMR 30.000, Toxic Substances Control Act (TSCA) regulations, or the equivalent regulations of other states, and all other applicable local, state, and federal regulations. All excavated materials classified as hazardous waste shall be disposed of at an out-of-state permitted facility. This facility shall be a RCRA hazardous waste or TSCA facility, or RCRA hazardous waste incinerator. This type of facility shall be approved/permitted by the State in which it operates to accept hazardous waste in accordance with all applicable local, state and federal regulations and shall be permitted to accept all contamination which may be present in the soil excavate. The Contractor shall ensure that, when needed, the facility can accept TSCA waste materials i.e. polychlorinated biphenyls (PCBs). Hazardous waste shall be removed from the site for disposal or treatment via an LSP approved Manifest.

MONITORING/SAMPLING/TESTING REQUIREMENTS

The Contractor shall be responsible for monitoring, sampling and testing during and following excavation of contaminated soils to determine the specific class of contaminated material. Monitoring, sampling and testing frequency and techniques shall be performed in accordance with Item 180.03 – LSP Services. Additional sampling and analysis may be required to meet the requirements of the disposal facility license. The cost of such additional sampling and analysis shall be included in the bid price for the applicable disposal items. The Contractor shall obtain sufficient information to demonstrate that the contaminated soil meets the disposal criteria set by the receiving facility that will accept the material.

ITEMS 181.11, 181.12, 181.13 and 181.14 (Continued)

No excavated material will be permanently placed on-site or removed for off-site disposal until the results of chemical analyses have been received and the materials have been properly classified. The Contractor shall submit to the Engineer results of field and laboratory chemical analyses tests within seven days after their completion, accompanied by the classification of the material determined by the Contractor, and the intended disposition of the material. The Contractor shall submit to the Engineer for review all plans and documents relevant to LSP services, including but not limited to, all documents that shall be submitted to the DEP.

WASTE TRACKING

Copies of the fully executed Weight Slips/Bills of Lading/ Manifests/Material Shipping Records or other material tracking form received by the Contractor from each disposal facility and for each load disposed of at that facility, shall be submitted to Engineer and the Contractor's LSP within three days of receipt by the Contractor. The Contractor is responsible for preparing and submitting such documents for review and signature by the LSP or other appropriate person with signatory authority, three days in advance of transporting soil off-site. The Contractor shall furnish a form attached to each manifest or other material tracking form for all material removed off-site, certifying that the material was delivered to the site approved for the class of material. If the proposed disposition of the material is for reuse within the project construction corridor, the Contractor shall cooperate with MassDOT to obtain a suitable representative sample(s) of the material to establish its structural characteristics to meet the applicable structural requirements as fill for the project.

All material transported off-site shall be loaded by the Contractor into properly licensed and permitted vehicles and transported directly to the selected disposal or recycling facility and be accompanied by the applicable shipping paper. At a minimum, truck bodies shall be structurally sound with sealed tail gates, and trucks shall be lined and loads covered with a liner, which shall be placed to form a continuous waterproof tarpaulin to protect the load from wind and rain.

DECONTAMINATION OF EQUIPMENT

Tools and equipment which are to be taken from and reused off site shall be decontaminated in accordance with applicable local, state and federal regulations. This requirement shall include, but not be limited to, all tools, heavy machinery and excavating and hauling equipment used during excavation, stockpiling and handling of contaminated material. Decontamination of equipment is considered incidental to the applicable excavation item.

REGULATORY REQUIREMENTS

The Contractor shall be responsible for adhering to regulations, specifications and recognized standard practices related to contaminated material handling during excavation and disposal activities. MassDOT shall not be responsible at any time for the Contractor's violation of pertinent State or Federal regulations or endangerment of laborers and others.

ITEMS 181.11, 181.12, 181.13 and 181.14 (Continued)

The Contractor shall comply with all rules, regulations, laws, permits and ordinances of all authorities having jurisdiction including, but not limited to, Massachusetts DEP, the U.S. Environmental Protection Agency (EPA), Federal Department of Transportation (DOT), Massachusetts Water Resources Authority (MWRA), the Commonwealth of Massachusetts and other applicable local, state and federal agencies governing the disposal of contaminated soils.

All labor, materials, equipment and services required to make the work comply with such regulations shall be provided by the Contractor without additional cost to MassDOT. Whenever there is a conflict or overlap within the regulations, the most stringent provisions shall apply. The Contractor shall reimburse MassDOT for all costs it incurs, including penalties and/or for fines, as a result of the Contractor's failure to adhere to the regulations, specifications, recognized standard practices, etc., that relate to contaminated material handling, transportation and disposal.

SUBMITTALS

I. Summary of Sampling Results, Classification of Material and Proposed Disposal Option.

The following information, presented in tabular format, shall be submitted to the Engineer for review and approval prior to any reuse on-site or disposal off-site. This requirement is on-going throughout the project duration. At least two weeks prior to the start of any excavation activity, the Contractor shall submit a tracking template to be used to present the information as stipulated below. Excavation will not begin until the format is acceptable to MassDOT.

Characterization Reports will be submitted for all soil, sediment, debris and groundwater characterized through the sampling and analysis program. Each report will include a site plan which identifies the sampling locations represented in the Report. The Construction Plan sheets may be used as a base plan to record this information.

The Sampling Results shall be presented in tabular format. Each sample shall be identified by appropriate identification matching the sample identification shown on the Chain of Custody Record. The sample shall also be identified by location (e.g. grid number or stockpile number). For each sample, the following information shall be listed: the classification (unregulated, regulated, etc.), proposed disposal option for the stockpile or unit of material represented, and, all analytical results.

Each Characterization Report shall include the laboratory analytical report and Chain of Custody Record for the samples included in the Report.

II. Stockpiling, Transport, and Disposal.

At least two weeks prior to the start of any excavation activity, the Contractor shall submit, in writing, the following for review and shall not begin excavation activity until the entire submittal is acceptable to MassDOT.

ITEMS 181.11, 181.12, 181.13 and 181.14 (Continued)

Excavation and Stockpiling Protocol:

Provide a written description of the management protocols for performing excavation and stockpiling and/or direct loading for transport, referencing the locations and methods of excavating and stockpiling excavated material.

Disposal and Recycling Facilities:

1. Provide the name, address, applicable licenses and approved waste profile for disposal and/or recycling location(s) where contaminated soil will be disposed. Present information substantiating the suitability of proposed sites to receive classifications of materials intended to be disposed there, including the ability of the facility to accept anticipated volumes of material.

2. Provide a summary of the history of compliance actions for each disposal/recycling facility proposed to be used by the Contractor. The compliance history shall include a comprehensive list of any state or federal citations, notices of non-compliance, consent decrees or violations relative to the management of waste (including remediation waste) at the facility. Material shall not be sent to facilities which are actively considered by the DEP, USEPA or other responsible agency to be in violation of federal, state or local hazardous waste or hazardous material regulations. MassDOT reserves the right to reject any facility on the basis of poor compliance history.

Transportation:

The name, address, applicable license and insurance certificates of the licensed hauler(s) and equipment and handling methods to be used in excavation, segregation, transport, disposal or recycling.

III. Material Tracking and Analytical Documentation for Reuse/Disposal.

The following documents are required for all excavation, reuse and disposal operations and shall be in the format described. At least two weeks prior to the start of any excavation or demolition activity, the Contractor shall submit the tracking templates required to present the information as stipulated below. Excavation or demolition shall not begin until the format is acceptable to MassDOT.

All soils, sediments and demolition debris shall be tracked from the point of excavation to stockpiling to onsite treatment/processing operations to off-site disposal or onsite reuse as applicable.

Demolition Debris:

Demolition debris shall be tracked if the debris is stockpiled at a location other than the point of origin or if treatment or material processing is conducted. Identification of locations shall be based on the station-offset of the location. The tracking table shall identify date and point of generation, any field screening such as PID or dust monitoring, visual observations/comments, quantity, and stockpile ID/processing operation location For each unit of material tracked, the table shall also track reuse of the material on-site, providing reuse date, location of reuse as defined by start and end station, width of reuse location by offset, the fill elevation range, quantity, and finish grade for said location.

ITEMS 181.11, 181.12, 181.13 and 181.14 (Continued)

For demolition debris which is not reused on site, the table shall also track disposal of the material as defined by disposal date, quantity and disposal facility. The table shall provide a reference to any analytical data generated for the material.

Soil/Sediment:

Soil excavation shall be identified based on the station-offset of the excavation location limits. The tracking table shall identify date and point of generation, any field screening such as PID or dust monitoring, visual observations, quantity, and stockpile number/location. For each unit of material tracked, the table shall also track reuse of the material on-site and disposal of the material off-site using the same categories identified for demolition debris above.

METHOD OF MEASUREMENT

Items 181.11, 181.12, 181.13, and 181.14 will be measured for payment by the ton of actual and verified weight of contaminated materials removed and disposed of. The quantities will be determined only by weight slips issued by and signed by the disposal facility. The most cost-effective, legal disposal method shall be used. The work of the LSP for disposal under all of these items shall be incidental to the work with no additional compensation.

BASIS OF PAYMENT

Items 181.11, 181.12, 181.13, and 181.14 will be paid for at the Contract unit price per ton which price shall include all labor, materials, equipment and incidental costs required to complete the work. No separate payment will be made for any and all costs associated with approvals, permits, fees and taxes, additional testing/characterization required by the facility beyond the standard disposal test set, decontamination procedures, transportation and disposal, but all costs in connection therewith shall be included in the Contract unit price bid.

ITEM 182.1 INSPECTION AND TESTING FOR ASBESTOS LUMP SUM

The work under this item shall include the inspecting and testing of all materials suspected of containing asbestos. Existing Verizon telephone conduits within the existing bridge footprint are considered suspect materials for asbestos. Any destructive testing and demolition required to enable the inspection and testing of the suspected material will be considered incidental to this Item. All work must be in accordance with the regulations stated below.

The Contractor shall employ the services of a Massachusetts licensed "Asbestos Inspector" to inspect the material to determine whether or not asbestos is present. Should the asbestos inspector determine laboratory testing is required, a state certified laboratory shall be used to perform all necessary tests.

Dust suppression in the form of light water sprays, foams, dust suppressants and calcium chloride must be implemented to control dusting during trenching and excavation. Intrusive activities may be reduced or curtailed under high wind or heavy rain conditions if the Engineer deems continued operations to be a safety hazard to the workers.

REGULATIONS

U.S. Department of Labor, Occupational Safety and Health Administration, (OSHA) including but not limited to:

29 CFR 1910 Section 1001 and 29 CFR 1926 Section 58 Occupational exposure to Asbestos, Tremolite, Anthophyllite and Actinolite, Final Rule
29 CFR 1910 Section 134 Respiration Protection
29 CFR 1926 Construction Industry
29 CFR 1910 Section 2 Access to Employee Exposure and Medical Records
29 CFR 1910 Section 1200 Hazard Communication
29 CFR 1910 Section 145 Specifications for Accident Prevention Signs and Tags

U.S. Environmental Protection Agency, (EPA) including but not limited to:

40 CFR 762, CPTS 62044, FRL 2843-9, Federal Register Vol. 50 no.134, July 12, 1985 p.28530 - 28540 Asbestos Abatement Projects Rule
40 CFR 61 Subpart A Regulation for Asbestos
40 CFR 61 Subpart M (Revised Subpart B) National Emission Standard for Asbestos

U.S. Department of Transportation 49 CFR 172 and 173

Massachusetts Department of Labor Standards Regulations, (DLS) including but not limited to:

454 CMR 28.00 Removal, Containment and Encapsulation of Asbestos

Massachusetts Department of Environmental Protection (DEP) including but not limited to (supplementing subsection 7.01):

ITEM 182.1 (Continued)

310 CMR 7.00, Section 7.09 Odor and Dust, Section 7.10 Noise, Section 7.15 Air Pollution Control Regulations
310 CMR 18.00 and 19.00 Solid Waste Regulations

Massachusetts Division of Industrial Safety 45 CMR 10.00

Local Requirements including but not limited to those of Health Departments, Fire Departments and Inspection Services Departments

Wherever there is a conflict or overlap of the above references, the most stringent provision shall apply.

BASIS OF PAYMENT

Item 182.1 will be paid for at the Contract unit price per Lump Sum, which price shall include all labor, materials, tools, equipment, and all incidental costs required to complete the work as described and as required by the Engineer.

No separate payment will be made for the protection of general public, private property, the proper inspecting and testing of the material, but all costs in connection therewith shall be included in the Contract unit price bid.

ITEM 182.2 REMOVAL OF ASBESTOS FOOT

The work shall include the removal and satisfactory disposal of existing asbestos. The Contractor's attention is directed to the fact that existing asbestos shall be inspected and tested prior to removal, to determine if special removal and disposal is required. The Contractor shall follow all the rules and regulations stated in "ITEM 182.1 INSPECTION AND TESTING FOR ASBESTOS". If asbestos is present, the Contractor shall follow all the rules and regulations stated in the section "REMOVAL AND DISPOSAL OF ASBESTOS CONTAINING MATERIALS", under this item. The Contractor should notify and coordinate his/her efforts with the proper utility accordingly.

REMOVAL AND DISPOSAL OF ASBESTOS CONTAINING MATERIALS

This section specifies the requirements for the handling and removal of asbestos containing material. The Contractor must perform all asbestos handling and removal work in accordance with these specifications and the following additional requirements.

U.S. Department of Labor, Occupational Safety and Health Administration, (OSHA) including but not limited to:

29 CFR 1910 Section 1001 and 29 CFR 1926 Section 58 Occupational exposure to Asbestos, Tremolite, Anthophyllite and Actinolite, Final Rule
29 CFR 1910 Section 134 Respiration Protection
29 CFR 1926 Construction Industry
29 CFR 1910 Section 2 Access to Employee Exposure and Medical Records
29 CFR 1910 Section 1200 Hazard Communication
29 CFR 1910 Section 145 Specifications for Accident Prevention Signs and Tags

U.S. Environmental Protection Agency, (EPA) including but not limited to:

40 CFR 762, CPTS 62044, FRL 2843-9, Federal Register Vol. 50 no.134, July 12, 1985 p.28530 - 28540 Asbestos Abatement Projects Rule
40 CFR 61 Subpart A Regulation for Asbestos
40 CFR 61 Subpart M (Revised Subpart B) National Emission Standard for Asbestos

U.S. Department of Transportation 49 CFR 172 and 173

Massachusetts Department of Labor Standards, (DLS) including but not limited to:

454 CMR 28.00 Removal, Containment and Encapsulation of Asbestos

Massachusetts Department of Environmental Protection (DEP) including but not limited to (supplementing subsection 7.01):

310 CMR 7.00, Section 7.09 Odor and Dust, Section 7.10 Noise, Section 7.15 Air Pollution Control Regulations
310 CMR 18.00 and 19.00 Solid Waste Regulations

Massachusetts Division of Industrial Safety 45 CMR 10.00

ITEM 182.2 (Continued)

Local Requirements including but not limited to those of Health Departments, Fire Departments and Inspection Services Departments

Wherever there is a conflict or overlap of the above references, the most stringent provision shall apply.

All asbestos material shall be removed and properly disposed of by a contractor or subcontractor with a current Massachusetts Abatement Contractors License issued by the Department of Labor Standards. Work shall be supervised by a competent person as required by OSHA in 29 CFR 1926 to ensure regulatory compliance. This person must have completed a course at an EPA Training Center or equivalent course in asbestos abatement procedures, have had a minimum of four years on-the-job training and meet any additional requirements set forth in 29 CFR 1926 for a Competent Person. This person must also be certified by the Commonwealth as an Asbestos Supervisor and Asbestos Project Designer as required by 454 CMR 28.00.

Asbestos removal work shall be coordinated with all other work under the contract and shall be completed prior to performing any activities which could disturb the asbestos material or produce airborne asbestos fibers.

Dust suppression in the form of light water sprays, foams, dust suppressants and calcium chloride will be implemented as required to control dusting during trenching and excavation. Alternatively, intrusive activities may be reduced or curtailed under high wind or heavy rain conditions, which in the opinion of the Health and Safety Plan (HASP) may pose a safety hazard to the workers.

NOTIFICATION AND PERMITS

The Contractor shall prepare a formal pre-notification form at least ten (10) days prior to the start of asbestos removal work. This form must be submitted to the appropriate Regional Office of the Massachusetts Department of Environmental Protection and to the U.S. Environmental Protection Agency Region I Air and Hazardous Material Division. A copy of the submitted forms must be provided to the Engineer and kept at the work site.

Prior to starting any work, the Contractor shall also obtain any required asbestos removal permit(s) from the city/town. A copy of the permit(s) must be provided to the Engineer and posted at the work site.

The Contractor shall also obtain and pay all other applicable asbestos waste transportation and disposal permits, licenses and fees.

STANDARD OPERATING PROCEDURES

The standard operating procedure shall ensure the following:

1. Proper site security including posting of warning signs and restricting access to prevent unauthorized entry into the work spaces.
2. Proper protective clothing and respiratory protection prior to entering the work spaces.

ITEM 182.2 (Continued)

3. Safe work practices including provisions for communications; exclusion of eating, drinking, smoking, or use of procedures or equipment that would in any way reduce the effectiveness of respiratory protection or other engineering controls.
4. Proper exit practices from the work space though the showering and decontamination facilities.
5. Removing asbestos containing material in ways that minimize release of fibers.
6. Packing, labeling, loading, transporting and disposing of contaminated material in a way that minimizes or prevents exposure and contamination.
7. Emergency evacuation of personnel, for medical or safety (fire and smoke) so that exposure will be minimized.
8. Safety from accidents in the work space, especially from electrical shocks, slippery surfaces and entanglements in loose hoses and equipment.
9. Provisions for effective supervision and OSHA - specified personnel air monitoring for exposure during work.

REQUIRED SUBMITTALS

The Contractor shall submit to the Engineer the following listed items at least ten (10) calendar days prior to the start of asbestos work. No asbestos removal work activities shall commence until these items are reviewed by the Engineer, unless otherwise waived. Submittals shall be clearly labeled and in sufficient detail to enable the Engineer to form an opinion as to its conformity to the specifications.

1. Name, experience and DLS certification of proposed Supervisors and Foreman responsible for asbestos work.
2. Summary of workforce by disciplines and a notarized statement documenting that all proposed workers, by name, have received all required medical exams and have been properly trained and certified for asbestos removal work, respirator use and appropriate Massachusetts DLS, EPA and OSHA standards.
3. Notarized statement that workers are physically fit and able to wear and use the type of respiratory protection proposed for the project. Notarized certification signed by an officer of the abatement contracting firm that exposure measurements, medical surveillance and worker training records are being kept in conformance with 29 CFR 1926.
4. Written plan of action and standard operating procedures (HASP) to include: location and layout of decontamination areas; sequencing of asbestos work; detailed schedule of work activities by date and interface with other project activities which affect work performance; methods used to assure safety and security; worker protection and exposure monitoring; contingency and emergency evacuation procedures; detailed description of methods to be employed to control pollution; waste handling procedures.
5. Written respiratory protection program specifying level of protection intended for each operation required by the project and details of daily inspection and maintenance elements.
6. Copies of the U.S. EPA, State and local asbestos removal pre-notification forms. If applicable, lists and copies of all permits, licenses, or manifests which will be applied for and used.

ITEM 182.2 (Continued)

7. Name, location and applicable approval certificates for primary and secondary landfill for disposal of asbestos-containing or asbestos contaminated waste. Name, address and licenses number(s) of hauler permitted to transport waste. (Submit copies of completed manifests upon disposal).

The Contractor must provide copies of daily inspection and record logs upon request of the Engineer, at any time during project. This information will include but is not limited to work area entry data, respirator inspections and maintenance, HEPA-exhaust inspections and maintenance and other work applicable activities or reports of accidents or unusual events.

METHOD OF MEASUREMENT

Item 182.2 will be measured for payment by the Foot for the complete removal and disposal of the asbestos containing material.

BASIS OF PAYMENT

Item 182.2 will be paid for at the Contract unit price per Foot, which price shall include all labor, materials, tools, equipment, and all incidental costs required to complete the work specified above and as required by the Engineer.

No separate payment will be made for the protection of general public, private property, the proper inspecting and testing of the material, but all costs in connection therewith shall be included in the Contract unit price bid.

ITEM 221.1 FRAME AND COVER - SECURED EACH

The work under this Item shall conform to the relevant provisions of Subsections 201, 220 and the following:

The work to be done under this Item consists of the furnishing and delivering Frame and Cover – Secured to the site as shown on the Plans, and as directed by the Engineer.

Frame and Cover - Secured assemblies shall consist of covers and frames that conform to the nominal size, weight, material and load-carrying requirements in MassDOT Construction Standard Details 221.0.1, 221.0.2 and 221.0.3, and are on the relevant MassDOT Qualified Construction Materials list. Some dimensions of secured manhole covers and frames may vary slightly from those shown on the standard details to account for necessary fastening components. The Contractor shall submit shop drawings of all drainage castings for approval prior to ordering.

Covers and frames shall be held securely together by bolting to threaded holes in the frame or to nuts or tumbler devices secured by the frame, by use of hooks attached to the cover or by any other means approved by MassDOT, to prevent being dislodged under traffic loading. Gaskets and other sealing devices will not be allowed.

METHOD OF MEASUREMENT

Item 221.1 will be measured per EACH Frame and Cover – Secured furnished and delivered to the site.

BASIS OF PAYMENT

Item 221.1 will be paid for at the contract unit price EACH Frame and Cover – Secured furnished and delivered.

ITEM 222.11 FRAME AND GRATE (OR COVER) REMOVED AND RESET EACH

The work under this item shall conform to the relevant provisions under Subsection 220 of the Standard Specifications and the following:

Work shall include the removal, transporting, storing and resetting of existing frames and grates at the locations shown on the plans. If existing frame and grate are not suitable for reuse as determined by the Engineer, the contractor shall provide new frame and grate under item 222.1.

Existing frame and grate damaged by the Contractor's operations shall be replaced in-kind by the Contractor at no additional compensation.

METHOD OF MEASUREMENT

Item 222.11 will be measured for payment by the Each frame and grate removed and reset, complete in place.

BASIS OF PAYMENT

Item 222.11 will be paid for at the Contract unit price per Each, which price shall include all labor, materials, equipment, and all incidentals required to complete the work.

ITEM 302.081 8 INCH DUCTILE IRON WATER PIPE (RUBBER GASKET) WITH TEMPORARY SUPPORTS FOOT

The work under this item shall conform to the relevant provisions of Subsection 301 of the Standard Specification and the following:

The existing water main shall remain in service on the I-91 bridge until the proposed utility has been installed and water service can be transferred to the proposed pipe. The sequencing of the work must consider the timeline of the backwall removal and reconstruction, bearing replacements, beam end repairs, approach work, and deck removal and reconstruction. The Contractor is alerted to the following limitations on the installation of the proposed utility over the I-91 bridge:

- The existing diaphragms in the utility bay to remain consist of top and bottom struts that will limit access for installation of the proposed utility approximately every 15 feet. Top struts shall not be cut or removed.
- Temporary supports, sliding surfaces, and/or rollers, etc. may be used, however temporary supports may not be bolted to the tension flange of the beam. Welding to existing steel components to remain is not allowed.
- Insulation shall be post-installed unless the Contractor can show that installation of a pre-insulated pipe is feasible. Insulation shall be paid under item 373.08.
- Installation is suggested to be completed while the backwalls are removed for backwall reconstruction.
- See Special Provisions item 106.88, jacking and shoring, for limitations regarding the sequencing of pipe installation with the bearing replacements.

SUBMITTALS

At least 60 days prior to installation, the Contractor shall submit detailed plans and any calculations necessary to support the installation of the water main on the I-91 bridge, stamped and signed by a Professional Engineer licensed in the Commonwealth of Massachusetts to the Engineer for review and approval.

The design of any temporary supports shall be completed in accordance with the latest edition, including interims, of the AASHTO Guide Design Specifications for Bridge Temporary Works.

METHOD OF MEASUREMENT

Item 302.081 will be measured for payment by the Foot installed, complete in place.

BASIS OF PAYMENT

Item 302.081 will be paid for at Contract unit price per Foot, which price shall include all labor, tools, equipment, materials, blocking, bracing, temporary supports, submittals, approvals, permits, and all incidentals required to complete the work.

ITEM 325.16 16 INCH STEEL PIPE CASING FOR WATER PIPE FOOT

The work under this item shall conform to the relevant provisions of Subsection 960 of the Standard Specification and the following:

Steel pipe casing shall be fabricated and installed as shown on the plans and as required by the Engineer. Pipe casings shall conform to the requirements of ASTM A53, Grade A or B. Pipe casings shall be galvanized.

The actual sleeve size shall be coordinated with the utility provider for the utility size and insulation in place. All references herein to "16 inch" casings shall be considered a placeholder for the sleeve size required by the utility provider.

METHOD OF MEASUREMENT

Item 325.16 will be measured for payment by the Foot installed, complete in place.

BASIS OF PAYMENT

Item 325.16 will be paid for at the Contract unit price per Foot, which price shall include all labor, tools, equipment, materials, all dielectric spacers and end seals for both casings, bracing, loading, transportation, disposal fees necessary or incidental, approvals, permits, and all incidentals required to complete the work.

ITEM 371.08 **8 INCH COUPLING** **EACH**

The work under this item shall conform to the relevant provisions of Subsections 120 and 301 of the Standard Specifications, the "Bernardston Fire and Water-Rules and Regulations" (See Document A00804), and the following:

MATERIALS

Solid sleeves shall have long body type (12 inches minimum) and mechanical joints with retainer glands.

Couplings and transitional couplings for pipe less than or equal to 12 inches in diameter shall consist of a long body cast iron sleeve and shall have gaskets suitable for the pipe being joined. The bolts and nuts shall be corrosion resistant high strength and low alloy steel such as weathering steel. Couplings shall be Hymax models 2000/2100, Romac Industries, Inc. Macro HP, Smith-Blair 421 Series or approved equal. Transition couplings for pipe less than or equal to 12 inches in diameter shall be Dresser Style 162, Rockwell Type 441, Smith Blair Omni Style 442, or equivalent.

Provide couplings with an exterior epoxy coating.

METHOD OF MEASUREMENT

Item 371.08 will be measured for payment by the Each coupling installed, complete in place.

BASIS OF PAYMENT

Item 371.08 will be paid for at the Contract unit price per each, which price shall include all labor, materials, equipment, and all incidentals required to complete the work.

ITEM 504.2 GRANITE CURB TYPE VA4 – SPLAYED END EACH

The work under this item shall conform to the relevant provisions of Subsection 501 of the Standard Specifications and the following:

The work under this item shall include furnishing and installing curb transition sections at the locations shown on the plans to match into proposed or existing granite edging. The curbing shall have a minimum length of six feet (6'-0"). The curb shall be sawcut to match into the proposed adjacent granite curb or curb inlets at one end and the opposite end shall match into the existing or proposed granite edging as shown on the plans.

METHOD OF MEASUREMENT

Item 504.2 will be measured for payment by the Each splayed end installed, complete in place. Each six-foot splayed end curb shall constitute a single unit.

BASIS OF PAYMENT

Item 504.2 will be paid for at the Contract unit price per Each, which price shall include all labor, materials, equipment and all incidentals required to complete the work.

ITEM 657. TEMPORARY FENCE FOOT

The work under this item shall conform to the relevant provisions of Subsections 644 and 665 of the Standard Specifications and the following, and includes installation and removal of a chain link fence as shown on the plans to protect the safety of the general public or as required by the Engineer:

The temporary 6 foot high chain link fence shall be placed around the work area to protect areas with excavations as required by the Engineer and shall meet the requirements of the Standard Specifications and the Construction Standards, except the material need not be in new condition but shall not be deteriorated, nor in any way jeopardize the protection purposes intended. All fencing shall meet the approval of the Engineer. Gates shall be used at all locations that are to be opened on a regular basis.

Temporary Fence shall be reset as often as required by Contractor activities to meet the project schedule and to stage the construction, as required by the Engineer. The Contractor shall submit a plan to the Engineer indicating the locations and the lengths of each of these Items that he/she anticipates he/she will provide for the project. The methods of installation(s) and fence detail(s) shall also be submitted for approval by the Engineer.

The Contractor shall inspect the condition of Temporary Fence on a daily basis. Temporary Fence that is damaged shall be promptly replaced.

Fence fabric shall be placed on the face of the post away from the work area. The top edge of the fabric shall be finished with a knuckled selvage. Upon completion of the work, or as required by the Engineer, the fencing and supports shall be removed and disposed of off-site by the Contractor at no additional cost.

METHOD OF MEASUREMENT

Item 657. will be measured for payment by the Foot, complete in place.

BASIS OF PAYMENT

Item 657. will be paid for at the Contract unit price per Foot, which price shall include all labor, materials, equipment, and all incidentals required to complete the work, including posts, fence, gates, bracing, and footings. No additional payment will be made for final removal and proper disposal of the Temporary Fence.

The Contractor shall replace and/or restore sections of fence damaged due to accidents, vandalism or any other manner for the duration of the project. Damage due to construction activities or the Contractor’s operation shall be replaced at no additional cost to the Department.

ITEM 697.11 INLET SEDIMENTATION FILTER DEVICES EACH

The work under this Item shall conform to the relevant provisions of Subsections 227 and 670 of the Standard Specifications and the following:

The work under this Item includes the furnishing, installation, maintenance, and removal of a reusable fabric sack/bag (device) to be installed in drainage structures for the protection of wetlands and other resource areas and the prevention of silt and sediment from the construction site from entering the storm water collection system. The inlet sedimentation filter devices shall have an overflow / high-flow protection bypass system to prevent flooding during high-intensity storm events. Inlet sedimentation filter devices shall include a curb inlet sediment capture system for catch basins equipped with curb inlets. Inlet sedimentation filter devices shall be submitted to the Engineer for approval. Inlet sedimentation filter devices shall be manufactured by ACF Environmental; Dandy Products; Fabco Industries, Inc.; New Pig Corporation; or an approved equal.

CONSTRUCTION

Inlet sedimentation filter devices shall be installed in retained existing and proposed catch basins and drop inlets within the project limits and as required by the Resident Engineer.

The inlet sedimentation filter device shall be as manufactured to fit the opening of the drainage structure under regular flow conditions and shall be mounted under the grate. The insert shall be secured from the surface such that the grate can be removed without the insert discharging into the structure. The filter material shall be installed and maintained in accordance with the manufacturer's literature and as required by the Engineer. The inlet sedimentation filter device and its maintenance shall meet any requirements listed in the environmental permitting for the Contract and as described in this provision.

Inlet sedimentation filter devices shall remain in place until the placement of the pavement overlay or top course and the graded areas have become permanently stabilized. All materials used for the filter fabric will become the property of the Contractor and shall be removed from the site at the end of use.

The Contractor shall inspect the condition and clean all inlet sedimentation filter devices on the last work shift of each week, after each rainstorm, and during major rain events. Weekly inspection and cleaning of the inlet sedimentation filter devices is required whether or not the job is active. Inlet sedimentation filter devices shall be removed and cleaned to remove and disposed of accumulated debris and shall include backflushing the fabric to ensure all pores are cleaned prior to inspection by the Engineer. Inlet sedimentation filter devices, which have become damaged during construction operations, shall be repaired or replaced immediately at no additional cost to the Department.

When emptying the inlet sedimentation filter device, the Contractor shall take all due care to prevent sediment from entering the structure. Any silt or other debris found in the drainage system at the end of construction shall be removed at the Contractor's expense. The silt and sediment from the inlet sedimentation filter device shall be legally disposed of offsite.

ITEM 697.11 (Continued)

Under no condition shall silt and sediment from the insert be deposited on site and used in construction. If the Contractor chooses to store sediment removed from the inlet sedimentation filter devices for later disposal, the sediment must be stored in a designated stockpile location, covered to protect it from wind and precipitation, and protected from sediment loss with sedimentation capture control devices. If a Storm Water Pollution Prevention Plan (SWPPP) is required for the Contract, the stockpile location and its erosion control system, including cover protection, shall be described in the SWPPP.

As allowed by the Environmental Protection Agency's 2022 Construction General Permit Section 2.2.10 Footnote 31, inlet sedimentation filter devices may be removed in preparation of flood conditions; however, all of the following conditions must be met:

- The Contractor's approved SWPPP requires that inlet sedimentation filter devices be removed no sooner than the work shift prior to the anticipated start of the flood event and be reinstalled no later than the work shift after the end of the flood event.
- Only storms forecasted to produce 2.5" or more of rain in a 24-hour period as forecasted for the local area by a publicly available meteorological service will be accepted as flood events.
- The Contractor has provided a hard copy or pdf copy of the forecast of the flood event to the Engineer prior to implementing removal of inlet sedimentation filter devices.
- The Contractor removes inlet sedimentation filter devices at low-point inlets and only as many on-grade inlets as needed to prevent erosion from the anticipated storm.
- The removal of inlet sedimentation filter devices is done concurrently with other erosion and sedimentation control (ESC) storm protection activities including, but not limited to, pre-storm inspection and maintenance of devices and installation of additional lines of sedimentation capture devices in locations of concern.

All debris accumulated in inlet sedimentation control devices shall be handled and disposed of as specified in Subsection 227 of the Standard Specifications

METHOD OF MEASUREMENT

Item 697.11 will be measured for payment by the EACH inlet protected, complete in place.

BASIS OF PAYMENT

Item 697.11 will be paid for at the Contract unit price per EACH, which price shall include all labor, materials, equipment and all incidentals required to complete the work. No separate payment will be made for removal and disposal of the sediment from the insert, but all costs in connection therewith shall be included in the Contract unit price. Replacement of failed devices or components shall be made at no additional compensation.

ITEM 697.2 FLOATING SILT FENCE FOOT

The work under this item shall conform to the relevant provisions of Subsection 670 of the Standard Specifications and the following:

This work consists of furnishing, constructing, installing, maintaining, and ultimately removing a floating silt fence from the Fall River to minimize the drift of suspended sediment in the water body during construction of the Project. Construction of the floating silt fences and locations shall be as shown on the plans, and as required by the manufacturer and the Engineer.

Prior to the installation of the floating silt fence and its accessories, the Contractor shall submit the manufacturer's drawings and technical specifications to the Engineer for approval.

MATERIALS

Floating silt fence shall be made of a woven polypropylene with a minimum 200 lb. tensile strength. The Contractor shall submit to the Engineer for review and approval, product specifications and technical data provided by the manufacturer, prior to installation.

The fence shall be continuously weighted at the bottom to maintain a vertical submerged position. Anchors shall be placed at both ends of the curtain and at intermediate locations, as necessary, to hold the fence securely in place. The fence shall be installed to withstand the forces of the flow of the waterway.

CONSTRUCTION METHODS

When assembling and installing a floating silt fence, the Contractor shall follow all the directions of the floating silt fence manufacturer. The floating silt fence shall not be installed perpendicular to the direction of streamflow, such as across a river. The floating silt fence shall be installed parallel to the flow of water only, such as along a river bank. All construction activities which generate any sediment or turbidity into the waterway shall be contained within the floating silt fence.

Floating silt fence shall be installed before construction begins and earth is disturbed. Silt fences shall be inspected and approved by the Bernardston Conservation Commission Agents after installation and prior to commencement of further construction activities.

INSTALLATION OF FLOATING SILT FENCE

The floating silt fence shall be floated into position, attached to the anchor lines, and then unfurled. The Contractor shall securely attach curtain panel ends together using rope lashings. The top lashing shall be securely tied to the anchor line. The Contractor shall place the anchors such that the floating silt fence remains in the Plan location and none of the flotation devices are pulled under the water surface. If required by the Engineer, the Contractor shall supply and place additional anchorage.

ITEM 697.2 (Continued)

MAINTENANCE OF FLOATING SILT FENCE

Throughout the Project construction period, the Contractor shall maintain the floating silt fence so that no sediment caused by the Project enters the waterway beyond the floating silt fence. All floating silt fence damaged prior to installation, during installation, or during the life of the Contract shall be repaired or replaced to the satisfaction of the Engineer.

The Contractor shall inspect the silt fence daily to ensure continuous effectiveness. Fence shall be maintained for effective performance at all times. If any fence becomes damaged or dislodged, construction activities shall be halted until all deficiencies are corrected by the Contractor with no additional compensation. Floating debris shall be removed immediately if impacting the effectiveness of the system, otherwise it shall be removed at least weekly or at the direction of the Engineer.

REMOVAL OF FLOATING SILT FENCE

The floating silt fence shall remain in place until the Project is complete and the turbidity has settled to no more than what existed prior to the start of construction and remaining sediment has sufficiently settled. Sediment may be removed and the original depth (or plan elevation) restored. Any spoils must be taken to upland area and be stabilized. When required by the Engineer, the floating silt fence shall be furled in place, then released from its anchors and towed out of the water. The floating silt fence and all materials incidental to the construction of the floating silt fence shall be removed in such a manner as to minimize turbidity to adjacent waters. The floating silt fence and related components shall become the property of the Contractor and shall be removed from the Project.

METHOD OF MEASUREMENT

Item 697.2 will be measured for payment by the Foot of actual floating silt fence installed, complete in place.

BASIS OF PAYMENT

Item 697.2 will be paid for at the Contract unit price per Foot, which price shall include all labor, materials, equipment, and all incidentals required to complete the work.

ITEM 698.1	**GEOTEXTILE FABRIC FOR STABILIZATION**	**SQUARE YARD**
ITEM 698.2	**GEOTEXTILE FABRIC FOR SUBSURFACE DRAINAGE**	**SQUARE YARD**
ITEM 698.3	**GEOTEXTILE FABRIC FOR SEPARATION**	**SQUARE YARD**
ITEM 698.4	**GEOTEXTILE FABRIC FOR PERMANENT EROSION CONTROL**	**SQUARE YARD**

The work under these Items consists of furnishing and placing geotextile fabric for stabilization, subsurface drainage, separation and permanent erosion control at the locations and grades shown on the Plans or as required by the Engineer.

MATERIALS

Submitted fabrics shall be listed on the MassDOT Quality Construction Materials List (QCML) for the intended application.

CONSTRUCTION METHODS

Geotextile Fabric for Stabilization, Subsurface Drainage, Separation and Permanent Erosion Control shall be installed according to the manufacturer's instructions and in reasonable close conformity with the location, lines and grades indicated on the Plans.

Any section of fabric that is damaged shall be repaired in accordance with the manufacturer's requirements and AASHTO M 288 and as required by the Engineer or it shall be replaced at no cost to the Department.

METHOD OF MEASUREMENT

Items 698.1, 698.2, 698.3, and 698.4 will be measured for payment by the Square Yard of Geotextile Fabric for Stabilization, Subsurface Drainage, Separation and Permanent Erosion Control installed at the locations shown on the Plans, in accordance with these specifications, or as required by the Engineer, complete in place. Overlapping for seams and joints will be measured as one layer of fabric. Any embedment or wrapping at the toe or top of the slope will be measured for payment.

BASIS OF PAYMENT

Items 698.1, 698.2, 698.3, and 698.4 will be paid for at the Contract unit price per Square Yard, which price shall include furnishing and installing geotextile fabric, all miscellaneous associated assembly material, and all other labor, equipment, material, and all incidentals required to complete the work.

ITEM 699.1 IMPERMEABLE LINER SQUARE YARD

The work under this Item shall consist of furnishing and placing PVC liner material for stormwater containment at the locations and grades shown on the Plans or as required by the Engineer.

MATERIALS

Submitted product shall be minimum 20±1 mil (0.51±0.03 mm) polyvinyl chloride or polyethylene liner.

CONSTRUCTION METHODS

Impermeable liner shall be placed immediately after approval of subgrade preparation. Liner shall be folded over and overlapped on top of the bed to prevent soil intrusion into the aggregate bed.

Impermeable liner shall be placed in accordance with manufacturer's instructions and in reasonable close conformity with the location, lines and grades indicated on the Plans. All seams and openings in the liner shall be sealed according to manufacturer's recommendations and specifications. Adjacent strips of impermeable liner shall overlap a minimum of 18 inches or per manufacturer specifications, whichever is greater.

Any section of fabric that is damaged shall be repaired in accordance with the manufacturer's requirements and to the satisfaction of the Engineer or it shall be replaced at no cost to the Department.

METHOD OF MEASUREMENT

Item 699.1 will be measured for payment by the number of Square Yards installed, complete in place. Overlapping for seams and joints will be measured as one layer of fabric. Any embedment or wrapping at the toe or top of the slope will be measured for payment.

BASIS OF PAYMENT

Item 699.1 will be paid for at the Contract unit price per Square Yard of liner installed, complete in place, which price shall include all labor, materials, equipment, and all incidentals required to complete the work.

No additional compensation will be provided for all miscellaneous associated assembly material.

ITEM 701.4 TEMPORARY DETECTABLE WARNING PANEL EACH

The work under this Item shall conform to the relevant provisions of Subsection 701 of the Standard Specifications and the following:

Temporary Detectable Warning Panels shall be used during staged construction at the locations shown on the Temporary Traffic Control Plans (TTCP). The warning panels shall conform to Drawing Number 701.2.1 in the MassDOT Construction Standard Details. Panel color shall be approved by the Town of Bernardston prior to installation.

The work under this Item shall also include the removal and stacking of the detectable warning panels upon completion of their use during staged construction. The panels shall be stacked on boards at the MassDOT Maintenance Facility (55 Northfield Road, Bernardston, MA) as required by the Engineer. The Contractor shall provide a minimum of 48 hours advanced notification for delivery and stacking. Any panels delivered to the MassDOT Maintenance Facility but not wanted shall become the property of the Contractor and shall be removed, transported and discarded in accordance with all applicable regulations, at no additional cost.

METHOD OF MEASUREMENT

Item 701.4 will be measured for payment by the Each panel installed and then removed and stacked or removed and disposed.

BASIS OF PAYMENT

Item 701.4 will be paid for at the Contract unit price per Each, which price shall include all labor, materials, equipment, and all incidentals required to complete the work.

All incidentals involved with the installation and subsequent removal and stacking or removal and disposing of temporary detectable warning panels, including but not limited to hot mix asphalt sawcut, shall be considered incidental to this item.

ITEM 740. ENGINEER'S FIELD OFFICE AND EQUIPMENT (TYPE A) MONTH

The work under this Item shall conform to the relevant provisions of Subsection 740 of the Standard Specifications and the following:

Three computers and printer system meeting minimum requirements set forth below including installation, maintenance, power, paper, disks, and other supplies shall be provided at the Resident Engineer's Office:

All equipment shall be UL approved and Energy Star compliant.

THE COMPUTER SYSTEM SHALL MEET THE FOLLOWING MINIMUM CRITERIA OR BETTER:

Processor:	Intel, 3.5 GHz
System Memory (RAM):	12 GB
Hard Drive:	500 GB
Optical Drive:	DVD-RW/DVD+RW/CD-RW/CD+RW
Graphics Card:	8 GB
Network Adapter:	10/100 Mbit/s
USB Ports:	6 USB 3.0 ports
Keyboard:	Generic
Mouse:	Optical mouse with scroll, MS-Mouse compliant
Video/Audio	the computer system shall be capable of allow video calling and recording:
Video camera	shall be High Definition 1080p widescreen capable video calling and recording with built in microphone. The microphone system shall capture natural audio while filtering out background noise.
Audio	shall be stereo multimedia speaker system delivering premium sound.
OS:	Latest Windows Professional with all security updates
Web Browser:	Latest Internet Explorer with all security updates
Applications:	Latest MS Office Professional with all security updates Latest Adobe Acrobat Professional with all security updates Latest Autodesk AutoCAD LT Antivirus software with all current security updates maintained through the life of the contract.
Monitors:	Two 27" LED with Full HD resolution. Max. resolution 1920 x 1080
Flash drives:	2 (two) - 128GB USB 3.0
Internet access:	High Speed (min. 24 mbps) internet access with wireless router.

ITEM 740. (Continued)

THE MULTIFUNCTION PRINTER SYSTEM SHALL MEET THE FOLLOWING MINIMUM CRITERIA OR BETTER:

Color laser printer, fax, scanner, email and copier all in one with the following minimum capabilities:

- Estimated volume 8,000 pages per month
- LCD touch panel display
- 50 page reversing automatic document feeder (RADF)
- Reduction/enlargement capability
- Ability to copy and print 11" x 17" paper size
- email and network pc connectivity
- Microsoft and Apple compatibility
- ability to overwrite latent images on hard drive
- 600 x 600 dpi capability
- 30 pages per minute print speed (color),
- 4 Paper Trays Standard (not including the bypass tray)
- Automatic duplexing
- Finisher with staple functions
- Standard Ethernet. Print Controller
- Scan documents to PDF, PC and USB
- ability to print with authenticated access protection

The Contractor shall supply a maintenance contract for next day service, and all supplies (toner, staples, paper) necessary to meet estimated monthly usage.

The Engineer's Field Office and the equipment included herein including the computer system, and printer shall remain the property of the Contractor at the completion of the project. Disks, flash drives, and card readers with cards shall become the property of the Department.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Compensation for this work will be made at the contract unit price per month which price includes full compensation for all services and equipment, and incidentals necessary to provide equipment, maintenance, insurance as specified and as directed by the Engineer.

ITEM 751.766 COMPOST AND SEED OVER MODIFIED ROCKFILL AND RIPRAP CUBIC YARD

The work under this Item shall conform to the relevant provisions of Subsections 751, 767, and 765 of the Standard Specifications and the following.

The work under this Item shall consist of furnishing and pneumatically applying compost in conjunction with the specified native seed on designated areas of modified rockfill, bridge riprap, and dumped riprap and achieving satisfactory establishment of seeded species as specified herein.

Compost and Seed over Riprap shall be installed over riprap (Items 983.and 983.12) above the 100-Year Flood elevation (EL. 323.6) and to the limits shown on the Plans.

Compost and Seed over Modified Rockfill shall be installed to the limits shown on the Plans.

Compost shall be installed to fill small voids, as depicted on the plans, to an average thickness of 4 inches above the riprap, with variations in thickness as necessary to meet grading requirements.

QUALIFICATIONS

Compost application and seeding shall be done by a company having a minimum of five years of experience with native seed establishment. Prior to beginning work, the seeding Contractor shall furnish proof of qualifications to the Engineer for approval. Proof of qualifications shall include providing documentation (photos and contacts) to demonstrate knowledge and expertise with native seeding and establishment and proof of having completed successful native seeding projects.

MATERIAL AND SUBMITTALS

COMPOST

Compost shall meet the relevant provisions for Type 2 Compost, found in Section M1.06 of the Supplemental Standard Specifications.

The Engineer shall approve the Contractor's equipment for application.

SEED MIX

Seed Mixes and Submittals shall be per the item(s) for the permanent seed mix. Mix shall be:

Item 765.442 – Roadside Riverbank Mix

SEEDING SEASON

The season for seeding native mixes is April 1 - May 15 and October 1 - December 1 for dormant seeding. Written approval must be obtained for seeding outside the seeding season and, if approved, the permanent seed rate shall be increased by 50%

CONSTRUCTION METHODS

Method of application and equipment to be used shall be reviewed and approved by the Engineer prior to placement of material.

ITEM 751.766 (Continued)

PLACEMENT OF COMPOST

Compost shall be placed as shown on the Plans and in the Detail Sheets and as required by the Engineer. Material shall be placed so that settled material is at or slightly below the surface plane of the stone. The Contractor shall ensure that there will be adequate quantity, including adjustment for settlement.

For purposes of estimation, required compost quantities should be 300 cubic yards per acre to achieve the target depth.

SEEDING

For areas smaller than half an acre, unless otherwise approved by the Engineer, seeding shall be done by broadcast method. Seeding shall be done in conjunction with or immediately following Compost application. Alternative seeding methods must be submitted and approved by the Engineer 14 days in advance of compost and seed application.

HYDROSEEDING

Hydroseeding may be used for sites over half an acre in size or when the rock slope does not permit safe application via a broadcasting method. Hydroseed shall be per the manufacturer's directions and as follows.

Tank and hoses shall be cleaned from all previous hydroseeding and hydromulching projects. Seed shall be mixed into the slurry immediately before application and slurry applied within 30 minutes after seeds have been placed in the tank. Once seed has been placed in the tank, tank shall be agitated only enough to mix the seeds and keep slurry from separating.

WHEN SEEDING OCCURS AFTER APPLICATION OF COMPOST OR AFTER DECEMBER 1

When seeding is done more than 3 days after Compost application or when Compost is applied after December 1, seeding rate shall be increased by 50%.

OVER-SEEDING

Large extents of bare area (greater than 5-6 feet and depending on modified rock slope conditions) shall be over-seeded with the specified mix during the appropriate season for seeding. Rates, methods, and submittals shall be as specified under the relevant Seed Mix Item and Materials above.

Over-seeding, mulch, watering, and all work for over-seeding shall be incidental.

DETERMINING SATISFACTORY ESTABLISHMENT

A reasonably well-established stand of the specified seeded species as determined by the Engineer and the MassDOT Landscape Architect or designated Specialist will be required for Final Acceptance. The expectation is that an acceptable number and variety of the desired permanent seeded species will be visible. For seeding with compost over modified rock this shall generally be:

ITEM 751.766 (Continued)

A minimum of 50% coverage by the specified permanent seeded species after one growing season (considered June-September 15). Of that percentage, generally, depending on the mix species:

- At least 2 types of permanent seeded grass species shall be visible.
- At least 2 species of wildflowers shall be visible.
- There will be no more than 25% coverage by weed species.
- There will be no invasive or aggressive species within the stand at the time of acceptance.
- There shall be no evidence of seed from non-native mixes (ex., clover) due to using an incorrect or modified mix or due to failure to clean the hydroseeding tank if a hydroseeder is used.

Invasive and aggressive weeds (such as mugwort, vetch, knapweed, and chicory) must be cut, pulled with roots removed, or treated with herbicide by a licensed and approved applicator prior to going to seed for Interim Acceptance. Weed removal shall be coordinated with MassDOT Landscape Architect. No herbicides shall be used without approval and coordination with MassDOT Landscape Design Section.

ACCEPTANCE OF SEEDING AND ESTABLISHMENT WORK

Conditional Acceptance shall be based on approval of seed mix submittals and proper application of seed as specified herein.

Final Acceptance of Seed Establishment shall be given upon satisfactory Establishment as described above. If the seeded area fails to meet the requirements of Establishment by the end of the growing season, contractor shall propose and implement remediations and site shall be inspected during the following growing season after July 1st. Otherwise, Contractor shall forego the payment for Final Acceptance. All remediation shall be at the contractor's expense.

METHOD OF MEASUREMENT

Item 751.766 will be measured for payment by the Cubic Yard of compost installed, complete in place.

BASIS OF PAYMENT

Item 751.766 will be paid for at the Contract unit price per Cubic Yard, which price shall include all labor, materials, equipment, site preparation, and all incidentals required to complete the work.

Roadside Riverbank Mix will be compensated at the bid price per the specified seed mix item by pound.

Schedule of payment shall be as follows:

60% upon approval of Compost application and Conditional Acceptance of seeding as specified above 40% upon Final Acceptance of Seed Establishment.

ITEM 756. NPDES STORM WATER POLLUTION PREVENTION PLAN LUMP SUM

This Item addresses the preparation and implementation of a Storm Water Pollution Prevention Plan required by the National Pollutant Discharge Elimination System (NPDES) and applicable Construction General Permit (CGP) issued by the U.S. Environmental Protection Agency (EPA).

Pursuant to the Federal Clean Water Act, construction activities which disturb one acre or more are required to apply to the EPA for coverage under the NPDES General Permit for Storm Water Discharges from Construction Activities. The Contractor shall be fully responsible for compliance with the most recently issued CGP and any subsequent revisions. Should a fine or damages be assessed against it, or MassDOT, as a result of a local, state, or federal enforcement action due to non-compliance with the CGP, the Contractor shall take full responsibility.

The NPDES CGP requires the submission of a Notice of Intent (NOI) to the EPA prior to the start of construction (defined as any activity which disturbs land, including clearing and grubbing). There is a fourteen (14) day review period commencing from the date on which EPA enters the Notice into their database. Based on the review of the NOI, EPA may require additional information, including but not limited to, the submission of the Storm Water Pollution Prevention Plan (SWPPP) for review. Work may not commence on the project until final authorization has been granted by EPA. Any additional time required by EPA for review of submittals will not constitute a basis for claim of delay.

In addition, if the project discharges to an Outstanding Resource Water, vernal pool, or is within a coastal ACEC as identified by the Massachusetts Department of Environmental Protection (DEP), a separate notification to DEP is required. DEP may also require submission of the Storm Water Pollution Prevention Plan for review and approval. Filing fees associated with the notification to DEP and, if required, the SWPPP filing to DEP shall be paid by the Contractor.

The CGP also requires the preparation and implementation of a SWPPP in accordance with the afore-mentioned statutes and regulations. The Plan will include the CGP conditions and detailed descriptions of controls of erosion and sedimentation to be implemented during construction. The contractor shall prepare the SWPPP and update it as necessary. The Contractor shall submit the Plan to the Engineer for approval at least four (4) weeks prior to any site activities. It is the responsibility of the Contractor to comply with the CGP conditions and the conditions of any state Wetlands Protection Act Order, Water Quality Certification, Corps of Engineers Section 404 Permit and other environmental permits applicable to the project and to include in the SWPPP the methods and means necessary to comply with applicable conditions of said permits.

It is the responsibility of the Contractor to complete the SWPPP in accordance with the EPA CGP, provide all information required, and obtain any and all certifications as required by the CGP. Any amendments to the SWPPP required by site conditions, schedule changes, revised work, regulations, construction methodologies, and the like are the responsibility of the Contractor. Amendments will require the approval of the Engineer prior to implementation.

In addition to the CGP requirements for inspections, MassDOT requires inspection of all erosion controls and site conditions on a weekly basis. Inspections are also required at portions of sites that discharge to sediment or nutrient impaired or high quality waters per the CGP when each incidence of rainfall exceeding 0.25 inches in twenty-four hours or after snowmelt discharge from a storm event that produces 3.25 inches or more of snow within twenty-four hours occurs.

ITEM 756. (Continued)

The CGP requires that inspections be performed by a qualified individual as outlined in the CGP. MassDOT requires proof of completion of a 4 hour minimum sedimentation and erosion control training class current to the latest CGP. This individual can be, but not limited to, someone that is either a certified inspector, certified professional, or certified storm water inspector. The documentation shall be included as an appendix in the SWPPP. The inspector's qualifications shall be submitted to the Engineer for approval prior to beginning any work. This individual shall be on-site during construction to perform these inspections. In addition, if the Engineer determines at any time that the inspector's performance is inadequate, the Contractor shall provide an alternate inspector. Written weekly inspection forms, storm event inspection forms, and Monthly Summary Reports must be completed and provided to the Engineer. Monthly Summary Reports must include a summary of construction activities undertaken during the reporting period, general site conditions, erosion control maintenance and corrective actions taken, the anticipated schedule of construction activities for the next reporting period, any SWPPP amendments, and representative photographs.

The Contractor is responsible for preparation of the Plan, all SWPPP certifications, inspections, reports and any and all corrective actions necessary to comply with the provisions of the CGP. The Standard Specifications require adequate erosion control for the duration of the Contract. All control measures must be properly selected, installed, and maintained in accordance with manufacturer specifications and good engineering practices. If periodic inspections or other information indicates a control has been used inappropriately or is no longer adequate, it is the responsibility of the Contractor to replace or modify the control for site conditions at no additional cost to the Department. Contractor must maintain all control measures and other protective measures in effective operating conditions and shall consider replacement of erosion controls for each construction season.

The work under this item shall also include the preparation, submission and implementation of a Flood Contingency Plan. The plan shall address the potential need for the temporary relocation of construction and auxiliary equipment situated within the 1% annual chance of flooding zone to designated upland locations above the Base Flood Elevation during flood events. The Flood Contingency Plan shall address any additional MassDEP-required information requirements, as applicable. The Flood Contingency Plan shall be submitted to the Engineer for review and approval at the same time as the SWPPP.

This Item addresses acceptable completion of the SWPPP, any revisions/amendments required during construction, preparation of monthly reports and Flood Contingency Plan. In addition, any erosion controls beyond those specified in bid items which are selected by the

Contractor to facilitate and/or address the Contractor's schedule, methods and prosecution of the work shall be considered incidental to this item.

The CGP provides specific requirements for temporary and final stabilization. This shall be incorporated into the project schedule. The permit defines specific deadline requirements for Initial Stabilization ("immediately", i.e., no later than the end of the next work day following the day when earth-disturbing activities have temporarily or permanently ceased) and for Complete Stabilization Activities (no later than 14 calendar days after the initiation of stabilization). Stabilization criteria for vegetative and non-vegetative measures are provided in the CGP.

ITEM 756. (Continued)

The CGP requires the submission of a Notice of Termination (NOT) from all operators when final stabilization has been achieved, as well as removal and proper disposal of all construction materials, waste and waste handling devices, removal of all equipment and construction vehicles, removal of all temporary stormwater controls, etc. Approval of final stabilization by the Engineer and confirmation of submission of the NOT will be required prior to submission of the Resident Engineer's Final Estimate. The permittee shall use EPA's website to prepare and submit the NOT.

BASIS OF PAYMENT

Item 756 will be paid for at the Contract unit price Lump Sum, which price shall include all labor, materials, equipment, SWPPP & Flood Contingency Plan preparation, revisions/addenda during construction, monthly reports, filing fees, and all incidental costs required to complete the work.

Payment of 50% of the Lump Sum price of this item will be made upon acceptance of the NPDES Stormwater Pollution Prevention Plan & Flood Contingency Plan.

Payment of 40% of the Lump Sum price of this item will be paid in equal monthly installments distributed across the time remaining in the accepted baseline schedule until substantial completion.

The remaining 10% of the Lump Sum price of this Item will be paid following accepted submission of a Notice of Termination (NOT) when final stabilization has been achieved.

ITEM 761.1 BIORETENTION SOIL CUBIC YARD

The work under this item shall conform to the relevant provisions of Subsections 751 and 760 of the Standard Specifications and the following:

The work under this item shall include all materials, labor, equipment and other incidental items required to furnish and install the bioretention soil at the I-91 northbound off-ramp as shown on the plans. The work under this item shall include grading of the bioretention soil as shown on the plans.

MATERIALS

The acceptable material to be used in the bioretention area is provided in the following table:

Particle Type	Particle Size (in)	Percent by Dry Weight
Very Course Sand/Gravel	0.079 – 0.187	5% Maximum
Sand	0.017 – 0.079	80-90%
Silt	0.003 – 0.017	15% Maximum
Clay	<0.003	5% Maximum

The bioretention soil media shall be uniform, free of stones, stumps, roots, or similar materials larger than 0.187 inches. No compost shall be used in the planting mix.

Organic matter: Minimum of 3 percent by volume and maximum of 10 percent by volume
Soil Reaction: pH of 6 to 7

CEC of Total Soil: Minimum 10 meq/100mL at pH of 7.0.

Soil shall not contain the following:

Unacceptable Materials: Concrete slurry, concrete layers or chunks, cement, plaster, building debris, asphalt, bricks, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, solid waste, and other extraneous materials that are harmful to plant growth. Unsuitable Materials: Stones, roots, plants, sod, clay lumps, and pockets of coarse sand that exceed a combined maximum of 5 percent by dry weight of the manufactured soil. Large Materials: Stones, clods, roots, clay lumps, and pockets of coarse sand exceeding 0.187 inches (4.76 mm) in any dimension.

ACCEPTABLE ORGANIC SOIL AMENDMENTS

a. Wood Derivatives: Shredded wood, wood chips, ground bark, or wood waste; of uniform texture and free of stones, sticks, soil, or toxic materials.
b. Media amendments such as zero-valent iron and/or drinking water treatment residuals (alum) to enhance phosphorus sorption as specified by the engineer.

ITEM 761.1 (Continued)

SAMPLES AND SUBMITTALS

The Contractor shall submit manufacturer's product data sheet, supplier information, applicable dimensions, materials and installation instructions, as applicable, to the Engineer prior to ordering.

Submit certificates, signed by the materials producer, stating that materials meet or exceed the specified requirements.

CONSTRUCTION METHODS

All items listed below shall be constructed as indicated on the drawings and details and as further described below:

INSTALLATION SCHEDULE

Conduct operations not to interfere with, interrupt, damage, destroy, or endanger integrity of surface structures or utilities, in immediate or adjacent areas.

Weather limitations: Proceed with Bioretention Soil installation only when existing and forecasted weather conditions permit. Do not install during inclement weather, but not limited to heavy rain, high winds, frost and similar conditions.

Coordinate Bioretention Soil installation periods with planting and seeding periods and initial maintenance periods to provide required maintenance from date of Substantial Completion.

Spring Planting: April 1 to June 1
Fall Planting: August 15 to October 15

METHOD OF MEASUREMENT

Item 761.1 will be measured for payment by the Cubic Yard, complete in place.

BASIS OF PAYMENT

Item 761.1 will be paid for at the Contract unit price per Cubic Yard, which price shall include all labor, materials, equipment, and all incidentals required to complete the work.

No additional compensation will be provided for cost of material, compaction, verification and documentation of organic matter content, transport, site preparation, and placement of Bioretention Soil.

ITEM 765.21 ANNUAL COVER CROP FOR NATIVE SEEDING POUND

Work under this item shall conform to the relevant provisions of Subsection 765 of the Standard Specifications and the following.

DESCRIPTION

Work consists of furnishing and applying the appropriate annual grass to be seeded as a cover crop in conjunction with upland native seeding and at the rate specified herein.

A cover crop shall be used for following conditions:

- when specified under Application Rate for the permanent native upland seed mix
- for slopes 2:1 or steeper and an annual is not already specified as part of the permanent mix
- when seeding out of season and the native seed mix does not already specify an annual
- as required to prevent erosion until the permanent seed establishes.

A cover crop is not necessary for wetland seeding and is not typically necessary for soil stabilization when seeding in conjunction with a compost blanket application.

Annual rye (*Lolium multiflorum*) will not be accepted as an annual cover crop.

Using annual rye or exceeding the application rate such that a dense stand of annual grasses prevents germination of the native grasses will require mowing of annual grasses. In this instance, mowing of cover crop will be incidental to this item.

SEED AND APPLICATION RATE

Add 30 pounds/acre of the following seed based on seeding season:

Avena sativa (Grain Oats):	1 January to 31 July
Cecale cereale (Grain Rye):	1 August to 31 December

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Annual Cover Crop will be measured for payment per pound of seed, complete in place.

Annual Cover Crop will be paid at the contract unit price per pound upon approval of seed bag tags or other documentation of correct application rate and species, and upon acceptance of a satisfactory stand of annual grasses three weeks following seeding.

Application and care of cover crop will be paid for separately under Item 765.635 Native Seeding and Establishment

ITEM 765.411	**SHORT GRASSLAND MIX**	**POUND**
ITEM 765.442	**ROADSIDE RIVERBANK MIX**	**POUND**
ITEM 765.554	**WETLAND SEED – SEASONALLY FLOODED**	**POUND**

The work under these Items shall consist of furnishing the mix specified below in the required quantity.

SUBMITTALS

1) **Pre-Verification of Seed Availability.** Within 30 days after the Notice to Proceed, the Contractor shall submit to the Engineer the supplier's verification of availability of seed species in the required quantities and for the anticipated date of seeding. Verification shall be on the supplier's letterhead and notarized by the supplier's notary. Species not expected to be available should be noted and substitutions recommended.

2) **Final Verification of Seed Availability.** No earlier than 21 days prior to ordering, the Contractor shall submit to the Engineer the supplier's verification of availability of seed species and in the required quantities. Verification shall be on the supplier's letterhead and notarized by the supplier's notary. A copy of this submittal shall be forwarded to the MassDOT Landscape Design Section. Substitutions or changes in the mix at this time must be approved by MassDOT Landscape Design Section.

3) **Seed Worksheet** provided herein shall be submitted to the Engineer prior to ordering seed to determine the number of pounds of Pure Live Seed required.

4) **Seed Tags.** The contractor shall submit original seed tags from each bag of seed used on the project or ensure that each tag is photo documented by the Engineer while on the unopened bag.

   Number of tags submitted must correspond to number of bags delivered.

   Species listed on the seed tag shall match the Final Verification of Seed Availability (Submittal #2) unless approved otherwise. Tag must include: variety and species name; lot number; purity; percentage of inert matter; percentage of weeds, noxious seeds, and other crop seeds; germination, dormant or hard seed; total viability; origin of seed; germination test date, net weight, and name and address of seller. The origin of seed must be listed on the seed tag for all species in the mix to provide verification of original (generation 0) seed source. The smallest known geographic area (township, county, ecotype region, etc.) shall be listed. Ecotypes and cultivars shall be as close to Massachusetts as possible and appropriate to the site conditions.

   A copy of this submittal shall be forwarded to the MassDOT Landscape Design Section.

ITEMS 765.411, 765.442, 765.554 (Continued)

5) **Verification of Seed Delivery.** Prior to payment, contractor shall submit the Seed Delivery Verification form contained within the contract or the Supplier's Verification on company letterhead or a bill of lading. Supplier verification must include all information requested on the Verification form within this contract. The bill of lading must include variety and species name, lot number, net weight shipped, date of sale, invoice, project or seeding location, and name and address of Supplier. All information must be filled in and complete for acceptance. Information must match the seed tags and quantity of seed used on the job. A copy of this submittal shall be forwarded to the MassDOT Landscape Design Section.

6) **Seed Sample.** If requested or if seed is from a previously opened bag, the contractor may be asked to submit to the Engineer a sample of seed from the seed bag (1-2 cups) at the time of seeding.

SEEDING SEASON

The appropriate seeding seasons are:

Spring: April 1 - May 15
Fall: October 1 - December 1 for dormant seeding

PERMANENT SEED MIXES

CALCULATING PURE LIVE SEED (PLS)

Quantities specified are PURE LIVE SEED. Greater quantities of ordered seed may be required to achieve actual specified seeding rates.

Pure Live Seed (PLS) is defined as a percentage calculated by multiplying the percent of pure seed by the percent of viable seed (total germination, hard seed, and dormant seed). For example:

If a seed label indicates 90% purity, 78% germination, 10% hard seed, and 2% dormancy, it is calculated to be 90% x [78 + 10 + 2]% = 81% PLS.

Therefore, each pound of PLS would need 1 pound / 0.81 = 1.2 pounds of seed with a 90% purity and 90% total germination

Seed Mix(es) shall be as specified below. Ecotypes and cultivars shall be as close to Massachusetts as possible and appropriate to the site conditions.

ITEMS 765.411, 765.442, 765.554 (Continued)

765.411 SHORT GRASSLAND MIX

To be used on naturalized roadside slopes and around the bioretention basin area as shown on the Plans.

	Botanical Name	Common Name	% PLS by Weight
Grass	Schizachyrium scoparium	Little Bluestem	55.10%
	Elymus virginicus	Virginia Wild Rye	27.60%
	Festuca rubra	Creeping Red Fescue	7.00%
	Agrostis perennans	Upland Bentgrass	1.50%
	Eragrostis spectabilis 'RI Ecotype'	Purple Lovegrass 'RI Ecotype'	1.50%
	Dichanthelium clandestinum 'Tioga'	Deertongue grass 'Tioga'	1.0%
			93.60%
Herb/Forb	Chamaecrista fasciculata	Partridge Pea	3.00%
	Penstemon digitalis	Beard-tongue	1.50%
	Achillea millefolium	Common Yarrow	0.40%
	Solidago nemoralis	Grey Goldenrod	0.30%
	Aster laevis NY Ecotype	Smooth Aster NY Ecotype	0.20%
	Smooth Aster NY Ecotype	Slender Mountain Mint	0.20%
	Aster lateriflorus	Calico Aster	0.20%
	Solidago bicolor	White Goldenrod	0.20%
	Aster pilosus	Heath Aster	0.20%
	Zizia aurea	Golden Alexanders	0.10%
	Euthamia graminifolia	Grass-leaved Goldenrod	0.10%
			6.4%
			100.00%

ITEMS 765.411, 765.442, 765.554 (Continued)

765.442 ROADSIDE RIVERBANK MIX

To be used on slopes adjacent to the Fall River, compost and seed over riprap, and compost and seed over modified rockfill as shown on the Plans.

	Botanical Name	Common Name	% PLS by Weight
Grass	Elymus virginicus	Virginia Wild Rye	27.00%
	Schizachyrium scoparium 'Albany Pine'	Little Bluestem 'Albany Pine'	22.5%
	Andropogon gerardii NY Eco	Big Bluestem NY Eco	14.0%
	Elymus riparius	Riverbank Wild Rye	14.0%
	Panicum virgatum	Switch Grass	5.0%
	Dichanthelium clandestinum 'Tioga'	Deertongue grass 'Tioga'	5.0%
	Carex vulpinoidea	Fox Sedge	2.5%
	Agrostis perennans	Upland Bentgrass	1.5%
	Poa palustris	Fowl Bluegrass	0.3%
	Juncus effusus	Soft Rush	0.1%
	Juncus tenuis	Path Rush	0.1%
			92.00%
Herb/For b	Chamaecrista fasciculata	Partridge Pea	3.00%
	Penstemon digitalis	Beard-tongue	1.00%
	Vernonia noveboracensis	New York Ironweed	0.60%
	Helenium autumnale	Common Sneezeweed	0.50%
	Verbena hastata	Blue Vervain	0.40%
	Aster puniceus	Aster - Swamp	0.40%
	Aster cordifolius	Blue Wood Aster	0.30%
	Asclepias incarnata	Swamp Milkweed	0.30%
	Monarda fistulosa	Wild Bergamot	0.20%
	Aster novae-angliae	New England Aster	0.20%
	Solidago odora	Licorice Scented Goldenrod	0.20%
	Desmodium canadense	Showy Tick Trefoil	0.20%
	Eupatorium perfoliatum	Boneset	0.20%
	Eupatorium maculatum	Spotted Joe Pye Weed	0.20%
	Solidago juncea	Early Goldenrod	0.10%
	Euthamia graminifolia	Grass-leaved Goldenrod	0.10%
	Lobelia cardinalis	Cardinal Flower	0.10%
			8.00%
			100.00%

ITEMS 765.411, 765.442, 765.554 (Continued)

765.554 WETLAND – SEASONALLY FLOODED MIX

To be used within the bioretention basin as shown on the Plans.

	Botanical Name	Common Name	% PLS by Weight
Grass	Elymus riparius	Riverbank Wild Rye	20.00%
	Andropogon gerardii NY Eco	Big Bluestem NY Eco	12.00%
	Carex lupulina	Hop Sedge	10.00%
	Panicum clandestinum 'Tioga'	Deer Tongue 'Tioga'	10.00%
	Carex vulpinoidea	Fox Sedge	10.00%
	Carex scoparia	Broom sedge	8.00%
	Sorghastrum nutans NY Eco	Indiangrass NY Ecotype	8.00%
	Panicum virgatum	Switch Grass	8.00%
	Juncus effusus	Soft Rush	2.00%
	Juncus tenuis	Path Rush	1.00%
			89.00%
Herb/For b	Verbena hastata	Blue Vervain	4.00%
	Desmodium canadense	Showy Tick Trefoil	2.00%
	Eupatorium maculatum	Joe-pye Weed	1.00%
	Asclepias incarnata	Swamp Milkweed	1.00%
	Aster novae-angliae	New England Aster	1.00%
	Eupatorium perfoliatum	Boneset	0.70%
	Helenium autumnale	Common Sneezeweed	0.50%
	Aster puniceus	Aster - Swamp	0.50%
	Mimulus ringens	Monkey Flower	0.20%
	Vernonia noveboracensis	New York Ironweed	0.10%
			11.00%
			100.00%

APPLICATION RATE:

765.411 – Short Grassland Mix: 15lbs/acre PLS.

In addition, apply 30 pounds of cover crop (grain oats or grain rye) as appropriate to the season.

765.442**:** Roadside Riverbank Mix: 15 lbs/acre PLS. No cover crop shall be applied.

765.554**:** Wetland Seed – Seasonally Flooded Mix: Species ecotype shall be as native to New England region as possible. Apply this mix at 20 lbs PLS/acre.

Any species substitutions shall be with a species having similar characteristics and function. Substitutions must be approved by MassDOT Landscape Design Section per the documentation submittal process.

ITEMS 765.411, 765.442, 765.554 (Continued)

50% INCREASE ADJUSTMENT FOR FIELD CONDITIONS

Seeding under the following conditions requires a 50% increase in the permanent mix at the time of construction:

- Seeding out of season
  OR
- Seeding after Compost Blanket has been applied (unless already increased for out of season).

METHOD OF MEASUREMENT

Items 765.411, 765.442, and 765.554 will be measured for payment by the pound of Pure Live Seed delivered, complete in place.

BASIS OF PAYMENT

Items 765.411, 765.442, and 765.554 will be paid for at the Contract unit price per Pound of Pure Live Seed delivered upon approval of all Seed Submittal Documentation. Overseeding required to correct poor germination or establishment shall be incidental to this item. Application and care of native seed mix will be paid for separately under Item 765.635.

NATIVE SEED WORKSHEET

Project Description: _____ Project No: _____

Contractor: _____ Contract No: _____

Seed Mix Number & Description: _____

Contractor: Complete Prior To Ordering

Pounds of Seed Required Per Contract:

_____lbs./acre for _____Acre(s) OR _____ SY

Additional 50% increase if required (out of season or seeding over compost blanket):

_____**lbs. Total Seed Required**

Calculated Quantity for **P**ure **L**ive **S**eed (PLS[1]):

_____ **Total Pounds PLS**

Engineer: Verification at Time of Application

Number pounds delivered to site[2]: _____ Date(s): _____

Actual Seed Bag Tag/s Received or photo documented by Engineer: _____

[1] PLS=% pure seed x % viable seed (total germination, hard seed, and dormant seed).
*[2]Quantity delivered should match pounds **Total Pounds PLS** and **Verification of Seed Delivery**. Pounds should be shown on each Seed Tag.*

ITEM 765.635 NATIVE SEEDING AND ESTABLISHMENT SQUARE YARD

Work shall conform to the relevant provisions of Subsections 765 and 767 of the Standard Specifications and the following:

The work under this item shall consist of seeding, mowing, and other care to establish a stand of grass in the areas shown on the plans or as required by the Engineer. For the purposes of these specifications, the term "grass" shall apply to all the forbs, grasses, sedges, and rushes included in the materials.

QUALIFICATIONS

Seeding shall be done by a company having a minimum of five years of experience with native seed establishment. Prior to beginning work, the seeding Contractor shall furnish proof of qualifications to the Engineer for approval. Proof of qualifications shall include providing documentation (photos and contacts) to demonstrate knowledge and expertise with native seeding and establishment and proof of having completed successful native seeding projects.

SEEDING SEASON

Seeding seasons for native mixes is April 1 - May 15 and October 1 - December 1 for dormant seeding. Written approval must be obtained for seeding outside the seeding season and, if approved, the permanent seed rate shall be increased by 50%.

Seeding season for cover crops shall be grain oats January 1 – July 31 and grain rye August 1 – December 1.

MATERIAL AND SUBMITTALS

Seed Mixes and Submittals shall be per the item(s) for permanent and annual (cover crop) seed mixes.

Compost Blanket, if used, shall meet the material and submittal requirements for that item.

Hydromulch shall be wood fiber or straw applied per the Standard Specifications and at the rates specified below and per the manufacturer.

A certified statement shall be furnished, prior to start of work, to the Engineer by the Contractor as to the number of pounds of hydromulch, tackifier, and seed, per 100 gallons of water and as applicable to products used. This statement should also specify the number of square yards of seeding that can be covered with the solution specified above.

FERTILIZER

No fertilizers shall be applied.

WATER

Water, including hose and all other watering equipment required for the work, shall be furnished by the Contractor to the site at no additional cost.

ITEM 765.635 (Continued)

Water shall be suitable for irrigation and free from ingredients harmful to plant life. All plants injured or work damaged due to the lack of water or the use of too much water shall be the Contractor's responsibility to correct.

SEEDING

Hand broadcast method shall be used for all areas smaller than half an acre and when specified on the plans for areas over half an acre.

Seeding shall occur within 72 hours of placement of loam and final grading or the Contractor shall propose a reasonable, alternative schedule that shall be approved by the Engineer.

SURFACE PREPARATION

No seeding or soil preparation shall be done if soils are muddy or dry and compacted. Bare soils shall be raked to remove large stiff clods, lumps, brush, roots, stumps, litter and other foreign matter. Ruts and depressions shall be filled with additional loam or compost and the soil shall be re-graded to a relatively smooth finish corresponding to the required grades.

When seeding over existing or compacted soil or soil that has sat bare for more than 30 days, surface will be prepared by tilling or raking to a minimum depth of 2 inches prior to seeding and prior to Compost Blanket application (when applied).

Surface preparation shall be compensated for under for loam placement or topsoil rehandled and spread as appropriate to the project.

Jute or coir mesh, when specified in the contract, shall be placed after seeding and per the Standard Specifications and the manufacturer’s instruction.

Surface preparation shall be approved by the Engineer prior to seeding.

SEEDING OVER VARIOUS SUBSTRATES

Loam: Seeding shall occur within 72 hours of loam placement to prevent loss of topsoil. Seed shall be manually broadcast for areas less than half an acre (each area, not cumulative area) and when specified on the plans. Broadcasting shall be immediately followed by hydromulching as specified below. When not specified on the plans, larger areas may be hydroseeded as specified below.

Compost Blanket: Compost Blanket shall be applied as specified under that item. Seed should be hand broadcast at the same time as compost application to ensure a thin cover of compost over seed.

When seeding is done after application of Compost Blanket the rate shall be increased by 50%. If the Compost Blanket is applied after December 1, seed shall be broadcast or hydroseeding over the compost in the Spring and the rate increased by 50% specified under Seed Application.

Compost Mulch over Modified Rock: Compost Mulch and seed shall be applied as specified under that item. No hydromulch is required.

ITEM 765.635 (Continued)

COVER CROP

Cover crop shall be used when seeding out of season, when specified with the permanent native seed mix under that item, and as required to prevent erosion until the permanent seed establishes.
A cover crop should not be used with a steep slope mix or other permanent mix which already contains either cereal rye or oats in the composition of the mix. A cover crop is not necessary for wetland seeding and is not typically necessary for soil stabilization when seeding in conjunction with a compost blanket application.

SEED APPLICATION

All seed shall be mulched as specified herein.

Seed application shall be by broadcast seeding or by hydroseeding as described below.

BROADCAST SEEDING

Seed shall be broadcast spread using a cyclone or whirlwind seeder or hand broadcast. Small or light-seeded species such as bluestem may be mixed with approved filler to achieve an even distribution. Seed shall not be broadcast when wind velocities are greater than 15 mph.

Broadcast seeding shall be undertaken in two separate passes at ninety degrees to each other. One-half the seeding rate shall be applied in each direction (horizontally and vertically). To ensure seed to soil contact with broadcasting of seed, seeding shall be followed by rolling or tracking with equipment approved by the Engineer.

Broadcast seed shall be mulched with weed-free straw mulch unless seeding is done as part of Compost Blanket in which case it shall be as specified above under seeding with Compost Blanket application. Hydromulching shall be as specified under Hydromulching.

HYDROSEEDING AND HYDROMULCHING

Hydroseed and mulching shall be per the manufacturer's directions and as follows.

Hydroseeding shall only be used for sites over half an acre in size or with permission of the Engineer.

Tank and hoses shall be cleaned from all previous hydroseeding and hydromulching projects. Seed shall be mixed into the slurry immediately before application and slurry applied within 30 minutes after seeds have been placed in the tank. Once seed has been placed in the tank, tank shall be agitated only enough to mix the seeds and keep slurry from separating.

A 2-step process shall be used for seeding in conjunction with hydromulch. Seed shall be applied with 500 lbs/acre of hydromulch in the first pass. A second pass with 1,000 lbs/ acre of hydromulch shall be applied in a second pass. Each pass shall be applied in a different direction.

Once the seed has been added to the tank mixture a one-hour time limit is set for spreading the mixture on the soil. Once the one hour has passed the excess mixture must be discarded.

ITEM 765.635 (Continued)

For broadcast seeding, hydromulch shall be applied immediately following seeding at a rate of 1,000 lbs/acre. Tank shall be cleaned from any previous hydroseeding.

CARE DURING GERMINATION AND ESTABLISHMENT

Contractor shall care for seeded areas as necessary for successful germination. Care will include watering and weed control as necessary to achieve establishment of the specified seeded species after one growing season as specified below.

The contractor shall maintain the stand of grasses to ensure healthy growth of the seeded species. Work shall include mowing or weed-whacking for weed control, watering if necessary, and removal of invasive plants.

Watering shall be sufficient to achieve soil moisture to a depth of 2 inches or more and such moisture is uniform. Method of watering shall not erode or damage soil or grassed surfaces.

General Weed Control: Unless otherwise directed, mowing shall be as specified under Mowing for Weed Control for seed establishment. Weeds shall be mowed prior to weeds setting seed (by the end of July unless otherwise approved).

Control of Invasive and Aggressive Weeds: Invasive and aggressive weeds, including but not limited to mugwort, ragweed, knapweed, foxtail, crabgrass, and chicory must be cut or treated prior to going to seed. Herbicide treatment must be coordinated with MassDOT. Undesired species (such as chicory) introduced due to use of incorrect seed mix shall be removed at the Contractor's expense.

MOWING FOR WEED CONTROL

Mowing for weed control shall be completed after weeds have sprouted and show leaf and bud growth, but prior to setting seed, generally between July 7th and August 1st, unless directed otherwise by the MassDOT Landscape Architect and the Engineer.

Mowing height shall be as needed for weed control, generally to a height of 8 inches and not below 4 inches, unless directed otherwise. Mowing shall be with a brush hog mower or string trimmer other approved equipment. Conventional lawn mowers which cannot achieve the appropriate cut shall not be used.

Contractor shall give 48-hour notice prior to mowing work. Mowing shall only occur in dry sunny weather. Litter pickup should occur prior to mowing in all areas. If required, cut grass shall be raked and removed. Litter pickup and raking and removal of grass shall be incidental to the work.

Mowing equipment shall be approved by the Engineer prior to work.

OVER-SEEDING

Areas of bare ground greater than 2-3 feet in diameter shall be over-seeded with the specified mix during the appropriate season for seeding.

ITEM 765.635 (Continued)

Where required for overseeding mowing shall be as close to the soil as possible. Soil that is compacted shall be raked or otherwise roughened prior to over-seeding.

Over-seeding rates and methods shall those specified above under Materials and Methods. Following over-seeding, soil shall be lightly tamped to ensure seed to soil contact and areas shall be mulched with straw mulch and watered with a fine mist to moisten soil to a depth of at least 2 inches.

Over-seeding, mulch, watering, and all work for over-seeding shall be incidental.

DETERMINING SATISFACTORY GRASS ESTABLISHMENT

A well-established stand of the specified seeded species as determined by the Engineer and the MassDOT Landscape Architect will be required for Final Acceptance. The expectation is that an acceptable number and variety of the desired permanent seeded species (not the cover crop) will be visible. Generally:

- A minimum of 75% coverage by the specified permanent seeded species after one growing season. Of that percentage, generally, depending on the mix species:
    - At least 3 types of the permanent seeded grass species shall be visible.
    - At least 3 species of wildflowers shall be visible.
- There will be no significant gaps or bare soil (generally 2-3 feet in diameter or greater).
- There will be no more than 25% coverage by weed species.
- All soil shall be stabilized and there shall be no channeling or erosion.
- There will be no invasive or aggressive species within the stand at the time of acceptance.
- There shall be no evidence of seed from non-native mixes (i.e., clover) due to failure to clean the hydroseeding tank or using incorrect mix.

Invasive and aggressive weeds (such as mugwort, ragweed, knapweed, and chicory) must be cut or treated prior to going to seed for Interim Acceptance. Herbicide treatment must be coordinated with MassDOT.

A warm-season grass mix with perennials will not have uniform growth. A uniform stand of grass may indicate use of an incorrect mix.

ACCEPTANCE OF SEEDING AND ESTABLISHMENT WORK

Conditional Acceptance shall be based on proper application of seed as specified herein.

Interim Acceptance of Care. Seeding will be inspected by mid-July to assess germination and Establishment conditions as described above. When necessary for Interim Acceptance, areas shall be mowed prior to weed species producing seed and as specified above under Weed Control. ***Areas requiring weed control that are not mowed prior to weed seed dispersal will not be approved for Interim Acceptance.*** Seeding that shows good germination and is determined by the Engineer and Landscape Architect to not require weed control at time of inspection shall be accepted for Interim Acceptance payment.

ITEM 765.635 (Continued)

Final Acceptance of Establishment shall be given upon satisfactory Establishment as described above.

If the seeded area fails to meet the requirements of Establishment by the end of the growing season, contractor shall propose and implement remediations and site shall be inspected during the following growing season after July 1st. All remediation shall be at the contractor's expense.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Native Seeding and Establishment will be measured for payment by the square yard, complete in place.

Native Seeding and Establishment will be paid at the Contract unit price by the square yard upon Conditional, Interim, and Final Acceptances as described above. This price shall include all submittals, seeding, rolling to ensure seed-to-soil contact, weed control other than mowing, water, over-seeding, labor, materials, equipment, and all incidental costs required to complete the work of establishing a satisfactory stand of grass.

Native seed and cover crop mixes shall be compensated under the respective items.

Site preparation, including raking, tilling, removal of debris and stones, and other work to the prepare site for seeding shall be compensated under loam placement or topsoil rehandled and spread as relevant to the project. If used, Compost Blanket shall be compensated under the respective item.

Mowing for weed control will be incidental to this item.

Schedule of payment shall be as follows:

30% upon Conditional Acceptance

20% upon Interim Acceptance of Care, except this amount will be reduced to zero and final payment will be reduced accordingly when areas requiring weed control are not mowed as specified in the Interim Acceptance criteria.

50% upon Final Acceptance of Establishment

ITEM 767.121 SEDIMENT CONTROL BARRIER FOOT

The work under this item shall conform to the relevant provisions of Subsections 670, 751 and 767 of the Standard Specifications and shall include the furnishing and placement of a sediment control barrier. Sediment control barrier shall be installed prior to disturbing upslope soil.

The purpose of the sediment control barrier is to slow runoff velocity and filter suspended sediments from storm water flow. Sediment barrier may be used to contain stockpile sediments, to break slope length, and to slow or prevent upgradient water or water off road surfaces from flowing into a work zone. Contractor shall be responsible for ensuring that barriers fulfill the intent of adequately controlling siltation and runoff.

Twelve-inch diameter (after installation) compost filter tubes with biodegradable natural fabric (i.e., cotton, jute, burlap) are intended to be the primary sedimentation control barrier. Photo-biodegradable fabric shall not be used.

For small areas of disturbance with minimal slope and slope length, the Engineer may approve the following sediment control methods:

- 9-inch compost filter tubes
- Straw bales which shall be trenched

No straw wattles may be used. Additional compost filter tubes (adding depth or height) shall be used at specific locations of concentrated flow such as at gully points, steep slopes, or identified failure points in the sediment capture line.

When required by permits, additional sediment barrier shall be stored on-site for emergency use and replacement for the duration of the contract.

Where shown on the plans or when required by permits, sedimentation fence shall be used in addition to compost filter tubes and straw bales and shall be compensated under that item.

Sediment control barriers shall be installed in the approximate location as shown on the plans and as required so that no excavated or disturbed soil can enter mitigation areas or adjacent wetlands or waterways. If necessary to accommodate field conditions and to maximize effectiveness, barrier locations may be shifted with approval from the Engineer. Barriers shall be in place prior to excavation work. No work shall take place outside the barriers.

MATERIALS AND CONSTRUCTION

Prior to initial placement of barriers, the Contractor and the Engineer shall review locations specified on the plans and adjust placement to ensure that the placement will provide maximum effectiveness.

Barriers shall be staked, trenched, and/or wedged as specified herein and according to the Manufacturer's instructions. Barriers shall be securely in contact with existing soil such that there is no flow beneath the barrier.

ITEM 767.121 (Continued)

COMPOST FILTER TUBE

Compost material inside the filter tube shall meet M1.06.0, except for the following: no peat, manure or bio-solids shall be used; no kiln-dried wood or construction debris shall be allowed; material shall pass through a 2-inch sieve; and the C:N ratio shall be disregarded.

Outer tube fabric shall be made of 100% biodegradable materials (i.e., cotton, hemp or jute) and shall have a knitted mesh with openings that allow for sufficient water flow and effective sediment capture.

Tubes shall be tamped, but not trenched, to ensure good contact with soil. When reinforcement is necessary, tubes shall be stacked as shown on the detail plans.

STRAW BALES

Straw bales shall be used if shown on the plans or when specified by Orders of Condition or other permit requirements.

Bales should be placed in a single row, lengthwise on the contour, with ends of adjacent bales tightly abutting one another. All bales should be either wire-bound or string-tied. Straw bales should be installed so that bindings are oriented around the sides (rather than along the tops and bottoms) of the bales in order to prevent deterioration of the bindings.

The barrier should be entrenched and backfilled. A trench should be excavated the width of a bale and the length of the proposed barrier to a minimum depth of 4 inches. The trench must be deep enough to remove all grass and other material which might allow underflow. After the bales are staked and chinked (filled by wedging), the excavated soil should be backfilled against the barrier. Backfill soil should conform to the ground level on the downhill side and should be built up to 4 inches against the uphill side of the barrier.

Each bale should be securely anchored by at least 2 stakes or re-bars driven through the bale. The first stake in each bale should be driven toward the previously laid bale to force the bales together. Stakes or re-bars should be driven deep enough into the ground to securely anchor the bales. For safety reasons, stakes should not extend above the bales but should be driven in flush with the top of the bale.

The gaps between the bales should be chinked (filled by wedging) with straw to prevent water from escaping between the bales. Loose straw scattered over the area immediately uphill from a straw bale barrier tends to increase barrier efficiency. Wedging must be done carefully in order not to separate the bales.

When used in a swale, the barrier should be extended to such a length that the bottoms of the end bales are higher in elevation than the top of the lowest middle bale to assure that sediment-laden runoff will flow either through or over the barrier but not around it.

ITEM 767.121 (Continued)

SEDIMENTATION FENCE

Materials and Installation shall be per Section 670.40 and 670.60 of the Standard Specifications and the following:

Sedimentation fence shall only be used if shown on the plans or when specified by Orders of Condition or other permit requirements.

When used with compost filter tubes, the tube shall be placed on a minimum of 8 inches of folded fabric on the upslope side of the fence. Fabric does not need to be trenched.

When used with straw bales, an 8-inch deep and 4-inch wide trench or V-trench shall be dug on the upslope side of the fence line. One foot of fabric shall be placed in the bottom of the trench followed by backfilling with compacted earth or gravel. Stakes shall be on the down slope side of the trench and shall be spaced such that the fence remains vertical and effective.

Width of fabric shall be sufficient to provide a 36-inch high barrier after fabric is folded or trenched. Sagging fabric will require additional staking or other anchoring.

MAINTENANCE

Maintenance of the sediment control barrier shall be per Section 670.60 of the Standard Specifications or per the Stormwater Pollution Prevention Plan (SWPPP), whichever is more restrictive.

The contractor shall inspect the sediment barrier in accordance with relevant permits. At a minimum, barriers shall be inspected at least once every 7 calendar days and after a rain event resulting in 0.25 inches or more of rainfall. Contractor shall be responsible for ensuring that an effective barrier is in place and working effectively for all phases of the Contract.

Barriers that decompose such that they no longer provide the function required shall be repaired or replaced as directed. If the resulting berm of compost within the fabric tube is sufficiently intact (despite fabric decay) and continues to provide effective water and sediment control, barrier does not necessarily require replacement.

DISMANTLING & REMOVING

Barriers shall be dismantled and/or removed, as required, when construction work is complete and upslope areas have been permanently stabilized and after receiving permission to do so from the Engineer.

Regardless of site context, nonbiodegradable material and components of the sediment barriers, including photo-biodegradable fabric, plastic netting, nylon twine, and sedimentation fence, shall be removed and disposed off-site by the Contractor.

ITEM 767.121 (Continued)

For naturalized areas, biodegradable, natural fabric and material may be left in place to decompose on-site. In urban, residential, or other locations where aesthetics is a concern, the following shall apply:

- Compost filter tube fabric shall be cut and removed, and compost shall be raked to blend evenly (as would be done with a soil amendment or mulch). No more than a 2-inch depth shall be left on soil substrate.
- Straw bales shall be removed and disposed off-site by the Contractor. Areas of trenching shall be raked smooth and disturbed soils stabilized with a seed mix matching adjacent seeding or existing grasses (i.e., lawn or native grass mix).
- Sedimentation fence, stakes, and other debris shall be removed and disposed off-site. Site shall be restored to a neat and clean condition.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 767.121 will be measured and paid for at the contract unit price per foot of sediment control barrier which price shall include all labor, equipment, materials, maintenance, dismantling, removal, restoration of soil, and all incidental costs required to complete the work.

Additional barrier, such as double or triple stacking of compost filter tubes, will be paid for per foot of tube installed.

Barriers that have been driven over or otherwise damage by construction activities shall be repaired or replaced as directed by the Engineer at the Contractors expense.

ITEM 767.9 JUTE MESH SQUARE YARD

The work under this item shall conform to the relevant provisions of Section 700 of the Standard Specifications and the following.

The work under this item shall consist of furnishing and installing jute mesh fabric to prevent soil erosion. Jute mesh shall be placed over all areas of exposed soil in locations shown on the plans or as required by the Engineer.

MATERIALS

Jute netting or similar material shall be new, unused, undyed, and unbleached 100% biodegradable yarn (no polypropylene) and of uniform plain weave. The materials should weigh approximately 1.0 (+/- 5%) pounds per linear yard (assuming a 4-foot width).

Shall meet the following minimum requirements:

Open Area:	70-75%
Mesh Size:	approximately 1/2 inch with an open area of 60-65%.
Roll Weight:	approximately 1.0 (+/- 5%) pounds per linear yard
Warp Ends:	78 per linear yard
Weft Ends:	41 per linear yard
Recommended flow:	6 fps (1.8 m/s)
Functional Longevity:	6-9 months

Anchoring devices shall be 11-gauge steel staples 6-inch minimum length. In loose soils the length of the staples shall be 9-inches.

For areas that will be routinely mowed anchoring devices shall consist of minimum 8” wooden stakes. Longer stakes shall be used where loose soils or other conditions obligate, as required by the Engineer.

CONSTRUCTION METHODS

Area shall be seeded prior to installation of jute netting.

Installation shall be such as to ensure continuous contact with soil without folds or wrinkles. Jute netting shall be laid such that upslope fabric is placed over lower slope fabric by a minimum of 3 feet. Adjoining rolls shall be overlapped a minimum 6 inches. The netting shall extend beyond at least 1 foot beyond the edge of the seeded area.

The Contractor shall bury the ends of the jute netting 6-8 inches in anchor trenches at top and bottom of slopes.

Jute netting shall be anchored in place with vertically driven metal staples. The staples shall be driven in until their tops are flush with the soil. Staples shall be placed at 12-inch intervals along the top of a slope and in staggered courses along the face of the slope to achieve a minimum of 3 staples per square yard, or at manufacturer’s recommendations for the given site conditions.

ITEM 767.9 (Continued)

Contractor shall reseed all trenched and otherwise disturbed areas with specified seed mix. The Contractor shall maintain the jute netting and make satisfactory repairs of any areas damaged until acceptance of seed establishment.

METHOD OF MEASUREMENT

Jute Mesh will be measured by the number of Square Yards complete in place, including anchoring, as measured across the surface of grade and does not include buried or overlapped portions. The quantity measured for payment shall not exceed that shown on the plans or as directed by the Engineer.

Mesh that becomes loose or that is not otherwise functioning to stabilize soil shall be repaired and new or additional jute matting installed as required at the Contractor's expense. Soil erosion shall be repaired, and area shall be raked and reseeded with the original specified mix as required by the Engineer at the Contractors expense.

BASIS OF PAYMENT

Item 767.9 will be paid for at the contract unit price per Square Yard, which price shall include all labor, materials, equipment, trenching, placing, and stapling of jute fabric, reseeding of trenched and disturbed areas, and all incidental costs required to complete the work.

ITEM 825.21 RRFB-AC POWERED (2 POST ASSEMBLY SYSTEM) EACH

ITEM 825.31 RRFB-AC POWERED (3 POST ASSEMBLY SYSTEM) EACH

The work under these items shall conform to the relevant provisions of Subsection 825 of the Standard Specifications, the 11th Edition of the Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD), the January 2026 Massachusetts Amendments to the MUTCD, and the following:

The work shall include furnishing and installing AC-powered, pedestrian actuated, rectangular rapid flashing beacon (RRFB) systems at the locations shown on the plans and in accordance with the details shown on the plans at the following locations:

- Location 1: Church Street (Route 10) STA. 13+66 (3-post)
- Location 2: 1-91 SB On-Ramp (SW) – Church Street (Route 10) STA. 19+27 OFFSET: +47R (2-post)
- Location 3: Church Street (Route 10) STA. 34+58 (2-post)

A list of major RRFB items as required at these locations is included on the plans (see Construction Details). It is not intended that every fitting, minor detail or feature be shown and described, as the assumption is made that the Contractor and/or their Subcontractor is an expert in the particular area of responsibility and is capable of interpreting the plans, Specifications, and Special Provisions so that the bid and/or construction shall include all items required to provide complete, fully operational traffic control signal system and that they shall be provided and installed in a neat and workmanlike manner.

RRFB controller and LED beacons, APS pushbutton systems, and traffic signal posts and pedestals shall be listed on the Qualified Traffic Control Equipment List. Pedestals shall be cast iron.

AMBER LED RECTANGULAR RAPID FLASHING BEACON (RRFB)

The light intensity of the LED beacons during daytime conditions shall meet the minimum specifications for Class 1 yellow peak luminous intensity in the Society of Automotive Engineers (SAE) Standard J595 (Directional Flashing Optical Warning Devices for Authorized Emergency, Maintenance, and Service Vehicles) dated January, 2005. An automatic signal dimming device shall be included to reduce the brilliance of the LED beacons during nighttime conditions.

A pilot light shall be integrated into the housing of the dual rectangular yellow LED beacons, facing pedestrians in the crosswalk, to provide confirmation that the RRFB is in operation.

AC-POWER SERVICE CONNECTION

The service connection shown on the plans is approximate only. The Contractor shall determine exact location from the servicing utility, arrange to complete the service connection, and be responsible for all charges incidental thereto.

ITEMS 825.21 & 825.31 (Continued)

It shall be the Contractor's responsibility to contact the utility company. The electric company will connect and disconnect power as required. No work shall be done in manholes or on power poles without a representative of the electric company being present. The Contractor will be responsible for coordinating work with the electric company. All details for conduit, risers, wire, and meter socket, etc. shall conform to the utility company's standard at no additional costs.

The utility will provide a connection at the overhead structure and make the connection from the power source to the meter socket. The Contractor will install the conduit connecting the connection to the controller cabinet foundation. The service connection shall include a riser, weatherhead, and disconnect switch.

The Contractor shall furnish and install, or cause to be installed, all service equipment to the satisfaction of the electric utility company. It shall also be the Contractor's responsibility to pay all charges to the utility company for performing the work previously described.

Openings where cables enter the bottom of the controller cabinet, and each pull box shall be sealed with approved elastic sealing compound.

No direct reimbursement will be made under this contract to the Contractor for payments made to electric company, it being understood that full compensation for any payment made by the Contractor to the utility company will be included in the contract prices bid.

TESTING OF GROUNDING SYSTEM

Grounding Cable - Grounding cable shall be bare copper No. 8 AWG wires. All proposed RRFB equipment shall have new cabling.

The Contractor shall perform testing of the equipment grounding system in the presence of the Engineer and Town in accordance with the Standard Specifications.

PEDESTRIAN PUSH BUTTONS

RRFB shall restart the countdown timer upon each actuation, even if the button is pressed while it is already flashing. See FHWA IA-21 for additional information.

Pedestrian push button controls shall be raised from or flush with their housings and shall be a minimum of 2 inches in the smallest dimension. The force required to activate the controls shall be no greater than 5 pounds.

Pedestrian push buttons shall be located as close as practicable to the accessible ramp serving the controlled crossing and shall permit operation from a clear ground space. A mounting height of 42 inches above the finish sidewalk grade shall be used for pedestrian push buttons.

POSTS AND FOUNDATIONS

All pedestal posts associated with the RRFB shall be painted black. The new pedestal posts shall have cast-iron transformer bases and be made of aluminum.

ITEMS 825.21 & 825.31 (Continued)

New RRFB base foundations shall not obstruct a sidewalk or crosswalk so that passage by physically challenged persons is impaired and installation shall be in compliance with ADA/AAB standards. Sidewalk extensions shall be provided when needed in order to maintain minimum ADA/AAB compliance.

The new pedestal posts on new foundations may utilize either precast or cast-in-place cement concrete pedestal post foundations constructed in conformance with the MassDOT Standard Drawings.

Signal posts and bases shall be minimum 4" diameter aluminum shafts with cast pedestal bases. Poles shall be of a length such that a minimum vertical clearance of 7 feet is achieved between the ground surface and the bottom of the sign closest to the ground surface.

No separate payment will be made for work considered incidental to the excavation, including but not limited to, pedestal post foundations, dewatering, etc. but all costs in connection therewith shall be included in the bid price for Items 825.21 and 825.31, respectfully.

CONSTRUCTION METHODS

No work shall commence until the shop drawings are approved.

Layout and design of the RRFB system shall conform to the plans.

Foundation installations shall be per Subsection 801.62. The top of the foundation shall be ¼" to 1" proud of the sidewalk and chamfered at 45 degrees. Gaps between the sidewalk and foundation shall be no larger than ¼" and grouted with preformed joint filler.

The Contractor shall diagnose and replace any part of the pedestrian activated warning system that is found to be defective in workmanship, material, or manner of functioning within six months of final acceptance by the Engineer. This requirement does not supersede the one-year warranty period on materials specified in Subsection 815.20.

METHOD OF MEASUREMENT

Items 825.21 and 825.31 will be measured for payment by Each as a single system (2 post or 3 post assembly), complete in place.

BASIS OF PAYMENT

Items 825.21 and 825.31 will be paid for at the Contract unit price per Each, which price shall include all labor, materials, equipment, and all incidentals required to complete the work.

Any additional wiring, mounting equipment, or other materials or labor required for a complete operating system will be considered as incidental to these items.

ITEM 852.11 TEMPORARY PEDESTRIAN BARRICADE FOOT

ITEM 852.12 TEMPORARY PEDESTRIAN CURB RAMP EACH

DESCRIPTION

Work under these items consist of furnishing, deploying, maintaining in proper operating conditions, and removing temporary pedestrian barricades and temporary pedestrian ramps as part of a Temporary Pedestrian Access Route (TPAR) in order to guide pedestrians around a fully- or partially-closed sidewalk. These devices are intended to prevent pedestrians from entering the work area and to prevent pedestrians from inadvertently entering the vehicle travel lane by providing visual and physical separation between each space.

MATERIALS

The Temporary Pedestrian Barricade shall have a continuous bottom rail or edge no more than two (2) inches above the ground and eight (8) inches in height (minimum) to accommodate cane users, have a smooth and continuous hand railing along the top edge no less than 32 inches above the ground and not obstruct or project into the pedestrian path of travel. Barricade walls shall be nearly vertical and generally within the same plane.

If exposed to traffic, Temporary Pedestrian Barricades shall be crashworthy.

The Temporary Pedestrian Curb Ramp shall provide a 48 inch minimum width, with a firm, stable, and non-slip surface. Protective edging with a two (2) inch minimum height shall be installed when the curb ramp or landing platform has a vertical drop of six (6) inches or greater.

The Temporary Pedestrian Curb Ramp walkway and landing area surface shall be of a solid, continuous, contrasting color abutting up to the existing sidewalk.

If a Temporary Pedestrian Curb Ramp leads to a crosswalk, a detectable warning pad must be used at the base of the ramp; if it leads to a protected path that does not conflict with vehicular traffic then a detectable pad shall not be used.

CONSTRUCTION METHODS

The Temporary Pedestrian Barricade shall be placed in an area that will provide pedestrians with a TPAR on a smooth, continuous hard surface for its entirety. The geometry and alignment of the facility shall meet the applicable requirements of the "Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities" and the Massachusetts Architectural Access Board.
The recommended width of the TPAR is 60 inches, but if constraints exist a minimum clear width of 48 inches shall be provided along its entirety. If a 60 inch width cannot be accommodated in full, a 60 inch by 60 inch passing space shall be provided every 200 feet or less along the TPAR. Turning areas shall be 60 inches by 60 inches minimum.

Lateral joints between any surfaces shall not exceed 0.5 inches. Lateral edges may be vertical up to 0.25 inches high and shall be beveled at 1V:2H between 0.25 inches and 0.5 inches.

ITEMS 852.11 & 852.12 (Continued)

The TPAR shall be kept clear of debris, snow, and ice and the Temporary Pedestrian Barricades and Temporary Pedestrian Curb Ramps shall not obstruct drainage.

Removal and/or resetting of Temporary Pedestrian Barricades and Temporary Pedestrian Curb Ramps shall be considered incidental.

COMPENSATION

Payment for Temporary Pedestrian Barricades will be made at the contract price per foot installed in place, including all incidental items. This price shall include the cost of furnishing, installing, resetting, removal, and maintaining in good working condition.

Payment for Temporary Pedestrian Curb Ramps will be made at the contract price per each unit installed in place, including all incidental items. This price shall include the cost of furnishing, installing, resetting, removal, and maintaining in good working condition.

ITEM 853.22 TEMPORARY BOLT-DOWN BARRIER REMOVED AND RESET FOOT

The work under this Item shall conform to the relevant provisions of Subsection 850 of the Standard Specifications and the following:

The work shall consist of removal, transporting, storing, and resetting of Item 853.33 - Temporary Barrier - Limited Deflection (TL-3) and Item 853.34 - Temporary Barrier - Limited Deflection (TL-4) systems for channelization of traffic and/or work zone protection. Barrier which needs to be stored for an extended period of time shall be stored at a location approved by the Engineer and adequately protected from weather or potential damages.

Removal of the anchorage and restoration of pavement and bridge deck surfaces required for the barrier under this item shall meet the requirements of Items 853.33 and 853.34.

METHOD OF MEASUREMENT

Item 853.22 will be measured for payment by the Foot, complete in place.

BASIS OF PAYMENT

Item 853.22 will be paid for at the Contract unit price per Foot, which price shall include all labor, materials, equipment, and all incidentals required to complete the work.

The removal and resetting of Item 853.23 - Temporary Barrier (TL-3) will be paid for under Item 853.21.

ITEM 853.23 TEMPORARY BARRIER (TL-3) FOOT

The work under this item shall conform to the relevant provisions of Subsection 850 of the Standard Specifications and the following:

DESCRIPTION

The work under this item shall consist of furnishing, installing, maintaining and final removal of the TL-3 temporary free standing barrier system as required during stage construction at the bridge approaches for channelization of traffic and/or work zone protection.

MATERIALS

The Contractor shall use a temporary barrier system that is listed on the Qualified Traffic Control Equipment List.

The Contractor may submit alternate materials to the Engineer for approval if the temporary barrier system meets the following criteria:

1. The system has been tested by an independent laboratory that is accredited by FHWA to crash test roadside hardware.
2. The system meets the minimum requirements of the AASHTO Manual on Assessing Safety Hardware (MASH) at Test Level (TL) 3 or higher; and
3. The system has a federal-aid eligibility letter from FHWA.
4. The system has been coordinated with MDS to ensure a proper/compatible connection to the MDS Bolt-Down TL-4 barrier system on the bridge.

Delineators shall be installed on all temporary barrier systems in conformance with the relevant provisions of Section 850.69 and shall be incidental to the temporary barrier systems.

Temporary impact attenuators that are listed on the Qualified Traffic Control Equipment List shall be used whenever a blunt end of the temporary barrier system is facing traffic within the clear zone unless it is protected by a second barrier system or secured to a separate barrier system or bridge railing by a method approved by the manufacturer.

CONSTRUCTION METHODS

Temporary barrier systems shall be placed in line with the drawings. Installation shall be per the manufacturer's specifications, details, and the approved shop drawings.

The Contractor shall not place any breaks in the temporary barrier system that will result in sections that are shorter than the stated minimum length-of-need (LON) under MASH Test 3-11. Exceptions shall be allowed for gate systems or changeable length segments placed over expansion joints if those barrier segment types have been tested and meet the minimum requirements of MASH Test 3-11 with the adjoining barrier system. Within the LON section, temporary barrier systems shall only be placed on paved surfaces unless otherwise tested and certified under MASH TL-3 for those conditions.

ITEM 853.23 (Continued)

Damage to the pavement surface caused by the temporary barrier during installation, while in service, and/or during removal shall be repaired as required by the Engineer at the Contractor's expense.

SUBMITTALS

Prior to the commencement of any work under this item, the Contractor shall submit to the Engineer for review and approval a submittal containing the following information:

1. Copies of the testing results and the federal-aid eligibility letter shall be submitted and approved by the Engineer prior to procurement of an alternate temporary barrier system.

2. Shop drawings to confirm the available clear area behind the barrier equals or exceeds the maximum dynamic deflection of MASH Test 3-11 during testing procedures taken at an independent laboratory that is accredited by FHWA to crash test roadside hardware.

3. Shop drawings to confirm the system's compatibility with the MDS Bolt-Down TL-4 barrier system.

METHOD OF MEASUREMENT

Item 853.23 will be measured for payment by the Foot, complete in place.

BASIS OF PAYMENT

Item 853.23 will be paid for at the Contract unit price per Foot, which price shall include all labor, materials, equipment, and all incidentals required to complete the work.

No separate payment will be made for maintaining and the final removal of all temporary barrier, but all costs in connection therewith shall be included in the Contract unit price bid. The removal and resetting of barrier associated with this item between construction stages will be paid for under Item 853.21.

No separate payment will be made for installing the anchorages and hardware, nor for the restoration of pavement surfaces or adjacent permanent barrier systems to facilitate anchorage when barrier systems that require anchorage are used, but all costs in connection therewith shall be included in the Contract unit price bid.

ITEM 853.33 TEMPORARY BARRIER – LIMITED DEFLECTION (TL-3) FOOT

The work under this Item shall conform to the relevant provisions of Subsection 850 of the Standard Specifications and the following:

The work under this item shall consist of furnishing, installing, maintaining and final removal of limited deflection TL-3 temporary barrier systems for channelization of traffic and/or work zone protection. Limited deflection temporary barrier systems shall have a maximum dynamic deflection of 4 inches or less at the base and shall be used in areas where the available clear area behind the barrier system is 10 inches or less.

The limited deflection TL-3 barrier shall be installed on both bridges as detailed on the construction staging sheets within the plans. Any transitions from the limited deflection TL-3 barrier to the temporary TL-3 barrier shall be included in this item and shall be as specified by the manufacturer.

MATERIALS

The Contractor may submit alternate materials to the Engineer for approval if the limited deflection temporary barrier system meets the following criteria:

1. The system has been tested by an independent laboratory that is accredited by FHWA to crash test roadside hardware.

2. The system meets the minimum requirements of the AASHTO *Manual on Assessing Safety Hardware* (MASH) at Test Level (TL) 3 or higher; and

3. The system has a federal-aid eligibility letter from FHWA.

Pullout testing shall be performed on a minimum of one anchor per 50 feet of barrier, or as required by the manufacturer. Pullout test loads shall be as required by the manufacturer.

Delineators shall be installed on all limited deflection temporary barrier systems in conformance with the relevant provisions of Section 850.69 and shall be incidental to the temporary barrier systems.

Temporary impact attenuators that are listed on the Qualified Traffic Control Equipment List shall be used whenever a blunt end of the limited deflection temporary barrier system is facing traffic within the clear zone unless it is protected by a second barrier system or secured to a separate barrier system or bridge railing by a method approved by the manufacturer. Temporary impact attenuators will be paid for under Item 628.315 and shall conform to the requirements given therein.

CONSTRUCTION METHODS

Limited deflection temporary barrier systems shall be placed in line with the drawings. Installation shall be per the manufacturer’s specifications, details, and the approved shop drawings.

ITEM 853.33 (Continued)

The Contractor shall not place any breaks in the limited deflection temporary barrier system that will result in sections that are shorter than the stated minimum length-of-need (LON) under MASH Test 3-11. Exceptions shall be allowed for gate systems or changeable length segments placed over expansion joints if those barrier segment types have been tested and meet the minimum requirements of MASH Test 3-11 with the adjoining limited deflection barrier system.

Within the LON section, limited deflection temporary barrier systems shall only be placed on paved surfaces unless otherwise tested and certified under MASH TL-3 for those conditions.

Damage to the pavement surface caused by the limited deflection temporary barrier during installation, while in service, and/or during removal shall be repaired as required by the Engineer at the Contractor's expense.

The details of the proposed anchorage systems and all installation and removal procedures shall be in accordance with the recommendations of the manufacturer and shall be submitted to the Engineer for approval.

During construction the barrier system shall be bolted into the concrete bridge deck. The Contractor shall be responsible for filling the holes in the deck with grout or high performance concrete as approved by the Engineer and at no additional cost to the Project. Any damage to the deck reinforcement, which occurs during the course of the Contractor's operations, shall be repaired to the satisfaction of the Engineer at the Contractor's expense.

SUBMITTALS

Prior to the commencement of any work under this item, the Contractor shall submit to the Engineer for review and approval a submittal containing the following information:

1. Copies of the testing results and the federal-aid eligibility letter shall be submitted and approved by the Engineer prior to procurement of an alternate temporary barrier system.
2. Shop drawings to confirm the available clear area behind the barrier equals or exceeds the maximum dynamic deflection of MASH Test 3-11 during testing procedures taken at an independent laboratory that is accredited by FHWA to crash test roadside hardware.
3. Copies of the grout or high performance concrete used to fill the holes in the new bridge deck.

METHOD OF MEASUREMENT

Item 853.33 will be measured for payment by the foot, installed in place.

BASIS OF PAYMENT

Item 853.33 will be paid for at the Contract price per Foot , which price shall include all labor, materials, equipment, and all incidentals required to complete the work, including the cost of furnishing, installing, maintaining and final removal of all TL-3 limited deflection temporary barrier systems.

ITEM 853.33 (Continued)

For limited deflection temporary barrier systems that require anchorage systems, the cost of furnishing and installing the anchorage and hardware and the restoration of pavement surfaces and holes in the bridge deck or adjacent permanent barrier systems to facilitate anchorage shall be considered incidental to the cost of this item.

Payment for limited deflection temporary barrier removed and reset will be made under Item 853.22.

No additional payment will be made for temporary barrier transitions from Temporary Barrier - Limited Deflection (TL-3) on the bridge to the Temporary Barrier (TL-3) on the approaches. These transitions will be incidental to this item.

ITEM 853.34 **TEMPORARY BARRIER – LIMITED DEFLECTION (TL-4)** **FOOT**

The work under this item shall conform to the relevant provisions of Section 850 of the Standard Specifications and the following:

The work under this item shall include furnishing, installing, maintaining and final removal of the TL-4 temporary barrier system on the bridge for channelization of traffic and/or work zone protection. The barrier base width shall be 19.3" with a maximum dynamic deflection of 3.15".

MATERIALS

Delineators shall be installed on all temporary barrier systems in conformance with the relevant provisions of Section 850.69 and shall be incidental to the temporary barrier systems.

Temporary impact attenuators that are listed on the Qualified Traffic Control Equipment List shall be used whenever a blunt end of the temporary barrier system is facing traffic within the clear zone unless it is protected by a second barrier system or secured to a separate barrier system or bridge railing by a method approved by the manufacturer. Temporary impact attenuators will be paid for under Item 628.315 and shall conform to the requirements given therein.

CONSTRUCTION METHODS

Temporary barrier systems shall be placed in line with the drawings. Installation shall be per the manufacturer's specifications, details, and the approved shop drawings.

Pullout testing shall be performed on a minimum of one anchor per 50 feet of barrier, or as required by the manufacturer. Pullout test loads shall be as required by the manufacturer.

The Contractor shall not place any breaks in the temporary barrier system that will result in sections that are shorter than the stated minimum length-of-need (LON) under MASH Test 4-12. Exceptions shall be allowed for gate systems or changeable length segments placed over expansion joints if those barrier segment types have been tested and meet the minimum requirements of MASH Test 4-12 with the adjoining barrier system.

Within the LON section, temporary barrier systems shall only be placed on paved surfaces unless otherwise tested and certified under MASH TL-4 for those conditions.

Damage to the pavement surface caused by the limited deflection temporary barrier during installation, while in service, and/or during removal shall be repaired as required by the Engineer at the Contractor's expense.

The details of the proposed anchorage systems and all installation and removal procedures shall be in accordance with the recommendations of the manufacturer and shall be submitted to the Engineer for approval.

ITEM 853.34 (Continued)

During construction the barrier system shall be bolted into the newly placed concrete bridge deck or the existing bridge deck as applicable for the given construction stage. The Contractor shall be responsible for filling the holes in the deck with grout or high performance concrete as approved by the Engineer and at no additional cost to the Project. Any damage to the deck reinforcement, which occurs during the course of the Contractor's operations, shall be repaired to the satisfaction of the Engineer at the Contractor's expense.

SUBMITTALS

Prior to the commencement of any work under this item, the Contractor shall submit to the Engineer for review and approval a submittal containing the following information:

1. Shop drawings to confirm the available clear area behind the barrier equals or exceeds the maximum dynamic deflection of MASH Test 4-12 during testing procedures taken at an independent laboratory that is accredited by FHWA to crash test roadside hardware.

2. Copies of the grout or high performance concrete used to fill the holes in the new bridge deck.

METHOD OF MEASUREMENT

Item 853.34 will be measured for payment by the Foot installed, complete in place.

BASIS OF PAYMENT

Item 853.34 will be paid for at the Contract unit price per Foot, which price shall include all labor, materials, equipment, and all incidental required to complete the work.

No separate payment will be made for maintaining and the final removal of all TL-4 temporary barrier, but all costs in connection therewith shall be included in the Contract unit price bid.

No separate payment will be made for installing the anchorages and hardware, nor for the restoration of pavement surfaces and bridge deck or adjacent permanent barrier systems to facilitate anchorage when barrier systems that require anchorage are used, but all costs in connection therewith shall be included in the Contract unit price bid.

Payment for limited deflection temporary barrier removed and reset will be made under Item 853.22.

ITEM 853.35 TEMPORARY BARRIER TRANSITION EACH

The work under this item shall conform to the relevant provisions of Subsection 850 of the Standard Specifications and the following:

The work under this item shall include furnishing, installing, maintaining and final removal of the MDS temporary barrier transition piece on the bridge for channelization of traffic and/or work zone protection.

Temporary Barrier – Transition shall be used at each end of the transition between the Temporary Barrier - Limited Deflection (TL-4) on the bridge and the Temporary Barrier (TL-3) on the approaches. This item does not include transition from the Temporary Barrier - Limited Deflection (TL-3) on the bridge to the Temporary Barrier (TL-3) on the approaches, which is paid under Item 853.33.

The Contractor shall ensure that the barrier used under Item 853.23 Temporary Barrier (TL-3) is compatible with the temporary barrier transition provided by MDS barriers.

The Contractor shall use the MDS TL4 proprietary temporary barrier transition.

CONSTRUCTION METHODS

The Contractor shall coordinate with MDS for the installation of the temporary barrier transition.

METHOD OF MEASUREMENT

Item 853.35 will be measured for payment by the Each transition installed, complete in place.

BASIS OF PAYMENT

Item 853.35 will be paid for at the Contract unit price per Each, which price shall include all labor, materials, equipment, and all incidental required to complete the work.

No additional payment will be made for the removal and resetting of these transitions between stages of construction. No additional payment will be made for the final removal of these transitions.

No additional payment will be made for temporary barrier transitions from Temporary Barrier - Limited Deflection (TL-3) on the bridge to the Temporary Barrier (TL-3) on the approaches. These transitions will be incidental to Item 853.33.

ITEM 854.0412 12-IN. TEMPORARY WHITE LINE (MC, UFD) FOOT

ITEM 854.046 6-IN. TEMPORARY WHITE LINE (MC, UFD) FOOT

ITEM 855.046 6-IN. TEMPORARY YELLOW LINE (MC, UFD) FOOT

The work under these items shall conform to the relevant provisions of Subsection 860 of the Standard Specifications and shall consist of furnishing and installing Multi- Component (MC) Pavement Markings at the locations shown on the plans or as directed by the Engineer.

If the Multi-Component Pavement Marking material is applied over a different pavement marking material, the Contractor shall provide documentation that the Multi-Component Pavement Marking Material being used will adhere to the existing marking material.

If the Multi-Component Pavement Marking material is applied over a different pavement marking material, the Contractor shall provide documentation that the Multi-Component Pavement Marking Material being used will adhere to the existing marking material.

Work to be completed under these items shall conform to the relevant provisions of Subsection 860 of the Standard Specifications and shall consist of furnishing and installing Multi-Component (MC) Pavement Markings at the locations shown on the plans or as required by the Engineer.

If the Multi-Component Pavement Marking material is applied over a different pavement marking material, the contractor shall provide documentation that the Multi-Component Pavement Marking Material being used will adhere to the existing marking material.

MATERIALS

MC pavement markings shall consist of a two=component, 100% solids liquid binder, first drop beads or elements to provide retroreflectivity, and second drop glass beads to improve the durability of the pavement marking, reduce track-free times, and provide supplementary retro-reflectivity. MC Pavement Marking binders are typically composed of, but not limited to, Epoxies, Polyureas, or Urethanes.

Classification of dry time is based upon the results of the test procedures found in ASTM D711 (73.5 ± 3.5°F at 50 ± 5% relative humidity) when applied with glass beads. MC Ultra-Fast Dry (MC, UFD) pavement markings shall have a no track time of 3 minutes or less. The Contractor shall provide a Certificate of Compliance verifying the product supplied meets the specified dry time requirements per ASTM D711 prior to installation.

The Contractor shall select a liquid binder and bead/element combination that meets these performance specifications.

Second drop beads shall be manufactured from glass of a composition that is highly resistant to traffic wear and to the effects of weathering. If coating is required to meet the performance requirements, the second drop beads shall be coated to ensure satisfactory embedment and adhesion. Second drop beads retained on a No. 40 U.S. Standard Mesh Sieve shall have a minimum crush strength of 30 lbs. when tested in accordance with ASTM D1213.

ITEMS 854.0412, 854.046, & 855.046 (Continued)

The Contractor shall select a liquid binder and bead/element combination that meets these performance specifications.

The Contractor shall select a liquid binder and bead/element combination that meets these performance specifications.

Second drop beads shall be manufactured from glass of a composition that is highly resistant to traffic wear and to the effects of weathering. If coating is required to meet the performance requirements, the second drop beads shall be coated to ensure satisfactory embedment and adhesion. Second drop beads retained on a No. 40 U.S. Standard Mesh Sieve shall have a minimum crush strength of 30 lbs. when tested in accordance with ASTM D1213.

Second drop beads passing the No. 30 sieve shall have a minimum of 75 percent true spheres when tested in accordance with ASTM D1155. All second drop beads retained on the No. 20 and No. 30 sieves shall have a minimum of 80 percent true spheres as determined by ASTM D1155.

Second drop beads shall meet the following gradation requirements when tested in accordance with ASTM D1214:

Second drop beads shall meet the following gradation requirements when tested in accordance with ASTM D1214:

U.S. Standard Sieve No.	Percent Retained
20	3-10
30	15-35
50	45-75
70	0-10
Pan	0-5

CONSTRUCTION METHODS

The Contractor shall follow all installation instructions from the manufacturer, including allowable ranges of temperature and humidity for installation, unless otherwise approved by the Engineer.

The pavement surface shall be clean, dry and free of laitance, oil, dirt, grease, paint or other foreign contaminants prior to the installation of any new pavement markings. If an air lance is used to clean the surface, air compressors shall initially be blown out away from the application area to prevent compressor condensation build-up. A minimum of 24 hours of dry time following any rainfall is required prior to the placement of pavement markings.

Application rate for binder and all glass beads shall consider final pavement surface composition and smoothness in advance of application to ensure proper wet film thickness and embedment of all beads. The Contractor shall provide the Engineer with documentation from the manufacturer with all recommended application rates in advance of any pavement marking installation.

ITEMS 854.0412, 854.046, & 855.046 (Continued)

The minimum uniform wet thickness for the MC binder shall be 18 ±2 mils but should be modified if recommended by the manufacturer. The line thickness shall be met across at least the middle ⅔ of the pavement marking width. Depth plates shall be provided by the Contractor to the Engineer to assure that desired thickness is achieved.

The finished white color shall be free from tint, with good opacity and visibility under both daylight and artificial light. The finished yellow color shall be defined by Federal Test Standard 595 - Color Chip Number 13538, using Federal Test Standard 141 (Method 4252). The finished lines shall be uniform in color and have clean, well-defined edges.

Glass beads shall be applied in a manner that does not induce rolling or bouncing, to ensure that exposed portions of beads are free of binder material. Beads should be embedded in the binder to a depth of approximately 50% of their diameter.

Glass beads shall be applied as a reflective medium, using the double drop method, at a rate in accordance with the manufacturer's specification in order to meet the minimum retro-reflectivity levels.

Newly installed pavement markings shall be protected from tracking during the curing period per Subsection 860.63.

Once the installed pavement markings have been open for traffic for a minimum of 7 days, the Contractor shall perform retro-reflectance readings per the measurement and sampling procedures contained in ASTM D7585 (Standard Practice for Evaluating Retroreflective Pavement Markings Using Portable Hand-Operated Instruments) using the Referee Evaluation Protocol found in section 6.4, and the testing procedures shall follow ASTM E1710 (*Standard Test Method for Measurement of Retroreflective Pavement Marking Materials with CEN- Prescribed Geometry Using a Portable Retro-reflectometer).*

The average initial retro-reflectance readings shall exceed the following minimum values:

Test Method	*White Markings	*Yellow Markings
ASTM E1710 (Dry)	300 mcd/lux/m²	250 mcd/lux/m²

*Observation Angle = 1.05°, Entrance Angle = 88.8°

*Observation Angle=1.05°, Entrance Angle = 88.8°

Pavement markings with measured average initial retro-reflectance readings that do not meet the specified minimum values using the procedures outlined in subsection 6.4.5 of ASTM D7585 shall be removed by a method approved by the Engineer and reapplied at no additional cost, unless otherwise approved by the Engineer.

METHOD OF MEASURMENT

Items 854.0412, 854.046, and 855.046 will be measured for payment by the Foot, complete in place.

BASIS OF PAYMENT

Items 854.0412, 854.046, and 855.046 will be paid for at the Contract unit price per Foot, which price shall include all labor, materials, equipment, and all incidental required to complete the work.

ITEM 859.1 REFLECTORIZED DRUMS WITH SEQUENTIAL DAY FLASHING WARNING LIGHTS

The work under this Item shall conform the relevant provisions of Subsection 850 of the Standard Specifications and the following:

Work under this item consists of furnishing, installing, maintaining in proper operating conditions, and removing reflectorized drums, and any necessary ballast, equipped with sequential flashing warning lights.

MATERIALS

Reflectorized drums shall be listed on the MassDOT Qualified Traffic Control Equipment List.
Reflective sheeting on drums shall meet or exceed ASTM D4956 Type VIII. All drums shall be maintained in a satisfactory manner including the removal of oils, dirt, and debris that may cause reduced retroreflectivity.

The Contractor shall use one of the following sequential flashing warning light systems unless otherwise approved by the Engineer:

1. Empco-Lite LWCSD.
2. pi-Lit® Sequential Barricade-Style Lamp; or
3. Unipart Dorman SynchroGUIDE.

Sequential flashing warning lights shall be secured to reflectorized drums per the light manufacturer's specifications.

CONSTRUCTION METHODS

The first ten (10) drums in any merging or shifting taper as designated in the Temporary Traffic Control Plan shall be equipped with sequential flashing warning lights. These lights shall be operating, at a minimum, between dusk and dawn when the taper is deployed.

The successive flashing of the sequential warning lights shall occur from the upstream end of the merging or shifting taper to the downstream end of the taper in order to identify the desired vehicle path. Each warning light in the sequence shall be flashed at a rate of not less than 55, nor more than 75 times per minute.

Warning lights shall be powered off when drums are not deployed in a taper.

METHOD OF MEASUREMENT

A group of ten (10) reflectorized drums with sequential flashing warning lights is considered one (1) unit and will be measured by the day. Each period of up to 24 hours during which this unit is in use will be measured as one day regardless of the number of times that the drums are positioned, repositioned, removed, or returned to service.

BASIS OF PAYMENT

Reflectorized Drums with Sequential Flashing Warning Lights will be paid for at the contract unit price per day, which shall include full compensation for furnishing, positioning, repositioning, and removing the group of ten (10) drums as directed by the Engineer.

ITEM 862.406	**6 INCH RECESSED WHITE LINE (MC, UFD, WR)**	**FOOT**
ITEM 862.412	**12 INCH RECESSED WHITE LINE (MC, UFD, WR)**	**FOOT**
ITEM 863.406	**6 INCH RECESSED YELLOW LINE (MC, UFD, WR)**	**FOOT**
ITEM 863.412	**12 INCH RECESSED YELLOW LINE (MC, UFD, WR)**	**FOOT**

The work under these items shall conform to the relevant provisions of Subsection 860 of the Standard Specifications and shall consist of furnishing and installing Recessed Multi-Component (MC), Wet Reflective (WR) Pavement Markings at the locations shown on the plans or as required by the Engineer.

If the Multi-Component Pavement Marking material is applied over a different pavement marking material, the Contractor shall provide documentation that the Multi-Component Pavement Marking Material being used will adhere to the existing marking material.

MATERIALS

MC pavement markings shall consist of a two-component, 100% solids liquid binder, first drop beads or elements to provide wet and dry retroreflectivity, and second drop glass beads to improve the durability of the pavement marking, reduce track-free times, and provide supplementary retro-reflectivity. MC Pavement Marking binders are typically composed of, but not limited to, Epoxies, Polyureas, or Urethanes.

Classification of dry time is based upon the results of the test procedures found in ASTM D711 (73.5 ± 3.5°F at 50 ± 5% relative humidity) when applied with glass beads. MC Ultra-Fast Dry (MC, UFD) pavement markings shall have a no track time of 3 minutes or less. The Contractor shall provide a Certificate of Compliance verifying the product supplied meets the specified dry time requirements per ASTM D711 prior to installation.

The Contractor shall select a liquid binder and bead/element combination that meets these performance specifications.

Second drop beads shall be manufactured from glass of a composition that is highly resistant to traffic wear and to the effects of weathering. If coating is required to meet the performance requirements, the second drop beads shall be coated to ensure satisfactory embedment and adhesion. Second drop beads retained on a No. 40 U.S. Standard Mesh Sieve shall have a minimum crush strength of 30 lbs. when tested in accordance with ASTM D1213.

Second drop beads passing the No. 30 sieve shall have a minimum of 75 percent true spheres when tested in accordance with ASTM D1155. All second drop beads retained on the No. 20 and No. 30 sieves shall have a minimum of 80 percent true spheres as determined by ASTM D1155.

Second drop beads shall meet the following gradation requirements when tested in accordance with ASTM D1214:

ITEMS 862.406, 862.412, 863.406, & 863.412 (Continued)

U.S. Standard Sieve No.	Percent Retained
20	3-10
30	15-35
50	45-75
70	0-10
Pan	0-5

CONSTRUCTION METHODS

The Contractor shall follow all installation instructions from the manufacturer, including allowable ranges of temperature and humidity for installation, unless otherwise approved by the Engineer.

The pavement surface shall be clean, dry and free of laitance, oil, dirt, grease, paint or other foreign contaminants prior to the installation of any new pavement markings. If an air lance is used to clean the surface, air compressors shall initially be blown out away from the application area to prevent compressor condensation build-up. A minimum of 24 hours of dry time following any rainfall is required prior to the placement of pavement markings.

Recessing of markings shall be per 860.65: Recessed Markings.

Application rate for binder and all glass beads shall consider final pavement surface composition and smoothness in advance of application to ensure proper wet film thickness and embedment of all beads. The Contractor shall provide the Engineer with documentation from the manufacturer with all recommended application rates in advance of any pavement marking installation.

The minimum uniform wet thickness for the MC binder shall be 20 mils but should be increased if recommended by the manufacturer. The line thickness shall be met across at least the middle ⅔ of the pavement marking width. Depth plates shall be provided by the Contractor to the Engineer to assure that desired thickness is achieved.

The finished white color shall be free from tint, with good opacity and visibility under both daylight and artificial light. The finished yellow color shall be defined by Federal Test Standard 595 - Color Chip Number 13538, using Federal Test Standard 141 (Method 4252). The finished lines shall be uniform in color and have clean, well-defined edges.

Glass beads shall be applied in a manner that does not induce rolling or bouncing, to ensure that exposed portions of beads are free of binder material. Beads should be embedded in the binder to a depth of approximately 50% of their diameter.

Glass beads shall be applied as a reflective medium, using the double drop method, at a rate in accordance with the manufacturer’s specification in order to meet the minimum retro-reflectivity levels.

Newly installed pavement markings shall be protected from tracking during the curing period per Subsection 860.63.

ITEMS 862.406, 862.412, 863.406, & 863.412 (Continued)

Once the installed pavement markings have been open for traffic for a minimum of 7 days, the Contractor shall perform retro-reflectance readings per the measurement and sampling procedures contained in ASTM D7585 (Standard Practice for Evaluating Retroreflective Pavement Markings Using Portable Hand-Operated Instruments) using the Referee Evaluation Protocol found in section 6.4, and the testing procedures shall follow ASTM E1710 (*Standard Test Method for Measurement of Retroreflective Pavement Marking Materials with CEN-Prescribed Geometry Using a Portable Retro-reflectometer*) and ASTM E2177 (*Standard Test Method for Measuring the Coefficient of Retroreflected Luminance (R_L) of Pavement Markings in a Standard Condition of Wetness*).

The average initial retro-reflectance readings shall exceed the following minimum values:

Test Method	*White Markings	*Yellow Markings
ASTM E1710 (Dry)	475 mcd/lux/m²	375 mcd/lux/m²
ASTM E2177 (Wet Recovery)	375 mcd/lux/m²	300 mcd/lux/m²

*Observation Angle = 1.05°, Entrance Angle = 88.8°

Pavement markings with measured average initial retro-reflectance readings that do not meet the specified minimum values using the procedures outlined in subsection 6.4.5 of ASTM D7585 shall be removed by a method approved by the Engineer and reapplied at no additional cost, unless otherwise approved by the Engineer.

METHOD OF MEASUREMENT

Items 862.406, 862.412, 863.406, and 863.412 will be measured for payment by the Foot installed, complete in place.

BASIS OF PAYMENT

Items 862.406, 862.412, 863.406, and 863.412 will be paid for at the Contract unit price per Foot, which price shall include all labor, material, equipment, and all incidentals required to complete the work.

ITEM 864.34 **SLOTTED PAVEMENT MARKER TWO-WAY YELLOW/RED** **EACH**

ITEM 864.35 **SLOTTED PAVEMENT MARKER TWO-WAY YELLOW/YELLOW** **EACH**

The work under these items shall conform to the relevant provision of Subsection 860 of the Standard Specifications and the following:

The work under these items shall consist of furnishing and installing two-way yellow-red and two-way yellow-yellow reflectorized pavement markers (SLOTTED IN PAVEMENT) in accordance with the relevant provisions of Traffic Standard TR.6.2 "Raised Pavement Marker Placement" and TR.6.5 "Typical Pavement Marking for Conventional Roadways".

MATERIALS

Reflectorized pavement markers shall be 3M Series 290, Avery Dennison Lifelite Model C80, Ray-O-Lite Model 2004 or an approved equivalent.

CONSTRUCTION METHODS

The work shall include cutting the tapered pavement slot to the dimensions specified by the Manufacturer for the two way markers, application of the Manufacturer's recommended epoxy adhesive, and placing the reflectorized pavement marker in the proper position within the slot so that the reflective face is visible and perpendicular to oncoming traffic and so that the top of the marker is set 1/8± inch below the top of the adjacent pavement.

Surface preparation and installation shall be strictly in accordance with the Manufacturer's instructions.

METHOD OF MEASUREMENT

Items 864.34 and 854.35 will be measured for payment by the Each unit installed, complete in place.

BASIS OF PAYMENT

Items 864.34 and 854.35 will be paid for at the Contract unit price per Each, which price shall include all labor, materials, equipment, and all incidentals required to complete the work.

No separate payment will be made for cutting the tapered pavement slot, but all costs in connection therewith shall be included in the Contract unit price bid.

ITEM 864.41 GREEN COLORIZED PAVEMENT MARKINGS SQUARE FOOT

The work under this item shall conform to the relevant provisions of Subsection 860 of the Standard Specifications and the following:

The work under this item shall consist of furnishing and installing Colorized Pavement Markings at the locations shown on the plans or as required by the Engineer.

MATERIALS

Green Colorized Pavement Markings are composed of Epoxy, Methyl Methacrylate (MMA), or Preformed Thermoplastic Materials.

The initial daytime chromaticity coordinates for green colorized pavement shall fall within the area created by the following coordinates:

Initial Daytime Chromaticity Coordinates (Corner Points) for Green Colorized Pavement Markings				
	1	2	3	4
x	0.230	0.266	0.367	0.444
y	0.754	0.460	0.480	0.583

The surface of the Green Colorized Pavement Markings shall provide a minimum skid resistance value of 55 British Pendulum Number (BPN) when tested in accordance with ASTM E303.

The Contractor shall provide a Certificate of Compliance verifying the product supplied meets the specified daytime chromaticity requirements and friction requirements prior to installation.

CONSTRUCTION METHODS

The Contractor shall supply Shop Drawings to the Engineer for approval a minimum of 30 days in advance of installation. Shop Drawings shall include the product manufacturer's instructions, material safety data sheets (MSDS) for all components including any primers and sealers, and all tools, equipment, and procedures to be used for the installation. No work shall commence until the Shop Drawings have been approved.

It shall be the responsibility of the Contractor to prepare the surface prior to the installation of any Green Colorized Pavement Markings. Any joints or cracks in the pavement shall be pre-treated per the manufacturer's recommendation. The surface shall be clean and dry prior to installation of the system. If additional surface preparation is recommended by the manufacturer, such as the installation of a primer or preheating, it shall be completed per the manufacturer's specifications. All surface preparation shall be considered incidental to the cost of the item.

Any existing pavement markings that conflict with the Green Colorized Pavement Markings shall be removed by the Contractor in advance of installation; installation of colorized pavement over pavement markings shall not be allowed.

ITEMS 864.41 (Continued)

All existing pavement markings that are to remain, castings, curbs, and rumble strips within the vicinity of the colorized pavement application shall be covered and protected by the Contractor. Existing pavement markings damaged by the Green Colorized Pavement Markings installation shall be removed and replaced by the Contractor at no additional cost.

The Contractor shall follow all installation instructions from the manufacturer, including allowable ranges of temperature and humidity for installation, unless otherwise approved by the Engineer.

Upon completion of installation, a sealer shall be applied if recommended by the manufacturer. The sealer shall be installed per the manufacturer's specification. The application of a sealer shall be considered incidental to the cost of the item.

The Contractor shall maintain protection of the Green Colorized Pavement Markings installation from vehicle and foot traffic throughout the minimum cure time recommended by the manufacturer.

METHOD OF MEASUREMENT

Item 864.41 will be measured for payment by the Square Foot installed, complete in place.

BASIS OF PAYMENT

Item 864.41will be paid for at the Contract unit price per Square Foot, which price include all labor, materials, equipment, and all incidentals required to complete the work.

ITEM 874.2 TRAFFIC SIGN REMOVED AND RESET EACH

The work under this item shall conform to the relevant provisions under Subsection 828 of the Standard Specifications and the following:

The Contractor shall carefully remove and reset all designated existing signs including attachment hardware and sign support posts located as needed and where required by the Engineer.

The work under this item shall include the dismantling, removal, transporting, storing and resetting of existing traffic signs at the locations shown on the plans. The Contractor shall completely remove the sign and post and reset said sign and post at the new location. If existing sign and/or post are not suitable for reuse as determined by the Engineer, the contractor shall provide new sign and/or post under items 832. and/or 847.1 respectively. New attachment hardware shall be furnished as necessary to replace any missing or unusable existing hardware. Work shall also include the removal and disposal of footings up to a depth of 12 inches below the proposed surface of sidewalks and driveways as well as up to 36 inches below the proposed roadway.

Existing sign and/or post damaged by the contractor's operations shall be replaced in-kind by the Contractor at no additional compensation.

Included under this item are warning, regulatory, and route marker signs and miscellaneous directional signs.

The Contractor shall backfill with compacted gravel all holes resulting from the removal of the existing signs and their foundations and restore the area to match existing conditions of adjacent areas.

METHOD OF MEASUREMENT

Item 874.2 will be measured for payment by the Each traffic sign removed and reset, complete in place.

BASIS OF PAYMENT

Item 874.2 will be paid for at the Contract unit price per Each traffic sign removed and reset, which price shall include all labor, materials, equipment, and all incidentals required to complete the work.

No separate payment will be made for gravel backfill or excavation and disposal of existing footings, if required, but all costs in connection therewith shall be included in the Contract unit price bid.

ITEM 874.4 TRAFFIC SIGN REMOVED AND STACKED EACH

ITEM 874.41 GUIDE SIGN REMOVED AND STACKED EACH

ITEM 877.2 SIGN POST REMOVED AND STACKED EACH

The work under these items shall conform to the relevant provisions of Subsection 828 of the Standard Specifications and the following:

The work under these items shall consist of removing, transporting, protection, temporary storage and stacking of signs, posts and hardware. The signs, posts and hardware shall be stacked on boards at the MassDOT Maintenance Facility (55 Northfield Road, Bernardston, MA) as required by the Engineer. The Contractor shall provide a minimum of 48 hours advanced notification for delivery and stacking.

The work under these items shall also include the removal and disposal of footings, if present, up to a depth of 12 inches below the proposed surface of sidewalks and driveways as well as up to 36 inches below the proposed roadway.

Traffic signs determined to be unsatisfactory for reuse shall become the property of the Contractor and shall be removed and discarded.

The Contractor shall completely remove the sign and post. If existing sign and/or post are damaged by the Contractor's operations, a new sign and/or post of the same size and material shall be provided to the Town at the Contractor's expense.

The Contractor shall backfill with compacted gravel all holes resulting from the removal of the existing signs and their foundations and restore the area to match existing conditions of adjacent areas.

METHOD OF MEASUREMENT

Items 874.2, 874.41, and 877.2 will be measured for payment by the Each sign removed and stacked. Multiple signs on a single or double post assembly shall be considered as one unit. Multiple post assemblies shall be considered as one unit.

BASIS OF PAYMENT

Items 874.2, 874.41, and 877.2 will be paid for at the Contract unit price per Each, which price shall include all labor, materials, equipment and all incidentals required to complete the work.

No separate payment will be made for gravel backfill or excavation and disposal of existing footings, if required, but all costs in connection therewith shall be included in the Contract unit price bid.

ITEM 874.8 TRAFFIC SIGN REMOVED AND DISCARDED EACH

ITEM 874.81 GUIDE SIGN REMOVED AND DISCARDED EACH

The work under these items shall conform to the relevant provisions of Subsection 840 of the Standard Specifications and the following:

The work under these items shall consist of removing and discarding signs, sign posts and foundation, as shown on the plans or as required by the Engineer. The Contractor shall backfill with compacted gravel all holes resulting from the removal of the existing signs and their foundations and restore the area to match existing conditions of adjacent areas.

Sign that are determined to be salvageable by the Engineer shall be stacked on boards at the MassDOT Maintenance Facility (55 Northfield Road, Bernardston, MA) as required by the Engineer. The Contractor shall provide a minimum of 48 hours advanced notification for delivery and stacking.

METHOD OF MEASUREMENT

Items 874.8 and 874.81 will be measured for payment by each sign removed and discarded. Multiple signs on a single or double post assembly shall be considered as one unit.

BASIS OF PAYMENT

Items 874.8 and 874.81 will be paid for at the Contract unit price per Each, which price shall include all labor, materials, equipment, and all incidentals required to complete the work.

No separate payment will be made for excavation, backfill or stacking of salvageable posts, if required, but all costs in connection therewith shall be included in the Contract unit price bid.

ITEM 877.1 SIGN POST REMOVED AND DISCARDED EACH

The work under this item shall conform to the relevant provisions of Subsection 840 of the Standard Specifications and the following:

The work under this item shall consist of removing and discarding sign posts and foundation, if present, as shown on the plans or as required by the Engineer. The Contractor shall backfill with compacted gravel all holes resulting from the removal of the existing signs and their foundations and restore the area to match existing conditions of adjacent areas.

Sign posts that are determined to be salvageable by the Engineer shall be stacked on boards at the MassDOT Maintenance Facility (55 Northfield Road, Bernardston, MA) as required by the Engineer. The Contractor shall provide a minimum of 48 hours advanced notification for delivery and stacking.

METHOD OF MEASUREMENT

Item 877.1 will be measured for payment by the Each sign post removed and discarded. Multiple post assemblies shall be considered as one unit.

BASIS OF PAYMENT

Item 877.1 will be paid for at the Contract unit price per Each sign post removed and discarded, which price shall include all labor, materials, equipment, and all incidentals required to complete the work.

No separate payment will be made for excavation, backfill or stacking of salvageable posts, if required, but all costs in connection therewith shall be included in the Contract unit price bid.

ITEM 903.1 3000 PSI CEMENT CONCRETE CUBIC YARD

The work under this item shall conform to the relevant provisions of Subsections 140 and 901 of the Standard Specifications and the following:

The work under this item shall include all materials, equipment and labor needed to construct the cast-in-place concrete sub-footing as detailed in the Plans and/or required by the Engineer. The Contractor shall provide a level bearing surface for bearing on competent bedrock. The material above the competent bedrock shall be excavated and backfilled with cement concrete having a minimum compressive strength of 3,000 psi. Work required to remove additional bedrock for subsurface preparation shall be included in this Item and be performed with no additional compensation, and shall be deemed incidental to the unit price bid for this item.

Abutment and wingwall sub-footings shall be embedded to a minimum of 6 inches into bedrock, and the abutment and wingwall footings shall be embedded to a minimum of 6 inches into the sub-footing. A minimum depth of at least 6 inches of cement concrete fill shall be placed below the abutment/wingwall footings bearing on competent bedrock. The Contractor shall provide steel reinforcement and dowels as indicated in the Plans, or as required by the Engineer. Steel reinforcement and grouted dowels shall be incidental to the work under this Item.

Grouted dowels should be epoxy coated for resistance against corrosion and shall be spaced no closer than 3 feet on center. #6 dowels should be embedded a minimum of 5 feet into the bedrock and located at least 2 feet back from the face of the bedrock benches, otherwise the 5-foot embedment shall be taken from the lower bench. The ratio of dowel drill hole diameter to steel dowel diameter should be 1.5 to 2.5 and the dowel holes should be filled with non-shrink grout.

CONSTRUCTION METHODS

A level bearing surface shall be provided for the proposed sub-footings bearing on competent intact bedrock. Competent intact bedrock is defined as bedrock that is not loose or weathered and cannot be easily excavated with typical heavy excavation equipment. The competent bedrock surface shall be cleaned prior to placement of concrete. The competent bedrock shall be considered clean if less than 10 percent of the bedrock surface has 1-inch or less of sediment or loose soil, and no portion of the area has more than 1-inch of sediment or loose soil.

After confirmation of a suitable bedrock subgrade, the Contractor shall be prepared to pour concrete using tremie methods in order to displace any water if necessary. To minimize potential influence of groundwater, or surface water, the Contractor shall be prepared to place tremie concrete soon after removal of sump pumps.

The Contractor shall excavate additional bedrock as needed to provide stepped level bearing areas. The competent bedrock surface supporting the concrete footings, or concrete leveling pad, shall be no steeper than 6H:1V. Alternatively, the competent bedrock surface shall be micro-benched so that the footing/concrete leveling pad bears on level surfaces where the bedrock is steeper than 6H:1V.

ITEM 903.1 (Continued)

MATERIALS

A minimum of 3000 psi cement concrete shall be used to construct the sub-footing and those areas designated by the Engineer, and/or as designated on the Plans. The cement concrete shall conform to all material requirements contained in Subsection M4.02.00 of the Standard Specifications.

Steel reinforcement and dowels shall meet the requirements of AASHTO M31 (ASTM A615) Grade 60. The grout to be used for these dowels shall be a non-shrink cementitious mortar. Grouting material used to perform this work shall be listed on the MassDOT Qualified Construction Materials List. The minimum required compressive strength of the grout at 28 days shall be 6000psi.

METHOD OF MEASUREMENT

Item 903.1 will be measured for payment by the Cubic Yard, within the footprint indicated on the plans or as required, completed in place and accepted.

BASIS OF PAYMENT

Item 903.1 will be paid for at the Contract unit price per Cubic Yard, which price shall include all labor, materials, equipment, and all incidentals required to complete the work.

ITEM 909.5 RAPID SETTING CONCRETE CUBIC YARD

The work under this Item shall conform to the relevant provisions of Subsection 901 of the Standard Specifications and the following:

The work under this Item shall consist of supplying, mixing, placing, and curing of rapid setting cementitious material at deck repair locations or as required by the Engineer.

Surfaces adjacent to the placement shall be protected with drop cloths, waterproof paper, or other means to keep them free of material splashes, water, and debris.

MATERIALS

The rapid setting cementitious product shall be qualified rapid set material meeting the requirements of M4.04.2, that shall have completed testing through AASHTO's National Transportation Program (NTPEP) and is included on the MassDOT Qualified Construction Material List (QCML).

The rapid setting cementitious material shall be expanded with aggregate for placements that are two (2) inches or more in depth and must be formulated to develop a minimum compressive strength of 2000 psi within two (2) hours. A minimum compressive strength of 5 ksi shall be achieved at 72 hours. The nominal maximum aggregate size shall be 3/8 inch.

The product shall be expanded using clean non-reactive aggregates meeting the requirements of M4.01.2, from a MassDOT approved source according to a formulation acceptable to the manufacturer. Submit certified test reports showing the aggregate is non-reactive. Aggregate specified, labeled, and furnished by the rapid set patching material manufacturer may be used with approval of the Engineer. The mixing process for expanding the rapid setting patching material shall be performed per the Manufacturer's recommendations.

CONSTRUCTION METHODS

SURFACE PREPARATION

The surface to receive the rapid setting repair material shall be properly prepared and free from frost, ice, mud, water, grease, dirt, and any other materials that will hamper the bond.

Prior to placing the rapid setting repair material, the patch area shall be blast cleaned to remove all rust, oil, debris and dust.

The Contractor shall have the approval of the Engineer certifying that existing concrete has been removed to the required limits and requirements shown on the Plans and that adequate surface preparation has been achieved before any concrete is placed.

MIXING

The Contractor shall be required to mix and place the cement by using an eight (8) cubic foot minimum rubber-blade mobile mixer.

Two (2) mixers will be required to be on site, of which one mixer can be used as a back-up.

Sufficient mixing and placing equipment shall be provided on the construction site by the Contractor to ensure that a breakdown of equipment will not cause significant delays in completing the scheduled work in the shift.

ITEM 909.5 (Continued)

PLACEMENT AND FINISH

Repair concrete shall be placed immediately after mixing and shall be worked firmly into the sides and bottom of repair area to achieve a good bond. Final finishing shall be performed as soon as possible after placement as bleed water will be minimal.

Product shall be placed per the manufacturer's recommendation for temperature, including additional steps for placement during cold weather. The requirements of 901.33B shall apply for cold conditions.

Approval by the Engineer for all formwork shall be required prior to placement of any concrete. Formwork shall be maintained and remain in place a minimum of seventy-two (72) hours after placement. All formwork placed under this contract must be removed no later than forty-five (45) days after it was initially placed. Failure to remove formwork within forty-five (45) days may result in its removal by others, with the associated costs being assessed to the Contractor.

The Engineer may require the Contractor to vibrate and/or power screed the patched area. Payment for such equipment shall be considered incidental to this Item.

New reinforcing steel necessary for concrete repairs shall be epoxy coated and shall be considered incidental to this item

CURING

The rapid setting repair material shall be cured and protected until the minimum compressive strength of 2000 psi is achieved.

Rapid setting concrete placements shall be completed no later than 1:00 AM for nighttime operations so that the required compressive strength of 2000 psi is attained before the area is opened to traffic no later than 4:00 A.M.

SUBMITTALS

Prior to the commencement of any work under this item, the Contractor shall submit to the Engineer for review and approval all materials to be used under this item.

METHOD OF MEASUREMENT

Item 909.5 will be measured for payment by the Cubic Yard of rapid setting concrete furnished and installed, complete in place.

BASIS OF PAYMENT

Item 909.5 will be paid for at the Contract unit price per Cubic Yard, which price shall include all labor, materials, equipment, and all incidentals required to complete the work, as required by the Engineer.

No separate payment will be made for surface preparation, or supplying, installing, and removing formwork, but all costs in connection therewith shall be included in the Contract unit price bid.

The removal of deteriorated concrete will be paid for separately under Items 127.4 and 127.41.

New reinforcing steel will be considered incidental to this Item

ITEM 911.1 SHEAR CONNECTORS EACH

The work under this item shall conform to the relevant provisions of Subsection 960 and Subsection M8.04.1 of the Standard Specifications and shall be placed in accordance with the layout requirements shown on the Plans for Bridge No. B-10-018 (12C) over I-91.

Plans of the existing bridge show shear studs or optional spiral reinforcement on the top flanges of the existing beams in spans 2 through 4. If shear studs or spiral reinforcement are damaged beyond repair during deck demolition (paid under Item 113.1), they shall be removed within 1" above the top flanges and replaced with 6" studs. The Contractor will be paid for damages to existing studs for no more than 20% of the existing shear studs.

The work under this item shall comply with all the requirements as stated on the Plans. Replacement shear connectors shall be placed in accordance with the layout noted on the Plans. Where the remaining portion of existing spiral or stud connectors interferes with the placement of the new connectors, the new connectors shall be shifted to provide a minimum of 1" clear to the existing components to remain.

Proposed shear connectors in spans 1 and 5 as shown on the plans will be paid for under Item 992.1.

METHOD OF MEASUREMENT

Item 911.1 will be measured for payment by the Each shear connector which require replacement due to irreparable damage during deck demolition, to a maximum quantity of 20% of the total studs on the span.

BASIS OF PAYMENT

Item 911.1 will be paid for at the Contract unit price per Each, which price shall include all labor, materials, equipment, and all incidentals required to complete the work.

Costs for shear connectors associated with Bridge B-10-001 will be paid for under Item 995.01.

Costs for shear connectors associated with spans 1 and 5 on Bridge B-10-018 will be paid for under Item 992.1.

ITEM 912. DRILLING AND GROUTING DOWELS EACH

The work under this Item shall consist of drilling and grouting holes in the existing wingwalls and backwall of Bridge No. B-10-018 for the installation of the cast-in-place concrete copings and backwall as shown on the Plans, or as required by the Engineer.

MATERIALS

The grout to be used for these dowels shall be a non-shrink cementitious mortar. Grouting material used to perform this work shall be listed on the MassDOT Qualified Construction Materials List. The minimum required compressive strength of the grout at 28 days shall be 6000psi.

The steel dowels shall meet the requirements of AASHTO M31 (ASTM A615) Grade 60 reinforcement. All steel reinforcement dowels shall be epoxy coated. Epoxy coated dowels shall meet M8.01.7: Epoxy Coated Reinforcing Bars. Steel dowels shall be incidental to the work under this Item.

CONSTRUCTION METHODS

All dowel holes shall be drilled in accordance with the methods specified by the grout manufacturer. If drill requirements are not stated, all dowel holes shall be air drilled provided that the minimum edge distance as shown on the plans is observed. Should, in the Engineer's opinion, air drilling be inappropriate due to questionable strength of the existing concrete or insufficient edge distance, the dowel holes shall be diamond core drilled. The inner surfaces of diamond core drilled dowel holes shall be scored to develop sufficient keying action. The method of scoring of the dowel hole's inner surfaces shall be subject to the approval of the Engineer.

The depth of the drilled dowel holes shall be as shown on the Plans, except that the depth of drilled hole shall be modified as required to comply with the minimum depth of hole specified in the product literature of the cementitious mortar by the Contractor to develop the full yield strength of the reinforcing bars. Dowel hole diameter shall be per the grout manufacturer's recommendations for each size dowel unless stated otherwise on the Plans. The holes shall be blown clear of any debris and shall have the approval of the Engineer prior to the placement of any grout material.

The drilling operation shall be performed without damage to the portions of the structure that are to remain in place. The Contractor shall take care to avoid drilling through the existing reinforcing present in the existing wingwalls. The Contractor shall perform non-destructive testing such as pachometer testing to locate existing reinforcing and layout their dowels to avoid conflict. If during the drilling operation the Contractor hits existing rebar that is reasonably believed to be existing reinforcing, the Contractor shall abandon the drill hole and relocate the dowel layout as required by the Engineer. Any abandoned drill holes shall be repaired as required by the Engineer. Any damage to any existing portions of the structure that are to remain in place shall be repaired to a condition equal to or better than existing condition prior to the beginning of the Contractor's operations and shall be repaired at the Contractor's expense.

ITEM 912. (Continued)

The Contractor shall follow the recommendations of the manufacturer for mixing and placing the grout material prior to the placement of the dowels. The Contractor shall, at a minimum, adhere to the latest version of ACI 318 code requirements and manufacturer requirements regarding minimum and maximum temperatures while placing the grout. Any excessive grout around the hole after placement of the dowel shall be struck off smooth while the grout is still fresh. Grout shall not be applied if it is raining or snowing, or if such conditions appear to be imminent.

Pullout testing shall be performed on a minimum of one dowel per batch of grout used. Pullout test loads shall be as required by the manufacturer.

SUBMITTALS

Prior to the commencement of any work under this item, the Contractor shall submit to the Engineer for review and approval a submittal containing the grout manufacturer's literature completely describing the products to be utilized including: product data sheet and appropriate material safety data sheets. The grout shall be delivered with clearly marked, legible and intact labels. The labels shall be sufficient to all for verification with the approved data sheets. The Contractor shall also include details of the testing equipment used and locations of the test dowels.

METHOD OF MEASUREMENT

Item 912. will be measured for payment by the Each drilled and grouted hole regardless of depth, length or size of dowels accepted by the Engineer, complete in place.

BASIS OF PAYMENT

Item 912. will be paid for at the Contract unit price per Each, which price shall include all labor, testing, materials, equipment, and all incidentals required to complete the work.

No separate payment will be made for the furnishing, supply, and installation of dowels, but all costs in connection therewith shall be included in the Contract unit price bid.

The Contractor shall have no claim for any variations in the diameter of the hole, the method of drilling the hole, or the type of grout used in anchoring the proposed dowels.

ITEM 913.21 ANCHOR BOLT CORRECTIVE ACTION AT BEARINGS NOT SCHEDULED FOR REPLACEMENT EACH

The work under this item applies to locations where bearings are not scheduled for full replacement. For locations where full bearing replacement is indicated in the Contract Documents, this provision does not apply.

CORRECTIVE ACTION

Corrective actions may include replacement or rethreading of anchor bolts as required by the engineer.

1. Expansion Bearings: If an anchor bolt is found to be protruding from the bearing plate and guide angle with more than 1" spacing between the nut and connected element, the Contractor shall clean the anchor bolt and attempt to retighten or replace the nut. If the nut cannot be re-tightened and the condition exists at only 1 of the 2 bolts at the given bearing location, the engineer shall be notified of the condition. If this condition exists at both bolts at a single bearing location, the engineer shall be consulted for direction on corrective action.
2. Fixed Bearings: If an anchor bolt is found to be protruding from the bottom flange with more than ½" spacing between the nut and connected element at a fixed bearing, the Contractor shall attempt to retighten or replace the nut. If the nut cannot be re-tightened or replaced, the engineer shall be notified and consulted for direction on corrective action.

SUBMITTALS AND DOCUMENTATION

Prior to performing any corrective work, the Contractor shall submit the following to the Engineer for review:

- Photographs and field measurements documenting the condition.
- A proposed method and sequence for anchor bolt repair or replacement.
- Materials and equipment to be used.

LIMITATIONS

- Removal and replacement of the full bearing is not permitted under this Item.
- Work performed without Engineer review and written direction at fixed bearings will not be accepted.

METHOD OF MEASUREMENT

Item 913.21. will be measured for payment by the Each anchor bolt repair and/or replacement.

BASIS OF PAYMENT

Item 913.21 will be paid for at the Contract unit price per Each, which price shall include all labor, materials, tools, equipment, engineering services, costs associated with corrective actions (anchor bolt repair or replacement), and all incidentals required to complete the work.

Cleaning of anchor bolts and tightening of nuts shall be considered incidental to the project.

ITEM 950.11 TEMPORARY SHORING EACH

The work under this item shall consist of shoring existing stringers as required for performing patch repairs to the concrete pier caps at the Fall River Bridge.

This item is included as a contingency as a result of the findings at the February 2026 bridge inspection report which noted several areas of significant deterioration at the piers. There are multiple spalls in the pier caps, the most severe deterioration being below beam 10 on the West pier.

If, during pier patch repairs, the limits of deteriorated concrete extend to more than 10% of the bearing width, the Engineer shall be notified. If the Contractor is required by the Engineer to shore the existing beams to complete the repairs, the work shall be paid for under this item.

Shoring materials may be new or second hand. The Contractor shall submit a plan of the proposed work showing the details and indicating the materials to be used. The submittal shall include shoring design computations based on the bridge configurations and the working stresses of the materials used, sequence of operations, and all details incidental thereto. Unless otherwise required by the Engineer, the proposed shoring system shall be designed to stabilize the existing stringers to relieve load from the existing substructure enough to complete the required patch repairs.

If temporary traffic shifts are not implemented to complete the repairs, the components of the system shall have load capacity greater than the total calculated load carried by the existing stringer during normal traffic operation, which includes but is not limited to, dead load, live load, and impact load. The Contractor may elect to temporarily shift traffic away from the repair location, in which case the shoring does not need to be designed to carry live load or impact load. However, the traffic shift must remain in place until the repair is completed and the shoring has been removed.

The Contractor shall be responsible for determining design loads and for designing the shoring system in accordance with those loads. Design loads shall also include any construction dead or live loads anticipated to be present while the shoring is in place.

All materials shall be designed by working stress design (ASD), and factor of safety shall be per industry standards.

Approval of this submission shall be obtained prior to the commencement of any work under this item. The shoring plan and computations shall bear the seal and signature of a Professional Engineer of the appropriate discipline registered in Massachusetts.

Materials shall meet the following:

Wood Products:	M9.05.1
Fastenings:	M8.01.5
Structural Steel:	M8.05.0

All treated wood supplied by the Contractor shall meet the requirements of M9.05.1 for Wood Products, including the most recent versions of AWPA U1 and M4 which are incorporated by reference. No new wood shall be treated with inorganic arsenic (including chromated copper arsenate (CCA), ammoniacal copper arsenate (ACA), ammoniacal copper zinc arsenate (ACZA)), creosote or pentachlorophenol in all project construction.

ITEM 950.11 (Continued)

It is assumed that the existing water main will remain in service during pier repair operations. All utilities shall be protected from damage at all phases of construction. All costs associated with protection of the utilities shall be incidental to the project.

There are no bearing repairs or bearing replacements associated with this item.

The successful prosecution, safety, and completion of the work in an acceptable manner is the responsibility of the Contractor. In the event of any damage to the structure due to inadequate supports, or Contractor negligence, the Contractor shall repair or replace any such damaged components at no cost to the department.

When the repairs are completed and the supports are no longer needed as determined by the Engineer, all supporting materials shall be removed and become the property of the Contractor.

The bridge shall be kept open to two lanes of traffic while the stringers are supported. Traffic shifts are permitted to direct vehicles away from the location under repair.

METHOD OF MEASUREMENT

Item 950.11 will be measured for payment by the Each steel stringer shored temporarily, as required by the Engineer, complete in place and accepted.

BASIS OF PAYMENT

Item 950.11 will be paid for at the Contract unit price per Each, which price shall include all labor, materials, tools, equipment, engineering services, and all incidentals required to complete the work. The Contractor shall only be compensated once per shoring location and shall sequence the work accordingly.

Removal of Shoring is included under this Item and will not be paid for separately.

ITEM 953.30 TEMPORARY EARTH SUPPORT SYSTEM LUMP SUM

The work under this Item shall conform to the relevant provisions of Subsections 140 and 950 of the Standard Specifications and the following:

The work under this item shall include the design, procurement, furnishing, installation, and removing of a Temporary Earth Support System for open cut excavations while maintaining traffic on the existing roadway during construction, as indicated on the Plans or as required to complete the work to the satisfaction of the Engineer. Temporary earth support systems are intended to be installed to facilitate excavations for construction of the proposed bridge abutments and wingwalls, as well as demolition of the existing bridge abutments.

Excavation support systems constructed for this project shall be designed by the Contractor. The Excavation Support Systems include, but are not limited to, sheet piling, soldier piles and reinforced timber lagging, walers and struts, tie-backs, deadman soil anchors, corner braces, and vertical spacers; or any other system approved by the Engineer. The conceptual layouts of the Excavation Support System are shown on the Bridge Plans. These layouts were developed to serve as a basis for traffic management and design of the bridge. The Temporary Earth Support System shall be located in general as indicated on the Bridge Plans and as required to satisfy traffic management plans, demolition requirements, and to construct the proposed structures.

The Contractor shall prepare calculations and working drawings, in accordance with performance requirements specified hereafter and the details shown on the Plans. The design calculations and drawings shall be prepared, stamped, and signed by a Professional Engineer registered in the Commonwealth of Massachusetts who is experienced in designing excavation support systems. All components of the excavation support system shall be sized for the maximum forces during excavation and removal stages. Excavation support systems shall be selected and arranged in a manner to permit safe and expeditious construction of temporary and permanent structures. Excavation support systems shall be designed to limit ground movement and the effects on adjacent structures, roadways, and utilities.

The temporary excavation support system shall be designed to support all applicable loads including, but not limited to: temporary highway barriers, vehicular surcharge loads, construction equipment surcharge loads, vehicular impact loads, and lateral earth pressure of the retained soil.

Dewatering, if needed, shall be considered incidental to this Item.

Cobbles/boulders were encountered in the subsurface explorations. The Contractor will need to provide equipment that can remove and/or drill through obstructions such as cobbles/boulders. The Contractor is responsible for removal of all obstructions which interfere with the proposed work by pre-trenching/pre-excavation or other means and backfilling with a suitable material.

Portions of the Temporary Earth Support System which protrudes into the soil that supports the bridge structure or other adjacent structures shall be left in place as required by the Engineer. Supporting soil shall be defined as all soil directly below the footing contained within a series of planes that originate at the perimeter of the bottom of the footing and project down and away from the footing at an angle of 45° from the horizontal.

ITEM 953.30 (Continued)

Any left-in-place materials shall be cut-off at least 3 feet below finished grade. Materials intended to be left-in-place shall be subject to review and approval by the Engineer and shall be clearly identified on the Temporary Earth Support System Plans submitted by the Contractor.

MATERIALS

General: Provide materials that are either new or in serviceable condition.

Structural Steel: M8.05.0

Steel Sheet Piling: M8.05.4; with continuous interlocks.

Cast-in-Place Concrete: M4.02.0

Reinforcing Bars: M8.01.0

Grout: Suitable for service, minimum 4,000 psi.

PERFORMANCE REQUIREMENTS

Plans and calculations of the temporary excavation support system shall be prepared and submitted to the Engineer for approval. The Contractor designed temporary earth support systems shall meet the minimum following requirements:

1. The Contractor is responsible for selecting, designing, furnishing, installing and maintaining the temporary earth support systems.

2. The Contractor shall submit for review and approval, detailed plans and calculations of the proposed system. All plans and calculations submitted shall bear the seal of a Professional Engineer registered in Massachusetts. The submittal shall indicate installation and removal procedures, specify equipment to be used, and provide material specifications.

3. The temporary earth support system shall be designed to safely resist all anticipated loads it may be subjected to while in place, including HL93 live load surcharge and any expected surcharge from construction vehicles (i.e. heavy trucks and cranes). The allowable design stresses shall be in accordance with AASHTO Standards Specifications for Highway Bridges and AASHTO Guide Specification for Bridge Temporary Works.

4. All materials used for the temporary earth support systems shall be in good condition as determined by the Engineer.

The Contractor shall review the boring information and the geotechnical report prior to developing plans and details for any required temporary earth support system.

ITEM 953.30 (Continued)

The Contractor shall make their own evaluation of the existing conditions and facilities, and of the effects of the proposed Excavation Support System and construction methods and shall provide a design for all loads and methods necessary to permit the construction of the proposed abutments and wingwalls while maintaining public safety and protecting completed work and all third party property from damage caused by the operation.

The existing and proposed approximate location of several overhead and underground utilities are depicted on the construction plans. In no case shall any temporary earth support systems be installed using impact driving in close proximity to underground utilities.

BASIS OF PAYMENT

Item 953.30 will be paid for at the Contract unit price per Lump Sum, which price shall include all labor, materials, dewatering, equipment, tools, design, coordination, removal, and all incidentals required to complete the work.

Partial payments will be made at the following percentages:

Approval of Temporary Support of Excavation Submission	10%
Accepted Installation of Temporary Earth Support System (Bridge Stage 1)	30%
Accepted Installation of Temporary Earth Support System (Bridge Stage 2)	30%
Satisfactory removal of the Temporary Earth Support System	30%

ITEM 983.12 BRIDGE RIPRAP TON

The work under this Item shall conform to the relevant provisions of Subsection 983 of the Standard Specifications and the following.

Limits for riprap stones under this item are delineated on the bridge plans within the Contract Plans as all riprap in front of the bridge abutments and wingwalls. Limits for Dumped Riprap, paid for under item 983., are delineated within the highway plans as all riprap needed for the armoring of the northeast riverbank.

The gradation of Bridge Riprap shall conform to a D_{50} of 36" and a D_{100} of 72". The thickness of the riprap layer shall be a minimum of 12 feet thick for scour protection. The thickness of the riprap layer is permitted to be less than 12 feet thick only if bedrock is encountered prior to completing excavation. In locations where bedrock is encountered, the bottom of the riprap slope shall be keyed into rock as show in the Plans. The Contractor shall be responsible for ensuring that the riprap slopes are stabilized.

The top two feet of the bridge riprap layer shall be choked with smaller stones to ensure there are no large voids. The cost of the smaller stones used to choke riprap shall be considered incidental to this item.

Fill voids by shaking stone with the teeth of an excavator bucket, hand tamping with metal tamping rods, and by spraying water to settle fines between large stones. Plate compactors shall not be used.

METHOD OF MEASUREMENT

Item 983.12 will be measured for payment by the Ton of material installed within the specified limits and as required by the Engineer, complete in place.

BASIS OF PAYMENT

Item 983.12 will be paid for at the Contract unit price per Ton. Payment will be full compensation for placing the material specified and for furnishing all labor, materials, tools, equipment, testing, and all incidentals required to complete the work.

The cost for applying streambed material over bridge riprap and compost and seed over bridge riprap will be paid for under items 983.521 and 751.766, respectively.

ITEM 983.521 STREAMBED RESTORATION LUMP SUM

This work under this item shall consist of restoring riverbed material underneath and behind the sandbags for Control of Water for the proposed bridge replacement within the limits of work. In addition, this item covers filling riprap voids with streambed material. The streambed restoration shall replicate/maintain the existing natural channel bed outside the work area in terms of material, roughness, shape, profile, and appearance. The ultimate product will, to the extent possible, replicate the function and appearance of the natural stream channel.

The streambed restoration includes the reuse of material which is to be removed at the east river bank upstream of the bridge to the extents shown on the plans. All removed material shall be stockpiled for reuse under Item 148.01. The material stockpiled for reuse shall be used to restore the areas of the streambed which are impacted by the use of sandbag cofferdams to the limits shown on the plans and to fill riprap voids below the 100-Year Flood Elevation (323.6).

The Contractor shall coordinate with his/her sub-contractors to ensure all required equipment is available on-site to complete the work in this manner. The streambed restoration is required to comply with environmental permits issued for the project. MassDOT Environmental Services will provide a Fluvial Geomorphologist (Geomorphologist) to provide on-site oversight and assistance during streambed restoration construction to ensure the restoration is constructed as shown on the Plans, as required by these Special Provisions and in accordance with permit requirements.

At least 30 days prior to the commencement of construction, the Contractor shall coordinate with David Paulson (MassDOT Wetlands & Wildlife Unit Supervisor, (857) 262-3378 / david.j.paulson@state.ma.us) to set up an initial (virtual or in person) meeting with MassDOT's Geomorphologist, Contractor, and Resident Engineer. At this meeting, the Geomorphologist will provide an overview of the restoration work. The Contractor should be prepared to discuss the anticipated means, methods, and schedule.

Process Approval:

In lieu of a mockup, the Contractor shall schedule an additional onsite meeting to discuss the streambed restoration with the Geomorphologist and respective parties from MassDOT. The Geomorphologist shall be onsite during sandbag cofferdam removal. The Contractor shall provide the Geomorphologist adequate access to observe, direct, and inspect the channel and restoration work throughout the duration of the removal, stockpile, and reinstallation of the existing streambed material, if needed.

MATERIALS

Streambed material will likely be sourced from the excavated streambed material on the east upstream bank. The larger stones and cobbles in this area to be removed are likely not suitable for use in the streambed restoration. The material shall be removed, stockpiled and reused to fill the voids in the proposed riprap placed in front of the abutments and below elevation 323.6. The removal and stockpiling of this material shall be paid for under item 148.01.

ITEM 983.521 (Continued)

In the event that there is not enough available suitable material, additional streambed restoration material shall be locally sourced that matches the composition of the existing native river bed along the reach of Fall River where the project is located. The dominant particle size under the bridge is cobble and boulder in the main flow area. Note that the upstream further away from the structure is dominated by gravel while the downstream channel has areas of bedrock.

Stream Bed Material Gradation

Particle	% Composition
Boulder	15
Cobble	60
Gravel	15
Sand	10

The streambed material shall be approved by the Resident Engineer and Geomorphologist prior to use. Any additional streambed needed in addition to the stockpiled streambed material shall be considered incidental to this item.

CONSTRUCTION METHODS

CHANNEL BANKS BELOW 100-YEAR FLOOD ELEVATION AND ABOVE BANK FLAGS

Bridge Riprap and Dumped Riprap shall be placed in accordance with the requirements of item 983.12 and section 983 of the Standard Specifications. Fill voids by shaking stone with the teeth of an excavator bucket, hand tamping with metal tamping rods, and by spraying water to settle fines between large stones. Plate compactors shall not be used. The purpose of filling the voids is to prevent subsurface flow where surface water disappears into large voids between the stone fill below the channel bed surface during low flow conditions. The final riprap shape and appearance shall be finalized in the field as required by the Geomorphologist.

Streambed material shall which has been stockpiled under item 148.01 or an approved equal shall be reinstalled over riprap (Items 983. and 983.12) to fill small voids, as depicted on the plans, to an average thickness of 4 inches above the riprap, with variations in thickness as necessary to replicate existing channel conditions. Reinstallation of the stockpiled streambed material shall be placed on top of the riprap to restore streambed habitat and fish passage. The streambed materials shall be installed during normal low water conditions behind cofferdams in accordance with the environmental permits.

CHANNEL BELOW BANK FLAGS

The Contractor shall remove the sandbag cofferdams in such a way as to slowly wet the stream to minimize the initial sediment pulse. Every attempt shall be made to minimize the downstream movement of sediment. Sandbags cofferdams shall be removed once riprap voids have been filled.

The final streambed shall maintain the general configuration of the existing streambed and there shall be minimal to no subsurface flow upon final inspection by the Resident Engineer and Geomorphologist.

ITEM 983.521 (Continued)

COMPLETION

Once all material has been placed in the stream channel and approved by the Geomorphologist and Resident Engineer, the Contractor shall remove the cofferdams in such a way as to slowly wet the stream to minimize the initial sediment pulse. Every attempt shall be made to minimize the downstream movement of sediment.

The final streambed shall maintain the general configuration of the existing streambed bedform and there shall be minimal to no subsurface flow upon final inspection by the Resident Engineer and Geomorphologist. The project must be passable by fish and other aquatic organisms following construction.

The streambed restoration to be measured for payment will be the complete and accepted work for restoration of the streambed within the limits shown on the Plans as approved by the Resident Engineer and Geomorphologist.

BASIS OF PAYMENT

Item 983.521 will be paid for at the Contract unit price per Lump Sum. Payment will be full compensation for placing the material specified and for furnishing all labor, materials, tools, equipment, testing, and all incidentals required to complete the work.

Dredging and Stockpiling of Material shall conform to the requirements of item 148.01 and shall be paid for under that item. The cost for re-installing stockpiled material shall be incidental to item 983.521.

The cost for the materials and installation of Bridge Riprap and Dumped riprap will be paid for under items 983.12 and 983., respectively.

Compost and Seed over Bridge Riprap shall conform to the requirements of Item 751.766 and shall be paid for under that item.

Native Short Grassland Mix shall conform to the requirements of Item 765.415 and shall be paid for under that item.

The Geomorphologist will be provided by MassDOT at no cost to the Contractor.

ITEM 991.1 **CONTROL OF WATER – STRUCTURE NO. B-10-001 (CLA)** **LUMP SUM**

The work under this item shall conform to the relevant provisions of Subsections 140 and 950 of the Standard Specifications and the following:

The work under this item shall consist of installing and maintaining a water control structure in areas where riprap construction is performed as specified herein and shown on the Contract Plans.

The Contractor shall design, furnish, install, maintain and cut and/or remove the water control structure as required based upon the actual site conditions. The water control structure shall be installed prior to, and maintained during, but not limited to, pier demolition, excavation, backfilling, installation of dumped riprap and slope areas as needed.

The water control structure shall consist of sandbagging, sheeting, soldier piling and lagging, coated fabric steel frame cofferdams, or any other system that satisfies the design criteria contained herein and as shown on the plans. The water control structure must be capable of supporting all applied loads. The water control structure must be configured such that it will serve its intended purpose during all stages of construction without the need for reinstallation or major modifications.

As part of the work under this item, it is the responsibility of the Contractor to determine the need and extent of dewatering required. Dewatering, if needed, for the installation of riprap shall be considered incidental to this Item.

SUBMITTALS

The Contractor shall submit to the Engineer for review and approval, a detailed plan for water control, including the construction of the water control structure, and riprap placement sequence plan with a timetable and details specific to the sequence of construction. The submittals shall include working drawings and calculations detailing the methods and materials proposed to account for all anticipated loads and construction conditions necessary to permit the work while maintaining a safe work area and protecting property from damage.

The Water Control Plan shall include a Sedimentation and Erosion Control Plan and a Water Flow Diversion and Containment Plan. The plans shall be adequate in detail to define specifics regarding materials, sizes, connections and incidental items associated with the work. The furnishing of such plans shall not serve to relieve the Contractor's responsibility for the safety of the work or his/her responsibility for the successful completion of the project. The proposed plans submitted shall be designed and stamped by a Professional Engineer registered in the Commonwealth of Massachusetts.

The Contractor shall make his or her own evaluation of existing conditions and water flow, and of the effects of his proposed temporary works and construction methods, and shall provide in his or her design for all loads and construction conditions necessary to permit excavation and construction of the riprap while maintaining public safety and protecting complete work and all third party property from damage resulting from construction operations.

ITEM 991.1 (Continued)

SEDIMENTATION AND EROSION CONTROL PLAN

The Contractor shall submit to the Engineer, plans and details of the intended sedimentation treatment basin system that will be used along with dewatering techniques, and its location at the bridge site. All discharge resulting from dewatering activities shall be directed to temporary sedimentation treatment basins at locations approved by the Engineer. At no time shall said discharge be directly released into the river. The proposed plan shall include methods and equipment necessary to discharge water from the sedimentation treatment basins. Sedimentation treatment basins shall be sized appropriately to adequately dewater from the proposed work zone while allowing sufficient time for sediments to settle out of the water, and with a depth such that a minimum of 18 inches of freeboard is maintained throughout its use.

WATER FLOW DIVERSION AND CONTAINMENT PLAN

The Contractor shall submit plans and details along with a complete description showing any proposed systems for control of water and dewatering plan to the Engineer for his approval prior to the start of the work. The proposed plan shall include methods and equipment necessary to perform the work and shall include water discharge methods and equipment to bring water from the work zone to sedimentation treatment basin.

CONSTRUCTION METHODS

This work shall also include dewatering the excavation footprint of the riprap, as needed to conduct the work. The dewatering discharge shall be directed to a temporary sedimentation treatment basin. Where sandbags are used, the bags shall not decay nor rip or tear during the installation, its service life within the waterway, or during the removal process. The Contractor shall not disturb the stream bed in order to avoid migration of silts and sands further downstream.

Measures to control the discharge of sediment or pollutants into the water resource areas shall include, but not be limited to the following:

1. Site construction areas outside the buffer zones and on relatively flat ground.
2. Schedule the work within the resource areas to avoid periods of anticipated high water (i.e. spring floods) and inclement weather.
3. Management of construction operations involving hazardous materials, such as refueling and maintenance of equipment within the resource areas.
4. Installation and continuous maintenance of water control measures throughout the project.
5. Treatment of all discharge resulting from dewatering activities through a sedimentation/detention basin to control turbidity. At no time shall the discharge from dewatering activities be directly released into a resource area.

The locations of any sedimentation/retention basins will be determined by the Contractor based on the selected methods of construction. Placement of the basins shall be in an upland area that is within the existing right of way.

ITEM 991.1 (Continued)

All dewatering and related water control work shall be conducted in such a manner as to prevent siltation or contamination of the waterway. At a minimum, the settling basin shall be constructed of an earthen berm lined with geotextile fabric and surrounded by staked hay bales. The basin shall meet or exceed the following criteria:

1. The size and location of the basin shall be determined based on the size of the Contractor's pump and the anticipated groundwater levels and the need to perform abutment footing placement in the dry.
2. The outlet/weir of the dewatering basin shall not cause erosion of the surrounding area. An approved method of controlling erosion, such as an erosion control blanket, stone, etc., shall be used at the outlet of the basin.
3. The Contractor shall not allow any sediment within the settling basin to accumulate to a depth of greater than 12 inches at any point in the basin, nor shall the water level be allowed to rise to a height of more than 24 inches.
4. The sedimentation treatment basin shall be designed with a minimum of 18 inches of freeboard, which must be maintained at all times.
5. The Contractor shall inspect the settling basin(s) at least twice daily when in operation.
6. Damages shall be repaired immediately.
7. The settling basin outlet shall be cleaned daily.
8. The sediments within the settling basin shall be disposed of as approved by the Engineer.

BASIS OF PAYMENT

Item 991.1 will be paid for at the Contract unit price per Lump Sum, which price shall include, but not be limited to, the design of the water control structure, as well as all equipment, materials and labor needed for the installation, maintenance, removal, disposal of the materials used for water control, disposal of any siltation materials caused by the pumping operation, restoration of the streambed, and all incidentals required to complete the work under this item.

At locations where the water control structure also acts as a temporary support for excavation, as determined by the Engineer, those portions of the water control structure will be paid for under Item 953.30.

Partial payments will be made at the following percentages:	
Approval of design of the control of water structure	10%
Accepted installation of the control of water structure	60%
Satisfactory removal of the control of water structure	30%

ITEM 992.1 ALTERATION TO BRIDGE STRUCTURE NO. B-10-018 (12C) LUMP SUM

The work under this Item shall conform to the relevant provisions of Subsection 995 of the Standard Specifications and the specific requirements stipulated below for component parts of this Item. For those component parts where no specific requirement is stipulated, the Standard Specifications shall apply except for payment.

The work under this Item shall include all materials, equipment and labor needed to construct the following in multiple construction stages:

- Controlled Low-Strength Material (>300 PSI)
- 5000 PSI, 3/4 INCH, 685 HP Cement Concrete
- Precast Highway Guardrail Transition
- Steel Reinforcement for Structures
- Steel Reinforcement for Structures – Epoxy Coated
- Shear Connectors on Spans 1 and 5
- Laminated Elastomeric Bearing Pad without Anchor Bolts
- Laminated Sliding Elastomeric Bearing Pad without Anchor Bolts
- Structural Steel – Coated Steel
- Membrane Waterproofing For Bridge Decks
- Strip Seal Bridge Joint System
- Metal Bridge Railing (3 Rail), Steel (Type S3-MTL4)
- Protective Screen Type I

The work does not include any items listed separately in the proposal. Payment for materials shown on the Plans as being part of the bridge structure or which may be incidental to its construction and are not specifically included for payment under another Item shall be considered incidental to the work performed.

The lump sum payment for the work under this Item does not include payment for work under Item 113.1 Demolition of Deck of Bridge No. B-10-018 (12C), or other work for which payment is listed separately in the proposal. Payment for materials shown on the Plans as being part of this alteration to bridge structure or which may be incidental to its construction and are not specifically included for payment under another Item shall be considered incidental to the work performed under this Item and shall be included in the unit price of the component of which they are a part.

This Item includes all materials and labor necessary to complete the work in accordance with the schedules listed hereinafter under Basis for Partial Payments and all other Items that are part of the work for which payment is not provided in the proposal.

5000 PSI, 3/4 INCH, 685 HP CEMENT CONCRETE

The work to be done under this heading shall conform to the relevant provisions of Subsection 901 of the Standard Specifications and the following:

ITEM 992.1 (Continued)

5000 PSI, 3/4 INCH, 685 HP Cement Concrete shall be used to construct the deck slab, end diaphragms, backwall, approach slabs, wingwall modifications and at those areas designated by the Engineer, and/or as designated on the Plans.

5000 PSI, 3/4 INCH 685 HP Cement Concrete shall conform to all material requirements contained in Subsection M4.06.1 of the Standard Specifications.

The following items shall be considered as included in the price per cubic yard of concrete, as stated by the Contractor and approved by the Engineer in the "Basis of Partial payments": all preformed and pre-molded filler, joint sealer, bonded closed cell foam joint systems, backer rods, neoprene strips, formwork, paraffin and all other materials (complete in place) at construction joints, deck joints, and all other work considered as incidental to the work involved in furnishing and placing concrete for which payment is not provided elsewhere in the contract, shall be considered as included in the Lump Sum contract price for this item.

CONSTRUCTION METHODS

Strict placing, vibrating, and form stripping practices shall be followed to achieve quality concrete. Voids and forming accessory holes shall be patched as necessary to match the surrounding texture and color to produce a uniform finished product.

PLACEMENT, FINISHING AND CURING OF CAST IN PLACE CONCRETE DECKS

The construction of the cast in place concrete deck shall be in accordance with Subsection 901 of the Standard Specifications.

LAMINATED SLIDING ELASTOMERIC BEARING PAD WITHOUT ANCHOR BOLTS

The work under this heading shall conform to the applicable provisions of Subsection 922 of the Standard Specifications, except that the sliding elastomeric bearing will not have anchor bolts.

STRUCTURAL STEEL – COATED STEEL

The work under this heading shall conform to the applicable provisions of Subsection 960 of the Standard Specifications and the following:

Structural Steel shall hot dip galvanized, metallized, or metallized and painted in accordance with the Contract Plans. Hot dip galvanizing shall be in accordance with the requirements of Section M7.10.0 and these Special Provisions. Metallizing, and painting over metallizing, shall be in accordance with the requirements of the following section and Section M7.15.0. Steel coatings are incidental to the structural steel pay item.

SHEAR CONNECTORS

Shear Connectors shall conform to the applicable provisions of Subsection 960 and Subsection M8.04.1 of the Standard Specifications and the following:

Shear connectors shall comply with all the requirements as stated on the Plans.

ITEM 992.1 (Continued)

SUBMITTALS

Details of shear connectors, including manufacturer, sequence of installation, and all relevant technical data shall be submitted to the Engineer for approval prior to installation.

STEEL REINFORCEMENT FOR STRUCTURES - EPOXY COATED

The work under this Heading shall conform to the applicable provisions of Subsections 901 of the Standard Specifications and the following:

Special procedures shall be used during handling, storage, and installation to prevent damaging poxy coating, as outlined in the Concrete Reinforcing Steel Institute (CRSI) report titled "Guidelines for Inspection and Acceptance of Epoxy Coated Reinforcing Steel at the Jobsite".

Any damage to the epoxy coating shall be repaired following this report. A copy of this report must be available at the jobsite for reference.

Accessories supporting epoxy coated bars or welded wire fabric shall be epoxy coated. Individual and continuous slab bolsters and chairs shall be of a type to suit various conditions encountered and must be capable of supporting a 300 lb. load without damage or permanent distortion.

PRECAST HIGHWAY GUARDRAIL TRANSITIONS

A. General.

The work under this Heading consists of fabricating, transporting and installing Precast Highway Guardrail Transitions and includes all necessary labor, materials, and equipment to complete the work as shown on the Plans. The Precast Concrete Bridge Elements shall meet the requirements of Section M4: Cement Concrete and Related Materials.

MATERIALS

A. Materials.

Materials shall conform to M4.09.1 and the following (as applicable):

Non-Shrink Grout Products	M4.04.5
Controlled Low-Strength Material – Structural Non-Excavatable	M4.08.0
Welded Steel Wire Fabric	M8.01.2
Mechanical Reinforcing Bar Splicer	M8.01.9
Lifting Devices	PCI MNL-116
Corrugated Metal Pipe	AASHTO M 36

1. Vertical Adjustment Assembly.

Vertical Adjustment Assembly details and material requirements shall be as shown on the plans. Alternate devices may be used provided that they are adjustable and can support the anticipated loads. The design of the leveling devices, with necessary calculations, shall be submitted to the Engineer of Record for approval.

ITEM 992.1 (Continued)

2. **Threaded Inserts.**
   Threaded inserts are permissible to facilitate forming the keyway pours. Threaded inserts shall be hot dip galvanized or made of stainless steel. The number of threaded inserts shall be minimized, and the inserts shall not come in contact with the reinforcing steel.
3. **Corrugated Metal Pipe.**
   Corrugated Metal Pipe to be used for forming voids as specified on the plans shall be fabricated from steel and shall have a protective metallic coating of zinc (galvanizing).

CONSTRUCTION METHODS – PLANT FABRICATION

A. Pre-Production Meeting.

The Contractor shall notify the MassDOT Research and Materials Section to determine if a pre-production meeting will be required to review the specifications, shop drawings, curing plan, schedule, and discuss any specific requirements.

The meeting shall be held prior to scheduling a MassDOT Inspector (refer to M4.09.4 Department Acceptance), and at least seven (7) days prior to the scheduled casting of any Precast Concrete Bridge Element or control section. The Contractor shall schedule the meeting, which shall include representatives of the Fabricator and MassDOT.

B. Reinforcement.

The reinforcing bars shall be installed in accordance with Subsection 901.35, including tolerances for cover and horizontal spacing of bars. Components of mechanical reinforcing bar splicers shall be set with the tolerances shown on the plans. The reinforcing bars and mechanical reinforcing bar splicers shall be assembled into a rigid cage that will maintain its shape in the form and which will not allow individual reinforcing bars to move during the placement of concrete. This cage shall be secured in the form so that the clearances to all faces of the concrete, as shown on the plans, shall be maintained.

Where reinforcing bars are to protrude from one Precast Concrete Bridge Element in order to mate with reinforcing bar splicers in a second precast concrete element, the fabricator shall set the reinforcing bars and the reinforcing bar splicers with a template in order to ensure proper fit up within the tolerances specified on the plans.

C. Tolerances.

Fabrication shall comply with tolerances specified on the plans. Tolerances for steel reinforcement placement shall be in accordance with Subsection 901.35. In the absence of specifications on the plans, tolerances shall comply with the latest version of the PCI MNL 135, Precast Tolerance Manual.

D. Forms.

Concrete shall be cast in rigidly constructed forms, which will maintain the Precast Concrete Bridge Elements within specified tolerances to the shapes, lines and dimensions shown on the approved fabrication drawings. Forms shall be constructed from flat, smooth, non-absorbent material and shall be sufficiently tight to prevent the leakage of the plastic concrete.

ITEM 992.1 (Continued)

When wood forms are used, all faces in contact with the concrete shall be laminated or coated with a non-absorbent material. All worn or damaged forms, which cause irregularities on the concrete surface or damage to the concrete during form removal, shall be repaired or replaced before being reused.

If threaded inserts are cast into the elements for support of formwork, the inserts shall be recessed a minimum of 1 inch and shall be plugged after use with a grout of the same color as that of the precast cement concrete.

CONSTRUCTION METHODS – FIELD CONSTRUCTION

A. General.

All of the Contractor's field personnel involved in the erection and assembly of the Precast Concrete Bridge Elements shall have knowledge of and follow the approved Erection Procedure.

Prior to installation, the following documentation shall be reviewed and confirmed by the MassDOT Resident Engineer or designee:

(a) QC Compressive Strength Test Report Forms attaining Design Strength, f'c for the Precast Concrete Bridge Element's representative sublot.
(b) Certificate of Compliance generated by the Fabricator as described under the Fabricator Quality Control section.
(c) QC Inspection Reports signed by the Quality Control Manager.

Field construction staff shall verify that the Resident Engineer has accepted all Precast Concrete Bridge Elements prior to installation.

B. Erection Procedure.

Prior to the erection, the Contractor shall submit an Erection Procedure for approval by the Engineer. This submittal shall include computations and drawings for the transport, hoisting, erection and handling of the Precast Concrete Bridge Elements. The Erection Procedure shall be prepared and stamped by a Professional Engineer registered in the Commonwealth of Massachusetts with working knowledge of the Contractor's equipment, approved shop drawings, and materials to build the bridge. The Erection Procedure shall, at a minimum, include the following:

1. Erection Procedure

The Erection Procedure shall be prepared to conform to the requirements of 960.61, Design, Fabrication and Erection and the applicable sections in Chapter 8 of the PCI Design Handbook (eighth edition) for handling, erection, and bracing requirements. At a minimum, the Erection Procedure shall provide:

(a) Minimum concrete compressive strength for handling the Precast Concrete Bridge Elements.
(b) Concrete stresses during handling, transport, and erection.
(c) Crane capacities, pick radii, sling geometry, and lifting hardware.

ITEM 992.1 (Continued)

(d) Verification that the equipment can handle all pick loads and weights with the required factor of safety.
(e) Evaluation of construction sequence and evaluation of any geometric conflicts in the lifting of the Precast Concrete Bridge Elements and setting them as shown on the plans.
(f) Design of crane supports including verification of subgrade for support.
(g) Location and design of all temporary bracing that will be required during erection.

Non-shrink grout and concrete materials, approved by the Engineer, shall be placed as shown on the plans. Fill joints, keyways, and voids, in strict accordance with the specifications and manufacturer's recommendations and instructions.

For footings, approach slabs and highway guardrail transitions, once these Precast Concrete Bridge Elements have been set to the correct horizontal and vertical alignment, the void between them and the supporting soil shall be filled with Controlled Low-Strength Material – Structural Non-Excavatable to the limits as shown on the plans. Add additional grout ports in the footings to facilitate the bedding process if required.

Except in approach slabs, joints shall be filled flush to the top with non-shrink grout, and any vertical misalignment between adjacent elements shall be feathered out on a slope of 1 to 12.

Curing of grout or concrete shall be performed in strict accordance with the specifications and manufacturer's recommendations. Filling shall not be completed in cold weather when either the ambient temperature or the precast member's temperature is below the manufacturer's recommendation. No localized heating of either the precast members or of the air surrounding the element will be permitted in an attempt to reach application temperatures.

If the joints or voids are not filled within five days after the Precast Bridge Elements are erected, the Contractor shall cover and protect the openings from weather and debris until they are filled.

C. Survey and Layout.

Working points, working lines, and benchmark elevations shall be established prior to placement of all elements. The Contractor is responsible for field survey as necessary to complete the work. MassDOT reserves the right to perform additional independent survey. If discrepancies are found, the Contractor may be required to verify previous survey data.

D. Preparation of Closure Pours and Grouted Keyways.

Immediately prior to erecting the Precast Concrete Bridge Elements, the closure pours and grouted keyways shall be cleaned at the job site of all dust, dirt, carbonation, laitance, and other potentially detrimental materials which may interfere with the bonding of the closure pour concrete or grout and precast concrete using a high-pressure water blast. Any exposed reinforcing steel in the precast concrete shall be protected from damage during the cleaning of the keyways. Damaged epoxy coating of steel reinforcement shall be repaired, and the reinforcing steel shall be cleaned as required by the Engineer. The surfaces of the closure pours and grouted keyways shall be wetted so that the surfaces shall have a Saturated Surface Dry (SSD) condition for at least 24 hours prior to the placement of the closure pour concrete.

ITEM 992.1 (Continued)

E. Erection.

The elements shall be placed in the sequence and according to the methods outlined in the Erection Procedure. As the erection proceeds, the Contractor shall constantly monitor the assembly to ensure that the precast concrete bridge element is within proper horizontal and vertical location and tolerances prior to releasing it from the crane and setting the next unit. The Contractor may use shims to maintain proper setting tolerances.

The concrete elements shall be lifted only by the lifting devices, and the utmost care shall be taken to prevent distortion of the elements during handling, transportation or storage.

This approval will be contingent on the Contractor demonstrating by calculations, prepared by a Professional Engineer registered in Massachusetts, that the elements will not be damaged by the non-vertical lifting force and by documentation that the capacity of the lifting devices is adequate for the non-vertical lifting force.

After all Precast Concrete Bridge Elements have been placed, the actual overall dimensions of the structure both horizontal and vertical, as laid out shall not deviate from the nominal dimensions shown on the plans beyond a tolerance of +0 inches and -1 inches. Once the layout of Precast Concrete Bridge Elements has been accepted by the Engineer, the Contractor shall cut all lifting devices off below the surfaces of the elements.

F. Filling of Blockouts for Lifting Devices and Threaded inserts.

If the blockouts in the Precast Concrete Bridge Elements where the lifting devices were located will be exposed and visible after assembly is complete, the Contractor shall fill these blockouts with Mortar (M4.04.5).

After the formwork has been removed, all threaded inserts that have been cast into the precast concrete bridge deck for support of the formwork shall be filled with a grout of the same color as that of the precast concrete.

SCHEDULE OF BASIS FOR PARTIAL PAYMENT

Within ten (10) days after Notice to Proceed, the Contractor shall submit on his/her proposal form a schedule of unit prices for the major component Sub-Items that make up Item 992.1 as well as his/her total bridge structure Lump Sum cost for Bridge Structure No. B-10-018. The bridge structure Lump Sum breakdown quantities provided in the proposal form are estimated and not guaranteed. The total of all partial payments to the Contractor shall equal the LUMP SUM Contract price regardless of the accuracy of the quantities furnished by the Engineer for the individual bridge components.

The cost of labor and materials for any Item not listed but required to complete the work shall be considered incidental to Item 992.1 and no further compensation will be allowed.

ITEM 992.1 (Continued)

Sub-Item	Description	Quantity	Unit	Unit Price	Total
160.3	Controlled Low-Strength Material (>300 PSI)	6	CY	_____	_____
904.3	5000 PSI 3/4 IN., 685 HP Cement Concrete	600	CY	_____	_____
904.31	Precast Highway Guardrail Transition	4	EA	_____	_____
910.	Steel Reinforcement for Structures	13,500	LB	_____	_____
910.1	Steel Reinforcement for Structures – Epoxy Coated	146,600	LB	_____	_____
911.1	Shear Connectors	2,850	EA	_____	_____
922.	Laminated Elastomeric Bearing Pad without Anchor Bolts	8	EA	_____	_____
923.1	Laminated Sliding Elastomeric Bearing Pad without Anchor Bolts	32	EA	_____	_____
960.1	Structural Steel – Coated Steel	28,300	LB	_____	_____
965.	Membrane Waterproofing for Bridge Decks	12,900	SF	_____	_____
970.	Damp-Proofing	450	SF	_____	_____
972.	Strip Seal Bridge Joint System	115	FT	_____	_____
975.1	Metal Bridge Railing (3 Rail), Steel (Type S3-TL4)	580	FT	_____	_____
975.3	Protective Screen Type I	565	FT	_____	_____

Total Cost of Item 992.1 $_____

The schedule on the proposal form applies only to Bridge Structure No. B-10-018. Payment for similar materials and construction at locations other than at this bridge structure shall not be included under this Item. Sub-Item numbering is presented for information only in coordination with MassDOT Standard Nomenclature.

ITEM 993.2 TEMPORARY ACCESS TRESTLE AND SUPPORTS LUMP SUM

The work under this item shall include the design, procurement, furnishing, installation, maintenance and removal of the temporary access bridge required for the bridge removal and reconstruction as shown on the plans or as required by the Engineer.

The information shown on the plans pertaining to the temporary access bridge and sequence of construction conveys assumptions made by the Engineer and is for information only. The Contractor shall be responsible for selecting the means and methods for construction, subject to environmental permit restrictions. The temporary access bridge may consist of clear span or cantilevered sections as required to avoid possible conflicts with existing or proposed features. The Contractor shall prepare calculations and working drawings, in accordance with performance requirements specified hereafter and the details shown on the plans. The design calculations and drawings shall be prepared, stamped and signed by a Professional Engineer registered in the Commonwealth of Massachusetts.

The Contractor may adjust the design details shown on the plans provided the details are in conformance with the approved permits. The temporary access bridge shall have a minimum low chord elevation that is higher than the FEMA 100-year return frequency flood event of 323.6 feet (NAVD88). Solid walls, which will impede fish passage or the flow of water, may not be used to support the temporary access bridge. Any increase to the overall footprint of the temporary access bridge must be approved by the Engineer prior to construction.

MATERIALS

All materials used in the construction of the temporary access bridge shall be of a quality and nature acceptable to the Engineer. All materials shall be free of contaminants, such as lead paint, that are unacceptable for use in and around wetlands and waterways.

CONSTRUCTION METHODS

The temporary access bridge structure shall be substantially built in a workmanlike manner, using sufficient supporting members, decking systems, and fasteners, all of which shall be safe for performing the work and suitable for the intended purpose.

The Contractor shall also maintain the temporary access bridge structure by renewing or repairing damaged structural elements.

The allowable soil bearing value shall be determined by the Contractor through an examination of the site, a geotechnical foundation investigation, or through other means approved by the Engineer. Calculations to support the allowable soil bearing value shall be submitted for approval by the Engineer. Any geotechnical explorations for this purpose shall be conducted at no additional expense.

Upon completion of construction operations associated with the use of the temporary access bridge, the Contractor shall remove and properly dispose of the temporary trestle structure. During removal of the temporary works, the Contractor shall not disturb or damage any permanent construction.

ITEM 993.2 (Continued)

SUBMITTALS

At least 60 days prior to installation, the Contractor shall submit detailed plans and calculations stamped and signed by a Professional Engineer licensed in the Commonwealth of Massachusetts to the Engineer for review and approval.

The design of all access bridge components, including, but not limited to the decking, floorbeams, stringers, and abutments shall be done in accordance with the latest edition, including interims, of the AASHTO Guide Design Specifications for Bridge Temporary Works.

Review, acceptance, or approval of proposed plans or methods shall not relieve the Contractor of any obligations to provide a safe and usable temporary access bridge.

BASIS OF PAYMENT

Temporary Access Trestle and Supports will be paid for at the Contract Lump Sum price, which price shall include the planning, designing, constructing, maintaining, and removal of temporary access bridge. This price shall also include all materials, equipment, tools, labor, and all incidental costs required to complete the work.

Partial payments will be made at the following percentages:

Approval of design of the temporary access bridge	10%
Accepted installation of the temporary access bridge	60%
Satisfactory removal of the temporary access bridge	30%

ITEM 994.01 TEMPORARY PROTECTIVE SHEILDING LUMP SUM
BRIDGE NO. B-10-001 (CLA)

The work under this item shall consist of the Contractor designing, furnishing, installing, maintaining, removing, and disposing of a protective shielding system on and under the Route 10 (Church Street) bridge over Fall River, Bridge No. B-10-001.

The shielding shall protect vehicular traffic, pedestrians, personnel on the bridge and beneath the bridge, and the Fall River, from falling or flying debris during removal of the concrete deck and steel framing, as well as during removal of abutments and piers during phased construction.

The Contractor is responsible for preventing any debris or items of any kind from falling into the river below, nor into the resource areas within the vicinity of the river. Any material that accidentally falls into the river or vicinity shall be removed immediately.

No portion of the bridge deck shall be removed until the protective shielding is in place and complete.

Any existing formwork on the bridge shall also be removed and disposed by the Contractor away from the job area, at no additional expense.

The Contractor's design of the temporary protective shielding shall be prepared, designed, and stamped by a Professional Engineer licensed in the Commonwealth of Massachusetts and shall be submitted to the Engineer for review and approval. Payment for the Contractor's design and submittal, including contractor's engineering services, shall be considered incidental to this item and no further compensation will be allowed.

The Contractor shall be required to shield the entire structure over the Fall River, including as many partial setups, adjustments or removal as necessary to accommodate all stages of work.

The shielding shall conform to the following:

1. Shielding shall be designed such that impact on roadways during installation and removal will be minimal.

2. Shielding shall be in place prior to the start of any demolition.

3. Shielding shall extend the full length of the stringer bridge and a sufficient distance above and beyond the deck overhang at the fascia and vertically adjacent to the bridge fascia.

4. Shielding shall have all spaces along the perimeter and at the seams sealed to prevent dust and debris from escaping and falling onto the waterway below the steel stringer bridge.

ITEM 994.01 (Continued)

5. Shielding shall be designed to safely withstand all loads to which it will be subjected. The design shall be in accordance with the latest editions of the AASHTO LRFD Bridge Design Specifications and the AASHTO Guide Design Specification for Bridge Temporary Works. The design shall also include a complete description of the equipment and construction methods proposed for the deck removal, and also the maximum size of deck area being excavated (i.e., 1 ft. x 1 ft. Jackhammered sections or 6 ft. x 2 ft. wet sawcut sections). The shielding shall also be designed to withstand the maximum size of excavated area should it fall during excavation or removal.

6. Shielding shall be installed or removed only upon approval of the Engineer.

No debris shall be swung over vehicular or pedestrian traffic on the bridge.

If the Contractor's operations damage to any existing portions of the bridge that have been selected to be remain in place during phased construction, the Contractor shall repair such damage at his expense.

The Contractor is responsible for control of bridge traffic necessary to perform this shielding work and it shall be considered incidental to this Item.

SUBMITTALS

The Contractor shall submit shop drawings, working drawings, and associated design calculations, stamped by a Professional Structural Engineer registered in Massachusetts, of all proposed shielding to the Engineer for approval prior to installation. The drawings shall include details of all connections, brackets, and fasteners. The protective shielding shall be designed to support all construction and dead loads safely; and to be sealed tightly at all joints.

BASIS OF PAYMENT

Item 994.01 will be paid for at the Contract unit price per Lump Sum, which price shall be considered full compensation for all incidentals, labor, tools, equipment, materials, installation, maintenance, removal and legal disposal of all temporary systems, including as many partial setups, adjustments or removals as required to accommodate all stages of work as required to complete the work as described herein and all incidentals required to complete the work.

Payment shall be made based upon the following percentages: 10% upon approval of design, 20% upon completion of Stage 1 to the satisfaction and approval of the Engineer, 20% upon completion of Stage 2 to the satisfaction and approval of the Engineer, and 50% upon completion of Stage 3 including removal of the shielding system, to the satisfaction and approval of the Engineer.

ITEM 994.02 TEMPORARY PROTECTIVE SHEILDING LUMP SUM
BRIDGE NO. B-10-018 (12C)

The work under this item shall consist of the Contractor designing, furnishing, installing, maintaining, removing, and disposing of a protective shielding system on and under the Route 10 (Northfield Road) bridge over I-91, Bridge No. B-10-018.

The shielding shall protect vehicular traffic, pedestrians, personnel on the bridge and on the roadway beneath from falling or flying debris, or any tools or incidental equipment during existing deck demolition, excavation, debris removal, and construction activities during phased construction.

The Contractor is responsible for preventing any debris or items of any kind from falling onto the roadway below. Any material that accidentally falls onto the roadway or vicinity shall be removed immediately.

No portion of the bridge deck shall be removed until the protective shielding is in place and complete.

Field investigations indicate that existing formwork/shielding is present. Contractor may elect to re-use existing formwork provided that it meets the requirements noted herein. Any existing formwork on the bridge that is removed and disposed by the Contractor shall be removed and disposed away from the job area, at no additional expense.

The Contractor's design of the temporary protective shielding shall be prepared, designed, and stamped by a Professional Engineer licensed in the Commonwealth of Massachusetts and shall be submitted to the Engineer for review and approval. Payment for the Contractor's design and submittal, including contractor's engineering services, shall be considered incidental to this item and no further compensation will be allowed.

The Contractor shall be required to shield the entire structure over the roadway, including as many partial setups, adjustments or removal as necessary to accommodate all stages of work.

The shielding shall conform to the following:

1. Shielding shall be designed such that impact on roadways during installation and removal will be minimal.

2. Shielding shall be in place prior to the start of any demolition.

3. Shielding shall extend the full length of the stringer bridge and a sufficient distance above and beyond the deck overhang at the fascia and vertically adjacent to the bridge fascia.

4. Shielding shall have all spaces along the perimeter and at the seams sealed to prevent dust and debris from escaping and falling onto the roadway below the steel stringer bridge.

ITEM 994.02 (Continued)

5. Shielding shall be designed to safely withstand all loads to which it will be subjected. The design shall be in accordance with the latest editions of the AASHTO LRFD Bridge Design Specifications and the AASHTO Guide Design Specification for Bridge Temporary Works. The design shall also include a complete description of the equipment and construction methods proposed for the deck removal, and also the maximum size of deck area being excavated (i.e., 1 ft. x 1 ft. Jackhammered sections or 6 ft. x 2 ft. wet sawcut sections). The shielding shall also be designed to withstand the maximum size of excavated area should it fall during excavation or removal.

6. Shielding shall be installed or removed only upon approval of the Engineer.

No debris shall be swung over vehicular or pedestrian traffic on the bridge or roadway below.

The Contractor may utilize the bottom flanges of the existing steel girders as supports for the Protective Shielding in removal of the concrete bridge deck but shall not weld or drill holes in the existing girders for this purpose without prior approval of the Engineer. If the Contractor's operations damage any existing portions of the bridge that have been selected to be remain in place during phased construction, the Contractor shall repair such damage at his expense. The Contractor is responsible for control of bridge traffic necessary to perform this shielding work and it shall be considered incidental to this Item.

SUBMITTALS

The Contractor shall submit shop drawings, working drawings, and associated design calculations, stamped by a Professional Structural Engineer registered in Massachusetts, of all proposed shielding to the Engineer for approval prior to installation. The drawings shall include details of all connections, brackets, and fasteners. The protective shielding shall be designed to support all construction and dead loads safely; and to be sealed tightly at all joints.

BASIS OF PAYMENT

Item 994.02 will be paid for at the Contract unit price per Lump Sum, which price shall be considered full compensation for all incidentals, labor, tools, equipment, materials, installation, maintenance, removal and legal disposal of all temporary systems, including as many partial setups, adjustments or removals as required to accommodate all stages of work as required to complete the work as described herein and all incidentals required to complete the work.

Payment shall be made based upon the following percentages: 10% upon approval of design, 20% upon completion of Stage 1 to the satisfaction and approval of the Engineer, 20% upon completion of Stage 2 to the satisfaction and approval of the Engineer, and 50% upon completion of Stage 3 including removal of the shielding system, to the satisfaction and approval of the Engineer.

ITEM 995.01 **BRIDGE STRUCTURE, BRIDGE NO. B-10-001 (CLA)** **LUMP SUM**

The work under this item shall conform to the relevant provisions of Subsection 995 of the Standard Specifications and the following:

The work under this item shall conform to the specific requirements stipulated below for component parts of this Item. For those component parts where no specific requirement is stipulated, the MassDOT Standard Specifications shall apply except for payment.

Work under this Item shall include all labor, materials, equipment, and incidental costs required to construct the following:

- Sawing and Sealing Joints in Asphalt Pavement at Bridges
- 5000 PSI, 3/4 INCH, 685 HP Cement Concrete
- Precast Highway guardrail Transition
- Steel Reinforcement for Structures
- Steel Reinforcement for Structures – Epoxy Coated
- Shear Connectors
- Laminated Elastomeric Bearing Pad without Anchor Bolts
- Structural Steel – Coated Steel
- Membrane Waterproofing for Bridge Decks
- Damp-Proofing
- Metal Bridge Railing (3 Rail), Steel (Type MS3-TL4)

Excavation, backfills, and HMA pavement are paid for under separate payment items in the proposal.

The work does not include any items listed separately in the proposal. Payment for materials shown on the Plans as being part of the bridge structure or which may be incidental to its construction and are not specifically included for payment under another Item shall be considered incidental to the work performed under this Item and shall be included in the unit price of the component of which they are a part.

It shall be the responsibility of the Contractor to provide all survey controls necessary to assure accurate placement of the foundation elements and concrete components of the abutments and bearing seats under the multiple stages of construction.

SAWING AND SEALING JOINTS IN ASPHAT PAVEMENT AT BRIDGES

The work to be done under this Item consists of making a sealed kerf across the full width of the finished asphalt pavement at bridge abutments where called for on the Plans. The shape, width, and depth of the kerf shall be as shown on the Plans.

Prior to the start of the asphalt pavement operation, the Contractor shall place a mark on each curb or barrier on either side of the paved roadway. These marks shall be aligned with the actual end of the bridge deck and shall be placed so that they will not be covered or otherwise obscured by the asphalt pavement.

ITEM 995.01 (Continued)

After the completion of the paving operation, the Contractor shall snap a straight chalk line on the pavement between these two marks. The Contractor shall then saw cut the pavement along this line to the depth, width and shape as shown on the Plans. The equipment shall be approved by the Engineer prior to commencing work.

After completing the saw cutting, the Contractor shall clean the saw groove of any dust and debris with an oil free air blast. If the groove was wet sawn, the groove shall be cleaned with a water blast to remove any remaining slurry and debris, vacuumed with a Wet-or-Dry vacuum to remove any standing water, and then dried with an air blast from a Hot-Air-Lance.

Once the groove is clean and dry, the Contractor shall fill it completely with a Hot Applied Crack Sealer meeting the requirements of M3.05.2 in accordance with the manufacturer's application instructions and restrictions regarding ambient and material temperatures. The crack sealer shall be thoroughly cured prior to opening the road to traffic. To reduce tackiness, only boiler slag aggregate (black beauty) shall be scattered over the sealer when required by the Engineer. Conventional sand shall not be used for this purpose.

5000 PSI, 3/4 INCH, 685 HP CEMENT CONCRETE

The work to be done under these headings shall conform to the relevant provisions of Subsection 901 of the Standard Specifications and the following:

5000 PSI, 3/4 IN, 685 HP Cement Concrete shall be used to construct the abutments, wingwalls, keeper blocks, bridge deck, end diaphragms, approach slabs, sidewalks, and precast highway guardrail transitions, however, precast highway guardrail transitions will be paid for under the precast highway guardrail transitions.

The various classes of concrete and other materials shall be used as specified in the General Notes on the Plans and generally described above.

The following items shall be considered as included in the price per cubic yard of concrete, as stated by the Contractor and approved by the Engineer in the "Basis of Partial payments": all preformed and pre-molded filler, joint sealer, bonded closed cell foam joint systems, backer rods, neoprene strips, formwork, paraffin and all other materials (complete in place) at construction joints, deck joints, and all other work considered as incidental to the work involved in furnishing and placing concrete for which payment is not provided elsewhere in the contract, shall be considered as included in the Lump Sum contract price for this item.

PLACEMENT, FINISHING AND CURING OF CAST IN PLACE CONCRETE DECKS

The construction of the cast in place concrete deck shall be in accordance with Subsection 901 of the Standard Specifications.

PREFORMED JOINT FILLER

Preformed joint filler shall be installed at locations noted in the Contract Plans. Preformed joint filler shall be in accordance with the requirements of Section M9.14.0.

ITEM 995.01 (Continued)

PRECAST HIGHWAY GUARDRAIL TRANSITIONS

A. General.

The work under this Heading consists of fabricating, transporting and installing Precast Highway Guardrail Transitions and includes all necessary labor, materials, and equipment to complete the work as shown on the Plans. The Precast Concrete Bridge Elements shall meet the requirements of Section M4: Cement Concrete and Related Materials.

MATERIALS

A. Materials.

Materials shall conform to M4.09.1 and the following (as applicable):

Non-Shrink Grout Products	M4.04.5
Controlled Low-Strength Material – Structural Non-Excavatable	M4.08.0
Welded Steel Wire Fabric	M8.01.2
Mechanical Reinforcing Bar Splicer	M8.01.9
Lifting Devices	PCI MNL-116
Corrugated Metal Pipe	AASHTO M 36

1. Vertical Adjustment Assembly.

Vertical Adjustment Assembly details and material requirements shall be as shown on the plans. Alternate devices may be used provided that they are adjustable and can support the anticipated loads. The design of the leveling devices, with necessary calculations, shall be submitted to the Engineer of Record for approval.

2. Threaded Inserts.

Threaded inserts are permissible to facilitate forming the keyway pours. Threaded inserts shall be hot dip galvanized or made of stainless steel. The number of threaded inserts shall be minimized, and the inserts shall not come in contact with the reinforcing steel.

3. Corrugated Metal Pipe.

Corrugated Metal Pipe to be used for forming voids as specified on the plans shall be fabricated from steel and shall have a protective metallic coating of zinc (galvanizing).

CONSTRUCTION METHODS – PLANT FABRICATION

A. Pre-Production Meeting.

The Contractor shall notify the MassDOT Research and Materials Section to determine if a pre-production meeting will be required to review the specifications, shop drawings, curing plan, schedule, and discuss any specific requirements. The meeting shall be held prior to scheduling a MassDOT Inspector (refer to M4.09.4 Department Acceptance), and at least seven (7) days prior to the scheduled casting of any Precast Concrete Bridge Element or control section. The Contractor shall schedule the meeting, which shall include representatives of the Fabricator and MassDOT.

ITEM 995.01 (Continued)

B. Reinforcement.

The reinforcing bars shall be installed in accordance with Subsection 901.35, including tolerances for cover and horizontal spacing of bars. Components of mechanical reinforcing bar splicers shall be set with the tolerances shown on the plans. The reinforcing bars and mechanical reinforcing bar splicers shall be assembled into a rigid cage that will maintain its shape in the form and which will not allow individual reinforcing bars to move during the placement of concrete. This cage shall be secured in the form so that the clearances to all faces of the concrete, as shown on the plans, shall be maintained.

Where reinforcing bars are to protrude from one Precast Concrete Bridge Element in order to mate with reinforcing bar splicers in a second precast concrete element, the fabricator shall set the reinforcing bars and the reinforcing bar splicers with a template in order to ensure proper fit up within the tolerances specified on the plans.

C. Tolerances.

Fabrication shall comply with tolerances specified on the plans. Tolerances for steel reinforcement placement shall be in accordance with Subsection 901.35. In the absence of specifications on the plans, tolerances shall comply with the latest version of the PCI MNL 135, Precast Tolerance Manual.

D. Forms.

Concrete shall be cast in rigidly constructed forms, which will maintain the Precast Concrete Bridge Elements within specified tolerances to the shapes, lines and dimensions shown on the approved fabrication drawings. Forms shall be constructed from flat, smooth, non-absorbent material and shall be sufficiently tight to prevent the leakage of the plastic concrete. When wood forms are used, all faces in contact with the concrete shall be laminated or coated with a non-absorbent material. All worn or damaged forms, which cause irregularities on the concrete surface or damage to the concrete during form removal, shall be repaired or replaced before being reused. If threaded inserts are cast into the elements for support of formwork, the inserts shall be recessed a minimum of 1 inch and shall be plugged after use with a grout of the same color as that of the precast cement concrete.

CONSTRUCTION METHODS – FIELD CONSTRUCTION

A. General.

All of the Contractor's field personnel involved in the erection and assembly of the Precast Concrete Bridge Elements shall have knowledge of and follow the approved Erection Procedure.

Prior to installation, the following documentation shall be reviewed and confirmed by the MassDOT Resident Engineer or designee:

(d) QC Compressive Strength Test Report Forms attaining Design Strength, f'c for the Precast Concrete Bridge Element's representative sublot.
(e) Certificate of Compliance generated by the Fabricator as described under the Fabricator Quality Control section.
(f) QC Inspection Reports signed by the Quality Control Manager.

ITEM 995.01 (Continued)

Field construction staff shall verify that the Resident Engineer has accepted all Precast Concrete Bridge Elements prior to installation.

B. Erection Procedure.

Prior to the erection, the Contractor shall submit an Erection Procedure for approval by the Engineer. This submittal shall include computations and drawings for the transport, hoisting, erection and handling of the Precast Concrete Bridge Elements. The Erection Procedure shall be prepared and stamped by a Professional Engineer registered in the Commonwealth of Massachusetts with working knowledge of the Contractor's equipment, approved shop drawings, and materials to build the bridge. The Erection Procedure shall, at a minimum, include the following:

1. Erection Procedure

The Erection Procedure shall be prepared to conform to the requirements of 960.61, Design, Fabrication and Erection and the applicable sections in Chapter 8 of the PCI Design Handbook (eighth edition) for handling, erection, and bracing requirements. At a minimum, the Erection Procedure shall provide:

(h) Minimum concrete compressive strength for handling the Precast Concrete Bridge Elements.
(i) Concrete stresses during handling, transport, and erection.
(j) Crane capacities, pick radii, sling geometry, and lifting hardware.
(k) Verification that the equipment can handle all pick loads and weights with the required factor of safety.
(l) Evaluation of construction sequence and evaluation of any geometric conflicts in the lifting of the Precast Concrete Bridge Elements and setting them as shown on the plans.
(m) Design of crane supports including verification of subgrade for support.
(n) Location and design of all temporary bracing that will be required during erection.

Non-shrink grout and concrete materials, approved by the Engineer, shall be placed as shown on the plans. Fill joints, keyways, and voids, in strict accordance with the specifications and manufacturer's recommendations and instructions.

For footings, approach slabs and highway guardrail transitions, once these Precast Concrete Bridge Elements have been set to the correct horizontal and vertical alignment, the void between them and the supporting soil shall be filled with Controlled Low-Strength Material – Structural Non-Excavatable to the limits as shown on the plans. Add additional grout ports in the footings to facilitate the bedding process if required.

Except in approach slabs, joints shall be filled flush to the top with non-shrink grout, and any vertical misalignment between adjacent elements shall be feathered out on a slope of 1 to 12.

Curing of grout or concrete shall be performed in strict accordance with the specifications and manufacturer's recommendations. Filling shall not be completed in cold weather when either the ambient temperature or the precast member's temperature is below the manufacturer's recommendation. No localized heating of either the precast members or of the air surrounding the element will be permitted in an attempt to reach application temperatures.

ITEM 995.01 (Continued)

If the joints or voids are not filled within five days after the Precast Bridge Elements are erected, the Contractor shall cover and protect the openings from weather and debris until they are filled.

C. Survey and Layout.

Working points, working lines, and benchmark elevations shall be established prior to placement of all elements. The Contractor is responsible for field survey as necessary to complete the work. MassDOT reserves the right to perform additional independent survey. If discrepancies are found, the Contractor may be required to verify previous survey data.

D. Preparation of Closure Pours and Grouted Keyways.

Immediately prior to erecting the Precast Concrete Bridge Elements, the closure pours and grouted keyways shall be cleaned at the job site of all dust, dirt, carbonation, laitance, and other potentially detrimental materials which may interfere with the bonding of the closure pour concrete or grout and precast concrete using a high-pressure water blast. Any exposed reinforcing steel in the precast concrete shall be protected from damage during the cleaning of the keyways. Damaged epoxy coating of steel reinforcement shall be repaired, and the reinforcing steel shall be cleaned as required by the Engineer. The surfaces of the closure pours and grouted keyways shall be wetted so that the surfaces shall have a Saturated Surface Dry (SSD) condition for at least 24 hours prior to the placement of the closure pour concrete.

E. Erection.

The elements shall be placed in the sequence and according to the methods outlined in the Erection Procedure. As the erection proceeds, the Contractor shall constantly monitor the assembly to ensure that the precast concrete bridge element is within proper horizontal and vertical location and tolerances prior to releasing it from the crane and setting the next unit. The Contractor may use shims to maintain proper setting tolerances.

The concrete elements shall be lifted only by the lifting devices, and the utmost care shall be taken to prevent distortion of the elements during handling, transportation or storage.

This approval will be contingent on the Contractor demonstrating by calculations, prepared by a Professional Engineer registered in Massachusetts, that the elements will not be damaged by the non-vertical lifting force and by documentation that the capacity of the lifting devices is adequate for the non-vertical lifting force.

After all Precast Concrete Bridge Elements have been placed, the actual overall dimensions of the structure both horizontal and vertical, as laid out shall not deviate from the nominal dimensions shown on the plans beyond a tolerance of +0 inches and -1 inches.

Once the layout of Precast Concrete Bridge Elements has been accepted by the Engineer, the Contractor shall cut all lifting devices off below the surfaces of the elements.

ITEM 995.01 (Continued)

F. Filling of Blockouts for Lifting Devices and Threaded inserts.

If the blockouts in the Precast Concrete Bridge Elements where the lifting devices were located will be exposed and visible after assembly is complete, the Contractor shall fill these blockouts with Mortar (M4.04.5).

After the formwork has been removed, all threaded inserts that have been cast into the precast concrete bridge deck for support of the formwork shall be filled with a grout of the same color as that of the precast concrete.

STEEL REINFORCEMENT FOR STRUCTURES - EPOXY COATED

The work under this Heading shall conform to the relevant provisions of Subsections 901 of the Standard Specifications and the following:

Special procedures shall be used during handling, storage, and installation to prevent damaging epoxy coating, as outlined in the Concrete Reinforcing Steel Institute (CRSI) report titled "Guidelines for Inspection and Acceptance of Epoxy Coated Reinforcing Steel at the Jobsite". Any damage to the epoxy coating shall be repaired following this report. A copy of this report must be available at the jobsite for reference.

Accessories supporting epoxy coated bars or welded wire fabric shall be epoxy coated. Individual and continuous slab bolsters and chairs shall be of a type to suit various conditions encountered and must be capable of supporting a 300 lb. load without damage or permanent distortion

SHEAR CONNECTORS

Shear Connectors shall conform to the applicable provisions of Subsection 960 and Subsection M8.04.1 of the Standard Specifications and the following:

Shear connectors shall comply with all the requirements as stated on the Plans.

SUBMITTALS

Details of shear connectors, including manufacturer, sequence of installation, and all relevant technical data shall be submitted to the Engineer for approval prior to installation.

STRUCTURAL STEEL – COATED STEEL

The work under this heading shall conform to the applicable provisions of Subsection 960 of the Standard Specifications and the following:

Structural Steel shall hot dip galvanized, metallized, or metallized and painted in accordance with the Contract Plans. Hot dip galvanizing shall be in accordance with the requirements of Section M7.10.0 and these Special Provisions. Metallizing, and painting over metallizing, shall be in accordance with the requirements of the following section and Section M7.15.0. Steel coatings are incidental to the structural steel pay item.

ITEM 995.01 (Continued)

THERMAL SPRAYED COATING (METALIZING) FOOTSHOP APPLIED

This section provides the requirements for shop performed surface preparation; the application of a thermal spray coating (TSC/metalizing); the application of a coating system; and includes field application of coatings and repairs and touch up of all coatings after site erection of the coated structure.

GENERAL INFORMATION

1. All fabrication shall be completed prior to the application of a thermal sprayed coating. (TSC)
2. All surfaces to be coated shall be cleaned in accordance with SSPC SP-5.
3. All TSC shall be sealed with an approved sealer, except for faying surfaces.
4. After site erection of the structure, perform field touch-up of any damaged coating.
5. All fasteners shall be galvanized and coated with the intermediate and topcoat if applicable.
6. The products of only one thermal spray wire manufacturer and one coating manufacturer shall be used on the entire project.
7. All field painting shall be in accordance with applicable sections of Item 961 of the MassDOT Standards and Specifications.

MATERIALS

ABRASIVES

Provide abrasives that are clean, dry, and sized properly to provide the specified surface profile. The profile shall be dense, uniform and of sufficient angularity to be acceptable for the application of TSC.

Abrasives shall conform to the following as applicable:

- SSPC-AB 1 for mineral slag abrasives
- SSPC-AB 2 for recycled ferrous metal abrasives
- SSPC-AB 3 for new steel abrasives

THERMAL SPRAY FEEDSTOCK

The contractor shall provide material certificates from the supplier that includes the chemical composition and lot number of the wire. MassDOT will perform random sampling of wire from lots provided. Wire shall conform to ASTM A833. See table below for application and selection of wire type, thickness, and coating system.

Environmental Zone **2** shall be used for this project.

ENVIRONMENTAL ZONE*	WIRE TYPE	THICKNESS (mils)**	COATING SYSTEM***
1	Zinc-Aluminum	6-9	Three Coat
	Zinc-Aluminum	6-9	Sealer Only
2	Zinc- Aluminum	8-11	Three Coat
	Zinc-Aluminum	9-12	Sealer Only
3	Zinc Aluminum	9-12	Three Coat
	Zinc Aluminum	12-15	Sealer Only

ITEM 995.01 (Continued)

***Zone 1** – Bridges in rural environments, not over waterways, and not over high speed state or interstate highways with potential for salt spray and heavy salt use and de-icing chemical use.

***Zone 2** – Bridges in urban environments, near industrial and manufacturing plants, power plants, or warehouses, over heavy road traffic, or over waterways.

***Zone 3** – Bridges in marine environments, over or close to saltwater waterways, or over high speed state or interstate highways with potential for salt spray and heavy salt use and de-icing chemical use.

** Mil thickness on faying surfaces shall meet the requirements of the slip certificate.

*** Coating systems shall consist of a three coat paint system applied over the metalized surface or a clear sealer applied over the metalized surface.

SUBMITTALS

Submit the following information to the MassDOT - Highway for approval a minimum of thirty days prior to beginning any coating operations:

A. Manufacturer's recommendation and field history for the coating system proposed. Include data sheets for all selected coatings to be applied.
B. Procedures for shop surface preparation, the application of the TSC and application of coatings.
C. Procedures for coating of field connections.
D. Procedures for field touch-up surface preparation, application of TSC and application of coating.
E. Proposed abrasive for use in the shop.
F. Proposed thermal spray wire to be used and product data sheets. Provide certification of Class B slip coefficient.
G. A copy of SSPC-QP3/AISC (SPE) certification. This certification must be in effect at the time of bid and must remain in effect throughout the duration of the project.
H. Quality Systems Manual
I. Work schedule. Contractor must notify the Engineer a minimum of seven days prior to starting work.

QUALITY CONTROL

A. The shop performing the application of TSC and coating shall be certified by the American Institute of Steel Construction (AISC) Sophisticated Paint Endorsement (SPE) quality program, or under the Society for Protective Coatings (SSPC) QP3 program, "Standard Procedure for Evaluating Qualification of Shop Painting Applicators" and shall maintain certification throughout the project.

    1. The coating applicator shall have completed a minimum of three structural steel TSC projects that utilized the same coating system as that being specified on this project. Provide project locations, TSC/painting; name, e-mail address, and the telephone number of the owner or owner's representative.

ITEM 995.01 (Continued)

B. Provide an on-site Quality Control Specialist (QCS) who shall function as a TSC inspector with a minimum of five years of each TSC and coating application experience; and possess SSPC BCI Level 1 or NACE Certified Level 3 or other related certification as accepted by the MassDOT - Highway. The QCS shall not be a foreman or a member of the Contractor's production staff. The QCS's sole purpose shall be quality control testing, inspection and reporting.

PRE-APPLICATION MEETING

A pre-application meeting will be held prior to any steel fabrication that includes the application of thermal spray applied coatings. This meeting is separate from the pre-construction meeting for the entire project.

The following parties are required to attend this meeting: TSC/applicator, QCS, and MassDOT – Highway Representatives. Other project personnel should attend as may be needed.

PERSONNEL QUALIFICATION

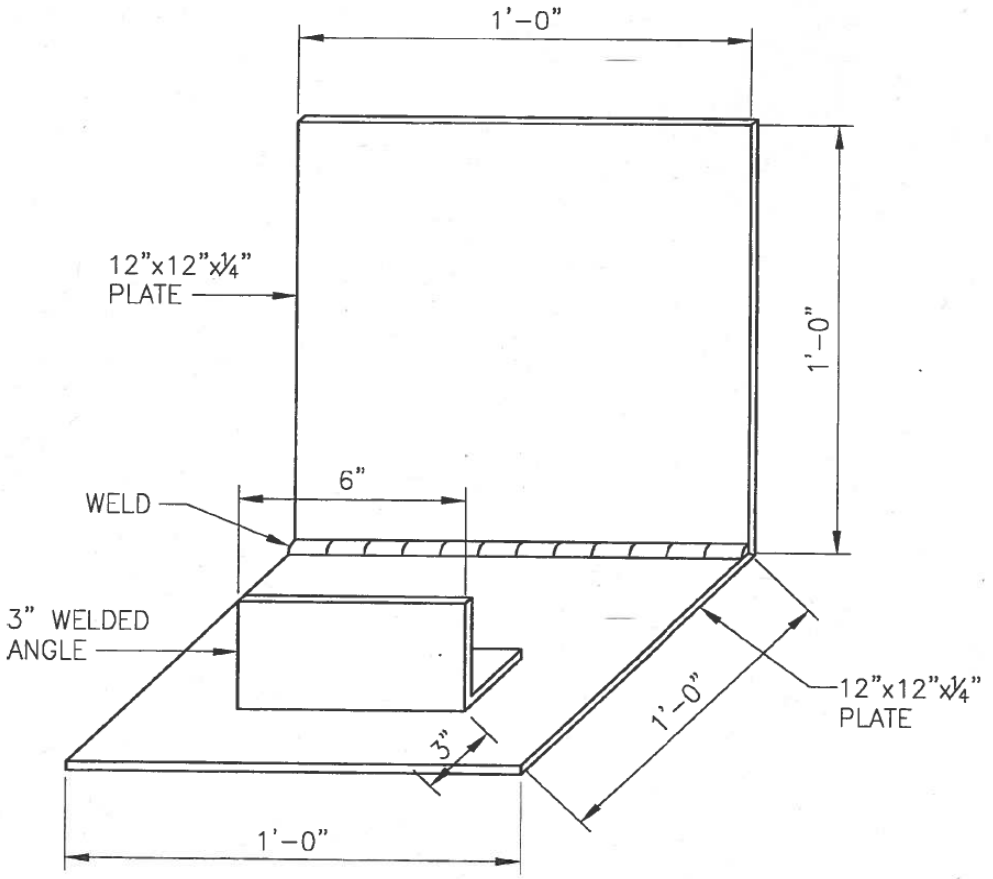
The applicators of the thermally applied material shall be individually qualified to apply the TSC as follows:

1. Each applicator must complete a practical test designed to demonstrate the ability to set up and operate the equipment to apply the material to the specified thicknesses to a minimum of 10 square feet of representative steel surfaces, and to successfully pass the surface preparation, bend, and cut tests specified herein. Administer the qualification testing, document the results in writing, and retain the bend test coupons for the duration of the project.
2. At the discretion of MassDOT - Highway, requalify the applicators at any time during the project to reconfirm the proficiency and the quality of the workmanship being provided. This may be required at any time due to unacceptable or failing results of the bend test, cut test, or poor workmanship.

SHOP QUALIFICATIONS

Prior to proceeding with the production blast cleaning operations prepare a minimum of five Job Reference Standards (JRS) test plates. Blast clean all surfaces of each test plate using the same equipment and abrasive that will be used for the production work. After acceptance of the surface cleanliness and profile, apply the TSC to all surfaces of each test plate. After acceptance of the TSC apply the sealer to be used with the three coat system to three test plates excluding the bottom surface of all test plates. After curing apply a coat of epoxy to two of the three test plates excluding the bottom surface. After curing apply a coat of the polyurethane topcoat to one test plates on all surfaces excluding the bottom surface. Apply the clear sealer to the last remaining TSC plate. Bottom surfaces of the prepared plates shall be used for cut testing as specified. Surface preparation and application shall be witnessed by a MassDOT representative. *See drawing below for dimensions and construction.*

ITEM 995.01 (Continued)



Configuration of JRS Test Plates

SURFACE PREPARATION

For cleaning that utilizes compressed air, utilize only clean, dry air. Conduct blotter test(s) in accordance with ASTM D4285 a minimum of one time each shift for each compressor system in use to verify that the air supply is free of moisture and oil contamination. Conduct the tests in the presence of the MassDOT – Highway Representative.

WELD SPATTER, SHARP EDGES, FLAME-CUT STEEL, HOLES, FINS, AND SILVERS

Remove slag, flux deposits, fins, slivers, burrs, and weld spatter from the steel. Grind any sharp edges around holes. Break all flame-cut and sheared edges. If blast profile is degraded by grinding restore profile by abrasive blasting.

SOLVENT CLEANING

Where oil and grease are present on the bare steel, remove by solvent cleaning to SSPC-SP 1 prior to blast cleaning. If contamination remains after blast cleaning, reclean with solvent prior to application of the TSC.

ITEM 995.01 (Continued)

Cleaning of galvanized bolts prior to the application of paint to bolted connections in the shop or in the field all galvanized fasteners shall be cleaned of all lubricating wax. Cleaning shall be in accordance with SSPC-SP-1, Solvent Cleaning, method 4.1.1. The contractor is responsible to identify the solvent and method needed to remove all lubricant. Cleanliness will be determined by the use of a white cloth wipe test. The test will be performed by the engineer using a clean white cloth and the same solvent used by the Contractor for cleaning. The cloth shall be wetted and rung to a damp condition, placed on selected fasteners and rubbed with a twisting motion around the entire exposed surface of the previously waxed surfaces of the fastener. A minimum of 3 alternating rotations shall be done. Acceptance of cleanliness is with no color transfer to the cloth. A minimum of 10% of the bolts at each bolted connection shall be tested for cleanliness.

ABRASIVE BLASTING

Blast clean all steel to, SSPC-SP5 "White Metal Surface Cleanliness." Determine the SP5 condition by use of SSPC-Vis 1. In the event of a conflict between the pictorial standard and the written definition the written definition shall prevail. Abrasive blast cleaned surfaces shall have a dense, uniform pattern of sharp, angular depressions and ridges, between 3.5-5.0 mils.

Surface preparation is defined as complete when all remedial repairs have been performed and the piece is accepted by both QC and MassDOT QA.

Verification of the profile height will be performed in accordance with ASTM D 4417 Method C.

Manual Blasting shall have a minimum of one profile depth measurement every 10 to 20 ft², of blasted surface.

Automated Blasting shall have a minimum of two profile depth measurements every 100 ft². When acceptable results are obtained on three consecutive days in which testing is conducted, the test frequency may be reduced to two spot readings for every 1,000 ft² providing the preparation method remains unchanged. If unacceptable results are encountered during testing or the preparation method has changed in any way, testing will revert back to a frequency of two tests per every 100 ft², until acceptable results are once again achieved over a three day period.

Profile replica tape shall be filed with the project inspection records. The Engineer with the use of a surface profile comparator will randomly inspect angularity of the profile.

The use of steel shot is not permitted.

TSC AND COATING APPLICATION

STORAGE, TESTING AND SAMPLING

The Contractor shall provide protection from the elements and insure that the paint is not subjected to temperatures outside the manufacturer's recommended extremes.

ITEM 995.01 (Continued)

Before the Contractor will be permitted to use any paint, the material provided for application shall have been sampled, tested and approved in accordance with Section M7. MassDOT's Research and Materials Laboratory needs a minimum of fourteen days after the receipt of samples to test and approve.

MIXING AND THINNING

Before the paint is applied, each component shall be mechanically mixed to ensure the pigment is completely dispersed. Mixing of components shall be accomplished by mechanical mixing, boxing or hand mixing of components will not be allowed. Any special precautions or requirements for mixing by the manufacturer shall be followed. Paint shall be kept thoroughly mixed in spray pots or containers during application. The pot life shall not be exceeded or attempts made to extend pot life with the addition of solvent.

If it is necessary for any reason to thin paint it will be done in the presence of the Engineer, in accordance with the manufacturer's recommendations. Thinning must be performed using a measuring cup marked in ounces or milliliters. Other methods, such as eyeballing, are not acceptable. Thinner shall be supplied from and recommended by the same manufacturer as the paint system.

For multi component paints, the mixing of half or partial kits is not allowed. If the need for small quantities of paint is anticipated, the contractor should order materials accordingly.

APPLICATION

Prior to the application of any coating material, the Engineer's approval must be obtained. All surfaces painted prior to the Engineer's approval, shall require the complete removal of the coating applied.

THERMAL SPRAYED COATING

Apply the TSC within six hours after the final abrasive blast cleaning is performed. If the steel is blast cleaned and remains unmetallized for longer than six hours, or if cleaned steel exhibits evidence of rustback, blast clean it again prior to metalizing. Remove abrasive residue and dust from the surface. Apply the metalizing only after the MassDOT – Highway Representative has accepted the prepared surface.

BEND TESTING FOR EVALUATION OF THE TSC

Conduct bend tests of applied TSC each day prior to production application. Unless otherwise required by the MassDOT - Highway, each day that TSC will be applied, conduct bend testing before beginning the production work. For each TSC applicator, blast clean five carbon steel coupons measuring 0.05 inches in thickness, 2 inches width, and between 5 and 8 inches in length. Use the same equipment and abrasive used for the production work. Have each applicator apply the TSC to five coupons in accordance with the requirements of this Section to dry film thickness between 8 and 15 mils. Conduct 180º bend testing on all five coupons using the appropriate mandrel in accordance with the requirements and acceptance criteria of SSPC-CS 23.

ITEM 995.01 (Continued)

Minor cracks that cannot be lifted from the substrate with a knife blade are acceptable. If lifting on any of the coupons is possible, modify the surface preparation/TSC process until acceptable results are achieved before proceeding with the production work.

Apply the TSC in accordance with the requirements of the material supplier, this specification, approved procedures and SSPC-CS 23.

The completion of TSC is defined as after the spraying of TSC is complete and all remedial repairs have been performed and the piece is accepted by both QC and MassDOT QA.

Touch-up of bare steel and/or TSC damage shall be done with organic zinc rich primer. The total area subject to repair shall be no more than .50 % of the total square foot of the piece requiring repair. The dry film thickness of the applied coating shall be a minimum of 5 mils. Surface preparation for all repair areas shall be as specified in, "Surface Preparation and Abrasives" paragraph 3. The maximum individual repair shall be limited to 1 square foot. Areas larger than 1 square foot shall be re-blasted and the TSC applied in accordance with this document.

SEALER COAT

Apply the seal coat to the TSC after the MassDOT – Highway Representative has accepted the TSC. The seal coat shall be thin enough when applied to penetrate into the body of the TSC and seal the porosity. Added thickness to porous TSC should not be measurable. Typically the seal coat is applied at a spreading rate resulting in a theoretical 1.5 mils dry film thickness. Apply the seal coat in accordance with the manufacturer's instructions as soon as possible after the application of the TSC but in no case greater than 6 hours. Verify that the TSC surface is clean and dry prior to the application of the sealer. If grease, oil, or similar contaminants become deposited on the TSC, remove them in accordance with SSPC-SP 1 prior to the application of the seal coat.

PAINT

Applied coatings shall not exhibit, runs, sags, holidays, wrinkling, pinholes, nap hair, topcoat gloss or color variations, or other film discontinuities.

Repair of unacceptable areas that involve removal of the coating system or part of it, shall require surface preparation and coating equal to that specified. Repair procedures used for any unacceptable coating shall be those supplied by the contractor and approved by the Engineer.

Application of full coats of paint shall be accomplished by spray equipment. Spray equipment shall meet the requirements of the coating manufacturer and be in proper working order.

Application by brush and roller will be allowed for limited access areas. Brushes and roller covers recommended by the coating manufacturer shall be used. Areas brushed and rolled will have a uniform thickness and be free of defects and excessive coating thickness.

ITEM 995.01 (Continued)

All coating shall be applied according to the latest manufacturer's data sheet or approved recommendations. The maximum recoat times of the primer, intermediate and finish coats shall not be exceeded.

Application of coatings shall not be done when the relative humidity is above 85% or when the surface temperature of the steel is less than 5°F above the Dew Point. Paint shall not be applied when the surface temperature is below 50°F or when the surface temperature is above 110°F.

If requested by the Engineer the Contractor shall provide written instructions from the coating manufacturer indicating the length of time that each coat must be protected from cold or inclement weather (e.g., exposure to rain) during its curing or drying period.

Paint shall not be applied when, in the Engineer's judgment, conditions are or will become unsatisfactory for application and proper cure. All changes as to the application parameters other than specified must be the manufacturer's and presented in writing and approved by the Engineer. Ambient conditions should be closely monitored so that proper cure/drying is achieved prior to recoat. In no case shall a succeeding coat of paint be applied before the previous coat has cured/dried sufficiently for recoat as per manufactured data sheet.

If required, contaminated surfaces shall be cleaned in accordance with SSPC- SP 1 Solvent Cleaning method 4.1.1.

Measurement of the ambient conditions shall be done in accordance with ASTM, E 337 Test Method for "Measuring Humidity with a Psychrometer" (the Measurement of Wet and Dry bulb Temperatures).

When the primer has cured sufficiently for recoat, all bridge components to be painted shall receive a full intermediate coat.

When the intermediate coat has cured sufficiently for recoat, all bridge components to be painted shall receive the finish coat.

COATING THICKNESS

Apply the shop and field coats to the dry film thicknesses as specified.

1. Determine the cumulative dry film thickness of each coat using a magnetic dry film thickness gage in accordance with SSPC-CS 23 and SSPC-PA 2 with the following exceptions:
    a. Take readings on each 100 square-foot increment of the surface.
    b. The minimum specified thickness of the TSC must be achieved at each individual spot measurement location (i.e., the 20 percent under run allowed by SSPC-PA 2 is not permitted for the metalizing).
2. If the thickness of any coat (TSC, seal coat, intermediate coat or top coat) is less than specified, apply additional material in accordance with the manufacturer's instructions and this Section before applying the next coat. Before applying additional TSC, visually confirm that there is no evidence of oxidation or contamination on the surface.

ITEM 995.01 (Continued)

3. Thickness of applied TSC greater than the contract specified shall be reported to the MassDOT-Highway QA inspector in writing prior to the end of the shift. The thickness of the applied TSC shall not be more than 120% of the specified range for the zone specified.

4. Application of TSC to faying surfaces that require a slip rating shall not be more than the maximum thickness specified in the environmental zone chart for each zone included in the materials section of this specification.

5. The minimum adhesion value of the unsealed TSC shall be the average of 3 spot reading resulting in an average of 700psi for each 500 sq/ft.

ACCESS FOR MASSDOT - HIGHWAY INSPECTION

Provide safe access and sufficient time for MassDOT - Highway inspections for any and all phases of the work, including but not limited to surface preparation, the application of each coat (including field coat), and for an inspection of the completed system.

QUALITY CONTROL DOCUMENTATION

Copies of Quality Control daily inspection and testing documents will be provided to the MassDOT – Highway Representative within 24 hours.

SCHEDULE OF BASIS FOR PARTIAL PAYMENT

Within ten (10) days after Notice to Proceed, the Contractor shall submit on his/her proposal form a schedule of unit prices for the major component Sub-Items that make up Item 995.01 as well as his/her total bridge structure Lump Sum cost for Bridge Structure No. B-10-001. The bridge structure Lump Sum breakdown quantities provided in the proposal form are estimated and not guaranteed. The total of all partial payments to the Contractor shall equal the LUMP SUM Contract price regardless of the accuracy of the quantities furnished by the Engineer for the individual bridge components.

ITEM 995.01 (Continued)

The cost of labor and materials for any Item not listed but required to complete the work shall be considered incidental to Item 995.01 and no further compensation will be allowed.

Sub-Item	Description	Quantity	Unit	Unit Price	Total
107.48	Preformed Joint Filler	150	FT	_____	_____
160.3	Controlled Low-Strength Material (> 300 PSI)	5	CY	_____	_____
482.31	Sawing and Sealing Joints in Asphalt Pavement at Bridges	125	FT	_____	_____
904.3	5000 PSI 3/4 INCH, 685 HP Cement Concrete	1,800	CY	_____	_____
904.31	Precast Highway Guardrail Transition	4	EA	_____	_____
910.	Steel Reinforcement for Structures	25500	LB	_____	_____
910.1	Steel Reinforcement for Structures – Epoxy Coated	328,700	LB	_____	_____
911.1	Shear Connectors	2,800	EA	_____	_____
922.	Laminated Elastomeric Bearing Pad Without Anchor Bolts	20	EA	_____	_____
960.1	Structural Steel – Coated Steel	205,000	LB	_____	_____
965.	Membrane Waterproofing for Bridge Decks	6,100	SF	_____	_____
970.	Damp-Proofing	9,300	SF	_____	_____
975.1	Metal Bridge Railing (3 Rail), Steel (Type S3-TL4)	346	FT	_____	_____
	Total Cost of Item 995.01			$_____	

The schedule on the proposal form applies only to Bridge Structure No. B-10-001. Payment for similar materials and construction at locations other than at this bridge structure shall not be included under this Item. Sub-Item numbering is presented for information only in coordination with MassDOT Standard Nomenclature.

END OF DOCUMENT
****

DOCUMENT A00802

DETAIL SHEETS

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THE COMMONWEALTH OF MASSACHUSETTS
MassDOT - HIGHWAY DIVISION
TEN PARK PLAZA, BOSTON, MA

PRELIMINARY ESTIMATE OF QUANTITIES - DETAIL SHEETS

TOWN/CITY: Bernardston
STA. 9+50 to 350+90

TYPE OF PROJECT: Bridge-Construction

YEAR: Federal Fiscal Year 2026
ROAD: Route 10 over Fall River & I-91
CLASS: Urban Arterial
DATE: August 14, 2026

PAVEMENT NOTES

PROPOSED HMA MILL & OVERLAY (STA. 26+60 TO STA. 35+85) **AREA = 5,373 SY**

SURFACE: 2" SUPERPAVE SURFACE COURSE - 12.5 POLYMER (SSC - 12.5 - P) OVER
2" PAVEMENT FINE MILLING

PROPOSED FULL DEPTH PAVEMENT (I-91 NB OFF-RAMP (SE); ROUTE 10: STA. 10+35 TO STA. 14+89, STA. 15+94 TO STA. 21+77, STA. 24+41 TO STA. 26+60)

AREA = 8,752 SY

SURFACE: 1½" SUPERPAVE BRIDGE SURFACE COURSE - 9.5 POLYMER (SSC-B - 9.5 - P) OVER
2" SUPERPAVE INTERMEDIATE COURSE – 12.5 (SIC – 12.5) OVER

BASE: 4" SUPERPAVE BASE COURSE – 37.5 (SBC – 37.5) OVER

SUBBASE: 4" DENSE GRADED CRUSHED STONE
8" (VARIABLE DEPTH OVER APPROACH SLABS) GRAVEL BORROW, TYPE b

PROPOSED FULL DEPTH PAVEMENT LESS THAN 4' WIDE **AREA = 53 SY**

SURFACE: 1½" SUPERPAVE BRIDGE SURFACE COURSE - 9.5 POLYMER (SSC-B - 9.5 - P) OVER
2" SUPERPAVE INTERMEDIATE COURSE – 12.5 (SIC – 12.5) OVER

BASE: 6" HIGH EARLY STRENGTH CEMENT CONCRETE BASE COURSE OVER

SUBBASE: 8" GRAVEL BORROW, TYPE b

PROPOSED BRIDGE PAVEMENT (STA 14+89 TO STA 15+94, STA 21+77 TO STA 24+41)

AREA = 2,034 SY

SURFACE: 1½" SUPERPAVE BRIDGE SURFACE COURSE - 9.5 POLYMER (SSC-B - 9.5 - P) OVER
1½" SUPERPAVE BRIDGE PROTECTIVE COURSE - 9.5 POLYMER (SPC-B - 9.5 - P) OVER
MEMBRANE WATERPROOFING

PAVEMENT NOTES (Continued)

PROPOSED TEMPORARY TRENCH PATCH **AREA = 647 SY**

SURFACE: 3½" HMA FOR TEMPORARY ASPHALT PATCHING

BASE: EXISTING MATERIAL SUITABLE FOR RE-USE

PROPOSED PERMANENT PAVEMENT TRENCH PATCH **AREA = 36 SY**

SURFACE: 2" SUPERPAVE SURFACE COURSE – 12.5 POLYMER (SSC – 12.5 – P) OVER VARIABLE DEPTH SUPERPAVE INTERMEDIATE COURSE – 19.0 (SIC – 19.0) (COMPACTED IN 2¼" (MIN) AND 3" (MAX) LIFTS) (SEE GENERAL PAVEMENT NOTE 6 BELOW) OVER

BASE: 8" GRAVEL BORROW, TYPE b OVER

SUBBASE: EXISTING MATERIAL SUITABLE FOR RE-USE SUPPLEMENTED WITH GRAVEL BORROW AS NECESSARY TO MATCH GRADE (SEE VARIOUS TRENCH DETAILS)

PROPOSED CEMENT CONCRETE PEDESTRIAN CURB RAMPS / SIDEWALKS / PEDESTRIAN REFUGE ISLAND

AREA = 1,028 SY

SURFACE: 4" CEMENT CONCRETE (4000 PSI, ¾", 610) OVER

BASE: 8" GRAVEL BORROW, TYPE b

PROPOSED CEMENT CONCRETE SIDEWALK THROUGH DRIVEWAY

AREA = 110 SY

SURFACE: 6" CEMENT CONCRETE (4000 PSI, ¾", 610) OVER

BASE: 8" GRAVEL BORROW, TYPE b

PROPOSED HMA DRIVEWAY – (RESIDENTIAL) **AREA = 333 SY**

SURFACE: 1½" SUPERPAVE SURFACE COURSE - 9.5 (SSC-9.5) OVER
2½" SUPERPAVE SURFACE COURSE – 12.5 (SSC-12.5) OVER

BASE: 8" SUITABLE EXISTING GRAVEL;
ADD GRAVEL BORROW, TYPE b AS REQUIRED

PAVEMENT NOTES (Continued)

PROPOSED HMA DRIVEWAYS – (COMMERCIAL / PUBLIC) **AREA = 362 SY**

SURFACE: 1½" SUPERPAVE SURFACE COURSE – 12.5 (SSC-12.5) OVER
2½" SUPERPAVE SURFACE COURSE – 12.5 (SSC-12.5) OVER

BASE: 8" SUITABLE EXISTING GRAVEL;
ADD GRAVEL BORROW, TYPE b AS REQUIRED

PROPOSED TEMPORARY PAVEMENT **AREA= 1012 SY**

SURFACE: 7½" HMA FOR TEMPORARY ASPHALT PATCHING

BASE: 12" (MIN) GRAVEL BORROW AS NECESSARY TO MEET GRADE

PROPOSED TEMPORARY HMA SW **AREA = 330 SY**

SURFACE: 3" HMA FOR TEMPORARY ASPHALT PATCHING

BASE: 8" SUITABLE EXISTING GRAVEL;
ADD GRAVEL BORROW, TYPE b AS REQUIRED

ITEM 101. CLEARING AND GRUBBING

Route 10

Station		Offset
13+43 to	15+05	RT
14+83 to	15+65	LT
15+15 to	15+71	RT
15+70 to	16+75	LT
19+22 to	19+43	LT

ITEM 102.511 TREE PROTECTION – ARMORING AND PRUNING

Route 10

Station	Offset
10+81	42’ RT

ITEM 102.521 TREE AND PLANT PROTECTION FENCE

Route 10

Station		Offset
34+37 to	35+92	RT

ITEM 146. DRAINAGE STRUCTURE REMOVED

Route 10

Station	Offset	Type
10+79	17' RT	ex DMH1
10+85	30' RT	ex CB2
11+82	22' RT	ex CB3
11+82	25' LT	ex CB4
13+73	27' LT	ex CB6
13+99	83' LT	ex CB7
16+55	27’ LT	ex CB11
19+28	24' RT	ex CB17
21+30	23’ LT	ex CB21
21+32	22' RT	ex CB20
24+80	22' RT	ex CB23
24+84	23' LT	ex CB24
28+23	23' LT	ex CB32
29+72	24' RT	ex CB35
33+46	32’ RT	ex CB36

I-91 NB Off Ramp (SE)

Station	Offset	Type
63+67	11’ LT	ex DMH5
64+73	48’ RT	ex CB30

ITEM 160.1 CONTROLLED LOW-STRENGTH MATERIAL – MANUAL EXCAVATABLE (<=100PSI)

To be used as directed for backfill around drainage pipe and existing utilities.

ITEM 201. CATCH BASIN

Route 10

Station	Offset	Structure #
10+58	21’ LT	1A
10+70	24' RT	1
11+82	15' LT	4
11+82	20' RT	5
12+86	39’ RT	7
13+52	26' RT	10
13+59	20' LT	13
13+99	84' LT	14
16+24	26' RT	16
16+46	74’ RT	15B
16+73	66’ RT	15C
16+69	17’ LT	19
17+30	25' RT	20
17+71	17’ LT	19B
19+21	29' LT	21
19+28	23' RT	25
21+07	20' RT	26
21+15	25' LT	29
24+80	20' RT	31
24+95	26' LT	32
26+54	21' RT	34
28+33	24' LT	42
29+77	19' RT	44
33+41	19' RT	45

I-91 NB Off-Ramp

Station	Offset	Structure #
64+64	10’ RT	35
64+05	43’ LT	37A
64+06	32’ RT	36
63+46	21’ LT	38
61+92	17’ LT	40A

ITEM 202. MANHOLE

Route 10

Station	Offset	Structure #
10+76	15' RT	2
11+86	14' RT	6
13+29	18' RT	8
16+48	63’ RT	15D
16+72	56’ RT	15E
16+78	17’ LT	19A
17+86	82' RT	48
21+07	23' LT	28
25+07	19’ RT	33
28+96	35' RT	43
33+48	25' RT	46

I-91 NB Off-Ramp

Station	Offset	Structure #
63+23	10' LT	40
63+46	15' LT	39
64+03	15' LT	37

ITEM 202.2 MANHOLE (9 TO 14 FOOT DEPTH)

Route 10

Station	Offset	Structure #
13+39	43’ RT	9

ITEM 204. GUTTER INLET

Route 10

Station	Offset	Structure #
11+82	22' LT	3
13+59	27' LT	12
16+66	29' LT	18
17+71	24’ LT	20A

ITEM 205. LEACHING BASIN

Route 10

Station	Offset	Structure #
17+30	25' RT	50
17+95	80' RT	49

ITEM 209.1 DROP INLET, TYPE DF

Route 10

Station	Offset	Structure #
33+45	36' RT	47

ITEM 220. DRAINAGE STRUCTURE ADJUSTED

Route 10

Station	Offset	Type
24+61	18' LT	DMH
28+13	17' LT	DMH
30+63	22' LT	DMH
33+63	21' LT	DMH

I-91 NB Off-Ramp

Station	Offset	Type
61+71	14' LT	DMH

ITEM 220.3 DRAINAGE STRUCTURE CHANGE IN TYPE

Route 10

Station	Offset	Structure #
16+54	25' RT	17
19+31	26' LT	22
17+86	82' RT	48

ITEM 220.5 DRAINAGE STRUCTURE REMODELED

Route 10

Station	Offset
17+86	82’ RT

ITEM 221. FRAME AND COVER

Route 10

Station	Offset
10+76	15' RT
11+82	15' LT
11+86	14' RT
13+29	18' RT
13+39	43' RT
13+59	20' LT
16+48	63’ RT
16+72	56’ RT
17+30	32’ RT
17+86	82' RT
28+96	35' RT
33+48	25' RT

I-91 NB Off-Ramp

Station	Offset
63+23	10’ LT
63+46	15' LT
64+03	15' LT

ITEM 221.1 FRAME AND COVER - SECURED

Route 10

Station	Offset
16+54	25' RT
16+55	27' LT
16+69	17’ LT
16+78	17’ LT
17+71	17’ LT
19+31	26' LT
20+25	19’ RT
21+08	23’ LT
24+61	18' LT
25+07	19’ RT
28+13	17' LT
30+63	22' LT
33+63	21' LT

ITEM 222. FRAME AND GRATE – MASSDOT BAR TYPE

Route 10

Station	Offset	Structure #
64+05	43’ LT	37A

ITEM 222.1 FRAME AND GRATE – MASSDOT CASCADE TYPE

Route 10

Station	Offset	Type
10+58	21' LT	Prop CB
10+70	24' RT	Prop CB
11+82	22' LT	Prop GI
11+82	20' RT	Prop CB
12+86	39' RT	Prop CB
13+52	26' RT	Prop CB
13+59	27' LT	Prop GI
13+99	84' LT	Prop CB
16+24	26' RT	Prop CB
16+46	74’ RT	prop CB
16+48	27' LT	Prop GI
16+73	67' RT	Prop CB
17+30	25' RT	Prop CB
17+71	24' LT	Prop CB
17+95	80’ RT	Prop LB
19+21	29' LT	Prop CB
21+07	20' RT	Prop CB
21+14	25’ LT	Prop CB
24+95	26' LT	Prop CB
26+54	21' RT	Prop CB
28+33	24' LT	Prop CB
29+77	21' RT	Prop CB
33+41	21' RT	Prop CB

I-91 NB Off-Ramp

Station	Offset	Type
61+92	10’ RT	PROP CB
63+46	21’ LT	PROP CB
64+06	32’ RT	PROP CB
64+64	10’ RT	PROP CB

ITEM 222.11 FRAME AND GRATE (OR COVER) REMOVED AND RESET

Route 10

Station	Offset
19+28	21' RT
24+80	20' RT

ITEM 222.2 FRAME AND GRATE – MASSDOT DROP INLET

Route 10

Station	Offset	Type
33+45	36’ RT	Drop Inlet

ITEM 223.2 FRAME AND GRATE (OR COVER) REMOVED AND DISCARDED

Route 10

Station	Offset	Type
10+79	17’ RT	FRAME & COVER
10+85	30’ RT	FRAME & GRATE
11+82	22’ RT	FRAME & GRATE

ITEM 223.2 (Continued)

11+82	25’ LT	FRAME & GRATE
13+73	27’ LT	FRAME & GRATE
13+99	83’ LT	FRAME & GRATE
16+55	27’ LT	FRAME & GRATE
19+28	24’ RT	FRAME & GRATE
21+30	23’ LT	FRAME & GRATE
21+32	22’ RT	FRAME & GRATE
24+61	18’ LT	FRAME & COVER
24+80	22’ RT	FRAME & GRATE
24+84	23’ LT	FRAME & GRATE
28+13	17' LT	FRAME & COVER
28+23	23’ LT	FRAME & GRATE
29+72	24’ RT	FRAME & GRATE
30+63	22' LT	FRAME & COVER
33+46	24’ RT	FRAME & GRATE
33+63	21' LT	FRAME & COVER

I-91 NB Off-Ramp

Station	Offset	Type
61+71	10’ RT	FRAME & GRATE
63+67	11’ LT	FRAME & COVER
64+73	48’ RT	FRAME & GRATE

ITEM 227.4 MASONRY PLUG

Route 10

Station	Offset
12+83	39’ RT
16+48	73’ RT
16+53	22’ RT
16+70	67’ RT
16+76	66’ RT
17+81	80’ RT
28+90	35’ RT

I-91 NB Off-Ramp

Station	Offset
64+03	30’ RT

ITEM 258. STONE FOR PIPE ENDS

Route 10

Station	Offset
14+02	56' RT
15+41	47' LT
15+47	60’ LT
19+33	66' LT

ITEM 302.08 8 INCH DUCTILE IRON WATER PIPE (RUBBER GASKET)

Route 10

Station		Offset
14+50 to	14+84	LT
15+94 to	16+70	LT

ITEM 309. DUCTILE IRON FITTINGS FOR WATER PIPE

4 vertical bends are required at Fall River Bridge Limits and 4 vertical bends are required at I-91 bridge limits.

Route 10

Station	Offset	Type
21+56	22' LT	11° bend
21+60	22' LT	11° bend
24+59	21' LT	11° bend
24+64	22' LT	11° bend

ITEM 358. GATE BOX ADJUSTED

Route 10

Station	Offset	Type
11+05	17' LT	WG
11+09	15' LT	WG
11+12	21' LT	WG
11+15	18' LT	WG
11+27	20' LT	WG
16+67	46' RT	WG
24+68	22' LT	WG
31+62	15' LT	WG
31+64	19' LT	WG
32+15	17' LT	WG
34+14	21' LT	WG

ITEM 371.08 8 INCH COUPLING

Route 10

Station	Offset
14+50	LT
16+75	LT

ITEM 451. HMA FOR PATCHING

To be used for mill & overlay areas that are in disrepair and cannot be milled out, and for permanent pavement trench patches.

ITEM 472. TEMPORARY ASPHALT PATCHING

To be used for temporary patching for access and drainage at drives, temporary wheelchair ramps, temporary trench patching, temporary stage construction, and for temporary traffic control.

ITEM 477.2 MILLED RUMBLE STRIP (TYPE C)

Route 10

Station		Offset
12+75 to	13+52	LT/RT
13+76 to	14+49	RT
13+82 to	14+60	LT/RT
14+22 to	14+70	LT

ITEM 477.2 (Continued)

16+26 to	16+61	LT/RT
16+93 to	17+41	LT/RT
17+08 to	17+42	LT
18+00 to	18+64	LT
18+33 to	21+54	LT/RT
18+80 to	19+44	RT
19+60 to	20+24	RT
20+14 to	20+78	LT
20+40 to	21+04	RT
20+94 to	21+55	LT
21+20 to	21+54	RT
24+64 to	25+28	RT
24+65 to	25+29	LT
24+65 to	28+62	LT/RT
25+44 to	25+82	RT
25+45 to	26+09	LT
26+25 to	26+89	LT
26+70 to	27+34	RT
27+50 to	28+14	RT
27+99 to	28+39	LT
28+30 to	28+54	RT
28+55 to	29+19	LT
29+67 to	30+22	LT
29+87 to	33+79	LT/RT
30+09 to	30+73	RT
30+38 to	31+02	LT
30+89 to	31+34	RT
31+83 to	32+40	LT
32+56 to	33+20	LT
32+61 to	33+25	RT
33+41 to	34+05	RT
34+14 to	34+50	LT/RT
34+21 to	34+50	RT
34+68 to	35+85	LT/RT
34+68 to	35+32	RT
34+95 to	35+59	LT
35+75 to	35+85	LT
35+48 to	35+85	RT

ITEM 482.5 SAWCUTTING ASPHALT PAVEMENT FOR BOX WIDENING

Route 10 Station		Offset
17+75 to	18+61	LT
26+60 to	28+00	LT
30+58 to	30+62	LT
33+67 to	33+84	LT

ITEM 504.2 GRANITE CURB TYPE VA4 – SPLAYED END

Route 10 Station	Offset
16+50	28 'LT
17+63	30 'LT
17+77	25 'LT

ITEM 504.2 (Continued)

19+16	31 'LT
19+28	29 'LT
21+34	26 'LT
25+01	26 'LT
28+27	25' LT
28+39	25’ LT

I-91 NB Off-Ramp

Station	Offset
61+86	11' RT
61+98	11' RT
64+58	11' RT
64+70	11' RT

ITEM 506. GRANITE CURB TYPE VB – STRAIGHT

Route 10

Station		Offset
10+25 to	10+77	LT
10+25 to	10+49	RT
11+40 to	12+17	LT
11+49 to	11+49	RT
11+52 to	11+59	RT
11+54 to	12+42	RT
11+63 to	11+69	RT
12+54 to	13+18	LT
13+33 to	13+55	RT
13+55 to	13+60	LT
13+55 to	13+61	LT
13+55 to	13+61	RT
13+62 to	13+62	LT/RT
13+72 to	13+72	LT/RT
13+72 to	13+78	LT
13+72 to	13+78	RT
13+76 to	13+78	LT
13+76 to	14+01	RT
14+18 to	14+75	LT
16+04 to	16+29	RT
16+43 to	16+49	LT
16+93 to	16+93	RT
17+27 to	19+14	RT
17+64 to	17+65	LT
19+23 to	19+25	RT
19+24 to	21+75	RT
21+37 to	21+78	LT
24+42 to	24+98	RT
24+59 to	25+70	LT
26+51 to	28+78	RT
29+74 to	29+80	RT
30+09 to	31+63	RT
32+30 to	34+48	RT

ITEM 506.1 GRANITE CURB TYPE VB – CURVED

Route 10 Station		Offset
10+49 to	10+86	RT
11+49 to	11+54	RT
11+49 to	11+52	RT
11+59 to	11+63	RT
13+55 to	13+55	LT/RT
13+78 to	13+78	LT/RT
13+78 to	13+83	LT
16+49 to	16+58	LT
16+54 to	16+57	RT
16+93 to	17+00	RT
17+65 to	17+68	LT
19+23 to	19+24	RT
29+46 to	29+51	RT
34+28 to	34+48	LT
39+29 to	39+41	RT

ITEM 509. GRANITE TRANSITION CURB FOR PEDESTRIAN CURB RAMPS – STRAIGHT

Route 10 Station		Offset
10+77 to	10+83	LT
11+38 to	11+40	LT
12+17 to	12+54	LT
12+42 to	12+51	RT
13+26 to	13+33	RT
13+18 to	13+55	LT
13+55 to	13+76	RT
13+60 to	13+76	LT
16+29 to	16+31	RT
17+23 to	17+27	RT
19+14 to	19+20	RT
19+25 to	19+31	LT
25+70 to	25+78	RT
26+48 to	26+51	RT
28+78 to	28+81	RT
29+70 to	29+74	RT
29+80 to	30+09	RT
34+48 to	34+57	LT
34+48 to	34+57	RT

ITEM 509.1 GRANITE TRANSITION CURB FOR PEDESTRIAN CURB RAMPS – CURVED

Route 10 Station		Offset
10+83 to	10+88	LT
10+86 to	10+91	RT
11+30 to	11+38	LT
13+83 to	13+83	LT
14+09 to	14+18	LT
16+31 to	16+54	RT
16+57 to	16+59	RT
17+00 to	17+23	RT

ITEM 509.1 (Continued)

25+78 to	25+80	RT
26+34 to	26+48	RT
28+81 to	28+88	RT
29+51 to	29+70	RT
31+63 to	32+30	RT
34+19 to	34+28	LT

ITEM 511.1 **GRANITE EDGING TYPE SB - STRAIGHT**

Route 10

Station		Offset
16+64 to	17+12	LT
17+15 to	17+25	LT
17+18 to	17+37	LT
17+30 to	17+39	LT
17+61 to	17+64	LT
17+81 to	18+53	LT
18+71 to	19+13	LT
19+24 to	19+34	RT
19+31 to	21+31	LT
19+35 to	19+45	RT
25+04 to	28+07	LT
28+22 to	28+24	LT
28+42 to	29+19	LT
28+95 to	29+01	RT
29+21 to	29+23	LT
29+55 to	29+55	LT
29+58 to	30+57	LT
30+82 to	33+84	LT

I-91 NB Off-Ramp

Station		Offset
61+20 to	65+14	LT
61+20 to	65+31	RT
64+45 to	64+51	LT

ITEM 512.1 **GRANITE EDGING TYPE SB (RADIUS 10 FEET OR LESS)**

Route 10

Station		Offset
17+15 to	17+18	LT
17+25 to	17+30	LT
17+37 to	17+39	LT
18+53 to	18+54	LT
28+22 to	28+24	LT
29+19 to	29+21	LT
29+55 to	29+58	LT
30+57 to	30+59	LT

ITEM 514. **GRANITE CURB INLET – STRAIGHT**

Route 10

Station	Offset
13+53	26' RT

ITEM 514. (Continued)

16+25	27' RT
16+66	29’ LT
17+30	26' RT
26+54	22' RT
33+41	22' RT

I-91 NB Off-Ramp

Station	Offset
64+64	11’ RT

ITEM 515. GRANITE CURB INLET – CURVED

Route 10

Station	Offset
10+71	25’ RT

ITEM 580. CURB REMOVED AND RESET

Route 10

Station		Offset
14+06 to	14+52	RT
16+00 to	16+17	RT
21+24 to	21+75	RT
24+40 to	24+97	RT

ITEM 581. CURB INLET REMOVED AND RESET

Route 10

Station	Offset
11+82	26' LT
11+82	23' RT
17+72	25' LT
19+28	24' RT
19+31	27' LT
21+07	20’ RT
21+14	25” LT
24+80	23' RT
24+95	25' LT

I-91 NB Off-Ramp

Station	Offset
61+92	11’ RT

ITEM 583. EDGING REMOVED AND RESET

Route 10

Station		Offset
12+47 to	13+27	LT
13+55 to	13+71	LT
13+76 to	13+83	LT
14+12 to	14+74	LT
16+32 to	16+51	LT
16+78 to	17+12	LT

ITEM 583. (Continued)

16+99 to	17+40	LT
17+61 to	18+61	LT
17+88 to	19+34	RT
18+71 to	21+77	LT
19+22 to	9+45	RT
19+31 to	21+24	RT
24+42 to	28+08	LT
24+97 to	26+87	RT
28+23 to	29+23	LT
29+55 to	30+62	LT
30+82 to	33+83	LT

I-91 NB Off-Ramp

Station		Offset
61+20 to	26+87	LT
61+20 to	29+01	RT

ITEM 595. CURB INLET REMOVED AND DISCARDED

Route 10

Station	Offset
10+58	22' LT
13+74	28' LT
16+55	28' LT

I-91 NB Off-Ramp

Station	Offset
64+73	50’ LT

ITEM 628.315 TEMPORARY IMPACT ATTENUATOR, REDIRECTIVE, TL-3

To be used for ends of temporary barriers during construction of I-91 and Fall River bridges.

ITEM 630.2 HIGHWAY GUARD REMOVED AND DISCARDED

Route 10

Station		Offset
13+41 to	14+32	RT
14+21 to	14+67	LT
16+15 to	16+51	RT
16+49 to	17+12	LT
18+57 to	21+63	LT
20+56 to	21+61	RT
24+56 to	27+25	LT
24+61 to	25+63	RT

ITEM 632.4 INDIVIDUAL POST REMOVED AND DISCARDED

Route 10

Station	Offset
34+01	32' RT
34+07	32 'RT

ITEM 632.4 (Continued)

34+10	32 'RT
34+11	32' RT

ITEM 657. TEMPORARY FENCE

I-91 NB Off-Ramp

Station	Offset
63+31 to	64+95 LT

ITEM 666. CHAIN LINK FENCE REMOVED AND RESET

Route 10

Station	Offset
24+48 to	24+49 LT

ITEM 669. FENCE REMOVED AND STACKED

Route 10

Station	Offset
13+18 to	13+40 RT
16+35 to	16+42 LT
16+37 to	16+44 LT

ITEM 691. BALANCED STONE WALL REMOVED AND REBUILT

Route 10

Station	Offset
10+25 to	10+50 LT
10+54 to	10+85b LT

ITEM 765.411 SHORT GRASSLAND MIX

Route 10

Station	Offset
13+15 to	14+06 RT
15+76 to	16+60 RT
16+44 to	17+13 LT
24+40 to	25+80 RT

ITEM 765.442 ROADSIDE RIVERBANK MIX

Route 10

Station	Offset
13+86 to	14+81 RT
14+82 to	15+43 LT
15+36 to	16+00 RT
15+90 to	16+92 LT

ITEM 765.554 WETLAND SEED – SEASONALLY FLOODED

I-91 NB Off-Ramp

Station	Offset
64+07 to	64+53 LT

ITEM 767.121 SEDIMENT CONTROL BARRIER

Route 10

Station		Offset
14+34 to	15+43	LT/RT
15+42 to	16+56	LT/RT
16+45 to	17+12	LT
18+22 to	18+52	LT
18+54 to	21+77	LT
24+40 to	27+92	LT

ITEM 767.6 AGED PINE BARK MULCH

Route 10

Station		Offset
10+25 to	10+50	LT
10+54 to	10+84	LT
32+23 to	32+40	RT

ITEM 767.9 JUTE MESH

Route 10

Station		Offset
13+86 to	14+06	RT
15+04 to	15+45	LT
16+33 to	16+93	LT

I-91 NB Off-Ramp

Station		Offset
64+07 to	64+53	LT

ITEM 804.3 3 INCH ELECTRICAL CONDUIT NM – PLASTIC (UL)

Route 10

Station	Offset
13+65 to	13+80 RT
13+68 to	13+80 LT
13+80 to	13+89 RT
13+73 to	13+80 LT/RT
13+80 to	13+80 LT/RT
18+36 to	19+23 RT
19+22 to	19+25 RT
19+23 to	19+27 RT
19+25 to	19+27 RT
19+27 to	19+39 RT
19+39 to	19+39 RT
34+45 to	34+62 LT
34+62 to	34+65 LT
34+63 to	34+65 RT
34+65 to	34+65 LT/RT

ITEM 811.31 PULL BOX 12 X 12 INCHES – SD2.031

Route 10

Station	Offset
13+80	35' LT
13+80	1' RT
13+80	36' RT
19+25	66’ RT
19+27	62' RT
19+40	38' RT
34+65	25' LT
34+65	23' RT

ITEM 825.21 RRFB-AC POWERED (2 POST ASSEMBLY SYSTEM)

Route 10

Station	Offset
19+31	RT
34+60	RT/LT

ITEM 825.31 RRFB-AC POWERED (3 POST ASSEMBLY SYSTEM)

Route 10

Station	Offset
13+73	RT/LT

ITEM 831. ROADSIDE GUIDE SIGN (D6/D8) – ALUMINUM PANEL (TYPE A)

Route 10

Sign	Station	Offset
MA-D1-5a	13+43	34' RT
MA-D1-5b	17+29	42' LT
MA-D1-5c	17+29	42' LT
MA-D1-6a	13+43	34' RT
MA-D1-6b	25+52	30' LT

ITEM 832. WARNING-REGULATORY AND ROUTE MARKER - ALUMINUM PANEL (TYPE A)

Route 10

Sign	Station	Offset
MA-M1-5 (10)	14+52	31' LT
	32+53	29' RT
M1-1 (91)	10+06	25’ RT
M2-1	10+06	25' RT
M3-1	32+53	29' RT
M3-3	14+51	31' LT
OM3-L	14+66	30' LT
	16+18	34' RT
	21+58	28' LT
	24+64	29' RT
OM3-R	14+17	35' RT
	16+52	31' LT
OM3-R	21+53	29' RT

ITEM 832. (Continued)

	24+64	28' LT
R1-1	10+96	36' LT
	11+52	27' RT
	17+00	42' RT
	33+74	36' LT
R2-1(45)	13+93	36' RT
R3-17	10+51	25' RT
	20+75	29’ RT
	26+74	29’ RT
	27+29	26’ LT
	35+82	28’ LT
R3-17aP	35+82	28’ LT
	10+51	25' RT
R5-1	16+80	39' LT
	17+20	28' LT
	17+36	29' LT
	17+67	29' LT
R5-1a	16+80	39' LT
	17+20	28' LT
	17+36	29' LT
	17+67	29' LT
R6-1L	16+80	39' LT
	17+20	28' LT
	17+36	29' LT
	17+67	29' LT
R6-1R	16+80	39' LT
	17+20	28' LT
	17+36	29' LT
	17+67	29' LT
R7-9	13+25	35' LT

I-91 NB Off-Ramp

Sign	Station	Offset
R1-1	65+04	14' LT
	65+18	21' RT
R3-2	64+65	14' LT
	64+75	14' RT
R5-1	65+11	13' LT
	65+27	26' RT
R5-1a	65+11	13' LT
	65+27	26' RT
R6-1L	65+11	13' LT
	65+27	26' RT
R6-1R	65+11	13' LT
	65+27	26' RT

ITEM 834.17 REFLECTORIZED FLEXIBLE DELINEATOR POST (AMBER)

Route 10

Station	Offset
19+32	33' RT

I-91 NB Off-Ramp

Station	Offset
61+68	13' LT
62+48	13' LT

ITEM 834.17 (Continued)

63+28	13' LT
64+07	13' LT
64+86	13' LT

ITEM 834.18 REFLECTORIZED FLEXIBLE DELINEATOR POST (WHITE)

Route 10

Station	Offset
19+28	63' RT

I-91 NB Off-Ramp

Station	Offset
61+64	13' RT
62+45	13' RT
63+25	13' RT
64+06	13' RT
64+87	13' RT

ITEM 841.1 SUPPORTS FOR GUIDE SIGN (D6 W/ D8-5 INCH TUBULAR POST) STEEL

Route 10

Station	Offset
13+43	34' RT
17+29	42' LT

ITEM 841.2 SUPPORTS FOR GUIDE SIGN (D6 – 5 INCH TUBULAR POST) STEEL

Route 10

Station	Offset
25+52	30' LT

ITEM 847.1 SIGN SUP (N/GUIDE)+RTE MKR/1 BRKWAY POST ASSEMBLY - STEEL

Route 10

Station	Offset
10+06	25' RT
10+51	25' RT
10+83	34' RT
10+96	36' LT
11+52	27' RT
12+50	33' LT
13+25	35' LT
13+30	35' RT
13+93	36' RT
14+14	31' LT
14+17	35' RT
14+21	31' LT
14+32	36' RT
14+51	31' LT
14+66	30' LT
16+18	34' RT
16+50	35' RT
16+52	31' LT

ITEM 847.1 (Continued)

16+84	43' LT
17+00	42' RT
17+21	54' LT
17+27	54' LT
17+28	33' RT
17+29	42' LT
17+65	32' LT
18+52	30' LT
19+25	27' RT
19+33	26' RT
21+53	29' LT
21+58	28' RT
24+64	29' RT
24+64	28' LT
25+72	29' RT
26+74	29' RT
27+29	26' LT
28+47	30' RT
30+57	28' LT
32+53	29' RT
33+30	29' RT
34+13	28' RT
35+82	28' LT

I-91 NB Off-Ramp

Station	Offset
63+61	14' RT
63+72	13'RT
63+76	13' LT
64+65	14' LT
64+75	14' RT
65+04	14' LT
65+18	21' RT

ITEM 848.1 **SIGN SUP (N/GUIDE)+RTE MKR W/2 BRKWAY POST ASSEMBLIES – STEEL**

Route 10

Station	Offset
11+25	31' LT
16+80	39' LT
17+18	29' LT
17+36	30' LT
17+67	29' LT
33+52	25' LT
33+74	36' LT

I-91 NB Off-Ramp

Station	Offset
65+11	13' LT
65+27	26' RT

ITEM 864.04 **PAVEMENT ARROWS AND LEGENDS REFLECTORIZED WHITE (THERMOPLASTIC)**

Route 10

Station	Type
10+31	BIKE LANE
10+62	BIKE LANE
11+62	BIKE LANE
16+43	BIKE LANE
17+13	RIGHT TURN/STRAIGHT
17+26	STRAIGHT ARROW
17+32	BIKE LANE
17+30	BIKE LANE
17+43	LEFT TURN
18+45	BIKE LANE
19+36	BIKE LANE
23+31	BIKE LANE
23+36	BIKE LANE
26+78	BIKE LANE
27+40	BIKE LANE
28+29	RIGHT TURN
28+50	ONLY
28+58	STRAIGHT ARROW
29+10	BIKE LANE
29+90	BIKE LANE
30+45	BIKE LANE
33+47	BIKE LANE
34+38	BIKE LANE
35+75	BIKE LANE

I-91 NB Off-Ramp

Station	Type
63+65	STRAIGHT ARROW
64+45	ONLY
64+85	RIGHT ARROW

ITEM 864.34 **SLOTTED PAVEMENT MARKER TWO-WAY YELLOW/RED**

I-91 NB Off-Ramp (SE)

Station	Offset
61+48	LT
61+88	LT
62+28	LT
62+68	LT
63+07	LT
63+47	LT
63+87	LT
64+27	LT
64+67	LT

I-91 SB Off-Ramp (NW)

Station	Offset
17+17	LT
17+43	LT
17+52	LT

I-91 SB Off-Ramp (SW)

Station	Offset
19+41	RT

ITEM 864.35 SLOTTED PAVEMENT MARKER TWO-WAY YELLOW/YELLOW

Route 10 Station
11+74
12+51
13+31
14+16
16+56
17+36
18+16
18+96
19+76
20+56
21+36
25+36
26+16
26+96
27+76
28+55
30+16
30+95
31+76
32+55
33+36
34+15
34+96
35+75

ITEM 864.41 GREEN COLORIZED PAVEMENT MARKINGS

Route 10 Station		Offset
10+61 to	11+51	RT
10+84 to	11+36	LT
16+39 to	17+14	RT
16+73 to	17+07	LT
17+45 to	17+63	LT
18+17 to	18+91	RT
18+74 to	19+48	LT
25+90 to	26+32	RT
27+67 to	28+09	LT
28+83 to	29+73	RT
29+26 to	29+52	LT
30+92 to	31+42	LT
33+66 to	34+40	LT

ITEM 874. STREET NAME SIGN

Route 10 Sign	Station	Offset
MA-D3-1b	10+83	34' RT
MA-D3-1e	10+83	34' RT
MA-D3-1a	11+25	30' LT
MA-D3-1e	11+25	30' LT
MA-D3-1c	16+50	35' RT
MA-D3-1e	16+50	35’ RT

ITEM 874. (Continued)

MA-D3-1d	33+74	36' LT
MA-D3-1f	33+54	25' LT

ITEM 874.2 **TRAFFIC SIGN REMOVED AND RESET**

Route 10

Sign	Station	Offset
"INTERSECTION AHEAD"	12+55	28' LT
"SPEED LIMIT 35”	14+16	30' LT
"#90"	14+23	31' LT
"STOP"	16+84	51' LT
"STOP"	17+09	30' LT
"TRAILER"	17+22	40' LT
OM1-1	17+27	50' LT
"STOP"	17+34	31' LT
"STOP"	17+66	34' LT
OM1-1	18+52	28' LT
OM1-1	19+31	29' RT
"NO LEFT TURN"	19+43	28' RT
"TRUCKS ENTERING RIGHT"	25+87	30' RT
"TWO WAY TRAFFIC"	28+46	31' RT
"OM1-1"	30+52	30' LT
"SCENIC " BYWAY	33+32	33' RT
"53"	34+14	32' RT

I-91 NB Off-Ramp (SE)

Sign	Station	Offset
"TRUCKS ENTERING RIGHT"	63+63	18' RT
"WRONG WAY”	64+82	61’ RT
"WRONG WAY"	64+98	32' RT

ITEM 874.4 **TRAFFIC SIGN REMOVED AND STACKED**

Route 10

Sign	Station	Offset
"I-91" "JUNCTION"	10+17	27' RT
"WEIGHT LIMIT" "AHEAD"	10+49	25' RT
"WEIGHT LIMIT"	13+63	32' RT
“FALLS RIVER”	14+35	35’ RT
"RTE. 10" &"SOUTH"	14+54	30' LT
"DNE & ONE WAY"	16+81	47' LT
"DNE & ONE WAY"	17+05	28' LT
"WEIGHT LIMIT"	17+24	28' LT
"DNE & ONE WAY"	17+33	28' LT
"DNE & ONE WAY"	17+68	31' LT
"WEIGHT LIMIT" "AHEAD"	21+41	28' LT
"YIELD & NO LEFT TURN"	26+68	30' RT
"DNE & ONE WAY"	26+72	28' RT
"YIELD"	26+89	54' RT

ITEM 874.4 (Continued)

"DNE & ONE WAY"	26+93	53' RT
"MOTORISTS GIVE 4 FT"	31+21	26' RT

ITEM 874.41 GUIDE SIGN REMOVED AND STACKED

Route 10

Sign	Station	Offset
"I-91 South"	25+58	30' LT

ITEM 874.8 TRAFFIC SIGN REMOVED AND DISCARDED

Route 10

Sign	Station	Offset
"STOP"	10+95	42' LT
"HARTWELL & RIVER ST"	11+26	37' LT
"STOP"	11+47	67' RT
"SLOW BLIND PERSON"	11+63	30' LT
"STATE HIGHWAY PARKING PROHIBITED"	13+13	27' LT
"R2-1(45)"	13+84	29' RT
OM3-R	14+28	31' RT
OM3-L	14+57	29' LT
OM3-L	16+18	32' RT
"KRINGLE DR"	16+40	36' RT
OM3-R	16+54	32' LT
"WEIGHT LIMIT"	17+12	229' LT
OM3-R	21+55	28' RT
OM3-L	21+60	29' LT
OM3-R	24+62	27' LT
OM3-L	24+62	29' RT
"STOP" & "BALD MOUNTAIN ROAD"	33+74	35' LT

ITEM 874.81 GUIDE SIGN REMOVED AND DISCARDED

Route 10

Sign	Station	Offset
"I-91 NORTH" "I-91 SOUTH"	13+45	35' RT
"RTE. 10 NORTH" "RTE. 10 SOUTH"	17+26	40' LT

ITEM 877.1 SIGN POST REMOVED AND DISCARDED

Route 10

Sign	Station	Offset
"DELINEATOR"	13+78	30' RT
"DELINEATOR"	27+24	25' LT
SIGN POST	33+61	28' LT
SIGN POST	33+81	49' LT
SIGN POST	28+59	27' RT

ITEM 877.2 **SIGN POST REMOVED AND STACKED**

Route 10

Sign	Station	Offset
"WHITE DELINEATOR"	19+05	52' RT
"YELLOW DELINEATOR"	19+34	34' RT
"YELLOW DELINEATOR"	26+76	29' RT

I-91 NB Off-Ramp (SE)

Sign	Station	Offset
"WHITE DELINEATOR"	62+31	12’ RT
"YELLOW DELINEATOR"	63+74	10’ LT
"YELLOW DELINEATOR"	64+66	19’ RT

ITEM 904. **4000 PSI, 3/4 INCH, 610 CEMENT CONCRETE**

For Proposed Headwalls.

Route 10

Station	Offset
15+41	47' LT
19+33	66' LT

ITEM 910. **STEEL REINFORCEMENT FOR STRUCTURES**

For Proposed Headwalls.

Route 10

Station	Offset
15+41	47' LT
19+33	66' LT

*** END OF DOCUMENT ***

DOCUMENT A00804

BERNARDSTON FIRE AND WATER

Rules And Regulations

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BERNARDSTON FIRE AND WATER

RULES AND REGULATIONS

April 2026

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INTRODUCTION

The Bernardston Fire and Water District, in the Commonwealth of Massachusetts, hereinafter referred to as the "District", was established by the acceptance of Chapter 93 of the Acts of 1930. The Act sets forth the corporate powers and the duties of the district.

These Rules and Regulations and all subsequent amendments thereto shall be considered a part of the agreement with the property owner served, hereinafter, referred to as "Person", and are supplementary to the Act and the By-laws of the District.

ARTICLE I

DEFINITIONS
(Arranged in alphabetical order)

Unless the context specifically requires otherwise, the meaning of terms used in this document shall be as follows:

Section 1: Applicant
"Applicant" shall mean any person that has submitted a request to the Superintendent for the water whether it is for a single-family home, a multi-family home, a sub-division, a business, or industry.

Section 2: Branch
“Branch" shall mean any water main to be connected to an existing water main where the existing main is greater than six (6) inches in diameter.

Section 3: Commissioners
"Commissioners" shall mean the duly elected members of the Board of Water Commissioners of the Bernardston Fire and Water District or their authorized employees, agents, or representatives.

Section 4: District
"District" shall mean the Bernardston Fire and Water District

Section 5: District Engineer
"District Engineer" shall mean any engineer or engineering firm that the Commissioners select to perform or assist in an evaluation relating to the operation of the water system.

Section 6: Licensee
"Licensee" shall mean any contractor who has been deemed capable and has been granted permission by the Commissioners to perform work on the water system, once a permit has been issued.

Section 7: Main
"Main" shall mean any water line in use by the District to supply water to more than one person's property on more than one lot.

Section 8: Superintendent
"Superintendent" shall mean the Superintendent of the Bernardston Fire & Water District or the Superintendent's duly authorized deputy, agent, or representative, as appointed by the Commissioners.

Section 9: Multi-Family
"Multi-Family" residence shall mean a building that is designed for and occupied exclusively for residential purposes and containing two (2) or more living units, such as condominiums, duplexes, apartment houses, hotels, motels, trailer parks, dormitories, extended health care facilities, congregate houses, etc.

Section 10: Permit
"Permit" shall mean the written authorization, by the District, to a licensed contractor to perform a specific task on the water system that has been approved by the Commissioners.

Section 11: Person
"Person" shall mean any individual, firm, company, association, society, corporation, or group.

Section 12: Service
"Service" shall mean any water line, between the curb stop and the water meter, connecting a water main to a person's property.

Section 13: Shall; May
"Shall" is mandatory; "May" is permissive.

Section 14: Sub-Division
"Sub-division" shall mean the division of a tract of land into two (2) or more lots.

Section 15: MassDEP
"MassDEP" shall mean (generally) the Division of Water Supply within such department, unless another division has jurisdiction over the subject matter of a regulation herein, in which case, the reference is to the appropriate division.

ARTICLE II

GENERAL REGULATIONS

Section 1: Power to Establish Regulations
The Commissioners may establish, change, and amend the Rules and Regulations for the introduction and use of water at any duly noticed meeting of the Commissioners, by a majority vote.

Section 2: Prevention of Water Waste
All persons taking the water supplied by the District shall prevent all waste of water.

Section 3: Authorization for Entering of Premises
The District, or any agent or assistant, may at reasonable times enter the premises of any water taker to examine any water pipes and plumbing therein or thereon for the purpose of ascertaining whether there is any waste of water and for the purpose of determining the quantity of water used and the manner of use and for the further purpose of shutting off water for non-payment of rates or fine or for any alleged violation of the provisions of these Rules and Regulations. In the event of a public emergency or service threat to the water supply needed for a fire safety or human consumption, entrance may be made at any time, after giving such notice as may be feasible in the circumstance.

Section 4: Decision on Waste of Water; Shut-off Supply.
The Commissioners shall have the power to decide what is a waste of water or improper use of water and to restrict its use. If the water taker refuses or neglects to comply with any order of the Commissioners after twenty-four (24) hours' notice, the water shall be shut off and not let on except by payment of reasonable charges, including the cost to repair or replace defective equipment causing such waste.

Section 5: Determination of Water Rates

A. The Commissioners shall determine and assess the water rates yearly.

B. Any person using water, in addition to such entrance fees as set forth in Article III, Section 2, shall pay for the water used at the established rates of the District and shall also pay for all service work and materials on that person's property.

C. Water bills shall be issued quarterly and are due thirty (30) days thereafter. Delinquent bills or accounts in arrears will be assessed a penalty of 18% per annum of the unpaid balance.

D. The unpaid balance of any water bill due the District under this section shall constitute a municipal lien on the property of the person(s) served by the District pursuant to Massachusetts General Law, Chapter 20, Section 42 (a) through (f). The existence of such a lien does not foreclose the use of any other lawful means of collecting payment, including the termination of service to the premises.

E. Should a person desire, due to a vacancy or prolonged non-use, to have a water service shut off, they shall notify the District in writing of the request, and the District will shut the service off at the curb stop for a fee of fifty dollars ($50.00). No usage bill will be issued while a service is shut off at the curb stop, however, a minimum bill, in accordance with the District's water rate schedule will be issued. When it is desired to have water turned back on, the person shall notify the District, and service will be reactivated and a fee of fifty dollars ($50.00) assessed.

F. In all cases, bills will be sent to and liability for payment will rest with the owner of the property.

Section 6: Water Bill Appeals

A. The Board of Commissioners may make adjustments in the water bills in all proper cases upon receipt, in writing, from the property owner of a request for adjustment stating reasons for such request, together with all information necessary to evaluate its merits. Excessive usage caused by pipe leaks or leaking fixtures on the owner's property, beyond the meter, shall not be considered cause for adjustment. Should the owner request the meter be removed and checked, this shall be done in accordance with Article III, Section 6, Meters.

Section 7: System Operation

A. The Commissioners may make repairs, extensions or improvements on the water system, etc. to the extent that such actions do not impair the District's ability to deliver water, or serve existing customers, reduce the water reserves below safe limits, or place the District in debt not authorized by the District's voters.

B. The District does not guarantee constant pressure nor uninterrupted service, nor does it assure either a full volume of water or the required pressure per square inch necessary to effectively operate appliances of any kind, the same being subject to all the variable conditions with may occur in the use of water from the main.

C. The District will not be responsible for damages caused by shutting off water.

D. For the purpose of doing repairs on pipes, valves, hydrants, or any other fixtures, or by work on the system, or by breaks in the pipes, or by low pressure resulting from any cause. Reasonable notice shall be given, if possible, to all· persons before the water is shut off, except in cases of emergency.

E. Any work on the water system by a private contractor or agent shall only be performed after procurement from the District of all necessary permits and licenses as herein described.

F. No plumber or other person not in the employ of the District shall shut water off or turn on the water at any service pipe, except at the cellar wall. Whenever, by request of the owner or representative, water is turned on or off at the curb stop for testing, plumbing, or other purposes, the charge for turning on or shutting off water shall be fifty dollars ($50.00).

G. No person, not in the employ of the District, or a member of the Fire Department in the performance of their duties shall turn on any hydrant, public or private, without first obtaining permission from the District.

Section 8: Appointment and Duties of the Superintendent

A. The Superintendent shall exercise a constant supervision of the water system and shall be responsible for its general operations, including, but not limited to:
   - Meter Reading
   - System Inspections
   - Water Quality Testing *Enforcing Rules and Regulations
   - System Maintenance

B. The Superintendent shall be the primary advisor to the Commissioners with regards to the overall operation of the system.

C. The authority of the Superintendent is derived from the powers granted the Commissioners by the District. As such, all decisions of the Superintendent are subject to review by the Commissioners any person wishing to appeal a decision by the Superintendent shall submit a written request setting forth the factual details, to the Commissioners for review and action.

D. The Superintendent shall report to the Commissioners monthly with respect to the general condition of the system, additions, special projects, etc.

ARTICLE III

WATER MAINS

Section 1: General
Extension of water mains shall be subject to approval by the Commissioners and shall be constructed under the supervision of the Superintendent and/ or the District's Engineer. In addition, all work will be performed by a licensed contractor under the terms of Article IV.

Section 2: Entrance Fees
The entrance fee charged by the District is for the privilege of any person to be allowed to connect to the water system. This fee may be used to offset the future capital expenditures that may be required due to the additional water usage by a new connection. The entrance fee does not include any material, labor, or water.

A. Entrance fees for any service pipe connection into the water system shall be due in accordance with the following schedule:

1. Residential
   a. Single family residence: Cost of installation of water service plus $500.00
   b. Multiple Family residence: [including all structures containing more than one (1) unit, such as condominiums, duplexes, apartment houses, apartment complexes, hotels, motels, trailer parks, dormitories, extended health care facilities, congregate housing, etc.]: Cost of installation of water service plus $1,000.00

2. Nonresidential/Commercial/Secondary/Branch Mains
   a. Entrance fee shall be based on size of service, size of branch main, and secondary main as follows:

1”	$3,000.00
1 ½”	$3,500.00
2”	$4,000.00
6”	$5,500.00
8”	$6,500.00
10”	$8,500.00
12”	$10,500.00

   b. Entrance fee for any service larger than twelve (12) inches shall be as determined by the Commissioners.

B. Secondary or branch mains connected to mains and service pipes connected thereto:
   1. Single family residential subdivision. The entrance fee shall be in accordance with the fee schedule as listed in Section 2.2 for each connection of a secondary or branch main, or mains, to the District's mains, plus five hundred dollars ($500.00) for each planned house lot served by the secondary or branch main.
   2. Multi-family residential subdivision. The entrance fee shall be nine thousand dollars ($9,000.00) for each connection of a secondary or branch main, or mains to the District's mains, plus five hundred dollars ($500.00) for each living unit served by the secondary or branch main.
   3. Commercial or industrial subdivision. The entrance fee shall be nine thousand ($9,000.00) for each connection of a secondary or branch main, or mains, to the District's mains, plus the non-residential entrance fee listed in Section 2.2 for each service connected to the secondary or branch mains.

C. Fire Protection

Any service pipe to be used for fire protection purposes (i.e., feeding hydrants, sprinkler systems, etc.) shall be separate service from the main and subject to an entrance fee of two thousand five hundred dollars ($2,500.00) for any size eight (8) inches or smaller and four thousand fifty dollars ($4,050.00) for any size

greater than eight (8) inches. Plus cost of installation and tapping of main/service.

Section 3: Payment of Entrance Fees

A. Entrance fees for all connections shall be payable at the time of application for connection.

B. The unpaid balance of any entrance fee due the District under this section shall constitute a municipal lien on the property of the application pursuant to Massachusetts General Law, Chapter 40, Section 42, (a) through (f). The existence of this lien does not foreclose the use of any other lawful means of collecting payment, including the termination of service to the premises.

Section 4: Service Pipes and Connections

A. Any person desiring to connect to the water supply system shall apply to the District's office and fill out the application form (Attachment I, "Request for Service"). The prescribed form must be accompanied in all cases by a plot plan showing the location of the proposed connection and appurtenances, unless this requirement is waived by the Commissioners.

B. In the case of the construction of an individual single-family home, it will be the responsibility of the property owner to have the service pipe installed. Services must be installed by a contractor licensed by the Commissioners. All work performed will be in accordance with these Rules and Regulations and District specifications.

C. The cost of all services shall be incurred by the developer or property owner, and they will furnish all material, labor, and whatever else is necessary to complete service. This includes the furnishing and installation of tapping sleeves and valves for larger services. The District will specify the kind and quality of the materials which shall be used for the service. Services must be installed by a contractor licensed by the Commissioners. This work shall be done in accordance with these Rules and Regulations and any District Specifications.

D. The District reserves the right to accept or reject any application for service installation.

E. No drain, sewer, gas, chemical, etc., lines shall be laid nearer than ten (10) horizontally feet to the water service pipes and at least three (3) feet from any buried electrical cable or conduit. Any vertical crossing shall be at least two (2) feet below the water line. Any sewer lines must be under the water line. Existing or future crossings, public or private, must be disclosed to the District and the person proposing the crossing shall provide to the District a plan certified by an engineer showing in detail the proposed crossing in relation to the District's mains and full compliance with the District's Rules and Regulations and Specifications. Exceptions may be granted in writing by the District after approval of other agencies.

F. All service pipe trenches with pipe properly laid from the property line to the meter shall remain open until inspected and approved by an agent of the District.

G. No fixture shall be attached to, nor shall any branch be made in the service pipe between the meter and the street main.

H. The service pipe shall be at least five (5) feet below the surface grade and shall be placed on firm and continuous earth so as to give unyielding and permanent support.

I. Each premises shall be supplied through an independent service pipe from a separate curb stop, and all apartment houses, office buildings, or business blocks shall have a separate service connection and curb stop for each tenant unless otherwise specifically approved or ordered by the District in which case the property owner is to be solely responsible for all water used on and in said building or premises.

Section 5: Maintenance and Repair of Service Pipes

A. Maintenance and repair of all service pipes shall be the responsibility of the property owner. The "Service Pipe," (as defined in Article I, Section 12), shall mean any water line connecting water main to a person's property up to and including the water meter.

B. Major repairs or relays of such pipes, whether deemed necessary by the Superintendent or requested by the property owner, shall be the responsibility of the property owner.

C. The District will only make emergency repairs that the Superintendent deems to be necessary at the time and the property owner shall be billed accordingly.

D. All expenses relative to this section shall be the responsibility of the property owner.

Section 6: Meters

A. All individual services from the water supply, except those feeding fire sprinkler systems, shall be metered by the District.

B. The District will furnish and install all meters for which a three hundred sixty dollars and eighty cents ($360.80) service charge will be paid by the person requesting the service. Notwithstanding the provisions of paragraph C of this section, all meters shall remain the property of the District.

C. If larger than a one (1) inch meter is required, or requested, the person requesting the service shall pay the cost of the meter and for the installation by a licensed plumber in the presence of an authorized representative of the District. The person requesting such service shall also pay the District an inspection fee equal to the hourly wage and benefit cost of the District's inspector multiplied by the number of hours spent on the job. After installation the meter will become the property of the District who will be responsible for the upkeep of that meter.

D. All meters will be equipped with remote reader, except as determined by the Commissioners, mounted either inside or outside of the building, as long as it receives a proper signal.

E. Meters will be maintained and replaced at the expense of the District, except in the case of injury or damage for which the District is not responsible, and then such meter shall be repaired or replaced by the District at the expense of the customer.

F. No person, except an agent of the District, shall change, alter, disconnect, or in any manner disturb the meter.

G. The meter and shutoff valves shall be installed in a place satisfactory to the District and readily available for access for the purpose of reading, making repairs, or replacement.

H. The property owner shall provide access to the meter at all reasonable times.

I. If the owner requests the District to remove the meter and check its accuracy, there shall be a charge assessed to the owner that shall be the current rate to test a water meter plus the current Water District labor rate for the hours required to test.

J. No meter shall be disconnected from the service pipe, moved, or disturbed without first obtaining permission of the District, who will send a properly authorized agent to attend to any change needed. The property owner will be charged for all the District's costs associated with the change.

K. Meters must not be exposed to frost, contamination, or physical damage.

L. Whenever a discrepancy occurs between the remote reader and the meter installed in the water line, the water line meter will determine water usage.

Section 7: Shutting Off Water

A. The District shall have the right at the discretion of the Commissioners to shut off water for the following reasons:

1. Making authorized alterations or repairs to meters, mains, or pipes.

2. Disregard of the Rules and Regulations of the District or the requirements of the Commissioners.

3. Neglecting to make payments of charges for water service or any other charges against the owner of the premises.

4. Misrepresentation in application as to the premises or fixtures to be supplied, or the use of the water supply.

5. Use of water for any premises or purpose not described in the application.

6. Tampering with any service pipe, meter, curb stop, seal, or any appliance of the District.

7. Failure to maintain, in good order, connections, service lines, or fixtures for which the customer or property owner is responsible.

8. Waste of water through improper or imperfect pipes, fixtures, or otherwise.

9. Vacancy of premises.

10. Refusals of access to premises to inspect, read, maintain or remove meters.

11. Refusal to conserve water during periods of restricted supply.

12. Failure to pay water bills or charges at a prior location.

13. Any cross connection which would introduce water or any liquid other than water supplied by the District into the service line of the District.

The District assumes no responsibility for damage resulting from shutting off water for such reasons.

B. The District shall have the right at the discretion of the Commissioners to restrict the use of water whenever public emergency so requires.

C. The District will undertake to use reasonable care to prevent and avoid interruptions and fluctuations in the service, but it cannot and doesn't guarantee that such will not occur. The District shall not be held liable for any damage to property or persons resulting from any delay or interruption in service unless caused by the willful act of the District.

Section 8: Renewal of Service

When water service to any premises has been terminated for any reason other than temporary vacancy it will be renewed only after the acceptance of a new application and when the conditions, circumstances, or practices which caused the water service to be discontinued are corrected to the satisfaction of the District, and upon the payment of all charges due and payable by the customer in accordance with the rates, and Rules and Regulations. A payment plan on overdue charges may be arranged at the discretion of the Commissioners if so desired.

Section 9: Fire Services

Public Fire Hydrants

A. The Fire Department shall have necessary use of hydrants at fires, but no other person shall be allowed to operate hydrants without permission of the Commissioners or their agents.

B. The Fire Department shall notify the District when a hydrant is used for any reason as soon as practicable, with exception to using a metered hydrant.

C. A proper hydrant wrench must be used when removing the cap and opening the hydrant.

D. No person shall obstruct access to any hydrant, by placing or permitting any snow, debris, building materials or other obstruction to remain on or within 3’ of the hydrant which will in any manner interfere with its use.

E. All public fire hydrants shall be maintained by the District.

F. Inspections and tests of public hydrants will be made by the District at convenient times and reasonable intervals.

G. Whenever a change in location, size, or type, or permanent removal of a fire hydrant is requested by the Town and/or a customer, such change will be made by the District at the expense of the Town and/or Customer.

H. When a Fire Hydrant is used for non-District use (street sweeping, construction, etc.), an application must be submitted to the district for use of the hydrant, The District will furnish and install a meter and backflow for which one hundred dollar ($100.00) service charge will be paid by the person requesting the service. Upon the completion of use, the customer will be billed the current water rate times 2 for all water used, at a minimum charge of twenty five dollars ($25.00)

Private Fire Service

I. Private fire service pipes may be installed at the owner's expense including the street connection. The layout of check valves, type and size of pipe, and control valves shall be subject to the approval of the District, Bernardston Fire Department, the Fire Underwriters, Massachusetts Plumbing Code, and MassDEP.

J. Owners shall install backflow prevention devices of the type required by MassDEP and/or Massachusetts Plumbing Code.

K. No service line or tap is to be taken from any private fire service line. Failure to comply with this regulation will subject the customer to discontinuance of service, and/or liability for quantity of water used as estimated by the District.

L. No consumption is permitted through fire connections except for the extinguishing of fires.

M. Owners with private fire services may be subject to standby charges as determined by the District.

N. The District is not responsible for the maintenance or pressures, volumes, or supply of water. The service may be subject to shutdowns or variations in pressure as system operations require or as a result of casualty.

Section 10: District Extensions

Any extension to be made by the District, for a group of people who desire to be served by the water system or any extensions to the water system to be made as capital improvements shall be made as follows:

A. Any group of five or more people in the District who desire to be served by the water system shall submit a petition to the Commissioners.

B. In the event that any person(s) wishes to be served by the water system immediately and without complying with the provisions of these Rules and Regulations, they shall be required to pay to the District in advance of construction the full cost of same and may thereafter petition the District for the privilege of being brought under the terms of these Rules and Regulations. The District is here- by authorized to expend money collected under this provision for such purposes with the Commissioners approval.

   In the event that the District shall vote to approve the extension, the petitioners shall have an amount equal to the cost of said extension refunded to them, less entrance fees as described in Section 2.

C. Upon vote of the District to construct a water main the District shall proceed with the construction by seeking bids from licensed contractors.

D. All mains installed shall conform to the Rules and Regulations under Article V on construction and any District specifications that apply.

E. Alternatively, a capital improvement or extension of service may be made in accordance with Massachusetts General Laws, Chapter 80, providing for the assessment of betterments by the District on the land particularly benefited by an improvement or extension.

Section 11: Subdivisions

A. The Developer shall file with the District, concurrently with filing with the Planning Board, a plan showing in detail the proposed water system. With this plan a detailed water supply impact study shall also be filed covering:

   1. A study of the water system within the subdivision covering pipe size, location, elevations, valves, flows, pressures, etc., and other pertinent information.

   2. A study of the impact of the subdivision on the existing water system.

   3. These studies shall be prepared by an engineer registered in the Commonwealth of Massachusetts.

   4. The report shall be such that the Commissioners, together with such professional consultants as it elects to employ, can make a judgment and render a decision as to whether the Commissioners shall allow a connection to the water system. Following their review, the Commissioners will determine whether and under what conditions these connections shall be made.

B. All costs of reviewing an impact study required by the District shall be paid by the applicant for service.

In order to insure a complete understanding of this, the Superintendent will have the applicant sign a District form (Attachment II) ("Review of Subdivision Plans") in with the developer agrees to pay all costs associated with the impact study being submitted, including, but not limited to, an engineering review by the District Engineer selected by the Commissioners if felt necessary by the Commissioners for adequate review of the impact study submitted.

C. The design of any proposed water system addition must be approved by the Commissioners prior to issuance of permits for construction. Water system construction must be inspected and approved by the District and/or the District's Engineer and the cost for engineering services (inspections) shall be paid by the developer or other sponsoring parties or agent.

1. The applicant and owner of the property shall pay all costs relating to the laying of water mains and appliances.

2. The applicant shall perform all work in accordance with these Rules and Regulations and with current specifications of the District.

3. Water mains shall be constructed by a competent licensed contractor and shall be cleaned, disinfected, flushed and tested before connection of the water system addition to the District's water system.

4. The applicant shall hold the District harmless and indemnify the District and The Town of Bernardston against any liability resulting from any defective materials, workmanship, or operation in connection with said installation. When working in public ways, the applicant and/or their contractors shall maintain Public Liability Insurance not less than one hundred thousand dollars, ($100,000.00) for injuries, including wrongful death to anyone person, subject to the same limit for each person in an amount not less than three hundred thousand dollars ($300,000.00) on account of an accident.

5. The applicant shall agree to pay for the privilege of connecting a water system addition to the District's water system in accordance with the provisions of Section 2.

D. In the case of all other users, whether commercial, residential, or industrial, the details as spelled out above shall be used, except that for small commercial or industrial users the detailed study may be modified after individual review by the Commissioners. In all cases, the approval must be in writing prior to any connections.

E. When any subdivision as determined by the Commissioners requires wells, pump stand pipes, booster stations, etc., the cost of each such installation shall be born by the applicant.

F. All system additions, i.e., mains, branches, hydrants, valves, wells, pumps, standpipes, etc., shall become the property of and be deeded to the District. When accepted by the Commissioners, in writing to the applicant, they shall from that time on be maintained and serviced by the District.

G. All work performed, material, and equipment will be warranted to the District for one (1) year, from the date of acceptance by the Commissioners, by the contractor who installed said equipment. This will include the cost to replace the defective work, material, or equipment.

H. Whenever possible, any sub-division will have the mains looped to prevent dead ends in the water system. This should also include the possibility of providing two (2) flow paths for supplying water to a subdivision.

Section 12: Miscellaneous

A. All future applicants for connections to the water system will be notified that no guaranteed will be made to any service, any part of which is connected to a system designed to use the supplied water for purposes such as landscape watering, fountains, or any other uses not essential to securing necessary occupancy permits and human habitation, the Commissioners shall further take any steps available to control such uses on existing services, and to control the use of all uses not essential to proper human occupancy.

B. All persons seeking service from the District shall be governed by these Rules and Regulations and the obligations and responsibilities assigned herein to applicants and customers.

C. The District reserves the right to place a lien on the real estate of any person who fails to pay bills for water or services supplied to or for the benefit of the owner's land (Massachusetts General Laws, Chapter 40, Section 42A (a) through (f))

D. Customers of the District must notify the District upon the pending sale of their property to allow the District to obtain a final read of the meter prior to Closing day and provide a valid forwarding address for a final bill.

E. Upon purchasing a property served by the District, the new owner must Fill out an Application for Meter Account (ATTATCHMENT VI) within 15 days of the Closing.

ARTICLE IV

LICENSE AND PERMIT REQUIREMENTS

Licenses

Section 1: General

A. Contractors or individuals of established qualifications, reputation, and experience may be licensed by the District to make connections to the water system.

B. No connection shall be made, or service pipes installed by any contractor or individual not so licensed.

C. No licenses shall be transferable.

D. A list of all licenses shall be kept by the District.

Section 2: License Fee

All licenses shall be subject to compliance with the following requirements:

A. Filing with the District an application form (Attachment III, "Application for License").

B. Applicants for licenses are required to pay a filing fee of sixty-seven dollars ($67.00), payable to the District, which amount will be refunded in full to the applicant if the application is rejected.

C. All licenses issued will expire on June 30 of each year after which they will be renewed upon payment of a renewal fee of sixty-seven dollars ($67.00).

Section 3: Approval

A. Applicants for licenses will be approved or disapproved within a period of thirty (30) days after filing the application. If the District has not acted on an application within thirty (30) days after filing, and payment of fees, a license shall automatically be approved.

B. The Commissioners reserve the right to revoke or suspend any license if any provision of said license is violated.

Section 4: Insurance

Applicants for licenses, after approval by the Commissioners, shall file with the District a certificate of insurance in the sum of one hundred thousand/three thousand dollars ($100,000.00/$300,000.00) to cover public liability and a certificate of insurance covering workmen's compensation shall be filed, all of which shall remain in full force and effect for a period of at least one (1) year from the date of original approval and each calendar year thereafter upon renewal. Said insurance shall indemnify the District and the Town of Bernardston against any and all claims, liability or action for damages incurred in any way connected with the performance of the work of the licensee and for or by reason of any acts or omissions of said licensee in the performance of work.

Section 5: Performance of Work

A. Licensees shall abide by all conditions of these Rules and Regulations, and District specifications with

particular reference to Article V, Construction.

B. Licensees shall comply with all District, town, state, and federal codes, rules and regulations.

C. Licensees are required if, during their work, they should encounter any previous violations of these Rules and Regulations, to give a full written report to the District within twenty-four (24) hours of such discovery.

D. Licensees are required to give personal attention to all installations and shall employ only competent and courteous workers.

E. Licensees shall have all necessary equipment, tools, and material to perform this work.

F. Licensees shall make repairs without cost to the District for any defect in the work or parts of the work furnished or built by the licensee. Any damage due to faulty workmanship or equipment furnished by the licensee in which defects or damage may appear within one (1) year from the date of final inspection shall also be repaired by the licensee.

Permits

Section 6: Purpose

The purpose of the permit is to inform the District, where the work is to be performed, who is performing the work, and what is being done to the system. This permit will also allow the District a chance to make sure all of the proper permits for the various state and town requirements are met.

Section 7: Where to Obtain a Permit?

Permits for installing water services and for connections to water mains may be obtained at the office of the Water District, or digitally by request through a Commissioner.

Section 8: Who Can Obtain a Permit?

Permits will only be issued to competent contractors licensed in the District. Permits are not transferrable between locations for water service connections nor are they transferrable between contractors.

Section 9: Revocation

Permits shall be subject to revocation when any of the Rules and Regulations and any District specifications are not being followed.

Section 10: Time Limit

If the work under the permit is not completed within ninety (90) days, a new permit must be obtained.

Section 11: Approval

Permits will not be issued until the applicant has filed a layout plan accurately showing the location of existing utility connections, house locations and route of water service, and said layout has been approved by the Commissioners.

Section 12: Existing Services

Permits must be obtained for the renewal of existing water service connections. Responsibility and liability for all repair work shall be the same as are imposed for the original connections.

Section 13: Other Permits

The issuance of a permit by the District in no way relieves the applicant, contractor, or the property owner of the responsibility to comply with the Rules and Regulations set forth by the Town of Bernardston, the State of Massachusetts, or any governmental authority.

Section 14: Other Requirements

No permit shall be issued, except in cases of emergency, to dig up or make an excavation in a public way until the applicant files with the Department of Public Works copies of the notices to public utility companies as required by General Laws, Chapter 82, Section 40. A valid Dig Safe ticket is required for the permit to be active.

ARTICLE V

CONSTRUCTION

Section 1: General

A. The Rules and Regulations in this Article shall be considered the minimum requirements for any service, branch, or main added to the system by a licensed contractor. Additional requirements may be imposed by the Commissioners in particular instances on proposed construction work for sound engineering reasons, such as, to meet the long-range system plan, prevent a sub-division from having a negative impact on system operations, and to prevent the expenditure of funds by the District to support the addition of a sub-division to the system, etc.

B. The Commissioners may from time to time develop standard specifications for equipment installation which will be used in addition to the Rules and Regulations and will be filed with the District's Superintendent's office.

Section 2: Permits

Before any permit is issued for the installation of a service, branch, or main, the following must be presented to the District:

A. A copy of the plot or sub-division plans approved by the Planning Board and the Commissioners to be kept on file.

B. A copy of a Trench permit issued by the Highway Department/Town of Bernardston.

C. A Dig Safe Permit

D. In the case of a permit being required by the State Department of Public Works, the contractor will fill out all required applications and the Superintendent will submit it on behalf of the District. All bonds required will be posted by the contractor on behalf of the District in addition to those required by the District.

Section 3: Mains

A. All pipes used for mains shall be a minimum of eight (8) inches in diameter.

B. All pipes shall be of a type specified by the District Engineer.

C. Mains installed as part of a sub-division shall include a corporation stop for each lot shown on the approved plan.

D. All mains installed shall be inspected by the District prior to backfilling.

E. Excavations will be to a depth that provides a minimum of five (5) feet of cover over the pipe.

F. If excavation is in ledge, a minimum of eight (8) inch spacing around the pipe will be required to allow for selected backfill material. It will be at the discretion of the District as to the type of bedding used and will depend on field conditions. In any event, it will be either sand, crushed bank gravel or three-fourths inch (3/4”) stone. No stones larger than three (3) inches in diameter may be used within the first foot of backfill over the pipe. Once the pipe has sufficient cover with select material, normal backfilling may

proceed with care.

G. Joining push-on or Tyton joint D. I. will be with the use of a come-along or bar. If a bar is used, a block of wood will be used between it and the pipe. The same applies for having a backhoe set larger diameter pipe, a block of wood will be inserted between the bucket and the pipe; in no event will there be a metal to metal or metal to plastic driving force to set the pipe. If this is not strictly complied with, the length of pipe will be removed and a new one used in its place.

H. All mains shall be installed per the District's specifications or as directed by the District's Engineer. In all cases this will include the installation of thrust blocks at all plugs, caps, tees, bends, and hydrants to prevent movement.

I. Main line taps will always be done with the use of a tapping sleeve and gate valve. The tapping sleeve to be Mueller or approved equal. If the contractor is to make the tap, evidence of competence through previous work must be furnished and the contractor must have the necessary tools to perform the work satisfactorily.

Section 4: Valves and Boxes

A. No new main shall extend over one thousand (1,000) feet in length without the use of a gate valve.

B. Main valves shall be either:

1. Gate valves that are open left, iron body, bronze mounted, double disc, non-rising stem as specified by the District.

2. Resilient Wedge valves that are open right and approved by the District Engineer.

3. Butterfly valves may be used on pipe size twelve (12) inches and up provided gear reduction is installed.

C. Main gate boxes shall be cast iron, slide-type with at least six (6) inches of adjustment and at least five. (5) feet long. The covers shall be flush, close fitting with the word "WATER" cast into the cover.

D. All intersections of mains shall be gated in their respective direction.

E. All valves shall be installed per the District's specifications or as directed by the District's Engineer. This includes the installation of thrust blocks at all valves.

F. Service box and valve covers must be plumb and set to finish grade.

Section 5: Hydrants

A. All hydrants shall be within five hundred (500) feet of each other or so spaced at the discretion of the Commissioners and after review by the Fire Chief.

B. All hydrants shall be located before and as close as possible to the gate valve specified in Section 4 to allow for flushing.

C. All hydrants shall be equipped with mechanical joint hubs.

D. All hydrant branches shall be of a type and style consistent with District specifications.

E. Hydrants shall have six (6) inch mechanical joint shoe, five (5) inch valve opening, and five (5) foot six (6)

inches bury, open left with two (2) two and a half (2.5”) inch hose nozzles and one (1) four and one-half (4.5”) inch pumper connection, National Standard Threads and operating nut.

F. No new hydrants shall be placed within fifteen (15) feet of a driveway or access road when possible.

G. Hydrants shall meet or exceed AWWA specifications C-502.

H. Hydrants shall be able to be rotated 360 degrees. Nozzles shall be threaded in and pinned. They shall have a positive closing; self-cleaning drain valve and drainage area shall be completely bronze, or brass lined.

Section 6: Construction Requirements

A. Work performed by the District.

In the event that the District is involved either in the repair of a main or service or installation of a new service or relay to a single-family residence or repairs to an existing service, the work shall be performed in accordance with the following:

1. Trenches or areas of excavation, after completion of installation or repairs, shall be rough graded and hand raked. Permanent repairs on the landowner's property (i.e., loaming, seeding, cold patching and hot topping of drives and walk, cement sidewalks, steps, etc.) shall be the homeowners responsibility.

2. Fences or walls of any kind, if not removed by the landowner, will, if within the District's means and capabilities, be removed and staked on the landowner's property. Upon completion of the work, re-erection or rebuilding shall be the responsibility of the landowner.

3. Trees, bushes, shrubs, hedges, flowers; lawn ornaments, etc., if not removed by the landowner, will, if within the District's means and capabilities, be removed and staked on the landowner's property. Upon completion of the work, replanting, or replacement of these items shall be the responsibility of the landowner.

4. In the event that the work necessitates the cutting of roots of trees, bushes, shrubs, hedges, etc., the District will not be responsible for their continued life.

5. The landowner shall be responsible for notifying the District of any underground wiring, wells, septic system pipes, drainage pipes, etc., that may be in the line of construction. Unless the District is notified in advance, it will assume no liability for resulting damage.

B. Work performed by developers and/or private contractors.

In the case of a water extension on or to a sub-division or other property, the owner of the property or developer thereof shall construct and install the mains and house connections in accordance with the following Rules and Regulations and District Specifications.

1. There shall be submitted to the Commissioners, in the case of a new sub-division which has the approval of the Planning Board, a plot plan which has been recorded in the Greenfield District Registry of Deeds. Other private projects approved by the Planning Board shall also submit a plan of the proposed water system prepared by a registered engineer.

2. All plans for a water system in the District will show and/or specify the following:

    a. Main locations
    b. Valve locations
    c. Service tap locations
    d. Hydrant locations

3. All taps to the existing system will specify a tapping sleeve and gate valve.

4. Any contractor involved in construction work in the District will strictly adhere to the provisions of these Rules and Regulations.

5. All material used must be of the same make and quality as specified by the District.

6. All labor and material costs to install a water system as specified herein will be borne by the owner, developer, or contractor, whatever the case may be. Costs for tapping into the system and the restoration of any public way will be borne by the owner, developer or contractor.

7. Excavation in any public way will require a trench permit from the Highway Department. Necessary forms may be obtained from and filed with the Highway Department. It will be the contractor's responsibility to notify Dig Safe utility companies, such as gas, telephone, electric, etc., if there is any possibility of their equipment or property being jeopardized by excavation. After receiving all other permits, the contractor will then file with the District per Section 2 for a District permit.

8. It shall be the contractor's responsibility to notify the Fire and Police Departments of the said work to be performed and, if necessary, to hire uniformed police for traffic control. In the event that the roadway cannot be restored to its normal surface immediately following the work, sufficient care will be taken to make the roadway smooth for traffic and, if necessary, to light with flashers as a warning to motor vehicles.

9. Before any water mains, services, or hydrants are installed in a sub-division, the contractor will bring the entire site where these utilities are to be located to subgrade, such grade will be verified by grade stakes provided and set by a registered land surveyor or engineer employed by the owner or contractor so that the District Engineer may expedite the checking of such grades.

Section 7: Connections

A. Service connections shall have as their minimum size one (1) inch diameter. All service pipes two (2) inches or under will be of HDPE water service pipe laid with tracer wire. Any service pipe larger than two (2) inches and less than eight (8) inches in diameter will be of material approved by the District.

B. All connections to the main will be preapproved by the District. A curb stop and box shall be installed prior to the property line of each service. The curb stop shall be copper T. head, open right, without a drain. Under no circumstances will any inverted key curbs be installed in any water system.

    The curb box or service box will be four and one-half (4) to five and one-half (5 1/2) feet, extension-type three fourths (3/4) inch rod, and cover to be counter sunk one (1) inch brass plug tapped for one (1) inch iron pipe. Minimum cover for services shall be five (5) feet zero (0) inches. Sand backfill material will be carefully placed around the service pipe to protect it from normal backfill and compaction.

C. On the inside of the building there shall be a meter installed by the District as set forth under Article III unless meter is installed in a pit when required below.

D. Where the service length is more than fifty feet (50’) a meter pit (type approved by the District) will be required

to be installed at the cost of the property owner. The pit will be installed level to grade and protected from damage from vehicles and equipment.

E. Each meter will have a ball valve, before and after, and each valve will be within one (1) foot zero (0) inches of the meter. Where pressures are more than eighty (80) pounds per square inch, a pressure reducing valve will be employed in the line. This equipment is to be supplied by the contractor or property owner.

F. Backflow prevention devices shall be installed when applicable.

Section 8: Inspections

A. Inspection will be provided by the District only on a limited or part time basis.

Before any backfilling is done, the District will be notified twenty-four (24) hours in advance and a representative of the District will inspect the completed work. This method of operation will be used for hydrant installations, main taps, service taps, etc. If the District feels that insufficient workmanship and care is being taken in the installation, a representative will be assigned from the District on a full-time basis. The contractor or owner will bear the cost of this representative at the hourly wage and benefit rate, Monday through Friday, from 7:00 A.M. to 3:00 P.M. Any time spent on the site, not within these limits or Saturday, Sunday, Holidays, etc., will be twice the representative's rate.

B. In cases where inspections of work performed by the applicant is required hereunder, or under any agreement between the applicant and the District, the applicant shall pay to the District the following fees:

District Engineer Inspection - the current hourly billing rate multiplied by the number of hours on the job.

Section 9: Testing

The contractor shall test all piping installed. Testing shall be performed concurrent with installation and no more than one thousand (1,000) feet of pipe shall be installed without being tested.

A. The pump, pipe connections and all necessary apparatus for the pressure and leakage tests, including gauges, and metering devices, shall be furnished by the contractor.

B. After the pipe has been laid, thrust backing cured and the trench backfilled, the entire pipeline, or any section thereof, shall be subjected to hydrostatic pressure and leak tests shall be performed in accordance with ANSI/AWWA C600, Section 4 - Hydrostatic Testing as and when directed by the District.

C. Should any test disclose leakage greater than that permitted, the contractor shall, at their expense, locate and repair the defective joints and/or pipe until the leakage is within the permitted allowance of the District.

D. Allowable leakage in gallons per hour per thousand (1,000) feet of pipeline shall be as follows (page 27) as taken from AWWA C600:

Test	Pipe Size (In.)					
PSI	2	4	6	8	12	16
100	0.15	0.30	0.45	0.60	0.90	1.20
125	0.17	0.34	0.50	0.67	1.01	1.34
150	0.19	0.37	0.55	0.74	1.10	1.47
175	0.20	0.40	0.59	0.80	1.19	1.59
200	0.21	0.43	0.64	0.85	1.28	1.70
225	0.23	0.45	0.68	0.90	1.35	1.80
250	0.24	0.47	0.71	0.95	1.42	1.90

Section 10: Disinfection

The completed pipeline is to be disinfected with a chlorine concentration of approximately fifty (50) parts per million prior to being placed in service. The introduction of this chlorine shall be accomplished by pumping or siphoning a calcium hypochlorite solution into the main. The chlorinated water is to remain in the new pipeline for a period of twenty-four (24) hours. During this period, proper precautions are to be taken to prevent this chlorinated water from flowing back into the existing system. Other methods of disinfection may be used after approval in writing is given by the Commissioners.

Section 11: As-builts

As-builts will be furnished to the District in duplicate by the contractor or owner at the completion of the project and before supplying water to the system. The plans in particular will depict exact distances between gate valves, ties to gate valves, both in the main and hydrant branches. Curb box location referenced to the house or building that it serves by at least two (2) ties from permanent points. GIS locations shall be submitted digitally to the district of all valves and or fittings installed in the project.

ARTICLE VI

WATER USE RESTRICTIONS IN RESPONSE TO DECLINE IN RESERVOIR ELEVATIONS

Section 1: Definitions

A. "Full (100%)" refers to the highest level of water the Fox Hill and Huckle Hill tanks may contain.

Section 2: Voluntary Use Restrictions

If the level of the tanks drops below fifty percent (50%) full the Commissioners shall impose the following voluntary water, use restrictions:

A. Residences and Businesses

All outdoor uses prohibited between 9:00 A.M. and 5:00 P.M.

Examples:
No lawn watering
No car washing.
No home garden watering
No filling of pools

B. Commercial Nurseries, Golf Courses, Municipal Recreation Fields, Commercial Agriculture Production (farms)

All outdoor use prohibited between 9:00 A.M. and 5:00 P.M. except watering of newly planted trees, shrubs, crops, and lawns, which shall be permitted at any time on the day of planting.

C. Municipal and other Commercial and Charitable Uses.

Municipal street sweeping, charitable carwashes, and driveway washing will not be allowed during periods of voluntary use restrictions. Hydrant flushing will not be permitted during such periods only when the Commissioners determine that flushing is necessary to maintain water quality.

Section 3: Involuntary Use Restrictions

If the level of the tanks drops below forty percent (40%) the Commissioners shall impose the following involuntary water, use restrictions.

Residences, Businesses, Commercial, Municipal, etc.

No outside water usage permitted (including all uses listed in Sections 2A, 2B, and 2C above.)

Section 4: Notification to the Public

The Commissioners shall notify water users of voluntary and involuntary restrictions through notices published on the District Website, Town of Bernardston Website and notices posted in town.

Section 5: Enforcement

The Commissioners shall enforce the voluntary and involuntary water use restrictions set forth in Sections 2 and 3 above, as follows:

A. First Offense

Any person who violates the terms of either a voluntary or involuntary restriction shall be issued a written warning by an agent of the District.

B. Second Offense

Any person who violates the terms of either a voluntary or involuntary restriction a second time, having received a warning as provided in A above, during any period in which water use restrictions (voluntary or involuntary) have been implemented, shall be fined two hundred dollars ($200.00).

C. Third Offense

The Commissioners shall terminate the water service of any person who violates the terms of either a voluntary or involuntary restriction for a third time during any period in which water use restrictions (voluntary or involuntary) have been implemented.

Section 6: Hardship Exemptions or Special Use Allowance

The Commissioners may exempt any person from the restrictions set forth above, or may impose a special use allowance, upon a finding that the person would otherwise suffer undue hardship. A person seeking such an exemption or special use allowance must petition the Commissioners in writing, stating the grounds on which said relief is sought.

In cases of emergency the Commissioners empower the Superintendent to grant temporary relief pending the final decision of the Commissioners on the issue of hardship.

ARTICLE VII

DEMAND MANAGEMENT REGULATIONS

Section 1: General

Any use conversion or change in water usage which will result in a ten percent (10%) increase in consumption over historical metered consumption, shall require a new application for a service connection.

Section 2: Entrance Fees and Refund Policy

An applicant for a service connection shall pay an entrance fee (established by the Commissioners) at the time the Commissioners grant the applicant permission to tie-in to the District's system.

If an applicant withdraws the application or allows the application to expire by failing to tie-in within the allotted time, the applicant shall be entitled to a refund of seventy-five percent (75%) of the entrance fee and the District shall be entitled to retain the remaining twenty-five percent (25%) of said fee.

ARTICLE VIII

OUTDOOR WATER USE REGULATION

Section 1: Authority

This Regulation is adopted by the Bernardston Fire and Water District under its police powers pursuant to the Home Rule Amendment of the Massachusetts Constitution, Article LXXXIX, to protect public health and welfare and pursuant to its powers under M.G.L. c.40, §§21 et seq. and implements the District's authority to regulate water use pursuant to M.G.L. c. 41, §69B. This Regulation also implements the Bernardston Fire and Water District's authority under M.G.L. c. 40, §41A, conditioned upon a declaration of water supply emergency issued by the Department of Environmental Protection under G.L. c. 21G, §15-17. This Regulation is also intended to implement other water conservation requirements of M.G.L. c. 21G, the "Massachusetts Water Management Act" and its regulations promulgated at 310 CMR 36.00.

Section 2: Purpose

The purpose of this Regulation is to protect, preserve and maintain the public health, safety, welfare and the environment whenever there is in force a "State of Water Supply Conservation" or a "State of Water Supply Emergency" by ensuring an adequate supply of water for drinking and fire protection and to protect the quality and quantity of water in local aquatic habitats such as ponds, rivers and wetlands. This purpose will be accomplished by providing for the imposition and enforcement of any duly implemented restrictions, requirements, provisions or conditions on water use imposed by the Bernardston Fire and Water District in accordance with this Regulation and/or by the Department of Environmental Protection under its state law authorities.

Section 3: Applicability

All Bernardston Fire and Water District residents that are customers of the public water supply system shall be subject to this by-law. This by-law shall be in effect year-round.

Section 4: Definitions

A. Agriculture shall mean farming in all its branches as defined at M.G.L. c. 128, § 1A.[1]

B. Automatic sprinkler system shall mean any system for watering vegetation other than a hand-held hose or a bucket.

C. Nonessential outdoor water use shall mean those uses that are not required:

1. for health or safety reasons.
2. by regulation.
3. for the production of food and fiber.
4. for the maintenance of livestock; or
5. to meet the core functions of a business (for example, irrigation by golf courses as necessary to maintain tees and greens, and limited fairway watering, or irrigation by plant nurseries or agricultural operations as necessary to maintain stock or establish new plantings, wash equipment to prevent damage and/or maintain performance, pest management and plant cooling).

[1] This statutory definition includes cultivation of the soil, dairying and the production, cultivation, growing and harvesting of agricultural, aquacultural, floricultural or horticultural commodities as well as forest harvesting, raising livestock inclusive of bees and fur-bearing animals and forestry, lumbering, preparation for market, delivery to storage or market or to carriers to market incidental to an agricultural operation.

A. Nonessential outdoor water uses that are subject to mandatory restrictions include:

1. Irrigation of lawns via sprinklers or automatic irrigation systems
2. Washing of vehicles, except in a commercial car wash or as necessary for operator safety or to prevent damage and/or maintain performance of agricultural or construction vehicles or equipment; and washing of exterior building surfaces, parking lots, driveways or sidewalks, except as necessary to apply paint, preservatives, stucco, pavement or cement.

B. Exceptions to nonessential outdoor water uses are:

1. Irrigation of public parks and recreation fields outside the hours of 9 AM to 5 PM
2. Irrigation of lawns, gardens, flowers and ornamental plants by means of a hand-held hose outside the hours of 9 AM to 5 PM
3. Irrigation outside the hours of 9 AM to 5 PM with harvested and stored storm water runoff.

C. The following outdoor water uses are subject to review and approval by Bernardston Fire and Water District, through its Board of Water Commissioners or their designee:

1. Irrigation to establish replanted or re sodded lawn or plantings during the months of May and September.
2. Irrigation of newly planted lawns (seeded or sodded) in the current calendar year for homes or businesses newly constructed in the previous twelve months.
3. Filling of privately owned outdoor pools.

D. Person shall mean any individual, corporation, trust, partnership, association, agency or authority, or other entity and any officer, employee, group or agent of such persons.

E. State of Water Supply Emergency shall mean a State of Water Supply Emergency declared by the Department of Environmental Protection under M.G.L. c.21G, §15-17.

F. State of Water Supply Conservation shall mean a State of Water Supply Conservation declared by the Bernardston Fire and Water District pursuant to Section 5 of this Regulation.

G. Water Customers shall mean all persons using the public water supply irrespective of that person's responsibility for billing purposes for use of the water.

H. Water Users shall mean all persons using district provided water within the Bernardston Fire and Water District.

Section 5: Declaration of a State of Water Supply Conservation

The District, through its Board of Water Commissioners or their designee authorized to act as such, may declare a State of Water Supply Conservation upon a determination that conservation measures are appropriate to ensure an adequate supply of water for drinking and fire protection, to protect the quality and quantity of water in local aquatic habitats such as ponds, rivers and wetlands and to ensure compliance with the Water Management Act. Upon notification to the public that a declaration of a State of Water Supply Conservation has been declared, no person shall violate any provision, restriction, requirement or condition of the declaration. The Water Commissioners may designate the Water Department Superintendent to declare a State of Water Supply Conservation at any time that conditions warrant. Public notice of a State of Water Conservation shall be given under Section 8 of this by-law before it may be enforced.

Section 6: Declaration of a State of Water Supply Emergency

Upon notification to the public that a declaration of a State of Water Supply Emergency has been issued by the

Department of Environmental Protection, no person shall violate any provision, restriction, requirement, condition of any order approved or issued by the Department for the purpose of bringing about an end to the State of Water Supply Emergency.

Section 7: Restricted Water Uses

A declaration of a State of Water Supply Conservation and/or a State of Water Supply Emergency shall include one or more of the following restrictions, conditions, or requirements limiting nonessential outdoor water use by water customers (and water users[2]) as necessary to control the volume of water pumped each day, except as provided as acceptable in Section 4. The applicable restrictions, conditions or requirements shall be included in the public notice required under Section 8.

A. Nonessential outdoor water use days: Nonessential outdoor water use is permitted only on the days per week specified in the State of Water Supply Emergency or State of Water Supply Conservation and public notice thereof. During a State of Water Supply Emergency or State of Water Supply Conservation, nonessential outdoor water use is restricted to two days or fewer per week.

B. Nonessential outdoor water use hours: nonessential outdoor water use is permitted only during the hourly periods specified in the declaration of a State of Water Supply Emergency or State of Water Supply Conservation and public notice thereof. At a minimum, nonessential outdoor water use is prohibited during the hours from 9AM to 5PM.

C. Nonessential outdoor water use method restriction: nonessential outdoor water use is restricted to a bucket or hand-held hose controlled by a nozzle.

D. Nonessential outdoor water use ban: Nonessential outdoor water use is prohibited at all times.

E. Automatic sprinkler system ban: The use of automatic sprinkler systems is prohibited.

Section 8: Public Notification of a State of Water Supply Conservation or State of Water Supply Emergency; Notification of DEP

A. Public Notification of a State of Water Supply Conservation – Notice to the public of all provisions, including all restrictions, requirements and conditions imposed by the Water District as part of a State of Water Supply Conservation shall be made as soon as possible, but no later than 48 hours following the declaration of a State Water Supply Conservation by publication on the District and Town Websites and by signage on major roadways or intersections. The Water District may also notify the public using other means determined to be appropriate (cable TV, reverse 911, email, etc.). Notification may also include email, Web sites, public service announcements on local media or other such means reasonably calculated to reach and inform all Water Users.

B. Public Notification of a State of Water Supply Emergency – Notice to the public of all provisions, including all restrictions, requirements and conditions imposed by a State of Water Supply Emergency declared by the Department shall be made by publication on the District and Town Websites and by signage on major roadways or intersections. The Water District may also notify the public using other means determined to be appropriate (cable TV, reverse 911, email, etc.). This notice shall be provided as soon as possible, but no later than 48 hours after the public water system receives notice of the Department's declaration of a State of Water Supply Emergency. Notification may also include email, Web sites, public service announcements on local media or other such means reasonably calculated to reach and inform all Water Users of the State of Water Supply Emergency.

C. Any restriction imposed under Section 5 or Section 6 or in the Department's State of Water Supply Emergency or Order shall not be effective until notification to the public is provided. Submittal of MassDEP's form "Notification of Water Use Restriction" shall be provided to the Massachusetts Department of Environmental Protection within 14 days of the effective date of the restrictions, per

MassDEP regulations (310 CMR 22.15(8)).

Section 9: Termination of a State of Water Supply Conservation; Notice

A State of Water Supply Conservation may be terminated by a majority vote of the Board of Water Commissioners or by decision of their designee upon a determination by either or both that the conditions requiring the State of Water Supply Conservation no longer exist. Public notification of the termination of a State of Water Supply Conservation shall be given in the same manner as is required in Section 8a for notice of its imposition.

Section 10: Termination of a State of Water Supply Emergency; Notice

Upon notification to the Water District that the declaration of a State of Water Supply Emergency has been terminated by the Department of Environmental Protection, the public will be notified of the termination in the same manner as is required in Section 8b for notice of its imposition.

Section 11: Penalties

The Water District through its Water Commissioners or their designee including the water superintendent, building inspector and/or local police may enforce this by-law. Any person violating this by-law shall be liable to the District in the amounts listed below:

1. First violation: Written Warning
2. Second violation: $ 200.00
3. Third violation: $ 300.00
4. Fourth and subsequent violations: $ 500.00

Each day of violation shall constitute a separate offense. Fines shall be recovered by complaint before the District Court, or by non-criminal disposition in accordance with section 21D of chapter 40 of the general laws. For purposes of non-criminal disposition, the enforcing person shall be any police officer of the town or the water superintendent or the superintendent's designee. If a State of Water Supply Emergency has been declared the Water Commissioners may, in accordance with G.L. c. 40, s. 41A, shut off the water at the meter or the curb stop.

Section 12: Severability

The invalidity of any portion or provision of this by-law shall not invalidate any other portion or provision thereof.

Section 13: Controls on In-Ground Irrigation Systems[2]

A. Registration and Installation

1. All new and existing in-ground irrigation systems shall be registered with the District's Board of Water Commissioners in such form and manner as they shall determine. A fee may be charged for this registration. Registration fees shall be set by the Board of Water Commissioners.[3] The Board may require inspection of the irrigation system.

[2] This section is intended to govern automatic irrigation systems and may be passed as part of a water use restriction bylaw or separately. It is included here for convenience.

[3] Be sure that fees charged avoid characterization as a tax under the principles of Emerson College vs. City of Boston, 391 Mass. 415, 424-426 (1984) by ensuring services provided (inspection, etc.) support the fee and that fees paid are used to pay for those services.

2. All in-ground irrigation systems shall be equipped with a timing device that can be set to make the system conform to the District's nonessential outdoor water use restrictions. During a State of Water Supply Emergency or State of Water Supply Conservation the timing device must be set to conform to the daily and hourly nonessential outdoor water use restrictions.

3. All in-ground irrigation systems shall be plumbed so that a shutoff valve is located outside the building and situated so that it may be shut off if found to be in violation of this by-law. For the purposes of this section only, Agents of the Board of Water Commissioners may enter upon any property to enforce this section.

B. Soil Moisture-Sensor Devices

1. All in-ground irrigation systems installed in the District after the date of effect of this bylaw shall be equipped with a soil moisture-sensor device, approved by the Board of Water Commissioners, to prevent the system from starting automatically when not needed. Proof of this installation shall be provided to the Board of Water Commissioners at the time of registration.

2. Any service or repair to an existing in-ground irrigation system shall include the installation of an approved moisture-sensor device, if the same is not already installed and in good working condition. Proof of this installation shall be provided to the Board of Water Commissioners at the time of installation.

C. Backflow Prevention

1. All in-ground irrigation systems connected to the municipal water system in the District shall be protected from backflow events by the installation of a backflow prevention device approved by the Board of Water Commissioners. Each backflow prevention device shall be registered with the Board of Water Commissioners. A fee may be charged for this registration. Registration fees shall be set by the Board of Water Commissioners.

2. The Board of Water Commissioners shall maintain a list, available to the Public, of approved backflow prevention devices. Refer to Table 22-1 in 310 CMR 22.22 for the recommended backflow protection for irrigation systems.

Each backflow prevention device shall be installed in accordance with 310 CMR 22.22 and the manufacturer's instructions. Each device shall be tested upon its installation and annually thereafter. A Massachusetts Certified Backflow Device Tester shall perform all testing. Copies of the results of all testing shall be filed with the Board of Water Commissioners..

ARTICLE IX

CROSS CONNECTION CONTROL ORDINANCE

Section 1: Purpose

A. To protect the public water supply served by Bernardston Fire and Water District from the possibility of contamination or pollution by isolating such contaminants or pollutants which could backflow or backspin into the public water system.

B. To promote the elimination or control of existing cross connections, actual or potential, between its customers in-plant potable water system, and non-potable systems.

C. To provide for the maintenance of a continuing program of cross connection control which will effectively prevent the contamination or pollution of all potable water systems by cross connection.

Section 2: Authority

A. As provided in the Federal Safe Drinking Water Act of 1974, (Public Law 93-523), and the Commonwealth of Massachusetts Drinking Water Regulations, 310 CMR 22.22, the water purveyor has the primary responsibility for preventing water from unapproved sources or any other substances from entering the public potable water system.

B. Bernardston Fire and Water District, Rules and Regulations.

Section 3: Responsibility

A. The Water District shall be responsible for the protection of the public potable water distribution system from contamination or pollution due to the backflow or back siphonage of contaminants or pollutants. If, as a result of the survey of the premises, the District determines that an approved backflow prevention device is required at the district's water service connection or as in-plant protection on any customer's premises, the District, or its delegated agent, shall issue a cross connection violation form to said customer to install approved backflow prevention devices. The customer shall, within a time frame determined by the District, install such approved device or devices at his own expense, and failure or refusal or inability on the part of the customer to install said device or devices within the specified time frame shall constitute a ground for discontinuing water service to the premises until such device or devices have been properly installed.

Section 4: Definitions

A. Air Gap Separation: the method of preventing backflow through the use of an unobstructed vertical distance through the free atmosphere between the lowest opening from any pipe or faucet supplying water to a tank, plumbing fixture, or other device and the flood level rim of the receptacle.

B. Approved: Accepted by the Reviewing Authority as meeting an applicable specification stated or cited in this regulation or as suitable for the proposed use.

C. Approved Backflow Prevention Device or Devices: A method to prevent backflow approved by the Department for use in Massachusetts.

D. Atmospheric Vacuum Breaker: An approved backflow device used to prevent back siphonage which is not designed for use under static line pressure.

E. Auxiliary Water Supply: Any water supply of unknown or questionable quality on or available to the premises other than the supplier's approved public potable water supply.

F. Back Pressure: Pressure created by mechanical means or other means which causes water or other liquids or substances to flow or move in a direction opposite to that which is intended.

G. Back Siphonage: A form of backflow due to reduced or sub-atmospheric pressure within a water system.

H. Backflow: The flow of water or other liquids, mixtures or substances into the distribution pipes of a potable water supply from any source other than the intended source.

I. Backflow Preventer with Intermediate Atmospheric Vent: A device having two independently operating check valves separated by an intermediate chamber with a means for automatically venting it to the atmosphere, in which the check valves are force loaded to a normally closed position and the venting means is force loaded to a normally open position.

J. Barometric Loop: A loop of pipe rising at least thirty-five (35) feet, at its topmost point, above the highest fixture it supplies.

K. District: The Bernardston Fire and Water District.

L. Contaminant: Any physical, chemical, biological or radiological substance or matter in water.

M. Cross Connection: Any actual or potential connection between a distribution pipe of potable water from a public water system and any waste pipe, soil pipe, sewer, drain, or other unapproved source.

N. Cross Connection Violation Form: A violation form designated by the Department, which is sent to the owner by the water supplier with copies sent to the Department, plumbing inspectors, and Board of Health delineating cross connection violations found on the owner's premises and a procedure for corrective action.

O. Department: The Massachusetts Department of Environmental Quality Engineering.

P. Double Check Valve Assembly: A backflow prevention device which incorporates an assembly.

Q. In-Plant Protection: The location of approved backflow prevention devices in a manner which provides simultaneous protection of the public water system and the potable water system within the premises.

R. Owner: Any person maintaining a cross connection installation or owning or occupying premises on which cross connections can or do exist.

S. Permit: A document issued by the Department which allows cross-connection installation.

T. Person: Any individual, corporation, company, association, trust, partnership, the Commonwealth, a municipality, district, or other subdivision or instrumentality of the United States, except that nothing herein shall be constructed to refer to or to include any American Indian tribe or the United States Secretary of the Interior in his capacity as trustee of Indian lands.

U. Pressure Vacuum Breaker: An approved backflow prevention device designed to prevent only back siphonage and which is designed for use under static line pressure, and which has necessary appurtenances for testing.

V. Reduced Pressure Backflow Preventer: An approved backflow prevention device incorporating (1) two more check valves, (2) an automatically operating differential relief valve located between the two

checks, (3) two shut-off valves, and (4) necessary appurtenances for testing.

W. Residential Dual Check: An assembly of two spring loaded independently operating check valves without tightly closing shutoff valves and test cocks. Generally employed immediately downstream of the water meter to act as a containment device.

X. Reviewing Authority: The Department, its Designee, or the local plumbing inspector, authorized by M.G.L. c. 142 and licensed by the Board of State Examiners of Plumbers and Gas Fitters, whichever is responsible for the review and approval of the installation of an approved backflow prevention device.

Section 5: Administration

A. The District will operate an active cross connection control program, to include the keeping of necessary records, which fulfills the requirements of the state MASSDEP's Cross Connection Regulations and is approved by the Department.

B. The owner shall allow his property to be inspected for possible cross connections and shall follow the provisions of the Districts program and the Department regulations.

Section 6: Requirements

A. District

1. On new installations, the District will provide on-site evaluation and/or inspection of plans in order to determine the type of backflow preventer, if any, that will be required, and notify the owner of plan approval requirements by the appropriate reviewing authority.

2. For premises existing prior to the start of this program, the District will perform surveys of the premises and reviews of as-built plans and issue a cross connection violation form to the owner detailing any corrective action required, the method of achieving the correction, and the time allowed for the correction to be made. The time period allowed shall depend upon the degree of hazard involved.

3. The District will not allow any connection to remain unless it is protected by an approved backflow preventer for which a permit has been tested to ensure satisfactory operation.

4. If the District determines at any time that a serious threat to public health exists, the water service will be terminated immediately.

5. The District shall have on its staff, or shall have a delegated representative, who is a backflow prevention device tester certified by the Commonwealth of Massachusetts.

B. Owner

1. The Owner shall be responsible for the elimination or protection of all cross connections on his premises.

2. The Owner shall be responsible for applying for and obtaining all necessary approvals and permits for the maintenance of cross connections and installation of backflow prevention devices, and applying annually for the renewal of each permit.

3. The Owner shall have any device that fails an inspection or test repaired by a licensed plumber.

4. The Owner shall inform the District of any proposed or modified cross connection and any existing cross connections of which the owner is aware but has not been found by the District.

5. The Owner shall not install a bypass around any backflow preventer unless there is a backflow preventer of the same type on the bypass. Owners who cannot shut down operation for testing of the device (s) must supply additional devices necessary to allow testing to take place.

6. The Owner shall install backflow preventers in a manner approved by the Department and by the District.

7. The Owner shall install only reduced pressure backflow preventers and double check valve assemblies approved by the state MassDEP.

8. Any Owner of industrial, commercial, or institutional premises having a private well or other private water source must have a permit if the well or source is cross connected to the District's system. Permission to cross connect may be denied by the District. The Owner may be required to install a backflow preventer at the service entrance if a private water source is maintained even if it is not cross connected to the District's system.

9. The Owner of any residential premises having a private well or other private water source will not be allowed a physical connection with the public water supply system without an approved backflow device being installed immediately after the water meter.

10. The owner shall be responsible for the payment of all fees for permits, device testing, retesting in the case that the device fails to operate correctly and second re-inspections for non-compliance with District or Department requirements.

Section 7: Degree of Hazard

The District recognizes the threat to the public water system arising from cross connections. As such, the District, whereas it is responsible for the quality of the public water supply, may require a containment device on the water service entrance to any customer who, as a result of unprotected cross connections, could contaminate the public water supply system.

Section 8: Enforcement

The District shall not allow a cross connection to exist with the public water supply system unless it is considered necessary, and all appropriate approvals and permits have been issued.

Section 9: Existing in-use Backflow Prevention Devices

Any existing backflow preventer shall be allowed by the District to continue in service unless the degree of hazard is such as to supersede the effectiveness of the present backflow preventer or result in an unreasonable risk to public health. Where the degree of hazard has increased, as in the case of a residential installation converting to a business establishment, any existing backflow preventer, or a reduced pressure backflow preventer must be installed in the event that no backflow device was present.

Section 10: Periodic Testing

A. Reduced pressure backflow preventers and double check valve assemblies shall be tested and inspected at least semiannually by the District.

B. Periodic testing shall be performed by the District's certified tester or delegated representative, who shall be a certified tester.

C. The testing shall be conducted during the District's regular business hours. Exceptions to this, when at the request of the Owner, may require additional charges to cover the increased costs to the District.

D. Reduced pressure backflow preventers and double check valve assemblies must be tested annually by the Owner, independent of the semi-annual test by the water supplier, and said test must be conducted by a certified tester.

E. Any backflow preventer which fails during periodic testing must be repaired or replaced by a licensed plumber. When repairs are necessary, upon completion of the repair, the device will be retested at the Owner's expense to insure proper operation. High hazard situations will not be allowed to continue unprotected if the backflow preventer fails the test and cannot be repaired immediately. In other situations, a compliance date of not more than fourteen days after the test date will be established. The Owner is responsible for spare parts, repair tools, or a replacement device. Parallel installation of two devices is an effective means of the Owner insuring that uninterrupted water service remains during testing or repair of devices and is strongly recommended when the Owner desires such continuity.

F. Backflow prevention devices will be tested more frequently than specified above in "A" in cases where there is a history of test failures and the District feels that due to the degree of hazard involved, additional testing is warranted. Cost of the additional tests will be born by the Owner.

G. Tests must be ninety (90) days apart.

BERNARDSTON FIRE AND WATER DISTRICT

295 South Street PO Box 176 Bernardston, MA 01337

413-475-3037

ATTACHMENT I

BERNARDSTON FIRE AND WATER DISTRICT

REQUEST FOR SERVICE

Account #_____

Subject to all terms, conditions, and restrictions printed or written below, permission is hereby granted to:

_____ of _____
(Name) (Company Name)

to renew ☐ repair ☐ or install ☐ a water service line at the location of _____
(Service Address)

for _____.
(Property Owner)

REQUIREMENTS

1. For any new water service, a tie-in fee of the total cost of the installation of the water service.
Also due is an Application fee of $500.00, an Inspection fee of $100.00 and a meter fee of $360.00.
All services 2" and under will be HDPE Water service pipe. They will be a minimum of one inch (1") in diameter. All fittings will be approved by the Water Department. Services over 2" material used will be subject to approval of the District.

2. There will be a minimum of five feet (5′) of cover over the water line. A two-foot (2′) minimum of sand backfill material will be carefully placed around the service pipe to protect it from normal backfill and compaction. The remainder of the trench will be backfilled with a material free of pieces of bituminous pavement and containing no stone larger than six inches (6"). Compaction of the rest of the trench above the zone around the pipe shall be done in layers not exceeding twelve inches (12") in depth and by use of power-driven tampers.

3. All new services will be tapped/installed by an approved contractor under the supervision of the Water Department.

4. All service lines will have a curb stop set no more than five feet (5′) from the edge of the paved surface of the roadway. An Erie type curb box with a rod will be used on all curb stops under one inch (1") in size. For curb stops over one inch (1") in size, a buffalo type curb box must be used. These boxes will be set flush with the ground.

5. All water service lines will be run in as straight line as possible from the corporation to wherever they enter the building. They will enter the foundation wall at a point no less that twelve inches (12") above the finished floor surface. The service will protrude through the wall a minimum of six inches (6") and a compression fitting will be used to connect a quarter turn ball valve of the appropriate size.
6. No service line may be run in the same trench as a sewer service or any other utility line.

7. All service lines must be inspected by Bernardston Fire and Water District personnel before being backfilled. If not inspected, the District will require that the line be uncovered for this purpose. The District requires twenty-four hours (24 hrs.) notice before all services are installed.

Note:All services shall be done to the satisfaction of the Bernardston Fire and Water District's personnel.

Note:No permits/construction will be approved after the first Monday in November or before the first Monday in April.

Note:For slab on grade applications the interior water service shall be installed in a continuous non-metallic sleeve beginning three feet outside the foundation, backfilled with clean sand prior to the installation of the finished concrete floor via a long radius sweep.

Note:Any and all labor and parts requiring Bernardston Fire and Water District personnel will be charged at prevailing rates.

ATTACHMENT I

BERNARDSTON FIRE AND WATER DISTRICT

REQUEST FOR SERVICE (PAGE 2)

In consideration of the granting of this permit, I_____, hereby agree to all terms described herein. (Signature)

Date: _____ Applicant's Mailing Address: _____

_____

Applicant's Telephone #: _____

Approved ☐ Disapproved ☐ Date:_____

_____

Signature of Water Commissioner

_____

Signature of Water Commissioner

_____

Signature of Water Commissioner

ATTACHMENT I

BERNARDSTON FIRE AND WATER DISTRICT

REQUEST FOR SERVICE (PAGE 3)

PLEASE DIAGRAM PLOT PLAN BELOW:

BERNARDSTON FIRE AND WATER DISTRICT

295 South Street PO Box 176 Bernardston, MA 01337

413-475-3037

ATTACHMENT IA

BERNARDSTON FIRE AND WATER DISTRICT

REQUEST FOR SERVICE RENEWAL

Account #_____

Subject to all terms, conditions, and restrictions printed or written below, permission is hereby granted to:

_____ of _____
(Name) (Company Name)

to renew ☐ repair ☐ or install ☐ a water service line at the location of _____
(Service Address)

for _____.
(Property Owner)

REQUIREMENTS

1. For any renewal of a water service, the following fees apply:

   Service Renewal Application fee: $500.00 Inspection fee: $100.00

   Please make check payable to: Bernardston Fire and Water District.

2. All services 2" and under will be HDPE water service pipe. They will be a minimum of one inch (1") in diameter. All fittings will be compression type unless otherwise specified by the Water Department. Services over 2" material used will be subject to approval of the District.
3. There will be a minimum of five feet (5′) of cover over the water line. A two-foot (2′) minimum of sand backfill material will be carefully placed around the service pipe to protect it from normal backfill and compaction. The remainder of the trench will be backfilled with a material free of pieces of bituminous pavement and containing no stone larger than six inches (6"). Compaction of the rest of the trench above the zone around the pipe shall be done in layers not exceeding twelve inches (12") in depth and by use of power-driven tampers.
4. All renewal services will be tapped/installed by an approved contractor under the supervision of the Water Department.
5. The gate box will be placed on all existing water services over the corporations. On renewal services, a gate box will be installed on the corporation stops. All boxes shall be set one inch (1/4") below the existing road surface.
6. All service lines will have a ball type curb stop set no more than five feet (5′) from the edge of the paved surface of the roadway. An Erie type curb box with a rod will be used on all curb stops under one inch (1") in size. For curb stops over one inch (1") in size, a buffalo type curb box must be used. These boxes will be set flush with the ground.
7. All water service lines will be run in as straight line as possible from the corporation to wherever they enter the building. They will enter the foundation wall at a point no less that twelve inches (12") above the finished floor surface. The service will protrude through the wall a minimum of six inches (6") and a flared fitting will be used to connect a quarter turn ball valve of the appropriate size.
8. No service line may be run in the same trench as a sewer service or any other utility line.
9. All service lines must be inspected by Bernardston Fire and Water District personnel before being backfilled. If not inspected, the District will require that the line be uncovered for this purpose. **The District requires twenty-four hours (24 hrs.) notice before all services are installed.**

Note: All services shall be done to the satisfaction of the Bernardston Fire and Water District's personnel.

Note: No permits/construction will be approved after the first Monday in November or before the first Monday in April.
Note: For slab on grade applications the interior water service shall be installed in a continuous non-metallic sleeve beginning three feet outside the foundation, backfilled with clean sand prior to the installation of the finished concrete floor via a long radius sweep,
Note: Any and all labor and parts requiring BERNARDSTON FIRE AND Water District personnel will be charged at prevailing rates.

ATTACHMENT IA

BERNARDSTON FIRE AND WATER DISTRICT

REQUEST FOR SERVICE RENEWAL (PAGE 2)

In consideration of the granting of this permit, I_____, hereby agree to all terms described herein. (Signature)

Date: _____ Applicant's Mailing Address: _____

_____

_____

Applicant's Telephone #: _____

Approved ☐ Disapproved ☐ Date:_____

_____

Signature of Water Commissioner

_____

Signature of Water Commissioner

_____

Signature of Water Commissioner

ATTACHMENT IA

BERNARDSTON FIRE AND WATER DISTRICT

REQUEST FOR SERVICE RENEWAL (PAGE 3)

PLEASE DIAGRAM PLOT PLAN BELOW:

BERNARDSTON FIRE AND WATER DISTRICT
295 South Street PO Box 176 Bernardston, MA 01337
413-475-3037

ATTACHMENT II

BERNARDSTON FIRE AND WATER DISTRICT

REVIEW OF SUB-DIVISION PLANS

Request for Service No.:_____

Date:_____

If in the opinion of the Commissioners of the Bernardston Fire and Water District, the sub-division plans and impact study submitted, entitled_____
(Name of Project)
require review and comment by the District's Engineer selected for that purpose,

I_____hereby agree to pay for all costs associated with the review of the plans and impact study submitted.
(Applicant)

_____
(Signature of Applicant)

Date:_____ Applicant's Address:_____

_____

_____

Applicant's Telephone #: _____

BERNARDSTON FIRE AND WATER DISTRICT
295 South Street PO Box 176 Bernardston, MA 01337
413-475-3037

ATTACHMENT III

BERNARDSTON FIRE AND WATER DISTRICT

APPLICATION FOR LICENSE

License No.:_____

Date:_____

I _____hereby apply for a license to make connections to the
(Individual/Firm Name)
Bernardston Fire and Water District distribution system during the calendar year_____.

I understand that I am required to pay a sixty-seven dollars ($67.00) filing fee which will be refunded in full if the license is rejected. *(Please make check payable to: Bernardston Fire and Water District.)* I further understand that said license gives me the general right to work on the distribution system provided that I have delivered the necessary insurance certificates. Once the license is issued to _____

_____
(Individual/Firm Name)

the licensee will be required to obtain the particular permits needed for each individual job and to comply with all the District's Rules and Regulations.

_____
(Signature of Applicant)

Applicant's Mailing Address: _____

_____

Applicant's Telephone #: _____

Approved ☐ Disapproved ☐ Date:_____

_____ _____ _____
Commissioner Commissioner Commissioner

BERNARDSTON FIRE AND WATER DISTRICT
295 South Street PO Box 176 Bernardston, MA 01337
413-475-3037

ATTACHMENT IV

BERNARDSTON FIRE AND WATER DISTRICT

APPLICATION FOR INSTALLATION OF WATER LINES – COMMERCIAL/INDUSTRIAL

I, hereby apply for, ☐ Commercial Water Service

☐ Industrial Water Service

To the Bernardston Fire and Water District, the undersigning being, _____,
(Owner/Applicant)

Of the property located at _____,
(Street Address) (City) (State) (Zip Code)

Does hereby request a permit to install and connect a new water service to supply, _____

_____at said location.
(Name of Business)

REQUIRED INFORMATION

The following must be completed in full:

1. 1. Size of structure _____.
(Square Footage)
2. 2. Size of service pipe requested _____.
(Inches)
3. 3. Number of employees _____.
4. Briefly describe the nature of your business as it relates to water demand (i.e., type of fixtures demanding water supply)

_____

_____

_____

CONT. PAGE 2

APPLICATION FOR INSTALLATION OF WATER LINES – COMMERCIAL/INDUSTRIAL

In consideration of granting this permit, the undersigned agrees:

1. To furnish any additional information relating to the installation of the fire service which this permit is sought as may be requested by the Bernardston Fire and Water District.

2. To cooperate at all times with the Bernardston Fire and Water District and its' representatives in their inspecting and supervision of fire service planning and construction.

3. To accept and abide by all provisions of the Rules and Regulations of the Town of Leicester.

NOTE: No permits will be approved after the first Monday in November or before the first Monday in April.

Signature of Owner: _____ Date: _____

Mailing Address: _____

_____

_____

For Office Use Only:

Approved ☐ Disapproved ☐ Date: _____

_____
(Signature of Commissioner)

_____
(Signature of Commissioner)

_____
(Signature of Commissioner)

BERNARDSTON FIRE AND WATER DISTRICT
295 South Street PO Box 176 Bernardston, MA 01337
413-475-3037

ATTACHMENT V

BERNARDSTON FIRE AND WATER DISTRICT

APPLICATION FOR FIRE PROTECTION

To the Bernardston Fire and Water District, the undersigned being,_____
(Owner/Applicant)

of the property located at, _____does hereby request a permit to install and
(Number and Street)

connect a fire service to supply _____at said location.
(Name of Business)

REQUIRED INFORMATION

The following information must be completed:

1. Size of structure _____.
(Square footage)

2. Construction of structure _____.

3. Size of service pipe requested _____.
(Inches)

4. Number of hydrants requested _____.

5. Briefly describe the nature of your business as it relates to demand (i.e., types of storage, materials stored, type of manufacturing process).

_____

_____

_____

_____

Any service pipe to be used for fire protection purposes (i.e., feeding hydrants, sprinkler systems, etc.) Shall be a separate from the main and subject to an entrance fee of Two Thousand Five Hundred Dollars ($2,500.00) for any eight (8) inch or smaller and Four Thousand Fifty Dollars ($4,050.00) for any size greater than eight (8) inches. Article III, C.

APPLICATION FOR FIRE PROTECTION (Page: 2)

In consideration of the granting of this permit, the undersigned agrees to:

1. Furnish any additional information relating to the installation of the water service for which this permit is sought as may be requested by the Bernardston Fire and Water District.

2. Accept and abide all provisions of the Rules and Regulations of the Bernardston Fire and Water District, and of all other pertinent Rules and Regulations that may be adopted in the future.

3. Cooperate with the Bernardston Fire and Water District and its representatives at all times in their inspecting and supervision of water service planning and construction.

4. Accept and abide by all provisions of the Rules and Regulations of the Town of Leicester.

Note: No permits will be approved after the first Monday in November or before the first Monday in April.

Signature of Owner:_____ Date:_____

Mailing Address:_____

Approved ☐ Disapproved ☐ Date:_____

_____ _____ _____

Commissioner Commissioner Commissioner

DIAGRAM PLOT PLAN BELOW OR ON OPPOSITE SIDE

BERNARDSTON FIRE AND WATER DISTRICT
295 South Street PO Box 176 Bernardston, MA 01337
413-475-3037

ATTACHMENT VI

BERNARDSTON FIRE AND WATER DISTRICT

Application for Meter Account

Address of service: _____

_____

Owners Name: _____

Owners Phone: _____

Owners Email: _____

Mailing Address: _____

_____

Signature of Owner: _____ Date: _____

For Office Use Only:

Approved ☐ Disapproved ☐ Date: _____

New Account #_____

_____
(Signature of Billing Clerk)

_____

DOCUMENT A00808

PROJECT UTILITY COORDINATION FORM

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Project Utilities Coordination (PUC) Form

CONTACTS AND GENERAL UTILITY INFORMATION

2/23/2026

City/Town:	Project File #:	PUC Completed by:	Utility Pole Set:		
Bernardston	612159	Paul Kelly	Verizon/Eversource		
Route/Street:	**Resident Engineer:**	**Mass DOT PM:**	**Scheduled Ad Date:**	**Total Poles Relocated:**	8/13/2026
Rte 10 over I91 and Fall River		Gregory Mischel	5/23/2026	8	PRINTED

Consultant:	Contact:	Office #	Cell #	Email
TEC	Robert Niccoli			"rniccoli@theengineeringcorp.com" <rniccoli@theengineeri

Utility Company	Contact	Office #	Cell #	Email	Scope, Budget, Duration Submitted		Reimbursement			Potential for District Initiated Early Relocation *		Utilities On Bridge/Structure		Utilities Underground (UG) /Aerial (OH)	
					Yes	No	Agreement	Non-Reimb'le	Notes	YES	NO	YES	NO	UG	OH
Eversource	Nicholas Langone			Langone, Nicholas <nicholas.langone@eversource.com>	X		x				x		x		x
VZ	Paul Styspeck			Paul. M. Styspeck (paul.m.styspeck@verizon.com)	x		x				x	x		x	x
Comcast	Tom Brown			Brown, Thomas H <thomas_brown@comcast.com>	x		x				x		x		x
MBI	Jason Wing			jason.wing@locallinx.com	x		X				x		x		x

Utility Relocation Notes for MassDOT Contractor

Unless otherwise noted by Contract, the MassDOT Contractor is to provide the District Construction Office with 7 Calendar Days advance notification in order to validate the current progress and provide the required 30 Days advance notice-to-proceed for the first Utility - and each subsequent Utility. These advance notifications are to be identified in the Contractor's Schedules (Pre-Con preparation, Baseline, Subnets, and Updated/Monthly Schedules) as specified in Subsection 8.02 (for DBB Contracts) and/or Section 9 (of DB Contracts). Note: The durations included below do not include these lead-times. See Additional 'Important Basis notes for Contractor' - on last PUC Form page.

Additional notes:

Suggested Sequence of Relocation (Based on Consultant proposed construction staging)

The sequence as detailed on the following pages is based on the consultants proposed staging plan. This information was compiled through meetings that included all of the utilities listed below along with the designer and the (insert Municipality here). The information provided is the best available information prior to project advertisement.

Proposal No. 612159-136484

Is 'enabling' (prep) work, by the Contractor, necessary prior to the start of the first series of utility relocations:	Yes	No
	x	

Has any of the Utility work been identified to work concurrently	Yes	No
	x	

8/13/2026
PRINTED

massDOT Massachusetts Department of Transportation Highway Division

	RESPONSIBLE PARTY		DESCRIPTION - Utility Relocation Phases, Tasks and Activities	Estimated Duration (Work Days) by Utilities (Lead time not included)	Concurrent / Exclusive Utility Work Contractor note: In planning and executing the work, the Access Restraints listed in the Special Provisions, takes precedence over the checklist in these 4 columns.				Access Restraint & Limitations of Operations Notes Should an AR be considered for the Contractor ?	
					Exclusive Utility on site	Concurrent Utilities	Contractor Off-Site	Contractor Concurrent		
	C = Contractor	U = Utility Co.			Utility working with no other Utilities in vicinity	Utility working with other Utilities on site	No Contractor physical construction operations on-site (while Utility is	Contractor and Utility are working on-site - but NOT in the same vicinity	Potential Access Restraint (Yes/No)	Reason/Note (optional)
Stage : 1 Phase : A	C = Cor		Enabling' work by the Contractor - _____The Contractor completes tree clearing and reviews proposed pole locations with the RE.							
			UTILITY OPERATIONS - _Initial Relocation for Route 10 over I91 and Route 10 over Fall River_____							
Task: 1			***Utility Co. VERIZON and Eversource***							
		U	Verizon and Eversource sets utility poles	17	x			x	NO	
		U	Verizon relocates Conduit and Risers to new utility pole near 26+20 RT (I91 NB off ramp), No Splicing	3	x			x	NO	
			Sub-Total	**20**						
			UTILITY OPERATIONS - _____							
Task: 2			***Utility Co. Eversource***							
		U	Eversource frames poles, sets anchor, replaces conductors and guying.	10	x		x		YES	
		U	Eversource transfers services	4	x		x		YES	
		U	Eversource removes old wire and pole tops	4	x		x		YES	
			Sub-Total	**18**						
			UTILITY OPERATIONS - _____							
Task: 3			***Utility Co. MBI/Locallinx***							
		U	MBI places new strand , lash new coax	1	x		x		YES	
		U	MBI delashes existing fiber swing to new strand and lash	1	x		x		YES	
		U	MBI splices and activate, wreck out old plant	1	x		x		YES	
			Sub-Total	**3**						
			UTILITY OPERATIONS - _____							
Task: 3			***Utility Co. Comcast***							
		U	Comcast places new strand , lash new coax	2	x		x		YES	
		U	Comcast delashes existing fiber swing to new strand and lash	1	x		x		YES	
		U	Comcast splices and activate, wreck out old plant	1	x		x		YES	
			Sub-Total	**4**						
			UTILITY OPERATIONS - _____							
Task: 4			***Utility Co. Verizon***							
		U	Verizon transfers ,splices and removes existing cable at Rte 10 over Fall River	28	x		x		YES	
		U	Verizon removes abandoned poles , anchors and equipment	18		x		x	NO	
			Sub-Total	**46**						
Stage : 1 Phase :B	C = Cor		Enabling' work by the Contractor - _____The Contractor removes the deck from the eastbound side of Rte 10 over I91 Bridge							
			UTILITY OPERATIONS - _Initial Relocation for Route 10 over I91 and Route 10 over Fall River_____							
Task: 1			***Utility Co. VERIZON***							
		U	Verizon repairs existing conduit (non-reimbursible work)	7	x			x	NO	
			Sub-Total	**7**						
Stage : 2 Phase : A	C = Cor		Enabling' work by the Contractor - _____The Contractor completes replacement of Bridge Structure over Fall River							
			UTILITY OPERATIONS - _Final Relocation for Route 10 over Fall River_____							
Task: 1			***Utility Co. VERIZON and Eversource***							
		U	Verizon and Eversource sets permanent utility poles	2	x			x	NO	
								x	NO	
			Sub-Total	**2**						
			UTILITY OPERATIONS - _____							
Task: 2			***Utility Co. Eversource***							
		U	Eversource frames poles, sets anchor, replaces conductors and guying.	3	x		x		YES	

	RESPONSIBLE PARTY		DESCRIPTION - Utility Relocation Phases, Tasks and Activities	Estimated Duration (Work Days) by Utilities (Lead time not included)	Concurrent / Exclusive Utility Work Contractor note: In planning and executing the work, the Access Restraints listed in the Special Provisions, takes precedence over the checklist in these 4 columns.				Access Restraint & Limitations of Operations Notes Should an AR be considered for the Contractor ?	
	C = Contractor	U = Utility Co.			Exclusive Utility on site: Utility working with no other Utilities in vicinity	Concurrent Utilities: Utility working with other Utilities on site	Contractor Off-Site: No Contractor physical construction operations on-site (while Utility is	Contractor Concurrent: Contractor and Utility are working on-site - but NOT in the same vicinity	Potential Access Restraint (Yes/No)	Reason/Note (optional)
		U	Eversource removes old wire and pole tops	2	x		x		YES	
			Sub-Total	**5**						
			UTILITY OPERATIONS - _____							
Task: 3			***Utility Co. MBI/Locallinx***							
		u	MBI places new strand , lash new coax	1	x		x		YES	
		u	MBI delashes existing fiber swing to new strand and lash	1	x		x		YES	
			Sub-Total	**2**						
			UTILITY OPERATIONS - _____							
Task: 3			***Utility Co. Comcast***							
		u	Comcast places new strand , lash new coax	2	x		x		YES	
		u	Comcast delashes existing fiber swing to new strand and lash	1	x		x		YES	
		u	Comcast splices and activate, wreck out old plant	1	x		x		YES	
			Sub-Total	**4**						
			UTILITY OPERATIONS - _____							
Task: 4			***Utility Co. Verizon***							
		u	Verizon transfers to new permanent utility poles	8	x		x		YES	
		u	Verizon removes abandoned pole and anchors	4		x		x	NO	
			Sub-Total	**12**						

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DOCUMENT A00820

Massachusetts Department of Transportation
Conditions of Custody

REQUEST FOR RELEASE OF MASSDOT AUTOCAD FILES FORM
(Only to be used following award of contract)

City/Town: BERNARDSTON Project File Number: 612159

Contract Number: 136484

Project Description: Bridge Replacement, B-10-001, Route 10 over Fall River and Deck Replacement, B-10-018, Route 10 over I-91

All AutoCAD files are provided solely as a courtesy to facilitate public access to information. MassDOT attempts to provide current and accurate information but cannot guarantee so. MassDOT provides such documents, files or other data "as is" without any warranty of any kind, either expressed or implied, including but not limited to, accuracy, reliability, omissions, completeness and currentness. The Commonwealth of Massachusetts and its Consultants shall not be liable for any claim for damages, including lost profits or other consequential, exemplary, incidental, indirect or special damages, relating in any way to the documents, files or other data accessible from this file, including, but not limited to, claims arising out of or related to electronic access or transmission of data or viruses. Because data stored on electronic media can deteriorate undetected or be modified without our knowledge, MassDOT cannot be held liable for its completeness or correctness. MassDOT makes no representation as to the compatibility of these files beyond the version of the stated CAD software.

By signing this form, I agree that it shall be my responsibility to reconcile this electronic data with the conformed contract documents, and that only the conformed contract documents shall be regarded as legal documents for this Project. I understand that this authorization does not give me the right to distribute the files. I agree to the terms above and wish to receive the AutoCAD files.

This signed form shall be emailed to the Highway Design Engineer at the MassDOT -Highway Division at the following email address:

DOTHighwayDesign@dot.state.ma.us
Attn: AutoCAD Files

Name of person requesting AutoCAD files: _____

Affiliation/Company: _____

Address: _____

_____

Telephone number: _____

Email address: _____

Signature/Date: _____

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DOCUMENT A00830

COMBINED 404 & 401 APPLICATION

404 Pre-Construction Notification Permit Application
&
401 Water Quality Certification Application

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USACE PCN & 401 WATER QUALITY PERMIT APPLICATION

Bridge Replacement

Bridge No. B-10-001(12D)
Church Street (Route 10)
Bernardston, Massachusetts
MassDOT Project Number 612159



SUBMITTED TO:
U.S. Army Corps of Engineers - Regulatory Division
696 Virginia Road
Concord, Massachusetts 01742

Massachusetts Dept. of Environmental Protection
100 Cambridge Street, Suite 900
Boston, MA 02114

PREPARED FOR:
Massachusetts Department of Transportation
10 Park Plaza
Boston, MA 02116

PREPARED BY:
Lucas Environmental, LLC
500A Washington Street
Quincy, Massachusetts 02169

IN ASSOCIATION WITH:
TEC, Inc.
282 Merrimack Street
Lawrence, MA 01840

REPORT DATE: July 2025

LUCAS ENVIRONMENTAL, LLC

July 11, 2025

U.S. Army Corps of Engineers
Attn: Daniel Vasconcelos
696 Virginia Road
Concord, Massachusetts 01742

MassDEP Wetlands and Waterways Division
Heidi Davis, MassDEP Highway Unit Supervisor, Wetlands Program
401 Water Quality Certification Program (via EEA ePLACE Portal)

Re: Section 404 Pre-Construction Notification Permit Application &
401 Water Quality Certification Application (BRP WW 11)
Bridge No. B-10-001(12D)
Church Street (Route 10) over the Fall River, Bernardston, Massachusetts

To Whom It May Concern:

On behalf of the Applicant, the Massachusetts Department of Transportation (MassDOT), and in association with TEC, Inc. (TEC), Lucas Environmental, LLC (LE) is pleased to submit this Pre-Construction Notification (PCN) Application for proposed activities within federally regulated wetlands and Waters of the United States eligible for the Massachusetts General Permit (GP) under Section 404 of the federal Water Pollution Control Act (a.k.a., "Clean Water Act") associated with the proposed replacement of the Church Street/Route 10 Bridge over the Fall River in Bernardston, Massachusetts.

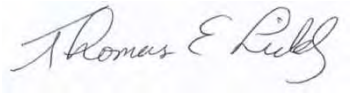
The project also requires a Minor Fill/Excavation 401 Water Quality Certification (WW 11) application to the Massachusetts Department of Environmental Protection (MassDEP). This application will be submitted to MassDEP via the ePlace Portal. This project qualifies under the MassDOT bridge exemption as specified in the 2014 Transportation Bond Bill. The bridge replacement design is substantially the functional equivalent of, and in similar alignment to, the existing bridge.

The proposed project will result in impacts to Waters of the U.S. (WOTUS), specifically along and land below the Ordinary High Water (OHW) line of the Fall River. The project site also lies within areas subject to the 100-year storm event. Under the GP, this project requires screening and a written determination of eligibility under the General Permit by the United States Army Corps of Engineers (USACE). As such, the Applicant is seeking authorization under General Permits 2 ("Maintenance"), and 23 ("Linear Transportation Projects and Wetland/Stream Crossings"). A pre-filing meeting was held with representatives from MassDOT, USACE, and MassDEP on May 15, 2025.

The project proponent hereby certifies that all information contained herein is true, accurate, and complete to the best of my knowledge and belief. The project proponent hereby requests that the certifying authority review and take action on this CWA 401 application within the appropriate reasonable period of time.

If you have any questions, please do not hesitate to contact me at 617.405.4053 or tel@lucasenviro.com. Thank you for your consideration in this matter.

Sincerely,
LUCAS ENVIRONMENTAL, LLC



Thomas Liddy, PWS, CWS, CESSWI
Environmental Project Manager

cc: MassDOT, Attn: Courtney Walker, Wetlands Coordinator (electronic copy)
MassDOT. Attn: Lily Collins, Wetlands Analyst
MassDOT, Gregory Mischel
USACE, Kevin Newton
MassDEP, Ryan Hale
MassDEP, Tyler Lewis
MassDEP, Jamie Iannelli
TEC, Inc. (electronic copy)
Bernardston Conservation Commission

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SECTION I – FORMS

Application for Department of the Army Permit

Application for MassDEP BRP WW 11

U.S. Army Corps of Engineers (USACE), New England District (NAE)

PRE-CONSTRUCTION NOTIFICATION (PCN)

DATA REQUIRED BY THE PRIVACY ACT OF 1974

Authority Rivers and Harbors Act, Section 10, 33 USC 403; Clean Water Act, Section 404, 33 USC 1344; Regulatory Programs of the Corps of Engineers; Final Rule 33 CFR 320-332.

Principal Purpose The information provided will be used in evaluating activities under Pre-Construction Notification procedures within New England.

Routine Uses Disclosure This information may be shared with other federal, state, and local government agencies during the application review process. Submission of requested information is voluntary. However, if information is not provided the PCN application cannot be fully evaluated nor can USACE render a permit decision.

Instructions The applicant must complete ALL required sections of this document before their submission to USACE. The PCN submission to USACE shall include one set of drawings which show the location and character of the proposed activity, statements that address each required field below, and documentation that supports each field (e.g., emails, letters, description/narrative, phone calls, surveys, reports, etc.). Electronic submissions to the following address are strongly preferred: cenae-r-ma@usace.army.mil. The email subject line shall contain the following: General Permit #, PCN, City/Town, and date submitted. An application that is not completed in full will be returned.

(ITEMS 1 THRU 4 TO BE FILLED BY USACE)

1. APPLICATION NO.	2. FIELD OFFICE CODE	3. DATE RECEIVED	4. DATE APPLICATION COMPLETE

(ITEMS BELOW TO BE FILLED BY APPLICANT)

5. APPLICANT'S NAME
First - Courtney Middle - Last - Walker
Company - MassDOT - Highway Division
E-mail Address - courtney.l.walker@dot.state.ma.us

6. APPLICANT'S ADDRESS:
Address- 10 Park Plaza, Room 7360
City - Boston State - MA Zip - 02116 Country -

7. APPLICANT'S PHONE NOs. with AREA CODE

a. Residence	b. Business	c. Fax	d. Mobile
	857.262.0757		

8. AUTHORIZED AGENT'S NAME AND TITLE (*agent is not required*)
First - Thomas Middle - Last - Liddy
Company - Lucas Environmental, LLC
E-mail Address - tel@lucasenviro.com

9. AGENT'S ADDRESS:
Address- 500A Washington Street
City - Quincy State - MA Zip - 0216 Country - USA

10. AGENT'S PHONE NOs. with AREA CODE

a. Residence	b. Business	c. Fax	d. Mobile
	617.405.405		

STATEMENT OF AUTHORIZATION

11. I hereby authorize, Thomas Liddy to act on my behalf as my agent in the processing of this general permit PCN application and to furnish, upon request, supplemental information in support of this general permit PCN application.

Courtney Walker — SIGNATURE OF APPLICANT
7/10/25 — DATE

NAME, LOCATION, AND DESCRIPTION OF PROJECT OR ACTIVITY

12. PROJECT NAME or TITLE (*see instructions*)

Bridge No. B-10-001 (12D) Replacement
Church Street (Route 10)
Bernardston, MA

13. NAME OF WATERBODY, IF KNOWN (*if applicable*)
Fall River

14. PROPOSED ACTIVITY STREET ADDRESS (*if applicable*)
Church Street Bridge
City: Bernardston State: MA Zip: 01337

15. LOCATION OF PROPOSED ACTIVITY (*see instructions*)
Latitude: 42.67069 °N Longitude: -72.54594 °W

16. OTHER LOCATION DESCRIPTIONS, IF KNOWN (*see instructions*)

State Tax Parcel ID: Municipality:

Section: Township: Range:

17. DIRECTIONS TO THE SITE.

Interstate 91 to Exit 50B (Route 10 South). Fall River is immediately west of the interchange.

18. IDENTIFY THE SPECIFIC GENERAL PERMIT(S) YOU PROPOSE TO USE:

GP 2. Maintenance; GP 23. Linear Transportation Projects and Wetland/Stream Crossings.

19. DESCRIPTION OF PROPOSED GENERAL PERMIT ACTIVITY (*see instructions*)

The project proposes to demolish the existing Church Street Bridge over the Fall River and construct a new bridge superstructure. The replacement structure will be constructed upgradient, spanning the Fall River. Additional work includes grading and repaving Church Street in the vicinity of the bridge and stormwater improvements.

20. DESCRIPTION OF PROPOSED MITIGATION MEASURES (*see instructions*)

Sedimentation and erosion controls will be installed below the work areas to prevent impacts to Waters of the US. Placement of riprap scour protection along the side slopes is also proposed.

21. PURPOSE OF GENERAL PERMIT ACTIVITY (*Describe the reason or purpose of the project, see instructions*)

The proposed project is necessary to replace the Church Street bridge.

22. Quantity of Wetlands, Streams, or Other Types of Waters Directly Affected by Proposed General Permit Activity (*see instructions*)

Area (square feet)	Length (linear feet)	Volume (cubic yards)	Duration	Purpose
331	112 (OHW/Bank)	35 dredge	Perm	Due to stream armoring
		36 fill	Perm	Addition of riprap
	212 (OHW/Bank)	N/A	Temp	
2,064			Temp	Due to use of sandbags for water control

Each PCN must include a delineation of wetlands, other special aquatic sites, and other waters, such as lakes and ponds, and perennial, intermittent, and ephemeral streams, on the project site.

23. List any other GP(s), regional general permit(s), or individual permit(s) used or intended to be used to authorize any part of the proposed project on any related activity (*see instructions*)

401 Water Quality Certification.

24. If the proposed activity will result in the loss of aquatic resources that exceed those identified in the New England District Compensatory Mitigation Thresholds, explain how the compensatory mitigation requirement will be satisfied. (*see instructions*)

No loss of aquatic resources.

25. Is Any Portion of the General Permit Activity Already Complete? [ ] Yes [X] No If Yes, describe the completed work:

26. List the name(s) of any species listed as endangered or threatened under the Endangered Species Act that might be affected by the proposed GP activity or utilize the designated critical habitat that might be affected by the proposed GP activity. (*see instructions*)

Northern Long-eared Bat

27. List any historic properties that have the potential to be affected by the proposed GP activity or include a vicinity map indicating the location of the historic property or properties. Attach relevant project information, along with any responses received from project notifications to this submittal. (*see instructions*)

BER.A - Bernardston Center Historic Area

28. For a proposed GP activity that will occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a "study river" for possible inclusion in the system while the river is in an official study status, identify the Wild and Scenic River or the "study river":

N/A

29. If the proposed GP activity also requires permission from the USACE pursuant to 33 U.S.C. 408 because it will alter or temporarily or permanently occupy or use a U.S. Army Corps of Engineers federally authorized civil works project, have you submitted a written request for section 408 permission from the USACE district having jurisdiction over that project? [ ] Yes [X] No

If "yes", please provide the date your request was submitted to the USACE District:

30. Does the activity require a 401 Water Quality Certification (WQC)? If so, specify the type of 401 WQC that is required (general or individual). In cases where an individual 401 WQC is required, provide the date the 401 WQC certification request was submitted to the certifying authority and their contact information.

Yes, an individual minor 401 Water Quality Certificate Fill/Excavation permit application will be submitted to MassDEP.

31. If the terms of the GP(s) you want to use require additional information to be included in the PCN (i.e. sampling and analysis plan), please include that information in this space or provide it on an additional sheet of paper marked Block 30. (*see instructions*)

32. I certify that the information in this pre-construction notification is complete and accurate. I further certify that I possess the authority to undertake the work described herein or am acting as the duly authorized agent of the applicant.

Courtney Walker	7/10/25	Thomas Liddy	06/13/25
SIGNATURE OF APPLICANT	DATE	SIGNATURE OF AGENT	DATE

The Pre-Construction Notification must be signed by the person who desires to undertake the proposed activity (applicant) and, if the statement in block 11 has been filled out and signed, the authorized agent.

18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals, or covers up any trick, scheme, or disguises a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statements or entry, shall be fined not more than $10,000 or imprisoned not more than five years or both.

Commonwealth of Massachusetts
Executive Office of Energy and Environmental Affairs
Department of Environmental Protection
100 Cambridge Street 9th Floor Boston, MA 02114 • 617-292-5500

Maura T. Healey
Governor

Kimberley Driscoll
Lieutenant Governor

Rebecca L. Tepper
Secretary

Bonnie Heiple
Commissioner

WW11 - 401 Minor Fill and Excavation Project Application

Permittee Information

Name: MassDOT Highway Division
Phone: (857) 262-0757
Address: 10 PARK PLAZA
BOSTON, MA 02116

Application Submitter Information

Name: THOMAS LIDDY
Phone: (617) 405-4053
Address: 500A WASHINGTON STREET
QUINCY, MA 02169

Location Information

Fall River
0 CHURCH STREET BERNARDSTON, MA 01337
Latitude: 42.67069
Longitude: -72.54594

Other Primary Location Info

Parcel ID	N/A
Municipality	BERNARDSTON

Project Information

Project Name	Bridge Replacement - Bridge No. B-10-001(12D)
Proposed Activity	The project proposes to replace the structurally deficient Fall River Bridge (Bridge B-10-001) with a new structure that will follow the same horizontal and vertical alignment as the existing crossing. As proposed, the Project consists of the full replacement of the three bridge spans along with widening along the 0.5 mile corridor to accommodate sidewalk access along the entire stretch.
Will the project occur in multiple municipalities?	No

Project Type

Commercial / Industrial	
Utility	
Real Estate Subdivision	
Institutional	
Other	Yes
Please provide additional information for the selection of your project type	Transportation

Proposed Areal Extent Info

Bordering Vegetated Wetland (sqft)	0
Isolated Vegetated Wetland (sqft)	0
Non-tidal Land Under Water (sqft)	2395
Salt Marsh (sqft)	0
Land Under the Ocean (sqft)	0
Intertidal Zone (sqft)	0
Total cumulative loss (sqft)	2395

Compliance With 314 CMR 9.00

Does the proposed project meet the definition of a Single and Complete Project at 314 CMR 9.02?	Yes
Does the proposed project include "multi-phased activities"?	No
Does the proposed project meet the definition of an Ecological Restoration Project?	No
Have you completed the Public Notice as per 314 CMR 9.05(3)? If yes, please attach a completed 'Proof of Public Notice' document in the document section.	No
Does the required Alternatives Analysis screen all practicable alternatives to the proposed discharge that would have less adverse impact on the aquatic ecosystem?	Yes
Does this proposed project meet the definition of Water-Dependent at 314 CMR 9.02?	Yes
Is the proposed project restricted to access to one dwelling unit?	No
Will the cumulative discharges of dredged or fill material to Waters of the United States within the Commonwealth exceed 1 acre in areal extent?	No

Report the areal extent, as expressed in square feet, of all proposed restoration or replication of Bordering Vegetated Wetlands and/or Isolated Vegetated Wetlands	0
Will any proposed discharges of dredged or fill material or any proposed restoration or replication occur within Rare Species Habitat as defined at 314 CMR 9.02?	No
Will the proposed project include or consist of the construction of a new non-tidal crossing of any Land Under Water?	No
Will the proposed project include or consist of the construction of a new tidal crossing of any Land Under Water?	No
Will the proposed project include or consist of the repair, replacement, and/or expansion of an existing non-tidal crossing of any Land Under Water?	Yes
If yes, will such repair, replacement, and/or expansion of an existing crossing comply with the Massachusetts River and Stream Crossing Standards (March 8, 2012) to the maximum extent practicable (see Practicable at 314 CMR 9.02)?	Yes
Will the proposed project include or consist of the repair, replacement, and/or expansion of an existing tidal crossing of any Land Under Water?	No
Does the proposed project include any amount of discharges of dredged or fill material to any Outstanding Resource Water?	No
Will any proposed “discharge of dredged or fill materials” occur within any certified Vernal Pool (as defined at 314 CMR 9.02)?	No

Additional Information

Is your project subject to Massachusetts Environmental Policy Act (MEPA)?	No
Is your project subject to Massachusetts Wetlands Protection Act?	No
Is your project subject to Massachusetts Public Waterfront Act?	No
Is your project subject to Massachusetts Historical Commission?	Yes
MHC File Number (if available)	RC.10955
Date of MHC Determination Letter (if available)	12/08/2023

Is your project subject to Massachusetts Bureau of Underwater Archeological Resources?	No
Is your project subject to U.S. Army Corps of Engineers – Section 404 of Federal Clean Water Act?	Yes
USACE File Number (if available)	TBD

Documents

Documents	Please upload 2 Required Document(s) which are mandatory to submit this Application: 1. Alternatives Analysis 2. Site Plans

Special Fee Provision

Exemption	Yes
Exemption Type	State Agency (only applicable if fee < or = to $100)
Exclusion (special agreement or policy)	
Substitution (ASP/IRP)	
Double Fee for Enforcement	
Hardship payment extension request	

Attachments

Name	Description	Type	Latest Updated
Alternatives Analysis.pdf	lternatives Analysis from Project Narrativ	Alternatives Analysis	07/10/2025
612159 Bernardston Permitting Plans.pdf	Plan Set	Site Plans	07/10/2025
PCN-401_Bernardston, Church St_July_10_2025.pdf	lete application with narrative and appen	Other	07/10/2025

Application Contacts

Name	Organization Name	Contact Person	Telephone #	Contact Type	Email
THOMAS, LIDDY	n/a	n/a	(617) 405-4053	Application Prepared By	tel@lucasenviro.com

Certification Information

Individual
THOMAS LIDDY
500A WASHINGTON STREET
QUINCY, MA 02169
United States

Telephone #: (617) 405-4053
E-mail: tel@lucasenviro.com

I certify that I am familiar with the work proposed and that to the best of my knowledge and belief the information contained in this application is true, complete, and accurate.

SECTION II – PROJECT NARRATIVE

1.0 INTRODUCTION

On behalf of the Applicant, the Massachusetts Department of Transportation (MassDOT), and in association with TEC, Inc. (TEC), Lucas Environmental, LLC (LE) is pleased to submit this Pre-Construction Notification (PCN) and Minor Fill/Excavation 401 Water Quality Certification (WW 11) Application for proposed activities within federally regulated wetlands and Waters of the United States eligible for the Massachusetts General Permit (GP) under Section 404 of the federal Water Pollution Control Act (a.k.a., "Clean Water Act") associated with the proposed replacement of the Church Street/Northfield Road/Route 10 Bridge over the Fall River in Bernardston, Massachusetts.

The project proposes to replace the structurally deficient Fall River Bridge (Bridge B-10-001) with a new structure that will follow the same horizontal and vertical alignment as the existing crossing. As proposed, the Project consists of the full replacement of the three bridge spans along with widening along the 0.5 mile corridor to accommodate sidewalk access along the entire stretch. Additionally, the northbound exit ramp at the I-91 interchange has been re-aligned to better reflect current MassDOT standards regarding pedestrian safety and lookback distance. Several drainage improvements will be made along the corridor as well to account for the relocated curbed gutter alignment along Route 10 and the exit ramp.

The existing I-91 Bridge (B-10-018) has severe deficiencies to the existing bridge deck. In reviewing the existing inspection reports, it is evident that the deck deflects under vehicular loads, which is causing unintended stress in the existing superstructure. The existing bridge consists of five simple spans which will be cleaned and painted as part of the deck replacement. The east backwall will also be rebuilt as part of this project. The deck replacement includes upgraded safety features and a 6-foot-wide sidewalk. There are no wetland impacts associated with the I-91 Bridge, therefore this is not discussed further in this application.

The proposed replacement of the Fall River Bridge will result in impacts to Waters of the U.S. (WOTUS), specifically to the bank and to land below the Ordinary High Water (OHW) line to the Fall River. The project site also lies within areas subject to the 100-year storm event. Under the GP, this project requires screening and a written determination of eligibility under the General Permit by the United States Army Corps of Engineers (USACE). As such, the Applicant is seeking authorization under General Permits 2 ("Maintenance"), and 23 ("Linear Transportation Projects and Wetland/Stream Crossings").

This project is being filed under the MassDOT bridge exemption as specified in the 2014 Transportation Bond Bill. Therefore, the project requires a Water Quality Certification (WW 11 – Minor Project Certification) from MassDEP, however does not require state permitting (WPA, MEPA, Ch. 91).

The overall purpose of this Narrative is to provide a detailed description of the existing conditions within the immediate area of proposed work; present specific activities subject to jurisdiction under the Clean Water Act; identify anticipated impacts; and present mitigation measures to be implemented to ensure that the project can be completed such that there are no long-term, adverse effects to Waters of the U.S. These mitigation measures include erosion and sedimentation controls, water control methods, and dredged material management measures. The location of figures, plans, and other supporting documentation are noted in the text, as well as in the Table of Contents.

2.0 EXISTING CONDITIONS

The Study Area includes the Church Street Bridge and surrounding areas within 200 feet of the structure, as well as the areas north and south of Church Street between Bald Mountain Road and the Fall River, including the I-91 interchange. The existing bridge over the Fall River is located just west of the I-91 interchange. Church Street is a paved, two lane (one in each direction) roadway that runs in an east/west direction. The surrounding area is generally characterized by low-density residential development, as well as mixed use commercial and industrial land uses. Fall River flows from north to south through the Study Area. Representative photographs are included in Appendix A – Photographic Documentation.

The existing bridge is a three-span structure with two (2) approximately 3.5-4.0-foot piers at a skewed distance of approximately 20-Feet from the left and right abutments. The bridge supports a 60-foot wide deck. The roadway is a two-lane Rural Major Collector roadway approximately 50-foot wide with granite curbing in the area of the structure. The roadway is served by a storm drain system that captures runoff in a catch basin/drain manhole/concrete piping system which conveys the runoff to the river.

Land cover within the project area is primarily well maintained grassed open space along with some wooded forest. Impervious areas are largely limited to roadway surfaces along with a few rooftops and driveways. The topography within the project area is mostly sloped down towards the Fall River crossing. A high point on the Route 10 corridor near the eastern terminus of the project will send a small portion of stormwater to the east, however these areas are captured in the existing stormwater network and routed back towards the west and outfall near the Fall River crossing. Any stormwater that bypasses these inlets would still find their way to an unnamed Fall River branch and eventually to the river, which firmly puts the entire project within the Fall River watershed.

Stormwater falling within the project area is picked up with the existing closed drainage network that was mostly installed during the interstate's construction in 1959. While the system appears to be working as intended, there are several catch basin to catch basin connections and no stormwater control measures(SCMs) currently installed. The existing drainage system consists of several separate networks which outfall into the Fall River. All but one outfall is located within 200 ft. of the Fall River crossing and have been combined in the analysis as one design point. The remaining outfall connects to the I-91 drainage system and outfalls into the Fall River approximately a half a mile downstream.

Fall River (Segment ID MA34-33) is identified as a Category 2 Water per the Final MassDEP 2018/2020 Integrated List of Waters (305(b)/303(d)). Waters are listed in Category 2 if they were identified as "attaining some uses; other uses not assessed". The uses attained include aesthetic, fish and other aquatic life and wildlife, primary contact recreation, and secondary contact recreation. Fish consumption and shellfish harvesting are not assessed.

The Study Area is not located within an Area of Critical Environmental Concern (ACEC), Outstanding Resource Water (ORW), MassDEP Wellhead Protection Area, or Watershed Protection Area. Fall River is designated as a Cold-Water Fishery by the Massachusetts Division of Fisheries and Wildlife. The Fall River is not designated as a National Wild and Scenic River and is not within 0.25 miles of one.

2.1 Fisheries and Wildlife / Natural Heritage Endangered Species / Vernal Pools

A review of the current MassGIS data layer for the Massachusetts Natural Heritage Atlas (effective August 1, 2021) under the Natural Heritage and Endangered Species Program (NHESP) indicates that the Study Area is not located within Priority Habitat of Rare Species or within Estimated Habitat of Rare Wildlife. No Certified or mapped Potential Vernal Pools under the jurisdiction of the Wetlands Protection Act Regulations (310 CMR 10.00 et seq.) or the Massachusetts Endangered Species Act (321 CMR 10.00 et seq.) occur within the Study Area.

According to the U.S. Fish & Wildlife Service Information for Planning and Consultation (IPAC) system, the project area is within known habitat for the Northern Long-eared Bat (NLEB; *Myotis septentrionalis*). Project design elements will demonstrate that the project can be constructed with no adverse impacts to the environment or endangered species that may be present within the project area. See Appendix B for rare species documentation regarding federal rare species.

The Fall River within the Study Area is identified as Essential Fish Habitat (EFH) for all life stages for Atlantic Salmon (*Salmo salar*). MassDOT initiated consultation with USFWS and NOAA National Marine Fisheries Service to determine if Atlantic Salmon is present in the Fall River. MassDOT and USFWS concluded that Atlantic Salmon is not present and formal consultation isn't needed, to which NOAA concurred. Refer to Appendix B – Rare and Sensitive Species information for documentation.

2.2 100-Year Floodplain

According to the July 2, 1980 FEMA Flood Insurance Rate Maps for the Town of Bernardston, Massachusetts, Community Panel Numbers 250110 0006A and 250110 0007A, there is an area designated as Zone AE associated with Fall River. Zone AE is classified as an area subject to the 1% annual chance flood (100-year flood), where base flood elevations have been determined. The Zone AE boundary extends between elevation 325 and 327 (NAVD 88) through the Study Area.

2.3 Wetland Resource Area Descriptions

Professional Wetland Scientists (PWS) from Lucas Environmental, LLC (LE) conducted site investigations on July 27, 2022 and January 12, 2023, to delineate wetland resources at the location of a transportation improvement project at the Church Street Bridge over Fall River in Bernardston, Massachusetts. The site investigation included the area adjacent to Church Street between the Fall River and Bald Mountain Road (the "Study Area"). No direct or indirect impacts to any of the Vegetated Wetlands are proposed.

This project qualifies under the MassDOT bridge exemption as specified in the 2014 Transportation Bond Bill. Therefore, wetland resource areas were delineated and described as Waters of the United States subject to Protection under the federal Clean Water Act (33 U.S.C. §1251 et seq (1972)) and the Massachusetts Clean Waters Act (MGL Chapter 21 Section 26-53) using the U.S. Army Corp of Engineers (USACE) Wetland Delineation Manual (1987), and the Northcentral and Northeast Regional Supplement (2012). Federal jurisdictional boundaries include the Ordinary High Water Mark (OHWM) associated with each watercourse identified as well as the limit of any vegetated wetlands. Other federally protected areas identified on site include the 100 -Year Floodplain, Stream Bank, and Streambed. Wetland Determination Data Forms are included with Appendix F.

Stream 1 – Fall River

Fall River flows from north to south through the Study Area. The Banks/OHW lines were field delineated with blue survey flagging numbered sequentially from BF1-1 to BF1-27 and BF1-100 to BF1-133. The Banks along the river are very steep, consisting largely of sheer vertical rock face. Under the bridge, the stream bank and channel have been channelized with gabion baskets and riprap. Vegetation growing along the river includes a mix of eastern hemlock (*Tsuga canadensis*), American elm (*Ulmus americana*), smooth sumac (*Rhus glabra*), multiflora rose (*Rosa multiflora*), jewelweed (*Impatiens capensis*), and Sphagnum moss (*Sphagnum* spp.). The OHW line corresponds with a topographic break in slope and is coincident with Inland Bank. The stream bed consists largely of exposed rock, although there are also shallow areas with accumulated sediment, particularly north of the bridge.

Bankfull width of the river was examined by SLR Consulting (SLR) in 2022. SLR examined bankfull widths upstream, downstream and under the existing bridge. The bankfull channel width upstream of the bridge is approximately 40 to 50 feet and the depth is approximately 2.5 feet. The bankfull channel width under the bridge is approximately 23.5 feet and the depth is approximately 2.5 feet. These measurements reflect on armored channel. The bankfull channel width downstream of the bridge is approximately 12 to 30 feet and the depth is approximately 2.5 feet. Refer to Appendix C – Hydraulic Study Report for more detailed information.

Wetland A

Wetland A is located north of the bridge, along the west side of the river. The wetland boundary was delineated with pink survey tape numbered sequentially with flag series WFA-1 to WFA-7. Wetland A is an emergent wetland vegetated with a mix of jewelweed, sensitive fern (*Onoclea sensibilis*), spotted Joe-pye weed (*Eupatorium maculatum*), and reed canary grass (*Phalaris arundinacea*). Soils consist of alluvial sand likely deposited by the river historically. Accumulation of organic material and redoximorphic features can be seen close to the surface. Indicators of wetland hydrology include drainage patterns, drift lines, and evidence of periodic flooding.

Wetland B

Wetland B is a wetland area associated with an intermittent drainage channel located north of the bridge, along the east side of the river. The wetland boundary was delineated with pink survey tape numbered sequentially with flag series WFB-1 to WFB-20. Wetland B originates from an outlet pipe which drains stormwater and surface flows from the I-91 interchange into the Fall River. Vegetation includes Japanese knotweed (*Lonicera japonica*), spotted jewelweed, and oriental bittersweet (*Celastrus orbiculatus*).

Wetland C

Wetland C includes two separate areas of wetland, located south of the bridge along the east Bank of the River. The wetland boundary was delineated with pink survey tape numbered sequentially with flag series WFC-1 to WFC-4 and WFC-5 to WFC-8. These areas consist of herbaceous vegetation growing on rock or shallow soil overlying rock. These areas are vegetated predominantly with sphagnum moss with lesser amounts of jewelweed, sensitive fern, and meadow rue (*Thalictrum sp.*). Groundwater can be observed flowing through these areas.

Wetland D

Wetland D borders on a drainage channel (intermittent stream) that flows east to west through the northeastern I-91 interchange north of Church Street, and to Fall River at Wetland B. The wetland boundary is delineated with pink survey tape numbered sequentially with flag series WFD-1 to WFD-29. The wetland consists of a central palustrine scrub-shrub (PSS) wetland surrounded by wet meadow emergent wetland (PEM) that is maintained by mowing. Common wetland vegetation observed includes silky dogwood (*Cornus amomum*), common elderberry (*Sambucus canadensis*), sensitive fern, purple loosestrife (*Lythrum salicaria*), soft rush (*Juncus effusus*), and broad-leaf cattail (*Typha latifolia*). Upland vegetation consists of black locust (*Robinia pseudoacacia*), eastern red cedar (*Juniperus virginiana*), Norway maple (*Acer platanoides*), bush honeysuckle (*Lonicera sp.*), multiflora rose (*Rosa multiflora*), and Oriental bittersweet (*Celastrus orbiculatus*). Hydric soils are generally fine sandy loam to silt loam with a shallow B-horizon depleted matrix.

Wetland E

Wetland E borders on the eastern end of the drainage channel described above for Wetland D, which flows through a culvert under I-91 between Wetland D and Wetland E. The wetland boundary is delineated with pink survey tape numbered sequentially with flag series WFE-1 to WFE-15 and WFE-100 to WFE-110. As with Wetland D, this wetland consists of a PSS wetland surrounded by a PEM that is maintained by mowing. There is a topographic high point within the southeast area of this wetland that contains an upland "island" that was included within the delineated wetland boundary. Observed wetland vegetation and soils within this wetland are similar to those described for Wetland D.

3.0 PROPOSED WORK

MassDOT is proposing Project # 612159 to replace the Fall River Bridge No. B-10-001(12D) on State Route 10 located in Bernardston, MA. As proposed, the Project consists of the full replacement of the bridge span along with widening along the 0.5-mile corridor to accommodate sidewalk access along the entire stretch. Several drainage improvements will be made along the corridor as well to account for the relocated curbed gutter alignment along Route 10 and the exit ramp. As noted above, the subject of this application is solely for the replacement of the bridge over the Fall River.

The proposed upgrade includes a full bridge replacement of the Route 10 bridge over the Fall River. The current three span bridge will be entirely replaced with a single span bridge, which will have a shorter span length. Both existing piers and abutments will be removed as part of the bridge replacement. The existing piers are above the OHW line. Riprap is proposed in these locations in accordance with the hydraulic report. The proposed single span bridge will carry two vehicular lanes, two buffered bike lanes, and a south side pedestrian sidewalk over the Fall River. The existing profile of the bridge will be maintained in order to minimize impacts at the approaches. The travel way will remain open in each direction for the duration of construction, including pedestrian traffic. The bridge will be widened to accommodate a sidewalk and travel lanes. Temporary barriers will be used on the bridge to accommodate the construction zone. Refer to Appendix H – Relevant Special Provisions for more detailed information.

The existing bridge is a three-span structure with two support piers at a skewed distance of approximately 45-feet from the east and west abutments. The proposed bridge superstructure will have a span length of 100 feet and a width of 64 feet (out to out). New concrete abutments will be constructed behind the existing piers and in front of the existing abutments, outside of the channel of Fall River. Access for demolition, staging, and construction will be provided with an access road on the west side of the river and a temporary trestle to access the east side. No equipment will be staged within the channel itself. It is expected that tree and brush clearing will be necessary. Tree clearing will be limited to the maximum extent possible.

The existing bridge is located within the National Flood Insurance Program (NFIP) Special Flood Hazard Area (SFHA) Zone AE. A hydraulic analysis was conducted using the US Army Corps of Engineer (USACOE), Hydrologic Engineering Center, HEC-RAS version 6.3 River Analysis System (See Appendix C – Hydraulic Study Report). Water surface profiles for 10%, 4%, 2%, 1%, 0.5% and 0.2% annual chance peak discharge events were developed in a manner consistent with the applicable NFIP base floodplain development performance standards. The proposed stream WSEL will be equal to or less than as the existing WSEL at all cross sections. Therefore, the project will not result in a “rise”.

In addition to the riprap in front of the abutments and wingwalls, the project also includes the addition of riprap along the slope along the eastern side of the river, north of the bridge span. It was recommended by the FHWA to armor this slope to avoid issues with stream migration. This will entail vegetation clearing, and addition of stone and riprap down into the base of the river.

During the pre-filing meeting, MassDEP recommended alternatives be considered to include stone vanes or weirs to help redirect flows away from the slope to reduce erosion. SLR evaluated utilizing these measures, however, deemed they were not feasible due any structure being prone to erosion and damage, requiring regular maintenance, and access to the river is limited. Alternatively, SLR recommended the stone be loamed and seeded to provide vegetative stabilization. This has been incorporated into the design. In addition the curvature of the river has been softened from the original design. See Appendix C for summary memo prepared by SLR.

Erosion and Sedimentation Controls

The project incorporates accepted erosion control practices to minimize and mitigate adverse impacts to the adjacent wetland resource areas during project activities. Prior to the start of work, an erosion control barrier consisting of compost filter tubes or equivalent will be installed at the down-gradient limits of work.

Dredging and Disposal Operation Plan

All dredged material excavated from the stream channel will be dewatered, covered, and stored on-site until it is ready to be either re-used or disposed of in accordance with applicable state and local regulations. A total of 35 cubic yards of material are proposed to be dredged. All dredging will occur within water control structures (i.e., floating silt fence or sandbags) and water will be pumped in order to create a dry condition within the section of work area. Dredged materials will be stored on site in adequately protected containment area, covered, and then re-laid following construction. The area of dredge is limited to the areas along each Bank of the river in order to re-grade to specified slopes, and to create a work area to excavate bedrock for the riprap to key in.

The erosion control barrier will be inspected after every storm event. Any sediment that collects behind the barrier will be removed and will be either reused at the site or disposed of at a suitable off-site location. Any damaged sections of the barrier will be repaired or replaced with appropriate erosion controls measures from the stockpile maintained on site during construction. The barrier will be maintained until the site has been stabilized following the completion of the project.

Stormwater & Drainage Improvements

The Project does not currently propose any major changes to the existing drainage patterns or land cover. However, the project does include a new sidewalk along the half mile length of the project which is responsible for the 5,901 square foot increase in impervious area over the project area. The relocation of the I-91 northbound off-ramp will slightly change drainage patterns and will require a small amount of grading to accomplish but will not significantly change the overall drainage patterns. A small amount of the drainage area falling on Route 10 that would find its way to the 1-91 downstream outfall in the existing condition has been routed to the Fall River crossing outfall due to the relocation of the intersection.

The existing subsurface stormwater network will be slightly modified to remove catch basin to catch basin connections in order to meet the current MassDOT stormwater standards and an undersized portion of the existing trunk line on the eastern end of the project will be upsized to meet performance standards for the 10-year 24-hour design storm. Additionally, the closed drainage system on the modified interstate exit ramp will be relocated to the new ramp location. The old ramp location will be demolished, loamed and seeded, to convert it to an “open space” land cover. Deep sump catch basins will replace existing basins where practical in order to increase sediment capture efficiency over the existing condition and two in-line leaching basins will be added in order to help offset groundwater recharge lost with the proposed additional impervious cover. Since the Fall River is a Coldwater Fishery an effort was made to provide as much infiltration to the Maximum Extent Practicable. The proposed leaching basins are located west of the bridge and will discharge to a new outlet located upgradient of the west side of the river, south of the bridge. There are no sites suitable within the highway layout to install an infiltration basin. Standard 3 has been fully met with the use of leaching basins. Refer to project plans for details on the infiltration basins.

LID techniques implemented on and adjacent to the bridge span include:

- Horizonal drainage across both bridge spans will be used instead of scuppers to better treat stormwater and avoid direct outfall to resource areas.
- Minimizing additional impervious area needed to add a sidewalk through the corridor by reducing lane widths and eliminating unnecessary pavement areas.
- The limit of work for the project area has been carefully laid out to minimize impacts to any natural resources.

In addition to the LID techniques employed, the proposed design seeks to further improve water quality by including non-structural SCMs within the Operation and Maintenance Plan like catch basin cleaning and street sweeping schedules. All impacts to key features and natural resources in this Project are temporary and minimized to the greatest extent practicable.

Refer to Appendix D for Stormwater Management Memo prepared by TEC.

4.0 PROPOSED IMPACTS TO WETLAND RESOURCE AREAS

The construction of the new bridge structure will involve unavoidable temporary and permanent alteration to wetland resource areas. Table 4-1 highlights the proposed impacts to wetlands and waterbody resource areas.

TABLE 4-1
SUMMARY OF WETLAND AND WATERBODY IMPACTS

Resource Area	Impacts	Surface Area (SF) Linear feet (LF)	Comments
Land Under Waters of the US	Temporary	2,064 SF	The permanent impact to the land under the water (WOTUS) is a result of the new embankment extending into the downgradient stream channel. Temporary impacts are related to installation of water control (sandbags). Approximately 35 cubic yards of material will be dredged and 36 cubic yards of fill material will be deposited.
	Permanent	331 SF	
Inland Bank/OHW	Temporary	212 LF	There will be permanent Bank/OHW impact in an area along the river. Permanent impacts are considered sections of Bank/OHW that are naturally vegetated and will be rip-rapped. Temporary impacts are considered those areas that already consist of rip-rap or stone and will be returned to rip rap or stone under proposed conditions.
	Permanent	112 LF	
100-Year Floodplain	Alteration	4,274 SF (Temp) 1,651 SF (Permanent)	Compensatory flood storage will be created as a result of the project. A hydraulic analysis has been completed demonstrating that the project will not cause an increase in the base flood elevation, meaning that the project will not contribute to an incremental increase in the horizontal extent and level of flood waters during peak flow. This analysis also found that the project will not restrict flows and will therefore not result in an increase in flood stage or velocity.
	Creation	+10.45 cubic yards +1,547 SF	The project will result in a net increase of compensatory flood storage.

***Impact calculations provided by TEC.**

4.1 Stream Crossing Standards

As a bridge replacement project, the project will meet the stream crossing standards to the maximum extent practicable as detailed in the Massachusetts Stream Crossing Handbook, and as demonstrated below in Table 4-2.

TABLE 4-2
SUMMARY OF STREAM CROSSING STANDARD COMPLIANCE

Parameter	General Standard	Provided
Spans	Bridges, 3-sided box culverts, open-bottom culverts, or arches	This standard is met. Bridge span is provided.
Embedment	Culverts should be embedded a minimum of 2 feet and at least 25% for round pipes.	Not Applicable – bridge span provided.
Crossing Span	Minimum: 1.2 x bankfull width	SLR estimates bankfull channel width for design is 50.8 feet. Recommended: 50.8 feet x 1.2 = 61 feet wide, with a minimum height of 10 feet. Provided: 100-foot wide bridge span with 30-foot headroom. This far exceeds the standard.
Openness Ratio	Openness Ratio (OR) = cross sectional area divided by length of culvert = 0.25 meters (0.82 feet)	The replacement structure provides an openness ratio of 47. (100’ x 30’/64 = 47) This far exceeds the standard.
Substrate	Match pre-construction substrate	This standard is met. Natural stream bottom will remain.
Water Depth & Velocity	Match water depth & velocity in natural stream	This standard is met. Water depth and velocity are comparable to natural channel.
Banks	Match horizontal profile of stream and banks on both sides of stream.	This standard is met. Installation of the bridge structure will not affect either Bank of the River.

5.0 INVASIVE SPECIES CONTROL

Temporary alteration to Waters of the US/ Land Under Water will create opportunities for invasive species to colonize newly exposed soils. Minor site grading and temporary construction access will create exposed areas of disturbed soils vulnerable to colonization by invasive species. Newly disturbed soils and vegetation present openings for highly prolific invasive plant species to establish and out-compete native plant species. Adjacent existing invasive species populations provide a seed bank for future growth, adding to the invasive management challenge.

The introduction or spread of invasive or other unacceptable plant or animal species on the Site or areas adjacent to the Project caused by the work shall be avoided to the maximum extent practicable. For example, construction equipment shall be thoroughly cleaned and free of vegetation and soil before and after use. An Invasive Plant Management Strategy will be developed and implemented for the project.

6.0 ALTERNATIVES ANALYSIS

This section provides a discussion of the site selection process implemented by the Applicant, and a summary of the alternative project layouts considered during the design process for this site. TEC conducted an analysis on different bridge replacement structures to evaluate different options to satisfy MassDOT criteria and improve traffic safety. The evaluation considered key constraints including access, safety, topography, utilities, hydraulics, surficial geology, constructability, and impacts to wetland resource areas.

6.1 Alternative 1: No-Build

Under the “No-Build” alternative, the land will remain unaltered, and there will be no direct or indirect impacts on wetlands or watercourses. This alternative assumes that the proposed bridge replacement project would not proceed, leaving the existing bridge in place. However, the bridge’s structural deficiencies will continue to worsen, eventually necessitating closure as its safe load-carrying capacity diminishes. The bridge would remain closed until all risks to public safety and the environment are mitigated. Given the severity of these deficiencies, the long-term maintenance costs would eventually justify a full replacement of the structure.

6.2 Alternative 2: Single Span Alternatives (Preferred)

The existing bridge consists of three simple spans with rolled steel beams and a reinforced concrete deck. Spans 1, 2, and 3 measure 44’-6”, 50’-6”, and 44’-6” in length, respectively. The typical bridge section includes a 5’-0” sidewalk, a 24’-0” westbound lane, a 13’-6” eastbound lane, and shoulders on each side of the bridge. TEC considered two alternatives for a single-span bridge:

- **Alternative 2A**: Single Span with Full-Height Abutment

  This option features a 95ft single span supported on full-height spread footing abutments approximately 30 feet tall.

The proposed bridge will span in front of the existing abutments, eliminating the need for piers and providing a clear span between abutments of approximately 92'-8". The tops of the existing abutments can be removed, while the lower portions will remain in place. The existing piers will be fully removed.

- **Alternative 2B**: Single Span with MSE Wall and Sub Abutment

  Similar to Alternative 2A, this option proposes a 95ft single span with pile-supported stub abutment behind a Mechanically Stabilized Earth (MSE) Wall. The MSE wall allows for the abutment footings to be at a higher elevation, which reduces their overall height. This option would provide a clear span between MSE walls equal to 69ft. This bridge will also span between the existing abutments and eliminate the existing piers.

The Hydrological Engineer analyzed both alternatives and determined that each would provide a sufficient hydraulic opening to convey the Fall River's design flows. After reviewing the hydraulic study and the boring logs prepared by the Geotechnical Engineer, the 95-foot span on spread footing abutments was deemed the most appropriate choice due to the cost savings from eliminating the MSE wall, the reduced risk associated with bedrock depth, and the larger clear opening.

Several superstructure types were considered for final design, including:

- Steel Plate Girders with Composite Deck
- Rolled Steel Beams with Composite Deck
- NEBT Girders with Composite Concrete Deck
- NEBT Girders with Full-Thickness Top Flange

Steel plate girders with a composite concrete deck were found to be the most economical option and had the least environmental impacts.

6.3 Alternative 3: Multi-span Alternative

Alternative 3 maintains a layout similar to that of the existing bridge but introduces the most significant impacts to resource areas and would be more intrusive to construct. Additionally, this structure would require more water control measures. For these reasons, a multi-span alternative was not pursued.

6.4 Alternative Construction and Water Control Methods

Steep slopes and challenging topography along the Fall River, limited access points, the proximity to a nearby single-family home and the I-91 off-ramp present significant constraints for the constructability of the bridge replacement. The elevation differences between the river channel and the adjacent uplands further complicate river crossings. Initially, TEC considered in-water temporary structures, such as culverts with temporary fill roads, to facilitate construction. However, these options were dismissed due to potential impacts on Essential Fish Habitat (EFH), fisheries, and flooding concerns. The preferred design, which completely avoids in-water structures, was selected as it is the least environmentally damaging, although it does not support the simplest construction methodologies.

The proposed design uses bulk sandbags within the stream to provide a dry work area. The sandbags will only be needed for the removal of the existing piers and the construction of the riprap slope, which will be a short duration of time. Additionally, a temporary access trestle will be provided for access to the eastern banks. The trestle will be founded above the OHWM and will not result in any environmental impacts.

7.0 ANTICIPATED CONSTRUCTION SEQUENCING

The following sequence is a general overview of the proposed project; however, this may be modified as project design advances or during construction by the contractor.

1. Establish detour route and signage (as needed).
2. Install erosion control barriers and floating silt fence downgradient of proposed construction area.
3. Perform general clearing and grubbing and site preparation.
4. Fence off work zone, mobilize equipment and crews, prepare staging areas.
5. Construct temporary access road and temporary trestle.
6. Install temporary protective shielding beneath bridge span to prevent demolition debris from dropping into river.
7. Relocate utility poles.
8. Shift traffic per proposed Traffic Management Plans (TMP's) for Stage 1 of construction.
9. Demolish and remove existing bridge structure for Stage 1 as denoted in the construction staging plans.
    1. Install control of water.
    2. Dewater work area around existing pier footings.
    3. Excavate and store clean streambed material, then demolish existing piers.
    4. Install riprap toes as detailed on Sheet 7 and begin excavation for proposed abutments.
10. Remove existing abutments and dewater the area as needed to construct new bridge abutments in the dry as required for Stage 1.
    1. Complete installation of riprap embankments and return work areas to proposed grades.
    2. Begin backfilling of proposed riprap.
11. Construct new superstructure for Stage 1.
12. Repeat steps 8-10 for stages 2 and 3 of construction.
13. Complete pavement improvements and install guardrail.
14. Install loam and seed within disturbed landscaped areas.
15. Install pavement markings.
16. Remove detour signs and re-open the road to traffic.

17. Perform final inspection and address punch list items.

8.0 SUMMARY

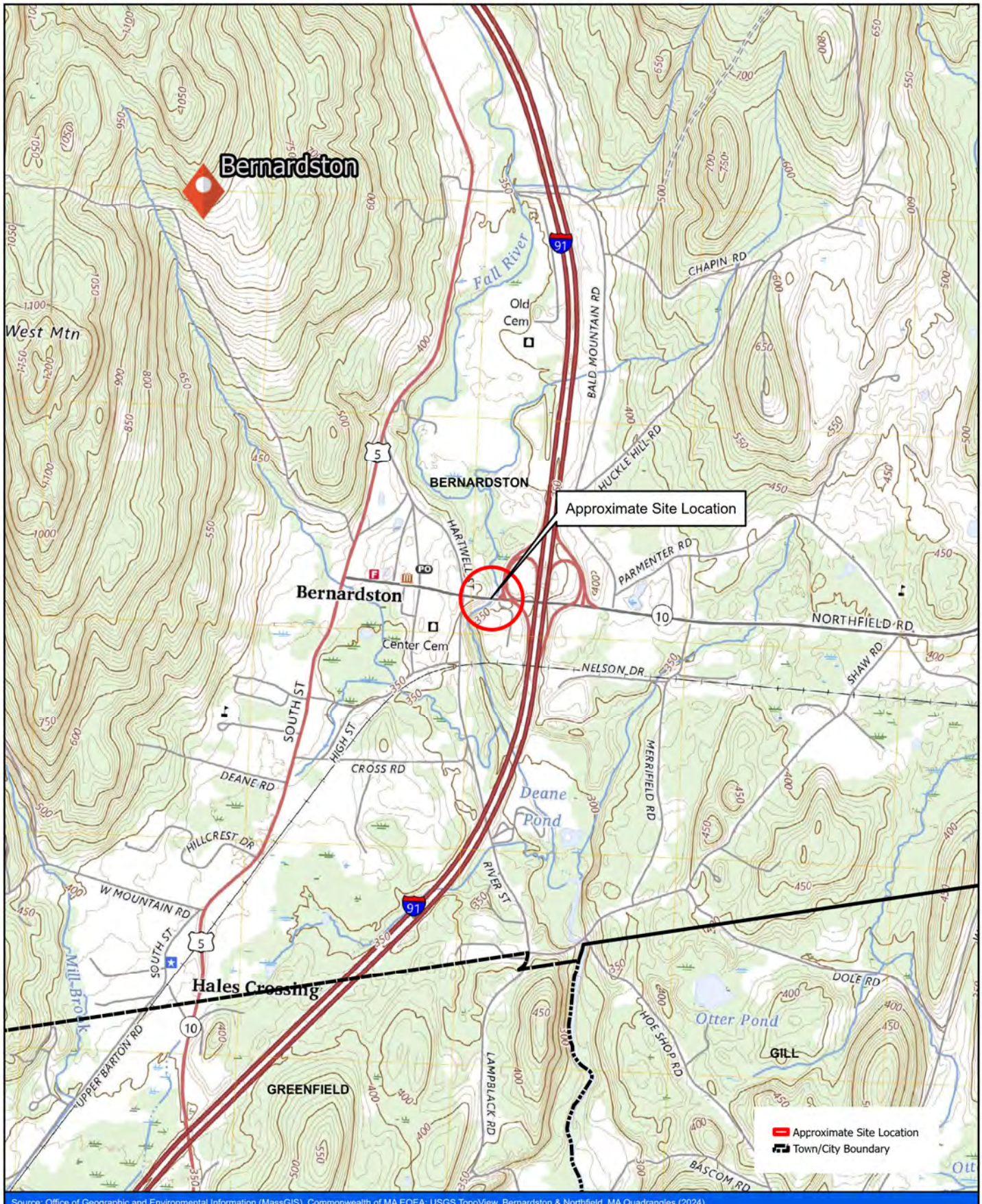
The project will consist of the complete replacement of Bridge B-10-001 (12D) over the Fall River in Bernardston, Massachusetts. The proposed roadway reconstruction work will restore and extend the service life of Church Street (Route 10), improve and provide safety improvements such as installing new signs, construct new sidewalks, provide stormwater improvements, as well as accommodating bicyclists and pedestrians.

The information contained in this application and the attached Project Plans sufficiently describes the site and proposed work. It is LE's opinion, based on our professional education, training, and familiarity with the project site, that the proposed work will not have any adverse effect, and the project is designed to minimize adverse effects on the resource areas as follows:

- The project replaces a structurally deficient bridge with a new structure, that will be widened to provide safer use for both vehicles and pedestrians.
- Significant improvements to stormwater management and treatment are proposed.
- A net gain of over ten cubic yards of compensatory flood storage is provided.
- The project is designed to avoid and minimize resource areas impacts to the extent practicable and impacts will be mitigated.
- The design incorporates floating silt fence and/or sandbags for control of water. Any work occurring for construction is to occur only when the work area is completely dry.
- Water will be temporarily pumped and discharged to an appropriate treatment or containment device (i.e., haybale corral/sediment filter bag) in accordance with applicable regulations.
- All dredged material excavated from the stream channel will be dewatered, covered, and stored on-site until it is ready to be redeposited into the stream channel or disposed off-site, as appropriate. Dredged materials will be stored on site in adequately protected containment area, covered, and then re-laid following construction.
- Erosion controls will be installed prior to the start of construction and be maintained throughout construction until the site is stabilized.

All temporary wetland impacts proposed near the work area will be restored in place following completion of construction. Accordingly, the Applicant respectfully requests that MassDEP issue a 401 Water Quality Certificate, and USACE authorize the work as described and shown on the attached Permitting Plans under General Permits 2 and 23 for Massachusetts.

SECTION III – FIGURES



Source: Office of Geographic and Environmental Information (MassGIS), Commonwealth of MA EOEA; USGS TopoView, Bernardston & Northfield, MA Quadrangles (2024)

N

0 500 1,000 2,000 Feet

USGS Map

Bridge No. B-10-001 Replacement
Fall River @ Church Street
Bernardston, Massachusetts

FIGURE 1

LUCAS ENVIRONMENTAL, LLC



Source: Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts Executive Office of Environmental Affairs; USGS Color Ortho Imagery - 15cm (2021)

N

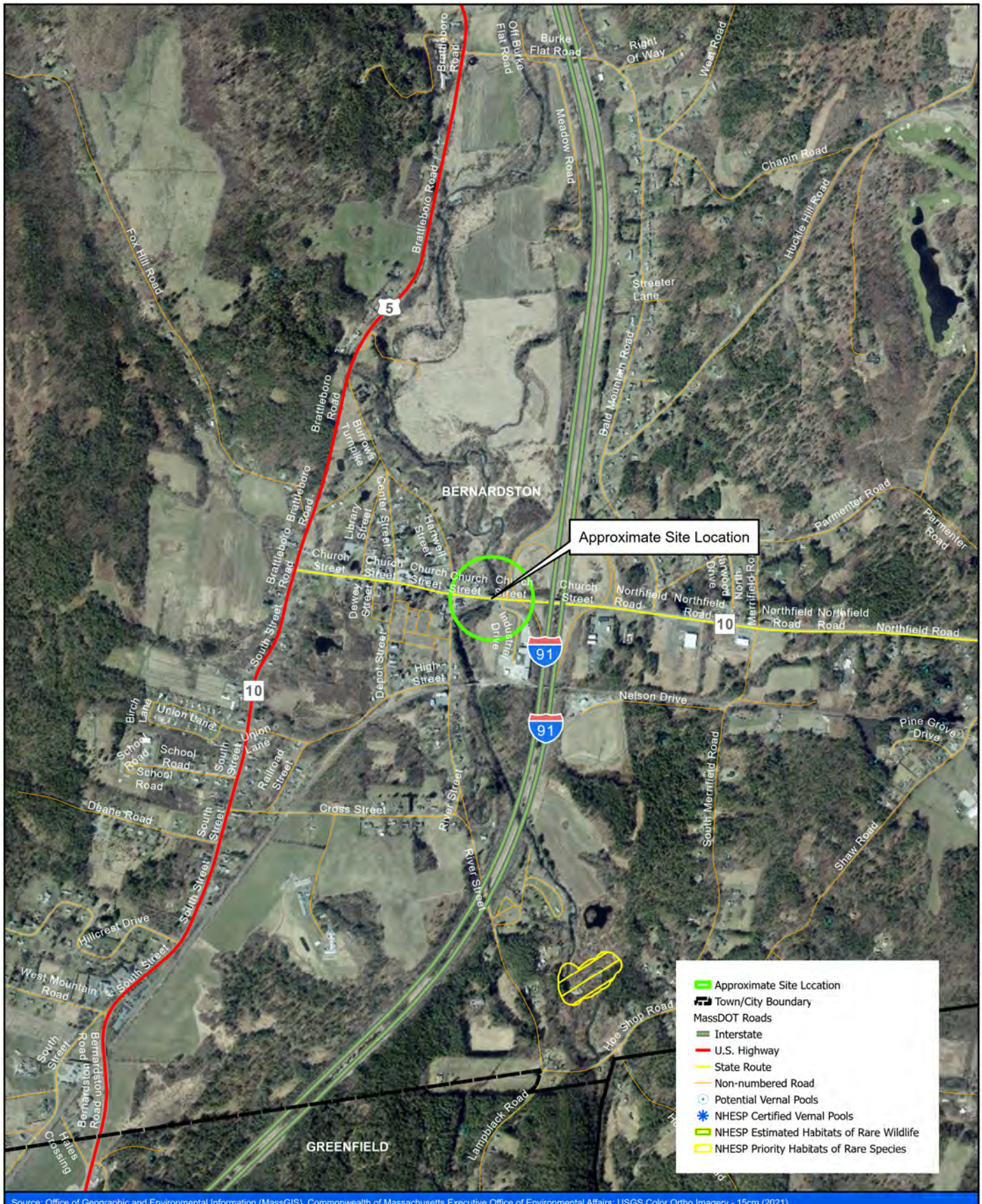
0 75 150 300 Feet

Aerial Map

Bridge No. B-10-001 Replacement
Fall River @ Church Street
Bernardston, Massachusetts

FIGURE 2

LUCAS ENVIRONMENTAL, LLC



Source: Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts Executive Office of Environmental Affairs; USGS Color Ortho Imagery - 15cm (2021)

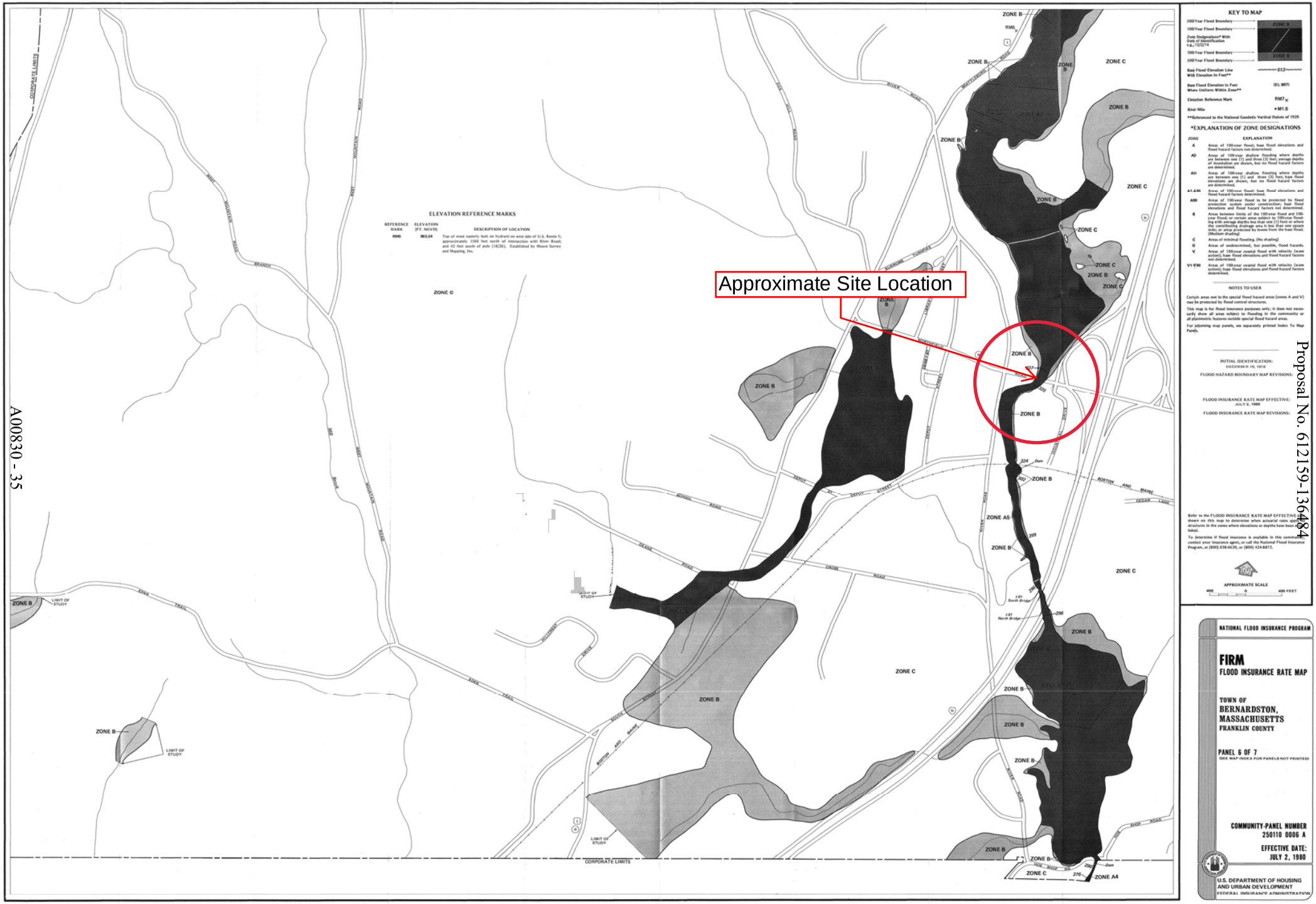
N

0 500 1,000 2,000 Feet

NHESP Map
Bridge No. B-10-001 Replacement
Fall River @ Church Street
Bernardston, Massachusetts

FIGURE 3

LUCAS ENVIRONMENTAL, LLC



A00830 - 35

Proposal No. 6121159-136484

SECTION IV – APPENDICES

APPENDIX A

PHOTOGRAPHIC DOCUMENTATION



Photograph 1: View of existing bridge span over Fall River looking east.



Photograph 2: View of Fall River looking upstream under bridge span.



Photograph 3: View of Fall River looking upstream, north of bridge.



Photograph 4: View of Fall River looking downstream, south of bridge.



Photograph 5: View of gabion wall and rip rap banks underneath bridge.



Photograph 6: Wetland 1 – showing drainage channel and saturation in the wetland.



Photograph 7: View of Wetland B.



Photograph 8: View of Wetland C.

APPENDIX B

RARE AND SENSTIVE SPECIES DOCUMENTATION

From: Alexa Cacacie - NOAA Federal
To: Burns, Trevor B. (DOT)
Subject: Re: MassDOT Fall River Bridge Replacement, Bernardston, MA
Date: Tuesday, December 10, 2024 12:53:43 PM

CAUTION: This email originated from a sender outside of the Commonwealth of Massachusetts mail system. Do not click on links or open attachments unless you recognize the sender and know the content is safe.

Hi Trevor,

Thanks for following up, my apologies for not getting back to you sooner. NMFS concurs with MassDOT's decision that a consultation is not currently needed for this project. Please let me know if you have any further questions.

Best,

Alexa

On Tue, Dec 10, 2024 at 12:13 PM Burns, Trevor B. (DOT) <Trevor.B.Burns@dot.state.ma.us> wrote:

> Hi Alexa,
>
> I wanted to circle back on this project. We worked the USFWS, which is making a map of diadromous fish in the Connecticut River watershed, And they had the Fall River mapped as partially impaired. The only species this was related to was Sea Lamprey, no other species was mapped for the Fall river. Attached I've included an email from the regional biologist in the area for the state. They stated no diadromous fish can access this river. MassDOT believes formal consultation shouldn't be needed due to the biological information in the region. I would like to hear your thoughts on this project and MassDOT will follow your guidance.
>
> Thanks,
>
> Trevor
>
> **From:** Burns, Trevor B. (DOT)
> **Sent:** Thursday, October 24, 2024 4:33 PM
> **To:** Alexa Cacacie - NOAA Federal <alexa.cacacie@noaa.gov>; Sabrina Pereira - NOAA Federal <sabrina.pereira@noaa.gov>
> **Subject:** RE: MassDOT Fall River Bridge Replacement, Bernardston, MA
>
> Apologies for the confusion Alexa and Sabrina. MassDOT acknowledges we must determine our impacts to give you a proper picture of our project. In the past, I've been recommending consultants reach out to you to confirm NOAA wants to see consultation for these projects far up

in the Connecticut river watershed where the knowledge of fish passage is limited, and salmon presence is extremely unlikely. If you would like us to no longer have that step in our planning, we can adjust. For this project, we are currently working with the USFWS to get confirmed data of diadromous fish passage in the fall river.

Best,

Trevor

From: Alexa Cacacie - NOAA Federal <alexa.cacacie@noaa.gov>
Sent: Monday, September 16, 2024 12:12 PM
To: tel@lucasenviro.com
Cc: sabrina.pereira@noaa.gov; Saniuk, Matthew J. (DOT) <Matthew.J.Saniuk@dot.state.ma.us>; Niccoli, Robert (EXT) <rniccoli@theengineeringcorp.com>; Nelson Sosa <nsosa@theengineeringcorp.com>; Christopher Lucas <cml@lucasenviro.com>; Thibault, Michelle (EXT) <mthibault@theengineeringcorp.com>; Burns, Trevor B. (DOT) <Trevor.B.Burns@dot.state.ma.us>; Mischel, Gregory (DOT) <Gregory.Mischel@dot.state.ma.us>
Subject: Re: MassDOT Fall River Bridge Replacement, Bernardston, MA

CAUTION: This email originated from a sender outside of the Commonwealth of Massachusetts mail system. Do not click on links or open attachments unless you recognize the sender and know the content is safe.

Hi Tom,

Thanks for reaching out. At this time, we do not have enough information to determine whether or not a time of year restriction would be necessary for this project. Moving forward, FHWA/MassDOT will need to determine if this project requires a consultation (programmatic or individual) and coordinate with us from there. Our FHWA programmatic agreement can be found here.

Please let us know if you have any additional questions!

Best,

Alexa & Sabrina

On Thu, Sep 12, 2024 at 1:10 PM Thomas Liddy <tel@lucasenviro.com> wrote:

> Alexa and Sabrina,
>
> I was forwarded your contact information by Matt Saniuk at MassDOT. We are working on the design and permitting of the replacement of the Church Street/ Route 10 Bridge over the Fall River in Bernardston, Massachusetts. The project proposes to replace the structurally deficient Fall River Bridge (Bridge B-10-001) with a new single span bridge structure.
>
> The Fall River at this location is designated as Essential Fish Habitat (EFH) for all life stages for Atlantic Salmon according to the EFH Mapper, presumably because it is a tributary to the Connecticut River. In addition, the Fall River is designated as a Cold-Water Fishery by the Massachusetts Division of Fisheries and Wildlife.
>
> The proposed replacement of the Fall River Bridge will result in temporary work within the Fall River. The exact duration and timing have not been determined yet, but it is anticipated that diversion of stream flows will be necessary to install rip rap along the stream bank under the bridge. This would entail installation of water control structures (most likely sandbags) as well as dredging of sediment within the stream bed. The project will be undergoing review by the Army Corps of Engineers under the Massachusetts General Permit, and by MassDEP under the 401 Water Quality Certification program to permit this work.
>
> At this stage it would be helpful to determine if a formal consultation with NOAA is necessary to determine if a time-of-year restriction would be required, or if there are other protective measures related to the salmon that should be incorporated into the design prior to submission of our permit applications.
>
> Attached are site locus figures. If you have any questions or would like to discuss the project further, please let me know and perhaps we can set up a virtual meeting.

Regards,

Tom Liddy, PWS/CWS, CESSWI
Environmental Consultant

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PLEASE NOTE MY NEW EMAIL ADDRESS: tel@lucasenviro.com

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--

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Marine Resource Management Specialist

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NOAA/ National Marine Fisheries Service

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
New England Ecological Services Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5094
Phone: (603) 223-2541 Fax: (603) 223-0104

In Reply Refer To: 03/27/2024 15:25:03 UTC
Project code: 2024-0065826
Project Name: 612159 - BERNARDSTON- BRIDGE REPLACEMENT, B-10-001, ROUTE 10 OVER FALL RIVER AND DECK REPLACEMENT

Subject: Consistency letter for the '612159 - BERNARDSTON- BRIDGE REPLACEMENT, B-10-001, ROUTE 10 OVER FALL RIVER AND DECK REPLACEMENT' project under the amended February 5, 2018, FHWA, FRA, FTA Programmatic Biological Opinion (dated March 23, 2023) for Transportation Projects within the Range of the Indiana Bat and Northern Long-eared Bat (NLEB).

To whom it may concern:

The U.S. Fish and Wildlife Service (Service) has received your request dated March 27, 2024 to verify that the **612159 - BERNARDSTON- BRIDGE REPLACEMENT, B-10-001, ROUTE 10 OVER FALL RIVER AND DECK REPLACEMENT** (Proposed Action) may rely on the amended February 5, 2018, FHWA, FRA, FTA Programmatic Biological Opinion Opinion (dated March 23, 2023) for Transportation Projects within the Range of the Indiana Bat and Northern Long-eared Bat (PBO) to satisfy requirements under section 7(a)(2) of the Endangered Species Act of 1973 (ESA) (87 Stat.884, as amended; 16 U.S.C. 1531 *et seq.*).

Based on the information you provided (Project Description shown below), you have determined that the Proposed Action will have no effect on the endangered Indiana bat (*Myotis sodalis*) or the endangered northern long-eared bat (*Myotis septentrionalis*). If the Proposed Action is not modified, **no consultation is required for these two species.** If the Proposed Action is modified, or new information reveals that it may affect the Indiana bat and/or northern long-eared bat in a manner or to an extent not considered in the PBO, further review to conclude the requirements of ESA section 7(a)(2) may be required.

For Proposed Actions that include bridge/culvert or structure removal, replacement, and/or maintenance activities:
If your initial bridge/culvert or structure assessment failed to detect Indiana bats and/or NLEBs use or occupancy, yet later detected prior to, or during construction, please submit the Post Assessment Discovery of Bats at Bridge/Culvert or Structure Form (User Guide Appendix E) to this Service Office within 2 working days of the incident. In these instances, potential incidental

take of Indiana bats and/or NLEBs may be exempted provided that the take is reported to the Service.

If the Proposed Action may affect any other federally-listed or proposed species and/or designated critical habitat, additional consultation between the lead Federal action agency and this Service Office is required. If the proposed action has the potential to take bald or golden eagles, additional coordination with the Service under the Bald and Golden Eagle Protection Act may also be required. In either of these circumstances, please advise the lead Federal action agency accordingly.

The following species may occur in your project area and **are not** covered by this determination:

- Monarch Butterfly *Danaus plexippus* Candidate
- Tricolored Bat *Perimyotis subflavus* Proposed Endangered

PROJECT DESCRIPTION

The following project name and description was collected in IPaC as part of the endangered species review process.

NAME

612159 - BERNARDSTON- BRIDGE REPLACEMENT, B-10-001, ROUTE 10 OVER FALL RIVER AND DECK REPLACEMENT

DESCRIPTION

612159 - BERNARDSTON- BRIDGE REPLACEMENT, B-10-001, ROUTE 10 OVER FALL RIVER AND DECK REPLACEMENT, B-10-018, ROUTE 10 OVER I-91
The project will consist of the full replacement of the bridge carrying Route 10 over Fall River and the preservation of the bridge carrying Route 10 over I-91 in the town of Bernardston. Work includes pavement milling and overlay and improvements to bicycle and pedestrian accommodations on Route 10.
Monarch Butterfly: Candidate Species only, no conservation measures at this time.
Tricolored Bat: Proposed Endangered Species only. At this time, no formal USFWS consultation is required.

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@42.670244800000006,-72.5388048867334,14z



DETERMINATION KEY RESULT

Based on the information you provided, you have determined that the Proposed Action will have no effect on the endangered Indiana bat and/or the endangered northern long-eared bat. Therefore, no consultation with the U.S. Fish and Wildlife Service pursuant to Section 7(a)(2) of the Endangered Species Act of 1973 (ESA) (87 Stat. 884, as amended 16 U.S.C. 1531 *et seq.*) is required for these two species.

QUALIFICATION INTERVIEW

1. Is the project within the range of the Indiana bat[1]?

   [1] See Indiana bat species profile

   Automatically answered
   No

2. Is the project within the range of the northern long-eared bat[1]?

   [1] See northern long-eared bat species profile

   Automatically answered
   Yes

3. [Semantic] Does your proposed action intersect an area where Indiana bats and northern long-eared bats are not likely to occur?

   Automatically answered
   Yes

DETERMINATION KEY DESCRIPTION: FHWA, FRA, FTA PROGRAMMATIC CONSULTATION FOR TRANSPORTATION PROJECTS AFFECTING NLEB OR INDIANA BAT

This key was last updated in IPaC on October 30, 2023. Keys are subject to periodic revision.

This decision key is intended for projects/activities funded or authorized by the Federal Highway Administration (FHWA), Federal Railroad Administration (FRA), and/or Federal Transit Administration (FTA), which may require consultation with the U.S. Fish and Wildlife Service (Service) under Section 7 of the Endangered Species Act (ESA) for the endangered **Indiana bat** (*Myotis sodalis*) and the endangered **northern long-eared bat** (NLEB) (*Myotis septentrionalis*).

This decision key should only be used to verify project applicability with the Service's amended February 5, 2018, FHWA, FRA, FTA Programmatic Biological Opinion (dated March 23, 2023) for Transportation Projects. The programmatic biological opinion covers limited transportation activities that may affect either bat species, and addresses situations that are both likely and not likely to adversely affect either bat species. This decision key will assist in identifying the effect of a specific project/activity and applicability of the programmatic consultation. The programmatic biological opinion is not intended to cover all types of transportation actions. Activities outside the scope of the programmatic biological opinion, or that may affect ESA-listed species other than the Indiana bat or NLEB, or any designated critical habitat, may require additional ESA Section 7 consultation.

IPAC USER CONTACT INFORMATION

Agency: Massachusetts Department of Transportation
Name: Ian Battles
Address: 10 Park Plaza
City: Boston
State: MA
Zip: 02116
Email ian.h.battles@dot.state.ma.us
Phone: 8572623378

LEAD AGENCY CONTACT INFORMATION

Lead Agency: Federal Highway Administration

APPENDIX C

HYDRAULIC STUDY & SLR REPORT

HYDRAULIC STUDY REPORT

Church Street (Route 10) over Fall River
Town of Bernardston, Franklin County, Massachusetts
Bridge No. B10001-12D-DOT-NBI
PROJECT No. 612159



May 11, 2023

Prepared for:

TEC - The Engineering Corp
282 Merrimack Street, 2d Floor
Lawrence, MA 01843
978.794.1792

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1.0 Executive Summary

The purpose of this technical report is to present the results of a study conducted at the bridge conveying the Fall River under Church Street (State Route 10) in Bernardston, MA in order to evaluate the hydraulic performance of the existing structure and two alternative designs. This report was prepared in a manner consistent with the Massachusetts Department of Transportation (MassDOT) guidelines for preparation of hydraulic studies at bridge sites modified to account for the preliminary nature of the design.

The scope of this investigation consisted of a review of pertinent hydrologic data for the Fall River at the Project site and a detailed hydraulic analysis. Data collected, hydraulic model input/output and scour calculations are presented in the appendices of this report. A narrative discussion of the problem statement, engineering methods, and the conclusions of the hydraulic study follows.

2.0 Project Description

The bridge is located on Church Street (State Route 10 immediately west of the intersection of Route 10 and Interstate Route 91 in the town of Bernardston, Franklin County, Massachusetts **(Figure 2-1).**

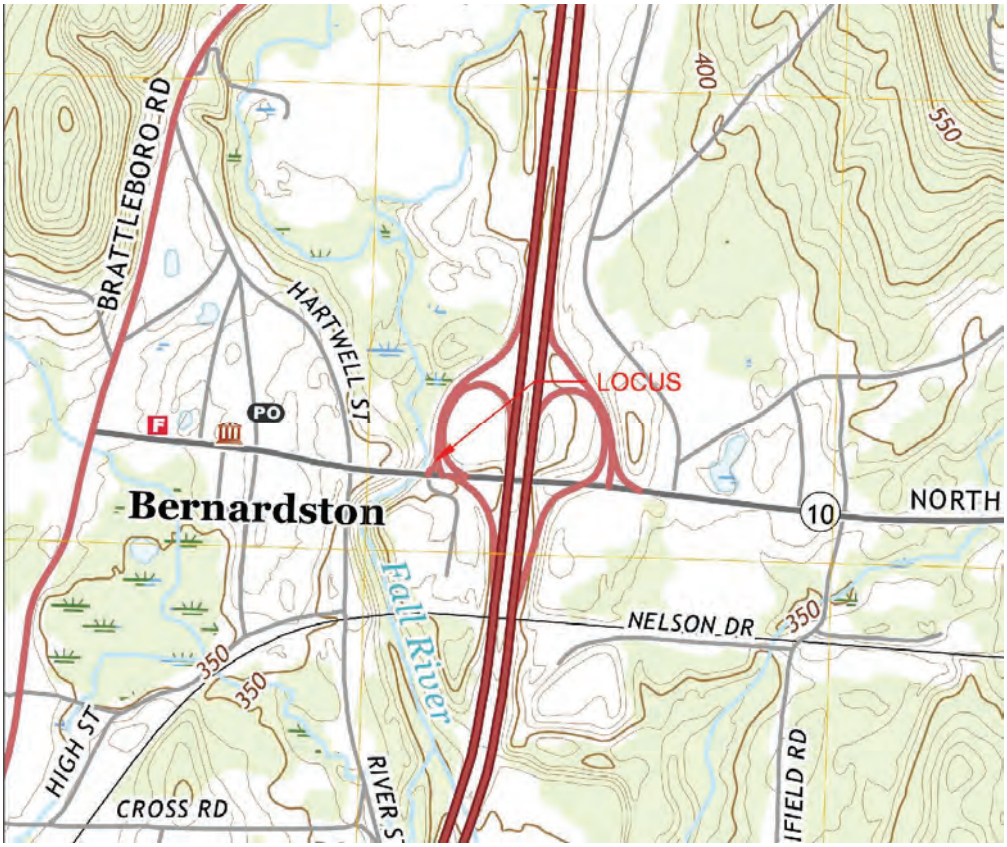


Figure 2-1: Bridge Location

2.1 Existing Structure

The subject bridge is located on Church Street (State Route 10) in the Town of Bernardston, Franklin County, Massachusetts located within the Church Street layout adjacent to the intersection with Interstate Route I-91. The Latitude and Longitude of the center of the bridge are 42°-40'-14.43"N and 72°-32'-45.52"W **(Appendix 7.1.1)**. The structure has a MassDOT designation of B10001-12D-DOT-NBI and the date of construction is 1959.

The existing bridge is a three-span structure with two 3.5'-4' piers at a skewed distance of approximately 20' from the left and right abutments. The bridge supports a 60' wide deck. The roadway is a two-lane Rural Major Collector roadway approximately 50' wide with granite curbing in the area of the structure. The roadway is served by a storm drain system that captures runoff in a catch basin/drain manhole/concrete piping system which conveys the runoff to the river.

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Figure 2-2: Existing Bridge

2.1.1 Crossed Waterway at the Bridge Location

The Fall River flows south from its source in southwestern Vermont. The river flows south under the Project bridge and continues flowing south for about 4.9 miles where it meets the Connecticut River. The upstream drainage area is about 25.7 square miles (**Figure 2-3)**. According to the USGS Bernardston Quadrangle, the stream is perennial (**Figure 2-1**).

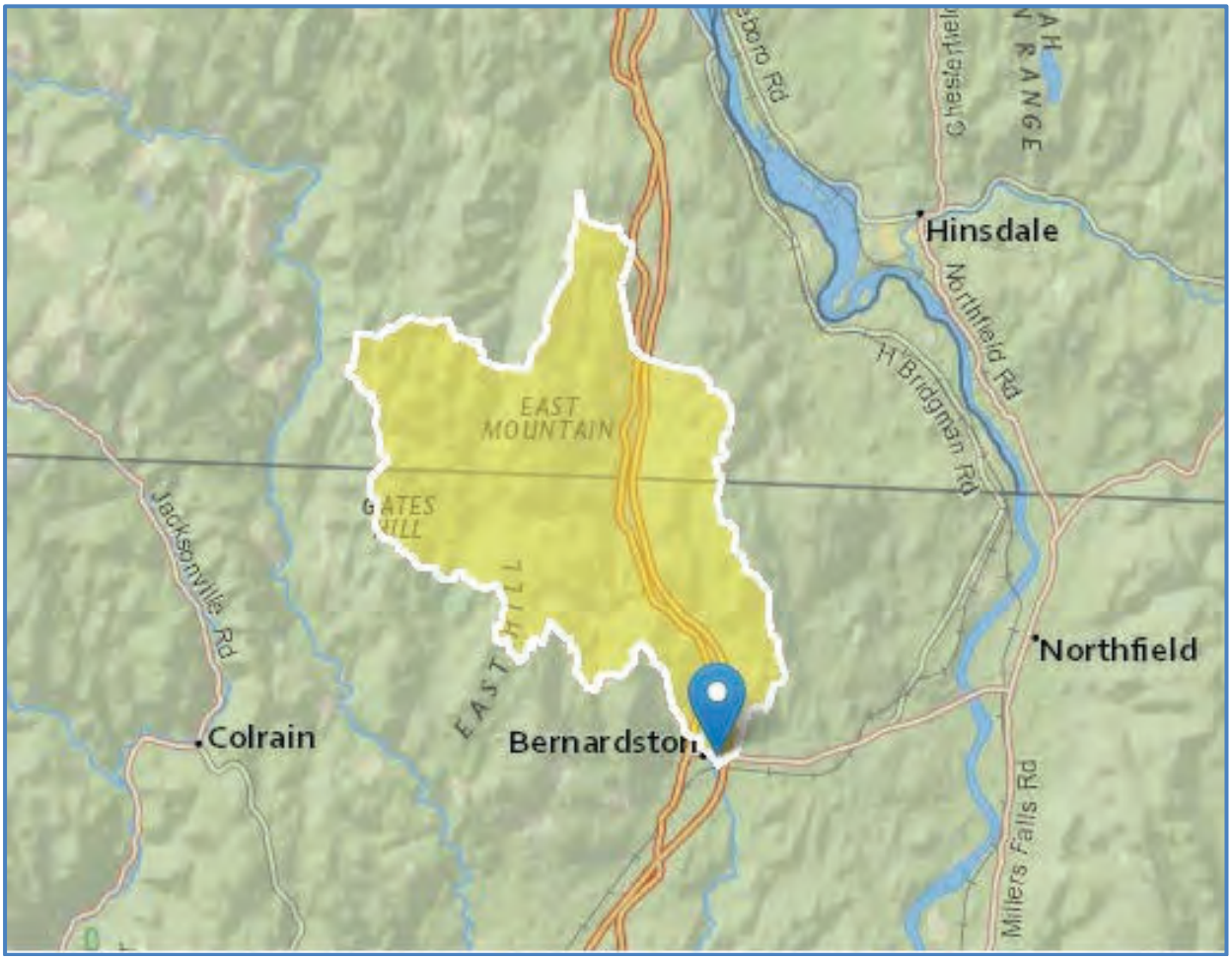


Figure 2-3: Drainage Area at Bridge Crossing

2.1.2 Highway Conveyed

Church Street is classified by MassDOT as a Rural Major Collector road which conveys approximately 8,564 vehicle trips per day. It is two-lane and approximately 50' wide with granite curbing in the Project area.

2.1.3 Land Use in the Vicinity of the Bridge

Land use near the bridge is a mix of forest, residential, commercial and open land (**Figure 2-4**).



Figure 2-4: Land Use at the Bridge Location

2.1.4 Special Site Considerations

The existing bridge is located within the National Flood Insurance Program (NFIP) Special Flood Hazard Area (SFHA) Zone AE of the regulatory flood zone delineations determined for the Fall River in the January 1980 Flood Insurance Study for the Town of Bernardston, Massachusetts and as shown on Flood Insurance Rate Map (FIRM) Panel No. 250110 0006 A, July 2, 1980. Zone AE refers to the area subject to inundation by the 1% chance flood event (100-year event) and where base flood elevations have been established (**Appendix 7.1.2, Appendix 7.1.3 and Figure 2-5**).

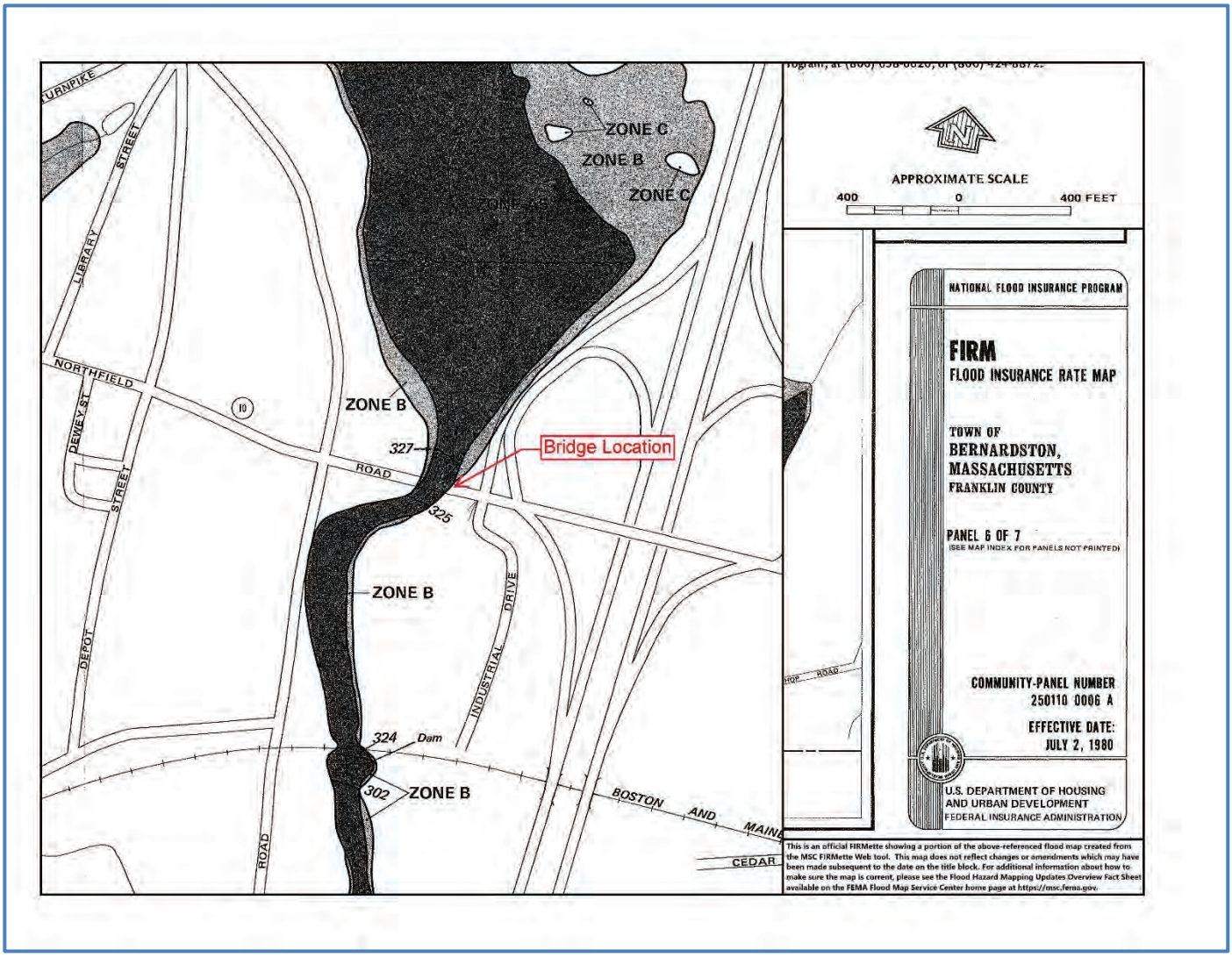


Figure 2-5: Flood Insurance Rate Map

2.2 Proposed Action

The proposed upgrade includes a full bridge replacement of the Route 10 bridge over the Fall River. The current three span bridge will be entirely replaced with a single span bridge, which will have a shorter span length. Both existing piers and abutments will be removed as part of the bridge replacement. The proposed single span bridge will carry two vehicular lanes, two buffered bike lanes, and a south side pedestrian sidewalk over the Fall River. The existing profile of the bridge will be maintained in order to minimize impacts at the approaches. The streambed will also be restored to the same elevation it is at now. **Figures 2-6 and 2-7** show the proposed cross sections of the alternatives.

- Alternative 1 – Full Height Abutment
- Alternative 2 – MSE Wall

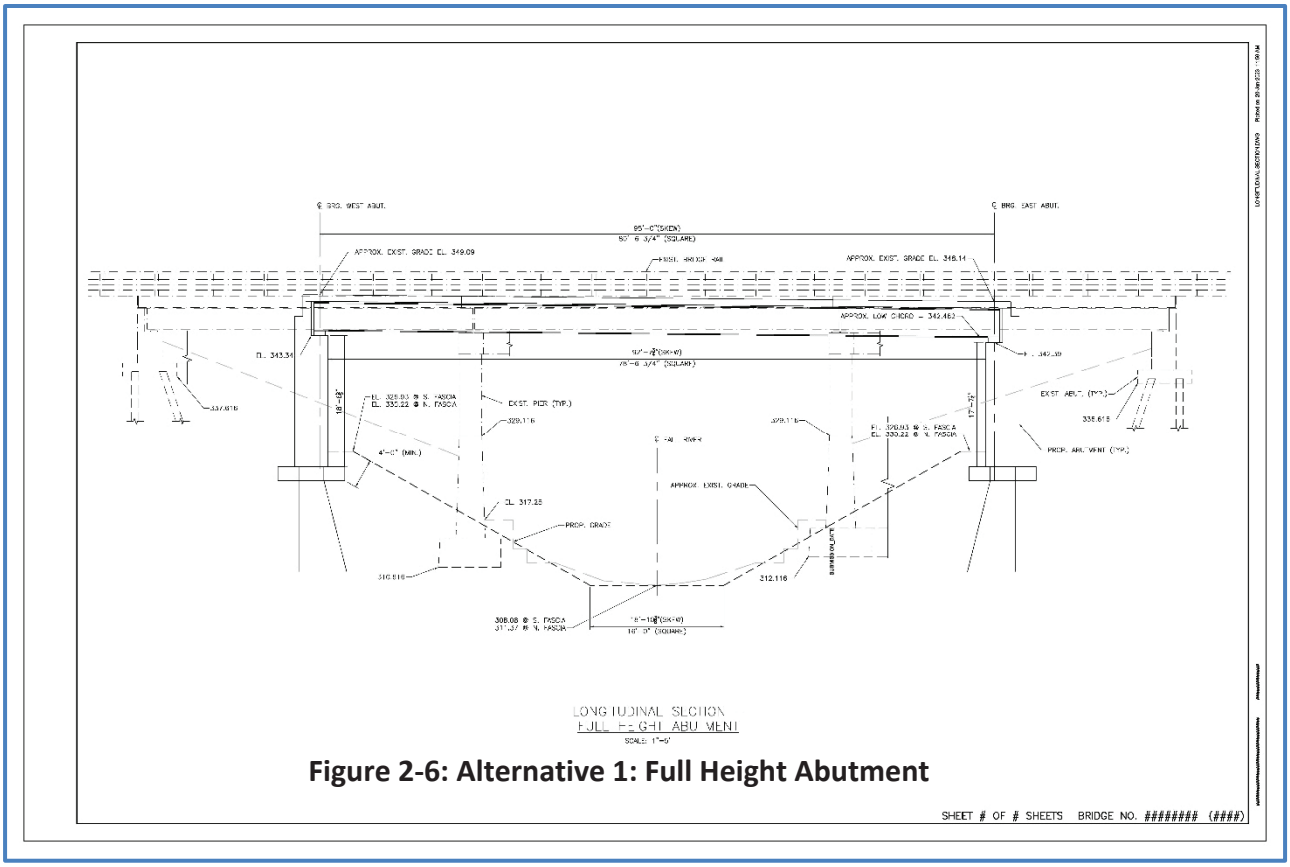


Figure 2-6: Alternative 1: Full Height Abutment

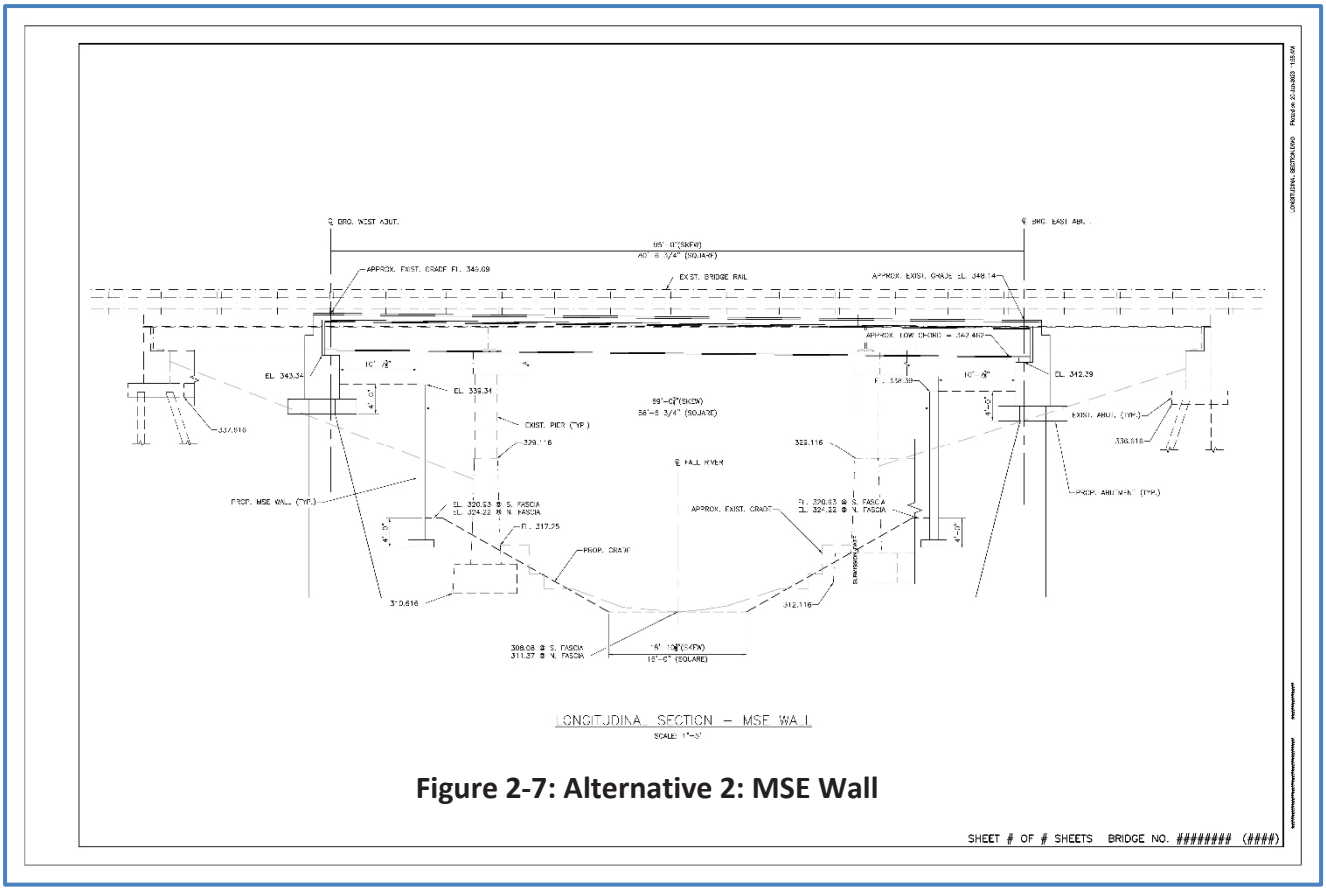


Figure 2-7: Alternative 2: MSE Wall

3.0 Data Collection

The following references and reports on the study area were available and were used as guidance during the hydrologic and hydraulic model development and analysis:

- Bernardston, MA Flood Insurance Study (FIS) January, 1980 (**Reference 1**)
- Bernardston, MA Flood Insurance Rate Map (FIRM) No. 250110 006 A, July 2, 1980 **(Reference 2)**
- Scour Sediment Sampling Results (**Appendix 7.4.1**)
- Base plans prepared by Hancock Associates, November 7, 2022

4.0 Engineering Methods

Hydrologic and hydraulic analyses were conducted to estimate the peak design discharges and water surface elevations respectively at the bridge location. The following sections briefly describe the methodology.

4.1 Hydrologic Analysis

The objective of the hydrologic analysis was to establish the 10% (10-yr), 4% (25-yr), 2% (50-yr), 1% (100-yr), 0.5% (200-yr), and 0.2% (500-yr) annual probability event peak discharges for the Fall River at the Project site and to establish boundary conditions required for the hydraulic and scour analysis. The design flood frequency for a *Rural Major Collector* bridge is the 4% annual probability event (**Reference 3**). The stream's drainage area at the Project location was delineated using the USGS StreamStats Website (**Reference 11**); See **Section 2.1.1** and **Figure 2-3** for delineated area at the bridge.

A review of the location of USGS gauges on the Fall River in the area of the bridge revealed that one gauge, no. 01167200 **(Reference 4 and Appendix 7.2.2)** is located about 1.5 miles upstream of the of the subject bridge. The data collected was limited to 16 flow measurements collected from 1971 to 1995. This number of data points is insufficient to calculate estimated peak flows. No other gauges are present between the bridge and the Connecticut River.

USGS StreamStats **(Reference 11)** was used to develop the peak flows for the bridge site. The program determined that the drainage area for the site is 25.7 square miles and the calculated peak flood discharges for the annual chance flood events. The FIS peak flows used in the design and the StreamStats peak flows used for comparison are detailed in **Table 4-1** and the hydrologic computations are in **Appendix 7.1.3 and Appendix 7.2.1**.

The FEMA Engineering Library furnished the HEC-2 data used to develop the FIS for the Fall River (**Appendix 7.1.5).** The HEC-2 data determined the peak flood discharges for the 10% (10-yr), 2% (50-yr), 1% (100-yr), and 0.2% (500-yr) annual chance flood events **(Table 4-1).** The Gumbel Distribution equation model was used to determine the 4% and 0.5% annual chance flood events based on the FIS values for the other events **(Appendix 7.2.3)**. The FIS data for all of the annual chance flood events will be used for the no-rise analysis.

Table 4-1: Peak Flood Discharges

Annual Probability Flood Event	FIS Peak Flow (cfs)	Streamstats Peak Flow (cfs)
10% (10-year)	1,160	1,700
4% (25-year)	1,678	2,300
2% (50-year)	2,040	2,800
1% (100-year)	2,520	3,340
0.5% (200-year)	3,072	3,940
0.2% (500-year)	3,780	4,800

4.2 Hydraulic Analyses

The hydraulic analysis was conducted using the US Army Corps of Engineer (USACOE), Hydrologic Engineering Center, HEC-RAS version 6.3 River Analysis System (**Reference 12**). HEC-RAS is capable of calculating steady flow water surface profile computations, one- and two-dimensional unsteady flow simulation, movable boundary sediment transport computations and water quality analysis. For the purposes of this analysis, we will be using the one-dimensional, steady flow water surface profile module to calculate the water surface profiles for the existing condition and then develop a proposed upgraded design for the project site. Water surface profiles for 10%, 4%, 2%, 1%, 0.5% and 0.2% annual chance peak discharge events were developed in a manner consistent with the applicable NFIP base floodplain development performance standards. The datum used to develop the duplicative effective analysis is NGVD 1929 since that is the datum used in the FIS. Because of the significant change in thalweg elevations due to scour it was determined that using NGVD 1929 without conversion would minimize the possibility of data entry error. In the corrected/effective and proposed condition hydraulic models the NAVD 1988 datum was used and the datum conversion from NGVD 1929, which was used in the HEC-2 data, to NAVD 88 is -0.38'.

4.2.1 No-Rise Analysis

Because the existing structure spans an effective NFIP regulatory floodway it is necessary to develop a no-rise base flood elevation profile hydraulic analysis as outlined in the MassDOT LRFD Bridge Manual, Part 1, January 2020 Revision, paragraph 1.3.5 (**Reference 3)**. The goal is to demonstrate compliance with the applicable NFIP development standards as described in 44 CFR 60.3(d)(3) which states:

(3) The community shall prohibit encroachments, including fill, new construction, substantial improvements, and other development within the adopted regulatory floodway unless it has been demonstrated through hydrologic and hydraulic analyses performed in accordance with standard engineering practice that the proposed encroachment would not result in any increase in flood levels within the community during the occurrence of the base flood discharge.

The FEMA FIS HEC-2 data for the encroachment analysis was received from the FEMA Engineering Library and was used in the analysis (**Appendix 7.1.5).**

4.2.2 Duplicative Effective Analysis

A duplicative effective analysis was conducted that involved uploading the currently effective model's input data received from FEMA into the HEC-RAS system. The design was calibrated to reproduce the currently effective BFE profile shown in the FIS within 0.5 feet **(Table 4-2)**. The reach domain was run between HEC-2 cross section 1.628, which is about 1,758' upstream of the site, to cross section 1.20, which is about 449' downstream of the site. There are three lettered cross sections within the project area and the duplicative effective model reproduced the current effective BFE for all cross sections to within 0.5 feet **Figure 4-1**.

The model parameters such as ineffective flow areas, bank stations, expansion and contraction coefficients and Manning's roughness coefficients were used as listed in the HEC-2 data **Appendix 7.1.5**. The duplicative effective/existing condition model was run using the steady-state step-backwater HEC-RAS analysis in a subcritical flow mode. All flood simulations performed in this duplicative effective/existing condition HEC-RAS model were run in a subcritical flow mode using FIS base flow in **Table 4-1,** and the known water surface elevation for the base flow in cross section 1.20 was used as the downstream boundary condition. The water surface value was determined from the Bernardston, MA FIS (**Appendix 7.1.3**). A summary of the duplicative effective analysis is presented in **Table 4-2.**



Figure 4-1: HEC-RAS Cross Section Layout Plan

Table 4-2: Comparison of Duplicative Effective Analysis

HEC-2 Station	HEC-RAS Cross Section	FIS Cross Section	[1] FIS BFE (ft, NGVD)	[2] Duplicative Effective BFE (ft, NGVD)	[2]-[1] Difference (ft)
1.628	1.628	J	328.1	327.9	-0.2
1.308	1.308	I	327.7	327.2	-0.5
1.200	1.200	H	324.5	324.5	0.0

4.2.3 Corrected Effective/Existing Conditions Analysis

The duplicate effective model was used to develop the corrected effective/existing condition HEC-RAS model. The corrected effective/existing conditions model was updated with the current topographic details at the FIS cross sections and added additional survey cross sections to represent the channel geometry more accurately. The cross-section data for the corrected effective/existing condition model upstream and downstream of the bridge was extracted by using recent survey which extends 500' upstream and downstream of the bridge and LiDAR data.

The reach domain used in this analysis extends from HEC-RAS cross section 1.628 (FIS cross section J) downstream to cross-section 1.20 (FIS cross section H) upstream of the bridge, for a total distance of 2,260 feet of stream length. **Figure 4-1** shows the location of HEC-RAS cross sections and the cross-section layout plan.

A dam located about 1,340 feet downstream of the bridge was removed subsequent to the publication of the FIS for Bernardston. This has resulted in the flood profiles in the FIS being invalidated for this area of the river. The removal of the dam has resulted in significant degradation of the river bed in the Project area. From the survey data it is observed that the thalweg elevations within the survey limit varies between -7.7 feet to -9 feet from the FIS thalweg elevations. See **Figure 4-2** for a comparison of the elevation profile of the river in FIS and in actual survey.

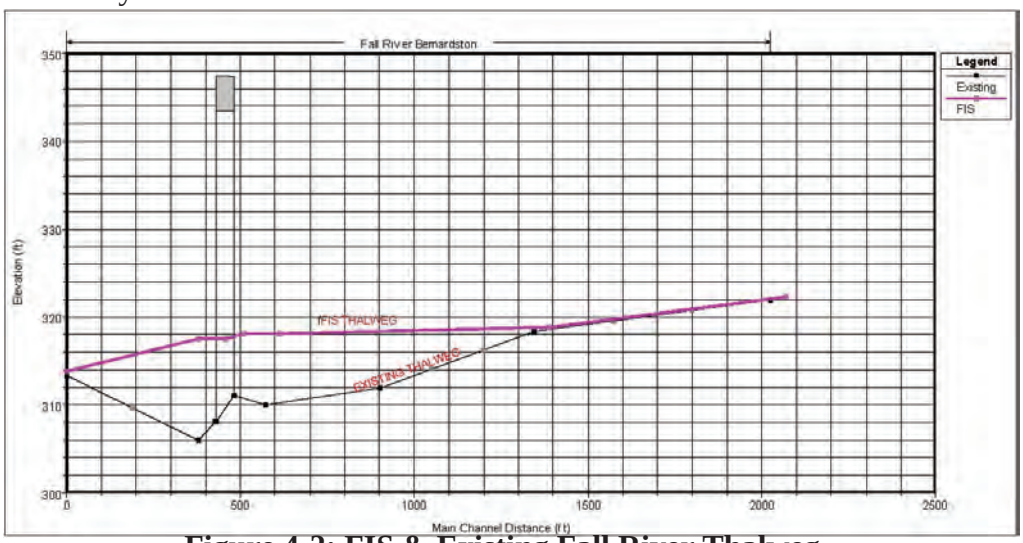


Figure 4-2: FIS & Existing Fall River Thalweg

The model parameters such as ineffective flow areas, bank stations, expansion and contraction coefficients, and Manning's roughness coefficients were modified based on the existing conditions. Additional cross sections based on the survey data and interpolated by the program were added to the effective/existing conditions model. The corrected effective/existing condition model was run using the steady-state step-backwater HEC-RAS analysis. All flood simulations performed in this corrected effective/existing condition HEC-RAS model were run in a subcritical flow mode using the FIS base flow in **Table 4-1** and normal depth as the downstream boundary condition for the Project design.

4.2.4 Proposed Condition Analysis

The current three span bridge will be entirely replaced with a single span bridge, which will have a shorter span length. Both existing piers and abutments will be removed as part of the bridge replacement and the two alternatives described in **Section 2.2** were evaluated. The proposed condition models were developed after updating the corrected existing/effective geometry with the proposed bridge geometry. All other model parameters remain the same as in the corrected effective/existing condition model. The proposed condition analysis was performed:

(1) To compare the effective/existing condition model with the proposed model results using the FIS 1% probability event base flow for the no-rise analysis; and
(2) To evaluate the Project impact using the FIS probability events flows.

Proposed Condition No-Rise Analysis

For the no-rise analysis, the proposed model was analyzed with the FIS 1% frequency event base flow listed in **Table 4-1** and a normal depth slope = 0.0038 as the downstream boundary condition using one dimensional steady state HEC-RAS modeling. The model was run in a subcritical flow regime. **Table 4-3** shows the results of the no-rise analysis at each of the FIS cross sections.

Table 4-3: Comparison of Corrective Effective and Proposed BFE's

HEC-RAS Cross Section	FIS Cross Section	[1] Existing Water Surface Elevation (ft,NAVD)	[2] Full Height Abutment Proposed Water Surface Elevation	[2]-[1] Full Height Abutment Project Impact (ft)	[3] MSE Wall Proposed Water Surface Elevation (ft,NAVD)	[3]-[1] MSE Wall Project Impact (ft)
1.628	FIS J	327.0	327.0	0.0	327.0	0.0
1.308	FIS I	323.5	323.5	0.0	323.5	0.0
Bridge						
1.200	FIS H	322.5	322.5	0.0	322.5	0.0

Proposed Condition Design Flood Analysis

As stated, all design flood simulations performed in 1-D HEC-RAS modeling were run in a subcritical flow mode and employed the FIS discharges listed in **Table 4-1.** The downstream boundary condition was assumed to be normal depth. **Table 4-4** summarizes the hydraulic

performance at the immediate upstream cross section (HEC-RAS Cross Section 1.291) of the bridge for the effective/existing condition and the proposed alternatives. The water surface elevations are within 0.1+/- feet of the existing conditions, and the average velocity is within 0.2+/- cubic feet per second of the existing conditions for all evaluated events.

Table 4-4: Summary of Hydraulic Performance Upstream of Culvert

Annual Probability Flood Event	Peak Flow (cfs)	Existing		Alternative 1		Alternative 2	
		WSEL (ft, NAVD)	Contracted Velocity (ft/sec)	WSEL (ft, NAVD)	Contracted Velocity (ft/sec)	WSEL (ft, NAVD)	Contracted Velocity (ft/sec)
10% (10-year)	1160	321.0	5.8	321.0	5.8	321.0	5.7
4% (25-year)	1678	321.8	7.4	321.8	7.4	321.8	7.4
2% (50-year)	2040	322.3	8.4	322.3	8.4	322.3	8.4
1% (100-year)	2520	322.9	9.6	322.8	9.7	322.9	9.6
0.5% (200-year)	3072	323.4	10.9	323.4	11.0	323.5	10.9
0.2% (500-year)	3780	324.2	12.3	324.0	12.5	324.1	12.4

The site has a Highway Functional Classification of Rural Major Collector and Table 1.3.4-1 of the MassDOT LRFD Manual (**Reference 3**) lists the hydraulic design flood as the 4% annual chance event which has been calculated as 1,678 cfs (**Table 4-1**). A comparison of the 4% (25-yr) annual chance event design flood elevation between the existing/effective and all proposed modeled cross sections is presented in **Table 4-5.**

Table 4-5: Comparison of Existing and Proposed Elevations for Design Flow

HEC-RAS Cross Section	Cross Section Description	[1] Existing Water Surface Elevation (ft,NAVD)	[2] Full Height Abutment Proposed Water Surface Elevation (ft,NAVD)	[2]-[1] Full Height Abutment Project Impact (ft)	[3] MSE Wall Proposed Water Surface Elevation (ft,NAVD)	[3]-[1] MSE Wall Project Impact (ft)
1.628	FIS J	326.6	326.6	0.0	326.6	0.0
1.5733*	Interpolate	325.5	325.5	0.0	325.5	0.0
1.5187*	Interpolate	323.5	323.5	0.0	323.5	0.0
1.464	Survey	322.7	322.7	0.0	322.7	0.0
1.4323*	Interpolate	322.6	322.6	0.0	322.6	0.0
1.4007*	Interpolate	322.5	322.5	0.0	322.5	0.0
1.369	Survey	322.3	322.3	0.0	322.3	0.0
1.308	FIS I	322.2	322.2	0.0	322.2	0.0
1.291	Survey	321.8	321.8	0.0	321.8	0.0
Bridge						
1.281	Survey	321.8	321.8	0.0	321.8	0.0
1.272	Survey	322.0	322.0	0.0	322.0	0.0
1.2360*	Interpolate	321.9	321.9	0.0	321.9	0.0
1.2	FIS H	321.4	321.4	0.0	321.4	0.0

The proposed stream WSEL will be the same as the existing WSEL at all cross sections. **Table 4-5** and **Appendix 7.3** list the results of the HEC-RAS modeling and WSEL profiles of the river.

4.2.5 Scour Safety and Stability Analysis

Scour potential at the crossing site was analyzed using the requirements set forth by MassDOT's LRFD Bridge Manual, section 1.3.3.5 (**Reference 3**) and using the guidelines by FHWA HEC-18, "*Evaluating Scour at Bridges"* (**Reference 6).** In accordance with Section 1.3.4 of LRFD Bridge Manual, for *Rural Major Collector* Highway Functional Classification, the river's 2% (50-year) and 1% (100-year) chance flood events were used as the scour design and scour check events respectively.

The design approach was to estimate long term aggradation/degradation, flood related contraction and local abutment scour depths for the 2% and 1% chance flood events. In this study the abutment scour is calculated using the Froehlich Equation for Abutment Scour method described in HEC-18 **(Reference 6)**.

The hydraulic variables used for scour calculations were obtained from the 1-D HEC-RAS model results. The results were extracted from cross sections at the approach section and contracted bridge section. As listed in **Section 3.0**, the soil data for scour calculations was obtained from the sampling analysis conducted as part of this project **Appendix 7.4.1**.

Historical data was obtained from the FEMA Engineering Library in the form of HEC-2 printouts for the Fall River in Bernardston. Comparing the stream elevation data from the 1977 HEC-2 run to the survey data collected in 2022, it was found that the elevation of the streambed in the Project area has decreased by approximately 7.7' (Cross Section 1.308) to 9.6' (Cross Section 1.200) **Table 4-2**. As previously noted, this was apparently due to the removal of a dam at Station 1.04, which is about 1,300 feet downstream from the Project. We have assumed that the degradation is now complete, and in both the scour design and check event analyses, it is assumed that the channel bed elevation will not further degrade over the service life of the bridge. A summary of computed 2% and 1% annual chance flood scour depths is presented in **Table 4-6.** See **Appendix 7.4.2** for the detailed scour calculations.

Table 4-6: Summary of Calculated Scour

Alternative	Annual Chance Event (%)	Contraction Scour (ft)	Local Abutment Scour (ft)	Total Abutment Scour (ft)
1 - Full Height Abutment	2	0.0	6.1	6.1
	1	0.0	6.4	6.4
2 - MSE Wall	2	0.0	6.1	6.1
	1	0.0	6.4	6.4

4.2.6 DEP Stream Crossing Standards

The DEP Stream Crossing Standards analyze a proposed crossing on a number of criteria that

fall under the rubric of General Standard or Optimum Standard. The General Standard is typically reserved for repairs or replacements to existing structures. Both alternatives will meet all of the General and Optimum Standards. See **Table 4-7** for a summary of the criteria.

Table 4-7: DEP Stream Crossing Standards

Standard	General Standard	Optimum Standard	Alternative #1	Alternative #2
1. Type of Crossing	Spans strongly preferred	same	Bridge Span	Bridge Span
2. Embedment	Culverts embedded 2'	same	n/a	n/a
3. Crossing Span	Spans channel width min of 1.2 bankfull width	Spans min of 1.2 bankfull with sufficient headroom to provide dry passage of wildlife	Greater than 1.2 bankfull width w/30'+ headroom	Greater than 1.2 bankfull width w/30'+ headroom
4. Opennes	Openness ratio of 0.82. Crossing should be wide and high relative to length.	Openness ratio of 1.64 and min height of 6'. If significant conditions reduce wildlife passage maintain min height of 8' and openness ratio of 2.64	Openness ratio greater than 1.64 w/30'+ height	Openness ratio greater than 1.64 w/30'+ height
5. Substrate	Natural bottom	same	Natural bottom	Natural bottom
6. Water Depth & Velocity	Comparable to found in natural channel	same	Water depth and velocity are comparable to natural channel	Water depth and velocity are comparable to natural channel

5.0 Conclusions & Recommendations

5.1 Conclusions

1. The Project hydraulic model predicts that the existing bridge and the proposed replacement alternatives will convey the 4% annual chance design flood event.
2. The Project hydraulic model predicts that the Project will neither result in any increase in flood elevations within the community during the base flood discharge of the Fall River. As noted, the existing floodway delineation has been invalidated by the removal of the downstream dam.

5.2 Recommendations

1. The information in **Table 5-1** for the recommended alternative should be presented within the Hydraulic Data Tables in the General Notes of the Construction Plan sets.
2. The calculated 2% (50-year) chance flood event total scour depth presented in **Table 5-1** for Alternative 1 should be considered for use as a bridge foundation condition in LRFD strength and service limit state foundation stability determination. Similarly, the calculated 1% (100-yr) chance flood event scour depth should be considered for use as a bridge foundation condition in the LRFD extreme event limit state foundation stability determination. The design engineer should be cognizant that the proposed bridge substructure will meet the foundation scour stability requirements set forth in MassDOT Bridge LRFD Manual (**Reference 3**), Section 3.2.10, and presented below.

For new bridges or full bridge replacements, the substructures shall be designed to meet the requirements of Paragraphs 3.2.10.2 and 3.9.10.3 for the calculated design and check scour without using scour countermeasures.

Table 5-1: Hydraulic Design Data (Existing & Proposed Conditions)

Hydraulic Design Data		
Drainage Area:	25.7 Square miles	
Design Flood Discharge:	1,678 Cubic Feet Per Second	
Design Flood Annual Chance (Return Frequency):	4% (25 Years)	
Design Flood Velocity:	7.4 Feet Per Second	
Design Flood Elevation:	321.8 Feet, NAVD 88	
Base (100- YEAR) Flood Data		
Base Flood Discharge:	2,520 Cubic Feet per Second	
Base Flood Elevation:	322.9 Feet, NAVD	
Design and Check Scour Data	**Alternative 1**	**Alternative 2**
Scour Design Flood Annual Chance (Return Frequency):	2% (50 Years)	
Design Flood Abutment Scour Depth:	6.1 Feet	6.1 Feet
Design Flood Contraction Scour Depth:	0 Feet	0 Feet
Scour Check Flood Annual Chance (Return Frequency):	1% (100 Years)	
Check Flood Abutment Scour Depth:	6.4 Feet	6.4 Feet
Check Flood Contraction Scour Depth:	0 Feet	0 Feet
Flood of Record		
Discharge:	Not Known	
Frequency (If Known):	Not Known	
Maximum Elevation:	Not Known	
Date:	Not Known	
History of Ice Floes:	None documented	
Evidence of Scour and Erosion:	Subsequent to the removal of dam downstream of the Project the streambed elevation decreased 8’-10’ in the Project area as determined by comparing the 1977 HEC-2 data with the 2022 survey data.	

6.0 References

6.1 Data Sources

Reference No.	Title
1	Bernardston, Massachusetts Flood Insurance Study (FIS), effective date January, 1980.
2	Town of Bernardston, Franklin County, Massachusetts Flood Insurance Rate Map (FIRM) Panel No. 250110 0006 A, July 2, 1980
3	MassDOT LRFD Bridge Manual, January 2020 Revision
4	USGS Gauge Data from Station 01167200 – Fall River @ Bernardston, MA
5	FEMA Engineering Library HEC-2 Release printout for Fall River, Bernardston, MA dated February, 1977.
6	US Department of Transportation Federal Highway Administration Hydraulic Engineering Circular No. 18 “Evaluating Scour at Bridges”, Fifth Edition, April 2012
7	US Department of Transportation Federal Highway Administration Hydraulic Engineering Circular No. 23 “Bridge Scour and Stream Instability Countermeasures”, September 2009
8	MassDOT “Design of Bridges and Culverts for Wildlife Passage at Freshwater Streams” December, 2010
9	MassDOT Culvert Inspection Reports, File No. B10001-12D-DOT-NBI, February 15, 2022 & August 12, 2022
10	Mass Highway Proposed Bridge Bernardston, Relocated Route No. 10, Sta 22+6, last revised July 23, 1959

6.2 Data Applications

11	United States Geological Survey (USGS) National Streamflow Statistics (StreamStats), Version 4.12.0
12	US Army Corps of Engineer (USACOE), Hydrologic Engineering Center, HEC-RAS River Analysis System, Version 6.3 September, 2022

7.0 Appendix

7.1 FEMA FIS & USGS Documents

7.1.1 Extract of USGS Bernardston Quadrangle
7.1.2 FEMA Firmette No. 250110 0006 A July 2, 1980
7.1.3 Floodway Data
7.1.4 Flood Profile
7.1.5 HEC-2 Data

7.2 Hydrologic Analyses

7.2.1 Drainage Area Using USGS Streamstats
7.2.2 USGS Gauging Station Data for Gauge No. 01167200
7.2.3 Hydrologic Calculations

7.3 Hydraulic Analyses

7.3.1 Duplicate Effective Model Bridge Cross Section
7.3.2 Duplicative Effective Model Channel Profile
7.3.3 Duplicative Effective Model Analysis Summary Table
7.3.4 Corrected Effective/Existing Bridge Cross Sections
7.3.5 Corrected Effective/Existing Channel Profile
7.3.6 Corrected Effective/Existing Analysis Summary Table
7.3.7 Proposed Bridge Cross Sections
7.3.8 Proposed Channel Profiles
7.3.9 Proposed Analyses Summary Table

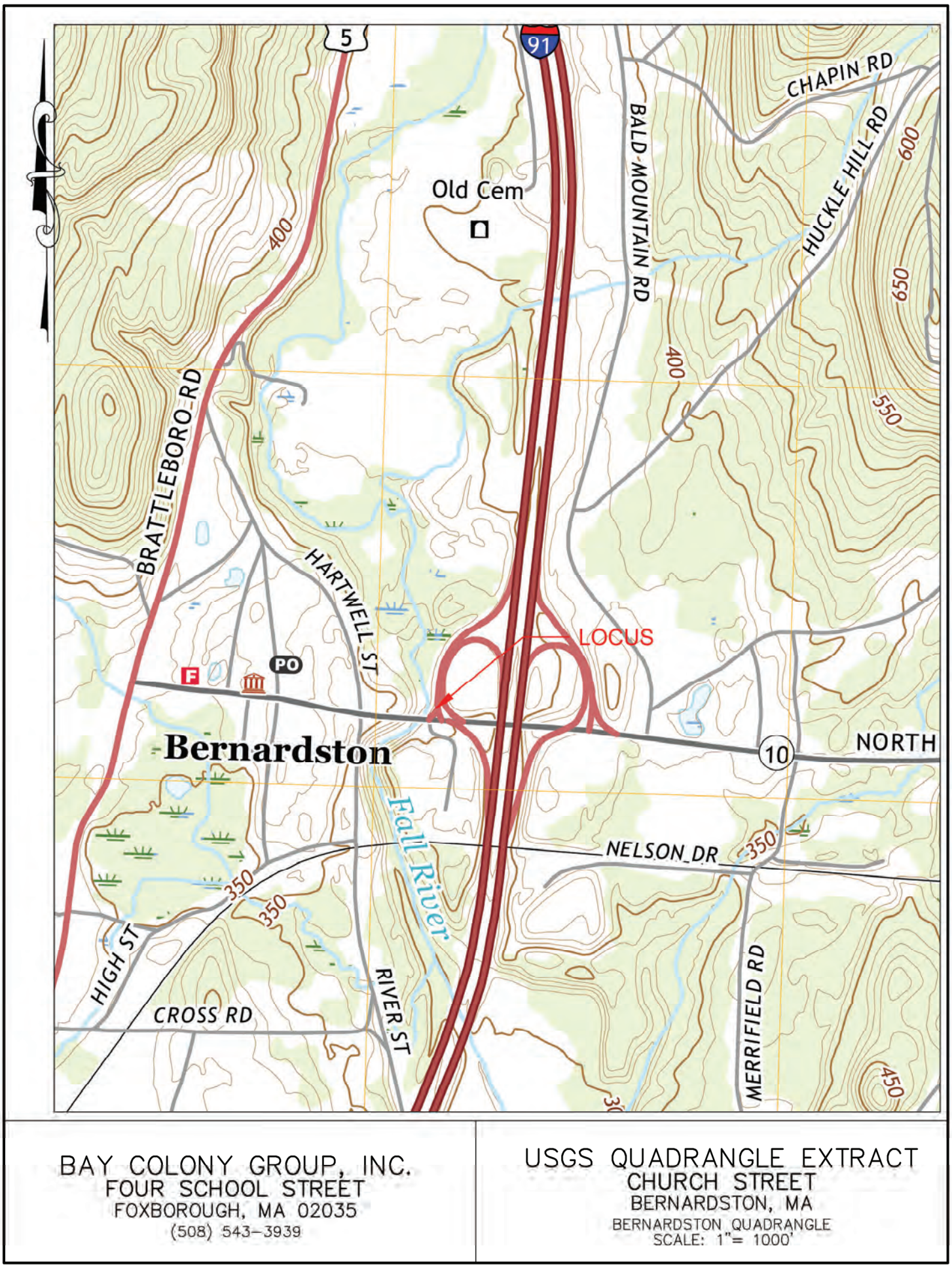
7.4 Scour Calculations

7.4.1 Scour Sediment Sampling Results
7.4.2 Scour Calculations

7.1 FEMA FIS & USGS Documents

7.1.1 Extract of USGS Bernardston Quadrangle
7.1.2 FEMA Firmette No. 250110 0006 A July 2, 1980
7.1.3 Floodway Data
7.1.4 Flood Profile
7.1.5 HEC-2 Data

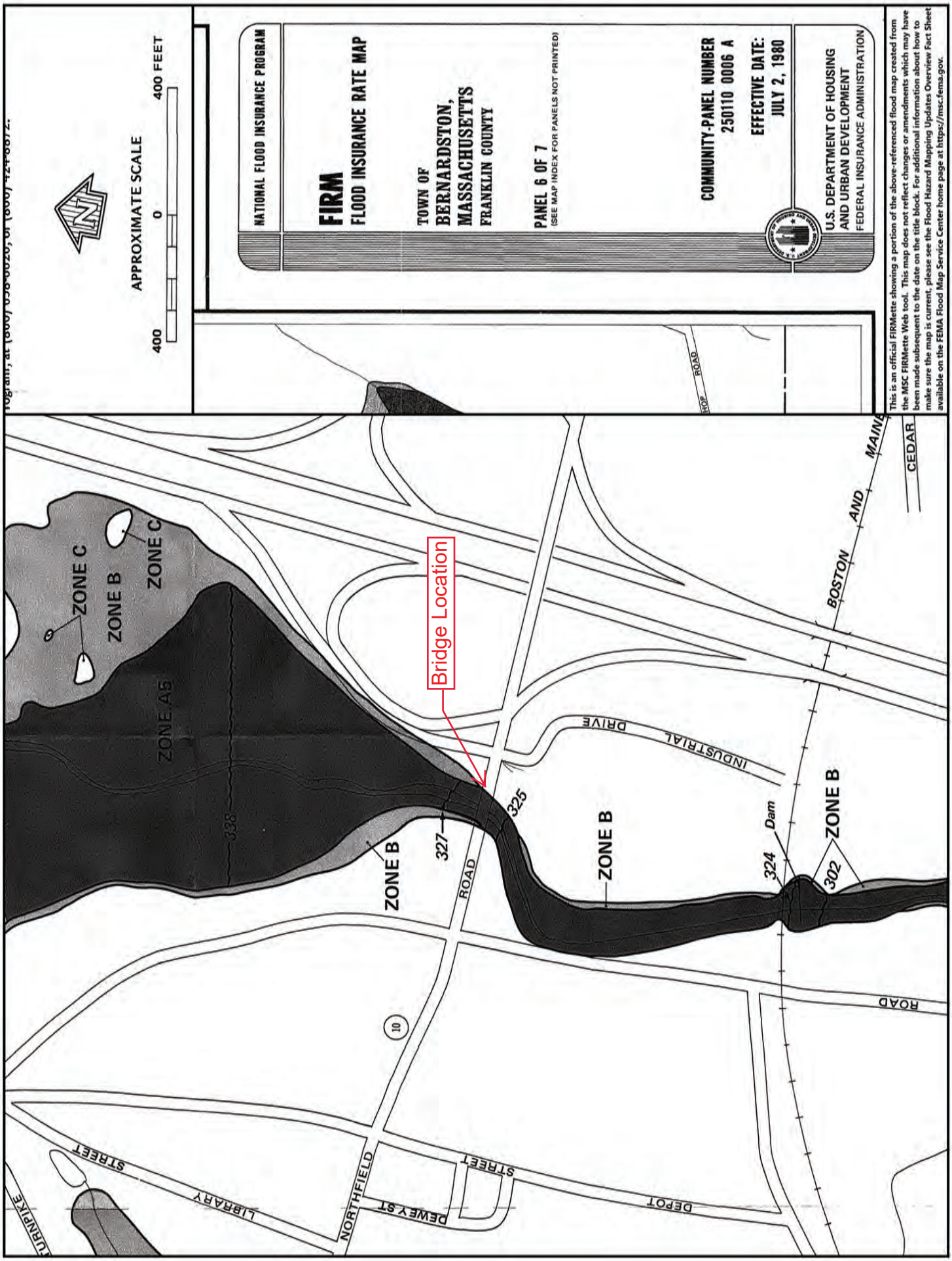
7.1.1



BAY COLONY GROUP, INC.
FOUR SCHOOL STREET
FOXBOROUGH, MA 02035
(508) 543-3939

USGS QUADRANGLE EXTRACT
CHURCH STREET
BERNARDSTON, MA
BERNARDSTON QUADRANGLE
SCALE: 1"= 1000'

7.1.2

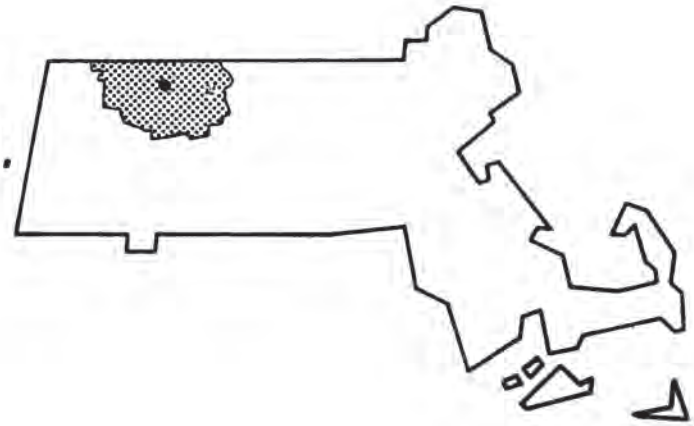

NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
TOWN OF
BERNARDSTON,
MASSACHUSETTS
FRANKLIN COUNTY
PANEL 6 OF 7
(SEE MAP INDEX FOR PANELS NOT PRINTED)
COMMUNITY-PANEL NUMBER
250110 0006 A
EFFECTIVE DATE:
JULY 2, 1980
U.S. DEPARTMENT OF HOUSING
AND URBAN DEVELOPMENT
FEDERAL INSURANCE ADMINISTRATION
APPROXIMATE SCALE
400 0 400 FEET
N
This is an official FIRMette showing a portion of the above-referenced flood map created from the MSC FIRMette Web tool. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For additional information about how to make sure the map is current, please see the Flood Hazard Mapping Updates Overview Fact Sheet available on the FEMA Flood Map Service Center home page at https://msc.fema.gov.
Bridge Location
ZONE C
ZONE B
ZONE C
ZONE A5
338
ZONE B
327
ROAD
325
ZONE B
INDUSTRIAL
DRIVE
BOSTON
AND
MAINE
CEDAR
324
Dam
302
ZONE B
ROAD
10
NORTHFIELD
STREET
DEWEY ST
DEPOT
LIBRARY
STREET
TURNPIKE

7.1.3

FLOOD INSURANCE STUDY



TOWN OF BERNARDSTON, MASSACHUSETTS
FRANKLIN COUNTY



JANUARY 1980

FEDERAL EMERGENCY MANAGEMENT AGENCY
FEDERAL INSURANCE ADMINISTRATION

COMMUNITY NUMBER - 250110
A00830 - 79

Table 1. Summary of Discharges

Flooding Source and Location	Drainage Area (Square Miles)	Peak Discharges (Cubic Feet per Second) 10-Year	50-Year	100-Year	500-Year
Fall River					
At Bernardston-Gill Corporate Limits	30.91	1290	2280	2830	4260
Downstream of Confluence With Tributary C	30.63	1280	2270	2820	4240
Upstream of Confluence With Tributary C	29.46	1240	2190	2720	4080
Downstream of Confluence With Tributary A	28.85	1230	2180	2700	4060
Upstream of Confluence With Tributary A	26.85	1160	2040	2520	3780
Upstream of Meadow Brook Road	24.33	1100	1940	2400	3600
Upstream of Confluence With Couch Brook	18.40	890	1560	1925	2870
Upstream of Confluence With Shattuck Keets Brook	17.77	880	1550	1910	2850
Upstream of Confluence With West Brook	7.51	370	590	690	970
At Upstream Corporate Limits of Study	5.46	280	440	510	710
Dry Brook					
At Bernardston-Gill Corporate Limits	6.02	350	570	680	970
At Upstream Limit of Detailed Study	5.35	330	550	660	950
West Brook					
Upstream of Confluence With Fall River	1.87	140	220	260	350

A00830 - 80

Proposal No. 612159-136484

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Fall River								
A	0.090	200	2,060	1.4	295.3	295.3	295.3	0.0
B	0.275	142	850	3.3	295.3	295.3	295.6	0.3
C	0.468	270	1,450	1.9	295.5	295.5	296.3	0.8
D	0.734	110	685	4.0	295.5	295.5	296.4	0.9
E	0.760	80	470	5.8	295.7	295.7	296.5	0.8
F	1.031	50	280	9.1	302.1	302.1	303.1	1.0
G	1.050	140	1,140	2.2	323.9	323.9	323.9	0.0
H	1.200	70	505	5.0	324.5	324.5	324.5	0.0
I	1.308	98	590	4.3	327.5	327.5	327.7	0.2
J	1.628	208	475	5.3	328.1	328.1	328.1	0.0
K	2.034	285/53[2]	460	5.5	333.0	333.0	333.4	0.4
L	2.246	260	525	4.8	338.5	338.5	339.1	0.6
M	2.515	110	330	7.7	341.6	341.6	341.7	0.1
N	2.778	200	460	5.5	346.7	346.7	347.2	0.5
O	2.962	70	410	6.1	353.2	353.2	353.6	0.4
P	3.189	80	280	8.5	356.5	356.5	356.5	0.0
Q	3.447	59	240	10.2	365.7	365.7	365.8	0.1
R	3.790	55	360	6.7	377.9	377.9	378.7	0.8
S	4.018	50	385	6.2	383.6	383.6	383.8	0.2
T	4.312	150	540	4.5	396.2	396.2	396.5	0.3
U	4.447	50	220	10.8	402.0	402.0	402.0	0.0
V	4.693	62	230	10.4	410.1	410.1	410.2	0.1
W	4.804	340	1,600	1.2	412.2	412.2	412.9	0.7
X	5.103	170	340	5.7	418.2	418.2	418.4	0.2
Y	5.441	120	310	6.3	427.1	427.1	427.5	0.4
Z	5.893	217	405	4.7	438.3	438.3	438.3	0.0

[1]Miles Above Corporate Limits [2]Left Channel/Right Channel

TABLE 2

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

TOWN OF BERNARDSTON, MA
(FRANKLIN CO.)

FLOODWAY DATA

FALL RIVER

A00830 - 81

Proposal No. 612159-136484

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
						(FEET NGVD)		
Fall River (continued)								
AA	6.105[1]	150	285	6.7	442.8	442.8	443.2	0.4
AB	6.445[1]	57	115	6.1	452.1	452.1	452.2	0.1
AC	6.607[1]	155	240	2.2	458.4	458.4	458.4	0.0
Dry Brook								
A	0.007[1]	50	115	6.0	307.1	307.1	307.3	0.2
B	0.173[1]	170	180	3.8	322.7	322.7	322.7	0.0
C	0.495[1]	100	160	4.2	349.9	349.9	349.9	0.0
D	0.823[1]	50	100	6.8	376.2	376.2	376.2	0.0
E	0.874[1]	80	465	1.5	382.3	382.3	382.3	0.0
F	1.153[1]	40	85	8.2	388.8	388.8	388.8	0.0
G	1.420[1]	120	225	3.0	400.8	400.8	401.6	0.8
H	1.670[1]	100	140	4.8	410.2	410.2	410.4	0.2
I	1.989[1]	60	140	4.9	422.9	422.9	423.3	0.4
West Brook								
A	0.025[2]	60	150	1.7	456.4	456.4	457.3	0.9
B	0.195[2]	30	75	3.6	469.3	469.3	469.7	0.4
C	0.367[2]	20	35	7.2	485.8	485.8	485.8	0.0

[1]Miles Above Corporate Limits [2]Miles Above Confluence with Fall River

TABLE 2

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

TOWN OF BERNARDSTON, MA
(FRANKLIN CO.)

FLOODWAY DATA

FALL RIVER-DRY BROOK-WEST BROOK

A00830 - 82

Proposal No. 612159-136484

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1% (100-YEAR) FLOOD AND			FLOOD HAZARD FACTOR	ZONE	BASE FLOOD ELEVATION (FEET NGVD)[3]
		10% (10-YEAR)	2% (50-YEAR)	0.2% (500-YEAR)			
Fall River							
Reach 1	0006	-2.244	-0.697	1.504	020	A4	Varies - See Map
Reach 2	0006	-3.627	-1.318	3.507	035	A7	Varies - See Map
Reach 3	0006	-2.355	-0.818	2.128	025	A5	Varies - See Map
Reach 4	0003,0004, 0006	-1.087	-0.321	0.983	010	A2	Varies - See Map
Reach 5	0001,0003, 0004	-2.000	-0.530	1.166	020	A4	Varies - See Map
Reach 6	0001	-1.734	-0.306	0.622	015	A3	Varies - See Map
Reach 7	0001	-0.889	-0.229	0.501	010	A2	Varies - See Map
Dry Brook							
Reach 1	0007	-0.933	-0.256	0.414	010	A2	Varies - See Map
Reach 2	0007	-4.960	-2.134	1.238	050	A10	Varies - See Map
Reach 3	0007	-0.633	-0.230	0.393	005	A1	Varies - See Map
West Brook							
Reach 1	0001	-0.374	-0.138	0.280	005	A1	Varies - See Map

[1]Flood Insurance Rate Map Panel [2]Weighted Average [3]Rounded to Nearest Foot

TABLE 3

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

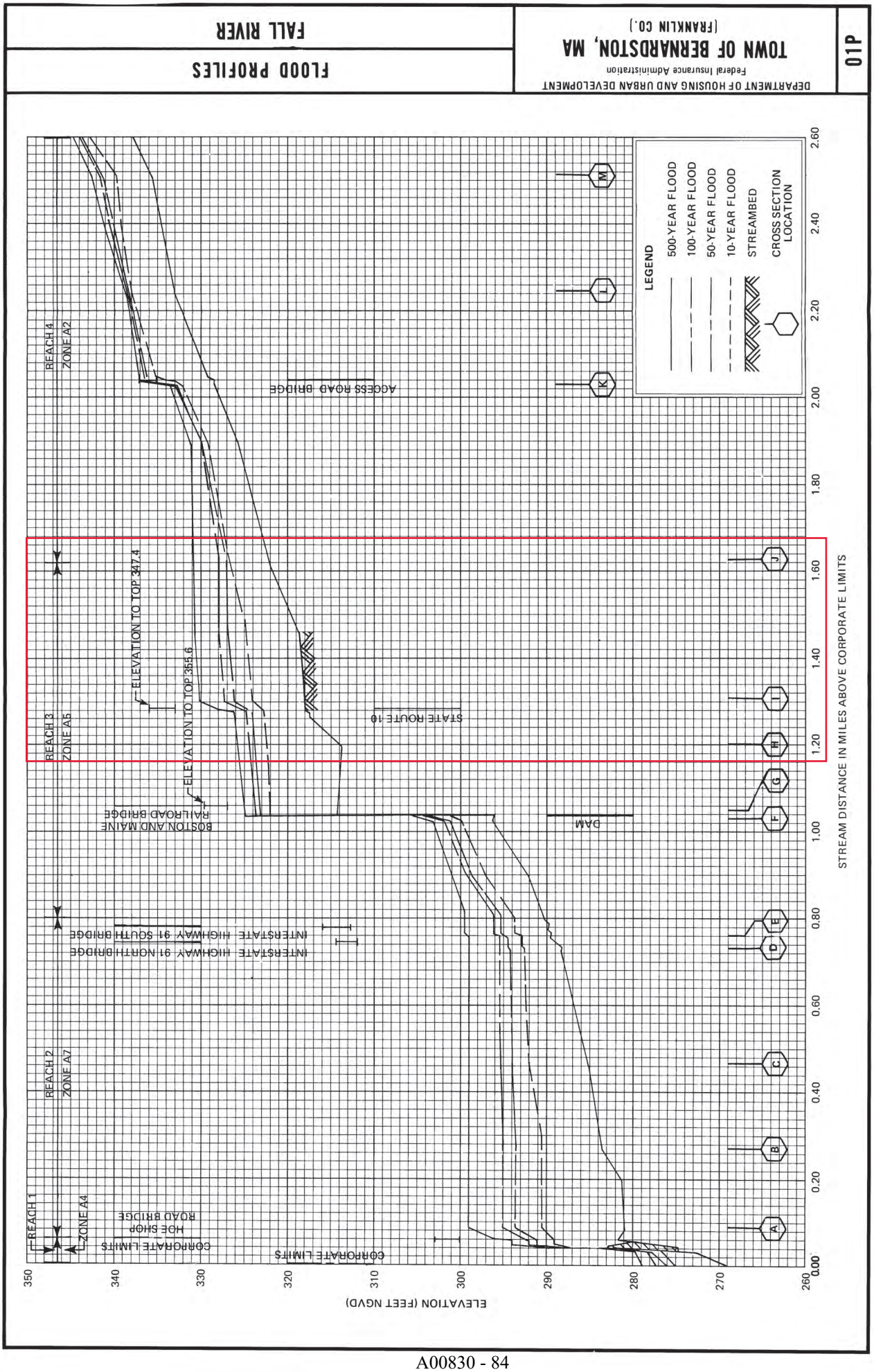
TOWN OF BERNARDSTON, MA
(FRANKLIN CO.)

FLOOD INSURANCE ZONE DATA

FALL RIVER-DRY BROOK-WEST BROOK

Proposal No. 612159-136484

7.1.4


01P
DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration
TOWN OF BERNARDSTON, MA
(FRANKLIN CO.)
FLOOD PROFILES
FALL RIVER
LEGEND
500-YEAR FLOOD
100-YEAR FLOOD
50-YEAR FLOOD
10-YEAR FLOOD
STREAMBED
CROSS SECTION LOCATION
REACH 4
ZONE A2
REACH 3
ZONE A5
REACH 2
ZONE A7
REACH 1
ZONE A4
ACCESS ROAD BRIDGE
ELEVATION TO TOP 347.4
ELEVATION TO TOP 355.6
STATE ROUTE 10
BOSTON AND MAINE RAILROAD BRIDGE
DAM
INTERSTATE HIGHWAY 91 SOUTH BRIDGE
INTERSTATE HIGHWAY 91 NORTH BRIDGE
CORPORATE LIMITS
HOE SHOP ROAD BRIDGE
CORPORATE LIMITS
ELEVATION (FEET NGVD)
STREAM DISTANCE IN MILES ABOVE CORPORATE LIMITS

NC	0.065	0.065	0.040	0.100	0.300	0.0	0.0	0.0	0.0	0.0
ET	0.0	952.000	1050.000	0.0	0.0	0.0	0.0	0.0	2.100	0.0
XI	1.068	13.000	960.000	1050.000	27.000	30.000	50.000	0.0	0.0	0.0
GR	340.000	910.000	355.000	920.000	330.000	940.000	325.000	950.000	320.100	960.000
GR	315.000	980.000	314.400	1000.000	315.000	1030.000	320.100	1050.000	325.000	1055.000
GR	330.000	1065.000	335.000	1090.000	340.000	1105.000	0.0	0.0	0.0	0.0
NC	0.070	0.065	0.045	0.100	0.300	0.0	0.0	0.0	0.0	0.0
ET	0.0	890.000	1020.000	0.0	0.0	0.0	0.0	0.0	2.100	0.0
XI	1.200	22.000	985.000	1015.000	650.000	730.000	697.000	0.0	0.0	0.0
GR	345.000	800.000	340.000	815.000	335.000	835.000	330.000	849.000	325.000	865.000
GR	322.500	875.000	320.000	905.000	319.300	924.000	319.300	974.000	317.300	985.000
GR	316.400	987.000	314.300	992.000	313.800	1000.000	314.400	1003.000	314.400	1010.000
GR	317.300	1015.000	320.000	1018.000	325.000	1024.000	330.000	1030.000	338.000	1040.000
GR	340.000	1050.000	345.000	1062.000	0.0	0.0	0.0	0.0	0.0	0.0
NC	0.055	0.065	0.045	0.100	0.300	0.0	0.0	0.0	0.0	0.0
ET	0.0	960.000	1038.000	0.0	0.0	0.0	0.0	0.0	2.100	0.0
XI	1.272	16.000	980.000	1035.000	300.000	380.000	380.000	0.0	0.0	0.0
GR	345.000	905.000	340.000	915.000	335.000	930.000	330.000	945.000	325.000	955.000
GR	320.000	980.000	318.200	990.000	317.600	1000.000	318.000	1020.000	319.000	1030.000
GR	320.000	1035.000	325.000	1040.000	330.000	1072.000	335.000	1083.000	340.000	1100.000
GR	345.000	1135.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NC	0.055	0.065	0.045	0.300	0.500	0.0	0.0	0.0	0.0	0.0
ET	0.0	976.000	1012.000	0.0	0.0	0.0	0.0	0.0	2.100	0.0
XI	1.281	21.000	976.500	1012.500	50.000	50.000	50.000	0.0	0.0	0.0
X3	10.000	0.0	0.0	0.0	0.0	0.0	0.0	343.200	344.200	0.0
GR	350.000	720.000	347.400	899.900	347.900	900.000	337.100	925.900	337.000	926.000
GR	319.700	973.000	343.500	973.100	343.600	976.400	317.500	976.500	318.000	1000.000
GR	318.700	1010.000	319.800	1012.500	320.800	1023.500	343.800	1023.600	343.900	1026.900
GR	320.900	1027.000	339.000	1074.000	339.100	1074.100	348.700	1100.000	348.800	1100.100
GR	350.000	1200.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SS	1.050	1.900	2.800	0.0	81.800	7.000	2536.000	0.0	318.700	318.000
ET	0.0	976.000	1012.000	0.0	0.0	0.0	0.0	0.0	2.100	0.0
XI	1.288	21.000	976.500	1012.500	68.500	68.500	68.500	0.0	0.0	0.0
X2	0.0	0.0	1.000	344.200	347.400	0.0	0.0	0.0	0.0	0.0
X3	10.000	0.0	0.0	0.0	0.0	0.0	0.0	347.400	348.500	0.0
GR	10.000	720.000	350.000	0.0	899.900	347.400	0.0	925.900	348.000	0.0
ET	926.000	348.000	343.200	1000.000	348.500	343.700	1074.000	349.000	344.200	1074.100
BT	349.000	0.0	1100.000	349.300	0.0	1100.100	348.800	0.0	1200.000	350.000
BT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GR	350.000	720.000	347.400	899.900	347.900	900.000	337.100	925.900	337.000	926.000
GR	319.700	973.000	343.500	973.100	343.600	976.400	318.200	976.500	318.700	1000.000
GR	319.400	1010.000	319.800	1012.500	320.800	1023.500	343.800	1023.600	343.900	1026.000
GR	320.900	1027.000	339.000	1074.000	339.100	1074.100	348.700	1100.000	348.800	1100.100
GP	350.000	1200.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ET	0.0	987.000	1030.000	0.0	0.0	0.0	0.0	0.0	2.100	0.0
XI	1.308	13.000	987.000	1013.000	90.000	115.000	106.000	0.0	0.0	0.0
GR	346.000	897.000	319.700	987.000	318.100	993.000	318.200	1000.000	319.100	1010.000
GR	319.700	1013.000	320.800	1021.000	322.100	1025.000	322.100	1048.000	337.400	1080.000
GR	340.000	1140.000	345.000	1150.000	350.000	1265.000	0.0	0.0	0.0	0.0
NC	0.070	0.070	0.040	0.100	0.300	0.0	0.0	0.0	0.0	0.0
ET	0.0	830.000	1190.000	0.0	0.0	0.0	0.0	0.0	2.100	0.0
XI	1.464	15.000	983.000	1017.000	950.000	775.000	824.000	0.0	0.0	0.0

XI	1.484	15.000	983.000	1017.000	990.000	775.000	824.000	0.0	0.0	0.0
GR	350.000	290.000	340.000	312.000	335.000	320.000	330.000	335.000	325.000	435.000
GR	320.000	983.000	319.000	990.000	318.800	1000.000	319.000	1010.000	320.100	1017.000
GR	325.000	1392.000	330.000	1402.000	335.000	1410.000	340.000	1430.000	350.000	1470.000
NC	0.055	0.070	0.040	0.100	0.300	0.0	0.0	0.0	0.0	0.0
ET	0.0	992.000	1250.000	0.0	0.0	0.0	0.0	0.0	2.100	0.0
XI	1.628	21.000	992.000	1008.000	1010.000	680.000	866.000	0.0	0.0	0.0
GR	350.000	230.000	345.000	250.000	340.000	300.000	340.500	420.000	330.000	580.000
GR	335.000	820.000	332.000	905.000	331.900	959.000	323.500	980.000	322.700	992.000
GR	322.600	995.000	322.300	1000.000	322.400	1006.000	322.700	1008.000	326.100	1016.000
GR	326.100	1540.000	330.000	1572.000	335.000	1597.000	340.000	1619.000	345.000	1650.000
GR	350.000	1730.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NC	0.055	0.065	0.040	0.100	0.300	0.0	0.0	0.0	0.0	0.0
ET	0.0	1800.000	2100.000	0.0	0.0	0.0	0.0	0.0	2.100	0.0
XI	1.902	13.000	1550.000	2010.000	590.000	892.000	1447.000	0.0	0.8	0.0
GR	350.000	245.000	345.000	272.000	340.000	300.000	335.000	390.000	335.000	935.000
GR	330.000	1372.000	326.500	1990.000	326.000	1995.000	325.800	2000.000	326.000	2005.000
GR	326.500	2010.000	330.000	2070.000	350.000	2100.000	0.0	0.0	0.0	0.0
NC	0.080	0.080	0.060	0.100	0.300	0.0	0.0	0.0	0.0	0.0
ET	0.0	1750.000	2020.000	0.0	0.0	0.0	0.0	0.0	2.100	0.0
XI	2.034	22.000	1987.000	2013.000	690.000	280.000	697.500	0.0	0.0	0.0
GR	350.000	117.000	345.000	130.000	342.000	155.000	342.000	242.000	340.000	275.000
GR	335.000	410.000	340.000	1450.000	337.700	1650.000	335.000	1672.000	331.500	1680.000
GR	331.000	1830.000	334.000	1984.000	330.400	1987.000	328.500	1990.000	328.500	2000.000
GR	328.500	2011.000	330.400	2013.000	332.600	2015.000	333.200	2029.000	335.000	2037.000
GR	339.500	2087.000	355.000	2120.000	0.0	0.0	0.0	0.0	0.0	0.0
NC	0.100	0.070	0.060	0.100	0.300	0.0	0.0	0.0	0.0	0.0
ET	0.0	409.000	2022.000	0.0	0.0	0.0	0.0	0.0	2.100	0.0
XI	2.043	21.000	1984.100	2015.900	50.000	50.000	50.000	0.0	0.0	0.0
X3	10.000	0.0	0.0	0.0	0.0	0.0	0.0	333.700	335.300	0.0
GR	340.000	375.000	335.000	415.000	335.000	450.000	335.000	500.000	338.200	1000.000
GR	340.000	1450.000	335.000	1672.000	333.700	1832.000	334.600	1932.000	334.700	1984.000
GR	329.200	1984.100	328.600	1994.000	329.300	2000.000	330.600	2007.000	331.000	2015.900
GR	339.300	2016.000	337.700	2050.000	340.200	2120.000	340.300	2135.000	34[illegible]	2160.000
GR	350.000	2170.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SB	0.0	1.900	2.400	0.0	32.000	0.0	163.200	0.0	328.800	328.800
ET	0.0	403.000	2016.000	0.0	0.0	0.0	0.0	0.0	2.100	0.0
XI	2.046	0.0	0.0	0.0	15.000	15.000	15.000	0.0	0.0	0.0
X2	0.0	0.0	1.000	335.300	333.700	0.0	0.0	0.0	0.0	0.0
X3	10.000	0.0	0.0	0.0	0.0	0.0	0.0	333.700	337.600	0.0
BT	17.000	375.000	340.000	0.0	415.000	335.000	0.0	450.000	335.000	0.0
BT	500.000	335.000	0.0	1450.000	340.000	0.0	1672.000	335.000	0.0	1832.000
BT	333.700	0.0	1932.000	334.600	0.0	1984.000	337.100	0.0	1984.100	337.800
BT	334.700	2000.000	338.000	335.000	2015.900	338.300	335.300	2016.000	337.600	0.0
BT	2050.000	337.700	0.0	2120.000	340.200	0.0	2135.000	340.300	0.0	2170.000
BT	350.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NC	0.100	0.080	0.060	0.100	0.300	0.0	0.0	0.0	0.0	0.0
ET	0.0	1120.000	2030.000	0.0	0.0	0.0	0.0	0.0	2.100	0.0
XI	2.055	14.000	1985.000	2015.000	50.000	50.000	50.000	0.0	0.0	0.0
GR	350.000	530.000	345.000	550.000	340.000	565.000	335.000	585.000	330.000	1695.000
GR	330.400	1985.000	329.300	1995.000	329.300	2000.000	329.300	2005.000	330.400	2015.000
GR	335.000	2185.000	340.000	2200.000	345.000	2225.000	350.000	2250.000	0.0	0.0
NC	0.080	0.080	0.060	0.100	0.300	0.0	0.0	0.0	0.0	0.0
ET	0.0	1920.000	2180.000	0.0	0.0	0.0	0.0	0.0	2.100	0.0

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	SECNO	XLCH	ELTRO	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	TOPWID	STCHL	STCHR	VCH
	1.200	697.00	0.0	0.0	313.80	1160.00	322.41	0.0	322.55	144.83	985.00	1015.00	3.48
	1.200	697.00	0.0	0.0	313.80	2040.00	323.84	0.0	324.04	152.93	985.00	1015.00	4.47
	1.200	697.00	0.0	0.0	313.80	2520.00	324.47	0.0	324.70	156.24	985.00	1015.00	4.89
	1.200	697.00	0.0	0.0	313.80	3780.00	325.91	0.0	326.22	163.99	985.00	1015.00	5.76
	1.272	380.00	0.0	0.0	317.60	1160.00	322.77	0.0	323.09	78.64	980.00	1035.00	4.60
	1.272	380.00	0.0	0.0	317.60	2040.00	324.22	0.0	324.74	80.33	980.00	1035.00	5.92
	1.272	380.00	0.0	0.0	317.60	2520.00	324.84	0.0	325.47	84.07	980.00	1035.00	6.53
	1.272	380.00	0.0	0.0	317.60	3780.00	326.25	0.0	327.10	95.53	980.00	1035.00	7.73
	1.281	50.00	0.0	0.0	317.50	1160.00	322.76	0.0	323.48	36.00	976.50	1012.50	6.80
	1.281	50.00	0.0	0.0	317.50	2040.00	324.02	0.0	325.40	36.00	976.50	1012.50	9.44
	1.281	50.00	0.0	0.0	317.50	2520.00	324.51	0.0	326.31	36.00	976.50	1012.50	10.78
	1.281	50.00	0.0	0.0	317.50	3780.00	325.42	0.0	328.55	36.00	976.50	1012.50	14.18
	1.288	68.50	347.40	344.20	318.20	1160.00	323.01	0.0	323.88	36.00	976.50	1012.50	7.46
	1.288	68.50	347.40	344.20	318.20	2040.00	324.71	0.0	326.09	36.00	976.50	1012.50	9.42
	1.288	68.50	347.40	344.20	318.20	2520.00	325.56	0.0	327.18	36.00	976.50	1012.50	10.19
	1.288	68.50	347.40	344.20	318.20	3780.00	328.06	0.0	330.01	36.00	976.50	1012.50	11.21
	1.308	106.00	0.0	0.0	318.10	1160.00	324.10	0.0	324.53	80.24	987.00	1013.00	5.96
	1.308	106.00	0.0	0.0	318.10	2040.00	326.36	0.0	326.79	92.72	987.00	1013.00	6.27
	1.308	106.00	0.0	0.0	318.10	2520.00	327.48	0.0	327.91	98.90	987.00	1013.00	6.35
	1.308	106.00	0.0	0.0	318.10	3780.00	330.35	0.0	330.75	114.72	987.00	1013.00	6.35
	1.464	824.00	0.0	0.0	318.80	1160.00	324.86	0.0	324.87	930.70	983.00	1017.00	1.32
	1.464	824.00	0.0	0.0	318.80	2040.00	326.97	0.0	326.98	1000.46	983.00	1017.00	1.09
	1.464	824.00	0.0	0.0	318.80	2520.00	328.06	0.0	328.06	1024.31	983.00	1017.00	1.03
	1.464	824.00	0.0	0.0	318.80	3780.00	330.85	0.0	330.86	1070.93	983.00	1017.00	0.95
*	1.628	866.00	0.0	0.0	322.30	1160.00	326.76	326.76	327.13	573.56	992.00	1008.00	6.99
*	1.628	866.00	0.0	0.0	322.30	2040.00	327.13	327.13	327.60	577.52	992.00	1008.00	8.71
	1.628	866.00	0.0	0.0	322.30	2520.00	328.07	0.0	328.21	587.57	992.00	1008.00	5.62
	1.628	866.00	0.0	0.0	322.30	3780.00	330.88	0.0	330.92	670.79	992.00	1008.00	3.00
	1.902	1447.00	0.0	0.0	325.80	1160.00	329.31	0.0	329.36	565.43	1990.00	2010.00	3.04
	1.902	1447.00	0.0	0.0	325.80	2040.00	330.00	0.0	330.06	698.13	1990.00	2010.00	3.54
	1.902	1447.00	0.0	0.0	325.80	2520.00	330.03	0.0	330.11	699.58	1990.00	2010.00	4.31
	1.902	1447.00	0.0	0.0	325.80	3780.00	331.31	0.0	331.36	814.65	1990.00	2010.00	3.25
*	2.034	697.50	0.0	0.0	328.50	1160.00	332.26	332.26	332.82	245.82	1987.00	2013.00	7.50
*	2.034	697.50	0.0	0.0	328.50	2040.00	332.78	332.78	333.45	278.76	1987.00	2013.00	9.12
*	2.034	697.50	0.0	0.0	328.50	2520.00	333.02	333.02	333.78	297.01	1987.00	2013.00	9.74
*	2.034	697.50	0.0	0.0	328.50	3780.00	333.57	333.57	334.42	333.05	1987.00	2013.00	10.76
*	2.043	50.00	0.0	0.0	328.60	1160.00	333.11	333.11	334.86	31.80	1984.10	2015.90	10.62
*	2.043	50.00	0.0	0.0	328.60	2040.00	335.49	335.49	336.13	533.29	1984.10	2015.90	7.67
*	2.043	50.00	0.0	0.0	328.60	2520.00	335.76	335.76	336.41	593.29	1984.10	2015.90	8.10
*	2.043	50.00	0.0	0.0	328.60	3780.00	336.19	336.19	336.96	690.73	1984.10	2015.90	9.50
	2.046	15.00	333.70	335.30	328.60	1160.00	334.43	333.11	335.23	201.17	1984.10	2015.90	7.36
	2.046	15.00	333.70	335.30	328.60	2040.00	336.19	0.0	336.31	676.82	1984.10	2015.90	4.17
	2.046	15.00	333.70	335.30	328.60	2520.00	336.47	0.0	336.59	735.16	1984.10	2015.90	4.25
	2.046	15.00	333.70	335.30	328.60	3780.00	337.06	0.0	337.17	857.10	1984.10	2015.90	4.36

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SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	TOPWID	STCHL	STCHR	VCH
0.600	697.00	0.0	0.0	287.00	2720.00	295.64	0.0	295.66	784.66	1980.00	2020.00	1.75
0.600	697.00	0.0	0.0	287.00	2720.00	296.44	0.0	296.47	360.00	1980.00	2020.00	2.16
0.734	697.00	0.0	0.0	288.60	2720.00	295.55	0.0	295.93	111.64	980.00	1020.00	5.70
0.734	697.00	0.0	0.0	288.60	2720.00	296.45	0.0	296.73	110.00	980.00	1020.00	4.89
0.738	25.00	0.0	0.0	288.40	2720.00	295.66	0.0	295.99	84.50	960.50	1045.00	4.62
0.738	25.00	0.0	0.0	288.40	2720.00	296.50	0.0	296.77	84.00	960.50	1045.00	4.15
0.751	67.00	314.40	311.80	289.10	2720.00	295.71	0.0	296.12	84.50	960.50	1045.00	5.13
0.751	67.00	314.40	311.80	289.10	2720.00	296.54	0.0	296.86	84.00	960.50	1045.00	4.56
0.760	50.00	0.0	0.0	289.80	2720.00	295.67	0.0	296.36	95.27	974.00	1026.00	7.17
0.760	50.00	0.0	0.0	289.80	2720.00	296.48	0.0	297.06	80.00	974.00	1026.00	6.50
0.771	60.00	0.0	0.0	289.60	2720.00	296.41	0.0	296.63	128.28	885.10	1114.90	3.77
0.771	60.00	0.0	0.0	289.60	2720.00	297.10	0.0	297.27	129.00	885.10	1114.90	3.36
0.784	67.00	315.90	312.60	290.20	2720.00	296.41	0.0	296.67	128.93	885.10	1114.90	4.05
0.784	67.00	315.90	312.60	290.20	2720.00	297.10	0.0	297.29	129.00	885.10	1114.90	3.58
0.793	50.00	0.0	0.0	289.80	2720.00	296.34	0.0	296.86	97.96	974.00	1026.00	6.28
0.793	50.00	0.0	0.0	289.80	2720.00	296.97	0.0	297.46	80.00	974.00	1026.00	6.00
0.800	35.00	0.0	0.0	290.40	2700.00	295.96	0.0	297.29	76.26	975.00	1025.00	9.60
0.800	35.00	0.0	0.0	290.40	2700.00	296.80	0.0	297.73	75.00	975.00	1025.00	8.05
0.900	530.00	0.0	0.0	292.20	2520.00	299.32	0.0	299.86	88.25	970.00	1025.00	6.12
0.900	530.00	0.0	0.0	292.20	2520.00	299.55	0.0	300.24	55.00	970.00	1025.00	6.65
1.031	690.00	0.0	0.0	296.40	2520.00	302.06	301.98	303.94	74.94	984.00	1016.00	12.06
1.031	690.00	0.0	0.0	296.40	2520.00	303.01	0.0	304.58	50.00	984.00	1016.00	10.73
1.043	63.40	0.0	0.0	296.20	2520.00	304.08	0.0	304.28	106.65	965.00	1059.00	3.55
1.043	63.40	0.0	0.0	296.20	2520.00	304.68	0.0	304.85	107.00	965.00	1059.00	3.27
1.044	5.00	319.20	315.50	314.50	2520.00	323.78	0.0	323.94	128.50	944.00	1059.00	3.15
1.044	5.00	319.20	315.50	314.50	2520.00	323.78	0.0	323.93	128.00	944.00	1059.00	3.15
1.050	27.00	0.0	0.0	314.50	2520.00	323.68	0.0	323.96	175.15	920.00	1060.00	2.17
1.050	27.00	0.0	0.0	314.50	2520.00	323.67	0.0	323.95	140.00	920.00	1060.00	2.21
1.057	35.00	0.0	0.0	314.40	2520.00	323.83	0.0	324.04	86.26	932.00	1036.40	3.64
1.057	35.00	0.0	0.0	314.40	2520.00	323.83	0.0	324.03	86.25	932.00	1036.40	3.64
1.059	13.00	355.60	346.60	314.40	2520.00	323.92	0.0	324.12	86.26	932.00	1036.40	3.60
1.059	13.00	355.60	346.60	314.40	2520.00	323.91	0.0	324.11	86.26	932.00	1036.40	3.60
1.068	50.00	0.0	0.0	314.40	2520.00	323.97	0.0	324.16	101.82	960.00	1050.00	3.46
1.068	50.00	0.0	0.0	314.40	2520.00	323.96	0.0	324.15	90.00	960.00	1050.00	3.51
1.200	697.00	0.0	0.0	313.80	2520.00	324.47	0.0	324.70	156.24	985.00	1015.00	4.89
1.200	697.00	0.0	0.0	313.80	2520.00	324.44	0.0	325.00	70.00	985.00	1015.00	6.68
1.272	380.00	0.0	0.0	317.60	2520.00	324.84	0.0	325.47	84.07	980.00	1035.00	6.53
1.272	380.00	0.0	0.0	317.60	2520.00	325.39	0.0	326.05	55.00	980.00	1035.00	6.49

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FALL RIVER TYPE1 SUMMARY

	SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CRIWS	EG	TOPWID	STCHL	STCHR	VCH
	1.281	50.00	0.0	0.0	317.50	2520.00	324.51	0.0	326.31	36.00	976.50	1012.50	10.78
	1.281	50.00	0.0	0.0	317.50	2520.00	325.23	0.0	326.73	35.50	976.50	1012.50	9.81
	1.288	68.50	347.40	344.20	318.20	2520.00	325.56	0.0	327.18	36.00	976.50	1012.50	10.19
	1.288	68.50	347.40	344.20	318.20	2520.00	325.91	0.0	327.41	35.50	976.50	1012.50	9.81
	1.308	106.00	0.0	0.0	318.10	2520.00	327.48	0.0	327.91	98.50	987.00	1013.00	6.35
	1.308	106.00	0.0	0.0	318.10	2520.00	327.71	0.0	328.10	98.00	987.00	1013.00	6.11
	1.464	824.00	0.0	0.0	318.80	2520.00	328.06	0.0	328.06	1024.31	983.00	1017.00	1.03
	1.464	824.00	0.0	0.0	318.80	2520.00	328.32	0.0	328.33	450.00	983.00	1017.00	1.48
	1.628	866.00	0.0	0.0	322.30	2520.00	328.07	0.0	328.21	587.57	992.00	1008.00	5.62
*	1.628	866.00	0.0	0.0	322.30	2520.00	328.03	328.03	328.95	208.00	992.00	1008.00	11.22
	1.902	1447.00	0.0	0.0	325.80	2520.00	330.03	0.0	330.11	699.98	1990.00	2010.00	4.31
	1.902	1447.00	0.0	0.0	325.80	2520.00	330.94	0.0	331.00	400.00	1990.00	2010.00	3.06
*	2.034	697.50	0.0	0.0	328.50	2520.00	333.02	333.02	333.78	297.01	1987.00	2013.00	9.74
*	2.034	697.50	0.0	0.0	328.50	2520.00	333.40	333.40	334.24	238.44	1987.00	2013.00	9.86
*	2.043	50.00	0.0	0.0	328.60	2520.00	335.76	335.76	336.41	593.29	1984.10	2015.90	8.10
*	2.043	50.00	0.0	0.0	328.60	2520.00	335.71	335.71	336.41	583.39	1984.10	2015.90	8.32
	2.046	15.00	333.70	335.30	328.60	2520.00	336.47	0.0	336.59	735.16	1984.10	2015.90	4.29
	2.046	15.00	333.70	335.30	328.60	2520.00	336.48	0.0	336.60	736.78	1984.10	2015.90	4.22
	2.055	50.00	0.0	0.0	329.30	2520.00	336.61	0.0	336.61	1611.28	1985.00	2015.00	0.71
	2.055	50.00	0.0	0.0	329.30	2520.00	336.65	0.0	336.68	315.00	1985.00	2015.00	1.83
*	2.246	1008.00	0.0	0.0	333.10	2520.00	338.48	338.48	338.88	936.86	1987.00	2013.00	7.60
*	2.246	1008.00	0.0	0.0	333.10	2520.00	339.06	339.06	339.87	260.00	1987.00	2013.00	9.26
	2.369	649.00	0.0	0.0	334.30	2520.00	340.04	0.0	340.08	444.69	1987.00	2013.00	2.43
	2.369	649.00	0.0	0.0	334.30	2520.00	340.82	0.0	340.86	300.00	1987.00	2013.00	2.14
*	2.515	771.00	0.0	0.0	335.70	2520.00	341.61	341.61	342.43	401.97	2988.00	3012.00	9.79
*	2.515	771.00	0.0	0.0	335.70	2520.00	341.76	341.76	343.33	110.00	2988.00	3012.00	12.06
	2.613	517.00	0.0	0.0	338.00	2520.00	344.22	0.0	344.33	574.78	980.00	1020.00	4.05
	2.613	517.00	0.0	0.0	338.00	2520.00	345.11	0.0	345.26	200.00	980.00	1020.00	4.13
	2.778	871.00	0.0	0.0	342.00	2520.00	346.73	0.0	347.29	557.94	988.00	1012.00	9.20
	2.778	871.00	0.0	0.0	342.00	2520.00	347.20	0.0	348.17	200.00	988.00	1012.00	10.66
	2.962	972.00	0.0	0.0	345.20	2520.00	353.23	0.0	354.11	69.55	984.00	1016.00	8.19
	2.962	972.00	0.0	0.0	345.20	2520.00	353.65	0.0	354.41	70.00	984.00	1016.00	7.67
	2.972	55.00	0.0	0.0	345.90	2520.00	354.07	0.0	354.42	85.22	953.00	1047.00	4.72
	2.972	55.00	0.0	0.0	345.90	2520.00	354.35	0.0	354.67	86.00	953.00	1047.00	4.52
	2.977	28.00	361.80	362.00	345.90	2520.00	354.16	0.0	354.50	85.57	953.00	1047.00	4.66
	2.977	28.00	361.80	362.00	345.90	2520.00	354.43	0.0	354.74	86.00	953.00	1047.00	4.47
	2.987	60.00	0.0	0.0	346.00	2520.00	354.53	0.0	354.55	655.02	975.00	1110.00	1.31
	2.987	60.00	0.0	0.0	346.00	2520.00	354.76	0.0	354.78	450.00	975.00	1110.00	1.30

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Proposal No. 612159-136484

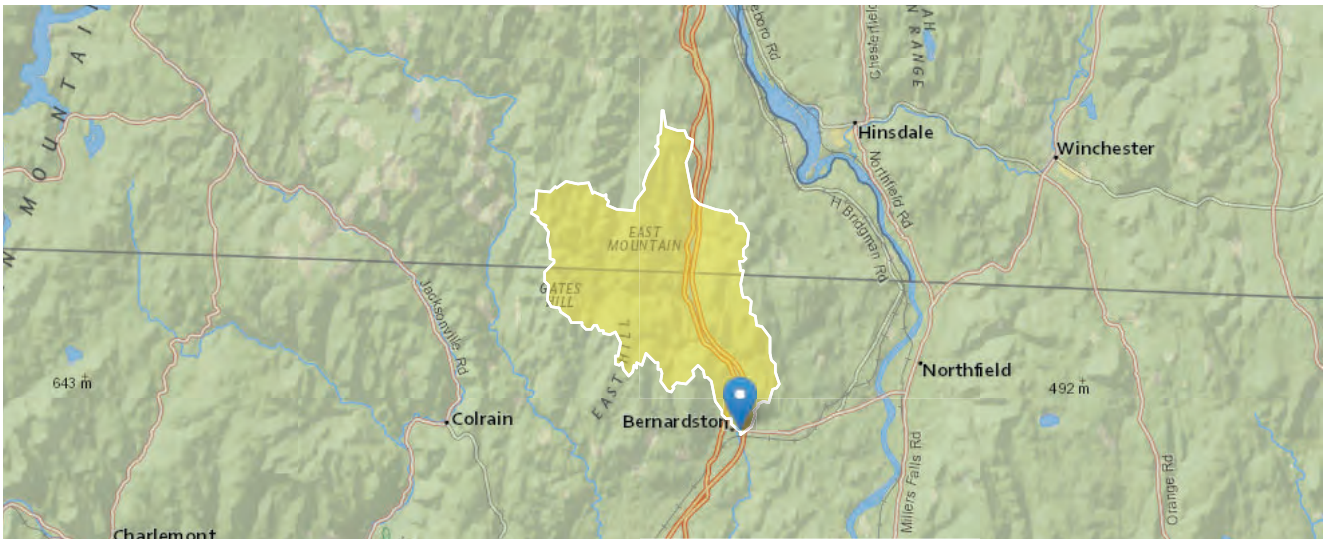
7.2 Hydrologic Analyses

7.2.1 Drainage Area Using USGS Streamstats
7.2.2 USGS Gauging Station Data for Gauge No. 01167200
7.2.3 Hydrologic Calculations

7.2.1

StreamStats Report - Church Street (State Route 10) Bernardston, MA

Region ID: MA
Workspace ID: MA20230118190053400000
Clicked Point (Latitude, Longitude): 42.67071, -72.54616
Time: 2023-01-18 14:01:15 -0500



Collapse All

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
BSLDEM10M	Mean basin slope computed from 10 m DEM	16.53	percent
DRNAREA	Area that drains to a point on a stream	25.7	square miles
ELEV	Mean Basin Elevation	856	feet
LC06STOR	Percentage of water bodies and wetlands determined from the NLCD 2006	1.73	percent

Peak-Flow Statistics

Peak-Flow Statistics Parameters [Peak Statewide 2016 5156]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	25.7	square miles	0.16	512
ELEV	Mean Basin Elevation	856	feet	80.6	1948
LC06STOR	Percent Storage from NLCD2006	1.73	percent	0	32.3

Peak-Flow Statistics Flow Report [Peak Statewide 2016 5156]

PII: Prediction Interval-Lower, Plu: Prediction Interval-Upper, ASEp: Average Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	PII	Plu	ASEp
50-percent AEP flood	784	ft^3/s	397	1550	42.3
20-percent AEP flood	1290	ft^3/s	645	2580	43.4
10-percent AEP flood	1700	ft^3/s	830	3480	44.7
4-percent AEP flood	2300	ft^3/s	1080	4880	47.1
2-percent AEP flood	2800	ft^3/s	1280	6140	49.4

Statistic	Value	Unit	PII	Plu	ASEp
1-percent AEP flood	3340	ft^3/s	1480	7560	51.8
0.5-percent AEP flood	3940	ft^3/s	1690	9190	54.1
0.2-percent AEP flood	4800	ft^3/s	1960	11700	57.6

Peak-Flow Statistics Citations

Zarriello, P.J.,2017, Magnitude of flood flows at selected annual exceedance probabilities for streams in Massachusetts: U.S. Geological Survey Scientific Investigations Report 2016–5156, 99 p. (https://dx.doi.org/10.3133/sir20165156)

Bankfull Statistics

Bankfull Statistics Parameters [Bankfull Statewide SIR2013 5155]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	25.7	square miles	0.6	329
BSLDEM10M	Mean Basin Slope from 10m DEM	16.53	percent	2.2	23.9

Bankfull Statistics Parameters [Appalachian Highlands D Bieger 2015]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	25.7	square miles	0.07722	940.1535

Bankfull Statistics Parameters [New England P Bieger 2015]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	25.7	square miles	3.799224	138.999861

Bankfull Statistics Parameters [USA Bieger 2015]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	25.7	square miles	0.07722	59927.7393

Bankfull Statistics Flow Report [Bankfull Statewide SIR2013 5155]

PII: Prediction Interval-Lower, Plu: Prediction Interval-Upper, ASEp: Average Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	ASEp
Bankfull Width	62.5	ft	21.3
Bankfull Depth	2.71	ft	19.8
Bankfull Area	169	ft^2	29
Bankfull Streamflow	819	ft^3/s	55

Bankfull Statistics Flow Report [Appalachian Highlands D Bieger 2015]

Statistic	Value	Unit
Bieger_D_channel_width	58.5	ft
Bieger_D_channel_depth	2.85	ft
Bieger_D_channel_cross_sectional_area	170	ft^2

Bankfull Statistics Flow Report [New England P Bieger 2015]

Statistic	Value	Unit
Bieger_P_channel_width	62.7	ft
Bieger_P_channel_depth	2.81	ft
Bieger_P_channel_cross_sectional_area	181	ft^2

Bankfull Statistics Flow Report [USA Bieger 2015]

Statistic	Value	Unit
Bieger_USA_channel_width	38.8	ft
Bieger_USA_channel_depth	2.41	ft
Bieger_USA_channel_cross_sectional_area	98.6	ft^2

Bankfull Statistics Flow Report [Area-Averaged]

PII: Prediction Interval-Lower, Plu: Prediction Interval-Upper, ASEp: Average Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	ASEp
Bankfull Width	62.5	ft	21.3
Bankfull Depth	2.71	ft	19.8
Bankfull Area	169	ft^2	29
Bankfull Streamflow	819	ft^3/s	55
Bieger_D_channel_width	58.5	ft	
Bieger_D_channel_depth	2.85	ft	
Bieger_D_channel_cross_sectional_area	170	ft^2	
Bieger_P_channel_width	62.7	ft	
Bieger_P_channel_depth	2.81	ft	
Bieger_P_channel_cross_sectional_area	181	ft^2	
Bieger_USA_channel_width	38.8	ft	
Bieger_USA_channel_depth	2.41	ft	
Bieger_USA_channel_cross_sectional_area	98.6	ft^2	

Bankfull Statistics Citations

Bent, G.C., and Waite, A.M.,2013, Equations for estimating bankfull channel geometry and discharge for streams in Massachusetts: U.S. Geological Survey Scientific Investigations Report 2013–5155, 62 p., (http://pubs.usgs.gov/sir/2013/5155/)

Bieger, Katrin; Rathjens, Hendrik; Allen, Peter M.; and Arnold, Jeffrey G.,2015, Development and Evaluation of Bankfull Hydraulic Geometry Relationships for the Physiographic Regions of the United States, Publications from USDA-ARS / UNL Faculty, 17p. (https://digitalcommons.unl.edu/usdaarsfacpub/1515?utm_source=digitalcommons.unl.edu%2Fusdaarsfacpub%2F1515&utm_medium=PDF&utm_campaign=PDFCoverPages)

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Application Version: 4.12.0
StreamStats Services Version: 1.2.22
NSS Services Version: 2.2.1

7.2.2

Click to hideNews Bulletins

- See the Water Data for the Nation Blog for the latest news and updates.

Streamflow Measurements for the Nation

USGS 01167200 FALL RIVER AT BERNARDSTON, MA

Available data for this site | Surface-water: Field measurements | GO

Franklin County, Massachusetts
Hydrologic Unit Code 01080201
Latitude 42°41'15", Longitude 72°32'43" NAD27
Drainage area 25.60 square miles

Output formats

HTML table with channel data
HTML table without channel data
Tab-separated data with channel data
Tab-separated data without channel data
Graph of data
Reselect output format

Meas. Number	Date Time	Time Datum	Measurement Used?	Who	Measuring Agency	Stream flow (ft^3/s)	Gage Height (ft)	GH Change (ft)	Meas. Duration (hr)	Meas. Rated
16	1995-08-21 15:34	EDT	Yes	LYC	USGS	1.27	10.52			Good
15	1995-08-10 11:35	EDT	Yes	PLP	USGS	4.36	10.47	0.00	0.50	Unspecified
14	1995-06-19 16:27	EDT	Yes	LYC	USGS	5.58	10.69	0.00	0.50	Good
13	1994-09-07 07:15	EDT	Yes	DM	USGS	2.20	10.41	0.00	0.50	Good
12	1994-08-11 01:17	EDT	Yes	LYC	USGS	1.92	10.74			Fair
11	1994-07-13 -- --	--	Yes	GHL	USGS	3.87	10.40			Fair
10	1993-08-25 11:06	EDT	Yes	DM	USGS	1.24	10.28	0.00	0.40	Good
9	1993-07-26 13:53	EDT	Yes	LYC/ES	USGS	1.31	10.64	0.00	0.50	Unspecified
8	1993-07-02 09:26	EDT	Yes	LYC	USGS	2.82	10.88	0.00		Unspecified
7	1973-10-02 -- --	--	Yes	?	USGS	2.20				Unspecified
6	1973-03-22 -- --	--	Yes	?	USGS	128				Unspecified
5	1972-09-27 -- --	--	Yes	?	USGS	2.50				Unspecified
4	1972-09-12 -- --	--	Yes	?	USGS	2.50				Unspecified
3	1972-04-06 -- --	--	Yes	?	USGS	89.0				Unspecified
2	1971-10-07 -- --	--	Yes	?	USGS	1.00				Unspecified

Meas. Number	Date Time	Time Datum	Measurement Used?	Who	Measuring Agency	Stream flow (ft^3/s)	Gage Height (ft)	GH Change (ft)	Meas. Duration (hr)	Meas. Rated
1	1971-09-21 -- --	--	Yes	?	USGS	5.70				Unspecified

Questions about sites/data?
Feedback on this web site
Automated retrievals
Help
Data Tips
Explanation of terms
Subscribe for system changes
News

Accessibility FOIA Privacy Policies and Notices

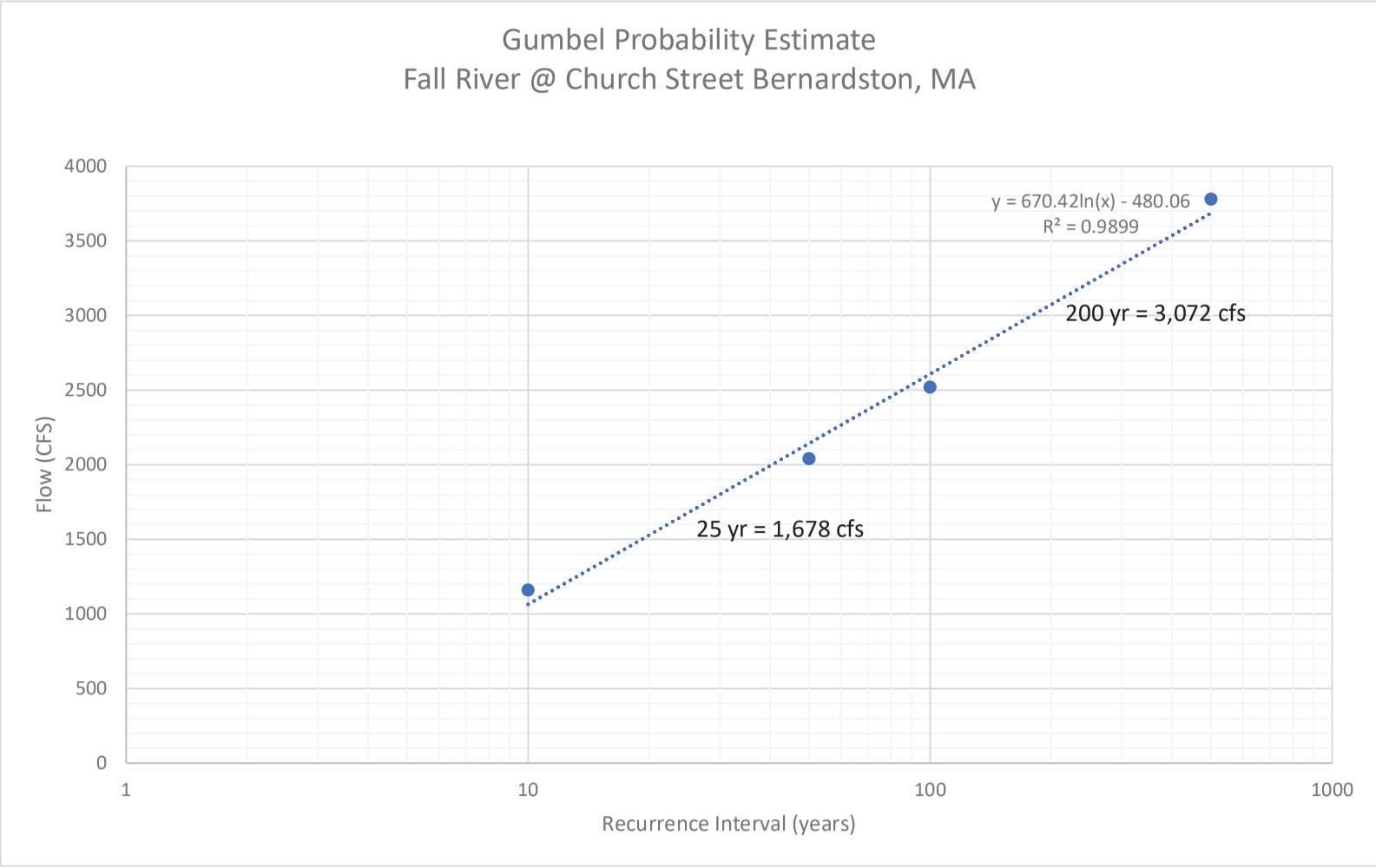
U.S. Department of the Interior | U.S. Geological Survey

Title: Surface Water for USA: Streamflow Measurements
URL: https://waterdata.usgs.gov/nwis/measurements?

Page Contact Information: Massachusetts Water Data Support Team
Page Last Modified: 2023-01-16 13:11:03 EST
0.25 0.23 caww02

Gumbel Probablity Estimate Worksheet

Flow (cfs)	Rank	Recurrance Interval (years)
3780	1	500
2520	2	100
2040	3	50
1160	4	10

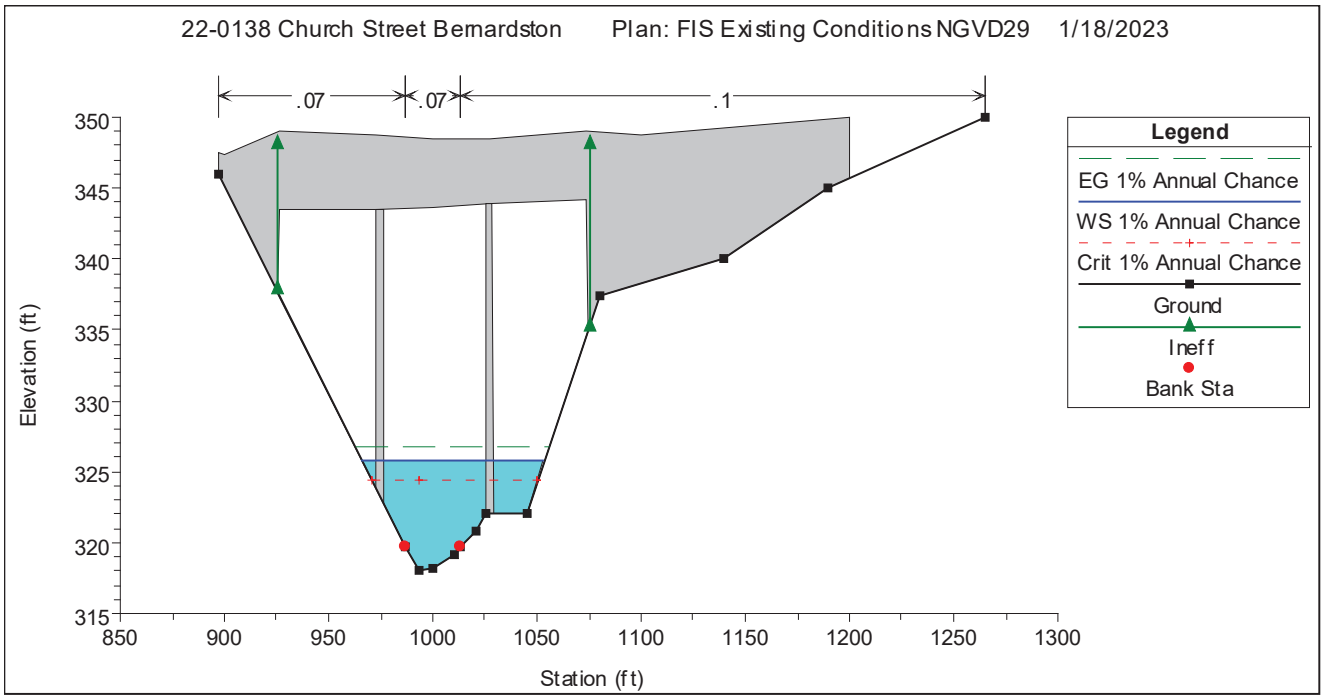


Bay Colony Group, Inc.
4 School Street
Foxborough, MA 02035

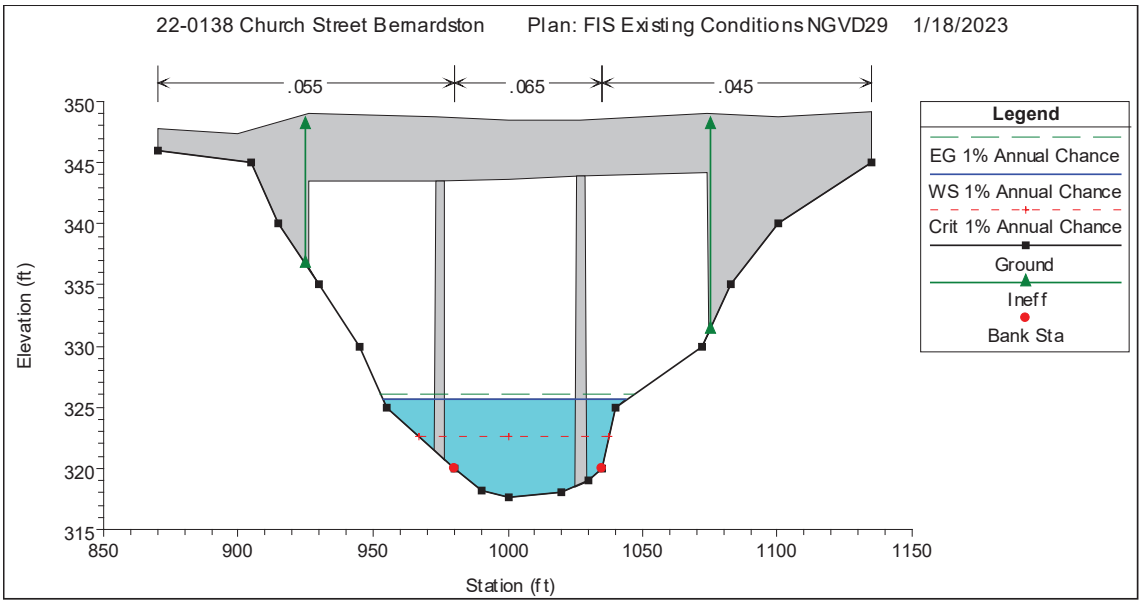
7.3 Hydraulic Analyses

7.3.1 Duplicate Effective Model Bridge Cross Section
7.3.2 Duplicate Effective Model Channel Profile
7.3.3 Duplicate Effective Model Analysis Summary Table
7.3.4 Corrected Effective/Existing Bridge Cross Sections
7.3.5 Corrected Effective/Existing Channel Profile
7.3.6 Corrected Effective/Existing Condition Analysis Summary Table
7.3.7 Proposed Bridge Cross Sections
7.3.8 Proposed Channel Profiles
7.3.9 Proposed Analysis Summary Table

7.3.1 Duplicate Effective Model Bridge Cross Section

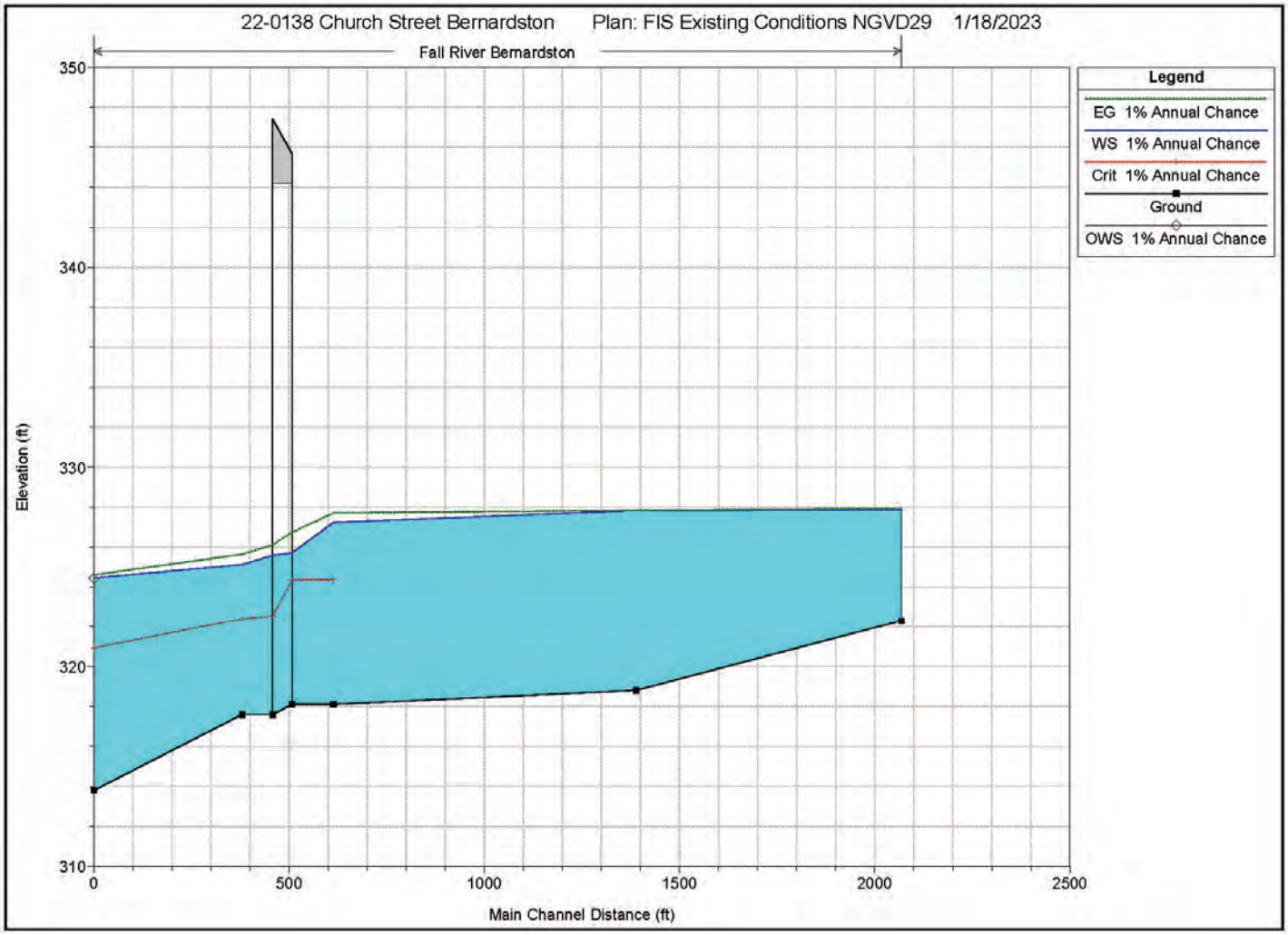


Upstream Bridge Station 1.285



Downstream Bridge Station 1.285

7.3.2 Duplicate Effective Model Channel Profile

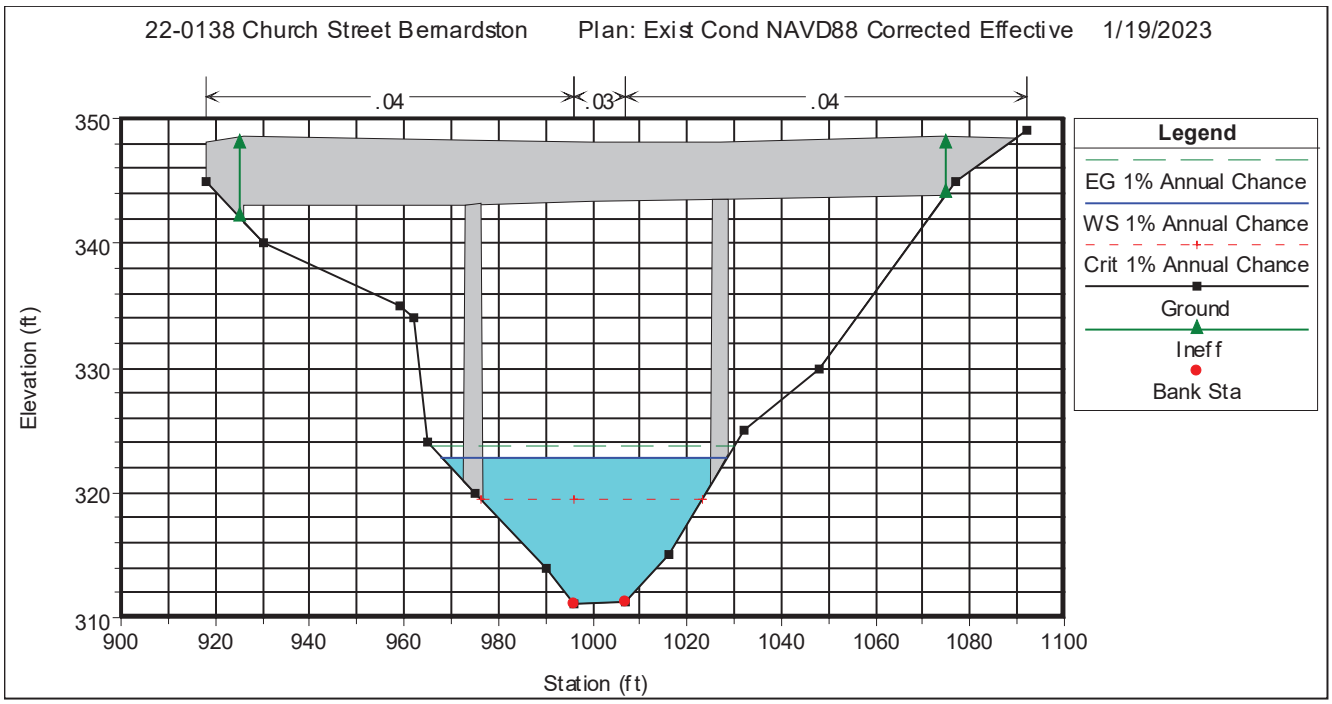


7.3.3 Duplicate Effective Analysis Summary Table

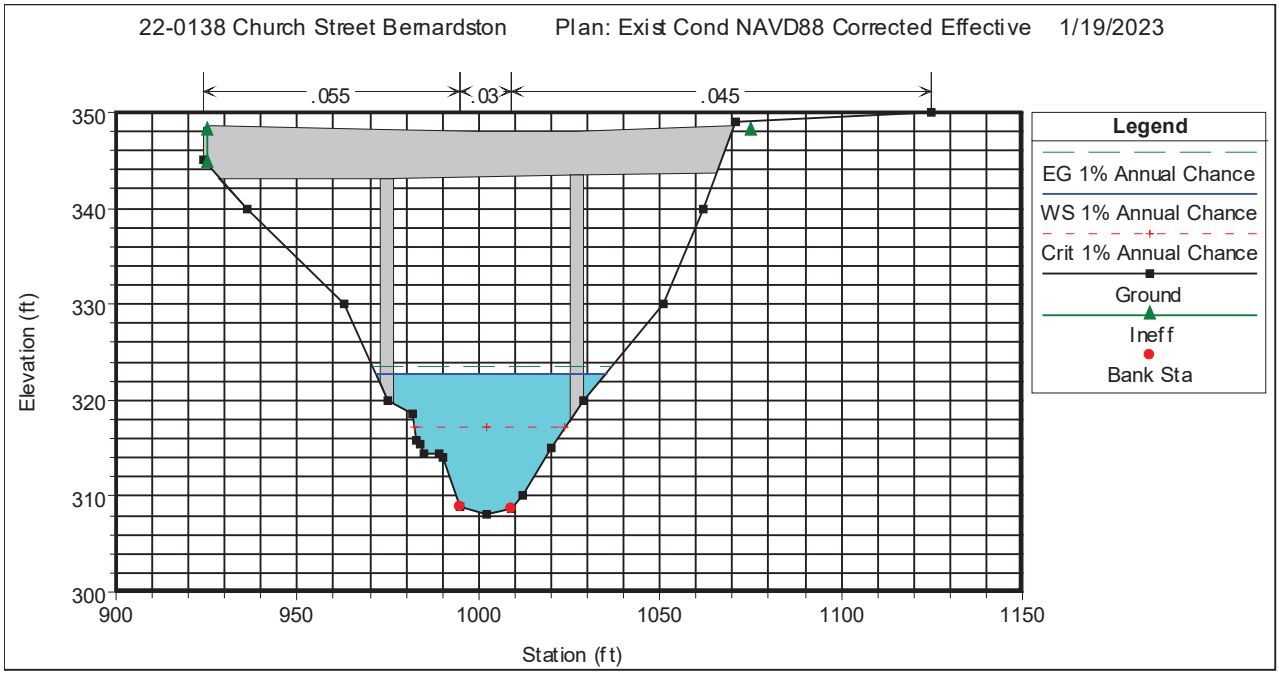
7.3.3 - Duplicate Effective Model Analysis Summary Table

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Bernardston	1.628	1% Annual Chance	2520	322.3	327.86		327.94	0.001583	2.8	1132.4	585.39	0.21
Bernardston	1.464	1% Annual Chance	2520	318.8	327.84		327.85	0.000027	0.46	5295.43	1019.51	0.03
Bernardston	1.308	1% Annual Chance	2520	318.1	327.24	324.39	327.72	0.005696	6.66	532.31	95.55	0.4
Bernardston	1.285	Bridge										
Bernardston	1.272	1% Annual Chance	2520	317.6	325.13	322.4	325.65	0.005346	5.97	452.8	86.11	0.4
Bernardston	1.2	1% Annual Chance	2520	313.8	324.47	320.93	324.62	0.001342	3.67	840.66	156.24	0.21

7.3.4 Corrected Effective/Existing Bridge Cross Sections

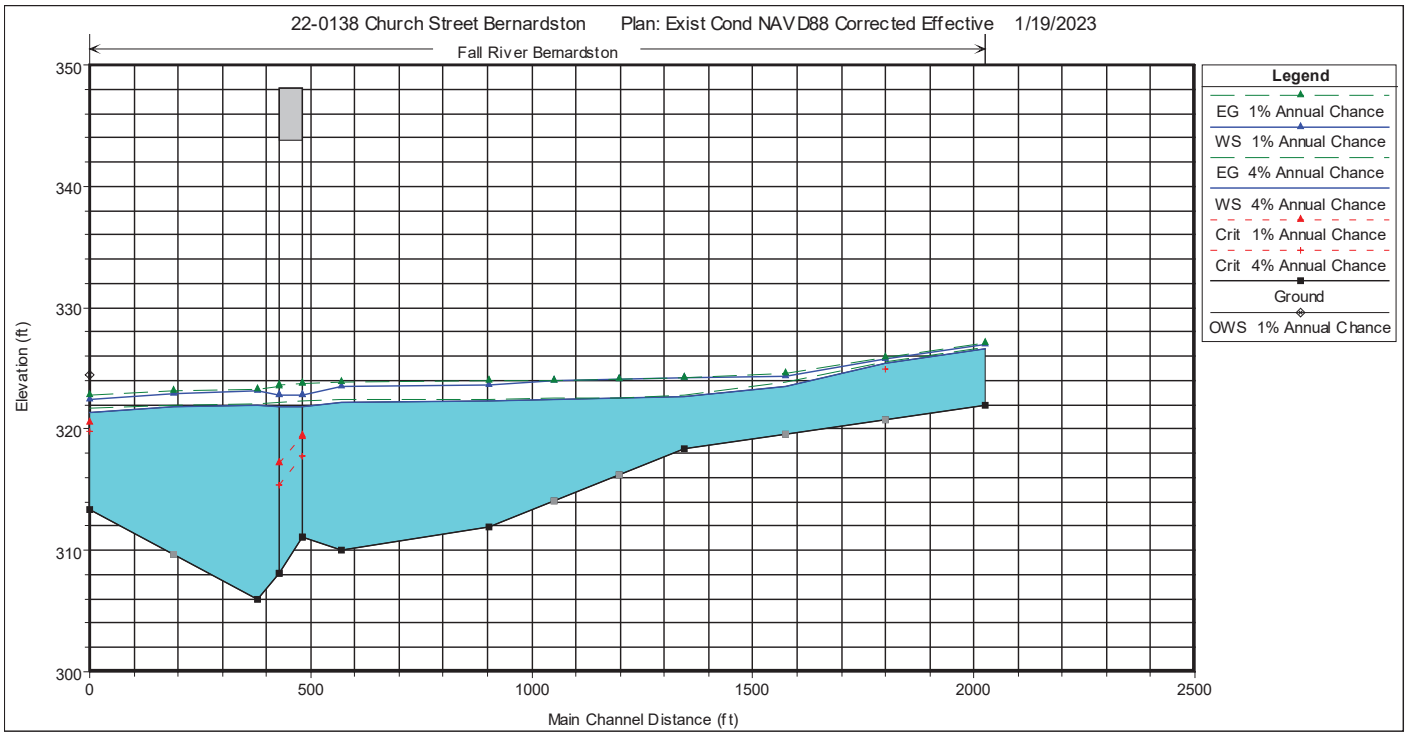


Upstream Bridge Station 1.285



Downstream Bridge Station 1.285

7.3.5 Corrected Effective/Existing Channel Profile

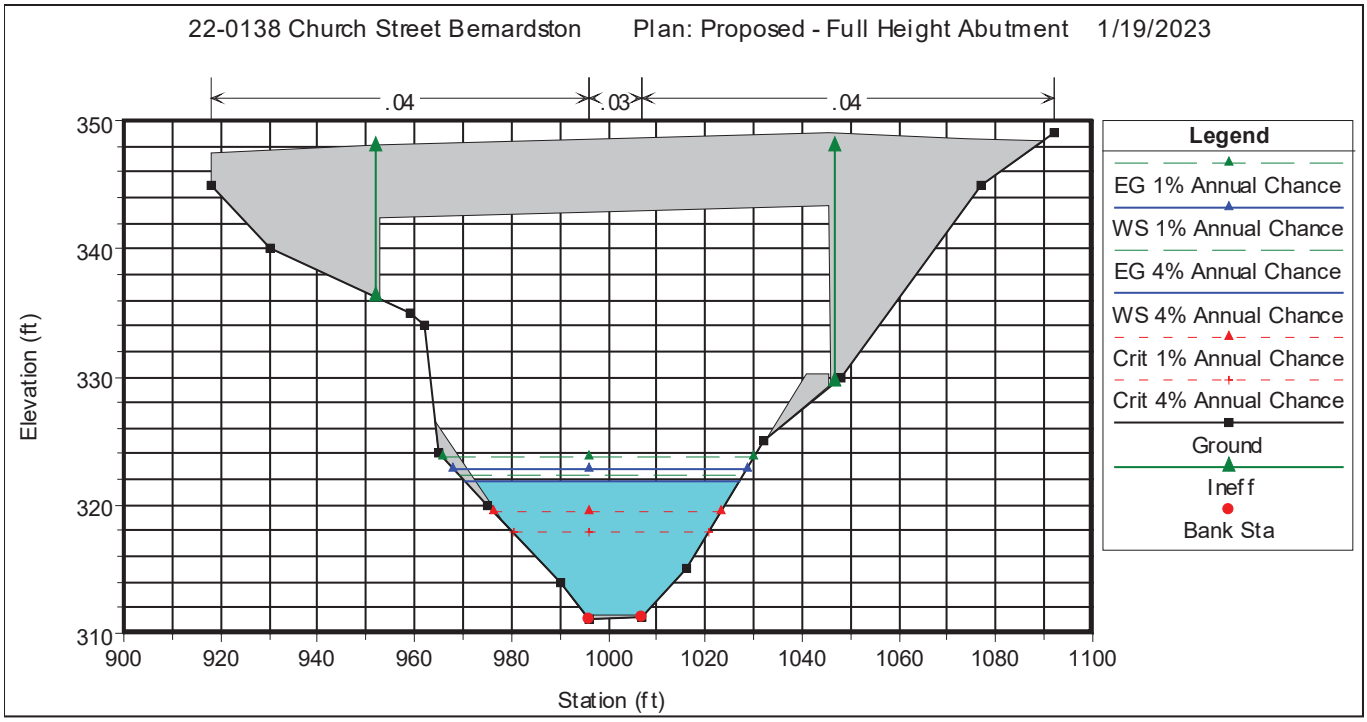


7.3.6 Corrected Effective/Existing Condition Analysis Summary Table

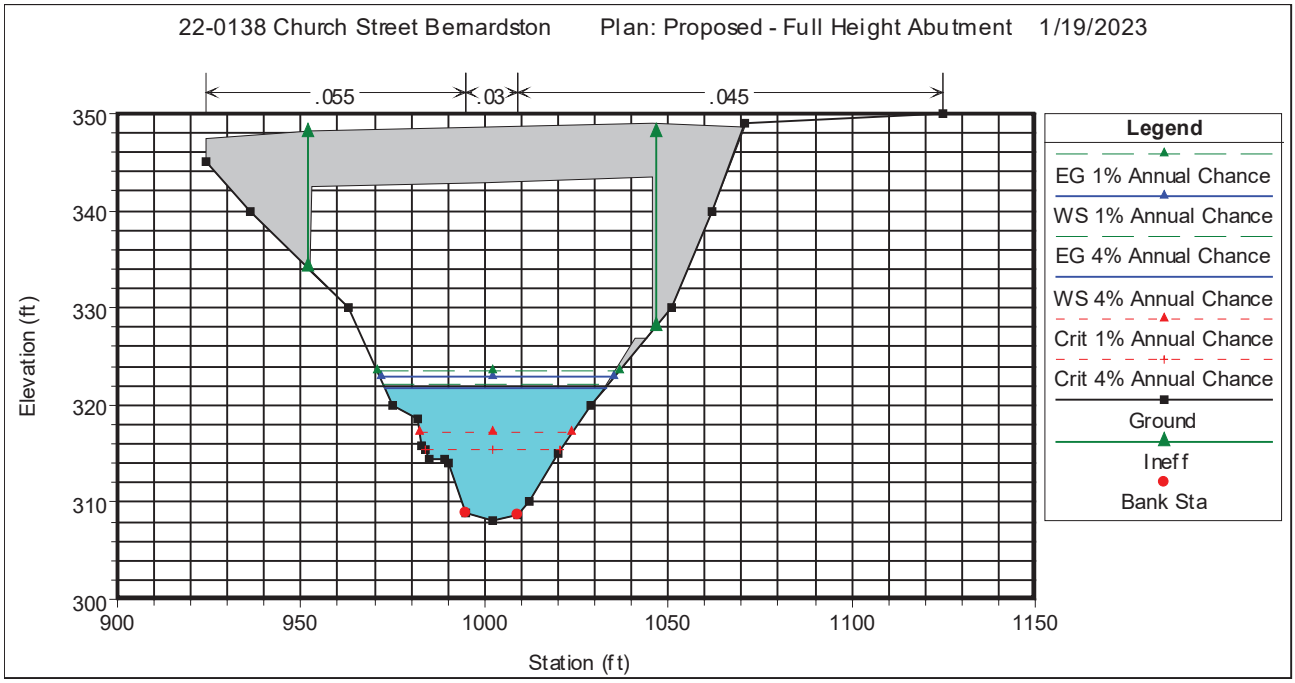
7.3.6 - Corrected Effective/Existing Condition Analysis Summary Table

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Bernardston	1.628	4% Annual Chance	1678	321.92	326.6		326.74	0.004569	4.22	621.77	575.97	0.35
Bernardston	1.628	1% Annual Chance	2520	321.92	326.97		327.12	0.004219	4.27	832.05	579.87	0.34
Bernardston	1.5733*	4% Annual Chance	1678	320.75	325.46	324.91	325.58	0.003683	3.65	647.61	515.15	0.3
Bernardston	1.5733*	1% Annual Chance	2520	320.75	325.8		325.95	0.004014	4	819.62	519.81	0.32
Bernardston	1.5187*	4% Annual Chance	1678	319.59	323.48		323.83	0.012756	5.78	371.69	298.69	0.54
Bernardston	1.5187*	1% Annual Chance	2520	319.59	324.39		324.6	0.005833	4.54	728.26	492.37	0.38
Bernardston	1.464	4% Annual Chance	1678	318.42	322.72		322.77	0.001525	2.06	1006.21	603.71	0.18
Bernardston	1.464	1% Annual Chance	2520	318.42	324.17		324.19	0.000499	1.45	2073.69	872.84	0.11
Bernardston	1.4323*	4% Annual Chance	1678	316.25	322.57		322.61	0.000563	1.99	1116.37	392.15	0.15
Bernardston	1.4323*	1% Annual Chance	2520	316.25	324.08		324.11	0.00042	2	1885.49	641.98	0.13
Bernardston	1.4007*	4% Annual Chance	1678	314.07	322.47		322.53	0.000348	2.49	977.37	226.76	0.16
Bernardston	1.4007*	1% Annual Chance	2520	314.07	323.96		324.04	0.000359	2.85	1446.39	360.96	0.17
Bernardston	1.369	4% Annual Chance	1678	311.9	322.27		322.47	0.00031	3.85	546.96	92.96	0.22
Bernardston	1.369	1% Annual Chance	2520	311.9	323.61		323.95	0.000433	4.98	686.89	109.34	0.27
Bernardston	1.308	4% Annual Chance	1678	310	322.21		322.38	0.000202	3.56	730.97	95.46	0.19
Bernardston	1.308	1% Annual Chance	2520	310	323.52		323.82	0.000306	4.71	862.08	103.5	0.23
Bernardston	1.291	4% Annual Chance	1678	311.1	321.79	317.8	322.31	0.000949	7.38	363.32	56.33	0.4
Bernardston	1.291	1% Annual Chance	2520	311.1	322.85	319.36	323.71	0.001426	9.64	425.41	60.68	0.5
Bernardston	1.285			Bridge								
Bernardston	1.281	4% Annual Chance	1678	308.1	321.81	315.41	322.21	0.000467	6.01	467.7	60.16	0.29
Bernardston	1.281	1% Annual Chance	2520	308.1	322.85	317.17	323.55	0.00077	8.12	531.66	63.68	0.38
Bernardston	1.272	4% Annual Chance	1678	306	321.97		322.02	0.000192	1.95	928.79	92.32	0.09
Bernardston	1.272	1% Annual Chance	2520	306	323.13		323.23	0.000316	2.62	1037.41	95.44	0.11
Bernardston	1.2360*	4% Annual Chance	1678	309.71	321.85		321.95	0.000662	2.93	691.31	108.04	0.15
Bernardston	1.2360*	1% Annual Chance	2520	309.71	322.96		323.12	0.000936	3.7	813.3	113.22	0.18
Bernardston	1.2	4% Annual Chance	1678	313.42	321.39	319.79	321.67	0.003804	4.96	439.2	136.3	0.33
Bernardston	1.2	1% Annual Chance	2520	313.42	322.45	320.55	322.78	0.003806	5.46	590.86	147.7	0.34

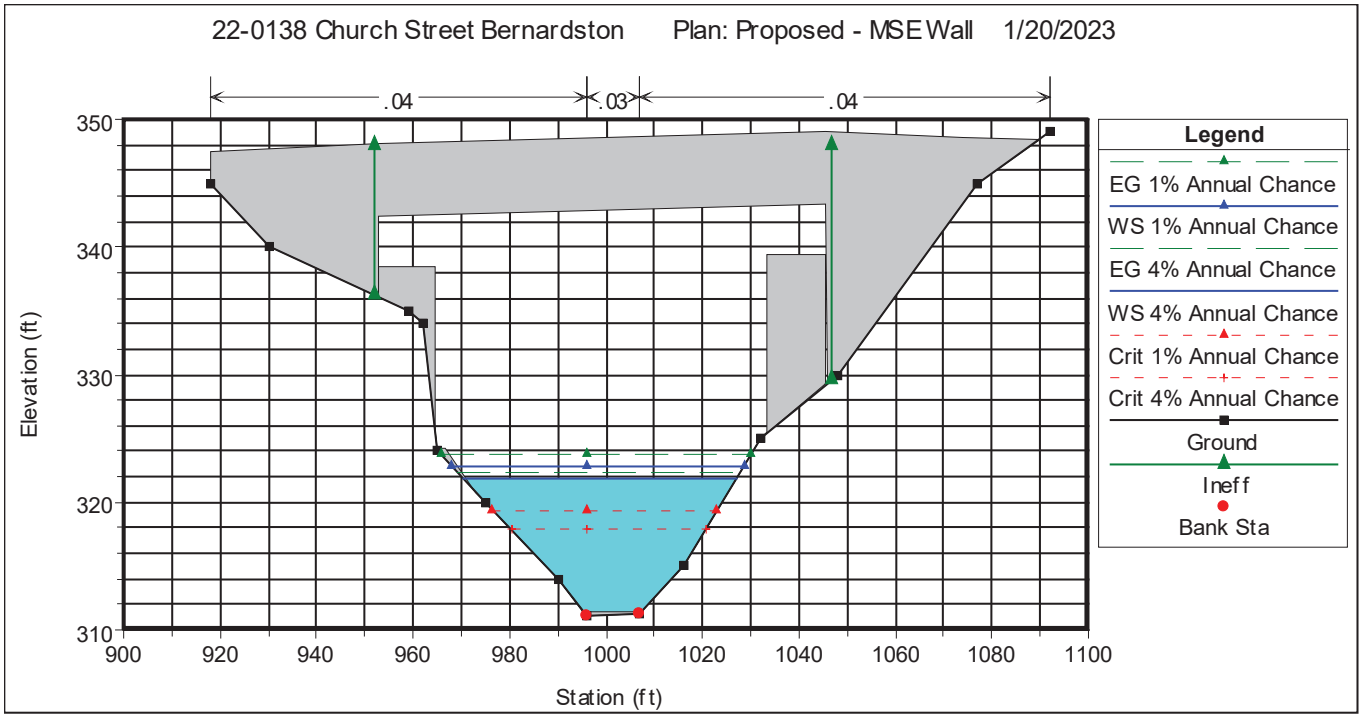
7.3.7 Proposed Bridge Cross Sections



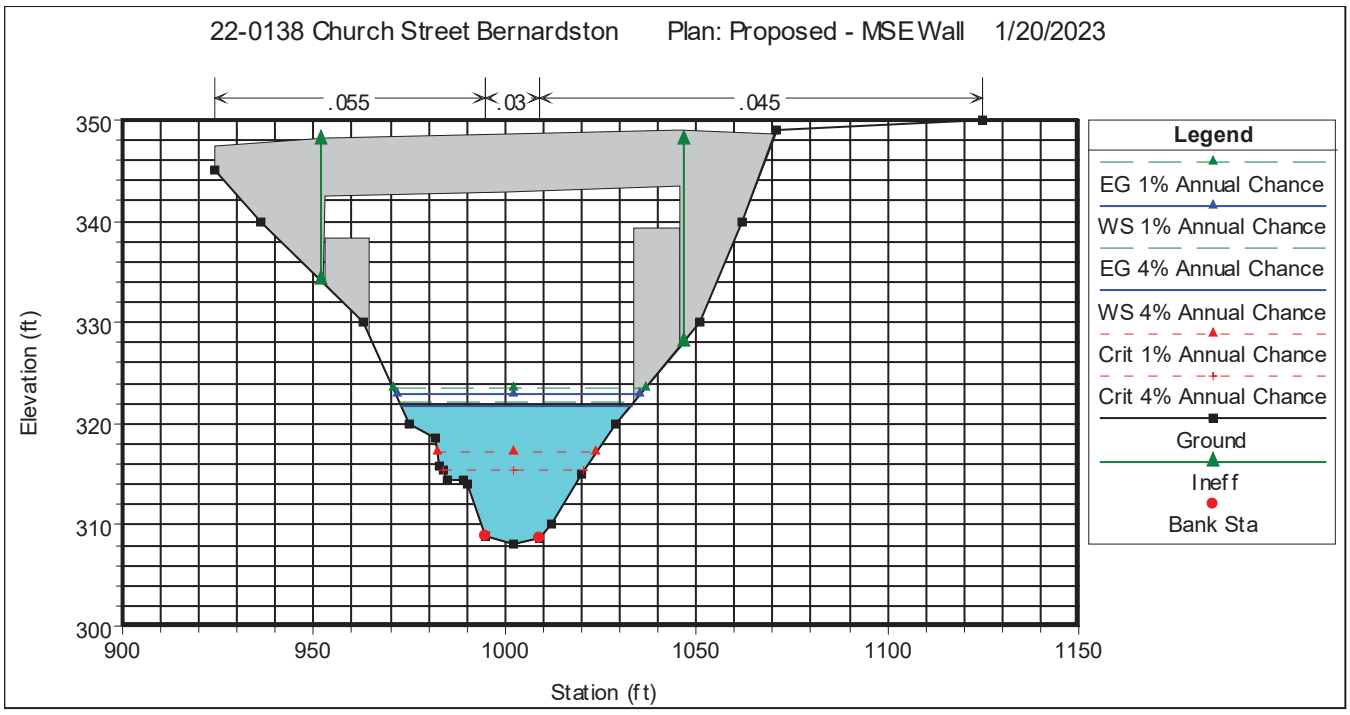
Full Height Abutment – Upstream



Full Height Abutment – Downstream

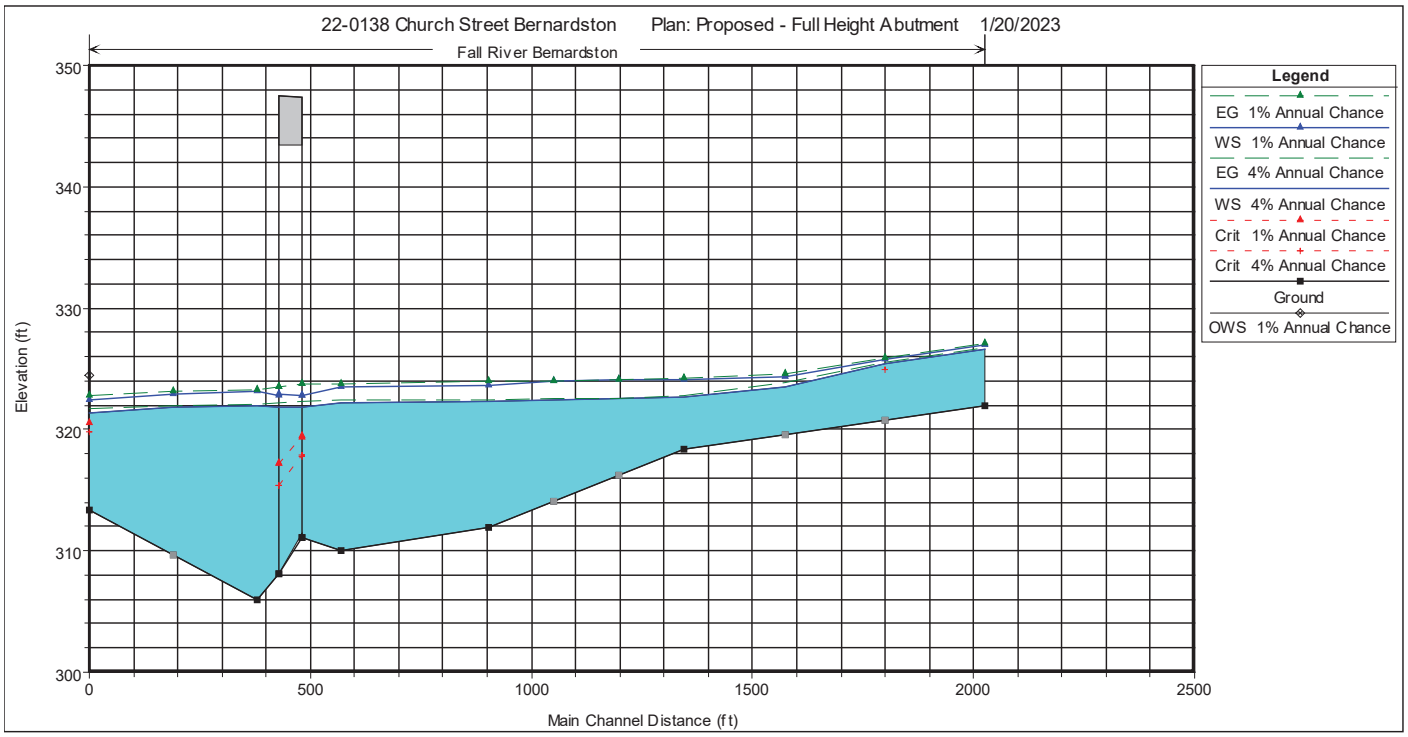


MSE Wall – Upstream

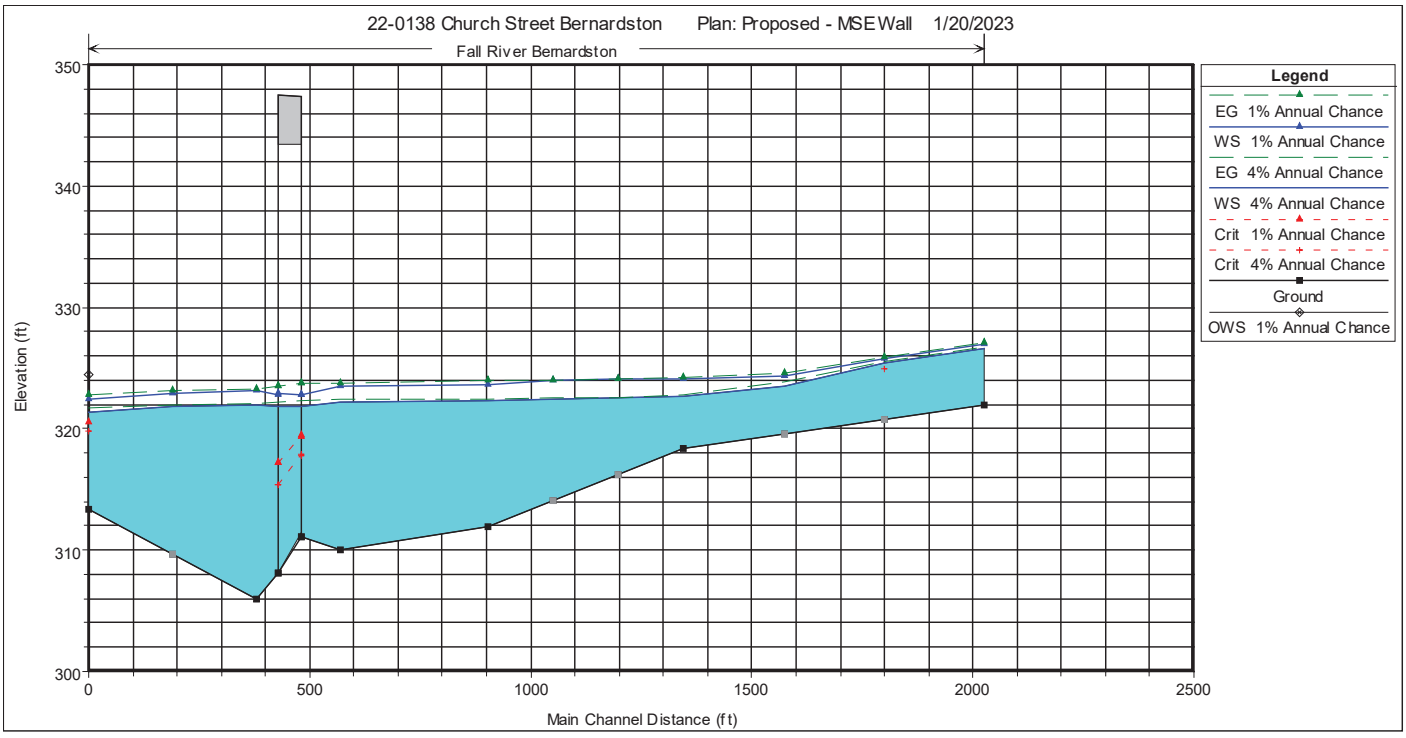


MSE Wall – Downstream

7.3.8 Proposed Channel Profiles



Full Height Abutment



MSE Wall

7.3.9 Proposed Analysis Summary Table

7.3.9 - Proposed Condition Analysis Summary Table - Full Height Abutment

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Bernardston	1.628	4% Annual Chance	1678	321.92	326.6		326.74	0.00457	4.22	621.75	575.97	0.35
Bernardston	1.628	1% Annual Chance	2520	321.92	326.97		327.12	0.004232	4.28	831.22	579.85	0.34
Bernardston	1.5733*	4% Annual Chance	1678	320.75	325.46	324.91	325.58	0.003682	3.65	647.64	515.15	0.3
Bernardston	1.5733*	1% Annual Chance	2520	320.75	325.8		325.95	0.004005	4	820.16	519.82	0.32
Bernardston	1.5187*	4% Annual Chance	1678	319.59	323.48		323.83	0.012761	5.78	371.62	298.66	0.54
Bernardston	1.5187*	1% Annual Chance	2520	319.59	324.38		324.59	0.005893	4.56	725.32	491.23	0.38
Bernardston	1.464	4% Annual Chance	1678	318.42	322.72		322.77	0.001523	2.06	1006.93	603.93	0.18
Bernardston	1.464	1% Annual Chance	2520	318.42	324.16		324.18	0.000504	1.46	2066.56	871.31	0.11
Bernardston	1.4323*	4% Annual Chance	1678	316.25	322.57		322.61	0.000562	1.99	1116.92	392.27	0.15
Bernardston	1.4323*	1% Annual Chance	2520	316.25	324.07		324.1	0.000423	2.01	1879.78	640.49	0.13
Bernardston	1.4007*	4% Annual Chance	1678	314.07	322.48		322.54	0.000347	2.49	977.7	226.82	0.16
Bernardston	1.4007*	1% Annual Chance	2520	314.07	323.95		324.03	0.000361	2.86	1442.98	360.67	0.17
Bernardston	1.369	4% Annual Chance	1678	311.9	322.27		322.47	0.00031	3.85	547.1	92.99	0.22
Bernardston	1.369	1% Annual Chance	2520	311.9	323.6		323.94	0.000435	4.98	685.75	109.33	0.27
Bernardston	1.308	4% Annual Chance	1678	310	322.21		322.38	0.000202	3.56	731.12	95.47	0.19
Bernardston	1.308	1% Annual Chance	2520	310	323.51		323.81	0.000307	4.71	860.99	103.44	0.23
Bernardston	1.291	4% Annual Chance	1678	311.1	321.79	317.8	322.31	0.000948	7.38	363.42	56.34	0.4
Bernardston	1.291	1% Annual Chance	2520	311.1	322.84	319.36	323.7	0.001433	9.65	424.58	60.63	0.5
Bernardston	1.285		Bridge									
Bernardston	1.281	4% Annual Chance	1678	308.1	321.81	315.41	322.21	0.000467	6.01	467.7	60.16	0.29
Bernardston	1.281	1% Annual Chance	2520	308.1	322.85	317.17	323.55	0.00077	8.12	531.66	63.68	0.38
Bernardston	1.272	4% Annual Chance	1678	306	321.97		322.02	0.000192	1.95	928.79	92.32	0.09
Bernardston	1.272	1% Annual Chance	2520	306	323.13		323.23	0.000316	2.62	1037.41	95.44	0.11
Bernardston	1.2360*	4% Annual Chance	1678	309.71	321.85		321.95	0.000662	2.93	691.31	108.04	0.15
Bernardston	1.2360*	1% Annual Chance	2520	309.71	322.96		323.12	0.000936	3.7	813.3	113.22	0.18
Bernardston	1.2	4% Annual Chance	1678	313.42	321.39	319.79	321.67	0.003804	4.96	439.2	136.3	0.33
Bernardston	1.2	1% Annual Chance	2520	313.42	322.45	320.55	322.78	0.003806	5.46	590.86	147.7	0.34

7.3.9 - Proposed Condition Analysis Summary Table - MSE Wall

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Bernardston	1.628	4% Annual Chance	1678	321.92	326.6		326.74	0.00457	4.22	621.75	575.97	0.35
Bernardston	1.628	1% Annual Chance	2520	321.92	326.97		327.12	0.004236	4.28	830.97	579.85	0.34
Bernardston	1.5733*	4% Annual Chance	1678	320.75	325.46	324.91	325.58	0.003683	3.65	647.63	515.15	0.3
Bernardston	1.5733*	1% Annual Chance	2520	320.75	325.8		325.95	0.004003	4	820.32	519.83	0.32
Bernardston	1.5187*	4% Annual Chance	1678	319.59	323.48		323.83	0.012756	5.78	371.68	298.68	0.54
Bernardston	1.5187*	1% Annual Chance	2520	319.59	324.38		324.59	0.00591	4.57	724.48	490.9	0.38
Bernardston	1.464	4% Annual Chance	1678	318.42	322.72		322.77	0.001525	2.06	1006.32	603.74	0.18
Bernardston	1.464	1% Annual Chance	2520	318.42	324.16		324.18	0.000505	1.46	2064.51	870.88	0.11
Bernardston	1.4323*	4% Annual Chance	1678	316.25	322.57		322.61	0.000563	1.99	1116.45	392.17	0.15
Bernardston	1.4323*	1% Annual Chance	2520	316.25	324.06		324.1	0.000424	2.01	1878.16	640.07	0.13
Bernardston	1.4007*	4% Annual Chance	1678	314.07	322.47		322.53	0.000348	2.49	977.41	226.77	0.16
Bernardston	1.4007*	1% Annual Chance	2520	314.07	323.95		324.03	0.000362	2.86	1442	360.58	0.17
Bernardston	1.369	4% Annual Chance	1678	311.9	322.27		322.47	0.00031	3.85	546.98	92.96	0.22
Bernardston	1.369	1% Annual Chance	2520	311.9	323.6		323.94	0.000435	4.99	685.42	109.32	0.27
Bernardston	1.308	4% Annual Chance	1678	310	322.21		322.38	0.000202	3.56	730.99	95.46	0.19
Bernardston	1.308	1% Annual Chance	2520	310	323.51		323.8	0.000307	4.71	860.68	103.42	0.23
Bernardston	1.291	4% Annual Chance	1678	311.1	321.79	317.8	322.31	0.000949	7.38	363.34	56.33	0.4
Bernardston	1.291	1% Annual Chance	2520	311.1	322.83	319.36	323.69	0.001435	9.66	424.34	60.61	0.5
Bernardston	1.285			Bridge								
Bernardston	1.281	4% Annual Chance	1678	308.1	321.81	315.41	322.21	0.000467	6.01	467.7	60.16	0.29
Bernardston	1.281	1% Annual Chance	2520	308.1	322.85	317.17	323.55	0.00077	8.12	531.66	63.68	0.38
Bernardston	1.272	4% Annual Chance	1678	306	321.97		322.02	0.000192	1.95	928.79	92.32	0.09
Bernardston	1.272	1% Annual Chance	2520	306	323.13		323.23	0.000316	2.62	1037.41	95.44	0.11
Bernardston	1.2360*	4% Annual Chance	1678	309.71	321.85		321.95	0.000662	2.93	691.31	108.04	0.15
Bernardston	1.2360*	1% Annual Chance	2520	309.71	322.96		323.12	0.000936	3.7	813.3	113.22	0.18
Bernardston	1.2	4% Annual Chance	1678	313.42	321.39	319.79	321.67	0.003804	4.96	439.2	136.3	0.33
Bernardston	1.2	1% Annual Chance	2520	313.42	322.45	320.55	322.78	0.003806	5.46	590.86	147.7	0.34

7.4 Scour Calculations

7.4.1 Scour Sediment Sampling Results
7.4.2 Scour Calculations

7.4.1 Scour Sediment Sampling Results

MEMORANDUM

To:	Mr. Bob Niccoli, PE, SE miccoli@theengineeringcorp.com
From:	Kamil A. Kocia
Subject:	Route 10 over Fall River Bridge, Bernardston, MA Summary of Riverbed Sampling Results – MassDOT Project No. 612159
Date:	August 8, 2022

Dear Mr. Niccoli:

In accordance with our proposal dated December 1, 2021, Nobis Engineering, Inc. (Nobis) d/b/a Nobis Group® has prepared this memorandum for TEC, Inc. (TEC) in support of the scour evaluation and hydraulic study report for the Route 10 over Fall River bridge project in Bernardston, Massachusetts.

Nobis visited the site on August 1, 2022 to collect three riverbed soil samples (designated as SS-1 through SS-3). See **Figure 1** for the Site Locus Plan.

Sample SS-1 was collected approximately 90 feet upstream from the bridge at the western floodplain and approximately 5 feet from the edge of the riverbank from depths ranging from 6 to 30 inches below ground surface (bgs). Sample SS-2 was collected approximately 90 feet upstream from the bridge in the river approximately 10 feet in from the western edge of the river from depths ranging from 6 to 24 inches bgs. Sample SS-3 was collected at the edge of the eastern floodplain slope and the bank of the river, approximately 80 feet upstream from the bridge, at depths ranging from 6 to 30 inches bgs. Approximate sample locations are shown on the attached **Figure 2** and on the **Photo Log**.

After each sample was obtained, the contents of the streambed samples were emptied into zip-lock bags prior to being transferred to John Turner Consulting, of Dover, New Hampshire for laboratory analysis. The geotechnical laboratory testing included grain size analysis – sieve only methods using ASTM D422 and ASTM D1140 standards. D_{50} particle sizes for the streambed samples are provided on the attached laboratory testing results.

Should you require additional information, please contact us at (978) 683-0891.

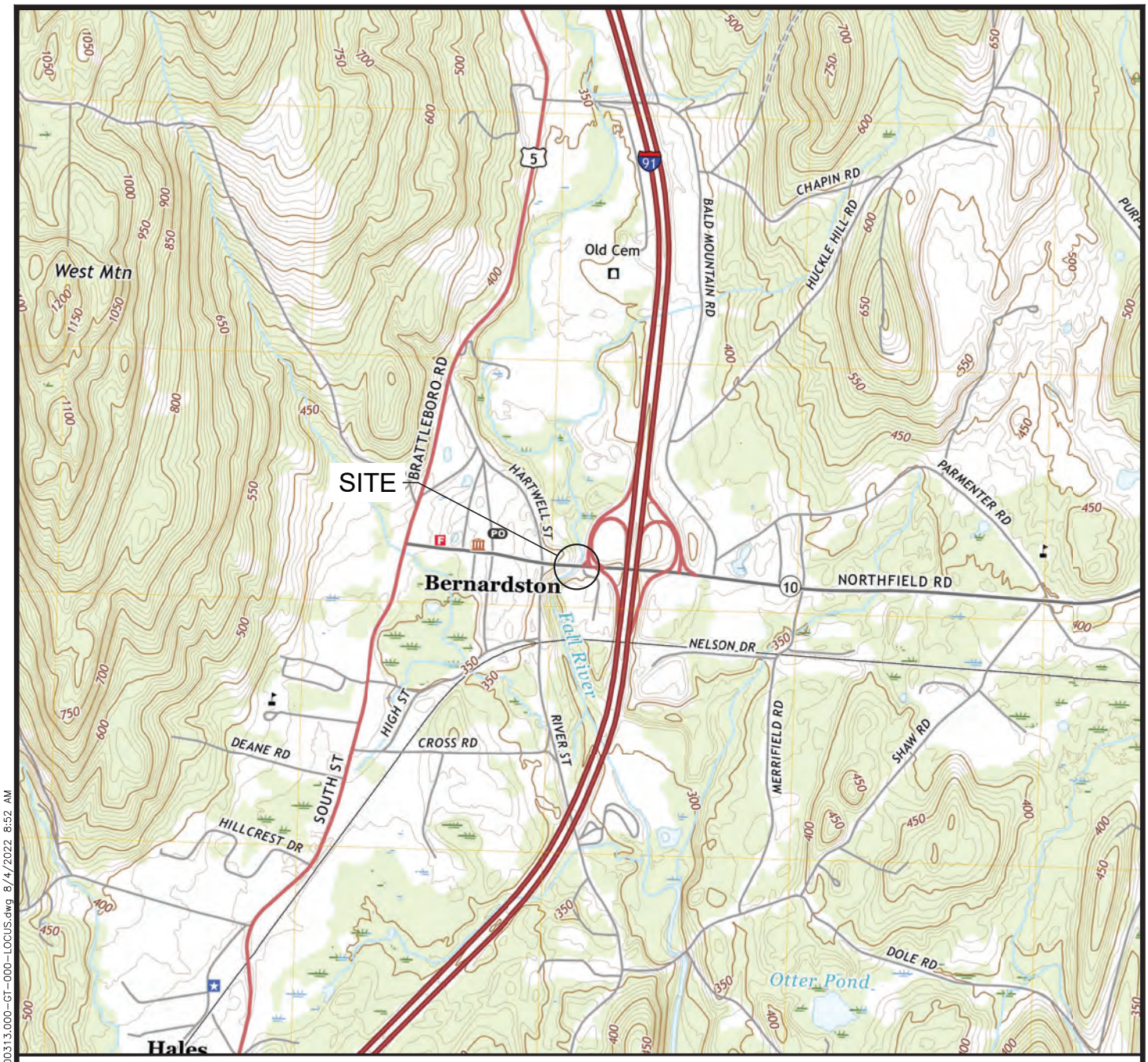
Sincerely,

NOBIS GROUP®

Kamil Kocia
Staff Engineer

Kurt Jelinek, PE
Director of Transportation

Attachments: Figure 1 – Site Locus Plan
Figure 2 – Streambed Sampling Location Plan
Photo Log
Lab Testing Results



NORTH

2021 USGS TOPOGRAPHIC MAP
BERNARDSTON QUADRANGLE
BERNARDSTON, MASSACHUSETTS
CONTOUR INTERVAL 10 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88)

APPROXIMATE SCALE
1 INCH = 2,000 FEET

PROJECT FILE NO. 612159

nobis



QUADRANGLE LOCATION

massDOT
Massachusetts Department of Transportation
Highway Division

FIGURE 1
SITE LOCUS PLAN
BERNARDSTON

ROUTE 10 OVER FALL RIVER BRIDGE

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION
HIGHWAY DIVISION

SHEET 1 OF 1 AUGUST 4, 2022

BRIDGE NO. B-10-001 (12D)

J:\100313.000-MassDOT Route 10 over Fall River Bridge, Bernardston\CAD\dwg\100313.000-GT-000-LOCUS.dwg 8/4/2022 8:52 AM


NOTES:
1. THE BASE PLAN WAS DEVELOPED USING AERIAL OTHIMAGERY FROM 2021, FROM THE ONLINE RESOURCE MASSMAPPER.
2. REFER TO RIVERBED SAMPLING REPORT ON FURTHER DETAILS OF THE RIVERBED SAMPLE LOCATIONS.
LEGEND
SS-1 RIVERBED SAMPLE LOCATION
N
0 100' 200'
GRAPHIC SCALE
FALL RIVER
ROUTE 10
SS-1
SS-2
SS-3
BRIDGE NO. B-10-001
FALL RIVER
ROUTE 10
PROJECT FILE NO. 612159
massDOT
Massachusetts Department of Transportation
Highway Division
FIGURE 2
RIVERBED SAMPLING LOCATION PLAN
BERNARDSTON
ROUTE 10 OVER FALL RIVER BRIDGE
MASSACHUSETTS DEPARTMENT OF TRANSPORTATION
HIGHWAY DIVISION
AUGUST 4, 2022
BRIDGE NO. B-10-001 (12D)
nobis
Nobis Group
585 Middlesex Street
Lowell, MA 01851
T (978) 683-0891
www.nobis-group.com
J:\100313.000-MassDOT Route 10 over Fall River Bridge, Bernardston\CAD\dwg\100313.000-GT-100-ELP.dwg 8/4/2022 9:11 AM

100313.000 MassDOT Route 10 over Fall River Bridge, Bernardston, MA – Photo Log – August 01, 2022.



Photo 1: View from Fall River, looking at Route 10 Bridge, north of riverbed sample SS-1 location.

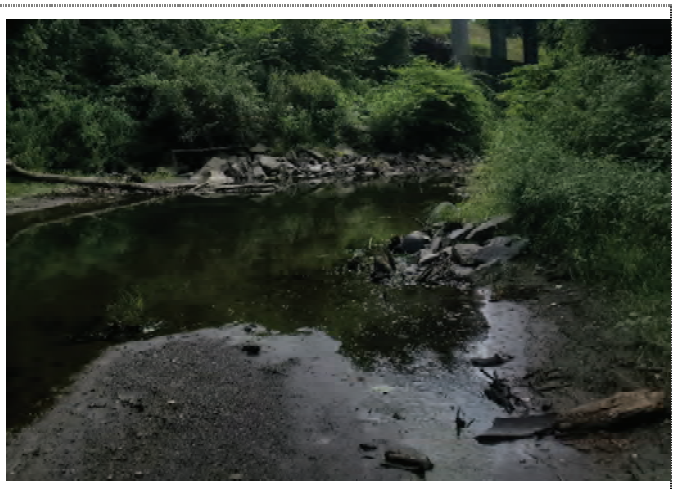


Photo 2: View near SS-1 & SS-2 sample locations looking downstream on the western floodplain.



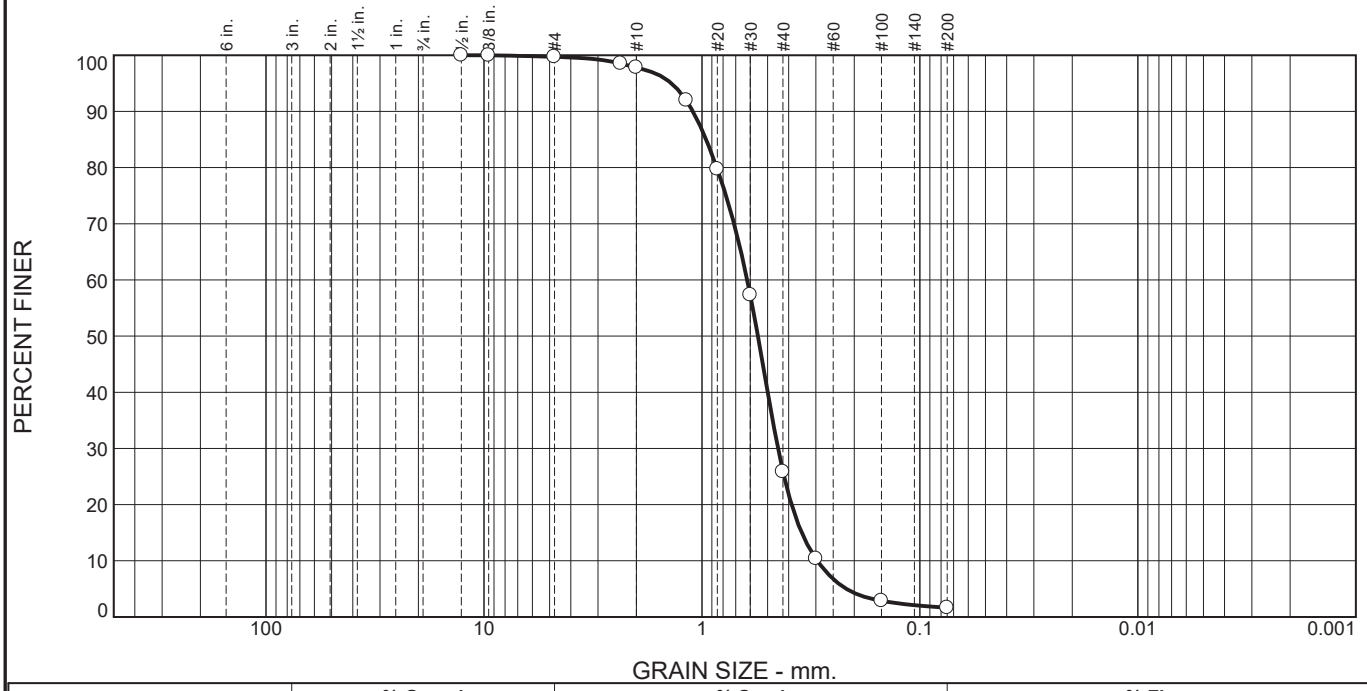
Photo 3: View from Route 10 Fall River Bridge towards all riverbed sample location areas, northward.



Photo 4: View of approximate riverbed sample location SS-3 from Fall River Bridge, looking north-eastward.

Nobis Group®
585 Middlesex Street
Lowell, MA 01851
T (978) 683-0891

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.3	1.9	72.0	24.2	1.6	

Test Results (ASTM D 422 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1/2"	100.0		
3/8"	100.0		
#4	99.7		
#8	98.5		
#10	97.8		
#16	92.0		
#20	79.7		
#30	57.3		
#40	25.8		
#50	10.4		
#100	2.9		
#200	1.6		

* (no specification provided)

Material Description

Dark brown sand

Atterberg Limits (ASTM D 4318)

PL= - LL= - PI= -

Classification

USCS (D 2487)= - AASHTO (M 145)= -

Coefficients

D_{90}= 1.1002 D_{85}= 0.9571 D_{60}= 0.6196
D_{50}= 0.5538 D_{30}= 0.4478 D_{15}= 0.3487
D_{10}= 0.2953 C_u= 2.10 C_c= 1.10

Remarks

Date Received: 08/02/2022 **Date Tested:** 08/04/2022

Tested By: Matt Watson

Checked By: Eric Tavares

Title: Lab Manager

Location: SS-1 West
Sample Number: 3522-654 **Depth:** 0.5'-2.5'

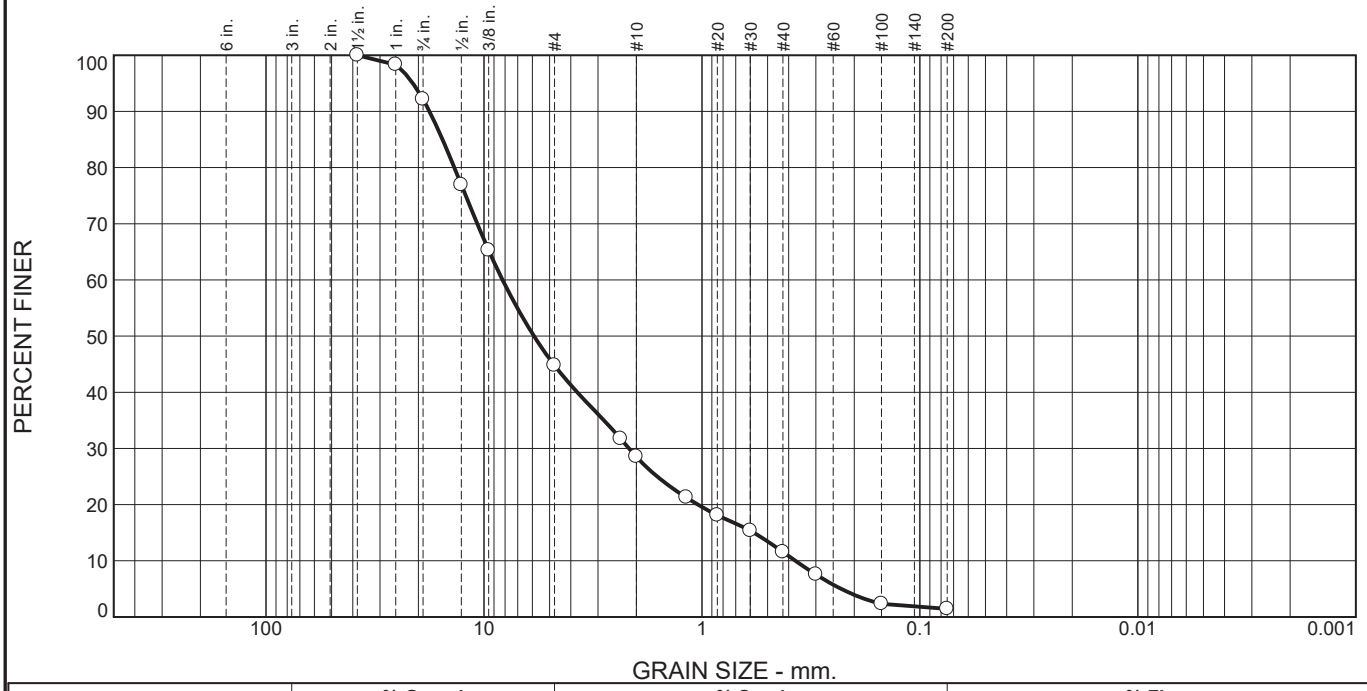
Date Sampled: 08/01/2022

JOHN TURNER CONSULTING

Client: Nobis Group
Project: Route 10 over Fall River - Bernardston, MA

Project No: 22-07-168 **Figure** 654A

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	7.9	47.3	16.3	16.9	10.2	1.4	

Test Results (ASTM D 422 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1 1/2"	100.0		
1"	98.3		
3/4"	92.1		
1/2"	76.9		
3/8"	65.3		
#4	44.8		
#8	31.7		
#10	28.5		
#16	21.3		
#20	18.1		
#30	15.3		
#40	11.6		
#50	7.6		
#100	2.3		
#200	1.4		

* (no specification provided)

Material Description

Dark brown gravel with sand

Atterberg Limits (ASTM D 4318)

PL= - LL= - PI= -

Classification

USCS (D 2487)= - AASHTO (M 145)= -

Coefficients

D_{90}= 17.8003 D_{85}= 15.5013 D_{60}= 8.2200
D_{50}= 5.8994 D_{30}= 2.1605 D_{15}= 0.5788
D_{10}= 0.3725 C_u= 22.07 C_c= 1.52

Remarks

Date Received: 08/02/2022 **Date Tested:** 08/04/2022

Tested By: Matt Watson

Checked By: Eric Tavares

Title: Lab Manager

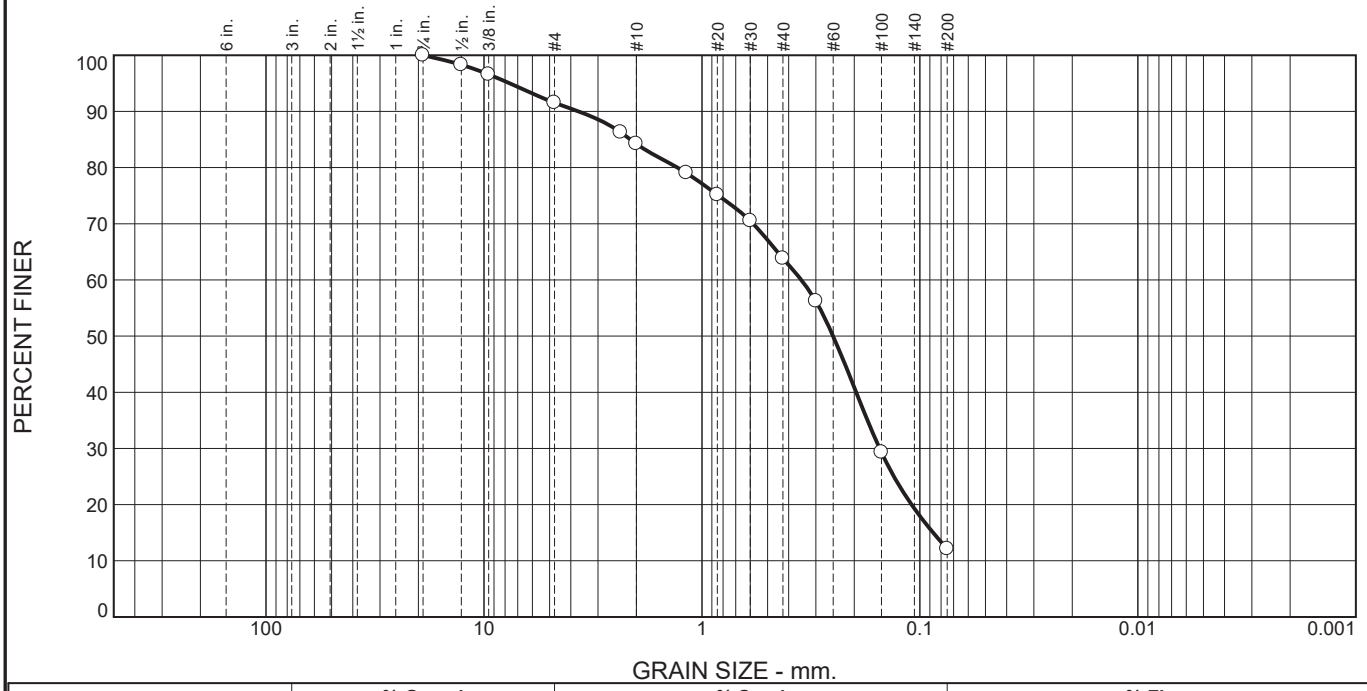
Location: SS-2 Mid **Date Sampled:** 08/01/2022
Sample Number: 3522-655 **Depth:** 0-2'

JOHN TURNER CONSULTING

Client: Nobis Group
Project: Route 10 over Fall River - Bernardston, MA

Project No: 22-07-168 **Figure** 655A

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	8.4	7.4	20.4	51.7	12.1	

Test Results (ASTM D 422 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/4"	100.0		
1/2"	98.3		
3/8"	96.6		
#4	91.6		
#8	86.3		
#10	84.2		
#16	79.1		
#20	75.1		
#30	70.5		
#40	63.8		
#50	56.2		
#100	29.3		
#200	12.1		

* (no specification provided)

Material Description

Dark brown sand

Atterberg Limits (ASTM D 4318)

PL= - LL= - PI= -

Classification

USCS (D 2487)= - AASHTO (M 145)= -

Coefficients

D_{90}= 3.6869 D_{85}= 2.1284 D_{60}= 0.3499
D_{50}= 0.2500 D_{30}= 0.1530 D_{15}= 0.0869
D_{10}= C_u= C_c=

Remarks

Date Received: 08/02/2022 **Date Tested:** 08/04/2022

Tested By: Matt Watson

Checked By: Eric Tavares

Title: Lab Manager

Location: SS-3 East
Sample Number: 3522-656 **Depth:** 0.5'-2.5'

Date Sampled: 08/01/2022

JOHN TURNER CONSULTING

Client: Nobis Group
Project: Route 10 over Fall River - Bernardston, MA

Project No: 22-07-168 **Figure** 656A

7.4.2 Scour Calculations

Project Name:	Fall River at Church Street, Bernardston, MA
Project Location:	Church Street Bernardston, MA
Project Job Number:	22-0138

Froehlich Equation for Abutment Scour (Alternative 1 - Full Height Abutment)

$Y_s/Y_a=2.27\ K_1K_2\ (L'/Y_a)^{0.43}\ Fr^{0.61} + 1$

K_1 = coefficient for abutment shape

K_2 = coefficient for angle of embankment to flow

L' = length of abutment projected normal to flow, ft

Y_a = average depth of flow in the floodplain, ft

A_e = the flow area of the approach cross section obstructed by the embankment, ft^2

Fr = Froude Number

$V_e = Q_e / A_e$, ft/sec

Q_e = the flow obstructed by the abutment and approach embankments, ft^3/sec

Y_s = scour depth, ft

Data Input

Abutment Location:	50-yr Frequency		100-yr Frequency	
	Left	**Right**	**Left**	**Right**
Y_a = average depth of flow in the floodplain, ft	5.4	6.1	5.7	6.4
K_1 = coefficient for abutment shape	1.00	1.00	1.00	1.00
K_2 = coefficient for angle of embankment to flow	1.0	0.9	1.0	0.9
L' = length of abutment projected normal to flow, ft	0.0	0.0	0.0	0.0
Q_e = the flow obstructed by the abutment and approach embankments, ft^3/sec	530.6	481.3	675.0	604.1
A_e = the flow area of the approach cross section obstructed by the embankment, ft^2	144.1	125.0	159.3	136.7
$V_e = Q_e / A_e$, ft/sec	3.7	3.8	4.2	4.4
Fr = Froude Number	0.440	0.440	0.500	0.500

Data Output

	50-yr Frequency			100-yr Frequency		
	Left	**Right**		**Left**	**Right**	
Ys =	5.4	6.1	**ft**	5.7	6.4	**ft**

Bay Colony Group, Inc.
4 School Street
Foxborough, MA 02035

Project Name:	Fall River at Church Street, Bernardston, MA
Project Location:	Church Street Bernardston, MA
Project Job Number:	22-0138

Froehlich Equation for Abutment Scour (Alternative 2 - MSE Wall)

$Y_s/Y_a=2.27\ K_1K_2\ (L'/Y_a)^{0.43}\ Fr^{0.61} + 1$

K_1 = coefficient for abutment shape

K_2 = coefficient for angle of embankment to flow

L' = length of abutment projected normal to flow, ft

Y_a = average depth of flow in the floodplain, ft

A_e = the flow area of the approach cross section obstructed by the embankment, ft^2

Fr = Froude Number

$V_e = Q_e / A_e$, ft/sec

Q_e = the flow obstructed by the abutment and approach embankments, ft^3/sec

Y_s = scour depth, ft

Data Input

Abutment Location:	50-yr Frequency		100-yr Frequency	
	Left	**Right**	**Left**	**Right**
Y_a = average depth of flow in the floodplain, ft	5.4	6.1	5.7	6.4
K_1 = coefficient for abutment shape	1.00	1.00	1.00	1.00
K_2 = coefficient for angle of embankment to flow	1.0	0.9	1.0	0.9
L' = length of abutment projected normal to flow, ft	0.0	0.0	0.0	0.0
Q_e = the flow obstructed by the abutment and approach embankments, ft^3/sec	530.5	481.3	674.8	604.0
A_e = the flow area of the approach cross section obstructed by the embankment, ft^2	144.0	125.0	159.2	136.7
$V_e = Q_e / A_e$, ft/sec	3.7	3.9	4.2	4.4
Fr = Froude Number	0.440	0.440	0.500	0.500

Data Output

	50-yr Frequency			100-yr Frequency		
	Left	**Right**		**Left**	**Right**	
Ys =	5.4	6.1	**ft**	5.7	6.4	**ft**

Bay Colony Group, Inc.
4 School Street
Foxborough, MA 02035

Project Name:	Fall River @ Church Street Bernardston, MA
Project Location:	Church Street Bernardston, MA
Project Job Number:	22-0138
Alternative:	Alternative 1 - Full Height Abutment

Determine Critical Velocity

$V_c = K_u y^{1/6} D^{1/3}$

V_c = Critical velocity above which bed material of D and smaller will be transported, ft/s

y = Average depth of flow upstream of the bridge, ft

D = Particle size for V_c, ft

D_{50} = Particle size in a mixture of which 50% are smaller, ft

K_u = 11.17

	Design Flood 50-yr	Check Flood 100-yr
	Data Input	**Data Input**
y =	11.1	11.7
D =	0.019355	0.019355
K_u =	11.17	11.17

Upstream Velocity (ft/sec)	8.4	9.7

Data Output		
V_c =	**4.5**	**4.5**

Critical Velocity V_C is less than mean velocity V therefore Live Bed conditions

Modified Laursen's 1960 Equation for Contraction Scour (Live Bed Condition)

$y2/y1 = (Q2/Q1)^{6/7} (W1/W2)^{k1}$

	Design Flood 50-yr	Check Flood 100-yr
	Data Input	**Data Input**
y_1 = Average depth in the upstream main channel, ft	11.1	11.7
y_2 = Average depth in the contracted section, ft	6.4	6.6
y_o = Existing depth in the contracted section before scour, ft	10.9	11.4
Q_1 = Flow in the upstream channel transporting sediment, ft3/s	2040	2520
Q_2 = Flow in the contracted channel, ft3/s	1028	1241
W_1 = Bottom width of the upstream main channel that is transporting bed material, ft	63	66
W_2 = Bottom width of main channel in contracted section less pier width, ft	61	63
k1 = Exponent determined in Section 6.3 HEC No. 18	0.69	0.69
$V^* = (gy_1S_1)^{1/2}$, ft/sec	0.30	0.34
T = Fall velocity of bed material based on the D50, Figure 6.8 HEC No. 18 multiplied 3.28, ft/sec	0.35	0.35
g = acceleration of gravity, (32.2 ft/sec)	32.2	32.2
S_1 = Slope of energy grade line of main channel, ft/ft	0.000248	0.000307
τ = Shear stress on the bed, lb/ft^2	0.99	0.99
Δ = Density of water (1.94 slugs/ft^3)	1.94	1.94

	Data Output	Data Output
Average depth of scour from water surface =	**6.4**	**6.6**
Average contraction scour depth (y_2 - y_0) y_s =	**-4.5**	**-4.9**

Bay Colony Group, Inc.
4 School Street
Foxborough, MA 02035

Project Name:	Fall River @ Church Street Bernardston, MA
Project Location:	Church Street Bernardston, MA
Project Job Number:	22-0138
Alternative:	Alternative 2 - MSE Wall

Determine Critical Velocity

$V_c = K_u y^{1/6} D^{1/3}$

V_c = Critical velocity above which bed material of D and smaller will be transported, ft/s

y = Average depth of flow upstream of the bridge, ft

D = Particle size for V_c, ft

D_{50} = Particle size in a mixture of which 50% are smaller, ft

K_u = 11.17

	Design Flood 50-yr	Check Flood 100-yr
	Data Input	**Data Input**
y =	11.1	11.7
D =	0.019355	0.019355
K_u =	11.17	11.17

Upstream Velocity (ft/sec)	8.4	9.7

Data Output		
V_c =	**4.5**	**4.5**

Critical Velocity V_C is less than mean velocity V therefore Live Bed conditions

Modified Laursen's 1960 Equation for Contraction Scour (Live Bed Condition)

$y2/y1 = (Q2/Q1)^{6/7} (W1/W2)^{k1}$

	Design Flood 50-yr	Check Flood 100-yr
	Data Input	**Data Input**
y_1 = Average depth in the upstream main channel, ft	11.1	11.7
y_2 = Average depth in the contracted section, ft	6.2	6.5
y_o = Existing depth in the contracted section before scour, ft	10.9	11.4
Q_1 = Flow in the upstream channel transporting sediment, ft3/s	2040	2520
Q_2 = Flow in the contracted channel, ft3/s	1028	1241
W_1 = Bottom width of the upstream main channel that is transporting bed material, ft	63	66
W_2 = Bottom width of main channel in contracted section less pier width, ft	63	65
k1 = Exponent determined in Section 6.3 HEC No. 18	0.64	0.69
$V^* = (gy_1S_1)^{1/2}$, ft/sec	0.64	0.73
T = Fall velocity of bed material based on the D50, Figure 6.8 HEC No. 18 multiplied 3.28, ft/sec	0.35	0.35
g = acceleration of gravity, (32.2 ft/sec)	32.2	32.2
S_1 = Slope of energy grade line of main channel, ft/ft	0.001157	0.001435
τ = Shear stress on the bed, lb/ft^2	0.99	0.99
Δ = Density of water (1.94 slugs/ft^3)	1.94	1.94

	Data Output	Data Output
Average depth of scour from water surface =	**6.2**	**6.5**
Average contraction scour depth $(y_2 - y_{0)}$ y_s =	**-4.6**	**-5.0**

A00830 - 126

Proposal No. 612159-136484

Memorandum

To: Tim Dexter, Massachusetts Department of Transportation (MassDOT)
Bob Niccoli, The Engineering Corporation (TEC)

From: Roy Schiff, SLR Consulting

Date: June 27, 2022

Subject: Review of Existing River Geomorphology
Bernardston – Church Street (Route 10) over the Fall River

Introduction

The Route 10 Bridge in Bernardston over the Fall River (Figure 1) is slated for replacement. The project site (Figure 2) was visited to investigate the river setting and estimate bankfull channel width.



Figure 1 – Upstream Face of the Route 10 Bridge over the Fall River (photo provided by TEC)

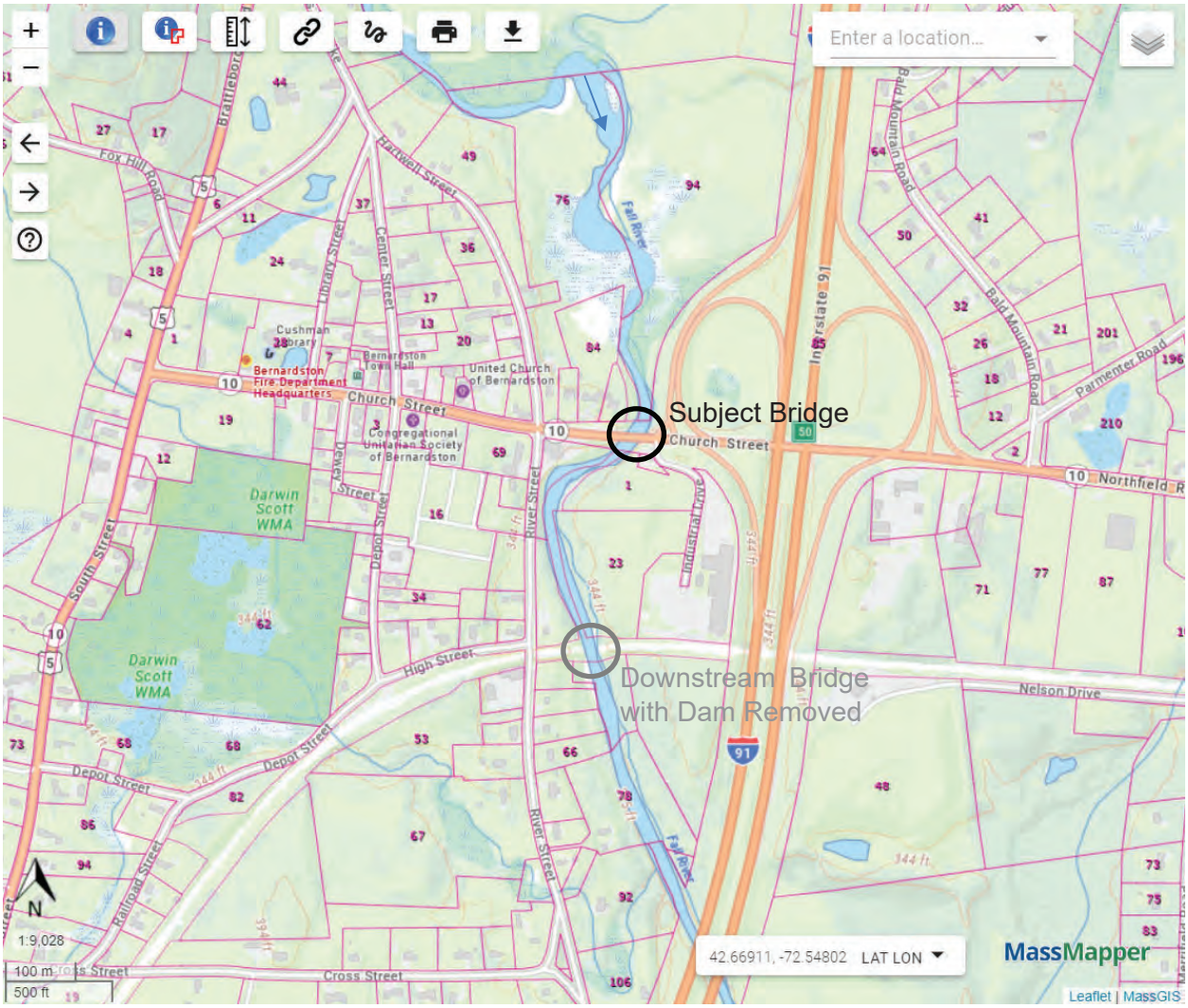


Figure 2 – Project Location (MassMapper)

A unique aspect of the site setting is that the river has cut down (i.e., is incised) due to the removal of a downstream dam associated with a Railroad Bridge (Figure 3). The river channel is at a lower elevation since the dam removal approximately 1,200 feet downstream that influences the subject bridge due to confined flows in a narrow valley.

SLR visited the project site on March 11, 2022 to observe the stream channels and perform bankfull measurements. Normal spring flow was taking place during the visit. The weather was sunny with air temperature in the 50's degrees Fahrenheit. Some snow and ice cover remained on the steep river banks complicating access to the site, along with deep swift flow on the downstream side of the bridge. The channel was safely accessible on the upstream side of the bridge. The snow and ice did not impede bankfull width measurements.

Figure 4 – Photograph of the Fall River Upstream of the Bridge



Figure 3 – Photograph of Former Dam and Railroad Bridge (Left) and Current Railroad Bridge (Right) (photos provided by TEC and MassDOT)

Bankfull dimensions (Bent and Waite, 2013) and flood flows (Zarriello, 2017) were estimated at the project site using the US Geological Survey StreamStats Web Application (Table 1).

Table 1 – Bankfull Dimension and Peak Flow Estimates (Source: USGS StreamStats)

Site	Location	Drainage Area (mi^2)	Bankfull Width (feet)	Bankfull Depth (feet)	Q2 (cfs)	Q10 (cfs)	Q50 (cfs)	Q100 (cfs)
Route 10, Bernardston	Upstream face of bridge	25.7	62.5	2.7	784	1,700	2,800	3,340

Initial bridge sizing based on MA Wetland Protection Act Standards (i.e., 1.2 times the channel bankfull width) suggests that the structure should be a 75-foot span. This 1.2 bankfull width standard must be met, to the maximum extent practicable, to obtain project permits and to create resilient stream crossings.

Field Observations

The most notable characteristic of the site is the highly variable channel dimensions ranging from a wider riffle-pool channel upstream of the bridge (Figure 4) to a riprap / gabion armored confined channel under the bridge (Figure 5) to a confined channel downstream of the bridge due to bedrock and armored valley walls (Figure 6). The riffle-pool channel upstream of the bridge leaves a wetland complex and has side channels and sediment bars. The river bed is mostly gravel with som cobble in faster-moving water. Bank erosion is common on the outside of the meander bends, a common occurrence in such an incised setting. The channel constricts abruptly flowing into the bridge.

The bankfull channel width upstream of the bridge is approximately 40 to 50 feet and the depth is approximately 2.5 feet (Table 1). The measurements 250 feet upstream of the bridge were taken as the most suitable for design as the field indicators were best and channel encroachment and confinement were low.

The bankfull channel width under the bridge is approximately 23.5 feet and the depth is approximately 2.5 feet (Table 1). These measurements reflect on armored channel and are not suitable for design. The encroachment is leading to excessive scour potential at the bridge, along with fish and wildlife blockages for most flows.

The bankfull channel width downstream of the bridge is approximately 12 to 30 feet and the depth is approximately 2.5 feet (Table 1). These measurements reflect a channel in a narrow valley with bedrock or armored walls. This level of confinement makes the channel dimensions unsuitable for design.



Figure 4 – Photograph of the Fall River Upstream of the Bridge (Looking Downstream)



Figure 5 – Photograph and Width Measurements Showing the Confined Channel Under the Bridge (Looking Downstream)



Figure 6 – Photograph of the Confined Fall River Downstream of the Bridge (Looking Downstream)



Figure 7 – Photograph of the Fall River Entering the Bridge (Looking Downstream)

Table 1 – Summary of Field Observations

Location	Bankfull Width (feet)	Bankfull Depth (feet)	Notes
360 feet upstream of bridge	39.8	2.5	Gravel-bed channel with islands. Incised. Too far upstream to use as channel changing.
250 feet upstream of bridge	50.8	2.5	Erosion on the outer bend. Recent flooding over point bar with fine deposition. Gravel and cobble in the riffle. This is the best measurement to use.
Under Bridge	23.5	2.5	Armored channel with riprap (w~15.5 feet), gabions (w~23.5-33.5 feet), and bridge piers (w~40.0 feet). High-velocity setting prone to scour. Fish and wildlife passage barrier. Downstream encroachment by armored valley wall and bedrock. Hydraulic roller near downstream face of bridge.
Artificial pinch point 61 feet downstream of bridge	Approximately 12	Not measured	Constriction due to concrete / armored valley wall.
Natural pinch point 208 feet downstream of bridge	29.4	Not measured	Looks like bedrock on both sides.
Design Recommendation	**50.8**	**2.5**	**This is the best measurement to use approaching the bridge where confinement is not taking place. Bridge needs to transition from wider channel setting to narrower channel and valley.**

The estimated bankfull channel width for design is 50.8 feet and the depth is 2.5 feet. The recommended bridge span is therefore 61 feet and the minimum bridge height is 10 feet. A key design consideration is to create a uniform flow transition into the bridge and out of the bridge to the narrow channel and valley setting. A hydraulic model can be used to investigate the changing channel dimensions and resulting flood veloctiy changes to reduce scour potential and improve fish and wildlige passage.

Additional Considerations

The project site is mapped as a regulated floodplain and floodway (Zone AE) (Figure 8). Note that the floodplain is mapped with the former dam in place as labeled on the Flood Insurance Rate Map. The FEMA mapping should be reviewed in detail to determine floodplain requirements and estimate design flows.

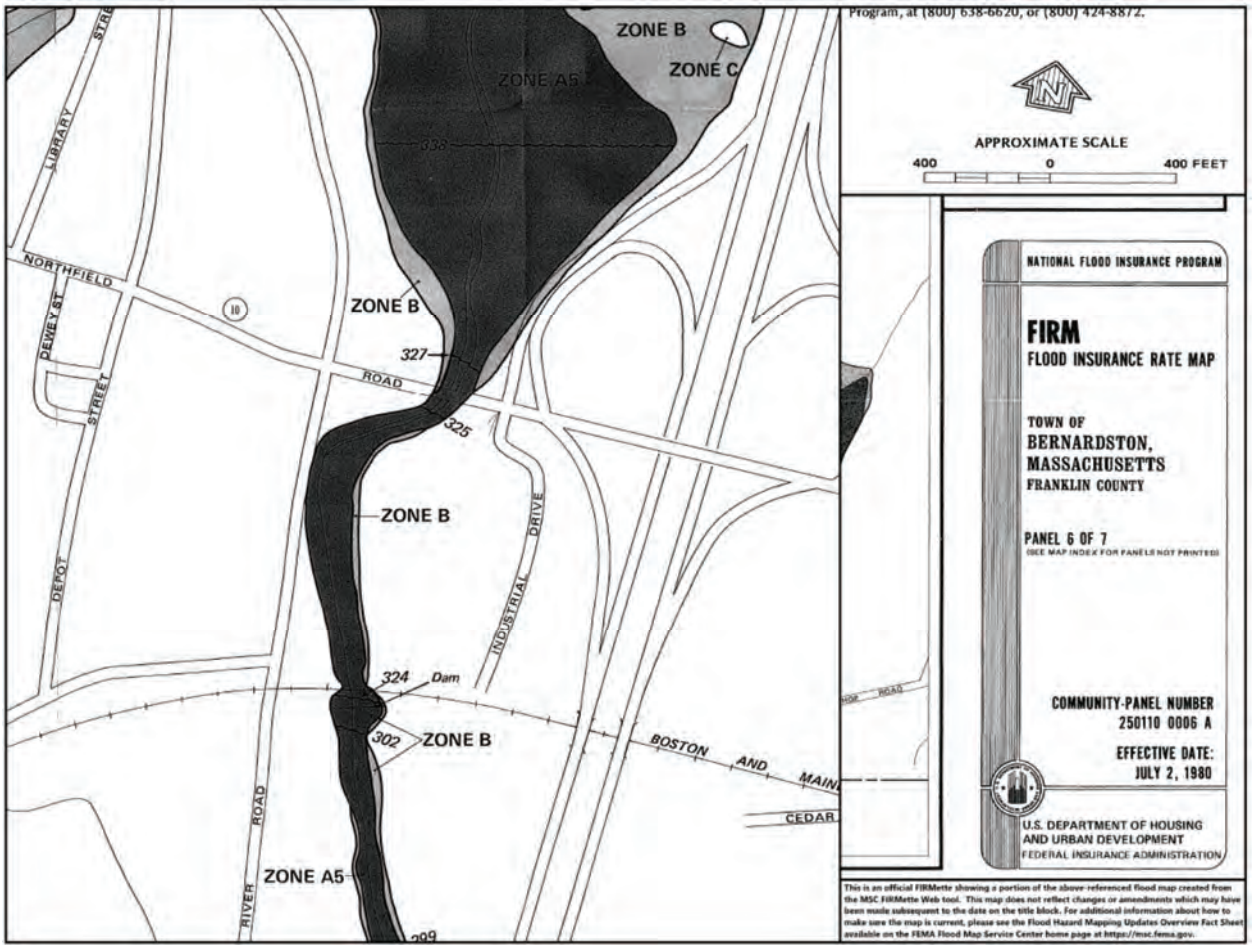


Figure 8 –FEMA Effective Flood Insurance Rate Map

Cited References

Bent, G. C. and A. M. Waite, 2013. Equations for Estimating Bankfull Channel Geometry and Discharge for Streams in Massachusetts (U.S. Geological Survey Scientific Investigations Report 2013–5155). U.S. Geological Survey.

Zarriello, P. J., 2017. Magnitude of Flood Flows at Selected Annual Exceedance Probabilities for Streams in Massachusetts (Https://Doi.Org/10.3133/Sir20165156). U.S. Geological Survey Scientific Investigations Report 2016–5156.

To: Kasey Provost and Robert Niccoli, TEC

From: Roy Schiff

SLR International Corporation

cc: Lily Collins and Courtney Walker, MassDOT

Date: May 19, 2025

Project No. 13869.00044

RE: Bernardston – Church Street (Route 10) over the Fall River (612159)

Bank armor is proposed on the lower and middle bank on the Fall River on the east bank just upstream of the proposed Route 10 (Church Street) Bridge replacement. The low bank is eroding as the river channel contracts entering the bridge and some form of stabilization is needed in this location due to high flood velocities leading to excessive erosion.

Following a suggestion that stone vanes or weirs be used to direct the channel away from the low bank to reduce erosion; MassDOT, TEC, and SLR Consulting had a discussion about the best approach to stabilizing the bank at the project site. Note that SLR Consulting prepared a fluvial geomorphic assessment of the river channel in June of 2022 to assess the site conditions and measure the bankfull channel width. The subject bank was noted to have an eroding lower bank, a vegetated middle bank, and a grass slope up to the I-91 highway ramp.

Bank armoring, with seeded grubbings over all of the stone and joint plantings along the bankfull river channel, is recommended to reduce erosion risk at the site. Field observations indicate that the channel is prone to varying flood elevations and velocities at the subject bank as water backs up and then contracts under the bridge. A concern exists that one or more vanes or weirs would be subject to erosion, prone to damage, and would likely require ongoing maintenance. With the difficulty accessing the base of the eroding bank, the need for regular maintenance should be avoided. The bank armor with overlying plantings should last longer than weirs or vanes.

The initial armor layout was adjusted by the design engineer and fluvial geomorphologist to pull the armoring back to maintain as much of the channel width as possible. The plantings on the low bank will create riparian cover and the stone armor will reduce erosion. Erosion potential at the site will also be reduced by removal of the existing piers and the increase in the width of the proposed bridge opening.

APPENDIX D

STORMWATER MEMO

Stormwater Memo

MassDOT Project No. 612159

Bridge Replacement Project

Bridge No. B-10-001(12D) – Route 10 (Church Street) over the Fall River Bernardston, MA

Prepared for: **MassDOT**
Highway Division
10 Park Plaza
Boston, MA 02116

Prepared by: **TEC, Inc.**
282 Merrimack Street
2nd Floor
Lawrence, MA 01843

May 23, 2024

Updated: January 22, 2025

This Stormwater Management Memorandum has been prepared to show compliance with the Massachusetts Stormwater Management Standards in accordance with the Massachusetts Water Quality Certification Regulations (314 CMR 9.00) to support the Project's Section 401 Water Quality Certificate Application.

1. Project Description

The Applicant, MassDOT, is proposing Project # 612159 to construct two bridge replacements (Bridge No. B-10-001(12D) and B-10-018(12C)) on State Route 10 over the Fall River and I-91, respectively, located in Bernardston, MA. As proposed, the Project consists of the full replacement of the two bridge spans along with widening along the 0.5 mile corridor to accommodate sidewalk access along the entire stretch. Additionally, the northbound exit ramp at the I-91 interchange has been re-aligned to better reflect current MassDOT standards regarding pedestrian safety and lookback distance. Several drainage improvements will be made along the corridor as well to account for the relocated curbed gutter alignment along Route 10 and the exit ramp.

2. Existing and Proposed Drainage Conditions

The project is located in a rural area along the I-91 corridor in Bernardston, MA. Land cover within the project area is primarily well maintained grassed open space along with some wooded forest. Impervious areas are largely limited to roadway surfaces along with a few rooftops and driveways. Soils within the overall drainage area are predominantly (83%) in drainage class 'A' with the remainder being in class 'D'. The topography within the project area is mostly sloped down towards the Fall River crossing. A high point on the Route 10 corridor near the eastern terminus of the project will send a small portion of stormwater to the east, however these areas are captured in the existing stormwater network and routed back towards the west and outfall near the Fall River crossing. Any stormwater that bypasses these inlets would still find their way to an unnamed Fall River branch and eventually to the river, which firmly puts the entire project within the Fall River watershed. Stormwater falling with the project area is picked up with the existing closed drainage network that was mostly installed during the interstate's construction in 1959. While the system appears to be working as intended, there are several catch basin to catch basin connections and no stormwater control measures(SCMs) currently installed. The existing drainage system consists of several separate networks which outfall into the Fall River. All but one outfall is located within 200 ft. of the Fall River crossing and have been combined in the analysis as one design point. The remaining outfall connects to the I-91 drainage system and outfalls into the Fall River approximately a half a mile downstream.

The Project does not currently propose any major changes to the existing drainage patterns or land cover. However, the project does include a new sidewalk along the half

mile length of the project which is responsible for the 5,901 square foot increase in impervious area over the project area. The relocation of the I-91 northbound off-ramp will slightly change drainage patterns and will require a small amount of grading to accomplish but will not significantly change the overall drainage patterns. A small amount of the drainage area falling on Route 10 that would find its way to the 1-91 downstream outfall in the existing condition has been routed to the Fall River crossing outfall due to the relocation of the intersection. The existing subsurface stormwater network will be slightly modified to remove catch basin to catch basin connections in order to meet the current MassDOT stormwater standards and an undersized portion of the existing trunk line on the eastern end of the project will be upsized to meet performance standards for the 10-year 24-hour design storm. Additionally, the closed drainage system on the modified interstate exit ramp will be relocated to the new ramp location. The old ramp location will be demolished, loamed and seeded, to convert it to an "open space" land cover. Deep sump catch basins will replace existing basins where practical in order to increase sediment capture efficiency over the existing condition and two in-line leaching basins will be added in order to help offset groundwater recharge lost with the proposed additional impervious cover. LID techniques implemented on and adjacent to the bridge span include:

- Horizonal drainage across both bridge spans will be used instead of scuppers to better treat stormwater and avoid direct outfall to resource areas.
- Minimizing additional impervious area needed to add a sidewalk through the corridor by reducing lane widths and eliminating unnecessary pavement areas.
- The limit of work for the project area has been carefully laid out to minimize impacts to any natural resources.

In addition to the LID techniques employed, the proposed design seeks to further improve water quality by including non-structural SCMs within the Operation and Maintenance Plan like catch basin cleaning and street sweeping schedules. All impacts to key features and natural resources in this Project are temporary and minimized to the greatest extent practicable.

According to the July 2, 1980 FEMA Flood Insurance Rate Maps for the Town of Bernardston, Massachusetts, Community Panel Numbers 250110 0006A and 250110 0007A, there is an area designated as Zone AE associated with Fall River. Zone AE is classified as an area subject to the 1% annual chance flood (100-year flood), where base flood elevations have been determined. The Zone AE boundary extends between elevation 325 and 327 (NAVD 88) through the Study Area.

Alternatives Analysis

Several different alternatives were evaluated to manage stormwater for the Bernardston Bridge Replacement Project. Some, like constructed gravel wetlands, bioretention areas, and wet basins, were considered but ultimately dismissed due to the space constraints within the project limits. Porous Pavement and subsurface infiltration were also contemplated, but not proposed due to long-term maintenance concerns. The proposed design represents the most practical strategy that can be expected of a project of this nature when taking into account space constraints and overall maintenance costs.

3. Massachusetts Department of Environmental Protection (MassDEP) – Stormwater Management Standards

As demonstrated below, the proposed Project complies with the MassDEP Stormwater Management Standards (the Standards) to the Maximum Extent Practicable. Under the Stormwater Management Standards, the Project is considered a redevelopment project because it involves maintenance and improvement of an existing roadway. The purpose of the project is the replacement of two bridge decks and the addition of sidewalk within the Route 10 corridor. The sidewalk will create an additional 5,901 square feet of impervious area over the existing project area. The increase in impervious cover has been minimized as much as possible and the public benefit to a safe crossing of this corridor would qualify this work as a limited project. The Project has been designed to meet the Stormwater Management Standards to the maximum extent practicable and to improve upon existing conditions.

Standard 1: No New Untreated Discharges

No new stormwater conveyance (e.g. outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.

No new outfalls are proposed with this project. Seventeen (17) deep sump catch basins are replacing the existing basins in order to increase water quality at the outfall points over the existing condition. Existing outfall locations will be modified to provide appropriately sized rip rap aprons to help minimize velocity and erosion.

Standard 2: Peak Rate Attenuation

Stormwater management systems shall be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates. This Standard may be waived for discharges to land subject to coastal storm flowage as defined in 310 CMR 10.04.

The Project has been designed to comply with Standard 2 to the maximum extent practicable. Table 1 includes a summary of impervious cover impacts, which can be used as a metric to understand impacts to peak discharge rates following development. As discussed previously and shown in the table below, this Project proposes an increase in the impervious area of 5,901 square feet associated with the new sidewalk. Stormwater modeling, included as Appendix C, shows a modest 0.86 cubic feet per second(cfs) increase, from 13.98 cfs to 14.84 cfs, in the 10-year 24-hour design storm flowrate. This is caused by two additional factors in addition to the increased impervious area. First, the replacement of an undersized trunk line will result in a larger flowrate to the outlet by removing the constriction that causes upstream flooding. Also, as stated previously, a portion of stormwater that lands on the Route 10 corridor that was previously routed down the I-91 northbound exit ramp has been re-routed to the Fall River crossing outfall. This change decreases the flowrate for the 10-yr 24-hour design storm at that outfall by 0.51 cfs, from 1.47 cfs to 0.96 cfs.

The increase in flowrate at the Fall River outfall will likely not cause any flooding concern as the Fall River at the outfall location has a drainage area of 25.7 square miles and a Lower 90% prediction interval flowrate of 830 cfs according to USGS's StreamStats. Meaning the project will increase the flowrate by 0.13% for the Lower 90% prediction interval for the 10-year storm event. The upper 90% prediction interval flowrate of 3,480 cfs will only increase by 0.03% for the 10-yr event. Space constraints within the road layout do not allow for more extensive rate attenuation methods. This standard has been met to the maximum extent practicable.

Table 1: Existing and proposed impervious cover

Existing Impervious Area (sq. ft)	Proposed Impervious Area (sq. ft)	Change In Impervious Area (sq. ft)	Percent Increase in Impervious Area (%)
270,537	276,438	5,901	2.18

Table 2: Peak Flowrates

	2-yr		10-yr		100-yr	
	Pre(cfs)	Post(cfs)	Pre(cfs)	Post(cfs)	Pre(cfs)	Post(cfs)
Outfall 1	6.10	7.18	13.98	14.84	25.60	27.17
Outfall 2	0.84	0.53	1.47	0.96	3.00	2.37

Standard 3: Stormwater Recharge

Loss of annual recharge to groundwater shall be eliminated or minimized through the use of environmentally sensitive site design, low impact development techniques, stormwater management practices and good operation and maintenance. At a minimum, the annual recharge from the post-development site shall approximate the annual recharge from pre-development conditions based on soil types. This Standard is met when the stormwater management system is designed to infiltrate the required recharge volume as determined in accordance with the Massachusetts Stormwater Handbook.

The 5,901 square foot increase in impervious area lies completely within Hydraulic Soil Group 'D' soils. This equates to a required recharge volume of 49 cubic feet of stormwater to fully meet Standard 3 requirements. Each of the two leaching basins provides for 170 cubic feet of recharge volume resulting in a total 340 cubic feet of recharge volume provided. Standard 3 has been fully met.

Standard 4: Water Quality

Stormwater management systems shall be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS). This Standard is met when:

a) *Suitable practices for source control and pollution prevention are identified in a long-term pollution prevention plan, and thereafter are implemented and maintained;*
b) *Structural stormwater best management practices are sized to capture the required water quality volume determined in accordance with the Massachusetts Stormwater Handbook; and*
c) *Pretreatment is provided in accordance with the Massachusetts Stormwater Handbook.*

Like most linear highway projects, there is little room within the layout to install SCMs that would fully satisfy this standard. Several existing catch basins will be replaced with deep sump catch basins that provide for 25% TSS removal which represents an improvement over the existing condition. In addition to this, new rip rap outfalls will be installed at each outlet location to help dissipate energy there and prevent erosion. All drainage that falls on the new bridge decks will travel horizontally into catch basins located just off of the approach in order to avoid scuppers discharging directly into resource areas. In addition to these improvements, the Long Term Pollution Prevention Plan(LTPPP) for this project will include regular maintenance of catch basins as well as scheduled street sweeping. The Project has been designed to comply with Standard 4 to the maximum extent practicable.

A Long-Term Pollution Prevention Plan (LTPPP) has been developed for the project in compliance with Standard 4. The Standard 9 section of this document includes this LTPPP.

Standard 5: Land Uses with Higher Potential Pollutant Loads (LUHPPLs)

For Land Uses with Higher Potential Pollutant Loads (LUHPPLs), source control and pollution prevention shall be implemented in accordance with the Massachusetts Stormwater Handbook to eliminate or reduce the discharge of stormwater runoff from such land uses to the maximum extent practicable. If through source control and/or pollution prevention all LUHPPLs cannot be completely protected from exposure to rain, snow, snow melt, and stormwater runoff, the proponent shall use the specific structural stormwater BMPs determined by the Department to be suitable for such uses as provided in the Massachusetts Stormwater Handbook. Stormwater discharges from LUHPPLs shall also comply with the

requirements of the Massachusetts Clean Waters Act, M.G.L. c. 21, §§ 26-53 and the regulations promulgated thereunder at 314 CMR 3.00, 314 CMR 4.00 and 314 CMR 5.00.

Standard 5 does not apply to the Project. There are no Land Uses with Higher Potential Pollutant Loads within the project area.

Standard 6: Critical Areas

Stormwater discharges within the Zone II or Interim Wellhead Protection Area of a public water supply and stormwater discharges near or to any other critical area require the use of the specific source control and pollution prevention measures and the specific structural stormwater best management practices determined by the Department to be suitable for managing discharges to such areas as provided in the Massachusetts Stormwater Handbook. A discharge is near a critical area if there is a strong likelihood of a significant impact occurring to said area, taking into account site-specific factors. Stormwater discharges to Outstanding Resource Waters and Special Resource Waters shall be removed and set back from the receiving water or wetland and receive the highest and best practical method of treatment. A "stormwater discharge" as defined in 314 CMR 3.04(2)(a)1 or (b), to an Outstanding Resource Water or Special Resource Water shall comply with 314 CMR 3.00 and 314 CMR 4.00. Stormwater discharges to a Zone I or Zone A are prohibited unless essential to the operation of a public water supply.

The Project has been designed to comply with Standard 6. Figure 4 shows the Critical Areas in the vicinity of the project site. The Fall River in this area is listed as a Coldwater Fishery Resource by the Massachusetts Division of Fisheries and Wildlife (DFW). No new permanent outfall will directly discharge to any of the surrounding critical areas, and existing outlets include leaching basins before the outfall where practical. Discharges are all within the buffer and will remain unchanged from the existing condition.

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the Maximum Extent Practicable

A redevelopment project is required to meet the following Stormwater Management Standards only to the maximum extent practicable: Standard 2, Standard 3, and the pretreatment and structural best management practice requirements of Standards 4, 5, and 6. Existing stormwater discharges shall comply with Standard 1 only to the maximum extent practicable. A redevelopment project shall also comply with all other requirements of the Stormwater Management Standards and improve existing conditions.

The Project is considered a redevelopment and has been designed to comply with the Stormwater Management Standards to the maximum extent practicable. Standards 1, 3, 5, and 6 have been fully met while Standards 2 and 4 have been met to the maximum extent practicable. While this project will result in a slight increase in peak stormwater flowrates, the public benefit of pedestrian access pathways outweighs the negligible change in peak rates. Additionally, while not fully meeting standard 4 for water quality, this project will represent an improvement over the existing condition.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Controls

A plan to control construction-related impacts, including erosion, sedimentation and other pollutant sources during construction and land disturbance activities (construction period erosion, sedimentation, and pollution prevention plan) shall be developed and implemented.

The implementation of erosion and sediment (E&S) controls during construction is considered a standard practice for all MassDOT projects. E&S controls will be installed before any land disturbance begins for the Project and will remain in place for the duration of the Project. The E&S controls for the Project are shown on the project plans and include filter tubes, tree protection, floating silt fence, and rip rap energy dissipation aprons.

The Project disturbs one or more acres of land; therefore, the project contractor will request coverage under the NPDES Construction General Permit (CGP) and develop a Stormwater Pollution Prevention Plan (SWPPP). The SWPPP follows the requirements of this standard and complies with the NPDES CGP.

Standard 9: Operation and Maintenance Plan

A Long-Term Operation and Maintenance (O&M) Plan shall be developed and implemented to ensure that stormwater management systems function as designed.

MassDOT O&M plans are implemented on a programmatic level by each MassDOT district. Each MassDOT district office is responsible for providing operation and maintenance for the MassDOT stormwater management systems within their respective jurisdictions. Appendix B includes the O&M Plan for this project.

Long-term pollution prevention for the Project includes litter pick-up, inspection and maintenance of stormwater assets, maintenance of landscaped areas, snow and ice management, street sweeping, prohibition of illicit discharges, and spill prevention and response.

Standard 10: Prohibition of Illicit Discharges

All illicit discharges to the stormwater management system are prohibited.

Illicit Discharge Statement

The project's stormwater management system, as shown on the plans submitted with this report, have been designed in full compliance with Standard 10. The project area does not have any known illicit connections. Any illicit connections to the stormwater management system found in the project limit of work during construction will be removed and/or resolved through MassDOT's Illicit Discharge Detention and Elimination (IDDE) Program.

Attachments: Appendix A – Stormwater Checklist
Appendix B – O&M Plan

Figures: Figure 1 – USGS Locus Map
Figure 2 – Soil Survey
Figure 3 – FEMA Flood Insurance Rate Map (FIRM)
Figure 4 – NHESP Estimated and Priority Habitats

Appendix A

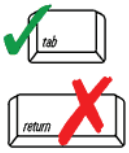
Stormwater Checklist

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

A. Introduction

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the Massachusetts Stormwater Handbook. The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.[1] This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8[2]
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

[1] The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

[2] For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.

Massachusetts Department of Environmental Protection
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Checklist for Stormwater Report

B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

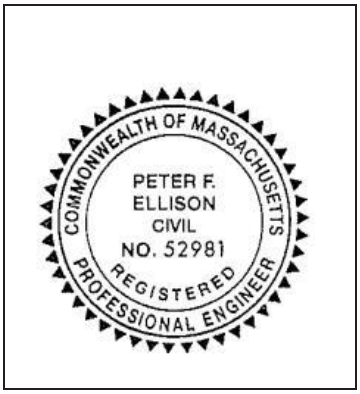
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature



6/20/2025

Signature and Date

Checklist

Project Type: Is the application for new development, redevelopment, or a mix of new and redevelopment?

☐ New development

☒ Redevelopment

☐ Mix of New Development and Redevelopment

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Checklist for Stormwater Report

Checklist (continued)

LID Measures: Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

- ☐ No disturbance to any Wetland Resource Areas
- ☐ Site Design Practices (e.g. clustered development, reduced frontage setbacks)
- ☐ Reduced Impervious Area (Redevelopment Only)
- ☒ Minimizing disturbance to existing trees and shrubs
- ☐ LID Site Design Credit Requested:
  - ☐ Credit 1
  - ☐ Credit 2
  - ☐ Credit 3
- ☐ Use of “country drainage” versus curb and gutter conveyance and pipe
- ☐ Bioretention Cells (includes Rain Gardens)
- ☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)
- ☐ Treebox Filter
- ☐ Water Quality Swale
- ☐ Grass Channel
- ☐ Green Roof
- ☐ Other (describe): _____

Standard 1: No New Untreated Discharges

- ☒ No new untreated discharges
- ☐ Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth
- ☐ Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.

Massachusetts Department of Environmental Protection
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Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.

☒ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.

☐ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

☒ Soil Analysis provided.

☐ Required Recharge Volume calculation provided.

☐ Required Recharge volume reduced through use of the LID site Design Credits.

☐ Sizing the infiltration, BMPs is based on the following method: Check the method used.

☐ Static ☐ Simple Dynamic ☐ Dynamic Field[1]

☐ Runoff from all impervious areas at the site discharging to the infiltration BMP.

☐ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.

☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.

☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:

- ☐ Site is comprised solely of C and D soils and/or bedrock at the land surface
- ☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
- ☐ Solid Waste Landfill pursuant to 310 CMR 19.000
- ☐ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.

☐ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.

☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

[1] 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.

Massachusetts Department of Environmental Protection
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Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

☐ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.

☐ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:

- Good housekeeping practices;
- Provisions for storing materials and waste products inside or under cover;
- Vehicle washing controls;
- Requirements for routine inspections and maintenance of stormwater BMPs;
- Spill prevention and response plans;
- Provisions for maintenance of lawns, gardens, and other landscaped areas;
- Requirements for storage and use of fertilizers, herbicides, and pesticides;
- Pet waste management provisions;
- Provisions for operation and management of septic systems;
- Provisions for solid waste management;
- Snow disposal and plowing plans relative to Wetland Resource Areas;
- Winter Road Salt and/or Sand Use and Storage restrictions;
- Street sweeping schedules;
- Provisions for prevention of illicit discharges to the stormwater management system;
- Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
- Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
- List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.

☒ A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.

☐ Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:

- ☐ is within the Zone II or Interim Wellhead Protection Area
- ☐ is near or to other critical areas
- ☐ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
- ☐ involves runoff from land uses with higher potential pollutant loads.

☐ The Required Water Quality Volume is reduced through use of the LID site Design Credits.

☐ Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.

Massachusetts Department of Environmental Protection
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Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

☐ The BMP is sized (and calculations provided) based on:

- ☐ The ½" or 1" Water Quality Volume or
- ☐ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.

☐ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.

☐ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)

☐ The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.

☐ The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted ***prior to*** the discharge of stormwater to the post-construction stormwater BMPs.

☐ The NPDES Multi-Sector General Permit does ***not*** cover the land use.

☐ LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.

☐ All exposure has been eliminated.

☐ All exposure has ***not*** been eliminated and all BMPs selected are on MassDEP LUHPPL list.

☐ The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

☐ The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.

☒ Critical areas and BMPs are identified in the Stormwater Report.

Massachusetts Department of Environmental Protection
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Checklist for Stormwater Report

Checklist (continued)

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

☒ The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:

- ☒ Limited Project
- ☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
- ☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
- ☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
- ☒ Bike Path and/or Foot Path
- ☒ Redevelopment Project
- ☐ Redevelopment portion of mix of new and redevelopment.

☒ Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.

☒ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
- Construction Period Operation and Maintenance Plan;
- Names of Persons or Entity Responsible for Plan Compliance;
- Construction Period Pollution Prevention Measures;
- Erosion and Sedimentation Control Plan Drawings;
- Detail drawings and specifications for erosion control BMPs, including sizing calculations;
- Vegetation Planning;
- Site Development Plan;
- Construction Sequencing Plan;
- Sequencing of Erosion and Sedimentation Controls;
- Operation and Maintenance of Erosion and Sedimentation Controls;
- Inspection Schedule;
- Maintenance Schedule;
- Inspection and Maintenance Log Form.

☐ A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

Checklist (continued)

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

☐ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has ***not*** been included in the Stormwater Report but will be submitted ***before*** land disturbance begins.

☐ The project is ***not*** covered by a NPDES Construction General Permit.

☐ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.

☒ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

☒ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:

- ☒ Name of the stormwater management system owners;
- ☒ Party responsible for operation and maintenance;
- ☒ Schedule for implementation of routine and non-routine maintenance tasks;
- ☒ Plan showing the location of all stormwater BMPs maintenance access areas;
- ☒ Description and delineation of public safety features;
- ☒ Estimated operation and maintenance budget; and
- ☒ Operation and Maintenance Log Form.

☐ The responsible party is ***not*** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:

- ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
- ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

☒ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;

☐ An Illicit Discharge Compliance Statement is attached;

☒ NO Illicit Discharge Compliance Statement is attached but will be submitted ***prior to*** the discharge of any stormwater to post-construction BMPs.

Appendix B

Operations and Maintenance(O & M) Plan

Bridge No. B-10-001 (12D) – Route 10 (Church Street) over the Fall River

Stormwater Management System Operation and Maintenance Plan and Long-Term Pollution Prevention Plan

Bernardston, MA

PREPARED FOR



10 Park Plaza
Boston, MA 02116

PREPARED BY



TEC, Inc
282 Merrimack Street
Lawrence, MA 01843

June 12, 2025

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1

Stormwater Management System Operation and Maintenance (O&M) Plan

This Stormwater Management System Operation and Maintenance (O&M) Plan describes the approach for inspection and maintenance of drainage infrastructure and structural stormwater control measures (SCMs) to minimize contaminant loading for Bridge No B-10-001(12D) – Route 10 (Church Street) over the Fall River Project in Bernardston, MA. In general, inspection and maintenance activities will be conducted consistent with the National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater Discharges from Small Municipal Separate Storm Sewer System (MS4) and MassDOT's anticipated NPDES Transportation Separate Storm Sewer System (TS4) Permit.

This document has been prepared per the requirements of Massachusetts Department of Environmental Protection (MassDEP) Regulations 310 CMR 10.05 (6)(k)(9) and satisfies the requirements of Massachusetts Stormwater Standard 9.

1.1 Responsible Party

In accordance with MassDOT procedures, the MassDOT District 2 office located in Bernardston, MA, is responsible for the maintenance of all stormwater management systems on MassDOT roads within the project area.

Questions or concerns regarding activities associated with this O&M Plan should be addressed to MassDOT's District 2 office located at 811 North King Street, Northampton, MA 01060, phone (857) 368-2000, during regular weekday hours, or to MassDOT's Highway Operations Center located in South Boston, MA at (800) 227-0608 during all other times and days, including weekends and holidays.

1.2 Inspection and Maintenance Measures and Record-Keeping

See Sheets 7-11 of the Bridge Replacement Plans for the proposed stormwater system within the project limits. The stormwater management system covered by this O&M Plan consists of the following measures:

- Deep Sump Catch Basins
- Drainage Manholes

MassDOT strives to achieve inspection and maintenance frequencies of SCMs and catch basins as outlined in MassDEP's Stormwater Handbook. However, it is a challenge for

MassDOT as a statewide agency to meet the stated inspection and maintenance frequencies set forth by MassDEP. As a result of this, MassDOT is in the process of developing a Programmatic Operations and Maintenance Plan (POMP) which will allow for the O&M of stormwater assets to be executed using a data driven approach. This POMP will implement a performance-based inspection and maintenance program for SCMs and catch basins. Once implemented, the POMP will supersede this project-specific operations and maintenance plan.

For SCMs, MassDOT's overall approach is to inspect SCMs, and based on the results of the inspections, perform maintenance to preserve functionality. For catch basins, MassDOT's approach is to perform maintenance at an interval that maintains the functionality of the catch basin (e.g., sump is less than 50% full of sediment). Catch basin inspections, including documentation of sediment accumulation, and maintenance will generally occur simultaneously.

Inspections and maintenance are recorded by personnel using hand-held tablets in the field to document sediment accumulation, maintenance action performed, and follow-up actions needed. Data is recorded in MassDOT's asset management system which is accessible in the field (mobile) or the office (desktop).

The table below summarizes data that is generally collected for each asset type. For all assets, the inspector and inspection date are recorded. Photo documentation of structure condition is taken and attached to the inspection record.

Inspection Form	Applicable Stormwater Assets	Information Collected
Inlets	› Catch basins	› Sediment accumulation › Trash/Debris accumulation › Signs of contamination › Frame and grate condition › Overall structure condition
SCMs	› Other SCMs (Drainage Manholes)	› SCM accessibility › Presence of standing water › Sediment accumulation › Trash/Debris accumulation › Overall SCM condition
Storm Discharge Points	› Outlets to SCMs	› Presence of flow › Signs of contaminated flow › Sediment accumulation › Level of erosion › Pipe condition › Overall structure condition

Inspection and maintenance records can be made available using the asset management system through request with the MassDOT District 2 Environmental Engineer. Records will be kept for at least three years. Representatives of the Town of Bernardston Conservation

Commission(s), MassDEP, and US EPA may obtain access to these records, upon request. Additionally, MassDOT will allow members and agents of MassDEP and the Conservation Commission(s) to enter and inspect the premises, upon request, to evaluate and ensure that the Operation and Maintenance Plan requirements for each SCM are being followed.

Maintenance actions will at a minimum meet the inspection and maintenance frequencies set forth by MassDEP. Additionally, frequency will be based on condition and impact to functionality. Maintenance to be performed on the stormwater system includes:

Stormwater Feature	Potential Maintenance Actions	
Underground SCMs	• Remove and properly dispose of trash, sediment, debris, and root intrusions • Clean out sumps at an interval to maintain functionality (less than 50% full of sediment) • Jet and repair pipes	• Stabilize and replace deteriorated structures
Inlets and Outlets to SCMs	• Clear inlet and remove and properly dispose of sediment, trash, leaf litter, debris, and vegetation • Repair or replace structural components • Repair damaged or eroded areas	• Remove woody growth • Stabilize or reconstruct eroded areas • Treat invasive plants according to MassDOT Vegetation Management Plan

Based on the results of the inspection, repairs will be made in accordance with MassDOT standard practices. Maintenance will be prioritized given the urgency of the required maintenance and availability of staff, contracts, etc. Maintenance may require contracting if existing contracts are unavailable to perform the work. More intensive remedial activities may require permitting and/or an engineering solution.

1.3 Erosion and Sediment Control Measures during Maintenance Activities

For maintenance activities that could result in discharges of sediments or other contaminants into wetlands, waterways, or other resource areas regulated under 310 CMR 10.00, the responsible maintenance personnel will employ measures to prevent migration of these sediments/contaminants. Such temporary measures may include, but are not necessarily limited to, the use of siltation barriers, catch basin silt sacks/filter bags, pipe plugs, cofferdams deployed within the stormwater structure, turbidity curtains, or other practices designed to prevent such discharges.

Where maintenance occurs in areas that are confined, with no risk of discharge to adjacent water bodies, no special measures may be needed. Examples include, but are not limited to: (1) cleaning of a forebay under dry conditions when the work can be completed and exposed surfaces stabilized prior to placing it back into service; and (2) catch basin cleaning where the activity is limited to removing material from a sump below the elevation of the outlet pipe.

1.4 O&M Budget

MassDOT performs maintenance for stormwater management systems as part of their routine operation and maintenance budget for roadways and bridges. Budgets are managed at the district level and vary by fiscal year, depending on funding sources.

2

Long-Term Pollution Prevention Plan

This Long-Term Pollution Prevention Plan (LTPPP) describes the approach for pollution prevention and related maintenance activities for Bridge No B-10-001(12D) – Route 10 (Church Street) over the Fall River Project in Bernardston, MA. In general, long-term pollution prevention and related maintenance activities will be conducted consistent with:

- The National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater Discharges from Small Municipal Separate Storm Sewer System (MS4),
- MassDOT's anticipated NPDES Transportation Separate Storm Sewer System (TS4) Permit, and
- Measures outlined in MassDOT's Stormwater Management Plan (SWMP).

This LTPPP satisfies the requirements related to pollution prevention under Massachusetts Stormwater Standards 4, 5, 6, and 10.

2.1 Practices for Long-Term Pollution Prevention

For the facilities covered, long-term pollution prevention includes the following measures.

- good housekeeping;
- storing materials and waste products inside or under cover;
- vehicle washing;
- routine inspections and maintenance of SCMs;
- spill prevention and response;
- maintenance of lawns, gardens, and other landscaped areas;
- storage and use of fertilizers, herbicides, and pesticides;
- pet waste management;
- operation and management of septic systems; and
- proper management of deicing chemicals and snow.

2.1.1 Litter Pick-up

MassDOT will conduct litter pick-up from the stormwater management facilities in conjunction with routine road maintenance activities.

2.1.2 Inspection and Maintenance of Stormwater Assets

MassDOT will conduct inspection and maintenance of drainage infrastructure and the stormwater control measures (SCMs) in accordance with the O&M Plan, as described in Section 1.

2.1.3 Maintenance of Landscaped Areas

Routine mowing will be conducted according to standard MassDOT practices. SCM basin bottoms and embankments designed to impound water should be mowed as required to prevent establishment of woody vegetation.

Except in rare circumstances, MassDOT does not use fertilizers, herbicides, and pesticides for the maintenance of facilities. Exceptions include using fertilizer to ensure the survival of new plantings and herbicides to control invasive plants. Use of fertilizers and herbicides is reviewed and approved by the MassDOT Landscape Design Section and District 2 Environmental Engineer prior to application. Local Conservation Commission review may also be required.

2.1.4 Snow and Ice Management

Snow and Ice Management will be conducted consistent with the practices outlined in the MassDOT Snow and Ice Control Program Environmental Status and Planning Report (ESPR), formerly known as the Snow and Ice Control Generic Environmental Impact Report (GEIR).

In accordance with the Snow and Ice Control ESPR, no sand is used on MassDOT properties for snow and ice control. The exception to this rule is within reduced salt areas where high sodium levels have been found in drinking water sources.

2.1.5 Street Sweeping

Routine highway cleaning, with a brush-type street sweeper, will be conducted in accordance with standard MassDOT practices. Sweeping will occur annually in the Spring.

2.1.6 Prohibition of Illicit Discharges

The MassDEP Stormwater Management Standard 10 prohibits illicit discharges to the stormwater management system. Illicit discharges are discharges that do not consist entirely of stormwater, except for certain specified non-stormwater discharges.

In accordance with the existing MS4 permit and anticipated TS4 permit requirements, examples of discharges from the following sources are not considered illicit discharges:

- Firefighting activities*
- Foundation drains
- Water line flushing
- Footing drains
- Landscape irrigation
- Flows from riparian habitats/wetlands
- Potable water sources
- Dechlorinated swimming pool water
- Street wash waters
- Wash water from residential buildings (no detergents)

- Individual residential car washing
- Uncontaminated groundwater
- Rising groundwater
- Diverted stream flows
- Condensation from air conditioning units
- Run-on from private driveways caused by precipitation
- Lawn watering
- Water from crawl space pumps

*Water from firefighting activities is allowed and need only be addressed where they are identified as significant sources of pollutants to waters of the United States.

Based on plan review and confirmation in the field, there are no known or proposed illicit connections associated with the Bridge No B-10-001(12D) – Route 10 (Church Street) over the Fall River Project. Should an interconnection to the stormwater management system be identified, the MassDOT PM will coordinate with the District Permits Engineer to confirm if the connections are authorized. For unauthorized connections, the MassDOT PM and/or MassDOT Environmental Services Section will investigate the connections and if they are determined to be illicit, the connections will be managed through MassDOT's Illicit Discharge Detection and Elimination (IDDE) program and/or through other agencies.

2.1.7 Spill Prevention and Response

This roadway redevelopment project discharges towards wetlands adjacent to the Fall River, a cold water fishery.

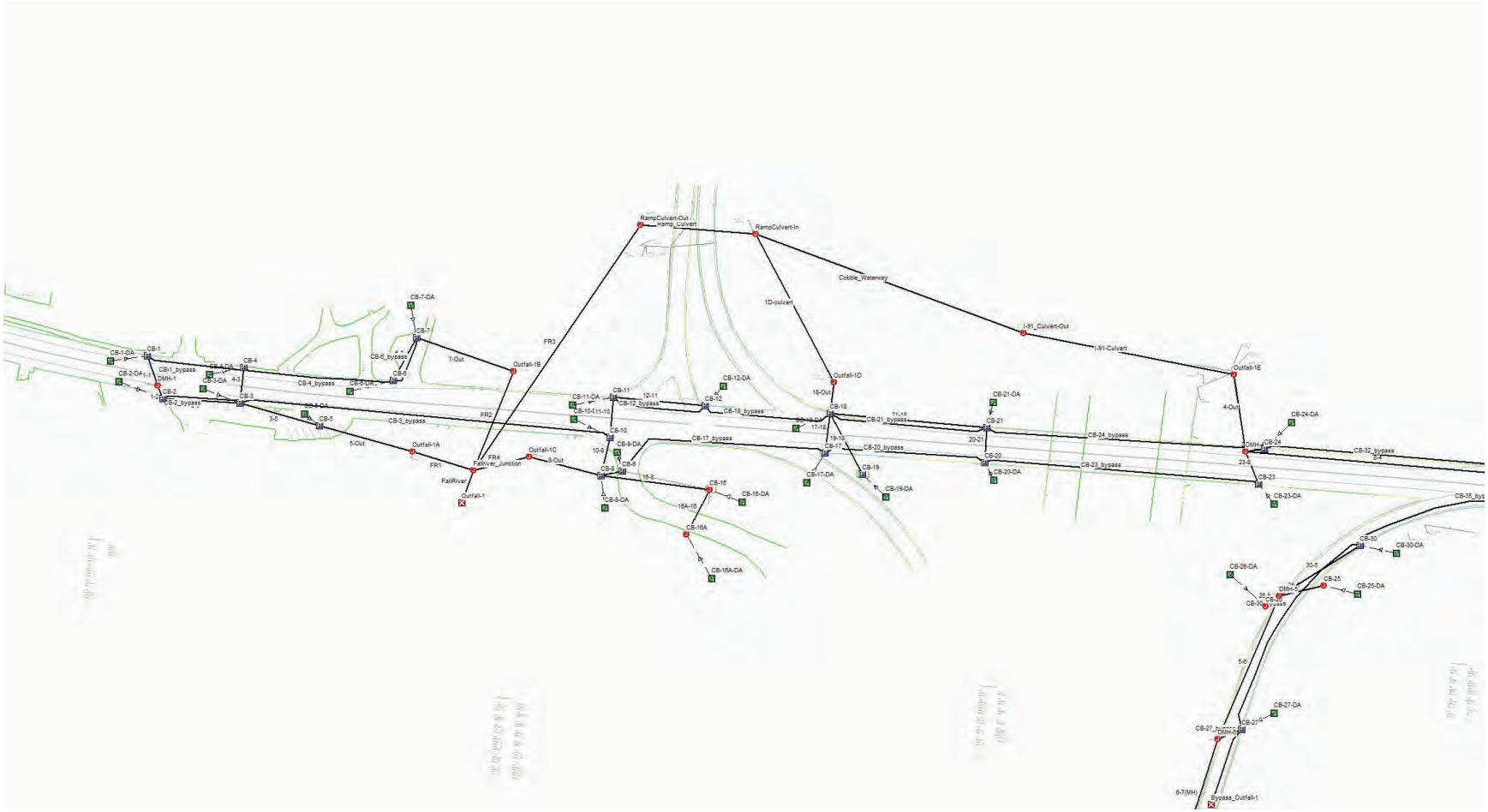
Response procedures will be implemented *at* the drainage outfalls *for* any significant release of hazardous materials such as fuels, oils, or chemical materials that have the potential of discharging to the Bordering Vegetated Wetland or the Fall River, a cold water fishery. The outlets are located north of the bridge. Spill containment measures provided nearby the site include spill kits such as booms, caps, covers, pneumatic plugs, and absorbent material.

Reportable quantities will immediately be reported to the applicable Federal, State, and local agencies as required by law. Reportable quantities of chemical, fuels, or oils are established under the Clean Water Act and enforced through MassDEP. The MassDEP Emergency Response Program shall be immediately notified in accordance with required procedures for the report of a release (telephone (888) 304-1133).

MassDOT works with first responders and/or public water supply owners to determine the best approach to protect water supplies, and provides training and materials to carry out action plans. In the case of a spill, applicable containment and clean-up procedures will be performed immediately. These procedures are implemented in accordance with the Unified Response Manual at the local level by first responders, which includes the Town of Bernardston's local public safety departments (e.g., fire, police, public works, board of health). MassDOT will be on-site to aid with traffic control and to provide clean-up supplies, as necessary. Spill material collected during the response will be promptly removed and disposed of in accordance with Federal, State, and local requirements. If necessary, a licensed emergency response contractor will assist in cleanup of releases depending on the amount of the release and the ability of the responsible party to perform the required response.

Appendix C

Stormwater Calculations



Autodesk Storm and Sanitary Analysis



Autodesk Storm and Sanitary Analysis

Project Description

File Name ..... SSA Analysis - EX2.SPF

Rainfall Details

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
49		Time Series	2-yr	Cumulative	inches	Massachusetts	Franklin	2.00	2.90	SCS Type III 24-hr

Subbasin Summary

SN	Subbasin ID	Area (ac)	Peak Rate Factor	Weighted Curve Number	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1	Bald_Mtn-DA	5.35	484.00	70.00	2.90	0.66	3.53	2.44	0 00:18:55
2	CB-10-DA	0.27	484.00	92.00	2.90	2.07	0.55	0.55	0 00:06:00
3	CB-11-DA	0.27	484.00	95.00	2.90	2.35	0.63	0.61	0 00:06:00
4	CB-12-DA	0.05	484.00	96.00	2.90	2.42	0.13	0.12	0 00:06:00
5	CB-16A-DA	1.93	484.00	43.00	2.90	0.00	0.01	0.00	0 00:22:23
6	CB-16-DA	0.82	484.00	52.00	2.90	0.11	0.09	0.01	0 00:21:09
7	CB-17-DA	0.11	484.00	91.00	2.90	1.97	0.22	0.23	0 00:06:00
8	CB-18-DA	0.13	484.00	93.00	2.90	2.15	0.29	0.29	0 00:06:00
9	CB-19-DA	0.16	484.00	39.00	2.90	0.00	0.00	0.00	0 00:11:16
10	CB-1-DA	0.41	484.00	87.00	2.90	1.65	0.68	0.70	0 00:06:29
11	CB-20-DA	0.24	484.00	95.00	2.90	2.35	0.56	0.53	0 00:06:00
12	CB-21-DA	0.21	484.00	97.00	2.90	2.56	0.54	0.50	0 00:06:00
13	CB-23-DA	0.13	484.00	91.00	2.90	1.97	0.25	0.25	0 00:06:00
14	CB-24-DA	0.17	484.00	91.00	2.90	1.98	0.33	0.33	0 00:06:00
15	CB-25-DA	0.72	484.00	52.00	2.90	0.11	0.08	0.01	0 00:08:28
16	CB-26-DA	0.19	484.00	39.00	2.90	0.00	0.00	0.00	0 00:08:43
17	CB-27-DA	0.15	484.00	96.00	2.90	2.45	0.37	0.36	0 00:06:00
18	CB-28-DA	0.97	484.00	30.00	2.90	0.00	0.00	0.00	0 00:16:31
19	CB-2-DA	0.57	484.00	68.00	2.90	0.58	0.33	0.25	0 00:11:16
20	CB-30-DA	0.24	484.00	96.00	2.90	2.45	0.59	0.56	0 00:06:00
21	CB-32-DA	0.06	484.00	92.00	2.90	2.05	0.13	0.13	0 00:06:00
22	CB-33-DA	0.08	484.00	39.00	2.90	0.00	0.00	0.00	0 00:06:00
23	CB-34A-DA	0.14	484.00	39.00	2.90	0.00	0.00	0.00	0 00:11:01
24	CB-34-DA	0.23	484.00	75.00	2.90	0.90	0.20	0.18	0 00:12:58
25	CB-35-DA	0.25	484.00	60.00	2.90	0.30	0.08	0.04	0 00:09:21
26	CB-36-DA	0.26	484.00	73.00	2.90	0.80	0.21	0.20	0 00:06:00
27	CB-3-DA	0.06	484.00	98.00	2.90	2.65	0.17	0.15	0 00:06:00
28	CB-4-DA	0.19	484.00	77.00	2.90	1.00	0.19	0.20	0 00:06:00
29	CB-5-DA	0.16	484.00	98.00	2.90	2.67	0.44	0.40	0 00:06:00
30	CB-6-DA	0.23	484.00	85.00	2.90	1.50	0.35	0.36	0 00:06:00
31	CB-7-DA	0.75	484.00	54.00	2.90	0.15	0.11	0.03	0 00:13:13
32	CB-8-DA	0.43	484.00	64.00	2.90	0.43	0.18	0.10	0 00:17:38
33	CB-9-DA	1.02	484.00	59.00	2.90	0.27	0.27	0.11	0 00:18:15
34	DI-1-DA	1.39	484.00	65.00	2.90	0.46	0.64	0.38	0 00:18:17

Node Summary

SN	Element ID	Element Type	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Initial Water Elevation (ft)	Surcharge Elevation (ft)	Ponded Area (ft^2)	Peak Inflow (cfs)	Max HGL Elevation Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	Bald_Mtn	Junction	368.00	375.00	368.00	375.00	0.00	2.44	369.02	0.00	5.98	0 00:00	0.00	0.00
2	CB-16	Junction	340.70	344.05	340.70	344.05	0.00	0.01	340.75	0.00	3.30	0 00:00	0.00	0.00
3	CB-16A	Junction	342.00	346.00	342.00	346.00	10.00	0.00	342.02	0.00	3.98	0 00:00	0.00	0.00
4	CB-25	Junction	361.40	366.92	361.40	366.92	10.00	0.01	361.43	0.00	5.49	0 00:00	0.00	0.00
5	CB-26	Junction	361.20	364.26	361.20	364.26	10.00	0.00	361.20	0.00	3.06	0 00:00	0.00	0.00
6	CB-28	Junction	342.40	348.24	342.40	348.24	10.00	0.00	342.43	0.00	5.81	0 00:00	0.00	0.00
7	CB-33	Junction	373.40	378.68	373.40	378.68	10.00	0.20	373.54	0.00	5.14	0 00:00	0.00	0.00
8	CB-34	Junction	375.40	380.10	375.40	380.10	10.00	0.18	375.53	0.00	4.57	0 00:00	0.00	0.00
9	CB-34A	Junction	378.00	382.00	378.00	382.00	0.00	0.00	378.00	0.00	4.00	0 00:00	0.00	0.00
10	CB-36	Junction	372.40	376.41	372.40	376.41	10.00	0.20	372.49	0.00	3.92	0 00:00	0.00	0.00
11	DHM-8	Junction	363.80	378.03	363.80	378.03	0.00	3.14	364.39	0.00	13.64	0 00:00	0.00	0.00
12	DI-1	Junction	368.20	371.60	368.20	371.60	10.00	0.38	368.43	0.00	3.17	0 00:00	0.00	0.00
13	DMH-1	Junction	350.80	356.38	350.80	356.38	0.00	0.53	351.07	0.00	5.31	0 00:00	0.00	0.00
14	DMH-10	Junction	367.30	377.69	367.30	377.69	0.00	2.93	368.00	0.00	9.69	0 00:00	0.00	0.00
15	DMH-4	Junction	358.90	368.92	358.90	368.92	0.00	3.36	359.17	0.00	9.75	0 00:00	0.00	0.00
16	DMH-5	Junction	359.90	366.02	359.90	366.02	0.00	0.45	360.06	0.00	5.96	0 00:00	0.00	0.00
17	DMH-6	Junction	350.30	356.18	350.30	356.18	0.00	0.85	350.53	0.00	5.65	0 00:00	0.00	0.00
18	DMH-7	Junction	342.20	348.55	342.20	348.55	0.00	0.84	342.43	0.00	6.12	0 00:00	0.00	0.00
19	DMH-9	Junction	365.10	380.10	365.10	380.10	0.00	2.92	365.92	0.00	14.18	0 00:00	0.00	0.00
20	Fallriver_Junction	Junction	325.00	331.00	325.00	331.00	0.00	6.22	325.38	0.00	19.62	0 00:00	0.00	0.00
21	I-91_Culvert-Out	Junction	330.50	340.00	330.00	340.00	0.00	3.36	331.09	0.00	8.91	0 00:00	0.00	0.00
22	Outfall-1A	Junction	335.53	341.53	335.53	341.53	0.00	1.53	335.77	0.00	5.76	0 00:00	0.00	0.00
23	Outfall-1B	Junction	339.81	345.81	339.81	345.81	0.00	0.43	339.93	0.00	5.88	0 00:00	0.00	0.00
24	Outfall-1C	Junction	335.79	341.79	335.79	341.79	0.00	1.49	336.01	0.00	5.78	0 00:00	0.00	0.00
25	Outfall-1D	Junction	336.46	342.46	336.46	342.46	0.00	1.52	336.69	0.00	5.77	0 00:00	0.00	0.00
26	Outfall-1E	Junction	333.54	339.54	333.54	339.54	0.00	3.36	334.04	0.00	5.50	0 00:00	0.00	0.00
27	RampCulvert-In	Junction	328.72	340.00	328.72	340.00	0.00	4.01	329.43	0.00	10.57	0 00:00	0.00	0.00
28	RampCulvert-Out	Junction	327.58	340.00	327.58	340.00	0.00	3.98	327.84	0.00	12.16	0 00:00	0.00	0.00
29	Bypass_Outfall-1	Outfall	351.50					0.07	351.54					
30	Outfall-1	Outfall	324.50					6.10	324.87					
31	Outfall-2	Outfall	336.00					0.84	336.22					

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length (ft)	Inlet Invert Elevation (ft)	Outlet Invert Elevation (ft)	Average Slope (%)	Diameter or Height (in)	Manning's Roughness	Peak Flow (cfs)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Reported Condition
1	8-Oct	Pipe	CB-10	CB-8	49.56	340.70	339.70	2.0200	12.000	0.0130	1.36	5.06	0.27	5.01	0.38	0.38	0.00	Calculated
2	9-Oct	Pipe	DMH-10	DMH-9	301.09	367.30	365.30	0.6600	15.000	0.0130	2.92	5.26	0.56	4.27	0.68	0.55	0.00	Calculated
3	1-Jan	Pipe	CB-1	DMH-1	40.19	351.90	350.90	2.4900	12.000	0.0130	0.53	5.62	0.09	4.22	0.22	0.22	0.00	Calculated
4	10-Jan	Pipe	DI-1	DMH-10	19.49	368.20	367.90	1.5400	12.000	0.0130	0.38	4.42	0.09	3.11	0.21	0.21	0.00	Calculated
5	10-Nov	Pipe	CB-11	CB-10	51.81	342.80	341.10	3.2800	12.000	0.0130	0.79	6.45	0.12	5.27	0.25	0.25	0.00	Calculated
6	2-Jan	Pipe	DMH-1	CB-2	17.92	350.80	350.50	1.6700	12.000	0.0130	0.53	4.61	0.11	3.38	0.25	0.26	0.00	Calculated
7	11-Dec	Pipe	CB-12	CB-11	117.27	343.40	343.20	0.1700	12.000	0.0130	0.15	1.47	0.10	1.35	0.20	0.20	0.00	Calculated
8	16-8	Pipe	CB-16	CB-8	113.87	340.70	339.70	0.8800	12.000	0.0130	0.01	3.34	0.00	1.03	0.13	0.13	0.00	Calculated
9	16A-16	Pipe	CB-16A	CB-16	64.67	342.00	340.70	2.0100	12.000	0.0150	0.00	4.38	0.00	0.39	0.03	0.03	0.00	Calculated
10	17-18	Pipe	CB-17	CB-18	50.87	348.30	347.40	1.7700	12.000	0.0130	0.28	4.74	0.06	3.18	0.17	0.17	0.00	Calculated
11	18-Out	Pipe	CB-18	Outfall-1D	39.35	347.30	336.46	27.5500	12.000	0.0130	1.52	18.70	0.08	12.21	0.22	0.22	0.00	Calculated
12	19-18	Pipe	CB-19	CB-18	87.76	348.80	347.60	1.3700	12.000	0.0130	0.00	4.17	0.00	0.00	0.00	0.00	0.00	Calculated
13	20-21	Pipe	CB-20	CB-21	44.50	354.20	353.60	1.3500	12.000	0.0130	0.47	4.14	0.11	2.94	0.26	0.26	0.00	Calculated
14	21-18	Pipe	CB-21	CB-18	199.66	353.50	347.70	2.9000	12.000	0.0130	0.92	6.12	0.15	5.52	0.27	0.27	0.00	Calculated
15	3-Feb	Pipe	CB-2	CB-3	98.25	350.50	347.70	2.8500	12.000	0.0130	0.71	6.01	0.12	4.98	0.24	0.24	0.00	Calculated
16	23-8	Pipe	CB-23	DMH-4	44.32	365.50	364.00	3.3800	12.000	0.0130	0.21	6.55	0.03	3.68	0.12	0.12	0.00	Calculated
17	24-8	Pipe	CB-24	DMH-4	23.62	365.50	363.90	6.7700	12.000	0.0130	0.29	9.27	0.03	5.08	0.13	0.13	0.00	Calculated
18	25-5	Pipe	CB-25	DMH-5	58.23	361.40	360.00	2.4000	12.000	0.0130	0.01	5.52	0.00	1.41	0.03	0.03	0.00	Calculated
19	26-5	Pipe	CB-26	DMH-5	22.16	361.20	360.30	4.0600	12.000	0.0130	0.00	7.18	0.00	0.00	0.00	0.00	0.00	Calculated
20	27-6	Pipe	CB-27	DMH-6	32.60	351.30	350.60	2.1500	12.000	0.0130	0.39	5.22	0.08	3.67	0.19	0.19	0.00	Calculated
21	28-7	Pipe	CB-28	DMH-7	34.39	342.40	342.30	0.2900	12.000	0.0130	0.00	1.92	0.00	0.13	0.08	0.08	0.00	Calculated
22	30-5	Pipe	CB-30	DMH-5	120.67	365.90	360.00	4.8900	12.000	0.0130	0.45	7.88	0.06	5.36	0.16	0.16	0.00	Calculated
23	32-8	Pipe	CB-32	DHM-8	11.96	373.10	372.20	7.5300	12.000	0.0130	0.10	9.77	0.01	3.82	0.07	0.07	0.00	Calculated
24	33-8	Pipe	CB-33	DHM-8	88.56	373.40	372.20	1.3600	15.000	0.0130	0.20	7.52	0.03	2.58	0.14	0.11	0.00	Calculated
25	34-33	Pipe	CB-34	CB-33	60.73	375.40	373.90	2.4700	12.000	0.0130	0.18	5.60	0.03	3.17	0.12	0.12	0.00	Calculated
26	34A-34	Pipe	CB-34A	CB-34	78.21	378.00	376.10	2.4300	12.000	0.0130	0.00	5.55	0.00	0.00	0.00	0.00	0.00	Calculated
27	5-Mar	Pipe	CB-3	CB-5	105.08	347.20	346.30	0.8600	15.000	0.0130	1.15	5.98	0.19	3.59	0.38	0.31	0.00	Calculated
28	35-33	Pipe	CB-35	CB-33	89.39	374.00	373.90	0.1100	12.000	0.0130	0.03	1.19	0.02	0.71	0.10	0.10	0.00	Calculated
29	36-10	Pipe	CB-36	DMH-10	56.83	372.40	368.00	7.7400	18.000	0.0130	0.20	29.23	0.01	4.67	0.09	0.06	0.00	Calculated
30	3-Apr	Pipe	CB-4	CB-3	46.27	348.10	347.70	0.8600	15.000	0.0130	0.29	6.01	0.05	2.42	0.19	0.15	0.00	Calculated
31	4-Out	Pipe	DMH-4	Outfall-1E	98.96	358.90	333.54	25.6300	15.000	0.0130	3.36	32.70	0.10	10.47	0.38	0.31	0.00	Calculated
32	6-May	Pipe	DMH-5	DMH-6	198.15	359.90	350.30	4.8400	12.000	0.0130	0.45	7.84	0.06	4.22	0.19	0.19	0.00	Calculated
33	5-Out	Pipe	CB-5	Outfall-1A	123.22	340.30	335.53	3.8700	12.000	0.0130	1.53	7.01	0.22	7.87	0.30	0.30	0.00	Calculated
34	7-Jun	Pipe	CB-6	CB-7	62.15	346.60	341.80	7.7200	12.000	0.0130	0.33	9.90	0.03	5.70	0.13	0.13	0.00	Calculated
35	6-7(MH)	Pipe	DMH-6	DMH-7	157.05	350.30	342.50	4.9700	12.000	0.0130	0.84	7.94	0.11	6.46	0.22	0.22	0.00	Calculated
36	7(MH)-Out	Pipe	DMH-7	Outfall-2	127.60	342.20	336.00	4.8600	12.000	0.0130	0.84	7.85	0.11	6.38	0.22	0.22	0.00	Calculated
37	7-Out	Pipe	CB-7	Outfall-1B	130.52	341.60	339.81	1.3700	12.000	0.0130	0.43	4.17	0.10	4.42	0.18	0.18	0.00	Calculated
38	4-Aug	Pipe	DHM-8	DMH-4	351.98	363.80	359.20	1.3100	15.000	0.0130	3.13	7.38	0.42	5.63	0.58	0.46	0.00	Calculated
39	8-Out	Pipe	CB-8	Outfall-1C	94.37	339.60	335.79	4.0400	12.000	0.0130	1.49	7.16	0.21	8.00	0.29	0.29	0.00	Calculated
40	8-Sep	Pipe	CB-9	CB-8	27.57	341.40	340.10	4.7200	12.000	0.0150	0.13	6.70	0.02	3.24	0.10	0.10	0.00	Calculated
41	9-8(MH)	Pipe	DMH-9	DHM-8	250.42	365.10	364.00	0.4400	15.000	0.0130	2.92	4.28	0.68	3.77	0.75	0.60	0.00	Calculated
42	BMtn-10	Pipe	Bald_Mtn	DMH-10	64.81	368.50	367.40	1.7000	15.000	0.0130	2.44	8.42	0.29	4.64	0.56	0.45	0.00	Calculated
43	I-91-Culvert	Pipe	Outfall-1E	I-91_Culvert-Out	240.00	333.54	330.50	1.2700	24.000	0.0130	3.36	25.46	0.13	4.90	0.54	0.27	0.00	Calculated
44	Ramp_Culvert	Pipe	RampCulvert-In	RampCulvert-Out	134.00	328.72	327.58	0.8500	24.000	0.0130	3.98	20.87	0.19	6.75	0.49	0.24	0.00	Calculated
45	1D-culvert	Channel	Outfall-1D	RampCulvert-In	213.55	336.46	328.72	3.6200	36.000	0.0320	1.52	168.37	0.01	1.71	0.43	0.14	0.00	
46	CB-1_bypass	Channel	CB-1	CB-4	126.22	356.30	352.48	3.0300	6.000	0.0130	0.17	50.08	0.00	1.67	0.06	0.13	0.00	

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Proposal No. 612159-136484

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length (ft)	Inlet Invert Elevation (ft)	Outlet Invert Elevation (ft)	Average Slope (%)	Diameter or Height (in)	Manning's Roughness	Peak Flow (cfs)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Reported Condition
47	CB-12_bypass	Channel	CB-12	CB-11	124.46	348.19	346.64	1.2500	6.000	0.0160	0.04	26.10	0.00	0.62	0.07	0.15	0.00	
48	CB-17_bypass	Channel	CB-17	CB-9	277.20	352.17	346.02	2.2200	6.000	0.0160	0.06	34.84	0.00	1.82	0.04	0.08	0.00	
49	CB-18_bypass	Channel	CB-18	CB-12	166.98	351.79	348.19	2.1600	6.000	0.0160	0.07	33.52	0.00	1.30	0.05	0.09	0.00	
50	CB-2_bypass	Channel	CB-2	CB-3	100.68	355.60	353.17	2.4100	6.000	0.0160	0.05	36.34	0.00	1.08	0.04	0.08	0.00	
51	CB-20_bypass	Channel	CB-20	CB-17	207.40	358.45	352.17	3.0300	6.000	0.0160	0.11	39.73	0.00	1.52	0.05	0.11	0.00	
52	CB-21_bypass	Channel	CB-21	CB-18	202.68	358.38	351.79	3.2500	6.000	0.0160	0.10	41.17	0.00	1.50	0.05	0.10	0.00	
53	CB-23_bypass	Channel	CB-23	CB-20	350.32	369.60	358.45	3.1800	6.000	0.0160	0.05	40.73	0.00	0.83	0.05	0.10	0.00	
54	CB-24_bypass	Channel	CB-24	CB-21	354.71	369.68	353.60	4.5300	6.000	0.0160	0.07	45.09	0.00	0.78	0.04	0.08	0.00	
55	CB-27_bypass	Channel	CB-27	Bypass_Outfall-1	103.70	356.41	351.50	4.7300	6.000	0.0160	0.07	49.68	0.00	1.54	0.04	0.09	0.00	
56	CB-3_bypass	Channel	CB-3	CB-10	475.34	353.17	347.37	1.2200	6.000	0.0160	0.04	25.22	0.00	0.74	0.07	0.14	0.00	
57	CB-30_bypass	Channel	CB-30	CB-27	294.84	370.42	356.41	4.7500	6.000	0.0160	0.11	49.76	0.00	1.92	0.05	0.09	0.00	
58	CB-32_bypass	Channel	CB-32	CB-24	340.69	377.88	369.68	2.4100	6.000	0.0160	0.03	35.42	0.00	1.06	0.03	0.07	0.00	
59	CB-35_bypass	Channel	CB-35	CB-30	379.72	379.37	370.42	2.3600	6.000	0.0160	0.01	35.05	0.00	0.45	0.03	0.07	0.00	
60	CB-4_bypass	Channel	CB-4	CB-6	192.15	352.48	349.21	1.7000	6.000	0.0160	0.08	30.52	0.00	2.20	0.04	0.07	0.00	
61	CB-6_bypass	Channel	CB-6	CB-7	70.37	349.21	344.57	6.5900	6.000	0.0160	0.30	179.60	0.00	0.00	0.01	0.01	0.00	
62	Cobble_Waterway	Channel	I-91_Culvert-Out	RampCulvert-In	363.16	330.50	328.72	0.4900	36.000	0.0320	3.33	104.81	0.03	1.55	0.65	0.22	0.00	
63	FallRiver	Channel	Fallriver_Junction	Outfall-1	100.00	325.00	324.50	0.5000	240.000	0.0320	6.10	8532.83	0.00	1.58	0.37	0.02	0.00	
64	FR1	Channel	Outfall-1A	Fallriver_Junction	84.74	335.53	325.00	12.4300	12.000	0.0320	1.53	21.24	0.07	4.22	0.30	0.30	0.00	
65	FR2	Channel	Outfall-1B	Fallriver_Junction	138.29	339.81	325.00	10.7100	12.000	0.0320	0.43	19.71	0.02	1.67	0.24	0.24	0.00	
66	FR3	Channel	RampCulvert-Out	Fallriver_Junction	378.68	327.58	325.00	0.6800	120.000	0.0320	3.96	855.32	0.00	1.27	0.31	0.03	0.00	
67	FR4	Channel	Outfall-1C	Fallriver_Junction	71.36	335.79	325.00	15.1200	12.000	0.0320	1.49	23.43	0.06	4.29	0.30	0.30	0.00	

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Proposal No. 612159-136484

Inlet Summary

SN	Element ID	Inlet Manufacturer	Manufacturer Part Number	Inlet Location	Number of Inlets	Catchbasin Invert Elevation (ft)	Max (Rim) Elevation (ft)	Initial Water Elevation (ft)	Ponded Area (ft^2)	Peak Flow (cfs)	Peak Flow Intercepted by Inlet (cfs)	Peak Flow Bypassing Inlet (cfs)	Inlet Efficiency during Peak Flow (%)	Allowable Spread (ft)	Max Gutter Spread during Peak Flow (ft)	Max Gutter Water Elev. during Peak Flow (ft)
1	CB-1	FHWA HEC-22 GENERIC	N/A	On Grade	1	351.90	356.30	351.90	N/A	0.70	0.54	0.17	76.31	10.50	5.08	356.40
2	CB-10	FHWA HEC-22 GENERIC	N/A	On Sag	1	340.70	347.37	340.70	10.00	0.59	N/A	N/A	N/A	10.50	6.12	347.47
3	CB-11	FHWA HEC-22 GENERIC	N/A	On Sag	1	342.80	346.64	342.80	10.00	0.64	N/A	N/A	N/A	10.50	6.41	346.75
4	CB-12	FHWA HEC-22 GENERIC	N/A	On Grade	1	343.40	348.19	343.40	N/A	0.19	0.18	0.01	94.41	10.50	3.14	348.25
5	CB-17	FHWA HEC-22 GENERIC	N/A	On Grade	1	348.30	352.17	348.30	N/A	0.34	0.30	0.04	87.25	10.50	3.90	352.25
6	CB-18	FHWA HEC-22 GENERIC	N/A	On Grade	1	347.30	351.79	347.30	N/A	0.39	0.33	0.06	85.37	10.50	4.10	351.87
7	CB-19	FHWA HEC-22 GENERIC	N/A	On Sag	2	348.80	350.66	348.80	10.00	0.00	N/A	N/A	N/A	10.50	1.00	350.74
8	CB-2	FHWA HEC-22 GENERIC	N/A	On Grade	1	350.50	355.60	350.60	N/A	0.25	0.23	0.02	91.37	10.50	3.47	355.67
9	CB-20	FHWA HEC-22 GENERIC	N/A	On Grade	1	354.20	358.45	354.20	N/A	0.58	0.46	0.12	79.19	10.50	4.76	358.55
10	CB-21	FHWA HEC-22 GENERIC	N/A	On Grade	1	353.60	358.38	353.60	N/A	0.56	0.45	0.12	79.54	10.50	4.72	358.47
11	CB-23	FHWA HEC-22 GENERIC	N/A	On Grade	1	365.50	369.60	365.50	N/A	0.25	0.23	0.02	91.33	10.50	3.48	369.67
12	CB-24	FHWA HEC-22 GENERIC	N/A	On Grade	1	365.50	369.68	365.50	N/A	0.36	0.31	0.05	86.58	10.50	3.97	369.76
13	CB-27	FHWA HEC-22 GENERIC	N/A	On Grade	1	351.30	356.41	351.30	N/A	0.46	0.40	0.07	85.71	10.50	4.00	356.49
14	CB-3	FHWA HEC-22 GENERIC	N/A	On Grade	1	347.20	353.17	347.20	N/A	0.19	0.18	0.01	92.59	10.50	3.40	353.24
15	CB-30	FHWA HEC-22 GENERIC	N/A	On Grade	1	365.90	370.42	365.90	N/A	0.56	0.46	0.11	81.15	10.50	4.50	370.51
16	CB-32	FHWA HEC-22 GENERIC	N/A	On Grade	1	373.10	377.88	373.10	N/A	0.13	0.13	0.01	95.24	10.50	3.13	377.94
17	CB-35	FHWA HEC-22 GENERIC	N/A	On Grade	1	374.00	379.37	374.00	N/A	0.04	0.04	0.00	99.97	10.50	2.13	379.41
18	CB-4	FHWA HEC-22 GENERIC	N/A	On Grade	1	348.10	352.48	348.10	N/A	0.37	0.31	0.06	83.60	10.50	4.39	352.57
19	CB-5	FHWA HEC-22 GENERIC	N/A	On Sag	1	340.30	350.66	340.30	10.00	0.40	N/A	N/A	N/A	10.50	4.94	350.33
20	CB-6	FHWA HEC-22 GENERIC	N/A	On Grade	1	346.60	349.21	346.60	N/A	0.44	0.34	0.09	78.25	10.50	5.31	349.32
21	CB-7	FHWA HEC-22 GENERIC	N/A	On Sag	1	341.60	344.57	341.60	10.00	0.03	N/A	N/A	N/A	10.50	1.65	344.05
22	CB-8	FHWA HEC-22 GENERIC	N/A	On Sag	1	339.60	345.67	339.60	10.00	0.10	N/A	N/A	N/A	10.50	2.61	345.79
23	CB-9	FHWA HEC-22 GENERIC	N/A	On Sag	1	341.40	346.02	341.40	0.00	0.13	N/A	N/A	N/A	10.50	2.90	346.14

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Proposal No. 612159-136484

Subbasin Hydrology

Subbasin : Bald_Mtn-DA

Input Data

Area (ac) 5.35
Peak Rate Factor 484
Weighted Curve Number 70
Rain Gage ID ..... *

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	5.35	-	70
Composite Area & Weighted CN	5.35		70

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

Where :

Tc = Time of Concentration (hr)
n = Manning's roughness
Lf = Flow Length (ft)
P = 2 yr, 24 hr Rainfall (inches)
Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 * (Sf^0.5) (unpaved surface)
V = 20.3282 * (Sf^0.5) (paved surface)
V = 15.0 * (Sf^0.5) (grassed waterway surface)
V = 10.0 * (Sf^0.5) (nearly bare & untilled surface)
V = 9.0 * (Sf^0.5) (cultivated straight rows surface)
V = 7.0 * (Sf^0.5) (short grass pasture surface)
V = 5.0 * (Sf^0.5) (woodland surface)
V = 2.5 * (Sf^0.5) (forest w/heavy litter surface)
Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)

Channel Flow Equation :

V = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
R = Aq / Wp
Tc = (Lf / V) / (3600 sec/hr)

Where :

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
R = Hydraulic Radius (ft)
Aq = Flow Area (ft^2)
Wp = Wetted Perimeter (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)
n = Manning's roughness

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.8	0	0
Flow Length (ft) :	50	0	0
Slope (%) :	3.5	0	0
2 yr, 24 hr Rainfall (in) :	2.9	0	0
Velocity (ft/sec) :	0.05	0	0
Computed Flow Time (min) :	18.03	0	0

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	78	0	0
Slope (%) :	5	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	3.61	0	0
Computed Flow Time (min) :	0.36	0	0

Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0	0
Flow Length (ft) :	980	0	0
Channel Slope (%) :	5	0	0
Cross Section Area (ft^2) :	0.8	0	0
Wetted Perimeter (ft) :	0.6	0	0
Velocity (ft/sec) :	31.05	0	0
Computed Flow Time (min) :	0.53	0	0

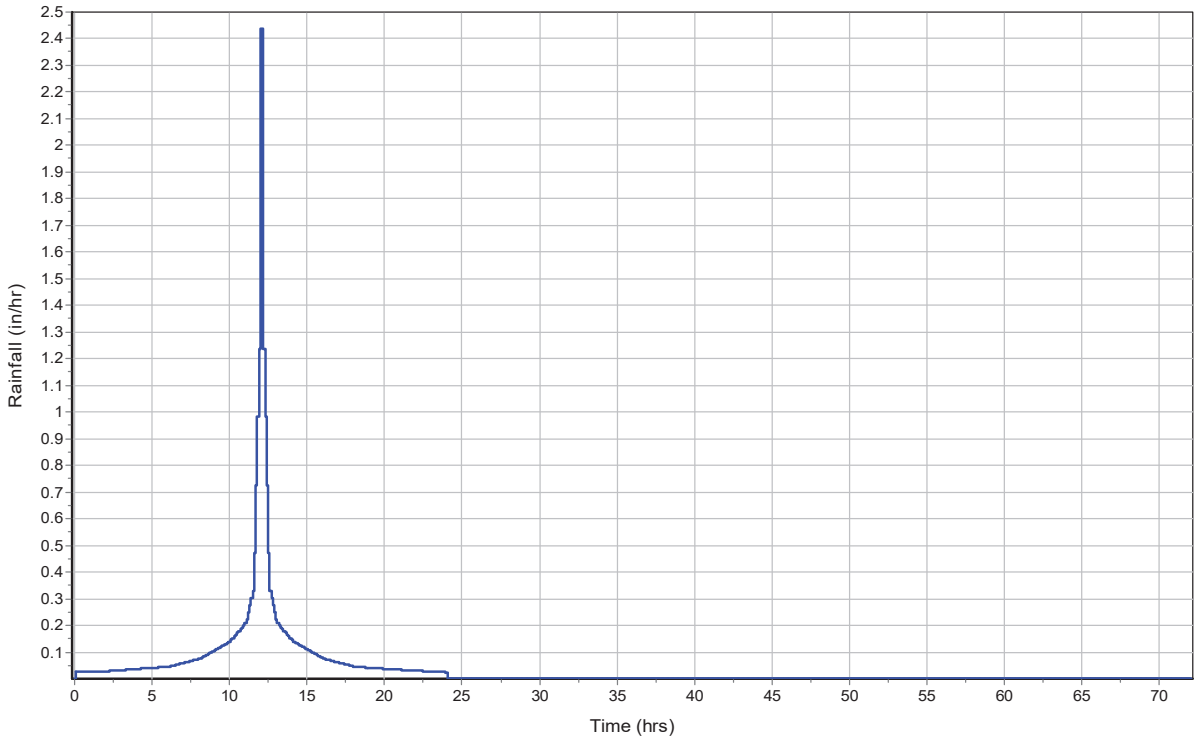
Total TOC (min) 18.92

Subbasin Runoff Results

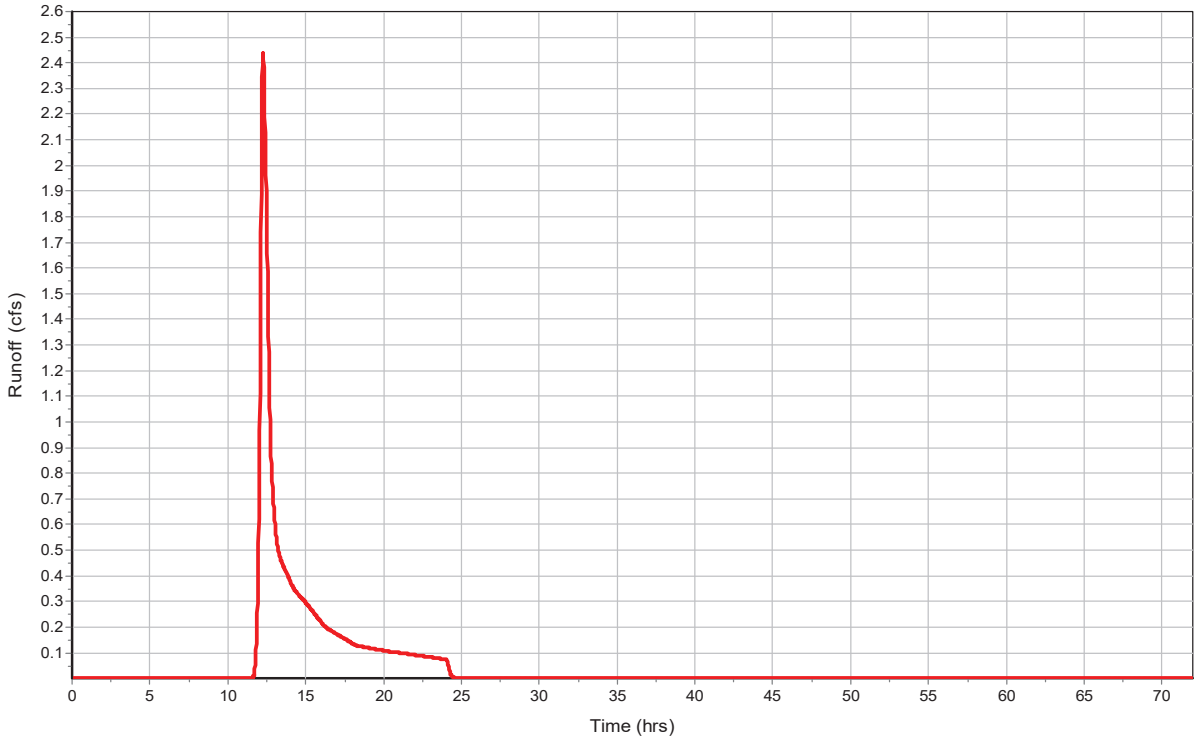
Total Rainfall (in)	2.9
Total Runoff (in)	0.66
Peak Runoff (cfs)	2.44
Weighted Curve Number	70
Time of Concentration (days hh:mm:ss)	0 00:18:55

Subbasin : Bald_Mtn-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-10-DA

Input Data

Area (ac)	0.27
Peak Rate Factor	484
Weighted Curve Number	92
Rain Gage ID	*

Composite Curve Number

32

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.27	-	92
Composite Area & Weighted CN	0.27		92

Time of Concentration

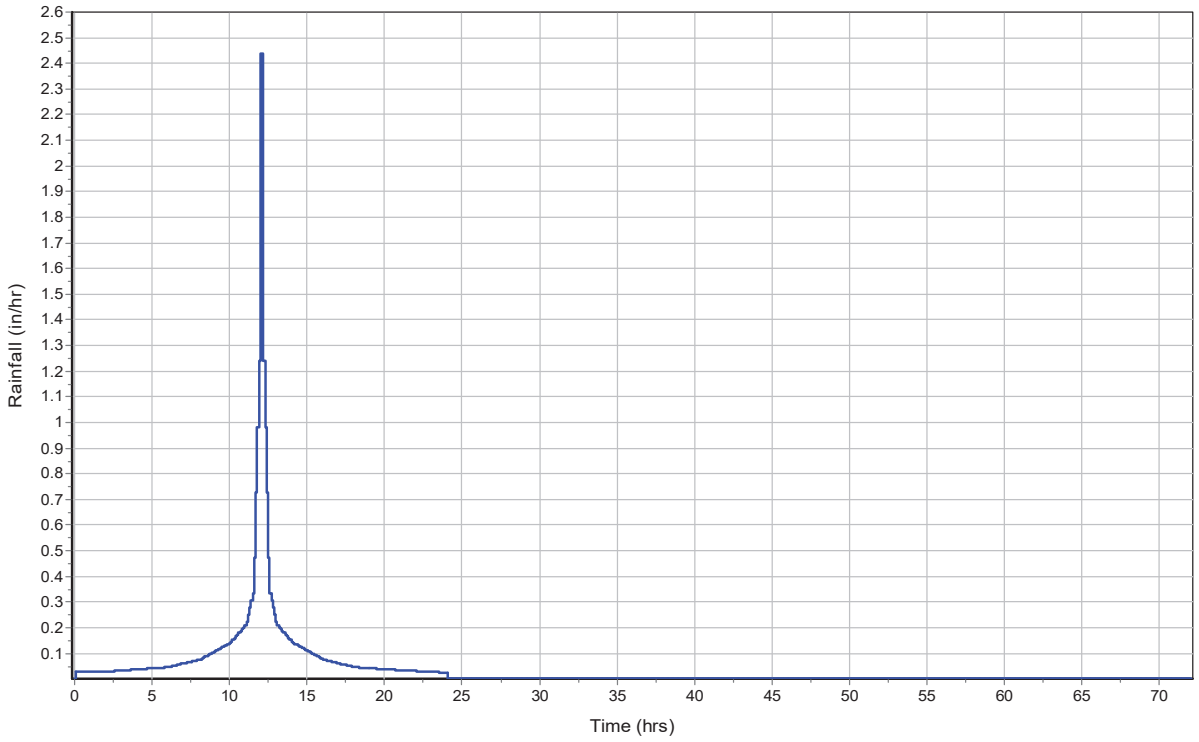
User-Defined TOC override (minutes): 6

Subbasin Runoff Results

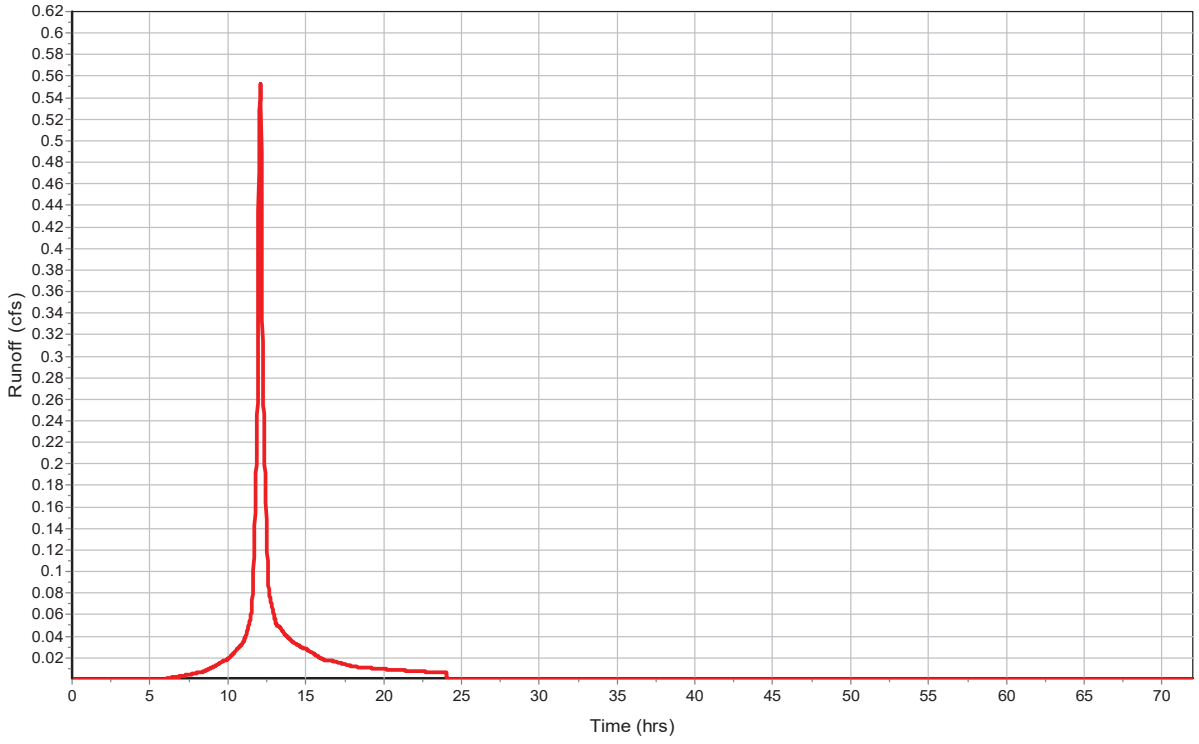
Total Rainfall (in)	2.9
Total Runoff (in)	2.07
Peak Runoff (cfs)	0.55
Weighted Curve Number	92
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : CB-10-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-11-DA

Input Data

Area (ac) 0.27
Peak Rate Factor 484
Weighted Curve Number 95
Rain Gage ID ..... *

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.27	-	95
Composite Area & Weighted CN	0.27		95

Time of Concentration

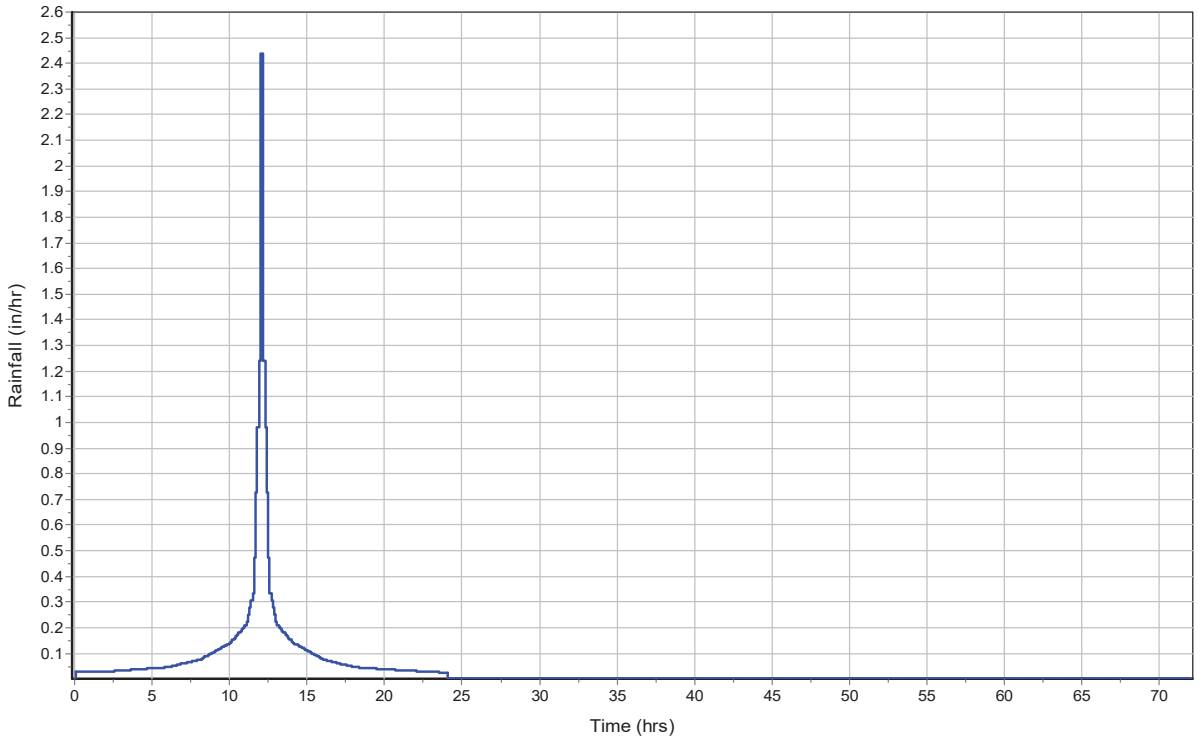
User-Defined TOC override (minutes): 6

Subbasin Runoff Results

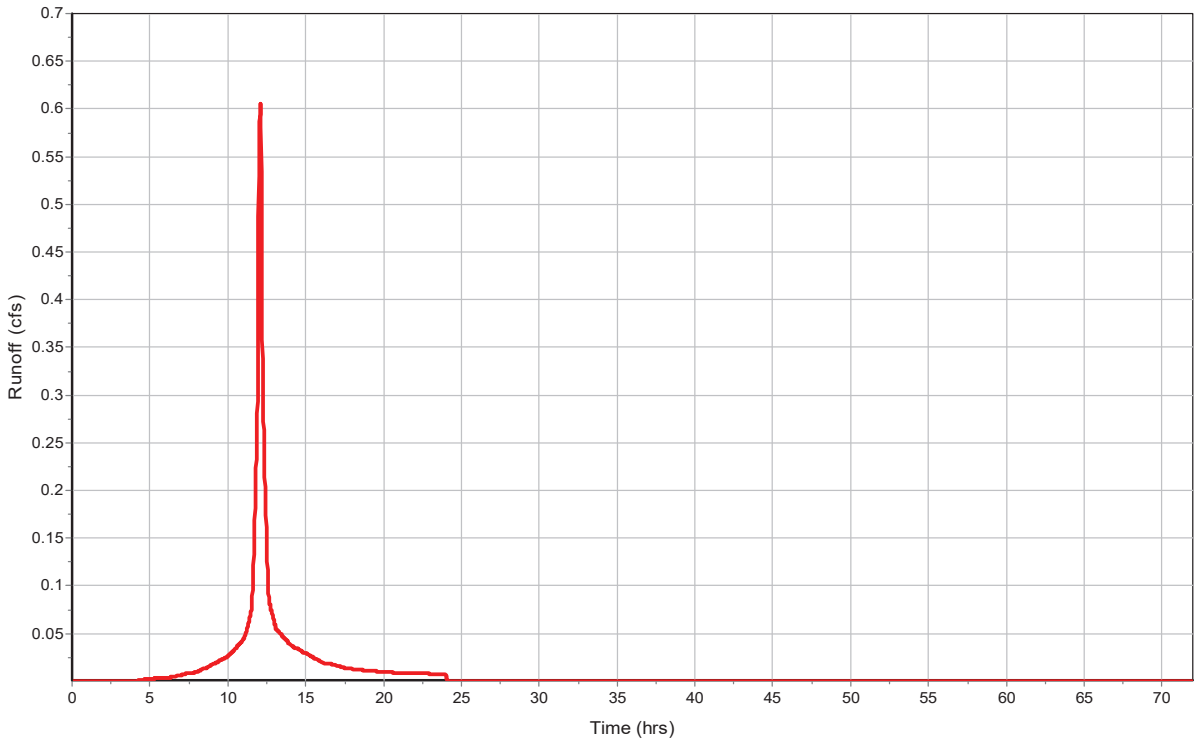
Total Rainfall (in) 2.9
Total Runoff (in) 2.35
Peak Runoff (cfs) 0.61
Weighted Curve Number 95
Time of Concentration (days hh:mm:ss) 0 00:06:00

Subbasin : CB-11-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-12-DA

Input Data

Area (ac) 0.05
Peak Rate Factor 484
Weighted Curve Number 96
Rain Gage ID ..... *

Composite Curve Number

32

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.05	-	96
Composite Area & Weighted CN	0.05		96

Time of Concentration

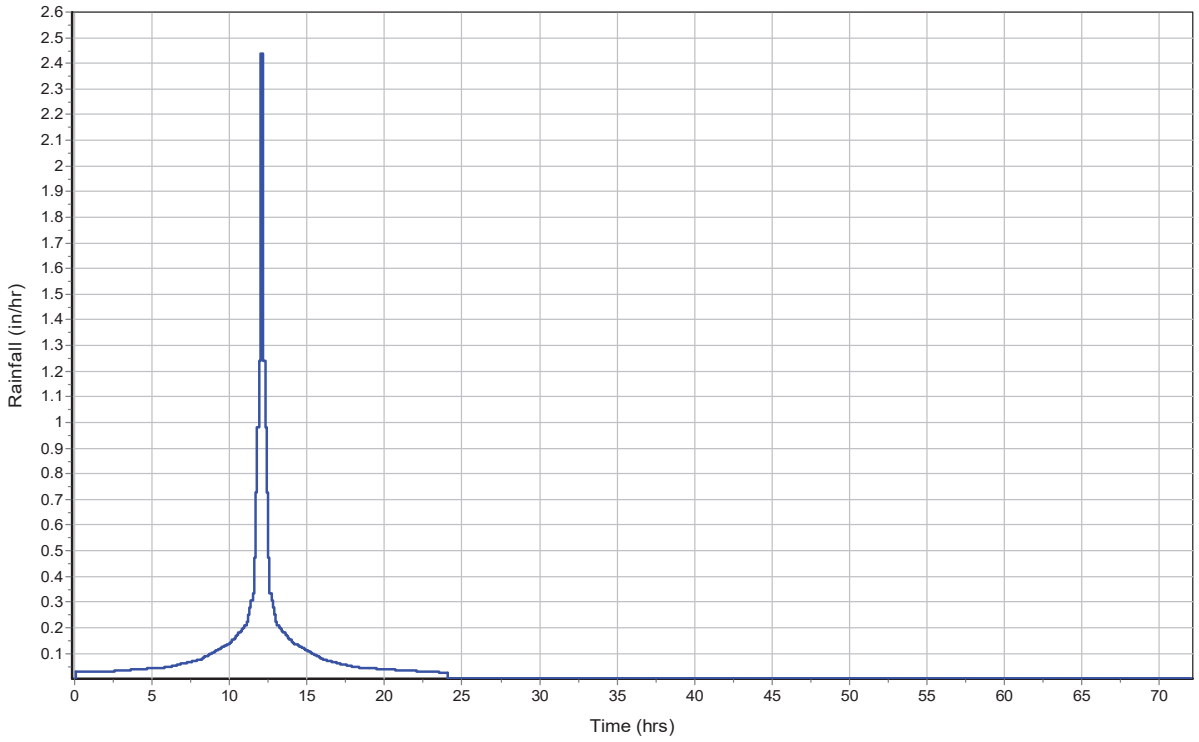
User-Defined TOC override (minutes): 6.00

Subbasin Runoff Results

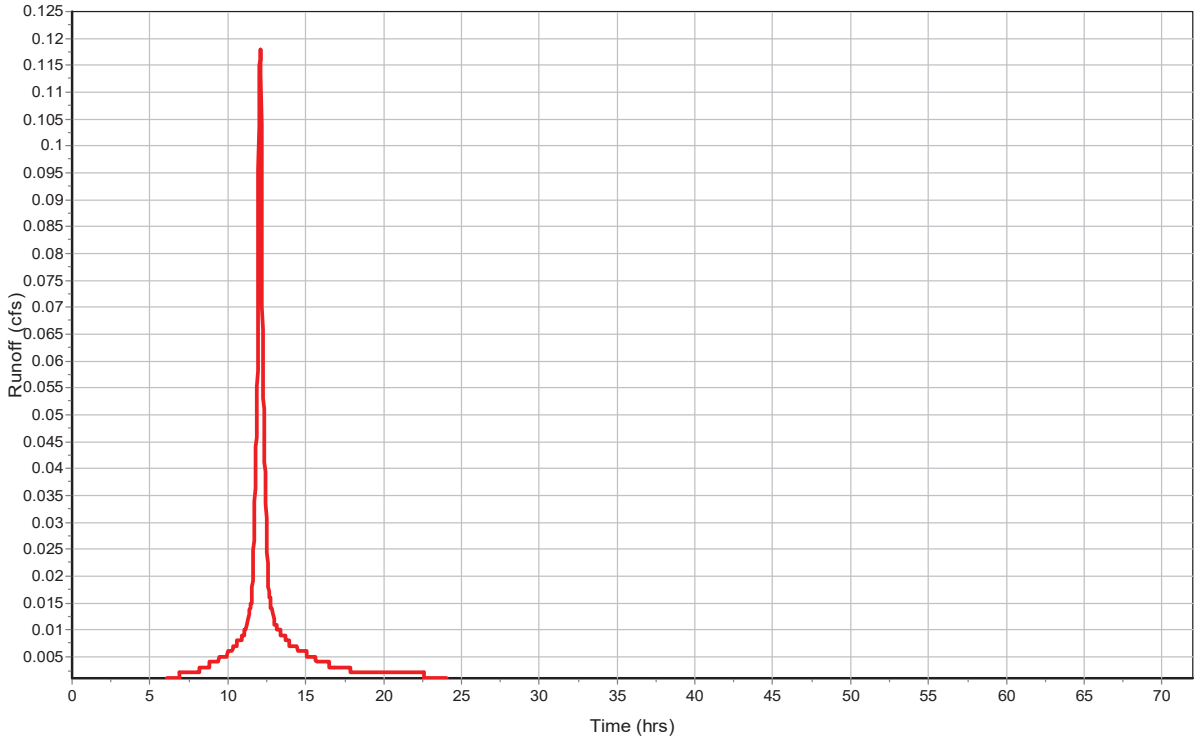
Total Rainfall (in) 2.9
Total Runoff (in) 2.42
Peak Runoff (cfs) 0.12
Weighted Curve Number 96
Time of Concentration (days hh:mm:ss) 0 00:06:00

Subbasin : CB-12-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-16A-DA

Input Data

Area (ac) 1.93
Peak Rate Factor 484
Weighted Curve Number 43
Rain Gage ID ..... *

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	1.93	-	43
Composite Area & Weighted CN	1.93		43

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	50	0	0
Slope (%) :	1.5	0	0
2 yr, 24 hr Rainfall (in) :	2.9	0	0
Velocity (ft/sec) :	0.06	0	0
Computed Flow Time (min) :	14.54	0	0

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	350	0	0
Slope (%) :	1.5	0	0
Surface Type :	Grass pasture	Unpaved	Unpaved
Velocity (ft/sec) :	0.86	0	0
Computed Flow Time (min) :	6.78	0	0

Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.27	0	0
Flow Length (ft) :	104	0	0
Channel Slope (%) :	1	0	0
Cross Section Area (ft^2) :	2	0	0
Wetted Perimeter (ft) :	0.4	0	0
Velocity (ft/sec) :	1.61	0	0
Computed Flow Time (min) :	1.07	0	0

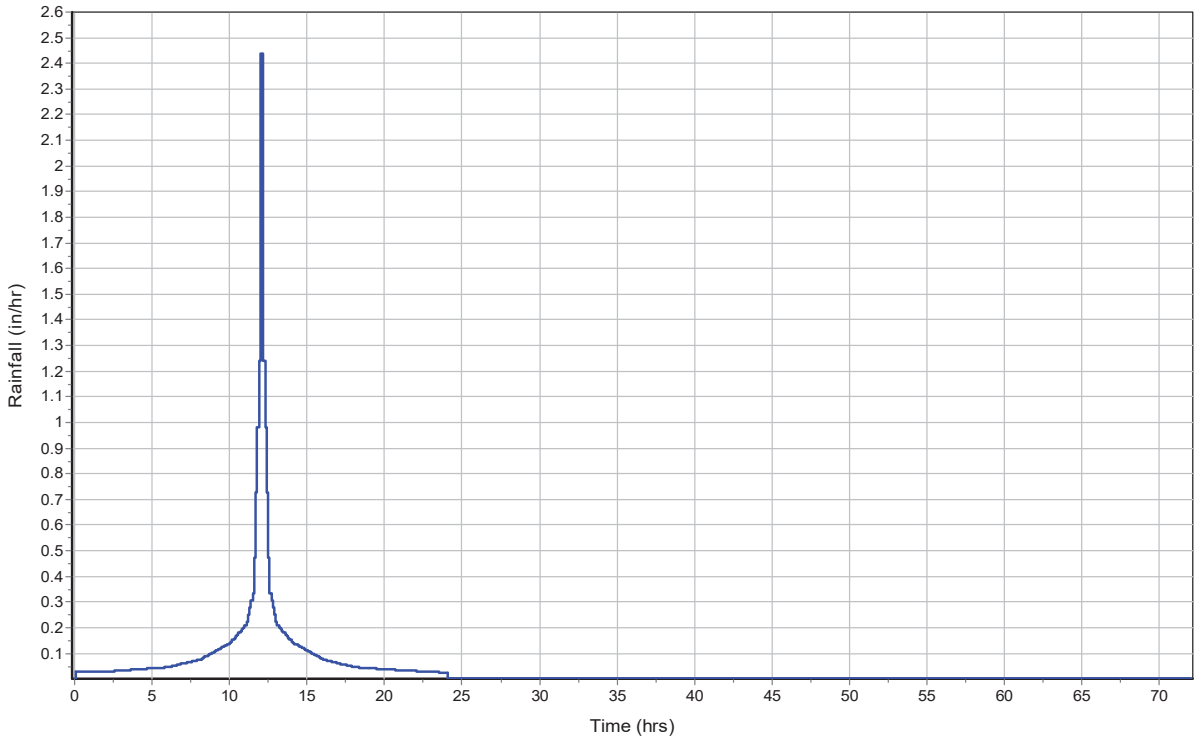
Total TOC (min) 22.39

Subbasin Runoff Results

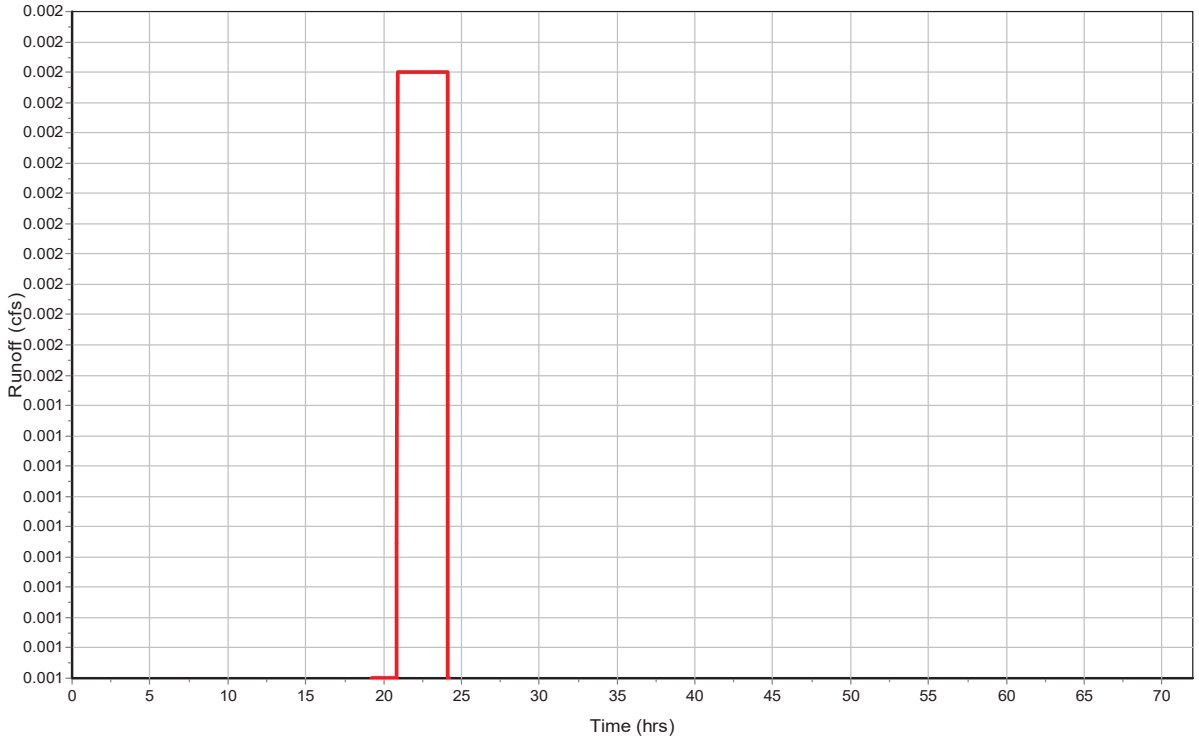
Total Rainfall (in) 2.9
Total Runoff (in) 0
Peak Runoff (cfs) 0
Weighted Curve Number 43
Time of Concentration (days hh:mm:ss) 0 00:22:23

Subbasin : CB-16A-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-16-DA

Input Data

Area (ac)	0.82
Peak Rate Factor	484
Weighted Curve Number	52
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.82	-	52
Composite Area & Weighted CN	0.82		52

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.6	0	0
Flow Length (ft) :	50	0	0
Slope (%) :	2.1	0	0
2 yr, 24 hr Rainfall (in) :	2.9	0	0
Velocity (ft/sec) :	0.05	0	0
Computed Flow Time (min) :	17.57	0	0

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	213	0	0
Slope (%) :	2	0	0
Surface Type :	Grass pasture	Unpaved	Unpaved
Velocity (ft/sec) :	0.99	0	0
Computed Flow Time (min) :	3.59	0	0

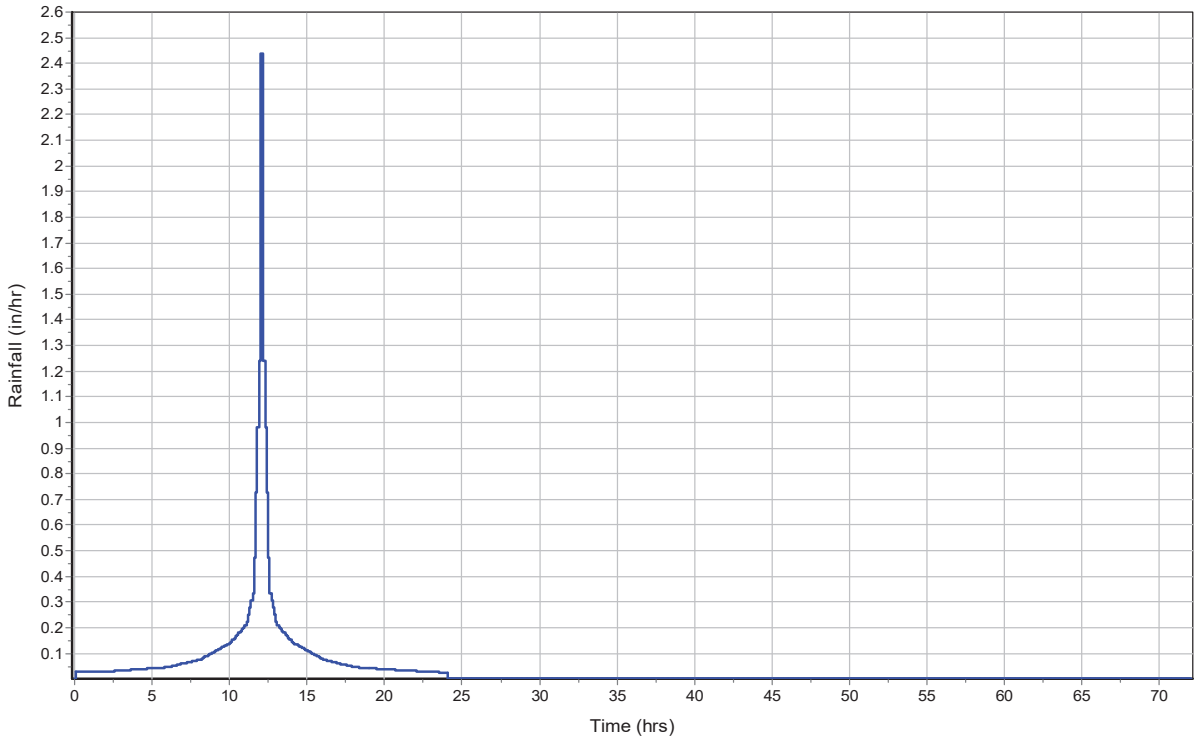
Total TOC (min) 21.16

Subbasin Runoff Results

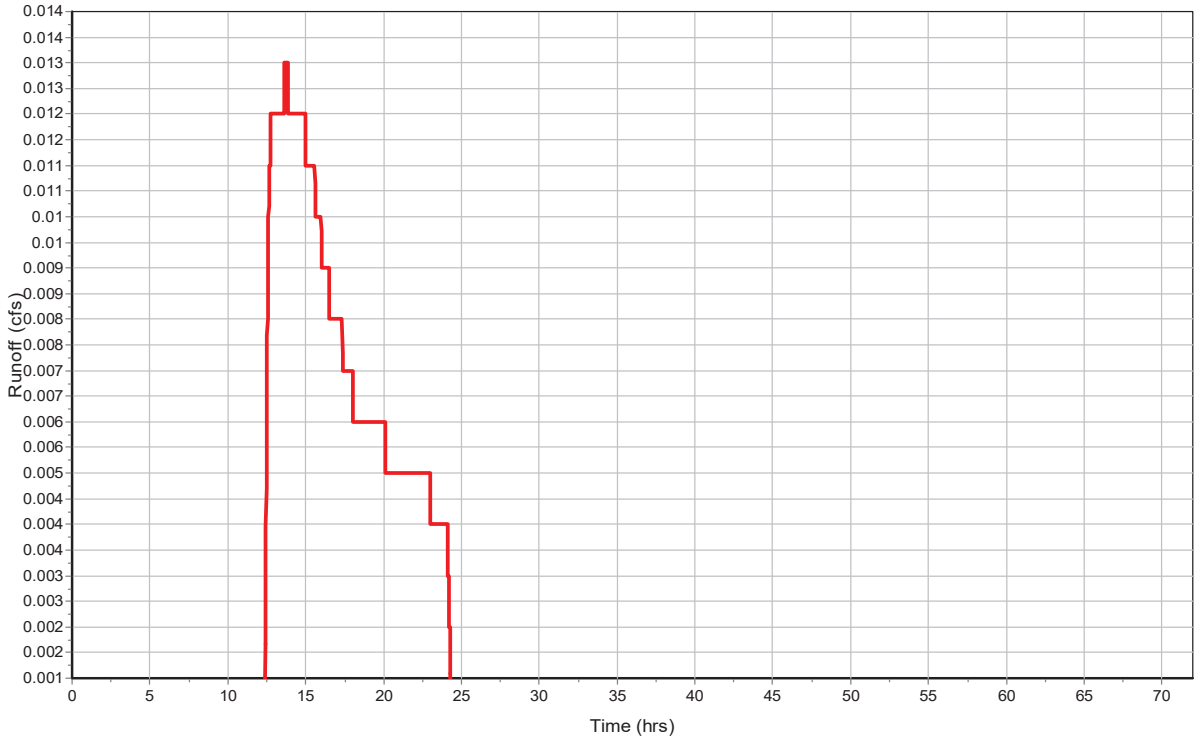
Total Rainfall (in)	2.9
Total Runoff (in)	0.11
Peak Runoff (cfs)	0.01
Weighted Curve Number	52
Time of Concentration (days hh:mm:ss)	0 00:21:10

Subbasin : CB-16-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-17-DA

Input Data

Area (ac) 0.11
Peak Rate Factor 484
Weighted Curve Number 91
Rain Gage ID ..... *

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.11	-	91
Composite Area & Weighted CN	0.11		91

Time of Concentration

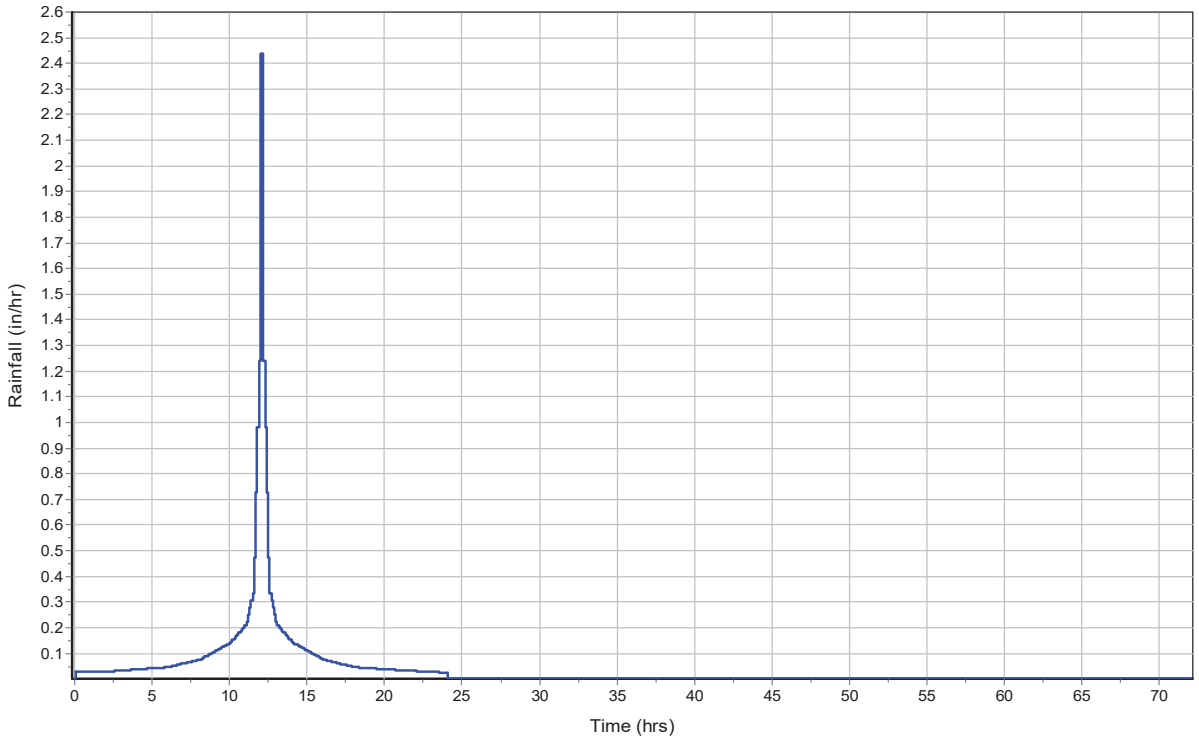
User-Defined TOC override (minutes): 6

Subbasin Runoff Results

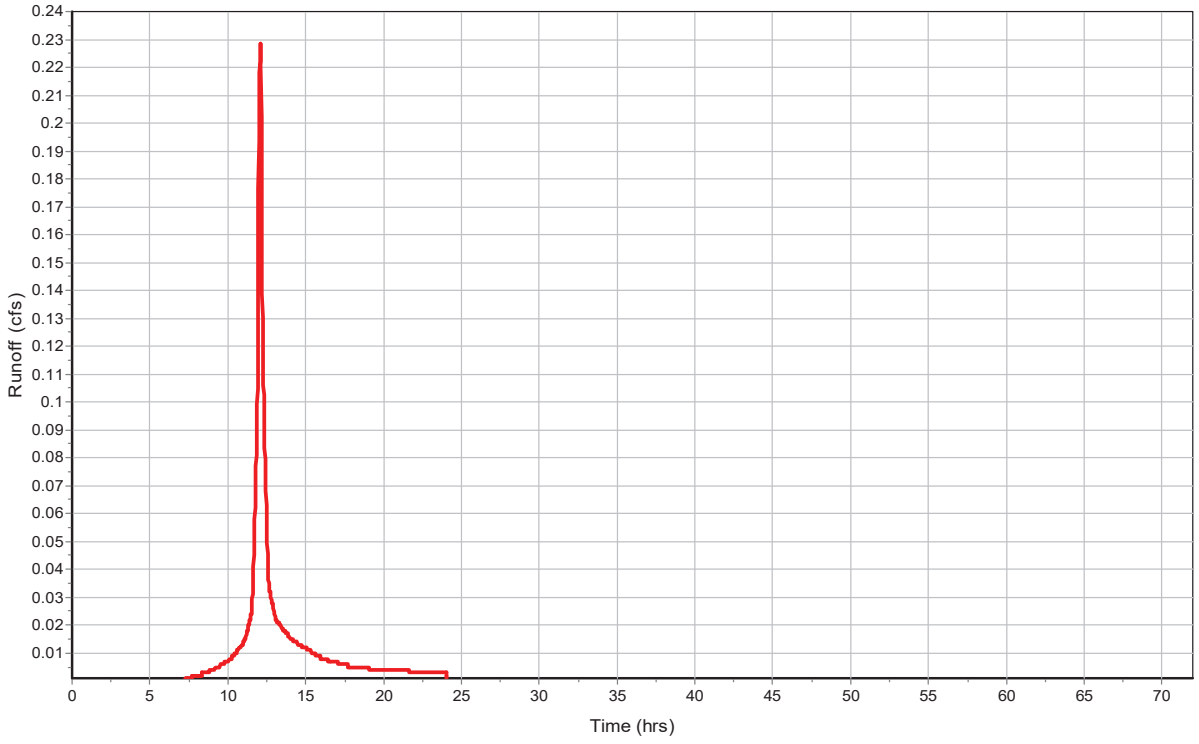
Total Rainfall (in) 2.9
Total Runoff (in) 1.97
Peak Runoff (cfs) 0.23
Weighted Curve Number 91
Time of Concentration (days hh:mm:ss) 0 00:06:00

Subbasin : CB-17-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-18-DA

Input Data

Area (ac)	0.13
Peak Rate Factor	484
Weighted Curve Number	93
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.13	-	93
Composite Area & Weighted CN	0.13		93

Time of Concentration

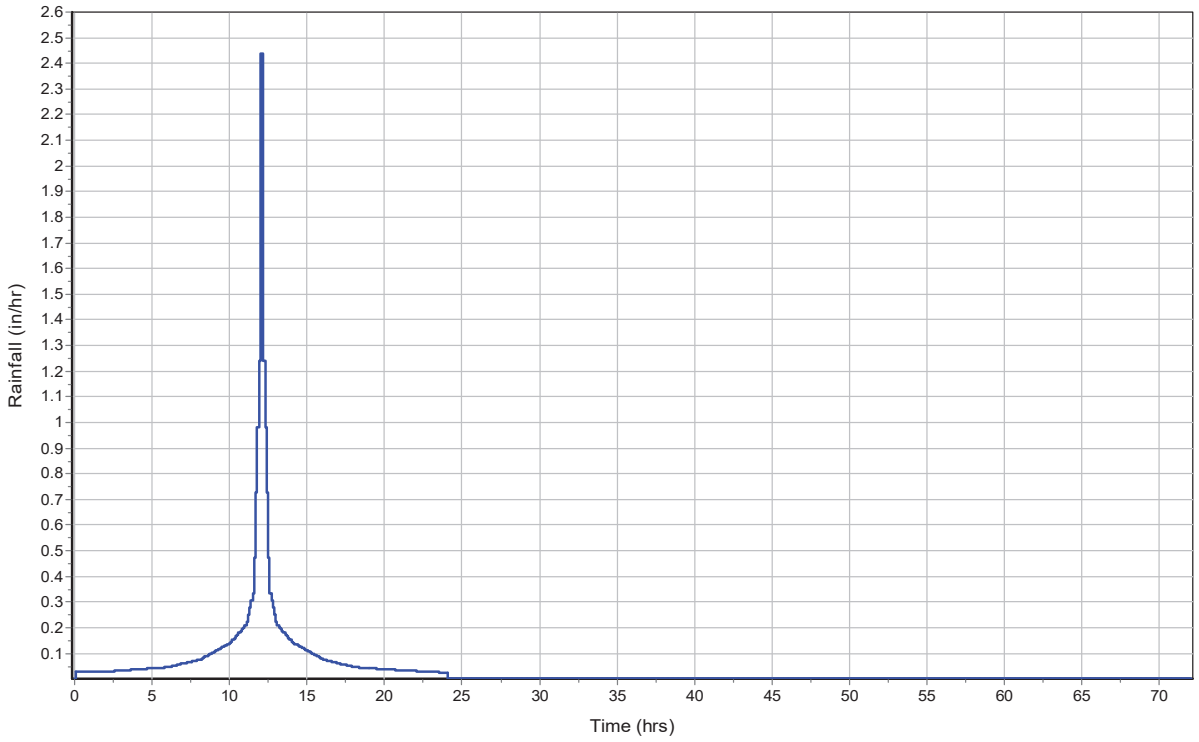
User-Defined TOC override (minutes): 6

Subbasin Runoff Results

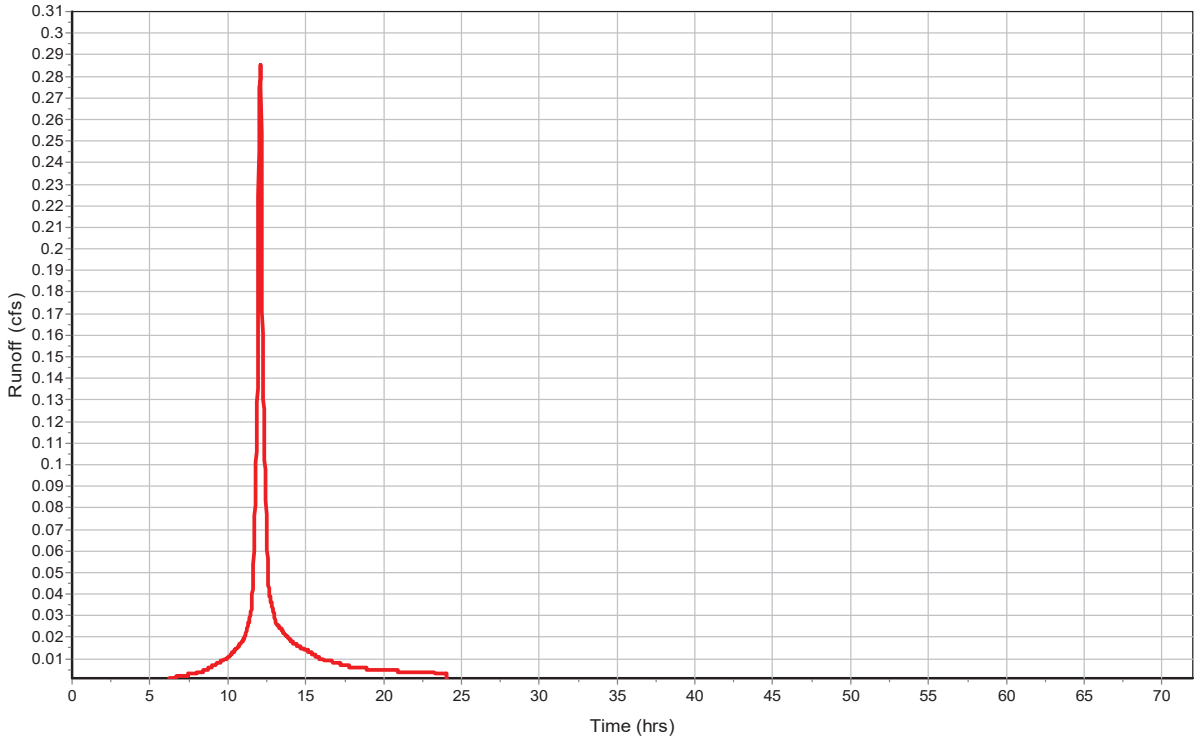
Total Rainfall (in)	2.9
Total Runoff (in)	2.15
Peak Runoff (cfs)	0.29
Weighted Curve Number	93
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : CB-18-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-19-DA

Input Data

Area (ac)	0.16
Peak Rate Factor	484
Weighted Curve Number	39
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.16	-	39
Composite Area & Weighted CN	0.16		39

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	50	0	0
Slope (%) :	4	0	0
2 yr, 24 hr Rainfall (in) :	2.9	0	0
Velocity (ft/sec) :	0.08	0	0
Computed Flow Time (min) :	9.82	0	0

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	122	0	0
Slope (%) :	4	0	0
Surface Type :	Grass pasture	Unpaved	Unpaved
Velocity (ft/sec) :	1.4	0	0
Computed Flow Time (min) :	1.45	0	0

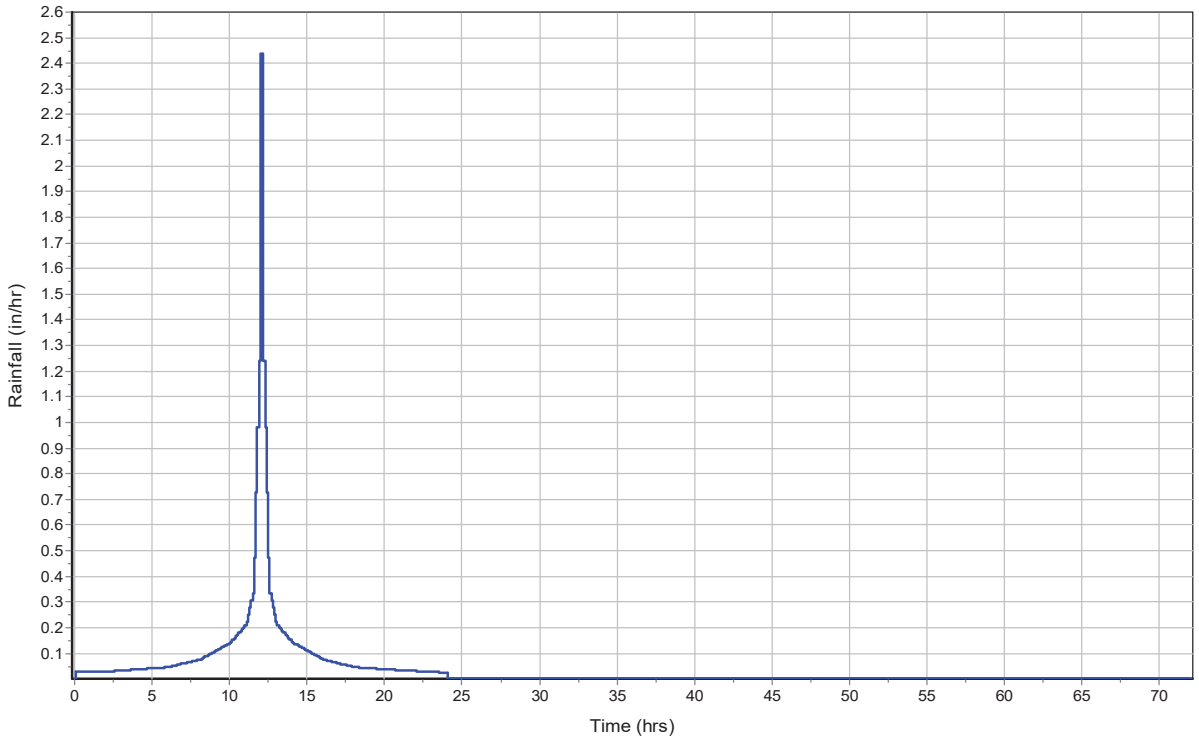
Total TOC (min) 11.27

Subbasin Runoff Results

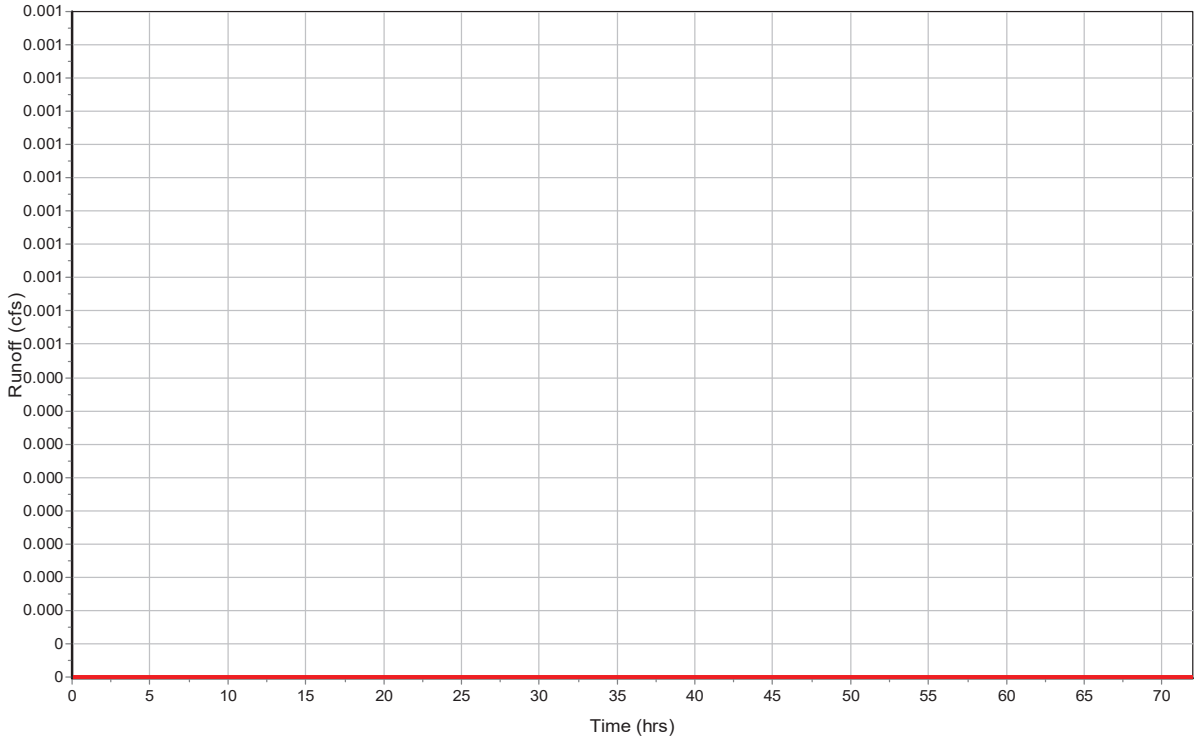
Total Rainfall (in)	2.9
Total Runoff (in)	0
Peak Runoff (cfs)	0
Weighted Curve Number	39
Time of Concentration (days hh:mm:ss)	0 00:11:16

Subbasin : CB-19-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-1-DA

Input Data

Area (ac)	0.41
Peak Rate Factor	484
Weighted Curve Number	87
Rain Gage ID	*

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	0.41	-	87
Composite Area & Weighted CN	0.41		87

Time of Concentration

	Subarea	Subarea	Subarea
Sheet Flow Computations	A	B	C
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	20	0	0
Slope (%) :	2	0	0
2 yr, 24 hr Rainfall (in) :	2.9	0	0
Velocity (ft/sec) :	0.05	0	0
Computed Flow Time (min) :	6.22	0	0

	Subarea	Subarea	Subarea
Channel Flow Computations	A	B	C
Manning's Roughness :	0.013	0	0
Flow Length (ft) :	490	0	0
Channel Slope (%) :	4	0	0
Cross Section Area (ft^2) :	0.8	0	0
Wetted Perimeter (ft) :	0.5	0	0
Velocity (ft/sec) :	31.36	0	0
Computed Flow Time (min) :	0.26	0	0

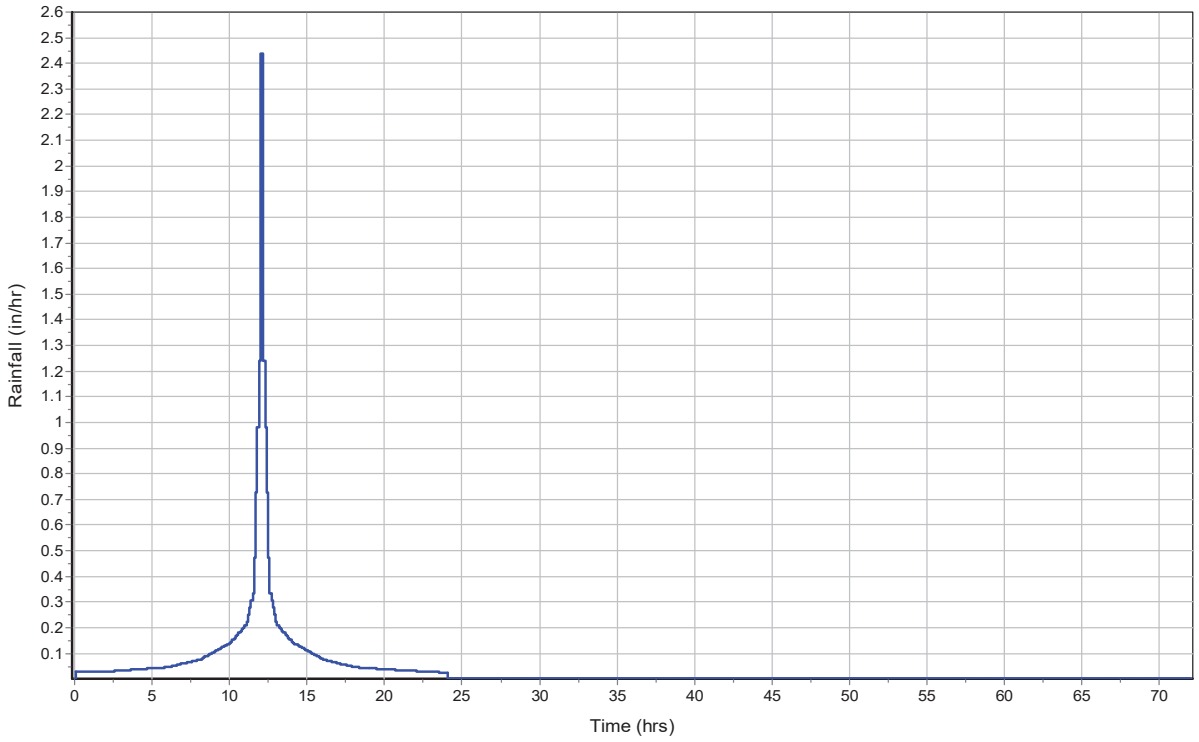
Total TOC (min) 6.49

Subbasin Runoff Results

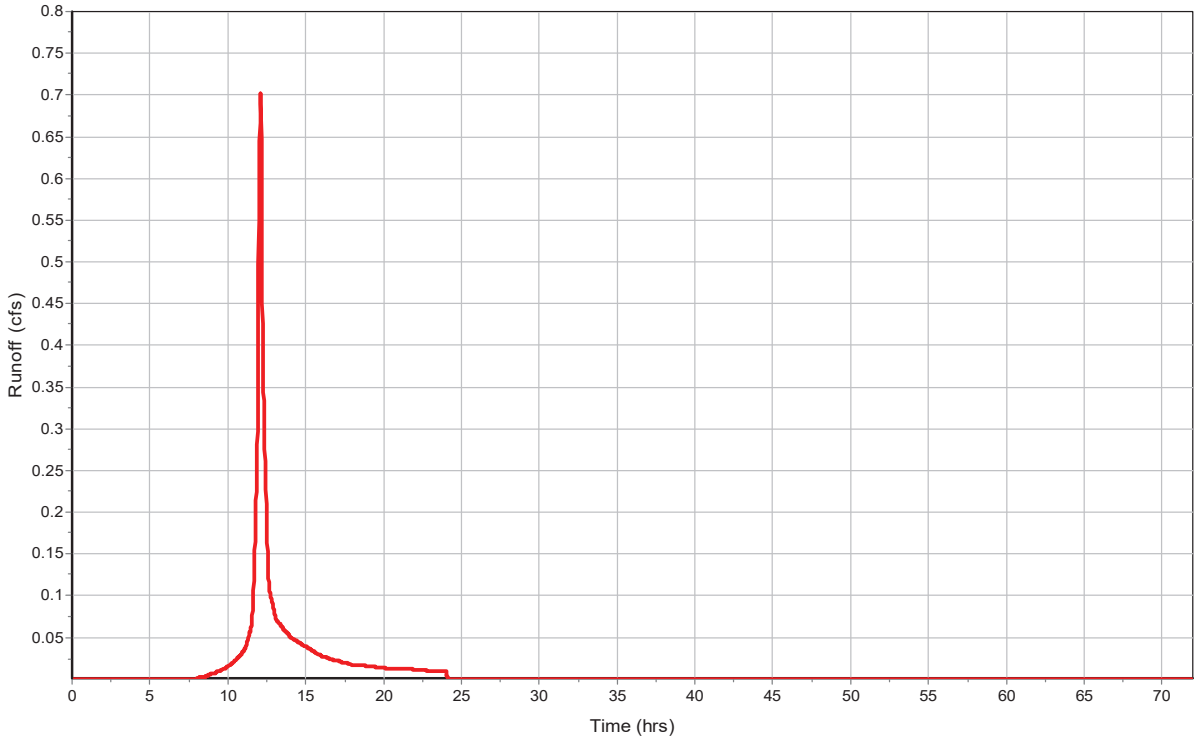
Total Rainfall (in)	2.9
Total Runoff (in)	1.65
Peak Runoff (cfs)	0.7
Weighted Curve Number	87
Time of Concentration (days hh:mm:ss)	0 00:06:29

Subbasin : CB-1-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-20-DA

Input Data

Area (ac)	0.24
Peak Rate Factor	484
Weighted Curve Number	95
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.24	-	95
Composite Area & Weighted CN	0.24		95

Time of Concentration

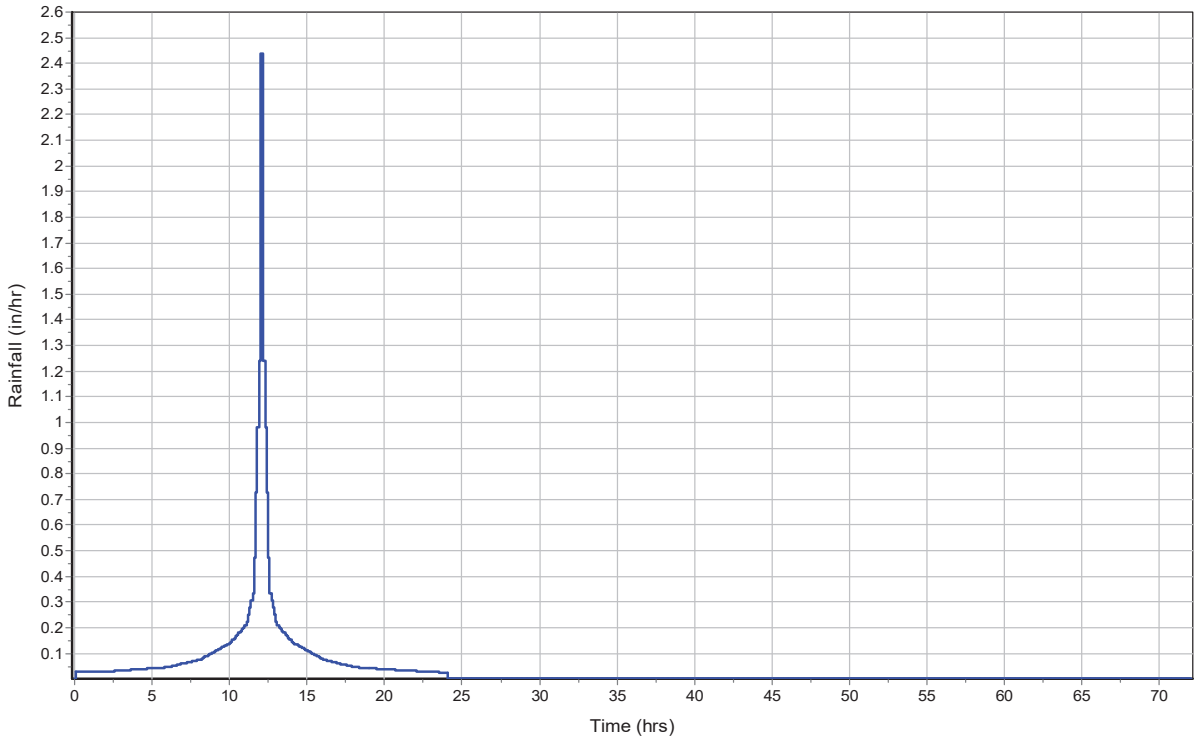
User-Defined TOC override (minutes): 6

Subbasin Runoff Results

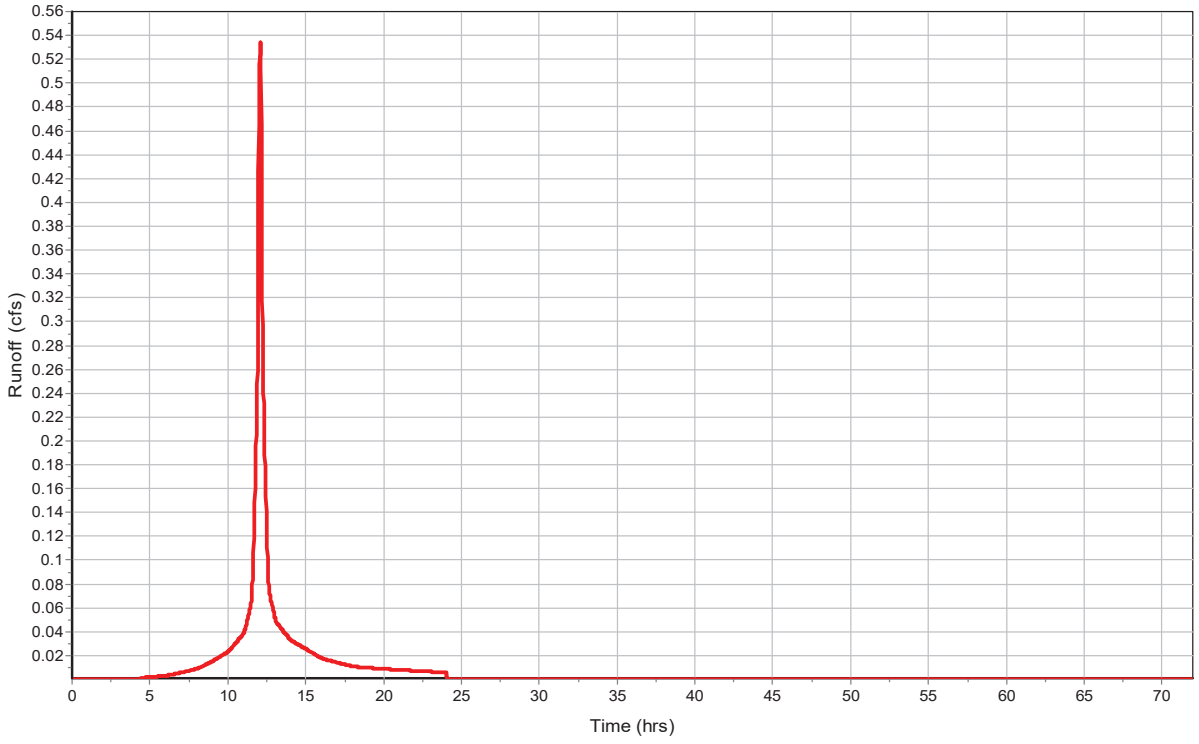
Total Rainfall (in)	2.9
Total Runoff (in)	2.35
Peak Runoff (cfs)	0.53
Weighted Curve Number	95
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : CB-20-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-21-DA

Input Data

Area (ac)	0.21
Peak Rate Factor	484
Weighted Curve Number	97
Rain Gage ID	*

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.21	-	97
Composite Area & Weighted CN	0.21		97

Time of Concentration

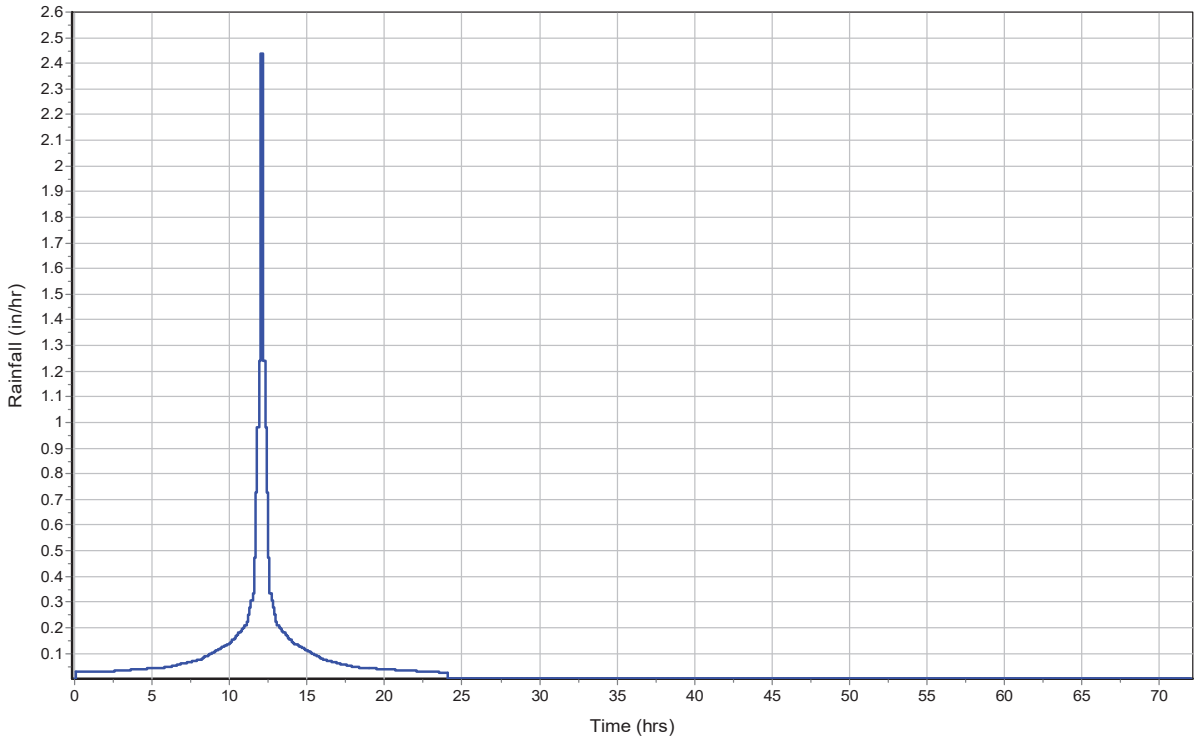
User-Defined TOC override (minutes): 6

Subbasin Runoff Results

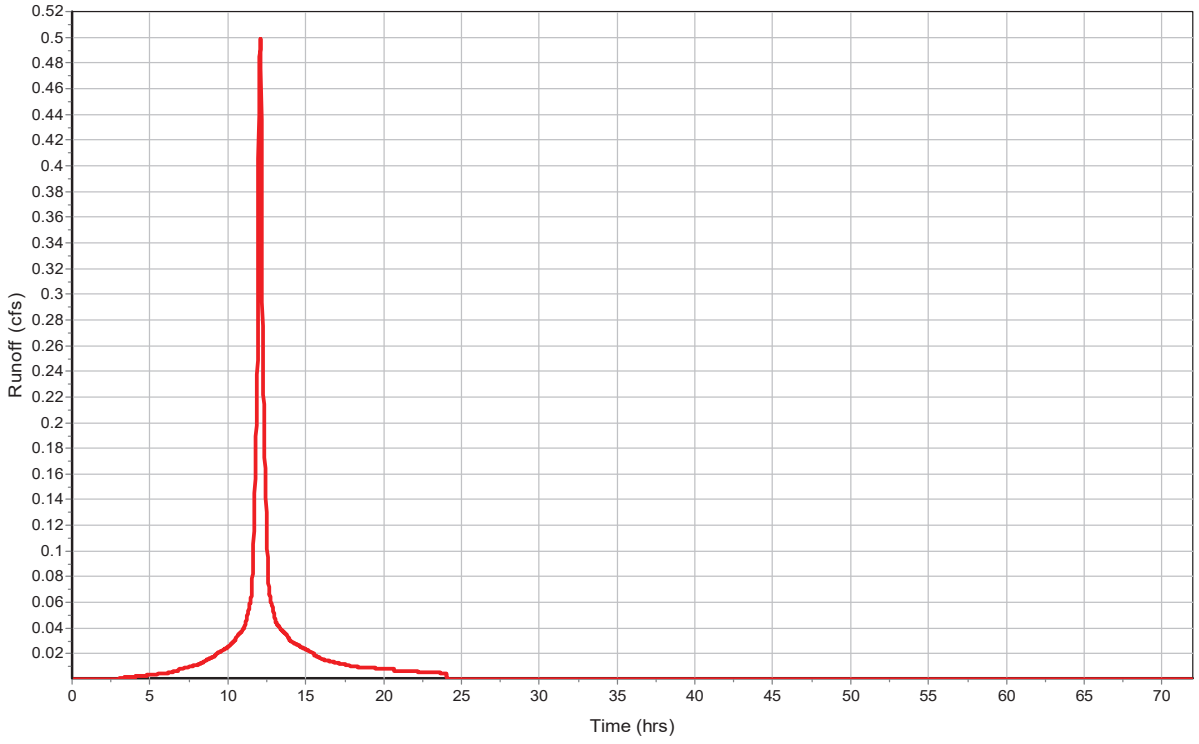
Total Rainfall (in)	2.9
Total Runoff (in)	2.56
Peak Runoff (cfs)	0.5
Weighted Curve Number	97
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : CB-21-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-23-DA

Input Data

Area (ac)	0.13
Peak Rate Factor	484
Weighted Curve Number	91
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.13	-	91
Composite Area & Weighted CN	0.13		91

Time of Concentration

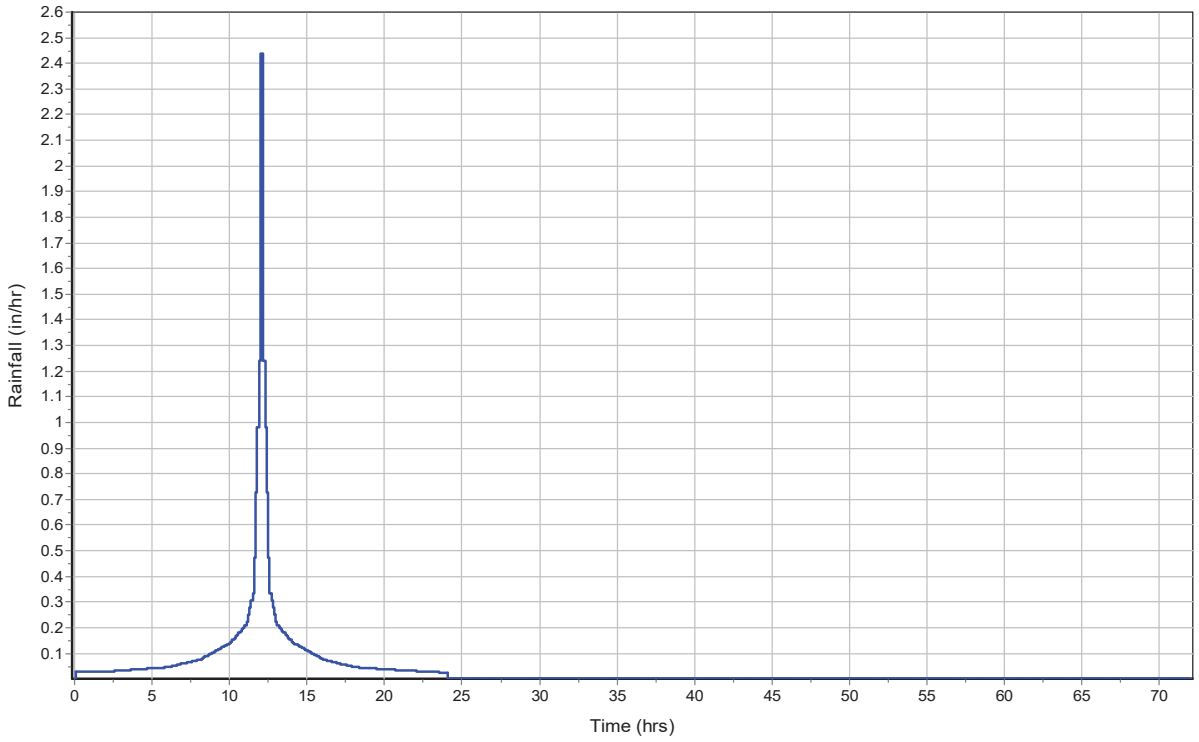
User-Defined TOC override (minutes): 6

Subbasin Runoff Results

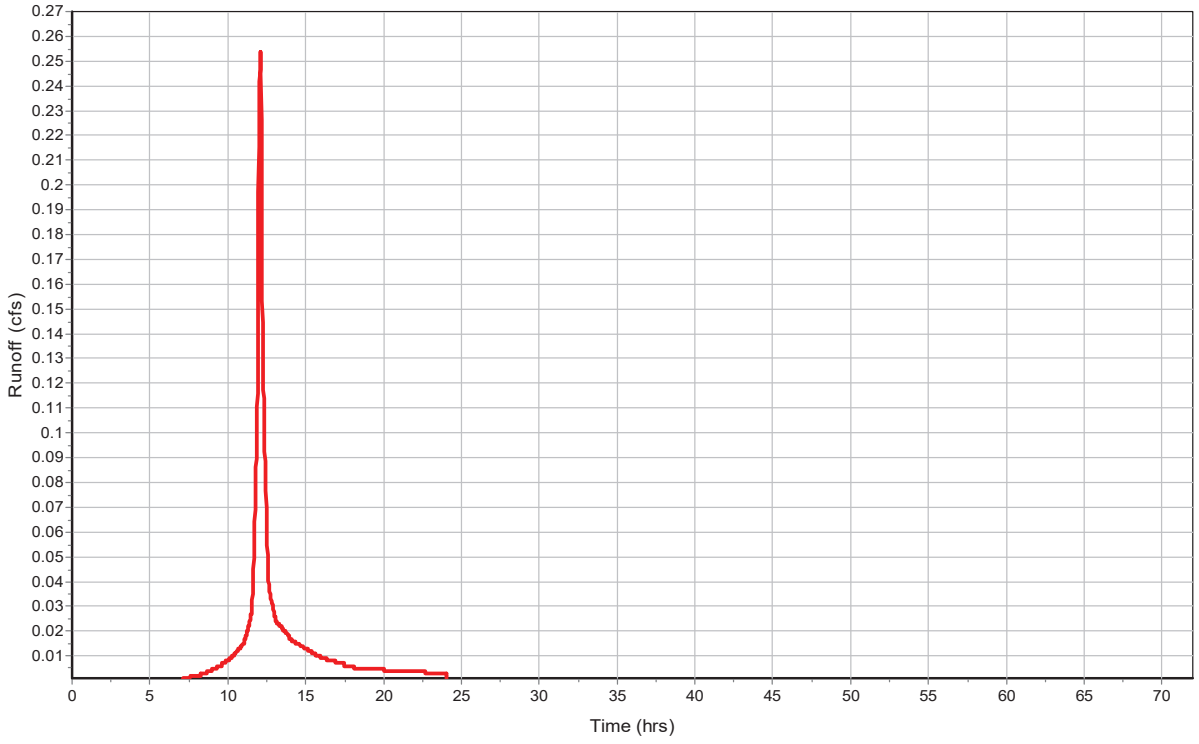
Total Rainfall (in)	2.9
Total Runoff (in)	1.97
Peak Runoff (cfs)	0.25
Weighted Curve Number	91
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : CB-23-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-24-DA

Input Data

Area (ac)	0.17
Peak Rate Factor	484
Weighted Curve Number	91
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.17	-	91
Composite Area & Weighted CN	0.17		91

Time of Concentration

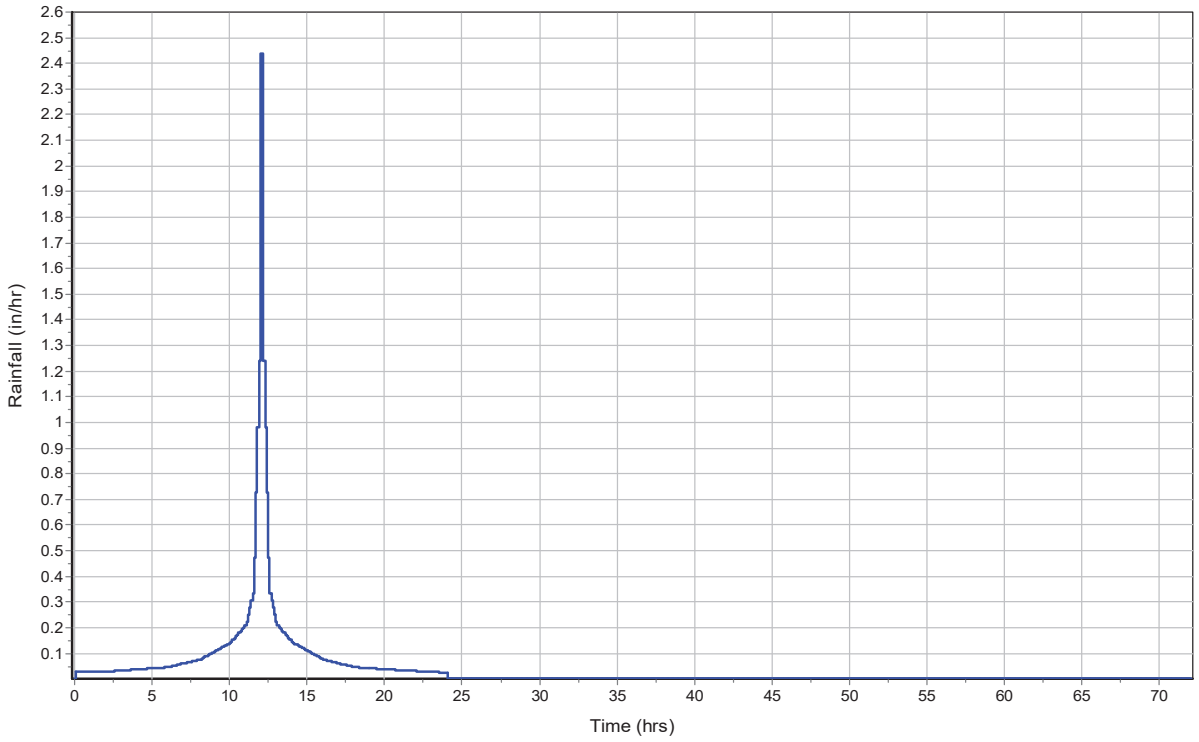
User-Defined TOC override (minutes): 6

Subbasin Runoff Results

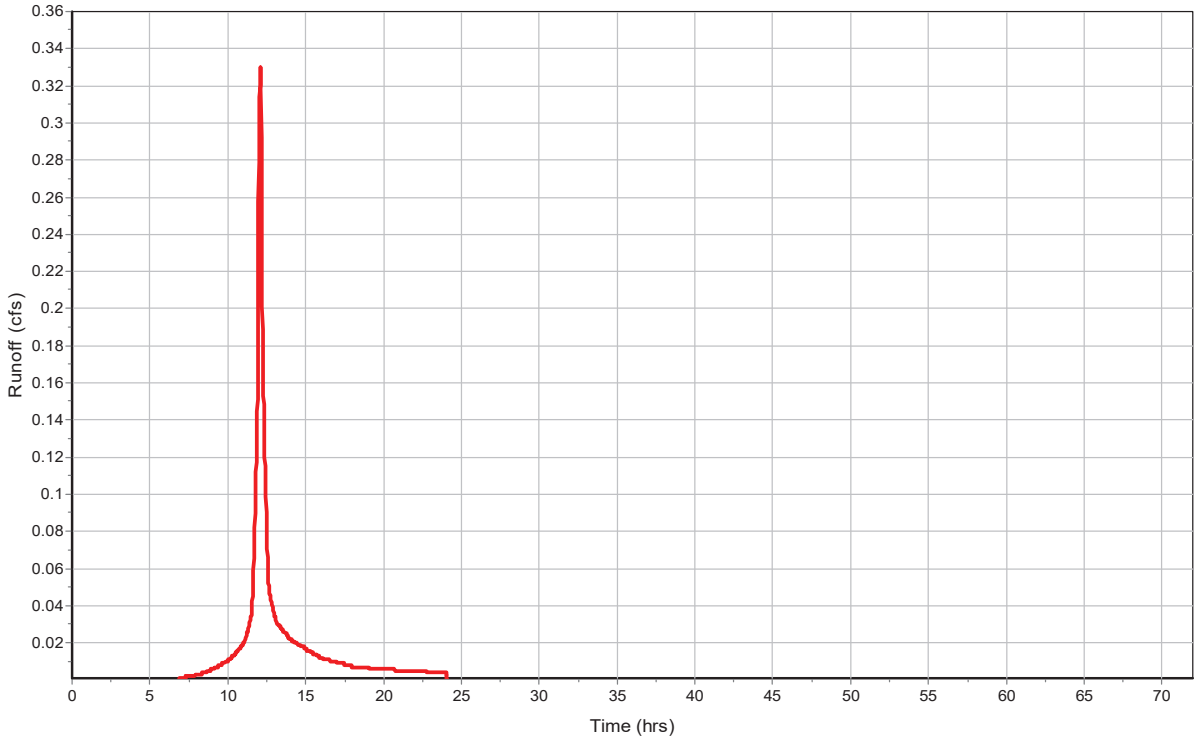
Total Rainfall (in)	2.9
Total Runoff (in)	1.98
Peak Runoff (cfs)	0.33
Weighted Curve Number	91
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : CB-24-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-25-DA

Input Data

Area (ac)	0.72
Peak Rate Factor	484
Weighted Curve Number	52
Rain Gage ID	*

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	0.72	-	52
Composite Area & Weighted CN	0.72		52

Time of Concentration

	Subarea	Subarea	Subarea
Sheet Flow Computations	A	B	C
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	50	0	0
Slope (%) :	6	0	0
2 yr, 24 hr Rainfall (in) :	2.9	0	0
Velocity (ft/sec) :	0.1	0	0
Computed Flow Time (min) :	8.35	0	0

	Subarea	Subarea	Subarea
Channel Flow Computations	A	B	C
Manning's Roughness :	0.027	0	0
Flow Length (ft) :	252	0	0
Channel Slope (%) :	5.5	0	0
Cross Section Area (ft^2) :	2.7	0	0
Wetted Perimeter (ft) :	0.7	0	0
Velocity (ft/sec) :	31.83	0	0
Computed Flow Time (min) :	0.13	0	0

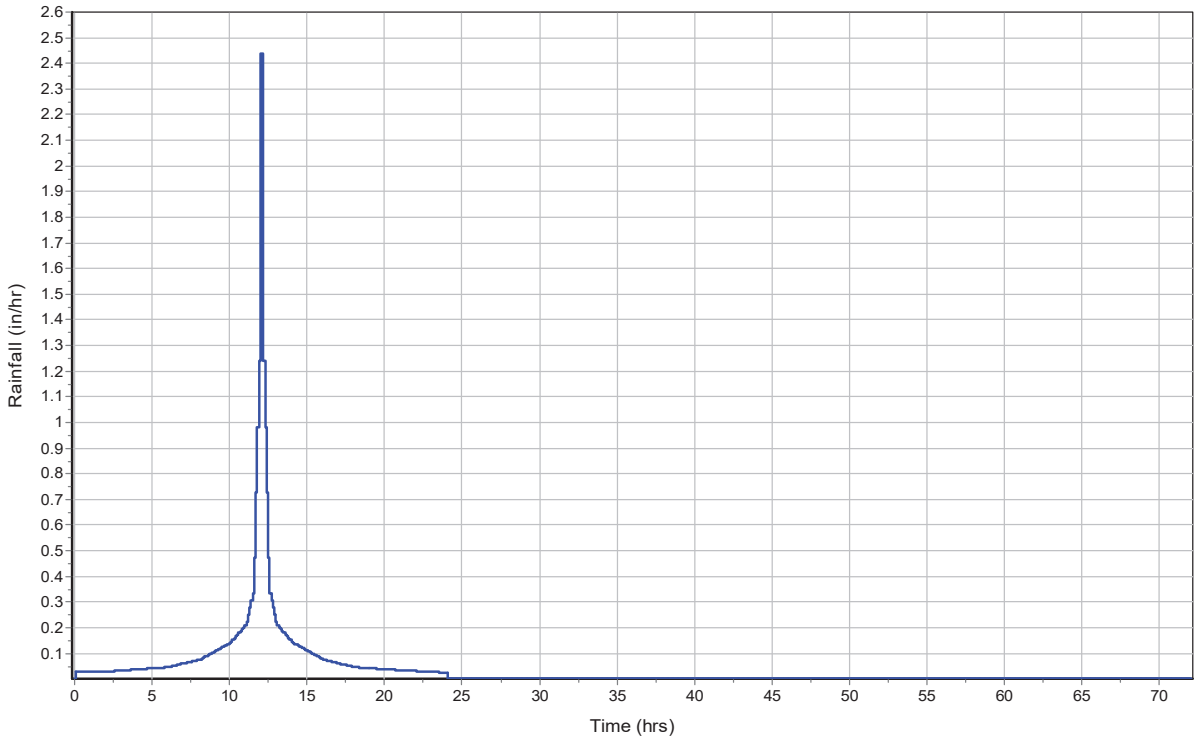
Total TOC (min) 8.48

Subbasin Runoff Results

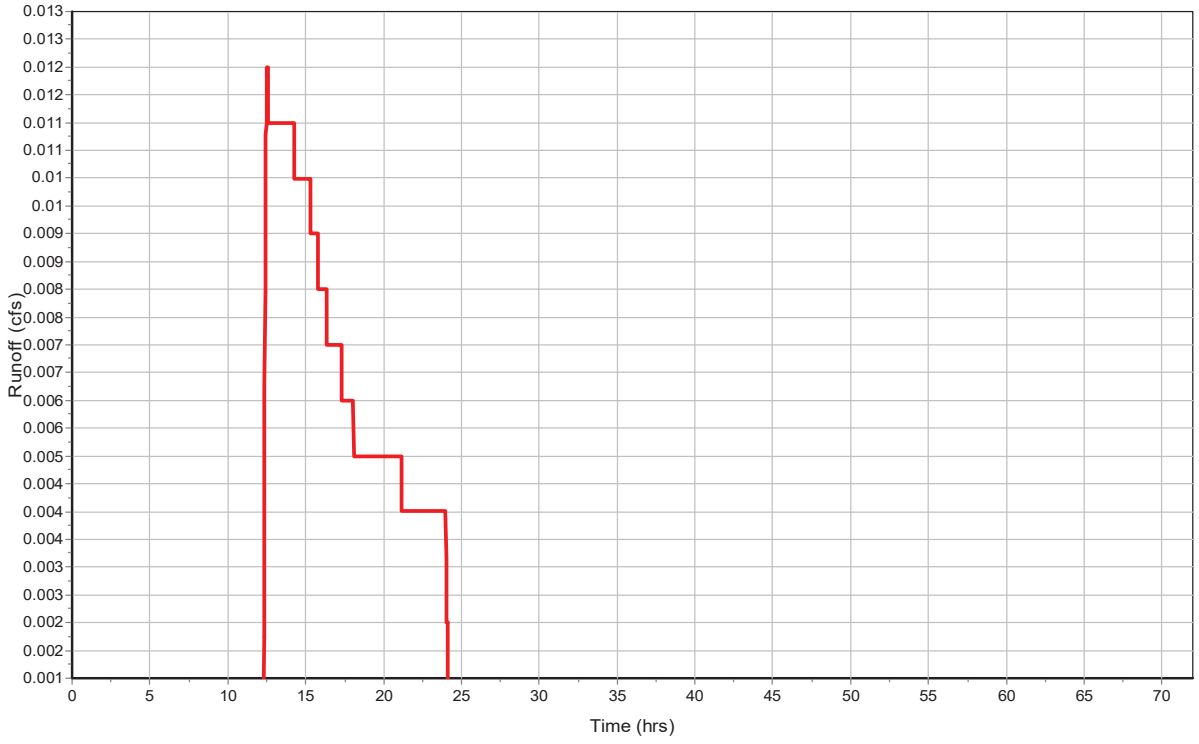
Total Rainfall (in)	2.9
Total Runoff (in)	0.11
Peak Runoff (cfs)	0.01
Weighted Curve Number	52
Time of Concentration (days hh:mm:ss)	0 00:08:29

Subbasin : CB-25-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-26-DA

Input Data

Area (ac)	0.19
Peak Rate Factor	484
Weighted Curve Number	39
Rain Gage ID	*

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	0.19	-	39
Composite Area & Weighted CN	0.19		39

Time of Concentration

	Subarea	Subarea	Subarea
Sheet Flow Computations	A	B	C
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	50	0	0
Slope (%) :	5.5	0	0
2 yr, 24 hr Rainfall (in) :	2.9	0	0
Velocity (ft/sec) :	0.1	0	0
Computed Flow Time (min) :	8.64	0	0

	Subarea	Subarea	Subarea
Channel Flow Computations	A	B	C
Manning's Roughness :	0.027	0	0
Flow Length (ft) :	120	0	0
Channel Slope (%) :	5.2	0	0
Cross Section Area (ft^2) :	2.4	0	0
Wetted Perimeter (ft) :	0.8	0	0
Velocity (ft/sec) :	26.18	0	0
Computed Flow Time (min) :	0.08	0	0

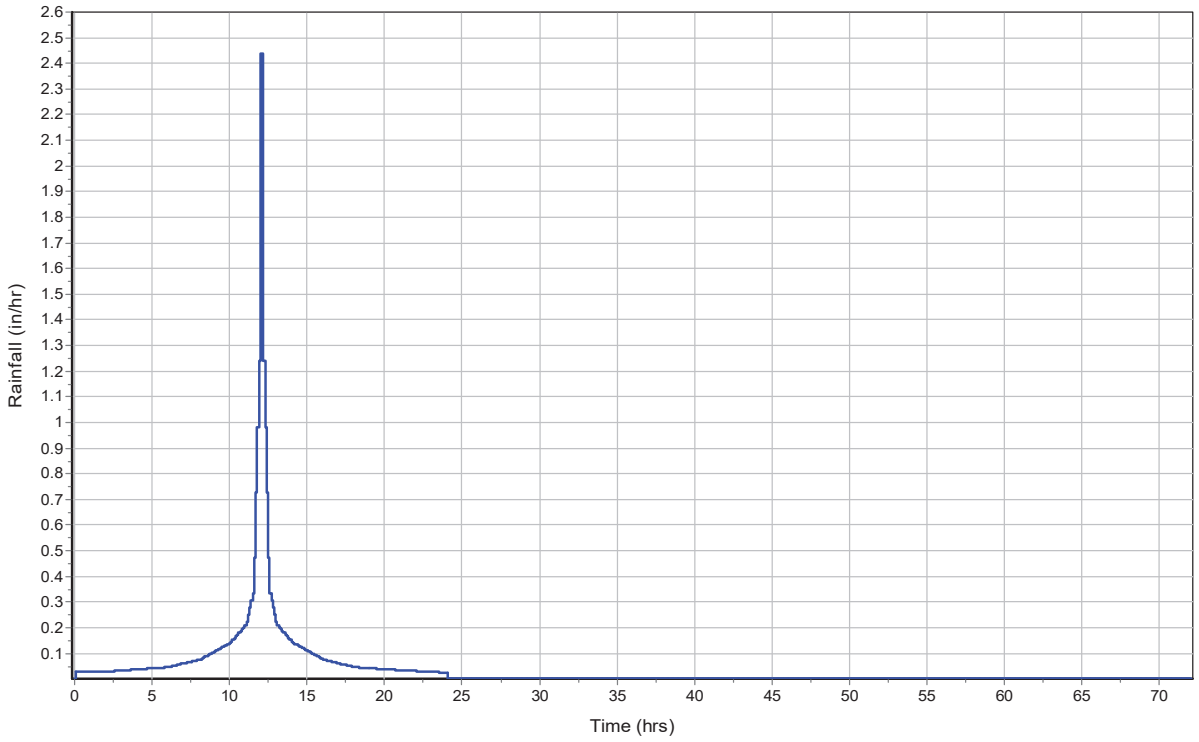
Total TOC (min) 8.72

Subbasin Runoff Results

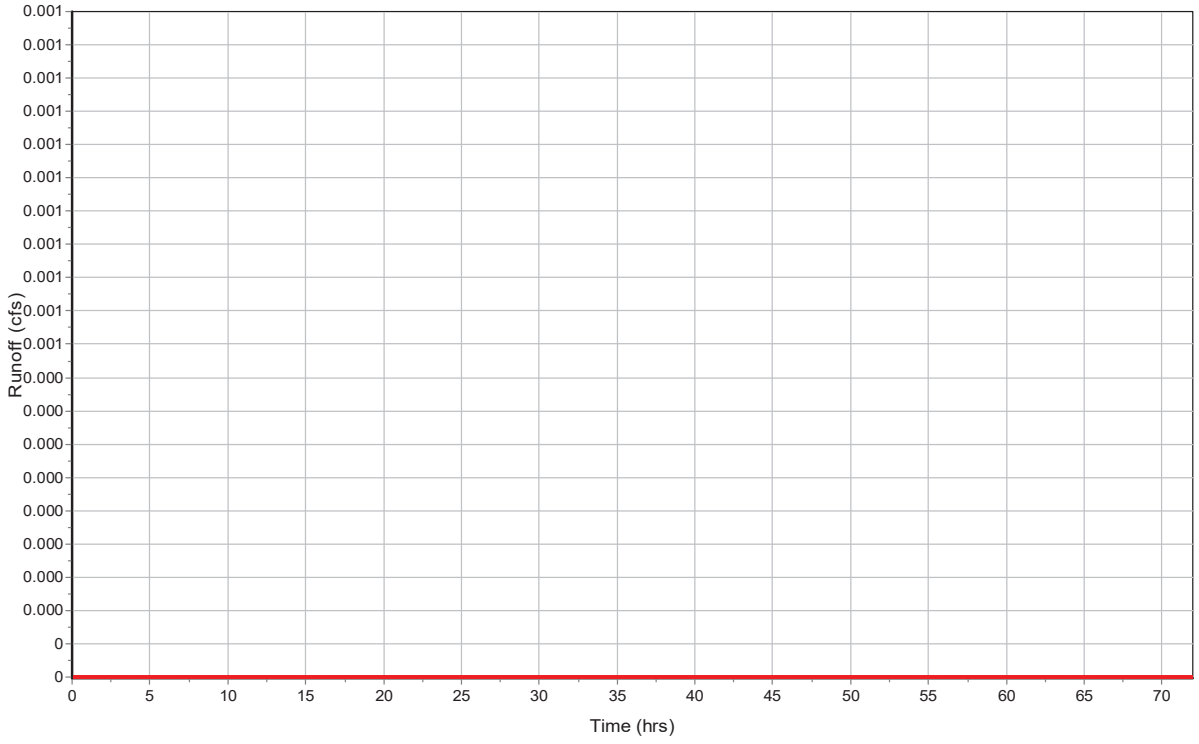
Total Rainfall (in)	2.9
Total Runoff (in)	0
Peak Runoff (cfs)	0
Weighted Curve Number	39
Time of Concentration (days hh:mm:ss)	0 00:08:43

Subbasin : CB-26-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-27-DA

Input Data

Area (ac)	0.15
Peak Rate Factor	484
Weighted Curve Number	96
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.15	-	96
Composite Area & Weighted CN	0.15		96

Time of Concentration

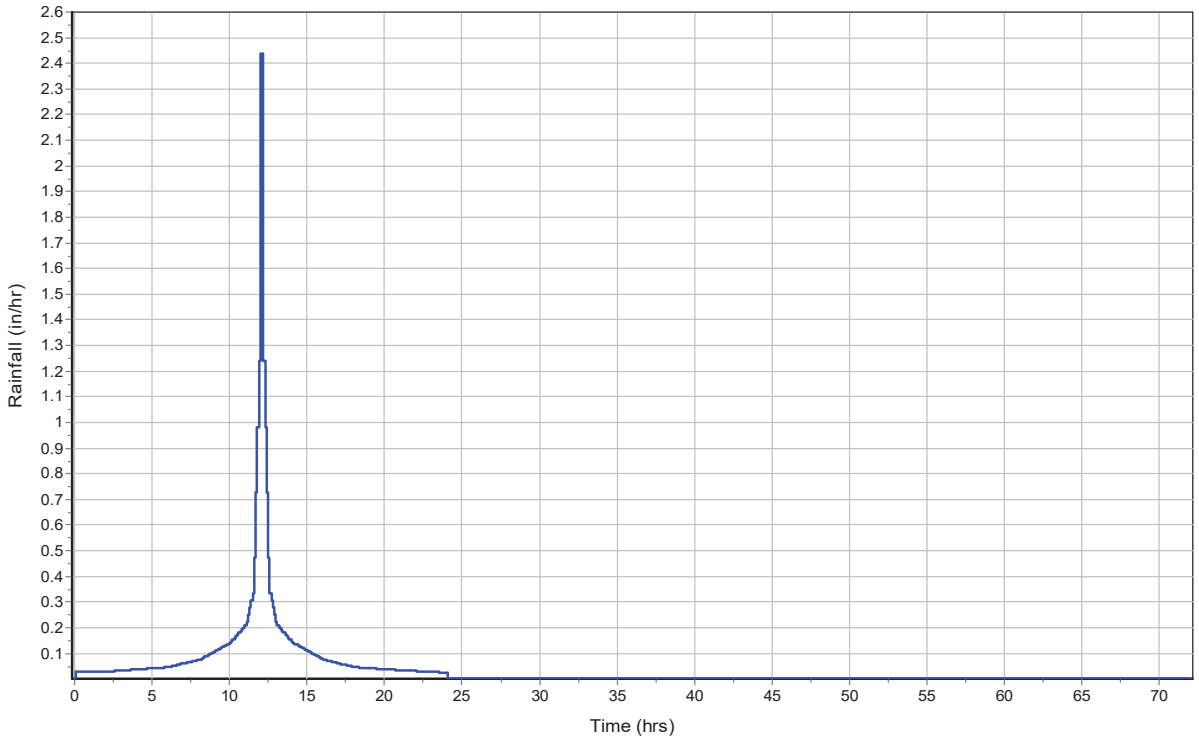
User-Defined TOC override (minutes): 6.00

Subbasin Runoff Results

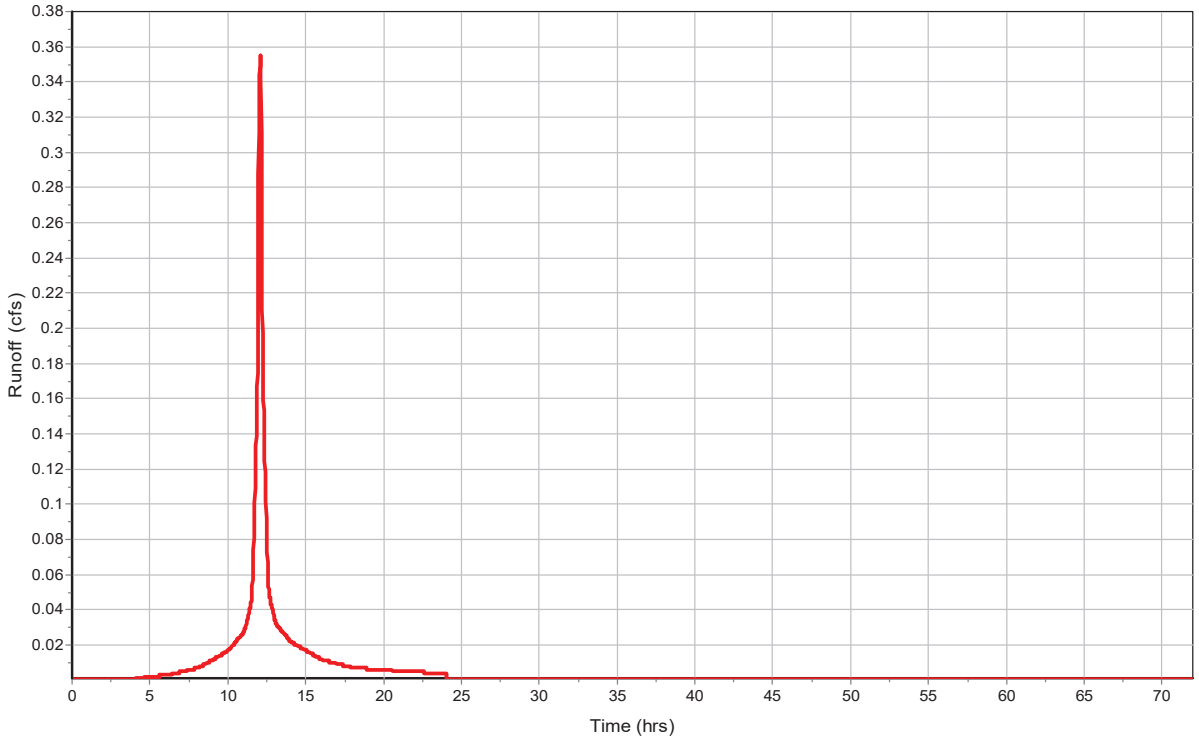
Total Rainfall (in)	2.9
Total Runoff (in)	2.45
Peak Runoff (cfs)	0.36
Weighted Curve Number	96
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : CB-27-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-28-DA

Input Data

Area (ac)	0.97
Peak Rate Factor	484
Weighted Curve Number	30
Rain Gage ID	*

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	0.97	-	30
Composite Area & Weighted CN	0.97		30

Time of Concentration

	Subarea	Subarea	Subarea
Sheet Flow Computations	A	B	C
Manning's Roughness :	0.6	0	0
Flow Length (ft) :	50	0	0
Slope (%) :	3	0	0
2 yr, 24 hr Rainfall (in) :	2.9	0	0
Velocity (ft/sec) :	0.05	0	0
Computed Flow Time (min) :	15.24	0	0

	Subarea	Subarea	Subarea
Shallow Concentrated Flow Computations	A	B	C
Flow Length (ft) :	80	0	0
Slope (%) :	5	0	0
Surface Type :	Woodland	Unpaved	Unpaved
Velocity (ft/sec) :	1.12	0	0
Computed Flow Time (min) :	1.19	0	0

	Subarea	Subarea	Subarea
Channel Flow Computations	A	B	C
Manning's Roughness :	0.027	0	0
Flow Length (ft) :	250	0	0
Channel Slope (%) :	5	0	0
Cross Section Area (ft^2) :	4	0	0
Wetted Perimeter (ft) :	0.7	0	0
Velocity (ft/sec) :	39.44	0	0
Computed Flow Time (min) :	0.11	0	0

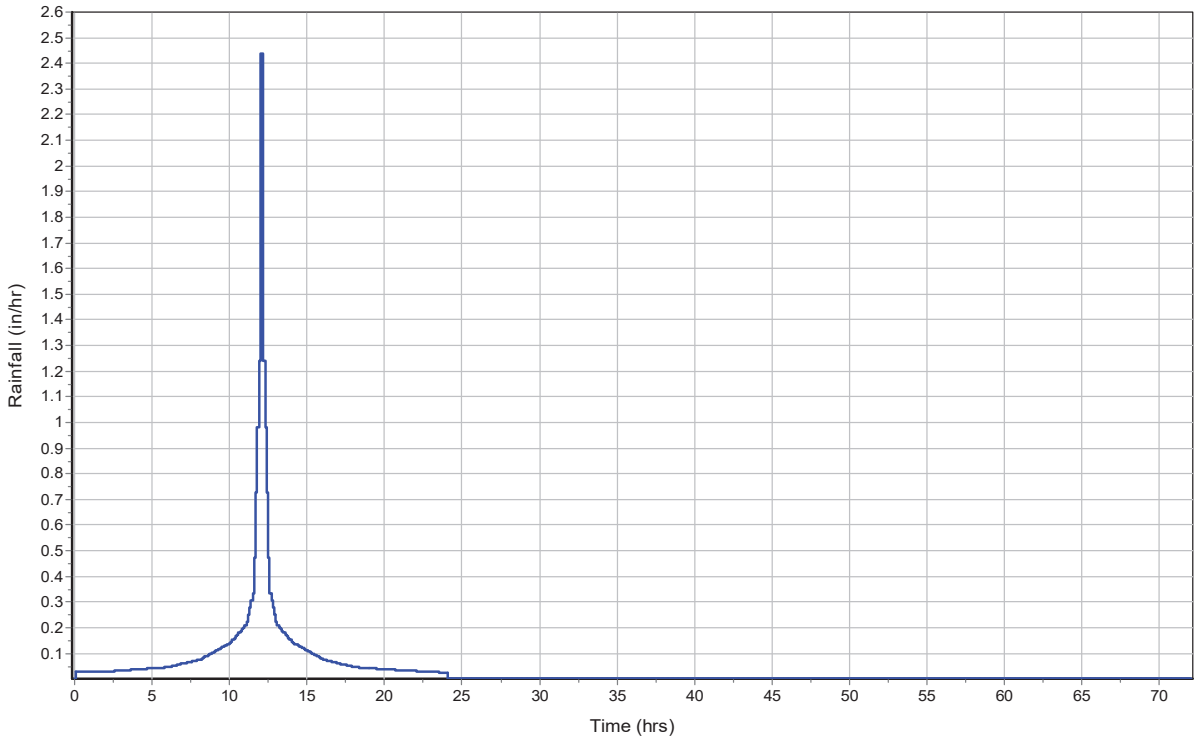
Total TOC (min) 16.53

Subbasin Runoff Results

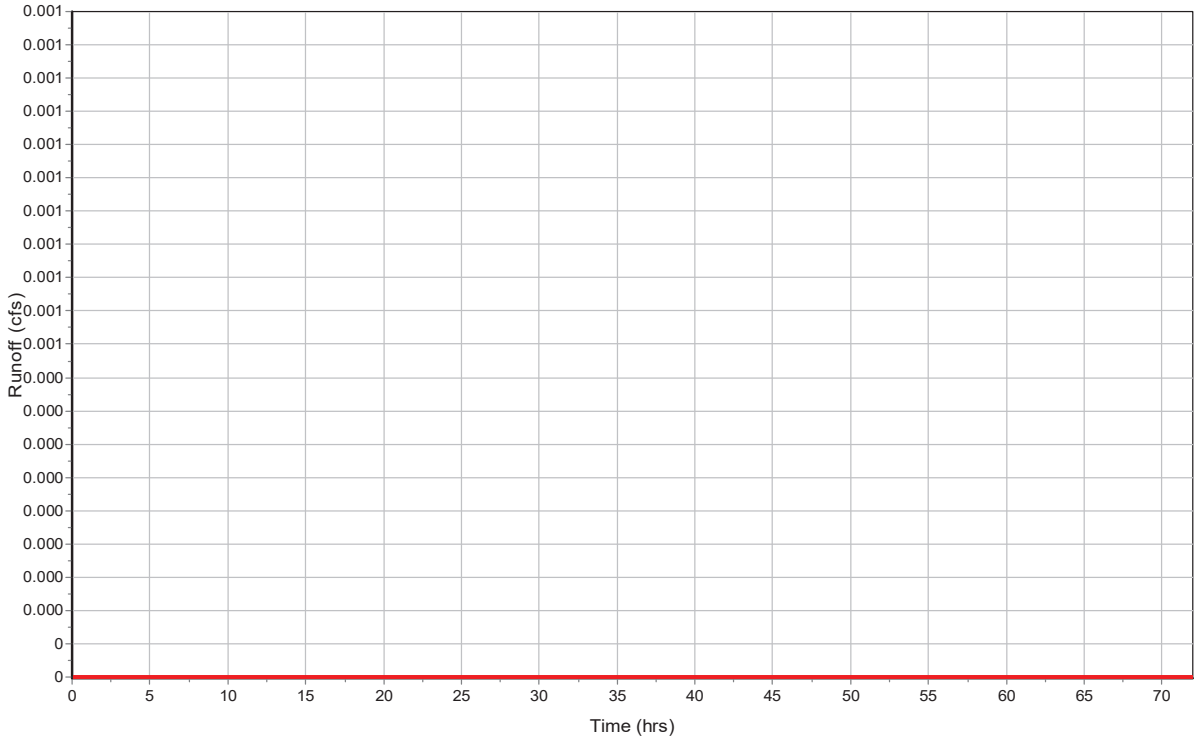
Total Rainfall (in)	2.9
Total Runoff (in)	0
Peak Runoff (cfs)	0
Weighted Curve Number	30
Time of Concentration (days hh:mm:ss)	0 00:16:32

Subbasin : CB-28-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-2-DA

Input Data

Area (ac)	0.57
Peak Rate Factor	484
Weighted Curve Number	68
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.57	-	68
Composite Area & Weighted CN	0.57		68

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	50	0	0
Slope (%) :	3	0	0
2 yr, 24 hr Rainfall (in) :	2.9	0	0
Velocity (ft/sec) :	0.08	0	0
Computed Flow Time (min) :	11.02	0	0

Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0	0
Flow Length (ft) :	480	0	0
Channel Slope (%) :	4	0	0
Cross Section Area (ft^2) :	0.8	0	0
Wetted Perimeter (ft) :	0.5	0	0
Velocity (ft/sec) :	31.36	0	0
Computed Flow Time (min) :	0.26	0	0

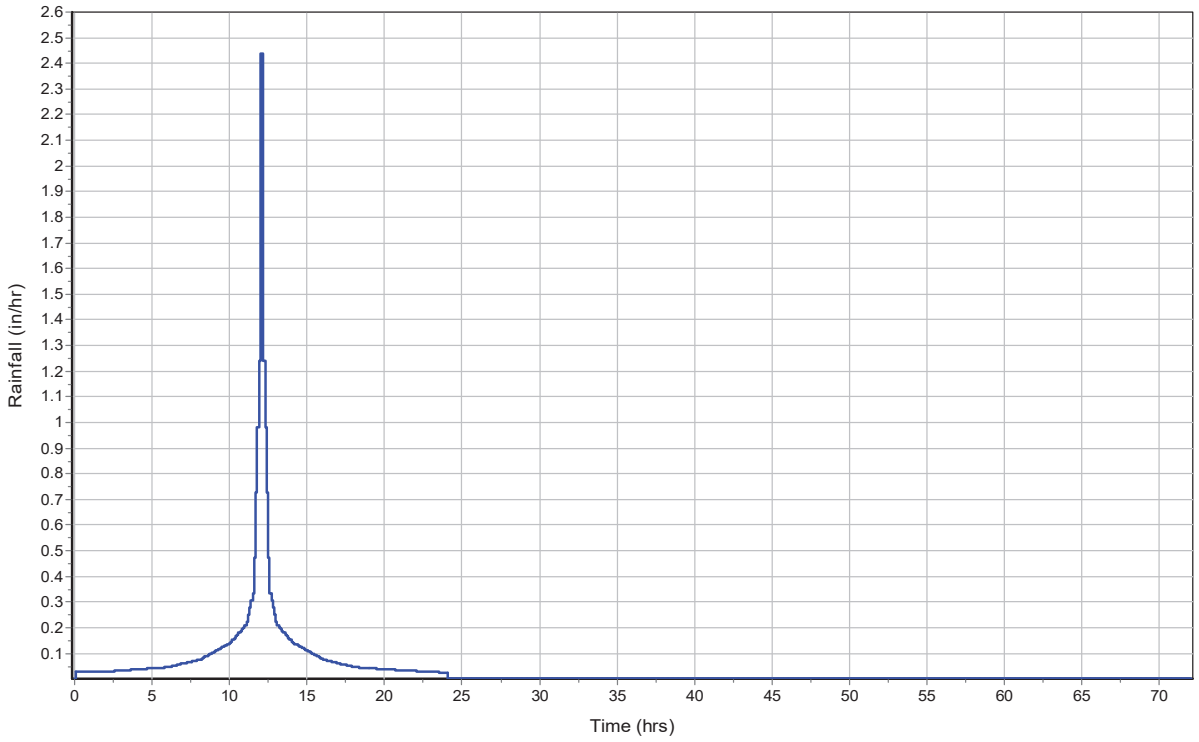
Total TOC (min) 11.27

Subbasin Runoff Results

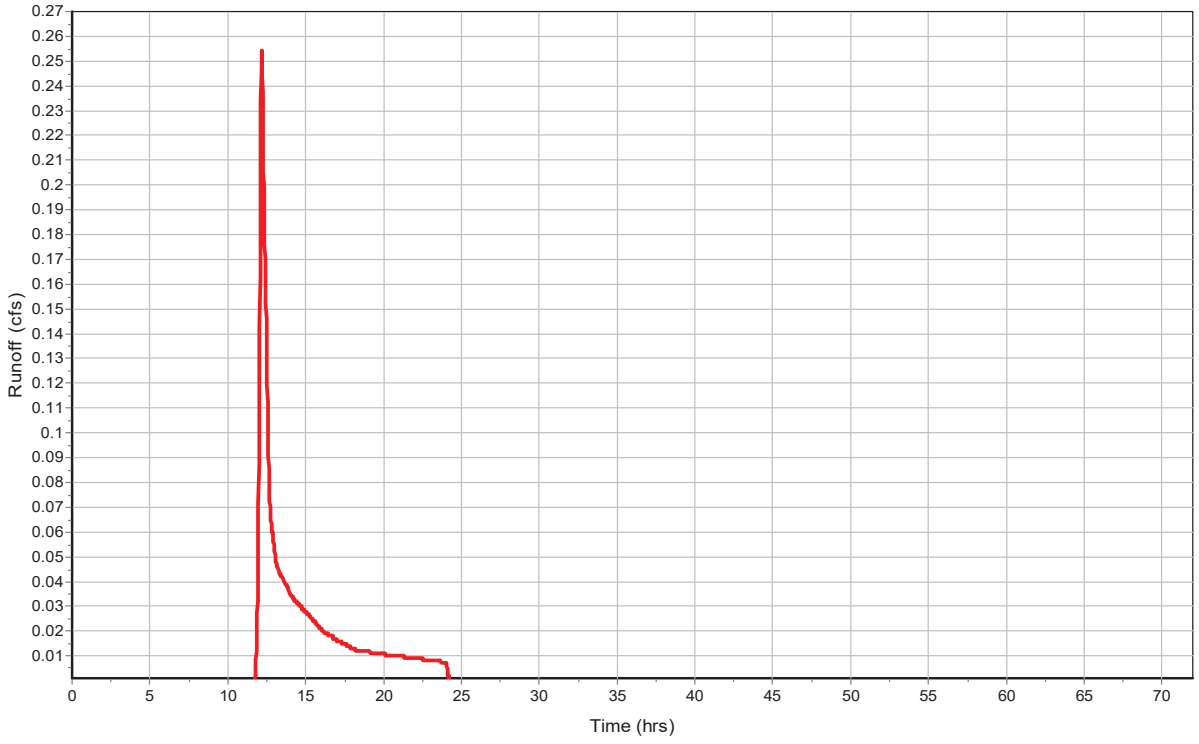
Total Rainfall (in)	2.9
Total Runoff (in)	0.58
Peak Runoff (cfs)	0.25
Weighted Curve Number	68
Time of Concentration (days hh:mm:ss)	0 00:11:16

Subbasin : CB-2-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-30-DA

Input Data

Area (ac)	0.24
Peak Rate Factor	484
Weighted Curve Number	96
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.24	-	96
Composite Area & Weighted CN	0.24		96

Time of Concentration

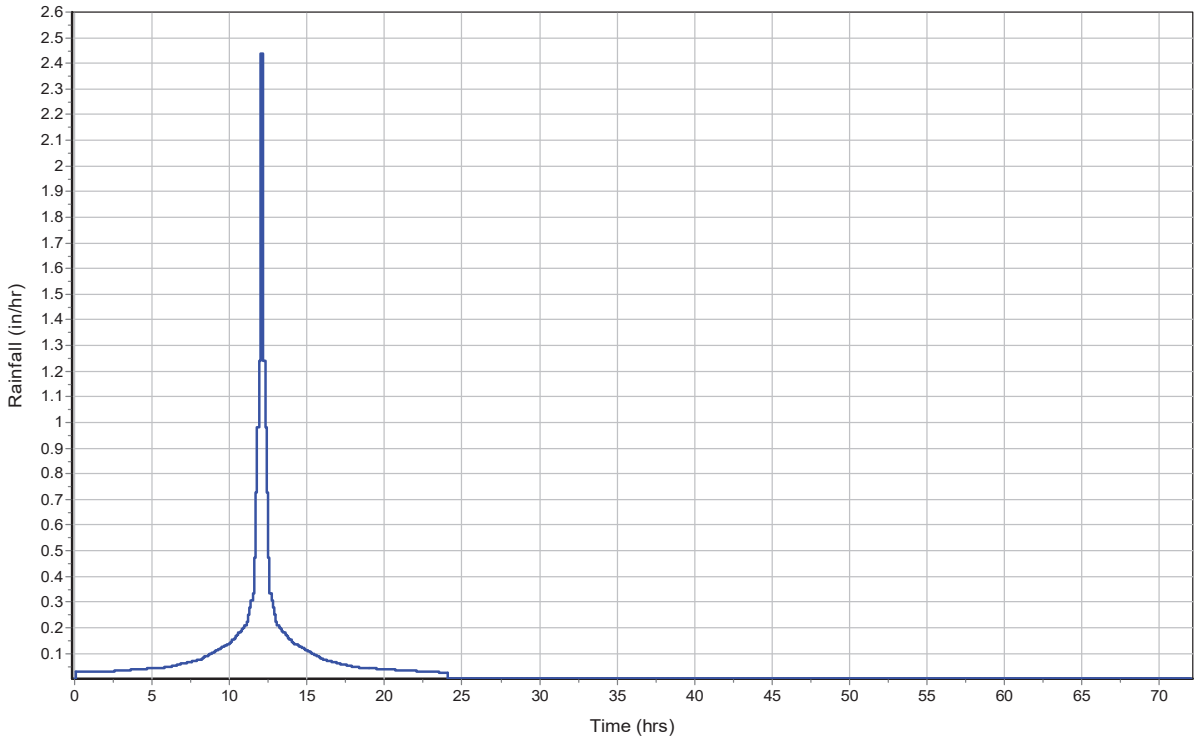
User-Defined TOC override (minutes): 6

Subbasin Runoff Results

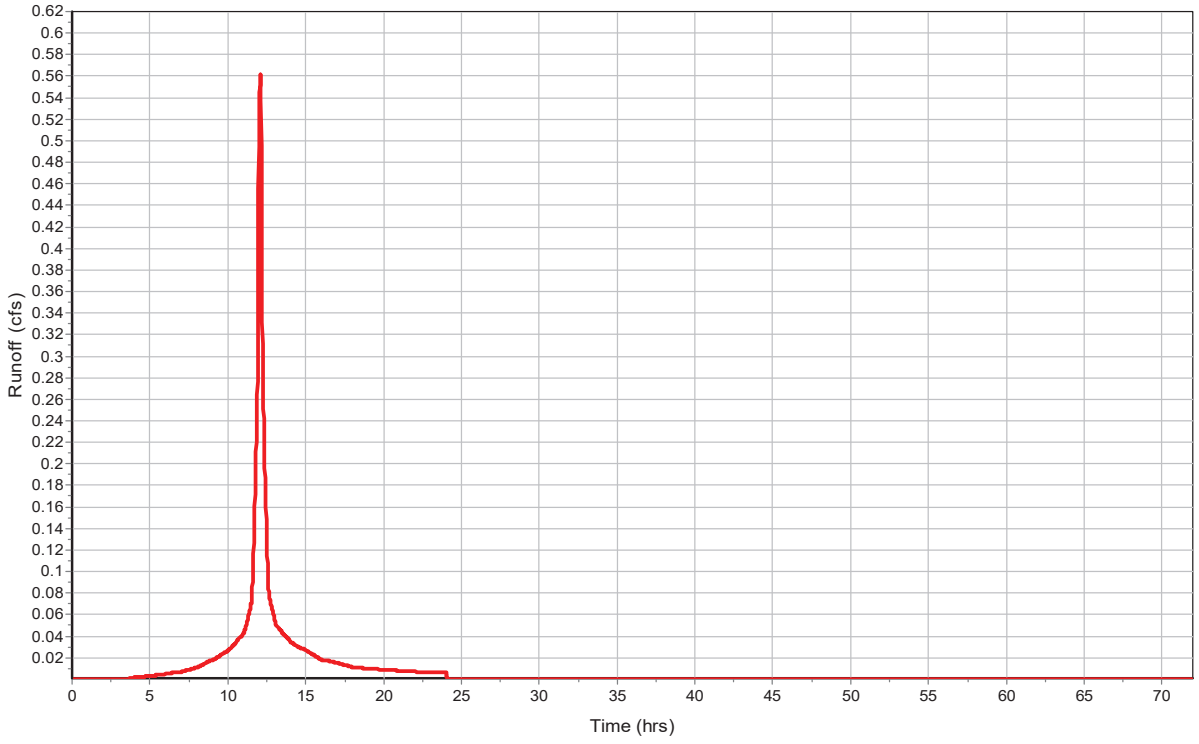
Total Rainfall (in)	2.9
Total Runoff (in)	2.45
Peak Runoff (cfs)	0.56
Weighted Curve Number	96
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : CB-30-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-32-DA

Input Data

Area (ac)	0.06
Peak Rate Factor	484
Weighted Curve Number	92
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.06	-	92
Composite Area & Weighted CN	0.06		92

Time of Concentration

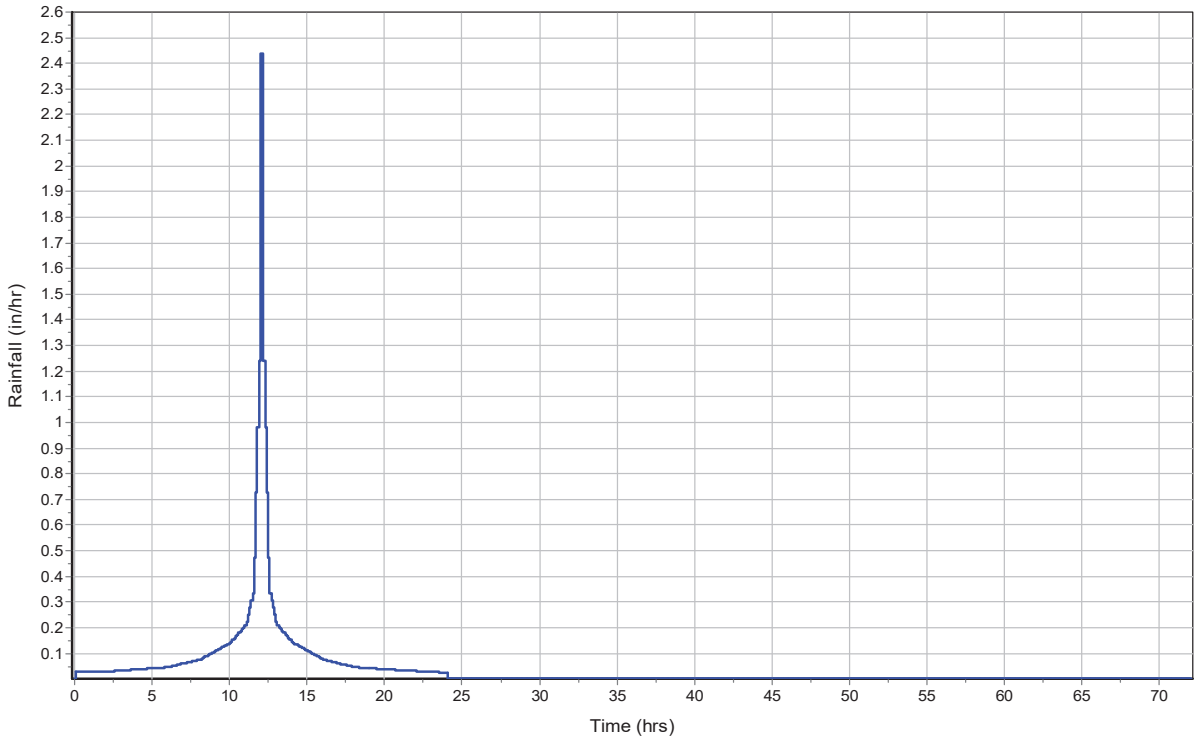
User-Defined TOC override (minutes): 6

Subbasin Runoff Results

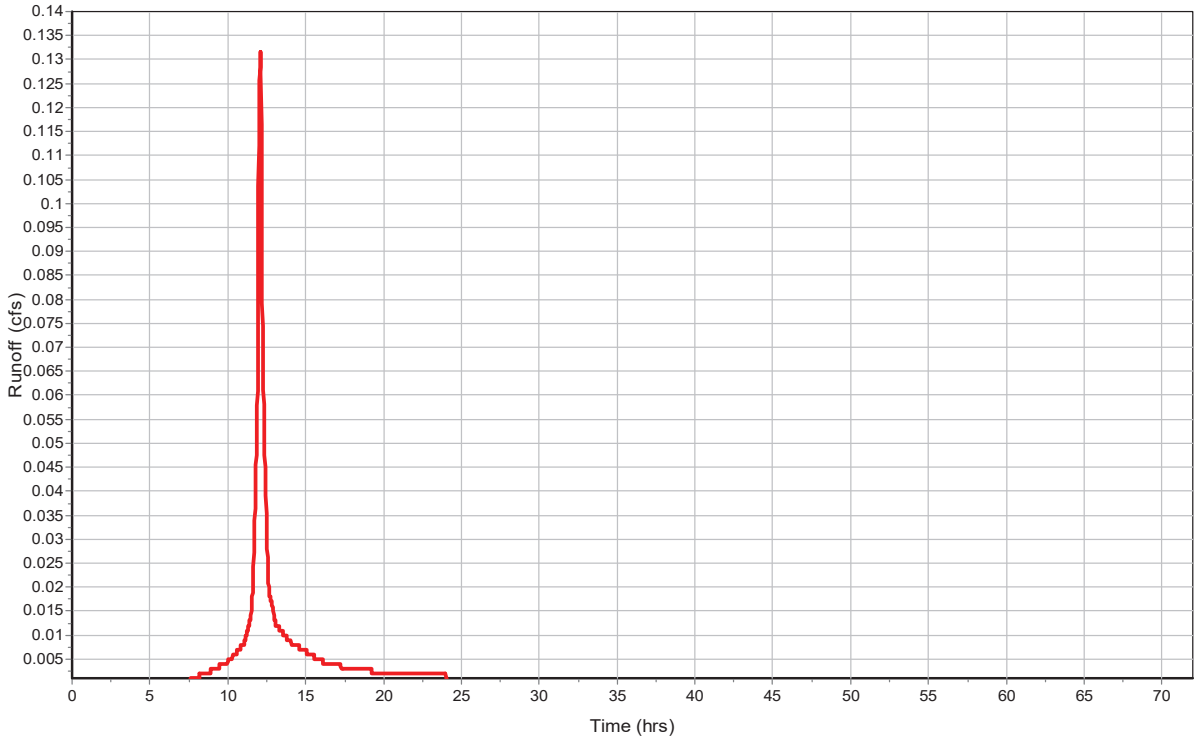
Total Rainfall (in)	2.9
Total Runoff (in)	2.05
Peak Runoff (cfs)	0.13
Weighted Curve Number	92
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : CB-32-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-33-DA

Input Data

Area (ac)	0.08
Peak Rate Factor	484
Weighted Curve Number	39
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.08	-	39
Composite Area & Weighted CN	0.08		39

Time of Concentration

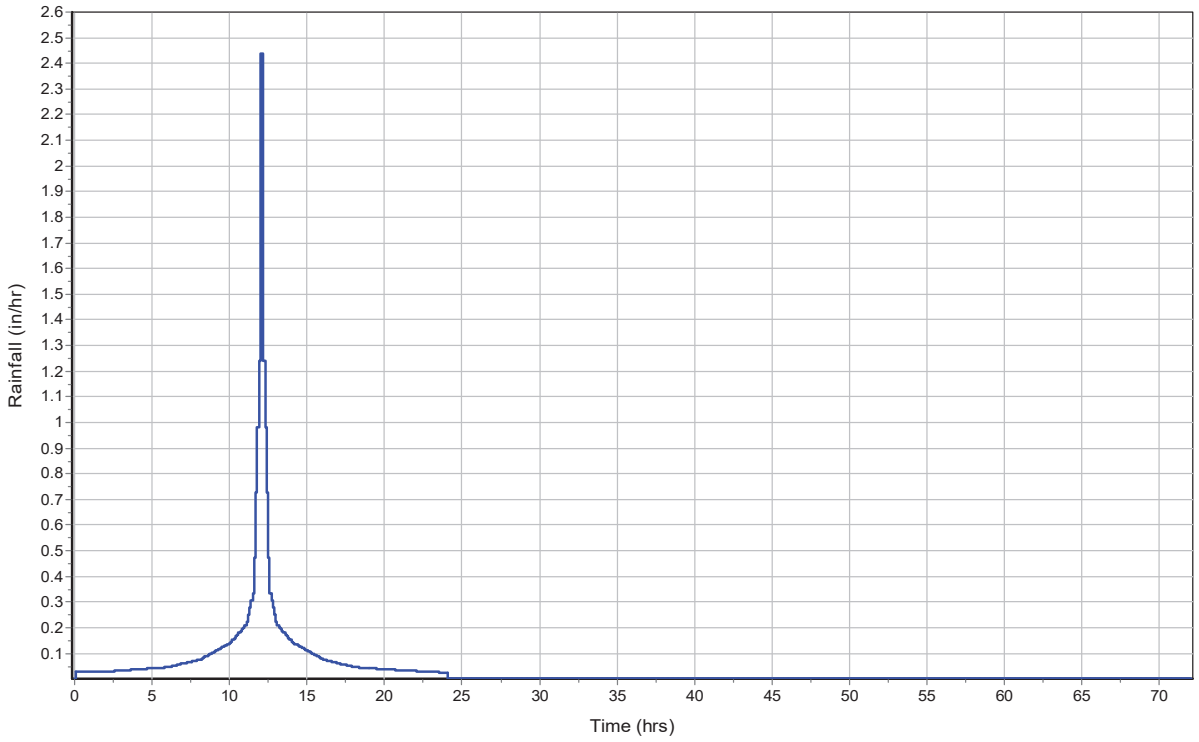
User-Defined TOC override (minutes): 6

Subbasin Runoff Results

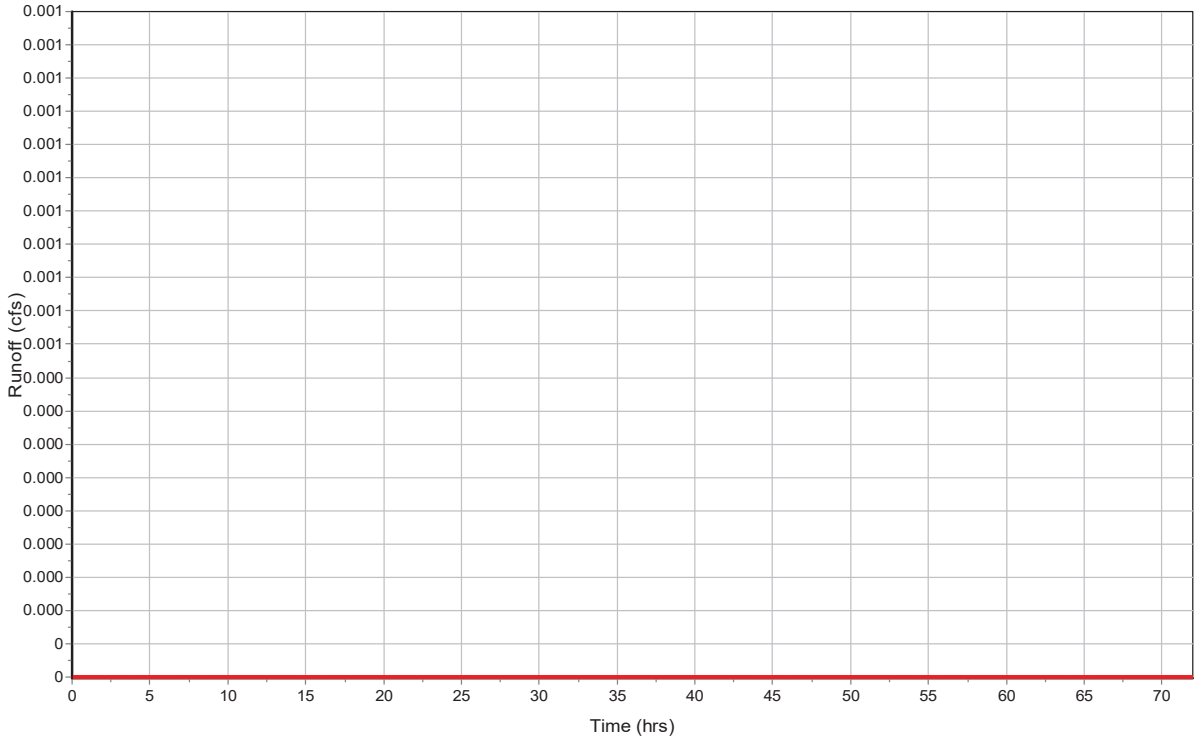
Total Rainfall (in)	2.9
Total Runoff (in)	0
Peak Runoff (cfs)	0
Weighted Curve Number	39
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : CB-33-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-34A-DA

Input Data

Area (ac)	0.14
Peak Rate Factor	484
Weighted Curve Number	39
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.14	-	39
Composite Area & Weighted CN	0.14		39

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	50	0	0
Slope (%) :	3	0	0
2 yr, 24 hr Rainfall (in) :	2.9	0	0
Velocity (ft/sec) :	0.08	0	0
Computed Flow Time (min) :	11.02	0	0

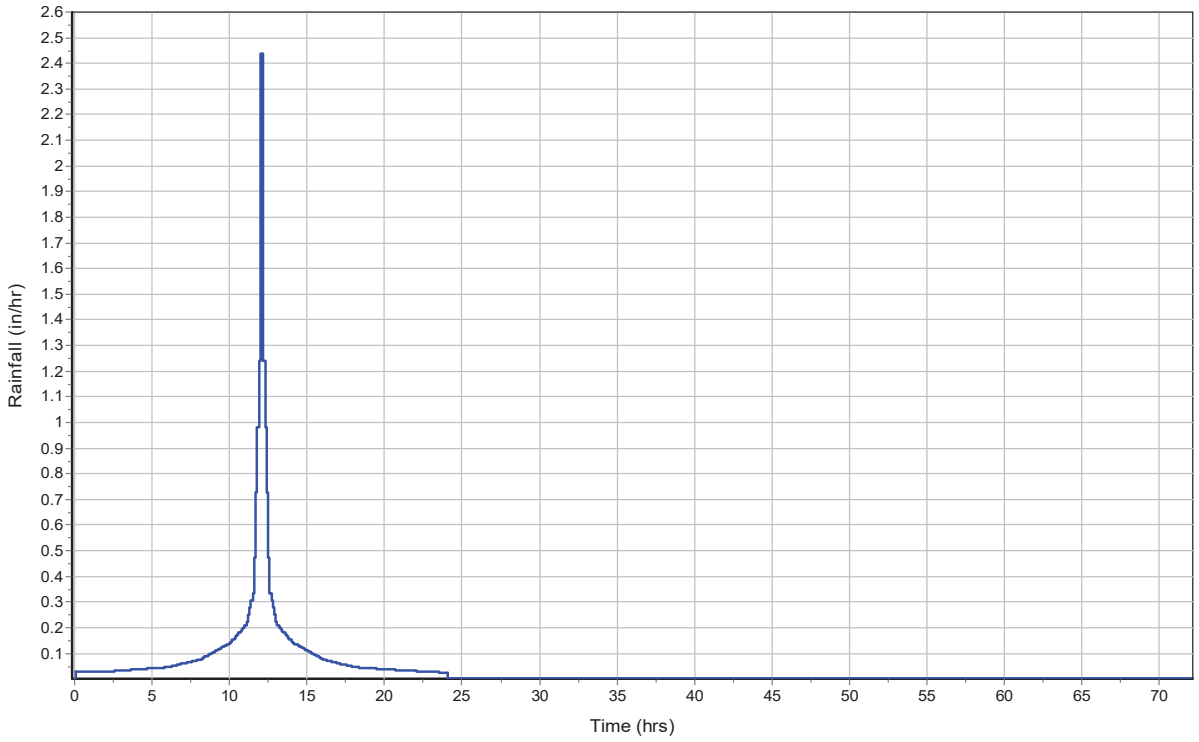
Total TOC (min) 11.02

Subbasin Runoff Results

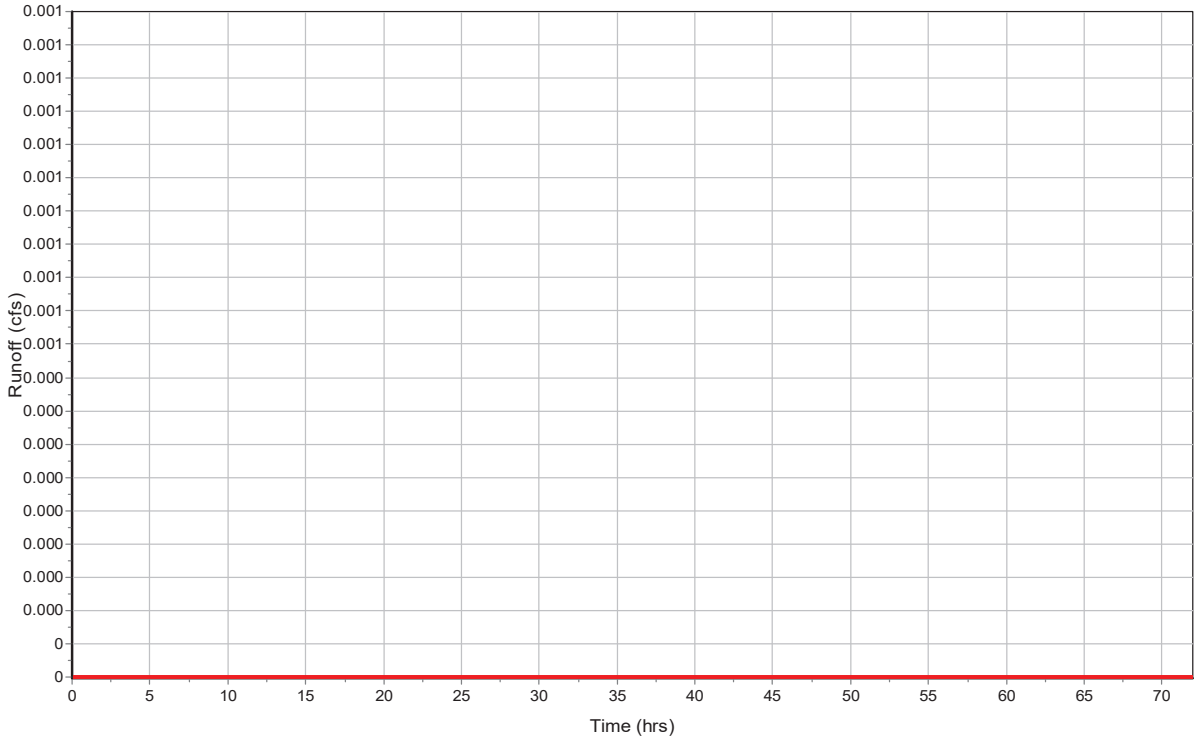
Total Rainfall (in)	2.9
Total Runoff (in)	0
Peak Runoff (cfs)	0
Weighted Curve Number	39
Time of Concentration (days hh:mm:ss)	0 00:11:01

Subbasin : CB-34A-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-34-DA

Input Data

Area (ac)	0.23
Peak Rate Factor	484
Weighted Curve Number	75
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.23	-	75
Composite Area & Weighted CN	0.23		75

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	50	0	0
Slope (%) :	2	0	0
2 yr, 24 hr Rainfall (in) :	2.9	0	0
Velocity (ft/sec) :	0.06	0	0
Computed Flow Time (min) :	12.96	0	0

Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0	0
Flow Length (ft) :	50	0	0
Channel Slope (%) :	3	0	0
Cross Section Area (ft^2) :	0.6	0	0
Wetted Perimeter (ft) :	0.3	0	0
Velocity (ft/sec) :	31.51	0	0
Computed Flow Time (min) :	0.03	0	0

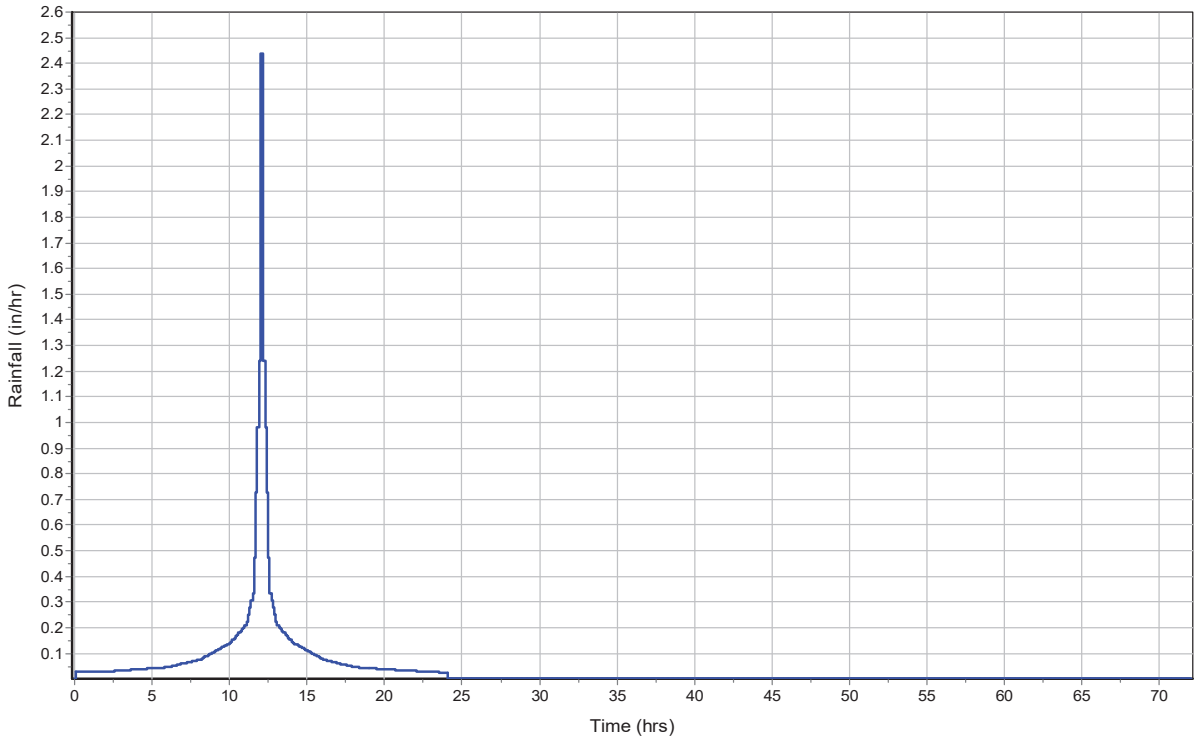
Total TOC (min) 12.98

Subbasin Runoff Results

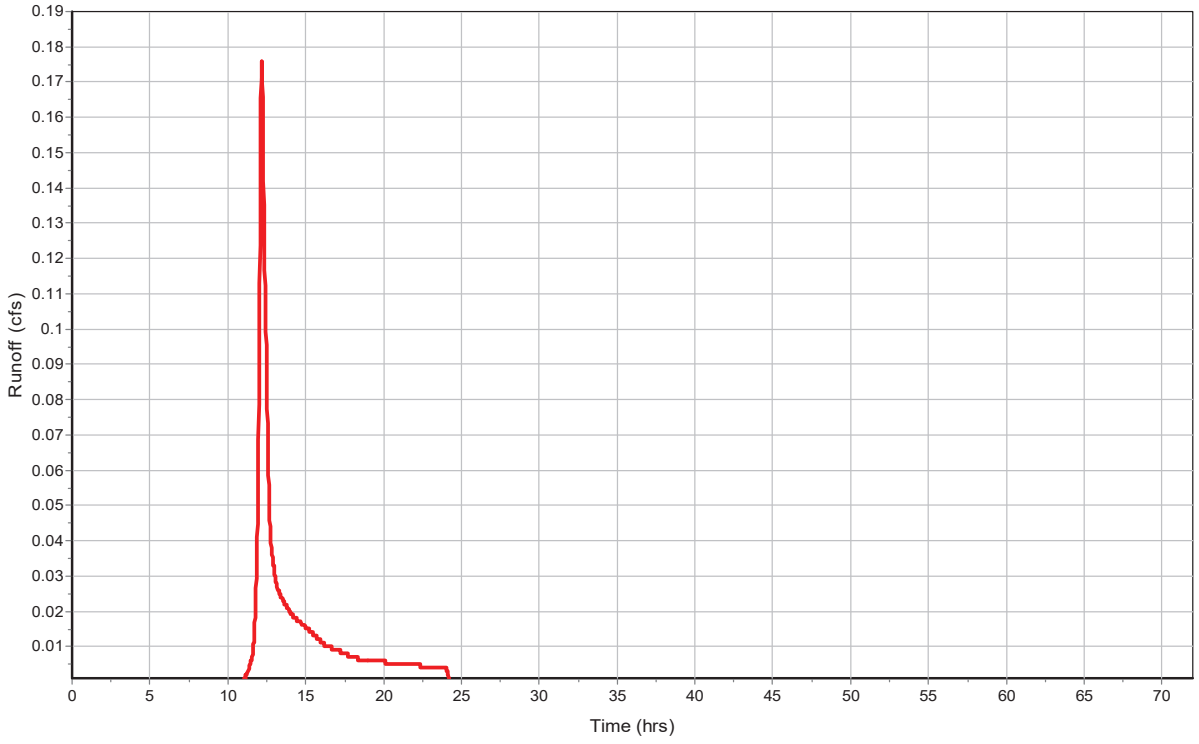
Total Rainfall (in)	2.9
Total Runoff (in)	0.9
Peak Runoff (cfs)	0.18
Weighted Curve Number	75
Time of Concentration (days hh:mm:ss)	0 00:12:59

Subbasin : CB-34-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-35-DA

Input Data

Area (ac)	0.25
Peak Rate Factor	484
Weighted Curve Number	60
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.25	-	60
Composite Area & Weighted CN	0.25		60

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	50	0	0
Slope (%) :	5	0	0
2 yr, 24 hr Rainfall (in) :	2.9	0	0
Velocity (ft/sec) :	0.09	0	0
Computed Flow Time (min) :	8.98	0	0

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	30	0	0
Slope (%) :	5	0	0
Surface Type :	Grass pasture	Unpaved	Unpaved
Velocity (ft/sec) :	1.57	0	0
Computed Flow Time (min) :	0.32	0	0

Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0	0
Flow Length (ft) :	76	0	0
Channel Slope (%) :	1	0	0
Cross Section Area (ft^2) :	0.6	0	0
Wetted Perimeter (ft) :	0.2	0	0
Velocity (ft/sec) :	23.84	0	0
Computed Flow Time (min) :	0.05	0	0

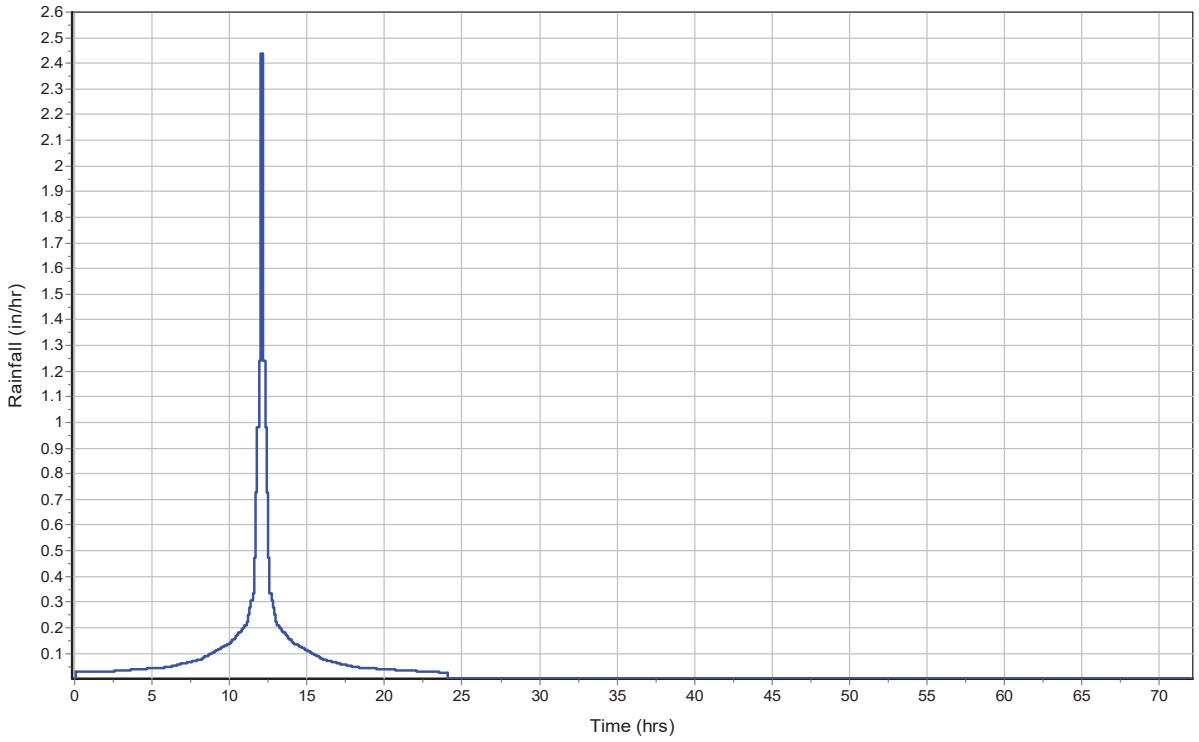
Total TOC (min) 9.35

Subbasin Runoff Results

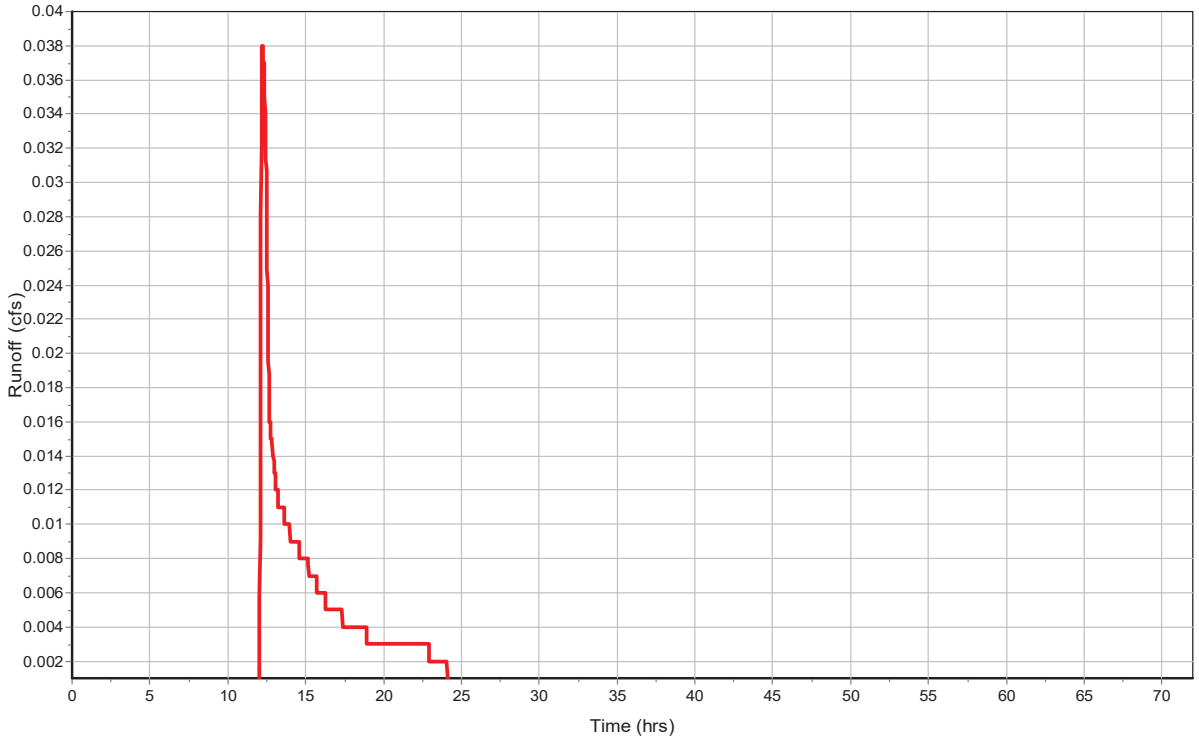
Total Rainfall (in)	2.9
Total Runoff (in)	0.3
Peak Runoff (cfs)	0.04
Weighted Curve Number	60
Time of Concentration (days hh:mm:ss)	0 00:09:21

Subbasin : CB-35-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-36-DA

Input Data

Area (ac)	0.26
Peak Rate Factor	484
Weighted Curve Number	73
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.26	-	73
Composite Area & Weighted CN	0.26		73

Time of Concentration

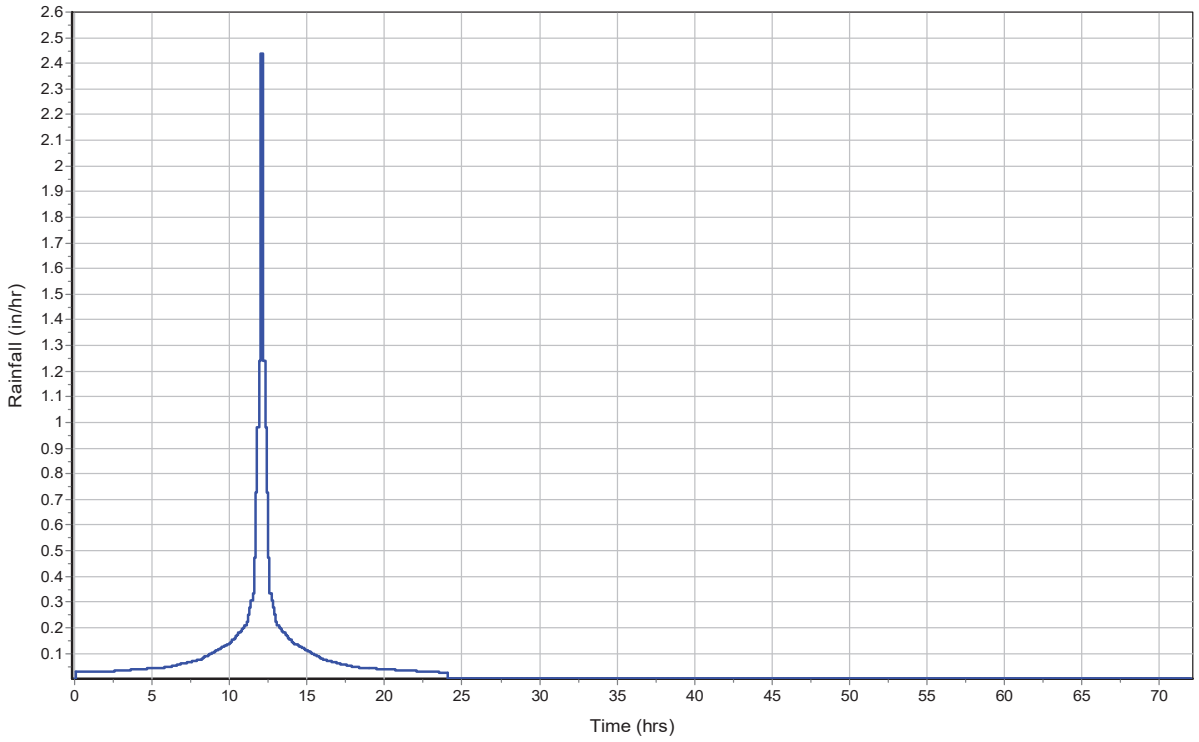
User-Defined TOC override (minutes): 6

Subbasin Runoff Results

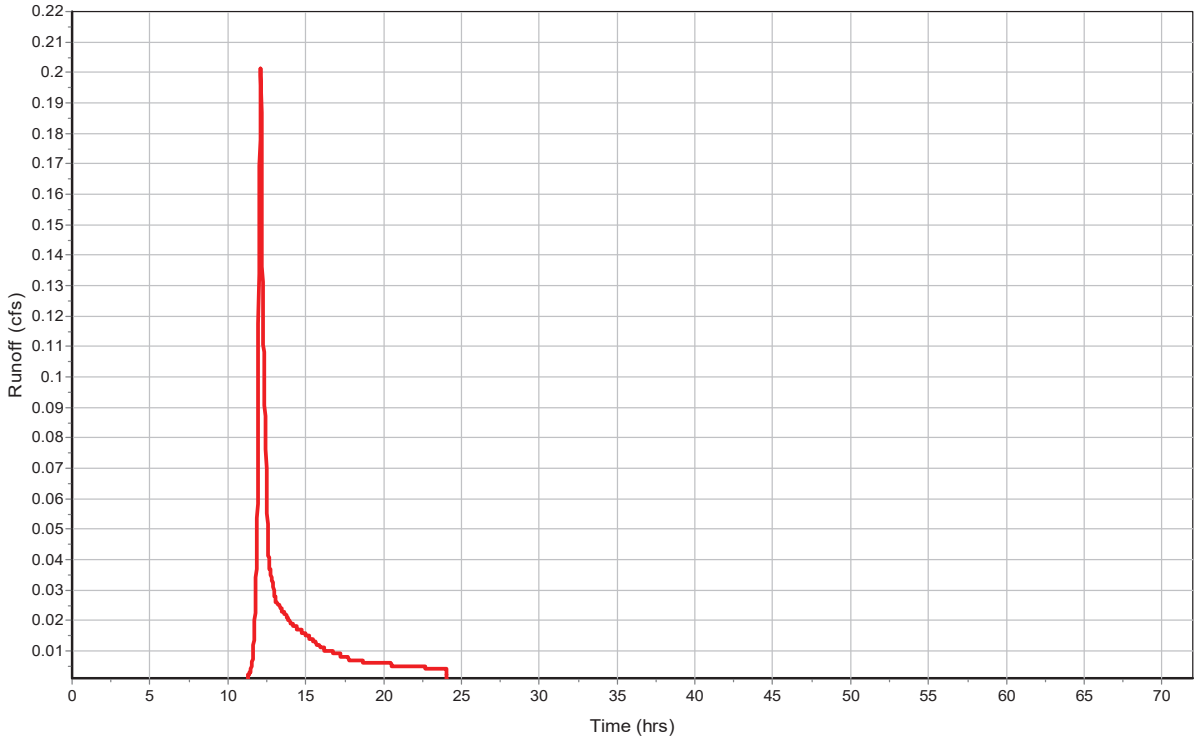
Total Rainfall (in)	2.9
Total Runoff (in)	0.8
Peak Runoff (cfs)	0.2
Weighted Curve Number	73
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : CB-36-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-3-DA

Input Data

Area (ac)	0.06
Peak Rate Factor	484
Weighted Curve Number	98
Rain Gage ID	*

Composite Curve Number

Soil/Surface Description	32 Area (acres)	Soil Group	Curve Number
-	0.06	-	98
Composite Area & Weighted CN	0.06		98

Time of Concentration

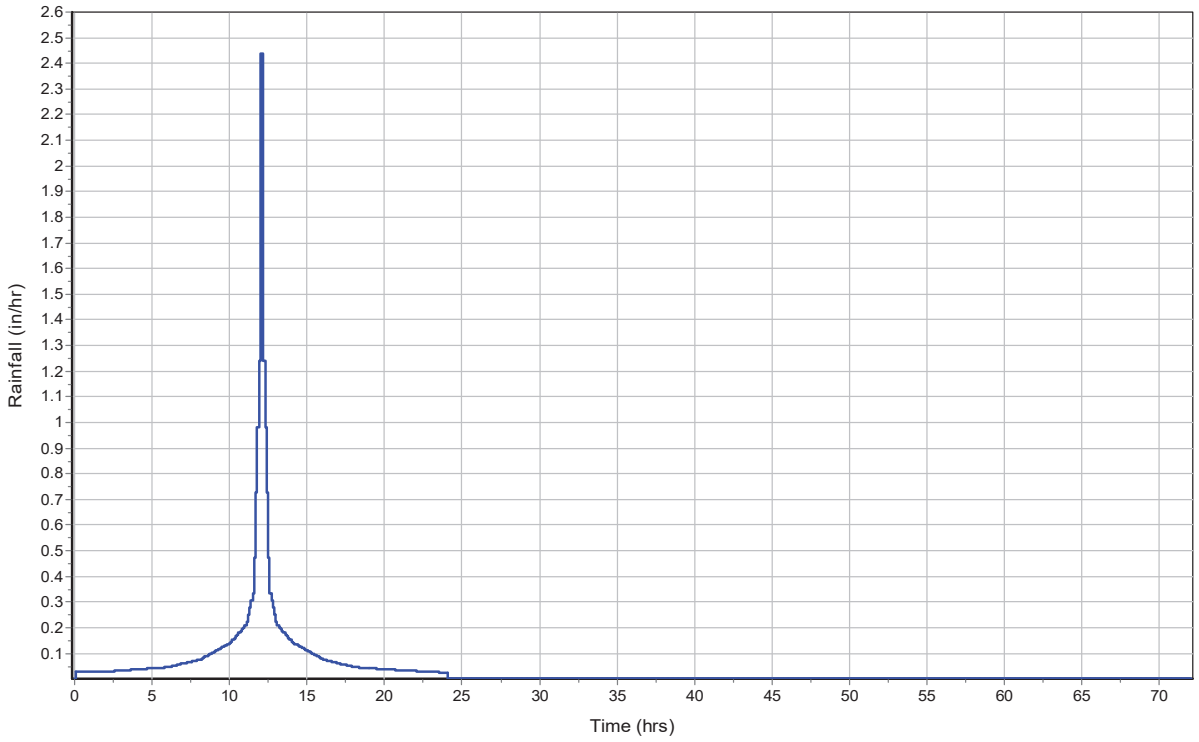
User-Defined TOC override (minutes): 6.00

Subbasin Runoff Results

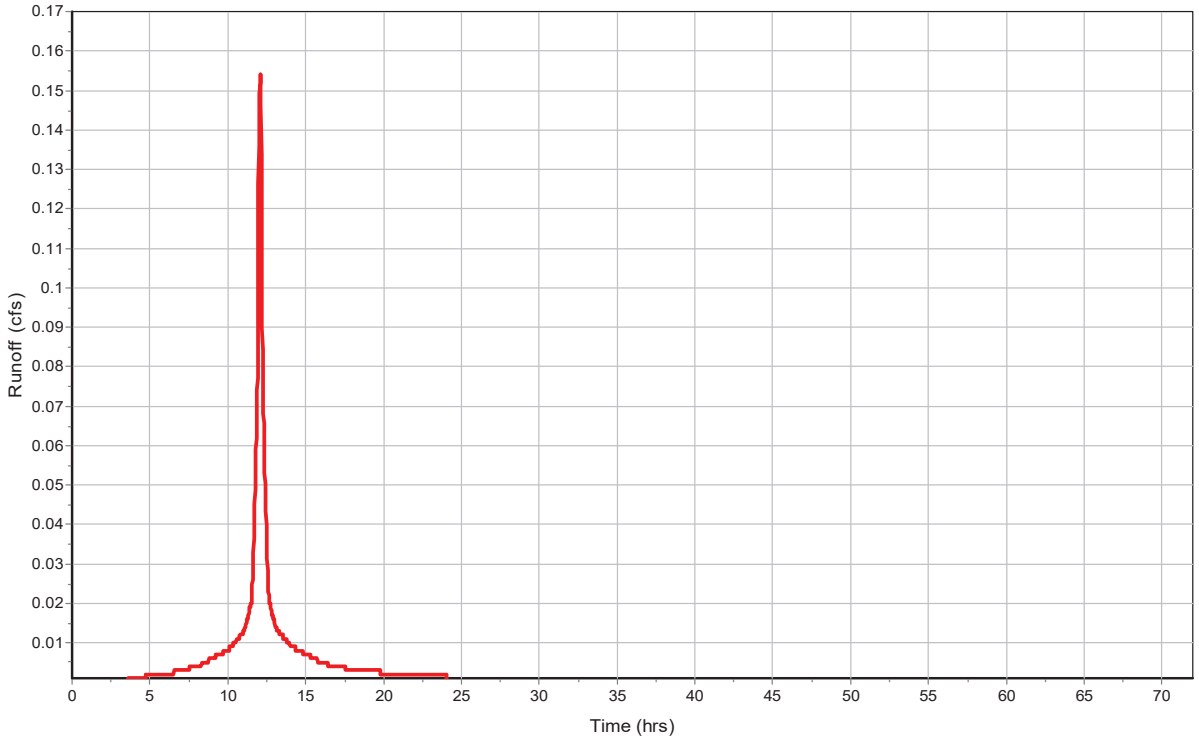
Total Rainfall (in)	2.9
Total Runoff (in)	2.65
Peak Runoff (cfs)	0.15
Weighted Curve Number	98
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : CB-3-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-4-DA

Input Data

Area (ac)	0.19
Peak Rate Factor	484
Weighted Curve Number	77
Rain Gage ID	*

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.19	-	77
Composite Area & Weighted CN	0.19		77

Time of Concentration

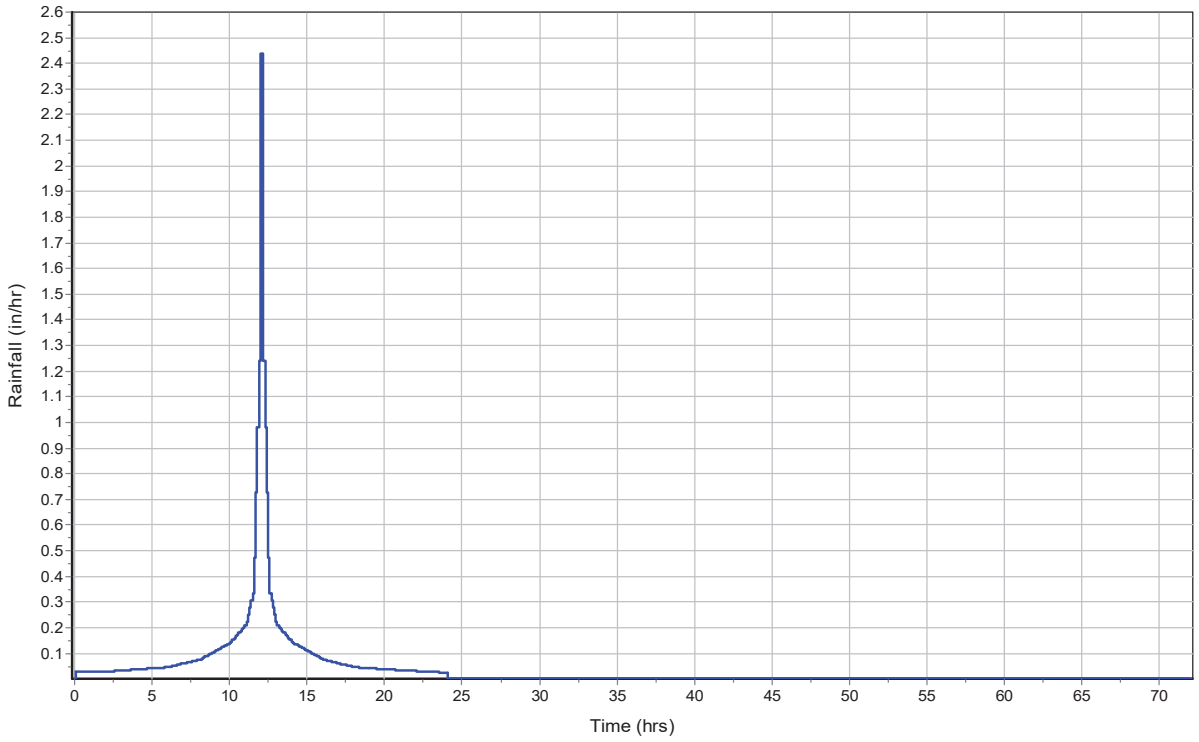
User-Defined TOC override (minutes): 6

Subbasin Runoff Results

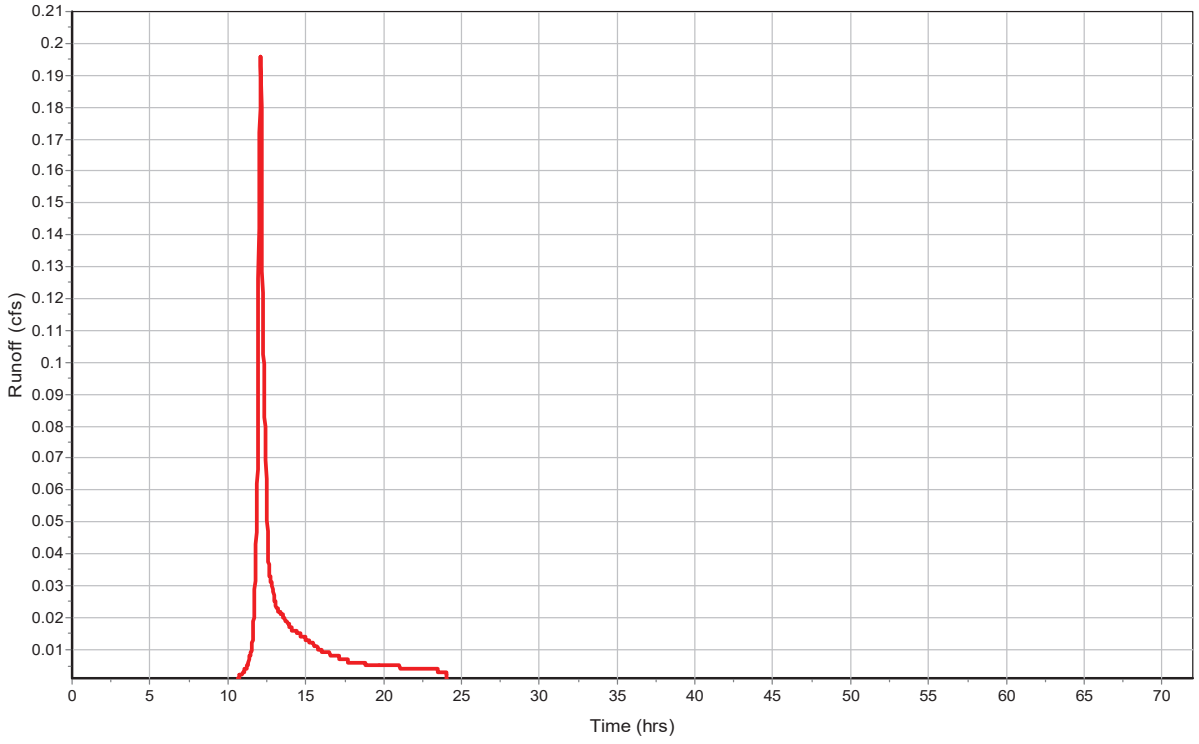
Total Rainfall (in)	2.9
Total Runoff (in)	1
Peak Runoff (cfs)	0.2
Weighted Curve Number	77
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : CB-4-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-5-DA

Input Data

Area (ac)	0.16
Peak Rate Factor	484
Weighted Curve Number	98
Rain Gage ID	*

Composite Curve Number

Soil/Surface Description	32 Area (acres)	Soil Group	Curve Number
-	0.16	-	98
Composite Area & Weighted CN	0.16		98

Time of Concentration

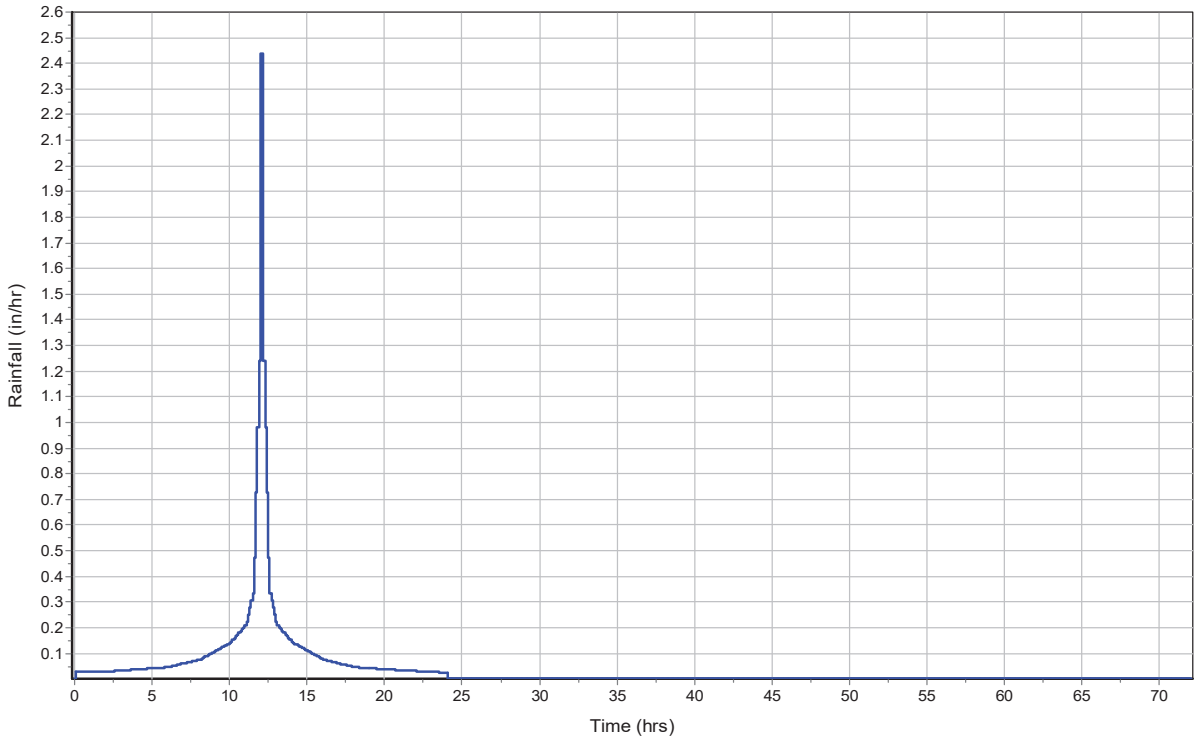
User-Defined TOC override (minutes): 6

Subbasin Runoff Results

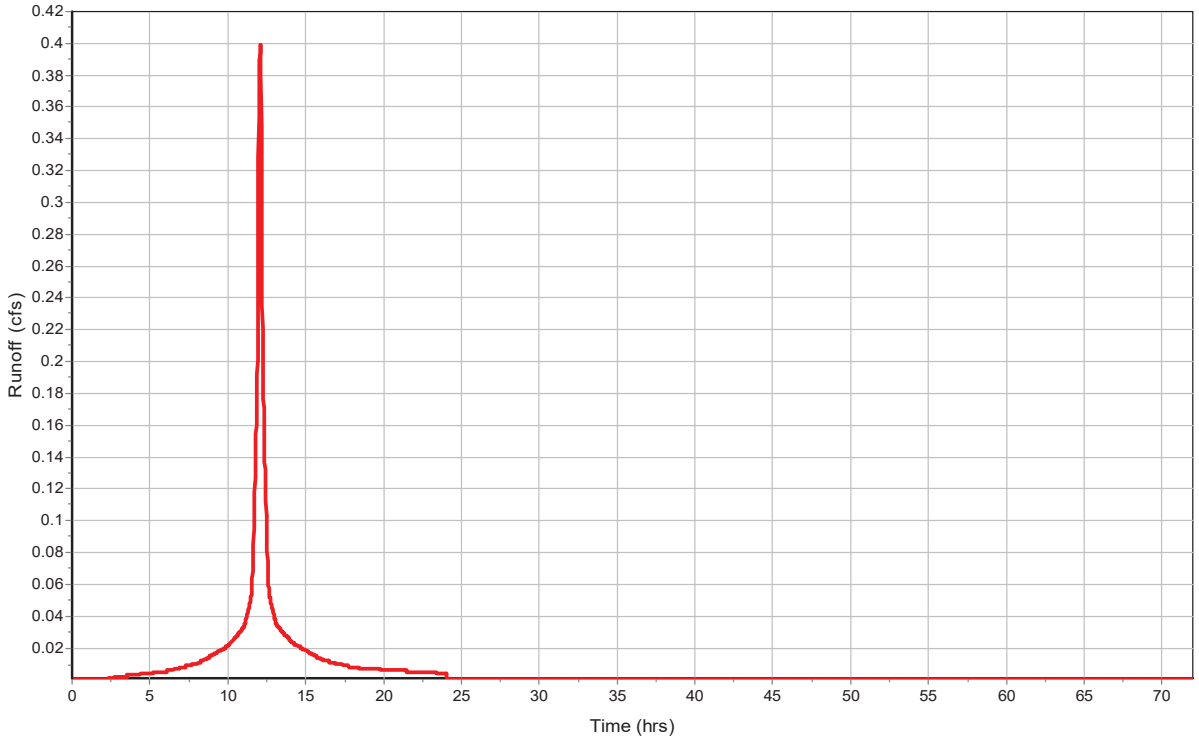
Total Rainfall (in)	2.9
Total Runoff (in)	2.67
Peak Runoff (cfs)	0.4
Weighted Curve Number	98
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : CB-5-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-6-DA

Input Data

Area (ac)	0.23
Peak Rate Factor	484
Weighted Curve Number	85
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.23	-	85
Composite Area & Weighted CN	0.23		85

Time of Concentration

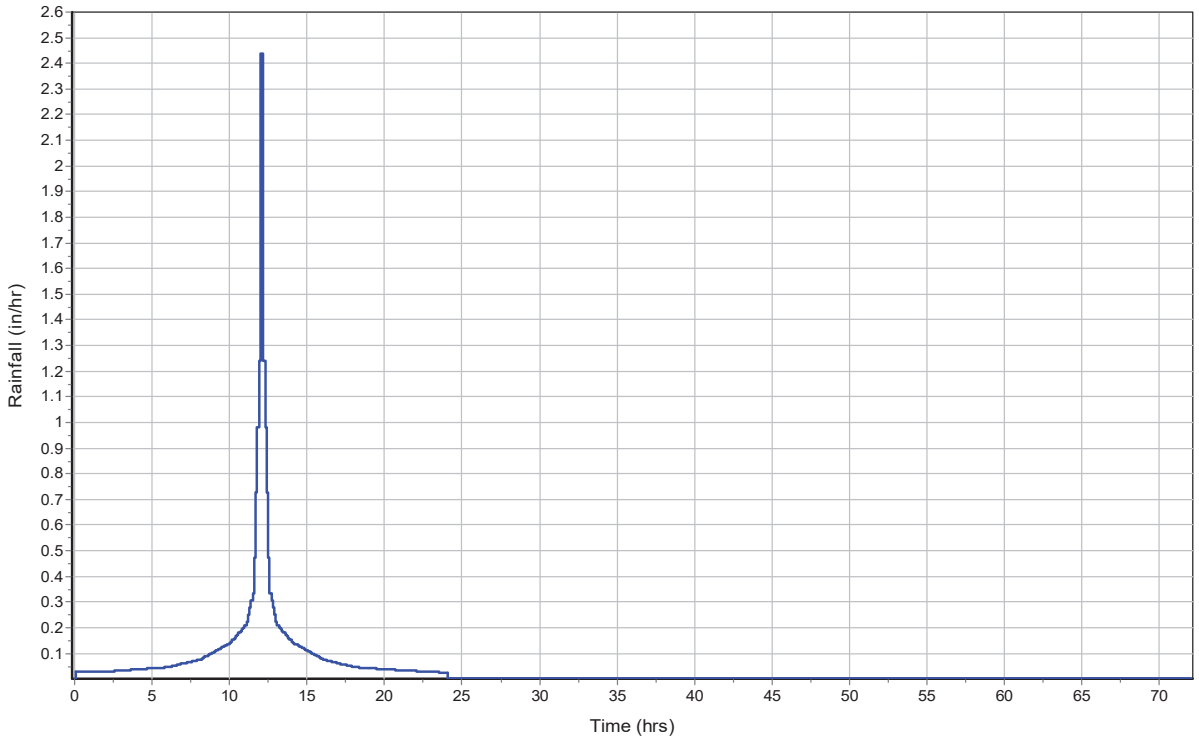
User-Defined TOC override (minutes): 6.00

Subbasin Runoff Results

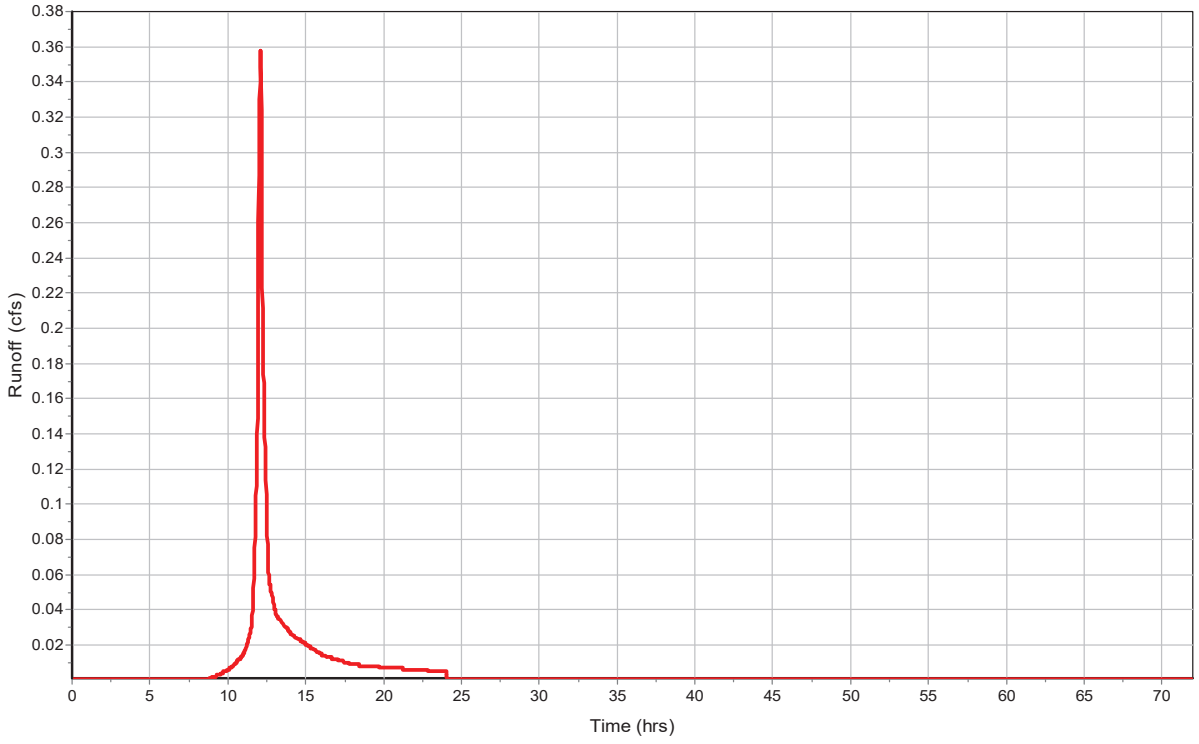
Total Rainfall (in)	2.9
Total Runoff (in)	1.5
Peak Runoff (cfs)	0.36
Weighted Curve Number	85
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : CB-6-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-7-DA

Input Data

Area (ac)	0.75
Peak Rate Factor	484
Weighted Curve Number	54
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.75	-	54
Composite Area & Weighted CN	0.75		54

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	50	0	0
Slope (%) :	2.5	0	0
2 yr, 24 hr Rainfall (in) :	2.9	0	0
Velocity (ft/sec) :	0.07	0	0
Computed Flow Time (min) :	11.85	0	0

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	230	0	0
Slope (%) :	3	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.79	0	0
Computed Flow Time (min) :	1.37	0	0

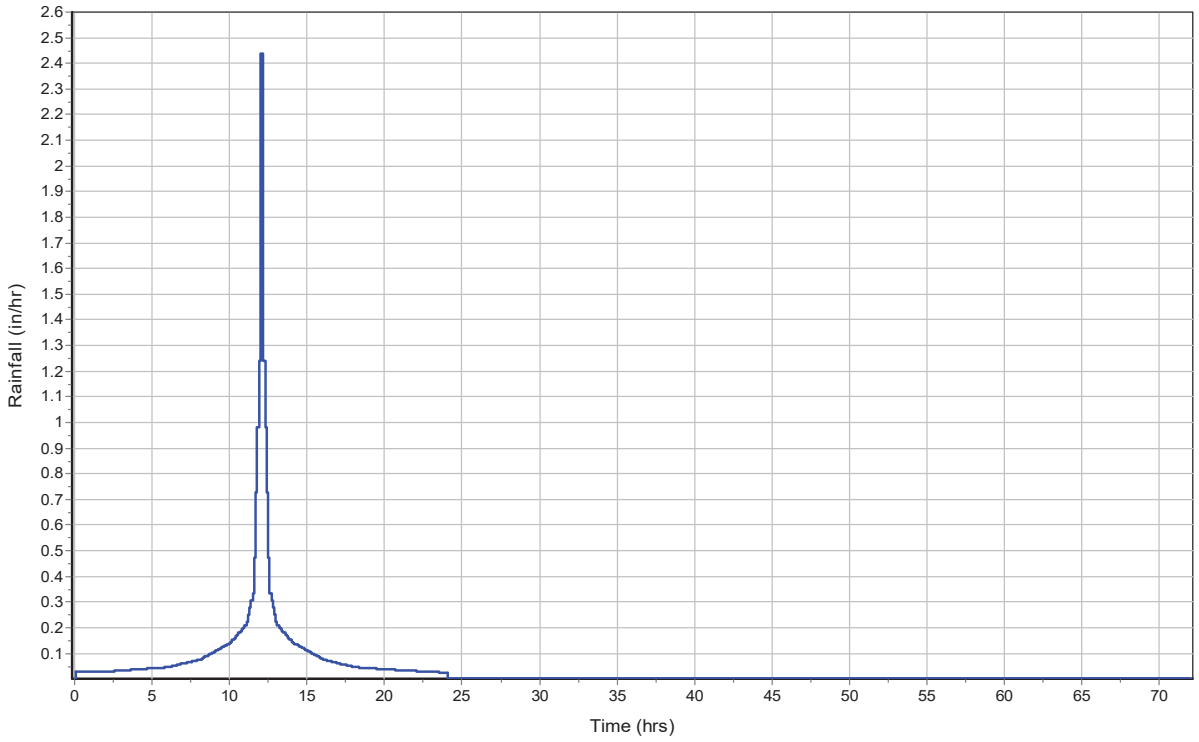
Total TOC (min) 13.22

Subbasin Runoff Results

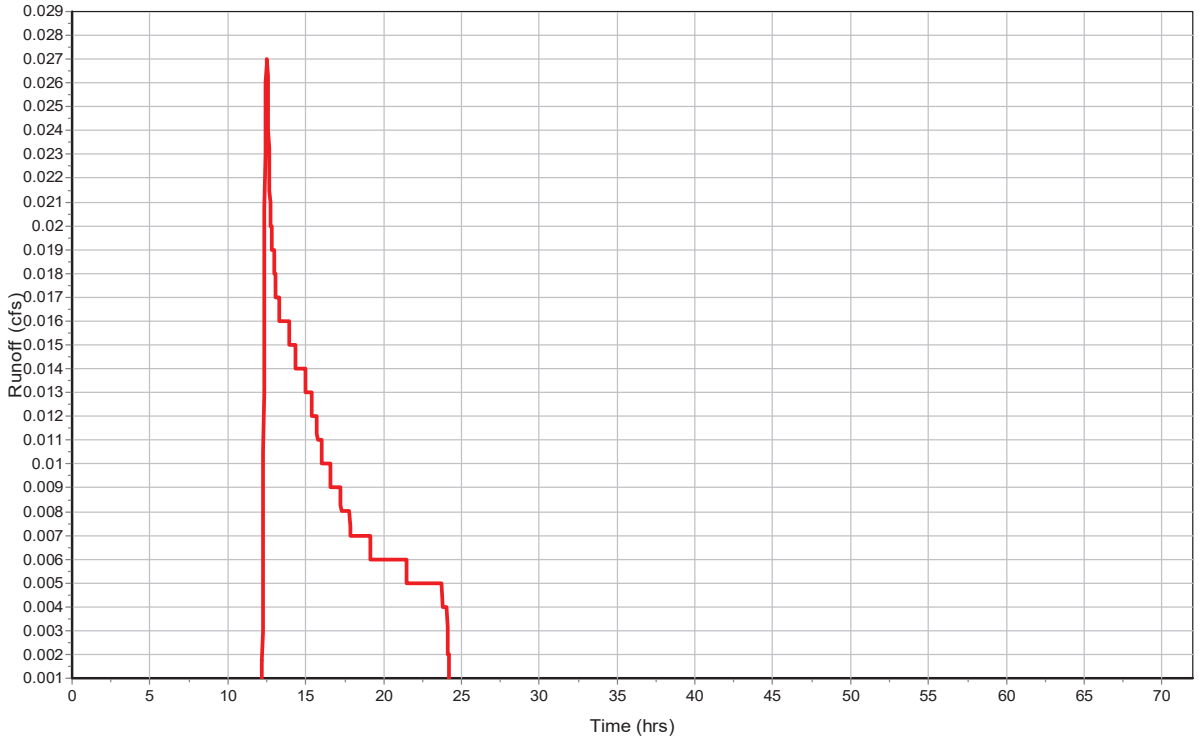
Total Rainfall (in)	2.9
Total Runoff (in)	0.15
Peak Runoff (cfs)	0.03
Weighted Curve Number	54
Time of Concentration (days hh:mm:ss)	0 00:13:13

Subbasin : CB-7-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-8-DA

Input Data

Area (ac)	0.43
Peak Rate Factor	484
Weighted Curve Number	64
Rain Gage ID	*

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	0.43	-	64
Composite Area & Weighted CN	0.43		64

Time of Concentration

	Subarea	Subarea	Subarea
Sheet Flow Computations	A	B	C
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	50	0	0
Slope (%) :	1.5	0	0
2 yr, 24 hr Rainfall (in) :	2.9	0	0
Velocity (ft/sec) :	0.06	0	0
Computed Flow Time (min) :	14.54	0	0

	Subarea	Subarea	Subarea
Shallow Concentrated Flow Computations	A	B	C
Flow Length (ft) :	160	0	0
Slope (%) :	1.5	0	0
Surface Type :	Grass pasture	Unpaved	Unpaved
Velocity (ft/sec) :	0.86	0	0
Computed Flow Time (min) :	3.1	0	0

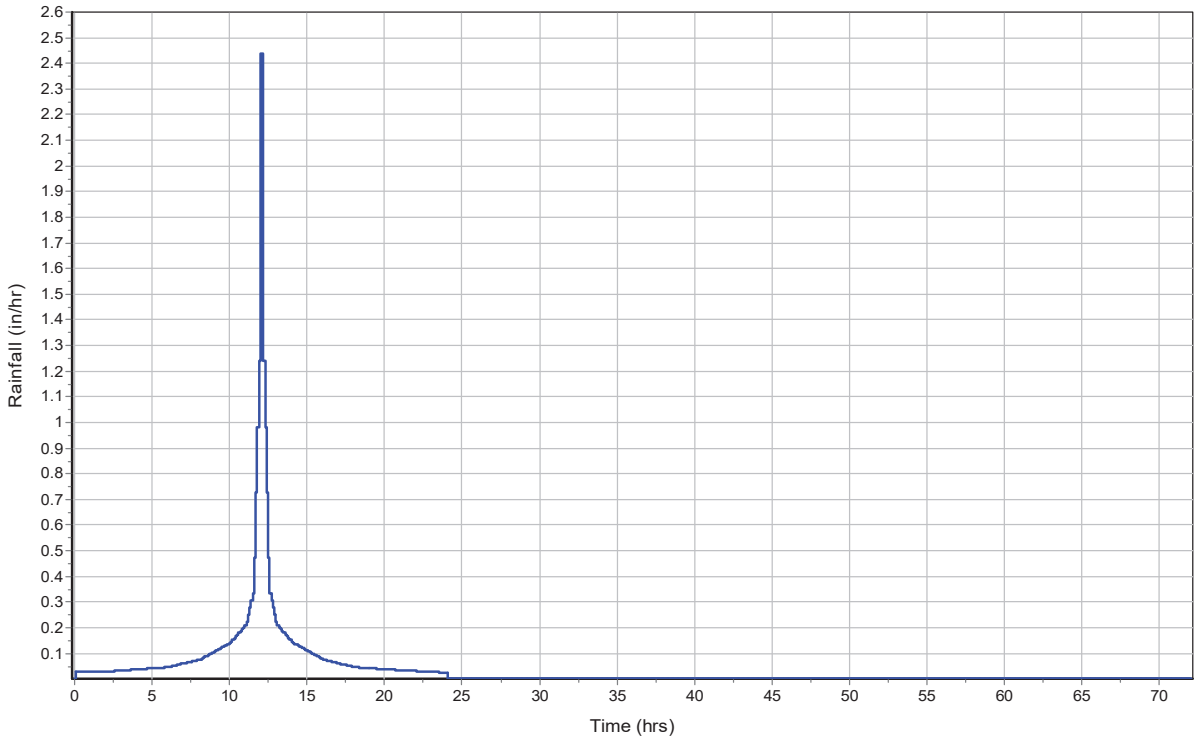
Total TOC (min) 17.64

Subbasin Runoff Results

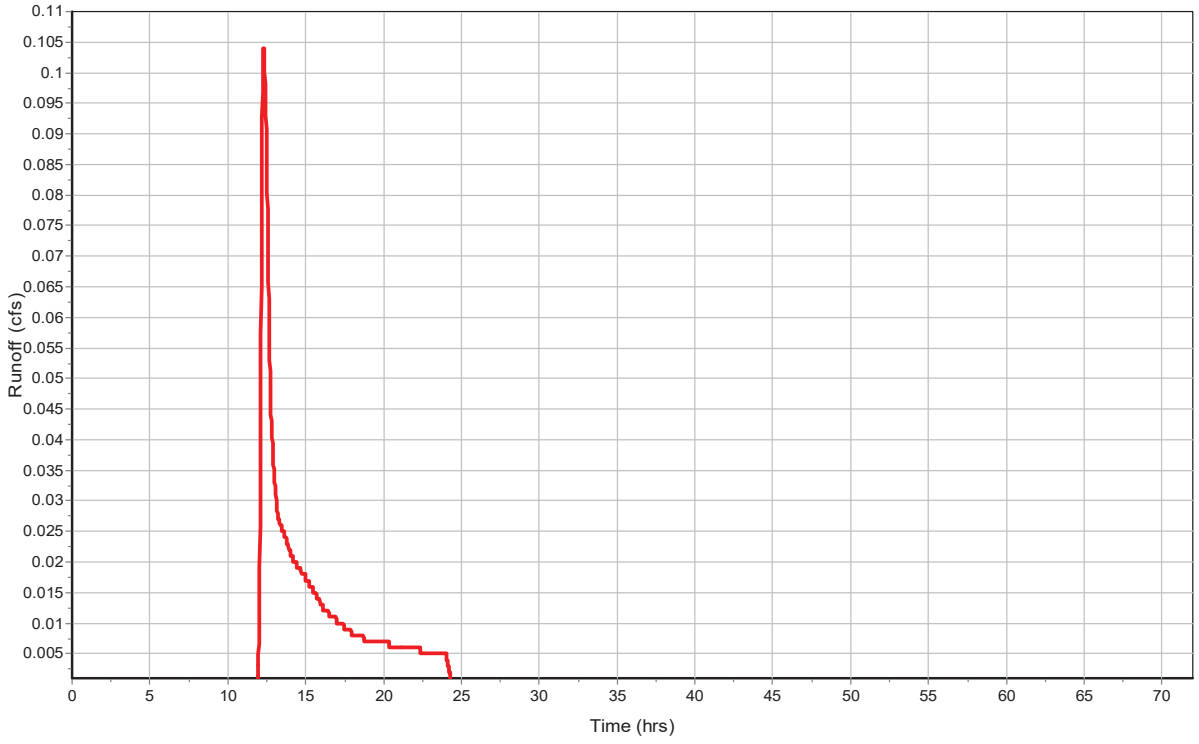
Total Rainfall (in)	2.9
Total Runoff (in)	0.43
Peak Runoff (cfs)	0.1
Weighted Curve Number	64
Time of Concentration (days hh:mm:ss)	0 00:17:38

Subbasin : CB-8-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-9-DA

Input Data

Area (ac)	1.02
Peak Rate Factor	484
Weighted Curve Number	59
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	1.02	-	59
Composite Area & Weighted CN	1.02		59

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	50	0	0
Slope (%) :	1.5	0	0
2 yr, 24 hr Rainfall (in) :	2.9	0	0
Velocity (ft/sec) :	0.06	0	0
Computed Flow Time (min) :	14.54	0	0

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	270	0	0
Slope (%) :	3	0	0
Surface Type :	Grass pasture	Unpaved	Unpaved
Velocity (ft/sec) :	1.21	0	0
Computed Flow Time (min) :	3.72	0	0

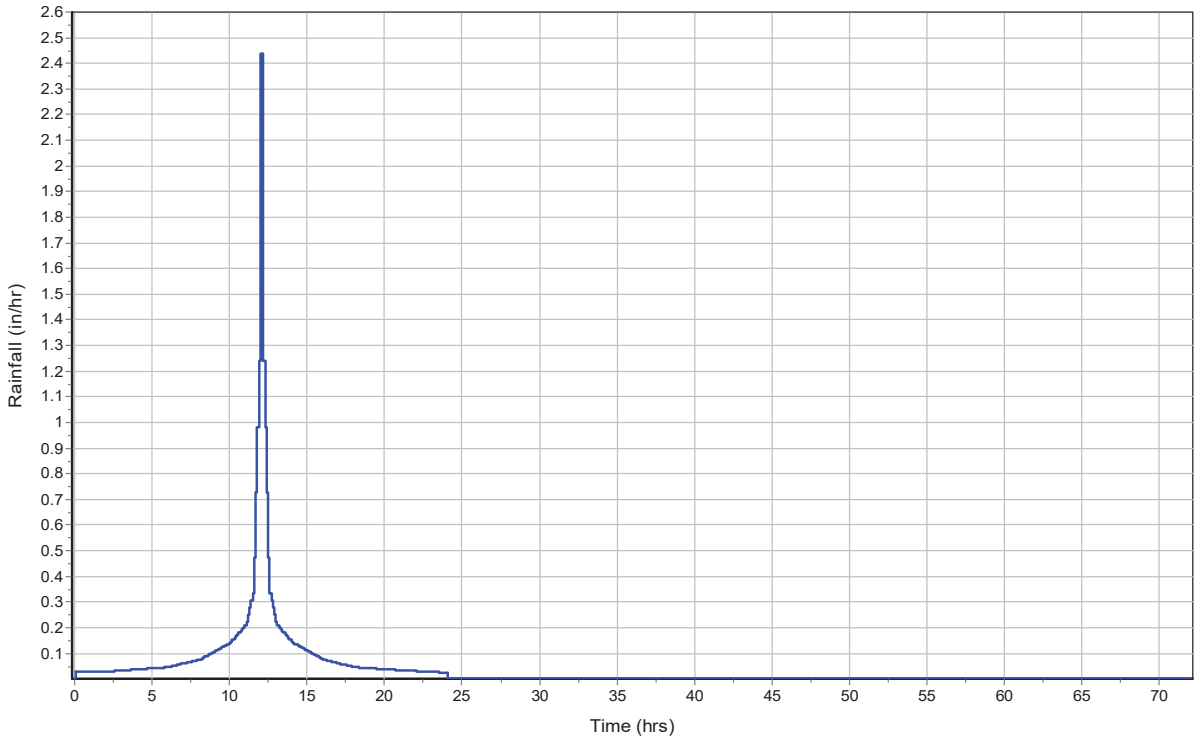
Total TOC (min) 18.25

Subbasin Runoff Results

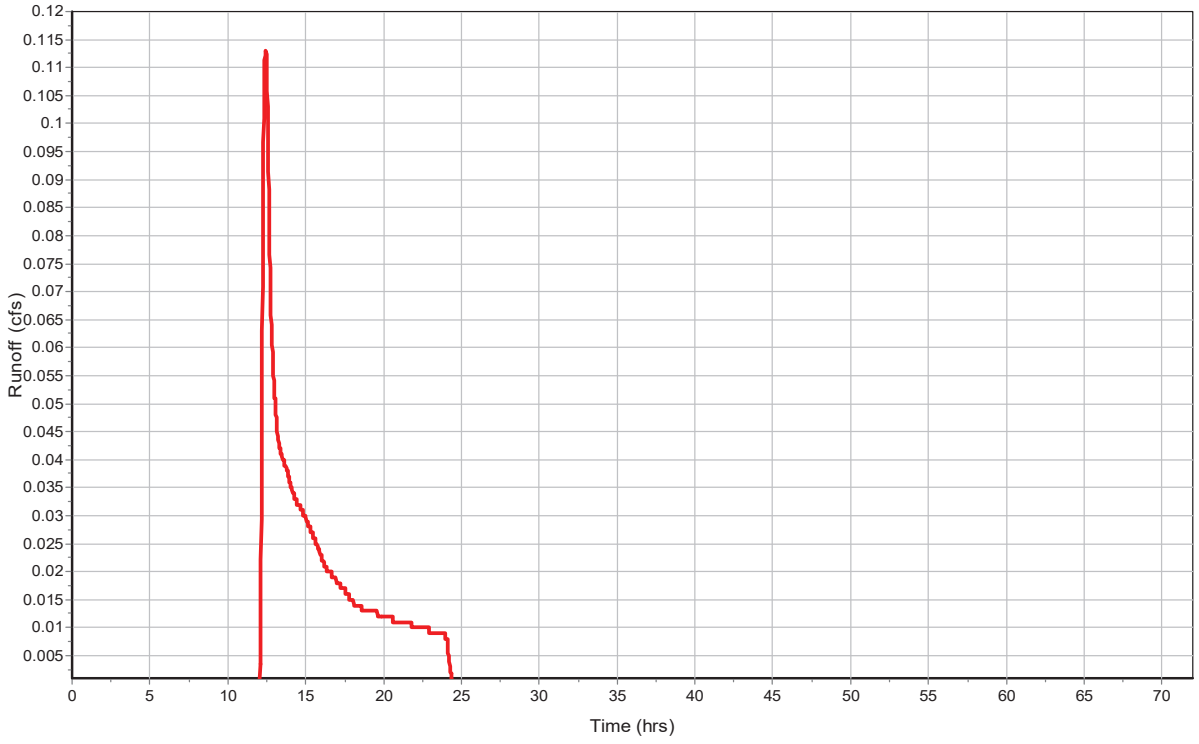
Total Rainfall (in)	2.9
Total Runoff (in)	0.27
Peak Runoff (cfs)	0.11
Weighted Curve Number	59
Time of Concentration (days hh:mm:ss)	0 00:18:15

Subbasin : CB-9-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : DI-1-DA

Input Data

Area (ac)	1.39
Peak Rate Factor	484
Weighted Curve Number	65
Rain Gage ID	*

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	1.39	-	65
Composite Area & Weighted CN	1.39		65

Time of Concentration

	Subarea	Subarea	Subarea
Sheet Flow Computations	A	B	C
Manning's Roughness :	0.6	0	0
Flow Length (ft) :	50	0	0
Slope (%) :	4	0	0
2 yr, 24 hr Rainfall (in) :	2.9	0	0
Velocity (ft/sec) :	0.06	0	0
Computed Flow Time (min) :	13.58	0	0

	Subarea	Subarea	Subarea
Shallow Concentrated Flow Computations	A	B	C
Flow Length (ft) :	220	0	0
Slope (%) :	2.5	0	0
Surface Type :	Woodland	Unpaved	Unpaved
Velocity (ft/sec) :	0.79	0	0
Computed Flow Time (min) :	4.64	0	0

	Subarea	Subarea	Subarea
Channel Flow Computations	A	B	C
Manning's Roughness :	0.027	0	0
Flow Length (ft) :	120	0	0
Channel Slope (%) :	4	0	0
Cross Section Area (ft^2) :	3.2	0	0
Wetted Perimeter (ft) :	0.8	0	0
Velocity (ft/sec) :	27.81	0	0
Computed Flow Time (min) :	0.07	0	0

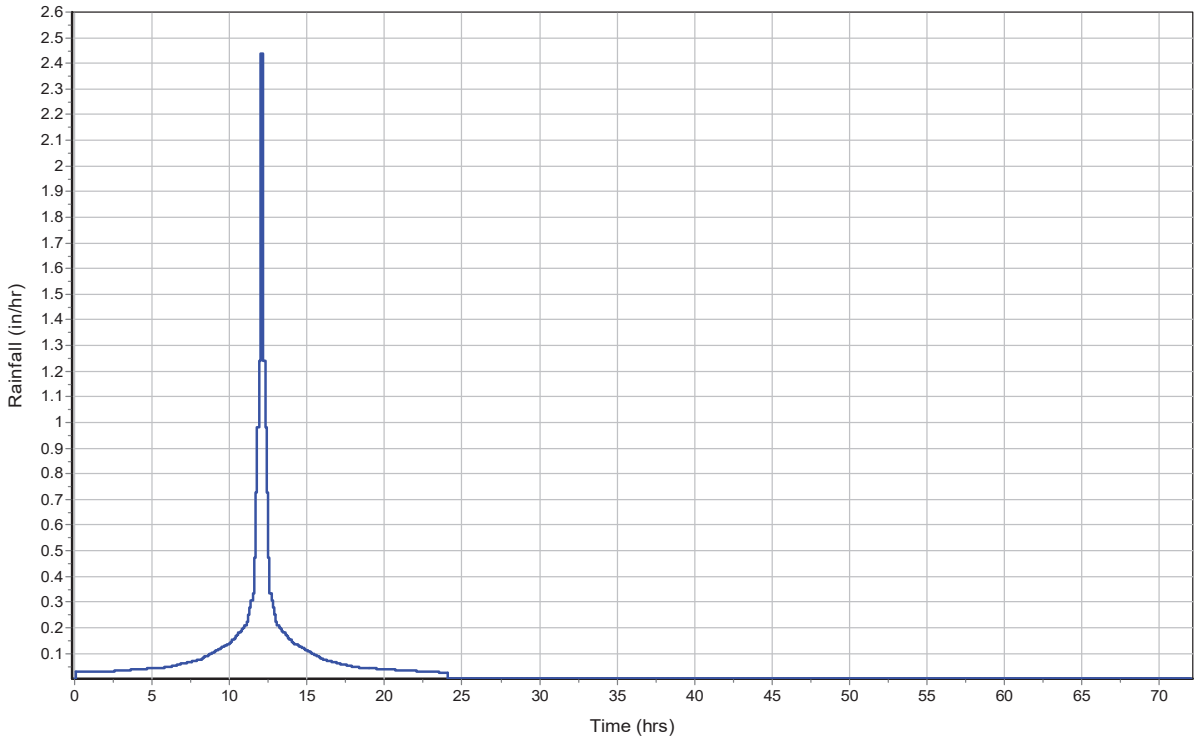
Total TOC (min) 18.29

Subbasin Runoff Results

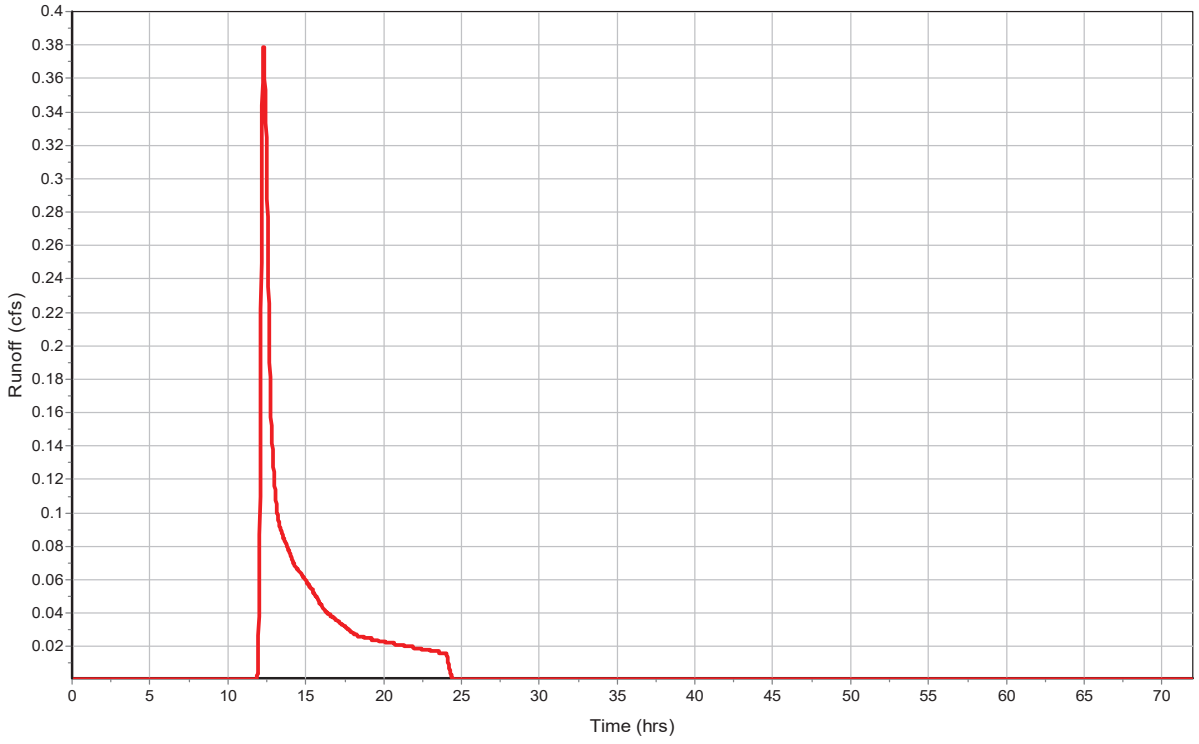
Total Rainfall (in)	2.9
Total Runoff (in)	0.46
Peak Runoff (cfs)	0.38
Weighted Curve Number	65
Time of Concentration (days hh:mm:ss)	0 00:18:17

Subbasin : DI-1-DA

Rainfall Intensity Graph



Runoff Hydrograph



Junction Input

SN	Element ID	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Ground/Rim (Max) Offset (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Surcharge Elevation (ft)	Surcharge Depth (ft)	Ponded Area (ft^2)	Minimum Pipe Cover (in)
1	Bald_Mtn	368.00	375.00	7.00	368.00	0.00	375.00	0.00	0.00	0.00
2	CB-16	340.70	344.05	3.35	340.70	0.00	344.05	0.00	0.00	0.00
3	CB-16A	342.00	346.00	4.00	342.00	0.00	346.00	0.00	10.00	0.00
4	CB-25	361.40	366.92	5.52	361.40	0.00	366.92	0.00	10.00	0.00
5	CB-26	361.20	364.26	3.06	361.20	0.00	364.26	0.00	10.00	0.00
6	CB-28	342.40	348.24	5.84	342.40	0.00	348.24	0.00	10.00	0.00
7	CB-33	373.40	378.68	5.28	373.40	0.00	378.68	0.00	10.00	0.00
8	CB-34	375.40	380.10	4.70	375.40	0.00	380.10	0.00	10.00	0.00
9	CB-34A	378.00	382.00	4.00	378.00	0.00	382.00	0.00	0.00	0.00
10	CB-36	372.40	376.41	4.01	372.40	0.00	376.41	0.00	10.00	0.00
11	DHM-8	363.80	378.03	14.23	363.80	0.00	378.03	0.00	0.00	0.00
12	DI-1	368.20	371.60	3.40	368.20	0.00	371.60	0.00	10.00	0.00
13	DMH-1	350.80	356.38	5.58	350.80	0.00	356.38	0.00	0.00	0.00
14	DMH-10	367.30	377.69	10.39	367.30	0.00	377.69	0.00	0.00	0.00
15	DMH-4	358.90	368.92	10.02	358.90	0.00	368.92	0.00	0.00	0.00
16	DMH-5	359.90	366.02	6.12	359.90	0.00	366.02	0.00	0.00	0.00
17	DMH-6	350.30	356.18	5.88	350.30	0.00	356.18	0.00	0.00	0.00
18	DMH-7	342.20	348.55	6.35	342.20	0.00	348.55	0.00	0.00	0.00
19	DMH-9	365.10	380.10	15.00	365.10	0.00	380.10	0.00	0.00	0.00
20	Fallriver_Junction	325.00	331.00	6.00	325.00	0.00	331.00	0.00	0.00	0.00
21	I-91_Culvert-Out	330.50	340.00	9.50	330.00	-0.50	340.00	0.00	0.00	0.00
22	Outfall-1A	335.53	341.53	6.00	335.53	0.00	341.53	0.00	0.00	0.00
23	Outfall-1B	339.81	345.81	6.00	339.81	0.00	345.81	0.00	0.00	0.00
24	Outfall-1C	335.79	341.79	6.00	335.79	0.00	341.79	0.00	0.00	0.00
25	Outfall-1D	336.46	342.46	6.00	336.46	0.00	342.46	0.00	0.00	0.00
26	Outfall-1E	333.54	339.54	6.00	333.54	0.00	339.54	0.00	0.00	0.00
27	RampCulvert-In	328.72	340.00	11.28	328.72	0.00	340.00	0.00	0.00	0.00
28	RampCulvert-Out	327.58	340.00	12.42	327.58	0.00	340.00	0.00	0.00	0.00

Junction Results

SN	Element ID	Peak Inflow (cfs)	Peak Lateral Inflow (cfs)	Max HGL Elevation Attained (ft)	Max HGL Depth Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Average HGL Elevation Attained (ft)	Average HGL Depth Attained (ft)	Time of Max HGL Occurrence (days hh:mm)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	Bald_Mtn	2.44	2.44	369.02	1.02	0.00	5.98	368.45	0.45	0 12:17	0 00:00	0.00	0.00
2	CB-16	0.01	0.01	340.75	0.05	0.00	3.30	340.71	0.01	0 13:52	0 00:00	0.00	0.00
3	CB-16A	0.00	0.00	342.02	0.02	0.00	3.98	342.00	0.00	0 21:32	0 00:00	0.00	0.00
4	CB-25	0.01	0.01	361.43	0.03	0.00	5.49	361.41	0.01	0 12:34	0 00:00	0.00	0.00
5	CB-26	0.00	0.00	361.20	0.00	0.00	3.06	361.20	0.00	0 00:00	0 00:00	0.00	0.00
6	CB-28	0.00	0.00	342.43	0.03	0.00	5.81	342.40	0.00	0 12:08	0 00:00	0.00	0.00
7	CB-33	0.20	0.00	373.54	0.14	0.00	5.14	373.41	0.01	0 12:13	0 00:00	0.00	0.00
8	CB-34	0.18	0.18	375.53	0.13	0.00	4.57	375.41	0.01	0 12:12	0 00:00	0.00	0.00
9	CB-34A	0.00	0.00	378.00	0.00	0.00	4.00	378.00	0.00	0 00:00	0 00:00	0.00	0.00
10	CB-36	0.20	0.20	372.49	0.09	0.00	3.92	372.41	0.01	0 12:08	0 00:00	0.00	0.00
11	DHM-8	3.14	0.00	364.39	0.59	0.00	13.64	363.84	0.04	0 12:19	0 00:00	0.00	0.00
12	DI-1	0.38	0.38	368.43	0.23	0.00	3.17	368.22	0.02	0 12:19	0 00:00	0.00	0.00
13	DMH-1	0.53	0.00	351.07	0.27	0.00	5.31	350.81	0.01	0 12:08	0 00:00	0.00	0.00
14	DMH-10	2.93	0.00	368.00	0.70	0.00	9.69	367.34	0.04	0 12:18	0 00:00	0.00	0.00
15	DMH-4	3.36	0.00	359.17	0.27	0.00	9.75	358.92	0.02	0 12:19	0 00:00	0.00	0.00
16	DMH-5	0.45	0.00	360.06	0.16	0.00	5.96	359.91	0.01	0 12:07	0 00:00	0.00	0.00
17	DMH-6	0.85	0.00	350.53	0.23	0.00	5.65	350.32	0.02	0 12:08	0 00:00	0.00	0.00
18	DMH-7	0.84	0.00	342.43	0.23	0.00	6.12	342.22	0.02	0 12:08	0 00:00	0.00	0.00
19	DMH-9	2.92	0.00	365.92	0.82	0.00	14.18	365.15	0.05	0 12:19	0 00:00	0.00	0.00
20	Fallriver_Junction	6.22	0.00	325.38	0.38	0.00	19.62	325.02	0.02	0 12:12	0 00:00	0.00	0.00
21	I-91_Culvert-Out	3.36	0.00	331.09	0.59	0.00	8.91	330.53	0.03	0 12:21	0 00:00	0.00	0.00
22	Outfall-1A	1.53	0.00	335.77	0.24	0.00	5.76	335.54	0.01	0 12:08	0 00:00	0.00	0.00
23	Outfall-1B	0.43	0.00	339.93	0.12	0.00	5.88	339.82	0.01	0 12:08	0 00:00	0.00	0.00
24	Outfall-1C	1.49	0.00	336.01	0.22	0.00	5.78	335.80	0.01	0 12:09	0 00:00	0.00	0.00
25	Outfall-1D	1.52	0.00	336.69	0.23	0.00	5.77	336.47	0.01	0 12:08	0 00:00	0.00	0.00
26	Outfall-1E	3.36	0.00	334.04	0.50	0.00	5.50	333.57	0.03	0 12:19	0 00:00	0.00	0.00
27	RampCulvert-In	4.01	0.00	329.43	0.71	0.00	10.57	328.77	0.05	0 12:22	0 00:00	0.00	0.00
28	RampCulvert-Out	3.98	0.00	327.84	0.26	0.00	12.16	327.60	0.02	0 12:23	0 00:00	0.00	0.00

Channel Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Shape	Height (ft)	Width (ft)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate
1	1D-culvert	213.55	336.46	0.00	328.72	0.00	7.74	3.6200	Trapezoidal	3.000	8.000	0.0320	0.5000	0.5000	0.0000	0.00	No
2	CB-1_bypass	126.22	356.30	4.40	352.48	4.38	3.82	3.0300	Trapezoidal	0.500	25.510	0.0130	0.5000	0.5000	0.0000	0.00	No
3	CB-12_bypass	124.46	348.19	4.79	346.64	3.84	1.55	1.2500	Trapezoidal	0.500	25.510	0.0160	0.5000	0.5000	0.0000	0.00	No
4	CB-17_bypass	277.20	352.17	3.87	346.02	4.62	6.15	2.2200	Trapezoidal	0.500	25.510	0.0160	0.5000	0.5000	0.0000	0.00	No
5	CB-18_bypass	166.98	351.79	4.49	348.19	4.79	3.60	2.1600	Trapezoidal	0.500	25.060	0.0160	0.5000	0.5000	0.0000	0.00	No
6	CB-2_bypass	100.68	355.60	5.10	353.17	5.97	2.43	2.4100	Trapezoidal	0.500	25.510	0.0160	0.5000	0.5000	0.0000	0.00	No
7	CB-20_bypass	207.40	358.45	4.25	352.17	3.87	6.28	3.0300	Trapezoidal	0.500	25.060	0.0160	0.5000	0.5000	0.0000	0.00	No
8	CB-21_bypass	202.68	358.38	4.78	351.79	4.49	6.59	3.2500	Trapezoidal	0.500	25.060	0.0160	0.5000	0.5000	0.0000	0.00	No
9	CB-23_bypass	350.32	369.60	4.10	358.45	4.25	11.15	3.1800	Trapezoidal	0.500	25.060	0.0160	0.5000	0.5000	0.0000	0.00	No
10	CB-24_bypass	354.71	369.68	4.18	353.60	0.00	16.08	4.5300	Trapezoidal	0.500	26.050	0.0160	0.5000	0.5000	0.0000	0.00	No
11	CB-27_bypass	103.70	356.41	5.11	351.50	0.00	4.91	4.7300	Trapezoidal	0.500	25.060	0.0160	0.5000	0.5000	0.0000	0.00	No
12	CB-3_bypass	475.34	353.17	5.97	347.37	6.67	5.80	1.2200	Trapezoidal	0.500	25.060	0.0160	0.5000	0.5000	0.0000	0.00	No
13	CB-30_bypass	294.84	370.42	4.52	356.41	5.11	14.01	4.7500	Trapezoidal	0.500	25.060	0.0160	0.5000	0.5000	0.0000	0.00	No
14	CB-32_bypass	340.69	377.88	4.78	369.68	4.18	8.20	2.4100	Trapezoidal	0.500	25.060	0.0160	0.5000	0.5000	0.0000	0.00	No
15	CB-35_bypass	379.72	379.37	5.37	370.42	4.52	8.95	2.3600	Trapezoidal	0.500	25.060	0.0160	0.5000	0.5000	0.0000	0.00	No
16	CB-4_bypass	192.15	352.48	4.38	349.21	2.61	3.27	1.7000	Trapezoidal	0.500	25.510	0.0160	0.5000	0.5000	0.0000	0.00	No
17	CB-6_bypass	70.37	349.21	2.61	344.57	2.97	4.64	6.5900	Trapezoidal	0.500	25.000	0.0160	0.5000	0.5000	0.0000	0.00	No
18	Cobble_Waterway	363.16	330.50	0.00	328.72	0.00	1.78	0.4900	Trapezoidal	3.000	14.000	0.0320	0.5000	0.5000	0.0000	0.00	No
19	FallRiver	100.00	325.00	0.00	324.50	0.00	0.50	0.5000	Trapezoidal	20.000	50.000	0.0320	0.5000	0.5000	0.0000	0.00	No
20	FR1	84.74	335.53	0.00	325.00	0.00	10.53	12.4300	Trapezoidal	1.000	3.000	0.0320	0.5000	0.5000	0.0000	0.00	No
21	FR2	138.29	339.81	0.00	325.00	0.00	14.81	10.7100	Trapezoidal	1.000	3.000	0.0320	0.5000	0.5000	0.0000	0.00	No
22	FR3	378.68	327.58	0.00	325.00	0.00	2.58	0.6800	Rectangular	10.000	10.000	0.0320	0.5000	0.5000	0.0000	0.00	No
23	FR4	71.36	335.79	0.00	325.00	0.00	10.79	15.1200	Trapezoidal	1.000	3.000	0.0320	0.5000	0.5000	0.0000	0.00	No

Channel Results

SN	Element ID	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Travel Time (min)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Froude Number	Reported Condition
1	1D-culvert	1.52	0 12:08	168.37	0.01	1.71	2.08	0.43	0.14	0.00		
2	CB-1_bypass	0.17	0 12:08	50.08	0.00	1.67	1.26	0.06	0.13	0.00		
3	CB-12_bypass	0.04	0 12:08	26.10	0.00	0.62	3.35	0.07	0.15	0.00		
4	CB-17_bypass	0.06	0 12:07	34.84	0.00	1.82	2.54	0.04	0.08	0.00		
5	CB-18_bypass	0.07	0 12:07	33.52	0.00	1.30	2.14	0.05	0.09	0.00		
6	CB-2_bypass	0.05	0 12:12	36.34	0.00	1.08	1.55	0.04	0.08	0.00		
7	CB-20_bypass	0.11	0 12:07	39.73	0.00	1.52	2.27	0.05	0.11	0.00		
8	CB-21_bypass	0.10	0 12:07	41.17	0.00	1.50	2.25	0.05	0.10	0.00		
9	CB-23_bypass	0.05	0 12:07	40.73	0.00	0.83	7.03	0.05	0.10	0.00		
10	CB-24_bypass	0.07	0 12:07	45.09	0.00	0.78	7.58	0.04	0.08	0.00		
11	CB-27_bypass	0.07	0 12:07	49.68	0.00	1.54	1.12	0.04	0.09	0.00		
12	CB-3_bypass	0.04	0 12:08	25.22	0.00	0.74	10.71	0.07	0.14	0.00		
13	CB-30_bypass	0.11	0 12:07	49.76	0.00	1.92	2.56	0.05	0.09	0.00		
14	CB-32_bypass	0.03	0 12:07	35.42	0.00	1.06	5.36	0.03	0.07	0.00		
15	CB-35_bypass	0.01	0 12:16	35.05	0.00	0.45	14.06	0.03	0.07	0.00		
16	CB-4_bypass	0.08	0 12:08	30.52	0.00	2.20	1.46	0.04	0.07	0.00		
17	CB-6_bypass	0.30	0 11:55	179.60	0.00	0.00		0.01	0.01	0.00		
18	Cobble_Waterway	3.33	0 12:21	104.81	0.03	1.55	3.90	0.65	0.22	0.00		
19	FallRiver	6.10	0 12:12	8532.83	0.00	1.58	1.05	0.37	0.02	0.00		
20	FR1	1.53	0 12:09	21.24	0.07	4.22	0.33	0.30	0.30	0.00		
21	FR2	0.43	0 12:08	19.71	0.02	1.67	1.38	0.24	0.24	0.00		
22	FR3	3.96	0 12:23	855.32	0.00	1.27	4.97	0.31	0.03	0.00		
23	FR4	1.49	0 12:09	23.43	0.06	4.29	0.28	0.30	0.30	0.00		

Pipe Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Pipe Shape	Pipe Diameter or Height (in)	Pipe Width (in)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate	No. of Barrels
1	8-Oct	49.56	340.70	0.00	339.70	0.10	1.00	2.0200	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
2	9-Oct	301.09	367.30	0.00	365.30	0.20	2.00	0.6600	CIRCULAR	15.000	15.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
3	1-Jan	40.19	351.90	0.00	350.90	0.10	1.00	2.4900	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
4	10-Jan	19.49	368.20	0.00	367.90	0.60	0.30	1.5400	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
5	10-Nov	51.81	342.80	0.00	341.10	0.40	1.70	3.2800	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
6	2-Jan	17.92	350.80	0.00	350.50	0.00	0.30	1.6700	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
7	11-Dec	117.27	343.40	0.00	343.20	0.40	0.20	0.1700	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
8	16-8	113.87	340.70	0.00	339.70	0.10	1.00	0.8800	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
9	16A-16	64.67	342.00	0.00	340.70	0.00	1.30	2.0100	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
10	17-18	50.87	348.30	0.00	347.40	0.10	0.90	1.7700	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
11	18-Out	39.35	347.30	0.00	336.46	0.00	10.84	27.5500	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
12	19-18	87.76	348.80	0.00	347.60	0.30	1.20	1.3700	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
13	20-21	44.50	354.20	0.00	353.60	0.00	0.60	1.3500	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
14	21-18	199.66	353.50	-0.10	347.70	0.40	5.80	2.9000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
15	3-Feb	98.25	350.50	0.00	347.70	0.50	2.80	2.8500	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
16	23-8	44.32	365.50	0.00	364.00	5.10	1.50	3.3800	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
17	24-8	23.62	365.50	0.00	363.90	5.00	1.60	6.7700	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
18	25-5	58.23	361.40	0.00	360.00	0.10	1.40	2.4000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
19	26-5	22.16	361.20	0.00	360.30	0.40	0.90	4.0600	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
20	27-6	32.60	351.30	0.00	350.60	0.30	0.70	2.1500	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
21	28-7	34.39	342.40	0.00	342.30	0.10	0.10	0.2900	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
22	30-5	120.67	365.90	0.00	360.00	0.10	5.90	4.8900	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
23	32-8	11.96	373.10	0.00	372.20	8.40	0.90	7.5300	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
24	33-8	88.56	373.40	0.00	372.20	8.40	1.20	1.3600	CIRCULAR	15.000	15.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
25	34-33	60.73	375.40	0.00	373.90	0.50	1.50	2.4700	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
26	34A-34	78.21	378.00	0.00	376.10	0.70	1.90	2.4300	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
27	5-Mar	105.08	347.20	0.00	346.30	6.00	0.90	0.8600	CIRCULAR	15.000	15.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
28	35-33	89.39	374.00	0.00	373.90	0.50	0.10	0.1100	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
29	36-10	56.83	372.40	0.00	368.00	0.70	4.40	7.7400	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
30	3-Apr	46.27	348.10	0.00	347.70	0.50	0.40	0.8600	CIRCULAR	15.000	15.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
31	4-Out	98.96	358.90	0.00	333.54	0.00	25.36	25.6300	CIRCULAR	15.000	15.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
32	6-May	198.15	359.90	0.00	350.30	0.00	9.60	4.8400	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
33	5-Out	123.22	340.30	0.00	335.53	0.00	4.77	3.8700	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
34	7-Jun	62.15	346.60	0.00	341.80	0.20	4.80	7.7200	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
35	6-7(MH)	157.05	350.30	0.00	342.50	0.30	7.80	4.9700	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
36	7(MH)-Out	127.60	342.20	0.00	336.00	0.00	6.20	4.8600	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
37	7-Out	130.52	341.60	0.00	339.81	0.00	1.79	1.3700	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
38	4-Aug	351.98	363.80	0.00	359.20	0.30	4.60	1.3100	CIRCULAR	15.000	15.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
39	8-Out	94.37	339.60	0.00	335.79	0.00	3.81	4.0400	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
40	8-Sep	27.57	341.40	0.00	340.10	0.50	1.30	4.7200	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
41	9-8(MH)	250.42	365.10	0.00	364.00	0.20	1.10	0.4400	CIRCULAR	15.000	15.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
42	BMtn-10	64.81	368.50	0.50	367.40	0.10	1.10	1.7000	CIRCULAR	15.000	15.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
43	I-91-Culvert	240.00	333.54	0.00	330.50	0.00	3.04	1.2700	CIRCULAR	24.000	24.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
44	Ramp_Culvert	134.00	328.72	0.00	327.58	0.00	1.14	0.8500	CIRCULAR	24.000	24.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1

Pipe Results

SN	Element ID	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Travel Time (min)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Froude Number	Reported Condition
1	8-Oct	1.36	0 12:08	5.06	0.27	5.01	0.16	0.38	0.38	0.00		Calculated
2	9-Oct	2.92	0 12:18	5.26	0.56	4.27	1.18	0.68	0.55	0.00		Calculated
3	1-Jan	0.53	0 12:08	5.62	0.09	4.22	0.16	0.22	0.22	0.00		Calculated
4	10-Jan	0.38	0 12:19	4.42	0.09	3.11	0.10	0.21	0.21	0.00		Calculated
5	10-Nov	0.79	0 12:08	6.45	0.12	5.27	0.16	0.25	0.25	0.00		Calculated
6	2-Jan	0.53	0 12:08	4.61	0.11	3.38	0.09	0.25	0.26	0.00		Calculated
7	11-Dec	0.15	0 12:08	1.47	0.10	1.35	1.45	0.20	0.20	0.00		Calculated
8	16-8	0.01	0 13:52	3.34	0.00	1.03	1.84	0.13	0.13	0.00		Calculated
9	16A-16	0.00	0 21:32	4.38	0.00	0.39	2.76	0.03	0.03	0.00		Calculated
10	17-18	0.28	0 12:07	4.74	0.06	3.18	0.27	0.17	0.17	0.00		Calculated
11	18-Out	1.52	0 12:07	18.70	0.08	12.21	0.05	0.22	0.22	0.00		Calculated
12	19-18	0.00	0 00:00	4.17	0.00	0.00		0.00	0.00	0.00		Calculated
13	20-21	0.47	0 12:07	4.14	0.11	2.94	0.25	0.26	0.26	0.00		Calculated
14	21-18	0.92	0 12:07	6.12	0.15	5.52	0.60	0.27	0.27	0.00		Calculated
15	3-Feb	0.71	0 12:09	6.01	0.12	4.98	0.33	0.24	0.24	0.00		Calculated
16	23-8	0.21	0 12:07	6.55	0.03	3.68	0.20	0.12	0.12	0.00		Calculated
17	24-8	0.29	0 12:07	9.27	0.03	5.08	0.08	0.13	0.13	0.00		Calculated
18	25-5	0.01	0 12:34	5.52	0.00	1.41	0.69	0.03	0.03	0.00		Calculated
19	26-5	0.00	0 00:00	7.18	0.00	0.00		0.00	0.00	0.00		Calculated
20	27-6	0.39	0 12:07	5.22	0.08	3.67	0.15	0.19	0.19	0.00		Calculated
21	28-7	0.00	0 12:02	1.92	0.00	0.13	4.41	0.08	0.08	0.00		Calculated
22	30-5	0.45	0 12:07	7.88	0.06	5.36	0.38	0.16	0.16	0.00		Calculated
23	32-8	0.10	0 12:07	9.77	0.01	3.82	0.05	0.07	0.07	0.00		Calculated
24	33-8	0.20	0 12:13	7.52	0.03	2.58	0.57	0.14	0.11	0.00		Calculated
25	34-33	0.18	0 12:12	5.60	0.03	3.17	0.32	0.12	0.12	0.00		Calculated
26	34A-34	0.00	0 00:00	5.55	0.00	0.00		0.00	0.00	0.00		Calculated
27	5-Mar	1.15	0 12:09	5.98	0.19	3.59	0.49	0.38	0.31	0.00		Calculated
28	35-33	0.03	0 12:21	1.19	0.02	0.71	2.10	0.10	0.10	0.00		Calculated
29	36-10	0.20	0 12:08	29.23	0.01	4.67	0.20	0.09	0.06	0.00		Calculated
30	3-Apr	0.29	0 12:08	6.01	0.05	2.42	0.32	0.19	0.15	0.00		Calculated
31	4-Out	3.36	0 12:19	32.70	0.10	10.47	0.16	0.38	0.31	0.00		Calculated
32	6-May	0.45	0 12:07	7.84	0.06	4.22	0.78	0.19	0.19	0.00		Calculated
33	5-Out	1.53	0 12:08	7.01	0.22	7.87	0.26	0.30	0.30	0.00		Calculated
34	7-Jun	0.33	0 12:08	9.90	0.03	5.70	0.18	0.13	0.13	0.00		Calculated
35	6-7(MH)	0.84	0 12:08	7.94	0.11	6.46	0.41	0.22	0.22	0.00		Calculated
36	7(MH)-Out	0.84	0 12:08	7.85	0.11	6.38	0.33	0.22	0.22	0.00		Calculated
37	7-Out	0.43	0 12:08	4.17	0.10	4.42	0.49	0.18	0.18	0.00		Calculated
38	4-Aug	3.13	0 12:19	7.38	0.42	5.63	1.04	0.58	0.46	0.00		Calculated
39	8-Out	1.49	0 12:09	7.16	0.21	8.00	0.20	0.29	0.29	0.00		Calculated
40	8-Sep	0.13	0 12:26	6.70	0.02	3.24	0.14	0.10	0.10	0.00		Calculated
41	9-8(MH)	2.92	0 12:19	4.28	0.68	3.77	1.11	0.75	0.60	0.00		Calculated
42	BMtn-10	2.44	0 12:17	8.42	0.29	4.64	0.23	0.56	0.45	0.00		Calculated
43	I-91-Culvert	3.36	0 12:20	25.46	0.13	4.90	0.82	0.54	0.27	0.00		Calculated
44	Ramp_Culvert	3.98	0 12:22	20.87	0.19	6.75	0.33	0.49	0.24	0.00		Calculated

Inlet Input

SN	Element ID	Inlet Manufacturer	Manufacturer Part Number	Inlet Location	Number of Inlets	Catchbasin Invert Elevation (ft)	Max (Rim) Elevation (ft)	Inlet Depth (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Ponded Area (ft^2)	Grate Clogging Factor (%)
1	CB-1	FHWA HEC-22 GENERIC	N/A	On Grade	1	351.90	356.30	4.40	351.90	0.00	N/A	0.00
2	CB-10	FHWA HEC-22 GENERIC	N/A	On Sag	1	340.70	347.37	6.67	340.70	0.00	10.00	0.00
3	CB-11	FHWA HEC-22 GENERIC	N/A	On Sag	1	342.80	346.64	3.84	342.80	0.00	10.00	0.00
4	CB-12	FHWA HEC-22 GENERIC	N/A	On Grade	1	343.40	348.19	4.79	343.40	0.00	N/A	0.00
5	CB-17	FHWA HEC-22 GENERIC	N/A	On Grade	1	348.30	352.17	3.87	348.30	0.00	N/A	0.00
6	CB-18	FHWA HEC-22 GENERIC	N/A	On Grade	1	347.30	351.79	4.49	347.30	0.00	N/A	0.00
7	CB-19	FHWA HEC-22 GENERIC	N/A	On Sag	2	348.80	350.66	1.86	348.80	0.00	10.00	0.00
8	CB-2	FHWA HEC-22 GENERIC	N/A	On Grade	1	350.50	355.60	5.10	350.60	0.10	N/A	0.00
9	CB-20	FHWA HEC-22 GENERIC	N/A	On Grade	1	354.20	358.45	4.25	354.20	0.00	N/A	0.00
10	CB-21	FHWA HEC-22 GENERIC	N/A	On Grade	1	353.60	358.38	4.78	353.60	0.00	N/A	0.00
11	CB-23	FHWA HEC-22 GENERIC	N/A	On Grade	1	365.50	369.60	4.10	365.50	0.00	N/A	0.00
12	CB-24	FHWA HEC-22 GENERIC	N/A	On Grade	1	365.50	369.68	4.18	365.50	0.00	N/A	0.00
13	CB-27	FHWA HEC-22 GENERIC	N/A	On Grade	1	351.30	356.41	5.11	351.30	0.00	N/A	0.00
14	CB-3	FHWA HEC-22 GENERIC	N/A	On Grade	1	347.20	353.17	5.97	347.20	0.00	N/A	0.00
15	CB-30	FHWA HEC-22 GENERIC	N/A	On Grade	1	365.90	370.42	4.52	365.90	0.00	N/A	0.00
16	CB-32	FHWA HEC-22 GENERIC	N/A	On Grade	1	373.10	377.88	4.78	373.10	0.00	N/A	0.00
17	CB-35	FHWA HEC-22 GENERIC	N/A	On Grade	1	374.00	379.37	5.37	374.00	0.00	N/A	0.00
18	CB-4	FHWA HEC-22 GENERIC	N/A	On Grade	1	348.10	352.48	4.38	348.10	0.00	N/A	0.00
19	CB-5	FHWA HEC-22 GENERIC	N/A	On Sag	1	340.30	350.66	10.36	340.30	0.00	10.00	0.00
20	CB-6	FHWA HEC-22 GENERIC	N/A	On Grade	1	346.60	349.21	2.61	346.60	0.00	N/A	0.00
21	CB-7	FHWA HEC-22 GENERIC	N/A	On Sag	1	341.60	344.57	2.97	341.60	0.00	10.00	0.00
22	CB-8	FHWA HEC-22 GENERIC	N/A	On Sag	1	339.60	345.67	6.07	339.60	0.00	10.00	0.00
23	CB-9	FHWA HEC-22 GENERIC	N/A	On Sag	1	341.40	346.02	4.62	341.40	0.00	0.00	0.00

Roadway & Gutter Input

SN	Element ID	Roadway Longitudinal Slope (ft/ft)	Roadway Cross Slope (ft/ft)	Roadway Manning's Roughness	Gutter Cross Slope (ft/ft)	Gutter Width (ft)	Gutter Depression (in)	Allowable Spread (ft)
1	CB-1	0.0320	0.0200	0.0160	0.0200	12.00	0.0000	10.50
2	CB-10	N/A	0.0200	0.0160	0.0200	2.00	0.0000	10.50
3	CB-11	N/A	0.0200	0.0160	0.0200	2.00	0.0000	10.50
4	CB-12	0.0300	0.0200	0.0160	0.0200	2.00	0.0000	10.50
5	CB-17	0.0314	0.0200	0.0160	0.0200	2.00	0.0656	10.50
6	CB-18	0.0314	0.0200	0.0160	0.0200	2.00	0.0000	10.50
7	CB-19	N/A	0.0200	0.0160	0.0200	2.00	0.0656	10.50
8	CB-2	0.0320	0.0200	0.0160	0.0200	2.00	0.0000	10.50
9	CB-20	0.0314	0.0200	0.0160	0.0200	2.00	0.0656	10.50
10	CB-21	0.0314	0.0200	0.0160	0.0200	2.00	0.0000	10.50
11	CB-23	0.0314	0.0200	0.0160	0.0200	2.00	0.0000	10.50
12	CB-24	0.0314	0.0200	0.0160	0.0200	2.00	0.0000	10.50
13	CB-27	0.0500	0.0200	0.0160	0.0200	2.00	0.0000	10.50
14	CB-3	0.0200	0.0200	0.0160	0.0200	2.00	0.0000	10.50
15	CB-30	0.0400	0.0200	0.0160	0.0200	2.00	0.0000	10.50
16	CB-32	0.0150	0.0200	0.0160	0.0200	2.00	0.0000	10.50
17	CB-35	0.0100	0.0200	0.0160	0.0200	2.00	0.0000	10.50
18	CB-4	0.0200	0.0200	0.0160	0.0200	2.00	0.0000	10.50
19	CB-5	N/A	0.0200	0.0160	0.0200	43.00	0.0000	10.50
20	CB-6	0.0100	0.0200	0.0160	0.0200	2.00	0.0000	10.50
21	CB-7	N/A	0.0170	0.0160	0.0200	78.00	0.0000	10.50
22	CB-8	N/A	0.0200	0.0160	0.0200	2.00	0.0656	10.50
23	CB-9	N/A	0.0200	0.0160	0.0200	2.00	0.0656	10.50

Inlet Results

SN	Element ID	Peak Flow (cfs)	Peak Lateral Inflow (cfs)	Peak Flow Intercepted by Inlet (cfs)	Peak Flow Bypassing Inlet (cfs)	Inlet Efficiency during Peak Flow (%)	Max Gutter Spread during Peak Flow (ft)	Max Gutter Water Elev. during Peak Flow (ft)	Max Gutter Water Depth during Peak Flow (ft)	Time of Max Depth Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	CB-1	0.70	0.70	0.54	0.17	76.31	5.08	356.40	0.10	0 12:08	0.00	0.00
2	CB-10	0.59	0.55	N/A	N/A	N/A	6.12	347.47	0.10	0 12:08	0.00	0.00
3	CB-11	0.64	0.61	N/A	N/A	N/A	6.41	346.75	0.11	0 12:08	0.00	0.00
4	CB-12	0.19	0.12	0.18	0.01	94.41	3.14	348.25	0.06	0 12:08	0.00	0.00
5	CB-17	0.34	0.23	0.30	0.04	87.25	3.90	352.25	0.08	0 12:07	0.00	0.00
6	CB-18	0.39	0.29	0.33	0.06	85.37	4.10	351.87	0.08	0 12:07	0.00	0.00
7	CB-19	0.00	0.00	N/A	N/A	N/A	1.00	350.74	0.08	0 00:00	0.00	0.00
8	CB-2	0.25	0.25	0.23	0.02	91.37	3.47	355.67	0.07	0 12:09	0.00	0.00
9	CB-20	0.58	0.53	0.46	0.12	79.19	4.76	358.55	0.10	0 12:07	0.00	0.00
10	CB-21	0.56	0.50	0.45	0.12	79.54	4.72	358.47	0.09	0 12:07	0.00	0.00
11	CB-23	0.25	0.25	0.23	0.02	91.33	3.48	369.67	0.07	0 12:07	0.00	0.00
12	CB-24	0.36	0.33	0.31	0.05	86.58	3.97	369.76	0.08	0 12:07	0.00	0.00
13	CB-27	0.46	0.35	0.40	0.07	85.71	4.00	356.49	0.08	0 12:07	0.00	0.00
14	CB-3	0.19	0.15	0.18	0.01	92.59	3.40	353.24	0.07	0 12:09	0.00	0.00
15	CB-30	0.56	0.56	0.46	0.11	81.15	4.50	370.51	0.09	0 12:07	0.00	0.00
16	CB-32	0.13	0.13	0.13	0.01	95.24	3.13	377.94	0.06	0 12:07	0.00	0.00
17	CB-35	0.04	0.04	0.04	0.00	99.97	2.13	379.41	0.04	0 12:21	0.00	0.00
18	CB-4	0.37	0.20	0.31	0.06	83.60	4.39	352.57	0.09	0 12:08	0.00	0.00
19	CB-5	0.40	0.40	N/A	N/A	N/A	4.94	350.33	-0.33	0 12:08	0.00	0.00
20	CB-6	0.44	0.36	0.34	0.09	78.25	5.31	349.32	0.11	0 12:08	0.00	0.00
21	CB-7	0.03	0.03	N/A	N/A	N/A	1.65	344.05	-0.52	0 12:08	0.00	0.00
22	CB-8	0.10	0.10	N/A	N/A	N/A	2.61	345.79	0.12	0 12:09	0.00	0.00
23	CB-9	0.13	0.11	N/A	N/A	N/A	2.90	346.14	0.12	0 12:26	0.00	0.00

Project Description

File Name ..... SSA Analysis - EX2.SPF

Rainfall Details

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
49		Time Series	10-yr	Cumulative	inches	Massachusetts	Franklin	10.00	4.30	SCS Type III 24-hr

Junction Results

SN	Element ID	Peak Inflow (cfs)	Peak Lateral Inflow (cfs)	Max HGL Elevation Attained (ft)	Max HGL Depth Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Average HGL Elevation Attained (ft)	Average HGL Depth Attained (ft)	Time of Max HGL Occurrence (days hh:mm)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	Bald_Mtn	6.36	6.36	375.00	7.00	0.00	0.00	368.53	0.53	0 12:14	0 12:15	0.02	5.00
2	CB-16	0.23	0.20	340.88	0.18	0.00	3.17	340.72	0.02	0 12:32	0 00:00	0.00	0.00
3	CB-16A	0.06	0.06	342.08	0.08	0.00	3.92	342.01	0.01	0 12:47	0 00:00	0.00	0.00
4	CB-25	0.22	0.22	361.54	0.14	0.00	5.38	361.41	0.01	0 12:11	0 00:00	0.00	0.00
5	CB-26	0.00	0.00	361.21	0.01	0.00	3.05	361.20	0.00	0 13:59	0 00:00	0.00	0.00
6	CB-28	0.01	0.00	342.51	0.11	0.00	5.73	342.40	0.00	0 12:09	0 00:00	0.00	0.00
7	CB-33	0.54	0.00	373.64	0.24	0.00	5.04	373.42	0.02	0 12:11	0 00:00	0.00	0.00
8	CB-34	0.39	0.39	375.59	0.19	0.00	4.51	375.41	0.01	0 12:11	0 00:00	0.00	0.00
9	CB-34A	0.00	0.00	378.02	0.02	0.00	3.98	378.00	0.00	0 15:41	0 00:00	0.00	0.00
10	CB-36	0.46	0.46	374.10	1.70	0.00	2.31	372.42	0.02	0 12:15	0 00:00	0.00	0.00
11	DHM-8	8.10	0.00	365.82	2.02	0.00	12.21	363.87	0.07	0 12:21	0 00:00	0.00	0.00
12	DI-1	1.25	1.25	374.16	5.96	2.56	0.00	368.27	0.07	0 12:15	0 12:09	0.01	16.00
13	DMH-1	0.81	0.00	351.15	0.35	0.00	5.23	350.82	0.02	0 12:08	0 00:00	0.00	0.00
14	DMH-10	7.52	0.00	374.09	6.79	0.00	3.60	367.42	0.12	0 12:15	0 00:00	0.00	0.00
15	DMH-4	8.10	0.00	359.32	0.42	0.00	9.60	358.93	0.03	0 12:20	0 00:00	0.00	0.00
16	DMH-5	0.84	0.00	360.12	0.22	0.00	5.90	359.92	0.02	0 12:09	0 00:00	0.00	0.00
17	DMH-6	1.47	0.00	350.60	0.30	0.00	5.58	350.32	0.02	0 12:08	0 00:00	0.00	0.00
18	DMH-7	1.47	0.00	342.51	0.31	0.00	6.04	342.22	0.02	0 12:08	0 00:00	0.00	0.00
19	DMH-9	7.51	0.00	369.62	4.52	0.00	10.48	365.21	0.11	0 12:20	0 00:00	0.00	0.00
20	Fallriver_Junction	14.01	0.00	325.64	0.64	0.00	19.36	325.04	0.04	0 12:15	0 00:00	0.00	0.00
21	I-91_Culvert-Out	8.10	0.00	331.43	0.93	0.00	8.57	330.56	0.06	0 12:21	0 00:00	0.00	0.00
22	Outfall-1A	2.84	0.00	335.87	0.34	0.00	5.66	335.55	0.02	0 12:08	0 00:00	0.00	0.00
23	Outfall-1B	1.02	0.00	340.01	0.20	0.00	5.80	339.82	0.01	0 12:09	0 00:00	0.00	0.00
24	Outfall-1C	2.86	0.00	336.11	0.32	0.00	5.68	335.81	0.02	0 12:10	0 00:00	0.00	0.00
25	Outfall-1D	2.35	0.00	336.76	0.30	0.00	5.70	336.48	0.02	0 12:07	0 00:00	0.00	0.00
26	Outfall-1E	8.10	0.00	334.36	0.82	0.00	5.18	333.60	0.06	0 12:20	0 00:00	0.00	0.00
27	RampCulvert-In	9.17	0.00	329.85	1.13	0.00	10.15	328.81	0.09	0 12:19	0 00:00	0.00	0.00
28	RampCulvert-Out	9.14	0.00	328.02	0.44	0.00	11.98	327.61	0.03	0 12:21	0 00:00	0.00	0.00

Channel Results

SN	Element ID	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Travel Time (min)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Froude Number	Reported Condition
1	1D-culvert	2.34	0 12:07	168.37	0.01	1.60	2.22	0.67	0.22	0.00		
2	CB-1_bypass	0.40	0 12:08	50.08	0.01	2.10	1.00	0.09	0.17	0.00		
3	CB-12_bypass	0.06	0 12:07	26.10	0.00	0.63	3.29	0.11	0.21	0.00		
4	CB-17_bypass	0.11	0 12:07	34.84	0.00	1.71	2.70	0.12	0.23	0.00		
5	CB-18_bypass	0.12	0 12:07	33.52	0.00	1.51	1.84	0.06	0.11	0.00		
6	CB-2_bypass	0.18	0 12:11	36.34	0.00	1.72	0.98	0.06	0.13	0.00		
7	CB-20_bypass	0.24	0 12:07	39.73	0.01	2.08	1.66	0.07	0.14	0.00		
8	CB-21_bypass	0.22	0 12:07	41.17	0.01	1.89	1.79	0.07	0.13	0.00		
9	CB-23_bypass	0.08	0 12:07	40.73	0.00	0.84	6.95	0.06	0.12	0.00		
10	CB-24_bypass	0.12	0 12:07	45.09	0.00	0.87	6.80	0.06	0.11	0.00		
11	CB-27_bypass	0.13	0 12:07	49.68	0.00	1.78	0.97	0.05	0.11	0.00		
12	CB-3_bypass	0.08	0 12:09	25.22	0.00	0.76	10.42	0.10	0.21	0.00		
13	CB-30_bypass	0.23	0 12:07	49.76	0.00	2.42	2.03	0.06	0.12	0.00		
14	CB-32_bypass	0.05	0 12:07	35.42	0.00	1.13	5.02	0.04	0.08	0.00		
15	CB-35_bypass	0.05	0 12:10	35.05	0.00	0.84	7.53	0.05	0.11	0.00		
16	CB-4_bypass	0.17	0 12:08	30.52	0.01	2.65	1.21	0.05	0.10	0.00		
17	CB-6_bypass	0.31	0 12:08	179.60	0.00	0.00		0.01	0.02	0.00		
18	Cobble_Waterway	8.09	0 12:21	104.81	0.08	1.94	3.12	1.03	0.34	0.00		
19	FallRiver	13.98	0 12:15	8532.83	0.00	2.13	0.78	0.62	0.03	0.00		
20	FR1	2.84	0 12:08	21.24	0.13	4.52	0.31	0.48	0.48	0.00		
21	FR2	1.02	0 12:09	19.71	0.05	1.92	1.20	0.41	0.41	0.00		
22	FR3	9.14	0 12:21	855.32	0.01	1.74	3.63	0.53	0.05	0.00		
23	FR4	2.86	0 12:10	23.43	0.12	4.32	0.28	0.47	0.47	0.00		

Pipe Results

SN	Element ID	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Travel Time (min)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Froude Number	Reported Condition
1	8-Oct	2.12	0 12:08	5.06	0.42	5.54	0.15	0.49	0.49	0.00		Calculated
2	9-Oct	7.51	0 12:15	5.26	1.43	6.12	0.82	1.25	1.00	28.00		SURCHARGED
3	1-Jan	0.81	0 12:08	5.62	0.14	4.71	0.14	0.27	0.27	0.00		Calculated
4	10-Jan	1.38	0 12:25	4.42	0.31	3.52	0.09	1.00	1.00	24.00		SURCHARGED
5	10-Nov	1.23	0 12:08	6.45	0.19	5.88	0.15	0.31	0.31	0.00		Calculated
6	2-Jan	0.81	0 12:08	4.61	0.18	3.47	0.09	0.34	0.34	0.00		Calculated
7	11-Dec	0.24	0 12:08	1.47	0.17	1.55	1.26	0.25	0.25	0.00		Calculated
8	16-8	0.23	0 12:32	3.34	0.07	2.18	0.87	0.26	0.26	0.00		Calculated
9	16A-16	0.06	0 12:47	4.38	0.01	1.24	0.87	0.12	0.12	0.00		Calculated
10	17-18	0.50	0 12:07	4.74	0.10	3.72	0.23	0.23	0.23	0.00		Calculated
11	18-Out	2.35	0 12:07	18.70	0.13	13.33	0.05	0.28	0.28	0.00		Calculated
12	19-18	0.00	0 15:16	4.17	0.00	0.92	1.59	0.01	0.01	0.00		Calculated
13	20-21	0.66	0 12:07	4.14	0.16	3.19	0.23	0.31	0.31	0.00		Calculated
14	21-18	1.31	0 12:07	6.12	0.21	6.07	0.55	0.32	0.32	0.00		Calculated
15	3-Feb	1.32	0 12:09	6.01	0.22	5.88	0.28	0.33	0.33	0.00		Calculated
16	23-8	0.34	0 12:07	6.55	0.05	4.21	0.18	0.16	0.16	0.00		Calculated
17	24-8	0.47	0 12:07	9.27	0.05	5.73	0.07	0.16	0.16	0.00		Calculated
18	25-5	0.22	0 12:11	5.52	0.04	3.35	0.29	0.14	0.14	0.00		Calculated
19	26-5	0.00	0 14:01	7.18	0.00	1.21	0.31	0.01	0.01	0.00		Calculated
20	27-6	0.64	0 12:07	5.22	0.12	4.15	0.13	0.25	0.25	0.00		Calculated
21	28-7	0.01	0 12:00	1.92	0.00	0.23	2.49	0.16	0.16	0.00		Calculated
22	30-5	0.66	0 12:08	7.88	0.08	5.97	0.34	0.20	0.20	0.00		Calculated
23	32-8	0.16	0 12:07	9.77	0.02	4.31	0.05	0.10	0.10	0.00		Calculated
24	33-8	0.54	0 12:11	7.52	0.07	3.44	0.43	0.23	0.19	0.00		Calculated
25	34-33	0.39	0 12:11	5.60	0.07	3.96	0.26	0.18	0.18	0.00		Calculated
26	34A-34	0.00	0 15:41	5.55	0.00	1.06	1.23	0.01	0.01	0.00		Calculated
27	5-Mar	2.26	0 12:08	5.98	0.38	4.26	0.41	0.56	0.45	0.00		Calculated
28	35-33	0.15	0 12:11	1.19	0.12	1.24	1.20	0.21	0.21	0.00		Calculated
29	36-10	0.55	0 12:25	29.23	0.02	5.69	0.17	1.50	1.00	7.00		SURCHARGED
30	3-Apr	0.64	0 12:08	6.01	0.11	2.98	0.26	0.29	0.23	0.00		Calculated
31	4-Out	8.10	0 12:20	32.70	0.25	13.30	0.12	0.62	0.50	0.00		Calculated
32	6-May	0.84	0 12:09	7.84	0.11	5.15	0.64	0.26	0.26	0.00		Calculated
33	5-Out	2.84	0 12:08	7.01	0.40	9.01	0.23	0.42	0.42	0.00		Calculated
34	7-Jun	0.58	0 12:08	9.90	0.06	6.62	0.16	0.18	0.18	0.00		Calculated
35	6-7(MH)	1.47	0 12:08	7.94	0.19	7.52	0.35	0.30	0.30	0.00		Calculated
36	7(MH)-Out	1.47	0 12:09	7.85	0.19	7.42	0.29	0.30	0.30	0.00		Calculated
37	7-Out	1.02	0 12:09	4.17	0.25	5.39	0.40	0.29	0.29	0.00		Calculated
38	4-Aug	7.75	0 12:21	7.38	1.05	6.63	0.88	1.18	0.94	0.00		> CAPACITY
39	8-Out	2.86	0 12:10	7.16	0.40	9.17	0.17	0.42	0.42	0.00		Calculated
40	8-Sep	0.59	0 12:22	6.70	0.09	4.92	0.09	0.21	0.21	0.00		Calculated
41	9-8(MH)	7.51	0 12:15	4.28	1.75	6.12	0.68	1.25	1.00	14.00		SURCHARGED
42	BMtn-10	6.34	0 12:14	8.42	0.75	5.17	0.21	1.25	1.00	22.00		SURCHARGED
43	I-91-Culvert	8.10	0 12:20	25.46	0.32	6.30	0.63	0.87	0.44	0.00		Calculated
44	Ramp_Culvert	9.14	0 12:19	20.87	0.44	8.01	0.28	0.78	0.39	0.00		Calculated

Inlet Results

SN	Element ID	Peak Flow (cfs)	Peak Lateral Inflow (cfs)	Peak Flow Intercepted by Inlet (cfs)	Peak Flow Bypassing Inlet (cfs)	Inlet Efficiency during Peak Flow (%)	Max Gutter Spread during Peak Flow (ft)	Max Gutter Water Elev. during Peak Flow (ft)	Max Gutter Water Depth during Peak Flow (ft)	Time of Max Depth Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	CB-1	1.21	1.21	0.81	0.40	67.15	6.24	356.42	0.12	0 12:08	0.00	0.00
2	CB-10	0.96	0.88	N/A	N/A	N/A	8.08	347.51	0.14	0 12:08	0.00	0.00
3	CB-11	0.99	0.93	N/A	N/A	N/A	8.22	346.78	0.14	0 12:08	0.00	0.00
4	CB-12	0.30	0.18	0.27	0.03	88.70	3.76	348.27	0.08	0 12:08	0.00	0.00
5	CB-17	0.61	0.37	0.48	0.13	78.38	4.85	352.27	0.10	0 12:07	0.00	0.00
6	CB-18	0.67	0.45	0.51	0.15	76.89	5.02	351.89	0.10	0 12:07	0.00	0.00
7	CB-19	0.00	0.00	N/A	N/A	N/A	1.10	350.75	0.09	0 15:54	0.00	0.00
8	CB-2	0.71	0.71	0.54	0.17	75.90	5.13	355.70	0.10	0 12:09	0.00	0.00
9	CB-20	0.90	0.82	0.65	0.25	72.09	5.59	358.56	0.11	0 12:07	0.00	0.00
10	CB-21	0.87	0.75	0.63	0.24	72.56	5.54	358.49	0.11	0 12:07	0.00	0.00
11	CB-23	0.41	0.41	0.35	0.06	84.53	4.19	369.68	0.08	0 12:07	0.00	0.00
12	CB-24	0.58	0.54	0.46	0.12	79.14	4.76	369.78	0.10	0 12:07	0.00	0.00
13	CB-27	0.77	0.54	0.60	0.17	77.54	4.85	356.51	0.10	0 12:07	0.00	0.00
14	CB-3	0.39	0.23	0.32	0.07	83.09	4.44	353.26	0.09	0 12:08	0.00	0.00
15	CB-30	0.89	0.86	0.66	0.24	73.61	5.35	370.53	0.11	0 12:08	0.00	0.00
16	CB-32	0.21	0.21	0.19	0.02	90.21	3.73	377.95	0.07	0 12:07	0.00	0.00
17	CB-35	0.20	0.20	0.18	0.02	89.45	3.94	379.45	0.08	0 12:11	0.00	0.00
18	CB-4	0.81	0.41	0.58	0.23	71.29	5.85	352.60	0.12	0 12:08	0.00	0.00
19	CB-5	0.60	0.60	N/A	N/A	N/A	6.15	350.35	-0.31	0 12:08	0.00	0.00
20	CB-6	0.81	0.64	0.55	0.25	68.53	6.65	349.34	0.13	0 12:05	0.00	0.00
21	CB-7	0.27	0.27	N/A	N/A	N/A	4.07	344.09	-0.48	0 12:08	0.00	0.00
22	CB-8	0.37	0.37	N/A	N/A	N/A	4.72	345.83	0.16	0 12:10	0.00	0.00
23	CB-9	0.63	0.58	N/A	N/A	N/A	6.35	346.21	0.19	0 12:22	0.00	0.00

Project Description

File Name ..... SSA Analysis - EX2.SPF

Rainfall Details

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
49		Time Series	100-yr	Cumulative	inches	Massachusetts	Franklin	100.00	6.53	SCS Type III 24-hr

Junction Results

SN	Element ID	Peak Inflow (cfs)	Peak Lateral Inflow (cfs)	Max HGL Elevation Attained (ft)	Max HGL Depth Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Average HGL Elevation Attained (ft)	Average HGL Depth Attained (ft)	Time of Max HGL Occurrence (days hh:mm)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	Bald_Mtn	6.36	6.36	375.00	7.00	0.00	0.00	368.53	0.53	0 12:14	0 12:15	0.02	5.00
2	CB-16	0.23	0.20	340.88	0.18	0.00	3.17	340.72	0.02	0 12:32	0 00:00	0.00	0.00
3	CB-16A	0.06	0.06	342.08	0.08	0.00	3.92	342.01	0.01	0 12:47	0 00:00	0.00	0.00
4	CB-25	0.22	0.22	361.54	0.14	0.00	5.38	361.41	0.01	0 12:11	0 00:00	0.00	0.00
5	CB-26	0.00	0.00	361.21	0.01	0.00	3.05	361.20	0.00	0 13:59	0 00:00	0.00	0.00
6	CB-28	0.01	0.00	342.51	0.11	0.00	5.73	342.40	0.00	0 12:09	0 00:00	0.00	0.00
7	CB-33	0.54	0.00	373.64	0.24	0.00	5.04	373.42	0.02	0 12:11	0 00:00	0.00	0.00
8	CB-34	0.39	0.39	375.59	0.19	0.00	4.51	375.41	0.01	0 12:11	0 00:00	0.00	0.00
9	CB-34A	0.00	0.00	378.02	0.02	0.00	3.98	378.00	0.00	0 15:41	0 00:00	0.00	0.00
10	CB-36	0.46	0.46	374.10	1.70	0.00	2.31	372.42	0.02	0 12:15	0 00:00	0.00	0.00
11	DHM-8	8.10	0.00	365.82	2.02	0.00	12.21	363.87	0.07	0 12:21	0 00:00	0.00	0.00
12	DI-1	1.25	1.25	374.16	5.96	2.56	0.00	368.27	0.07	0 12:15	0 12:09	0.01	16.00
13	DMH-1	0.81	0.00	351.15	0.35	0.00	5.23	350.82	0.02	0 12:08	0 00:00	0.00	0.00
14	DMH-10	7.52	0.00	374.09	6.79	0.00	3.60	367.42	0.12	0 12:15	0 00:00	0.00	0.00
15	DMH-4	8.10	0.00	359.32	0.42	0.00	9.60	358.93	0.03	0 12:20	0 00:00	0.00	0.00
16	DMH-5	0.84	0.00	360.12	0.22	0.00	5.90	359.92	0.02	0 12:09	0 00:00	0.00	0.00
17	DMH-6	1.47	0.00	350.60	0.30	0.00	5.58	350.32	0.02	0 12:08	0 00:00	0.00	0.00
18	DMH-7	1.47	0.00	342.51	0.31	0.00	6.04	342.22	0.02	0 12:08	0 00:00	0.00	0.00
19	DMH-9	7.51	0.00	369.62	4.52	0.00	10.48	365.21	0.11	0 12:20	0 00:00	0.00	0.00
20	Fallriver_Junction	14.01	0.00	325.64	0.64	0.00	19.36	325.04	0.04	0 12:15	0 00:00	0.00	0.00
21	I-91_Culvert-Out	8.10	0.00	331.43	0.93	0.00	8.57	330.56	0.06	0 12:21	0 00:00	0.00	0.00
22	Outfall-1A	2.84	0.00	335.87	0.34	0.00	5.66	335.55	0.02	0 12:08	0 00:00	0.00	0.00
23	Outfall-1B	1.02	0.00	340.01	0.20	0.00	5.80	339.82	0.01	0 12:09	0 00:00	0.00	0.00
24	Outfall-1C	2.86	0.00	336.11	0.32	0.00	5.68	335.81	0.02	0 12:10	0 00:00	0.00	0.00
25	Outfall-1D	2.35	0.00	336.76	0.30	0.00	5.70	336.48	0.02	0 12:07	0 00:00	0.00	0.00
26	Outfall-1E	8.10	0.00	334.36	0.82	0.00	5.18	333.60	0.06	0 12:20	0 00:00	0.00	0.00
27	RampCulvert-In	9.17	0.00	329.85	1.13	0.00	10.15	328.81	0.09	0 12:19	0 00:00	0.00	0.00
28	RampCulvert-Out	9.14	0.00	328.02	0.44	0.00	11.98	327.61	0.03	0 12:21	0 00:00	0.00	0.00

Channel Results

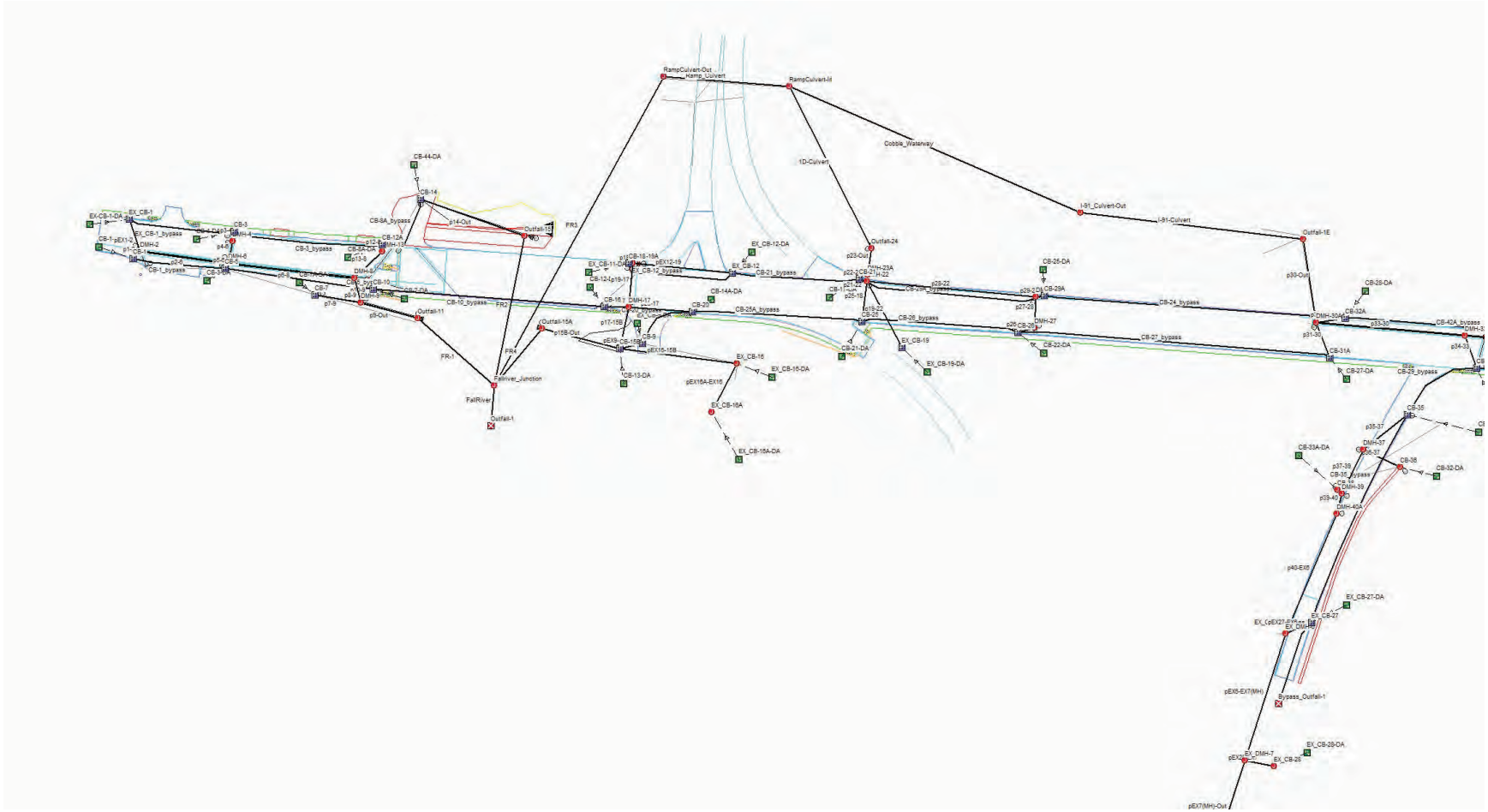
SN	Element ID	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Travel Time (min)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Froude Number	Reported Condition
1	1D-culvert	2.34	0 12:07	168.37	0.01	1.60	2.22	0.67	0.22	0.00		
2	CB-1_bypass	0.40	0 12:08	50.08	0.01	2.10	1.00	0.09	0.17	0.00		
3	CB-12_bypass	0.06	0 12:07	26.10	0.00	0.63	3.29	0.11	0.21	0.00		
4	CB-17_bypass	0.11	0 12:07	34.84	0.00	1.71	2.70	0.12	0.23	0.00		
5	CB-18_bypass	0.12	0 12:07	33.52	0.00	1.51	1.84	0.06	0.11	0.00		
6	CB-2_bypass	0.18	0 12:11	36.34	0.00	1.72	0.98	0.06	0.13	0.00		
7	CB-20_bypass	0.24	0 12:07	39.73	0.01	2.08	1.66	0.07	0.14	0.00		
8	CB-21_bypass	0.22	0 12:07	41.17	0.01	1.89	1.79	0.07	0.13	0.00		
9	CB-23_bypass	0.08	0 12:07	40.73	0.00	0.84	6.95	0.06	0.12	0.00		
10	CB-24_bypass	0.12	0 12:07	45.09	0.00	0.87	6.80	0.06	0.11	0.00		
11	CB-27_bypass	0.13	0 12:07	49.68	0.00	1.78	0.97	0.05	0.11	0.00		
12	CB-3_bypass	0.08	0 12:09	25.22	0.00	0.76	10.42	0.10	0.21	0.00		
13	CB-30_bypass	0.23	0 12:07	49.76	0.00	2.42	2.03	0.06	0.12	0.00		
14	CB-32_bypass	0.05	0 12:07	35.42	0.00	1.13	5.02	0.04	0.08	0.00		
15	CB-35_bypass	0.05	0 12:10	35.05	0.00	0.84	7.53	0.05	0.11	0.00		
16	CB-4_bypass	0.17	0 12:08	30.52	0.01	2.65	1.21	0.05	0.10	0.00		
17	CB-6_bypass	0.31	0 12:08	179.60	0.00	0.00		0.01	0.02	0.00		
18	Cobble_Waterway	8.09	0 12:21	104.81	0.08	1.94	3.12	1.03	0.34	0.00		
19	FallRiver	13.98	0 12:15	8532.83	0.00	2.13	0.78	0.62	0.03	0.00		
20	FR1	2.84	0 12:08	21.24	0.13	4.52	0.31	0.48	0.48	0.00		
21	FR2	1.02	0 12:09	19.71	0.05	1.92	1.20	0.41	0.41	0.00		
22	FR3	9.14	0 12:21	855.32	0.01	1.74	3.63	0.53	0.05	0.00		
23	FR4	2.86	0 12:10	23.43	0.12	4.32	0.28	0.47	0.47	0.00		

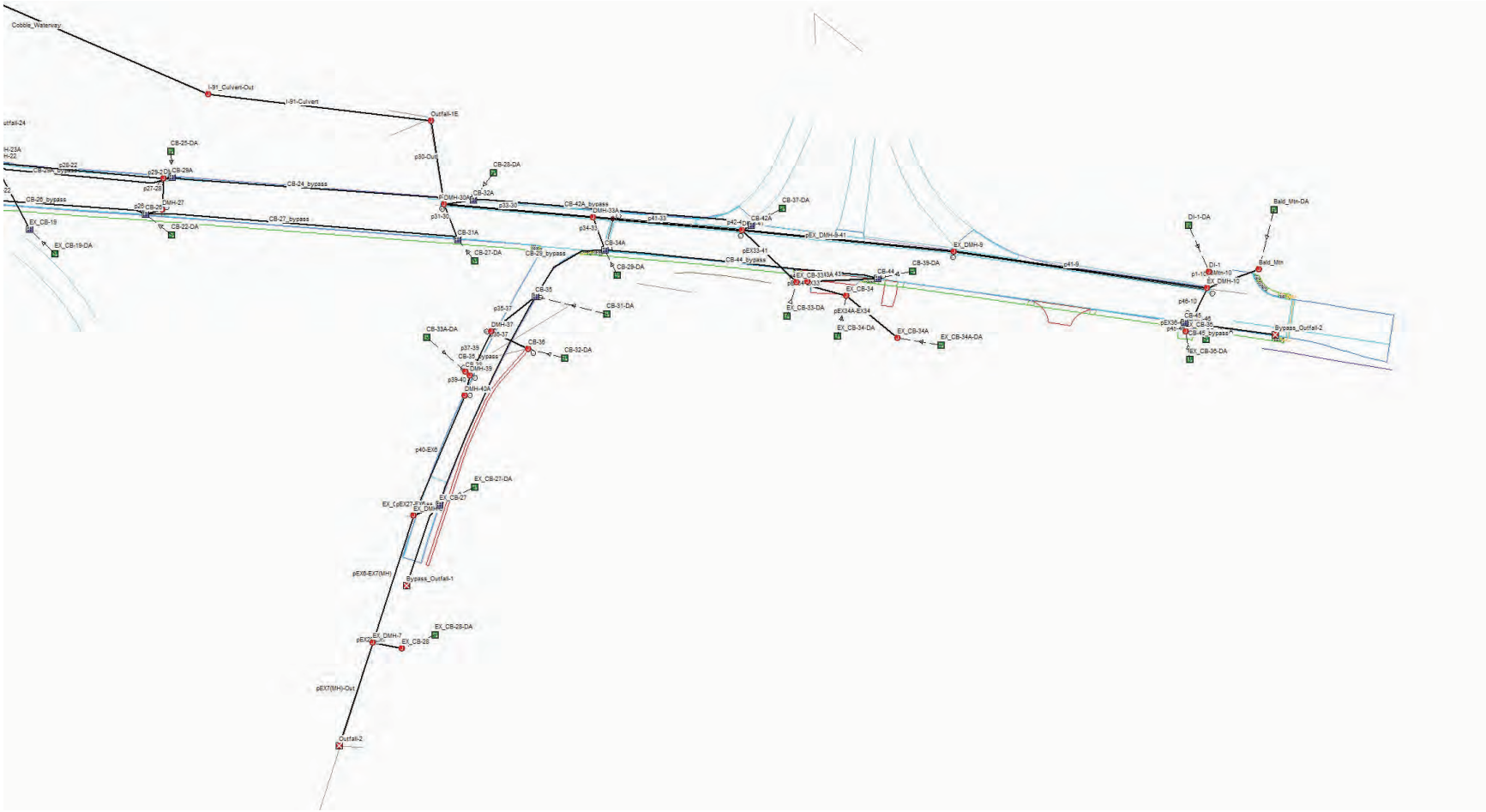
Pipe Results

SN	Element ID	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Travel Time (min)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Froude Number	Reported Condition
1	8-Oct	2.12	0 12:08	5.06	0.42	5.54	0.15	0.49	0.49	0.00		Calculated
2	9-Oct	7.51	0 12:15	5.26	1.43	6.12	0.82	1.25	1.00	28.00		SURCHARGED
3	1-Jan	0.81	0 12:08	5.62	0.14	4.71	0.14	0.27	0.27	0.00		Calculated
4	10-Jan	1.38	0 12:25	4.42	0.31	3.52	0.09	1.00	1.00	24.00		SURCHARGED
5	10-Nov	1.23	0 12:08	6.45	0.19	5.88	0.15	0.31	0.31	0.00		Calculated
6	2-Jan	0.81	0 12:08	4.61	0.18	3.47	0.09	0.34	0.34	0.00		Calculated
7	11-Dec	0.24	0 12:08	1.47	0.17	1.55	1.26	0.25	0.25	0.00		Calculated
8	16-8	0.23	0 12:32	3.34	0.07	2.18	0.87	0.26	0.26	0.00		Calculated
9	16A-16	0.06	0 12:47	4.38	0.01	1.24	0.87	0.12	0.12	0.00		Calculated
10	17-18	0.50	0 12:07	4.74	0.10	3.72	0.23	0.23	0.23	0.00		Calculated
11	18-Out	2.35	0 12:07	18.70	0.13	13.33	0.05	0.28	0.28	0.00		Calculated
12	19-18	0.00	0 15:16	4.17	0.00	0.92	1.59	0.01	0.01	0.00		Calculated
13	20-21	0.66	0 12:07	4.14	0.16	3.19	0.23	0.31	0.31	0.00		Calculated
14	21-18	1.31	0 12:07	6.12	0.21	6.07	0.55	0.32	0.32	0.00		Calculated
15	3-Feb	1.32	0 12:09	6.01	0.22	5.88	0.28	0.33	0.33	0.00		Calculated
16	23-8	0.34	0 12:07	6.55	0.05	4.21	0.18	0.16	0.16	0.00		Calculated
17	24-8	0.47	0 12:07	9.27	0.05	5.73	0.07	0.16	0.16	0.00		Calculated
18	25-5	0.22	0 12:11	5.52	0.04	3.35	0.29	0.14	0.14	0.00		Calculated
19	26-5	0.00	0 14:01	7.18	0.00	1.21	0.31	0.01	0.01	0.00		Calculated
20	27-6	0.64	0 12:07	5.22	0.12	4.15	0.13	0.25	0.25	0.00		Calculated
21	28-7	0.01	0 12:00	1.92	0.00	0.23	2.49	0.16	0.16	0.00		Calculated
22	30-5	0.66	0 12:08	7.88	0.08	5.97	0.34	0.20	0.20	0.00		Calculated
23	32-8	0.16	0 12:07	9.77	0.02	4.31	0.05	0.10	0.10	0.00		Calculated
24	33-8	0.54	0 12:11	7.52	0.07	3.44	0.43	0.23	0.19	0.00		Calculated
25	34-33	0.39	0 12:11	5.60	0.07	3.96	0.26	0.18	0.18	0.00		Calculated
26	34A-34	0.00	0 15:41	5.55	0.00	1.06	1.23	0.01	0.01	0.00		Calculated
27	5-Mar	2.26	0 12:08	5.98	0.38	4.26	0.41	0.56	0.45	0.00		Calculated
28	35-33	0.15	0 12:11	1.19	0.12	1.24	1.20	0.21	0.21	0.00		Calculated
29	36-10	0.55	0 12:25	29.23	0.02	5.69	0.17	1.50	1.00	7.00		SURCHARGED
30	3-Apr	0.64	0 12:08	6.01	0.11	2.98	0.26	0.29	0.23	0.00		Calculated
31	4-Out	8.10	0 12:20	32.70	0.25	13.30	0.12	0.62	0.50	0.00		Calculated
32	6-May	0.84	0 12:09	7.84	0.11	5.15	0.64	0.26	0.26	0.00		Calculated
33	5-Out	2.84	0 12:08	7.01	0.40	9.01	0.23	0.42	0.42	0.00		Calculated
34	7-Jun	0.58	0 12:08	9.90	0.06	6.62	0.16	0.18	0.18	0.00		Calculated
35	6-7(MH)	1.47	0 12:08	7.94	0.19	7.52	0.35	0.30	0.30	0.00		Calculated
36	7(MH)-Out	1.47	0 12:09	7.85	0.19	7.42	0.29	0.30	0.30	0.00		Calculated
37	7-Out	1.02	0 12:09	4.17	0.25	5.39	0.40	0.29	0.29	0.00		Calculated
38	4-Aug	7.75	0 12:21	7.38	1.05	6.63	0.88	1.18	0.94	0.00		> CAPACITY
39	8-Out	2.86	0 12:10	7.16	0.40	9.17	0.17	0.42	0.42	0.00		Calculated
40	8-Sep	0.59	0 12:22	6.70	0.09	4.92	0.09	0.21	0.21	0.00		Calculated
41	9-8(MH)	7.51	0 12:15	4.28	1.75	6.12	0.68	1.25	1.00	14.00		SURCHARGED
42	BMtn-10	6.34	0 12:14	8.42	0.75	5.17	0.21	1.25	1.00	22.00		SURCHARGED
43	I-91-Culvert	8.10	0 12:20	25.46	0.32	6.30	0.63	0.87	0.44	0.00		Calculated
44	Ramp_Culvert	9.14	0 12:19	20.87	0.44	8.01	0.28	0.78	0.39	0.00		Calculated

Inlet Results

SN	Element ID	Peak Flow (cfs)	Peak Lateral Inflow (cfs)	Peak Flow Intercepted by Inlet (cfs)	Peak Flow Bypassing Inlet (cfs)	Inlet Efficiency during Peak Flow (%)	Max Gutter Spread during Peak Flow (ft)	Max Gutter Water Elev. during Peak Flow (ft)	Max Gutter Water Depth during Peak Flow (ft)	Time of Max Depth Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	CB-1	1.21	1.21	0.81	0.40	67.15	6.24	356.42	0.12	0 12:08	0.00	0.00
2	CB-10	0.96	0.88	N/A	N/A	N/A	8.08	347.51	0.14	0 12:08	0.00	0.00
3	CB-11	0.99	0.93	N/A	N/A	N/A	8.22	346.78	0.14	0 12:08	0.00	0.00
4	CB-12	0.30	0.18	0.27	0.03	88.70	3.76	348.27	0.08	0 12:08	0.00	0.00
5	CB-17	0.61	0.37	0.48	0.13	78.38	4.85	352.27	0.10	0 12:07	0.00	0.00
6	CB-18	0.67	0.45	0.51	0.15	76.89	5.02	351.89	0.10	0 12:07	0.00	0.00
7	CB-19	0.00	0.00	N/A	N/A	N/A	1.10	350.75	0.09	0 15:54	0.00	0.00
8	CB-2	0.71	0.71	0.54	0.17	75.90	5.13	355.70	0.10	0 12:09	0.00	0.00
9	CB-20	0.90	0.82	0.65	0.25	72.09	5.59	358.56	0.11	0 12:07	0.00	0.00
10	CB-21	0.87	0.75	0.63	0.24	72.56	5.54	358.49	0.11	0 12:07	0.00	0.00
11	CB-23	0.41	0.41	0.35	0.06	84.53	4.19	369.68	0.08	0 12:07	0.00	0.00
12	CB-24	0.58	0.54	0.46	0.12	79.14	4.76	369.78	0.10	0 12:07	0.00	0.00
13	CB-27	0.77	0.54	0.60	0.17	77.54	4.85	356.51	0.10	0 12:07	0.00	0.00
14	CB-3	0.39	0.23	0.32	0.07	83.09	4.44	353.26	0.09	0 12:08	0.00	0.00
15	CB-30	0.89	0.86	0.66	0.24	73.61	5.35	370.53	0.11	0 12:08	0.00	0.00
16	CB-32	0.21	0.21	0.19	0.02	90.21	3.73	377.95	0.07	0 12:07	0.00	0.00
17	CB-35	0.20	0.20	0.18	0.02	89.45	3.94	379.45	0.08	0 12:11	0.00	0.00
18	CB-4	0.81	0.41	0.58	0.23	71.29	5.85	352.60	0.12	0 12:08	0.00	0.00
19	CB-5	0.60	0.60	N/A	N/A	N/A	6.15	350.35	-0.31	0 12:08	0.00	0.00
20	CB-6	0.81	0.64	0.55	0.25	68.53	6.65	349.34	0.13	0 12:05	0.00	0.00
21	CB-7	0.27	0.27	N/A	N/A	N/A	4.07	344.09	-0.48	0 12:08	0.00	0.00
22	CB-8	0.37	0.37	N/A	N/A	N/A	4.72	345.83	0.16	0 12:10	0.00	0.00
23	CB-9	0.63	0.58	N/A	N/A	N/A	6.35	346.21	0.19	0 12:22	0.00	0.00


RampCulvert-Out
Ramp_Culvert
RampCulvert-Inl
Cobble_Waterway
1D-Culvert
I-91_Culvert-Out
I-91_Culvert
Outfall-1E
CB-44-DA
CB-14
CB-8A_bypass
p14-Out
Outfall-14
FR3
CB-12A
DMH-13
CB-8A-DA
p13-8
CB-3_bypass
CB-1_bypass
CB-7
p7-9
p9-Out
Outfall-11
CB-10_bypass
FR2
FR-1
FallRiver_Junction
FallRiver
Outfall-1
Outfall-15A
p15B-Out
CB-9
pEX9-CB-15B
pEX15-15B
CB-13-DA
EX_CB-16
EX_CB-16-DA
pEX15A-EX16
EX_CB-16A
EX_CB-16A-DA
EX_CB-12-DA
EX_CB-12
CB-21_bypass
Outfall-24
p23-Out
CB-14A-DA
CB-25-DA
CB-25A_bypass
CB-24_bypass
CB-26_bypass
CB-27_bypass
CB-21-DA
EX_CB-19
EX_CB-19-DA
CB-22-DA
CB-28-DA
CB-32A
CB-42A_bypass
CB-31A
CB-27-DA
CB-29_bypass
CB-35
CB-33A-DA
CB-38
CB-32-DA
CB-35_bypass
DMH-39
DMH-40A
p40-EX6
EX_CB-27-DA
EX_CB-27
EX_DMH-6
pEX6-EX7(MH)
Bypass_Outfall-1
EX_CB-28-DA
EX_DMH-7
EX_CB-28
pEX7(MH)-Out


Cobble_Waterway
I-91_Culvert-Out
I-91-Culvert
Outfall-1E
p30-Out
CB-25-DA
CB-29A
p29-22
CB-24_bypass
CB-25_bypass
EX_CB-19
EX_CB-19-DA
p25
DMH-27
CB-22-DA
CB-27_bypass
CB-28-DA
CB-32A
p33-32
CB-42A_bypass
DMH-33A
p31-33
p34-33
CB-31A
CB-27-DA
CB-29_bypass
CB-34A
CB-29-DA
p41-33
CB-42A
CB-37-DA
pEX_DMH-9-41
EX_DMH-9
pEX33-41
CB-44_bypass
EX_CB-33/34A
CB-44
CB-39-DA
p41-9
DI-1-DA
Bald_Mtn-DA
DI-1
p1-10
EX_DMH-10
Bald_Mtn
p46-10
CB-45
CB-45_bypass
Bypass_Outfall-2
EX_CB-35-DA
EX_CB-33-DA
EX_CB-34
pEX34A-EX34
EX_CB-34-DA
EX_CB-34A
EX_CB-34A-DA
CB-35
CB-31-DA
p35-37
DMH-37
CB-33A-DA
p37-36
CB-35_bypass
CB-36
CB-32-DA
CB-38
DMH-39
p39-40
DMH-40A
p40-EX6
EX_CB-21-DA
EX_CB-27
EX_DMH-6
pEX6-EX7(MH)
Bypass_Outfall-1
EX_CB-28-DA
EX_DMH-7
EX_CB-28
pEX7(MH)-Out
Outfall-2

Project Description

File Name ..... SSA Analysis - PROP2.SPF

Rainfall Details

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
49		Time Series	2-yr	Cumulative	inches	Massachusetts	Franklin	2.00	2.90	SCS Type III 24-hr

Subbasin Summary

SN	Subbasin ID	Area (ac)	Peak Rate Factor	Weighted Curve Number	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1	Bald_Mtn-DA	5.35	484.00	70.00	2.90	0.66	3.53	2.44	0 00:18:55
2	CB-12-DA	0.20	484.00	98.00	2.90	2.67	0.54	0.49	0 00:06:00
3	CB-13-DA	0.43	484.00	64.00	2.90	0.43	0.18	0.10	0 00:17:38
4	CB-14A-DA	0.22	484.00	98.00	2.90	2.67	0.58	0.52	0 00:06:00
5	CB-17-DA	0.13	484.00	98.00	2.90	2.67	0.36	0.32	0 00:06:00
6	CB-1-DA	0.57	484.00	68.00	2.90	0.58	0.33	0.25	0 00:11:16
7	CB-21-DA	0.11	484.00	98.00	2.90	2.66	0.30	0.28	0 00:06:00
8	CB-22-DA	0.24	484.00	98.00	2.90	2.67	0.63	0.57	0 00:06:00
9	CB-25-DA	0.21	484.00	98.00	2.90	2.67	0.57	0.51	0 00:06:00
10	CB-27-DA	0.06	484.00	97.00	2.90	2.54	0.15	0.14	0 00:06:00
11	CB-28-DA	0.17	484.00	95.00	2.90	2.35	0.39	0.38	0 00:06:00
12	CB-29-DA	0.20	484.00	98.00	2.90	2.67	0.53	0.48	0 00:06:00
13	CB-31-DA	0.09	484.00	93.00	2.90	2.15	0.19	0.19	0 00:06:00
14	CB-32-DA	0.88	484.00	50.00	2.90	0.07	0.06	0.01	0 00:08:28
15	CB-33A-DA	0.07	484.00	39.00	2.90	0.00	0.00	0.00	0 00:08:43
16	CB-37-DA	0.06	484.00	92.00	2.90	2.05	0.13	0.13	0 00:06:00
17	CB-39-DA	0.25	484.00	61.00	2.90	0.33	0.08	0.05	0 00:09:21
18	CB-3-DA	0.06	484.00	98.00	2.90	2.65	0.17	0.15	0 00:06:00
19	CB-42-DA	0.17	484.00	97.00	2.90	2.56	0.44	0.41	0 00:06:00
20	CB-44-DA	0.75	484.00	54.00	2.90	0.15	0.11	0.03	0 00:13:13
21	CB-4-DA	0.19	484.00	78.00	2.90	1.06	0.20	0.21	0 00:06:00
22	CB-7A-DA	0.14	484.00	98.00	2.90	2.67	0.37	0.32	0 00:06:00
23	CB-7-DA	0.09	484.00	98.00	2.90	2.66	0.24	0.22	0 00:06:00
24	CB-8A-DA	0.23	484.00	91.00	2.90	1.98	0.46	0.46	0 00:06:00
25	DI-1-DA	1.39	484.00	65.00	2.90	0.46	0.64	0.38	0 00:18:17
26	EX_CB-11-DA	0.27	484.00	95.00	2.90	2.35	0.63	0.61	0 00:06:00
27	EX_CB-12-DA	0.05	484.00	98.00	2.90	2.64	0.14	0.12	0 00:06:00
28	EX_CB-16A-DA	1.93	484.00	43.00	2.90	0.00	0.01	0.00	0 00:22:23
29	EX_CB-16-DA	0.82	484.00	52.00	2.90	0.11	0.09	0.01	0 00:21:09
30	EX_CB-19-DA	0.16	484.00	39.00	2.90	0.00	0.00	0.00	0 00:11:16
31	EX_CB-27-DA	0.14	484.00	98.00	2.90	2.67	0.36	0.32	0 00:06:00
32	EX_CB-28-DA	0.98	484.00	30.00	2.90	0.00	0.00	0.00	0 00:16:31
33	EX_CB-33-DA	0.08	484.00	39.00	2.90	0.00	0.00	0.00	0 00:06:00
34	EX_CB-34A-DA	0.14	484.00	39.00	2.90	0.00	0.00	0.00	0 00:11:01
35	EX_CB-34-DA	0.23	484.00	74.00	2.90	0.85	0.19	0.16	0 00:12:58
36	EX_CB-36-DA	0.09	484.00	39.00	2.90	0.00	0.00	0.00	0 00:06:00
37	EX_CB-9-DA	0.80	484.00	51.00	2.90	0.09	0.07	0.01	0 00:18:15
38	EX-CB-1-DA	0.41	484.00	87.00	2.90	1.65	0.68	0.70	0 00:06:29

Node Summary

SN	Element ID	Element Type	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Initial Water Elevation (ft)	Surcharge Elevation (ft)	Ponded Area (ft^2)	Peak Inflow (cfs)	Max HGL Elevation Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	Bald_Mtn	Junction	368.00	375.00	368.00	375.00	0.00	2.44	369.02	0.00	5.98	0 00:00	0.00	0.00
2	CB-36	Junction	361.42	366.73	361.42	366.73	10.00	0.01	361.46	0.00	5.27	0 00:00	0.00	0.00
3	CB-38	Junction	361.20	364.26	361.20	364.26	10.00	0.00	361.20	0.00	3.06	0 00:00	0.00	0.00
4	DHM-41	Junction	363.80	378.08	363.80	378.08	0.00	3.18	364.40	0.00	13.68	0 00:00	0.00	0.00
5	DI-1	Junction	368.20	371.60	368.20	371.60	10.00	0.38	368.43	0.00	3.17	0 00:00	0.00	0.00
6	DMH-13	Junction	345.20	349.70	345.20	349.70	0.00	0.41	345.43	0.00	4.27	0 00:00	0.00	0.00
7	DMH-17	Junction	340.70	347.56	340.70	347.56	10.00	1.79	341.17	0.00	6.39	0 00:00	0.00	0.00
8	DMH-19A	Junction	342.80	347.51	342.80	347.51	0.00	0.82	343.08	0.00	4.43	0 00:00	0.00	0.00
9	DMH-2	Junction	350.80	356.28	350.80	356.28	0.00	0.74	351.08	0.00	5.20	0 00:00	0.00	0.00
10	DMH-22	Junction	347.30	351.92	347.30	351.92	10.00	1.60	347.85	0.00	4.07	0 00:00	0.00	0.00
11	DMH-23A	Junction	347.10	352.12	347.10	352.12	0.00	1.60	347.29	0.00	4.83	0 00:00	0.00	0.00
12	DMH-27	Junction	354.10	358.87	354.10	358.87	10.00	0.48	354.36	0.00	4.51	0 00:00	0.00	0.00
13	DMH-28	Junction	353.50	358.65	353.50	358.65	10.00	0.96	353.78	0.00	4.87	0 00:00	0.00	0.00
14	DMH-30A	Junction	358.90	369.12	358.90	369.12	0.00	3.56	359.18	0.00	9.94	0 00:00	0.00	0.00
15	DMH-33A	Junction	361.50	374.69	361.50	374.69	0.00	3.36	362.16	0.00	12.53	0 00:00	0.00	0.00
16	DMH-37	Junction	360.84	368.44	360.84	368.44	0.00	0.23	360.98	0.00	7.46	0 00:00	0.00	0.00
17	DMH-39	Junction	359.10	365.20	359.10	365.20	0.00	0.23	359.22	0.00	5.98	0 00:00	0.00	0.00
18	DMH-4	Junction	349.43	352.93	349.43	352.93	0.00	0.30	349.64	0.00	3.29	0 00:00	0.00	0.00
19	DMH-40A	Junction	357.80	363.55	357.80	365.55	0.00	0.23	357.92	0.00	5.63	0 00:00	0.00	0.00
20	DMH-43A	Junction	373.90	379.98	373.90	379.98	0.00	0.04	374.02	0.00	5.96	0 00:00	0.00	0.00
21	DMH-46	Junction	372.20	378.27	372.20	378.27	0.00	0.32	372.80	0.00	5.47	0 00:00	0.00	0.00
22	DMH-6	Junction	348.76	353.36	348.76	353.36	0.00	1.17	349.12	0.00	4.24	0 00:00	0.00	0.00
23	DMH-8	Junction	344.66	350.88	344.66	350.88	0.00	1.57	345.23	0.00	5.65	0 00:00	0.00	0.00
24	DMH-9	Junction	339.68	349.50	339.68	349.50	0.00	2.09	342.44	0.00	7.06	0 00:00	0.00	0.00
25	EX_CB-16	Junction	340.70	344.05	340.70	344.05	0.00	0.01	340.75	0.00	3.30	0 00:00	0.00	0.00
26	EX_CB-16A	Junction	342.00	346.00	342.00	346.00	10.00	0.00	342.02	0.00	3.98	0 00:00	0.00	0.00
27	EX_CB-28	Junction	342.40	348.24	342.40	348.24	10.00	0.00	342.40	0.00	5.84	0 00:00	0.00	0.00
28	EX_CB-33	Junction	373.40	378.68	373.40	378.68	10.00	0.20	373.54	0.00	5.14	0 00:00	0.00	0.00
29	EX_CB-34	Junction	375.40	380.10	375.40	380.10	10.00	0.16	375.52	0.00	4.58	0 00:00	0.00	0.00
30	EX_CB-34A	Junction	378.00	382.00	378.00	382.00	0.00	0.00	378.00	0.00	4.00	0 00:00	0.00	0.00
31	EX_CB-36	Junction	372.40	376.41	372.40	376.41	10.00	0.00	372.80	0.00	3.61	0 00:00	0.00	0.00
32	EX_DMH-10	Junction	367.30	377.69	367.30	377.69	0.00	2.97	368.00	0.00	9.69	0 00:00	0.00	0.00
33	EX_DMH-6	Junction	350.30	356.18	350.30	356.18	0.00	0.53	350.48	0.00	5.70	0 00:00	0.00	0.00
34	EX_DMH-7	Junction	342.20	348.55	342.20	348.55	0.00	0.53	342.38	0.00	6.17	0 00:00	0.00	0.00
35	EX_DMH-9	Junction	365.10	380.10	365.10	380.10	0.00	2.96	365.93	0.00	14.17	0 00:00	0.00	0.00
36	Fallriver_Junction	Junction	325.00	331.00	325.00	331.00	0.00	7.34	325.42	0.00	19.58	0 00:00	0.00	0.00
37	I-91_Culvert-Out	Junction	330.50	340.00	330.00	340.00	0.00	3.56	331.11	0.00	8.89	0 00:00	0.00	0.00
38	Outfall-11	Junction	338.96	339.96	338.96	339.96	0.00	2.09	339.22	0.00	0.74	0 00:00	0.00	0.00
39	Outfall-15	Junction	322.35	323.35	322.35	323.35	0.00	0.17	339.86	0.00	0.95	0 00:00	0.00	0.00
40	Outfall-15A	Junction	328.00	329.00	328.00	329.00	0.00	1.96	336.07	0.00	0.72	0 00:00	0.00	0.00
41	Outfall-1E	Junction	333.54	339.54	333.54	339.54	0.00	3.56	334.05	0.00	5.49	0 00:00	0.00	0.00
42	Outfall-24	Junction	336.46	342.46	336.46	342.46	0.00	1.60	336.70	0.00	5.76	0 00:00	0.00	0.00
43	RampCulvert-In	Junction	328.72	340.00	328.72	340.00	0.00	4.27	329.46	0.00	10.54	0 00:00	0.00	0.00
44	RampCulvert-Out	Junction	327.58	340.00	327.58	340.00	0.00	4.25	327.85	0.00	12.15	0 00:00	0.00	0.00
45	Bypass_Outfall-1	Outfall	351.50					0.06	351.54					
46	Bypass_Outfall-2	Outfall	375.40					0.08	375.45					
47	Outfall-1	Outfall	324.50					7.18	324.90					
48	Outfall-2	Outfall	336.00					0.53	336.18					

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length (ft)	Inlet Invert Elevation (ft)	Outlet Invert Elevation (ft)	Average Slope (%)	Diameter or Height (in)	Manning's Roughness	Peak Flow (cfs)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Reported Condition
1	I-91-Culvert	Pipe	Outfall-1E	I-91_Culvert-Out	240.00	333.54	330.50	1.2700	24.000	0.0130	3.56	25.46	0.14	4.96	0.56	0.28	0.00	Calculated
2	p10-9	Pipe	CB-10	DMH-9	18.00	345.87	345.28	3.2800	12.000	0.0130	0.21	6.45	0.03	3.50	0.13	0.13	0.00	Calculated
3	p1-10	Pipe	DI-1	EX_DMH-10	19.49	368.20	367.90	1.5400	12.000	0.0130	0.38	4.42	0.09	3.11	0.21	0.21	0.00	Calculated
4	p1-2	Pipe	CB-1	DMH-2	7.00	351.26	351.00	3.7100	12.000	0.0130	0.21	6.87	0.03	3.40	0.13	0.13	0.00	Calculated
5	p12-8	Pipe	CB-12A	DMH-13	4.00	346.98	346.70	7.0000	12.000	0.0130	0.41	9.43	0.04	4.50	0.17	0.17	0.00	Calculated
6	p13-8	Pipe	DMH-13	DMH-8	44.00	345.20	344.76	1.0000	12.000	0.0130	0.41	3.56	0.11	1.89	0.35	0.35	0.00	Calculated
7	p14-Out	Pipe	CB-14	Outfall-15	135.00	340.57	322.35	13.5000	12.000	0.0130	0.17	13.09	0.01	1.88	0.54	0.54	0.00	Calculated
8	p15B-Out	Pipe	CB-15B	Outfall-15A	90.00	339.60	328.00	12.8900	12.000	0.0130	1.96	12.79	0.15	3.75	0.63	0.63	0.00	Calculated
9	p16-17	Pipe	CB-16	DMH-17	25.00	343.31	343.06	1.0000	12.000	0.0130	0.53	3.56	0.15	2.95	0.28	0.28	0.00	Calculated
10	p17-15B	Pipe	DMH-17	CB-15B	49.56	340.50	339.70	1.6100	12.000	0.0130	1.79	5.06	0.35	5.34	0.44	0.44	0.00	Calculated
11	p18-19A	Pipe	CB-18	DMH-19A	2.00	344.99	344.51	24.0000	12.000	0.0150	0.64	15.13	0.04	6.26	0.19	0.19	0.00	Calculated
12	p19-17	Pipe	DMH-19A	DMH-17	52.00	342.80	341.10	3.2700	12.000	0.0150	0.82	5.58	0.15	4.84	0.27	0.27	0.00	Calculated
13	p19-22	Pipe	EX_CB-19	DMH-22	87.76	348.80	347.60	1.3700	12.000	0.0130	0.00	4.17	0.00	0.00	0.13	0.13	0.00	Calculated
14	p20-17	Pipe	CB-20	DMH-17	73.00	343.79	343.06	1.0000	12.000	0.0130	0.45	3.56	0.13	2.98	0.25	0.25	0.00	Calculated
15	p21-22	Pipe	CB-21	DMH-22	6.00	347.50	347.40	1.6700	12.000	0.0130	0.32	4.60	0.07	1.67	0.41	0.41	0.00	Calculated
16	p22-23A	Pipe	DMH-22	DMH-23A	3.00	347.30	347.20	3.3300	12.000	0.0130	1.60	6.50	0.25	4.73	0.45	0.45	0.00	Calculated
17	p23-Out	Pipe	DMH-23A	Outfall-24	30.00	347.10	336.46	35.4700	12.000	0.0130	1.60	21.22	0.08	12.83	0.22	0.22	0.00	Calculated
18	p25-18	Pipe	CB-25	DMH-22	51.00	348.20	347.40	1.5700	12.000	0.0130	0.32	4.46	0.07	1.74	0.32	0.32	0.00	Calculated
19	p2-6	Pipe	DMH-2	DMH-6	106.00	350.80	348.86	1.8300	12.000	0.0130	0.73	4.82	0.15	4.29	0.27	0.27	0.00	Calculated
20	p26-27	Pipe	CB-26	DMH-27	21.00	354.49	354.28	1.0000	12.000	0.0130	0.48	3.56	0.13	2.85	0.27	0.27	0.00	Calculated
21	p27-28	Pipe	DMH-27	DMH-28	44.50	354.10	353.60	1.1200	12.000	0.0130	0.48	3.78	0.13	3.10	0.25	0.25	0.00	Calculated
22	p28-22	Pipe	DMH-28	DMH-22	200.00	353.50	347.70	2.9000	12.000	0.0130	0.96	6.07	0.16	5.54	0.27	0.27	0.00	Calculated
23	p29-28	Pipe	CB-29A	DMH-28	6.00	353.71	353.61	1.6700	12.000	0.0130	0.48	4.60	0.10	3.08	0.25	0.25	0.00	Calculated
24	p30-Out	Pipe	DMH-30A	Outfall-1E	100.00	358.90	333.54	25.3600	15.000	0.0130	3.56	32.53	0.11	10.63	0.40	0.32	0.00	Calculated
25	p31-30	Pipe	CB-31A	DMH-30A	45.00	365.40	364.00	3.1100	12.000	0.0130	0.11	6.28	0.02	2.98	0.10	0.10	0.00	Calculated
26	p32-30	Pipe	CB-32A	DMH-30A	31.00	364.25	363.90	1.1300	12.000	0.0130	0.34	3.79	0.09	2.78	0.21	0.21	0.00	Calculated
27	p33-30	Pipe	DMH-33A	DMH-30A	199.55	361.50	359.20	1.1500	15.000	0.0130	3.36	6.94	0.48	5.37	0.63	0.51	0.00	Calculated
28	p3-4	Pipe	CB-3	DMH-4	4.00	350.22	349.63	14.7500	12.000	0.0130	0.30	13.68	0.02	5.52	0.12	0.12	0.00	Calculated
29	p34-33	Pipe	CB-34A	DMH-33A	36.00	365.00	361.80	8.8900	12.000	0.0130	0.40	17.46	0.02	8.63	0.21	0.21	0.00	Calculated
30	p35-37	Pipe	CB-35	DMH-37	62.00	366.34	363.44	4.6800	12.000	0.0130	0.23	7.71	0.03	4.29	0.12	0.12	0.00	Calculated
31	p36-37	Pipe	CB-36	DMH-37	44.00	361.42	360.94	1.0900	12.000	0.0130	0.01	3.72	0.00	0.98	0.04	0.04	0.00	Calculated
32	p37-39	Pipe	DMH-37	DMH-39	54.00	360.84	359.20	3.0400	12.000	0.0130	0.23	6.21	0.04	3.66	0.13	0.13	0.00	Calculated
33	p38-39	Pipe	CB-38	DMH-39	2.00	361.20	361.10	5.0000	12.000	0.0130	0.00	7.97	0.00	0.00	0.00	0.00	0.00	Calculated
34	p39-40	Pipe	DMH-39	DMH-40A	20.00	359.10	358.05	5.2500	12.000	0.0130	0.23	8.16	0.03	4.29	0.12	0.12	0.00	Calculated
35	p40-EX6	Pipe	DMH-40A	EX_DMH-6	172.00	357.80	350.30	4.3600	12.000	0.0130	0.23	7.44	0.03	3.11	0.15	0.15	0.00	Calculated
36	p41-33	Pipe	DHM-41	DMH-33A	152.43	363.80	361.60	1.4400	15.000	0.0130	3.18	7.76	0.41	5.71	0.58	0.46	0.00	Calculated
37	p41-9	Pipe	EX_DMH-10	EX_DMH-9	301.09	367.30	365.30	0.6600	15.000	0.0130	2.96	5.26	0.56	4.28	0.69	0.55	0.00	Calculated
38	p42-41	Pipe	CB-42A	DHM-41	17.00	373.74	373.58	0.9400	12.000	0.0130	0.10	3.46	0.03	1.86	0.12	0.12	0.00	Calculated
39	p43-EX33	Pipe	DMH-43A	EX_CB-33	11.91	373.50	373.90	-3.3600	12.000	0.0130	0.04	0.33	0.11	0.87	0.10	0.10	0.00	Calculated
40	p44-43	Pipe	CB-44	DMH-43A	78.00	374.83	374.05	1.0000	12.000	0.0130	0.04	3.56	0.01	1.44	0.07	0.07	0.00	Calculated
41	p45-46	Pipe	CB-45	DMH-46	4.00	373.37	373.27	2.5000	12.000	0.0130	0.32	5.63	0.06	3.06	0.19	0.19	0.00	Calculated
42	p4-6	Pipe	DMH-4	DMH-6	24.00	349.43	349.16	1.1200	12.000	0.0130	0.30	3.78	0.08	2.65	0.20	0.20	0.00	Calculated
43	p46-10	Pipe	DMH-46	EX_DMH-10	37.55	372.70	368.00	12.5200	18.000	0.0130	0.32	37.16	0.01	6.27	0.10	0.07	0.00	Calculated
44	p5-6	Pipe	CB-5	DMH-6	4.00	350.22	349.16	26.5000	12.000	0.0130	0.15	18.34	0.01	6.11	0.07	0.07	0.00	Calculated
45	p6-8	Pipe	DMH-6	DMH-8	140.00	348.76	346.38	1.7000	12.000	0.0130	1.17	4.65	0.25	4.77	0.35	0.35	0.00	Calculated
46	p7-9	Pipe	CB-7	DMH-9	50.00	340.30	339.78	1.0400	12.000	0.0130	0.44	3.63	0.12	0.70	1.00	1.00	3907.00	SURCHARGED

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Proposal No. 612159-136484

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length (ft)	Inlet Invert Elevation (ft)	Outlet Invert Elevation (ft)	Average Slope (%)	Diameter or Height (in)	Manning's Roughness	Peak Flow (cfs)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Reported Condition
47	p8-9	Pipe	DMH-8	DMH-9	23.00	344.66	344.43	1.0000	12.000	0.0130	1.57	3.56	0.44	3.83	0.52	0.52	0.00	Calculated
48	p9-Out	Pipe	DMH-9	Outfall-11	79.00	342.00	335.53	8.1900	12.000	0.0130	2.09	6.99	0.30	8.46	0.35	0.35	0.00	Calculated
49	pBMtn-10	Pipe	Bald_Mtn	EX_DMH-10	64.81	368.50	367.40	1.7000	15.000	0.0130	2.44	8.42	0.29	4.59	0.56	0.45	0.00	Calculated
50	pEX_DMH-9-41	Pipe	EX_DMH-9	DHM-41	250.42	365.10	364.00	0.4400	15.000	0.0130	2.96	4.28	0.69	3.78	0.76	0.61	0.00	Calculated
51	pEX1-2	Pipe	EX_CB-1	DMH-2	40.19	351.90	350.90	2.4900	12.000	0.0130	0.55	5.62	0.10	4.26	0.22	0.22	0.00	Calculated
52	pEX12-19	Pipe	EX_CB-12	DMH-19A	110.00	343.40	343.20	0.1800	12.000	0.0130	0.18	1.52	0.12	1.44	0.22	0.22	0.00	Calculated
53	pEX16-15B	Pipe	EX_CB-16	CB-15B	113.87	340.70	339.70	0.8800	12.000	0.0130	0.01	3.34	0.00	1.03	0.08	0.08	0.00	Calculated
54	pEX16A-EX16	Pipe	EX_CB-16A	EX_CB-16	64.67	342.00	340.70	2.0100	12.000	0.0130	0.00	5.05	0.00	0.40	0.03	0.03	0.00	Calculated
55	pEX27-EX6	Pipe	EX_CB-27	EX_DMH-6	32.60	351.30	350.60	2.1500	12.000	0.0130	0.30	5.22	0.06	3.42	0.17	0.17	0.00	Calculated
56	pEX28-EX7	Pipe	EX_CB-28	EX_DMH-7	34.39	342.40	342.30	0.2900	12.000	0.0130	0.00	1.92	0.00	0.00	0.04	0.04	0.00	Calculated
57	pEX33-41	Pipe	EX_CB-33	DHM-41	88.56	373.40	372.20	1.3600	15.000	0.0130	0.20	7.52	0.03	2.58	0.14	0.11	0.00	Calculated
58	pEX34A-EX34	Pipe	EX_CB-34A	EX_CB-34	78.21	378.00	376.10	2.4300	12.000	0.0130	0.00	5.55	0.00	0.00	0.00	0.00	0.00	Calculated
59	pEX34-EX33	Pipe	EX_CB-34	EX_CB-33	60.73	375.40	373.90	2.4700	12.000	0.0130	0.16	5.60	0.03	3.10	0.12	0.12	0.00	Calculated
60	pEX36-43	Pipe	EX_CB-36	DMH-46	19.28	372.40	372.30	0.5200	18.000	0.0130	0.00	7.57	0.00	0.04	0.45	0.30	0.00	Calculated
61	pEX6-EX7(MH)	Pipe	EX_DMH-6	EX_DMH-7	157.05	350.30	342.50	4.9700	12.000	0.0130	0.53	7.94	0.07	5.64	0.18	0.18	0.00	Calculated
62	pEX7(MH)-Out	Pipe	EX_DMH-7	Outfall-2	127.60	342.20	336.00	4.8600	12.000	0.0130	0.53	7.85	0.07	5.57	0.18	0.18	0.00	Calculated
63	pEX9-15B	Pipe	CB-9	CB-15B	27.57	341.40	340.10	4.7200	12.000	0.0130	0.12	7.74	0.02	3.48	0.09	0.09	0.00	Calculated
64	Ramp_Culvert	Pipe	RampCulvert-In	RampCulvert-Out	134.00	328.72	327.58	0.8500	24.000	0.0130	4.25	20.87	0.20	6.86	0.50	0.25	0.00	Calculated
65	1D-Culvert	Channel	Outfall-24	RampCulvert-In	213.55	336.46	328.72	3.6200	36.000	0.0320	1.60	168.37	0.01	1.63	0.46	0.15	0.00	
66	CB-1_bypass	Channel	CB-1	CB-5	100.68	356.26	353.31	2.9300	6.000	0.0130	0.04	49.28	0.00	1.31	0.04	0.07	0.00	
67	CB-10_bypass	Channel	CB-10	CB-16	252.16	350.37	347.58	1.1100	6.000	0.0130	0.04	29.56	0.00	0.79	0.06	0.13	0.00	
68	CB-20_bypass	Channel	CB-20	CB-9	72.73	347.92	346.02	2.6100	6.000	0.0130	0.13	139.14	0.00	0.29	0.02	0.05	0.00	
69	CB-21_bypass	Channel	CB-21	EX_CB-12	166.98	351.44	348.19	1.9500	6.000	0.0130	0.09	39.20	0.00	1.53	0.05	0.10	0.00	
70	CB-24_bypass	Channel	CB-32A	CB-29A	354.71	369.68	358.30	3.2100	6.000	0.0130	0.06	55.10	0.00	0.93	0.04	0.07	0.00	
71	CB-25A_bypass	Channel	CB-25	CB-20	277.20	352.34	347.92	1.5900	6.000	0.0130	0.06	36.35	0.00	2.29	0.03	0.06	0.00	
72	CB-26_bypass	Channel	CB-26	CB-25	207.40	357.99	352.34	2.7200	6.000	0.0130	0.11	46.38	0.00	1.48	0.05	0.11	0.00	
73	CB-27_bypass	Channel	CB-31A	CB-26	350.32	369.60	358.35	3.2100	6.000	0.0130	0.02	51.26	0.00	0.58	0.04	0.08	0.00	
74	CB-29_bypass	Channel	CB-34A	CB-35	90.00	378.24	375.05	3.5400	6.000	0.0130	0.08	60.04	0.00	2.18	0.04	0.07	0.00	
75	CB-29A_bypass	Channel	CB-29A	CB-21	202.68	358.91	351.44	3.6900	6.000	0.0130	0.09	53.94	0.00	1.49	0.05	0.10	0.00	
76	CB-3_bypass	Channel	CB-3	CB-12A	192.15	352.72	349.48	1.6900	6.000	0.0130	0.07	37.38	0.00	2.44	0.03	0.07	0.00	
77	CB-35_bypass	Channel	CB-35	EX_CB-27	295.00	370.84	356.41	4.8900	6.000	0.0130	0.04	62.14	0.00	1.33	0.03	0.07	0.00	
78	CB-42A_bypass	Channel	CB-42A	CB-32A	340.69	378.24	370.05	2.4000	6.000	0.0130	0.03	40.82	0.00	1.18	0.03	0.06	0.00	
79	CB-44_bypass	Channel	CB-44	CB-34A	291.31	379.83	374.95	1.6800	6.000	0.0130	0.01	36.37	0.00	0.55	0.03	0.06	0.00	
80	CB-45_bypass	Channel	CB-45	Bypass_Outfall-2	92.00	377.87	375.40	2.6800	6.000	0.0130	0.08	46.04	0.00	1.51	0.05	0.09	0.00	
81	CB-5_bypass	Channel	CB-5	CB-10	223.18	353.31	350.37	1.3200	6.000	0.0130	0.03	32.25	0.00	0.85	0.04	0.08	0.00	
82	CB-8A_bypass	Channel	CB-12A	CB-14	70.37	349.48	344.57	6.9800	6.000	0.0130	0.34	227.39	0.00	0.00	0.01	0.01	0.00	
83	Cobble_Waterway	Channel	I-91_Culvert-Out	RampCulvert-In	363.16	330.50	328.72	0.4900	36.000	0.0320	3.54	104.81	0.03	1.57	0.67	0.22	0.00	
84	EX_CB-1_bypass	Channel	EX_CB-1	CB-3	126.22	356.30	352.72	2.8400	6.000	0.0130	0.16	48.49	0.00	1.74	0.06	0.12	0.00	
85	EX_CB-12_bypass	Channel	EX_CB-12	CB-18	124.46	348.19	347.49	0.5600	6.000	0.0130	0.03	21.59	0.00	0.58	0.08	0.15	0.00	
86	EX_CB-27_bypass	Channel	EX_CB-27	Bypass_Outfall-1	103.70	356.41	351.50	4.7300	6.000	0.0130	0.06	61.14	0.00	1.69	0.04	0.07	0.00	
87	FallRiver	Channel	Fallriver_Junction	Outfall-1	100.00	325.00	324.50	0.5000	240.000	0.0320	7.18	8532.83	0.00	1.68	0.41	0.02	0.00	
88	FR-1	Channel	Outfall-11	Fallriver_Junction	84.74	335.53	325.00	12.4300	12.000	0.0320	2.09	24.45	0.09	5.02	0.34	0.34	0.00	
89	FR2	Channel	Outfall-15	Fallriver_Junction	138.29	339.81	325.00	10.7100	12.000	0.0320	0.11	19.71	0.01	0.99	0.21	0.21	0.00	
90	FR3	Channel	RampCulvert-Out	Fallriver_Junction	378.68	327.58	325.00	0.6800	120.000	0.0320	4.25	2308.05	0.00	1.26	0.34	0.03	0.00	
91	FR4	Channel	Outfall-15A	Fallriver_Junction	87.86	335.79	325.00	12.2800	12.000	0.0320	1.96	21.11	0.09	4.74	0.34	0.34	0.00	

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Proposal No. 612159-136484

Inlet Summary

SN	Element ID	Inlet Manufacturer	Manufacturer Part Number	Inlet Location	Number of Inlets	Catchbasin Invert Elevation (ft)	Max (Rim) Elevation (ft)	Initial Water Elevation (ft)	Ponded Area (ft^2)	Peak Flow (cfs)	Peak Flow Intercepted by Inlet (cfs)	Peak Flow Bypassing Inlet (cfs)	Inlet Efficiency during Peak Flow (%)	Allowable Spread (ft)	Max Gutter Spread during Peak Flow (ft)	Max Gutter Water Elev. during Peak Flow (ft)
1	CB-1	FHWA HEC-22 GENERIC	N/A	On Grade	1	351.26	356.26	351.26	N/A	0.25	0.24	0.02	93.34	10.50	3.22	356.32
2	CB-10	FHWA HEC-22 GENERIC	N/A	On Grade	1	345.87	350.37	345.87	N/A	0.25	0.23	0.02	92.46	10.50	3.59	350.44
3	CB-12A	FHWA HEC-22 GENERIC	N/A	On Grade	1	346.98	349.48	346.98	N/A	0.52	0.40	0.12	76.97	10.50	5.25	349.58
4	CB-14	FHWA HEC-22 GENERIC	N/A	On Sag	1	340.57	344.57	340.57	10.00	0.03	N/A	N/A	N/A	10.50	1.65	344.05
5	CB-15B	FHWA HEC-22 GENERIC	N/A	On Sag	1	339.60	345.67	339.60	10.00	0.10	N/A	N/A	N/A	10.50	2.61	345.79
6	CB-16	FHWA HEC-22 GENERIC	N/A	On Sag	1	343.31	347.58	343.31	10.00	0.53	N/A	N/A	N/A	10.50	5.77	347.68
7	CB-18	FHWA HEC-22 GENERIC	N/A	On Sag	1	344.99	347.49	342.80	10.00	0.64	N/A	N/A	N/A	10.50	6.40	347.60
8	CB-20	FHWA HEC-22 GENERIC	N/A	On Grade	1	343.79	347.92	343.79	N/A	0.58	0.44	0.14	75.28	10.50	5.46	348.03
9	CB-21	FHWA HEC-22 GENERIC	N/A	On Grade	1	347.50	351.44	347.50	N/A	0.41	0.33	0.08	80.74	10.50	4.79	351.54
10	CB-25	FHWA HEC-22 GENERIC	N/A	On Grade	1	348.20	352.34	348.20	N/A	0.38	0.34	0.05	88.03	10.50	3.77	352.42
11	CB-26	FHWA HEC-22 GENERIC	N/A	On Grade	1	354.49	357.99	354.49	N/A	0.59	0.48	0.11	81.60	10.50	4.42	358.08
12	CB-29A	FHWA HEC-22 GENERIC	N/A	On Grade	1	353.71	358.91	353.71	N/A	0.57	0.47	0.10	81.98	10.50	4.39	359.00
13	CB-3	FHWA HEC-22 GENERIC	N/A	On Grade	1	350.22	352.72	350.22	N/A	0.36	0.31	0.05	86.13	10.50	4.03	352.80
14	CB-31A	FHWA HEC-22 GENERIC	N/A	On Grade	1	365.40	369.65	365.40	N/A	0.14	0.13	0.00	98.51	10.50	2.56	369.70
15	CB-32A	FHWA HEC-22 GENERIC	N/A	On Grade	1	364.25	370.05	364.25	N/A	0.40	0.35	0.05	87.41	10.50	3.83	370.13
16	CB-34A	FHWA HEC-22 GENERIC	N/A	On Grade	1	370.45	374.95	370.45	N/A	0.48	0.41	0.07	84.73	10.50	4.10	375.03
17	CB-35	FHWA HEC-22 GENERIC	N/A	On Grade	1	366.34	370.84	366.34	N/A	0.27	0.25	0.02	94.01	10.50	3.14	370.90
18	CB-42A	FHWA HEC-22 GENERIC	N/A	On Grade	1	373.74	377.24	373.74	N/A	0.13	0.13	0.00	96.65	10.50	2.89	377.30
19	CB-44	FHWA HEC-22 GENERIC	N/A	On Grade	1	374.83	379.83	374.83	N/A	0.05	0.05	0.00	99.98	10.50	2.10	379.87
20	CB-45	FHWA HEC-22 GENERIC	N/A	On Grade	1	373.37	377.87	373.37	N/A	0.41	0.34	0.07	82.79	10.50	4.45	377.96
21	CB-5	FHWA HEC-22 GENERIC	N/A	On Grade	1	347.20	353.31	347.20	N/A	0.19	0.18	0.01	94.55	10.50	3.13	353.37
22	CB-7	FHWA HEC-22 GENERIC	N/A	On Sag	1	340.30	350.66	340.30	10.00	0.32	N/A	N/A	N/A	10.50	4.42	350.32
23	CB-9	FHWA HEC-22 GENERIC	N/A	On Sag	1	341.40	346.02	341.40	0.00	0.13	N/A	N/A	N/A	10.50	2.91	346.14
24	EX_CB-1	FHWA HEC-22 GENERIC	N/A	On Grade	1	351.90	356.30	351.90	N/A	0.70	0.55	0.15	78.78	10.50	4.72	356.39
25	EX_CB-12	FHWA HEC-22 GENERIC	N/A	On Grade	1	343.40	348.19	343.40	N/A	0.22	0.20	0.01	94.80	10.50	3.07	348.25
26	EX_CB-19	FHWA HEC-22 GENERIC	N/A	On Sag	2	348.80	350.66	348.80	10.00	0.00	N/A	N/A	N/A	10.50	1.00	350.74
27	EX_CB-27	FHWA HEC-22 GENERIC	N/A	On Grade	1	351.30	356.41	351.30	N/A	0.36	0.32	0.04	89.24	10.50	3.64	356.48

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Proposal No. 612159-136484

Subbasin Hydrology

Subbasin : Bald_Mtn-DA

Input Data

Area (ac)	5.35
Peak Rate Factor	484
Weighted Curve Number	70
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	5.35	-	70
Composite Area & Weighted CN	5.35		70

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

Where :

Tc = Time of Concentration (hr)
n = Manning's roughness
Lf = Flow Length (ft)
P = 2 yr, 24 hr Rainfall (inches)
Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 * (Sf^0.5) (unpaved surface)
V = 20.3282 * (Sf^0.5) (paved surface)
V = 15.0 * (Sf^0.5) (grassed waterway surface)
V = 10.0 * (Sf^0.5) (nearly bare & untilled surface)
V = 9.0 * (Sf^0.5) (cultivated straight rows surface)
V = 7.0 * (Sf^0.5) (short grass pasture surface)
V = 5.0 * (Sf^0.5) (woodland surface)
V = 2.5 * (Sf^0.5) (forest w/heavy litter surface)
Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)

Channel Flow Equation :

V = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
R = Aq / Wp
Tc = (Lf / V) / (3600 sec/hr)

Where :

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
R = Hydraulic Radius (ft)
Aq = Flow Area (ft^2)
Wp = Wetted Perimeter (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)
n = Manning's roughness

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.8	0	0
Flow Length (ft) :	50	0	0
Slope (%) :	3.5	0	0
2 yr, 24 hr Rainfall (in) :	2.9	0	0
Velocity (ft/sec) :	0.05	0	0
Computed Flow Time (min) :	18.03	0	0

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	78	0	0
Slope (%) :	5	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	3.61	0	0
Computed Flow Time (min) :	0.36	0	0

Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0	0
Flow Length (ft) :	980	0	0
Channel Slope (%) :	5	0	0
Cross Section Area (ft^2) :	0.8	0	0
Wetted Perimeter (ft) :	0.6	0	0
Velocity (ft/sec) :	31.05	0	0
Computed Flow Time (min) :	0.53	0	0

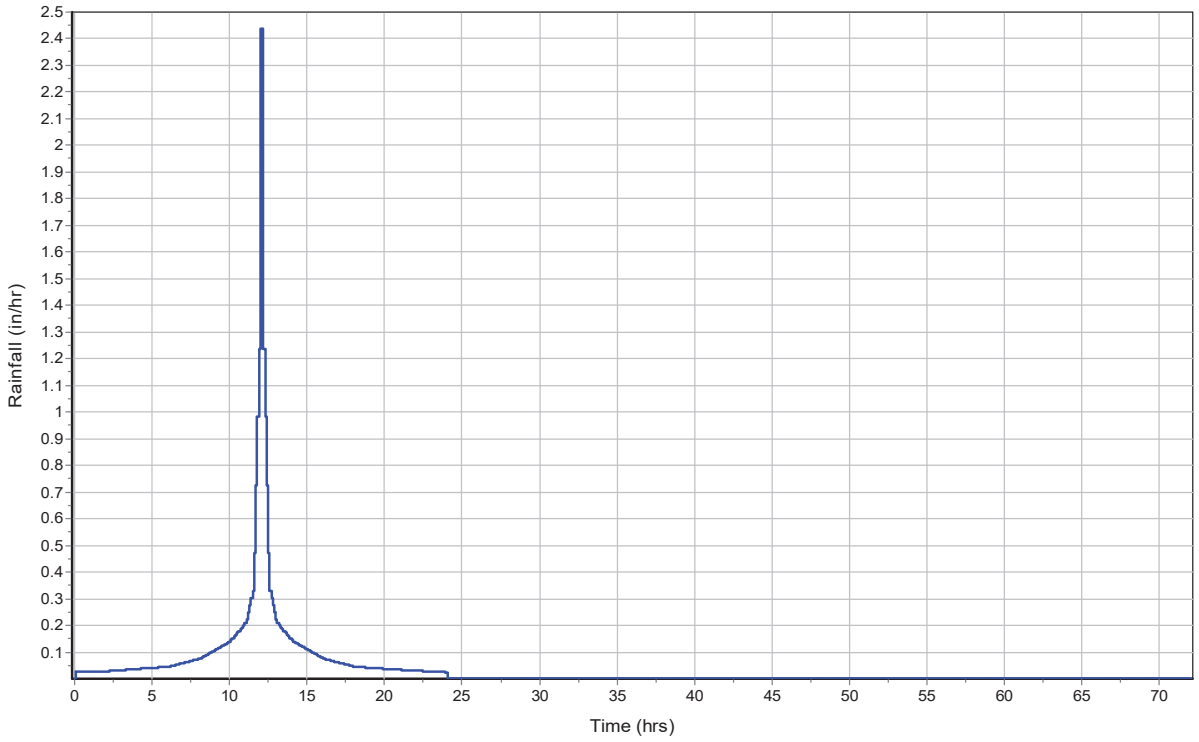
Total TOC (min) 18.92

Subbasin Runoff Results

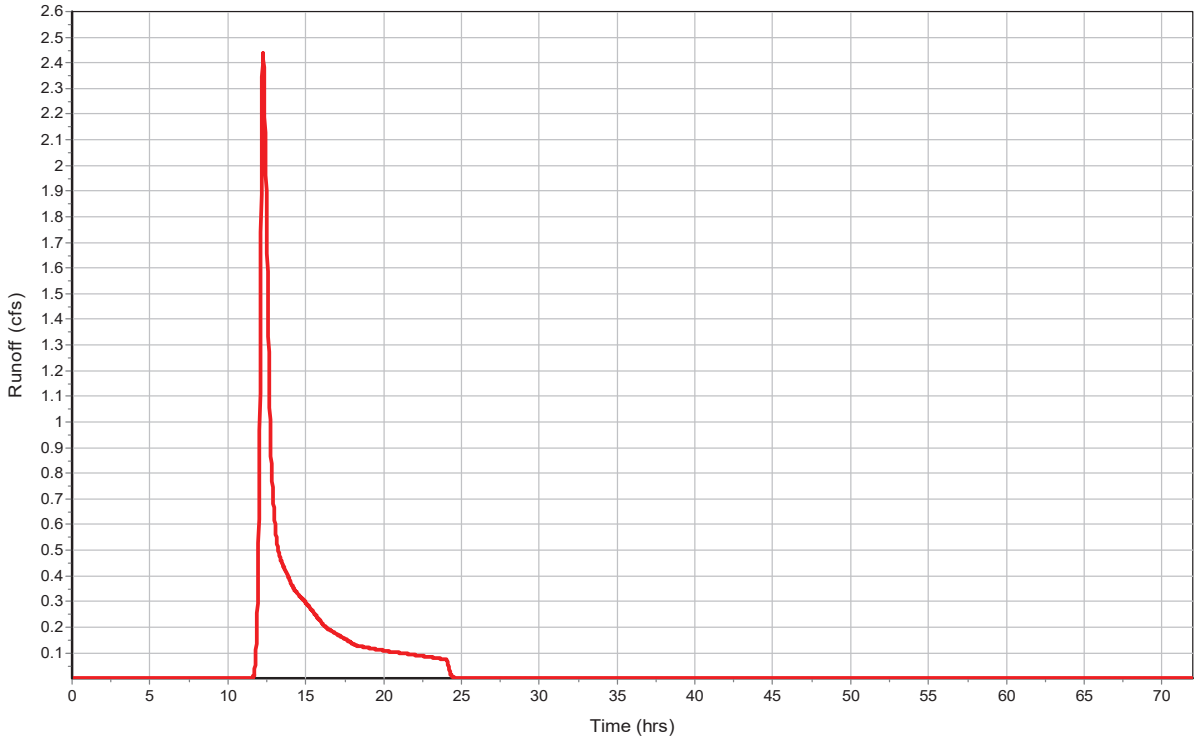
Total Rainfall (in)	2.9
Total Runoff (in)	0.66
Peak Runoff (cfs)	2.44
Weighted Curve Number	70
Time of Concentration (days hh:mm:ss)	0 00:18:55

Subbasin : Bald_Mtn-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-12-DA

Input Data

Area (ac)	0.2
Peak Rate Factor	484
Weighted Curve Number	98
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.2	-	98
Composite Area & Weighted CN	0.2		98

Time of Concentration

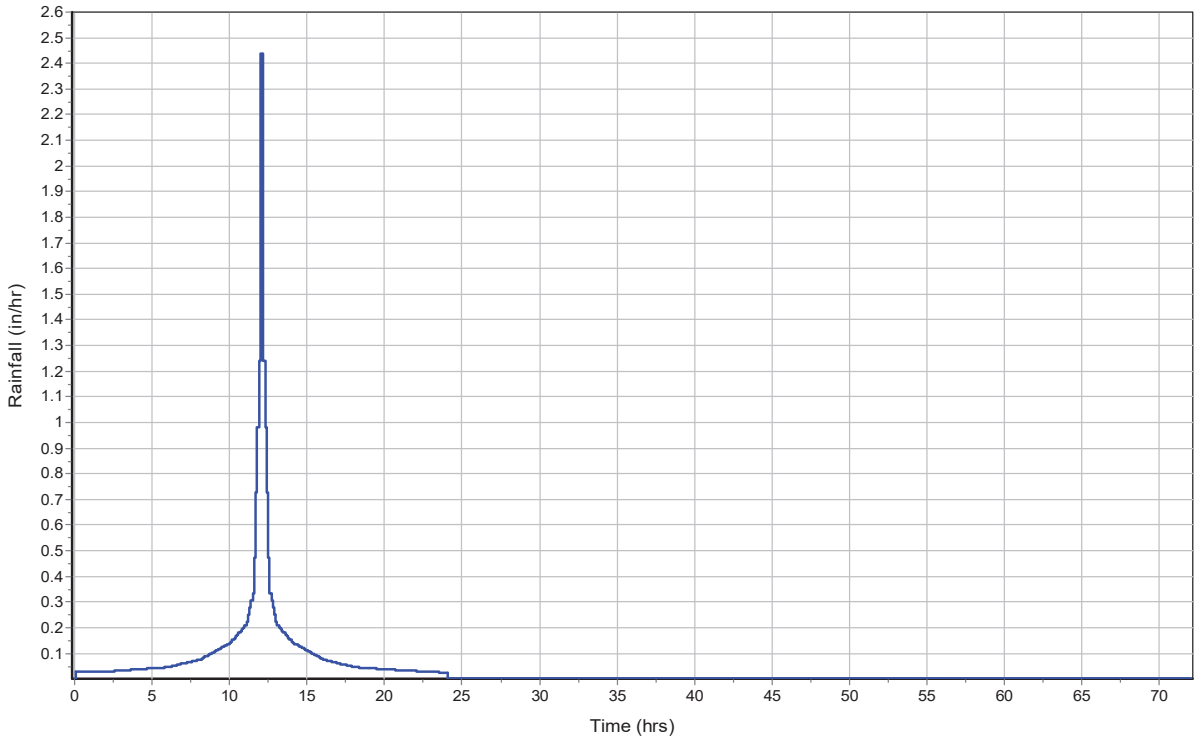
User-Defined TOC override (minutes): 6

Subbasin Runoff Results

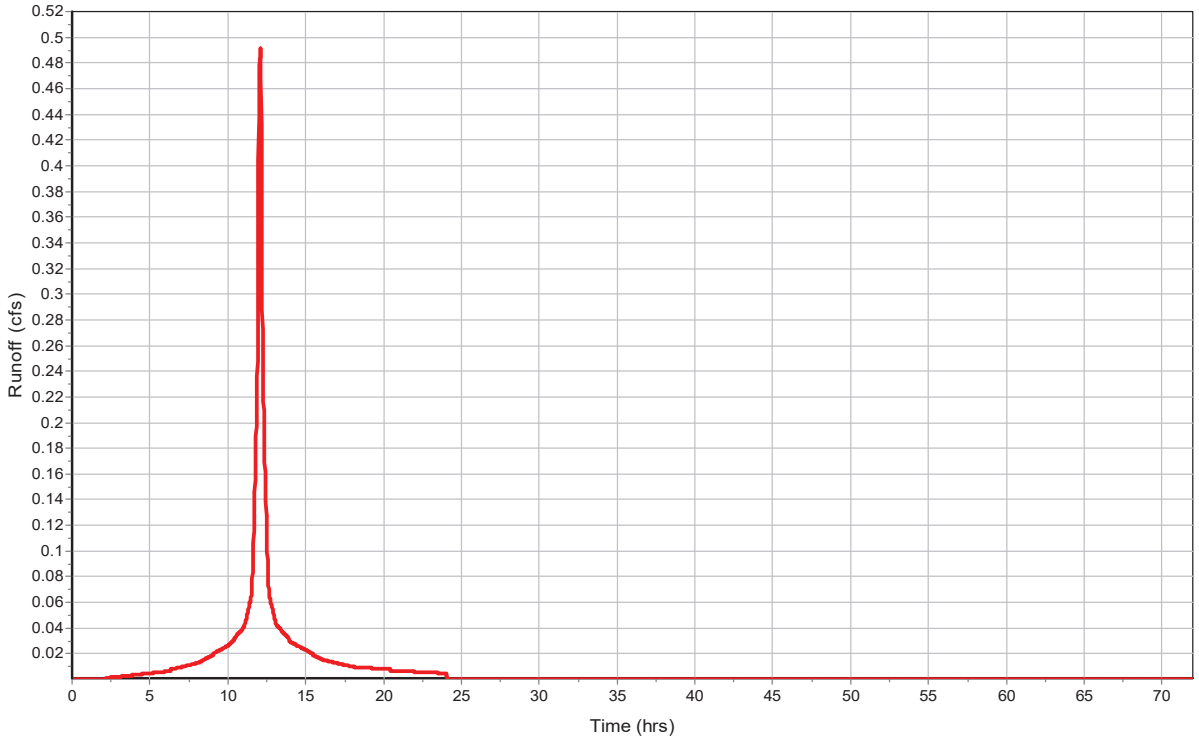
Total Rainfall (in)	2.9
Total Runoff (in)	2.67
Peak Runoff (cfs)	0.49
Weighted Curve Number	98
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : CB-12-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-13-DA

Input Data

Area (ac) 0.43
Peak Rate Factor 484
Weighted Curve Number 64
Rain Gage ID ..... *

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.43	-	64
Composite Area & Weighted CN	0.43		64

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	50	0	0
Slope (%) :	1.5	0	0
2 yr, 24 hr Rainfall (in) :	2.9	0	0
Velocity (ft/sec) :	0.06	0	0
Computed Flow Time (min) :	14.54	0	0

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	160	0	0
Slope (%) :	1.5	0	0
Surface Type :	Grass pasture	Unpaved	Unpaved
Velocity (ft/sec) :	0.86	0	0
Computed Flow Time (min) :	3.1	0	0

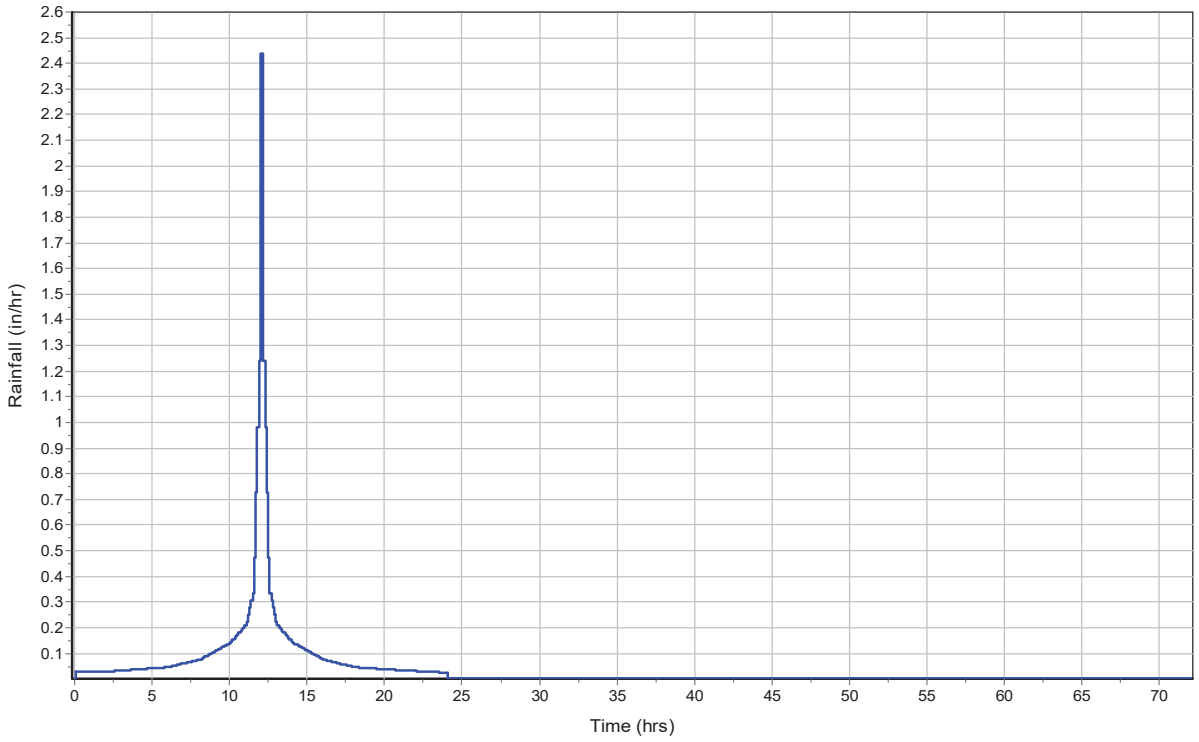
Total TOC (min) 17.64

Subbasin Runoff Results

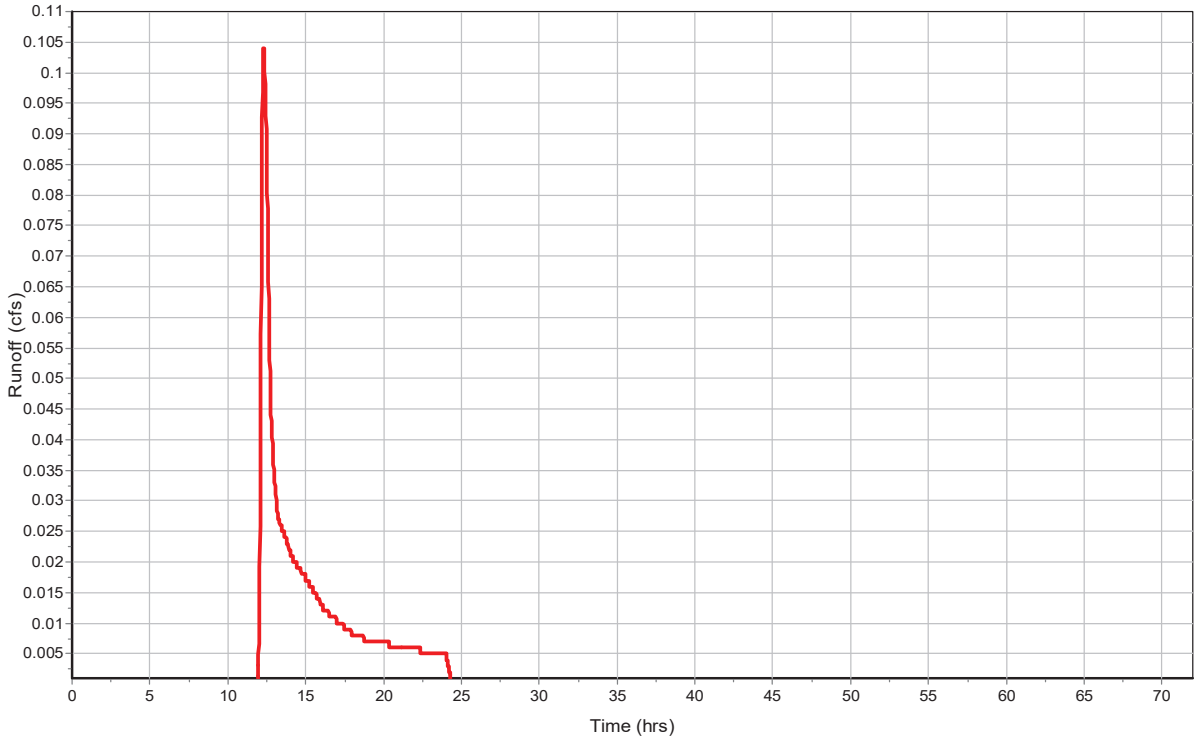
Total Rainfall (in) 2.9
Total Runoff (in) 0.43
Peak Runoff (cfs) 0.1
Weighted Curve Number 64
Time of Concentration (days hh:mm:ss) 0 00:17:38

Subbasin : CB-13-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-14A-DA

Input Data

Area (ac)	0.22
Peak Rate Factor	484
Weighted Curve Number	98
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.22	-	98
Composite Area & Weighted CN	0.22		98

Time of Concentration

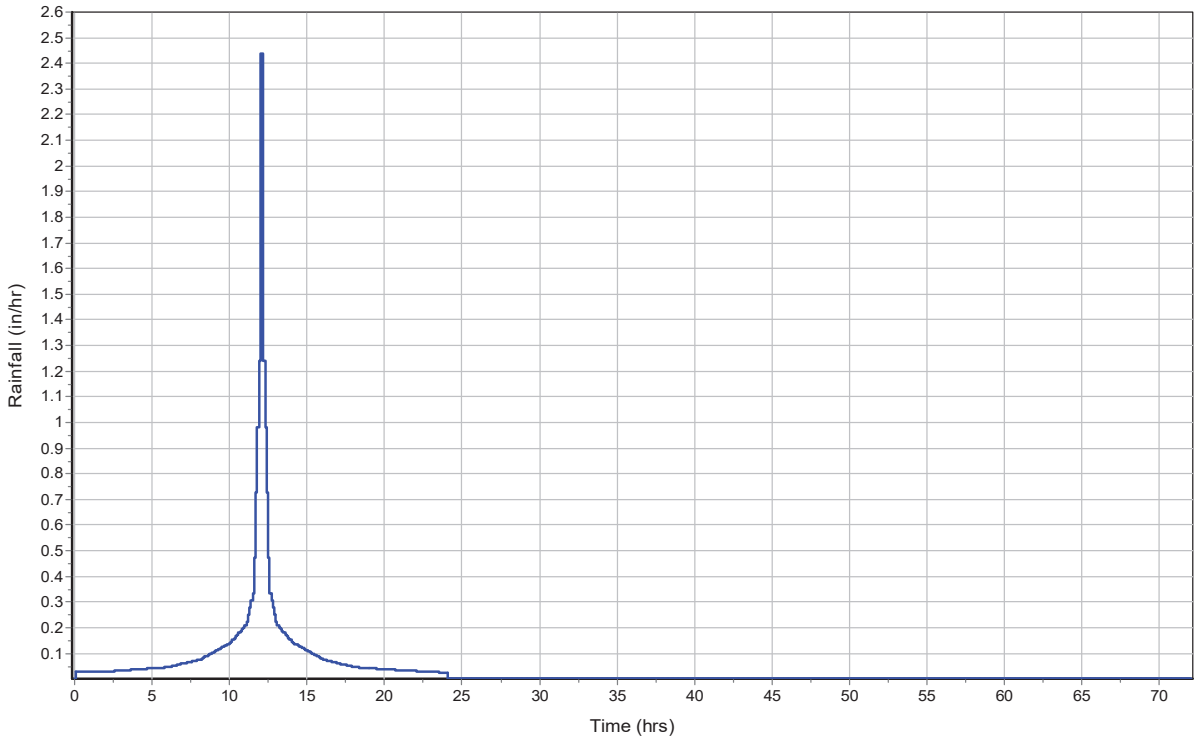
User-Defined TOC override (minutes): 6

Subbasin Runoff Results

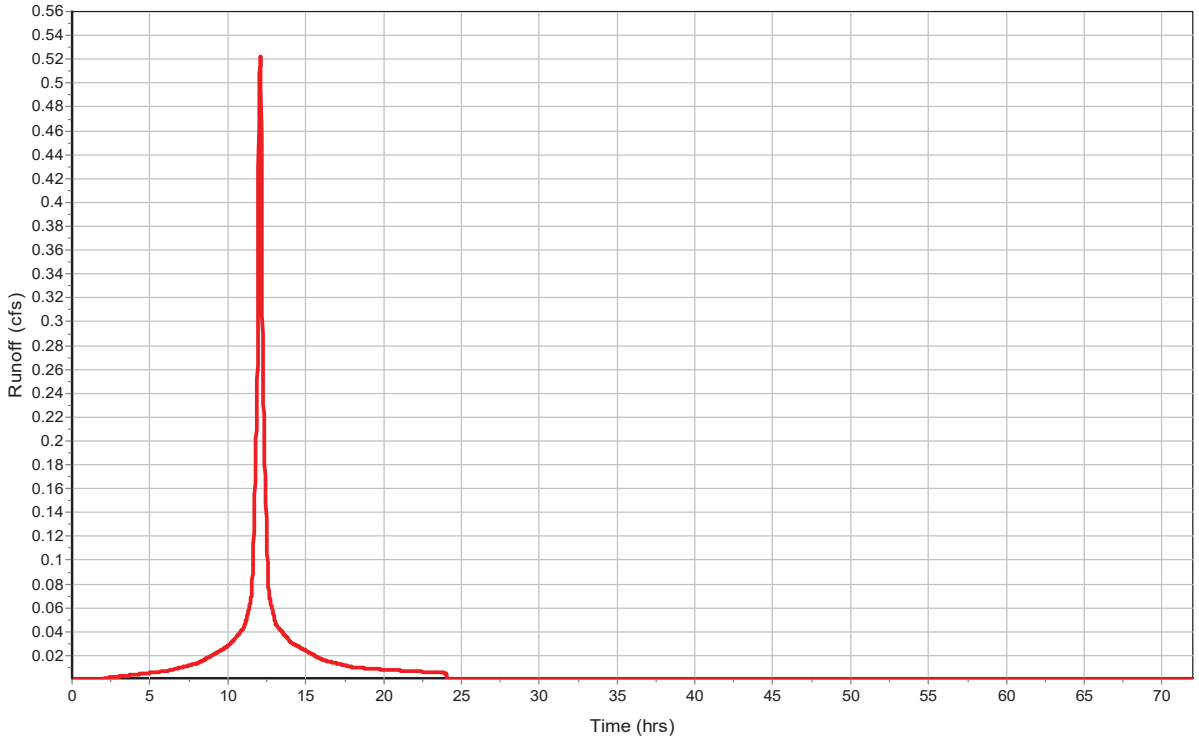
Total Rainfall (in)	2.9
Total Runoff (in)	2.67
Peak Runoff (cfs)	0.52
Weighted Curve Number	98
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : CB-14A-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-17-DA

Input Data

Area (ac) 0.13
Peak Rate Factor 484
Weighted Curve Number 98
Rain Gage ID ..... *

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.13	-	98
Composite Area & Weighted CN	0.13		98

Time of Concentration

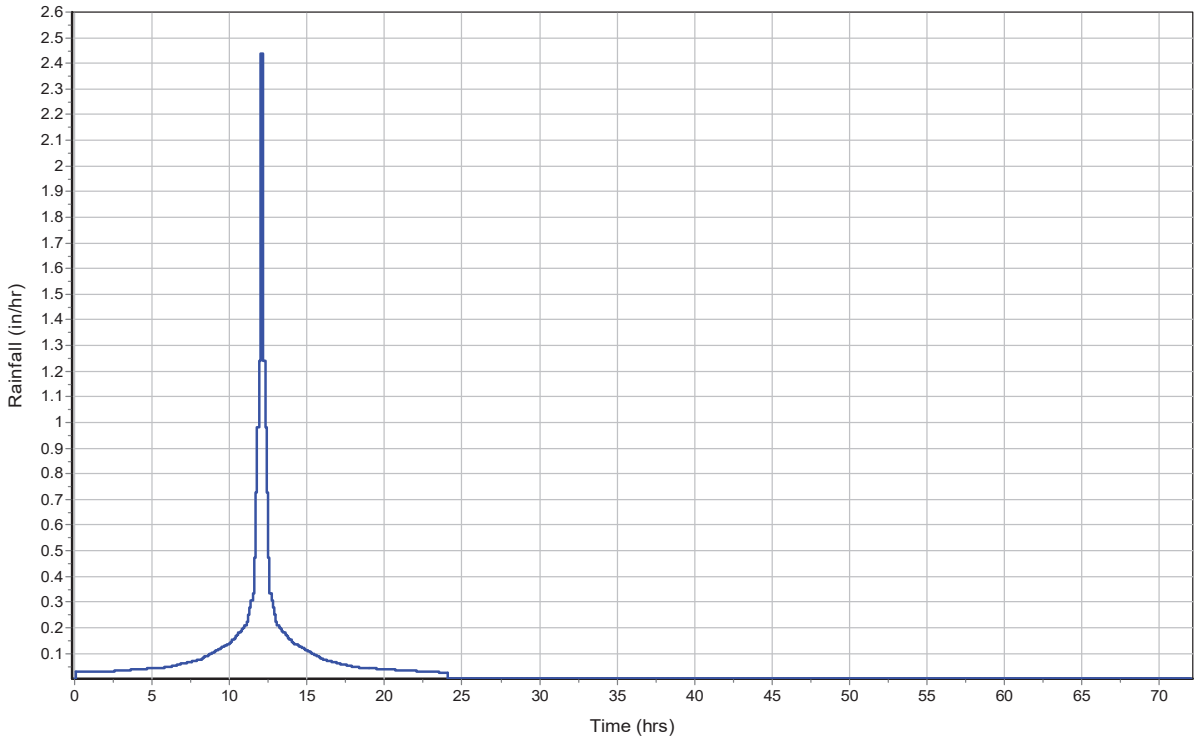
User-Defined TOC override (minutes): 6

Subbasin Runoff Results

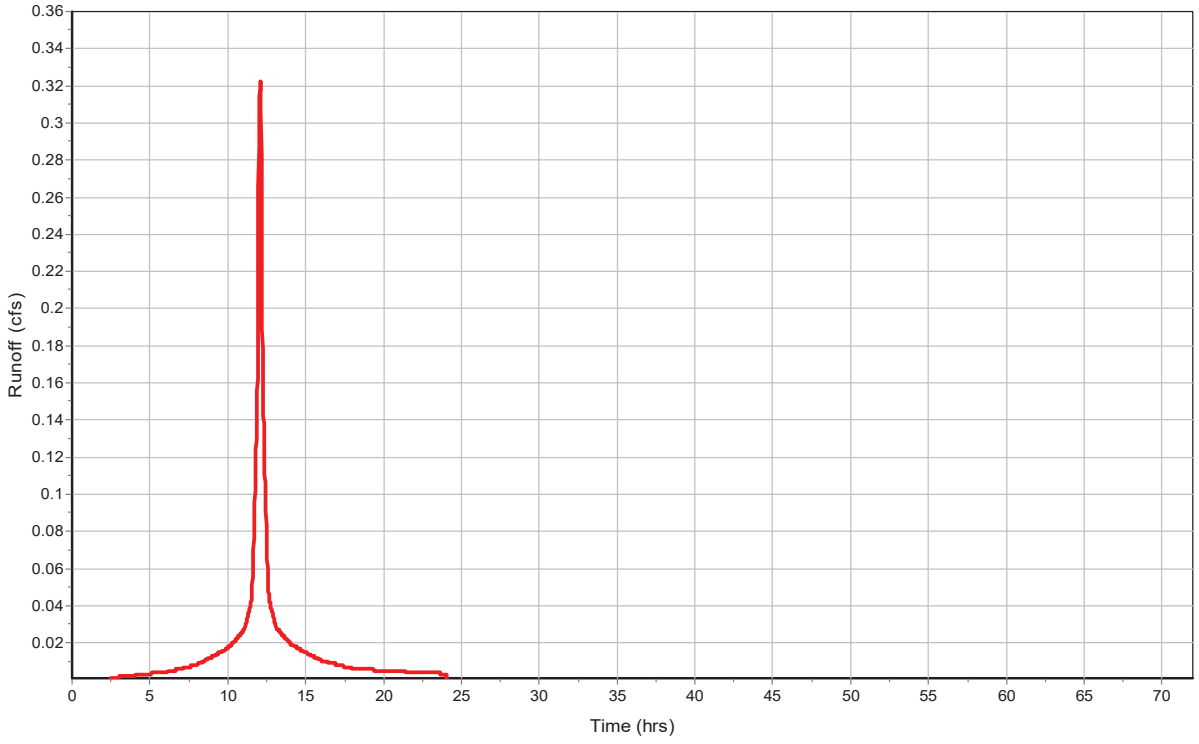
Total Rainfall (in) 2.9
Total Runoff (in) 2.67
Peak Runoff (cfs) 0.32
Weighted Curve Number 98
Time of Concentration (days hh:mm:ss) 0 00:06:00

Subbasin : CB-17-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-1-DA

Input Data

Area (ac)	0.57
Peak Rate Factor	484
Weighted Curve Number	68
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.57	-	68
Composite Area & Weighted CN	0.57		68

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	50	0	0
Slope (%) :	3	0	0
2 yr, 24 hr Rainfall (in) :	2.9	0	0
Velocity (ft/sec) :	0.08	0	0
Computed Flow Time (min) :	11.02	0	0

Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0	0
Flow Length (ft) :	480	0	0
Channel Slope (%) :	4	0	0
Cross Section Area (ft^2) :	0.8	0	0
Wetted Perimeter (ft) :	0.5	0	0
Velocity (ft/sec) :	31.36	0	0
Computed Flow Time (min) :	0.26	0	0

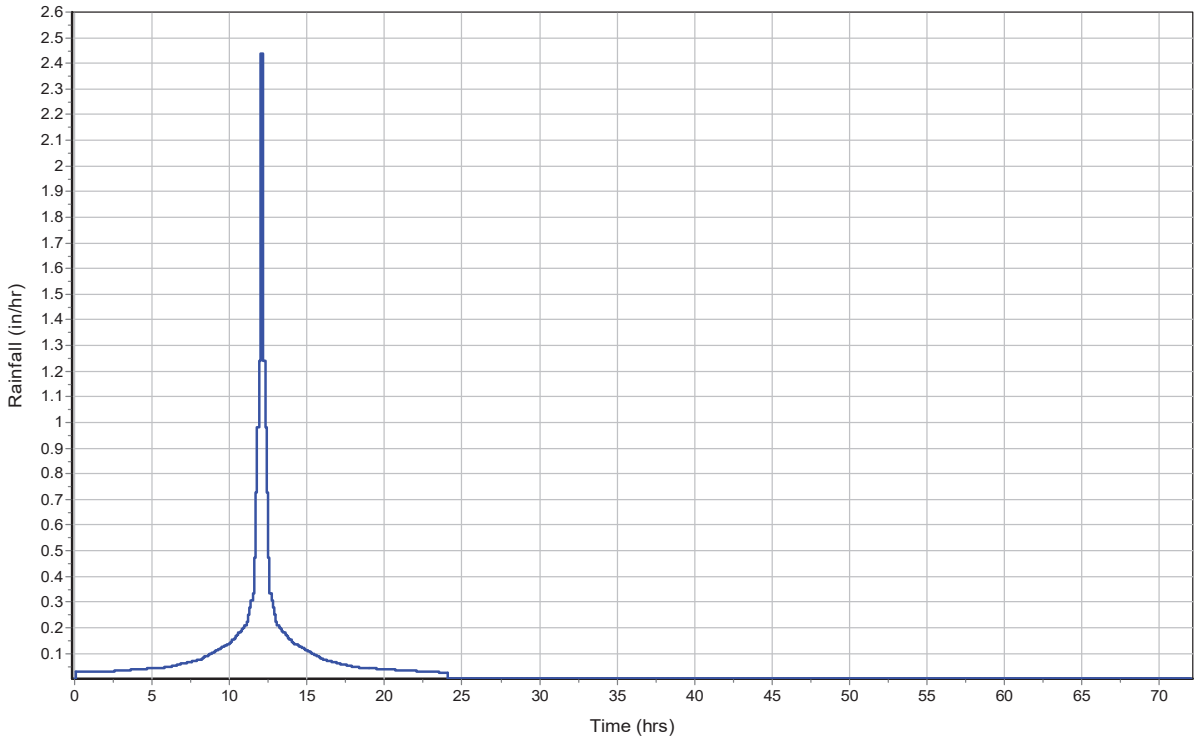
Total TOC (min) 11.27

Subbasin Runoff Results

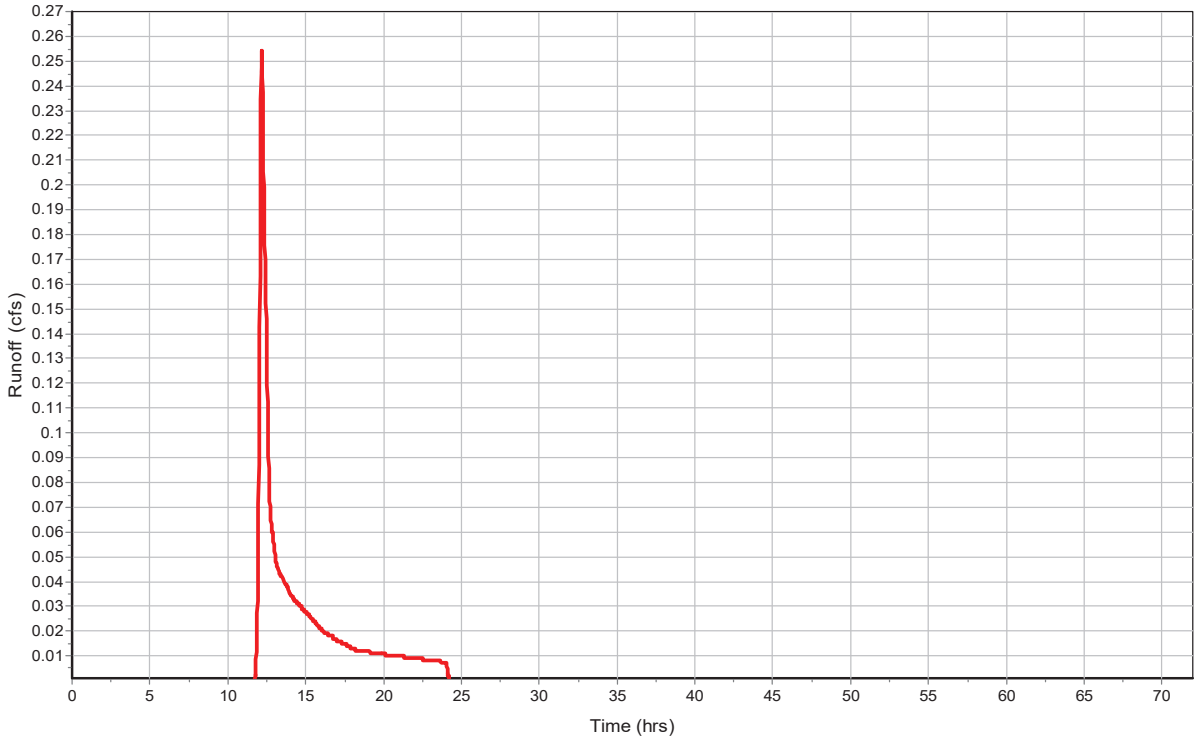
Total Rainfall (in)	2.9
Total Runoff (in)	0.58
Peak Runoff (cfs)	0.25
Weighted Curve Number	68
Time of Concentration (days hh:mm:ss)	0 00:11:16

Subbasin : CB-1-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-21-DA

Input Data

Area (ac)	0.11
Peak Rate Factor	484
Weighted Curve Number	98
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.11	-	98
Composite Area & Weighted CN	0.11		98

Time of Concentration

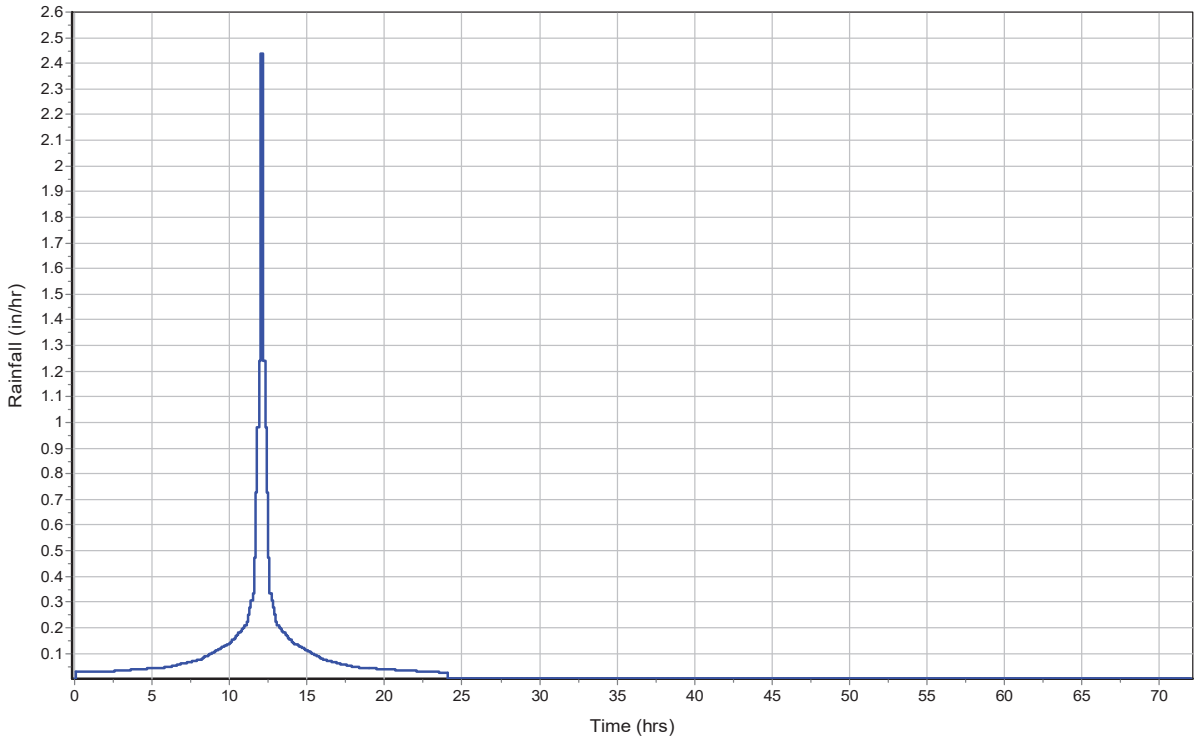
User-Defined TOC override (minutes): 6

Subbasin Runoff Results

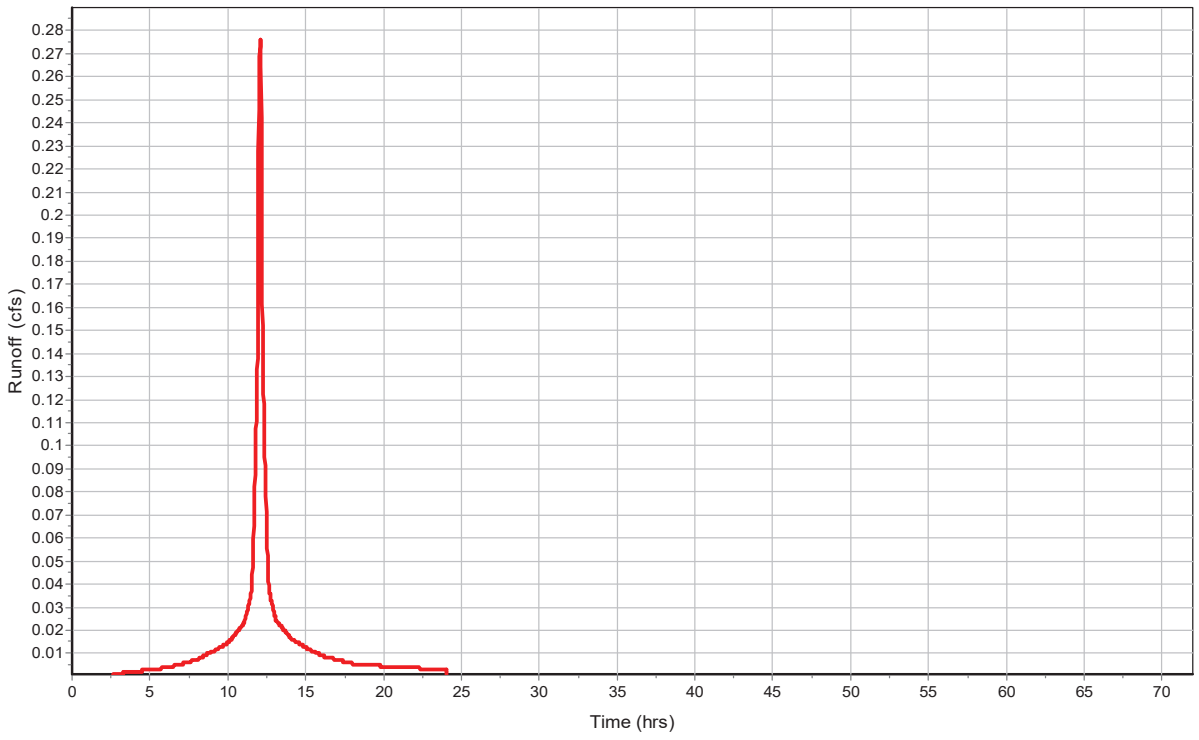
Total Rainfall (in)	2.9
Total Runoff (in)	2.66
Peak Runoff (cfs)	0.28
Weighted Curve Number	98
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : CB-21-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-22-DA

Input Data

Area (ac)	0.24
Peak Rate Factor	484
Weighted Curve Number	98
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.24	-	98
Composite Area & Weighted CN	0.24		98

Time of Concentration

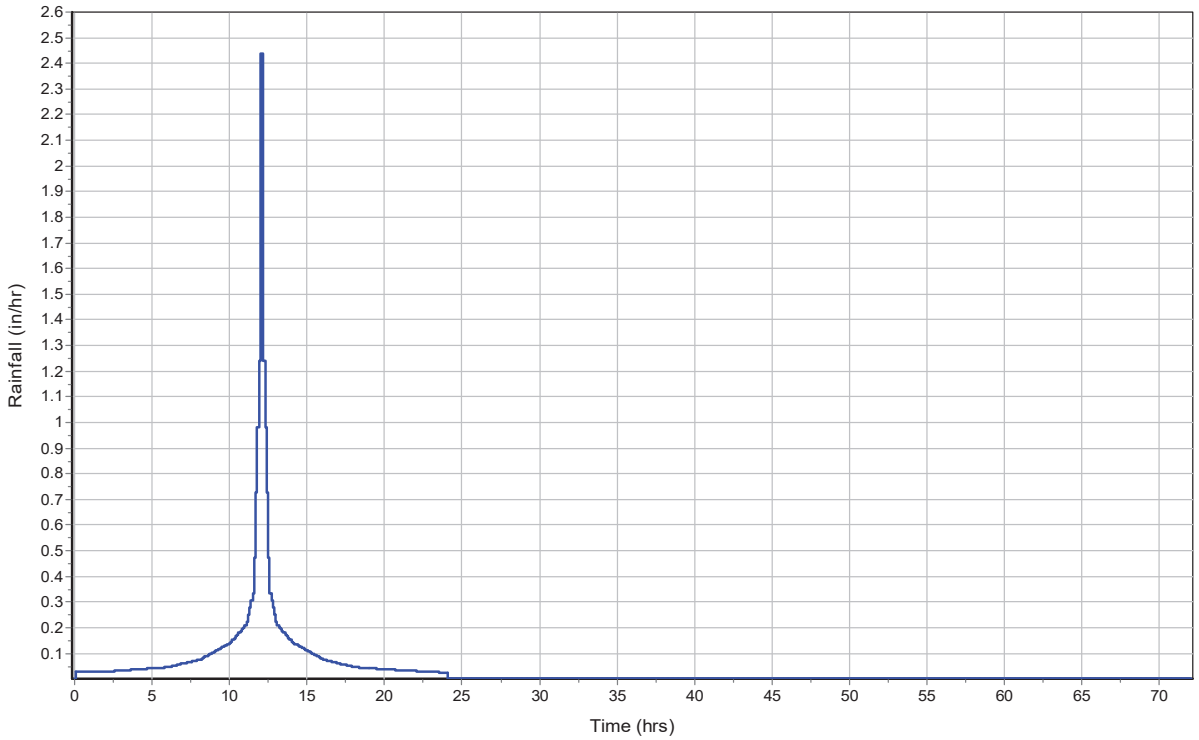
User-Defined TOC override (minutes): 6

Subbasin Runoff Results

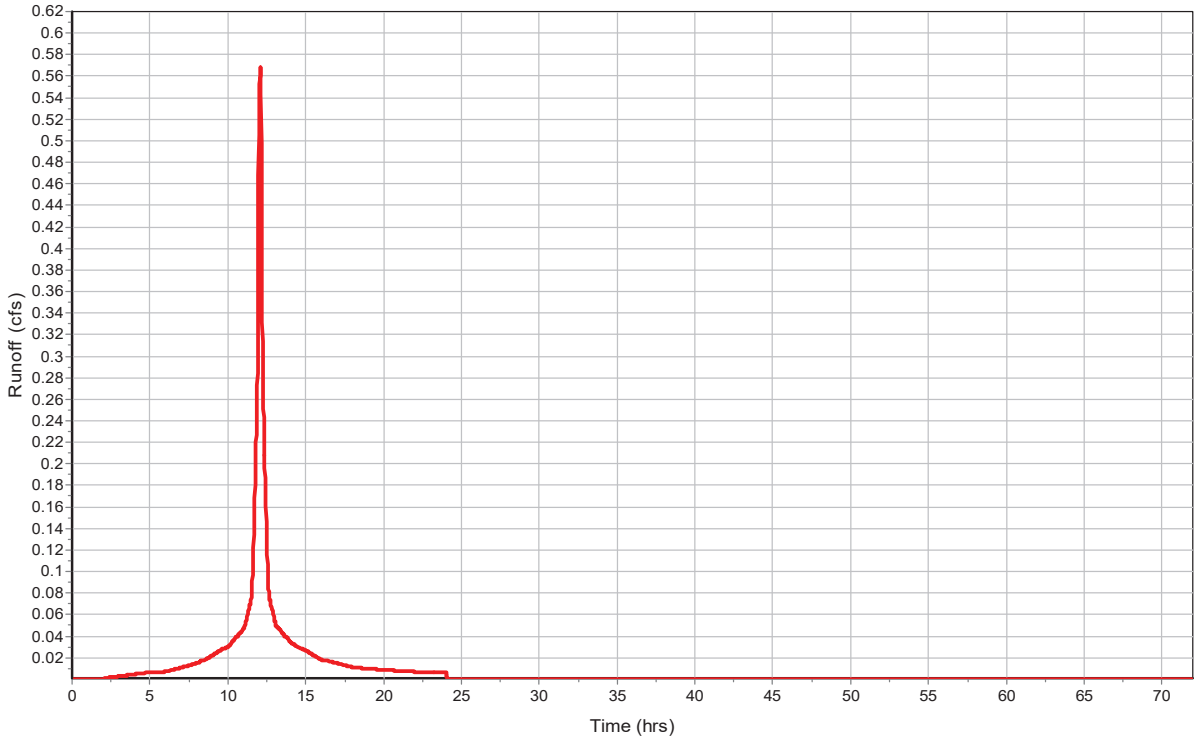
Total Rainfall (in)	2.9
Total Runoff (in)	2.67
Peak Runoff (cfs)	0.57
Weighted Curve Number	98
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : CB-22-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-25-DA

Input Data

Area (ac) 0.21
Peak Rate Factor 484
Weighted Curve Number 98
Rain Gage ID ..... *

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.21	-	98
Composite Area & Weighted CN	0.21		98

Time of Concentration

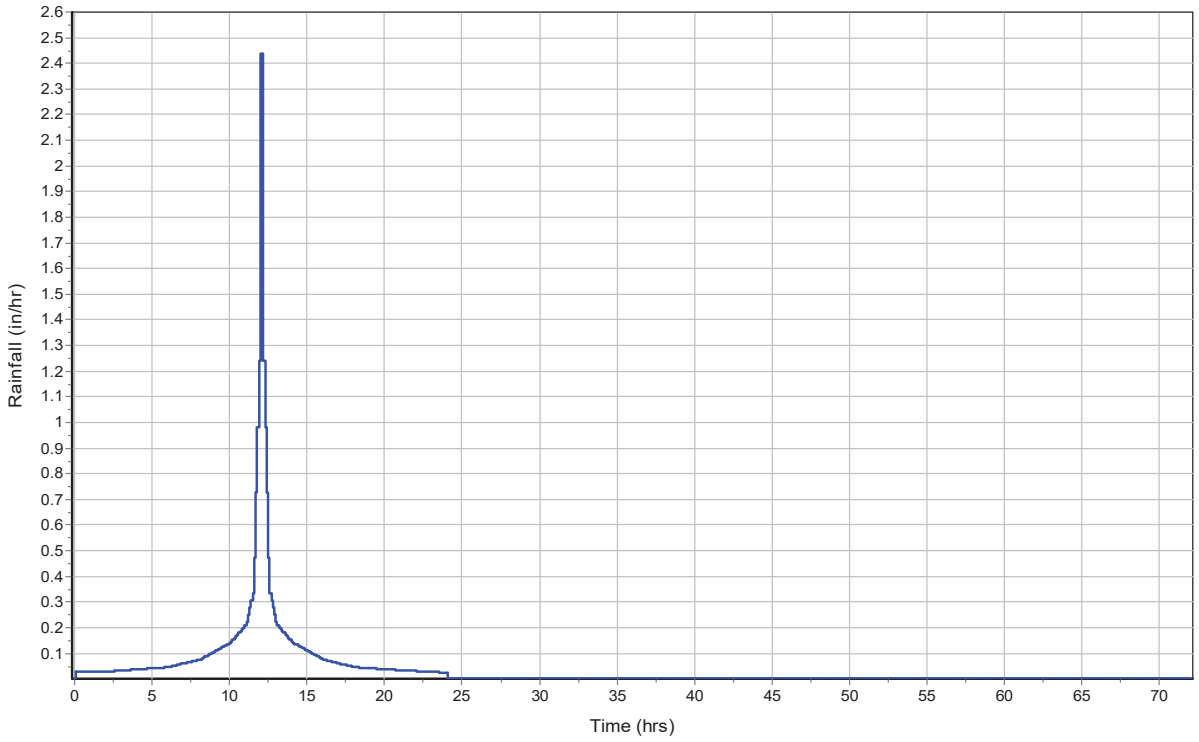
User-Defined TOC override (minutes): 6

Subbasin Runoff Results

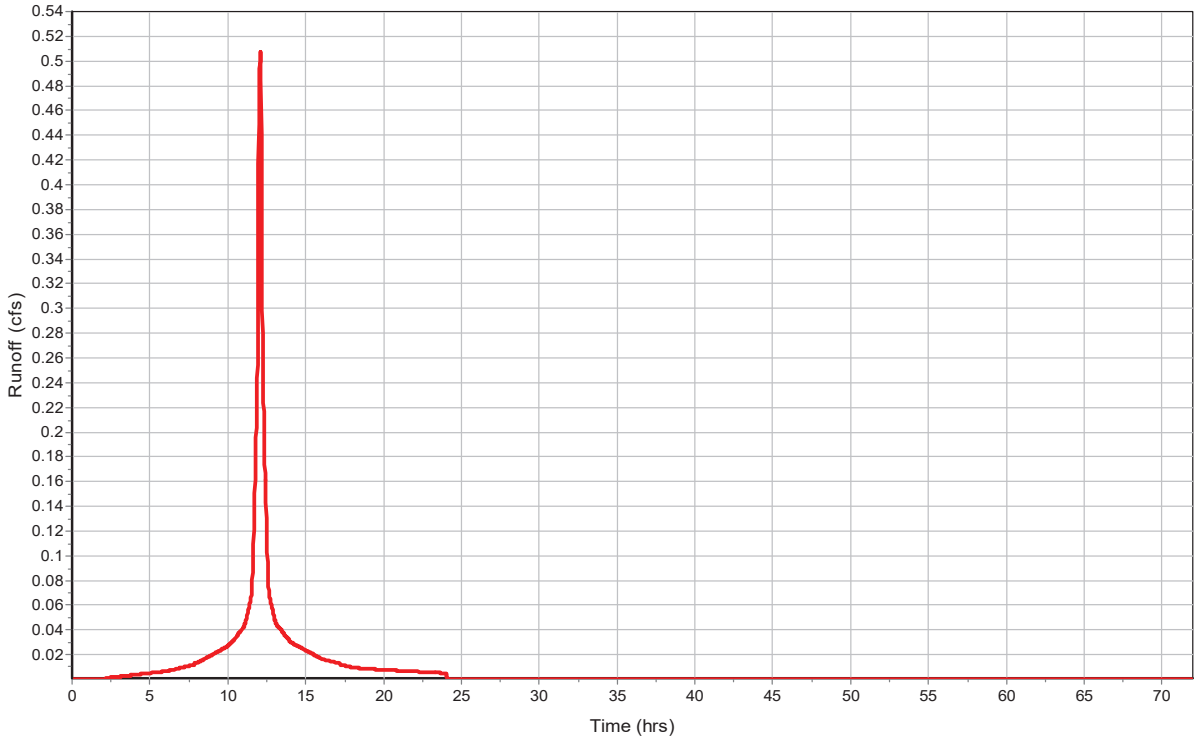
Total Rainfall (in) 2.9
Total Runoff (in) 2.67
Peak Runoff (cfs) 0.51
Weighted Curve Number 98
Time of Concentration (days hh:mm:ss) 0 00:06:00

Subbasin : CB-25-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-27-DA

Input Data

Area (ac)	0.06
Peak Rate Factor	484
Weighted Curve Number	97
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.06	-	97
Composite Area & Weighted CN	0.06		97

Time of Concentration

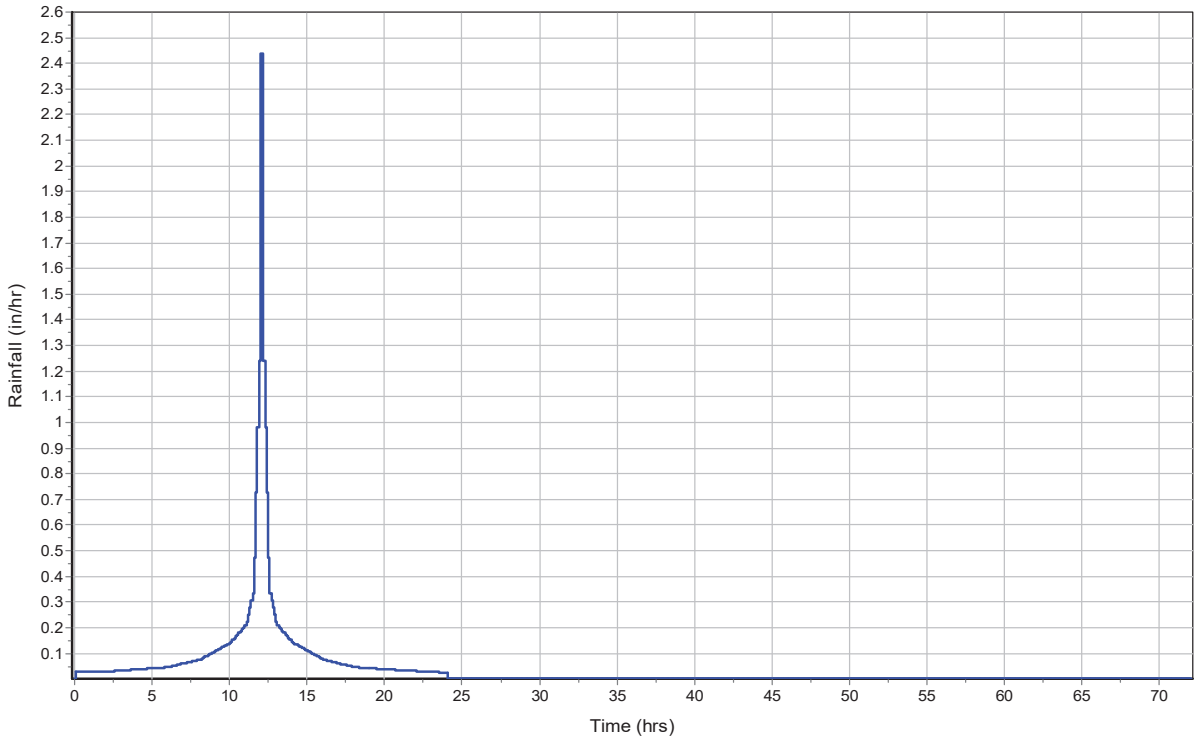
User-Defined TOC override (minutes): 6

Subbasin Runoff Results

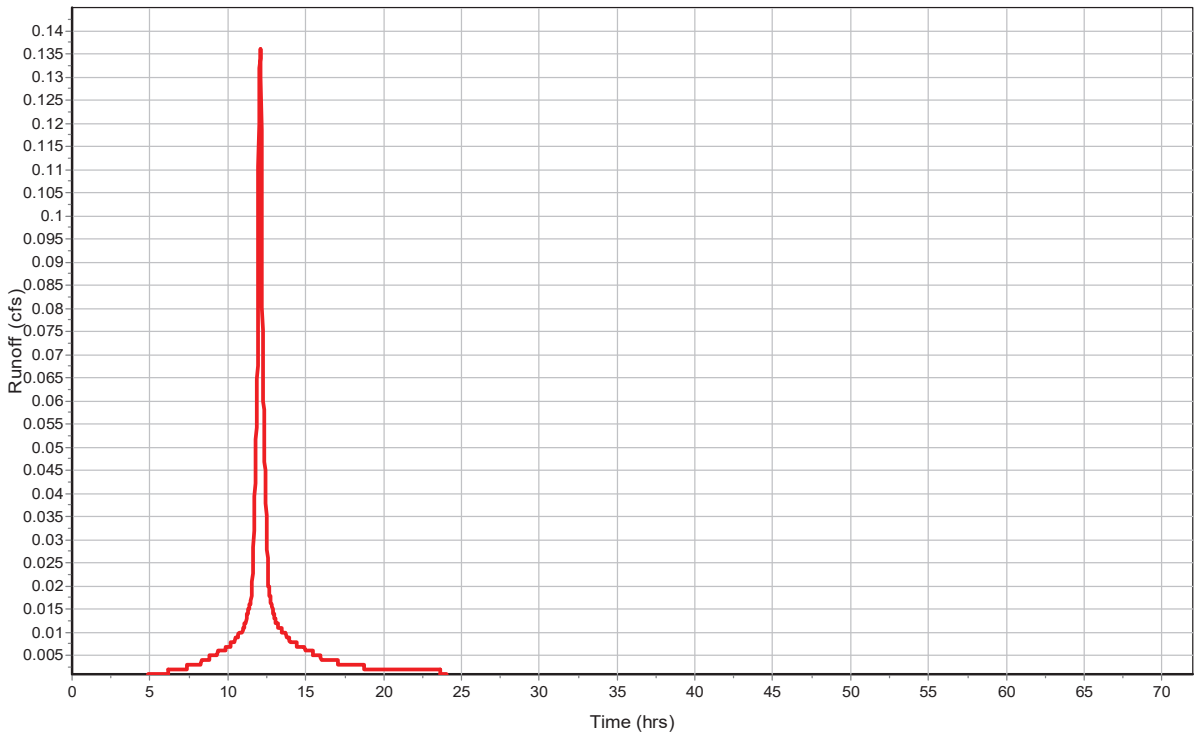
Total Rainfall (in)	2.9
Total Runoff (in)	2.54
Peak Runoff (cfs)	0.14
Weighted Curve Number	97
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : CB-27-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-28-DA

Input Data

Area (ac)	0.17
Peak Rate Factor	484
Weighted Curve Number	95
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.17	-	95
Composite Area & Weighted CN	0.17		95

Time of Concentration

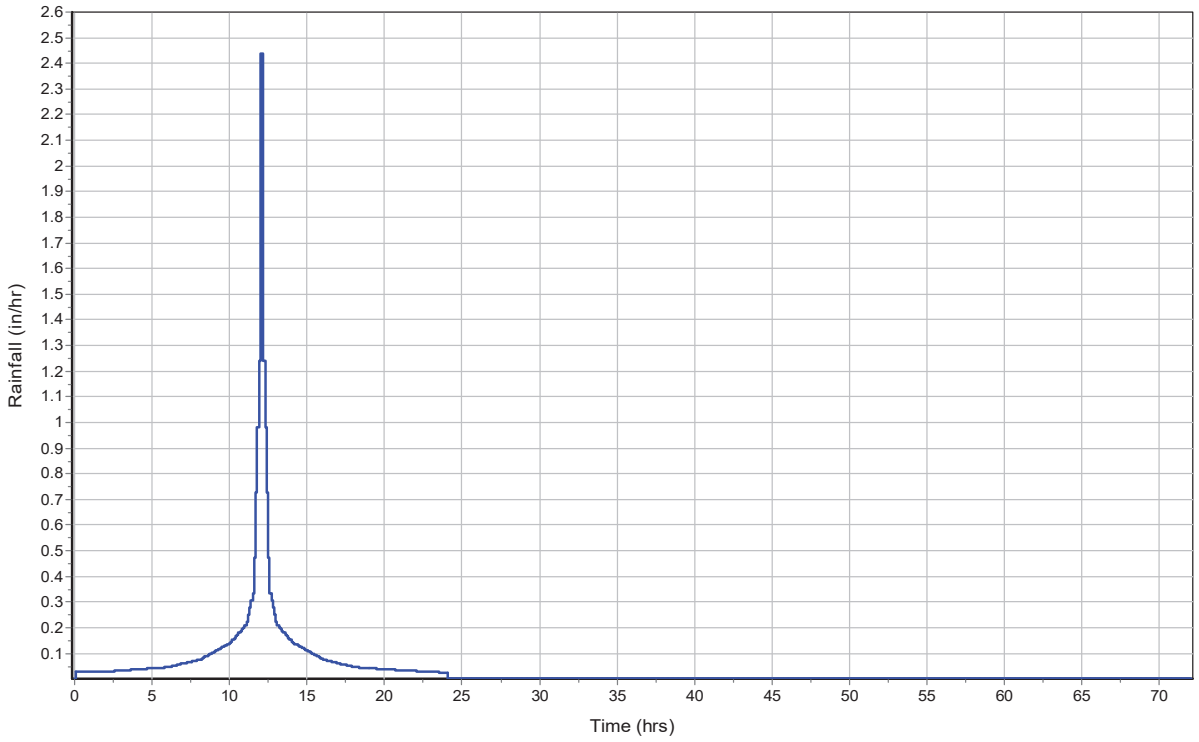
User-Defined TOC override (minutes): 6

Subbasin Runoff Results

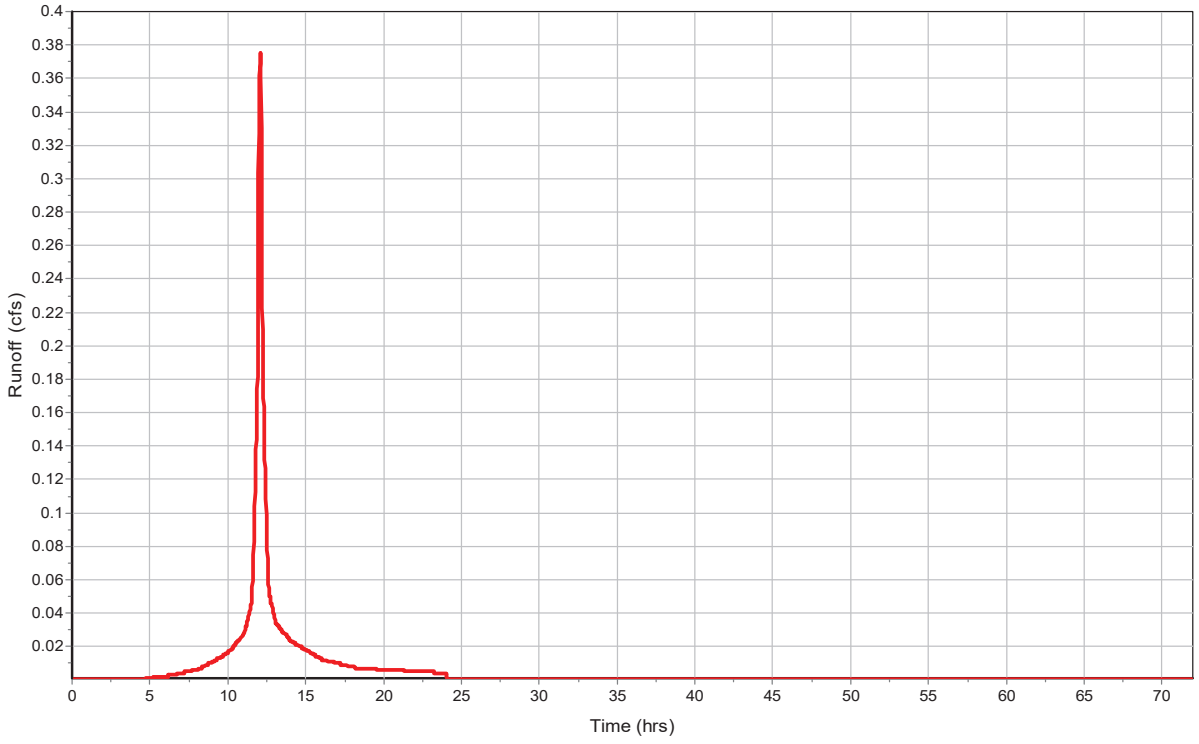
Total Rainfall (in)	2.9
Total Runoff (in)	2.35
Peak Runoff (cfs)	0.38
Weighted Curve Number	95
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : CB-28-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-29-DA

Input Data

Area (ac)	0.2
Peak Rate Factor	484
Weighted Curve Number	98
Rain Gage ID	*

Composite Curve Number

Soil/Surface Description	32 Area (acres)	Soil Group	Curve Number
-	0.2	-	98
Composite Area & Weighted CN	0.2		98

Time of Concentration

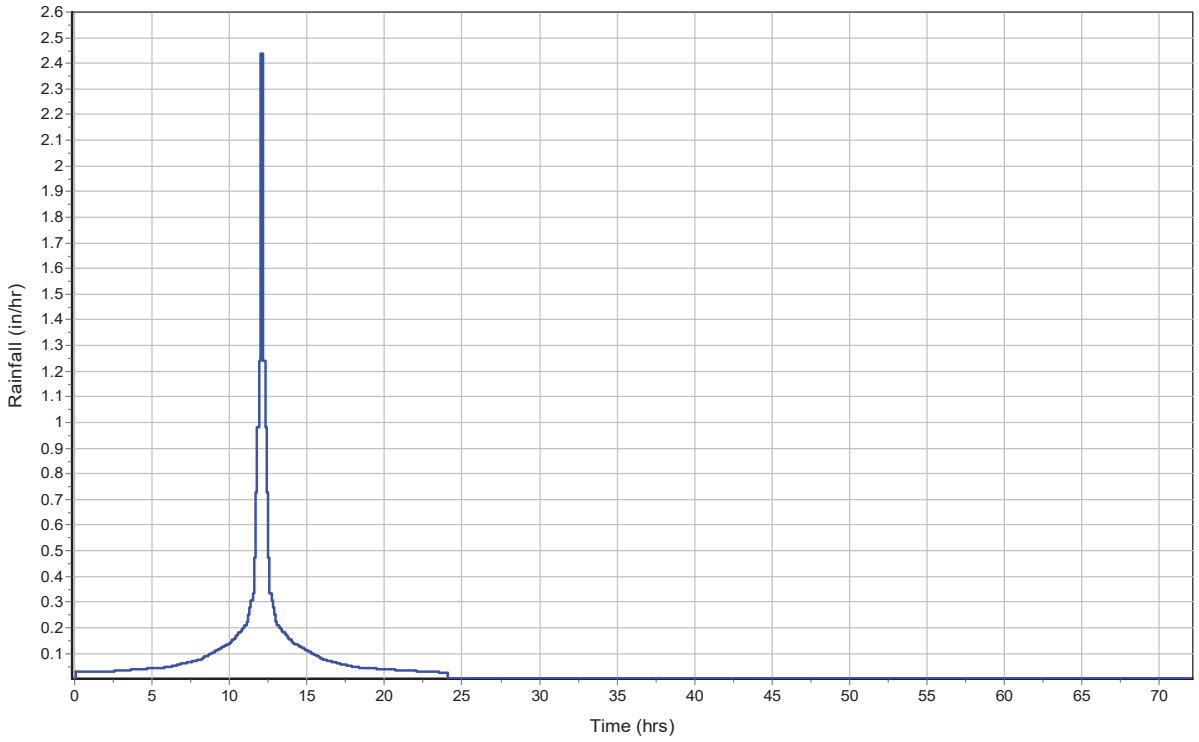
User-Defined TOC override (minutes): 6

Subbasin Runoff Results

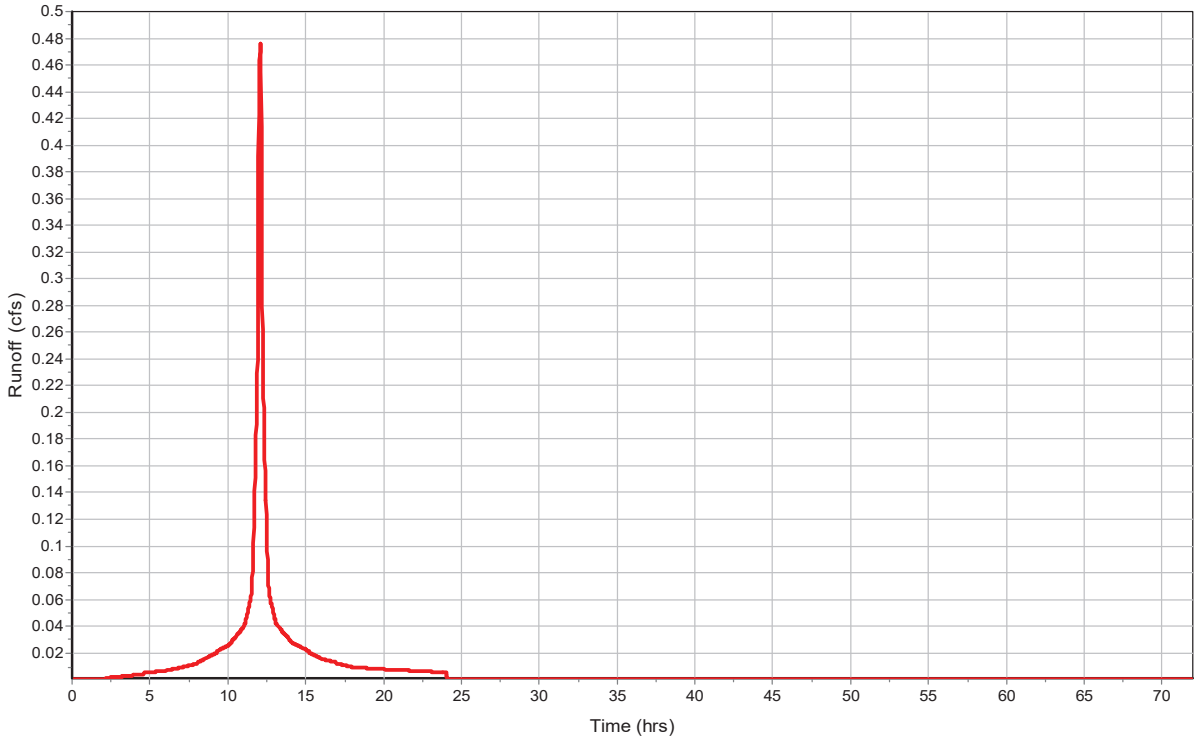
Total Rainfall (in)	2.9
Total Runoff (in)	2.67
Peak Runoff (cfs)	0.48
Weighted Curve Number	98
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : CB-29-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-31-DA

Input Data

Area (ac)	0.09
Peak Rate Factor	484
Weighted Curve Number	93
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.09	-	93
Composite Area & Weighted CN	0.09		93

Time of Concentration

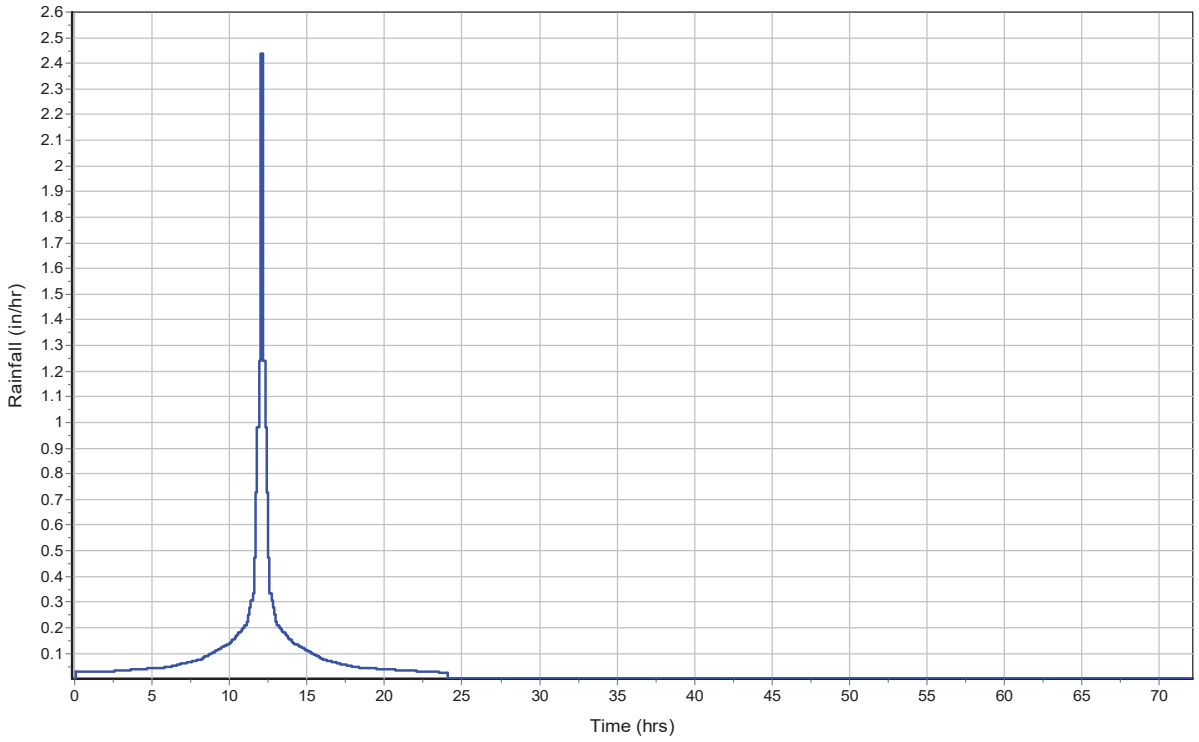
User-Defined TOC override (minutes): 6

Subbasin Runoff Results

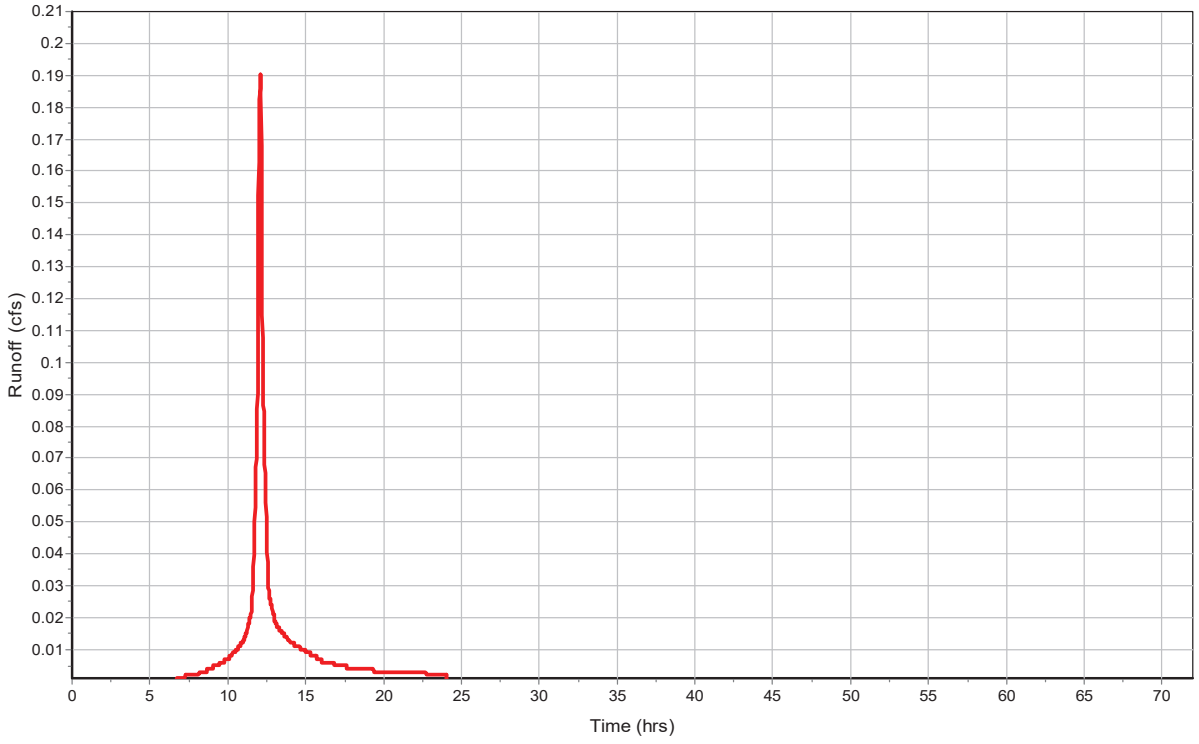
Total Rainfall (in)	2.9
Total Runoff (in)	2.15
Peak Runoff (cfs)	0.19
Weighted Curve Number	93
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : CB-31-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-32-DA

Input Data

Area (ac)	0.88
Peak Rate Factor	484
Weighted Curve Number	50
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.88	-	50
Composite Area & Weighted CN	0.88		50

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	50	0	0
Slope (%) :	6	0	0
2 yr, 24 hr Rainfall (in) :	2.9	0	0
Velocity (ft/sec) :	0.1	0	0
Computed Flow Time (min) :	8.35	0	0

Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.027	0	0
Flow Length (ft) :	252	0	0
Channel Slope (%) :	5.5	0	0
Cross Section Area (ft^2) :	2.7	0	0
Wetted Perimeter (ft) :	0.7	0	0
Velocity (ft/sec) :	31.83	0	0
Computed Flow Time (min) :	0.13	0	0

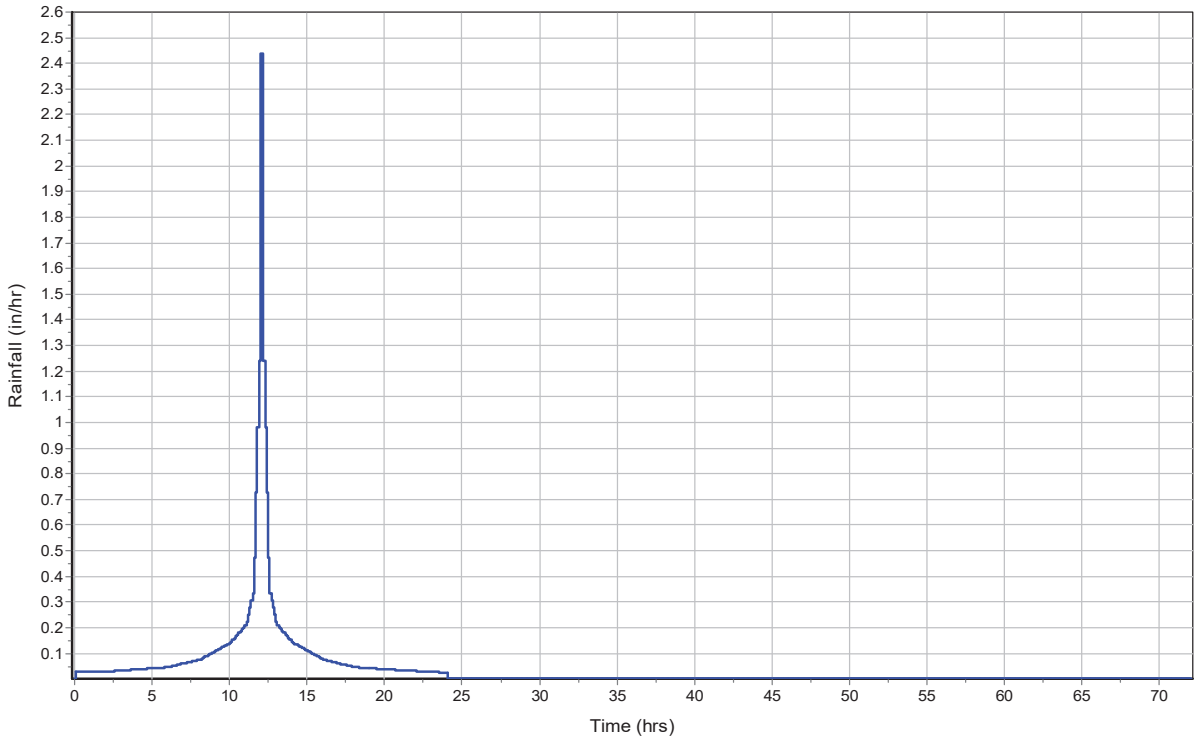
Total TOC (min) 8.48

Subbasin Runoff Results

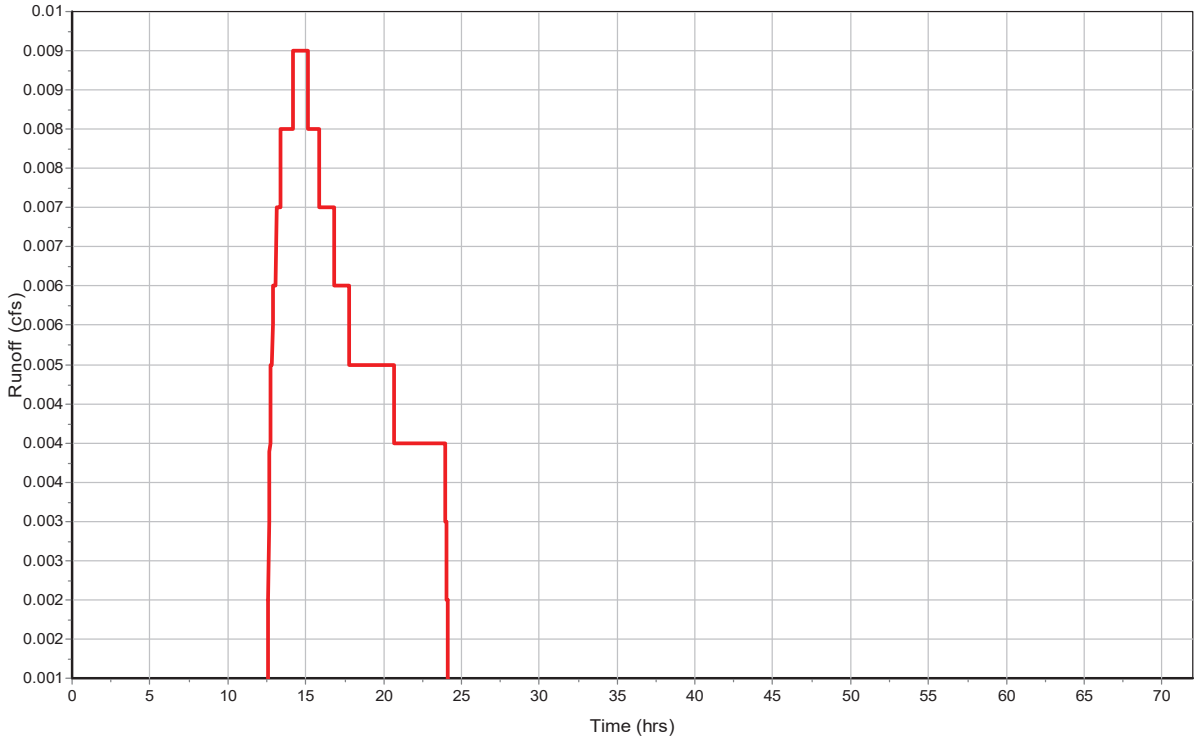
Total Rainfall (in)	2.9
Total Runoff (in)	0.07
Peak Runoff (cfs)	0.01
Weighted Curve Number	50
Time of Concentration (days hh:mm:ss)	0 00:08:29

Subbasin : CB-32-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-33A-DA

Input Data

Area (ac)	0.07
Peak Rate Factor	484
Weighted Curve Number	39
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.07	-	39
Composite Area & Weighted CN	0.07		39

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	50	0	0
Slope (%) :	5.5	0	0
2 yr, 24 hr Rainfall (in) :	2.9	0	0
Velocity (ft/sec) :	0.1	0	0
Computed Flow Time (min) :	8.64	0	0

Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.027	0	0
Flow Length (ft) :	120	0	0
Channel Slope (%) :	5.2	0	0
Cross Section Area (ft^2) :	2.4	0	0
Wetted Perimeter (ft) :	0.8	0	0
Velocity (ft/sec) :	26.18	0	0
Computed Flow Time (min) :	0.08	0	0

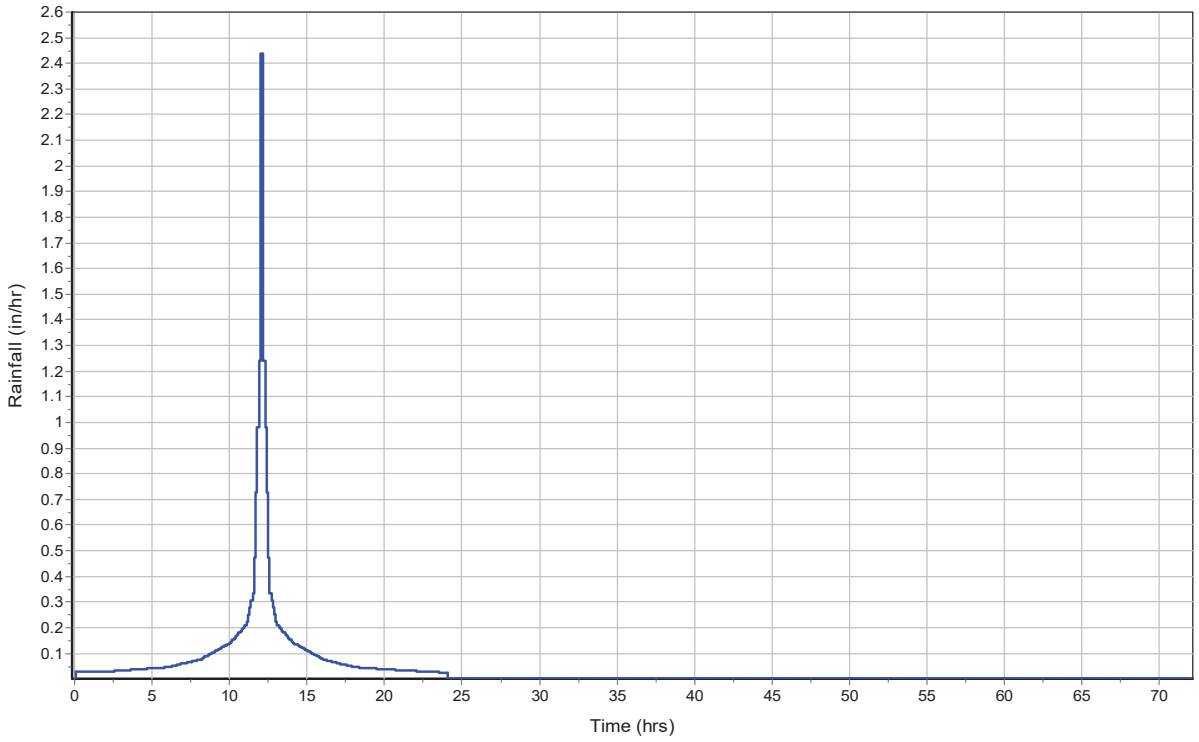
Total TOC (min) 8.72

Subbasin Runoff Results

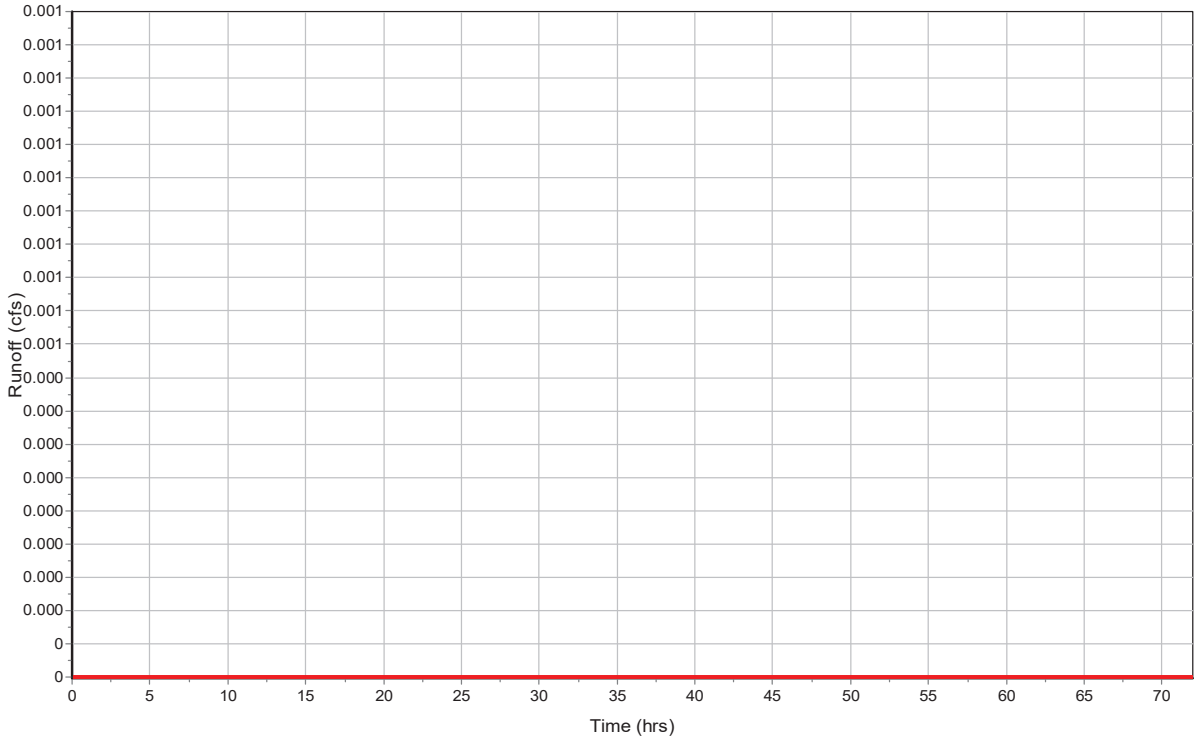
Total Rainfall (in)	2.9
Total Runoff (in)	0
Peak Runoff (cfs)	0
Weighted Curve Number	39
Time of Concentration (days hh:mm:ss)	0 00:08:43

Subbasin : CB-33A-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-37-DA

Input Data

Area (ac)	0.06
Peak Rate Factor	484
Weighted Curve Number	92
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.06	-	92
Composite Area & Weighted CN	0.06		92

Time of Concentration

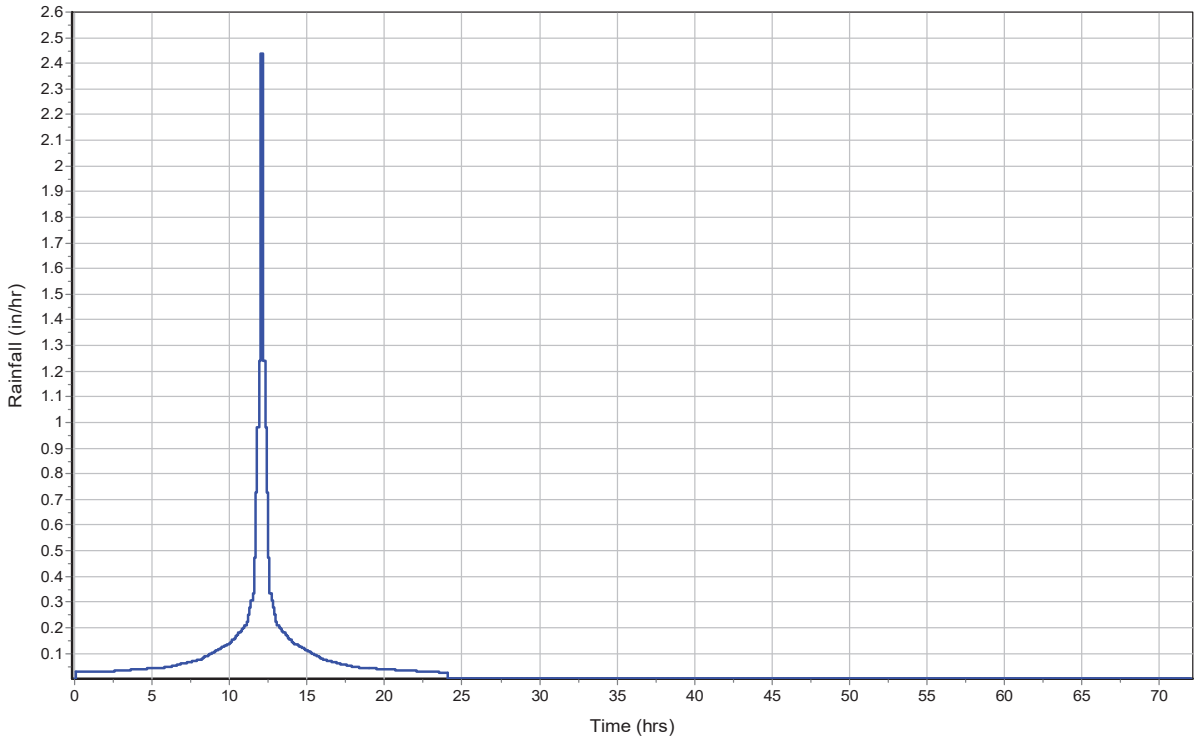
User-Defined TOC override (minutes): 6

Subbasin Runoff Results

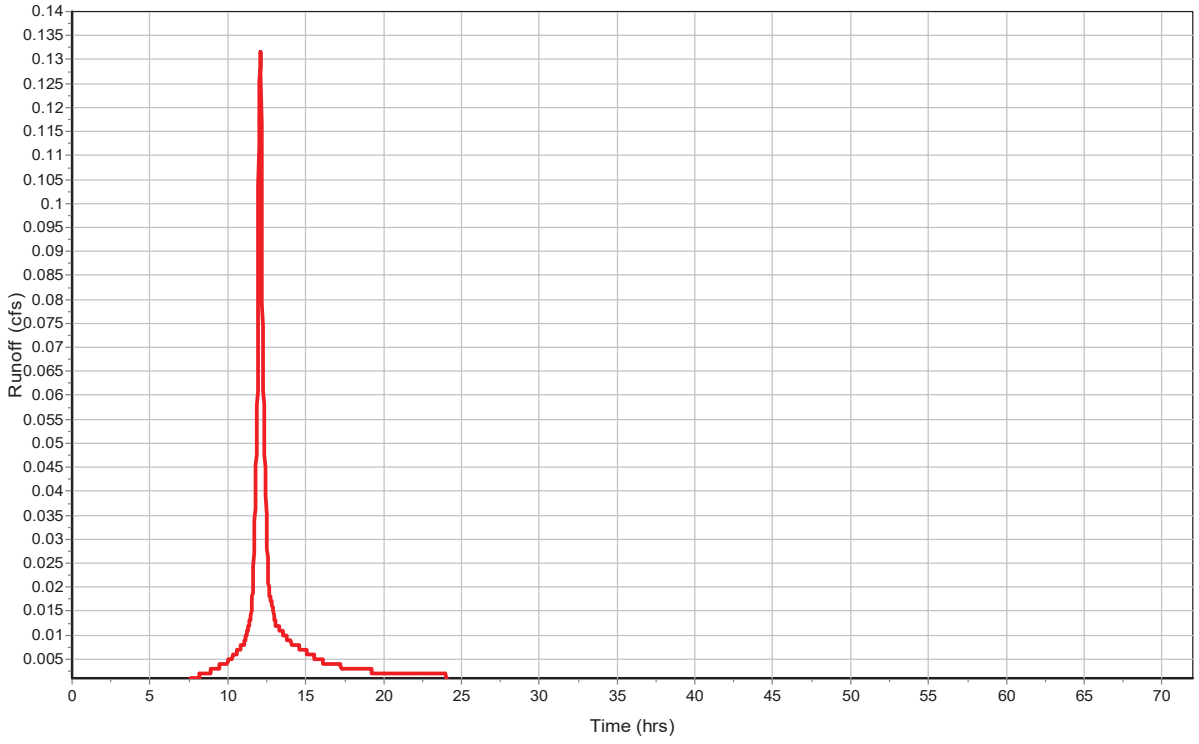
Total Rainfall (in)	2.9
Total Runoff (in)	2.05
Peak Runoff (cfs)	0.13
Weighted Curve Number	92
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : CB-37-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-39-DA

Input Data

Area (ac)	0.25
Peak Rate Factor	484
Weighted Curve Number	61
Rain Gage ID	*

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	0.25	-	61
Composite Area & Weighted CN	0.25		61

Time of Concentration

	Subarea	Subarea	Subarea
Sheet Flow Computations	A	B	C
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	50	0	0
Slope (%) :	5	0	0
2 yr, 24 hr Rainfall (in) :	2.9	0	0
Velocity (ft/sec) :	0.09	0	0
Computed Flow Time (min) :	8.98	0	0

	Subarea	Subarea	Subarea
Shallow Concentrated Flow Computations	A	B	C
Flow Length (ft) :	30	0	0
Slope (%) :	5	0	0
Surface Type :	Grass pasture	Unpaved	Unpaved
Velocity (ft/sec) :	1.57	0	0
Computed Flow Time (min) :	0.32	0	0

	Subarea	Subarea	Subarea
Channel Flow Computations	A	B	C
Manning's Roughness :	0.013	0	0
Flow Length (ft) :	76	0	0
Channel Slope (%) :	1	0	0
Cross Section Area (ft^2) :	0.6	0	0
Wetted Perimeter (ft) :	0.2	0	0
Velocity (ft/sec) :	23.84	0	0
Computed Flow Time (min) :	0.05	0	0

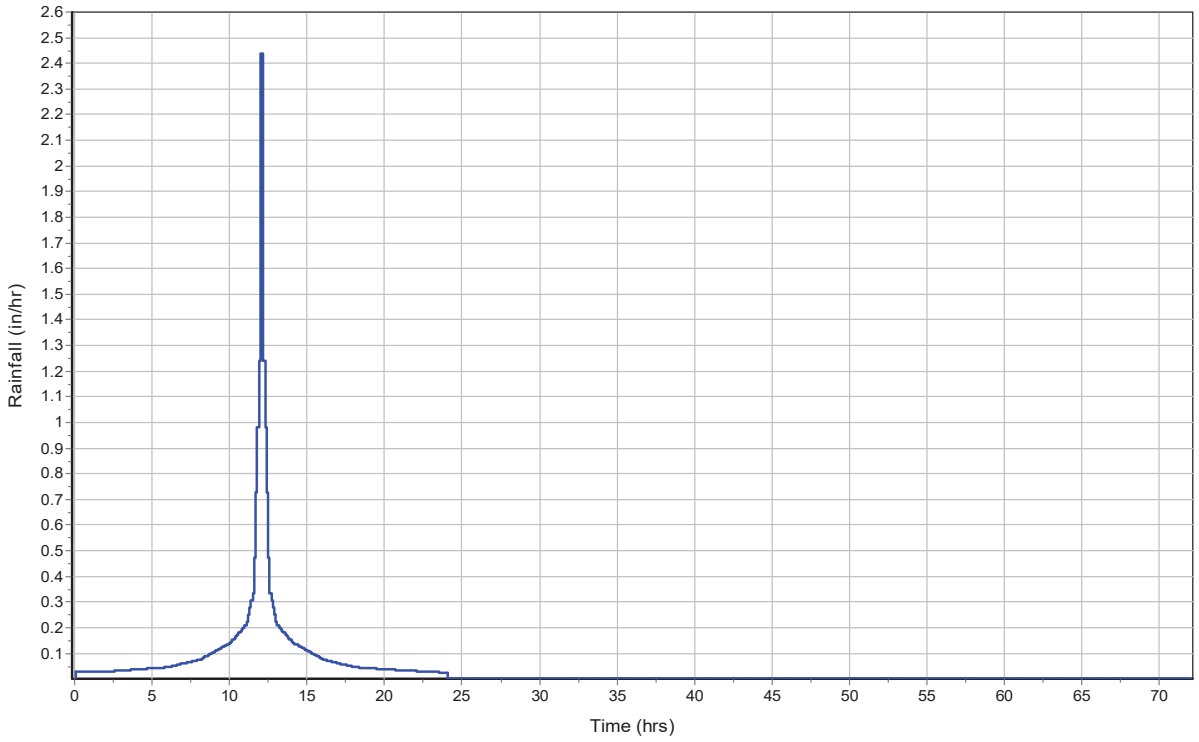
Total TOC (min) 9.35

Subbasin Runoff Results

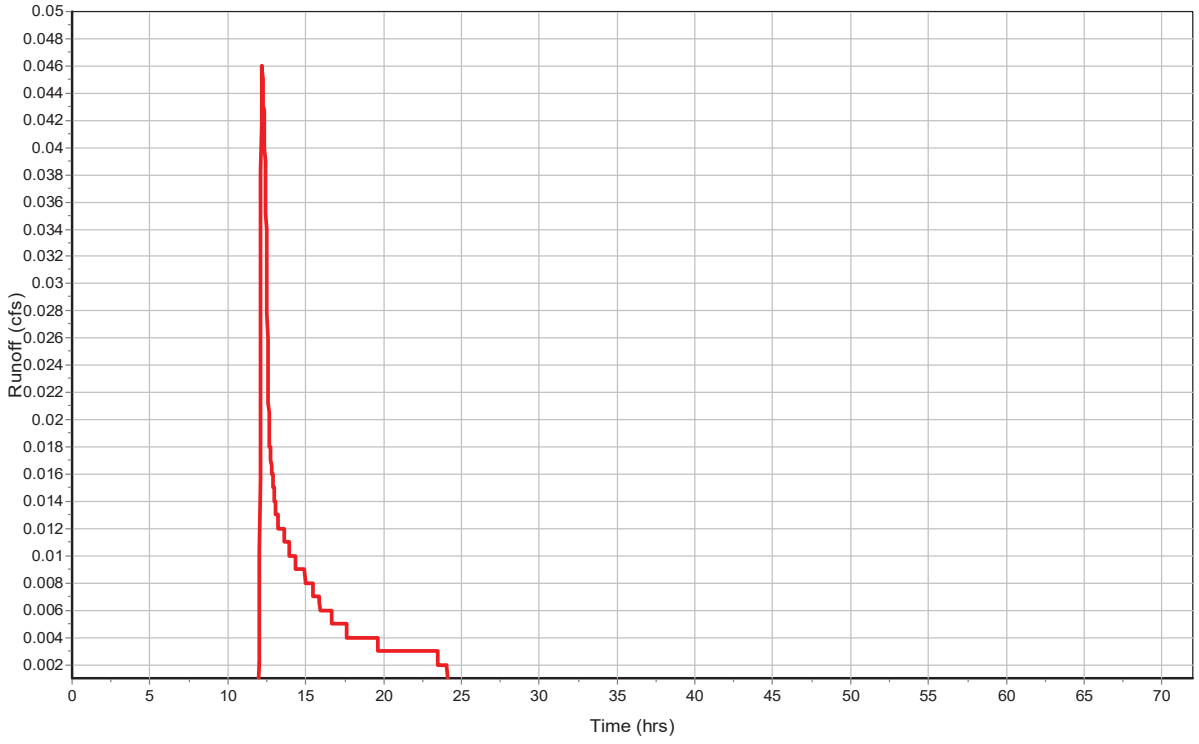
Total Rainfall (in)	2.9
Total Runoff (in)	0.33
Peak Runoff (cfs)	0.05
Weighted Curve Number	61
Time of Concentration (days hh:mm:ss)	0 00:09:21

Subbasin : CB-39-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-3-DA

Input Data

Area (ac)	0.06
Peak Rate Factor	484
Weighted Curve Number	98
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.06	-	98
Composite Area & Weighted CN	0.06		98

Time of Concentration

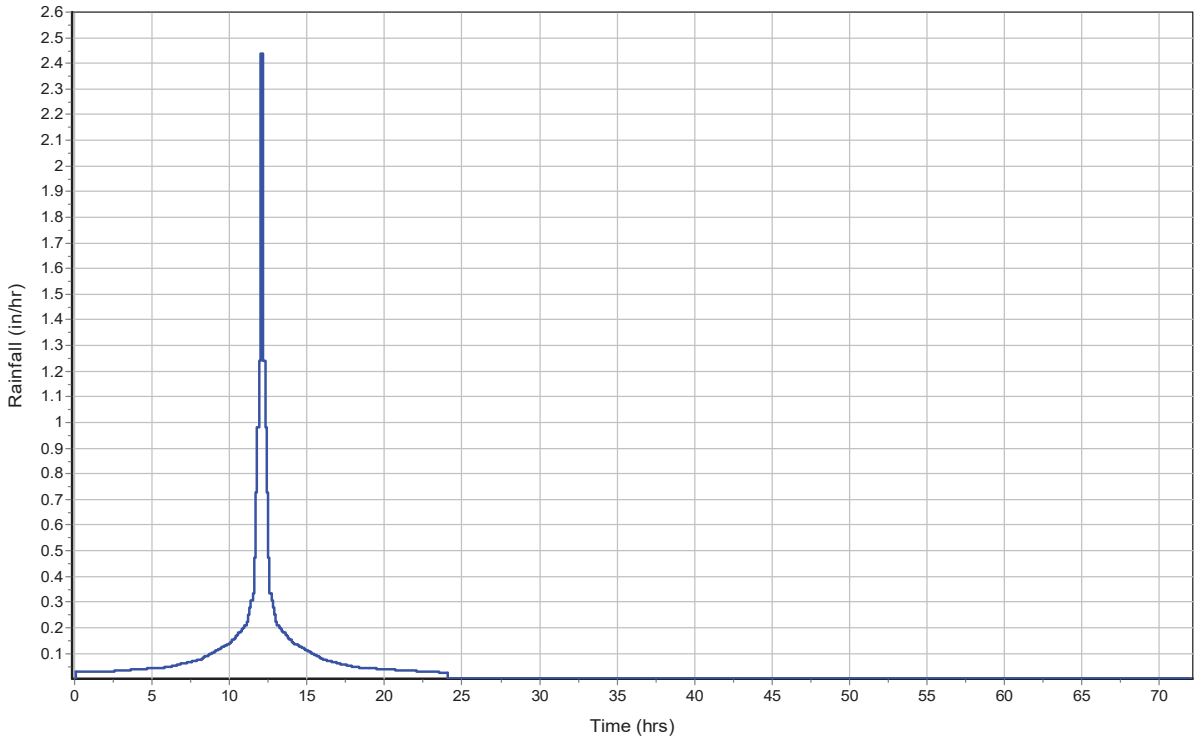
User-Defined TOC override (minutes): 6.00

Subbasin Runoff Results

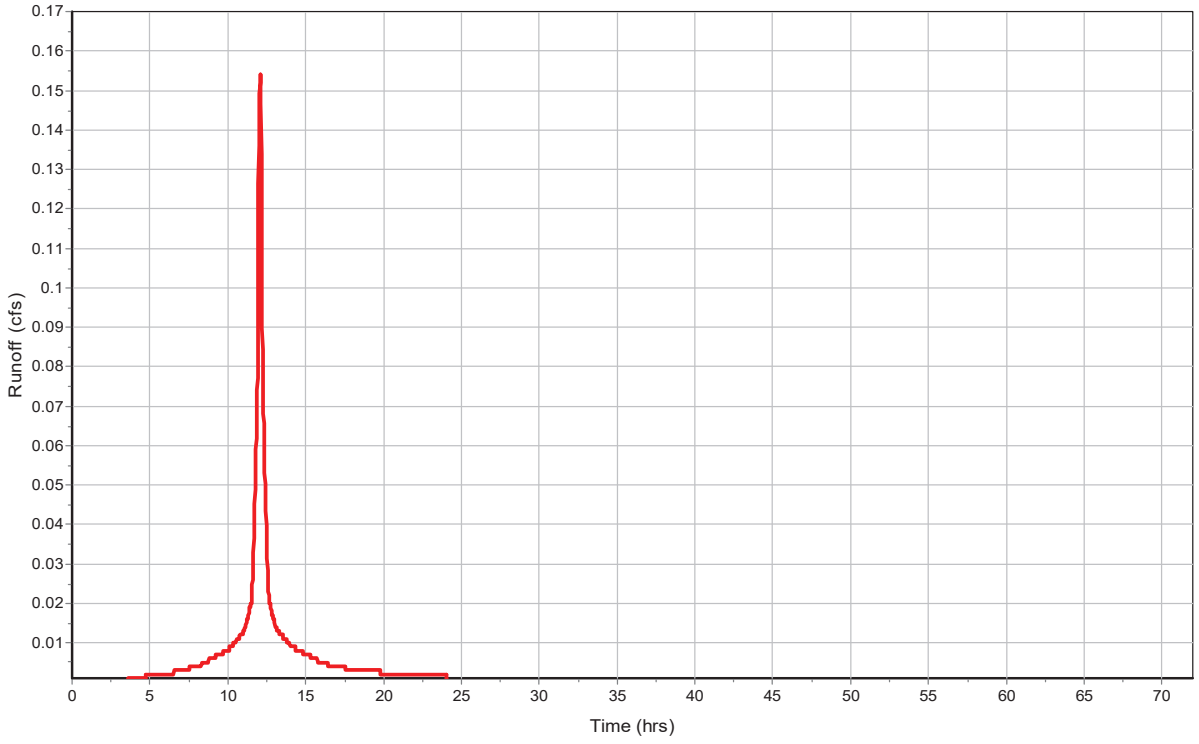
Total Rainfall (in)	2.9
Total Runoff (in)	2.65
Peak Runoff (cfs)	0.15
Weighted Curve Number	98
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : CB-3-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-42-DA

Input Data

Area (ac)	0.17
Peak Rate Factor	484
Weighted Curve Number	97
Rain Gage ID	*

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.17	-	97
Composite Area & Weighted CN	0.17		97

Time of Concentration

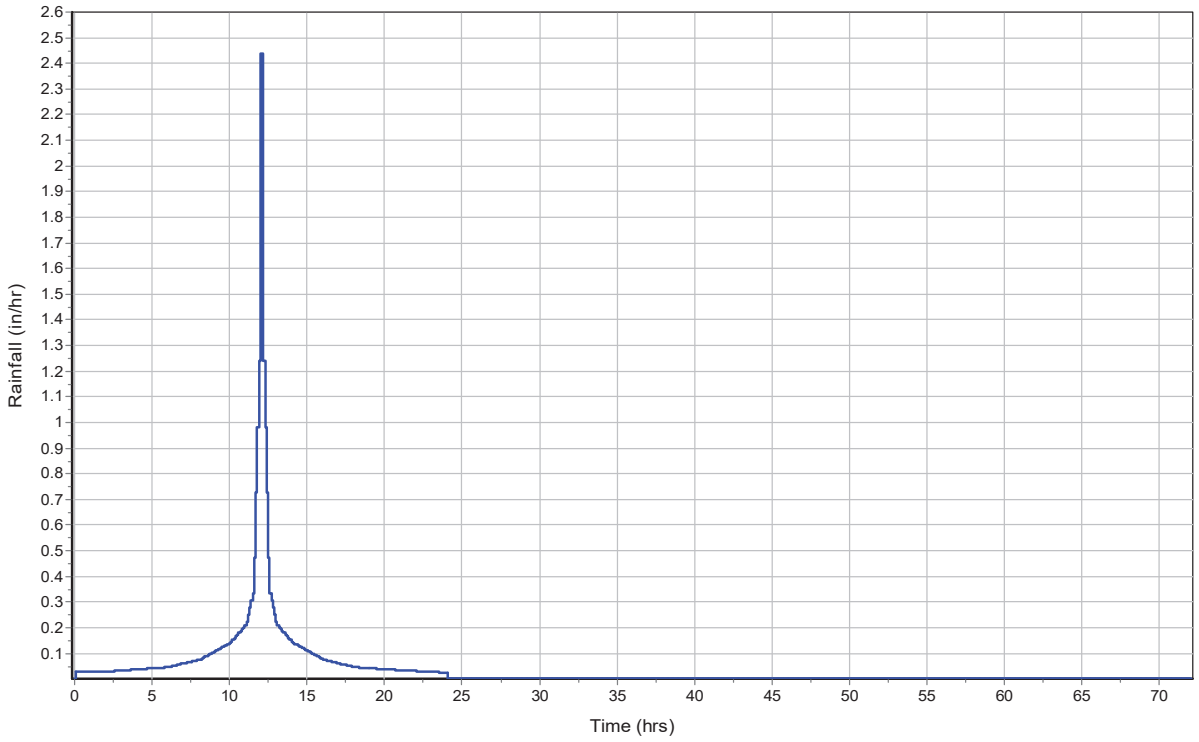
User-Defined TOC override (minutes): 6

Subbasin Runoff Results

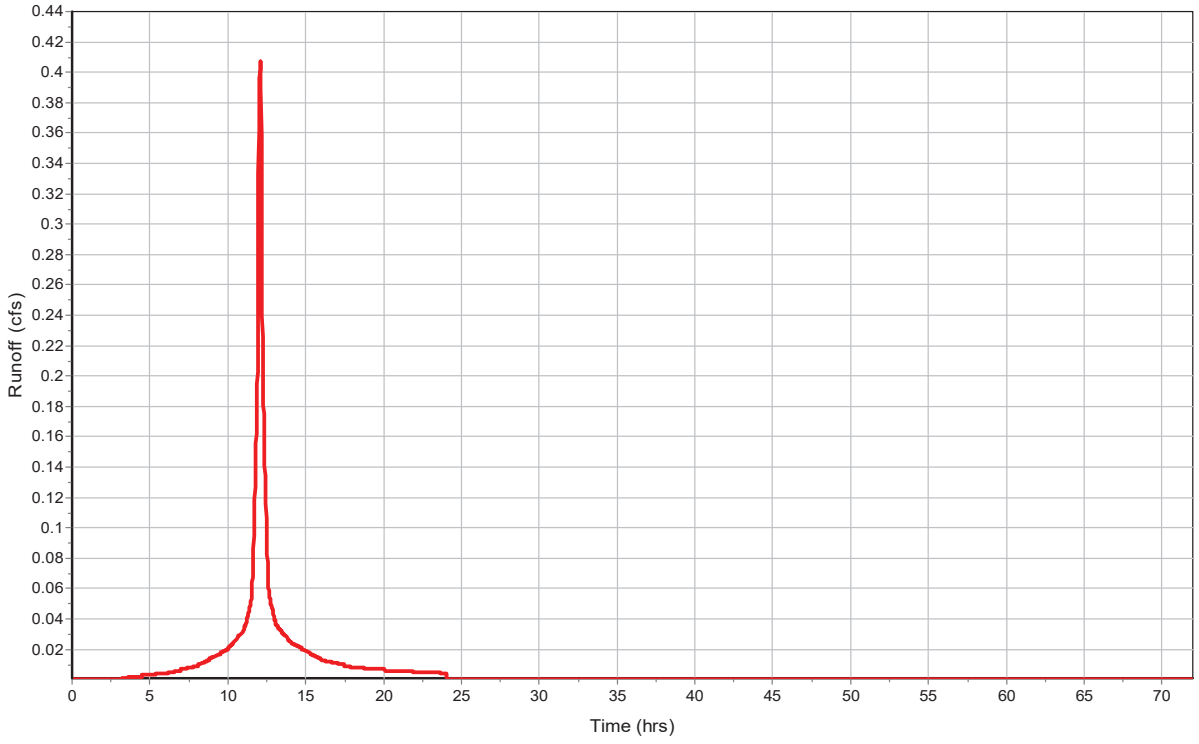
Total Rainfall (in)	2.9
Total Runoff (in)	2.56
Peak Runoff (cfs)	0.41
Weighted Curve Number	97
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : CB-42-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-44-DA

Input Data

Area (ac)	0.75
Peak Rate Factor	484
Weighted Curve Number	54
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.75	-	54
Composite Area & Weighted CN	0.75		54

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	50	0	0
Slope (%) :	2.5	0	0
2 yr, 24 hr Rainfall (in) :	2.9	0	0
Velocity (ft/sec) :	0.07	0	0
Computed Flow Time (min) :	11.85	0	0

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	230	0	0
Slope (%) :	3	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.79	0	0
Computed Flow Time (min) :	1.37	0	0

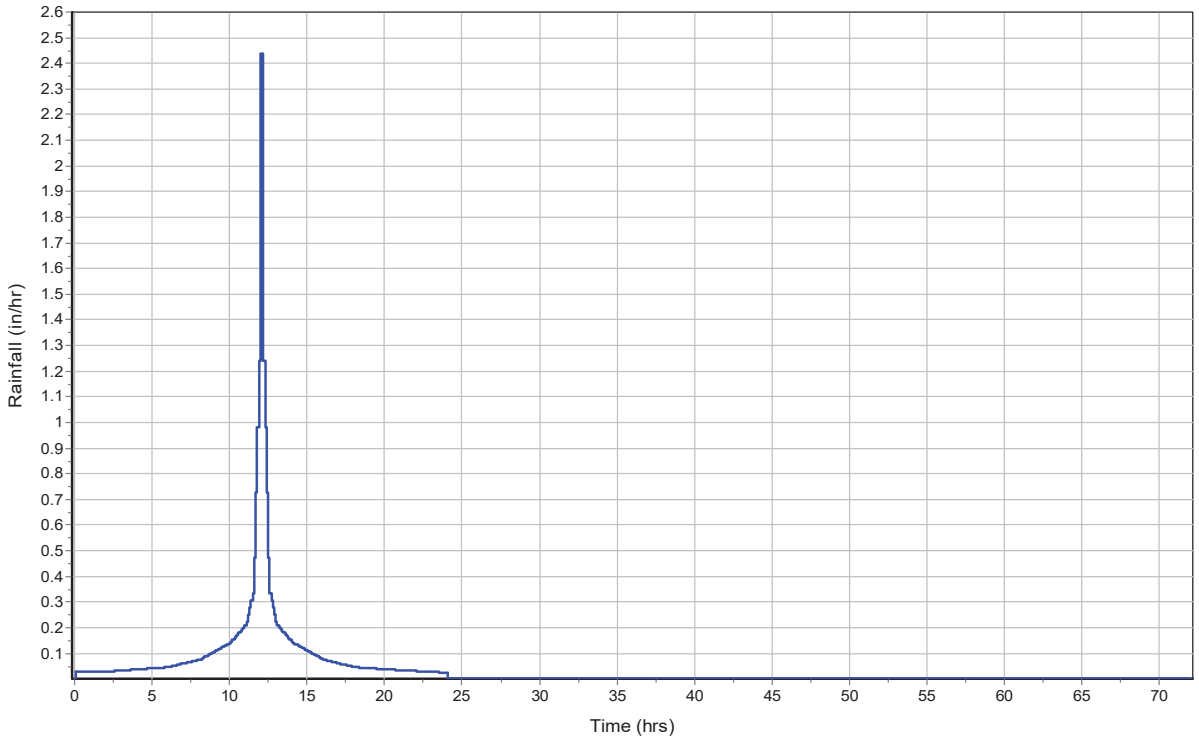
Total TOC (min) 13.22

Subbasin Runoff Results

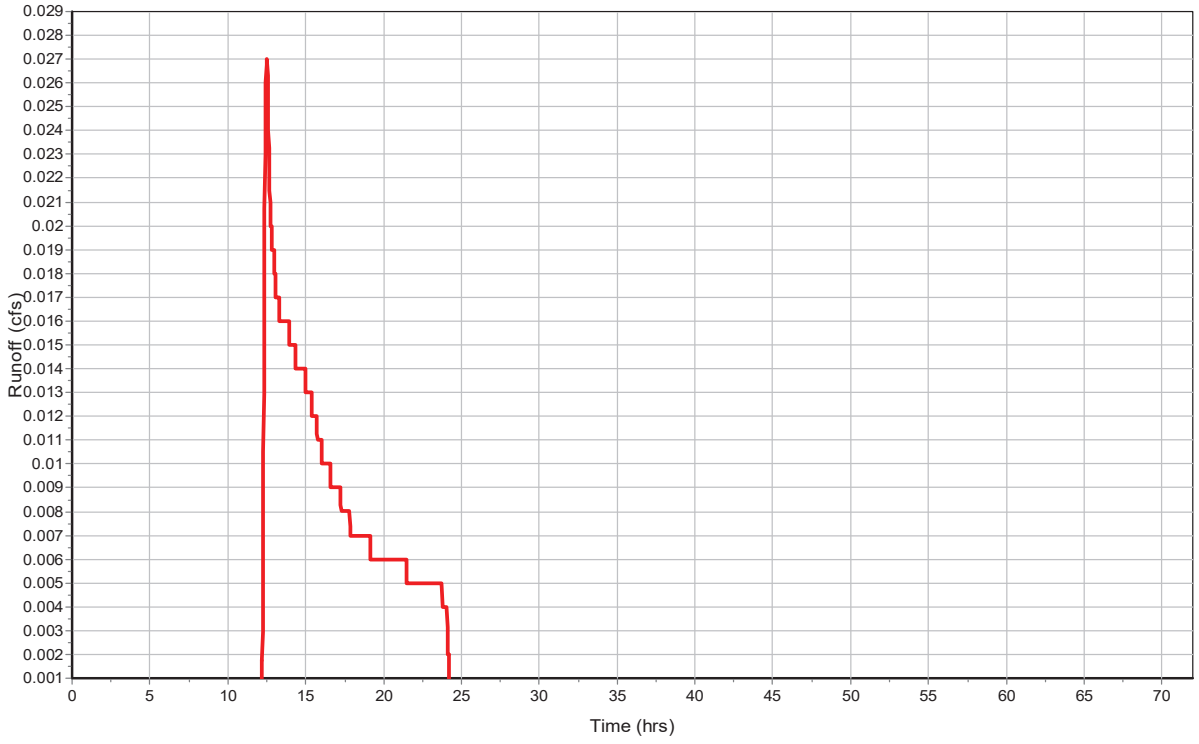
Total Rainfall (in)	2.9
Total Runoff (in)	0.15
Peak Runoff (cfs)	0.03
Weighted Curve Number	54
Time of Concentration (days hh:mm:ss)	0 00:13:13

Subbasin : CB-44-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-4-DA

Input Data

Area (ac)	0.19
Peak Rate Factor	484
Weighted Curve Number	78
Rain Gage ID	*

Composite Curve Number

Soil/Surface Description	32 Area (acres)	Soil Group	Curve Number
-	0.19	-	78
Composite Area & Weighted CN	0.19		78

Time of Concentration

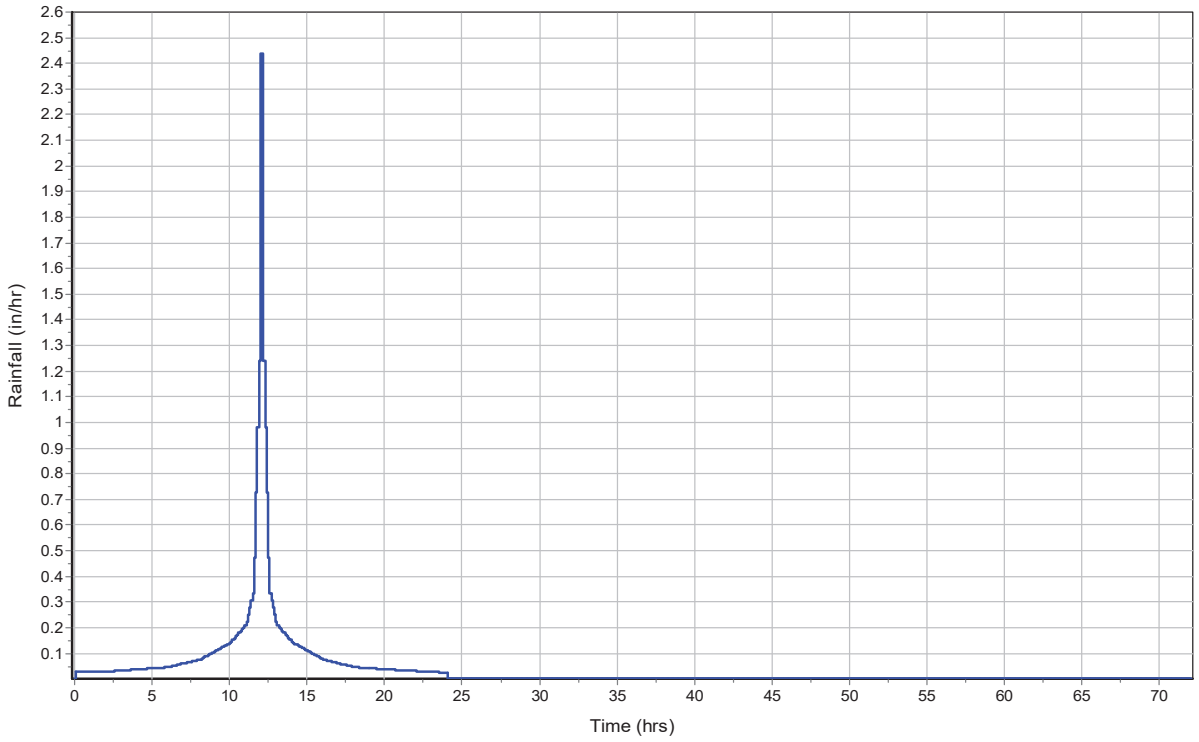
User-Defined TOC override (minutes): 6

Subbasin Runoff Results

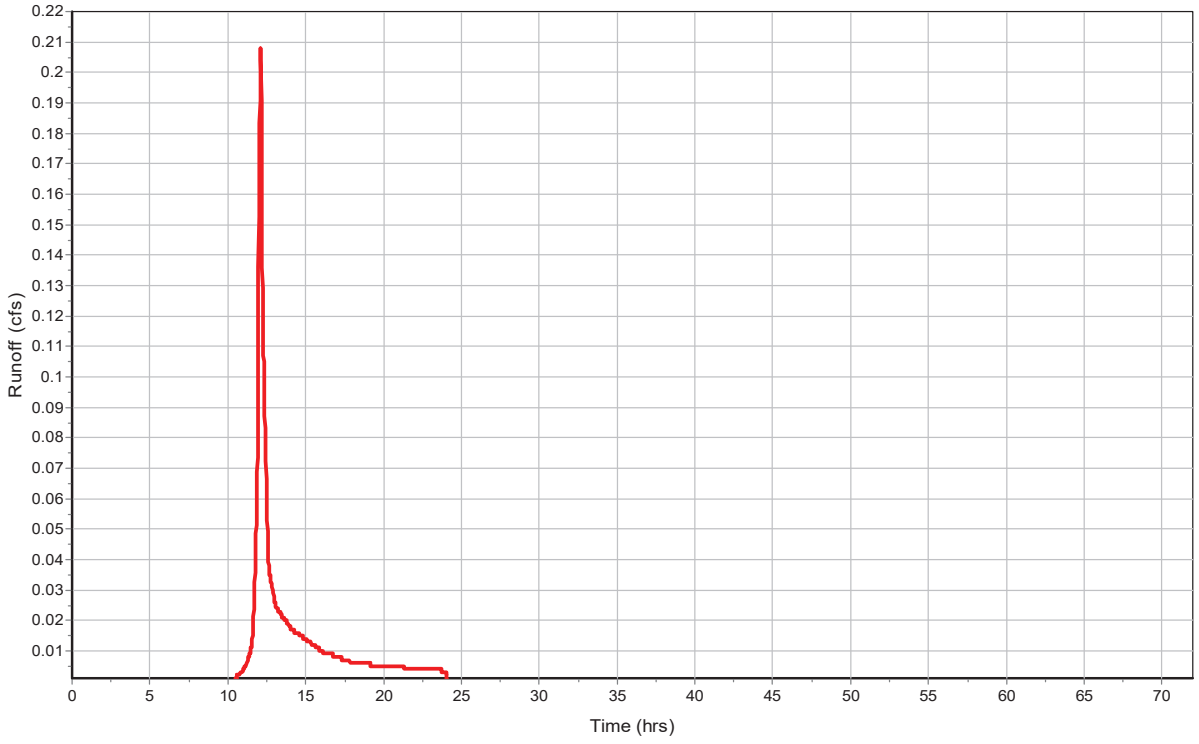
Total Rainfall (in)	2.9
Total Runoff (in)	1.06
Peak Runoff (cfs)	0.21
Weighted Curve Number	78
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : CB-4-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-7A-DA

Input Data

Area (ac)	0.14
Peak Rate Factor	484
Weighted Curve Number	98
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.14	-	98
Composite Area & Weighted CN	0.14		98

Time of Concentration

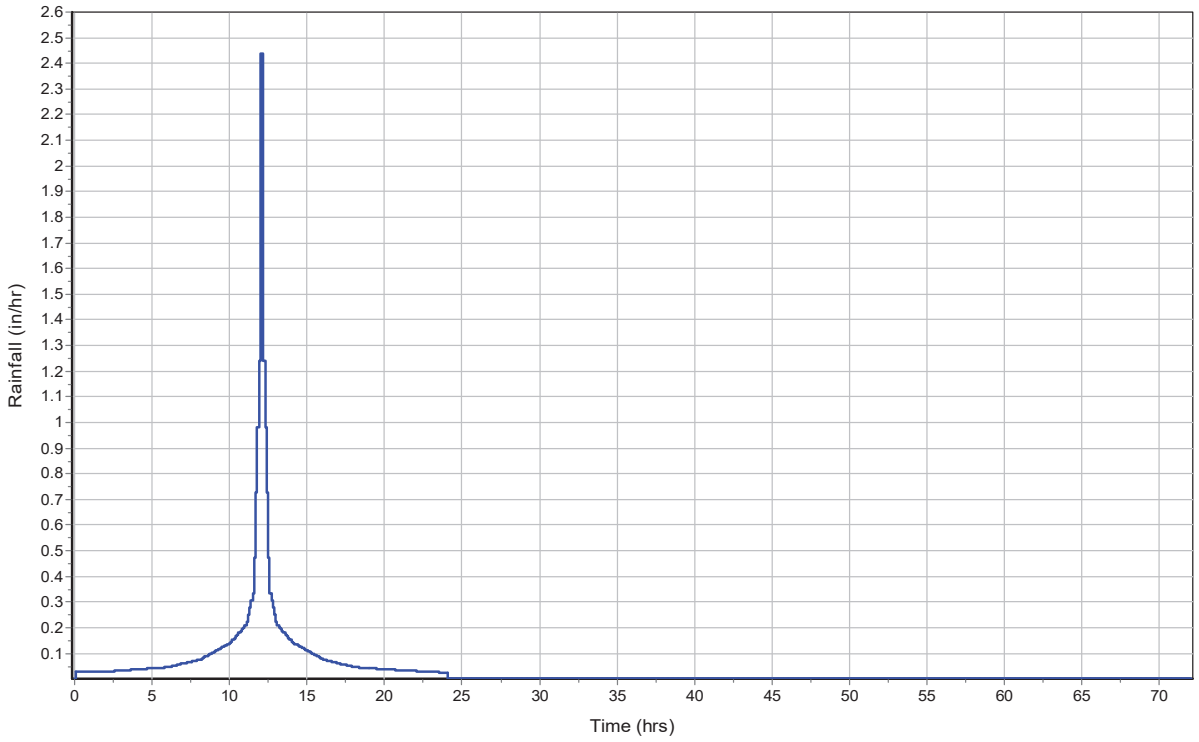
User-Defined TOC override (minutes): 6

Subbasin Runoff Results

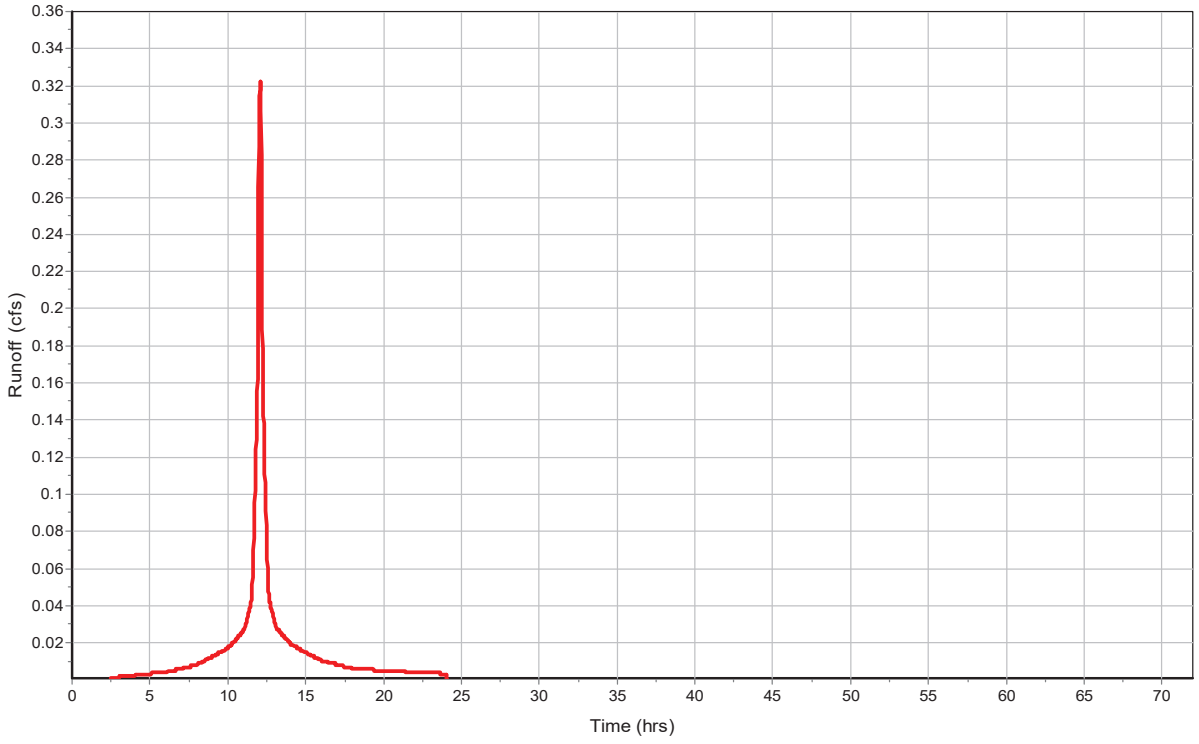
Total Rainfall (in)	2.9
Total Runoff (in)	2.67
Peak Runoff (cfs)	0.32
Weighted Curve Number	98
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : CB-7A-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-7-DA

Input Data

Area (ac)	0.09
Peak Rate Factor	484
Weighted Curve Number	98
Rain Gage ID	*

Composite Curve Number

Soil/Surface Description	32 Area (acres)	Soil Group	Curve Number
-	0.09	-	98
Composite Area & Weighted CN	0.09		98

Time of Concentration

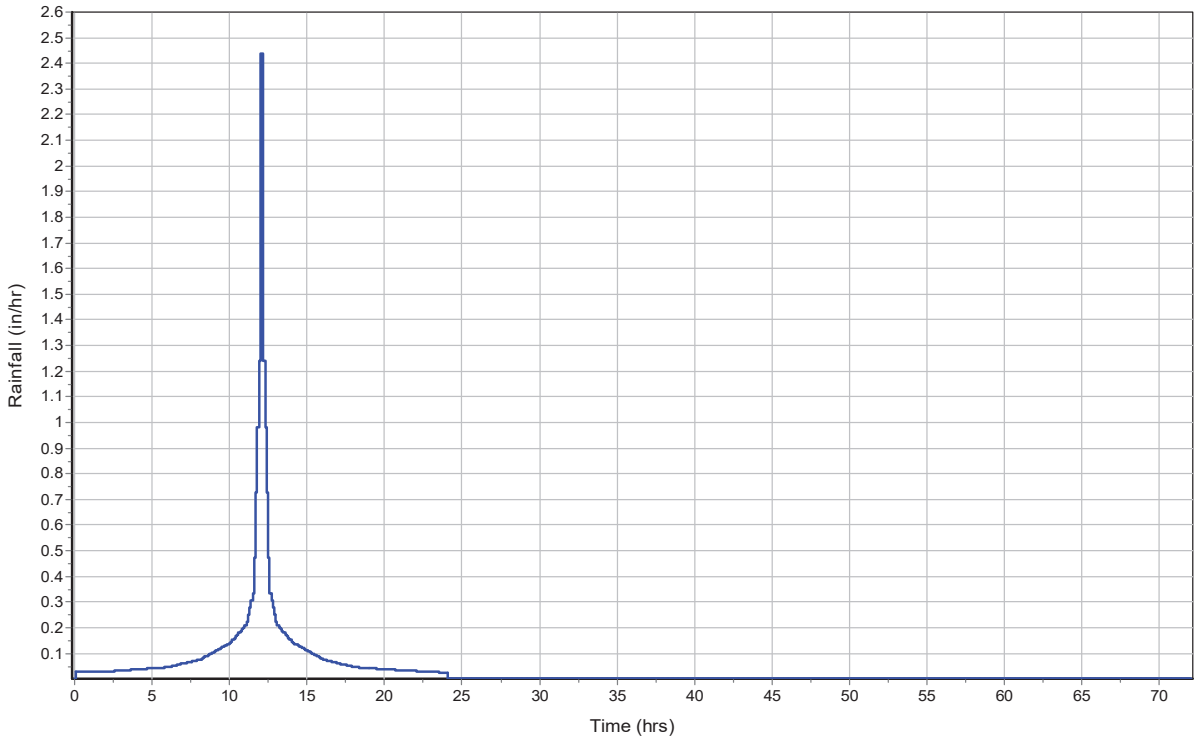
User-Defined TOC override (minutes): 6

Subbasin Runoff Results

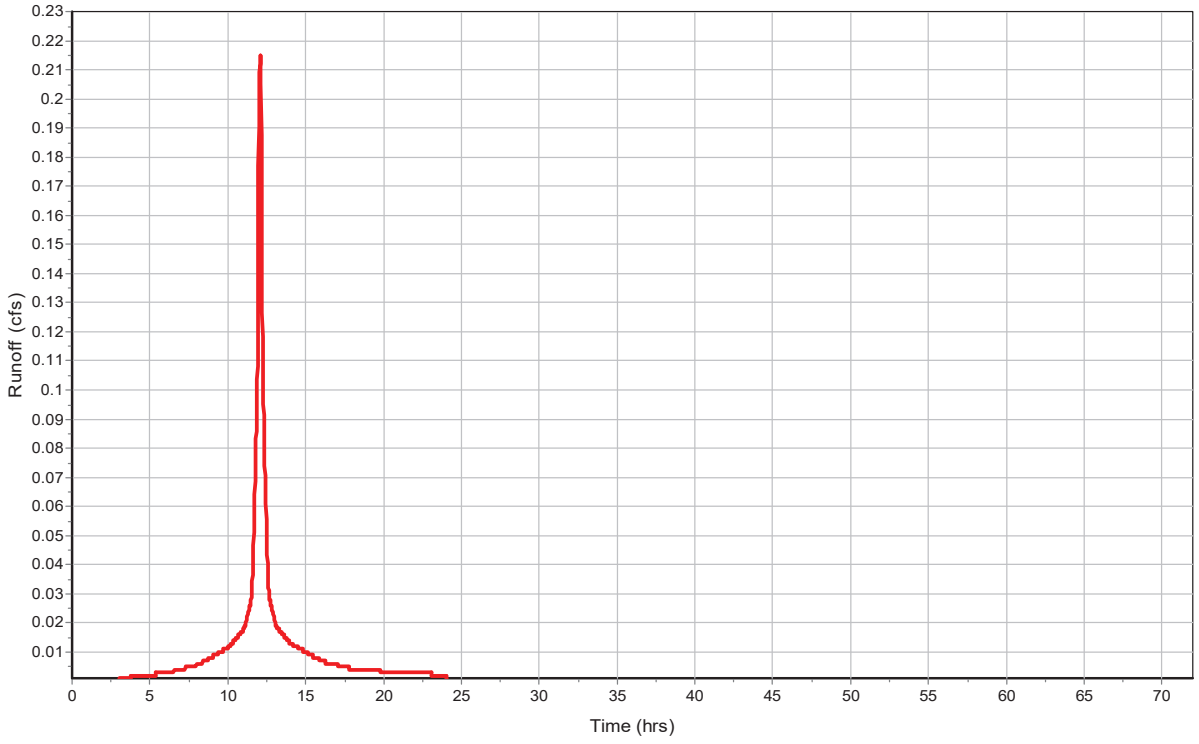
Total Rainfall (in)	2.9
Total Runoff (in)	2.66
Peak Runoff (cfs)	0.22
Weighted Curve Number	98
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : CB-7-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-8A-DA

Input Data

Area (ac)	0.23
Peak Rate Factor	484
Weighted Curve Number	91
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.23	-	91
Composite Area & Weighted CN	0.23		91

Time of Concentration

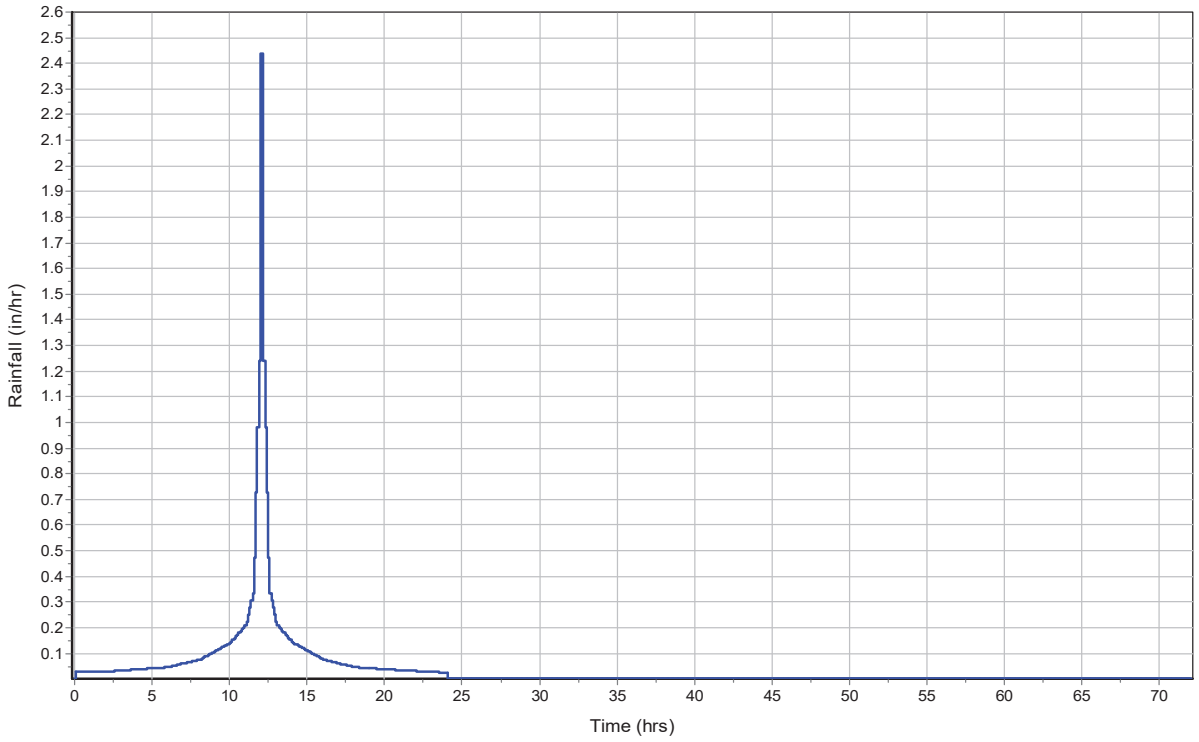
User-Defined TOC override (minutes): 6.00

Subbasin Runoff Results

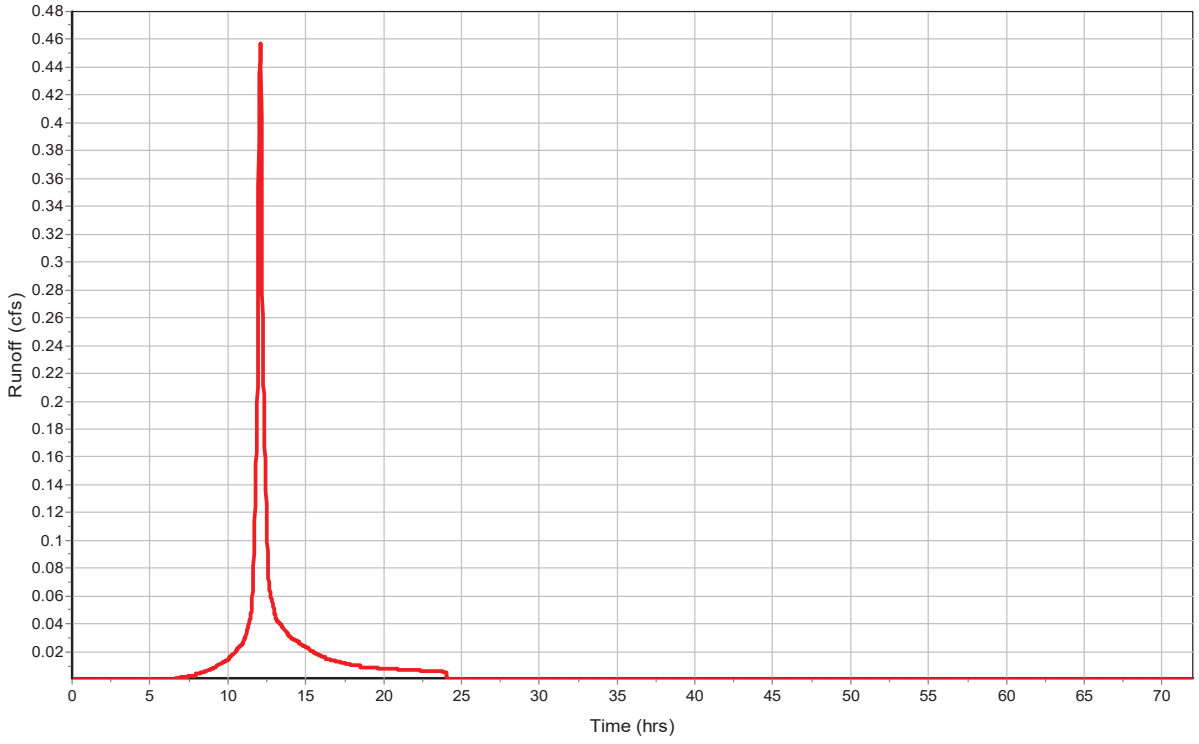
Total Rainfall (in)	2.9
Total Runoff (in)	1.98
Peak Runoff (cfs)	0.46
Weighted Curve Number	91
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : CB-8A-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : DI-1-DA

Input Data

Area (ac)	1.39
Peak Rate Factor	484
Weighted Curve Number	65
Rain Gage ID	*

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	1.39	-	65
Composite Area & Weighted CN	1.39		65

Time of Concentration

	Subarea	Subarea	Subarea
Sheet Flow Computations	A	B	C
Manning's Roughness :	0.6	0	0
Flow Length (ft) :	50	0	0
Slope (%) :	4	0	0
2 yr, 24 hr Rainfall (in) :	2.9	0	0
Velocity (ft/sec) :	0.06	0	0
Computed Flow Time (min) :	13.58	0	0

	Subarea	Subarea	Subarea
Shallow Concentrated Flow Computations	A	B	C
Flow Length (ft) :	220	0	0
Slope (%) :	2.5	0	0
Surface Type :	Woodland	Unpaved	Unpaved
Velocity (ft/sec) :	0.79	0	0
Computed Flow Time (min) :	4.64	0	0

	Subarea	Subarea	Subarea
Channel Flow Computations	A	B	C
Manning's Roughness :	0.027	0	0
Flow Length (ft) :	120	0	0
Channel Slope (%) :	4	0	0
Cross Section Area (ft^2) :	3.2	0	0
Wetted Perimeter (ft) :	0.8	0	0
Velocity (ft/sec) :	27.81	0	0
Computed Flow Time (min) :	0.07	0	0

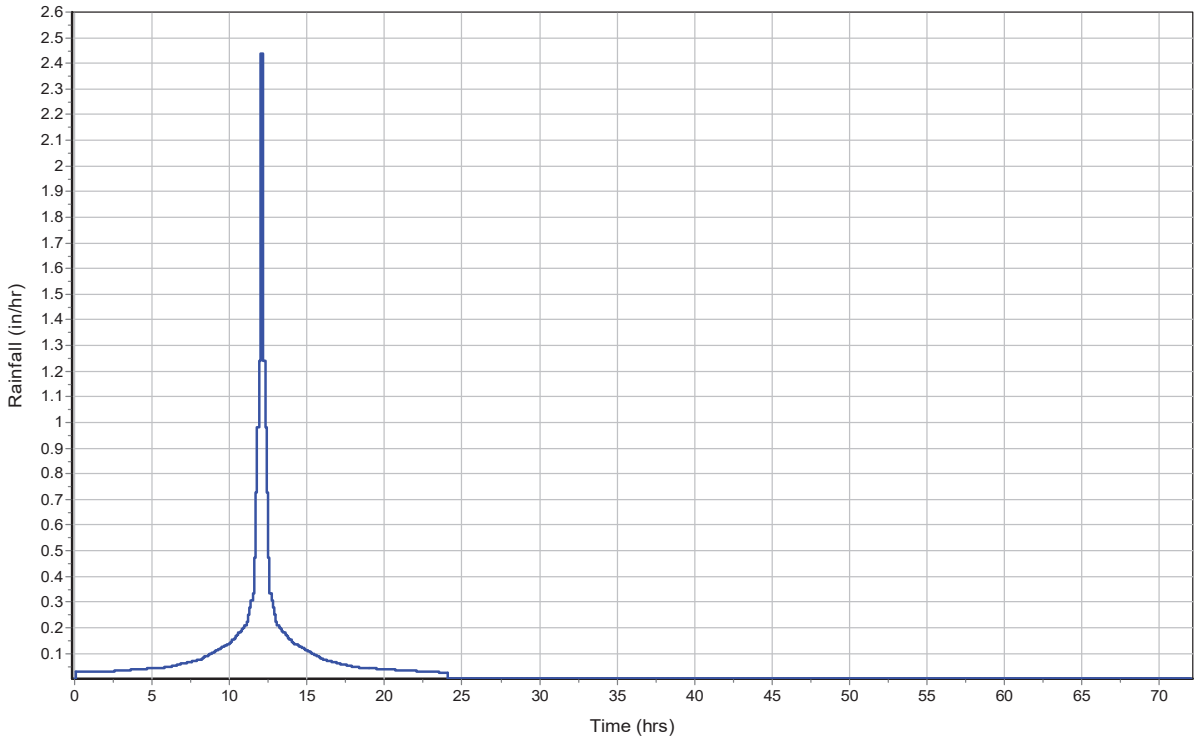
Total TOC (min) 18.29

Subbasin Runoff Results

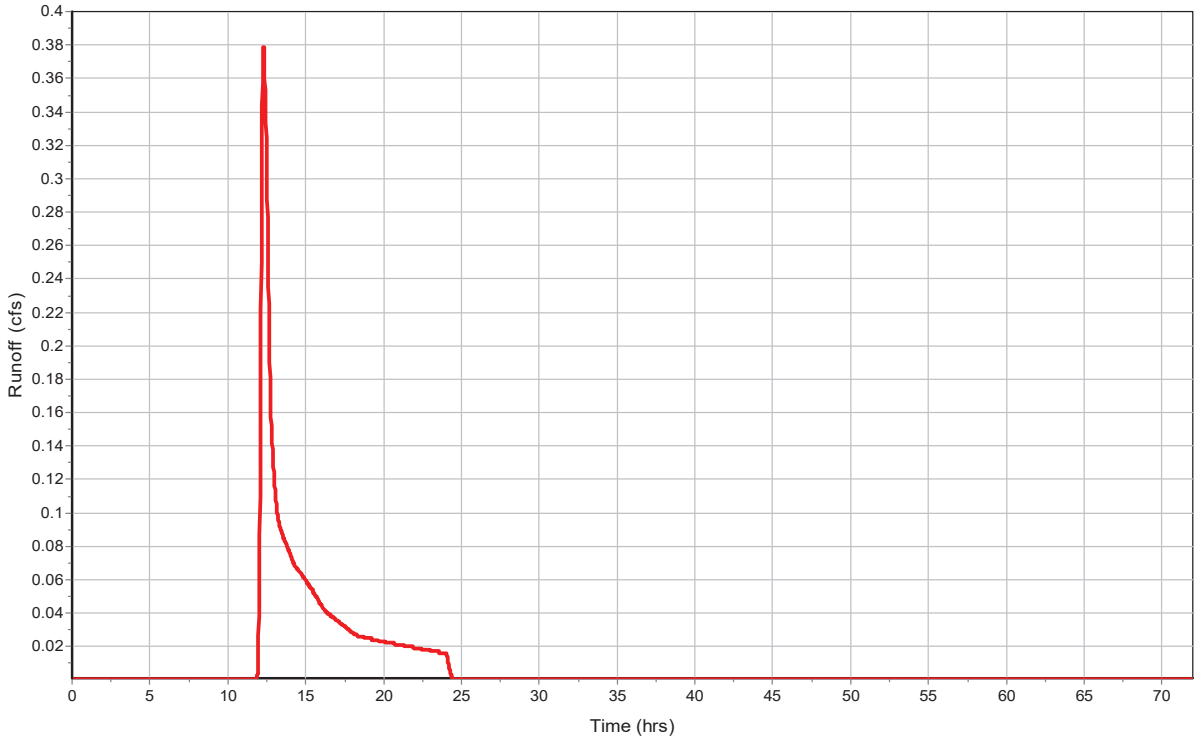
Total Rainfall (in)	2.9
Total Runoff (in)	0.46
Peak Runoff (cfs)	0.38
Weighted Curve Number	65
Time of Concentration (days hh:mm:ss)	0 00:18:17

Subbasin : DI-1-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : EX_CB-11-DA

Input Data

Area (ac)	0.27
Peak Rate Factor	484
Weighted Curve Number	95
Rain Gage ID	*

Composite Curve Number

Soil/Surface Description	32 Area (acres)	Soil Group	Curve Number
-	0.27	-	95
Composite Area & Weighted CN	0.27		95

Time of Concentration

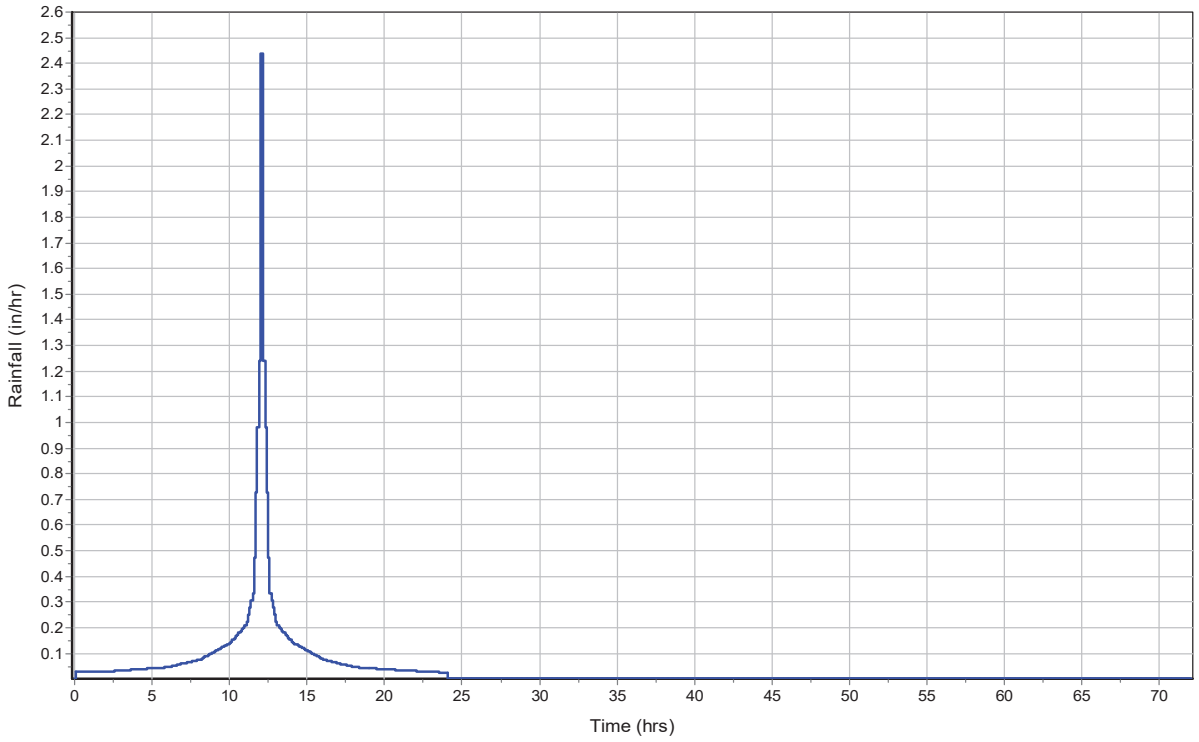
User-Defined TOC override (minutes): 6

Subbasin Runoff Results

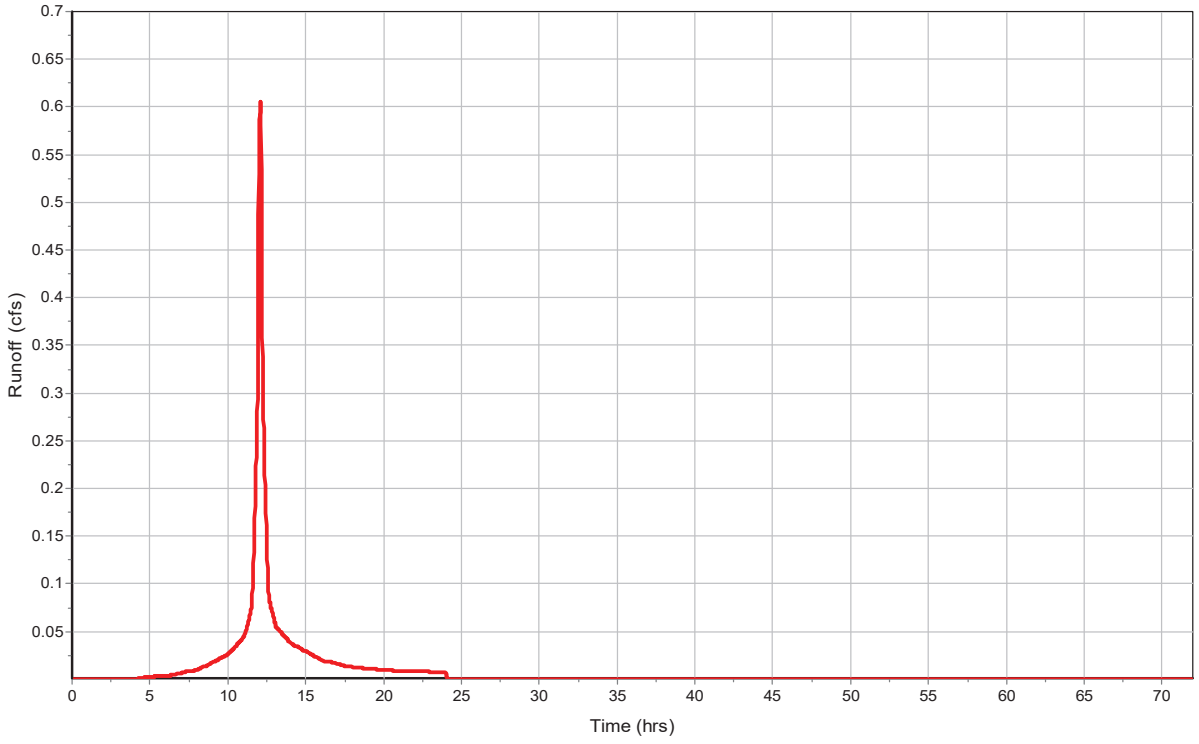
Total Rainfall (in)	2.9
Total Runoff (in)	2.35
Peak Runoff (cfs)	0.61
Weighted Curve Number	95
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : EX_CB-11-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : EX_CB-12-DA

Input Data

Area (ac)	0.05
Peak Rate Factor	484
Weighted Curve Number	98
Rain Gage ID	*

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.05	-	98
Composite Area & Weighted CN	0.05		98

Time of Concentration

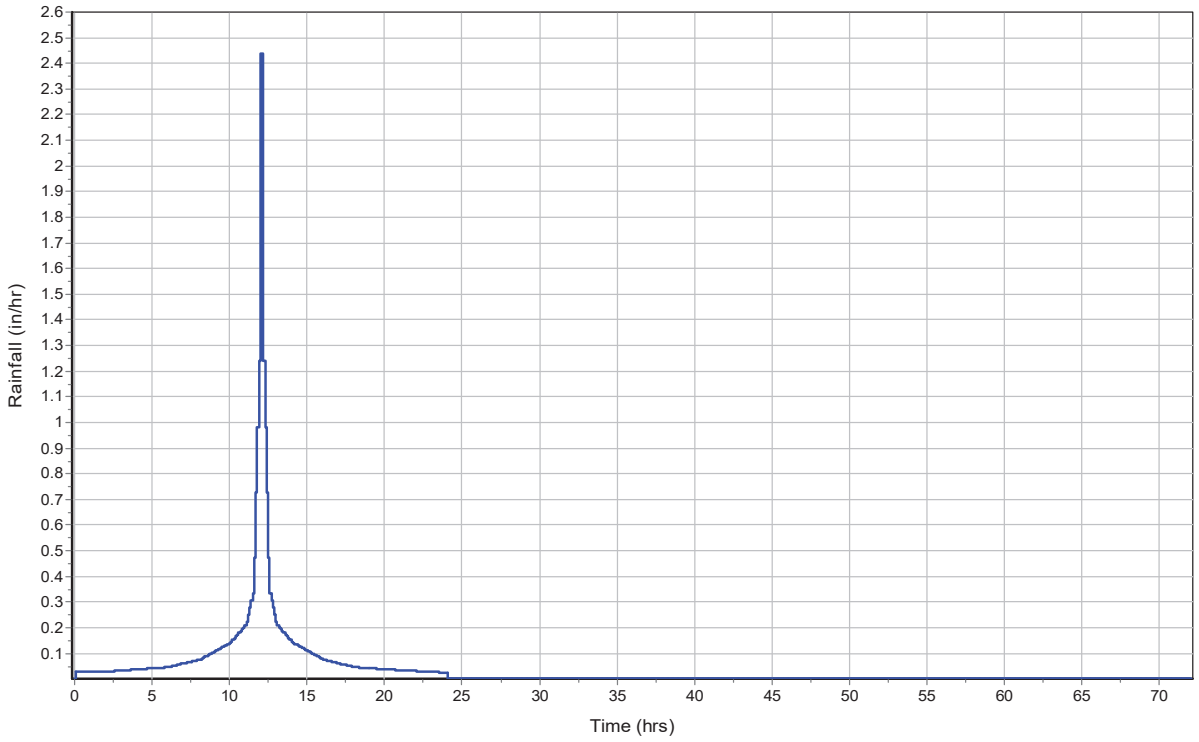
User-Defined TOC override (minutes): 6.00

Subbasin Runoff Results

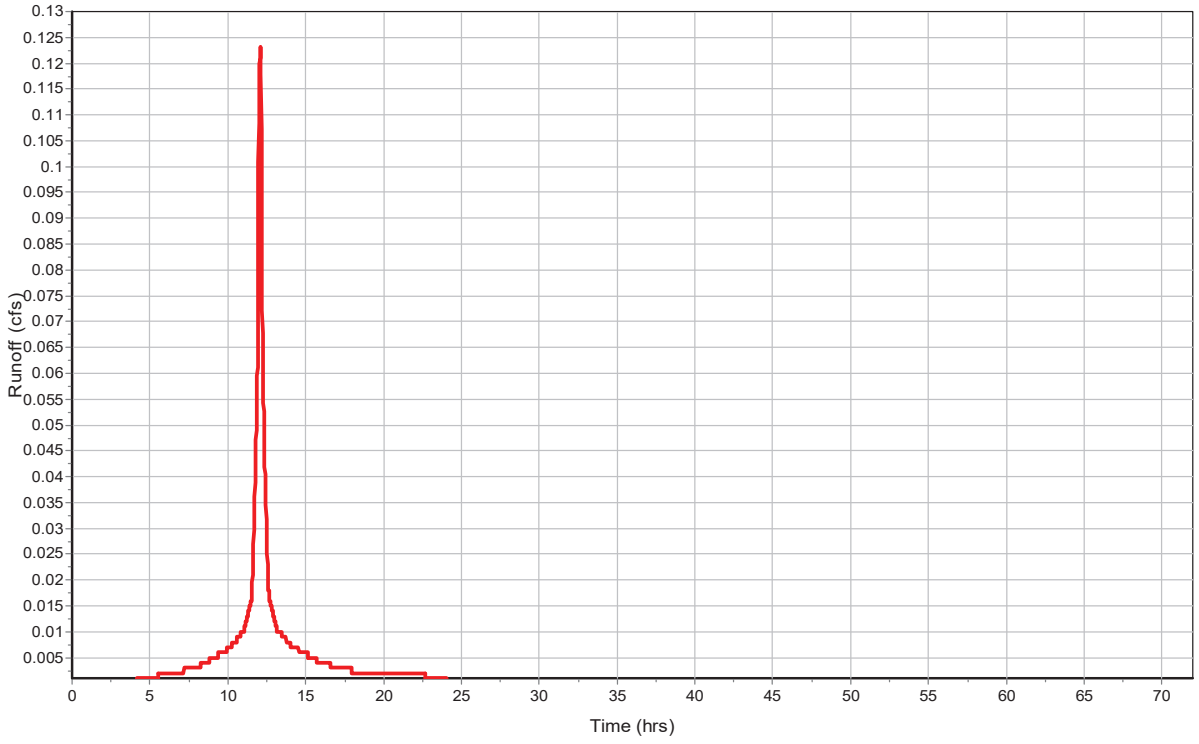
Total Rainfall (in)	2.9
Total Runoff (in)	2.64
Peak Runoff (cfs)	0.12
Weighted Curve Number	98
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : EX_CB-12-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : EX_CB-16A-DA

Input Data

Area (ac)	1.93
Peak Rate Factor	484
Weighted Curve Number	43
Rain Gage ID	*

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	1.93	-	43
Composite Area & Weighted CN	1.93		43

Time of Concentration

	Subarea	Subarea	Subarea
Sheet Flow Computations	A	B	C
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	50	0	0
Slope (%) :	1.5	0	0
2 yr, 24 hr Rainfall (in) :	2.9	0	0
Velocity (ft/sec) :	0.06	0	0
Computed Flow Time (min) :	14.54	0	0

	Subarea	Subarea	Subarea
Shallow Concentrated Flow Computations	A	B	C
Flow Length (ft) :	350	0	0
Slope (%) :	1.5	0	0
Surface Type :	Grass pasture	Unpaved	Unpaved
Velocity (ft/sec) :	0.86	0	0
Computed Flow Time (min) :	6.78	0	0

	Subarea	Subarea	Subarea
Channel Flow Computations	A	B	C
Manning's Roughness :	0.27	0	0
Flow Length (ft) :	104	0	0
Channel Slope (%) :	1	0	0
Cross Section Area (ft^2) :	2	0	0
Wetted Perimeter (ft) :	0.4	0	0
Velocity (ft/sec) :	1.61	0	0
Computed Flow Time (min) :	1.07	0	0

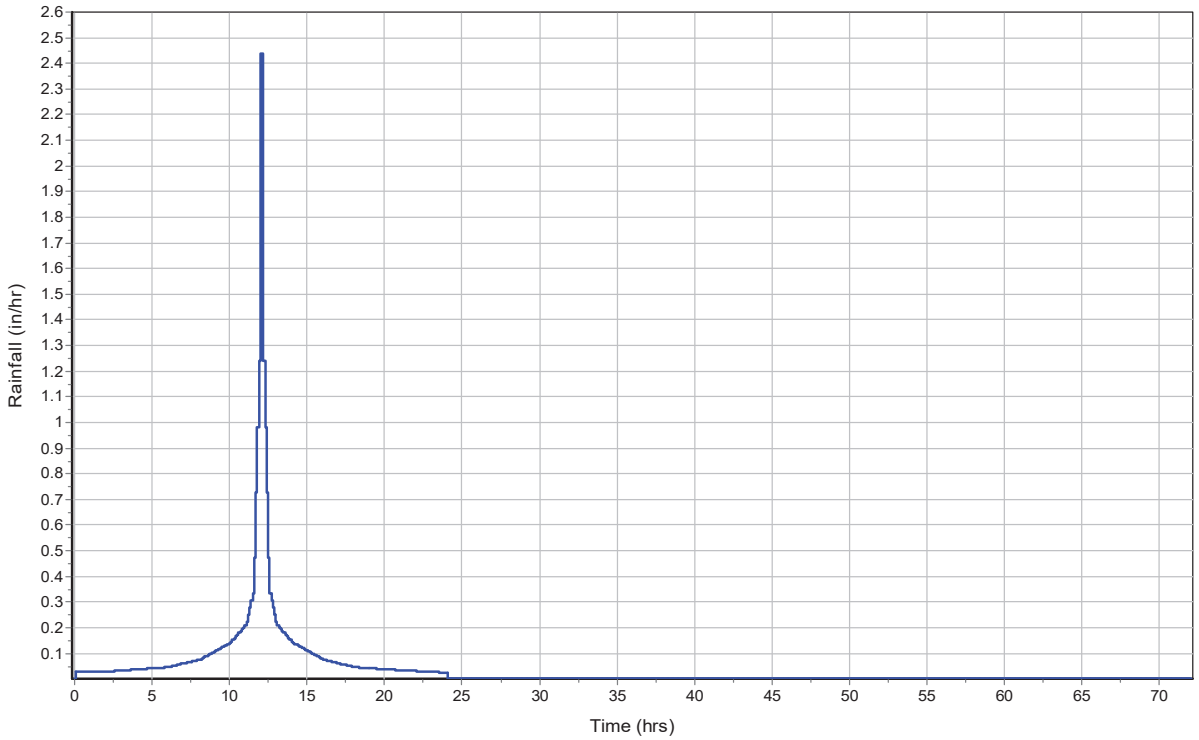
Total TOC (min) 22.39

Subbasin Runoff Results

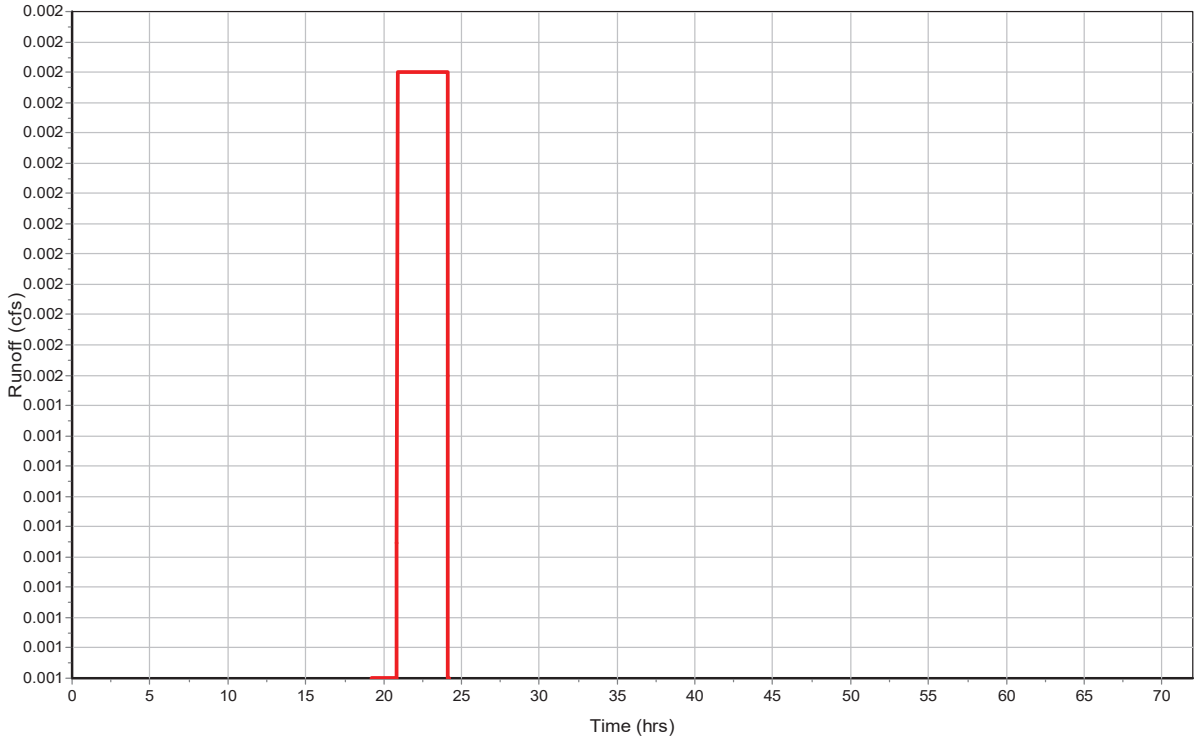
Total Rainfall (in)	2.9
Total Runoff (in)	0
Peak Runoff (cfs)	0
Weighted Curve Number	43
Time of Concentration (days hh:mm:ss)	0 00:22:23

Subbasin : EX_CB-16A-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : EX_CB-16-DA

Input Data

Area (ac)	0.82
Peak Rate Factor	484
Weighted Curve Number	52
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.82	-	52
Composite Area & Weighted CN	0.82		52

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.6	0	0
Flow Length (ft) :	50	0	0
Slope (%) :	2.1	0	0
2 yr, 24 hr Rainfall (in) :	2.9	0	0
Velocity (ft/sec) :	0.05	0	0
Computed Flow Time (min) :	17.57	0	0

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	213	0	0
Slope (%) :	2	0	0
Surface Type :	Grass pasture	Unpaved	Unpaved
Velocity (ft/sec) :	0.99	0	0
Computed Flow Time (min) :	3.59	0	0

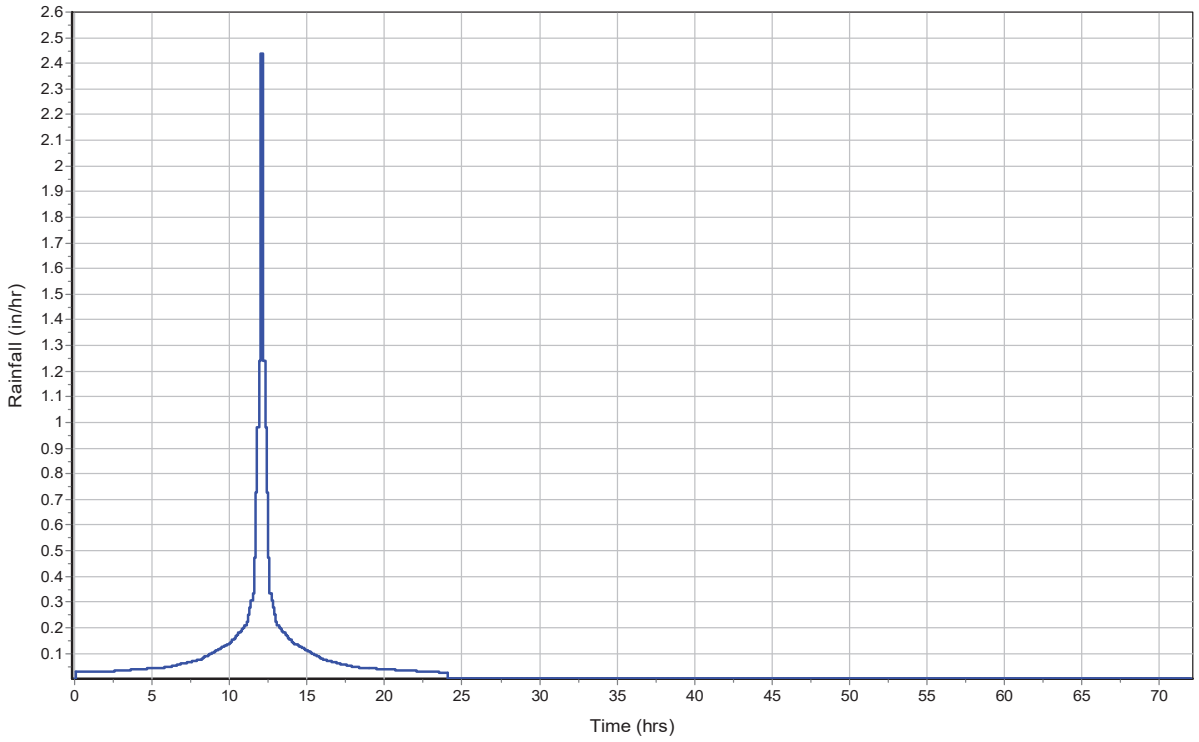
Total TOC (min) 21.16

Subbasin Runoff Results

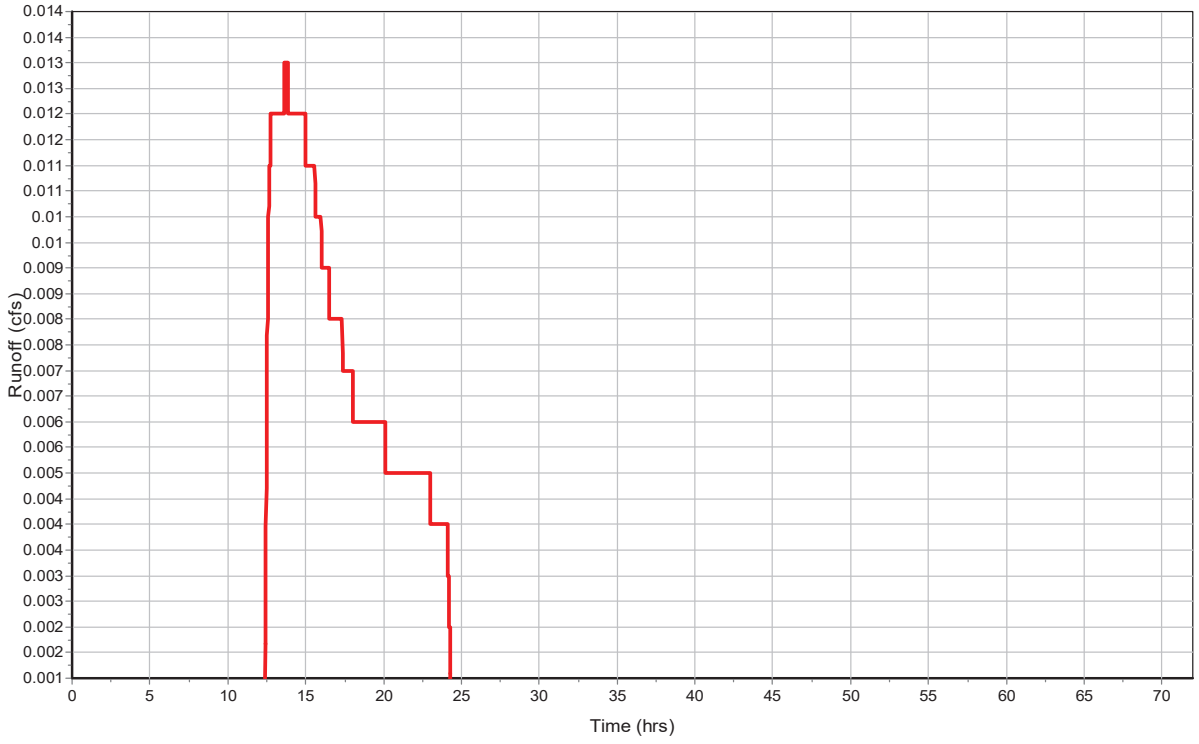
Total Rainfall (in)	2.9
Total Runoff (in)	0.11
Peak Runoff (cfs)	0.01
Weighted Curve Number	52
Time of Concentration (days hh:mm:ss)	0 00:21:10

Subbasin : EX_CB-16-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : EX_CB-19-DA

Input Data

Area (ac)	0.16
Peak Rate Factor	484
Weighted Curve Number	39
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.16	-	39
Composite Area & Weighted CN	0.16		39

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	50	0	0
Slope (%) :	4	0	0
2 yr, 24 hr Rainfall (in) :	2.9	0	0
Velocity (ft/sec) :	0.08	0	0
Computed Flow Time (min) :	9.82	0	0

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	122	0	0
Slope (%) :	4	0	0
Surface Type :	Grass pasture	Unpaved	Unpaved
Velocity (ft/sec) :	1.4	0	0
Computed Flow Time (min) :	1.45	0	0

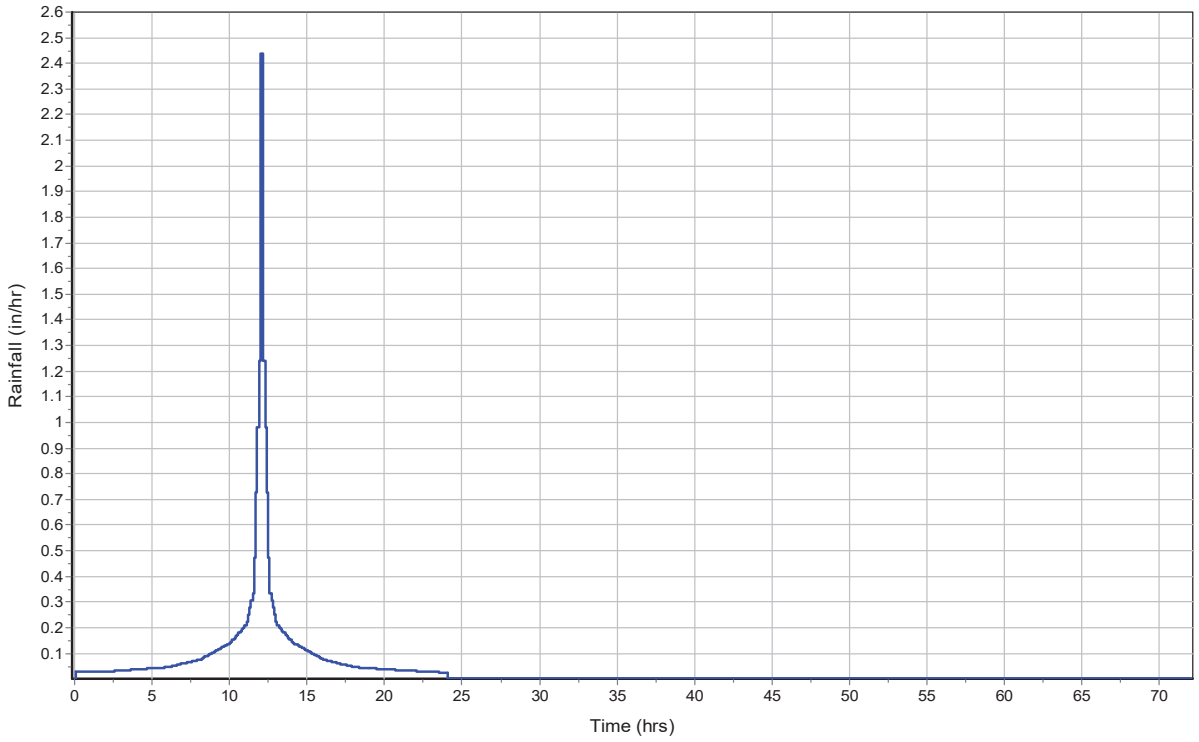
Total TOC (min) 11.27

Subbasin Runoff Results

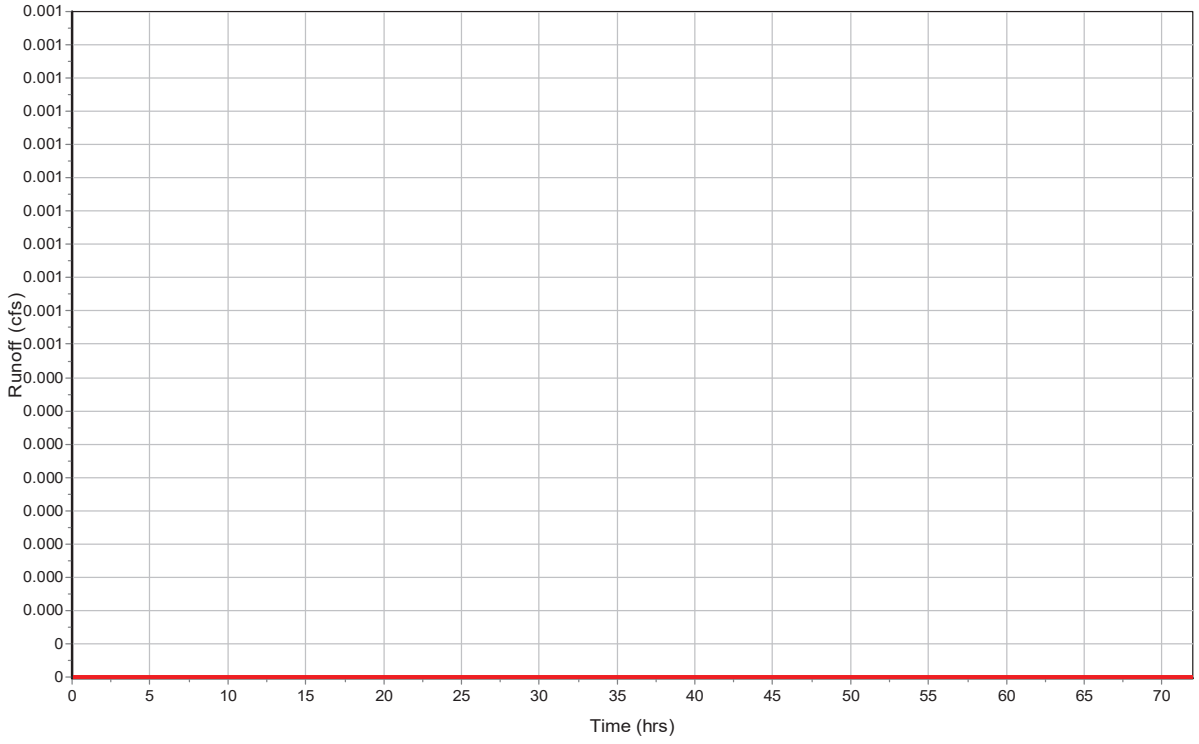
Total Rainfall (in)	2.9
Total Runoff (in)	0
Peak Runoff (cfs)	0
Weighted Curve Number	39
Time of Concentration (days hh:mm:ss)	0 00:11:16

Subbasin : EX_CB-19-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : EX_CB-27-DA

Input Data

Area (ac)	0.14
Peak Rate Factor	484
Weighted Curve Number	98
Rain Gage ID	*

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.14	-	98
Composite Area & Weighted CN	0.14		98

Time of Concentration

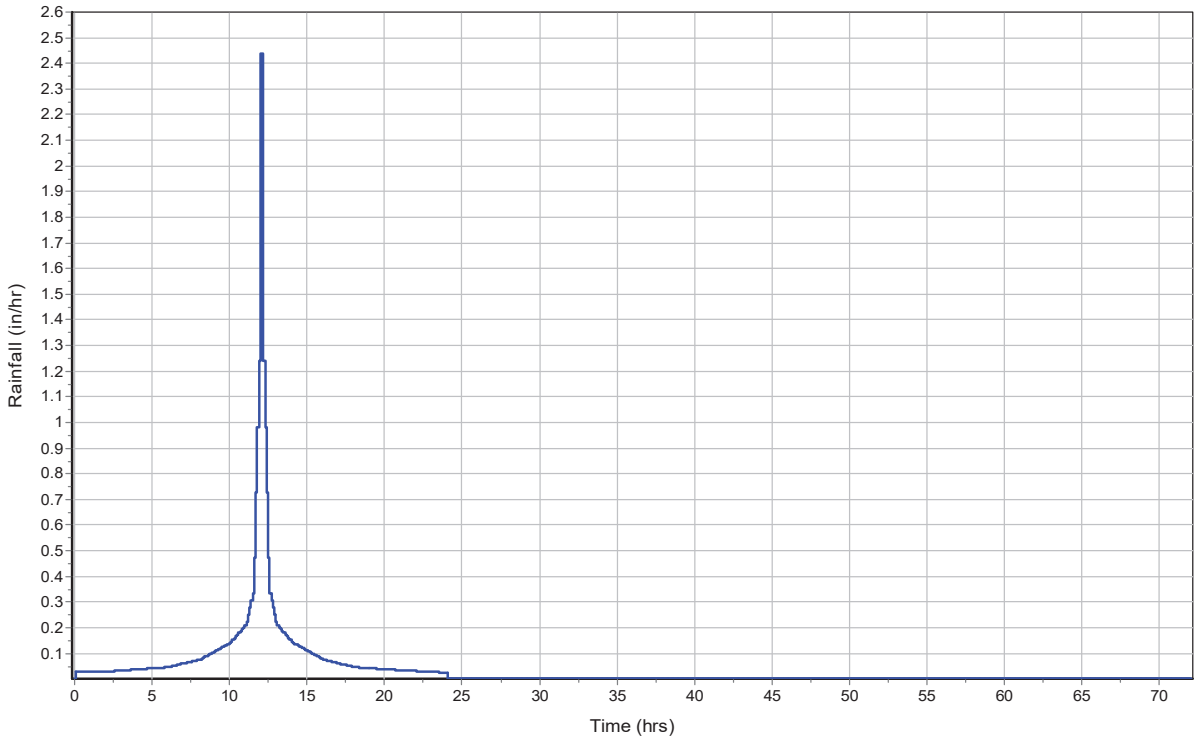
User-Defined TOC override (minutes): 6.00

Subbasin Runoff Results

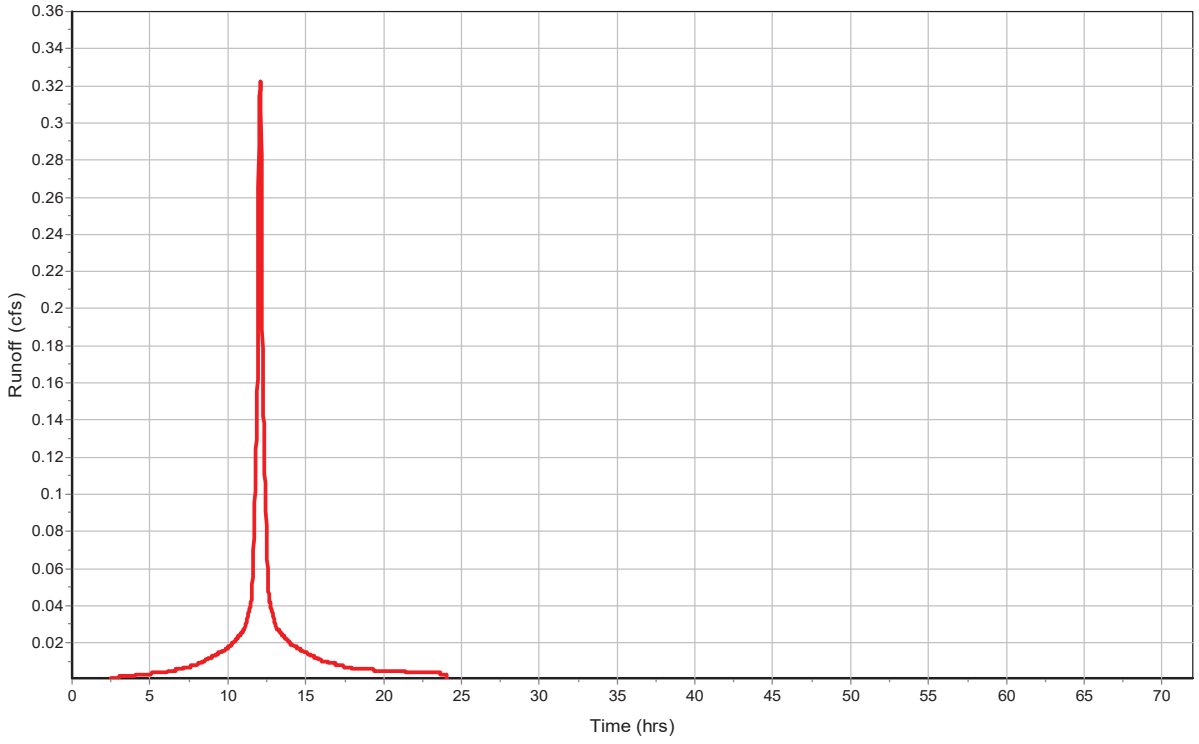
Total Rainfall (in)	2.9
Total Runoff (in)	2.67
Peak Runoff (cfs)	0.32
Weighted Curve Number	98
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : EX_CB-27-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : EX_CB-28-DA

Input Data

Area (ac)	0.98
Peak Rate Factor	484
Weighted Curve Number	30
Rain Gage ID	*

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	0.98	-	30
Composite Area & Weighted CN	0.98		30

Time of Concentration

	Subarea	Subarea	Subarea
Sheet Flow Computations	A	B	C
Manning's Roughness :	0.6	0	0
Flow Length (ft) :	50	0	0
Slope (%) :	3	0	0
2 yr, 24 hr Rainfall (in) :	2.9	0	0
Velocity (ft/sec) :	0.05	0	0
Computed Flow Time (min) :	15.24	0	0

	Subarea	Subarea	Subarea
Shallow Concentrated Flow Computations	A	B	C
Flow Length (ft) :	80	0	0
Slope (%) :	5	0	0
Surface Type :	Woodland	Unpaved	Unpaved
Velocity (ft/sec) :	1.12	0	0
Computed Flow Time (min) :	1.19	0	0

	Subarea	Subarea	Subarea
Channel Flow Computations	A	B	C
Manning's Roughness :	0.027	0	0
Flow Length (ft) :	250	0	0
Channel Slope (%) :	5	0	0
Cross Section Area (ft^2) :	4	0	0
Wetted Perimeter (ft) :	0.7	0	0
Velocity (ft/sec) :	39.44	0	0
Computed Flow Time (min) :	0.11	0	0

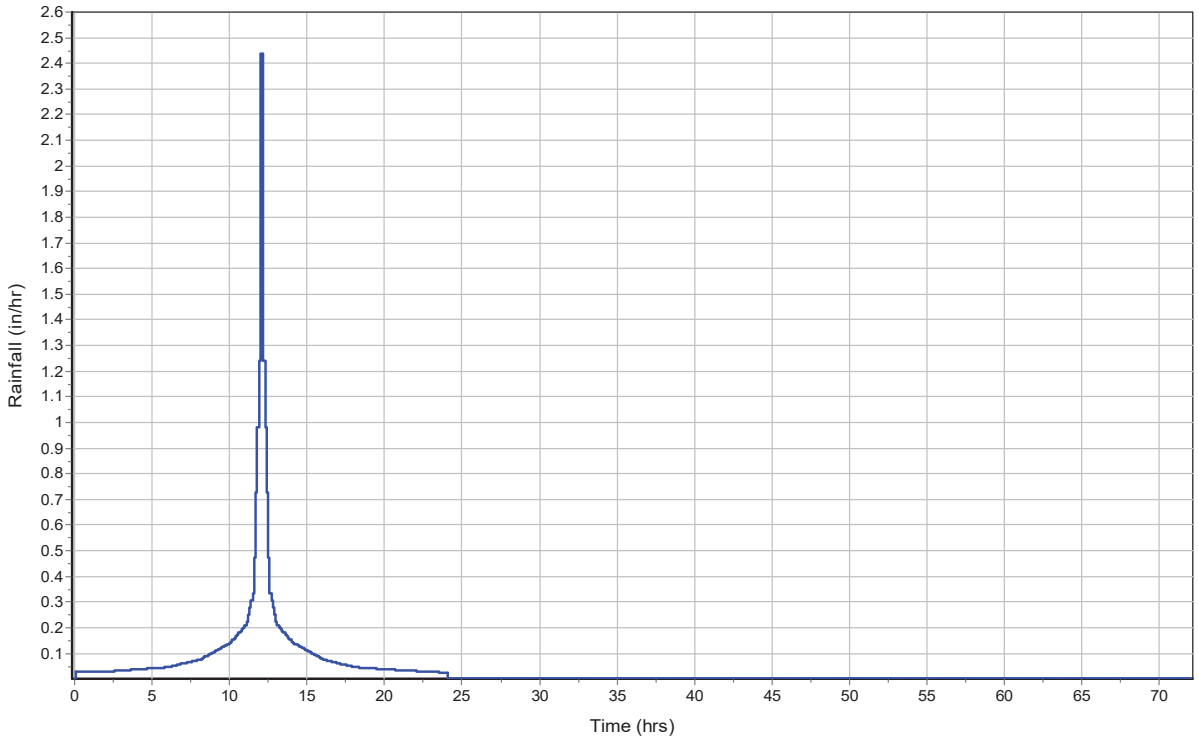
Total TOC (min) 16.53

Subbasin Runoff Results

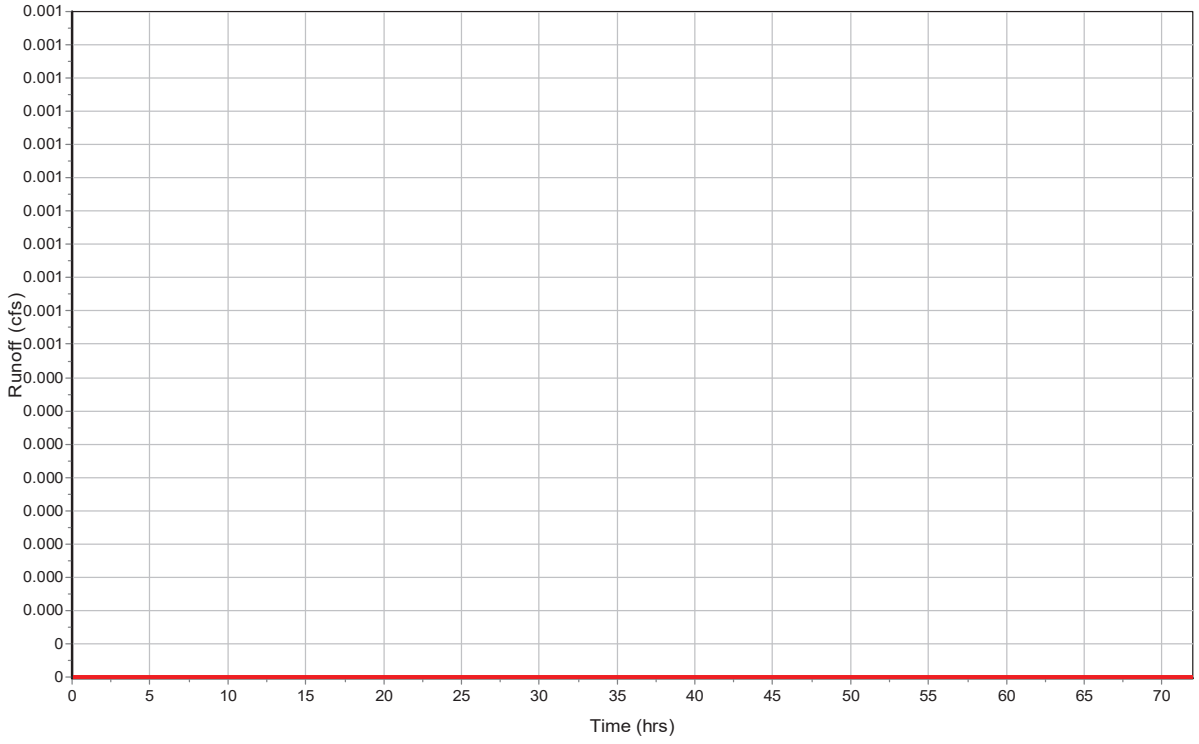
Total Rainfall (in)	2.9
Total Runoff (in)	0
Peak Runoff (cfs)	0
Weighted Curve Number	30
Time of Concentration (days hh:mm:ss)	0 00:16:32

Subbasin : EX_CB-28-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : EX_CB-33-DA

Input Data

Area (ac)	0.08
Peak Rate Factor	484
Weighted Curve Number	39
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.08	-	39
Composite Area & Weighted CN	0.08		39

Time of Concentration

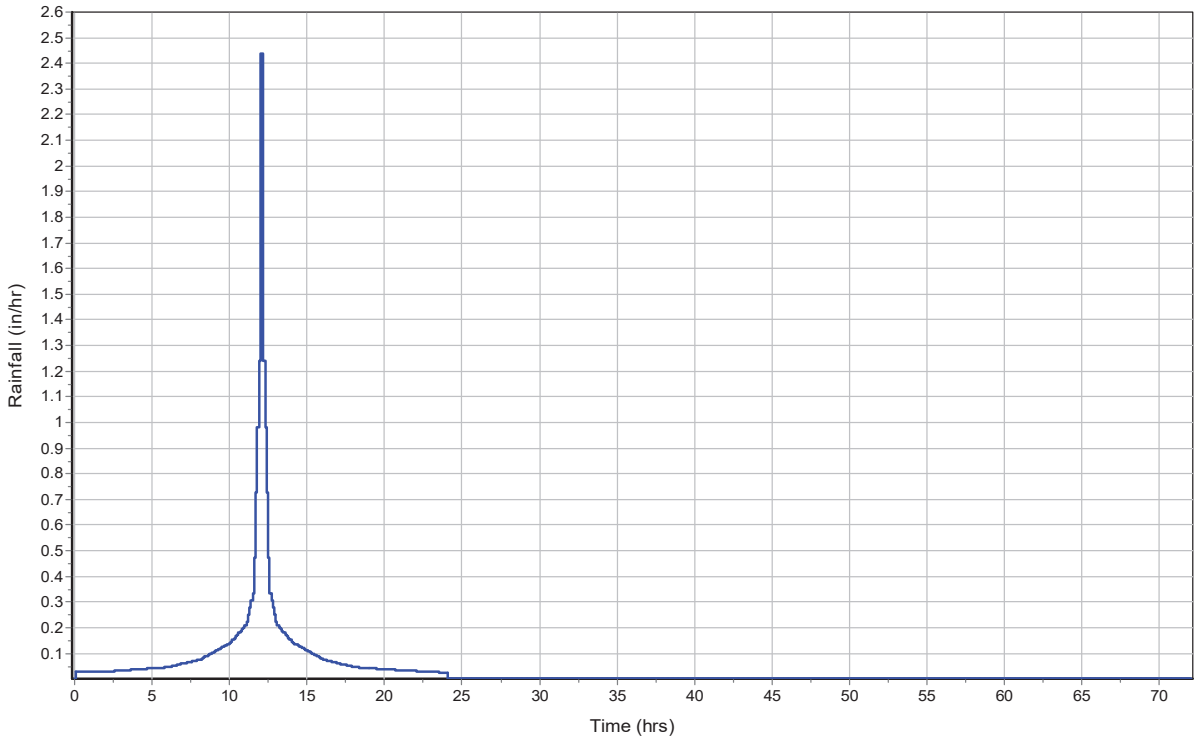
User-Defined TOC override (minutes): 6

Subbasin Runoff Results

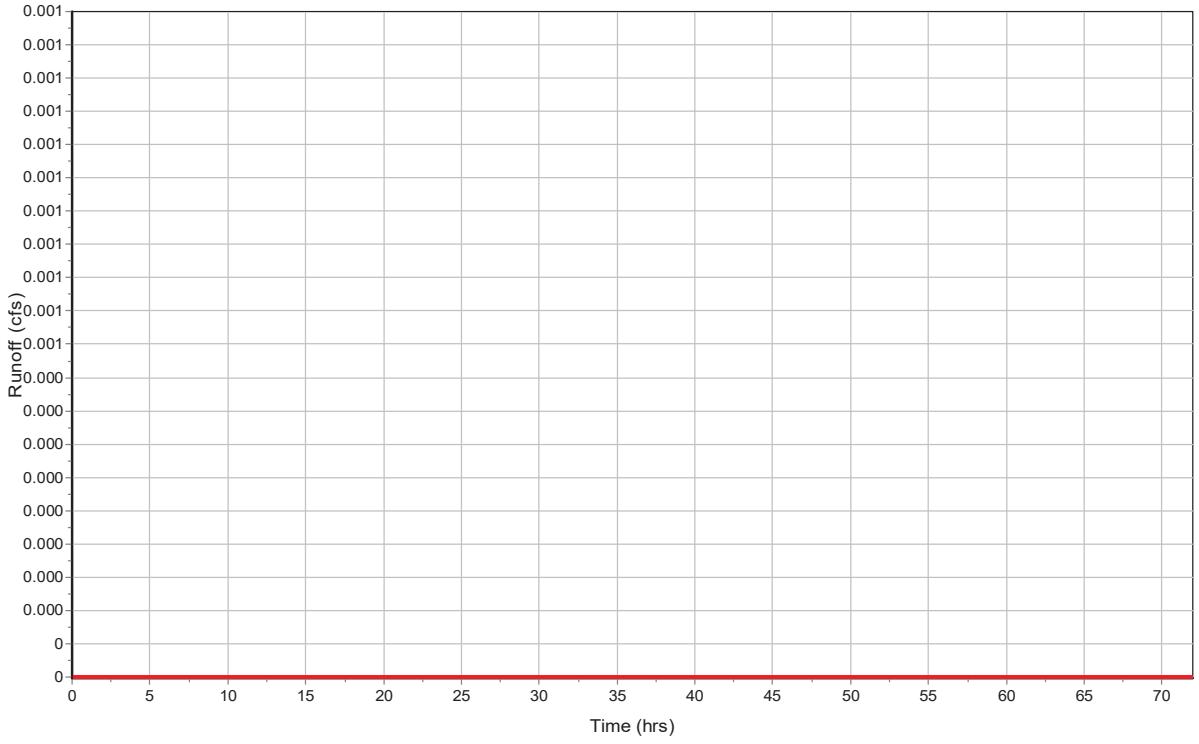
Total Rainfall (in)	2.9
Total Runoff (in)	0
Peak Runoff (cfs)	0
Weighted Curve Number	39
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : EX_CB-33-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : EX_CB-34A-DA

Input Data

Area (ac)	0.14
Peak Rate Factor	484
Weighted Curve Number	39
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.14	-	39
Composite Area & Weighted CN	0.14		39

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	50	0	0
Slope (%) :	3	0	0
2 yr, 24 hr Rainfall (in) :	2.9	0	0
Velocity (ft/sec) :	0.08	0	0
Computed Flow Time (min) :	11.02	0	0

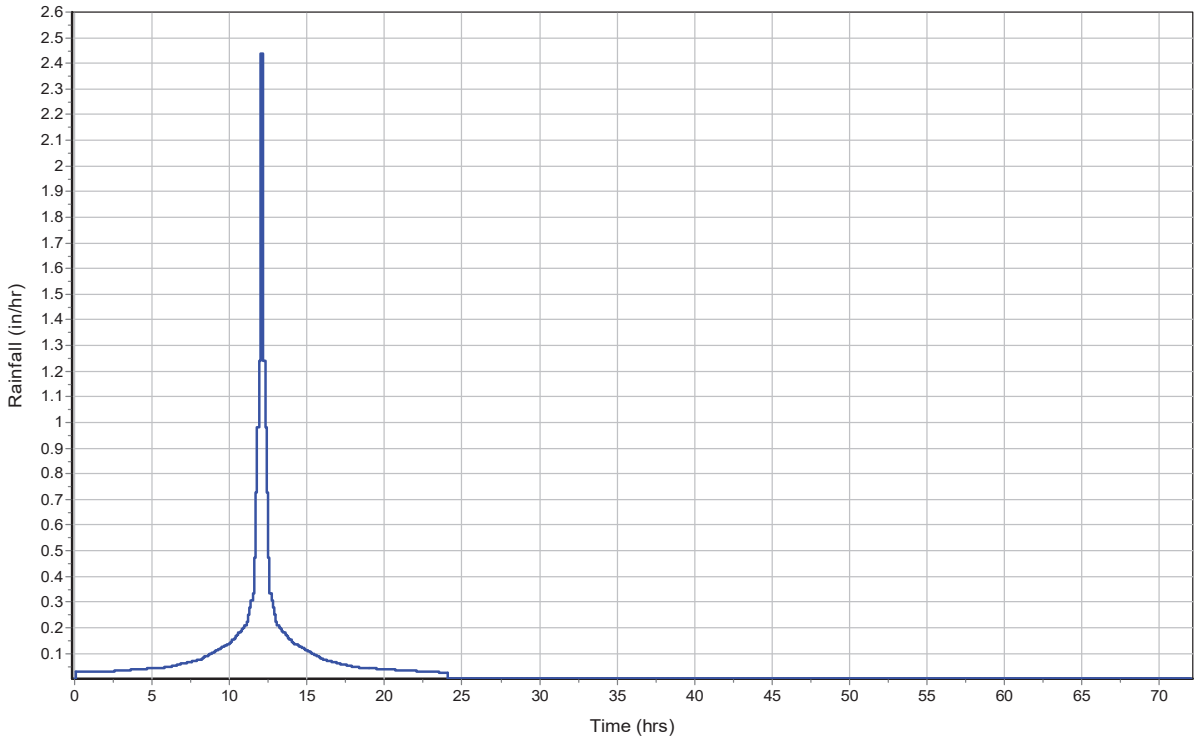
Total TOC (min) 11.02

Subbasin Runoff Results

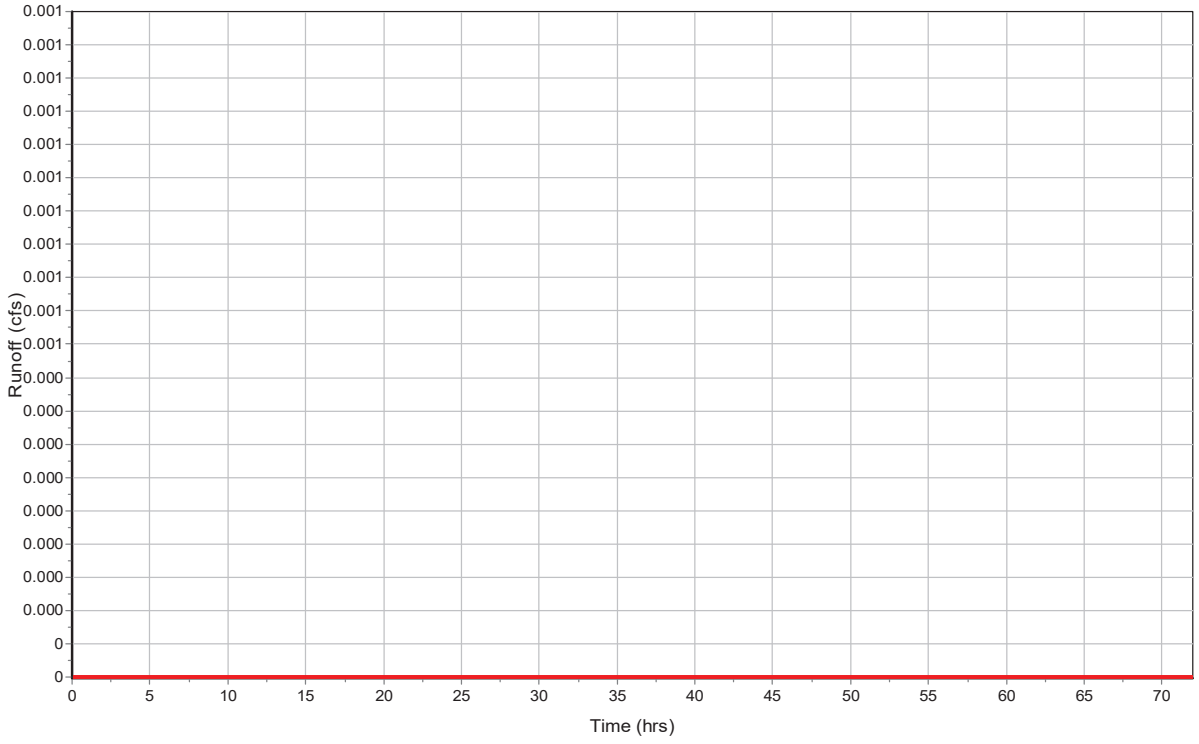
Total Rainfall (in)	2.9
Total Runoff (in)	0
Peak Runoff (cfs)	0
Weighted Curve Number	39
Time of Concentration (days hh:mm:ss)	0 00:11:01

Subbasin : EX_CB-34A-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : EX_CB-34-DA

Input Data

Area (ac)	0.23
Peak Rate Factor	484
Weighted Curve Number	74
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.23	-	74
Composite Area & Weighted CN	0.23		74

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	50	0	0
Slope (%) :	2	0	0
2 yr, 24 hr Rainfall (in) :	2.9	0	0
Velocity (ft/sec) :	0.06	0	0
Computed Flow Time (min) :	12.96	0	0

Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0	0
Flow Length (ft) :	50	0	0
Channel Slope (%) :	3	0	0
Cross Section Area (ft^2) :	0.6	0	0
Wetted Perimeter (ft) :	0.3	0	0
Velocity (ft/sec) :	31.51	0	0
Computed Flow Time (min) :	0.03	0	0

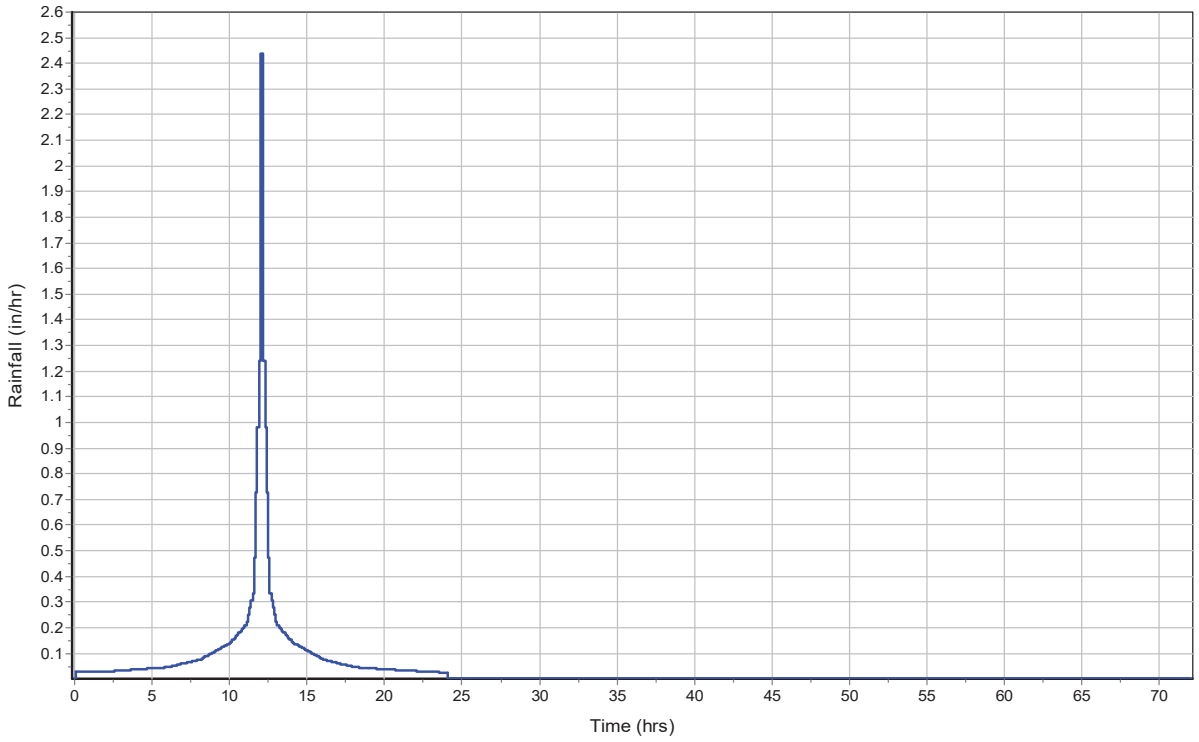
Total TOC (min) 12.98

Subbasin Runoff Results

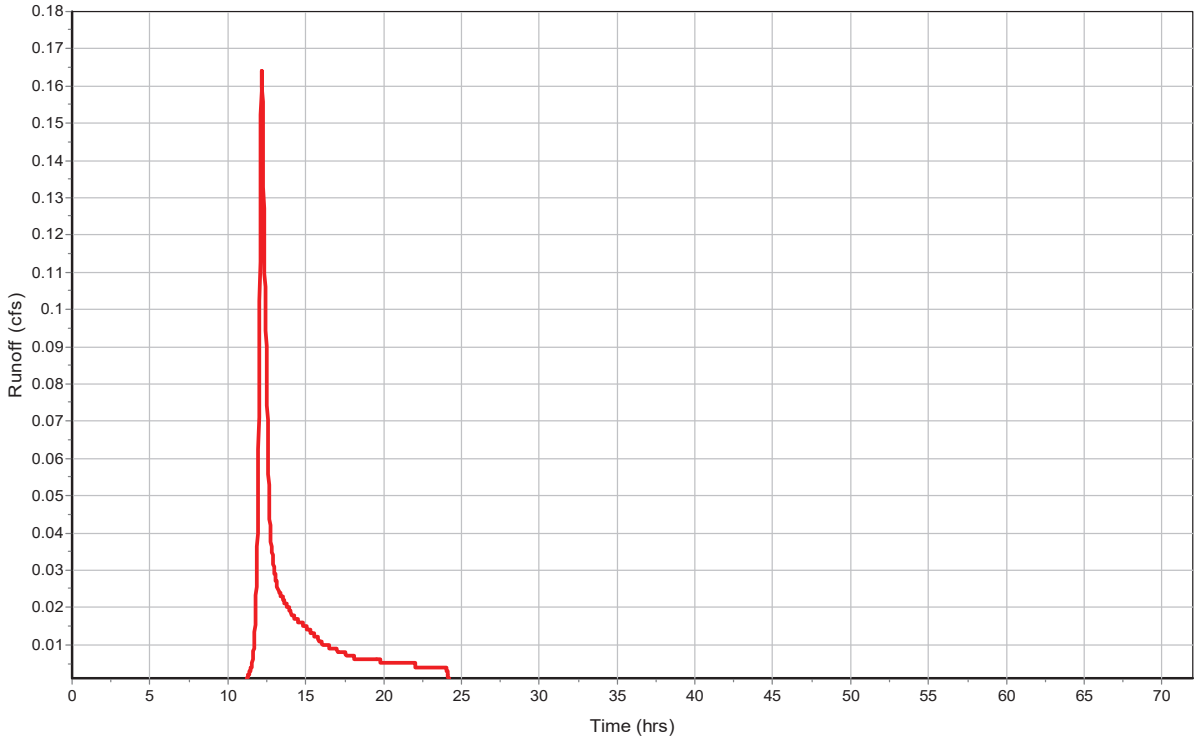
Total Rainfall (in)	2.9
Total Runoff (in)	0.85
Peak Runoff (cfs)	0.16
Weighted Curve Number	74
Time of Concentration (days hh:mm:ss)	0 00:12:59

Subbasin : EX_CB-34-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : EX_CB-36-DA

Input Data

Area (ac)	0.09
Peak Rate Factor	484
Weighted Curve Number	39
Rain Gage ID	*

Composite Curve Number

Soil/Surface Description	32 Area (acres)	Soil Group	Curve Number
-	0.09	-	39
Composite Area & Weighted CN	0.09		39

Time of Concentration

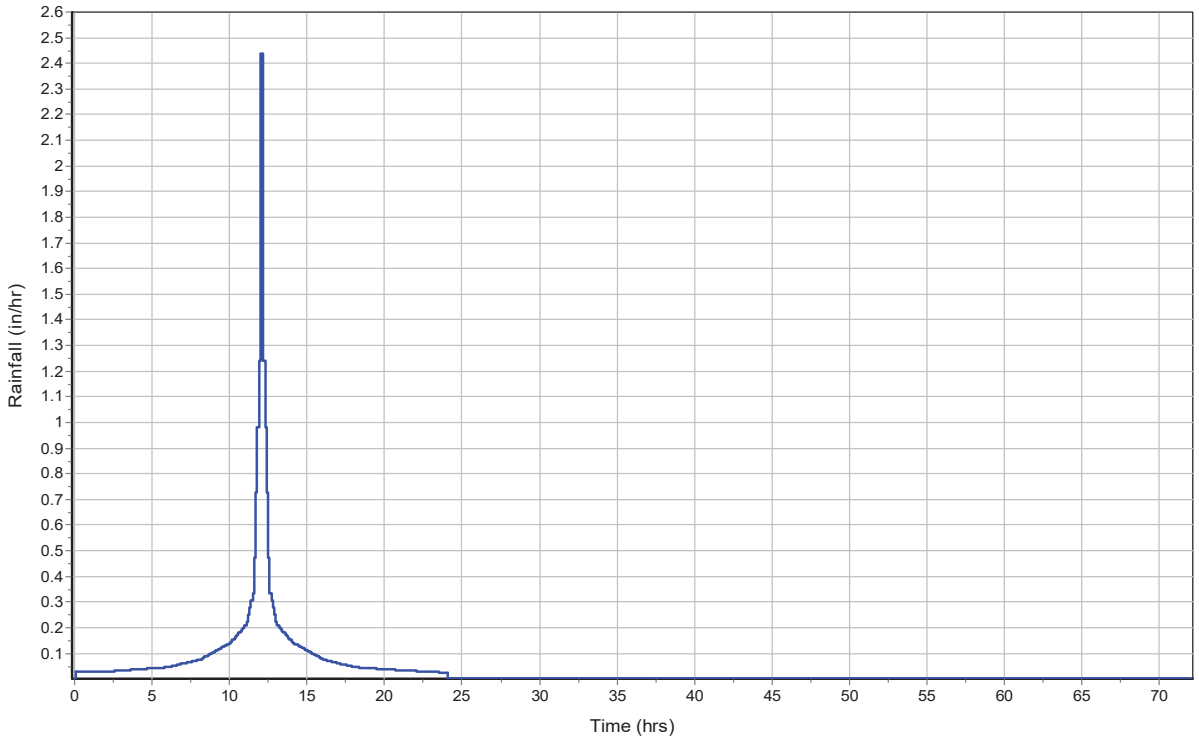
User-Defined TOC override (minutes): 6

Subbasin Runoff Results

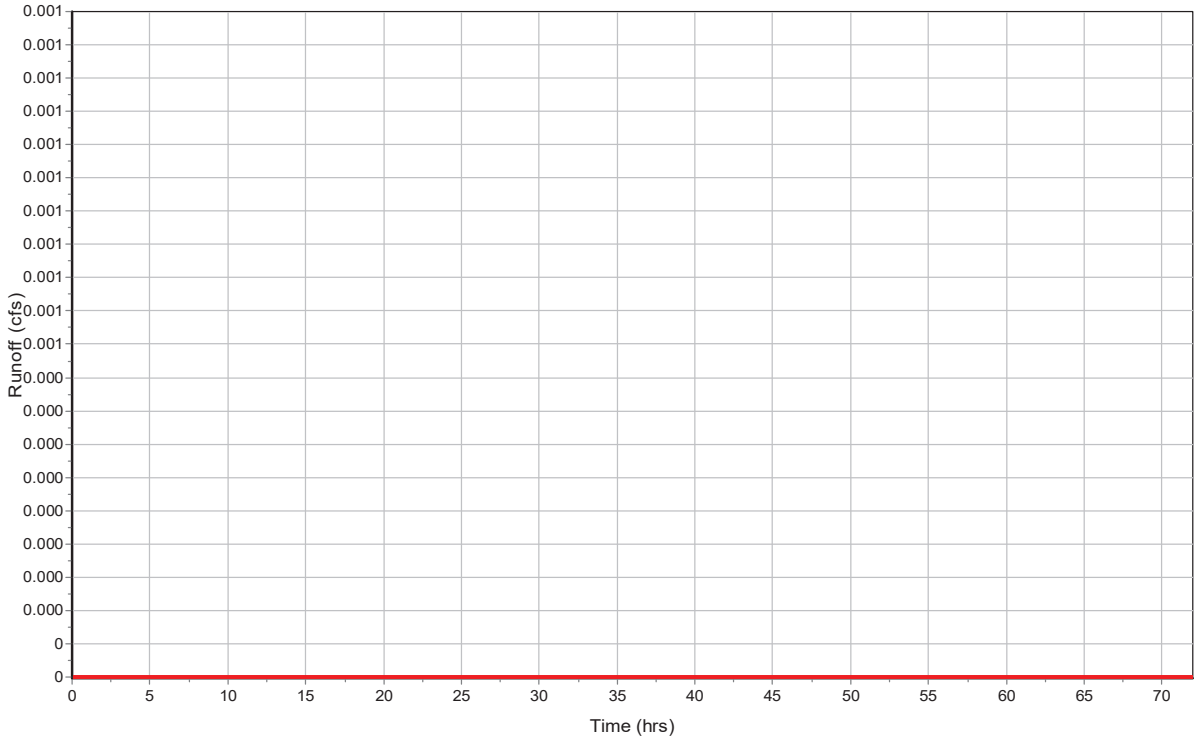
Total Rainfall (in)	2.9
Total Runoff (in)	0
Peak Runoff (cfs)	0
Weighted Curve Number	39
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : EX_CB-36-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : EX_CB-9-DA

Input Data

Area (ac)	0.8
Peak Rate Factor	484
Weighted Curve Number	51
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.8	-	51
Composite Area & Weighted CN	0.8		51

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	50	0	0
Slope (%) :	1.5	0	0
2 yr, 24 hr Rainfall (in) :	2.9	0	0
Velocity (ft/sec) :	0.06	0	0
Computed Flow Time (min) :	14.54	0	0

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	270	0	0
Slope (%) :	3	0	0
Surface Type :	Grass pasture	Unpaved	Unpaved
Velocity (ft/sec) :	1.21	0	0
Computed Flow Time (min) :	3.72	0	0

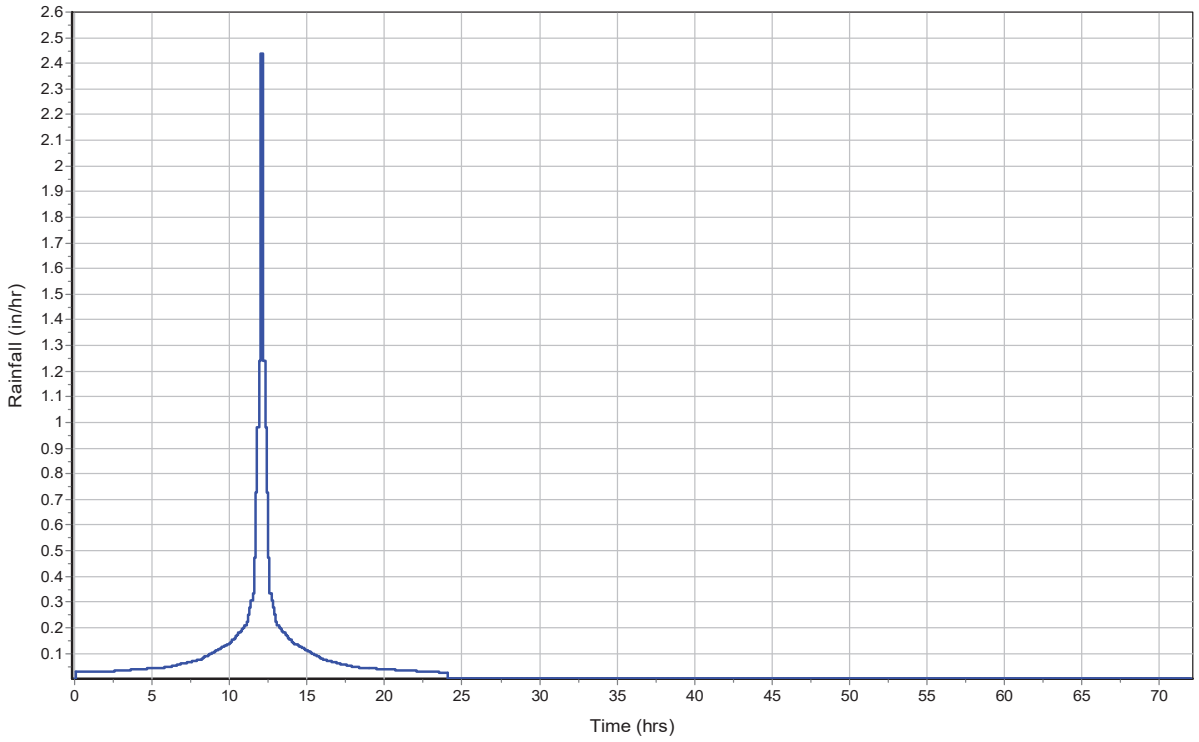
Total TOC (min) 18.25

Subbasin Runoff Results

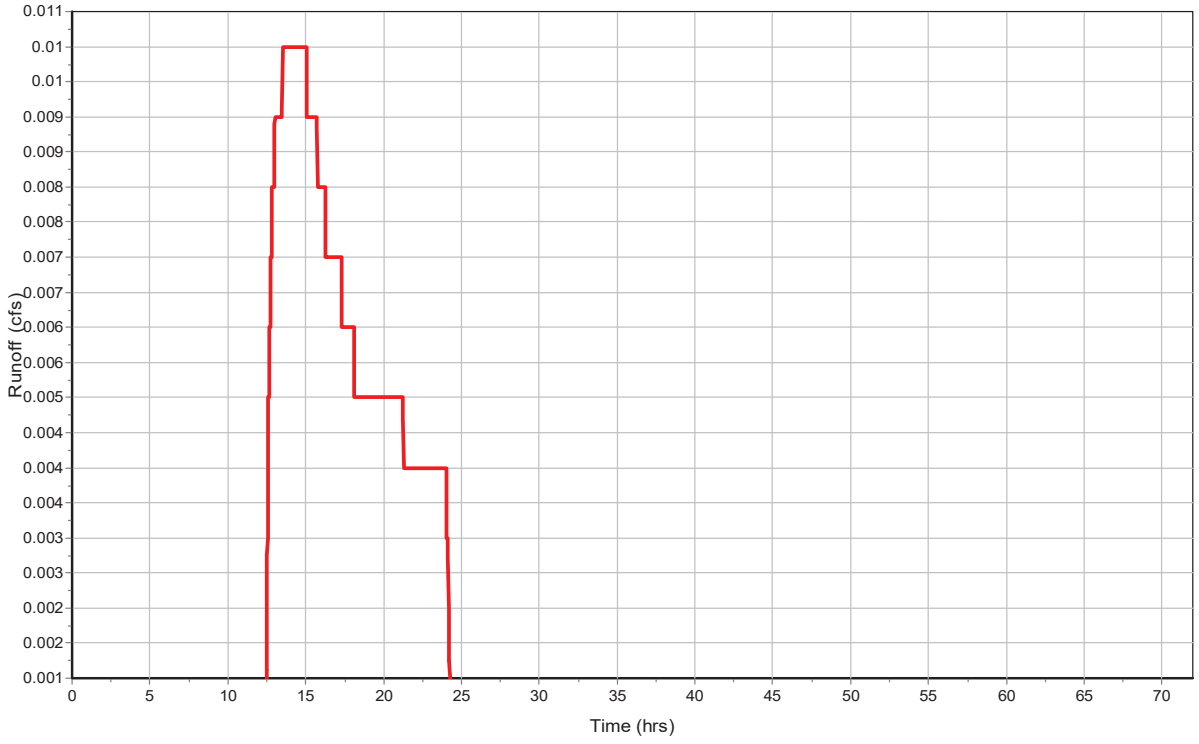
Total Rainfall (in)	2.9
Total Runoff (in)	0.09
Peak Runoff (cfs)	0.01
Weighted Curve Number	51
Time of Concentration (days hh:mm:ss)	0 00:18:15

Subbasin : EX_CB-9-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : EX-CB-1-DA

Input Data

Area (ac)	0.41
Peak Rate Factor	484
Weighted Curve Number	87
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.41	-	87
Composite Area & Weighted CN	0.41		87

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	20	0	0
Slope (%) :	2	0	0
2 yr, 24 hr Rainfall (in) :	2.9	0	0
Velocity (ft/sec) :	0.05	0	0
Computed Flow Time (min) :	6.22	0	0

Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0	0
Flow Length (ft) :	490	0	0
Channel Slope (%) :	4	0	0
Cross Section Area (ft^2) :	0.8	0	0
Wetted Perimeter (ft) :	0.5	0	0
Velocity (ft/sec) :	31.36	0	0
Computed Flow Time (min) :	0.26	0	0

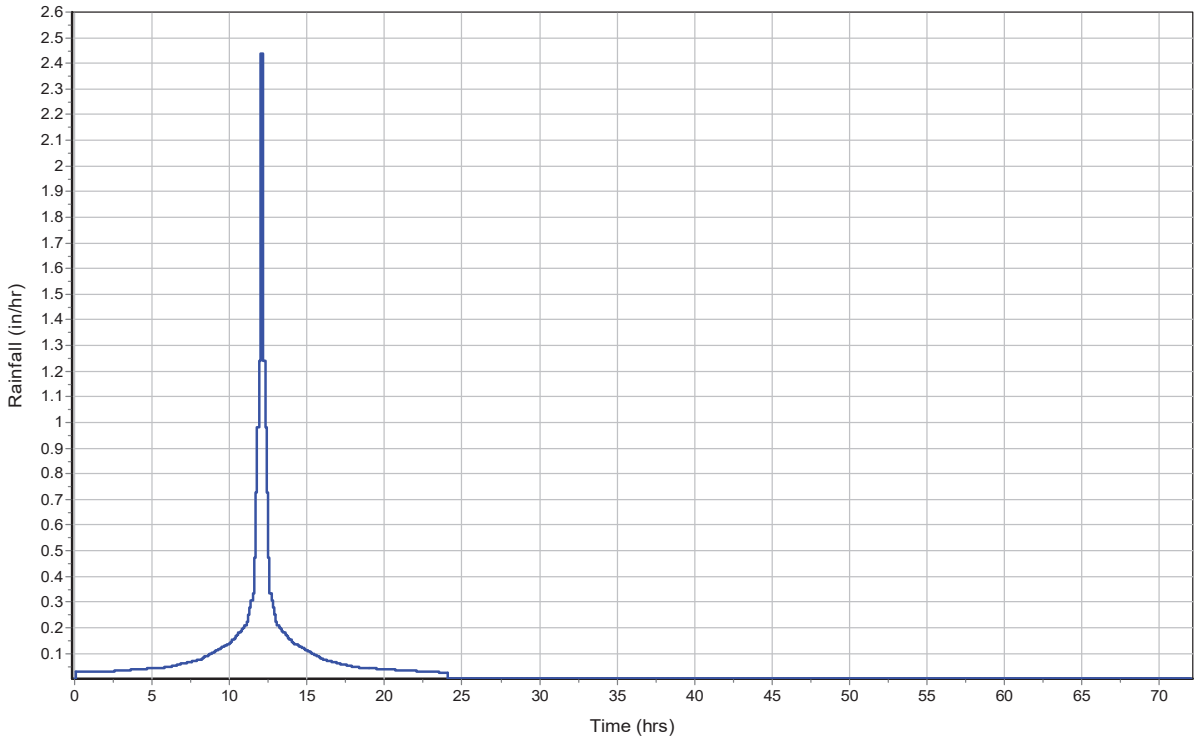
Total TOC (min) 6.49

Subbasin Runoff Results

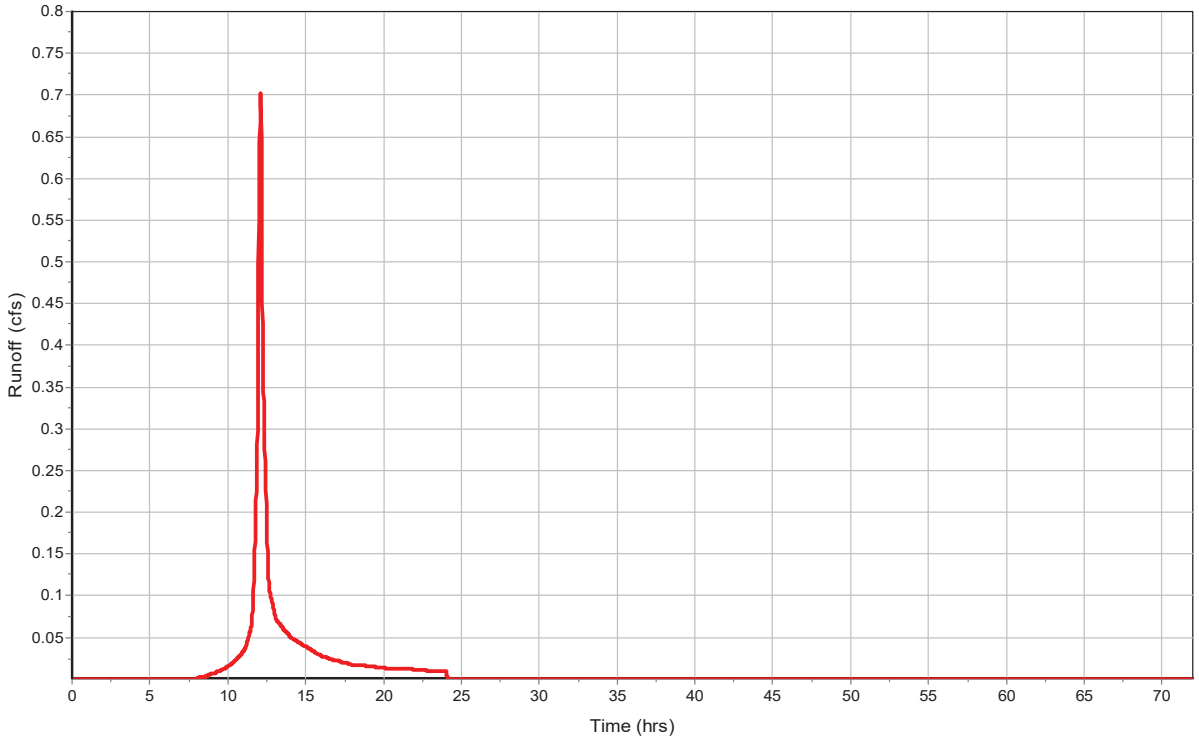
Total Rainfall (in)	2.9
Total Runoff (in)	1.65
Peak Runoff (cfs)	0.7
Weighted Curve Number	87
Time of Concentration (days hh:mm:ss)	0 00:06:29

Subbasin : EX-CB-1-DA

Rainfall Intensity Graph



Runoff Hydrograph



Junction Input

SN	Element ID	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Ground/Rim (Max) Offset (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Surcharge Elevation (ft)	Surcharge Depth (ft)	Ponded Area (ft^2)	Minimum Pipe Cover (in)
1	Bald_Mtn	368.00	375.00	7.00	368.00	0.00	375.00	0.00	0.00	0.00
2	CB-36	361.42	366.73	5.31	361.42	0.00	366.73	0.00	10.00	0.00
3	CB-38	361.20	364.26	3.06	361.20	0.00	364.26	0.00	10.00	0.00
4	DHM-41	363.80	378.08	14.28	363.80	0.00	378.08	0.00	0.00	0.00
5	DI-1	368.20	371.60	3.40	368.20	0.00	371.60	0.00	10.00	0.00
6	DMH-13	345.20	349.70	4.50	345.20	0.00	349.70	0.00	0.00	0.00
7	DMH-17	340.70	347.56	6.86	340.70	0.00	347.56	0.00	10.00	0.00
8	DMH-19A	342.80	347.51	4.71	342.80	0.00	347.51	0.00	0.00	0.00
9	DMH-2	350.80	356.28	5.48	350.80	0.00	356.28	0.00	0.00	0.00
10	DMH-22	347.30	351.92	4.62	347.30	0.00	351.92	0.00	10.00	0.00
11	DMH-23A	347.10	352.12	5.02	347.10	0.00	352.12	0.00	0.00	0.00
12	DMH-27	354.10	358.87	4.77	354.10	0.00	358.87	0.00	10.00	0.00
13	DMH-28	353.50	358.65	5.15	353.50	0.00	358.65	0.00	10.00	0.00
14	DMH-30A	358.90	369.12	10.22	358.90	0.00	369.12	0.00	0.00	0.00
15	DMH-33A	361.50	374.69	13.19	361.50	0.00	374.69	0.00	0.00	0.00
16	DMH-37	360.84	368.44	7.60	360.84	0.00	368.44	0.00	0.00	0.00
17	DMH-39	359.10	365.20	6.10	359.10	0.00	365.20	0.00	0.00	0.00
18	DMH-4	349.43	352.93	3.50	349.43	0.00	352.93	0.00	0.00	0.00
19	DMH-40A	357.80	363.55	5.75	357.80	0.00	365.55	2.00	0.00	0.00
20	DMH-43A	373.90	379.98	6.08	373.90	0.00	379.98	0.00	0.00	0.00
21	DMH-46	372.20	378.27	6.07	372.20	0.00	378.27	0.00	0.00	0.00
22	DMH-6	348.76	353.36	4.60	348.76	0.00	353.36	0.00	0.00	0.00
23	DMH-8	344.66	350.88	6.22	344.66	0.00	350.88	0.00	0.00	0.00
24	DMH-9	339.68	349.50	9.82	339.68	0.00	349.50	0.00	0.00	0.00
25	EX_CB-16	340.70	344.05	3.35	340.70	0.00	344.05	0.00	0.00	0.00
26	EX_CB-16A	342.00	346.00	4.00	342.00	0.00	346.00	0.00	10.00	0.00
27	EX_CB-28	342.40	348.24	5.84	342.40	0.00	348.24	0.00	10.00	0.00
28	EX_CB-33	373.40	378.68	5.28	373.40	0.00	378.68	0.00	10.00	0.00
29	EX_CB-34	375.40	380.10	4.70	375.40	0.00	380.10	0.00	10.00	0.00
30	EX_CB-34A	378.00	382.00	4.00	378.00	0.00	382.00	0.00	0.00	0.00
31	EX_CB-36	372.40	376.41	4.01	372.40	0.00	376.41	0.00	10.00	0.00
32	EX_DMH-10	367.30	377.69	10.39	367.30	0.00	377.69	0.00	0.00	0.00
33	EX_DMH-6	350.30	356.18	5.88	350.30	0.00	356.18	0.00	0.00	0.00
34	EX_DMH-7	342.20	348.55	6.35	342.20	0.00	348.55	0.00	0.00	0.00
35	EX_DMH-9	365.10	380.10	15.00	365.10	0.00	380.10	0.00	0.00	0.00
36	Fallriver_Junction	325.00	331.00	6.00	325.00	0.00	331.00	0.00	0.00	0.00
37	I-91_Culvert-Out	330.50	340.00	9.50	330.00	-0.50	340.00	0.00	0.00	0.00
38	Outfall-11	338.96	339.96	1.00	338.96	0.00	339.96	0.00	0.00	0.00
39	Outfall-15	322.35	323.35	1.00	322.35	0.00	323.35	0.00	0.00	0.00
40	Outfall-15A	328.00	329.00	1.00	328.00	0.00	329.00	0.00	0.00	0.00
41	Outfall-1E	333.54	339.54	6.00	333.54	0.00	339.54	0.00	0.00	0.00
42	Outfall-24	336.46	342.46	6.00	336.46	0.00	342.46	0.00	0.00	0.00
43	RampCulvert-In	328.72	340.00	11.28	328.72	0.00	340.00	0.00	0.00	0.00
44	RampCulvert-Out	327.58	340.00	12.42	327.58	0.00	340.00	0.00	0.00	0.00

Junction Results

SN	Element ID	Peak Inflow (cfs)	Peak Lateral Inflow (cfs)	Max HGL Elevation Attained (ft)	Max HGL Depth Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Average HGL Elevation Attained (ft)	Average HGL Depth Attained (ft)	Time of Max HGL Occurrence (days hh:mm)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	Bald_Mtn	2.44	2.44	369.02	1.02	0.00	5.98	368.48	0.48	0 12:17	0 00:00	0.00	0.00
2	CB-36	0.01	0.01	361.46	0.04	0.00	5.27	361.43	0.01	0 14:34	0 00:00	0.00	0.00
3	CB-38	0.00	0.00	361.20	0.00	0.00	3.06	361.20	0.00	0 00:00	0 00:00	0.00	0.00
4	DHM-41	3.18	0.00	364.40	0.60	0.00	13.68	363.87	0.07	0 12:19	0 00:00	0.00	0.00
5	DI-1	0.38	0.38	368.43	0.23	0.00	3.17	368.22	0.02	0 12:19	0 00:00	0.00	0.00
6	DMH-13	0.41	0.00	345.43	0.23	0.00	4.27	345.23	0.03	0 12:08	0 00:00	0.00	0.00
7	DMH-17	1.79	0.00	341.17	0.47	0.00	6.39	340.75	0.05	0 12:08	0 00:00	0.00	0.00
8	DMH-19A	0.82	0.00	343.08	0.28	0.00	4.43	342.83	0.03	0 12:08	0 00:00	0.00	0.00
9	DMH-2	0.74	0.00	351.08	0.28	0.00	5.20	350.83	0.03	0 12:09	0 00:00	0.00	0.00
10	DMH-22	1.60	0.00	347.85	0.55	0.00	4.07	347.36	0.06	0 12:07	0 00:00	0.00	0.00
11	DMH-23A	1.60	0.00	347.29	0.19	0.00	4.83	347.12	0.02	0 12:07	0 00:00	0.00	0.00
12	DMH-27	0.48	0.00	354.36	0.26	0.00	4.51	354.13	0.03	0 12:07	0 00:00	0.00	0.00
13	DMH-28	0.96	0.00	353.78	0.28	0.00	4.87	353.53	0.03	0 12:07	0 00:00	0.00	0.00
14	DMH-30A	3.56	0.00	359.18	0.28	0.00	9.94	358.94	0.04	0 12:19	0 00:00	0.00	0.00
15	DMH-33A	3.36	0.00	362.16	0.66	0.00	12.53	361.58	0.08	0 12:19	0 00:00	0.00	0.00
16	DMH-37	0.23	0.00	360.98	0.14	0.00	7.46	360.86	0.02	0 12:07	0 00:00	0.00	0.00
17	DMH-39	0.23	0.00	359.22	0.12	0.00	5.98	359.12	0.02	0 12:08	0 00:00	0.00	0.00
18	DMH-4	0.30	0.00	349.64	0.21	0.00	3.29	349.45	0.02	0 12:08	0 00:00	0.00	0.00
19	DMH-40A	0.23	0.00	357.92	0.12	0.00	5.63	357.82	0.02	0 12:08	0 00:00	0.00	0.00
20	DMH-43A	0.04	0.00	374.02	0.12	0.00	5.96	373.92	0.02	0 12:14	0 00:00	0.00	0.00
21	DMH-46	0.32	0.00	372.80	0.60	0.00	5.47	372.69	0.49	0 12:07	0 00:00	0.00	0.00
22	DMH-6	1.17	0.00	349.12	0.36	0.00	4.24	348.80	0.04	0 12:09	0 00:00	0.00	0.00
23	DMH-8	1.57	0.00	345.23	0.57	0.00	5.65	344.72	0.06	0 12:08	0 00:00	0.00	0.00
24	DMH-9	2.09	0.00	342.44	2.76	0.00	7.06	341.89	2.21	0 12:08	0 00:00	0.00	0.00
25	EX_CB-16	0.01	0.01	340.75	0.05	0.00	3.30	340.71	0.01	0 13:52	0 00:00	0.00	0.00
26	EX_CB-16A	0.00	0.00	342.02	0.02	0.00	3.98	342.00	0.00	0 21:29	0 00:00	0.00	0.00
27	EX_CB-28	0.00	0.00	342.40	0.00	0.00	5.84	342.40	0.00	0 00:00	0 00:00	0.00	0.00
28	EX_CB-33	0.20	0.00	373.54	0.14	0.00	5.14	373.42	0.02	0 12:13	0 00:00	0.00	0.00
29	EX_CB-34	0.16	0.16	375.52	0.12	0.00	4.58	375.41	0.01	0 12:12	0 00:00	0.00	0.00
30	EX_CB-34A	0.00	0.00	378.00	0.00	0.00	4.00	378.00	0.00	0 00:00	0 00:00	0.00	0.00
31	EX_CB-36	0.00	0.00	372.80	0.40	0.00	3.61	372.69	0.29	0 12:07	0 00:00	0.00	0.00
32	EX_DMH-10	2.97	0.00	368.00	0.70	0.00	9.69	367.38	0.08	0 12:17	0 00:00	0.00	0.00
33	EX_DMH-6	0.53	0.00	350.48	0.18	0.00	5.70	350.32	0.02	0 12:08	0 00:00	0.00	0.00
34	EX_DMH-7	0.53	0.00	342.38	0.18	0.00	6.17	342.22	0.02	0 12:08	0 00:00	0.00	0.00
35	EX_DMH-9	2.96	0.00	365.93	0.83	0.00	14.17	365.19	0.09	0 12:19	0 00:00	0.00	0.00
36	Fallriver_Junction	7.34	0.00	325.42	0.42	0.00	19.58	325.05	0.05	0 12:12	0 00:00	0.00	0.00
37	I-91_Culvert-Out	3.56	0.00	331.11	0.61	0.00	8.89	330.57	0.07	0 12:21	0 00:00	0.00	0.00
38	Outfall-11	2.09	0.00	339.22	0.26	0.00	0.74	338.99	0.03	0 12:08	0 00:00	0.00	0.00
39	Outfall-15	0.17	0.00	339.86	17.51	0.00	0.95	336.60	14.25	0 13:28	0 00:00	0.00	0.00
40	Outfall-15A	1.96	0.00	336.07	8.07	0.00	0.72	335.23	7.23	0 12:08	0 00:00	0.00	0.00
41	Outfall-1E	3.56	0.00	334.05	0.51	0.00	5.49	333.61	0.07	0 12:18	0 00:00	0.00	0.00
42	Outfall-24	1.60	0.00	336.70	0.24	0.00	5.76	336.48	0.02	0 12:08	0 00:00	0.00	0.00
43	RampCulvert-In	4.27	0.00	329.46	0.74	0.00	10.54	328.82	0.10	0 12:20	0 00:00	0.00	0.00
44	RampCulvert-Out	4.25	0.00	327.85	0.27	0.00	12.15	327.61	0.03	0 12:22	0 00:00	0.00	0.00

Channel Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Shape	Height (ft)	Width (ft)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate
1	1D-Culvert	213.55	336.46	0.00	328.72	0.00	7.74	3.6200	Trapezoidal	3.000	8.000	0.0320	0.5000	0.5000	0.0000	0.00	No
2	CB-1_bypass	100.68	356.26	5.00	353.31	6.11	2.95	2.9300	Trapezoidal	0.500	25.510	0.0130	0.5000	0.5000	0.0000	0.00	No
3	CB-10_bypass	252.16	350.37	4.50	347.58	4.27	2.79	1.1100	Trapezoidal	0.500	25.060	0.0130	0.5000	0.5000	0.0000	0.00	No
4	CB-20_bypass	72.73	347.92	4.13	346.02	4.62	1.90	2.6100	Trapezoidal	0.500	25.000	0.0130	0.5000	0.5000	0.0000	0.00	No
5	CB-21_bypass	166.98	351.44	3.94	348.19	4.79	3.25	1.9500	Trapezoidal	0.500	25.060	0.0130	0.5000	0.5000	0.0000	0.00	No
6	CB-24_bypass	354.71	369.68	5.43	358.30	4.59	11.38	3.2100	Trapezoidal	0.500	26.050	0.0130	0.5000	0.5000	0.0000	0.00	No
7	CB-25A_bypass	277.20	352.34	4.14	347.92	4.13	4.42	1.5900	Trapezoidal	0.500	25.510	0.0130	0.5000	0.5000	0.0000	0.00	No
8	CB-26_bypass	207.40	357.99	3.50	352.34	4.14	5.65	2.7200	Trapezoidal	0.500	25.060	0.0130	0.5000	0.5000	0.0000	0.00	No
9	CB-27_bypass	350.32	369.60	4.20	358.35	3.86	11.25	3.2100	Trapezoidal	0.500	25.060	0.0130	0.5000	0.5000	0.0000	0.00	No
10	CB-29_bypass	90.00	378.24	7.79	375.05	8.71	3.19	3.5400	Trapezoidal	0.500	25.060	0.0130	0.5000	0.5000	0.0000	0.00	No
11	CB-29A_bypass	202.68	358.91	5.20	351.44	3.94	7.47	3.6900	Trapezoidal	0.500	25.060	0.0130	0.5000	0.5000	0.0000	0.00	No
12	CB-3_bypass	192.15	352.72	2.50	349.48	2.50	3.24	1.6900	Trapezoidal	0.500	25.510	0.0130	0.5000	0.5000	0.0000	0.00	No
13	CB-35_bypass	295.00	370.84	4.50	356.41	5.11	14.43	4.8900	Trapezoidal	0.500	25.060	0.0130	0.5000	0.5000	0.0000	0.00	No
14	CB-42A_bypass	340.69	378.24	4.50	370.05	5.80	8.19	2.4000	Trapezoidal	0.500	25.060	0.0130	0.5000	0.5000	0.0000	0.00	No
15	CB-44_bypass	291.31	379.83	5.00	374.95	4.50	4.88	1.6800	Trapezoidal	0.500	25.060	0.0130	0.5000	0.5000	0.0000	0.00	No
16	CB-45_bypass	92.00	377.87	4.50	375.40	0.00	2.47	2.6800	Trapezoidal	0.500	25.060	0.0130	0.5000	0.5000	0.0000	0.00	No
17	CB-5_bypass	223.18	353.31	6.11	350.37	4.50	2.94	1.3200	Trapezoidal	0.500	25.060	0.0130	0.5000	0.5000	0.0000	0.00	No
18	CB-8A_bypass	70.37	349.48	2.50	344.57	4.00	4.91	6.9800	Trapezoidal	0.500	25.000	0.0130	0.5000	0.5000	0.0000	0.00	No
19	Cobble_Waterway	363.16	330.50	0.00	328.72	0.00	1.78	0.4900	Trapezoidal	3.000	14.000	0.0320	0.5000	0.5000	0.0000	0.00	No
20	EX_CB-1_bypass	126.22	356.30	4.40	352.72	2.50	3.58	2.8400	Trapezoidal	0.500	25.510	0.0130	0.5000	0.5000	0.0000	0.00	No
21	EX_CB-12_bypass	124.46	348.19	4.79	347.49	2.50	0.70	0.5600	Trapezoidal	0.500	25.510	0.0130	0.5000	0.5000	0.0000	0.00	No
22	EX_CB-27_bypass	103.70	356.41	5.11	351.50	0.00	4.91	4.7300	Trapezoidal	0.500	25.060	0.0130	0.5000	0.5000	0.0000	0.00	No
23	FallRiver	100.00	325.00	0.00	324.50	0.00	0.50	0.5000	Trapezoidal	20.000	50.000	0.0320	0.5000	0.5000	0.0000	0.00	No
24	FR-1	84.74	335.53	-3.43	325.00	0.00	10.53	12.4300	Trapezoidal	1.000	3.000	0.0320	0.5000	0.5000	0.0000	0.00	No
25	FR2	138.29	339.81	17.46	325.00	0.00	14.81	10.7100	Trapezoidal	1.000	3.000	0.0320	0.5000	0.5000	0.0000	0.00	No
26	FR3	378.68	327.58	0.00	325.00	0.00	2.58	0.6800	Trapezoidal	10.000	30.000	0.0320	0.5000	0.5000	0.0000	0.00	No
27	FR4	87.86	335.79	7.79	325.00	0.00	10.79	12.2800	Trapezoidal	1.000	3.000	0.0320	0.5000	0.5000	0.0000	0.00	No

Channel Results

SN	Element ID	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Travel Time (min)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Froude Number	Reported Condition
1	1D-Culvert	1.60	0 12:08	168.37	0.01	1.63	2.18	0.46	0.15	0.00		
2	CB-1_bypass	0.04	0 12:12	49.28	0.00	1.31	1.28	0.04	0.07	0.00		
3	CB-10_bypass	0.04	0 12:07	29.56	0.00	0.79	5.32	0.06	0.13	0.00		
4	CB-20_bypass	0.13	0 12:07	139.14	0.00	0.29	4.18	0.02	0.05	0.00		
5	CB-21_bypass	0.09	0 12:07	39.20	0.00	1.53	1.82	0.05	0.10	0.00		
6	CB-24_bypass	0.06	0 12:07	55.10	0.00	0.93	6.36	0.04	0.07	0.00		
7	CB-25A_bypass	0.06	0 12:07	36.35	0.00	2.29	2.02	0.03	0.06	0.00		
8	CB-26_bypass	0.11	0 12:07	46.38	0.00	1.48	2.34	0.05	0.11	0.00		
9	CB-27_bypass	0.02	0 12:07	51.26	0.00	0.58	10.07	0.04	0.08	0.00		
10	CB-29_bypass	0.08	0 12:07	60.04	0.00	2.18	0.69	0.04	0.07	0.00		
11	CB-29A_bypass	0.09	0 12:07	53.94	0.00	1.49	2.27	0.05	0.10	0.00		
12	CB-3_bypass	0.07	0 12:08	37.38	0.00	2.44	1.31	0.03	0.07	0.00		
13	CB-35_bypass	0.04	0 12:07	62.14	0.00	1.33	3.70	0.03	0.07	0.00		
14	CB-42A_bypass	0.03	0 12:07	40.82	0.00	1.18	4.81	0.03	0.06	0.00		
15	CB-44_bypass	0.01	0 12:14	36.37	0.00	0.55	8.83	0.03	0.06	0.00		
16	CB-45_bypass	0.08	0 12:07	46.04	0.00	1.51	1.02	0.05	0.09	0.00		
17	CB-5_bypass	0.03	0 12:08	32.25	0.00	0.85	4.38	0.04	0.08	0.00		
18	CB-8A_bypass	0.34	0 11:35	227.39	0.00	0.00		0.01	0.01	0.00		
19	Cobble_Waterway	3.54	0 12:21	104.81	0.03	1.57	3.86	0.67	0.22	0.00		
20	EX_CB-1_bypass	0.16	0 12:08	48.49	0.00	1.74	1.21	0.06	0.12	0.00		
21	EX_CB-12_bypass	0.03	0 12:07	21.59	0.00	0.58	3.58	0.08	0.15	0.00		
22	EX_CB-27_bypass	0.06	0 12:07	61.14	0.00	1.69	1.02	0.04	0.07	0.00		
23	FallRiver	7.18	0 12:12	8532.83	0.00	1.68	0.99	0.41	0.02	0.00		
24	FR-1	2.09	0 12:08	24.45	0.09	5.02	0.28	0.34	0.34	0.00		
25	FR2	0.11	0 13:28	19.71	0.01	0.99	2.33	0.21	0.21	0.00		
26	FR3	4.25	0 12:22	2308.05	0.00	1.26	5.01	0.34	0.03	0.00		
27	FR4	1.96	0 12:08	21.11	0.09	4.74	0.31	0.34	0.34	0.00		

Pipe Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Pipe Shape	Pipe Diameter or Height (in)	Pipe Width (in)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate	No. of Barrels
1	I-91-Culvert	240.00	333.54	0.00	330.50	0.00	3.04	1.2700	CIRCULAR	24.000	24.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
2	p10-9	18.00	345.87	0.00	345.28	5.60	0.59	3.2800	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
3	p1-10	19.49	368.20	0.00	367.90	0.60	0.30	1.5400	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
4	p1-2	7.00	351.26	0.00	351.00	0.20	0.26	3.7100	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
5	p12-8	4.00	346.98	0.00	346.70	1.50	0.28	7.0000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
6	p13-8	44.00	345.20	0.00	344.76	0.10	0.44	1.0000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
7	p14-Out	135.00	340.57	0.00	322.35	0.00	18.22	13.5000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
8	p15B-Out	90.00	339.60	0.00	328.00	0.00	11.60	12.8900	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
9	p16-17	25.00	343.31	0.00	343.06	2.36	0.25	1.0000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
10	p17-15B	49.56	340.50	-0.20	339.70	0.10	0.80	1.6100	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
11	p18-19A	2.00	344.99	0.00	344.51	1.71	0.48	24.0000	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
12	p19-17	52.00	342.80	0.00	341.10	0.40	1.70	3.2700	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
13	p19-22	87.76	348.80	0.00	347.60	0.30	1.20	1.3700	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
14	p20-17	73.00	343.79	0.00	343.06	2.36	0.73	1.0000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
15	p21-22	6.00	347.50	0.00	347.40	0.10	0.10	1.6700	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
16	p22-23A	3.00	347.30	0.00	347.20	0.10	0.10	3.3300	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
17	p23-Out	30.00	347.10	0.00	336.46	0.00	10.64	35.4700	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
18	p25-18	51.00	348.20	0.00	347.40	0.10	0.80	1.5700	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
19	p2-6	106.00	350.80	0.00	348.86	0.10	1.94	1.8300	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
20	p26-27	21.00	354.49	0.00	354.28	0.18	0.21	1.0000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
21	p27-28	44.50	354.10	0.00	353.60	0.10	0.50	1.1200	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
22	p28-22	200.00	353.50	0.00	347.70	0.40	5.80	2.9000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
23	p29-28	6.00	353.71	0.00	353.61	0.11	0.10	1.6700	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
24	p30-Out	100.00	358.90	0.00	333.54	0.00	25.36	25.3600	CIRCULAR	15.000	15.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
25	p31-30	45.00	365.40	0.00	364.00	5.10	1.40	3.1100	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
26	p32-30	31.00	364.25	0.00	363.90	5.00	0.35	1.1300	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
27	p33-30	199.55	361.50	0.00	359.20	0.30	2.30	1.1500	CIRCULAR	15.000	15.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
28	p3-4	4.00	350.22	0.00	349.63	0.20	0.59	14.7500	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
29	p34-33	36.00	365.00	-5.45	361.80	0.30	3.20	8.8900	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
30	p35-37	62.00	366.34	0.00	363.44	2.60	2.90	4.6800	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
31	p36-37	44.00	361.42	0.00	360.94	0.10	0.48	1.0900	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
32	p37-39	54.00	360.84	0.00	359.20	0.10	1.64	3.0400	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
33	p38-39	2.00	361.20	0.00	361.10	2.00	0.10	5.0000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
34	p39-40	20.00	359.10	0.00	358.05	0.25	1.05	5.2500	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
35	p40-EX6	172.00	357.80	0.00	350.30	0.00	7.50	4.3600	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
36	p41-33	152.43	363.80	0.00	361.60	0.10	2.20	1.4400	CIRCULAR	15.000	15.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
37	p41-9	301.09	367.30	0.00	365.30	0.20	2.00	0.6600	CIRCULAR	15.000	15.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
38	p42-41	17.00	373.74	0.00	373.58	9.78	0.16	0.9400	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
39	p43-EX33	11.91	373.50	-0.40	373.90	0.50	-0.40	-3.3600	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
40	p44-43	78.00	374.83	0.00	374.05	0.15	0.78	1.0000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
41	p45-46	4.00	373.37	0.00	373.27	1.07	0.10	2.5000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
42	p4-6	24.00	349.43	0.00	349.16	0.40	0.27	1.1200	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
43	p46-10	37.55	372.70	0.50	368.00	0.70	4.70	12.5200	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
44	p5-6	4.00	350.22	3.02	349.16	0.40	1.06	26.5000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
45	p6-8	140.00	348.76	0.00	346.38	1.72	2.38	1.7000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
46	p7-9	50.00	340.30	0.00	339.78	0.10	0.52	1.0400	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
47	p8-9	23.00	344.66	0.00	344.43	4.75	0.23	1.0000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
48	p9-Out	79.00	342.00	2.32	335.53	-3.43	6.47	8.1900	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
49	pBMtn-10	64.81	368.50	0.50	367.40	0.10	1.10	1.7000	CIRCULAR	15.000	15.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
50	pEX_DMH-9-41	250.42	365.10	0.00	364.00	0.20	1.10	0.4400	CIRCULAR	15.000	15.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
51	pEX1-2	40.19	351.90	0.00	350.90	0.10	1.00	2.4900	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
52	pEX12-19	110.00	343.40	0.00	343.20	0.40	0.20	0.1800	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
53	pEX16-15B	113.87	340.70	0.00	339.70	0.10	1.00	0.8800	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
54	pEX16A-EX16	64.67	342.00	0.00	340.70	0.00	1.30	2.0100	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
55	pEX27-EX6	32.60	351.30	0.00	350.60	0.30	0.70	2.1500	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
56	pEX28-EX7	34.39	342.40	0.00	342.30	0.10	0.10	0.2900	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
57	pEX33-41	88.56	373.40	0.00	372.20	8.40	1.20	1.3600	CIRCULAR	15.000	15.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
58	pEX34A-EX34	78.21	378.00	0.00	376.10	0.70	1.90	2.4300	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
59	pEX34-EX33	60.73	375.40	0.00	373.90	0.50	1.50	2.4700	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
60	pEX36-43	19.28	372.40	0.00	372.30	0.10	0.10	0.5200	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
61	pEX6-EX7(MH)	157.05	350.30	0.00	342.50	0.30	7.80	4.9700	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
62	pEX7(MH)-Out	127.60	342.20	0.00	336.00	0.00	6.20	4.8600	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
63	pEX9-15B	27.57	341.40	0.00	340.10	0.50	1.30	4.7200	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
64	Ramp_Culvert	134.00	328.72	0.00	327.58	0.00	1.14	0.8500	CIRCULAR	24.000	24.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1

Pipe Results

SN	Element ID	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Travel Time (min)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Froude Number	Reported Condition
1	I-91-Culvert	3.56	0 12:19	25.46	0.14	4.96	0.81	0.56	0.28	0.00		Calculated
2	p10-9	0.21	0 12:07	6.45	0.03	3.50	0.09	0.13	0.13	0.00		Calculated
3	p1-10	0.38	0 12:19	4.42	0.09	3.11	0.10	0.21	0.21	0.00		Calculated
4	p1-2	0.21	0 12:12	6.87	0.03	3.40	0.03	0.13	0.13	0.00		Calculated
5	p12-8	0.41	0 12:08	9.43	0.04	4.50	0.01	0.17	0.17	0.00		Calculated
6	p13-8	0.41	0 12:08	3.56	0.11	1.89	0.39	0.35	0.35	0.00		Calculated
7	p14-Out	0.17	0 11:35	13.09	0.01	1.88	1.20	0.54	0.54	0.00		Calculated
8	p15B-Out	1.96	0 12:08	12.79	0.15	3.75	0.40	0.63	0.63	0.00		Calculated
9	p16-17	0.53	0 12:08	3.56	0.15	2.95	0.14	0.28	0.28	0.00		Calculated
10	p17-15B	1.79	0 12:08	5.06	0.35	5.34	0.15	0.44	0.44	0.00		Calculated
11	p18-19A	0.64	0 12:08	15.13	0.04	6.26	0.01	0.19	0.19	0.00		Calculated
12	p19-17	0.82	0 12:08	5.58	0.15	4.84	0.18	0.27	0.27	0.00		Calculated
13	p19-22	0.00	0 00:00	4.17	0.00	0.00		0.13	0.13	0.00		Calculated
14	p20-17	0.45	0 12:07	3.56	0.13	2.98	0.41	0.25	0.25	0.00		Calculated
15	p21-22	0.32	0 12:07	4.60	0.07	1.67	0.06	0.41	0.41	0.00		Calculated
16	p22-23A	1.60	0 12:07	6.50	0.25	4.73	0.01	0.45	0.45	0.00		Calculated
17	p23-Out	1.60	0 12:07	21.22	0.08	12.83	0.04	0.22	0.22	0.00		Calculated
18	p25-18	0.32	0 12:07	4.46	0.07	1.74	0.49	0.32	0.32	0.00		Calculated
19	p2-6	0.73	0 12:09	4.82	0.15	4.29	0.41	0.27	0.27	0.00		Calculated
20	p26-27	0.48	0 12:07	3.56	0.13	2.85	0.12	0.27	0.27	0.00		Calculated
21	p27-28	0.48	0 12:07	3.78	0.13	3.10	0.24	0.25	0.25	0.00		Calculated
22	p28-22	0.96	0 12:07	6.07	0.16	5.54	0.60	0.27	0.27	0.00		Calculated
23	p29-28	0.48	0 12:07	4.60	0.10	3.08	0.03	0.25	0.25	0.00		Calculated
24	p30-Out	3.56	0 12:19	32.53	0.11	10.63	0.16	0.40	0.32	0.00		Calculated
25	p31-30	0.11	0 12:07	6.28	0.02	2.98	0.25	0.10	0.10	0.00		Calculated
26	p32-30	0.34	0 12:07	3.79	0.09	2.78	0.19	0.21	0.21	0.00		Calculated
27	p33-30	3.36	0 12:19	6.94	0.48	5.37	0.62	0.63	0.51	0.00		Calculated
28	p3-4	0.30	0 12:08	13.68	0.02	5.52	0.01	0.12	0.12	0.00		Calculated
29	p34-33	0.40	0 12:07	17.46	0.02	8.63	0.07	0.21	0.21	0.00		Calculated
30	p35-37	0.23	0 12:07	7.71	0.03	4.29	0.24	0.12	0.12	0.00		Calculated
31	p36-37	0.01	0 14:34	3.72	0.00	0.98	0.75	0.04	0.04	0.00		Calculated
32	p37-39	0.23	0 12:07	6.21	0.04	3.66	0.25	0.13	0.13	0.00		Calculated
33	p38-39	0.00	0 00:00	7.97	0.00	0.00		0.00	0.00	0.00		Calculated
34	p39-40	0.23	0 12:08	8.16	0.03	4.29	0.08	0.12	0.12	0.00		Calculated
35	p40-EX6	0.23	0 12:08	7.44	0.03	3.11	0.92	0.15	0.15	0.00		Calculated
36	p41-33	3.18	0 12:19	7.76	0.41	5.71	0.44	0.58	0.46	0.00		Calculated
37	p41-9	2.96	0 12:18	5.26	0.56	4.28	1.17	0.69	0.55	0.00		Calculated
38	p42-41	0.10	0 12:07	3.46	0.03	1.86	0.15	0.12	0.12	0.00		Calculated
39	p43-EX33	0.04	0 12:14	0.33	0.11	0.87	0.23	0.10	0.10	0.00		Calculated
40	p44-43	0.04	0 12:14	3.56	0.01	1.44	0.90	0.07	0.07	0.00		Calculated
41	p45-46	0.32	0 12:07	5.63	0.06	3.06	0.02	0.19	0.19	0.00		Calculated
42	p4-6	0.30	0 12:08	3.78	0.08	2.65	0.15	0.20	0.20	0.00		Calculated
43	p46-10	0.32	0 12:07	37.16	0.01	6.27	0.10	0.10	0.07	0.00		Calculated
44	p5-6	0.15	0 12:08	18.34	0.01	6.11	0.01	0.07	0.07	0.00		Calculated
45	p6-8	1.17	0 12:09	4.65	0.25	4.77	0.49	0.35	0.35	0.00		Calculated
46	p7-9	0.44	0 11:39	3.63	0.12	0.70	1.19	1.00	1.00	3907.00		SURCHARGED
47	p8-9	1.57	0 12:08	3.56	0.44	3.83	0.10	0.52	0.52	0.00		Calculated
48	p9-Out	2.09	0 12:08	6.99	0.30	8.46	0.16	0.35	0.35	0.00		Calculated
49	pBMtn-10	2.44	0 12:17	8.42	0.29	4.59	0.24	0.56	0.45	0.00		Calculated
50	pEX_DMH-9-41	2.96	0 12:19	4.28	0.69	3.78	1.10	0.76	0.61	0.00		Calculated
51	pEX1-2	0.55	0 12:08	5.62	0.10	4.26	0.16	0.22	0.22	0.00		Calculated
52	pEX12-19	0.18	0 12:08	1.52	0.12	1.44	1.27	0.22	0.22	0.00		Calculated
53	pEX16-15B	0.01	0 13:52	3.34	0.00	1.03	1.84	0.08	0.08	0.00		Calculated
54	pEX16A-EX16	0.00	0 21:29	5.05	0.00	0.40	2.69	0.03	0.03	0.00		Calculated
55	pEX27-EX6	0.30	0 12:07	5.22	0.06	3.42	0.16	0.17	0.17	0.00		Calculated
56	pEX28-EX7	0.00	0 00:00	1.92	0.00	0.00		0.04	0.04	0.00		Calculated
57	pEX33-41	0.20	0 12:13	7.52	0.03	2.58	0.57	0.14	0.11	0.00		Calculated
58	pEX34A-EX34	0.00	0 00:00	5.55	0.00	0.00		0.00	0.00	0.00		Calculated
59	pEX34-EX33	0.16	0 12:12	5.60	0.03	3.10	0.33	0.12	0.12	0.00		Calculated
60	pEX36-43	0.00	0 11:58	7.57	0.00	0.04	8.03	0.45	0.30	0.00		Calculated
61	pEX6-EX7(MH)	0.53	0 12:08	7.94	0.07	5.64	0.46	0.18	0.18	0.00		Calculated
62	pEX7(MH)-Out	0.53	0 12:08	7.85	0.07	5.57	0.38	0.18	0.18	0.00		Calculated
63	pEX9-15B	0.12	0 12:09	7.74	0.02	3.48	0.13	0.09	0.09	0.00		Calculated
64	Ramp_Culvert	4.25	0 12:20	20.87	0.20	6.86	0.33	0.50	0.25	0.00		Calculated

Inlet Input

SN	Element ID	Inlet Manufacturer	Manufacturer Part Number	Inlet Location	Number of Inlets	Catchbasin Invert Elevation (ft)	Max (Rim) Elevation (ft)	Inlet Depth (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Ponded Area (ft^2)	Grate Clogging Factor (%)
1	CB-1	FHWA HEC-22 GENERIC	N/A	On Grade	1	351.26	356.26	5.00	351.26	0.00	N/A	0.00
2	CB-10	FHWA HEC-22 GENERIC	N/A	On Grade	1	345.87	350.37	4.50	345.87	0.00	N/A	0.00
3	CB-12A	FHWA HEC-22 GENERIC	N/A	On Grade	1	346.98	349.48	2.50	346.98	0.00	N/A	0.00
4	CB-14	FHWA HEC-22 GENERIC	N/A	On Sag	1	340.57	344.57	4.00	340.57	0.00	10.00	0.00
5	CB-15B	FHWA HEC-22 GENERIC	N/A	On Sag	1	339.60	345.67	6.07	339.60	0.00	10.00	0.00
6	CB-16	FHWA HEC-22 GENERIC	N/A	On Sag	1	343.31	347.58	4.27	343.31	0.00	10.00	0.00
7	CB-18	FHWA HEC-22 GENERIC	N/A	On Sag	1	344.99	347.49	2.50	342.80	-2.19	10.00	0.00
8	CB-20	FHWA HEC-22 GENERIC	N/A	On Grade	1	343.79	347.92	4.13	343.79	0.00	N/A	0.00
9	CB-21	FHWA HEC-22 GENERIC	N/A	On Grade	1	347.50	351.44	3.94	347.50	0.00	N/A	0.00
10	CB-25	FHWA HEC-22 GENERIC	N/A	On Grade	1	348.20	352.34	4.14	348.20	0.00	N/A	0.00
11	CB-26	FHWA HEC-22 GENERIC	N/A	On Grade	1	354.49	357.99	3.50	354.49	0.00	N/A	0.00
12	CB-29A	FHWA HEC-22 GENERIC	N/A	On Grade	1	353.71	358.91	5.20	353.71	0.00	N/A	0.00
13	CB-3	FHWA HEC-22 GENERIC	N/A	On Grade	1	350.22	352.72	2.50	350.22	0.00	N/A	0.00
14	CB-31A	FHWA HEC-22 GENERIC	N/A	On Grade	1	365.40	369.65	4.25	365.40	0.00	N/A	0.00
15	CB-32A	FHWA HEC-22 GENERIC	N/A	On Grade	1	364.25	370.05	5.80	364.25	0.00	N/A	0.00
16	CB-34A	FHWA HEC-22 GENERIC	N/A	On Grade	1	370.45	374.95	4.50	370.45	0.00	N/A	0.00
17	CB-35	FHWA HEC-22 GENERIC	N/A	On Grade	1	366.34	370.84	4.50	366.34	0.00	N/A	0.00
18	CB-42A	FHWA HEC-22 GENERIC	N/A	On Grade	1	373.74	377.24	3.50	373.74	0.00	N/A	0.00
19	CB-44	FHWA HEC-22 GENERIC	N/A	On Grade	1	374.83	379.83	5.00	374.83	0.00	N/A	0.00
20	CB-45	FHWA HEC-22 GENERIC	N/A	On Grade	1	373.37	377.87	4.50	373.37	0.00	N/A	0.00
21	CB-5	FHWA HEC-22 GENERIC	N/A	On Grade	1	347.20	353.31	6.11	347.20	0.00	N/A	0.00
22	CB-7	FHWA HEC-22 GENERIC	N/A	On Sag	1	340.30	350.66	10.36	340.30	0.00	10.00	0.00
23	CB-9	FHWA HEC-22 GENERIC	N/A	On Sag	1	341.40	346.02	4.62	341.40	0.00	0.00	0.00
24	EX_CB-1	FHWA HEC-22 GENERIC	N/A	On Grade	1	351.90	356.30	4.40	351.90	0.00	N/A	0.00
25	EX_CB-12	FHWA HEC-22 GENERIC	N/A	On Grade	1	343.40	348.19	4.79	343.40	0.00	N/A	0.00
26	EX_CB-19	FHWA HEC-22 GENERIC	N/A	On Sag	2	348.80	350.66	1.86	348.80	0.00	10.00	0.00
27	EX_CB-27	FHWA HEC-22 GENERIC	N/A	On Grade	1	351.30	356.41	5.11	351.30	0.00	N/A	0.00

Roadway & Gutter Input

SN	Element ID	Roadway Longitudinal Slope (ft/ft)	Roadway Cross Slope (ft/ft)	Roadway Manning's Roughness	Gutter Cross Slope (ft/ft)	Gutter Width (ft)	Gutter Depression (in)	Allowable Spread (ft)
1	CB-1	0.0320	0.0200	0.0130	0.0200	2.00	0.0000	10.50
2	CB-10	0.0170	0.0200	0.0130	0.0200	2.00	0.0000	10.50
3	CB-12A	0.0100	0.0200	0.0130	0.0200	2.00	0.0000	10.50
4	CB-14	N/A	0.0170	0.0130	0.0200	78.00	0.0000	10.50
5	CB-15B	N/A	0.0200	0.0130	0.0200	2.00	0.0656	10.50
6	CB-16	N/A	0.0200	0.0130	0.0200	2.00	0.0000	10.50
7	CB-18	N/A	0.0200	0.0130	0.0200	2.00	0.0000	10.50
8	CB-20	0.0100	0.0200	0.0130	0.0200	2.00	0.0000	10.50
9	CB-21	0.0100	0.0200	0.0130	0.0200	2.00	0.0000	10.50
10	CB-25	0.0314	0.0200	0.0130	0.0200	2.00	0.0000	10.50
11	CB-26	0.0314	0.0200	0.0130	0.0200	2.00	0.0000	10.50
12	CB-29A	0.0314	0.0200	0.0130	0.0200	2.00	0.0000	10.50
13	CB-3	0.0200	0.0200	0.0130	0.0200	2.00	0.0000	10.50
14	CB-31A	0.0314	0.0200	0.0130	0.0200	2.00	0.0000	10.50
15	CB-32A	0.0314	0.0200	0.0130	0.0200	2.00	0.0000	10.50
16	CB-34A	0.0314	0.0200	0.0130	0.0200	2.00	0.0000	10.50
17	CB-35	0.0400	0.0200	0.0130	0.0200	2.00	0.0000	10.50
18	CB-42A	0.0150	0.0200	0.0130	0.0200	2.00	0.0000	10.50
19	CB-44	0.0100	0.0200	0.0130	0.0200	2.00	0.0000	10.50
20	CB-45	0.0144	0.0200	0.0130	0.0200	2.00	0.0000	10.50
21	CB-5	0.0200	0.0200	0.0130	0.0200	2.00	0.0000	10.50
22	CB-7	N/A	0.0200	0.0130	0.0200	43.00	0.0000	10.50
23	CB-9	N/A	0.0200	0.0130	0.0200	2.00	0.0656	10.50
24	EX_CB-1	0.0320	0.0200	0.0130	0.0200	2.00	0.0000	10.50
25	EX_CB-12	0.0300	0.0200	0.0130	0.0200	2.00	0.0000	10.50
26	EX_CB-19	N/A	0.0200	0.0130	0.0200	2.00	0.0656	10.50
27	EX_CB-27	0.0500	0.0200	0.0160	0.0200	2.00	0.0000	10.50

Inlet Results

SN	Element ID	Peak Flow (cfs)	Peak Lateral Inflow (cfs)	Peak Flow Intercepted by Inlet (cfs)	Peak Flow Bypassing Inlet (cfs)	Inlet Efficiency during Peak Flow (%)	Max Gutter Spread during Peak Flow (ft)	Max Gutter Water Elev. during Peak Flow (ft)	Max Gutter Water Depth during Peak Flow (ft)	Time of Max Depth Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	CB-1	0.25	0.25	0.24	0.02	93.34	3.22	356.32	0.06	0 12:12	0.00	0.00
2	CB-10	0.25	0.21	0.23	0.02	92.46	3.59	350.44	0.07	0 12:07	0.00	0.00
3	CB-12A	0.52	0.46	0.40	0.12	76.97	5.25	349.58	0.10	0 12:08	0.00	0.00
4	CB-14	0.03	0.03	N/A	N/A	N/A	1.65	344.05	-0.52	0 11:35	0.00	0.00
5	CB-15B	0.10	0.10	N/A	N/A	N/A	2.61	345.79	0.12	0 12:08	0.00	0.00
6	CB-16	0.53	0.49	N/A	N/A	N/A	5.77	347.68	0.10	0 12:08	0.00	0.00
7	CB-18	0.64	0.61	N/A	N/A	N/A	6.40	347.60	0.11	0 12:08	0.00	0.00
8	CB-20	0.58	0.52	0.44	0.14	75.28	5.46	348.03	0.11	0 12:07	0.00	0.00
9	CB-21	0.41	0.32	0.33	0.08	80.74	4.79	351.54	0.10	0 12:07	0.00	0.00
10	CB-25	0.38	0.28	0.34	0.05	88.03	3.77	352.42	0.08	0 12:07	0.00	0.00
11	CB-26	0.59	0.57	0.48	0.11	81.60	4.42	358.08	0.09	0 12:07	0.00	0.00
12	CB-29A	0.57	0.51	0.47	0.10	81.98	4.39	359.00	0.09	0 12:07	0.00	0.00
13	CB-3	0.36	0.21	0.31	0.05	86.13	4.03	352.80	0.08	0 12:08	0.00	0.00
14	CB-31A	0.14	0.14	0.13	0.00	98.51	2.56	369.70	0.05	0 12:07	0.00	0.00
15	CB-32A	0.40	0.37	0.35	0.05	87.41	3.83	370.13	0.08	0 12:07	0.00	0.00
16	CB-34A	0.48	0.48	0.41	0.07	84.73	4.10	375.03	0.08	0 12:04	0.00	0.00
17	CB-35	0.27	0.19	0.25	0.02	94.01	3.14	370.90	0.06	0 12:07	0.00	0.00
18	CB-42A	0.13	0.13	0.13	0.00	96.65	2.89	377.30	0.06	0 12:07	0.00	0.00
19	CB-44	0.05	0.05	0.05	0.00	99.98	2.10	379.87	0.04	0 12:14	0.00	0.00
20	CB-45	0.41	0.41	0.34	0.07	82.79	4.45	377.96	0.09	0 12:07	0.00	0.00
21	CB-5	0.19	0.15	0.18	0.01	94.55	3.13	353.37	0.06	0 12:08	0.00	0.00
22	CB-7	0.32	0.32	N/A	N/A	N/A	4.42	350.32	-0.34	0 11:40	0.00	0.00
23	CB-9	0.13	0.01	N/A	N/A	N/A	2.91	346.14	0.12	0 12:09	0.00	0.00
24	EX_CB-1	0.70	0.70	0.55	0.15	78.78	4.72	356.39	0.09	0 12:08	0.00	0.00
25	EX_CB-12	0.22	0.12	0.20	0.01	94.80	3.07	348.25	0.06	0 12:07	0.00	0.00
26	EX_CB-19	0.00	0.00	N/A	N/A	N/A	1.00	350.74	0.08	0 00:00	0.00	0.00
27	EX_CB-27	0.36	0.32	0.32	0.04	89.24	3.64	356.48	0.07	0 12:07	0.00	0.00

Project Description

File Name ..... SSA Analysis - PROP2.SPF

Rainfall Details

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
49		Time Series	10-yr	Cumulative	inches	Massachusetts	Franklin	10.00	4.30	SCS Type III 24-hr

Junction Results

SN	Element ID	Peak Inflow (cfs)	Peak Lateral Inflow (cfs)	Max HGL Elevation Attained (ft)	Max HGL Depth Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Average HGL Elevation Attained (ft)	Average HGL Depth Attained (ft)	Time of Max HGL Occurrence (days hh:mm)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	Bald_Mtn	6.36	6.36	375.00	7.00	0.00	0.00	368.74	0.74	0 12:14	0 12:16	0.06	7.00
2	CB-36	0.18	0.18	361.58	0.16	0.00	5.15	361.44	0.02	0 12:14	0 00:00	0.00	0.00
3	CB-38	0.00	0.00	361.20	0.00	0.00	3.06	361.20	0.00	0 00:00	0 00:00	0.00	0.00
4	DHM-41	7.79	0.00	366.56	2.76	0.00	11.52	363.98	0.18	0 12:17	0 00:00	0.00	0.00
5	DI-1	1.25	1.25	374.26	6.06	2.66	0.00	368.45	0.25	0 12:16	0 12:09	0.01	18.00
6	DMH-13	0.64	0.00	345.62	0.42	0.00	4.08	345.24	0.04	0 12:09	0 00:00	0.00	0.00
7	DMH-17	2.66	0.00	341.32	0.62	0.00	6.24	340.77	0.07	0 12:08	0 00:00	0.00	0.00
8	DMH-19A	1.26	0.00	343.15	0.35	0.00	4.36	342.85	0.05	0 12:08	0 00:00	0.00	0.00
9	DMH-2	1.37	0.00	351.18	0.38	0.00	5.10	350.85	0.05	0 12:09	0 00:00	0.00	0.00
10	DMH-22	2.39	0.00	348.01	0.71	0.00	3.91	347.38	0.08	0 12:07	0 00:00	0.00	0.00
11	DMH-23A	2.39	0.00	347.34	0.24	0.00	4.78	347.13	0.03	0 12:07	0 00:00	0.00	0.00
12	DMH-27	0.66	0.00	354.41	0.31	0.00	4.46	354.14	0.04	0 12:07	0 00:00	0.00	0.00
13	DMH-28	1.34	0.00	353.83	0.33	0.00	4.82	353.55	0.05	0 12:07	0 00:00	0.00	0.00
14	DMH-30A	8.25	0.00	359.33	0.43	0.00	9.79	358.96	0.06	0 12:16	0 00:00	0.00	0.00
15	DMH-33A	7.90	0.00	367.45	5.95	0.00	7.24	361.69	0.19	0 12:10	0 00:00	0.00	0.00
16	DMH-37	0.52	0.00	361.05	0.21	0.00	7.39	360.87	0.03	0 12:09	0 00:00	0.00	0.00
17	DMH-39	0.52	0.00	359.30	0.20	0.00	5.90	359.13	0.03	0 12:09	0 00:00	0.00	0.00
18	DMH-4	0.65	0.00	349.75	0.32	0.00	3.18	349.46	0.03	0 12:08	0 00:00	0.00	0.00
19	DMH-40A	0.52	0.00	357.98	0.18	0.00	5.57	357.83	0.03	0 12:09	0 00:00	0.00	0.00
20	DMH-43A	0.17	0.00	374.14	0.24	0.00	5.84	373.93	0.03	0 12:11	0 00:00	0.00	0.00
21	DMH-46	0.61	0.00	374.19	1.99	0.00	4.08	372.73	0.53	0 12:16	0 00:00	0.00	0.00
22	DMH-6	2.31	0.00	349.30	0.54	0.00	4.06	348.82	0.06	0 12:08	0 00:00	0.00	0.00
23	DMH-8	2.93	0.00	345.61	0.95	0.00	5.27	344.76	0.10	0 12:09	0 00:00	0.00	0.00
24	DMH-9	3.71	0.00	342.63	2.95	0.00	6.87	341.96	2.28	0 12:08	0 00:00	0.00	0.00
25	EX_CB-16	0.23	0.20	340.88	0.18	0.00	3.17	340.73	0.03	0 12:32	0 00:00	0.00	0.00
26	EX_CB-16A	0.06	0.06	342.07	0.07	0.00	3.93	342.01	0.01	0 12:48	0 00:00	0.00	0.00
27	EX_CB-28	0.00	0.00	342.45	0.05	0.00	5.79	342.40	0.00	0 12:09	0 00:00	0.00	0.00
28	EX_CB-33	0.54	0.00	373.64	0.24	0.00	5.04	373.43	0.03	0 12:11	0 00:00	0.00	0.00
29	EX_CB-34	0.37	0.37	375.58	0.18	0.00	4.52	375.42	0.02	0 12:11	0 00:00	0.00	0.00
30	EX_CB-34A	0.00	0.00	378.02	0.02	0.00	3.98	378.00	0.00	0 15:41	0 00:00	0.00	0.00
31	EX_CB-36	0.27	0.00	374.19	1.79	0.00	2.22	372.74	0.34	0 12:16	0 00:00	0.00	0.00
32	EX_DMH-10	7.41	0.00	374.19	6.89	0.00	3.50	367.66	0.36	0 12:16	0 00:00	0.00	0.00
33	EX_DMH-6	0.96	0.00	350.54	0.24	0.00	5.64	350.34	0.04	0 12:09	0 00:00	0.00	0.00
34	EX_DMH-7	0.96	0.00	342.44	0.24	0.00	6.11	342.23	0.03	0 12:09	0 00:00	0.00	0.00
35	EX_DMH-9	7.15	0.00	370.47	5.37	0.00	9.63	365.41	0.31	0 12:09	0 00:00	0.00	0.00
36	Fallriver_Junction	15.03	0.00	325.66	0.66	0.00	19.34	325.09	0.09	0 12:12	0 00:00	0.00	0.00
37	I-91_Culvert-Out	8.25	0.00	331.43	0.93	0.00	8.57	330.63	0.13	0 12:18	0 00:00	0.00	0.00
38	Outfall-11	3.71	0.00	339.33	0.37	0.00	0.63	339.00	0.04	0 12:08	0 00:00	0.00	0.00
39	Outfall-15	0.47	0.00	339.93	17.58	0.00	0.88	337.70	15.35	0 12:09	0 00:00	0.00	0.00
40	Outfall-15A	3.23	0.00	336.16	8.16	0.00	0.63	335.41	7.41	0 12:09	0 00:00	0.00	0.00
41	Outfall-1E	8.25	0.00	334.37	0.83	0.00	5.17	333.66	0.12	0 12:16	0 00:00	0.00	0.00
42	Outfall-24	2.39	0.00	336.76	0.30	0.00	5.70	336.49	0.03	0 12:08	0 00:00	0.00	0.00
43	RampCulvert-In	9.50	0.00	329.88	1.16	0.00	10.12	328.89	0.17	0 12:17	0 00:00	0.00	0.00
44	RampCulvert-Out	9.44	0.00	328.01	0.43	0.00	11.99	327.64	0.06	0 12:19	0 00:00	0.00	0.00

Channel Results

SN	Element ID	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Travel Time (min)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Froude Number	Reported Condition
1	1D-Culvert	2.39	0 12:08	168.37	0.01	1.55	2.30	0.68	0.23	0.00		
2	CB-1_bypass	0.16	0 12:11	49.28	0.00	2.10	0.80	0.05	0.11	0.00		
3	CB-10_bypass	0.06	0 12:08	29.56	0.00	0.79	5.32	0.09	0.18	0.00		
4	CB-20_bypass	0.26	0 12:07	139.14	0.00	0.34	3.57	0.05	0.10	0.00		
5	CB-21_bypass	0.15	0 12:07	39.20	0.00	1.75	1.59	0.06	0.12	0.00		
6	CB-24_bypass	0.12	0 12:07	55.10	0.00	1.08	5.47	0.05	0.10	0.00		
7	CB-25A_bypass	0.10	0 12:07	36.35	0.00	2.51	1.84	0.04	0.08	0.00		
8	CB-26_bypass	0.22	0 12:07	46.38	0.00	1.93	1.79	0.07	0.13	0.00		
9	CB-27_bypass	0.03	0 12:07	51.26	0.00	0.59	9.90	0.05	0.10	0.00		
10	CB-29_bypass	0.17	0 12:07	60.04	0.00	2.78	0.54	0.05	0.10	0.00		
11	CB-29A_bypass	0.20	0 12:07	53.94	0.00	1.99	1.70	0.06	0.13	0.00		
12	CB-3_bypass	0.16	0 12:09	37.38	0.00	2.98	1.07	0.04	0.09	0.00		
13	CB-35_bypass	0.07	0 12:07	62.14	0.00	1.63	3.02	0.04	0.08	0.00		
14	CB-42A_bypass	0.04	0 12:07	40.82	0.00	1.26	4.51	0.04	0.07	0.00		
15	CB-44_bypass	0.05	0 12:10	36.37	0.00	1.00	4.86	0.05	0.10	0.00		
16	CB-45_bypass	0.15	0 12:07	46.04	0.00	1.75	0.88	0.06	0.12	0.00		
17	CB-5_bypass	0.07	0 12:09	32.25	0.00	1.12	3.32	0.05	0.10	0.00		
18	CB-8A_bypass	0.34	0 11:10	227.39	0.00	0.00		0.01	0.02	0.00		
19	Cobble_Waterway	8.22	0 12:18	104.81	0.08	1.93	3.14	1.05	0.35	0.00		
20	EX_CB-1_bypass	0.37	0 12:08	48.49	0.01	2.22	0.95	0.08	0.16	0.00		
21	EX_CB-12_bypass	0.05	0 12:07	21.59	0.00	0.57	3.64	0.11	0.21	0.00		
22	EX_CB-27_bypass	0.10	0 12:07	61.14	0.00	2.03	0.85	0.04	0.09	0.00		
23	FallRiver	14.84	0 12:12	8532.83	0.00	2.17	0.77	0.64	0.03	0.00		
24	FR-1	3.71	0 12:08	24.45	0.15	5.43	0.26	0.50	0.50	0.00		
25	FR2	0.47	0 12:09	19.71	0.02	1.22	1.89	0.39	0.39	0.00		
26	FR3	9.42	0 12:19	2308.05	0.00	1.68	3.76	0.54	0.05	0.00		
27	FR4	3.22	0 12:09	21.11	0.15	4.63	0.32	0.51	0.51	0.00		

Pipe Results

SN	Element ID	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Travel Time (min)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Froude Number	Reported Condition
1	I-91-Culvert	8.25	0 12:16	25.46	0.32	6.24	0.64	0.88	0.44	0.00		Calculated
2	p10-9	0.32	0 12:08	6.45	0.05	3.92	0.08	0.16	0.16	0.00		Calculated
3	p1-10	1.48	0 12:26	4.42	0.34	3.53	0.09	1.00	1.00	23.00		SURCHARGED
4	p1-2	0.55	0 12:11	6.87	0.08	4.18	0.03	0.23	0.23	0.00		Calculated
5	p12-8	0.64	0 12:08	9.43	0.07	4.87	0.01	0.22	0.22	0.00		Calculated
6	p13-8	0.63	0 12:08	3.56	0.18	1.76	0.42	0.64	0.64	0.00		Calculated
7	p14-Out	0.47	0 12:09	13.09	0.04	1.88	1.20	0.56	0.56	0.00		Calculated
8	p15B-Out	3.23	0 12:09	12.79	0.25	5.38	0.28	0.71	0.71	0.00		Calculated
9	p16-17	0.79	0 12:08	3.56	0.22	3.26	0.13	0.35	0.35	0.00		Calculated
10	p17-15B	2.66	0 12:08	5.06	0.53	5.80	0.14	0.57	0.57	0.00		Calculated
11	p18-19A	0.98	0 12:08	15.13	0.06	6.63	0.01	0.24	0.24	0.00		Calculated
12	p19-17	1.26	0 12:08	5.58	0.23	5.41	0.16	0.34	0.34	0.00		Calculated
13	p19-22	0.00	0 15:16	4.17	0.00	0.92	1.59	0.20	0.20	0.00		Calculated
14	p20-17	0.62	0 12:07	3.56	0.17	3.25	0.37	0.29	0.29	0.00		Calculated
15	p21-22	0.53	0 12:07	4.60	0.11	1.67	0.06	0.57	0.57	0.00		Calculated
16	p22-23A	2.39	0 12:07	6.50	0.37	5.24	0.01	0.56	0.56	0.00		Calculated
17	p23-Out	2.39	0 12:07	21.22	0.11	13.87	0.04	0.27	0.27	0.00		Calculated
18	p25-18	0.53	0 12:07	4.46	0.12	1.74	0.49	0.42	0.42	0.00		Calculated
19	p2-6	1.37	0 12:09	4.82	0.28	4.60	0.38	0.41	0.41	0.00		Calculated
20	p26-27	0.66	0 12:07	3.56	0.19	3.09	0.11	0.32	0.32	0.00		Calculated
21	p27-28	0.66	0 12:07	3.78	0.18	3.37	0.22	0.30	0.30	0.00		Calculated
22	p28-22	1.34	0 12:07	6.07	0.22	6.06	0.55	0.32	0.32	0.00		Calculated
23	p29-28	0.68	0 12:07	4.60	0.15	3.36	0.03	0.30	0.30	0.00		Calculated
24	p30-Out	8.25	0 12:16	32.53	0.25	13.36	0.12	0.63	0.50	0.00		Calculated
25	p31-30	0.17	0 12:07	6.28	0.03	3.39	0.22	0.12	0.12	0.00		Calculated
26	p32-30	0.50	0 12:07	3.79	0.13	3.09	0.17	0.26	0.26	0.00		Calculated
27	p33-30	7.90	0 12:17	6.94	1.14	6.59	0.50	1.18	0.94	0.00		> CAPACITY
28	p3-4	0.65	0 12:08	13.68	0.05	6.41	0.01	0.19	0.19	0.00		Calculated
29	p34-33	0.58	0 12:07	17.46	0.03	7.61	0.08	0.56	0.56	0.00		Calculated
30	p35-37	0.40	0 12:07	7.71	0.05	5.02	0.21	0.16	0.16	0.00		Calculated
31	p36-37	0.18	0 12:14	3.72	0.05	2.37	0.31	0.15	0.15	0.00		Calculated
32	p37-39	0.52	0 12:09	6.21	0.08	4.60	0.20	0.20	0.20	0.00		Calculated
33	p38-39	0.00	0 00:00	7.97	0.00	0.00		0.00	0.00	0.00		Calculated
34	p39-40	0.52	0 12:09	8.16	0.06	5.27	0.06	0.18	0.18	0.00		Calculated
35	p40-EX6	0.52	0 12:09	7.44	0.07	4.36	0.66	0.21	0.21	0.00		Calculated
36	p41-33	7.59	0 12:18	7.76	0.98	6.19	0.41	1.25	1.00	18.00		SURCHARGED
37	p41-9	7.15	0 12:14	5.26	1.36	5.83	0.86	1.25	1.00	28.00		SURCHARGED
38	p42-41	0.17	0 12:07	3.46	0.05	2.11	0.13	0.16	0.16	0.00		Calculated
39	p43-EX33	0.17	0 12:11	0.33	0.51	1.43	0.14	0.20	0.20	0.00		Calculated
40	p44-43	0.17	0 12:10	3.56	0.05	2.27	0.57	0.15	0.15	0.00		Calculated
41	p45-46	0.46	0 12:07	5.63	0.08	3.33	0.02	0.87	0.87	0.00		Calculated
42	p4-6	0.65	0 12:08	3.78	0.17	3.22	0.12	0.30	0.30	0.00		Calculated
43	p46-10	0.70	0 12:26	37.16	0.02	6.89	0.09	1.50	1.00	0.00		Calculated
44	p5-6	0.30	0 12:09	18.34	0.02	6.80	0.01	0.12	0.12	0.00		Calculated
45	p6-8	2.31	0 12:08	4.65	0.50	5.63	0.41	0.52	0.52	0.00		Calculated
46	p7-9	0.71	0 11:28	3.63	0.19	0.90	0.93	1.00	1.00	4012.00		SURCHARGED
47	p8-9	2.93	0 12:09	3.56	0.82	4.25	0.09	0.82	0.82	0.00		Calculated
48	p9-Out	3.71	0 12:08	6.99	0.53	9.43	0.14	0.50	0.50	0.00		Calculated
49	pBMtn-10	6.30	0 12:14	8.42	0.75	5.14	0.21	1.25	1.00	22.00		SURCHARGED
50	pEX_DMH-9-41	7.15	0 12:14	4.28	1.67	5.86	0.71	1.25	1.00	17.00		SURCHARGED
51	pEX1-2	0.84	0 12:08	5.62	0.15	4.68	0.14	0.28	0.28	0.00		Calculated
52	pEX12-19	0.28	0 12:07	1.52	0.18	1.65	1.11	0.27	0.27	0.00		Calculated
53	pEX16-15B	0.23	0 12:32	3.34	0.07	2.37	0.80	0.21	0.21	0.00		Calculated
54	pEX16A-EX16	0.06	0 12:48	5.05	0.01	1.29	0.84	0.12	0.12	0.00		Calculated
55	pEX27-EX6	0.46	0 12:07	5.22	0.09	3.82	0.14	0.21	0.21	0.00		Calculated
56	pEX28-EX7	0.00	0 12:03	1.92	0.00	0.14	4.09	0.09	0.09	0.00		Calculated
57	pEX33-41	0.54	0 12:11	7.52	0.07	3.44	0.43	0.23	0.19	0.00		Calculated
58	pEX34A-EX34	0.00	0 15:41	5.55	0.00	1.06	1.23	0.01	0.01	0.00		Calculated
59	pEX34-EX33	0.37	0 12:11	5.60	0.07	3.89	0.26	0.18	0.18	0.00		Calculated
60	pEX36-43	0.27	0 12:11	7.57	0.04	0.44	0.73	1.50	1.00	9.00		SURCHARGED
61	pEX6-EX7(MH)	0.96	0 12:09	7.94	0.12	6.69	0.39	0.24	0.24	0.00		Calculated
62	pEX7(MH)-Out	0.96	0 12:09	7.85	0.12	6.62	0.32	0.24	0.24	0.00		Calculated
63	pEX9-15B	0.26	0 12:11	7.74	0.03	4.34	0.11	0.13	0.13	0.00		Calculated
64	Ramp_Culvert	9.44	0 12:18	20.87	0.45	8.11	0.28	0.79	0.40	0.00		Calculated

Inlet Results

SN	Element ID	Peak Flow (cfs)	Peak Lateral Inflow (cfs)	Peak Flow Intercepted by Inlet (cfs)	Peak Flow Bypassing Inlet (cfs)	Inlet Efficiency during Peak Flow (%)	Max Gutter Spread during Peak Flow (ft)	Max Gutter Water Elev. during Peak Flow (ft)	Max Gutter Water Depth during Peak Flow (ft)	Time of Max Depth Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	CB-1	0.71	0.71	0.56	0.15	78.56	4.75	356.35	0.09	0 12:11	0.00	0.00
2	CB-10	0.39	0.32	0.34	0.05	87.12	4.25	350.46	0.09	0 12:08	0.00	0.00
3	CB-12A	0.89	0.74	0.61	0.28	68.47	6.37	349.61	0.13	0 12:08	0.00	0.00
4	CB-14	0.27	0.27	N/A	N/A	N/A	4.07	344.09	-0.48	0 12:09	0.00	0.00
5	CB-15B	0.37	0.37	N/A	N/A	N/A	4.72	345.83	0.16	0 12:09	0.00	0.00
6	CB-16	0.80	0.73	N/A	N/A	N/A	7.25	347.71	0.13	0 12:08	0.00	0.00
7	CB-18	0.99	0.93	N/A	N/A	N/A	8.21	347.63	0.14	0 12:08	0.00	0.00
8	CB-20	0.88	0.78	0.60	0.28	68.62	6.36	348.05	0.13	0 12:07	0.00	0.00
9	CB-21	0.68	0.48	0.49	0.18	72.79	5.78	351.56	0.12	0 12:07	0.00	0.00
10	CB-25	0.63	0.41	0.51	0.12	80.37	4.56	352.43	0.09	0 12:07	0.00	0.00
11	CB-26	0.88	0.85	0.66	0.22	75.02	5.14	358.09	0.10	0 12:07	0.00	0.00
12	CB-29A	0.87	0.76	0.66	0.22	75.15	5.13	359.01	0.10	0 12:07	0.00	0.00
13	CB-3	0.79	0.42	0.59	0.21	73.92	5.37	352.83	0.11	0 12:08	0.00	0.00
14	CB-31A	0.20	0.20	0.20	0.01	95.53	2.98	369.71	0.06	0 12:07	0.00	0.00
15	CB-32A	0.62	0.58	0.50	0.12	80.80	4.51	370.14	0.09	0 12:07	0.00	0.00
16	CB-34A	0.75	0.71	0.58	0.17	77.64	4.85	375.05	0.10	0 12:07	0.00	0.00
17	CB-35	0.47	0.30	0.41	0.06	86.64	3.89	370.92	0.08	0 12:07	0.00	0.00
18	CB-42A	0.21	0.21	0.19	0.02	91.93	3.46	377.31	0.07	0 12:07	0.00	0.00
19	CB-44	0.21	0.21	0.19	0.02	89.99	3.75	379.91	0.08	0 12:10	0.00	0.00
20	CB-45	0.61	0.61	0.47	0.15	76.30	5.18	377.97	0.10	0 12:16	0.00	0.00
21	CB-5	0.37	0.23	0.32	0.05	85.90	4.05	353.39	0.08	0 12:08	0.00	0.00
22	CB-7	0.48	0.48	N/A	N/A	N/A	5.47	350.34	-0.32	0 11:33	0.00	0.00
23	CB-9	0.30	0.18	N/A	N/A	N/A	4.25	346.17	0.15	0 12:11	0.00	0.00
24	EX_CB-1	1.21	1.21	0.85	0.37	69.76	5.78	356.42	0.12	0 12:08	0.00	0.00
25	EX_CB-12	0.33	0.18	0.30	0.03	89.75	3.60	348.26	0.07	0 12:07	0.00	0.00
26	EX_CB-19	0.00	0.00	N/A	N/A	N/A	1.10	350.75	0.09	0 15:22	0.00	0.00
27	EX_CB-27	0.55	0.48	0.46	0.09	83.06	4.27	356.50	0.09	0 12:07	0.00	0.00

Project Description

File Name ..... SSA Analysis - PROP2.SPF

Rainfall Details

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
49		Time Series	100-yr	Cumulative	inches	Massachusetts	Franklin	100.00	6.53	SCS Type III 24-hr

Junction Results

SN	Element ID	Peak Inflow (cfs)	Peak Lateral Inflow (cfs)	Max HGL Elevation Attained (ft)	Max HGL Depth Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Average HGL Elevation Attained (ft)	Average HGL Depth Attained (ft)	Time of Max HGL Occurrence (days hh:mm)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	Bald_Mtn	13.89	13.89	375.00	7.00	0.00	0.00	369.07	1.07	0 12:01	0 12:14	3.69	37.00
2	CB-36	1.08	1.08	361.84	0.42	0.00	4.89	361.47	0.05	0 12:10	0 00:00	0.00	0.00
3	CB-38	0.02	0.02	361.24	0.04	0.00	3.02	361.21	0.01	0 12:20	0 00:00	0.00	0.00
4	DHM-41	8.15	0.00	367.90	4.10	0.00	10.18	364.19	0.39	0 12:11	0 00:00	0.00	0.00
5	DI-1	3.05	3.05	375.11	6.91	3.51	0.00	368.77	0.57	0 12:14	0 11:59	0.02	44.00
6	DMH-13	1.08	0.00	346.58	1.38	0.00	3.12	345.28	0.08	0 12:08	0 00:00	0.00	0.00
7	DMH-17	4.14	0.00	341.60	0.90	0.00	5.96	340.81	0.11	0 12:08	0 00:00	0.00	0.00
8	DMH-19A	2.02	0.00	343.26	0.46	0.00	4.25	342.86	0.06	0 12:07	0 00:00	0.00	0.00
9	DMH-2	2.26	0.00	351.30	0.50	0.00	4.98	350.88	0.08	0 12:08	0 00:00	0.00	0.00
10	DMH-22	3.61	0.00	348.24	0.94	0.00	3.68	347.42	0.12	0 12:07	0 00:00	0.00	0.00
11	DMH-23A	3.61	0.00	347.41	0.31	0.00	4.71	347.15	0.05	0 12:07	0 00:00	0.00	0.00
12	DMH-27	0.92	0.00	354.48	0.38	0.00	4.39	354.16	0.06	0 12:07	0 00:00	0.00	0.00
13	DMH-28	1.94	0.00	353.89	0.39	0.00	4.76	353.56	0.06	0 12:07	0 00:00	0.00	0.00
14	DMH-30A	9.83	0.00	359.37	0.47	0.00	9.75	359.00	0.10	0 12:09	0 00:00	0.00	0.00
15	DMH-33A	8.89	0.00	367.95	6.45	0.00	6.74	361.86	0.36	0 12:00	0 00:00	0.00	0.00
16	DMH-37	1.72	0.00	361.25	0.41	0.00	7.19	360.89	0.05	0 12:09	0 00:00	0.00	0.00
17	DMH-39	1.73	0.00	359.50	0.40	0.00	5.70	359.15	0.05	0 12:09	0 00:00	0.00	0.00
18	DMH-4	1.15	0.00	349.89	0.46	0.00	3.04	349.49	0.06	0 12:08	0 00:00	0.00	0.00
19	DMH-40A	1.73	0.00	358.13	0.33	0.00	5.42	357.85	0.05	0 12:09	0 00:00	0.00	0.00
20	DMH-43A	0.43	0.00	374.28	0.38	0.00	5.70	373.96	0.06	0 12:10	0 00:00	0.00	0.00
21	DMH-46	1.08	0.00	374.73	2.53	0.00	3.54	372.83	0.63	0 12:13	0 00:00	0.00	0.00
22	DMH-6	4.11	0.00	349.59	0.83	0.00	3.77	348.86	0.10	0 12:08	0 00:00	0.00	0.00
23	DMH-8	5.16	0.00	346.52	1.86	0.00	4.36	344.83	0.17	0 12:08	0 00:00	0.00	0.00
24	DMH-9	6.41	0.00	344.15	4.47	0.00	5.35	342.06	2.38	0 12:09	0 00:00	0.00	0.00
25	EX_CB-16	1.68	0.88	341.24	0.54	0.00	2.81	340.78	0.08	0 12:22	0 00:00	0.00	0.00
26	EX_CB-16A	0.85	0.85	342.28	0.28	0.00	3.72	342.04	0.04	0 12:25	0 00:00	0.00	0.00
27	EX_CB-28	0.02	0.02	342.60	0.20	0.00	5.64	342.42	0.02	0 12:09	0 00:00	0.00	0.00
28	EX_CB-33	1.23	0.02	373.77	0.37	0.00	4.91	373.45	0.05	0 12:11	0 00:00	0.00	0.00
29	EX_CB-34	0.78	0.76	375.67	0.27	0.00	4.43	375.44	0.04	0 12:11	0 00:00	0.00	0.00
30	EX_CB-34A	0.04	0.04	378.06	0.06	0.00	3.94	378.01	0.01	0 12:23	0 00:00	0.00	0.00
31	EX_CB-36	0.41	0.02	374.73	2.33	0.00	1.68	372.84	0.44	0 12:13	0 00:00	0.00	0.00
32	EX_DMH-10	7.73	0.00	374.73	7.43	0.00	2.96	368.02	0.72	0 12:13	0 00:00	0.00	0.00
33	EX_DMH-6	2.37	0.00	350.69	0.39	0.00	5.49	350.36	0.06	0 12:09	0 00:00	0.00	0.00
34	EX_DMH-7	2.37	0.00	342.60	0.40	0.00	5.95	342.26	0.06	0 12:09	0 00:00	0.00	0.00
35	EX_DMH-9	7.23	0.00	371.04	5.94	0.00	9.06	365.71	0.61	0 12:11	0 00:00	0.00	0.00
36	Fallriver_Junction	27.43	0.00	325.97	0.97	0.00	19.03	325.15	0.15	0 12:11	0 00:00	0.00	0.00
37	I-91_Culvert-Out	9.83	0.00	331.52	1.02	0.00	8.48	330.71	0.21	0 12:10	0 00:00	0.00	0.00
38	Outfall-11	6.37	0.00	339.46	0.50	0.00	0.50	339.03	0.07	0 12:09	0 00:00	0.00	0.00
39	Outfall-15	1.60	0.00	340.07	17.72	0.00	0.74	338.28	15.93	0 12:09	0 00:00	0.00	0.00
40	Outfall-15A	6.55	0.00	336.33	8.33	0.00	0.46	335.61	7.61	0 12:10	0 00:00	0.00	0.00
41	Outfall-1E	9.83	0.00	334.46	0.92	0.00	5.08	333.73	0.19	0 12:08	0 00:00	0.00	0.00
42	Outfall-24	3.61	0.00	336.84	0.38	0.00	5.62	336.51	0.05	0 12:08	0 00:00	0.00	0.00
43	RampCulvert-In	13.33	0.00	330.15	1.43	0.00	9.85	328.99	0.27	0 12:10	0 00:00	0.00	0.00
44	RampCulvert-Out	13.13	0.00	328.11	0.53	0.00	11.89	327.67	0.09	0 12:11	0 00:00	0.00	0.00

Channel Results

SN	Element ID	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Travel Time (min)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Froude Number	Reported Condition
1	1D-Culvert	3.60	0 12:08	168.37	0.02	1.50	2.37	0.90	0.30	0.00		
2	CB-1_bypass	0.57	0 12:10	49.28	0.01	2.98	0.56	0.09	0.17	0.00		
3	CB-10_bypass	0.11	0 12:08	29.56	0.00	0.80	5.25	0.12	0.24	0.00		
4	CB-20_bypass	0.48	0 12:07	139.14	0.00	0.25	4.85	0.17	0.34	0.00		
5	CB-21_bypass	0.30	0 12:07	39.20	0.01	2.15	1.29	0.07	0.15	0.00		
6	CB-24_bypass	0.24	0 12:07	55.10	0.00	1.43	4.13	0.06	0.13	0.00		
7	CB-25A_bypass	0.20	0 12:07	36.35	0.01	2.90	1.59	0.05	0.10	0.00		
8	CB-26_bypass	0.42	0 12:07	46.38	0.01	2.27	1.52	0.09	0.17	0.00		
9	CB-27_bypass	0.05	0 12:07	51.26	0.00	0.59	9.90	0.06	0.12	0.00		
10	CB-29_bypass	0.33	0 12:07	60.04	0.01	3.40	0.44	0.06	0.12	0.00		
11	CB-29A_bypass	0.38	0 12:07	53.94	0.01	2.31	1.46	0.08	0.16	0.00		
12	CB-3_bypass	0.43	0 12:08	37.38	0.01	3.61	0.89	0.07	0.14	0.00		
13	CB-35_bypass	0.12	0 12:07	62.14	0.00	1.71	2.88	0.05	0.10	0.00		
14	CB-42A_bypass	0.07	0 12:07	40.82	0.00	1.28	4.44	0.05	0.10	0.00		
15	CB-44_bypass	0.15	0 12:10	36.37	0.00	1.38	3.52	0.07	0.14	0.00		
16	CB-45_bypass	0.29	0 12:07	46.04	0.01	2.06	0.74	0.08	0.15	0.00		
17	CB-5_bypass	0.18	0 12:09	32.25	0.01	1.60	2.32	0.07	0.13	0.00		
18	CB-8A_bypass	0.67	0 12:07	227.39	0.00	2.34	0.50	0.01	0.02	0.00		
19	Cobble_Waterway	9.79	0 12:10	104.81	0.09	1.96	3.09	1.22	0.41	0.00		
20	EX_CB-1_bypass	0.79	0 12:08	48.49	0.02	2.31	0.91	0.12	0.23	0.00		
21	EX_CB-12_bypass	0.09	0 12:07	21.59	0.00	0.57	3.64	0.14	0.28	0.00		
22	EX_CB-27_bypass	0.21	0 12:07	61.14	0.00	2.49	0.69	0.06	0.12	0.00		
23	FallRiver	27.17	0 12:11	8532.83	0.00	2.67	0.62	0.93	0.05	0.00		
24	FR-1	6.37	0 12:09	24.45	0.26	5.61	0.25	0.73	0.73	0.00		
25	FR2	1.60	0 12:09	19.71	0.08	1.66	1.39	0.61	0.61	0.00		
26	FR3	13.09	0 12:11	2308.05	0.01	1.64	3.85	0.75	0.07	0.00		
27	FR4	6.54	0 12:10	21.11	0.31	4.99	0.29	0.75	0.75	0.00		

Pipe Results

SN	Element ID	Peak Flow	Time of Peak Flow Occurrence	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Travel Time	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged	Froude Number	Reported Condition
		(cfs)	(days hh:mm)	(cfs)		(ft/sec)	(min)	(ft)		(min)		
1	I-91-Culvert	9.83	0 12:09	25.46	0.39	6.51	0.61	0.97	0.49	0.00		Calculated
2	p10-9	0.55	0 12:08	6.45	0.09	4.45	0.07	0.21	0.21	0.00		Calculated
3	p1-10	3.06	0 12:15	4.42	0.69	3.89	0.08	1.00	1.00	49.00		SURCHARGED
4	p1-2	1.05	0 12:10	6.87	0.15	4.73	0.02	0.34	0.34	0.00		Calculated
5	p12-8	1.08	0 12:07	9.43	0.12	5.39	0.01	0.30	0.30	0.00		Calculated
6	p13-8	1.07	0 12:08	3.56	0.30	1.66	0.44	1.00	1.00	10.00		SURCHARGED
7	p14-Out	1.60	0 12:09	13.09	0.12	2.94	0.77	0.65	0.65	0.00		Calculated
8	p15B-Out	6.55	0 12:10	12.79	0.51	8.72	0.17	0.91	0.91	0.00		Calculated
9	p16-17	1.21	0 12:08	3.56	0.34	3.62	0.12	0.44	0.44	0.00		Calculated
10	p17-15B	4.14	0 12:08	5.06	0.82	6.20	0.13	0.80	0.80	0.00		Calculated
11	p18-19A	1.53	0 12:07	15.13	0.10	7.06	0.00	0.32	0.32	0.00		Calculated
12	p19-17	2.02	0 12:07	5.58	0.36	5.90	0.15	0.48	0.48	0.00		Calculated
13	p19-22	0.04	0 12:22	4.17	0.01	1.58	0.93	0.34	0.34	0.00		Calculated
14	p20-17	0.90	0 12:07	3.56	0.25	3.58	0.34	0.36	0.36	0.00		Calculated
15	p21-22	0.82	0 12:07	4.60	0.18	1.66	0.06	0.81	0.81	0.00		Calculated
16	p22-23A	3.61	0 12:07	6.50	0.55	5.80	0.01	0.74	0.74	0.00		Calculated
17	p23-Out	3.61	0 12:07	21.22	0.17	15.02	0.03	0.34	0.34	0.00		Calculated
18	p25-18	0.85	0 12:07	4.46	0.19	1.89	0.45	0.57	0.57	0.00		Calculated
19	p2-6	2.26	0 12:08	4.82	0.47	4.68	0.38	0.62	0.62	0.00		Calculated
20	p26-27	0.92	0 12:07	3.56	0.26	3.35	0.10	0.38	0.38	0.00		Calculated
21	p27-28	0.92	0 12:07	3.78	0.24	3.66	0.20	0.36	0.36	0.00		Calculated
22	p28-22	1.94	0 12:07	6.07	0.32	6.16	0.54	0.47	0.47	0.00		Calculated
23	p29-28	1.01	0 12:07	4.60	0.22	3.71	0.03	0.38	0.38	0.00		Calculated
24	p30-Out	9.83	0 12:09	32.53	0.30	13.97	0.12	0.70	0.56	0.00		Calculated
25	p31-30	0.26	0 12:07	6.28	0.04	3.83	0.20	0.14	0.14	0.00		Calculated
26	p32-30	0.72	0 12:07	3.79	0.19	3.37	0.15	0.32	0.32	0.00		Calculated
27	p33-30	8.89	0 12:10	6.94	1.28	7.34	0.45	1.20	0.96	0.00		> CAPACITY
28	p3-4	1.15	0 12:08	13.68	0.08	6.61	0.01	0.29	0.29	0.00		Calculated
29	p34-33	0.88	0 12:08	17.46	0.05	6.00	0.10	0.58	0.58	0.00		Calculated
30	p35-37	0.69	0 12:07	7.71	0.09	5.83	0.18	0.21	0.21	0.00		Calculated
31	p36-37	1.07	0 12:10	3.72	0.29	3.75	0.20	0.39	0.39	0.00		Calculated
32	p37-39	1.72	0 12:09	6.21	0.28	6.21	0.14	0.38	0.38	0.00		Calculated
33	p38-39	0.02	0 12:20	7.97	0.00	1.89	0.02	0.04	0.04	0.00		Calculated
34	p39-40	1.73	0 12:09	8.16	0.21	6.90	0.05	0.36	0.36	0.00		Calculated
35	p40-EX6	1.73	0 12:09	7.44	0.23	6.78	0.42	0.36	0.36	0.00		Calculated
36	p41-33	8.16	0 12:13	7.76	1.05	6.65	0.38	1.25	1.00	44.00		SURCHARGED
37	p41-9	7.23	0 12:00	5.26	1.37	5.89	0.85	1.25	1.00	54.00		SURCHARGED
38	p42-41	0.27	0 12:07	3.46	0.08	2.38	0.12	0.20	0.20	0.00		Calculated
39	p43-EX33	0.43	0 12:10	0.33	1.32	1.92	0.10	0.33	0.33	0.00		> CAPACITY
40	p44-43	0.43	0 12:10	3.56	0.12	2.95	0.44	0.24	0.24	0.00		Calculated
41	p45-46	0.65	0 12:07	5.63	0.11	3.53	0.02	1.00	1.00	28.00		SURCHARGED
42	p4-6	1.15	0 12:08	3.78	0.30	3.68	0.11	0.45	0.45	0.00		Calculated
43	p46-10	0.79	0 12:42	37.16	0.02	6.09	0.10	1.50	1.00	35.00		SURCHARGED
44	p5-6	0.71	0 12:09	18.34	0.04	7.01	0.01	0.30	0.30	0.00		Calculated
45	p6-8	4.10	0 12:08	4.65	0.88	6.23	0.37	0.78	0.78	0.00		Calculated
46	p7-9	1.88	0 12:01	3.63	0.52	2.39	0.35	1.00	1.00	4100.00		SURCHARGED
47	p8-9	5.15	0 12:08	3.56	1.45	6.65	0.06	0.96	0.96	0.00		> CAPACITY
48	p9-Out	6.37	0 12:09	6.99	0.91	10.12	0.13	0.75	0.75	0.00		Calculated
49	pBMtn-10	6.59	0 12:01	8.42	0.78	5.37	0.20	1.25	1.00	48.00		SURCHARGED
50	pEX_DMH-9-41	7.23	0 12:00	4.28	1.69	5.94	0.70	1.25	1.00	44.00		SURCHARGED
51	pEX1-2	1.24	0 12:08	5.62	0.22	4.73	0.14	0.38	0.38	0.00		Calculated
52	pEX12-19	0.49	0 12:07	1.52	0.32	1.94	0.95	0.36	0.36	0.00		Calculated
53	pEX16-15B	1.68	0 12:22	3.34	0.50	4.03	0.47	0.55	0.55	0.00		Calculated
54	pEX16A-EX16	0.85	0 12:25	5.05	0.17	2.85	0.38	0.41	0.41	0.00		Calculated
55	pEX27-EX6	0.66	0 12:07	5.22	0.13	4.19	0.13	0.26	0.26	0.00		Calculated
56	pEX28-EX7	0.02	0 15:20	1.92	0.01	0.86	0.67	0.25	0.25	0.00		Calculated
57	pEX33-41	1.23	0 12:11	7.52	0.16	4.29	0.34	0.35	0.28	0.00		Calculated
58	pEX34A-EX34	0.04	0 12:23	5.55	0.01	2.04	0.64	0.06	0.06	0.00		Calculated
59	pEX34-EX33	0.78	0 12:11	5.60	0.14	4.77	0.21	0.26	0.26	0.00		Calculated
60	pEX36-43	0.41	0 12:01	7.57	0.05	0.48	0.67	1.50	1.00	38.00		SURCHARGED
61	pEX6-EX7(MH)	2.37	0 12:09	7.94	0.30	8.53	0.31	0.38	0.38	0.00		Calculated
62	pEX7(MH)-Out	2.37	0 12:09	7.85	0.30	8.40	0.25	0.39	0.39	0.00		Calculated
63	pEX9-15B	0.99	0 12:17	7.74	0.13	6.09	0.08	0.28	0.28	0.00		Calculated
64	Ramp_Culvert	13.13	0 12:10	20.87	0.63	8.61	0.26	0.98	0.49	0.00		Calculated

Inlet Results

SN	Element ID	Peak Flow (cfs)	Peak Lateral Inflow (cfs)	Peak Flow Intercepted by Inlet (cfs)	Peak Flow Bypassing Inlet (cfs)	Inlet Efficiency during Peak Flow (%)	Max Gutter Spread during Peak Flow (ft)	Max Gutter Water Elev. during Peak Flow (ft)	Max Gutter Water Depth during Peak Flow (ft)	Time of Max Depth Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	CB-1	1.61	1.61	1.05	0.57	64.98	6.43	356.39	0.13	0 12:10	0.00	0.00
2	CB-10	0.66	0.49	0.52	0.13	79.67	5.16	350.47	0.10	0 12:08	0.00	0.00
3	CB-12A	1.62	1.19	0.95	0.67	58.75	7.99	349.64	0.16	0 12:07	0.00	0.00
4	CB-14	1.07	1.07	N/A	N/A	N/A	8.62	344.17	-0.40	0 12:09	0.00	0.00
5	CB-15B	0.92	0.92	N/A	N/A	N/A	7.87	345.89	0.22	0 12:10	0.00	0.00
6	CB-16	1.23	1.12	N/A	N/A	N/A	9.33	347.75	0.17	0 12:08	0.00	0.00
7	CB-18	1.54	1.45	N/A	N/A	N/A	10.70	347.68	0.19	0 12:07	0.00	0.00
8	CB-20	1.39	1.19	0.85	0.54	61.17	7.55	348.07	0.15	0 12:07	0.00	0.00
9	CB-21	1.12	0.73	0.72	0.40	64.69	6.95	351.58	0.14	0 12:07	0.00	0.00
10	CB-25	1.05	0.63	0.76	0.29	71.95	5.51	352.45	0.11	0 12:07	0.00	0.00
11	CB-26	1.34	1.29	0.91	0.43	67.89	6.03	358.11	0.12	0 12:07	0.00	0.00
12	CB-29A	1.40	1.15	0.94	0.46	67.38	6.10	359.03	0.12	0 12:07	0.00	0.00
13	CB-3	1.58	0.79	0.99	0.59	62.52	6.95	352.86	0.14	0 12:07	0.00	0.00
14	CB-31A	0.31	0.31	0.28	0.03	90.68	3.50	369.72	0.07	0 12:07	0.00	0.00
15	CB-32A	0.96	0.89	0.71	0.26	73.48	5.33	370.16	0.11	0 12:07	0.00	0.00
16	CB-34A	1.21	1.08	0.85	0.37	69.65	5.80	375.07	0.12	0 12:08	0.00	0.00
17	CB-35	0.81	0.47	0.63	0.18	78.14	4.76	370.94	0.10	0 12:07	0.00	0.00
18	CB-42A	0.33	0.33	0.29	0.05	85.83	4.11	377.32	0.08	0 12:07	0.00	0.00
19	CB-44	0.58	0.58	0.44	0.14	75.41	5.44	379.94	0.11	0 12:10	0.00	0.00
20	CB-45	0.94	0.94	0.65	0.29	69.25	6.09	377.99	0.12	0 12:13	0.00	0.00
21	CB-5	0.89	0.35	0.64	0.25	72.04	5.60	353.42	0.11	0 12:09	0.00	0.00
22	CB-7	0.73	0.73	N/A	N/A	N/A	6.92	350.37	-0.29	0 12:00	0.00	0.00
23	CB-9	1.07	0.84	N/A	N/A	N/A	8.60	346.26	0.24	0 12:17	0.00	0.00
24	EX_CB-1	2.03	2.03	1.24	0.79	61.18	7.01	356.44	0.14	0 12:07	0.00	0.00
25	EX_CB-12	0.58	0.28	0.47	0.11	81.54	4.44	348.28	0.09	0 12:07	0.00	0.00
26	EX_CB-19	0.04	0.04	N/A	N/A	N/A	1.75	350.76	0.10	0 12:22	0.00	0.00
27	EX_CB-27	0.85	0.73	0.65	0.20	75.93	5.03	356.51	0.10	0 12:07	0.00	0.00

Figures

Figure 1 – USGS Locus Map

Figure 2 – Soil Survey

Figure 3 – FEMA Flood Insurance Rate Map (FIRM)

Figure 4 – NHESP Estimated and Priority Habitats

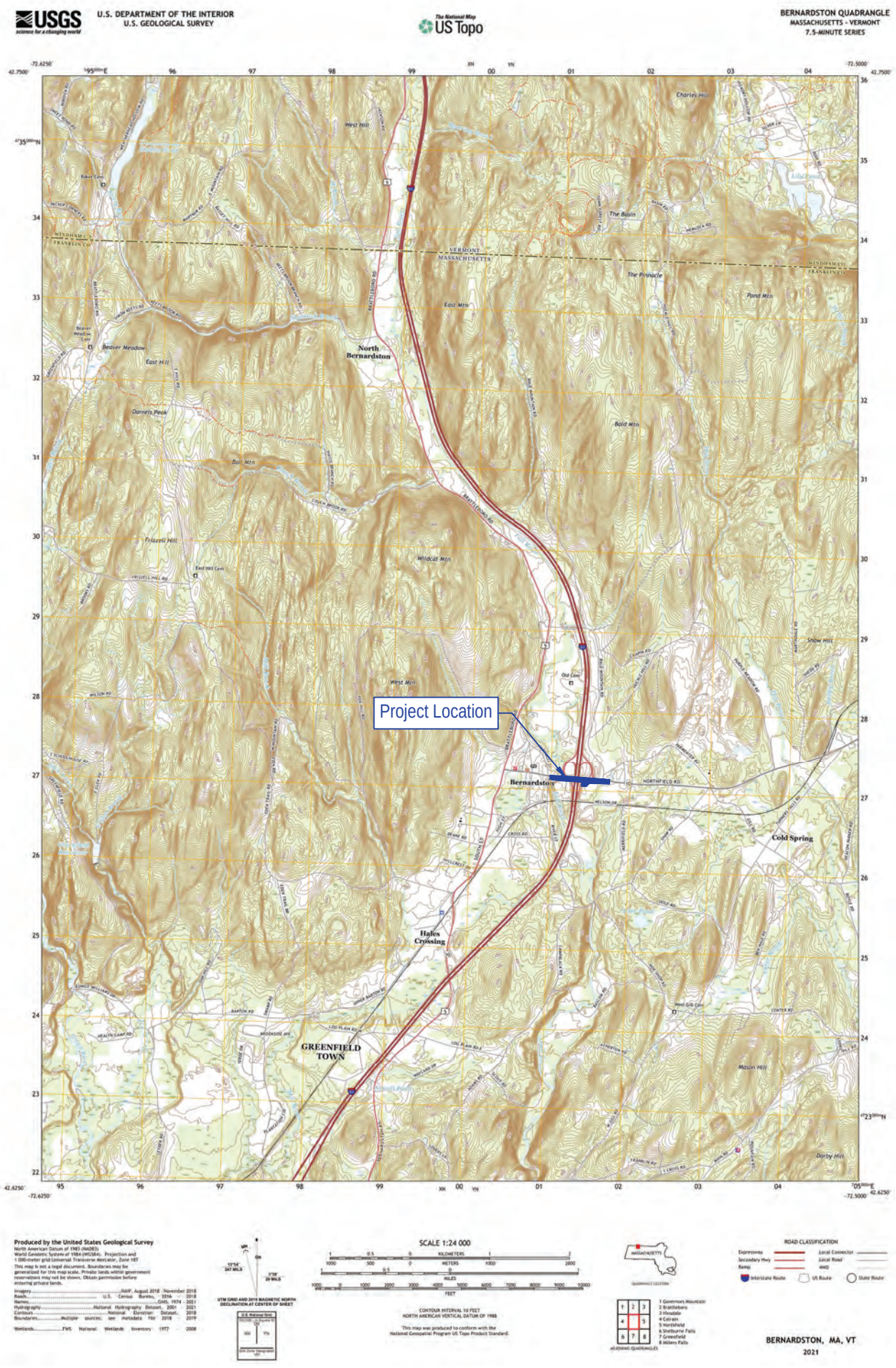
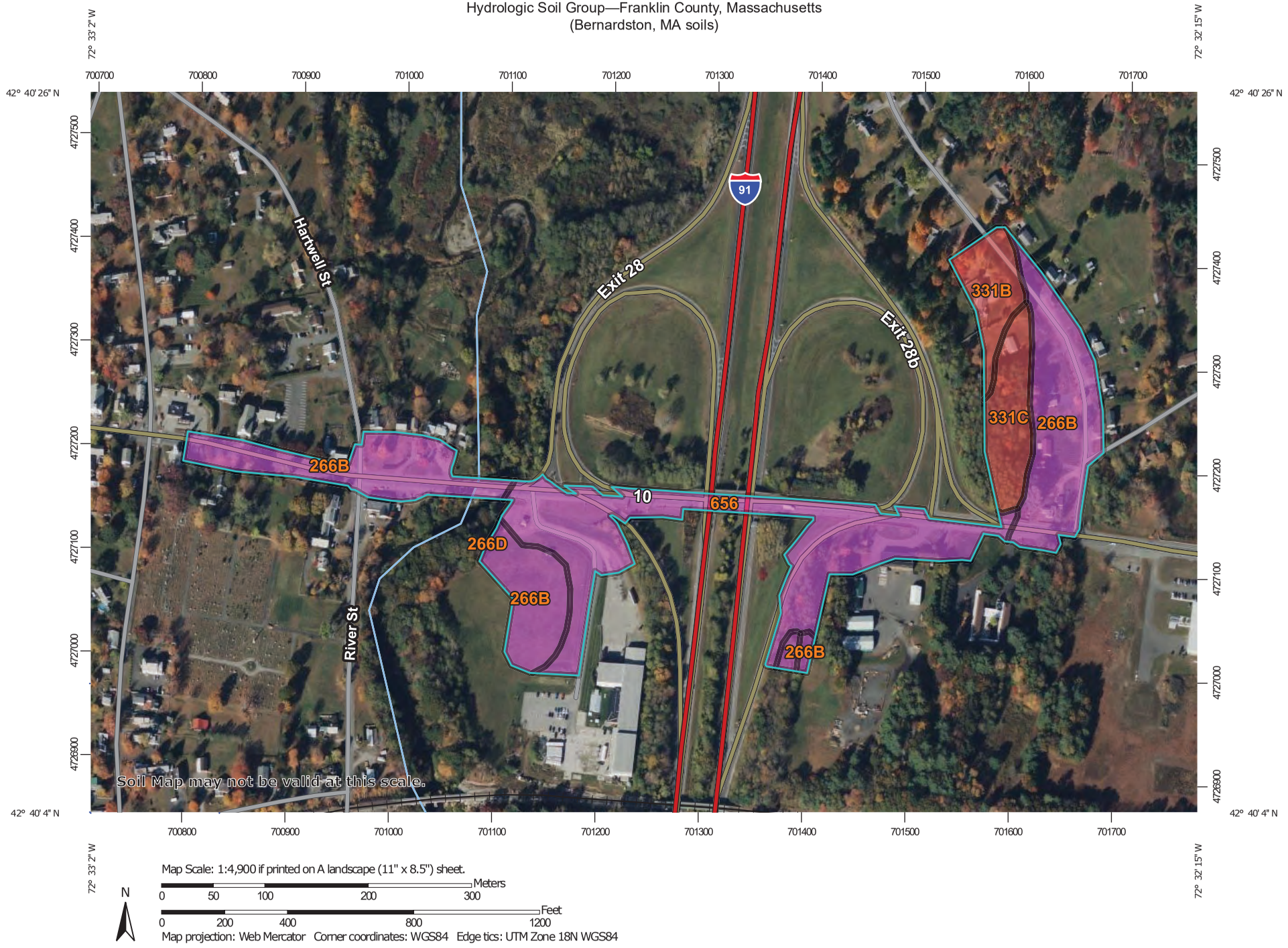


Figure 1 - USGS Locus Map

Hydrologic Soil Group—Franklin County, Massachusetts
(Bernardston, MA soils)



Map Scale: 1:4,900 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 50 100 200 300

Feet
0 200 400 800 1200

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Franklin County, Massachusetts
Survey Area Data: Version 18, Sep 12, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Oct 15, 2020—Oct 31, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

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Proposal No. 612159-136484

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
262F	Quonset fine sandy loam, 25 to 45 percent slopes	A	0.2	0.8%
266B	Warwick channery fine sandy loam, 3 to 8 percent slopes	A	8.5	46.3%
266D	Warwick channery fine sandy loam, 15 to 25 percent slopes	A	0.0	0.0%
331B	Bernardston silt loam, 3 to 8 percent slopes, very stony	D	1.4	7.4%
331C	Bernardston silt loam, 8 to 15 percent slopes, very stony	D	1.7	9.4%
656	Udorthents-Urban land complex	A	6.6	36.0%
Totals for Area of Interest			**18.4**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher



A00830 - 375

KEY TO MAP

500-Year Flood Boundary
100-Year Flood Boundary
Zone Designations* With Date of Identification e.g., 12/2/74
100-Year Flood Boundary
500-Year Flood Boundary
Base Flood Elevation Line With Elevation In Feet**
513
Base Flood Elevation In Feet Where Uniform Within Zone**
(EL 987)
Elevation Reference Mark
RM7
River Mile
M1.5

**Referenced to the National Geodetic Vertical Datum of 1929

*EXPLANATION OF ZONE DESIGNATIONS

ZONE	EXPLANATION
A	Areas of 100-year flood; base flood elevations and flood hazard factors not determined.
AO	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; average depths of inundation are shown, but no flood hazard factors are determined.
AH	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown, but no flood hazard factors are determined.
A1-A30	Areas of 100-year flood; base flood elevations and flood hazard factors determined.
A99	Areas of 100-year flood to be protected by flood protection system under construction; base flood elevations and flood hazard factors not determined.
B	Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile, or areas protected by levees from the base flood. (Medium shading)
C	Areas of minimal flooding. (No shading)
D	Areas of undetermined, but possible, flood hazards.
V	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined.
V1-V30	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined.

NOTES TO USER

Certain areas not in the special flood hazard areas (zones A and V) may be protected by flood control structures.

This map is for flood insurance purposes only; it does not necessarily show all areas subject to flooding in the community or all planimetric features outside special flood hazard areas.

For adjoining map panels, see separately printed Index To Map Panels.

INITIAL IDENTIFICATION: DECEMBER 10, 1976

FLOOD HAZARD BOUNDARY MAP REVISIONS:

FLOOD INSURANCE RATE MAP EFFECTIVE: JULY 2, 1980

FLOOD INSURANCE RATE MAP REVISIONS:

Refer to the FLOOD INSURANCE RATE MAP EFFECTIVE shown on this map to determine when actuarial rates apply to structures in the zones where elevations or depths have been established.

To determine if flood insurance is available in this community, contact your insurance agent, or call the National Flood Insurance Program, at (800) 638-6620, or (800) 424-8872.

APPROXIMATE SCALE
400 0 400 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

TOWN OF
BERNARDSTON, MASSACHUSETTS
FRANKLIN COUNTY

PANEL 6 OF 7
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
250110 0006 A

EFFECTIVE DATE:
JULY 2, 1980

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
FEDERAL INSURANCE ADMINISTRATION

Proposal No. 612159-136484

Figure 4 - NHESP Estimated and Priority Habitats



NHESP Certified Vernal Pools

NHESP Priority Habitats of Rare Species

NHESP Estimated Habitats of Rare Wildlife

Property Tax Parcels

LUCAS ENVIRONMENTAL, LLC

APPENDIX E

SHPO / THPO CORRESPONDENCE

Maura Healey, Governor
Kimberley Driscoll, Lieutenant Governor
Monica Tibbits-Nutt, Acting Secretary & CEO
Jonathan L. Gulliver, Highway Administrator

MassDOT
Massachusetts Department of Transportation
Highway Division

RECEIVED
NOV 13 2023
MASS. HIST. COMM
RC. 10955

November 8, 2023

Ms. Brona Simon
State Historic Preservation Officer
Massachusetts Historical Commission
220 Morrissey Boulevard
Boston, MA 02125

CONCURRENCE. Brona Simon
12/8/23
BRONA SIMON
STATE HISTORIC
PRESERVATION OFFICER
MASSACHUSETTS
HISTORICAL COMMISSION

RE: BERNARDSTON: MassDOT Project #612159
Bridge B-10-001 Replacement, Route 10 over Fall River
Bridge B-10-018 Deck Replacement, Route 10 over I-91
Section 106 Review: No Adverse Effect
Section 4(f): Temporary Occupancies – No 4(f) Use

Dear Ms. Simon,

The Massachusetts Department of Transportation (MassDOT) is proposing to expend federal funds to replace Bridge B-10-001 which carries Route 10 over Fall River in Bernardston. The project also includes replacing the deck on Bridge B-10-018 which carries Route 10 over I-91. The 0.5-mile project area on Route 10 extends easterly from River Street/Hartwell Street to Bald Mountain Road. The project work is within the **National Register-eligible Bernardston Center Historic District.** MassDOT has reviewed the project under the Massachusetts Statewide Programmatic Agreement for Section 106 of the National Historic Preservation Act of 1966, as amended [36 CFR 800], and has determined that the proposed work will have **No Adverse Effect** on any properties that are listed or are eligible for listing in the National Register of Historic Places.

Project Description

Bridge B-10-001, constructed in 1959, consists of a three span steel stinger structure with a reinforced concrete deck. The structure is approximately 143-ft. in length. The bridge will be constructed on the same alignment using a staged construction approach. The replacement structure will be a single span steel plate girder superstructure with a cast in place composite concrete deck. The substructure will consist of cast in place concrete abutments founded on micro-piles and cast in place U-wingwalls founded on micro-piles. The proposed cross section will consist of two 12-foot travel lanes, two buffered bike lanes, and a sidewalk on the south side of the bridge (same side as existing sidewalk) that will connect with a pedestrian crossing west of the bridge to provide connectivity to the existing sidewalk on the north side of Route 10 (Church Street) at the Hartwell Street and River Street intersection. Temporary utility relocations (water and overhead) will be required to complete the project. Additional project work includes pavement milling and overlay, pavement markings, ADA-compliant sidewalk, ramp, and curbing reconstruction, drainage adjustments, grading, guardrail, and erosion controls.

Bridge B-10-018, constructed in 1959, has severe deficiencies to the existing bridge deck. The existing interstate bridge consists of five simple spans which will be cleaned and painted as part of the deck replacement. The east backwall will also be rebuilt as part of this project. The deck replacement includes upgraded safety features and a 6-foot-wide sidewalk.

Ten Park Plaza, Suite 4160, Boston, MA 02116
Tel: 857-368-4636, TTY: 857-368-0655
mass.gov/massdot

Bernardston Center Historic District

The Route 10 project area is within the eastern limits of the NR-eligible Bernardston Center Historic District (BER.A). The MHC determined on March 20, 1991 and May 14, 1997 that Bernardston Center is a well-preserved village center that developed after the arrival of the railroad in the mid-19th century. Bernardston Center is NR-eligible as an historic district under Criteria A and C. The project work within the eastern limits of the NR-eligible Bernardston Center Historic District will include roadway and sidewalk reconstruction.

Bridge B-10-001 (Route 10 Bridge over Fall River - BER.903) is located at the eastern edge of the NR-eligible Bernardston Center Historic District. The bridge is a common structural type and was determined to be conditionally not eligible by the MHC on June 22, 1993. It is MassDOT's opinion that the bridge is not NR-eligible either individually or as a contributing element to the Bernardston Center Historic District. Bridge B-10-018 is exempt from review as an interstate bridge.

Minor temporary easements will be required to accommodate the project work on the following contributing properties within the NR-eligible Bernardston Center Historic District:

Dr. Elijah Carpenter House (BER.31) at 68 Church St
Parcel X-TE-1 (311 sq. ft.) to accommodate sidewalk reconstruction and removing and resetting the section of stone walls and stone walk currently within the SHLO to the edge of the property (see attached special provision and marked plan sheet).

Dwight Root House (BER.30) at 76 Church St
Parcel X-TE-2 (32 sq. ft.) to accommodate grading.

H.S. Streeter General Store / Gas Station (BER.88) at 77 Church St
Parcel X=TE-3 (94 sq. ft.) to accommodate erosion controls and placing loam and seed.

Powers Institute Dormitory (BER.28) at 84 Church St
Parcel X-TE-4 (130 sq. ft.) to accommodate driveway apron reconstruction.

George Alexander House (BER.27) at 90 Church St
Parcel X-TE-5 (117 sq. ft.) and Parcel X-TE-6 (350 sq. ft.) to accommodate driveway apron reconstruction and access.

Archaeological Assessment

A review of the MHC's archaeological maps in MACRIS revealed no recorded archaeological sites in the vicinity of the project area. It is the opinion of the MassDOT Archaeologist that low sensitivity can be ascribed to the project's direct area of potential effect based on the impacts of past roadway, bridge, drainage, and utility construction, and roadside residential development. The project work will be confined to disturbed areas within and immediately adjacent to the existing roadway layout.

Section 4(f) Evaluation – Temporary Occupancies – No 4(f) use

This project also requires temporary occupancies, also known as temporary construction easements, on contributing parcels within the NR-eligible Bernardston Center Historic District. These temporary occupancies are necessary to facilitate sidewalk reconstruction, grading, placing loam and seed, and driveway apron reconstruction. The parcels highlighted in yellow on the enclosed ROW plans show the proposed temporary occupancies on the contributing properties.

It is MassDOT's opinion that the temporary occupancies located within or adjacent to the NR-listed property will satisfy the five conditions required for a temporary occupancy not to constitute a "use" within the meaning of Section 4(f), pursuant to 23 CFR 774.13(d):

(1) Duration must be temporary, i.e., less than the time needed for construction of the project, and there should be no change in ownership of the land;
(2) Scope of the work must be minor, i.e., both the nature and the magnitude of the changes to the Section 4(f) property are minimal;
(3) There are no anticipated permanent adverse physical impacts, nor will there be interference with the protected activities, features, or attributes of the property, on either a temporary or permanent basis;
(4) The land being used must be fully restored, i.e., the property must be returned to a condition which is at least as good as that which existed prior to the project; and
(5) There must be documented agreement of the official(s) with jurisdiction over the Section 4(f) resource regarding the above conditions.

The SHPO is the official with jurisdiction over a historic site for the purposes of Section 4(f), pursuant to 23 CFR 774.17. Your concurrence with this No Adverse Effect finding will signify that your office agrees with MassDOT's assessment that the proposed temporary occupancies do not constitute a "use" of the NR-eligible historic properties under Section 4(f) and that the conditions listed above have been satisfied, pursuant to Condition 5.

Section 106 Consultation and No Adverse Effect Finding

An early notification letter was forwarded to the Bernardston Historical Commission on November 1, 2023. A copy was forwarded to the MHC.

MassDOT solicits your concurrence with our finding of No Adverse Effect for this project under Section 106 of the National Historic Preservation Act of 1966, as amended. Please feel free to contact me at jameson.harwood@dot.state.ma.us if you have any questions.

Sincerely,

Jameson Harwood
Cultural Resources Supervisor
Environmental Services

ENC: Locus
Project plans
ROW plans sheets (marked up)
Special provision
Photos
LHC letter

Harwood, Jameson (DOT)

From: Microsoft Outlook
To: Bettina Washington
Sent: Monday, December 18, 2023 9:33 AM
Subject: Relayed: MassDOT Project #612159 - Bernardston bridges PNF

Delivery to these recipients or groups is complete, but no delivery notification was sent by the destination server:

Bettina Washington (thpo@wampanoagtribe-nsn.gov)

Subject: MassDOT Project #612159 - Bernardston bridges PNF

Harwood, Jameson (DOT)

From: Harwood, Jameson (DOT)
Sent: Monday, December 18, 2023 9:33 AM
To: Bettina Washington
Subject: MassDOT Project #612159 - Bernardston bridges PNF
Attachments: 20231218 Bernardston bridges PNF (MassDOT Project 612159).pdf; Plans - 25%.pdf

Ms. Washington,

MassDOT is submitting information for the above-referenced project to the THPO to meet the Section 106 consultation requirements of FHWA (lead federal agency) and the US Army Corps of Engineers. Please submit any written comments or concerns regarding historic or archaeological properties that may be affected by this project to Carrie Lavallee, P.E., Chief Engineer, Massachusetts Department of Transportation, 10 Park Plaza, Boston, MA 02116-3973, Attn: Jameson Harwood.

You also may send comments, questions, or requests for more information by email to Jameson.Harwood@state.ma.us

Thank you,
Jamie

Jameson M. Harwood, Cultural Resources Supervisor
Environmental Services Section
***MassDOT* – Highway Division**
10 Park Plaza
Boston, MA 02116

Harwood, Jameson (DOT)

From: Microsoft Outlook
To: Robinson, David S (EEA)
Sent: Monday, December 18, 2023 9:31 AM
Subject: Delivered: MassDOT Project #612159 - Bernardston bridges PNF

Your message has been delivered to the following recipients:

Robinson, David S (EEA) (David.S.Robinson@mass.gov)

Subject: MassDOT Project #612159 - Bernardston bridges PNF

Harwood, Jameson (DOT)

From: Harwood, Jameson (DOT)
Sent: Monday, December 18, 2023 9:31 AM
To: Robinson, David S (EEA)
Subject: MassDOT Project #612159 - Bernardston bridges PNF
Attachments: 20231218 Bernardston bridges PNF (MassDOT Project 612159).pdf; Plans - 25%.pdf

Tracking:

Recipient	Delivery
Robinson, David S (EEA)	Delivered: 12/18/2023 9:31 AM

David,

MassDOT is submitting information for the above-referenced project to the BUAR to meet the Section 106 consultation requirements of FHWA (lead federal agency) and the US Army Corps of Engineers. Please submit any written comments or concerns regarding historic or archaeological properties that may be affected by this project to Carrie Lavallee, P.E., Chief Engineer, Massachusetts Department of Transportation, 10 Park Plaza, Boston, MA 02116-3973, Attn: Jameson Harwood.

You also may send comments, questions, or requests for more information by email to Jameson.Harwood@state.ma.us

Thank you,
Jamie

Jameson M. Harwood, Cultural Resources Supervisor
Environmental Services Section
***MassDOT* – Highway Division**
10 Park Plaza
Boston, MA 02116

Harwood, Jameson (DOT)

From: Microsoft Outlook
To: David Weeden (David.Weeden@mwtribe-nsn.gov); 106Review
Sent: Monday, December 18, 2023 9:32 AM
Subject: Relayed: MassDOT Project #612159 - Bernardston bridges PNF

Delivery to these recipients or groups is complete, but no delivery notification was sent by the destination server:

David Weeden (David.Weeden@mwtribe-nsn.gov) (David.Weeden@mwtribe-nsn.gov)

106Review (106Review@mwtribe-nsn.gov)

Subject: MassDOT Project #612159 - Bernardston bridges PNF

Harwood, Jameson (DOT)

From: Harwood, Jameson (DOT)
Sent: Monday, December 18, 2023 9:32 AM
To: David Weeden (David.Weeden@mwtribe-nsn.gov); 106Review
Subject: MassDOT Project #612159 - Bernardston bridges PNF
Attachments: 20231218 Bernardston bridges PNF (MassDOT Project 612159).pdf; Plans - 25%.pdf

David,

MassDOT is submitting information for the above-referenced project to the THPO to meet the Section 106 consultation requirements of FHWA (lead federal agency) and the US Army Corps of Engineers. Please submit any written comments or concerns regarding historic or archaeological properties that may be affected by this project to Carrie Lavallee, P.E., Chief Engineer, Massachusetts Department of Transportation, 10 Park Plaza, Boston, MA 02116-3973, Attn: Jameson Harwood.

You also may send comments, questions, or requests for more information by email to Jameson.Harwood@state.ma.us

Thank you,
Jamie

Jameson M. Harwood, Cultural Resources Supervisor
Environmental Services Section
***MassDOT* – Highway Division**
10 Park Plaza
Boston, MA 02116

Harwood, Jameson (DOT)

From: Microsoft Outlook
To: Tashtesook@aol.com
Sent: Monday, December 18, 2023 9:34 AM
Subject: Relayed: MassDOT Project #612159 - Bernardston bridges PNF

Delivery to these recipients or groups is complete, but no delivery notification was sent by the destination server:

Tashtesook@aol.com (Tashtesook@aol.com)

Subject: MassDOT Project #612159 - Bernardston bridges PNF

Harwood, Jameson (DOT)

From: Harwood, Jameson (DOT)
Sent: Monday, December 18, 2023 9:34 AM
To: Tashtesook@aol.com
Subject: MassDOT Project #612159 - Bernardston bridges PNF
Attachments: 20231218 Bernardston bridges PNF (MassDOT Project 612159).pdf; Plans - 25%.pdf

Mr. Brown,

MassDOT is submitting information for the above-referenced project to the THPO to meet the Section 106 consultation requirements of FHWA (lead federal agency) and the US Army Corps of Engineers. Please submit any written comments or concerns regarding historic or archaeological properties that may be affected by this project to Carrie Lavallee, P.E., Chief Engineer, Massachusetts Department of Transportation, 10 Park Plaza, Boston, MA 02116-3973, Attn: Jameson Harwood.

You also may send comments, questions, or requests for more information by email to Jameson.Harwood@state.ma.us

Thank you,
Jamie

Jameson M. Harwood, Cultural Resources Supervisor
Environmental Services Section
***MassDOT* – Highway Division**
10 Park Plaza
Boston, MA 02116

No comments received on PNF from THPOs or BUAR (1/23/2024 JMH)

950 CMR: OFFICE OF THE SECRETARY OF THE COMMONWEALTH

APPENDIX A
MASSACHUSETTS HISTORICAL COMMISSION
220 MORRISSEY BOULEVARD
BOSTON, MASS. 02125
617-727-8470, FAX: 617-727-5128

PROJECT NOTIFICATION FORM

Project Name:	Bridge B-10-001 Replacement and Bridge B-10-018 Deck Replacement (MassDOT Project #612159)
Location /Address:	B-10-001 Rt 10 over Fall River, B-10-018 Rt 10 over I-91
City/Town:	Bernardston

Project Proponent

Name:	Massachusetts Department of Transportation
Address:	10 Park Plaza
City/Town/Zip/Telephone:	Boston, MA 02116

Agency license or funding for the project (list all licenses, permits, approvals, grants or other entitlements being sought from state and federal agencies).

Agency Name	**Type of License or funding (specify)**
FHWA	Federal Funding (lead federal agency)
USACOE	Section 404 permit

Project Description (narrative):

Bridge B-10-001, constructed in 1959, consists of a three span steel stinger structure with a reinforced concrete deck. The structure is approximately 143-ft. in length. The bridge will be constructed on the same alignment using a staged construction approach. The replacement structure will be a single span steel plate girder superstructure with a cast in place composite concrete deck. The substructure will consist of cast in place concrete abutments founded on micro-piles and cast in place U-wingwalls founded on micro-piles. The proposed cross section will consist of two 12-foot travel lanes, two buffered bike lanes, and a sidewalk on the south side of the bridge (same side as existing sidewalk) that will connect with a pedestrian crossing west of the bridge to provide connectivity to the existing sidewalk on the north side of Route 10 (Church Street) at the Hartwell Street and River Street intersection. Temporary utility relocations (water and overhead) will be required to complete the project. Additional project work includes pavement milling and overlay, pavement markings, ADA-compliant sidewalk, ramp, and curbing reconstruction, drainage adjustments, grading, guardrail, and erosion controls.

Bridge B-10-018, constructed in 1959, has severe deficiencies to the existing bridge deck. The existing interstate bridge consists of five simple spans which will be cleaned and painted as part of the deck replacement. The east backwall will also be rebuilt as part of this project. The deck replacement includes upgraded safety features and a 6-foot-wide sidewalk.

Does the project include demolition? If so, specify nature of demolition and describe the building(s) which are proposed for demolition.

N/A

Does the project include rehabilitation of any existing buildings? If so, specify nature of rehabilitation and describe the building(s) which are proposed for rehabilitation.

N/A

Does the project include new construction? If so, describe (attach plans and elevations if necessary).

See plans

To the best of your knowledge, are any historic or archaeological properties known to exist within the project's area of potential impact? If so, specify.

The Route 10 project area is within the eastern limits of the NR-eligible Bernardston Center Historic District (BER.A). The MHC determined on March 20, 1991 and May 14, 1997 that Bernardston Center is a well-preserved village center that developed after the arrival of the railroad in the mid-19th century. Bernardston Center is NR-eligible as an historic district under Criteria A and C. The project work within the eastern limits of the NR-eligible Bernardston Center Historic District will include roadway and sidewalk reconstruction.

Bridge B-10-001 (Route 10 Bridge over Fall River - BER.903) is located at the eastern edge of the NR-eligible Bernardston Center Historic District. The bridge is a common structural type and was determined to be conditionally not eligible by the MHC on June 22, 1993. On December 8, 2023, the MHC concurred with MassDOT's finding that the Route 10 Bridge over Fall River (BER.903) is not NR-eligible either individually or as a contributing element to the Bernardston Center Historic District. Bridge B-10-018 is exempt from review as an interstate bridge.

A review of the MHC's archaeological maps in MACRIS revealed no recorded archaeological sites in the vicinity of the project area. It is the opinion of the MassDOT Archaeologist that low sensitivity can be ascribed to the project's direct area of potential effect based on the impacts of past roadway, bridge, drainage, and utility construction, and roadside residential development. The project work will be confined to disturbed areas within and immediately adjacent to the existing roadway layout.

What is the total acreage of the project area?

Woodland	_____	acres	Productive Resources:		
Wetland	_____	acres	Agriculture	_____	acres
Floodplain	_____	acres	Forestry	_____	acres
Open Space	_____	acres	Mining/Extraction	_____	acres
Developed	_____	acres	Total Project Acreage	_____	acres

What is the acreage of the proposed new construction? _____ acres

What is the present land use of the project area?

Bridge B-10-001 is located in residential/commercial area and Bridge B-10-018 is an interstate bridge.

Please attach a copy of the section of the USGS quadrangle map which clearly marks the project location.

This Project Notification Form has been submitted to the MHC in compliance with 950 CMR 71.00.

Signature of person submitting this form: **Date:** 12/18/2023

Name: Jameson Harwood, Cultural Resources Supervisor

Address: 10 Park Plaza - Room 7130

City/Town/Zip: Boston, MA 02717

Telephone: Email: jameson.harwood@dot.state.ma.us

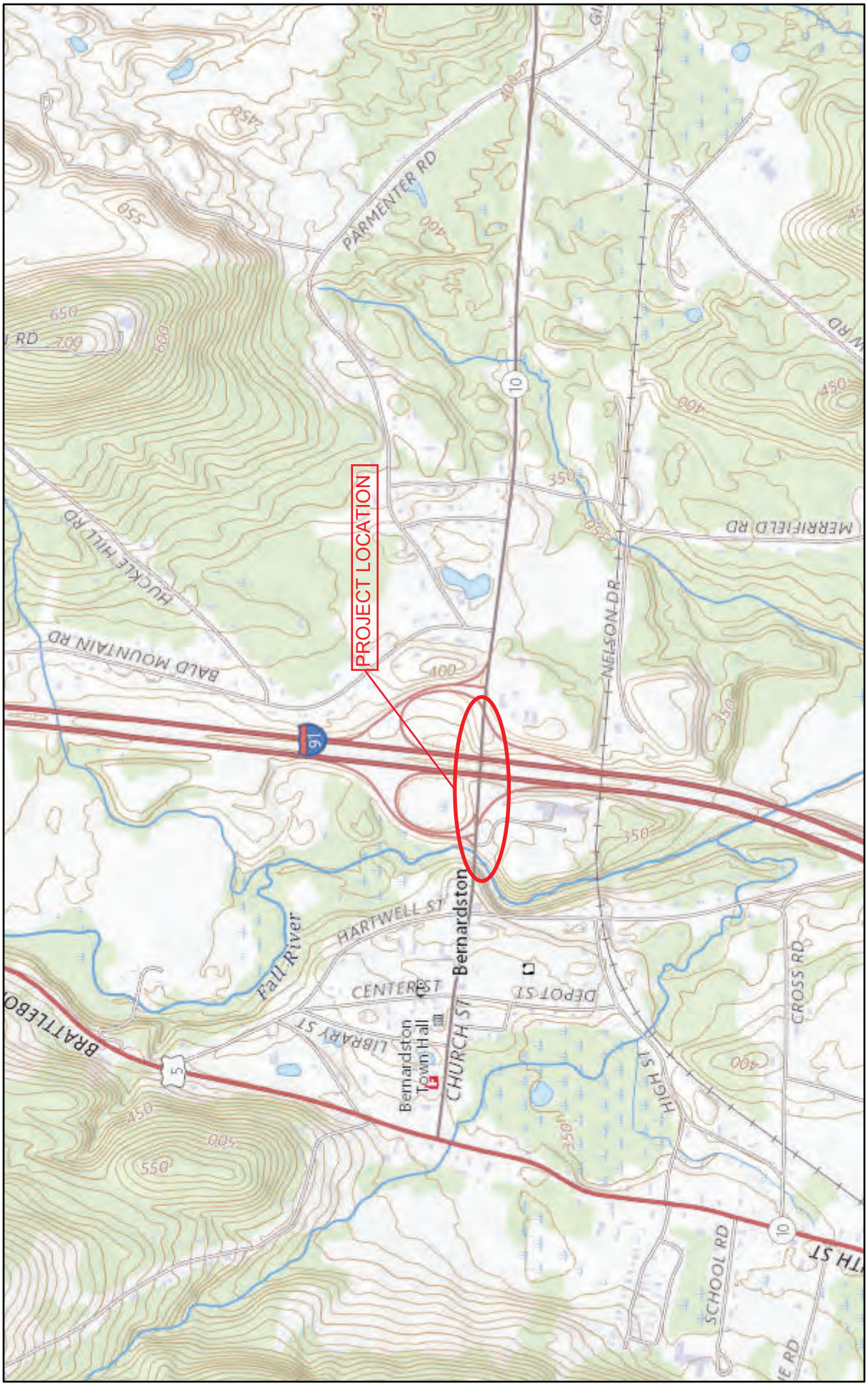
REGULATORY AUTHORITY

950 CMR 71.00: M.G.L. c. 9, §§ 26-27C as amended by St. 1988, c. 254.

CC

CC:

USGS Locus - Route 10 Bernardston



1:18,056

0 0.1 0.2 0.4 mi

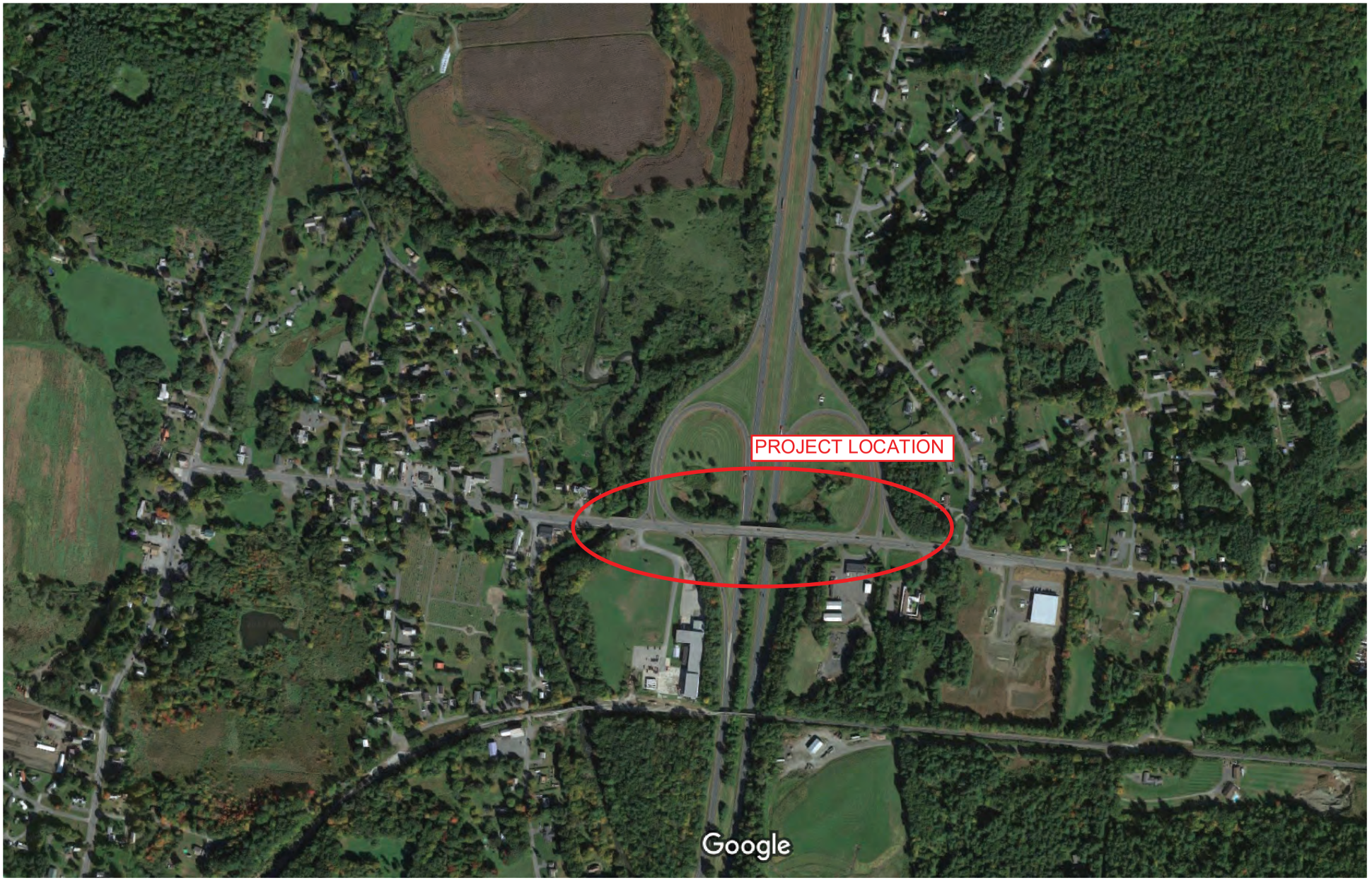
0 0.17 0.35 0.7 km

USGS The National Map: National Boundaries Dataset, 3DEP Elevation Program, Geographic Names Information System, National Hydrography

USGS 2021 USGS

5/30/2023, 3:51:08 PM

Google Maps Aerial Locus - Route 10 Bernardston



Imagery ©2023 Google, Map data ©2023 Google 100 m

A00830 - 393

Proposal No. 612159-136484

November 1, 2023

Bernardston Historical Commission
Bernardston Town Hall
38 Church Street
Bernardston, MA 01337

RE: BERNARDSTON: MassDOT Project #612159
Bridge B-10-001 Replacement, Route 10 over Fall River
Bridge B-10-018 Deck Replacement, Route 10 over I-91
Section 106 Review – Early Environmental Coordination

Dear Commission Members:

The Massachusetts Department of Transportation, Highway Division (MassDOT) is proposing to replace Bridge B-10-001 in Bernardston which carries Route 10 over Fall River. The project will also replace the deck of Bridge B-10-018 which carries Route 10 over I-91. This project will be supported in part with federal funds dispersed through MassDOT. The project, therefore, will require review under Section 106 of the National Historic Preservation Act of 1966 as amended (36 CFR 800). The enclosed project information is provided to the Bernardston Historical Commission to initiate consultation with appropriate representatives of local government in compliance with the regulations governing Section 106.

Bridge B-10-001 is a three span, steel stringer structure constructed in 1959. The planned replacement structure will consist of a single span steel girder bridge founded on integral abutments. The proposed cross section will consist of two 12-foot travel lanes, two buffered bike lanes, and a sidewalk on the south side of the bridge (same side as existing sidewalk) that will connect with a pedestrian crossing west of the bridge to provide connectivity to the existing sidewalk on the north side of Route 10 (Church Street) at the Hartwell Street and River Street intersection. Temporary utility relocations (water and overhead) will be required to complete the project.

MassDOT requests that the Commission review the enclosed materials at their earliest convenience. Please submit written comments to: Carrie Lavallee, P.E., Chief Engineer, MassDOT, Highway Division, 10 Park Plaza, Room 4260, Boston, MA 02116, Attn: Jameson Harwood.

If you have any questions, please feel free to contact me at jameson.harwood@dot.state.ma.us.

Sincerely,

Jameson Harwood
Cultural Resources Supervisor
Environmental Services

atts: Locus
cc: B. Simon, MHC w/atts.

APPENDIX F

WETLAND DATA FORMS

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Church Street over Fall River City/County: Bernardston Sampling Date: 07/27/22

Applicant/Owner: MassDOT State: MA Sampling Point: A-5

Investigator(s): Lucas Environmental, LLC Section, Township, Range:

Landform (hillside, terrace, etc.): Hillside Local relief (concave, convex, none): Slope (%): 8

Subregion (LRR or MLRA): LRR R Lat: Long: Datum:

Soil Map Unit Name: Warwick Channery Fine Sandy Loam NWI classification: R/PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)

Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes X No

Are Vegetation , Soil , or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No	**Is the Sampled Area**	
Hydric Soil Present?	Yes X	No	**within a Wetland?**	**Yes** X **No**
Wetland Hydrology Present?	Yes X	No	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- Surface Water (A1)
- High Water Table (A2)
- X Saturation (A3)
- Water Marks (B1)
- Sediment Deposits (B2)
- Drift Deposits (B3)
- Algal Mat or Crust (B4)
- Iron Deposits (B5)
- Inundation Visible on Aerial Imagery (B7)
- Sparsely Vegetated Concave Surface (B8)
- Water-Stained Leaves (B9)
- Aquatic Fauna (B13)
- Marl Deposits (B15)
- Hydrogen Sulfide Odor (C1)
- Oxidized Rhizospheres on Living Roots (C3)
- Presence of Reduced Iron (C4)
- Recent Iron Reduction in Tilled Soils (C6)
- Thin Muck Surface (C7)
- Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- Surface Soil Cracks (B6)
- Drainage Patterns (B10)
- Moss Trim Lines (B16)
- Dry-Season Water Table (C2)
- Crayfish Burrows (C8)
- Saturation Visible on Aerial Imagery (C9)
- Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- Shallow Aquitard (D3)
- Microtopographic Relief (D4)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes	No X	Depth (inches):	
Water Table Present?	Yes	No X	Depth (inches):	
Saturation Present? (includes capillary fringe)	Yes X	No	Depth (inches): 8	

Wetland Hydrology Present? **Yes** X **No**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants. Sampling Point: A-5

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *None*			
2.			
3.			
4.			
5.			
6.			
7.			
	=Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1. *Sambucus canadensis*	50	Yes	FACW
2. *Lonicera japonica*	50	Yes	FACU
3.			
4.			
5.			
6.			
7.			
	100 =Total Cover		
Herb Stratum (Plot size: 5)			
1. *Impatiens capensis*	98	Yes	FACW
2. *Eutrochium purpureum*	3	No	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	101 =Total Cover		
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
	=Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 66.7% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	148	x 2 =	296
FAC species	3	x 3 =	9
FACU species	50	x 4 =	200
UPL species	0	x 5 =	0
Column Totals:	201 (A)		505 (B)

Prevalence Index = B/A = 2.51

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: A-5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 3/1	100					Loamy/Clayey	A
8-16	5Y 3/1	80	5YR 4/4	10	c	m	Loamy/Clayey	Prominent redox concentrations

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ High Chroma Sands (S11) (**LRR K, L**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- X Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** ___

Remarks:

This data form is revised from Northcentral and Northeast Regional Supplement Version 2.0 to reflect the NRCS Field Indicators of Hydric Soils version 7.0 March 2013 Errata. (http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_051293.docx)

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Church Street over Fall River City/County: Bernardston Sampling Date: 07/27/22

Applicant/Owner: MassDOT State: MA Sampling Point: A-5

Investigator(s): Lucas Environmental, LLC Section, Township, Range:

Landform (hillside, terrace, etc.): Hillside Local relief (concave, convex, none): Slope (%): 8

Subregion (LRR or MLRA): LRR R Lat: Long: Datum:

Soil Map Unit Name: Warwick Channery Fine Sandy Loam NWI classification: R/PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)

Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes X No

Are Vegetation , Soil , or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area**
Hydric Soil Present?	Yes	No X	**within a Wetland?** **Yes** **No** X
Wetland Hydrology Present?	Yes	No X	If yes, optional Wetland Site ID:

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- Surface Water (A1)
- High Water Table (A2)
- Saturation (A3)
- Water Marks (B1)
- Sediment Deposits (B2)
- Drift Deposits (B3)
- Algal Mat or Crust (B4)
- Iron Deposits (B5)
- Inundation Visible on Aerial Imagery (B7)
- Sparsely Vegetated Concave Surface (B8)
- Water-Stained Leaves (B9)
- Aquatic Fauna (B13)
- Marl Deposits (B15)
- Hydrogen Sulfide Odor (C1)
- Oxidized Rhizospheres on Living Roots (C3)
- Presence of Reduced Iron (C4)
- Recent Iron Reduction in Tilled Soils (C6)
- Thin Muck Surface (C7)
- Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- Surface Soil Cracks (B6)
- Drainage Patterns (B10)
- Moss Trim Lines (B16)
- Dry-Season Water Table (C2)
- Crayfish Burrows (C8)
- Saturation Visible on Aerial Imagery (C9)
- Stunted or Stressed Plants (D1)
- Geomorphic Position (D2)
- Shallow Aquitard (D3)
- Microtopographic Relief (D4)
- FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes	No X	Depth (inches):
Water Table Present?	Yes	No X	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes	No X	Depth (inches):

Wetland Hydrology Present? **Yes** **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants. Sampling Point: A-5

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer platanoides*	63	Yes	UPL
2. *Prunus serotina*	20	Yes	FACU
3.			
4.			
5.			
6.			
7.			
	83	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. *Acer platanoides*	20	Yes	UPL
2. *Rosa multiflora*	10	Yes	FACU
3.			
4.			
5.			
6.			
7.			
	30	=Total Cover	
Herb Stratum (Plot size: 5)			
1. *Impatiens capensis*	20	Yes	FACW
2. *Onoclea sensibilis*	10	Yes	FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	30	=Total Cover	
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
		=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 33.3% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	30	x 2 =	60
FAC species	0	x 3 =	0
FACU species	30	x 4 =	120
UPL species	83	x 5 =	415
Column Totals:	143	(A)	595 (B)

Prevalence Index = B/A = 4.16

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ___ **No** X

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: A-5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 3/1	100					Loamy/Clayey	A
12-18	2.5YR 3/1	100			c	m	Loamy/Clayey	B
18-20	2.5Y 3/1	90	10YR 4/4	10	c	m	Loamy/Clayey	Prominent redox concentrations

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ High Chroma Sands (S11) (**LRR K, L**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ___ **No** X

Remarks:

This data form is revised from Northcentral and Northeast Regional Supplement Version 2.0 to reflect the NRCS Field Indicators of Hydric Soils version 7.0 March 2013 Errata. (http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_051293.docx)

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Church Street over Fall River City/County: Bernardston Sampling Date: 07/27/22

Applicant/Owner: MassDOT State: MA Sampling Point: B-19

Investigator(s): Lucas Environmental, LLC Section, Township, Range:

Landform (hillside, terrace, etc.): Valley Local relief (concave, convex, none): Slope (%): 3

Subregion (LRR or MLRA): LRR R Lat: Long: Datum:

Soil Map Unit Name: Warwick Channery Fine Sandy Loam NWI classification: R/PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)

Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes X No

Are Vegetation , Soil , or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No	**Is the Sampled Area**	
Hydric Soil Present?	Yes X	No	**within a Wetland?**	**Yes** X **No**
Wetland Hydrology Present?	Yes X	No	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes	No X	Depth (inches):	
Water Table Present?	Yes X	No	Depth (inches):	11
Saturation Present? (includes capillary fringe)	Yes X	No	Depth (inches):	0

Wetland Hydrology Present? **Yes** X **No**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants. Sampling Point: B-19

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *None*			
2.			
3.			
4.			
5.			
6.			
7.			
	=Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	=Total Cover		
Herb Stratum (Plot size: 5)			
1. *Callitriche stagnalis*	10	Yes	OBL
2. *Lythrum salicaria*	5	Yes	OBL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	15 =Total Cover		
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
	=Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	15	x 1 =	15
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	15 (A)		15 (B)

Prevalence Index = B/A = 1.00

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL Sampling Point: B-19

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	5Y 3/1	80	5YR 4/4	20	c	m	Sandy	A
4-12	N 3/	100					Muck	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- X Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ High Chroma Sands (S11) (**LRR K, L**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** ___

Remarks:

This data form is revised from Northcentral and Northeast Regional Supplement Version 2.0 to reflect the NRCS Field Indicators of Hydric Soils version 7.0 March 2013 Errata. (http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_051293.docx)

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Church Street over Fall River City/County: Bernardston Sampling Date: 07/27/22

Applicant/Owner: MassDOT State: MA Sampling Point: B-19

Investigator(s): Lucas Environmental, LLC Section, Township, Range:

Landform (hillside, terrace, etc.): Valley Local relief (concave, convex, none): Slope (%): 3

Subregion (LRR or MLRA): LRR R Lat: Long: Datum:

Soil Map Unit Name: Warwick Channery Fine Sandy Loam NWI classification: R/PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)

Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes X No

Are Vegetation , Soil , or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area**
Hydric Soil Present?	Yes	No X	**within a Wetland?** **Yes** **No** X
Wetland Hydrology Present?	Yes	No X	If yes, optional Wetland Site ID:

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- Surface Water (A1)
- High Water Table (A2)
- Saturation (A3)
- Water Marks (B1)
- Sediment Deposits (B2)
- Drift Deposits (B3)
- Algal Mat or Crust (B4)
- Iron Deposits (B5)
- Inundation Visible on Aerial Imagery (B7)
- Sparsely Vegetated Concave Surface (B8)
- Water-Stained Leaves (B9)
- Aquatic Fauna (B13)
- Marl Deposits (B15)
- Hydrogen Sulfide Odor (C1)
- Oxidized Rhizospheres on Living Roots (C3)
- Presence of Reduced Iron (C4)
- Recent Iron Reduction in Tilled Soils (C6)
- Thin Muck Surface (C7)
- Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- Surface Soil Cracks (B6)
- Drainage Patterns (B10)
- Moss Trim Lines (B16)
- Dry-Season Water Table (C2)
- Crayfish Burrows (C8)
- Saturation Visible on Aerial Imagery (C9)
- Stunted or Stressed Plants (D1)
- Geomorphic Position (D2)
- Shallow Aquitard (D3)
- Microtopographic Relief (D4)
- FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes	No X	Depth (inches):
Water Table Present?	Yes	No X	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes	No X	Depth (inches):

Wetland Hydrology Present? **Yes** **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants. Sampling Point: B-19

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer platanoides*	63	Yes	UPL
2.			
3.			
4.			
5.			
6.			
7.			
	63	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. *Lonicera japonica*	63	Yes	FACU
2. *Syringa vulgaris*	20	Yes	UPL
3.			
4.			
5.			
6.			
7.			
	83	=Total Cover	
Herb Stratum (Plot size: 5)			
1. *Onoclea sensibilis*	20	Yes	FACW
2. *Impatiens capensis*	20	Yes	FACW
3. *Celastrus orbiculatus*	10	Yes	UPL
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	50	=Total Cover	
Woody Vine Stratum (Plot size:)			
1. *Celastrus orbiculatus*	10	Yes	UPL
2.			
3.			
4.			
	10	=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 28.6% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	40	x 2 =	80
FAC species	0	x 3 =	0
FACU species	63	x 4 =	252
UPL species	103	x 5 =	515
Column Totals:	206 (A)		847 (B)

Prevalence Index = B/A = 4.11

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ___ **No** X

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: B-19

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 3/1	100					Loamy/Clayey	A
8-12	5Y 4/1	100					Loamy/Clayey	Bw

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ High Chroma Sands (S11) (**LRR K, L**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ___ **No** X

Remarks:

This data form is revised from Northcentral and Northeast Regional Supplement Version 2.0 to reflect the NRCS Field Indicators of Hydric Soils version 7.0 March 2013 Errata. (http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_051293.docx)

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Church Street over Fall River City/County: Bernardston Sampling Date: 07/27/22

Applicant/Owner: MassDOT State: MA Sampling Point: C-3

Investigator(s): Lucas Environmental, LLC Section, Township, Range:

Landform (hillside, terrace, etc.): Valley Local relief (concave, convex, none): Slope (%): 10

Subregion (LRR or MLRA): LRR R Lat: Long: Datum:

Soil Map Unit Name: Warwick Channery Fine Sandy Loam NWI classification: R/PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No	**Is the Sampled Area**	
Hydric Soil Present?	Yes X	No	**within a Wetland?**	**Yes** X **No**
Wetland Hydrology Present?	Yes X	No	If yes, optional Wetland Site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- X Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches):	
Water Table Present?	Yes ____	No X	Depth (inches):	
Saturation Present? (includes capillary fringe)	Yes ____	No X	Depth (inches):	

Wetland Hydrology Present? **Yes** X **No**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants. Sampling Point: C-3

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	=Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1. *Ulmus americana*	20	Yes	FACW
2.			
3.			
4.			
5.			
6.			
7.			
	20 =Total Cover		
Herb Stratum (Plot size: 5)			
1. *Impatiens capensis*	63	Yes	FACW
2. *Sphagnum*	20	Yes	OBL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	83 =Total Cover		
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
	=Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	20	x 1 =	20
FACW species	83	x 2 =	166
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	103 (A)		186 (B)

Prevalence Index = B/A = 1.81

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: C-3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ High Chroma Sands (S11) (**LRR K, L**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** ___

Remarks:
Non-soils due to rock.

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Church Street over Fall River City/County: Bernardston Sampling Date: 07/27/22

Applicant/Owner: MassDOT State: MA Sampling Point: C-3

Investigator(s): Lucas Environmental, LLC Section, Township, Range:

Landform (hillside, terrace, etc.): Valley Local relief (concave, convex, none): Slope (%): 10

Subregion (LRR or MLRA): LRR R Lat: Long: Datum:

Soil Map Unit Name: Warwick Channery Fine Sandy Loam NWI classification: R/PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)

Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes X No

Are Vegetation , Soil , or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area**
Hydric Soil Present?	Yes	No X	**within a Wetland?** **Yes** **No** X
Wetland Hydrology Present?	Yes	No X	If yes, optional Wetland Site ID:

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- Surface Water (A1)
- High Water Table (A2)
- Saturation (A3)
- Water Marks (B1)
- Sediment Deposits (B2)
- Drift Deposits (B3)
- Algal Mat or Crust (B4)
- Iron Deposits (B5)
- Inundation Visible on Aerial Imagery (B7)
- Sparsely Vegetated Concave Surface (B8)
- Water-Stained Leaves (B9)
- Aquatic Fauna (B13)
- Marl Deposits (B15)
- Hydrogen Sulfide Odor (C1)
- Oxidized Rhizospheres on Living Roots (C3)
- Presence of Reduced Iron (C4)
- Recent Iron Reduction in Tilled Soils (C6)
- Thin Muck Surface (C7)
- Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- Surface Soil Cracks (B6)
- Drainage Patterns (B10)
- Moss Trim Lines (B16)
- Dry-Season Water Table (C2)
- Crayfish Burrows (C8)
- Saturation Visible on Aerial Imagery (C9)
- Stunted or Stressed Plants (D1)
- Geomorphic Position (D2)
- Shallow Aquitard (D3)
- Microtopographic Relief (D4)
- FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes	No X	Depth (inches):
Water Table Present?	Yes	No X	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes	No X	Depth (inches):

Wetland Hydrology Present? **Yes** **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants. Sampling Point: C-3

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Tsuga canadensis*	63	Yes	FACU
2. *Betula lenta*	20	Yes	FACU
3.			
4.			
5.			
6.			
7.			
	83	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. *Tsuga canadensis*	63	Yes	FACU
2. *Robinia pseudoacacia*	10	No	FACU
3. *Quercus alba*	10	No	FACU
4. *Lonicera tatarica*	10	No	FACU
5.			
6.			
7.			
	93	=Total Cover	
Herb Stratum (Plot size: 5)			
1. *Osmunda claytoniana*	10	Yes	FAC
2. *Acer platanoides*	3	Yes	UPL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	13	=Total Cover	
Woody Vine Stratum (Plot size:)			
1. *Celastrus orbiculatus*	10	Yes	UPL
2.			
3.			
4.			
	10	=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 16.7% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	10	x 3 =	30
FACU species	176	x 4 =	704
UPL species	13	x 5 =	65
Column Totals:	199	(A)	799 (B)

Prevalence Index = B/A = 4.02

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ___ **No** X

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: C-3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ High Chroma Sands (S11) (**LRR K, L**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ___ **No** X

Remarks:

Soils too thin due to ledge/rock

APPENDIX G

PROJECT PLANS

BRIDGE REPLACEMENT PROJECT

PLAN AND PROFILE OF

ST 10 (CHURCH STREET) OVER FALL RIVER

BRIDGE NO. B-10-001 (CLA)

IN THE TOWN OF

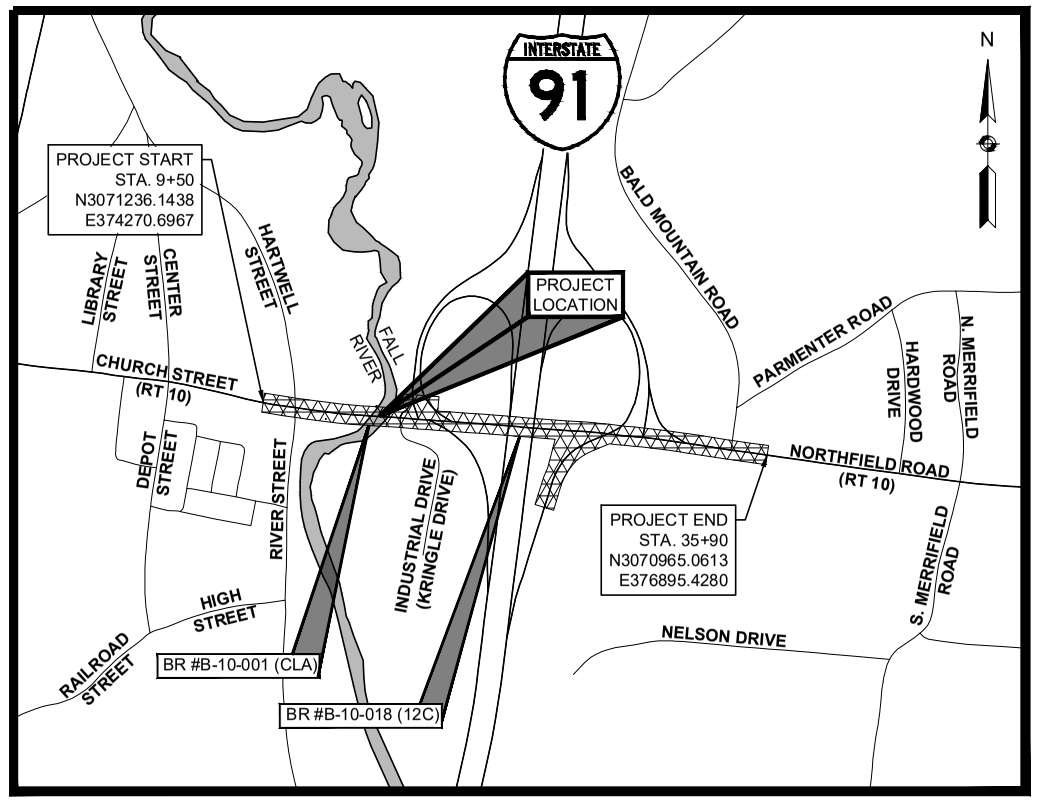
BERNARDSTON

FRANKLIN COUNTY

PERMIT APPLICATION

INDEX

SHEET NO.	DESCRIPTION
1	TITLE SHEET & INDEX
2	BRIDGE GENERAL PLAN
3	ELEVATION & GRADING DETAILS
4	STREAMBED RESTORATION PLAN
5	PROFILES
6	BANK & LUW IMPACT PLAN
7	BLSF IMPACT PLAN
8	CONTROL OF WATER PLAN
9	CONSTRUCTION DETAILS



0 1000 2000 3000 4000

SCALE: 1" = 1000'

SHEET 1 OF 9

WATER QUALITY CERTIFICATE APPLICATION
BERNARDSTON, MASSACHUSETTS
ST 10 (CHURCH ST) OVER FALL RIVER
BRIDGE B–10–001
JULY 2025

A00830 - 415

612159_BR1(GENPLAN).DWG Plotted on 8-Jul-2025 1:21 PM

Proposal No. 612159-136484

GUARDRAIL DETAILS

STA 13+39 RT TO STA 13+76 RT TANGENT END TREATMENT, TL-2
STA 13+76 RT TO STA 14+10 RT TRANSITION TO BRIDGE RAIL

STA 14+36 LT TO STA 14+45 LT TRAILING ANCHORAGE
STA 14+45 LT TO STA 14+79 LT TRANSITION TO BRIDGE RAIL

STA 15+97 RT TO STA 16+31 RT TRANSITION TO BRIDGE RAIL
STA 16+31 RT TO STA 16+43 RT GUARDRAIL TL-2 (CURVED, R=50')
STA 16+43 RT TO STA 16+53 RT TRAILING ANCHORAGE

STA 16+40 LT TO STA 16+73 LT TRANSITION TO BRIDGE RAIL (CURVED, R=60')
STA 16+73 LT TO STA 17+03 LT GUARDRAIL, TL-2 (CURVED)
STA 17+03 LT TO STA 17+12 LT TRANSITION TO NCHRP 350

STA 18+62 LT TO STA 18+70 LT TRAILING ANCHORAGE
STA 18+70 LT TO STA 18+75 LT GUARDRAIL, TL-2
STA 18+75 LT TO STA 19+54 LT GUARDRAIL, TL-2 (CURVED, R=145')

TRAFFIC SIGNAL CONDUIT

SEE BELOW

WATER SUPPLY ALTERATIONS

SEE UTILITY PLANS

DRAINAGE DETAILS

SEE UTILITY PLANS

LEGEND

- # = DRIVEWAY NUMBER
- # = PEDESTRIAN CURB RAMP NUMBER
- = CEM CONC PEDESTRIAN CURB RAMP
- = PROP MODIFIED ROCKFILL SLOPE STABILIZATION/RIPRAP

NOTES:

1. THE HORIZONTAL DATUM IS THE NORTH AMERICAN DATUM OF 1983 (NAD83) MASSACHUSETTS STATE PLANE COORDINATE SYSTEM IN U.S. SURVEY FEET.
2. THE VERTICAL DATUM IS THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) IN FEET.

BRIDGE GENERAL PLAN
SCALE: 1" = 40'

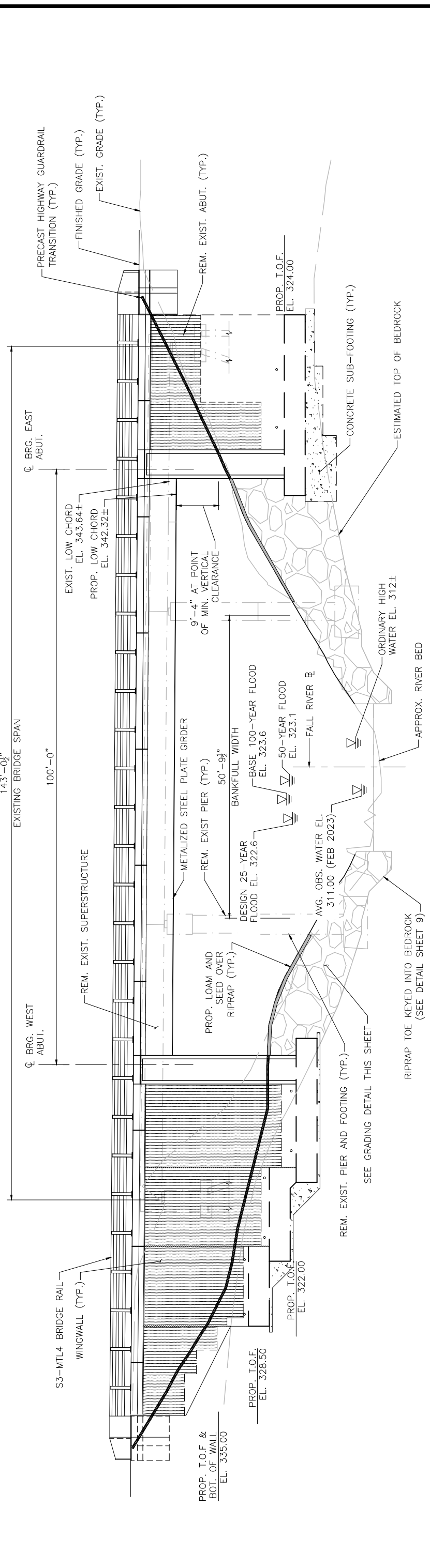
SCALE: 1" = 40'

SHEET 2 OF 9

WATER QUALITY CERTIFICATE APPLICATION
BERNARDSTON, MASSACHUSETTS
ST 10 (CHURCH ST) OVER FALL RIVER
BRIDGE B-10-001
JULY 2025

612159_BR2(ELEVATION).DWG Plotted on 8-Jul-2025 1:19 PM

WATER QUALITY CERTIFICATE APPLICATION
BERNARDSTON, MASSACHUSETTS
ST 10 (CHURCH ST) OVER FALL RIVER
BRIDGE B-10-001
JULY 2025

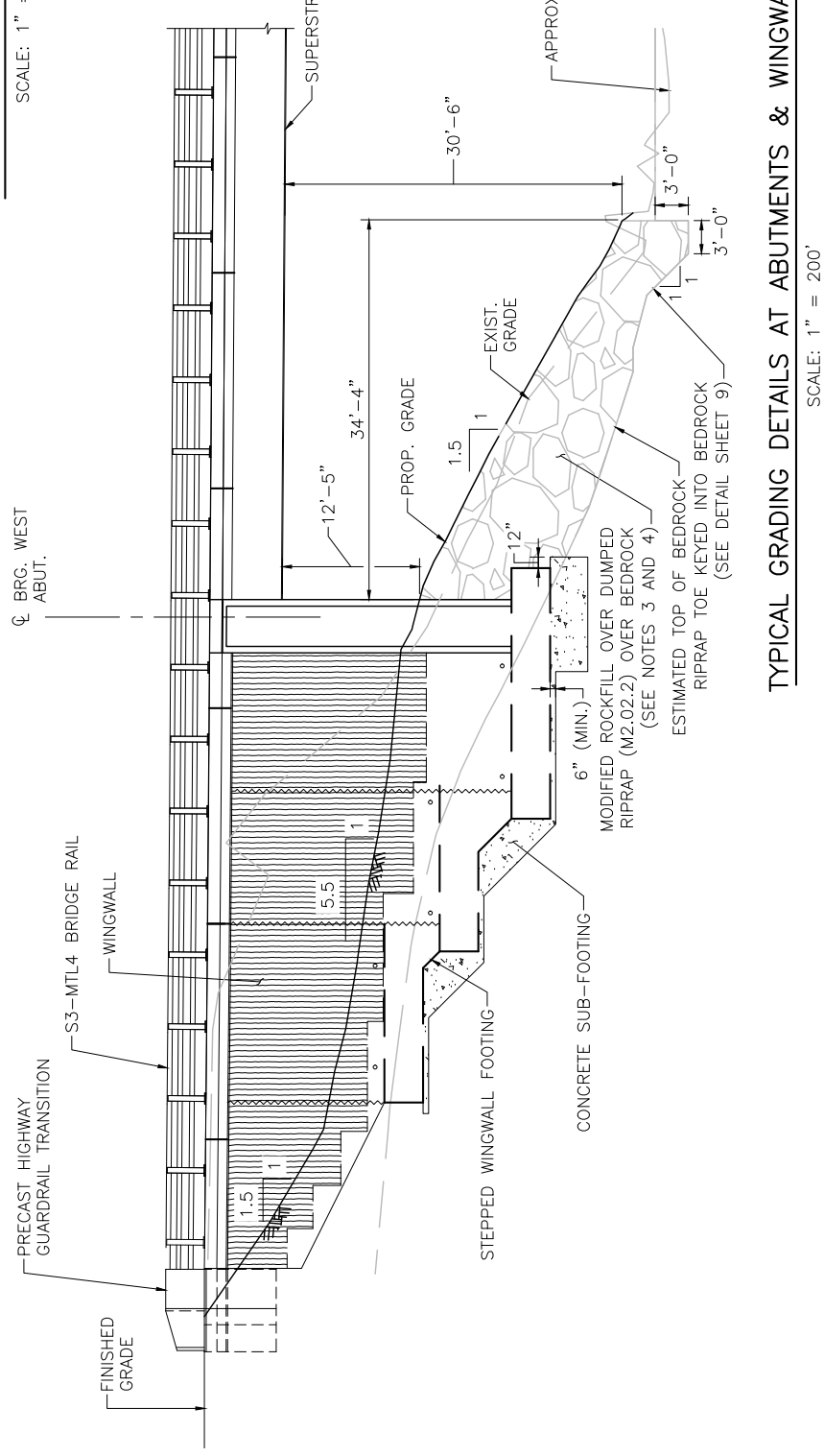


BRIDGE GENERAL ELEVATION

SCALE: 1" = 200'

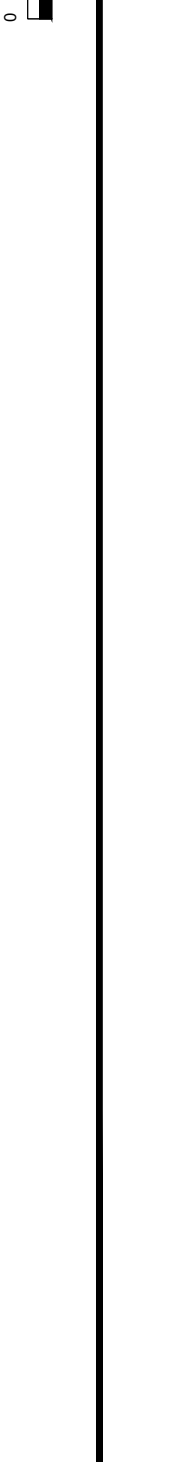
NOTES:

1. THE HORIZONTAL DATUM IS THE NORTH AMERICAN DATUM OF 1983 (NAD83) MASSACHUSETTS STATE PLANE COORDINATE SYSTEM IN U.S. SURVEY FEET.
2. THE VERTICAL DATUM IS THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) IN FEET.
3. LOAM AND SEED SHALL BE PLACED ON TOP OF RIPRAP/MODIFIED ROCKFILL ABOVE THE 100-YEAR FLOOD ELEVATION (EL. 323.60).
4. STREAMBED MATERIAL IN ACCORDANCE WITH ITEM 983.521 – STREAMBED RESTORATION SHALL BE USED TO FILL RIPRAP VOIDS BELOW THE 100-YEAR FLOOD ELEVATION.



TYPICAL GRADING DETAILS AT ABUTMENTS & WINGWALLS

SCALE: 1" = 200'



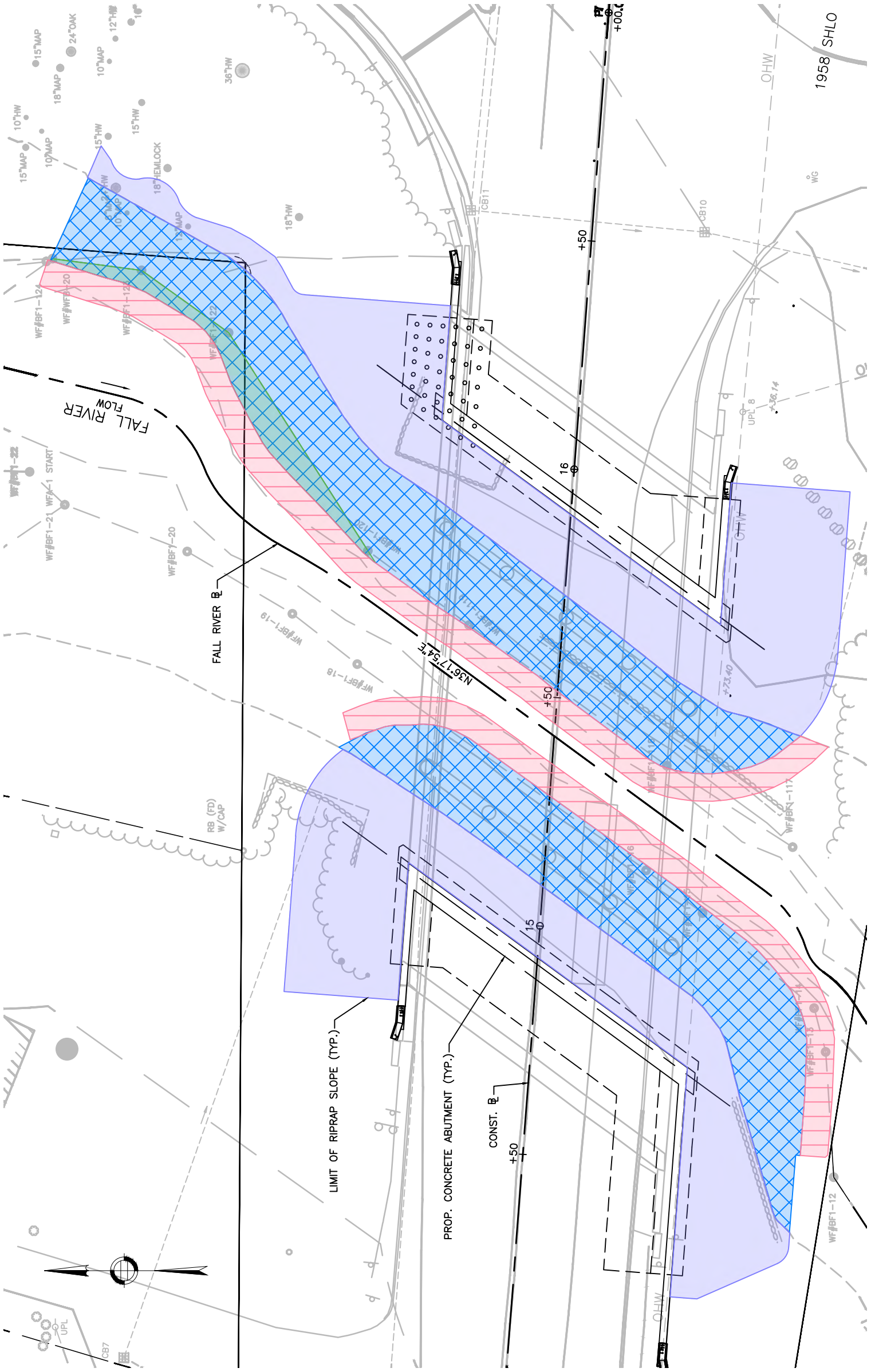
612159_BR4(STREAMBED RESTORATION).DWG Plotted on 8-Jul-2025 1:53 PM

LEGEND:

- LOAM AND SEED OVER RIPRAP ABOVE 100-YEAR FLOOD ELEVATION.
- STREAMBED MATERIAL OVER RIPRAP BELOW 100-YEAR FLOOD ELEVATION AND ABOVE BANK FLAGS.
- STREAMBED RESTORATION BELOW SANDBAGS. (ONLY DISTURBANCE IS THE PLACEMENT AND REMOVAL OF SANDBAGS)
- DREDGE AREA BELOW BANK FLAGS. RE-USE DREDGE MATERIAL TO FILL VOIDS IN BLUE AREA. THIS AREA WILL BE RIPRAP WITH STREAMBED MATERIAL IN THE VOIDS IN ITS FINAL CONDITION

SHEET 4 OF 9

WATER QUALITY CERTIFICATE APPLICATION
BERNARDSTON, MASSACHUSETTS
ST 10 (CHURCH ST) OVER FALL RIVER
BRIDGE B-10-001
JULY 2025



STREAMBED RESTORATION PLAN

SCALE: 1" = 1'-0"

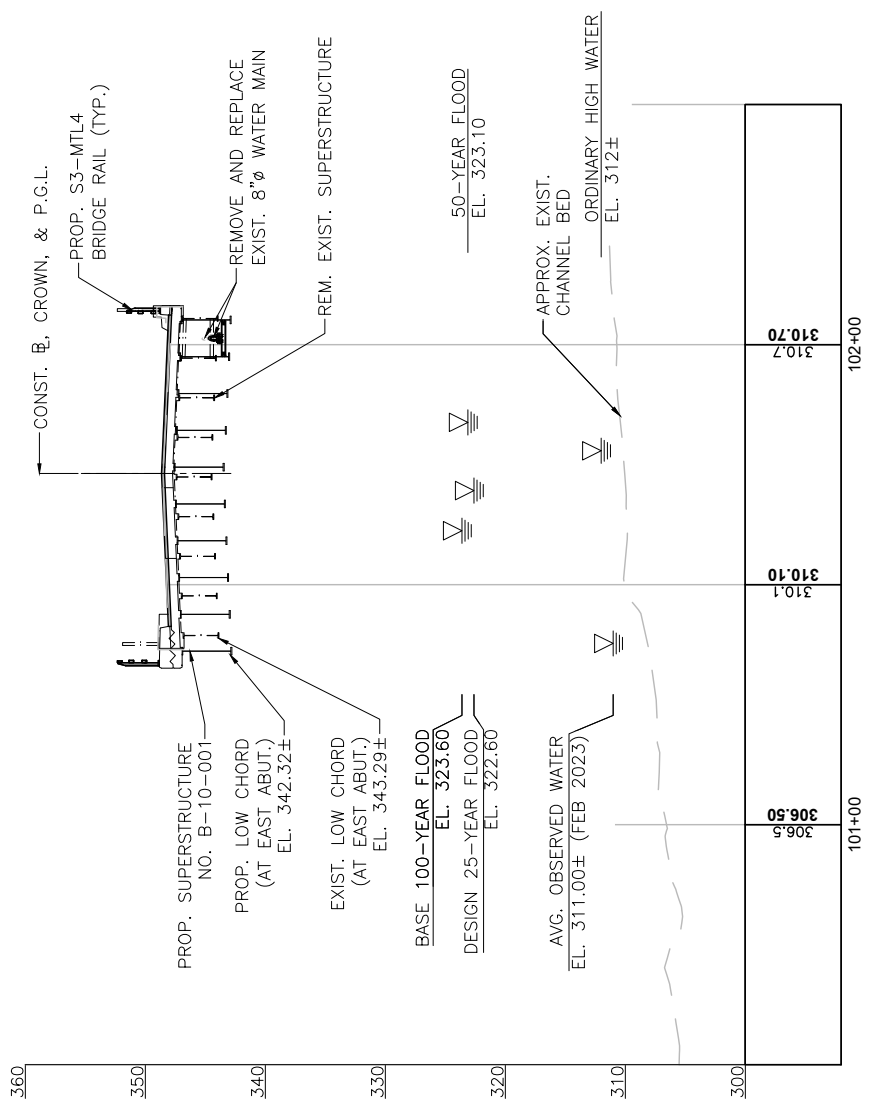
612159_BR3(PROFILE).DWG Plotted on 8-Jul-2025 1:19 PM

WATER QUALITY CERTIFICATE APPLICATION
BERNARDSTON, MASSACHUSETTS
ST 10 (CHURCH ST) OVER FALL RIVER
BRIDGE B-10-001
JULY 2025

SHEET 5 OF 9

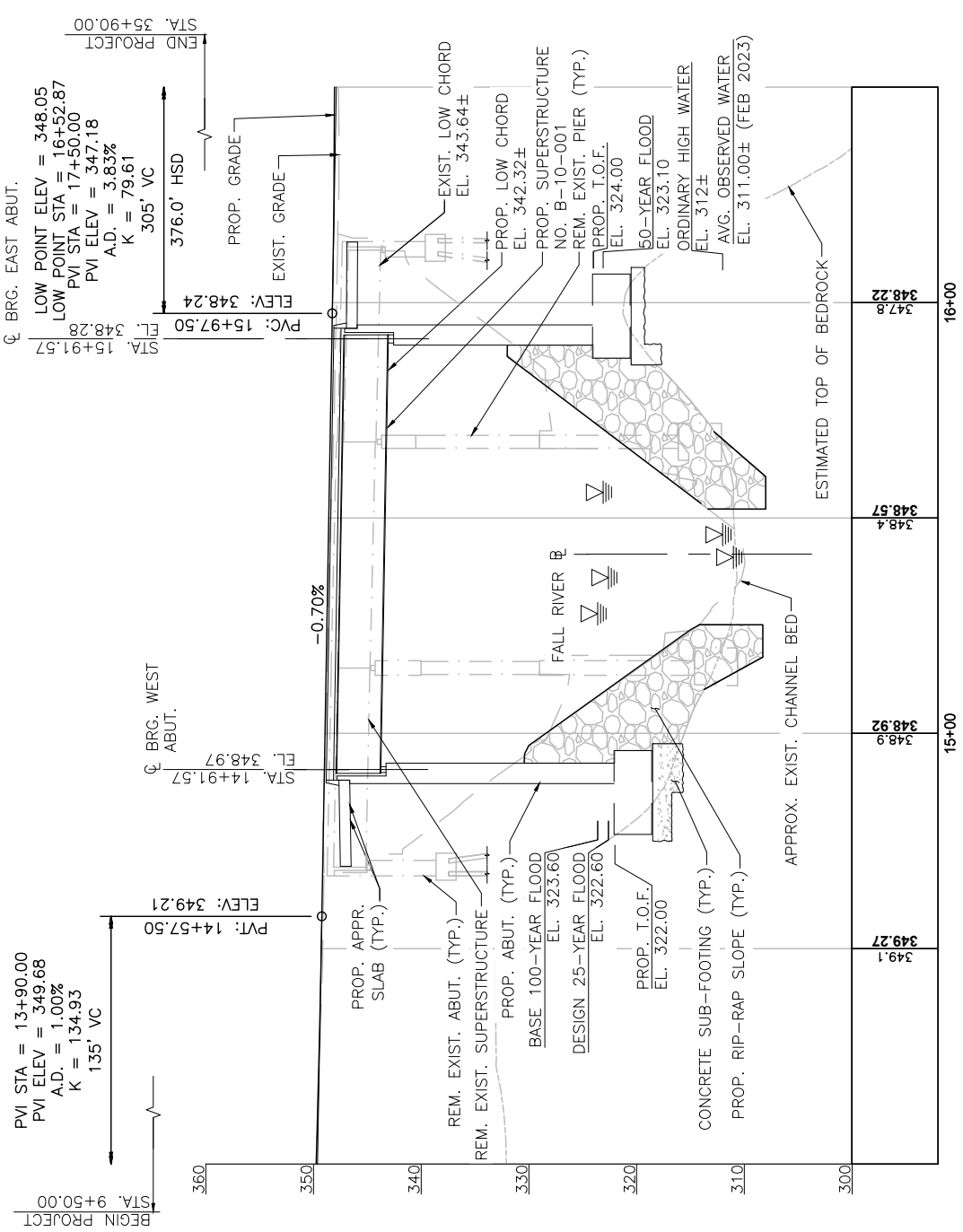
PROFILE – FALL RIVER

HORIZONTAL SCALE: 1" = 40'
VERTICAL SCALE: 1/8" = 1'-0"



PROFILE – ST 10 (CHURCH ST)

HORIZONTAL SCALE: 1" = 40'
VERTICAL SCALE: 1/8" = 1'-0"





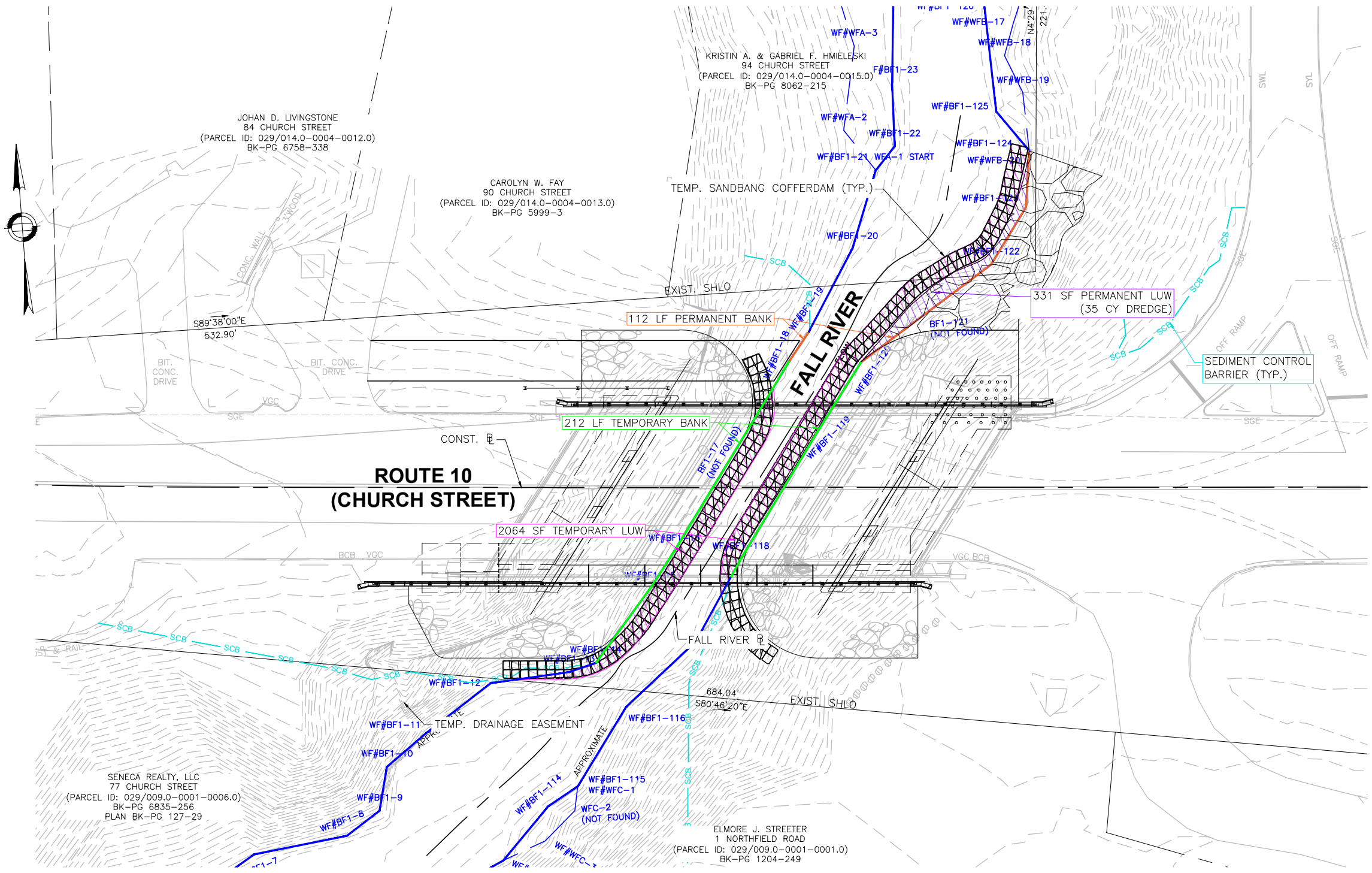
NOTES:

1. THE HORIZONTAL DATUM IS THE NORTH AMERICAN DATUM OF 1983 (NAD83) MASSACHUSETTS STATE PLANE COORDINATE SYSTEM IN U.S. SURVEY FEET.
2. THE VERTICAL DATUM IS THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) IN FEET.

A00830 - 420

612159_BR4(IMPACTS).DWG Plotted on 8-Jul-2025 1:30 PM

Proposal No. 612159-136484



WOTUS IMPACT PLAN

SCALE: 1" = 40'

SUMMARY OF RESOURCE AREA IMPACTS			
LEGEND	TYPE	IMPACTS	SURFACE AREA (SF) LINEAR FEET (LF)
	IMPACTS TO WATERS OF THE U.S. (WOTUS)	TEMPORARY	2064 SF
		PERMANENT	331 SF (35 CY DREDGE)
	BANK/OHW	TEMPORARY	212 LF
		PERMANENT	112 LF
	VEGETATED WETLAND		
	ORDINARY HIGH WATER/BANK (OHW)		
SCB	SEDIMENT CONTROL BARRIER		

NOTES:

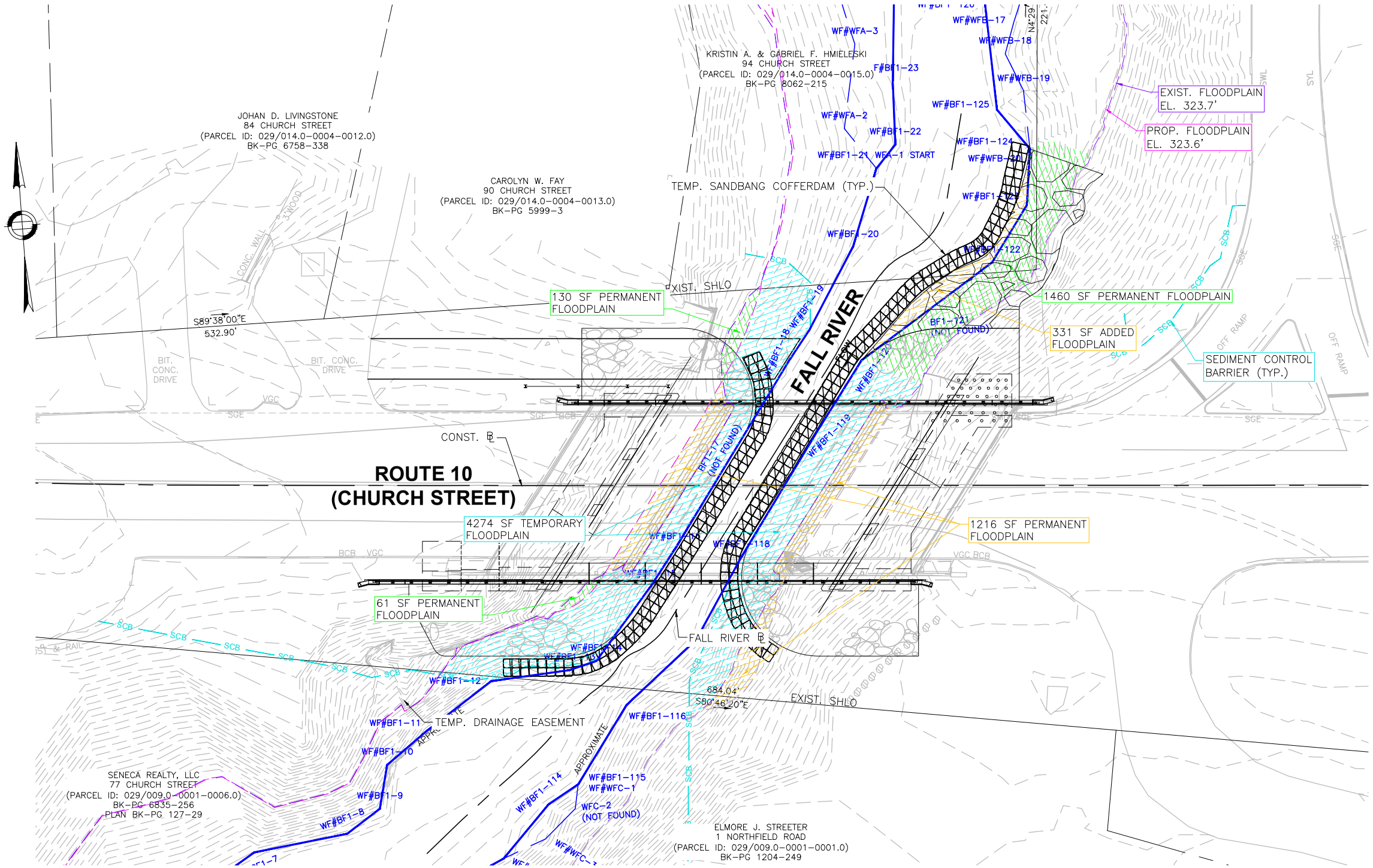
1. THE HORIZONTAL DATUM IS THE NORTH AMERICAN DATUM OF 1983 (NAD83) MASSACHUSETTS STATE PLANE COORDINATE SYSTEM IN U.S. SURVEY FEET.
2. THE VERTICAL DATUM IS THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) IN FEET.

0 40 100 160

SCALE: 1" = 40'

SHEET 6 OF 9

WATER QUALITY CERTIFICATE APPLICATION
BERNARDSTON, MASSACHUSETTS
ST 10 (CHURCH ST) OVER FALL RIVER
BRIDGE B-10-001
JULY 2025



100-YEAR FLOODPLAIN IMPACT PLAN

SCALE: 1" = 40'

SUMMARY OF RESOURCE AREA IMPACTS			
LEGEND	TYPE	IMPACTS	SURFACE AREA (SF) LINEAR FEET (LF)
	IMPACTS WITHIN 100-YEAR FLOODPLAINS (FLOODPLAIN)	TEMPORARY	4274 SF
		PERMANENT	1651 SF
		ADDED	1547 SF
	EXISTING FLOODPLAIN (323.7')		
	PROPOSED FLOODPLAIN (323.6')		
	VEGETATED WETLAND		
	ORDINARY HIGH WATER/BANK (OHW)		
SCB	SEDIMENT CONTROL BARRIER		

NOTES:

1. THE HORIZONTAL DATUM IS THE NORTH AMERICAN DATUM OF 1983 (NAD83) MASSACHUSETTS STATE PLANE COORDINATE SYSTEM IN U.S. SURVEY FEET.
2. THE VERTICAL DATUM IS THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) IN FEET.

0 40 100 160

SCALE: 1" = 40'

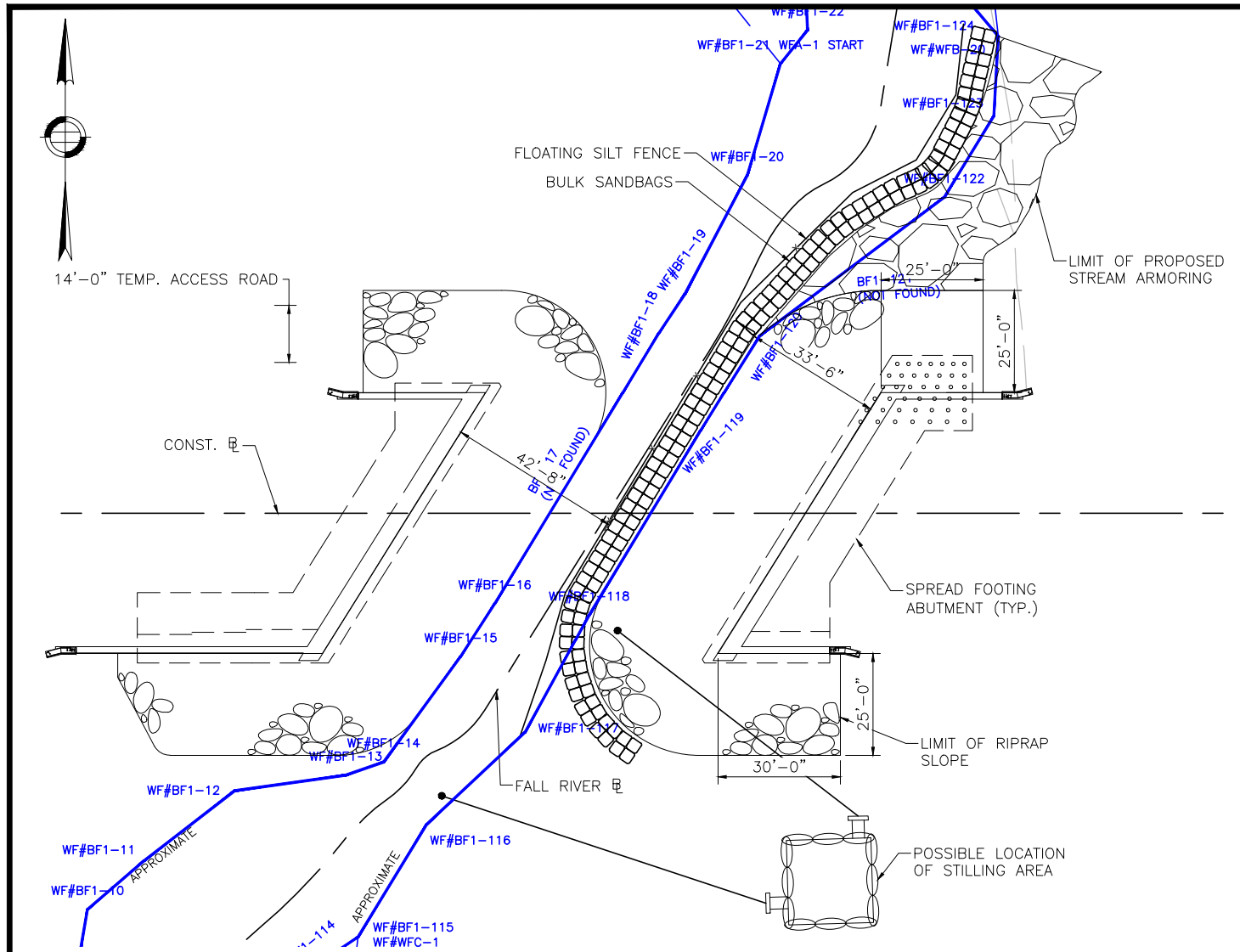
SHEET 7 OF 9

WATER QUALITY CERTIFICATE APPLICATION
BERNARDSTON, MASSACHUSETTS
ST 10 (CHURCH ST) OVER FALL RIVER
BRIDGE B-10-001
JULY 2025

A008301 - 421

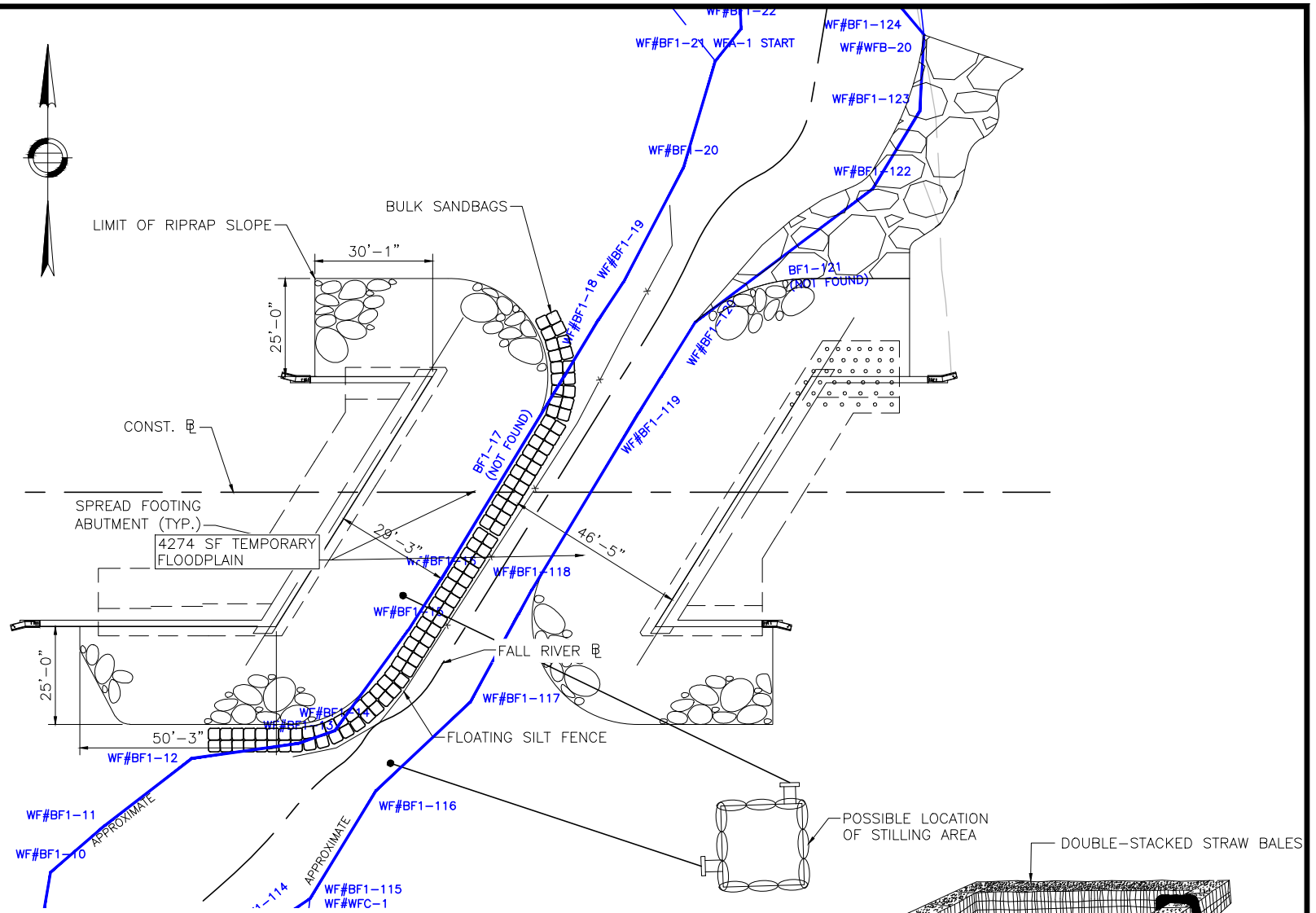
612159_BR4(IMPACTS).DWG Plotted on 8-Jul-2025 1:35 PM

Proposal No. 612159-136484



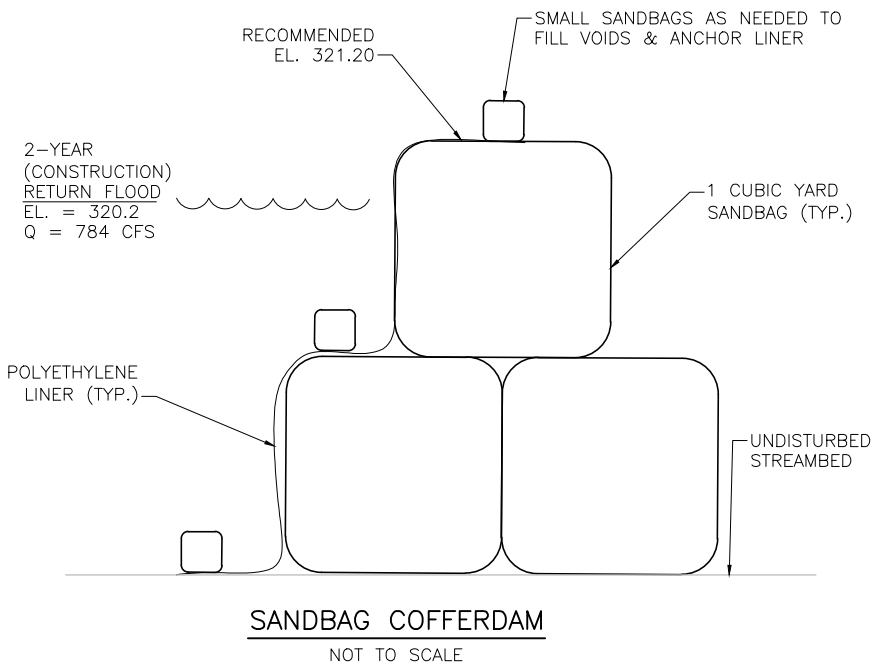
CONTROL OF WATER PLAN – EAST BANK

SCALE: 1" = 40'



CONTROL OF WATER PLAN – WEST BANK

SCALE: 1" = 40'



SANDBAG COFFERDAM

NOT TO SCALE

CONTROL OF WATER NOTES:

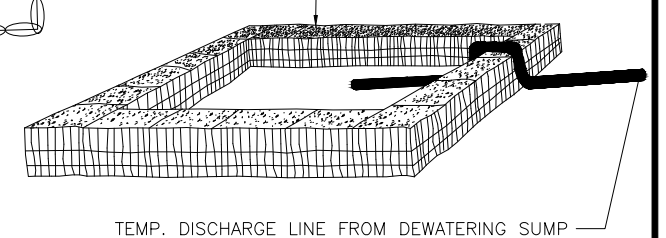
1. PROPOSED BRIDGE SUPERSTRUCTURE NOT SHOWN FOR CLARITY.
2. THE C.O.W. SYSTEM SHOW IN THESE PLANS IS CONCEPTUAL. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DESIGN OF THE CONTROL OF WATER (C.O.W.) SYSTEM AND SHALL SUBMIT A CONTROL OF WATER PLAN TO THE ENGINEER FOR APPROVAL.
3. ALL DEWATERING SHALL BE DIVERTED TO A TEMPORARY STILLING BASIN PRIOR TO BEING PUMPED BACK INTO THE STREAM. NO CONTAMINATED WATER IS PERMITTED TO ENTER THE STREAM
4. C.O.W. SYSTEM SHALL BE DESIGNED USING A 2-YEAR (CONSTRUCTION) RETURN FREQUENCY FLOOD EVENT OF 784 CFS. PROVIDED SYSTEM SHALL EXTEND 12" (MIN.) ABOVE STORM ELEVATION. IF THE C.O.W. SYSTEM WILL BE IN PLACE FOR GREATER THAN 1-YEAR, THE C.O.W. SYSTEM SHALL BE DESIGNED USING A 5-YEAR (CONSTRUCTION) RETURN FREQUENCY FLOOD EVENT OF 1290 CFS.
5. C.O.W. SYSTEM SHALL BE INSPECTED DAILY FOR WATER LEAKS OR EROSION AND REPAIR PROCEDURES SHALL BE IMPLEMENTED ACCORDINGLY.

SUGGESTED SEQUENCE OF CONSTRUCTION:

1. CONSTRUCT THE PROPOSED BRIDGE AS SHOWN ON THE STAGE CONSTRUCTION SEQUENCING PLANS.
2. FOR EACH STAGE OF CONSTRUCTION INSTALL CONTROL OF WATER SYSTEM TO SHIFT THE STREAM TO THE EAST OR WEST AS REQUIRED FOR THE GIVEN STAGE. C.O.W. SYSTEM SHALL CONSIST OF A SANDBAG COFFERDAM OR APPROVED EQUIVALENT.
3. DEWATER THE WORK AREA TO REMOVE EXISTING BOULDER/RIP RAP SCOUR PROTECTION STONES AS REQUIRED FOR CONSTRUCTION OF THE GIVEN STAGE.
4. PLACE RIPRAP SLOPE FOR SCOUR PROTECTION TO THE EXTENTS PRACTICAL FOR THAT CONSTRUCTION STAGE. RIPRAP TOE SHALL BE KEYED INTO BEDROCK.
5. SHIFT CONTROL OF WATER SYSTEM TO MOVE THE FALL RIVER FLOW TO THE EAST OR WEST AS NEEDED FOR EACH GIVEN STAGE AND REPEAT SEQUENCE.
6. REMOVE SANDBAG COFFERDAM AND RESTORE NORMAL RIVER FLOW AFTER RIPRAP SLOPES FOR ALL STAGES OF CONSTRUCTION HAVE BEEN INSTALLED.

0 40 100 160

SCALE: 1" = 40'



NOTES:
DISCHARGE TO SEDIMENTATION BASIN (AS SHOWN) OR TO SILTATION/ DEWATERING BAG SUCH AS FLOGARD DEWATERING BAG MODEL SC-DW1215Z, OR APPROVED EQUAL. SYSTEM SHOWN IS CONCEPTUAL ONLY AND IS TO BE DESIGNED BY CONTRACTOR.

TEMPORARY STILLING AREA

SCALE: N.T.S.

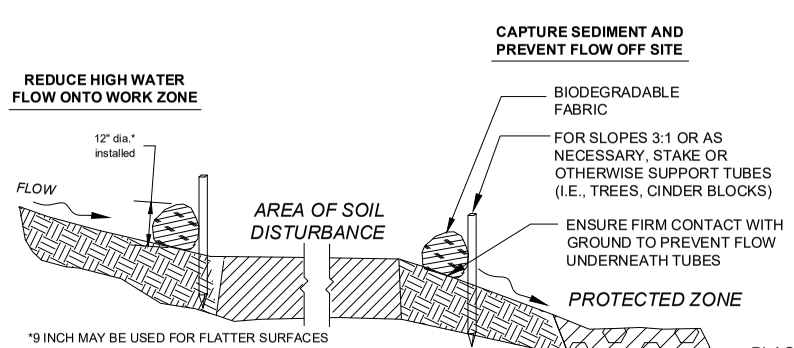
SHEET 8 OF 9

WATER QUALITY CERTIFICATE APPLICATION
BERNARDSTON, MASSACHUSETTS
ST 10 (CHURCH ST) OVER FALL RIVER
BRIDGE B-10-001
JULY 2025

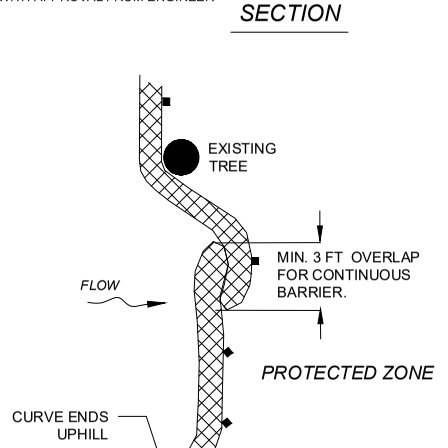
A00830 - 422

612159_BR4(IMPACTS).DWG Plotted on 8-Jul-2025 1:48 PM

Proposal No. 612159-136484



SECTION



PLACE TUBE ALONG CONTOURS AND PERPENDICULAR TO FLOW.

PLACE AS CLOSE TO LIMIT OF SOIL DISTURBANCE AS POSSIBLE

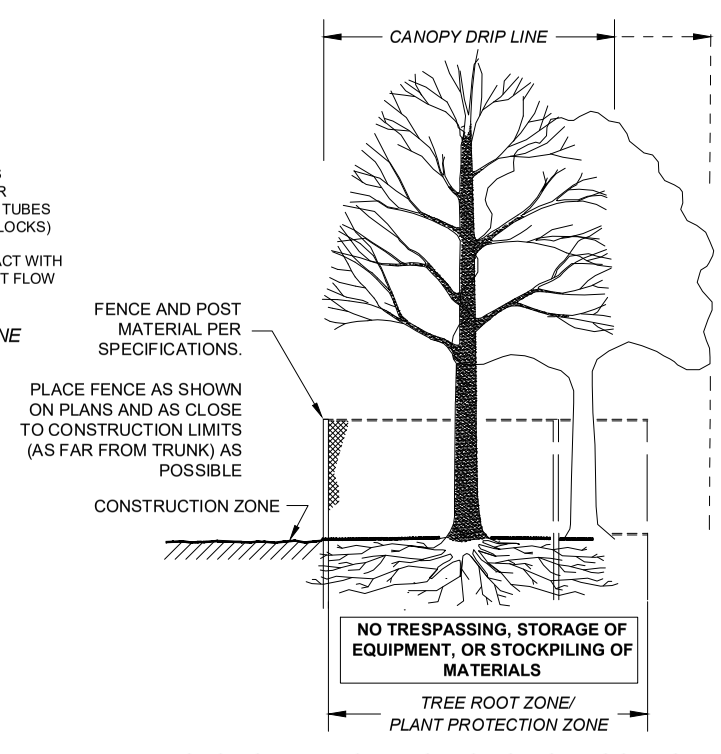
ADJUST LOCATION AS REQUIRED FOR OPTIMUM EFFECTIVENESS.
DO NOT INSTALL IN WATERWAYS.

PLACE STAKES AS NEEDED TO SECURE TUBES IN PLACE.

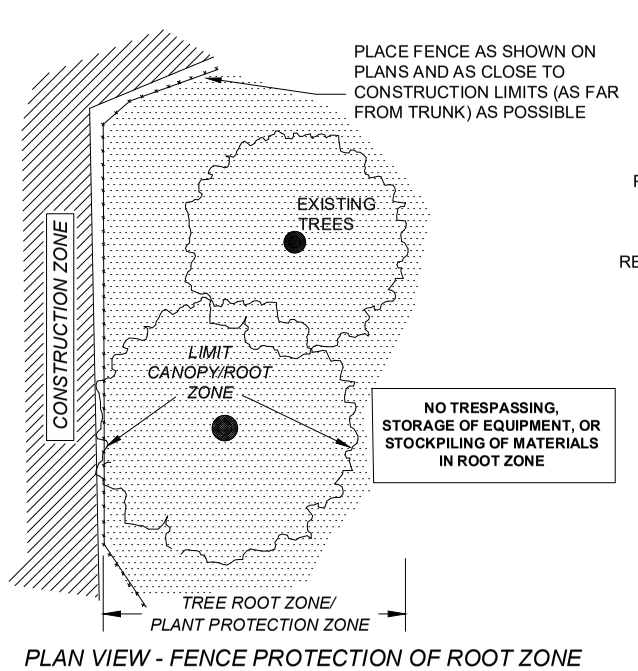
PLAN VIEW

SEDIMENT BARRIER - COMPOST FILTER TUBES

N.T.S.



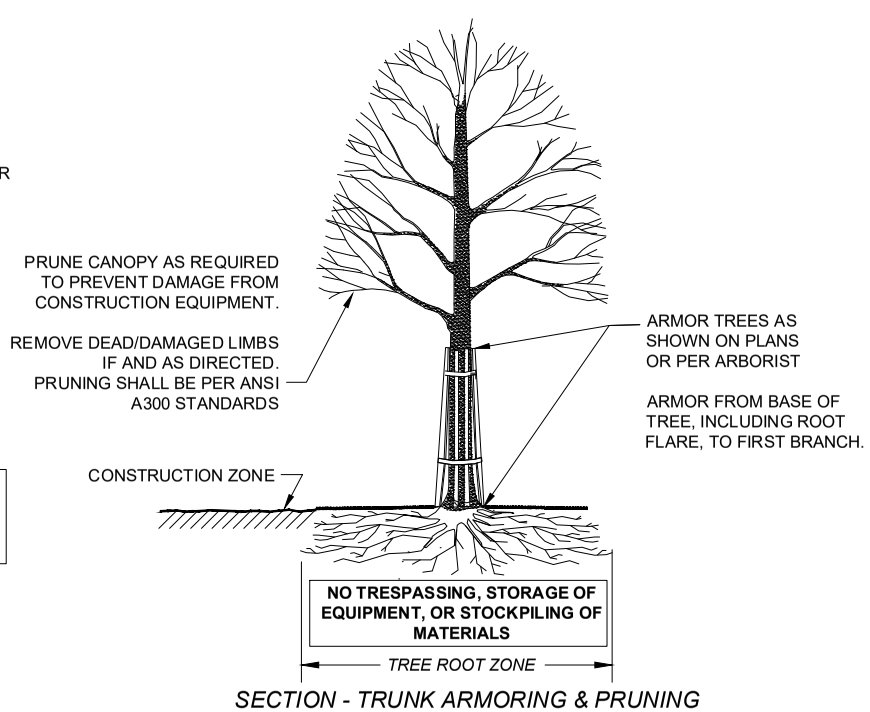
SECTION - FENCE PROTECTION OF ROOT ZONE



PLAN VIEW - FENCE PROTECTION OF ROOT ZONE

TREE PROTECTION - ROOT ZONE

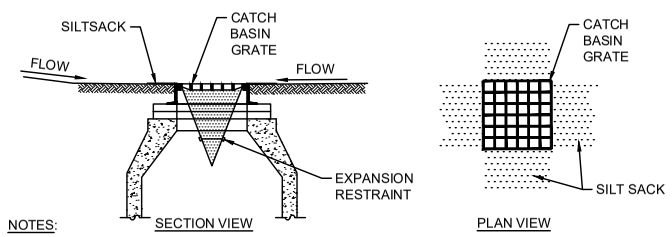
N.T.S.



SECTION - TRUNK ARMORING & PRUNING

TREE PROTECTION - TRUNK

N.T.S.

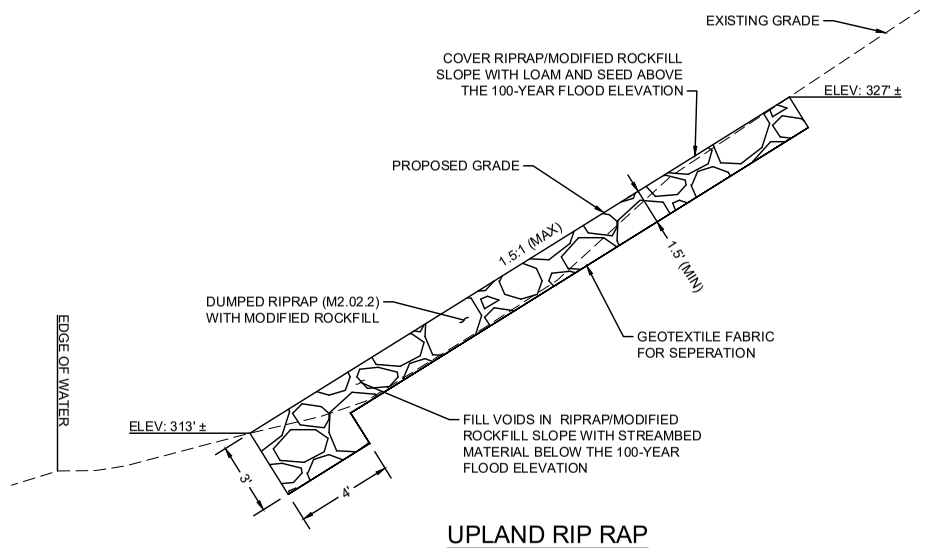


NOTES:

1. INSTALL SILT SACK IN EXISTING CATCH BASINS BEFORE COMMENCING WORK, AND IN NEW CATCH BASINS IMMEDIATELY AFTER INSTALLATION OF STRUCTURE. MAINTAIN UNTIL BINDER COURSE PAVING IS COMPLETE OR A PERMANENT STAND OF GRASS HAS BEEN ESTABLISHED.
2. GRATE TO BE PLACED OVER SILT SACK.
3. SILT SACK SHALL BE INSPECTED PERIODICALLY AND AFTER ALL STORM EVENTS AND CLEANING OR REPLACEMENT SHALL BE PERFORMED PROMPTLY AS NEEDED.

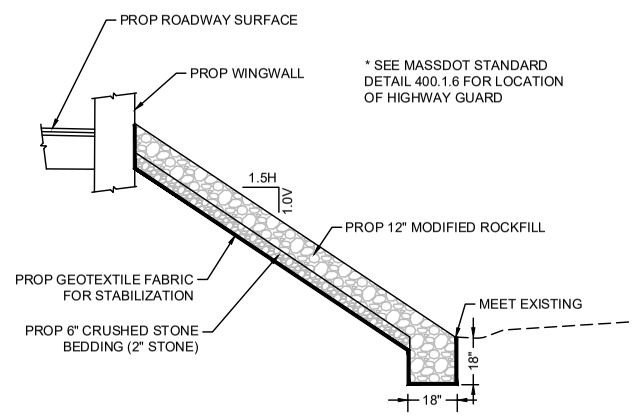
INLET PROTECTION SILT SACK IN CATCH BASIN

N.T.S.



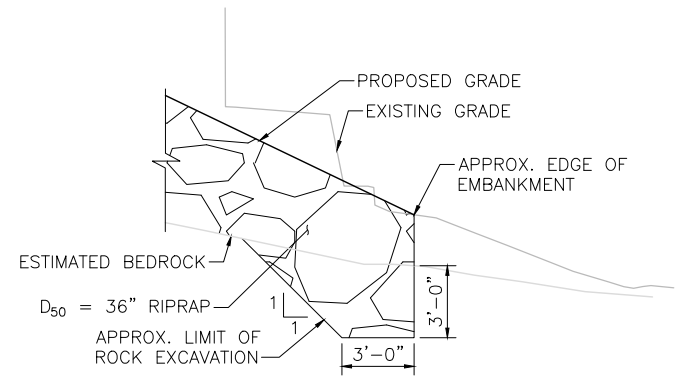
UPLAND RIP RAP

N.T.S.



MODIFIED ROCKFILL SLOPE STABILIZATION

N.T.S.



RIPRAP TOE – AT BEDROCK

NOT TO SCALE

SHEET 9 OF 9

WATER QUALITY CERTIFICATE APPLICATION
BERNARDSTON, MASSACHUSETTS
ST 10 (CHURCH ST) OVER FALL RIVER
BRIDGE B-10-001
JULY 2025

A00830 - 423
612159_BR5(DETAILS).DWG Plotted on 8-Jul-2025 1:20 PM
Proposal No. 612159-136484

APPENDIX H

RELEVANT SPECIAL PROVISIONS

DOCUMENT A00801

SPECIAL PROVISIONS

BERNARDSTON
Federal Aid Project No. XXX(XX-XX)-XXX(XXX)
ST 10 (Church Street) over the Fall River (B-10-001) – Proposed Bridge
ST 10 (Northfield Road) over I-91 (B-10-018) – Proposed Deck Replacement

Labor participation goals for this Project shall be 15.3% for minorities and 6.9% for women for each job category. The goals are applicable to both Contractor's and Subcontractor's on-site construction workforce. Refer to Document 00820 for details.

SCOPE OF WORK

The work under this contract consists of the proposed bridge replacement of State Route 10 (Church Street) over the Fall River (Bridge No. B-10-001) and the proposed deck replacement of State Route 10 (Northfield Road) over Interstate 91 (Bridge No. B-10-018), along with the roadway reconstruction of approximately 2,640 feet of State Route 10 in the Town of Bernardston.

The proposed improvements are needed to address the existing failing deck and substructure of the Fall River Bridge (B-10-001) and failing deck of the I-91 bridge (B-10-018). The proposed Fall River bridge will consist of a single span with continuous steel plate girders supported on spread footing abutments founded on bedrock. The existing roadway width will be widened and the existing wide shoulders will be striped for buffered bicycle lanes and a striped median for increased safety. The project also includes construction of a temporary access driveway for construction of B-10-001, realignment of the I-91 northbound off-ramp (SE) and the temporary relocation and constrction of the I-91 southbound off-ramp (NW) to ease construction staging.

The improvements also include stage construction sequencing, control of water, earth excavation, ADA / AAB compliant sidewalk and pedestrian curb ramps, driveway reconstruction, full depth pavement, pavement milling and overlay, superpave asphalt pavement, bridge rail and highway guardrail, granite curb, utility relocations, riprap, pavement markings, signs, installation of Rectangular Rapid Flashing Beacons, water and drainage improvements, and other incidental work. Deck shoring and protective bridge shielding will be used to facilitate the staged demolition of both bridges and provide protection of falling or flying debris.

All work under this Contract shall be done in conformance with the *2025 Standard Specifications for Highways and Bridges*, the *Supplemental Specifications* contained in this book, the *Construction Standard Details* in effect as of March 12, 2025, the *1990 Standard Drawings for Signs and Supports*, the *2015 Overhead Signal Structure and Foundation Standard Drawings*, the *2009 Manual on Uniform Traffic Control Devices (MUTCD) with Revisions 1, 2, and 3 and the November 2022 Massachusetts Amendments to the MUTCD, the 1968 Standard Drawings for Traffic Signals and Highway Lighting*, the latest edition of The *American Standard for Nursery Stock*, the Plans and these Special Provisions.

ITEM 102.3 HERBICIDE TREATMENT OF INVASIVE PLANTS HOUR

This work must be performed by persons who meet the qualifications below and are approved by the Landscape Design Section.

Work under this item consists of herbicide treatment of invasive plants currently existing within the project limits and as directed. An Invasive Plant Management Strategy (IPMS) shall be submitted to the Engineer for review and approval and the IPMS shall be implemented on-site. The IPMS shall be written and submitted per Item 102.33 Invasive Plant Management Strategy and shall be measured and paid for under that Item.

Work under this item shall be coordinated with work and schedule for Selective Clearing, Clearing and Grubbing, Mowing, Tree Removal, Planting, and Wetland Mitigation items.

Payment is per hour on-site and shall be compensation for a minimum crew of 2 licensed applicators, 2 back-pack sprayers and mist-blowers, a properly equipped spray truck with spray hoses, and a tank with sufficient capacity for a full day of work. If there is only one applicator, hourly payment shall be adjusted to 50 percent of the unit price.

Date and time stamped photos indicating start and stop time of work must be submitted if requested.

This item is not intended for manual removal of plants.

Management of plants determined to have been introduced to the site via imported loam, compost, mulch, plants, equipment, or other construction activities will be the Contractor’s responsibility and at the Contractor’s expense.

Herbicide shall be applied during daytime hours only.

Measures to prevent the introduction of invasive plant species to the site and to address introduction due to construction-related activities shall be covered under the Standard Specifications, Division I - Subsections 7.01(D) Plant Pest Control and 7.13 Protection and Restoration of Property as amended in these Special Provisions.

Plant species targeted for management under this item shall be as determined in the field per the site walk and as specified in the IPMS.

The definition of invasive plant species shall be as described by Massachusetts Invasive Plant Advisory Group (MIPAG): “non-native species that have spread into native or minimally managed plant systems in Massachusetts, causing economic or environmental harm by developing self-sustaining populations and becoming dominant and/or disruptive to those systems.”

Control of invasive plants shall begin immediately with the initiation of construction activities and prior to any clearing or site disturbance. Treatment areas shall include stockpile locations and may, upon approval of the Engineer, extend outside the project limit. Treatment shall be done each consecutive year for the duration of the contract unless specified otherwise in the IMPS or unless directed otherwise by the MassDOT invasive species contact. Work shall be done during the growing season from May – October unless otherwise specified in the IPMS.

ITEM 102.3 (Continued)

Areas identified for vegetation control measures shall be as shown on the plans and as determined in the field by the Engineer and a MassDOT Landscape Architect. Contact at MassDOT Landscape Design Section may be contacted at: tara.mitchell@dot.state.ma.us.

QUALIFICATIONS

The applicators shall submit and meet the qualifications outlined below. A list of contractors specializing in invasive management and approved by MassDOT Landscape Design Section is available on the following website: https://www.mass.gov/lists/landscape-design-and-roadside-maintenance under Invasive Plant Management.

Requirements

1. Company must provide proof of qualifications by providing the following:
    a. Narrative describing company, its expertise and experience with invasive plant control.
    b. Demonstrate experience with herbicide treatment as part of restorations and in sensitive areas.
    c. Describe company's technical qualifications and past performance.

2. Company must meet licensing requirements:
    a. All crew applicators must have a Massachusetts Commercial Applicator License (CORE).
    b. At least one or more applicator must have a ROW certification, if required for work.
    c. Company must provide name(s) of applicator(s) and Applicator License/Certification number for all contractor crew leaders working on the project.
    d. Company must provide documentation of any warnings, penalties or fines received in the last three (3) years.

3. Company must provide proof of experience with invasive plant control and include following:
1) At least five (5) references from prior invasive plant control work completed in last five (5) years. Provide contact information including address, phone number and email.
2) Provide a summary of each of these projects including nature of the problem, specific invasive vegetation treated, dates and period of treatment, methodologies used, and summary of success or not in terms of meeting performance objectives. Include summary of equipment used.
3) Photo documentation of these projects.
4) GPS coordinates of project locations, if available.

4. Crew leader must have expertise with invasive plant control and provide the following:
    a. Have held Core license for at least five (5) years.
    b. Resume listing five (5) or more years of experience applying pesticides with the company or with another company specializing in vegetation management.

SUBMITTALS

No work shall begin without approval of the submittals.

Submittals include the following items:

ITEM 102.3 (Continued)

Invasive Plant Management Strategy (IPMS)

At least thirty (30) days prior to proposed treatment the IPMS shall be submitted for approval by the Engineer and MassDOT Landscape Architect. All chemicals, methods and work done under this item shall be consistent with the IPMS. The IPMS shall be as described under Item 102.33.

Herbicide Use Report

Within two (2) weeks after each application, the Contractor shall provide to the Engineer and the MassDOT Landscape Architect a completed and signed MassDOT Herbicide Use Report.

Photo Documentation

Digital photos with date and time of herbicide application work, showing start time and completion time, are required and must be submitted for measurement of payment upon request.

MATERIALS

All proposed herbicides shall be as approved in the IPMS. Herbicides shall be labeled for the method of treatment and shall meet all federal, state and local regulation requirements. Application rates will depend on herbicide proposed and shall be per the manufacturer's label for specific application.

METHODS

All methods used shall be as approved in the IPMS which shall be determined during the Initial Site Walk as described under Item 102.33 Invasive Plant Management Strategy.

The Contractor shall be responsible for marking delineated areas and plants to be preserved, removed, or otherwise treated. Fencing or other materials needed for marking and delineating protected areas shall be incidental to this item.

The Contractor shall notify the Engineer a minimum of 3 days prior to date of expected herbicide application. Applicators shall notify the Engineer upon arriving on-site and upon leaving the site.

Herbicide Applications

All herbicide application shall conform to Massachusetts Pesticide Laws and Regulations per the Massachusetts Department of Agricultural Resources (MDAR) Pesticide Bureau.

Mixing, applying and/or disposing of herbicides shall always be in accordance with instructions on their labels and all applicable federal, state, and local regulations. Mixing shall not occur within sensitive areas, wetlands, or buffer zones.

Contractor shall not spray 2 hours prior to precipitation, during rain, or during windy conditions. The Contractor shall be responsible for monitoring weather conditions and adjusting the work schedule as appropriate for the herbicide and application method to be used.

ITEM 102.3 (Continued)

Targeted vegetation shall be identified and marked prior to treatment. Plants treated by foliar spray, injection or glove application or other methods that leave standing vegetation, as opposed to cut-stump application, shall remain clearly marked for identification through the contract period.

Desirable vegetation shall be protected from both spray and other physical damage.

Contractor is responsible for any damage to vegetation not designated for removal or treatment. Vegetation damaged shall be restored. Cost of replacement plants and/or restoration shall be borne by the Contractor.

Contractor shall ensure that the public does not enter a work area while herbicide application or spraying is underway.

Disposal Of Invasive Plant Material

All material to be cleared shall become the property of the Contractor. The satisfactory disposal of all cleared plant material (seeds, roots, woody vegetation, associated soils, etc.) shall be the Contractor's responsibility.

The Contractor shall take measures to prevent viable plant material from leading to further infestations (seeds, roots, woody material, etc.) while stockpiled, in transit, or at final disposal locations. All precautions shall be taken to avoid contamination of natural landscapes with invasive plants or invasive plant material.

Chipping, shredding, or on-site burning of plant material must be approved by the Engineer and included in the IMPS.

For plant material taken to an incinerating facility per the IPMS, a receipt from that facility shall be submitted to the Engineer as proof of disposal.

Where feasible, it is preferable to dispose of plants on-site or to bury them on-site with on-going monitoring for re-sprouting. Disposal locations and methods must be approved and included in the IPMS. Site work such as grading and seeding to stabilize and restore disposal area shall be incidental to this item.

The Contractor shall be responsible for treating or otherwise managing areas of re-growth due to improper disposal. Treatment shall be at the Contractor's expense.

Follow-Up Treatment

Plants and areas shall be re-treated as necessary and as appropriate to the time of year. Treatment shall be for the duration of the contract and per the IPMS.

ITEM 102.3 (Continued)

MEASURE OF SUCCESS

The expectation is a minimum of 85-95 percent control achieved after the first treatment, depending on plants targeted and extent of population, and based on the expectations laid out in the IPMS. The expectation for the contract duration is 95-100% eradication by the end of the treatment period, unless otherwise specified in the IPMS.

METHOD OF MEASUREMENT

Item 102.3 will be measured for payment by the Hour of verified crew time spent on the project doing herbicide application as and where specified herein and in the IPMS. A crew shall be defined as a minimum of two licensed applicators each equipped with (at minimum) back-pack sprayer and mist blower. The crew shall also have a properly equipped spray truck with hoses and a tank with sufficient capacity for a full day of work.

BASIS OF PAYMENT

Item 102.3 will be paid at the contract unit price per Hour, which price shall include all labor, materials, equipment, tools, and all incidentals required to complete the work.

Payment will be based upon verified time spent on the project doing herbicide application as and where specified in the IPMS and upon receipt and approval of submittals. Payment will not include travel time to and from the Contractor's place of business and nor time for investigative field trips.

If there is only one applicator, hourly payment shall be adjusted to 50 percent of the unit price.

The Invasive Plant Management Strategy will be paid for under Item 102.33.

ITEM 102.33 INVASIVE PLANT MANAGEMENT STRATEGY HOUR

This item consists of providing an Invasive Plant Management Strategy (IPMS) for the control of invasive plants currently existing on the project site and/or as directed and shall be coordinated with Item 102.3 Herbicide Treatment of Invasive Plants. Unless otherwise approved, the IPMS shall be submitted in the form of the MassDOT Invasive Plant Management Strategy Report Form.

The IPMS shall be submitted for review and approval by the MassDOT Landscape Design Section or their representative, and the IPMS shall be implemented on-site.

The Invasive Plant Management Strategy Report Form is available online at https://www.mass.gov/lists/landscape-design-and-roadside-maintenance under Invasive Plant Management.

Herbicide treatment for invasive plants shall be as described under Item 102.3 Herbicide Treatment of Invasive Plants and shall be compensated per that Item.

Work under this item shall be coordinated with work and schedule for Selective Clearing, Clearing and Grubbing, Mowing, Tree Removal, Planting, and Wetland Mitigation as relevant to the project.

Individual attending the site walk and determining the Invasive Plant Management Strategy must demonstrate expertise with vegetation management and invasive plant control and submit qualifications as described below.

QUALIFICATIONS

Individual shall be from the same company as that providing services for Item 102.3 Herbicide Treatment of Invasive Plants and shall submit the following, if not submitted under Item 102.3:

- Submit copy of current Core license.
- Submit a resume listing five (5) or more years of experience managing invasive plants with a company specializing in vegetation management.
- References shall be submitted if requested.

SUBMITTALS

Task Summary & Reports

For measurement of payment, the contractor shall submit the total sum and a breakdown of hours for the tasks performed. At a minimum, the tasks shall include the Initial Site Walk, submittal of an approved IPMS, and if requested to accommodate project or site changes, a Follow-up Site Inspection and accompanying IPMS Amendment.

Interim Site Monitoring Reports and/or a Final Report shall be submitted if requested by the MassDOT Landscape Design contact. The MassDOT Landscape Design contact must be notified to attend the site inspection walk when an Interim or Final Report has been requested.

ITEM 102.33 (Continued)

Invasive Plant Management Strategy (IPMS)

At least thirty (30) days prior to construction activities and/or any proposed treatment, the contractor shall submit the IPMS for approval by the Engineer and MassDOT Landscape Architect. All chemicals and methods proposed shall be consistent with applicable Massachusetts Wetlands Protection Act Order of Conditions.

The IPMS shall be completed in coordination with the Prime Contractor and the Engineer and shall include the following as appropriate and applicable to the project and to the IPMS Report Form questions and Guidance:

I. Project Information

a. Company writing the IPMS and performing the herbicide application.
b. Date of site walk
c. Attendees at site walk
d. Expected end date of contract and expected last treatment (month/season)

II. Brief Description of Conditions

a. Provide a free-hand sketch on construction plans or aerial image showing species, location, and as relevant, show or note extent of population as relevant to Strategy (i.e., population extends off ROW preventing eradication, small population and eradication deemed feasible within contract schedule, etc.).

III. Coordination with Roadway Contractor regarding other work

a. Tree Work: Note coordination to be implemented with tree removal, clearing, and clearing and grubbing as applicable to the project.
b. Wetland Mitigation - Include management proposed for wetland mitigation areas in the IPMS, if and as required.
c. Planting: If there will be planting in areas proposed for treatment, propose treatment and schedule to avoid herbicide damage to plants.
d. Mowing: If coordination is required with state mowers, note need in IPMS.

IV. Soil Management

a. Provide specifics on how soil with invasive plant roots (in particular) or seeds will be handled (i.e., separate stockpiles, plant material will be buried on-site, re-used on-site, disposed off-site and if so, where?).
b. Show stockpile locations on plan and include treatment schedule.
c. Note measures that will be implemented to avoid spread through equipment, including how and where equipment will be cleaned.

V. Invasive Plant Treatment & Management

a. Proposed chemical and methods of treatment for each species or area.
b. Time of treatment based on target plant species.
c. Submit product label including application methods and rates (entire MSDS information need not be submitted if available online).
d. Proposed performance metrics or measure of treatment success if different from that specified under Item 102.3.
e. Method for disposing invasive plant material. This includes material that may result in spread (i.e., seeds, roots) and material that has been treated and/or is not viable (foliage, dead wood, etc.). Methods may include grinding in place, stockpiling and treating, and incinerating offsite.

ITEM 102.33 (Continued)

f. Expected follow-up treatment for duration of contract.

VI. Monitoring Schedule if requested by MassDOT.

Note: The IPMS is critical for identifying pre-construction conditions as well as strategies for minimizing import or spread of invasive plants. Failure to provide an approved IPMS may jeopardize this item, in which case, the contractor will be responsible for management of invasive plants found on-site at no cost to the contract.

Photo Documentation

Digital photos of site conditions, typical species, and extent of infestation must be provided with the IPMS and with any follow-up monitoring or reporting. Photos of follow-up monitoring and reporting must be date and time stamped for acceptance.

METHODS

Initial Site Walk

Prior to any construction activities and soil disturbance, the Contractor shall walk the site with the Engineer and the MassDOT Landscape Architect to determine the IPMS. During the site walk the Contractor shall identify limits of work and, as necessary, mark locations of areas designated for treatment and individual plants targeted for treatment or removal. The Contractor shall be responsible for marking delineated areas and plants to be preserved, removed, or otherwise treated. Fencing or other materials needed for marking and delineating protected areas shall be incidental to this item.

IPMS Follow-up Amendment

The IPMS may be amended to address additional concerns or adjust to conditions if required by the MassDOT Landscape Architect. The amended IPMS shall be submitted to the Engineer and MassDOT Landscape Architect for approval at least fourteen (14) days prior to any proposed treatment.

Interim Site Monitoring Inspection Reports

If required by the MassDOT Landscape Architect and Engineer, Interim Site Monitoring and an accompanying report shall be conducted. Interim Reports must include time and date stamped photos showing treated locations and species.

Final Inspection

A final inspection and report documenting the status of the invasive control may be required for regulatory purposes or for instances where control will be continued by others. The report shall include photo documentation of pre-construction (existing) and post-treatment conditions, notations on a plan or aerial image of area treated, summary of treatment performed, and control achieved. Final reports submittal must include time and date stamped photos.

ITEM 102.33 (Continued)

METHOD OF MEASUREMENT

Item 102.33 will be measured for payment by the Hour. The basis for measurement shall be per the completion of tasks as approved under the Task Summary submittal and acceptance of submittals and photos described above.

BASIS OF PAYMENT

Item 102.33 will be paid at the contract unit price per Hour, which price shall include all labor, materials, equipment, tools, and all incidentals required to complete the work. Payment shall not include travel time to and from the Contractor's place of business.

ITEM 102.511 TREE PROTECTION – ARMORING & PRUNING EACH

The work under this item shall conform to the relevant provisions of Sections 771 of the Standard Specifications and the following:

Tree protection – armoring and pruning shall be used for instances where construction activity (the use of heavy equipment), comes within proximity to potentially damage tree trunk(s) or limbs.

The work shall include the furnishing and installing of temporary tree trunk protection, minor limb pruning, or removal of lower tree limbs to prevent injury to the tree from construction equipment and activities; as shown on the Drawings; and/or as required by the Engineer.

REFERENCES

If requested, the Contractor shall provide to the Engineer one copy of the latest edition of the American National Standards Institute (ANSI) A300 Standard Practices for Tree, Shrub, and Other Woody Plant Maintenance: Part 1-Pruning and Part 5-Construction Management Standard. Provision of reference shall be incidental to this item.

MATERIALS

Trunk armoring shall be such that it prevents damage to the trunk from construction equipment. Material used for trunk armoring or mounting shall be such that installation and removal shall not damage the trunk.

Acceptable trunk armoring materials shall include two by four (2x4) wood cladding, mounted with wire or metal strapping, or when duration of construction activities is less than three months, slotted corrugated plastic pipe, mounted with duct tape. Eight (8) once untreated burlap shall be used to wrap the tree trunk prior to installation of cladding.

Alternative armoring methods or materials may be acceptable if approved by the Engineer.

The height of tree trunk cladding shall be measured from the base of the tree (including root flare) to the bottom of the first branch, or to a height of eight (8) feet, or as may be required by the Engineer.

METHODS OF WORK

Prior to construction activities, the Engineer, Contractor, and the Arborist (if item is included in the contract), shall review trees noted on the Drawings to be protected. Final decision and selection of trees to be armored and/or pruned shall be per the Engineer.

Care shall be taken to avoid damage to the bark during installation and removal of armoring. Trunk armoring shall be maintained such that it is effective for as long as required or replaced when materials are found to be damaged or ineffective, as determined by the Engineer. Replacement, if required, shall be incidental to the work. Armoring shall be removed immediately upon completion of work activities adjacent to the protected tree(s).

ITEM 102.511 (Continued)

Pruning of limbs shall conform to the techniques and standards of the most recent ANSI A300 standards.

DAMAGES OR LOSS

If trees designated for protection under this item are damaged, including root damage from unapproved trespassing onto the root zone, the Contractor shall, at his own expense, secure the services of an Arborist, described in Item 102.55. The Arborist shall be approved by MassDOT.

If, based on the recommendation of the Arborist, the Engineer determines that damages can be remedied by corrective measures, such as repairing trunk or limb injury; soil compaction remediation; pruning; soil injection fertilization; and/or watering; the damage shall be repaired as soon as possible, within the appropriate season for such work and according to industry standards.

If, based on the recommendation of the Arborist, the Engineer determines that damages are irreparable, or that the damages are such that the tree is sufficiently compromised to pose a future safety hazard, the tree shall be removed. Tree removal shall include cleanup of all wood, grinding of the stump to a depth sufficient to plant a replacement tree or plant, removal of all chips from the stump site, and filling the resulting hole with topsoil. Such tree removal(s), grinding, debris removal, and topsoil filling, shall be at the Contractor's expense.

Tree removal from improper or inadequate tree protection shall result in the Engineer assessing the Contractor monetary damages consistent with industry standards for assessed value and/or replacement.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 102.511 will be measured and paid at the contract unit price per EACH tree to be armored and pruned. This will include full compensation for all labor, equipment, materials, and incidentals for the satisfactory completion of the work and the subsequent removal and satisfactory disposal of the protective materials upon completion of the contract or as required by the Engineer.

Payment for work under this item will be scheduled as follows:

- 40% of the value shall be paid upon installation of trunk armoring and completion of pruning work, if required.

- 60% of the value shall be paid at the end of construction operations that would potentially damage the tree and after protection materials have been removed and properly disposed of by the Contractor. In the event of repairable damages, payment shall be made after the completion of remediation measures.

No separate payment will be made for costs of remedial actions, including Arborist services, tree removal, but all costs in connection therewith shall be included in the Contract unit price bid.

Tree damages assessed, due to lack of or improper tree and plant protective measures being taken, shall be deducted from the contract price of the work.

ITEM 102.521 TREE AND PLANT PROTECTION FENCE FOOT

The work under this Item shall conform to the relevant provisions of Sections 644 and 771 of the Standard Specifications and the following:

Work under this item shall consist of furnishing, installing, and maintaining tree and plant protection fence(s) in a vertical and taut position; removing and resetting fencing as may be required; and final removal of protection fence(s) at the completion of construction activities, or as otherwise required by the Engineer.

The purpose of the fencing is to signify a construction work-free zone and physical barrier, thereby preventing damage to tree roots, tree trunks, soil, and all other vegetation within this delineated Tree and Plant Protection Zone (TPPZ), as shown on the Drawings, as required by the Engineer, and as described herein.

Protection shall be for the duration of the construction activities unless otherwise required by the Engineer.

MATERIALS

Tree and plant protection fence(s) shall provide a minimum forty-eight (48) inch tall barrier, that remains vertical and taut. The Fence shall be orange plastic safety fence (recommended where high visibility is necessary), or wooden snow fencing, or other approved material. Posts and anchoring materials shall be incidental to the work.

Per requirements of the Engineer, additional posts, deeper post depths, and/or additional attachments shall be used if the fabric or fence sags, leans or otherwise is not providing visible or physical protection to the TPPZ.

REFERENCES

If requested, the Contractor shall provide to the Engineer one copy of the American National Standards Institute (ANSI) A300 Standard Practices for Tree, Shrub, and Other Woody Plant Maintenance Part 1, Pruning and Part 5, Construction Management Standard. Provision of reference shall be incidental to this item.

ESTABLISHMENT OF THE TPPZ

Fencing shall be used to delineate and establish the TPPZ, adjacent to construction areas, staging areas, stockpile areas, as shown on the Drawings, and/or as required by the Engineer.

Fencing shall be located as close to the work zone limit and as far from tree trunk(s) and plants as possible to maximize the area to be protected. Fence shall run parallel and adjacent to construction activity to create a barrier between the work zone and the root zone or designated limit of plants and soils to be protected.

ITEM 102.521 (Continued)

When construction activities surround (or have the potential to surround) trees or plants to be protected, a circular enclosure shall be used. In these instances, the TPPZ limit shall be the drip line of each tree or as close as possible to the drip line, and/or as shown on the Drawings. The drip line is defined as the outermost limit of tree canopy.

The Contractor shall not engage in any construction activity within the TPPZ without the approval of the Engineer. Activities may including operating, moving, or storing equipment, supplies, or materials; and locating temporary facilities, including trailers or portable toilets, Accessing or traversing the TPPZ shall not be permitted.

METHOD OF WORK

TPPZ fencing shall be installed prior to any construction work or staging activities. Fence(s) shall be repositioned where and as necessary for optimum tree and plant protection. Repositioning shall be incidental to this item. TPPZ fencing shall not be moved without prior approval by the Engineer.

The TPPZ shall be protected at all times from compaction of the soil; damage of any kind to trunks, bark, branches, leaves, and roots of all plants; and contamination of the soil with construction materials, debris, silt, fuels, oils, and any chemicals substance.

After construction activities are completed, or when required by the Engineer, fencing, stakes, and other anchoring materials, if any, shall be removed and disposed off-site by the Contractor.

REQUIRED WORK WITHIN THE TPPZ

In the event that grading, trenching, utility work, or storage is unavoidable within the TPPZ, the Engineer shall be notified. Measures may be required for tree protection and preservations, including air spading; the use of six (6) inch depth of wood chips or approved matting for root protection; pruning of branches; and/or trunk protection. These protection measures shall be paid under applicable contract items.

Landscaping work specified within the TPPZ shall be accomplished by hand tools. Where handwork is not feasible, with permission of the Engineer, work shall be conducted with the smallest mechanized equipment necessary.

TREE AND PLANT INJURY OR LOSS

If the TPPZ is encroached by construction activity without approval, at the discretion of the Engineer, the Contractor may be required to provide a more durable barrier (e.g., Jersey Barriers, chain link fence (if not already in use) to secure the area. Costs of furnishing and installing additional or more durable barrier(s) shall be borne by the Contractor.

In such cases of encroachment, soils shall be considered compacted and tree root injury will be assumed. Action shall be taken as specified below.

ITEM 102.521 (Continued)

In the event that trees designated for protection under this item are injured, including root injury from unapproved trespassing onto the root zone, the Contractor shall, at his own expense, secure the services of an Arborist, described under Item 102.55. The Arborist shall be approved by MassDOT.

In the event of spills, compaction or injury, the Contractor shall take corrective action immediately using methods approved by the Engineer, in coordination with the Arborist.

If, based on the recommendations of the Arborist, the Engineer determines that injuries can be remedied by corrective measures, such as repairing trunk or limb injury, soil compaction remediation, pruning, and/or watering; the injury shall be repaired as soon as possible, within the appropriate season for such work, and according to industry standards.

If, based on the recommendations of the Arborist, the Engineer determines that injuries are irreparable, or that the injuries are such that the tree is sufficiently compromised to pose a future safety hazard, the tree shall be removed. Tree removal shall include cleanup of all wood, grinding of the stump to a depth sufficient to plant a replacement tree or plant, removal of all chips from the stump site, and filling the resulting hole with topsoil. Such tree removal(s), grinding, debris removal, and filling, shall be at the Contractor's expense.

Tree removal from improper or inadequate protection of the TPPZ shall result in the Engineer assessing the Contractor monetary damages consistent with industry standards for assessed value and/or replacement.

Shrubs removals from improper or inadequate protection of the TPPZ shall be replaced with plants of similar species and equal size or the largest size plants reasonably available. The Engineer shall approve the size, quality, and quantity of the replacement plant(s). Each replacement shall include a minimum of one year of watering and establishment care, specified under Section 771.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Tree and Plant Protection Fence will be measured by the FOOT, complete in place, by the length along the top of the fence.

Tree and plant protection fence will be paid for under the contract unit price per FOOT, complete in place and shall include all materials, labor, and equipment required to furnish, install, anchor, maintain, and remove the fence upon completion, as described herein. Posts, temporary footings, anchoring and removal upon completion, shall be incidental to this item.

No separate payment will be made for costs of remedial actions, including addition of more durable barriers, Arborist services, tree or plant removal, shrub replacement and establishment, but all costs in connection therewith shall be included in the Contract unit price bid.

Tree damages assessed, due to lack of or improper tree and plant protective measures being taken, shall be deducted from the contract price of the work.

ITEM 102.521 (Continued)

Payment for work under this item will be scheduled as follows:

- Forty (40) percent of the value payment will be made upon installation of TPPZ fencing.

- Sixty (60) percent of the value payment will be made when TPPZ fencing materials have been maintained to function as specified for the intended duration and removed and disposed off-site at the completion of protection measure requirement.

ITEM 102.55 **ARBORIST** **HOUR**

DESCRIPTION

The work under this Item is for the services of a Certified Arborist. Arborist shall be an International Society of Arboriculture (ISA) Certified Arborist or a Massachusetts Certified Arborist. The Arborist shall have at least 10 years of experience in tree care, including tree protection during construction, and shall demonstrate a familiarity with the American National Standards Institute (ANSI) A300 Standard Practices for Tree, Shrub, and Other Woody Plant Maintenance Part 1Pruning, Part 5 Construction Management Standards, and Part 9 Tree Risk Assessment.

The Arborist's general responsibilities include protecting high priority trees within and adjacent to the project limits, stating areas, and access routes; recommending removal of diseased, damaged or otherwise unhealthy trees that pose a potential safety hazard; evaluating effects of construction on future health of trees close to proposed work; and recommending and/or overseeing tree work amd care.

The Arborist for this item shall not be from the same company as the company responsible for selective clearing or tree removal work.

For projects with multiple phases, projects where construction activities (work or stockpiling) shifts, or when otherwise required by the Engineer, the Arborist shall re-evaluate conditions and provide follow-up recommendations.

SUBMITTALS

- Contractor shall submit to the Engineer for approval by MassDOT Landscape Design the qualifications and experience of the Arborist. Submittal shall include copy of current certification and a resume summarizing specific construction experience (including relevant MassDOT projects) for a minimum of five projects.
- Arborist's Report documenting recommendations shall be submitted to the Engineer and an electronic copy forwarded to MassDOT Landscape Design Section. Report shall include the following:

SCOPE OF WORK

The Arborist shall be responsible for the following tasks:

- Oversight
  - direct or execute pruning of branches and/or roots, air spading, and/or other tree care operations
- Monitoring and Inspections
  - periodically inspect fencing and ensure root zones are properly protected and clear of equipment and materials as required by the Engineer
  - reevaluate tree protection measures for various phases of a project
  - submit inspection notes with relevant and dated photos to the Engineer.

ITEM 102.55 (Continued)

METHODS

Prior to any work, the Arborist shall walk the site with the Contractor, the Engineer, the Town Tree Warden, and, if specified, the MassDOT Landscape Architect, to review trees, limits of construction activities, and other concerns. Where required for proper assessment of tree impacts, limits of work shall be staked or otherwise marked in the field prior to the site walk.

Trees to be removed shall be painted or otherwise marked.

Trees to be retained shall be marked such that it does not mar or damage the tree and such that marker is not easily removed. As applicable to the work and scope of the project, trees designated for removal or to be retained shall be noted on the plan and/or in the arborist's report and photographed.

Trees designated to remain that are damaged or removed by construction activities shall be noted and photographed for inclusion in inspection reports submitted to the Engineer.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 102.55 will be measured for payment by the Hour of time spent onsite.

Item 102.55 will be paid at the contract unit price per hour upon submittal and acceptance of Reports described above.

ITEM 180.01 ENVIRONMENTAL HEALTH AND SAFETY PROGRAM LUMP SUM

The work shall consist of ensuring the health and safety of the Contractor's employees and subcontracting personnel, the Engineer, their representatives, the environment, and public welfare from any on-site chemical contamination present in air, soil, water and sediment.

The Contractor shall prepare and implement a site-specific Environmental Health and Safety Plan (EHASP) which has been approved and stamped by a Certified Industrial Hygienist (CIH) and includes the preparer's name and work experience. The EHASP shall include appropriate components required by OSHA Standard 29 CFR 1910.120(b) and the Massachusetts Contingency plan (MCP) 310 CMR 40.0018 and shall comply with all applicable state and federal laws, regulations, standards and guidelines, and provide a degree of protection and training appropriate for implementation on the project. The EHASP shall be a dynamic document with provision for change to reflect new information, new practices or procedures, changing site environmental conditions or other situations which may affect site workers and the public. The EHASP shall be developed and implemented independently from the standard construction HASP required to work on all MassDOT construction projects.

Health and safety procedures provided by the Contractor shall comply with all the appropriate regulations that address employee working conditions, including but not limited to standards established by OSHA and National Institute for Occupational Safety and Health (NIOSH). Equipment used for the purpose of health and safety shall be approved by and meet pertinent standards and specifications of the appropriate regulatory agencies.

A copy of the most up-to-date version of the EHASP shall be maintained on-site at all times by the Contractor. The on-site copy shall contain the signature of the Engineer and each on-site employee of the MassDOT, Contractor, and Subcontractors involved with on-site activities. The employee's signature on the EHASP shall be deemed prima facie evidence that the employee has read and understands the plan. Updated copies of signature sheets shall be submitted to the Engineer.

The EHASP shall specify a Contractor Site Safety and Health Officer responsible for implementation of the EHASP and to oversee all construction activities, including handling, storage, sampling and transport, which require contact with or exposure to potentially hazardous materials.

The level of protection required to ensure the health and safety of on-site personnel will be stipulated in the EHASP. The Site Safety and Health Officer shall implement the EHASP based on changing site and weather conditions, type of operation or activity, chemical compounds identified on-site, concentration of the chemicals, air monitoring data, physical state of the hazardous materials, potential duration of exposure to hazardous materials, dexterity required to perform work, decontamination procedures, required personnel and type of equipment to be utilized.

ITEM 180.01 (Continued)

During implementation of the EHASP, a daily log shall be kept by the Site Safety and Health Officer and a copy shall be provided weekly to the Engineer. This log shall be used to record a description of the weather conditions, levels of personal protection being employed, screening data and any other information relevant to on-site environmental safety conditions. The Site Safety and Health Officer shall sign and date the daily log.

BASIS OF PAYMENT

Preparation and implementation of the Environmental Health and Safety Program, including the monitoring, protection and storage of all contaminated materials, as well as subsequent modifications to the EHASP, will be paid for at the Contract unit price per lump sum, which price shall include all labor, materials, equipment and incidental costs required to complete the work.

Payment of 50% of the Environmental Health and Safety Program contract price will be made upon the initial acceptance of the EHASP by the Engineer. Payment of the remaining 50% of the Environmental Health and Safety Program contract price will be made upon completion of the work. The bid price shall include preparation and implementation of the EHASP as well as the cost for its enforcement by the Site Safety and Health Officer along with any necessary revisions and updates. The work of implementing the Environmental Health and Safety Program includes work involving, but not limited to, the monitoring, protection, and storage of all contaminated materials.

ITEM 180.03 LICENSED SITE PROFESSIONAL SERVICES HOUR

Within limited areas of the project site, soils, sediments and/or groundwater may be contaminated. A Licensed Site Professional (LSP) shall be required to provide the services required to comply with the requirements of the MCP. These services may include sampling, analysis and characterization of potentially contaminated media, preparation of Immediate Response Action (IRA) Plans, Utility-Related Abatement Measure (URAM) and Release Abatement Measure (RAM) Plans, Imminent Hazard Evaluations, status reports, transmittal forms, release notification forms, risk assessments, completion statements, and related documents required pursuant to the Massachusetts Contingency Plan (MCP). LSP hours related to the characterization and disposal of contaminated soil and/or sediment are incidental to the disposal items. An estimate of LSP services to be provided shall be submitted to the Engineer for approval before any LSP activity begins.

The name and qualifications of the LSP and all environmental technicians to be assigned to the project shall be submitted to the Engineer for approval at least four weeks prior to initial site activities. The LSP shall have a current, valid license issued by the Massachusetts Board of Registration of Hazardous Waste Site Cleanup Professionals. The LSP shall have significant experience in the oversight of MCP activities at active construction sites. Qualification packages for the LSP and each technician shall include a resume, all recent work assignments with responsibilities identified (previous 5 years), and applicable training and certifications. A list of all Notices of Noncompliance, Notice of Audit Findings and Enforcement Orders issued by the DEP shall be submitted for all work assignments listed for the LSP and environmental technicians. The LSP shall evaluate soil and/or sediment with discoloration, odor, and presence of petroleum liquid or sheening on the groundwater surface, or any abnormal gas or materials in the ground which are known or suspected to be oil or hazardous materials. Excavated soil and sediment which is suspected of petroleum contamination shall be field screened using the jar headspace procedures according to established DEP Guidance. All field screening equipment shall be pre-approved by the Engineer. The LSP shall ensure proper on site calibration of all field screening instrumentation.

The Engineer shall be contacted immediately when observations or any field screening results verify contamination requiring further analysis, and/or enhanced management of suspect soil and/or sediment. Any enhanced management of contaminated soil to ensure proper stockpiling and storage is incidental to the LSP Services item. The LSP shall adequately characterize subsurface conditions prior to backfill in areas where contaminated material has been excavated. The Engineer shall approve the locations of the testing sites prior to the sampling.

ITEM 180.03 (Continued)

Contaminated soil, sediment and/or groundwater shall be handled in accordance with all applicable state and federal statutes, regulations and policies. The LSP shall adequately characterize contaminated media for comparison to the requirements of the MCP. The Contractor and the LSP shall be aware of the reporting requirements for releases of oil and/or other hazardous material (OHM) as set forth in federal and state laws and regulations, and shall both be held responsible for performing the work in accordance with all applicable Federal and State laws and regulations. The LSP shall maintain written records in a clear and concise format which tracks the excavation, stockpiling, analysis and reuse/disposal of all suspect contaminated soils, sediments and groundwater. These records shall be up-to-date and available to the Engineer on a bi-weekly basis. The LSP shall review and summarize the laboratory data from any analyses performed on contaminated media. A report shall be delivered to the Engineer outlining the material sampling methods, laboratory analysis results and proposed course of action. The laboratory report together with Chain of Custody forms for all analytical results shall be submitted to the Engineer within 14 days after completion of such analyses.

The LSP and Contractor shall be held responsible for the submission of all MCP-related documents to the Engineer at least 14 days in advance of any timeframe specified in the MCP and for the timely submission of data and tracking information as noted within this Item. All documents prepared under this Item shall be reviewed and signed by the approved LSP. The Contractor and LSP shall be responsible for all fines, penalties and enforcement requirements imposed by applicable regulatory agencies for failure to meet regulatory and contract timeframes. No compensation will be provided for such fines, penalties and enforcement actions.

The Contractor and the LSP shall be aware of the reporting requirements for releases of oil and/or other hazardous material (OHM) as set forth in federal and state laws and regulations, and shall both be held responsible for performing the work in accordance with all applicable Federal and State laws and regulations.

If the Contractor causes a release of OHM, the Contractor shall be responsible for assessing and remediating the release in accordance with all pertinent State and Federal regulations, including securing the services of a LSP, at his own expense.

The LSP shall coordinate all activities involving both MassDOT and the DEP through the Engineer. Any notification of release shall be approved by the Department before submittal to the DEP, except if an imminent hazard condition exists as defined in 309 CMR 4.03(4)(b).

The LSP shall verify that construction-related plans and training are in place before construction Begins. During the excavation, the LSP shall oversee all contaminated soil excavation and visually inspect material that will be moved. The LSP shall oversee the construction work activities in Manchester Street Park and the Contractor shall following the requirements from the Activity and Use Limitation (AUL) was filed for the 85 Manchester Street site in 2005. The LSP shall ensure proper management of soil along the right-of-way and the implementation of best management practice in accordance with the “Best Management Practices for Controlling Exposure to Soil during the Development of Rail Trails” document issued by DEP.

ITEM 180.03 (Continued)

Laboratory Testing in Support of LSP Services

Laboratory testing provides for analytical testing in support of LSP services related to maintaining MCP compliance, such as delineating the extent and type of contamination present. Sampling and testing for disposal purposes are not included.

To maintain compliance with the MCP or other regulatory requirements, the LSP shall request approval from the Engineer to obtain samples from various locations and depths within the project area and to perform laboratory analyses on those samples. The samples shall be delivered to a DEP-certified laboratory using proper chain-of-custody documentation for analyses which, depending upon site conditions and suspected and/or identified contaminants of concern, may include, but are not limited to, metals, polychlorinated biphenyls (PCBs), volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides, polycyclic aromatic hydrocarbons (PAHs), extractable petroleum hydrocarbons (EPHs) and volatile petroleum hydrocarbons (VPHs). Subsequent testing, depending upon initial results, may be required for Toxicity Characteristic Leaching Procedure (TCLP) analyses (EPA Method 1311) for metals.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

LSP Services for work under this item will be measured per person, per hour of service provided by LSP, Environmental Technicians and other approved personnel. Travel time shall not be included in the billable hours. LSP hours related to soil/sediment disposal (disposal characterization, landfill acceptance, disposal package preparation, etc.) shall be incidental to disposal items.

The quantity and type of laboratory tests shall be approved by the Engineer beforehand. The Contractor will be reimbursed upon written evidence of payment. The Contractor may be required to obtain cost estimates from three DEP certified laboratories for the Engineer to choose the service provider. Laboratory testing related to soil/sediment disposal (disposal characterization, landfill acceptance, disposal package preparation, etc.) shall be incidental to disposal items.

LSP Services will be paid for at the Contract unit price per hour, or fraction thereof, spent to perform the work as described above. The bid price shall be a blended rate that includes the cost of the LSP, environmental technicians and other personnel, the performance of all work tasks and field screening, including required equipment, materials and instrumentation, and production of all documentation described above. All requests for payment shall be accompanied by the following information: the names of the personnel associated with the work charged under LSP Services, dates and hours worked, work conducted, including, where appropriate, locations as identified on the construction plans, and a copy of the field diary for the dates submitted.

Laboratory Testing will be reimbursed upon receipt of paid invoices for testing approved by the Engineer.

ITEM 181.11	**DISPOSAL OF UNREGULATED SOIL**	**TON**
ITEM 181.12	**DISPOSAL OF REGULATED SOIL IN-STATE FACILITY**	**TON**
ITEM 181.13	**DISPOSAL OF REGULATED SOIL OUT-OF-STATE FACILITY**	**TON**
ITEM 181.14	**DISPOSAL OF HAZARDOUS WASTE**	**TON**

The work under these items shall include the transportation and disposal of contaminated material excavated, or excavated and stockpiled. It shall also include the cost of any additional laboratory analyses required by a particular disposal facility beyond the standard disposal test set.

Excavation of existing subsurface materials may include the excavation of contaminated soils. The Contractor shall be responsible for the proper coordination of characterization, transport and disposal, recycling or reuse of contaminated soils. Disposal, recycling or reuse will be referred to as "disposal" for the purposes of this specification. However, regardless of the use of the term herein, there will be no compensation under these items for reuse within the project limits. The Contractor will be responsible for coordinating the activities required for characterization, transport and disposal of contaminated soils. Such coordination will include the Engineer and his/her designee overseeing management of contaminated materials. Contaminated soils shall be disposed of in a manner appropriate for the soil classification as described below and in accordance with the applicable laws of local, state and federal authorities. The Contractor shall be responsible for identifying disposal facility(ies) licensed to accept the class of contaminated soils to be managed and assure that the facility can accept the anticipated volume of soil contemplated by the project. The Contractor shall be responsible for hiring a Licensed Site Professional (LSP) and all ancillary professional services including laboratories as needed for this work. The Contractor will be responsible for obtaining all permits, approvals, manifests, waste profiles, Bills of Lading, etc. subject to the approval of the Engineer prior to the removal of the contaminated soil from the site. The Contractor and LSP shall prepare and submit to the Engineer for approval all documents required under the Massachusetts Contingency Plan (MCP) and related laws and environmental regulations to conduct characterization, transport, and disposal of contaminated materials.

CLASSES OF CONTAMINATED SOILS

The Contractor and its LSP shall determine if soil excavated or soil to be excavated is unregulated soil or contaminated soil as defined in this section. Such materials shall be given a designation for purposes of reuse or disposal based on the criteria of the MCP. Soils and sediments which are not suitable for reuse will be given a designation for purposes of off-site disposal based on the characterization data and disposal facility license requirements. The Classes of Contaminated Soils are defined as follows:

ITEMS 181.11, 181.12, 181.13 and 181.14 (Continued)

UNREGULATED SOIL consists of soil, fill and dredged material with measured levels of oil and hazardous material (OHM) contamination at concentrations below the applicable Reportable Concentrations (RCs) presented in the MCP. Unregulated soil consists of material which may be reused (or otherwise disposed) as fill within the Commonwealth of Massachusetts subject to the non-degradation criteria of the MCP (310 CMR 40.0032(3), in a restricted manner, such that they are sent to a location with equal or higher concentrations of similar contaminants. Disposal areas include licensed disposal facilities, approved industrial settings in areas which will be capped or covered with pavement or loamed and seeded, and for purposes of this project shall be reused as fill within the project site construction corridor whenever possible. The material cannot be placed in residential and/or environmentally sensitive (e.g. wetlands) areas. Under no circumstances shall contaminated soils be placed in an uncontaminated or less contaminated area (including the area above the groundwater table if this area shows no sign of contamination).

The Contractor shall submit to MassDOT the proposed disposal location for unregulated soils for approval. If such a disposal location is not a licensed disposal facility, the Contractor shall submit to the Engineer analytical data to characterize the disposal area sufficiently to verify that the unregulated material generated within the MassDOT construction project limits is equal to or less than the contaminant levels at the disposal site and meets the non-degradation requirements of the MCP. In addition, the Contractor shall provide written confirmation from the owner of the proposed disposal location that they have been provided with the analytical data for both the materials to be disposed as well as the disposal site characterization and that s/he agrees to accept this material. A Material Shipping Record or Bill of Lading, as appropriate, shall be used to track the off-site disposal of unregulated soil and a copy, signed by the disposal facility or property owner, shall be provided to the Engineer to document legal disposal of the unregulated material.

The cost of on-site disposal of unregulated soil within the project area will be considered incidental to the item of work to which it pertains.

REGULATED SOIL consists of materials containing measurable levels of OHM that are equal to or exceed the applicable Reportable Concentrations for the site as defined by the MCP, 310 CMR 40.0000. Regulated soil which meets the MCP reuse criteria of the applicable soil/groundwater category for this project area may be reused on site provided that it meets the appropriate geotechnical criteria established by the Engineer. Regulated Soil may be reused (as daily or intermediate cover or pre-cap contouring material) or disposed (as buried waste) at lined landfills within the Commonwealth of Massachusetts or at an unlined landfill that is approved by the Massachusetts Department of Environmental Protection (DEP) for accepting such material, in accordance with DEP Policy #COMM-97-001, or at a similar out-of-state facility. It should be noted that soils which exceed the levels and criteria for disposal at in-state landfills, as outlined in COMM-97-001, may be shipped to an in-state landfill, but require approval from the DEP Division of Solid Waste Management and receiving facility. An additional management alternative for this material is recycling into asphalt. Regulated Soils may also be recycled at a DEP approved recycling facility possessing a Class A recycling permit subject to acceptance by the facility and compliance with DEP Policy #BWSC-94-400. Regulated Soil removed from the site for disposal or treatment shall be removed via an LSP approved Bill of Lading, Manifest or applicable material tracking form. This type of facility shall be approved/permitted by the State in which it operates to accept the class of contaminated soil in accordance with all applicable local, state and federal regulations.

ITEMS 181.11, 181.12, 181.13 and 181.14 (Continued)

HAZARDOUS WASTE consists of materials which shall be disposed of at a facility permitted and operated in full compliance with Federal Regulation 40 CFR 260-265, Massachusetts Regulation 310 CMR 30.000, Toxic Substances Control Act (TSCA) regulations, or the equivalent regulations of other states, and all other applicable local, state, and federal regulations. All excavated materials classified as hazardous waste shall be disposed of at an out-of-state permitted facility. This facility shall be a RCRA hazardous waste or TSCA facility, or RCRA hazardous waste incinerator. This type of facility shall be approved/permitted by the State in which it operates to accept hazardous waste in accordance with all applicable local, state and federal regulations and shall be permitted to accept all contamination which may be present in the soil excavate. The Contractor shall ensure that, when needed, the facility can accept TSCA waste materials i.e. polychlorinated biphenyls (PCBs). Hazardous waste shall be removed from the site for disposal or treatment via an LSP approved Manifest.

MONITORING/SAMPLING/TESTING REQUIREMENTS

The Contractor shall be responsible for monitoring, sampling and testing during and following excavation of contaminated soils to determine the specific class of contaminated material. Monitoring, sampling and testing frequency and techniques shall be performed in accordance with Item 180.03 – LSP Services. Additional sampling and analysis may be required to meet the requirements of the disposal facility license. The cost of such additional sampling and analysis shall be included in the bid price for the applicable disposal items. The Contractor shall obtain sufficient information to demonstrate that the contaminated soil meets the disposal criteria set by the receiving facility that will accept the material.

No excavated material will be permanently placed on-site or removed for off-site disposal until the results of chemical analyses have been received and the materials have been properly classified. The Contractor shall submit to the Engineer results of field and laboratory chemical analyses tests within seven days after their completion, accompanied by the classification of the material determined by the Contractor, and the intended disposition of the material. The Contractor shall submit to the Engineer for review all plans and documents relevant to LSP services, including but not limited to, all documents that shall be submitted to the DEP.

WASTE TRACKING:

Copies of the fully executed Weight Slips/Bills of Lading/ Manifests/Material Shipping Records or other material tracking form received by the Contractor from each disposal facility and for each load disposed of at that facility, shall be submitted to Engineer and the Contractor's LSP within three days of receipt by the Contractor. The Contractor is responsible for preparing and submitting such documents for review and signature by the LSP or other appropriate person with signatory authority, three days in advance of transporting soil off-site. The Contractor shall furnish a form attached to each manifest or other material tracking form for all material removed off-site, certifying that the material was delivered to the site approved for the class of material. If the proposed disposition of the material is for reuse within the project construction corridor, the Contractor shall cooperate with MassDOT to obtain a suitable representative sample(s) of the material to establish its structural characteristics to meet the applicable structural requirements as fill for the project.

ITEMS 181.11, 181.12, 181.13 and 181.14 (Continued)

All material transported off-site shall be loaded by the Contractor into properly licensed and permitted vehicles and transported directly to the selected disposal or recycling facility and be accompanied by the applicable shipping paper. At a minimum, truck bodies shall be structurally sound with sealed tail gates, and trucks shall be lined and loads covered with a liner, which shall be placed to form a continuous waterproof tarpaulin to protect the load from wind and rain.

DECONTAMINATION OF EQUIPMENT

Tools and equipment which are to be taken from and reused off site shall be decontaminated in accordance with applicable local, state and federal regulations. This requirement shall include, but not be limited to, all tools, heavy machinery and excavating and hauling equipment used during excavation, stockpiling and handling of contaminated material. Decontamination of equipment is considered incidental to the applicable excavation item.

REGULATORY REQUIREMENTS

The Contractor shall be responsible for adhering to regulations, specifications and recognized standard practices related to contaminated material handling during excavation and disposal activities. MassDOT shall not be responsible at any time for the Contractor's violation of pertinent State or Federal regulations or endangerment of laborers and others. The Contractor shall comply with all rules, regulations, laws, permits and ordinances of all authorities having jurisdiction including, but not limited to, Massachusetts DEP, the U.S. Environmental Protection Agency (EPA), Federal Department of Transportation (DOT), Massachusetts Water Resources Authority (MWRA), the Commonwealth of Massachusetts and other applicable local, state and federal agencies governing the disposal of contaminated soils.

All labor, materials, equipment and services required to make the work comply with such regulations shall be provided by the Contractor without additional cost to MassDOT. Whenever there is a conflict or overlap within the regulations, the most stringent provisions shall apply. The Contractor shall reimburse MassDOT for all costs it incurs, including penalties and/or for fines, as a result of the Contractor's failure to adhere to the regulations, specifications, recognized standard practices, etc., that relate to contaminated material handling, transportation and disposal.

SUBMITTALS

I. Summary of Sampling Results, Classification of Material and Proposed Disposal Option.

The following information, presented in tabular format, shall be submitted to the Engineer for review and approval prior to any reuse on-site or disposal off-site. This requirement is on-going throughout the project duration. At least two weeks prior to the start of any excavation activity, the Contractor shall submit a tracking template to be used to present the information as stipulated below. Excavation will not begin until the format is acceptable to MassDOT.

ITEMS 181.11, 181.12, 181.13 and 181.14 (Continued)

Characterization Reports will be submitted for all soil, sediment, debris and groundwater characterized through the sampling and analysis program. Each report will include a site plan which identifies the sampling locations represented in the Report. The Construction Plan sheets may be used as a baseplan to record this information.

The Sampling Results shall be presented in tabular format. Each sample shall be identified by appropriate identification matching the sample identification shown on the Chain of Custody Record. The sample shall also be identified by location (e.g. grid number or stockpile number). For each sample, the following information shall be listed: the classification (unregulated, regulated, etc.), proposed disposal option for the stockpile or unit of material represented, and, all analytical results.

Each Characterization Report shall include the laboratory analytical report and Chain of Custody Record for the samples included in the Report.

II. Stockpiling, Transport, and Disposal.

At least two weeks prior to the start of any excavation activity, the Contractor shall submit, in writing, the following for review and shall not begin excavation activity until the entire submittal is acceptable to MassDOT.

Excavation and Stockpiling Protocol:
Provide a written description of the management protocols for performing excavation and stockpiling and/or direct loading for transport, referencing the locations and methods of excavating and stockpiling excavated material.

Disposal and Recycling Facilities:
1. Provide the name, address, applicable licenses and approved waste profile for disposal and/or recycling location(s) where contaminated soil will be disposed. Present information substantiating the suitability of proposed sites to receive classifications of materials intended to be disposed there, including the ability of the facility to accept anticipated volumes of material.

ITEMS 181.11, 181.12, 181.13 and 181.14 (Continued)

2. Provide a summary of the history of compliance actions for each disposal/recycling facility proposed to be used by the Contractor. The compliance history shall include a comprehensive list of any state or federal citations, notices of non-compliance, consent decrees or violations relative to the management of waste (including remediation waste) at the facility. Material shall not be sent to facilities which are actively considered by the DEP, USEPA or other responsible agency to be in violation of federal, state or local hazardous waste or hazardous material regulations. MassDOT reserves the right to reject any facility on the basis of poor compliance history.

Transportation:
The name, address, applicable license and insurance certificates of the licensed hauler(s) and equipment and handling methods to be used in excavation, segregation, transport, disposal or recycling.

III. Material Tracking and Analytical Documentation for Reuse/Disposal.

The following documents are required for all excavation, reuse and disposal operations and shall be in the format described. At least two weeks prior to the start of any excavation or demolition activity, the Contractor shall submit the tracking templates required to present the information as stipulated below. Excavation or demolition shall not begin until the format is acceptable to MassDOT.

All soils, sediments and demolition debris shall be tracked from the point of excavation to stockpiling to onsite treatment/processing operations to off-site disposal or onsite reuse as applicable.

Demolition Debris:
Demolition debris shall be tracked if the debris is stockpiled at a location other than the point of origin or if treatment or material processing is conducted. Identification of locations shall be based on the station-offset of the location. The tracking table shall identify date and point of generation, any field screening such as PID or dust monitoring, visual observations/comments, quantity, and stockpile ID/processing operation location. For each unit of material tracked, the table shall also track reuse of the material on-site, providing reuse date, location of reuse as defined by start and end station, width of reuse location by offset, the fill elevation range, quantity, and finish grade for said location. For demolition debris which is not reused on site, the table shall also track disposal of the material as defined by disposal date, quantity and disposal facility. The table shall provide a reference to any analytical data generated for the material.

Soil/Sediment:
Soil excavation shall be identified based on the station-offset of the excavation location limits. The tracking table shall identify date and point of generation, any field screening such as PID or dust monitoring, visual observations, quantity, and stockpile number/location. For each unit of material tracked, the table shall also track reuse of the material on-site and disposal of the material off-site using the same categories identified for demolition debris above.

ITEMS 181.11, 181.12, 181.13 and 181.14 (Continued)

METHOD OF MEASUREMENT

Disposal of Unregulated Soil, Disposal of Regulated Soil – In-State Facility, Disposal of Regulated Soil – Out-of-State Facility and Disposal of Hazardous Waste will be measured for payment by the ton of actual and verified weight of contaminated materials removed and disposed of. The quantities will be determined only by weight slips issued by and signed by the disposal facility. The most cost-effective, legal disposal method shall be used. The work of the LSP for disposal under all of these items shall be incidental to the work with no additional compensation.

BASIS OF PAYMENT

Disposal of Unregulated Soil, Disposal of Regulated Soil – In-State Facility, Disposal of Regulated Soil – Out-of-State Facility and Disposal of Hazardous Waste will be paid for at the Contract unit price per ton which price shall include all labor, materials, equipment and incidental costs required to complete the work. No separate payment will be made for approvals, permits, fees and taxes, additional testing/characterization required by the facility beyond the standard disposal test set, decontamination procedures, transportation and disposal, but all costs in connection therewith shall be included in the Contract unit price bid.

ITEM 697.11 INLET SEDIMENTATION FILTER DEVICES EACH

Work under this Item shall conform to the relevant provisions of Subsections 227 and 670 of the Standard Specifications and the following:

The work under this Item includes the furnishing, installation, maintenance, and removal of a reusable fabric sack/bag (device) to be installed in drainage structures for the protection of wetlands and other resource areas and the prevention of silt and sediment from the construction site from entering the storm water collection system. The inlet sedimentation filter devices shall have an overflow / high-flow protection bypass system to prevent flooding during high-intensity storm events. Inlet sedimentation filter devices shall include a curb inlet sediment capture system for catch basins equipped with curb inlets. Inlet sedimentation filter devices shall be submitted to the Engineer for approval. Inlet sedimentation filter devices shall be manufactured by ACF Environmental; Dandy Products; Fabco Industries, Inc.; New Pig Corporation; or an approved equal.

CONSTRUCTION

Inlet sedimentation filter devices shall be installed in retained existing and proposed catch basins and drop inlets within the project limits and as required by the Resident Engineer.

The inlet sedimentation filter device shall be as manufactured to fit the opening of the drainage structure under regular flow conditions and shall be mounted under the grate. The insert shall be secured from the surface such that the grate can be removed without the insert discharging into the structure. The filter material shall be installed and maintained in accordance with the manufacturer's literature and as directed by the Engineer. The inlet sedimentation filter device and its maintenance shall meet any requirements listed in the environmental permitting for the Contract and as described in this provision.

Inlet sedimentation filter devices shall remain in place until the placement of the pavement overlay or top course and the graded areas have become permanently stabilized. All materials used for the filter fabric will become the property of the Contractor and shall be removed from the site at the end of use.

The Contractor shall inspect the condition and clean all inlet sedimentation filter devices on the last work shift of each week, after each rainstorm, and during major rain events. Weekly inspection and cleaning of the inlet sedimentation filter devices is required whether or not the job is active. Inlet sedimentation filter devices shall be removed and cleaned to remove and disposed of accumulated debris and shall include backflushing the fabric to ensure all pores are cleaned prior to inspection by the Engineer. Inlet sedimentation filter devices, which have become damaged during construction operations, shall be repaired or replaced immediately at no additional cost to the Department.

When emptying the inlet sedimentation filter device, the Contractor shall take all due care to prevent sediment from entering the structure. Any silt or other debris found in the drainage system at the end of construction shall be removed at the Contractor's expense. The silt and sediment from the inlet sedimentation filter device shall be legally disposed of offsite. Under no condition shall silt and sediment from the insert be deposited on site and used in construction. If the Contractor chooses to store sediment removed from the inlet sedimentation filter devices for later disposal, the sediment must be stored in a designated stockpile location, covered to protect it from wind and precipitation, and protected from sediment loss with sedimentation capture control

ITEM 697.1 (Continued)

devices. If a Storm Water Pollution Prevention Plan (SWPPP) is required for the Contract, the stockpile location and its erosion control system, including cover protection, shall be described in the SWPPP.

As allowed by the Environmental Protection Agency's 2022 Construction General Permit Section 2.2.10 Footnote 31, inlet sedimentation filter devices may be removed in preparation of flood conditions; however, all of the following conditions must be met:

- The Contractor's approved SWPPP requires that inlet sedimentation filter devices be removed no sooner than the work shift prior to the anticipated start of the flood event and be reinstalled no later than the work shift after the end of the flood event.
- Only storms forecasted to produce 2.5" or more of rain in a 24-hour period as forecasted for the local area by a publicly available meteorological service will be accepted as flood events.
- The Contractor has provided a hard copy or pdf copy of the forecast of the flood event to the Engineer prior to implementing removal of inlet sedimentation filter devices.
- The Contractor removes inlet sedimentation filter devices at low-point inlets and only as many on-grade inlets as needed to prevent erosion from the anticipated storm.
- The removal of inlet sedimentation filter devices is done concurrently with other erosion and sedimentation control (ESC) storm protection activities including, but not limited to, pre-storm inspection and maintenance of devices and installation of additional lines of sedimentation capture devices in locations of concern.

All debris accumulated in inlet sedimentation control devices shall be handled and disposed of as specified in Subsection 227 of the Standard Specifications

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Inlet sedimentation filter devices will be measured and paid at the Contract unit price per EACH inlet protected, complete in place, which price shall include all labor, materials, equipment and incidental costs required to complete the work. No separate payment will be made for removal and disposal of the sediment from the insert, but all costs in connection therewith shall be included in the Contract unit price. Replacement of failed devices or components shall be made at no additional compensation.

ITEM 697.2 FLOATING SILT FENCE FOOT

Work under this item shall conform to the relevant provisions of Subsection 670 of the Standard Specifications and the following:

This work consists of furnishing, constructing, installing, maintaining, and ultimately removing a floating silt fence from the Fall River to minimize the drift of suspended sediment in the water body during construction of the Project. Construction of the floating silt fences and locations shall be as shown on the plans, and as required by the manufacturer and the Engineer.

Prior to the installation of the floating silt fence and its accessories, the Contractor shall submit the manufacturer's drawings and technical specifications to the Engineer for approval.

MATERIALS

Floating silt fence shall be made of a woven polypropylene with a minimum 200 lb. tensile strength. The Contractor shall submit to the Engineer for review and approval, product specifications and technical data provided by the manufacturer, prior to installation.

The fence shall be continuously weighted at the bottom to maintain a vertical submerged position. Anchors shall be placed at both ends of the curtain and at intermediate locations, as necessary, to hold the fence securely in place. The fence shall be installed to withstand the forces of the flow of the waterway.

CONSTRUCTION METHODS

General

When assembling and installing a floating silt fence, the Contractor shall follow all the directions of the floating silt fence manufacturer. The floating silt fence shall not be installed perpendicular to the direction of streamflow, such as across a river. The floating silt fence shall be installed parallel to the flow of water only, such as along a river bank. All construction activities which generate any sediment or turbidity into the waterway shall be contained within the floating silt fence.

Floating silt fence shall be installed before construction begins and earth is disturbed. Silt fences shall be inspected and approved by the Bernardston Conservation Commission Agents after installation and prior to commencement of further construction activities.

ITEM 697.2 (Continued)

Installation of Floating silt fence

The floating silt fence shall be floated into position, attached to the anchor lines, and then unfurled. The Contractor shall securely attach curtain panel ends together using rope lashings. The top lashing shall be securely tied to the anchor line. The Contractor shall place the anchors such that the floating silt fence remains in the Plan location and none of the flotation devices are pulled under the water surface. If required by the Engineer, the Contractor shall supply and place additional anchorage.

Maintenance of Floating silt fence

Throughout the Project construction period, the Contractor shall maintain the floating silt fence so that no sediment caused by the Project enters the waterway beyond the floating silt fence. All floating silt fence damaged prior to installation, during installation, or during the life of the Contract shall be repaired or replaced to the satisfaction of the Engineer. The Contractor shall remover floating debris at least weekly or as directed by the Engineer.

The Contractor shall inspect the silt fence daily to ensure continuous effectiveness. Fence shall be maintained for effective performance at all times. If any fence becomes damaged or dislodged, construction activities shall be halted until all deficiencies are corrected by the Contractor with no additional compensation.

Removal of Floating silt fence

The floating silt fence shall remain in place until the Project is complete and the turbidity has settled to no more than what existed prior to the start of construction and remaining sediment has sufficiently settled. Sediment may be removed and the original depth (or plan elevation) restored. Any spoils must be taken to upland area and be stabilized. When required by the Engineer, the floating silt fence shall be furled in place, then released from its anchors and towed out of the water. The floating silt fence and all materials incidental to the construction of the floating silt fence shall be removed in such a manner as to minimize turbidity to adjacent waters. The floating silt fence and related components shall become the property of the Contractor and shall be removed from the Project.

METHOD OF MEASUREMENT

Floating Silt Fence will be measured for payment by the Foot of actual floating silt fence installed, completed, and accepted by the Engineer.

BASIS OF PAYMENT

Floating Silt Fence will be paid for at the Contract unit price per Foot, which price shall include all labor, materials, equipment, and incidental costs required to complete the work.

ITEM 698.3 GEOTEXTILE FABRIC FOR SEPARATION SQUARE YARD
ITEM 698.4 GEOTEXTILE FABRIC FOR PERMANENT EROSION CONTROL SQUARE YARD

GENERAL

This work consists of furnishing and placing geotextile fabric for separation and permanent erosion control at the locations and grades shown on the Plans or as required by the Engineer.

MATERIALS

Submitted fabrics shall be listed on the MassDOT Quality Construction Materials List (QCML) for the intended application.

CONSTRUCTION METHODS

Geotextile Fabric for Separation and Permanent Erosion Control shall be installed according to the manufacturer's instructions and in reasonable close conformity with the location, lines and grades indicated on the Plans.

Any section of fabric that is damaged shall be repaired in accordance with the manufacturer's requirements and AASHTO M 288 and to the satisfaction of the Engineer or it shall be replaced at no cost to the Department.

METHOD OF MEASUREMENT

Geotextile Fabric for Separation and Geotextile Fabric for Permanent Erosion Control will be measured for payment by the number of square yards installed at the locations shown on the Plans, in accordance with these specifications, or as required by the Engineer. Overlapping for seams and joints shall be measured as one layer of fabric. Any embedment or wrapping at the toe or top of the slope shall be measured for payment.

BASIS OF PAYMENT

Geotextile Fabric for Separation and Geotextile Fabric for Permanent Erosion Control will be paid for at the respective Contract bid price per Square Yard of fabric installed, which price shall include furnishing and installing geotextile fabric, all miscellaneous associated assembly material, and all other labor, equipment, material, and incidental costs required to complete the work as specified and as required by the Engineer.

ITEM 740. ENGINEER'S FIELD OFFICE AND EQUIPMENT (TYPE A) MONTH

The work under this Item shall conform to the relevant provisions of Subsection 740 of the Standard Specifications and the following:

Three computers and printer system meeting minimum requirements set forth below including installation, maintenance, power, paper, disks, and other supplies shall be provided at the Resident Engineer's Office:

All equipment shall be UL approved and Energy Star compliant.

Each Computer System shall meet the following minimum criteria or better:

Processor:	Intel, 3.5 GHz
System Memory (RAM):	12 GB
Hard Drive:	500 GB
Optical Drive:	DVD-RW/DVD+RW/CD-RW/CD+RW
Graphics Card:	8 GB
Network Adapter:	10/100 Mbit/s
USB Ports:	6 USB 3.0 ports
Keyboard:	Generic
Mouse:	Optical mouse with scroll, MS-Mouse compliant
Video/Audio:	the computer system shall be capable of allow video calling and recording: Video camera shall be High Definition 1080p widescreen capable video calling and recording with built in microphone. The microphone system shall capture natural audio while filtering out background noise. Audio shall be stereo multimedia speaker system delivering premium sound.
OS:	Latest Windows Professional with all security updates
Web Browser:	Latest Internet Explorer with all security updates
Applications:	Latest MS Office Professional with all security updates Latest Adobe Acrobat Professional with all security updates Latest Autodesk AutoCAD LT Antivirus software with all current security updates maintained through the life of the contract.
Monitors:	Two 27" LED with Full HD resolution. Max. resolution 1920 x 1080
Flash drives:	2 (two) - 128GB USB 3.0
Internet access:	High Speed (min. 24 mbps) internet access with wireless router.

ITEM 740. (Continued)

The Multifunction Printer System shall meet the following minimum criteria or better:

Color laser printer, fax, scanner, email and copier all in one with the following minimum capabilities:

- Estimated volume 8,000 pages per month
- LCD touch panel display
- 50 page reversing automatic document feeder (RADF)
- Reduction/enlargement capability
- Ability to copy and print 11" x 17" paper size
- email and network pc connectivity
- Microsoft and Apple compatibility
- ability to overwrite latent images on hard drive
- 600 x 600 dpi capability
- 30 pages per minute print speed (color),
- 4 Paper Trays Standard (not including the bypass tray)
- Automatic duplexing
- Finisher with staple functions
- Standard Ethernet. Print Controller
- Scan documents to PDF, PC and USB
- ability to print with authenticated access protection

The Contractor shall supply a maintenance contract for next day service, and all supplies (toner, staples, paper) necessary to meet estimated monthly usage.

The Engineer's Field Office and the equipment included herein including the computer system, and printer shall remain the property of the Contractor at the completion of the project. Disks, flash drives, and card readers with cards shall become the property of the Department.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Engineers Field Office and Equipment (Type A) will be measured and paid for at the Contract unit price per month, which price includes full compensation for all services and equipment, and incidentals required to provide equipment, maintenance, insurance as specified and as required by the Engineer.

ITEM 756. NPDES STORM WATER POLLUTION PREVENTION PLAN LUMP SUM

This Item addresses the preparation and implementation of a Storm Water Pollution Prevention Plan required by the National Pollutant Discharge Elimination System (NPDES) and applicable Construction General Permit (CGP) issued by the U.S. Environmental Protection Agency (EPA).

Pursuant to the Federal Clean Water Act, construction activities which disturb one acre or more are required to apply to the EPA for coverage under the NPDES General Permit for Storm Water Discharges from Construction Activities. The Contractor shall be fully responsible for compliance with the most recently issued CGP and any subsequent revisions. Should a fine or penalty be assessed against it, or MassDOT, as a result of a local, state, or federal enforcement action due to non-compliance with the CGP, the Contractor shall take full responsibility.

The NPDES CGP requires the submission of a Notice of Intent (NOI) to the EPA prior to the start of construction (defined as any activity which disturbs land, including clearing and grubbing). There is a fourteen (14) day review period commencing from the date on which EPA enters the Notice into their database. Based on the review of the NOI, EPA may require additional information, including but not limited to, the submission of the Storm Water Pollution Prevention Plan (SWPPP) for review. Work may not commence on the project until final authorization has been granted by EPA. Any additional time required by EPA for review of submittals will not constitute a basis for claim of delay.

In addition, if the project discharges to an Outstanding Resource Water, vernal pool, or is within a coastal ACEC as identified by the Massachusetts Department of Environmental Protection (DEP), a separate notification to DEP is required. DEP may also require submission of the Storm Water Pollution Prevention Plan for review and approval. Filing fees associated with the notification to DEP and, if required, the SWPPP filing to DEP shall be paid by the Contractor.

The CGP also requires the preparation and implementation of a SWPPP in accordance with the afore-mentioned statutes and regulations. The Plan will include the CGP conditions and detailed descriptions of controls of erosion and sedimentation to be implemented during construction. The contractor shall prepare the SWPPP and update it as necessary. The Contractor shall submit the Plan to the Engineer for approval at least four (4) weeks prior to any site activities. It is the responsibility of the Contractor to comply with the CGP conditions and the conditions of any state Wetlands Protection Act Order, Water Quality Certification, Corps of Engineers Section 404 Permit and other environmental permits applicable to the project and to include in the SWPPP the methods and means necessary to comply with applicable conditions of said permits.

It is the responsibility of the Contractor to complete the SWPPP in accordance with the EPA CGP, provide all information required, and obtain any and all certifications as required by the CGP. Any amendments to the SWPPP required by site conditions, schedule changes, revised work, regulations, construction methodologies, and the like are the responsibility of the Contractor. Amendments will require the approval of the Engineer prior to implementation.

ITEM 756. (Continued)

Included in the CGP conditions is the requirement for inspection of all erosion controls and site conditions on a weekly basis as well as after each incidence of rainfall exceeding 0.25 inches in twenty-four hours. For multi-day storms, EPA requires that an inspection must be performed during or after the first day of the event and after the end of the event. The CGP requires that inspections be performed by a qualified individual as outlined in the CGP. MassDOT requires proof of completion of a 4 hour minimum sedimentation and erosion control training class current to the latest CGP. This individual can be, but not limited to, someone that is either a certified inspector, certified professional, or certified storm water inspector. The documentation shall be included as an appendix in the SWPPP. The inspector's qualifications shall be submitted to the Engineer for approval prior to beginning any work. This individual shall be on-site during construction to perform these inspections. In addition, if the Engineer determines at any time that the inspector's performance is inadequate, the Contractor shall provide an alternate inspector. Written weekly inspection forms, storm event inspection forms, and Monthly Summary Reports must be completed and provided to the Engineer. Monthly Summary Reports must include a summary of construction activities undertaken during the reporting period, general site conditions, erosion control maintenance and corrective actions taken, the anticipated schedule of construction activities for the next reporting period, any SWPPP amendments, and representative photographs.

The Contractor is responsible for preparation of the Plan, all SWPPP certifications, inspections, reports and any and all corrective actions necessary to comply with the provisions of the CGP. The Standard Specifications require adequate erosion control for the duration of the Contract. All control measures must be properly selected, installed, and maintained in accordance with manufacturer specifications and good engineering practices. If periodic inspections or other information indicates a control has been used inappropriately or is no longer adequate, it is the responsibility of the Contractor to replace or modify the control for site conditions at no additional cost to the Department. Contractor must maintain all control measures and other protective measures in effective operating condition and shall consider replacement of erosion controls for each construction season.

This Item addresses acceptable completion of the SWPPP, any revisions/amendments required during construction, and preparation of monthly reports. In addition, any erosion controls beyond those specified in bid items which are selected by the Contractor to facilitate and/or address the Contractor's schedule, methods and prosecution of the work shall be considered incidental to this item.

The CGP provides specific requirements for temporary and final stabilization. This shall be incorporated into the project schedule. The permit defines specific deadline requirements for Initial Stabilization ("immediately", i.e., no later than the end of the next work day following the day when earth-disturbing activities have temporarily or permanently ceased) and for Complete Stabilization Activities (no later than 14 calendar days after the initiation of stabilization). Stabilization criteria for vegetative and non-vegetative measures are provided in the CGP.

ITEM 756. (Continued)

The CGP requires the submission of a Notice of Termination (NOT) from all operators when final stabilization has been achieved, as well as removal and proper disposal of all construction materials, waste and waste handling devices, removal of all equipment and construction vehicles, removal of all temporary stormwater controls, etc. Approval of final stabilization by the Engineer and confirmation of submission of the NOT will be required prior to submission of the Resident Engineer's Final Estimate. The permittee shall use EPA's website to prepare and submit the NOT.

COMPENSATION

Payment for all work under this Item shall be made at the contract unit price, lump sum, which shall include all work detailed above, including Plan preparation, required revisions, revisions/addenda during construction, monthly reports and filing fees.

Payment of fifty (50) % of the contract price shall be made upon acceptance of the NPDES Stormwater Pollution Prevention plan. Payment of forty (40) % of the contract price shall be made in equal installments over the expected duration of stormwater pollution prevention measures. Payment of the final ten (10) % of the contract price shall be paid upon satisfactory submissions of a Notice of termination (NOT) when final stabilization has been achieved.

ITEM 765.21 ANNUAL COVER CROP FOR NATIVE SEEDING POUND

Work under this item shall be in according with Subsection 765 of the Standard Specifications and the following.

DESCRIPTION

Work consists of furnishing and applying the appropriate annual grass to be seeded as a cover crop in conjunction with upland native seeding and at the rate specified herein.

A cover crop shall be used for following conditions:

- when specified under Application Rate for the permanent native upland seed mix
- for slopes 2:1 or steeper and an annual is not already specified as part of the permanent mix
- when seeding out of season and the native seed mix does not already specify an annual
- as required to prevent erosion until the permanent seed establishes.

A cover crop is not necessary for wetland seeding and is not typically necessary for soil stabilization when seeding in conjunction with a compost blanket application.

Annual rye (*Lolium multiflorum*) will not be accepted as an annual cover crop.

Using annual rye or exceeding the application rate such that a dense stand of annual grasses prevents germination of the native grasses will require mowing of annual grasses. In this instance, mowing of cover crop will be incidental to this item.

Seed and Application Rate

Add 30 pounds/acre of the following seed based on seeding season:

Avena sativa (Grain Oats):	1 January to 31 July
Cecale cereale (Grain Rye):	1 August to 31 December

METHOD OF MEASUREMENT

Annual Cover Crop for Native Seeding will be measured for payment per pound of seed, complete in place, upon approval of seed bag tags or other documentation of correct application rate and species, and upon acceptance of a satisfactory stand of annual grasses three weeks following seeding.

BASIS OF PAYMENT

Annual Cover Crop for Native Seeding will be paid for at the contract unit price per pound, which price shall include all labor, materials, equipment, and incedental costs required to complete the work.

Application and care of cover crop will be paid for separately under Item 765.635 Native Seeding and Establishment.

ITEM 765.451 **PART SHADE ROADSIDE MIX** **POUND**

Work under this item shall consist of furnishing the mix(es) specified below in the required quantity.

SUBMITTALS

1) Pre-Verification of Seed Availability. Within 30 days after the Notice to Proceed, the Contractor shall submit to the Engineer the supplier's verification of availability of seed species in the required quantities and for the anticipated date of seeding. Verification shall be on the supplier's letterhead and notarized by the supplier's notary. Species not expected to be available should be noted and substitutions recommended.

2) Final Verification of Seed Availability. No earlier than 21 days prior to ordering, the Contractor shall submit to the Engineer the supplier's verification of availability of seed species and in the required quantities. Verification shall be on the supplier's letterhead and notarized by the supplier's notary. A copy of this submittal shall be forwarded to the MassDOT Landscape Design Section. Substitutions or changes in the mix at this time must be approved by MassDOT Landscape Design Section.

3) Seed Worksheet provided herein shall be submitted to the Engineer prior to ordering seed to determine the number of pounds of Pure Live Seed required.

4) Seed Tags. The contractor shall submit original seed tags from each bag of seed used on the project or ensure that each tag is photo documented by the Engineer while on the unopened bag.

   Number of tags submitted must correspond to number of bags delivered.

   Species listed on the seed tag shall match the Final Verification of Seed Availability (Submittal #2) unless approved otherwise. Tag must include: variety and species name; lot number; purity; percentage of inert matter; percentage of weeds, noxious seeds, and other crop seeds; germination, dormant or hard seed; total viability; origin of seed; germination test date, net weight, and name and address of seller. The origin of seed must be listed on the seed tag for all species in the mix to provide verification of original (generation 0) seed source. The smallest known geographic area (township, county, ecotype region, etc.) shall be listed. Ecotypes and cultivars shall be as close to Massachusetts as possible and appropriate to the site conditions.

   A copy of this submittal shall be forwarded to the MassDOT Landscape Design Section.

5) Verification of Seed Delivery. Prior to payment, contractor shall submit the Seed Delivery Verification form contained within the contract or the Supplier's Verification on company letterhead or a bill of lading. Supplier verification must include all information requested on the Verification form within this contract. The bill of lading must include variety and species name, lot number, net weight shipped, date of sale, invoice, project or seeding location, and name and address of Supplier. All information must be filled in and complete for acceptance. Information must match the seed tags and quantity of seed used on the job. A copy of this submittal shall be forwarded to the MassDOT Landscape Design Section.

ITEM 765.451 (Continued)

6) Seed Sample. If requested or if seed is from a previously opened bag, the contractor may be asked to submit to the Engineer a sample of seed from the seed bag (1-2 cups) at the time of seeding.

SEEDING SEASON

The appropriate seeding seasons are:

Spring: April 1 - May 15
Fall: October 1 - December 1 for dormant seeding

PERMANENT SEED MIX(ES)

Calculating Pure Live Seed (PLS)

Quantities specified are PURE LIVE SEED. Greater quantities of ordered seed may be required to achieve actual specified seeding rates.

Pure Live Seed (PLS) is defined as a percentage calculated by multiplying the percent of pure seed by the percent of viable seed (total germination, hard seed, and dormant seed). For example:

If a seed label indicates 90% purity, 78% germination, 10% hard seed, and 2% dormancy, it is calculated to be 90% x [78 + 10 + 2]% = 81% PLS.

Therefore, each pound of PLS would need 1 pound / 0.81 = 1.2 pounds of seed with a 90% purity and 90% total germination

Seed Mix(es) shall be as specified below. Ecotypes and cultivars shall be as close to Massachusetts as possible and appropriate to the site conditions.

ITEM 765.451 (Continued)

765.451 Part Shade Roadside Mix

	Botanical Name	Common Name	% PLS by Weight
Grass	Festuca rubra	Creeping Red Fescue	25.70%
	Elymus virginicus	Virginia Wild Rye	24.00%
	Schizachyrium scoparium	Little Blue Stem	22.50%
	Panicum virgatum	Switch Grass	10.00%
	Panicum clandestinum 'Tioga'	Deer Tongue 'Tioga'	7.00%
	Carex vulpinoidea	Fox Sedge	2.00%
	Agrostis perennans	Upland Bentgrass	2.00%
	Juncus effusus	Soft Rush	0.20%
			93.40%
Herb/Forb	Chamaecrista fasciculata	Partridge Pea	3.00%
	Penstemon digitalis	Beard-tongue	1.00%
	Zizia aurea	Golden Alexanders	0.30%
	Desmodium canadense	Showy Tick Trefoil	0.30%
	Solidago bicolor	White Goldenrod	0.20%
	Solidago caesia	Woodland Goldenrod	0.20%
	Rudbeckia hirta-VT ecotype	Black-eyed Susan-VT ecotype	0.20%
	Aster novae-angliae	New England Aster	0.20%
	Solidago odora	Licorice Scented Goldenrod	0.20%
	Aster divaricatus	White Wood Aster	0.20%
	Heliopsis helianthoides	Ox-Eye Sunflower	0.20%
	Pycnanthemum tenuifolium	Slender Mountain Mint	0.20%
	Monarda fistulosa	Wild Bergamot	0.10%
	Eupatorium perfoliatum	Boneset	0.10%
	Aster lateriflorus	Calico Aster	0.10%
	Oenothera fruticosa var. fruticosa	Sundrops	0.10%
			6.60%
			100.00%

Application Rate

765.451**:** 15 lbs/acre PLS. No cover crop shall be applied.

Any species substitutions shall be with a species having similar characteristics and function. Substitutions must be approved by MassDOT Landscape Design Section per the documentation submittal process.

50% Increase Adjustment for Field Conditions

Seeding under the following conditions requires a 50% increase in the permanent mix at the time of construction:

- Seeding out of season
  OR
- Seeding after Compost Blanket has been applied (unless already increased for out of season).

ITEM 765.451 (Continued)

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Part Shade Roadside Mix will be measured for payment by the pound of Pure Live Seed delivered and complete in place.

Part Shade Roadside Mix will be paid at the contract unit price per pound of Pure Live Seed delivered upon approval of all Seed Submittal Documentation. Overseeding required to correct poor germination or establishment shall be incidental to the item.

Application and care of native seed mix will be paid for separately under Item 735.635 Native Seeding and Establishment.

NATIVE SEED WORKSHEET

Project Description: _____ Project No: _____

Contractor: _____ Contract No: _____

Seed Mix Number & Description: _____

Contractor: Complete Prior To Ordering

Pounds of Seed Required Per Contract:

_____lbs./acre for _____Acre(s) OR _____ SY

Additional 50% increase if required (out of season or seeding over compost blanket):

_____**lbs. Total Seed Required**

Calculated Quantity for **P**ure **L**ive **S**eed (PLS[1]):

_____ **Total Pounds PLS**

Engineer: Verification at Time of Application

Number pounds delivered to site[2]: _____ Date(s): _____

Actual Seed Bag Tag/s Received or photo documented by Engineer: _____

[1] *PLS=% pure seed x % viable seed (total germination, hard seed, and dormant seed).*
[2] *Quantity delivered should match pounds* ***Total Pounds PLS*** *and* ***Verification of Seed Delivery****. Pounds should be shown on each Seed Tag.*

ITEM 765.635 NATIVE SEEDING AND ESTABLISHMENT SQUARE YARD

Work shall conform to the relevant provisions of Subsections 765 and 767 of the Standard Specifications and the following:

The work under this item shall consist of seeding, mowing, and other care to establish a stand of grass in the areas shown on the plans or as required by the Engineer. For the purposes of these specifications, the term "grass" shall apply to all the forbs, grasses, sedges, and rushes included in the materials.

QUALIFICATIONS

Seeding shall be done by a company having a minimum of five years of experience with native seed establishment. Prior to beginning work, the seeding Contractor shall furnish proof of qualifications to the Engineer for approval. Proof of qualifications shall include providing documentation (photos and contacts) to demonstrate knowledge and expertise with native seeding and establishment and proof of having completed successful native seeding projects.

SEEDING SEASON

Seeding seasons for native mixes is April 1 - May 15 and October 1 - December 1 for dormant seeding. Written approval must be obtained for seeding outside the seeding season and, if approved, the permanent seed rate shall be increased by 50%.

Seeding season for cover crops shall be grain oats January 1 – July 31 and grain rye August 1 – December 1.

MATERIAL AND SUBMITTALS

Seed Mixes and Submittals shall be per the item(s) for permanent and annual (cover crop) seed mixes.

Compost Blanket, if used, shall meet the material and submittal requirements for that item.

Hydromulch shall be wood fiber or straw applied per the Standard Specifications and at the rates specified below and per the manufacturer.

A certified statement shall be furnished, prior to start of work, to the Engineer by the Contractor as to the number of pounds of hydromulch, tackifier, and seed, per 100 gallons of water and as applicable to products used. This statement should also specify the number of square yards of seeding that can be covered with the solution specified above.

Fertilizer

No fertilizers shall be applied.

ITEM 765.635 (Continued)

Water

Water, including hose and all other watering equipment required for the work, shall be furnished by the Contractor to the site at no additional cost. Water shall be suitable for irrigation and free from ingredients harmful to plant life. All plants injured or work damaged due to the lack of water or the use of too much water shall be the Contractor's responsibility to correct.

SEEDING

Hand broadcast method shall be used for all areas smaller than half an acre and when specified on the plans for areas over half an acre.

Seeding shall occur within 72 hours of placement of loam and final grading or the Contractor shall propose a reasonable, alternative schedule that shall be approved by the Engineer.

Surface Preparation

No seeding or soil preparation shall be done if soils are muddy or dry and compacted. Bare soils shall be raked to remove large stiff clods, lumps, brush, roots, stumps, litter and other foreign matter. Ruts and depressions shall be filled with additional loam or compost and the soil shall be re-graded to a relatively smooth finish corresponding to the required grades.

When seeding over existing or compacted soil or soil that has sat bare for more than 30 days, surface will be prepared by tilling or raking to a minimum depth of 2 inches prior to seeding and prior to Compost Blanket application (when applied).

Surface preparation shall be compensated for under for loam placement or topsoil rehandled and spread as appropriate to the project.

Jute or coir mesh, when specified in the contract, shall be placed after seeding and per the Standard Specifications and the manufacturer’s instruction.

Surface preparation shall be approved by the Engineer prior to seeding.

Seeding over Various Substrates

Loam: Seeding shall occur within 72 hours of loam placement to prevent loss of topsoil. Seed shall be manually broadcast for areas less than half an acre (each area, not cumulative area) and when specified on the plans. Broadcasting shall be immediately followed by hydromulching as specified below. When not specified on the plans, larger areas may be hydroseeded as specified below.

Compost Blanket: Compost Blanket shall be applied as specified under that item. Seed should be hand broadcast at the same time as compost application to ensure a thin cover of compost over seed.

When seeding is done after application of Compost Blanket the rate shall be increased by 50%. If the Compost Blanket is applied after December 1, seed shall be broadcast or hydroseeding over the compost in the Spring and the rate increased by 50% specified under Seed Application.

ITEM 765.635 (Continued)

Compost Mulch over Modified Rock: Compost Mulch and seed shall be applied as specified under that item. No hydromulch is required.

Cover Crop

Cover crop shall be used when seeding out of season, when specified with the permanent native seed mix under that item, and as required to prevent erosion until the permanent seed establishes.

A cover crop should not be used with a steep slope mix or other permanent mix which already contains either cereal rye or oats in the composition of the mix. A cover crop is not necessary for wetland seeding and is not typically necessary for soil stabilization when seeding in conjunction with a compost blanket application.

Seed Application

All seed shall be mulched as specified herein.

Seed application shall be by broadcast seeding or by hydroseeding as described below.

Broadcast Seeding

Seed shall be broadcast spread using a cyclone or whirlwind seeder or hand broadcast. Small or light-seeded species such as bluestem may be mixed with approved filler to achieve an even distribution. Seed shall not be broadcast when wind velocities are greater than 15 mph.

Broadcast seeding shall be undertaken in two separate passes at ninety degrees to each other. One-half the seeding rate shall be applied in each direction (horizontally and vertically). To ensure seed to soil contact with broadcasting of seed, seeding shall be followed by rolling or tracking with equipment approved by the Engineer.

Broadcast seed shall be mulched with weed-free straw mulch unless seeding is done as part of Compost Blanket in which case it shall be as specified above under seeding with Compost Blanket application. Hydromulching shall be as specified under Hydromulching.

Hydroseeding and Hydromulching

Hydroseed and mulching shall be per the manufacturer's directions and as follows.

Hydroseeding shall only be used for sites over half an acre in size or with permission of the Engineer.

Tank and hoses shall be cleaned from all previous hydroseeding and hydromulching projects. Seed shall be mixed into the slurry immediately before application and slurry applied within 30 minutes after seeds have been placed in the tank. Once seed has been placed in the tank, tank shall be agitated only enough to mix the seeds and keep slurry from separating.

A 2-step process shall be used for seeding in conjunction with hydromulch. Seed shall be applied with 500 lbs/acre of hydromulch in the first pass. A second pass with 1,000 lbs/ acre of hydromulch shall be applied in a second pass. Each pass shall be applied in a different direction.

ITEM 765.635 (Continued)

Once the seed has been added to the tank mixture a one-hour time limit is set for spreading the mixture on the soil. Once the one hour has passed the excess mixture must be discarded.

For broadcast seeding, hydromulch shall be applied immediately following seeding at a rate of 1,000 lbs/acre. Tank shall be cleaned from any previous hydroseeding.

CARE DURING GERMINATION AND ESTABLISHMENT

Contractor shall care for seeded areas as necessary for successful germination. Care will include watering and weed control as necessary to achieve establishment of the specified seeded species after one growing season as specified below.

The contractor shall maintain the stand of grasses to ensure healthy growth of the seeded species. Work shall include mowing or weed-whacking for weed control, watering if necessary, and removal of invasive plants.

Watering shall be sufficient to achieve soil moisture to a depth of 2 inches or more and such moisture is uniform. Method of watering shall not erode or damage soil or grassed surfaces.

General Weed Control: Weeds shall be mowed prior to weeds setting seed (by the end of July unless otherwise approved).

Control of Invasive and Aggressive Weeds: Invasive and aggressive weeds, including but not limited to mugwort, ragweed, knapweed, foxtail, crabgrass, and chicory must be cut or treated prior to going to seed. Herbicide treatment must be coordinated with MassDOT. Undesired species (such as chicory) introduced due to use of incorrect seed mix shall be removed at the Contractor's expense.

MOWING FOR WEED CONTROL

Mowing for weed control shall be completed after weeds have sprouted and show leaf and bud growth, but prior to setting seed, generally between July 7th and August 1st, unless required otherwise by the MassDOT Landscape Architect and the Engineer.

Mowing height shall be as needed for weed control, generally to a height of 8 inches and not below 4 inches, unless required otherwise. Mowing shall be with a brush hog mower or string trimmer other approved equipment. Conventional lawn mowers which cannot achieve the appropriate cut shall not be used.

Contractor shall give 48-hour notice prior to mowing work. Mowing shall only occur in dry sunny weather. Litter pickup should occur prior to mowing in all areas. If required, cut grass shall be raked and removed. Litter pickup and raking and removal of grass shall be incidental to the work.

Mowing equipment shall be approved by the Engineer prior to work.

ITEM 765.635 (Continued)

OVER-SEEDING

Areas of bare ground greater than 2-3 feet in diameter shall be over-seeded with the specified mix during the appropriate season for seeding. Where required for overseeding mowing shall be as close to the soil as possible. Soil that is compacted shall be raked or otherwise roughened prior to over-seeding.

Over-seeding rates and methods shall those specified above under Materials and Methods. Following over-seeding, soil shall be lightly tamped to ensure seed to soil contact and areas shall be mulched with straw mulch and watered with a fine mist to moisten soil to a depth of at least 2 inches.

Over-seeding, mulch, watering, and all work for over-seeding shall be incidental.

DETERMINING SATISFACTORY GRASS ESTABLISHMENT

A well-established stand of the specified seeded species as determined by the Engineer and the MassDOT Landscape Architect will be required for Final Acceptance. The expectation is that an acceptable number and variety of the desired permanent seeded species (not the cover crop) will be visible. Generally:

- A minimum of 75% coverage by the specified permanent seeded species after one growing season. Of that percentage, generally, depending on the mix species:
    - At least 3 types of the permanent seeded grass species shall be visible.
    - At least 3 species of wildflowers shall be visible.
- There will be no significant gaps or bare soil (generally 2-3 feet in diameter or greater).
- There will be no more than 25% coverage by weed species.
- All soil shall be stabilized and there shall be no channeling or erosion.
- There will be no invasive or aggressive species within the stand at the time of acceptance.
- There shall be no evidence of seed from non-native mixes (i.e., clover) due to failure to clean the hydroseeding tank or using incorrect mix.

Invasive and aggressive weeds (such as mugwort, ragweed, knapweed, and chicory) must be cut or treated prior to going to seed for Interim Acceptance. Herbicide treatment must be coordinated with MassDOT.

A warm-season grass mix with perennials will not have uniform growth. A uniform stand of grass may indicate use of an incorrect mix.

ACCEPTANCE OF SEEDING AND ESTABLISHMENT WORK

Conditional Acceptance shall be based on proper application of seed as specified herein.

Interim Acceptance of Care. Seeding will be inspected by mid-July to assess germination and Establishment conditions as described above. When necessary for Interim Acceptance, areas shall be mowed prior to weed species producing seed and as specified above under Weed Control. Areas requiring weed control that are not mowed prior to weed seed dispersal will not be approved for Interim Acceptance. Seeding that shows good germination and is determined by the Engineer and

ITEM 765.635 (Continued)

Landscape Architect to not require weed control at time of inspection shall be accepted for Interim Acceptance payment.

Final Acceptance of Establishment shall be given upon satisfactory Establishment as described above.

If the seeded area fails to meet the requirements of Establishment by the end of the growing season, contractor shall propose and implement remediations and site shall be inspected during the following growing season after July 1st. All remediation shall be at the contractor's expense.

METHOD OF MEASUREMENT

Native Seeding and Establishment will be measured for payment by the square yard, complete in place.

BASIS OF PAYMENT

Native Seeding and Establishment will be paid for at the Contract unit price per square yard, which price shall include all submittals, seeding, rolling to ensure seed-to-soil contact, weed control and mowing, water, over-seeding, labor, materials, equipment, and all incidental costs required to complete the work of establishing a satisfactory stand of grass.

Native seed and cover crop mixes shall be compensated under the respective items.

Site preparation, including raking, tilling, removal of debris and stones, and other work to the prepare site for seeding shall be compensated under loam placement or topsoil rehandled and spread as relevant to the project.

Mowing for weed control will be incidental to this item.

Schedule of payment shall be as follows:

30% upon Conditional Acceptance

20% upon Interim Acceptance of Care, except this amount will be reduced to zero and final payment will be reduced accordingly when areas requiring weed control are not mowed as specified in the Interim Acceptance criteria.

50% upon Final Acceptance of Establishment

ITEM 767.121 SEDIMENT CONTROL BARRIER FOOT

The work under this item shall conform to the relevant provisions of Subsections 670, 751 and 767 of the Standard Specifications and shall include the furnishing and placement of a sediment control barrier. Sediment control barrier shall be installed prior to disturbing upslope soil.

The purpose of the sediment control barrier is to slow runoff velocity and filter suspended sediments from storm water flow. Sediment barrier may be used to contain stockpile sediments, to break slope length, and to slow or prevent upgradient water or water off road surfaces from flowing into a work zone. Contractor shall be responsible for ensuring that barriers fulfill the intent of adequately controlling siltation and runoff.

Twelve-inch diameter (after installation) compost filter tubes with biodegradable natural fabric (i.e., cotton, jute, burlap) are intended to be the primary sedimentation control barrier.

For small areas of disturbance with minimal slope and slope length, the Engineer may approve the following sediment control methods:

- 9-inch compost filter tubes
- Straw bales which shall be trenched

No straw wattles may be used. Additional compost filter tubes (adding depth or height) shall be used at specific locations of concentrated flow such as at gully points, steep slopes, or identified failure points in the sediment capture line.

When required by permits, additional sediment barrier shall be stored on-site for emergency use and replacement for the duration of the contract.

Where shown on the plans or when required by permits, silt fence shall be used in addition to compost filter tubes and straw bales and shall be incidental to the item.

Sediment control barriers shall be installed in the approximate location as shown on the plans and as required so that no excavated or disturbed soil can enter mitigation areas or adjacent wetlands or waterways. Barriers shall be in place prior to excavation work. No work shall take place outside the barriers.

MATERIALS AND CONSTRUCTION

Prior to initial placement of barriers, the Contractor and the Engineer shall review locations specified on the plans and adjust placement to ensure that the placement will provide maximum effectiveness.

Barriers shall be staked, trenched, and/or wedged as specified herein and according to the Manufacturer’s instructions. Barriers shall be securely in contact with existing soil such that there is no flow beneath the barrier.

ITEM 767.121 (Continued)

Compost Filter Tube

Compost material inside the filter tube shall meet M1.06.0, except for the following: no peat, manure or bio-solids shall be used; no kiln-dried wood or construction debris shall be allowed; material shall pass through a 2-inch sieve; and the C:N ratio shall be disregarded.

Outer tube fabric shall be made of 100% biodegradable materials (i.e., cotton, hemp or jute) and shall have a knitted mesh with openings that allow for sufficient water flow and effective sediment capture.

Tubes shall be tamped, but not trenched, to ensure good contact with soil. When reinforcement is necessary, tubes shall be stacked as shown on the detail plans.

Straw Bales

Straw bales shall be used if shown on the plans or when specified by Orders of Condition or other permit requirements.

Bales should be placed in a single row, lengthwise on the contour, with ends of adjacent bales tightly abutting one another. All bales should be either wire-bound or string-tied. Straw bales should be installed so that bindings are oriented around the sides (rather than along the tops and bottoms) of the bales in order to prevent deterioration of the bindings.

The barrier should be entrenched and backfilled. A trench should be excavated the width of a bale and the length of the proposed barrier to a minimum depth of 4 inches. The trench must be deep enough to remove all grass and other material which might allow underflow. After the bales are staked and chinked (filled by wedging), the excavated soil should be backfilled against the barrier. Backfill soil should conform to the ground level on the downhill side and should be built up to 4 inches against the uphill side of the barrier.

Each bale should be securely anchored by at least 2 stakes or re-bars driven through the bale. The first stake in each bale should be driven toward the previously laid bale to force the bales together. Stakes or re-bars should be driven deep enough into the ground to securely anchor the bales. For safety reasons, stakes should not extend above the bales but should be driven in flush with the top of the bale.

The gaps between the bales should be chinked (filled by wedging) with straw to prevent water from escaping between the bales. Loose straw scattered over the area immediately uphill from a straw bale barrier tends to increase barrier efficiency. Wedging must be done carefully in order not to separate the bales.

When used in a swale, the barrier should be extended to such a length that the bottoms of the end bales are higher in elevation than the top of the lowest middle bale to assure that sediment-laden runoff will flow either through or over the barrier but not around it.

ITEM 767.121 (Continued)

Sedimentation Fence

Materials and Installation shall be per Section 670.40 and 670.60 of the Standard Specifications and the following:

Sedimentation fence shall only be used if shown on the plans or when specified by Orders of Condition or other permit requirements.

When used with compost filter tubes, the tube shall be placed on a minimum of 8 inches of folded fabric on the upslope side of the fence. Fabric does not need to be trenched.

When used with straw bales, an 8-inch deep and 4-inch wide trench or V-trench shall be dug on the upslope side of the fence line. One foot of fabric shall be placed in the bottom of the trench followed by backfilling with compacted earth or gravel. Stakes shall be on the down slope side of the trench and shall be spaced such that the fence remains vertical and effective.

Width of fabric shall be sufficient to provide a 36-inch high barrier after fabric is folded or trenched. Sagging fabric will require additional staking or other anchoring.

MAINTENANCE

Maintenance of the sediment control barrier shall be per Section 670.60 of the Standard Specifications or per the Stormwater Pollution Prevention Plan (SWPPP), whichever is more restrictive.

The contractor shall inspect the sediment barrier in accordance with relevant permits. At a minimum, barriers shall be inspected at least once every 7 calendar days and after a rain event resulting in 0.25 inches or more of rainfall. Contractor shall be responsible for ensuring that an effective barrier is in place and working effectively for all phases of the Contract.

Barriers that decompose such that they no longer provide the function required shall be repaired or replaced as required. If the resulting berm of compost within the fabric tube is sufficiently intact (despite fabric decay) and continues to provide effective water and sediment control, barrier does not necessarily require replacement.

DISMANTLING & REMOVING

Barriers shall be dismantled and/or removed, as required, when construction work is complete and upslope areas have been permanently stabilized and after receiving permission to do so from the Engineer.

Regardless of site context, nonbiodegradable material and components of the sediment barriers, including photo-biodegradable fabric, plastic netting, nylon twine, and silt fence, shall be removed and disposed off-site by the Contractor.

ITEM 767.121 (Continued)

For naturalized areas, biodegradable, natural fabric and material may be left in place to decompose on-site. In urban, residential, or other locations where aesthetics is a concern, the following shall apply:

- Compost filter tube fabric shall be cut and removed, and compost shall be raked to blend evenly (as would be done with a soil amendment or mulch). No more than a 2-inch depth shall be left on soil substrate.
- Straw bales shall be removed and disposed off-site by the Contractor. Areas of trenching shall be raked smooth and disturbed soils stabilized with a seed mix matching adjacent seeding or existing grasses (i.e., lawn or native grass mix).
- Silt fence, stakes, and other debris shall be removed and disposed off-site. Site shall be restored to a neat and clean condition.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 767.121 will be measured and paid for at the contract unit price per foot of sediment control barrier which price shall include all labor, equipment, materials, maintenance, dismantling, removal, restoration of soil, and all incidental costs required to complete the work.

Additional barrier, such as double or triple stacking of compost filter tubes, will be paid for per foot of tube installed.

Barriers that have been driven over or otherwise damage by construction activities shall be repaired or replaced as required by the Engineer at the Contractor's expense.

ITEM 983.521 STREAMBED RESTORATION LUMP SUM

DESCRIPTION

This work shall consist of restoring river bed material underneath and behind the sandbags for Control of Water for the proposed bridge replacement within the limits of work. In addition, this item covers filling riprap voids with streambed material. The streambed restoration shall replicate/maintain the existing natural channel bed outside the work area in terms of material, roughness, shape, profile, and appearance. The ultimate product will, to the extent possible, replicate the function and appearance of the natural stream channel.

The streambed restoration includes the reuse of material which is to be removed at the east river bank upstream of the bridge to the extents shown on the plans. All removed material shall be stockpiled for reuse. The material stockpiled for reuse shall be used to restore the areas of the streambed which are impacted by the use of sandbag cofferdams to the limits shown on the plans and to fill riprap voids below the 100-Year Flood Elevation (323.6).

The Contractor shall coordinate with his/her sub-contractors to ensure all required equipment is available on-site to complete the work in this manner. The streambed restoration is required to comply with environmental permits issued for the project. MassDOT Environmental Services will provide a Fluvial Geomorphologist (Geomorphologist) to provide on-site oversight and assistance during streambed restoration construction to ensure the restoration is constructed as shown on the Plans, as required by these Special Provisions and in accordance with permit requirements.

At least 30 days prior to the commencement of construction, the Contractor shall coordinate with David Paulson (MassDOT Wetlands & Wildlife Unit Supervisor, (857) 262-3378 / david.j.paulson@state.ma.us) to set up an initial (virtual or in person) meeting with MassDOT's Geomorphologist, Contractor, and Resident Engineer. At this meeting, the Geomorphologist will provide an overview of the restoration work. The Contractor should be prepared to discuss the anticipated means, methods, and schedule.

Process Approval:

In lieu of a mockup, the Contractor shall schedule an additional onsite meeting to discuss the streambed restoration with the Geomorphologist and respective parties from MassDOT. The Geomorphologist shall be onsite during sandbag cofferdam removal. The Contractor shall provide the Geomorphologist adequate access to observe, direct, and inspect the channel and restoration work throughout the duration of the removal, stockpile, and reinstallation of the existing streambed material, if needed.

MATERIAL

Streambed material will likely be sourced from the excavated streambed material on the east upstream bank. The larger stones and cobbles in this area to be removed are likely not suitable for use in the streambed restoration. The material shall be removed, stockpiled and reused to fill the voids in the proposed riprap placed in front of the abutments and below elevation 323.6.

In the event that there is not enough available suitable material, additional streambed restoration material shall be locally sourced that matches the composition of the existing native river bed along the reach of Fall River where the project is located. The dominant particle size under the bridge is cobble and boulder in the main flow area. Note that the upstream further away from the structure is dominated by gravel while the downstream channel has areas of bedrock.

Stream Bed Material Gradation

Particle	% Composition
Boulder	15
Cobble	60
Gravel	15
Sand	10

The streambed material shall be approved by the Resident Engineer and Geomorphologist prior to use.

Related Items

Modified Rockfill. Shall conform to the requirements of Item 986. Modified Rockfill and shall be paid for under that item.

Riprap Stone. Shall conform to the requirements of Item 983. Dumped Riprap and shall be paid for under that item.

Loam and Seed. Shall conform to the requirements of Item 751. Loam for Roadside and 765. Seeding and shall be paid for under those items.

CONSTRUCTION

Channel Banks Above 100-Year Flood Elevation

Loam and seed shall be reinstalled over riprap (Item 983.1), as depicted on the plans, to an average thickness of 4 inches above the riprap, with variations in thickness as necessary to meet grading requirements.

The initial placement of modified rockfill shall fill / choke the larger voids in the proposed riprap, then the placement of loam and seed shall fill / choke the smaller voids. Fill voids by shaking stone with the teeth of an excavator bucket, hand tamping with metal tamping rods, and by spraying water to settle fines between large stones. Plate compactors shall not be used.

Channel Banks Below 100-Year Flood Elevation and above bank flags

The streambed material shall be reinstalled over riprap (Item 983.1), as depicted on the plans, to an average thickness of 4 inches above the riprap, with variations in thickness as necessary to replicate existing channel conditions.

The initial placement of modified rockfill shall fill / choke the larger voids in the proposed riprap, then the placement of streambed material shall fill / choke the smaller voids. Fill voids

by shaking stone with the teeth of an excavator bucket, hand tamping with metal tamping rods, and by spraying water to settle fines between large stones. Plate compactors shall not be used. The purpose of filling the voids is to prevent subsurface flow where surface water disappears into large voids between the stone fill below the channel bed surface during low flow conditions. The final riprap shape and appearance shall be finalized in the field as directed by the Geomorphologist.

Reinstallation of the stockpiled streambed material shall be placed on top of the riprap to restore streambed habitat and fish passage. The streambed materials shall be installed during normal low water conditions behind cofferdams in accordance with the environmental permits.

Channel Below Bank Flags

The Contractor shall remove the sandbag cofferdams in such a way as to slowly wet the stream to minimize the initial sediment pulse. Every attempt shall be made to minimize the downstream movement of sediment. Sandbags cofferdams shall be removed once riprap voids have been filled.

The final streambed shall maintain the general configuration of the existing streambed and there shall be minimal to no subsurface flow upon final inspection by the Resident Engineer and Geomorphologist.

Completion

Once all material has been placed in the stream channel and approved by the Geomorphologist and Resident Engineer, the Contractor shall remove the cofferdams in such a way as to slowly wet the stream to minimize the initial sediment pulse. Every attempt shall be made to minimize the downstream movement of sediment.

The final streambed shall maintain the general configuration of the existing streambed bedform and there shall be minimal to no subsurface flow upon final inspection by the Resident Engineer and Geomorphologist. The project must be passable by fish and other aquatic organims following construction.

The streambed restoration to be measured for payment will be the complete and accepted work for restoration of the streambed within the limits shown on the Plans as approved by the Resident Engineer and Geomorphologist.

BASIS OF PAYMENT

The accepted streambed restoration will be paid for on a lump sum basis. Payment will be full compensation for excavating, stockpiling, transporting, and placing the material specified and for furnishing all labor, tools, equipment, testing, and incidentals necessary to complete the work.

The Geomorphologist will be provided by MassDOT at no cost to the Contractor.

ITEM 991.1 **CONTROL OF WATER – STRUCTURE NO. B-10-001 (CLA)** **LUMP SUM**

The work under this item shall conform to the relevant provisions of Subsections 140 and 950 of the Standard Specifications and the following:

The work shall consist of installing and maintaining a water control structure in areas where riprap construction is performed as specified herein and shown on the Contract Drawings.

The Contractor shall design, furnish, install, maintain and cut and/or remove the water control structure as required based upon the actual site conditions. The water control structure shall be installed prior to, and maintained during, but not limited to, pier demolition, excavation, backfilling, installation of dumped riprap and slope areas as needed.

The water control structure shall consist of sandbagging, sheeting, soldier piling and lagging, coated fabric steel frame cofferdams, or any other system that satisfies the design criteria contained herein and as shown on the plans. The water control structure must be capable of supporting all applied loads. The water control structure must be configured such that it will serve its intended purpose during all stages of construction without the need for reinstallation or major modifications.

As part of the work under this item, it is the responsibility of the Contractor to determine the need and extent of dewatering required. Dewatering, if needed, for the installation of riprap shall be considered incidental to this Item.

SUBMITTALS

The Contractor shall submit to the Engineer for review and approval, a detailed plan for water control, including the construction of the water control structure, and riprap placement sequence plan with a timetable and details specific to the sequence of construction. The submittals shall include working drawings and calculations detailing the methods and materials proposed to account for all anticipated loads and construction conditions necessary to permit the work while maintaining a safe work area and protecting property from damage.

The Water Control Plan shall include a Sedimentation and Erosion Control Plan and a Water Flow Diversion and Containment Plan. The plans shall be adequate in detail to define specifics regarding materials, sizes, connections and incidental items associated with the work. The furnishing of such plans shall not serve to relieve the Contractor's responsibility for the safety of the work or his/her responsibility for the successful completion of the project. The proposed plans submitted shall be designed and stamped by a Professional Engineer registered in the Commonwealth of Massachusetts.

The Contractor shall make his or her own evaluation of existing conditions and water flow, and of the effects of his proposed temporary works and construction methods, and shall provide in his or her design for all loads and construction conditions necessary to permit excavation and construction of the riprap while maintaining public safety and protecting complete work and all third party property from damage resulting from construction operations.

ITEM 991.1 (Continued)

Sedimentation and Erosion Control Plan

The Contractor shall submit to the Engineer, plans and details of the intended sedimentation treatment basin system that will be used along with dewatering techniques, and its location at the bridge site. All discharge resulting from dewatering activities shall be directed to temporary sedimentation treatment basins at locations approved by the Engineer. At no time shall said discharge be directly released into the river. The proposed plan shall include methods and equipment necessary to discharge water from the sedimentation treatment basins. Sedimentation treatment basins shall be sized appropriately to adequately dewater from the proposed work zone while allowing sufficient time for sediments to settle out of the water, and with a depth such that a minimum of 18 inches of freeboard is maintained throughout its use.

Water Flow Diversion and Containment Plan

The Contractor shall submit plans and details along with a complete description showing any proposed systems for control of water and dewatering plan to the Engineer for his approval prior to the start of the work. The proposed plan shall include methods and equipment necessary to perform the work and shall include water discharge methods and equipment to bring water from the work zone to sedimentation treatment basin.

CONSTRUCTION METHODS

This work shall also include dewatering the excavation footprint of the riprap, as needed to conduct the work. The dewatering discharge shall be directed to a temporary sedimentation treatment basin. Where sandbags are used, the bags shall not decay nor rip or tear during the installation, its service life within the waterway, or during the removal process. The Contractor shall not disturb the stream bed in order to avoid migration of silts and sands further downstream.

Measures to control the discharge of sediment or pollutants into the water resource areas shall include, but not be limited to the following:

1. Site construction areas outside the buffer zones and on relatively flat ground.
2. Schedule the work within the resource areas to avoid periods of anticipated high water (i.e. spring floods) and inclement weather.
3. Management of construction operations involving hazardous materials, such as refueling and maintenance of equipment within the resource areas.
4. Installation and continuous maintenance of water control measures throughout the project.
5. Treatment of all discharge resulting from dewatering activities through a sedimentation/detention basin to control turbidity. At no time shall the discharge from dewatering activities be directly released into a resource area.

The locations of any sedimentation/retention basins will be determined by the Contractor based on the selected methods of construction. Placement of the basins shall be in an upland area that is within the existing right of way.

ITEM 991.1 (Continued)

All dewatering and related water control work shall be conducted in such a manner as to prevent siltation or contamination of the waterway. At a minimum, the settling basin shall be constructed of an earthen berm lined with geotextile fabric and surrounded by staked hay bales. The basin shall meet or exceed the following criteria:

1. The size and location of the basin shall be determined based on the size of the Contractor's pump and the anticipated groundwater levels and the need to perform abutment footing placement in the dry.
2. The outlet/weir of the dewatering basin shall not cause erosion of the surrounding area. An approved method of controlling erosion, such as an erosion control blanket, stone, etc., shall be used at the outlet of the basin.
3. The Contractor shall not allow any sediment within the settling basin to accumulate to a depth of greater than 12 inches at any point in the basin, nor shall the water level be allowed to rise to a height of more than 24 inches.
4. The sedimentation treatment basin shall be designed with a minimum of 18 inches of freeboard, which must be maintained at all times.
5. The Contractor shall inspect the settling basin(s) at least twice daily when in operation.
6. Damages shall be repaired immediately.
7. The settling basin outlet shall be cleaned daily.
8. The sediments within the settling basin shall be disposed of as approved by the Engineer.

BASIS OF PAYMENT

Item 991.1 will be paid for at the Contract lump sum price, which price shall include, but not be limited to, the design of the water control structure, as well as all equipment, materials and labor needed for the installation, maintenance, removal, disposal of the materials used for water control, disposal of any siltation materials caused by the pumping operation, and restoration of the streambed and all incidental costs required to complete the work under this item.

At locations where the water control structure also acts as a temporary support for excavation, as determined by the Engineer, those portions of the water control structure will be paid for under Item 953.3.

Partial payments will be made at the following percentages:	
Approval of design of the control of water structure	10%
Accepted installation of the control of water structure	60%
Satisfactory removal of the control of water structure	30%

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DOCUMENT A00831

U.S. ARMY CORPS OF ENGINEERS

General Permit Verification

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Regulatory Division
Transportation & Utility Section
File No. NAE-2005-01156

Courtney Walker
MassDOT – Highway Division
Ten Park Plaza RM 7360
Boston, Massachusetts 02116-3973
Via Email: Courtney.I.Walker@dot.state.ma.us

Dear Ms. Walker:

This letter is in response to the application you submitted to the U.S. Army Corps of Engineers (USACE), New England District on July 11, 2025, for a Department of the Army general permit verification. We have assigned this project file number NAE-2005-01156, which you should reference in all correspondence with this office. This letter follows a provisional notification letter from this office, dated September 5, 2025.

A review of the information provided indicates the proposed work includes the permanent discharge of fill material within 331 square feet below the Ordinary High Water (OHW) mark of the Fall River associated with the replacement of the bridge conveying Church Street (Route 10) over the Fall River, at Latitude 42.670510º and Longitude -72.545950º, in Bernardston, Franklin County, Massachusetts. The existing 3-span bridge will be replaced with a new single-span bridge. Rip-rap overtopped with natural streambed material will be placed along the eastern side of the river, north of the bridge span, and extending below the OHW mark of the river, to prevent the river from migrating any closer to the highway ramps in this location. The project also includes temporary impacts within 3,110 square feet below OHW due to installation and dewatering of sandbag cofferdams. The work is shown on the enclosed plans titled "BRIDGE REPLACEMENT PROJECT PLAN AND PROFILE OF ST 10 (CHURCH STREET) OVER FALL RIVER BRIDGE NO. B-10-001 (CLA) IN THE TOWN OF BERNARDSTON FRANKLIN COUNTY," on 16 sheets dated 10/30/2025.

Based on the information you have provided, we verify that the activity is authorized under General Permit 23 of the June 2, 2023, federal permit known as the Massachusetts General Permits (GPs). If the extent of the project area and/or nature of the authorized impacts to waters are modified, a revised application must be submitted to this office for written approval before work is initiated. You can find a copy of these permits at: https://www.nae.usace.army.mil/Missions/Regulatory/State-General-Permits/.

Any deviation from the terms and conditions of the permit, or your submitted plans, may subject the permittee to the enforcement provisions of our regulations. Therefore, in the event changes to this project are contemplated, it is recommended you coordinate with this office prior to proceeding with the work. This office must approve any changes before you undertake them. You must perform this work in compliance with the terms and conditions of the GPs listed above, and also in compliance with the following special conditions:

Project Specific Special Conditions:

1. The permittee shall complete and return the enclosed Work-Start Notification Form to this office at least two weeks prior to the anticipated construction start date.

2. The permittee shall complete and return the enclosed Completion Certification Form to this office at least one month following the completion of the authorized work.

3. All construction shall be completed in accordance with the limits of construction and construction sequences detailed on the enclosed plan drawings, titled "BRIDGE REPLACEMENT PROJECT PLAN AND PROFILE OF ST 10 (CHURCH STREET) OVER FALL RIVER BRIDGE NO. B-10-001 (CLA) IN THE TOWN OF BERNARDSTON FRANKLIN COUNTY," on 16 sheets, and dated 10/30/2025. If you change the plans or construction methods for work within or adjacent to the Fall River, please contact us immediately to discuss modification of this authorization. USACE must approve any changes before you undertake them.

4. A conditioned Water Quality Certification (WQC) has been issued by the Massachusetts Department of Environmental Protection for your project and is attached. You must comply with the conditions specified in the WQC.

This verification is valid until June 1, 2028. You must commence or be under contract to commence the work authorized herein by June 1, 2028 and complete the work by June 1, 2029. If not, you must contact this office to determine the need for further authorization before beginning or continuing the activity. It is recommended that you contact this office before this authorization expires to discuss if permit reissuance is a possibility.

This GP verification and any associated authorizations does not preclude the necessity to obtain any other federal, state, or local permits, licenses, and/or certifications, which may be required.

If you have any questions related to this verification or have issues accessing documents referenced in this letter, please contact Dan Vasconcelos, Project Manager, at 978-318-8653, or by email at daniel.b.vasconcelos@usace.army.mil.

This agency continually strives to improve our customer service. To better serve you, please complete the Customer Service Survey located at: https://regulatory.ops.usace.army.mil/customer-service-survey/.

Sincerely,

Grace Moses
Chief, Technical Support Branch
Regulatory Division

Enclosures

cc (w/enclosures):
Heidi Davis, MassDEP (via heidi.davis@mass.gov)
Tyler Lewis, MassDEP (via tyler.lewis@mass.gov)
Lily Collins, MassDOT (via lily.r.collins@dot.state.ma.us)

Work-Start Notification Form

File Number: NAE-2005-01156 State: Massachusetts County: Franklin

Permittee: MassDOT – Highway Division, Courtney Walker
Date Verification Issued: 1/6/2026
Project Manager: Dan Vasconcelos

At least two weeks prior to commencing the activity authorized by this permit, sign this certification and return it to the following address:

US ARMY CORPS OF ENGINEERS
New England District
Attn: Dan Vasconcelos
696 Virginia Road
Concord, MA 01742
or
daniel.b.vasconcelos@usace.army.mil
978-318-8653

Please note that your permitted activity is subject to a compliance inspection by a U. S. Army Corps of Engineers (USACE) representative. Failure to comply with any terms or conditions of this authorization may result in the USACE suspending, modifying or revoking the authorization and/or issuing a Class I administrative penalty, or initiating other appropriate legal action.

The people (e.g. contractor) listed below will do the work, and they understand the permit's conditions and limitations.

Contractor Name/Contractor Firm: _____
Business Address: _____
_____
Contractor Phone and Email: _____

Proposed Construction Dates: Start: _____ Finish: _____

_____ _____
Signature of Permittee Date

U.S. Army Corps of Engineers (USACE)

CERTIFICATION OF COMPLIANCE WITH DEPARTMENT OF THE ARMY PERMIT

For use of this form, see Section 404 of the Clean Water Act, Section 10 of the Rivers and Harbors Act of 1899, and Section 103 of the Marine Protection, Research, and Sanctuaries Act; the proponent agency is CECW-COR.

Form Approved - OMB No. 0710-0003 Expires 2027-10-31

The Agency Disclosure Notice (ADN)

The Public reporting burden for this collection of information, 0710-0003, is estimated to average 10 minutes per response, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or burden reduction suggestions to the Department of Defense, Washington Headquarters Services, at whs.mc-alex.esd.mbx.dd-dod-information-collections@mail.mil. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

PURPOSE: This form is used by recipients of U.S. Army Corps of Engineer Regulatory permits to certify compliance with the permit terms and conditions.

Your permitted activity is subject to a compliance inspection by a U.S. Army Corps of Engineers representative. If you fail to comply with this permit, you are subject to permit suspension, modification, or revocation.

Upon completion of the activity authorized by this permit and any mitigation required by the permit, sign this certification and return it to the U.S. Army Corps of Engineers, New England District, Regulatory Office.

The certification can be submitted by email at daniel.b.vasconcelos@usace.army.mil or by mail at the below address:

U.S. Army Corps of Engineers
New England District Office
Street Address: 696 Virginia Road
City: Concord State: MA Zip Code: 01742

COMPLETED BY THE CORPS

Corps Action Number: NAE-2005-01156

Permit Type: General Permit

General Permit Number and Name (*if applicable*): 23 (Linear Transportation)

Name of Permittee: Courtney Walker

Project Name: Church Street (Route 10) over Fall River

Project Location (*physical address*): Church Street
Bernardston, Massachusetts

PERMITTEE'S CERTIFICATION

Date Work Started: _____

Date Work Completed: _____

Enclose photographs showing the completed project (*if available*).

I _____ hereby certify that the work authorized by the above referenced permit has been completed in accordance with all of the permit terms and conditions, and that any required compensatory mitigation has been completed in accordance with the permit conditions.

Name	Date	Signature

BRIDGE REPLACEMENT PROJECT

PLAN AND PROFILE OF

ST 10 (CHURCH STREET) OVER FALL RIVER

BRIDGE NO. B-10-001 (CLA)

IN THE TOWN OF

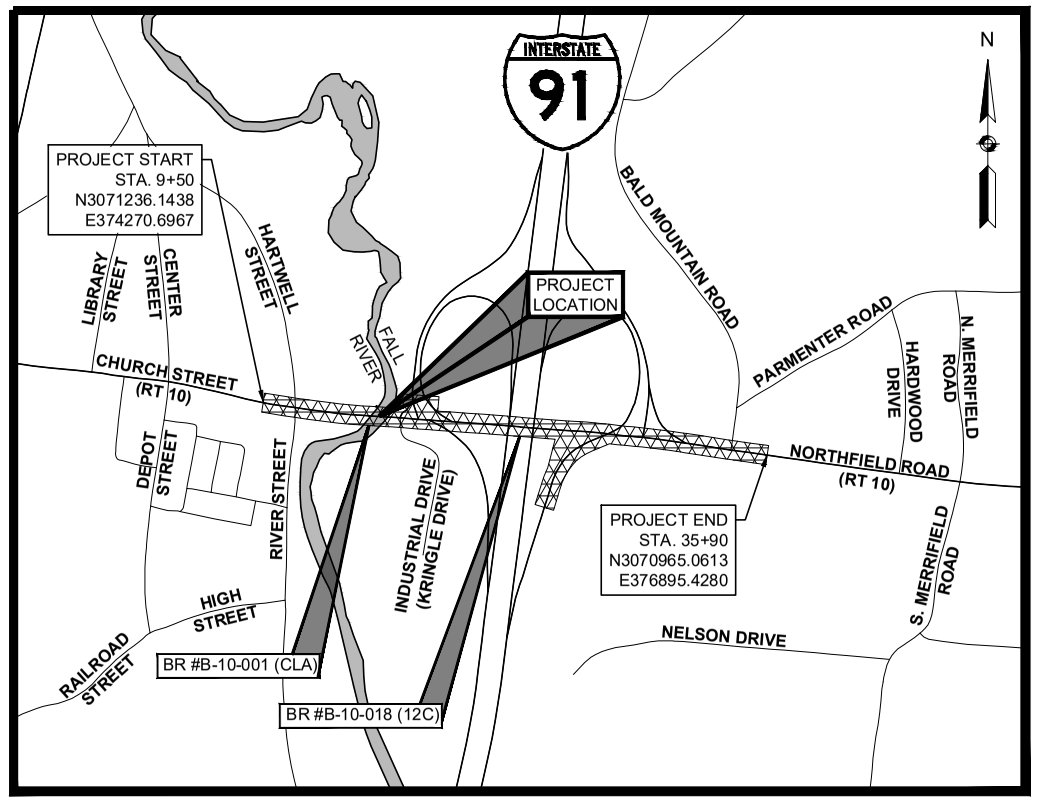
BERNARDSTON

FRANKLIN COUNTY

PERMIT APPLICATION

INDEX

SHEET NO.	DESCRIPTION
1	TITLE SHEET & INDEX
2	CONSTRUCTION PLAN (1 OF 5)
3	CONSTRUCTION PLAN (2 OF 5)
4	CONSTRUCTION PLAN (3 OF 5)
5	CONSTRUCTION PLAN (4 OF 5)
6	CONSTRUCTION PLAN (5 OF 5)
7	DRAINAGE DETAILS
8	ELEVATION & GRADING DETAILS
9	STREAMBED RESTORATION PLAN
10	PROFILES
11	BANK & LUW IMPACT PLAN
12	BLSF IMPACT PLAN
13	CONTROL OF WATER PLAN
14	CONSTRUCTION DETAILS
15	LANDSCAPE PLAN (1 OF 2)
16	LANDSCAPE PLAN (2 OF 2)



0 1000 2000 3000 4000

SCALE: 1" = 1000'

SHEET 1 OF 16

WATER QUALITY CERTIFICATE APPLICATION
BERNARDSTON, MASSACHUSETTS
ST 10 (CHURCH ST) OVER FALL RIVER
BRIDGE B-10-001
OCTOBER 2025

A00831 - 8

612159_BR1(GENPLAN).DWG Plotted on 30-Oct-2025 3:36 PM

Proposal No. 612159-136484

GUARDRAIL DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

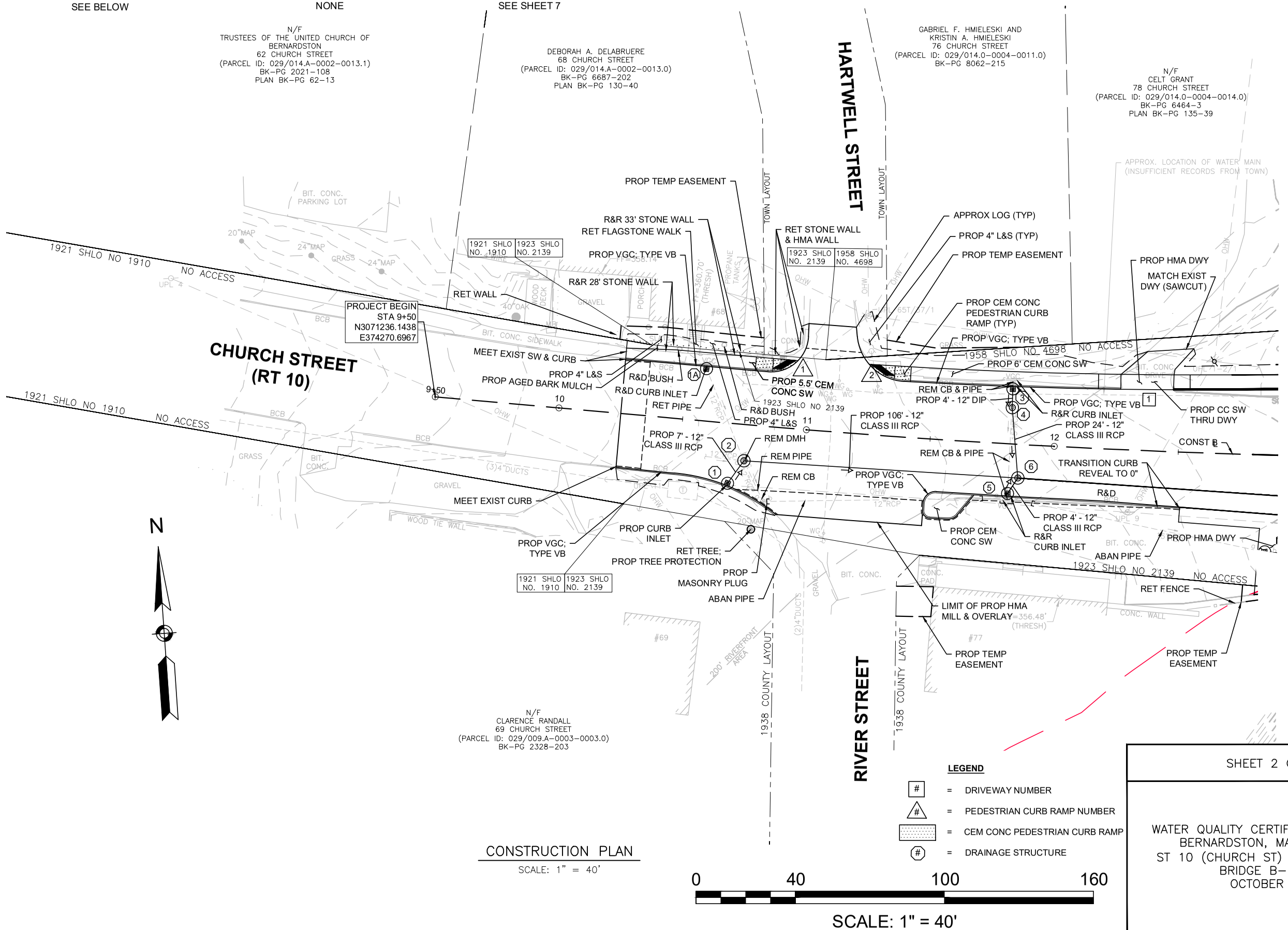
SEE BELOW

WATER SUPPLY ALTERATIONS

NONE

DRAINAGE DETAILS

SEE SHEET 7



CONSTRUCTION PLAN

SCALE: 1" = 40'

SHEET 2 OF 16

WATER QUALITY CERTIFICATE APPLICATION
BERNARDSTON, MASSACHUSETTS
ST 10 (CHURCH ST) OVER FALL RIVER
BRIDGE B-10-001
OCTOBER 2025

A00831 - 9

T1217.01_HD1(GENPLAN).DWG Plotted on 30-Oct-2025 3:27 PM

Proposal No. 612159-136484

T1217.01_HD1(GENPLAN).DWG Plotted on 30-Oct-2025 3:29 PM

WATER QUALITY CERTIFICATE APPLICATION
BERNARDSTON, MASSACHUSETTS
ST 10 (CHURCH ST) OVER FALL RIVER
BRIDGE B-10-001
OCTOBER 2025

SHEET 3 OF 16

CONSTRUCTION PLAN
SCALE: 1" = 40'

SCALE: 1" = 40'
0 40 100 160

I-91 SB ON-RAMP (NW)
I-91 SB OFF-RAMP (NW)
NORTHFIELD ROAD (RT 10)
FALL RIVER
100FT FOUNDATION OFFSET
50FT SLOPE OFFSET
TOP OF SLOPE
50FT WETLAND OFFSET
1923 SHLO NO 2139 NO ACCESS
1959 TOWN LAYOUT NO 4774
1967 SHLO NO. 3662
1956 SHLO NO 4698 NO ACCESS
B-10-001(CLA)
100'-0" SPAN (SKEW)
84'-9" SPAN (SQUARE)
64'-0" OUT-TO-OUT
55'-0" PROP. ROADWAY
14'-0" TEMP ACCESS DRIVEWAY

DRAINAGE DETAILS
SEE SHEET 7

GUARDRAIL DETAILS
SEE CONSTRUCTION DRAWINGS

TRAFFIC SIGNAL CONDUIT
NONE

WATER SUPPLY ALTERATIONS
NONE

LEGEND
= DRIVEWAY NUMBER
= PEDESTRIAN CURB RAMP NUMBER
= CEM CONC PEDESTRIAN CURB RAMP
= PROP MODIFIED ROCKFILL SLOPE STABILIZATION/RIPRAP
= DRAINAGE STRUCTURE

NOTES:
1. THE HORIZONTAL DATUM IS THE NORTH AMERICAN DATUM OF 1983 (NAD83) MASSACHUSETTS STATE PLANE COORDINATE SYSTEM IN U.S. SURVEY FEET.
2. THE VERTICAL DATUM IS THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAV88) IN FEET.

GUARDRAIL DETAILS
SEE CONSTRUCTION DRAWINGS

TRAFFIC SIGNAL CONDUIT
NONE

WATER SUPPLY ALTERATIONS
NONE

DRAINAGE DETAILS
SEE SHEET 7

N

50FT SLOPE OFFSET FROM RAMP

BOTTOM OF SLOPE

28% SLOPE

LIMIT OF PROP FDP; PROP SAWCUT

MEET EXIST SGE

PROP STONE FOR PIPE ENDS= 4' LENGTH X 1.5' DEPTH

BEGIN CLEARING & GRUBBING

REM INV & PIPE

PROP CLEARING & GRUBBING (578 SF)

PROP 37' - 12" CLASS III RCP

R&R CURB INLET

PROP SGE; TYPE SB

PROP SPLAYED END PROP 6' - 12" CLASS III RCP

RET PIPE

PROP SEDIMENT CONTROL BARRIER (TYP)

APPROX LOG (TYP)

PROP 4" L&S (TYP)

WOODED AREA

RET FENCE

PROP 3' - 12" CLASS III RCP

R&R CURB INLET

PROP VGC; TYPE VB

METAL GUARDRAIL (TYP.)

REM CB & PIPE TO DRAINAGE STRUCTURE #29

PROP APPROACH SLAB

PROP 40' - 12" CLASS III RCP

REM CB & PIPE

PROP 6' CEM CONC SW

RET CB & PIPE

R&R CURB INLET

REM EXIST GUARDRAIL (105')

PROP GUARDRAIL (TYP)

RET FENCE

B-10-018(12C)

PROP BRIDGE PAVEMENT

RET POST W/CAMERAS

RET PIPE

PROP APPROACH SLAB

PROP VGC; TYPE VB

REM CB

PROP 4" L&S

PROP 3" PVC CONDUIT

PROP 6' CEM CONC SW

LIMIT OF PROP HMA MILL & OVERLAY

MEET EXIST SGE

LIMIT OF PROP FDP; PROP SAWCUT

RET EXIST PVMT

I-91 SB ON-RAMP (SW)

I-91 SOUTHBOUND

100' WETLAND BUFFER ZONE

I-91 NORTHBOUND

NORTHFIELD ROAD (RT 10)

91 NORTHBOUND

(12)4"DUCTS

CONC. SIDEWALK

10'CLF

6'CLF

20"RCP

12"RCP

DMH RIM=343.55

CB RIM=343.06

TCB

CHH

WF#WFD-7 WF#WFD-10 WF#WFD-11 WF#WFD-12 WF#WFD-13 WF#WFD-14 WF#WFD-15 WF#WFD-16 WF#WFD-17 WF#WFD-18 WF#WFD-19

WF#WFE-13 WF#WFE-14 WF#WFE-15 END

1959 SHLO NO 4774

1923 SHLO NO. 2139

1959 SHLO NO. 4774

1896 TOWN LAYOUT

NO ACCESS

GRAVEL

N/F
KITTREDGE INDUSTRIES, LLC
31 KRINGLE DRIVE
(PARCEL ID: 029/009.0-0001-0003.0)
BK-PG 6079-57
PLAN BK PG 118-66

CONTINUED ON SHEET NO. 3

CONTINUED ON SHEET NO. 5

LEGEND

#	=	DRIVEWAY NUMBER
#	=	PEDESTRIAN CURB RAMP NUMBER
	=	CEM CONC PEDESTRIAN CURB RAMP
#	=	DRAINAGE STRUCTURE

CONSTRUCTION PLAN
SCALE: 1" = 40'

0 40 100 160
SCALE: 1" = 40'

SHEET 4 OF 16

WATER QUALITY CERTIFICATE APPLICATION
BERNARDSTON, MASSACHUSETTS
ST 10 (NORTHFIELD ROAD) OVER I-91
BRIDGE B-10-018
OCTOBER 2025

Proposal No. 612159-136484

T1217.01_HD1(GENPLAN).DWG Plotted on 30-Oct-2025 3:29 PM

A00831 - 11

T1217.01_HD1(GENPLAN).DWG Plotted on 30-Oct-2025 3:27 PM

WATER QUALITY CERTIFICATE APPLICATION
BERNARDSTON, MASSACHUSETTS
ST 10 (NORTHFIELD ROAD) OVER I-91
BRIDGE B-10-018
OCTOBER 2025

SHEET 5 OF 16

CONSTRUCTION PLAN

SCALE: 1" = 40'

SCALE: 1" = 40'

LEGEND

= DRIVEWAY NUMBER

= PEDESTRIAN CURB RAMP NUMBER

= CEM CONC PEDESTRIAN CURB RAMP

= DRAINAGE STRUCTURE

DRAINAGE DETAILS
SEE SHEET 7

GUARDRAIL DETAILS
SEE CONSTRUCTION DRAWINGS

TRAFFIC SIGNAL CONDUIT
NONE

WATER SUPPLY ALTERATIONS
NONE

CONTINUED ON SHEET NO. 6

CONTINUED ON SHEET NO. 4

CONTINUED LEFT

CONTINUED RIGHT

T1217.01_HD1(GENPLAN).DWG Plotted on 30-Oct-2025 3:28 PM

WATER QUALITY CERTIFICATE APPLICATION
BERNARDSTON, MASSACHUSETTS
ST 10 (NORTHFIELD ROAD) OVER I-91
BRIDGE B-10-018
OCTOBER 2025

SHEET 6 OF 16

CONSTRUCTION PLAN
SCALE: 1" = 40'

SCALE: 1" = 40'
0 40 100 160

LEGEND
- # = DRIVEWAY NUMBER
- # = PEDESTRIAN CURB RAMP NUMBER
- = CEM CONC PEDESTRIAN CURB RAMP
- = DRAINAGE STRUCTURE

DRAINAGE DETAILS
SEE SHEET 7

TRAFFIC SIGNAL CONDUIT
SEE BELOW

WATER SUPPLY ALTERATIONS
NONE

GUARDRAIL DETAILS
NONE

NEAL R. BARDWELL
210 PARMENTER ROAD
(PARCEL ID: 029/009.0-0004-0002.0)
BK-PG 2568-16

HEIRS, DEVISEES AND LEGAL REPRESENTATIVES OF THE ESTATE OF COLA R. NELSON
5 BALD MOUNTAIN ROAD
(PARCEL ID: 029/009.0-0004-0001.0)
BK-PG 1321-213

N/F
ANNEMARIE C. MASON
2 BALD MOUNTAIN ROAD
(PARCEL ID: 029/009.0-0003-0001.0)
BK-PG 6498-328

N/F
STEVEN S. HEAN
12 BALD MOUNTAIN ROAD
(PARCEL ID: 029/014.0-0005-0018.3)
BK-PG 6423-240
PLAN BK-PG 86-95

CRUMPIN FOX CLUB, INC. a/k/a CRUMPIN-FOX CLUB, INC.
71-73 NORTHFIELD ROAD
(PARCEL ID: 029/009.0-0002-0003.0-6.0)
BK-PG 2759-120
PLAN BK-PG 84-69

CRUMPIN FOX CLUB, INC. a/k/a CRUMPIN-FOX CLUB, INC.
71-73 NORTHFIELD ROAD
(PARCEL ID: 029/009.0-0002-0003.0-6.0)
BK-PG 2759-120
PLAN BK-PG 84-69

BALD MOUNTAIN ROAD
PARMENTER ROAD
NORTHFIELD ROAD (RT 10)

1958 SHLO NO. 5556 NO ACCESS
1966 SHLO NO. 5556 NO ACCESS
1958 SHLO NO. 4698 NO ACCESS
1927 SHLO NO. 2456 NO ACCESS
1911 SHLO NO. 1345 NO ACCESS
1958 TOWN LAYOUT NO. 4698

PROJECT END
STA 35+90
N3070965.0613
E376895.4280

LIMIT OF PROP HMA MILL & OVERLAY; STA 35+85
LIMIT OF PROP HMA MILL & OVERLAY
PROP HMA MILL & OVERLAY
PROP TEMP EASEMENT
PROP PERM EASEMENT
PROP TREE PROTECTION FENCE
RET TREES (TYP)
REM EXIST PVMT; PROP 4" L&S
PROP 5.5' CEM CONC SW
PROP CEM CONC PEDESTRIAN CURB RAMP (TYP)
R&D WOOD POST (4)
PROP 3" PVC CONDUIT
PROP RRFB
PROP EOP
PROP SAWCUT (TYP)
PROP CURB INLET
PROP 5' - 12" CLASS III RCP
PROP 7' -12" CLASS III RCP
REM CB & PIPE
RET PIPE
RET DI & PIPE
ADJ DMH
RET POST
RET FENCE
R&R SGE
MEET EXIST SGE
RET EXIST PAVEMENT
PROP VGC; TYPE VB
PROP 6' CEM CONC SW (TYP)
PROP 4" L&S (TYP)
PROP AGED BARK MULCH
APPROX LOG (TYP)
RET BUSHES
RET LP
PROP CC SW THRU DWY
PROP HMA DWY
MATCH EXIST DWY (SAWCUT)
REM EXIST PVMT; PROP 4" L&S
PROP TEMP EASEMENT

1958 SHLO NO. 4698 | 1966 SHLO NO. 5556
1927 SHLO NO. 2456 | 1966 SHLO NO. 5556
1911 SHLO NO. 1345 | 1927 SHLO NO. 2456

CONTINUED ON SHEET NO. 5

GUARDRAIL DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

SEE BELOW

WATER SUPPLY ALTERATIONS

NONE

DRAINAGE DETAILS

THIS SHEET

PROPOSED DRAINAGE STRUCTURE DATA

NO.	TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
1	PROP CBCI	10+70.25	24.2' RT	356.26	-	351.26 (2)	4' SUMP; CURVED CURB INLET
1A	PROP CB	10+57.72	21.0' LT	356.39	-	351.9 (EX)	4' SUMP; STRAIGHT CURB INLET
2	PROP DMH	10+76.07	14.6' RT	356.28	351.0 (EX) 351.00 (1)	350.80 (6)	R&R CURB INLET
3	PROP GICI	11+82.05	22.2' LT	352.72	-	350.22 (4)	R&R CURB INLET
4	PROP CB W/ MH COVER	11+82.24	14.7' LT	352.93	349.63 (3)	349.43 (6)	4' SUMP
5	PROP CBCI	11+82.32	20.0' RT	353.31	-	349.31 (6)	4' SUMP; R&R CURB INLET
6	PROP DMH	11+86.09	13.5' RT	353.36	348.86 (2) 349.16 (4) 349.16 (5)	348.76 (8)	CORE HOLE IN EXIST
7	PROP CB	12+85.88	39.1' RT	350.66	-	340.3 (9)	4' SUMP
8	PROP DMH	13+29.39	18.2' RT	350.88	346.38 (6) 344.76 (13)	344.66 (9)	5' DIAMETER
9	PROP DMH	13+38.96	42.9' RT	349.50	339.78 (7) 344.43 (8) 345.28 (10)	339.68 (11)	5' DIAMETER
10	PROP CBCI	13+52.51	26.0' RT	350.37	-	345.87 (9)	4' SUMP; STRAIGHT CURB INLET
11	PROP FES	14+00.36	55.6' RT	-	-	339.03 (9)	12"
12	PROP GI	13+58.73	27.0' LT	349.48	-	346.98 (13)	NO CURB INLET
13	PROP CB W/ MH COVER	13+58.73	19.5' LT	349.70	346.70 (12)	345.20 (8)	4' SUMP
14	PROP CB	13+99.22	83.5' LT	344.57	-	340.57 (15) 339.07 (TEMP)	4' SUMP; REM EX CB
15	PROP HDWL	15+41.07	47.0' LT	-	-	319.31 (14)	SEE CONST STD DETAIL 230.0.1
15A	PROP FES	15+53.41	58.4' RT	-	-	328.00 (15D)	12"
15B	PROP CB	16+46.49	74.1' RT	345.67	339.7 (EX)	339.60 (15D)	4' SUMP
15C	PROP CB	16+72.90	66.0' RT	346.02	-	341.70 (15E)	4' SUMP
15D	PROP DMH	16+48.17	62.7' RT	346.17	340.35 (17) 338.40 (15E) 339.50 (15B)	338.30 (15A)	
15E	PROP DMH	16+72.66	55.9' RT	346.51	338.70 (48) 341.60 (15C)	338.60 (15D)	
16	PROP CBCI	16+24.53	26.0' RT	347.58	-	343.31 (17)	4' SUMP; STRAIGHT CURB INLET
17	CIT TO DMH	16+53.79	24.5' RT	347.56	343.06 (16) 341.10 (19) 343.06 (20)	340.70 (15D)	CORE HOLES IN EXIST
18	PROP GI	16+48.41	27.0' LT	347.49	-	344.99 (19)	CORE HOLES IN EXIST
19	ADJ EXIST CB	16+54.71	26.8' LT	347.51	343.2 (EX CB12) 344.51 (18)	342.80 (17)	CORE HOLE IN EXIST; R&D EXIST F&C PROP F&C
20	PROP CBCI	17+30.25	25.0' RT	347.92		*343.29 (50) **343.79 (17)	4' SUMP; STRAIGHT CURB INLET
20A	PROP CBCI	17+71.46	24.0' LT	348.46	-	343.4 (EX)	4' SUMP; R&R CURB INLET
21	PROP CBCI	19+21.45	29.1' LT	351.44	-	347.50 (22)	4' SUMP; R&R CURB INLET
22	CIT TO DMH	19+30.94	26.4' LT	351.92	347.40 (21) 347.70 (28) 347.6± (EX CB19) 347.40 (25)	347.30 (24)	CORE HOLES IN EXIST
24	PROP HDWL	19+33.27	65.6' LT	-	-	336.46 (22)	SEE CONST STD DETAIL 230.0.1
25	PROP CBCI	19+27.99	22.8' RT	351.77	-	348.2 (EX)	MATCH EXIST INVERT; 4' SUMP; R&R CURB INLET, R&R F&G

PROPOSED DRAINAGE STRUCTURE DATA

NO.	TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
26	PROP CBCI	21+07.63	20.3' RT	357.98	-	353.65 (28)	4' SUMP; R&R CURB INLET
28	PROP DMH	21+07.63	23.4' LT	357.92	353.70 (29) 353.25 (26)	352.8 (EX)	4' SUMP; R&R CI, R&R F&G; MATCH EXIST INVERT
29	PROP CBCI	21+14.67	25.2' LT	358.11	-	353.80 (28)	4' SUMP; R&R CURB INLET
30	ADJ EXIST DMH	24+61.33	18.2' LT	369.12	359.2 (EX) 364.00 (31) 363.90 (32)	358.9 (EX)	CORE HOLE IN EXIST
31	PROP CBCI	24+79.70	20.3' RT	369.65	-	366.15 (33)	4' SUMP; R&R CI, R&R F&G; MATCH EXIST INVERT
32	PROP CBCI	24+95.48	25.2' LT	370.05	-	364.25 (30)	4' SUMP; OFFSET TOP; R&R CURB INLET
33	PROP DMH	25+07.01	18.8' RT	370.54	366.00 (31) 366.25 (34)	365.90 (33A)	4' SUMP; STRAIGHT CURB INLET
33A	PROP FES	25+07.00	60.9' RT	-	-	365.50	12"
34	PROP CBCI	26+54.01	21.0' RT	374.95	-	370.65 (33)	4' SUMP; STRAIGHT CURB INLET
35	PROP CBCI	64+64.00	10.0' RT	370.84	-	366.34 (37)	4' SUMP; STRAIGHT CURB INLET
36	PROP CB	64+05.74	32.4' RT	366.73	-	361.42 (37)	4' SUMP
37	PROP DMH	64+03.44	15.0' LT	368.44	363.44 (35) 360.94 (36) 360.96 (37A)	360.84 (39)	MATCH EXIST INVERT OUT
37A	PROP OCS	64+04.85	43.0' LT	365.75	358.05 (39)	361.20 (37)	MATCH EXIST INVERT OUT
38	PROP CB	63+46.05	20.8' LT	364.26	-	361.20 (39)	4' SUMP
39	PROP DMH	63+46.00	14.5' LT	365.20	359.20 (37) 361.10 (38)	359.10 (40)	CORE HOLE IN EXIST
40	PROP DMH	63+22.95	9.5' LT	363.55	358.05 (39)	357.8± (EX)	MATCH EXIST INVERT OUT
40A	PROP CB	61+91.70	10.0' RT	356.47	-	351.3 (EX)	4' SUMP; R&R CURB INLET
41	ADJ EXIST DMH	28+12.93	16.8' LT	378.08	373.58 (42) 372.2 (EX CB3) 364.0 (EX DMH 9)	363.80 (33)	CORE HOLE IN EXIST
42	PROP CB	28+33.17	23.7' LT	378.24	-	373.74 (41)	4' SUMP
43	PROP DMH	28+67.56	25.4' RT	379.30	374.33 (44) 373.2 (EX)	373.1 (EX)	MATCH EXIST INVERT OUT
44	PROP CB	28+75.14	21.0' RT	378.88		374.38 (43)	4' SUMP
45	PROP CBCI	33+41.16	19.0' RT	378.12	-	373.62 (46)	4' SUMP; STRAIGHT CURB INLET
46	PROP DMH	33+48.09	25.0' RT	378.56	373.52 (45) 372.3 (47)	372.2± (EX)	MATCH EXIST PIPE INVERTS
47	PROP DROP INLET, TYPE DF	33+44.68	35.7' RT	376.45		372.40 (46)	SEE CONSTRUCTION DETAIL 209.1.1
48	PROP DMH	17+85.93	81.5' RT	344.15	339.90 (49) 342.6 (EX)	339.80 (15E)	REMODEL, REPLACE EXIST DOUBLE HOLE TOP SECTION OF STRUCTURE WITH SINGLE HOLE TOP SECTION (PAID FOR UNDER ITEM 202.), CORE HOLE IN EXIST
49	PROP LEACHING BASIN	17+95.52	80.5' RT	344.05		340.00 (48)	3' SUMP
50	PROP LEACHING BASIN W/ MH COVER	17+30.25	32.0' RT	348.49	343.19 (20)		3' SUMP

NOTE: THERE ARE NO PROPOSED STRUCTURES #23 AND #27.

*OFFSET PROVIDED IS TO CENTER OF PROPOSED STRUCTURE

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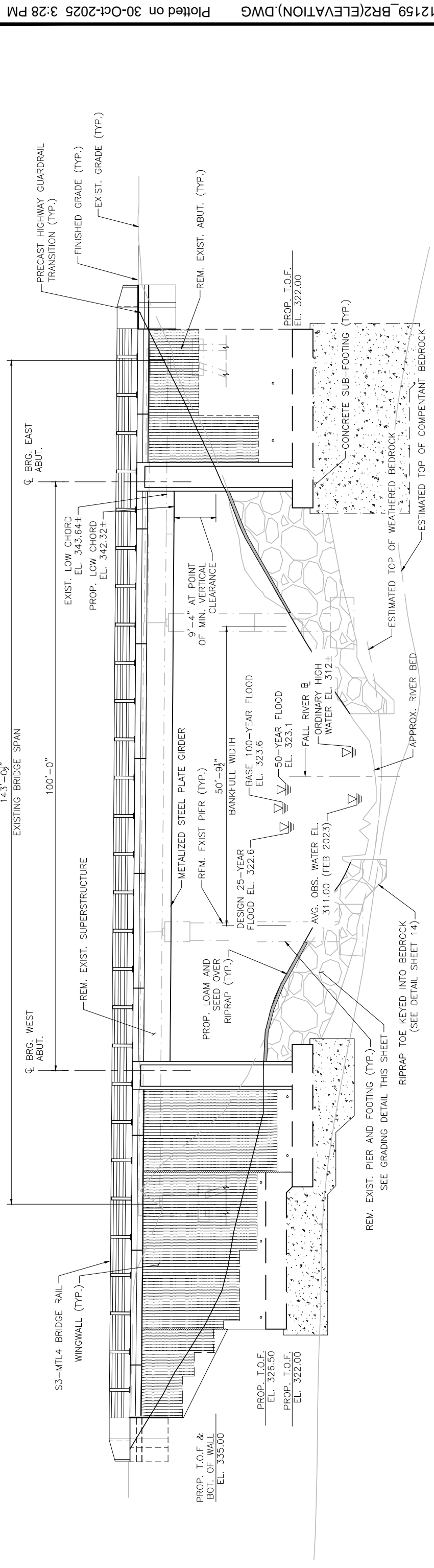
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Proposal No. 612159-136484

612159_BR2(ELEVATION).DWG Plotted on 30-Oct-2025 3:28 PM

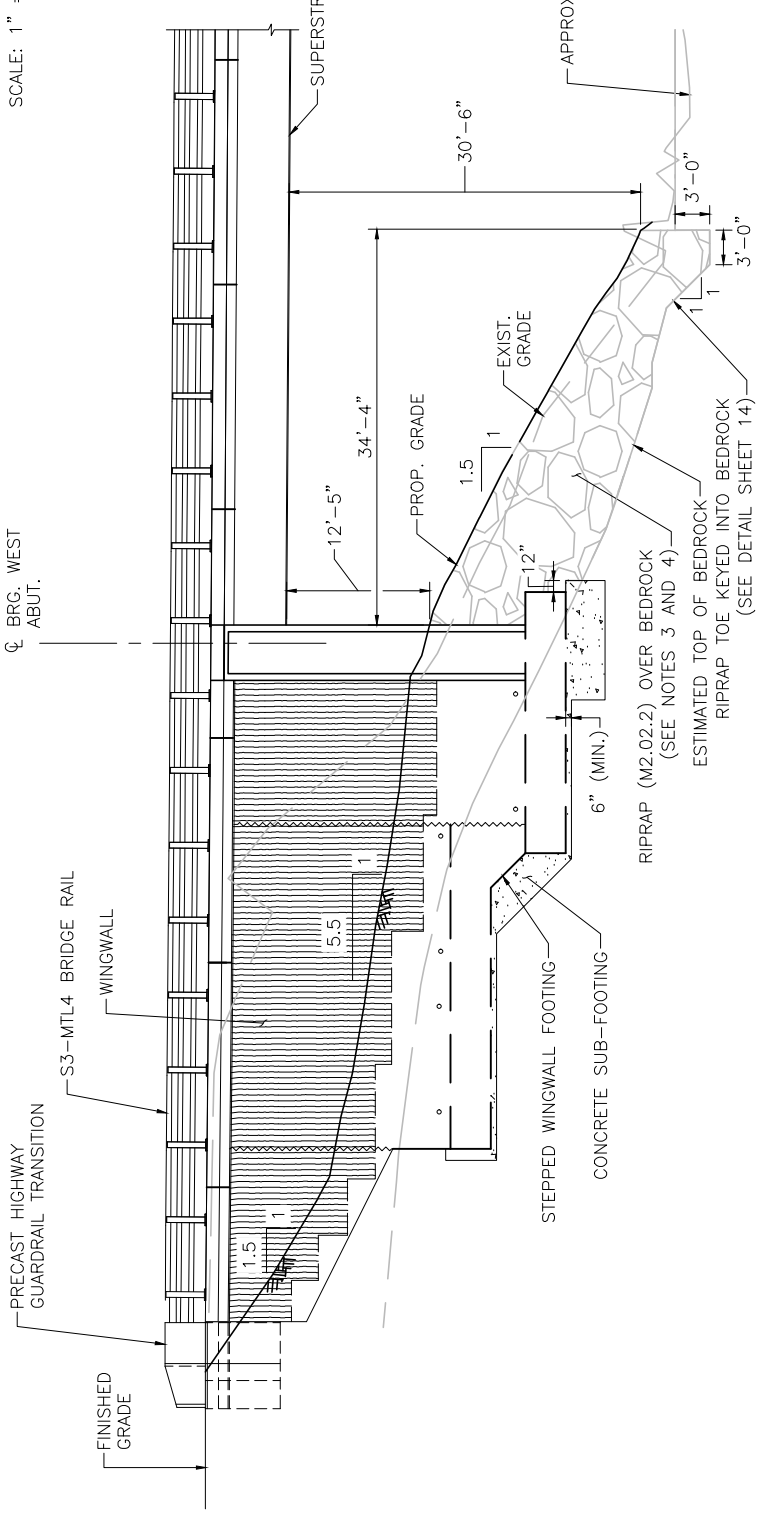
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BRIDGE GENERAL ELEVATION

SCALE: 1" = 200'

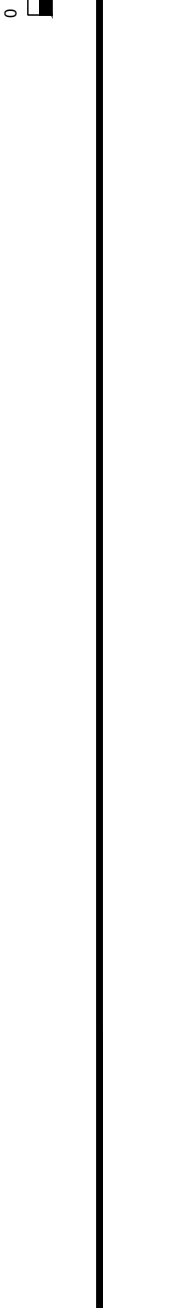


TYPICAL GRADING DETAILS AT ABUTMENTS & WINGWALLS

SCALE: 1" = 200'

NOTES:

1. THE HORIZONTAL DATUM IS THE NORTH AMERICAN DATUM OF 1983 (NAD83) MASSACHUSETTS STATE PLANE COORDINATE SYSTEM IN U.S. SURVEY FEET.
2. THE VERTICAL DATUM IS THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) IN FEET.
3. LOAM AND SEED SHALL BE PLACED ON TOP OF RIPRAP/MODIFIED ROCKFILL ABOVE THE 100-YEAR FLOOD ELEVATION (EL. 323.60).
4. STREAMBED MATERIAL IN ACCORDANCE WITH ITEM 983.521 – STREAMBED RESTORATION SHALL BE USED TO FILL RIPRAP VOIDS BELOW THE 100-YEAR FLOOD ELEVATION.



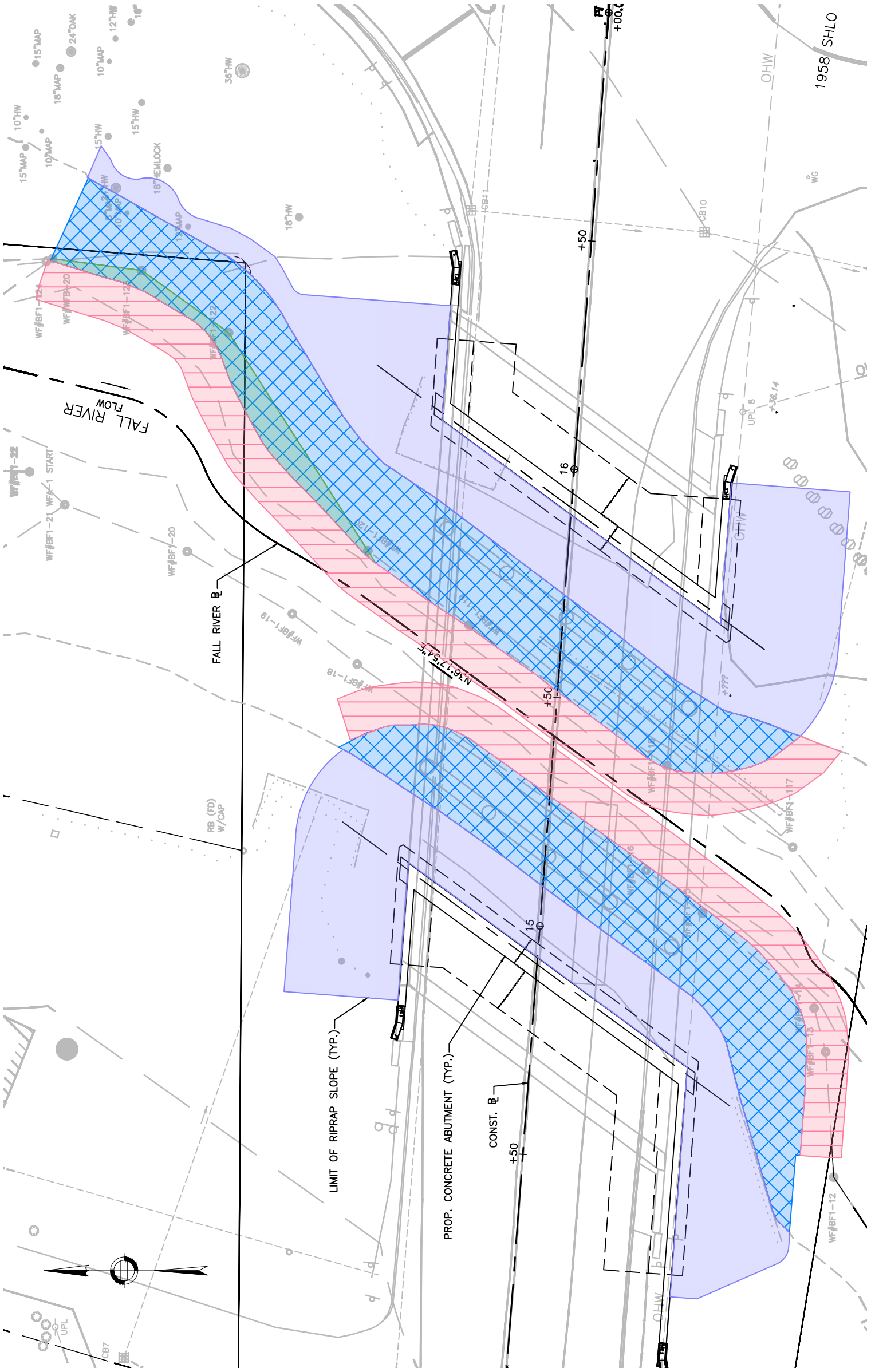
612159_BR4(STREAMBED RESTORATION).DWG Plotted on 30-Oct-2025 3:28 PM

LEGEND:

- LOAM AND SEED OVER RIPRAP ABOVE 100-YEAR FLOOD ELEVATION.
- STREAMBED MATERIAL OVER RIPRAP BELOW 100-YEAR FLOOD ELEVATION AND ABOVE BANK FLAGS.
- STREAMBED RESTORATION BELOW SANDBAGS. (ONLY DISTURBANCE IS THE PLACEMENT AND REMOVAL OF SANDBAGS)
- DREDGE AREA BELOW BANK FLAGS. RE-USE DREDGE MATERIAL TO FILL VOIDS IN BLUE AREA. THIS AREA WILL BE RIPRAP WITH STREAMBED MATERIAL IN THE VOIDS IN ITS FINAL CONDITION

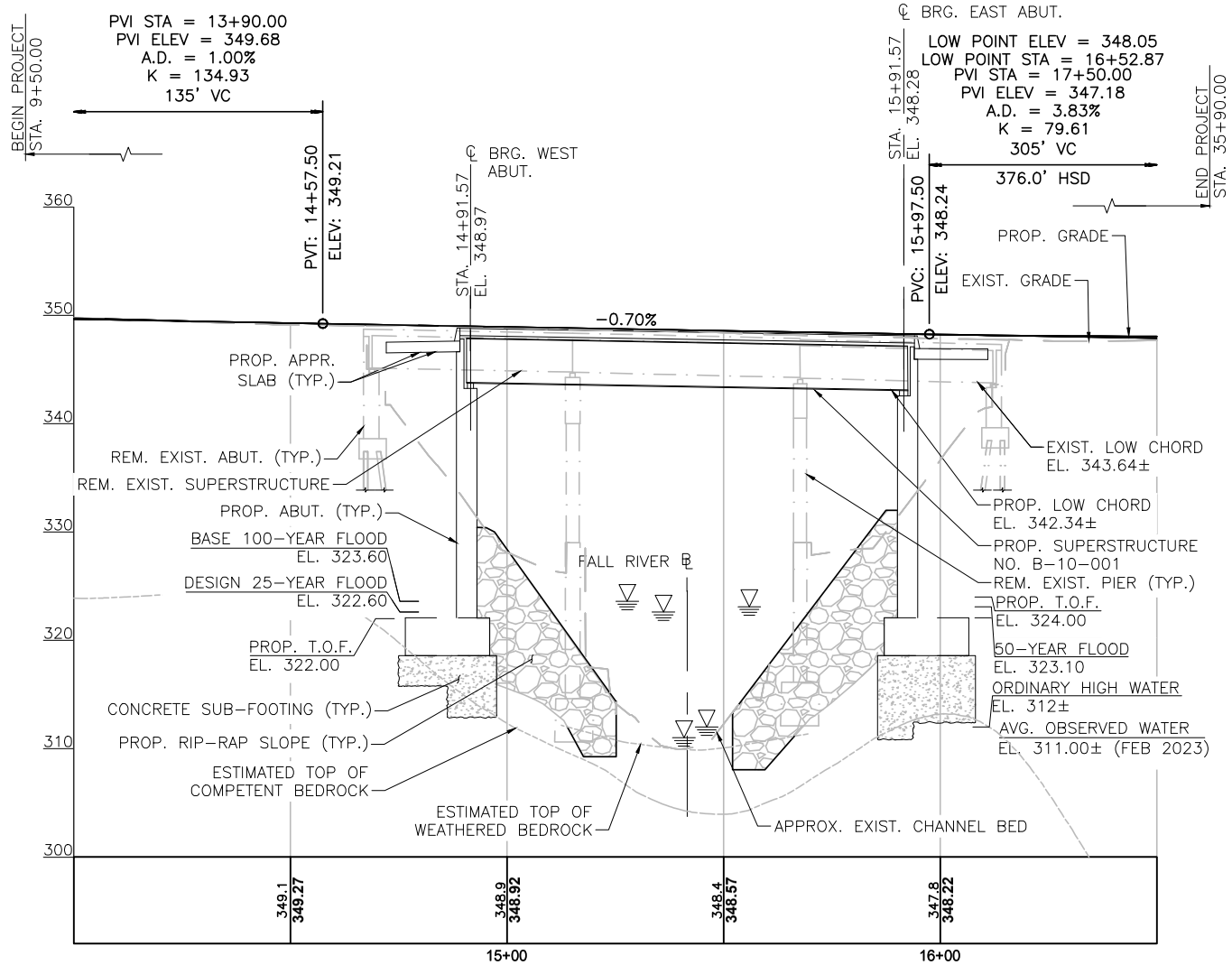
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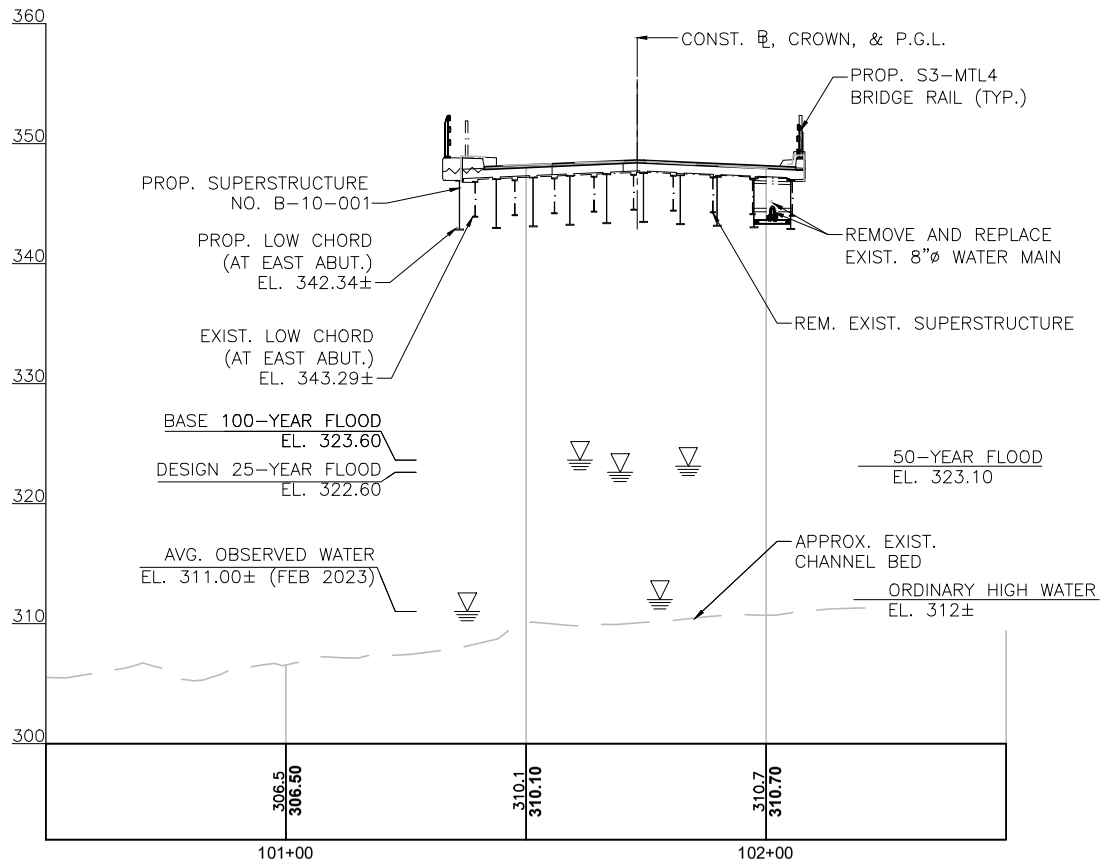
STREAMBED RESTORATION PLAN

SCALE: 1" = 1'-0"



PROFILE – ST 10 (CHURCH ST)

HORIZONTAL SCALE: 1" = 40'
VERTICAL SCALE: $\frac{1}{8}$" = 1'-0"



PROFILE – FALL RIVER

HORIZONTAL SCALE: 1" = 40'
VERTICAL SCALE: $\frac{1}{8}$" = 1'-0"

NOTES:

1. THE HORIZONTAL DATUM IS THE NORTH AMERICAN DATUM OF 1983 (NAD83) MASSACHUSETTS STATE PLANE COORDINATE SYSTEM IN U.S. SURVEY FEET.
2. THE VERTICAL DATUM IS THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) IN FEET.

HOR. SCALE: 1" = 40'
40 0 40 80
VER. SCALE: $\frac{1}{8}$" = 1'-0"
8 0 8 16

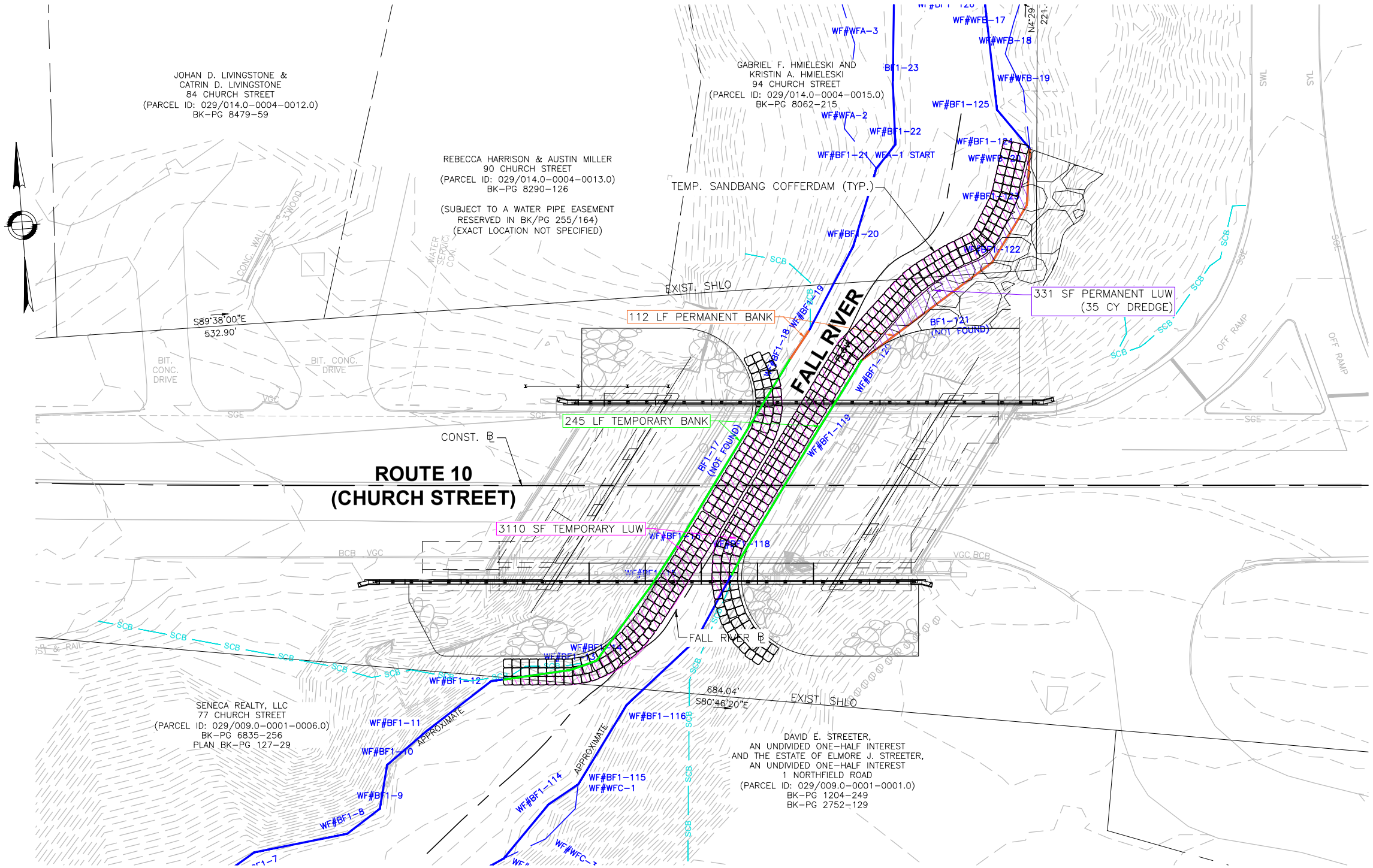
SHEET 10 OF 16

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612159_BR3(PROFILE).DWG Plotted on 30-Oct-2025 3:27 PM

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SUMMARY OF RESOURCE AREA IMPACTS			
LEGEND	TYPE	IMPACTS	SURFACE AREA (SF) LINEAR FEET (LF)
	IMPACTS TO WATERS OF THE U.S. (WOTUS)	TEMPORARY	3110 SF
		PERMANENT	331 SF (35 CY DREDGE)
	BANK/OHW	TEMPORARY	245 LF
		PERMANENT	112 LF
	VEGETATED WETLAND		
	ORDINARY HIGH WATER/BANK (OHW)		
SCB	SEDIMENT CONTROL BARRIER		

WOTUS IMPACT PLAN

SCALE: 1" = 40'

NOTES:

1. THE HORIZONTAL DATUM IS THE NORTH AMERICAN DATUM OF 1983 (NAD83) MASSACHUSETTS STATE PLANE COORDINATE SYSTEM IN U.S. SURVEY FEET.
2. THE VERTICAL DATUM IS THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) IN FEET.

0 40 100 160

SCALE: 1" = 40'

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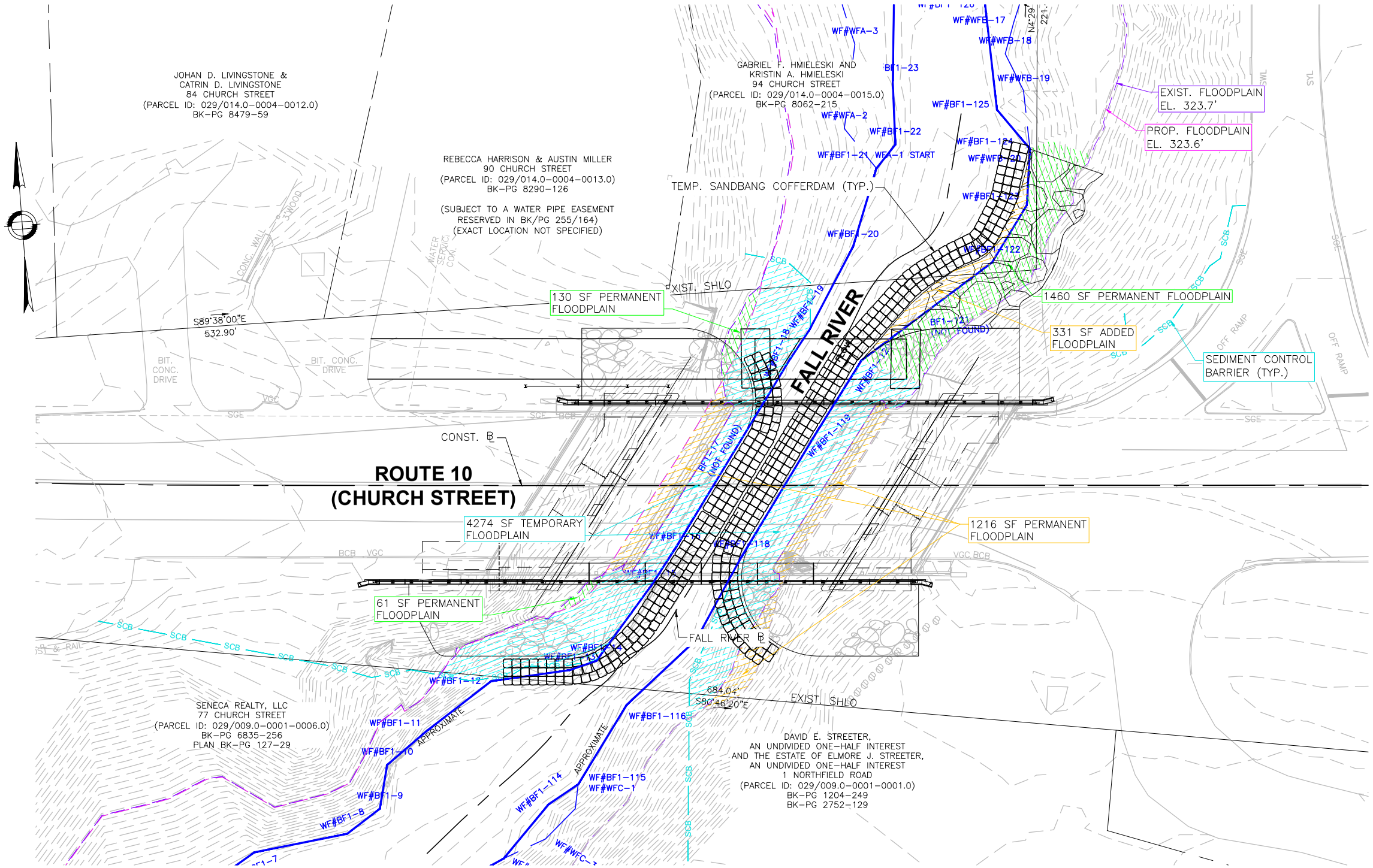
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Proposal No. 612159-136484

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612159_BR4(IMPACTS).DWG Plotted on 30-Oct-2025 3:29 PM

Proposal No. 612159-136484



100–YEAR FLOODPLAIN IMPACT PLAN

SCALE: 1" = 40'

SUMMARY OF RESOURCE AREA IMPACTS			
LEGEND	TYPE	IMPACTS	SURFACE AREA (SF) LINEAR FEET (LF)
	IMPACTS WITHIN 100-YEAR FLOODPLAINS (FLOODPLAIN)	TEMPORARY	4274 SF
		PERMANENT	1651 SF
		ADDED	1547 SF
	EXISTING FLOODPLAIN (323.7')		
	PROPOSED FLOODPLAIN (323.6')		
	VEGETATED WETLAND		
	ORDINARY HIGH WATER/BANK (OHW)		
SCB	SEDIMENT CONTROL BARRIER		

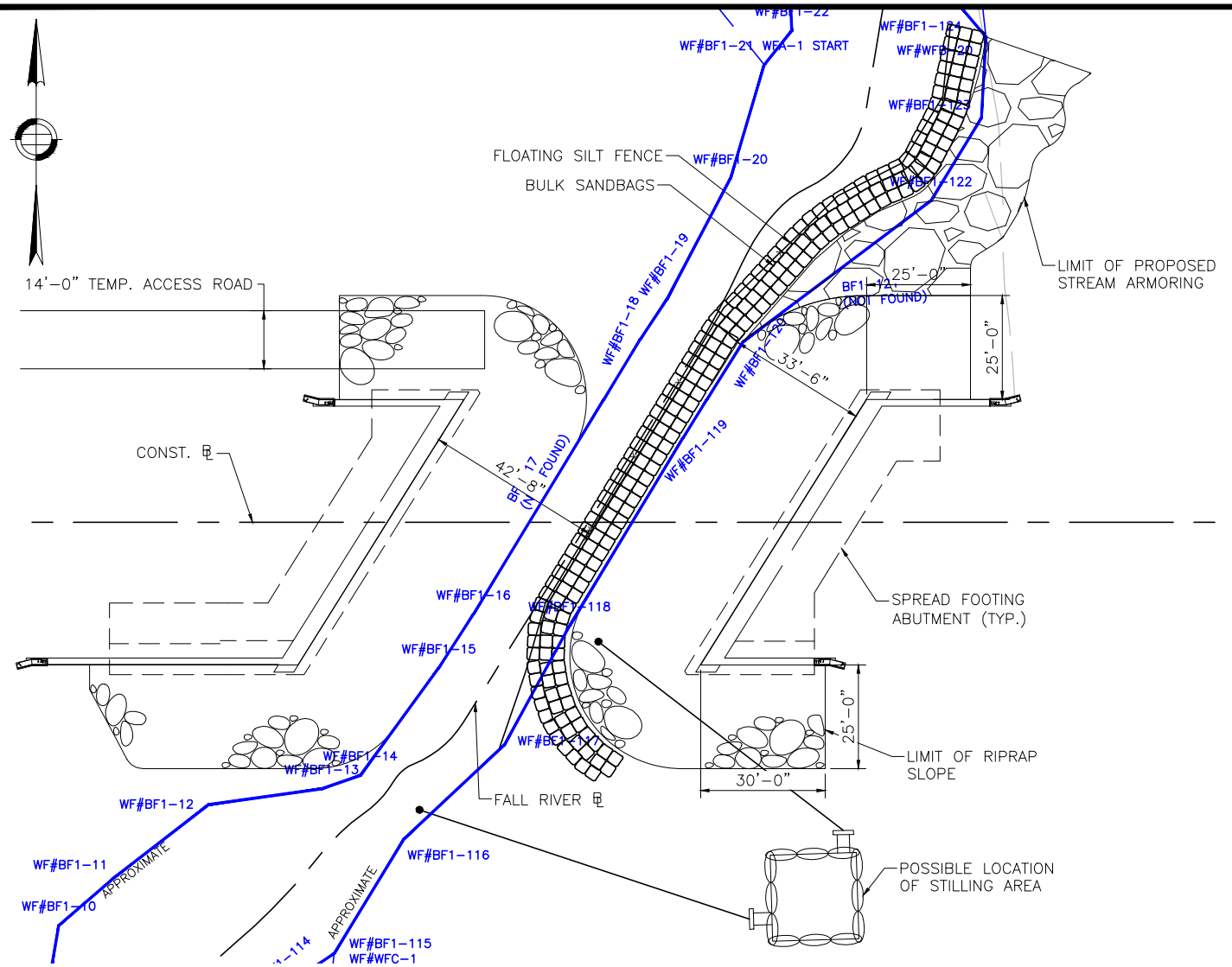
NOTES:

1. THE HORIZONTAL DATUM IS THE NORTH AMERICAN DATUM OF 1983 (NAD83) MASSACHUSETTS STATE PLANE COORDINATE SYSTEM IN U.S. SURVEY FEET.
2. THE VERTICAL DATUM IS THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) IN FEET.

0 40 100 160

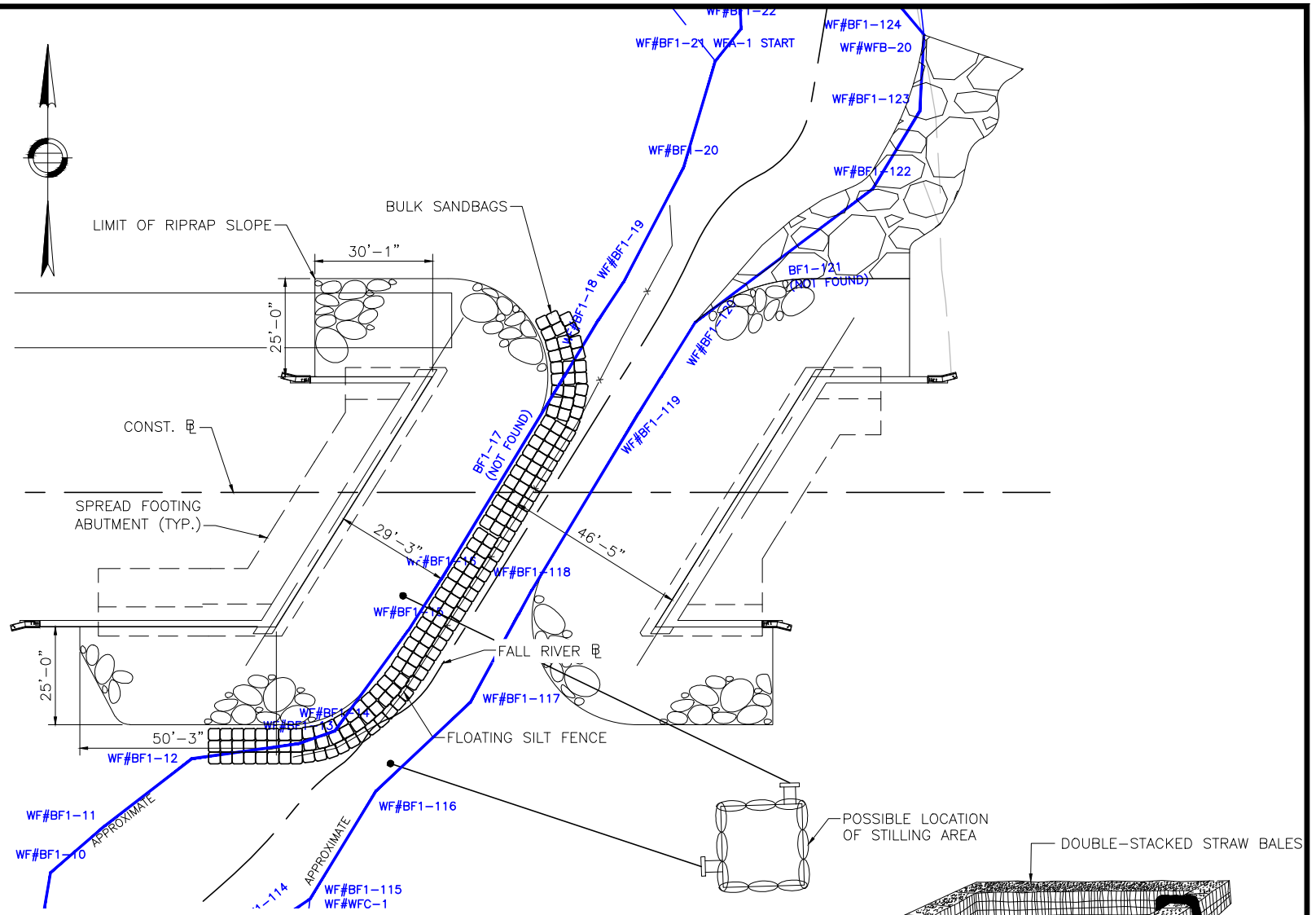
SCALE: 1" = 40'

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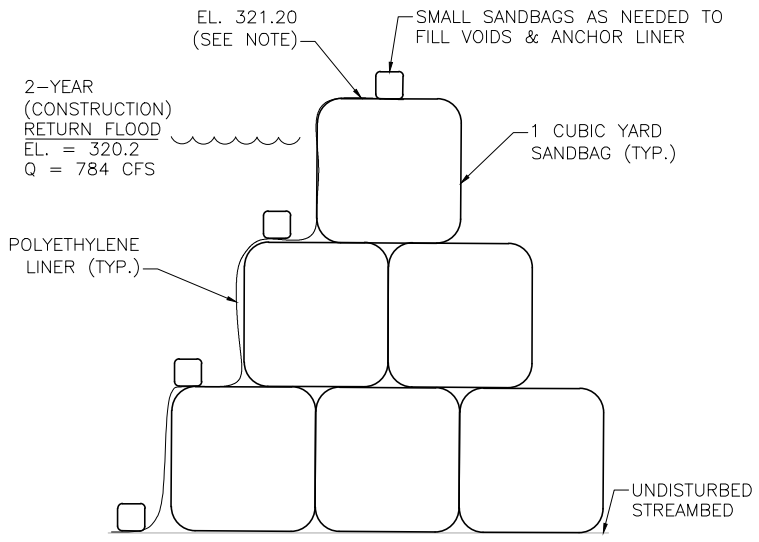
CONTROL OF WATER PLAN – EAST BANK

SCALE: 1" = 40'



CONTROL OF WATER PLAN – WEST BANK

SCALE: 1" = 40'



SANDBAG COFFERDAM

NOT TO SCALE

CONTROL OF WATER NOTES:

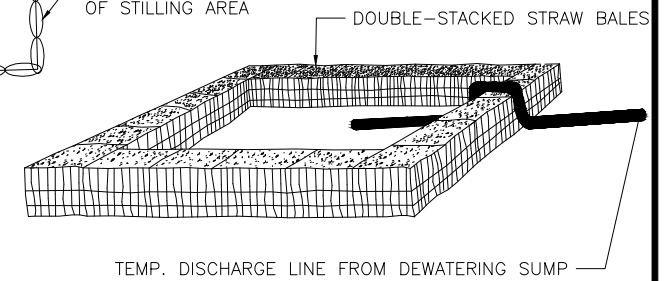
1. PROPOSED BRIDGE SUPERSTRUCTURE NOT SHOWN FOR CLARITY.
2. THE C.O.W. SYSTEM SHOW IN THESE PLANS IS CONCEPTUAL. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DESIGN OF THE CONTROL OF WATER (C.O.W.) SYSTEM AND SHALL SUBMIT A CONTROL OF WATER PLAN TO THE ENGINEER FOR APPROVAL.
3. ALL DEWATERING SHALL BE DIVERTED TO A TEMPORARY STILLING BASIN PRIOR TO BEING PUMPED BACK INTO THE STREAM. NO CONTAMINATED WATER IS PERMITTED TO ENTER THE STREAM
4. C.O.W. SYSTEM SHALL BE DESIGNED USING A 2-YEAR (CONSTRUCTION) RETURN FREQUENCY FLOOD EVENT OF 784 CFS. PROVIDED SYSTEM SHALL EXTEND 12" (MIN.) ABOVE STORM ELEVATION. IF THE C.O.W. SYSTEM WILL BE IN PLACE FOR GREATER THAN 1-YEAR, THE C.O.W. SYSTEM SHALL BE DESIGNED USING A 5-YEAR (CONSTRUCTION) RETURN FREQUENCY FLOOD EVENT OF 1290 CFS.
5. C.O.W. SYSTEM SHALL BE INSPECTED DAILY FOR WATER LEAKS OR EROSION AND REPAIR PROCEDURES SHALL BE IMPLEMENTED ACCORDINGLY.

SUGGESTED SEQUENCE OF CONSTRUCTION:

1. CONSTRUCT THE PROPOSED BRIDGE AS SHOWN ON THE STAGE CONSTRUCTION SEQUENCING PLANS.
2. FOR EACH STAGE OF CONSTRUCTION INSTALL CONTROL OF WATER SYSTEM TO SHIFT THE STREAM TO THE EAST OR WEST AS REQUIRED FOR THE GIVEN STAGE. C.O.W. SYSTEM SHALL CONSIST OF A SANDBAG COFFERDAM OR APPROVED EQUIVALENT.
3. DEWATER THE WORK AREA TO REMOVE EXISTING BOULDER/RIP RAP SCOUR PROTECTION STONES AS REQUIRED FOR CONSTRUCTION OF THE GIVEN STAGE.
4. PLACE RIPRAP SLOPE FOR SCOUR PROTECTION TO THE EXTENTS PRACTICAL FOR THAT CONSTRUCTION STAGE. RIPRAP TOE SHALL BE KEYED INTO BEDROCK.
5. SHIFT CONTROL OF WATER SYSTEM TO MOVE THE FALL RIVER FLOW TO THE EAST OR WEST AS NEEDED FOR EACH GIVEN STAGE AND REPEAT SEQUENCE.
6. REMOVE SANDBAG COFFERDAM AND RESTORE NORMAL RIVER FLOW AFTER RIPRAP SLOPES FOR ALL STAGES OF CONSTRUCTION HAVE BEEN INSTALLED.

0 40 100 160

SCALE: 1" = 40'



NOTES:
DISCHARGE TO SEDIMENTATION BASIN (AS SHOWN) OR TO SILTATION/ DEWATERING BAG SUCH AS FLOGARD DEWATERING BAG MODEL SC-DW1215Z, OR APPROVED EQUAL. SYSTEM SHOWN IS CONCEPTUAL ONLY AND IS TO BE DESIGNED BY CONTRACTOR.

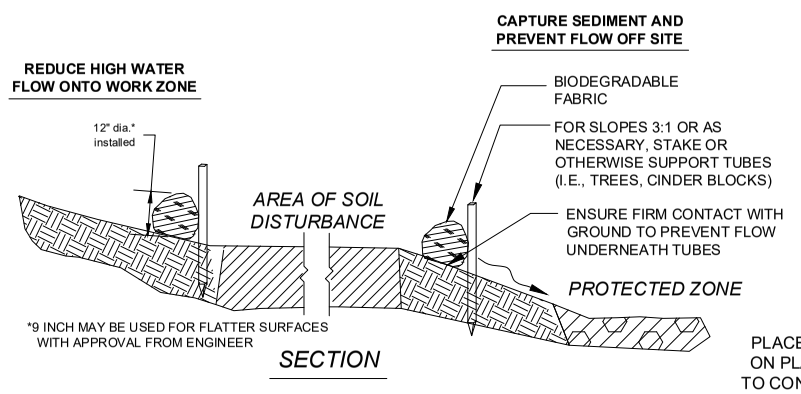
TEMPORARY STILLING AREA

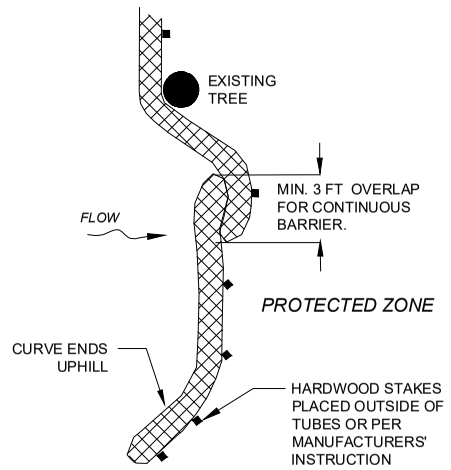
SCALE: N.T.S.

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612159_BR4(IMPACTS).DWG Plotted on 30-Oct-2025 3:27 PM





PLACE TUBE ALONG CONTOURS AND PERPENDICULAR TO FLOW.

PLACE AS CLOSE TO LIMIT OF SOIL DISTURBANCE AS POSSIBLE

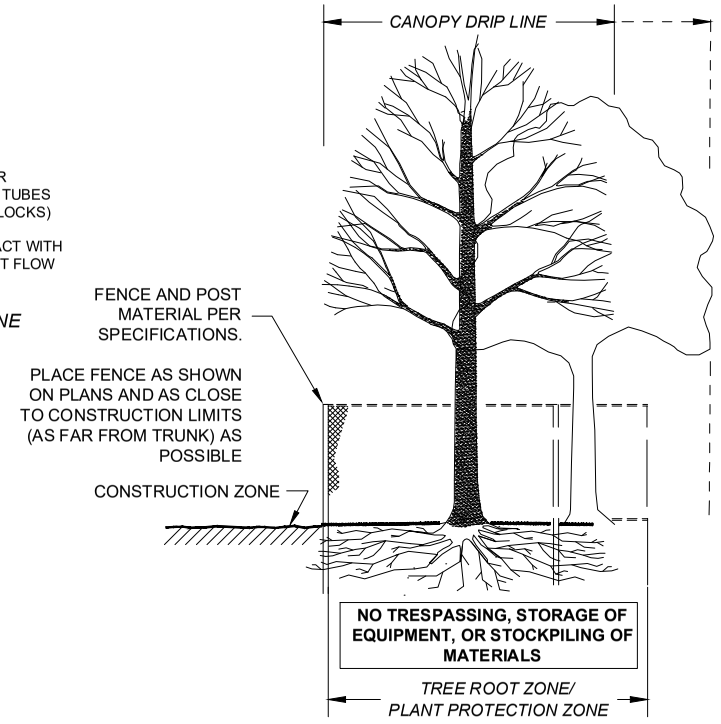
ADJUST LOCATION AS REQUIRED FOR OPTIMUM EFFECTIVENESS. DO NOT INSTALL IN WATERWAYS.

PLACE STAKES AS NEEDED TO SECURE TUBES IN PLACE.

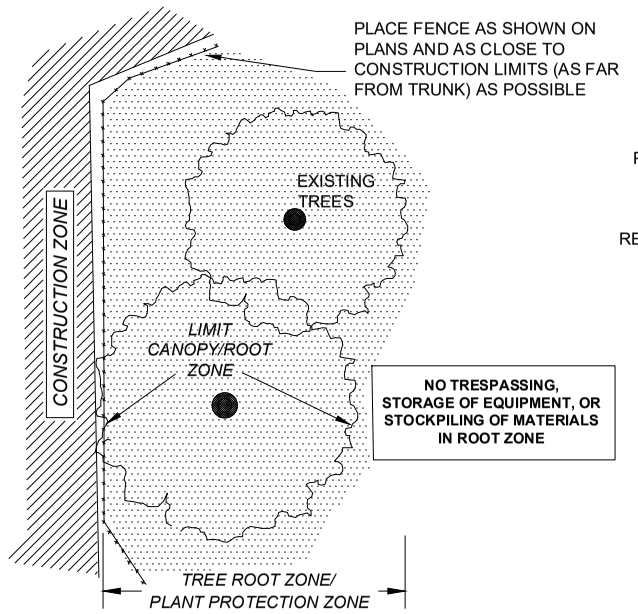
PLAN VIEW

SEDIMENT BARRIER - COMPOST FILTER TUBES

N.T.S.



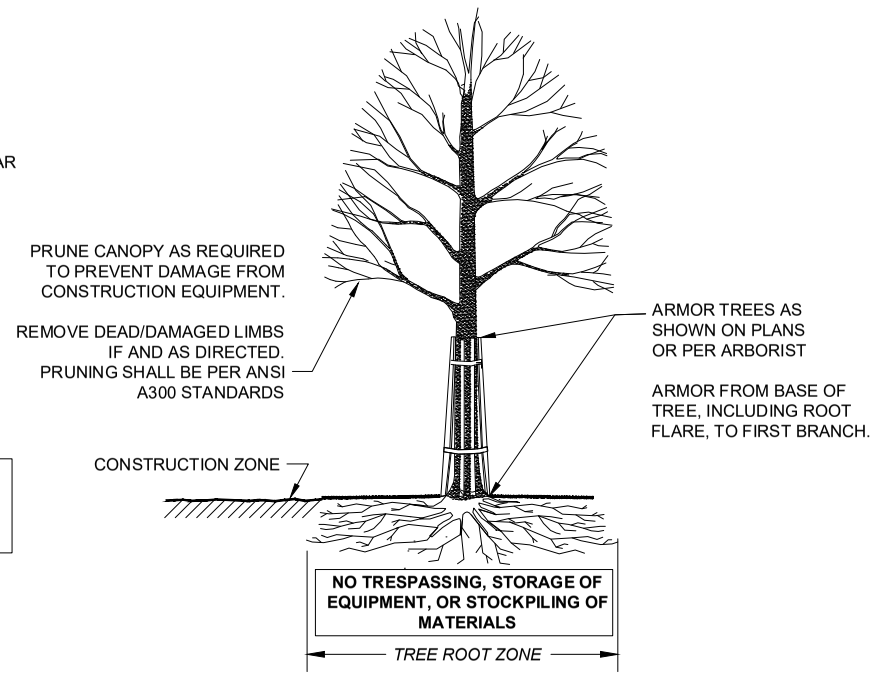
SECTION - FENCE PROTECTION OF ROOT ZONE



PLAN VIEW - FENCE PROTECTION OF ROOT ZONE

TREE PROTECTION - ROOT ZONE

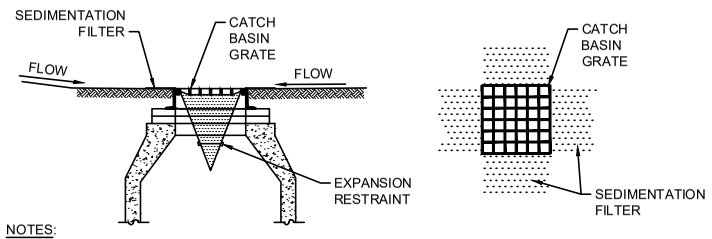
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SECTION - TRUNK ARMORING & PRUNING

TREE PROTECTION - TRUNK

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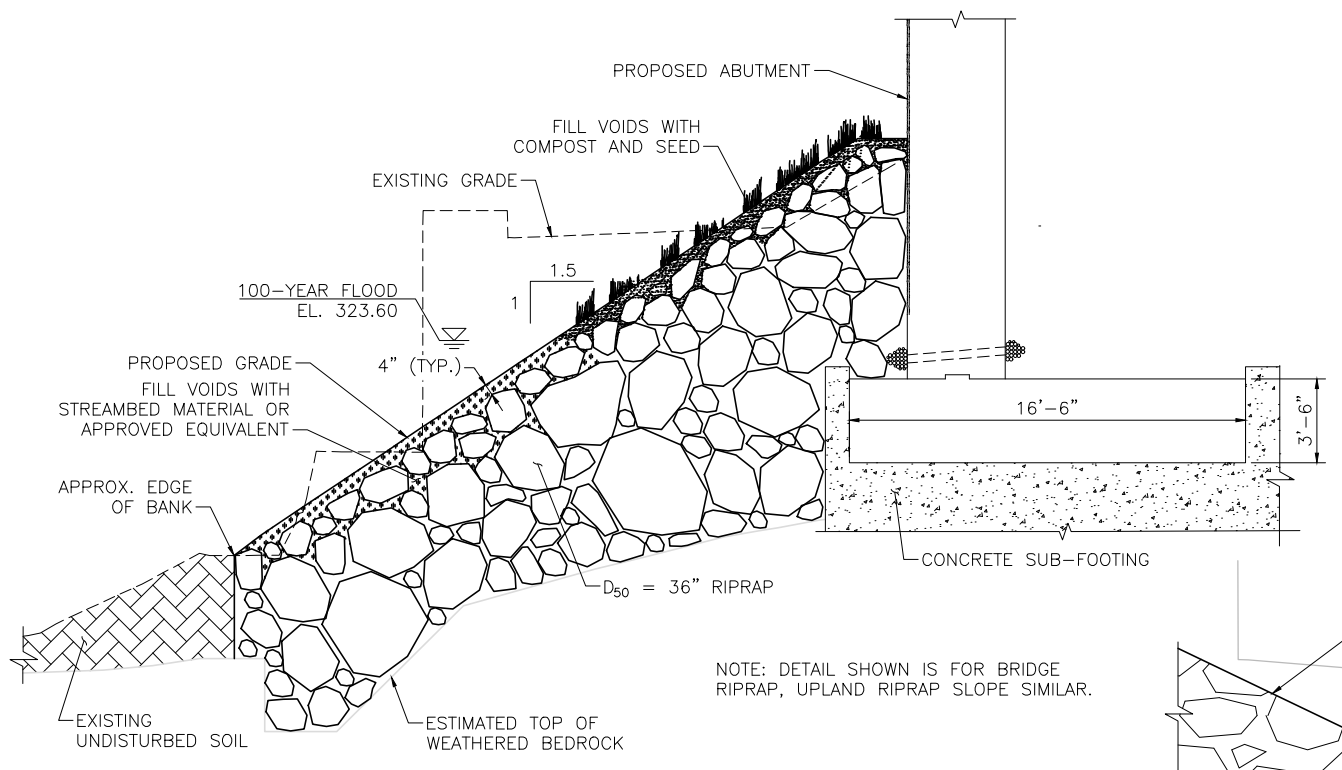


NOTES:

1. INSTALL SILT SACK IN EXISTING CATCH BASINS BEFORE COMMENCING WORK, AND IN NEW CATCH BASINS IMMEDIATELY AFTER INSTALLATION OF STRUCTURE. MAINTAIN UNTIL BINDER COURSE PAVING IS COMPLETE OR A PERMANENT STAND OF GRASS HAS BEEN ESTABLISHED.
2. GRATE TO BE PLACED OVER SILT SACK.
3. SILT SACK SHALL BE INSPECTED PERIODICALLY AND AFTER ALL STORM EVENTS AND CLEANING OR REPLACEMENT SHALL BE PERFORMED PROMPTLY AS NEEDED.

INLET SEDIMENTATION FILTER DEVICES IN CATCH BASIN

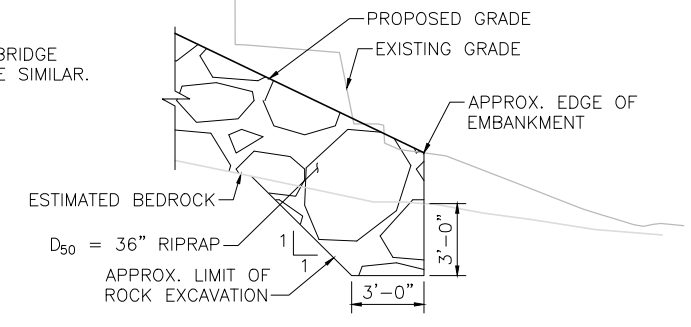
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STREAMBED RESTORATION DETAIL

N.T.S

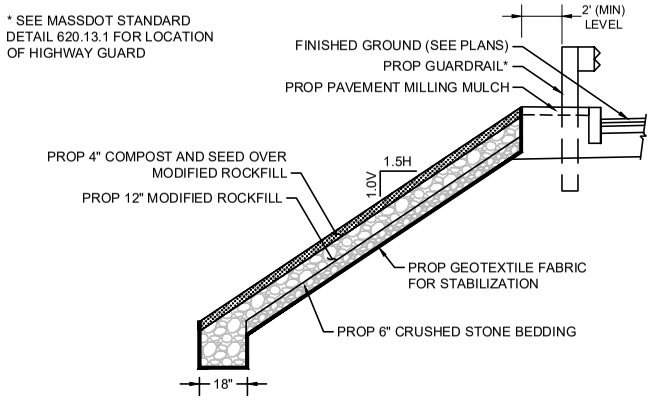
NOTE: DETAIL SHOWN IS FOR BRIDGE RIPRAP, UPLAND RIPRAP SLOPE SIMILAR.



RIPRAP TOE – AT BEDROCK

NOT TO SCALE

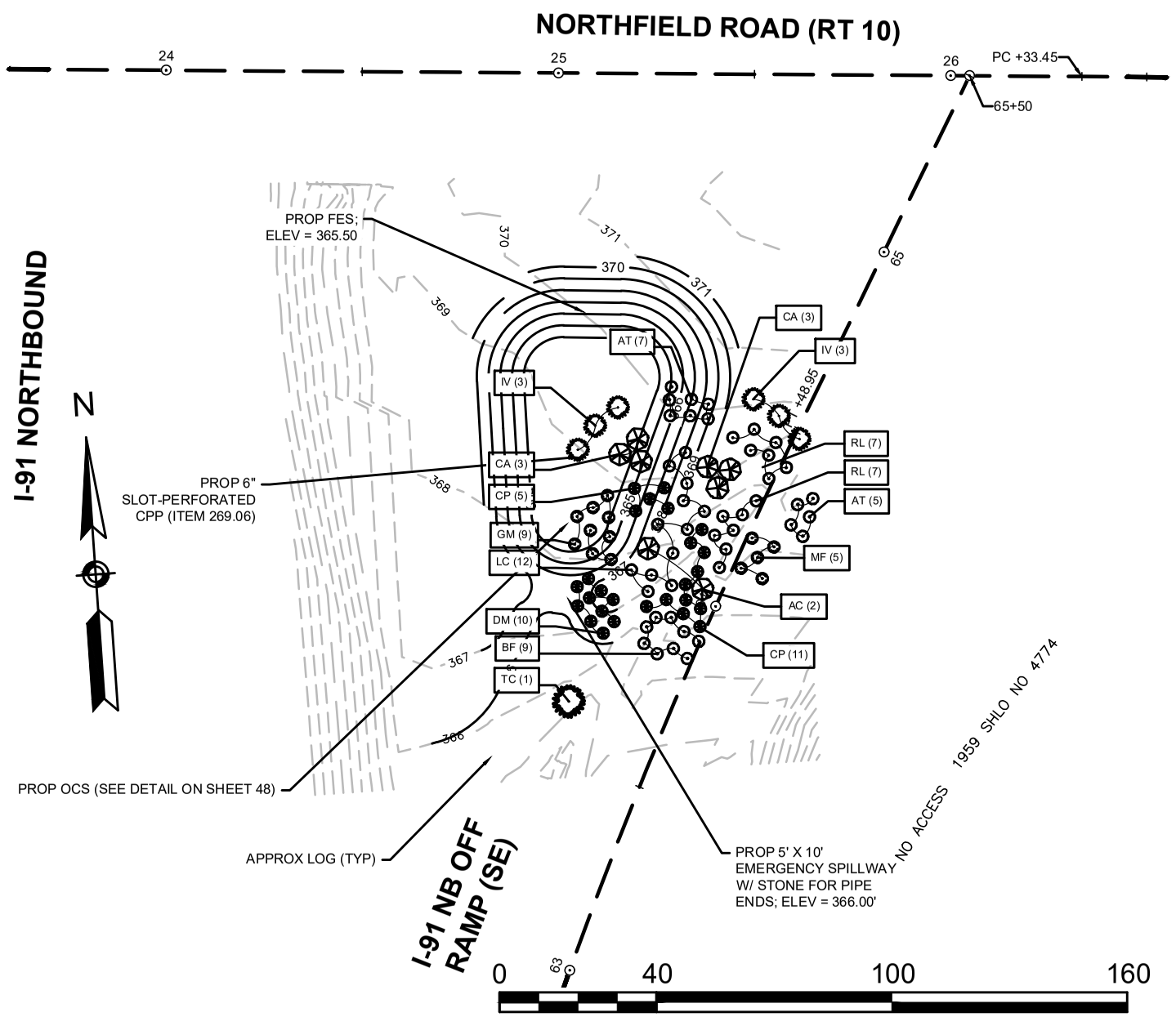
* SEE MASSDOT STANDARD DETAIL 620.13.1 FOR LOCATION OF HIGHWAY GUARD

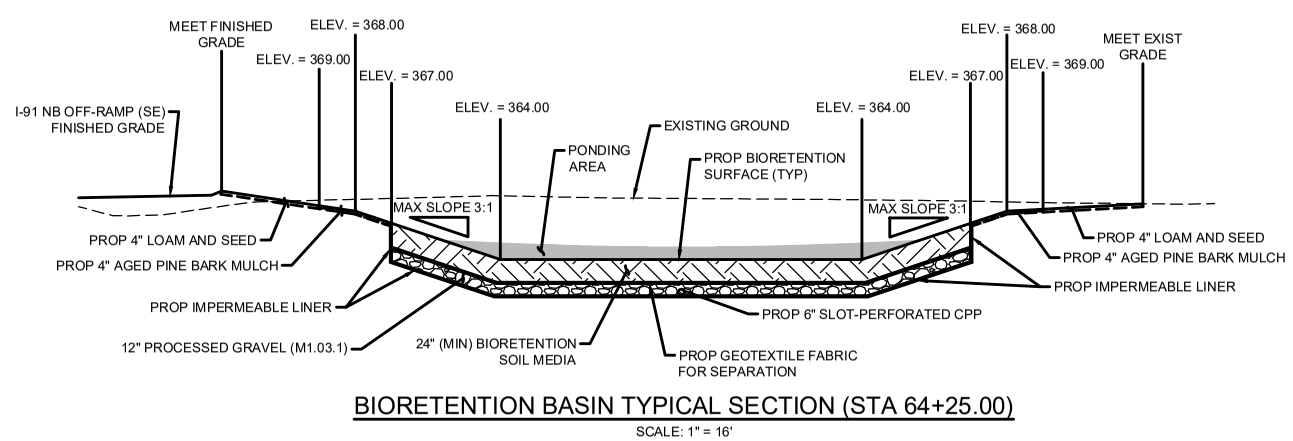


MODIFIED ROCKFILL SLOPE STABILIZATION

N.T.S.

WATER QUALITY CERTIFICATE APPLICATION
BERNARDSTON, MASSACHUSETTS
ST 10 (CHURCH ST) OVER FALL RIVER
BRIDGE B-10-001
OCTOBER 2025





BIORETENTION BASIN TYPICAL SECTION (STA 64+25.00)

SCALE: 1" = 16'

LANDSCAPE NOTES

1. UNLESS OTHERWISE NOTED, ALL EXISTING TREES AND OTHER PLANT MATERIAL ARE TO BE PROTECTED FOR THE DURATION OF THE PROJECT.
2. THE CONTRACTOR SHALL SUPPLY ALL PLANT MATERIAL IN QUANTITIES SUFFICIENT TO COMPLETE THE PLANTING PLAN AS SHOWN ON THE PLANS.
3. ALL PLANT MATERIAL TO CONFORM TO THE GUIDELINES ESTABLISHED BY THE "AMERICAN STANDARD FOR NURSERY STOCK" PUBLISHED BY THE AMERICAN ASSOCIATION OF NURSERYMEN, INC. ANSI Z60.1 - LATEST EDITION
4. ALL PLANT MATERIAL TO BE APPROVED BY THE LANDSCAPE ARCHITECT.
5. STAKE LOCATIONS OF PLANT MATERIAL FOR APPROVAL BY LANDSCAPE ARCHITECT PRIOR TO COMMENCEMENT OF WORK.

TREES							
SYMBOL		QTY	BOTANICAL NAME	COMMON NAME	SIZE	ROOT	NOTES
	TC	1	TSUGA CANADENSIS	CANADIAN HEMLOCK	7-8 FEET	BB	-

SHRUBS							
SYMBOL		QTY	BOTANICAL NAME	COMMON NAME	SIZE	ROOT	NOTES
	IV	6	ILEX VERTICILLATA	COMMON WINTERBERRY	2-2.5 FEET	BB	-
	CA	6	CLETHRA ALNIFOLIA 'SIXTEEN CANDLES'	SUMMERSWEET	2-2.5 FEET	-	-
	AC	2	AMELANCHIER CANADENSIS	DOWNY SHADBLOW	5-6 FEET	BB	MULTI-STEM

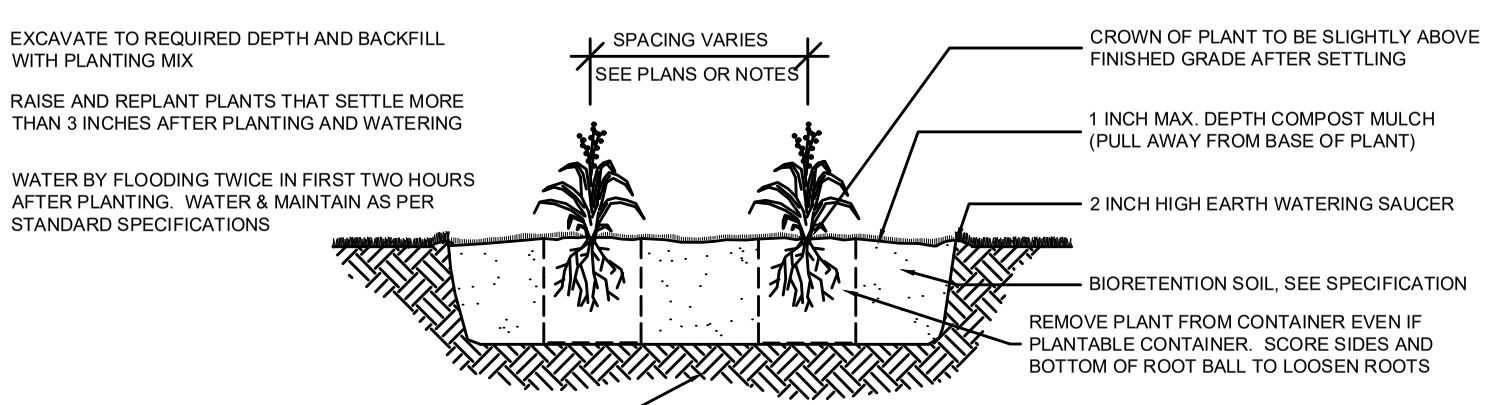
PERENNIALS AND GROUND COVERS							
SYMBOL		QTY	BOTANICAL NAME	COMMON NAME	SIZE	ROOT	NOTES
	AT	12	ASCLEPIAS TUBEROSA	BUTTERFLY MILKWEED	#1 POT	-	-
	BF	9	IRIS VERSICOLOR	BLUE FLAG IRIS	#2 POT	-	-
	GM	9	GERANIUM MACULATAM	SPOTTED CRANES BILL	#1 POT	-	-
	MF	5	MONARDA FISTULOSA	WILD BERGAMOT (BEEBALM)	#2 POT	-	-
	RL	14	RUDBECKIA LACINIATA	CUTLEAF CONEFLOWER	#2 POT	-	-
	LC	12	LOBELIA CARDINALIS	CARDINAL FLOWER	#2 POT	-	-
	DM	10	DRYOPTERIS MARGINALIS	MARGINAL WOOD FERN	#2 POT	-	-
	CP	16	CAREX PENSYLVANICA	PENNSYLVANIA SEDGE	#1 POT	-	-

SHEET 15 OF 16

WATER QUALITY CERTIFICATE APPLICATION
BERNARDSTON, MASSACHUSETTS
ST 10 (CHURCH ST) OVER FALL RIVER
BRIDGE B-10-001
OCTOBER 2025

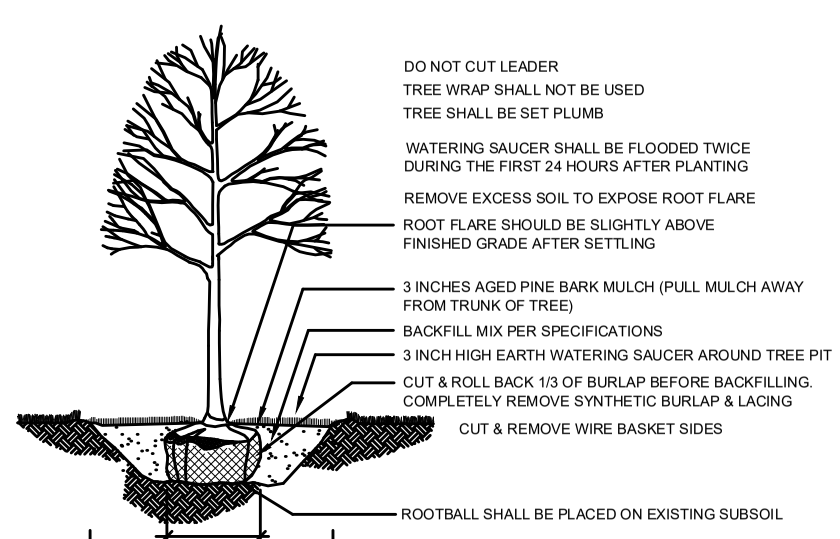
A00831 - 22

T1217.01_HD7_LANDSCAPING.DWG Plotted on 30-Oct-2025 3:29 PM
Proposal No. 6121592159-136484



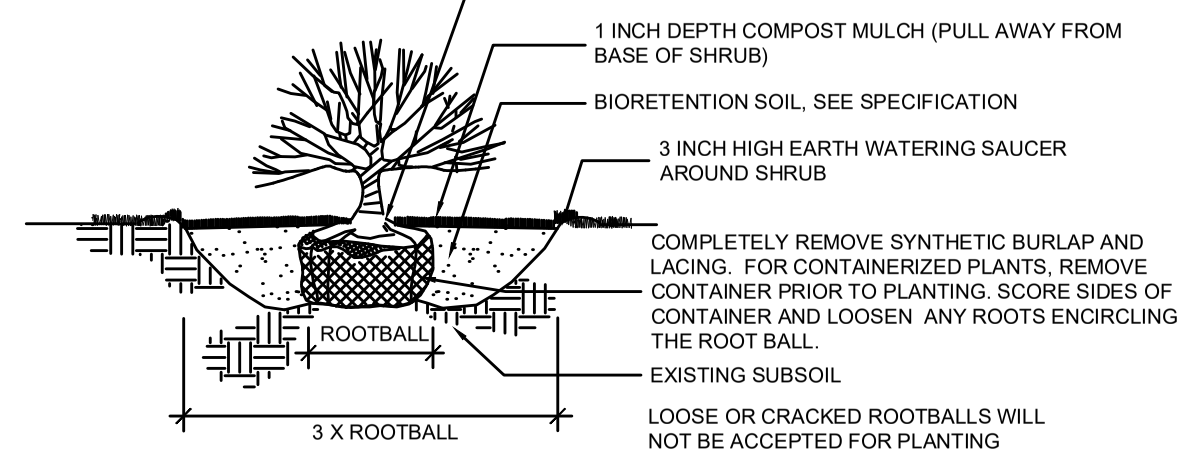
ORNAMENTAL GRASS / PERENNIAL / UNDERCOVER PLANTING

N.T.S.



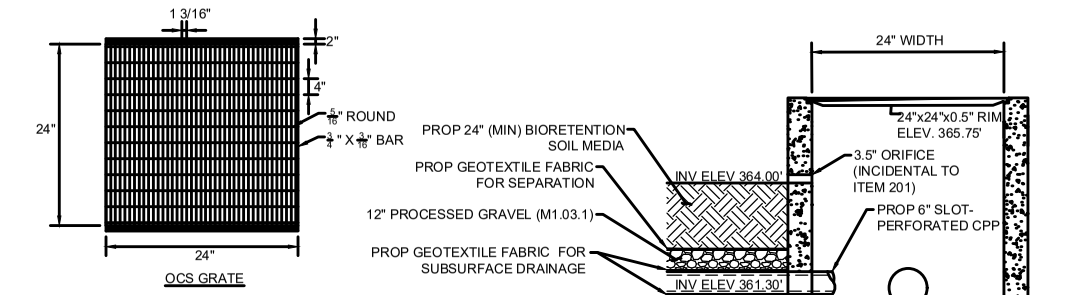
DECIDUOUS TREE PLANTING

N.T.S.



SHRUB PLANTING

N.T.S.



SECTION A-A NOTES:
1. GRATE SHALL BE 24"x24" (INNER DIMENSIONS) WITH A 2" WIDE X ¾" THICK (MIN) LIP ON TWO SIDES THAT ARE BOLTED TO THE PRECAST CONCRETE BOX STRUCTURE USING BOLTS THAT ARE 0.5" THICK X 2" LONG (MIN).
2. GRATE SHALL BE MADE OF ASTM-A36 MATERIAL WITH A GALVANIZED COATING.
3. GRATE SHALL HAVE A MINIMUM PEDESTRIAN LOAD RATING.

OUTLET CONTROL STRUCTURE (OCS)

N.T.S.

SHEET 16 OF 16

WATER QUALITY CERTIFICATE APPLICATION
BERNARDSTON, MASSACHUSETTS
ST 10 (CHURCH ST) OVER FALL RIVER
BRIDGE B-10-001
OCTOBER 2025

A00831 - 23
Proposal No. 612159-136484
T1217.01_HD7_LANDSCAPING.DWG Plotted on 30-Oct-2025 3:28 PM

Commonwealth of Massachusetts
Executive Office of Energy and Environmental Affairs
Department of Environmental Protection
Address: 100 Cambridge Street, Suite 900, Boston MA 02114 | **Phone**: 617-292-5500

Maura T. Healey	**Kim Driscoll**	**Rebecca Tepper**	**Bonnie Heiple**
Governor	Lieutenant Governor	Secretary	Commissioner

12/3/2025

Massachusetts Department of Transportation
Highway Division
10 Park Plaza, Suite 6340
Boston, MA 02116
ATTN: Lily Collins

RE: 401 WATER QUALITY CERTIFICATION
BRP WW 11, Minor Fill Project
Church St. (Route 10) Bridge Replacement over Fall River
Bernardston, MA

401 WQC Filing Number: 25-WW11-0018-APP
USACE Application No. NAE-2005-01156
MassDOT File Number: 612159

Dear Ms. Collins:

The Massachusetts Department of Environmental Protection (MassDEP) has reviewed your application for a Water Quality Certification (WQC), as referenced above. The WQC application was deemed complete on November 3,2025. In accordance with the provisions of MGL Ch. 21, §§26-53 and Section 401 of the Federal Clean Water Act as amended (33 U.S.C. §1251 et seq.), it has been determined there is reasonable assurance the proposed project will be conducted in a manner which will not violate applicable water quality standards (314 CMR 4.00) and other applicable requirements of state law.

The project proposes a full replacement of the existing bridge (No. B-10-001(12D)) that carries Church Street/Route 10 over Fall River in Bernardston, MA (the Project). The Project also includes installation of scour protection, widening along the 0.5-mile corridor to accommodate sidewalk access over I-91, realignment of the northbound exit ramp at the I-91 interchange, and Stormwater Control Measure (SCM) installation. The bridge and substructure are stated as needing replacement due to various structural deficiencies.

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The existing bridge is oriented in an east-west direction, located immediately west of the I-91 Interchange and spanning Fall River which flows from north to south . The bridge is a three-span structure with two 4.0-foot piers at a skewed distance of approximately 20-feet from the abutments. The superstructure has a width of 60 feet and a total span of 143 feet. Church Street averages a width of 50 feet, accommodating 2 lanes of traffic and merging lanes from the I-91 ramps. No sidewalks are within the project limits. A closed drainage system of 26 catch basins discharges untreated stormwater to Fall River.

A portion of the project is within a FEMA mapped 1% annual chance of flood zone (Zone AE). Fall River is identified as essential fish habitat for Atlantic Salmon (*Salmo salar*), but the U.S. Fish & Wildlife Service along with NOAA National Marine Fisheries determined that Atlantic Salmon is not present. Bordering Vegetated Wetlands (BVW) have been identified immediately north and south of the project limits of the bridge crossing. Two additional BVWs have been delineated within the project limits; one within the I-91 southbound on-ramp and one within the I-91 northbound off-ramp.

The Project will fully replace a structurally deficient three span bridge with a new single span structure along a similar horizontal and vertical alignment. Both existing piers and abutments will be removed as part of the bridge replacement. The replacement bridge will have a span of 100 feet and a width of 64 feet. New concrete abutments will be constructed behind the existing piers and in front of the existing abutments, outside of Fall River. Access for demolition and construction will be provided with an access road on the west side of the river and a temporary trestle. For scour protection, riprap installation is proposed around the new abutments as well as the slope along the eastern side of the river, north of the bridge span. Full-depth pavement reconstruction and widening of the 0.5-mile corridor will allow for the installation of a sidewalk. Additionally, the northbound exit ramp at the I-91 interchange has been re-aligned to reflect current MassDOT standards regarding pedestrian safety. A total of 35 cubic yards of material is proposed to be dredged. All dredging will occur within water control structures and will be properly dewatered.

In total, 3,110 square feet (sf) of temporary and 331 sf of permanent impacts to Land Under Water (LUW) is required to complete the project. Bulk sandbag cofferdams will be installed within Fall River and dewatered to create dry working conditions while maintaining flow. These dewatered areas will be utilized to install the abutments and scour protection on each slope. The scour protection installation will primarily occur above ordinary high water with some within LUW accounting for the permanent impacts.

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Natural streambed material will be installed atop the riprap to fill voids within the riprap. A fluvial geomorphologist is proposed to be on site for restoration of the impacted streambed.

An alternatives analysis was completed in accordance with 314 CMR 9.00. MassDOT has stated that the existing bridge is structurally deficient and presents a risk to driver safety due to a potential bridge failure; therefore, a no-build alternative is not practicable to meet project goals. Three alternatives were considered, with the chosen alternative meeting stream crossing standards and minimizing impacts to LUW.

The Project meets the Stormwater Management Standards to the maximum extent practicable (MEP) per 314 CMR 9.06(6). The widening of the bridge and 0.5-mile corridor will increase impervious surface within the Project limits by 5,901 sf. During the course of project review, MassDOT revised the project to include a bioretention area to be located south of Church St and just west of the I-95 northbound off-ramp. Twenty-six catch basins within the project limits will be replaced with deep sump catch and two leaching basins will be installed to meet the Stormwater Management Standards to the MEP as a redevelopment project.

Despite decreasing the overall span, the new structure will still fully comply with stream crossing standards. The removal of the two piers will improve upon existing conditions.

Based on a review of information provided by the applicant, MassDEP finds that this project complies with the standards described under 314 CMR 9.06. Public notice was provided in the Greenfield Recorder on July 14, 2025. No comment letters were received during the public comment period.

Therefore, based on information currently in the record, MassDEP grants a WQC for this project subject to the following conditions to maintain water quality, to minimize impact on waters and wetlands, and to ensure compliance with appropriate state law. The Department further certifies in accordance with 314 CMR 9.00 that there is reasonable assurance the project or activity will be conducted in a manner which will not violate applicable water quality standards (314 CMR 4.00) and other applicable requirements of state law. Finally, the Department has determined that upon satisfying the conditions and mitigation requirements of this approval, the project provides a level of water quality necessary to protect existing uses and accordingly finds that the project to be implemented satisfies the Surface Water Quality Standards at 314 CMR 4.00.

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Pursuant to 314 CMR 9.09(1)(d); 314 CMR 9.06(6)(a); 310 CMR 9.06(2); 314 CMR 9.07; 314 CMR 9.07(1); 314 CMR 9.09(7)(5)(c); 314 CMR 9.11; and 314 CMR 9.09(1)(e), the following Special Conditions are necessary to ensure that construction practices and stormwater controls are implemented in such a manner as to prevent degradation to wetlands and waters; ensure that practicable steps have been taken which will avoid and minimize impacts to wetlands and waters; minimize turbidity and sediment caused by construction activities; ensure that water quality is not degraded, and that biology of the waters are not negatively impacted by potential discharges; and/or maintain a record of the dredged material for reference and to ensure accountability in its transportation.

Those Special Conditions that require direct submittals to MassDEP for either review, or review and approval, are denoted by the following notation (Submittal) at the end of the condition and are summarized in Attachment A. In addition, those conditions with the (Submittal) designation shall be included in the Special Provisions and, as applicable, reviewed at the Pre-Construction Meeting.

1. All work shall be performed in accordance with the following documents and plans:

    a. Application for Water Quality Certification. “Bridge Replacement, Bridge No. B-10-001(12D), Bernardston, MA” Prepared by TEC Inc. on behalf of MassDOT, dated July 2025, with cover letter and attachments. 401 WQC Filing Number: 25-WW11-0018-APP.

    b. MassDEP Technical Review. 401 Water Quality Certification, Minor Fill Project Certification. Church Street (Route 10) Bridge Replacement over Fall River in Bernardston, MA. Dated July 31, 2025.

    c. Responses to MassDEP Technical Review. Prepared by TEC Inc. on behalf of MassDOT. 401 Water Quality Certification, Minor Fill Project Certification. Church Street (Route 10) Bridge Replacement over Fall River in Bernardston, MA. Dated September 5, 2025.

    d. MassDEP Supplemental Technical Review. 401 Water Quality Certification, Minor Fill Project Certification. Church Street (Route 10) Bridge Replacement over Fall River in Bernardston, MA. EMAIL Dated September 16, 2025.

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e. Responses to MassDEP Supplemental Technical Review. Prepared by TEC Inc. on behalf of MassDOT. 401 Water Quality Certification, Minor Fill Project Certification. Church Street (Route 10) Bridge Replacement over Fall River in Bernardston, MA. EMAIL Dated September 26, 2025.

f. Revised Permit Cover Letter. Prepared by TEC Inc. on behalf of MassDOT. Dated October 31, 2025.

g. Revised Stormwater Management Report. Prepared by TEC Inc. on behalf of MassDOT. Dated May 23, 2024 (Revised October 30, 2025).

h. Revised Permit Plans. Prepared by TEC Inc. on behalf of MassDOT. Dated October 30, 2025.

i. DOT Specification Number 698.99 (Impermeable Liner)

j. DOT Specification Number 753.1 (Bioretention Soil)

Pre-Construction

2. A qualified **Fluvial Geomorphologist** (FGM) with a minimum of five years of relevant professional experience in stream replication and restoration projects shall be employed to oversee all LUW replication and restoration activities as proposed in the WQC application and as approved herein. The name, contact information, and qualifications of the FGM shall be provided to MassDEP for review and approval with a copy to the Bernardston Conservation Commission prior to the Pre-Construction Meeting required in Condition 5. The FGM shall either attend the Pre-Construction Meeting or a separate virtual or onsite meeting with MassDEP, MassDOT, and the Contractor prior to any LUW replacement or restoration work. **(Submittal)**

3. One individual with at least three years of experience with construction period erosion and sedimentation controls shall be employed to be responsible for CP/PP inspections (CP/PP Inspector). The name, contact information, and qualifications of the CP/PP Inspector shall be provided to MassDEP for review and approval with a copy to the Bernardston Conservation Commission prior to the Pre-Construction Meeting required in Condition 5. **(Submittal)**

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4. Prior to the Pre-Construction Meeting required in Condition 4, the applicant shall provide MassDEP with the name and contact information of the Resident Engineer (RE) responsible for ensuring that all work complies with the conditions of this WQC. **(Submittal)**

5. A minimum of 21 days prior to the start of ground disturbance or vegetation clearing, MassDOT shall contact MassDEP to schedule an onsite Pre-Construction Meeting to review the approved plans and terms and conditions of this WQC. The RE, the construction contractor (Contractor), a representative from the MassDOT Environmental Section and/or the District Environmental Engineer shall attend the Pre-Construction Meeting. **No work shall commence prior to the Pre-Construction Meeting.**

6. MassDEP shall be copied on applicable submittals to the U.S. Army Corps of Engineers (USACE). These include but are not limited to: Self-Verification Notification Form (SVNF); Pre-Construction Notification (PCN); Work-Start Notification Form; Mitigation Work-Start Notification Form; and Compliance Certification Form. The Work-Start Notification Form shall be submitted at least 14 days before the anticipated start of work and the Compliance Certification Form shall be submitted within 30 days following the completion of the authorized work. **(Submittal)**

7. A CP/PP shall be developed and implemented as required by 314 CMR 9.06(6)(a)8. A minimum of 14 days prior to the start of work, MassDOT shall submit the CP/PP for review and approval. If the U.S. Environmental Protection Agency (EPA) Construction General Permit (CGP) applies, the Stormwater Pollution Prevention Plan (SWPPP) may serve as the CP/PP, providing it includes the measures required to be in the CP/PP per these Special Conditions, in addition to the measures specifically required by the CGP. Any subsequent changes to the approved CP/PP (defined herein as including the construction period SWPPP if applicable) must be approved by MassDEP. **(Submittal)**

8. Training regarding erosion and sedimentation controls is required. The CP/PP Inspector and any other relevant personnel responsible for erosion and sedimentation controls shall complete the EPA CGP Inspector Training, or other training that meets the CGP requirements, as well as complete a comprehensive

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review of the approved CP/PP. Proof of completion of the training shall be submitted to MassDEP prior to the start of work. **(Submittal)**

9. The CP/PP shall identify, but shall not be limited to, staging and laydown areas in relation to BVWs and LUW, proposed dewatering methods and locations, proposed stockpile locations and their proximity to catch basins or other drainage conveyances that discharge to wetland resource areas, and the location of construction-period erosion and sedimentation controls. Stockpiles shall be located no less than 50 feet from BVWs, LUW, catch basins, or other drainage conveyances that discharge to BVWs or LUW.

10. A minimum of 14 days prior to the start of work, MassDOT shall submit a Control of Water Plan for review and approval. The Plan shall include a description of proposed methods to isolate and dewater work areas within streams while maintaining stream flow, including but not limited to the method of isolation (e.g., steel sheeting or sandbag cofferdam), dewatering methods and locations and specifications for stream bypass systems as applicable. The Control of Water Plan shall include a plan depicting BVW and LUW boundaries, and the location of all relevant methods and materials which shall be located within the BVW and LUW impact areas approved herein. The plan shall meet the requirements of the CP/PP and be specific to the Project. Dewatering and stream bypasses shall be conducted under the supervision of the RE or other project staff with knowledge of these practices and comply with the applicable conditions identified herein. **(Submittal)**

11. Prior to the start of work, approved erosion and sedimentation control measures shall be installed per the approved CP/PP and as applicable, the manufacturer specifications. Erosion and sedimentation control measures may consist of, but are not limited to, silt fence, staked straw bales, silt/turbidity curtains, compost filter tubes, etc.

12. Prior to the Pre-Construction Meeting, the boundaries of BVWs and LUW shall be re-flagged where they are within 50 feet of the limits of work. All boundary markers, once in place, shall remain in place throughout construction until all disturbed surfaces have been permanently stabilized. Boundary markers shall be fully evaluated annually and refreshed where needed. Implementation of and

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compliance with this requirement shall be documented by the RE. All construction personnel shall be made aware of these markers.

13. Prior to any work within the 1% annual chance of flooding zone within Project limits, including mobilization or storage of equipment and materials, a Flood Contingency Plan shall be submitted to MassDEP for review and approval that includes at a minimum the following information and provisions: **(Submittal)**

    a. The RE and/or Contractor shall monitor the National Weather Service forecast daily, and upon issuance of a flood watch or flood warning for the Project area, the Flood Contingency Plan shall be implemented.

    b. Upon implementation of the Flood Contingency Plan, all construction equipment and materials located below the Base Flood Elevation (BFE) shall be removed and placed in an upland location above the BFE and outside of BVW and LUW.

    c. Anchored stationary equipment may remain below the BFE if demonstrated to be required and upon written approval from MassDEP. In the event semi-stationary equipment cannot be feasibly removed before the arrival of the storm, they shall be adequately secured and MassDEP shall be notified prior to the storm.

    d. A requirement to inspect and maintain all erosion and sedimentation controls, and stabilize all exposed soils as needed below the BFE prior to the storm shall be included.

    e. A plan depicting at a minimum, but not limited to, BVW and LUW boundaries, the Project limits, and the BFE boundary based on ground elevations shall be included.

    f. Staff and materials must be available 24 hours per day, seven days per week to implement the Flood Contingency Plan. The name, affiliation, title, email address, and phone number of each person responsible for implementing the Flood Contingency Plan shall be included.

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g. No work shall commence until the flood watch or flood warning has ended, all areas below the BFE have been inspected, and erosion and sedimentation controls are maintained as needed.

14. The Contractor shall develop an Invasive Plant Management Strategy (IPMS) to be submitted to MassDEP for review and approval prior to the Pre-Construction Meeting. The IPMS shall be implemented as approved. **(Submittal)**

15. If needed, use of herbicides to control invasive species shall be implemented in accordance with the approved IPMS and with the following requirements:

    a. Herbicides shall only be applied by an individual with a current Massachusetts Applicator License;

    b. Only herbicides listed on the Massachusetts Department of Agriculture Rights of Way Sensitive Areas Materials List shall be applied to the targeted area/species;

    c. The manufacturer's label directions must be followed;

    d. Herbicide application shall use no more than the minimum application rate of the herbicide product for the appropriate site, species and application method; and
    e. Applicants may need to obtain a BRP WM04 Herbicide Permit from the MassDEP Wetlands Program, Dredge Unit before applying herbicides in wetlands and shall consult with the Dredge Unit regarding the applicability of a WM04 permit and shall obtain such permit if required by MassDEP. A WM04 permit is required for chemical application to open water bodies and wetlands.

16. A minimum of 21 days prior to the start of demolition work, a Demolition Plan shall be submitted for review and approval describing how the existing bridge will be demolished and what measures will be taken to ensure that demolition material, including but not limited to any pollutants, construction debris, toxic or hazardous substances, and airborne dust, is properly contained and does not enter Fall River. **(Submittal)**

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17. Final Construction Plans (the plans provided to the Contractor) shall be submitted for review at least 30 days prior to the Pre-Construction Meeting. Sufficient supporting information, explanation, and documentation shall be provided to MassDEP and the Bernardston Conservation Commission outlining any deviations from the plans approved herein, and MassDEP may at its discretion require additional supporting documentation as a condition of review. The updated set of plans shall become the "Final Plan of Record." The Plan shall be prepared and signed by a Professional Engineer in the Commonwealth of Massachusetts and shall incorporate all revisions and additions to the original plans that have been approved as discussed herein. **(Submittal)**

Construction Period

18. As noted on Sheet 14 of 16 of the project plans dated October 30, 2025, modified rock fill shall extend to the upstream riprap area shown on Sheet 3 of 16.

19. No more than **331 sf** of permanent and **3,110 sf** of temporary impacts to LUW shall occur. All work shall avoid unapproved impacts to BVW and LUW.

20. Under the direction of the CP/PP Inspector, inspection and maintenance of erosion and sediment controls in active work areas may be performed by both the Contractor and RE or other MassDOT project staff. Maintenance is the responsibility of the Contractor; however, the permittee shall be ultimately responsible for erosion and sedimentation control failure. The RE and/or contractor shall immediately notify MassDEP and the Bernardston Conservation Commission if any unauthorized discharges to BVWs or LUW occur.

21. CP/PP inspections shall occur at least once every seven calendar days and within 24 hours of a storm event that produces 0.5 inches or more of rain within a 24-hour period, or at a more stringent frequency if the CP/PP requires.

22. Copies of CP/PP Inspection and Maintenance Log Forms shall be submitted to MassDEP within 14 days upon request.

23. Disturbed areas shall be stabilized immediately after activities have permanently ceased or will be temporarily inactive for 14 or more calendar days. The installation

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of stabilization measures shall be implemented as soon as practicable, but no later than 14 calendar days after disturbed areas have been inactive.

24. Work within LUW shall be conducted in low or no-flow conditions to the extent practicable. Notice shall be provided to MassDEP and the Bernardston Conservation Commission within 24 hours prior to the commencement of dewatering. Dewatering methods and location(s) shall be approved by the RE or other project staff with knowledge of these practices prior to use to ensure consistency with the approved Control of Water Plan, and shall be documented in the CP/PP. There shall be no discharge of untreated dewatered stormwater or groundwater to BVWs or LUW. Any discharges shall be visibly free of sediment.

25. Additional erosion and sedimentation control materials shall be stored on-site at all times for emergency and routine replacement. Materials shall be kept covered, dry, and accessible at all times. The CP/PP Inspector shall be responsible for anticipating the need for and installation of additional erosion and sedimentation controls and shall have the authority to require additional erosion control measures to protect wetland resource areas beyond what is shown on the plans if field conditions or professional judgment dictate that additional protection is necessary.

26. The Contractor shall monitor the National Weather Service forecast for updates, and upon issuance of a flood watch for the 1% annual chance of flooding zone, shall implement the flood contingency plan referenced in Condition 12.

27. Any storm drains with potential to receive discharge from stockpiled materials or construction operations shall be managed to inhibit the inflow of sediment while not increasing the likelihood of roadway flooding during periods of precipitation. The CP/PP shall specify measures to implement this. Filter fabric stretched under storm drain inlet grates are not acceptable for this purpose.

28. Stockpiles shall be located no less than 50 feet from BVWs, LUW, catch basins, or other drainage conveyances that discharge to BVWs or LUW.

29. The contractor shall have designated washout areas for concrete equipment that will be comprised of impermeable material and sized to contain project concrete wastes and wash water. Concrete wash-out areas shall be located no less than 50

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feet from BVWs, LUW, and catch basins or other drainage conveyances that discharge directly or indirectly to BVWs or LUW.

30. Refueling, washing, and cleaning of vehicles and other construction equipment shall not take place within 50 feet of BVWs or LUW and any wash water shall be contained such that it does not drain toward BVWs or LUW. MassDEP shall explicitly approve in writing any deviation to this condition for oversized stationary vehicles.

31. The contractor shall have spill containment kits on site. In the event of a release of fuels and/or oils, the local fire department, MassDEP Emergency Response and MassDEP Wetlands Program Highway Unit shall be immediately contacted, and in addition, the MassDEP Bureau of Waste Site Cleanup shall be notified per the requirements of the Massachusetts Contingency Plan, 310 CMR 40.0000.

32. Construction vehicles or other vehicles or heavy equipment are prohibited from traversing over the proposed infiltration Stormwater Control Measures (SCMs) to avoid compaction of soils during construction. These areas shall be demarcated by silt fence with signage, or high visibility fencing. If access through the location of an infiltration SCM is unavoidable, MassDOT shall request written approval from MassDEP.

33. Construction vehicles and equipment shall not enter the BVW or LUW unless authorization is provided by way of this permit or amendment. The Contractor shall use equipment with boom reach capabilities and other measures to avoid inadvertent impacts to jurisdictional resource areas as a result of excavation, riprap placement, and/or bridge/pier demolition materials.

34. A temporary shielding or containment system shall be in place beneath the bridge structure prior to removal and concrete excavation to prevent debris from falling into the water below. In the event that any debris accidentally Fall River, it shall be immediately retrieved. Notice shall be provided to MassDEP if debris enters the river and that it has been removed with photo-documentation (if practicable) submitted by email.

Stream Mitigation

The Commonwealth of Massachusetts
Department of Environmental Protection

Address: 100 Cambridge Street, Suite 900, Boston, MA 02114
Phone: 617-292-5500

35. The FGM shall oversee all LUW restoration. Placement of streambed materials shall take place in no- or low-flow conditions. The Control of Water Plan required in Condition 9 shall include measures to create no-flow conditions for this work such as a pump bypass system or other dewatering method, if needed. Placement of streambed materials during greater than low-flow conditions shall require a placement plan, with a narrative describing turbidity control measures, submitted to MassDEP for review and approval.

36. A minimum of 14 days prior to installation of the streambed materials, the FGM shall meet with the contractor to determine the suitability of stockpiled streambed material for reuse and whether there is sufficient stockpiled material to complete streambed restoration.

37. Water shall be slowly introduced back into the restored and dewatered LUW work areas as to not cause erosion and sedimentation. This work shall be overseen by the FGM. The FGM shall provide final approval of the streambed restoration upon re-wetting of banks and removal of water controls (photographs will suffice unless otherwise determined by the FGM).

38. Upon completion of the LUW restoration, the FGM shall provide photographs and a summary of the completed work to MassDEP and the Bernardston Conservation Commission. **(Submittal)**

39. MassDEP reserves the right to determine the success or failure of the LUW replication areas and reserves the right to require additional measures deemed necessary to promote success.

Post-Construction

40. All temporary erosion and sedimentation controls shall be removed at the conclusion of work once the surrounding area has achieved final stabilization.

41. Mulch used as an erosion or sedimentation control may be spread in upland areas at a depth that will not inhibit vegetative growth and shall not be spread in BVWs or LUW.

General Conditions

The Commonwealth of Massachusetts
Department of Environmental Protection

Address: 100 Cambridge Street, Suite 900, Boston, MA 02114
Phone: 617-292-5500

42. Any proposed plan changes or amendment requests, as well as any required submittals shall be sent by email for review and approval to heidi.davis@mass.gov and tyler.lewis@mass.gov. **(Submittal)**

43. This WQC remains in effect for the same duration as the Section 404 permit that requires it.

44. No Special Condition set forth herein shall be construed or operate to prohibit MassDEP from taking enforcement against MassDOT or its contractors for any failure to comply with the terms and requirements of this WQC.

45. No activity authorized by this WQC may begin prior to expiration of the 21-day appeal period, or until a final decision is issued by MassDEP in the event of an appeal.

Failure to comply with this Certification is grounds for enforcement, including civil and criminal penalties, under MGL Ch. 21 §42, MGL Ch. 21A §16, or other possible actions/penalties as authorized by the General Laws of the Commonwealth.

This Certification does not relieve the applicant of the obligation to comply with other appropriate state or federal statutes or regulations.

NOTICE OF APPEAL RIGHTS

a.) Appeal Rights and Time Limits

Certain persons shall have a right to request an adjudicatory hearing concerning certifications by MassDEP when an application is required: (a) the applicant or property owner; (b) any person aggrieved by the decision who has submitted written comments during the public comment period; (c) any ten (10) persons of the Commonwealth pursuant to M.G.L. c.30A where a group member has submitted written comments during the public comment period; or (d) any governmental body or private organization with a mandate to protect the environment which has submitted written comments during the public comment period. Any person aggrieved, any ten (10) persons of the Commonwealth, or a governmental body or private organization with a mandate to protect the environment may appeal without having submitted written comments during the public comment period only when the claim is based on new substantive issues arising from material changes to the scope or impact of the activity and not apparent at the time of

The Commonwealth of Massachusetts
Department of Environmental Protection

Address: 100 Cambridge Street, Suite 900, Boston, MA 02114
Phone: 617-292-5500

public notice. To request an adjudicatory hearing pursuant to M.G.L. c.30A, § 10, a Notice of Claim must be made in writing, provided that the request is made by certified mail or hand delivery to MassDEP, with the appropriate filing fee specified within 310 CMR 4.10 along with a DEP Fee Transmittal Form within twenty-one (21) days from the date of issuance of this Certificate, and addressed to:

Case Administrator
Department of Environmental Protection
100 Cambridge Street, 9th Floor
Boston, MA 02114

A copy of the request shall at the same time be sent by certified mail or hand delivery to the Department of Environmental Protection at:

Department of Environmental Protection
Wetlands Program, Highway Unit
100 Cambridge Street, 8th floor
Boston, MA 02114

b.) Contents of Hearing Request

A Notice of Claim for Adjudicatory Hearing shall comply with MassDEP's Rules for Adjudicatory Proceedings, 310 CMR 1.01(6), and shall contain the following information pursuant to 314 CMR 9.10(3):

1. the 401 Certification Transmittal Number;
2. the complete name of the applicant and address of the project;
3. the complete name, address, and fax and telephone numbers of the party filing the request, and, if represented by counsel or other representative, the name, fax and telephone numbers, and address of the attorney;
4. if claiming to be a party aggrieved, the specific facts that demonstrate that the party satisfies the definition of "aggrieved person" found at 314 CMR 9.02;
5. a clear and concise statement that an adjudicatory hearing is being requested;
6. a clear and concise statement of (1) the facts which are grounds for the proceedings, (2) the objections to this Certificate, including specifically the manner in which it is alleged to be inconsistent with the MassDEP's Water Quality Regulations, 314 CMR 9.00, and (3) the relief sought through the adjudicatory

The Commonwealth of Massachusetts
Department of Environmental Protection

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Phone: 617-292-5500

hearing, including specifically the changes desired in the final written Certification; and

7. a statement that a copy of the request has been sent by certified mail or hand delivery to the applicant, the owner (if different from the applicant), the conservation commission of the city or town where the activity will occur, the Department of Conservation and Recreation (when the certificate concerns projects in Areas of Critical Environmental Concern), the public or private water supplier where the project is located (when the certificate concerns projects in Outstanding Resource Waters), and any other entity with responsibility for the resource where the project is located.

c.) Filing Fee and Address

The hearing request along with a DEP Fee Transmittal Form and a valid check or money order payable to the Commonwealth of Massachusetts in the amount of one hundred dollars ($100) must be mailed to:

Commonwealth of Massachusetts
Department of Environmental Protection
Commonwealth Master Lockbox
PO Box 4062
Boston, MA 02211

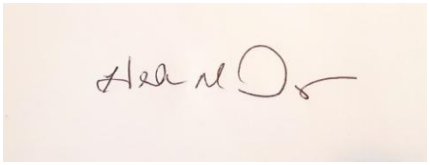
The request will be dismissed if the filing fee is not paid, unless the appellant is exempt or granted a waiver. The filing fee is not required if the appellant is a city or town (or municipal agency), county, or district of the Commonwealth of Massachusetts, or a municipal housing authority. MassDEP may waive the adjudicatory hearing filing fee pursuant to 310 CMR 4.06(2) for a person who shows that paying the fee will create an undue financial hardship. A person seeking a waiver must file an affidavit setting forth the facts believed to support the claim of undue financial hardship together with the hearing request as provided above.

Should you have any questions relative to this permit, please contact myself or at heidi.davis@mass.gov and Tyler Lewis tyler.lewis@mass.gov.

Very truly yours,

The Commonwealth of Massachusetts
Department of Environmental Protection

Address: 100 Cambridge Street, Suite 900, Boston, MA 02114
Phone: 617-292-5500



Heidi M. Davis
Highway Unit Supervisor

Ecc: DEP WERO – Michael McHugh
MassDOT – Melissa Lenker
MassDOT – Courtney Walker
MassDOT – Michael Joa
USACE – Dan Vasconcelos
USACE – Kevin Newton
USACE – cenae-r-ma@usace.army.mil
TEC Inc. – Robert Niccoli - rniccoli@theengineeringcorp.com
Bernardston ConCom – William Hill - WHill@townofbernardston.org

The Commonwealth of Massachusetts
Department of Environmental Protection

Address: 100 Cambridge Street, Suite 900, Boston, MA 02114
Phone: 617-292-5500

ATTACHMENT A

PRE-CONSTRUCTION SUBMITTAL CHECKLIST

Church Street Bridge Replacement over Fall River
Bernardston, MA

THIS CHECKLIST MUST BE COMPLETED PRIOR TO THE START OF WORK. NOTE THAT SOME CONDITIONS REQUIRE THAT INFORMATION BE SUBMITTED A SPECIFIC NUMBER OF DAYS PRIOR TO THE START OF WORK OR THE PRE-CONSTRUCTION MEETING.

Pre-Construction Meeting Date: _____

Condition	Required Submittal	Due Date	Date Submitted	Date Approved
PRE-CONSTRUCTION SUBMITTAL REQUIREMENTS				
2 and 3	Name, contact information, and qualifications of the FGM and CP/PP inspector, including specific experience and years to meet requirement	Prior to Pre-Construction Meeting		
4	Name and contact information of the RE	Prior to Pre-Construction Meeting		
6	USACE Work-Start Notification Form	14 days prior to work start		
7 & 8	CP/PP and Training Verification	14 days prior to work start		
10	Control of Water Plan	14 days prior to work start		

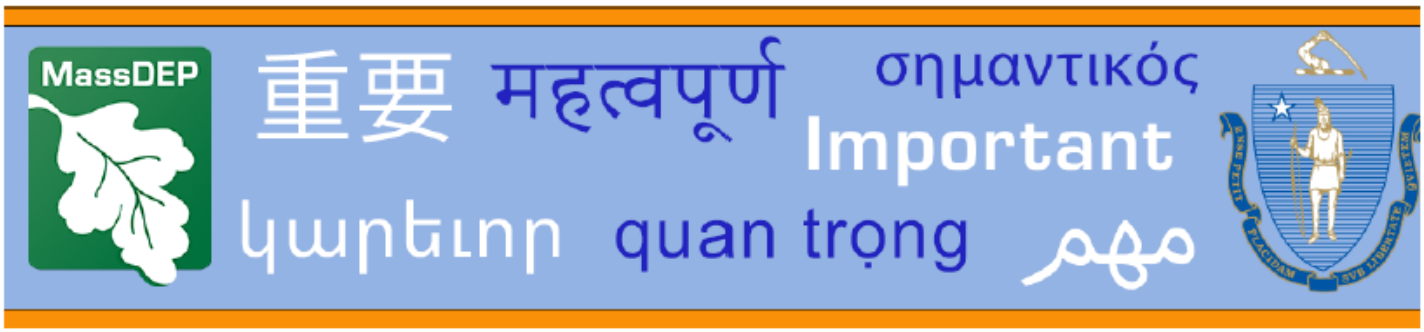
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Department of Environmental Protection

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Phone: 617-292-5500

13	Flood Contingency Plan	Prior to any work within 1% annual chance of flooding zone		
14	Invasive Plant Management Strategy	Prior to Pre-Construction Meeting		
16	Demo Plan	Prior to Pre-Construction Meeting		
17	Final Construction Plans	30 days prior to Pre-Construction Meeting		

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Department of Environmental Protection

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Phone: 617-292-5500



Communication for Non-English-Speaking Parties

This document is important and should be translated immediately.

If you need this document translated, please contact MassDEP's Director of Environmental Justice at the telephone number listed below.

Español Spanish

Este documento es importante y debe ser traducido inmediatamente. Si necesita traducir este documento, póngase en contacto con el Director de Justicia Ambiental de MassDEP (*MassDEP's Director of Environmental Justice*) en el número de teléfono que figura más abajo.

Português Portuguese

Este documento é importante e deve ser traduzido imediatamente. Se você precisar traduzir este documento, entre em contato com o Diretor de Justiça Ambiental do MassDEP no número de telefone listado abaixo.

繁體中文 Chinese Traditional

本文檔很重要，需要即刻進行翻譯。
如需對本文檔進行翻譯，請透過如下列示電話號碼與 MassDEP 的環境司法總監聯絡。

简体中文 Chinese Simplified

这份文件非常重要，需要立即翻译。
如果您需要翻译这份文件，请通过下方电话与 MassDEP 环境司法主任联系。

Ayisyen Kreyòl Haitian Creole

Dokiman sa a enpòtan epi yo ta dwe tradui l imedyatman. Si w bezwen tradui dokiman sa a, tanpri kontakte Direktè. Jistis Anviwònmantal MassDEP a nan nimewo telefòn ki endike anba a.

Việt Vietnamese

Tài liệu này và quan trọng và phải được dịch ngay. Nếu quý vị cần bản dịch của tài liệu này, vui lòng liên hệ với Giám Đốc Phòng Công Lý Môi Trường của MassDEP theo số điện thoại được liệt kê bên dưới.

ប្រទេសកម្ពុជា Khmer/Cambodian

ឯកសារនេះមានសារៈសំខាន់
ហើយគប្បីត្រូវត្រូវបានបកប្រែភ្លាមៗ។
ប្រសិនបើអ្នកត្រូវការអោយឯកសារនេះបកប្រែ
សូមទាក់ទងនាយកផ្នែកយុត្តិធម៌បរិស្ថានរបស់
MassDEPតាមរយៈលេខទូរស័ព្ទដែលបានរាយដូចខាងក្រោម។

Kriolu Kabuverdianu Cape Verdean

Es dokumentu sta important i tenki ser tradusidu immediatamenti. Se nho ta presisa ke es dokumentu sta tradisidu, por favor kontata O Diretor di Justisia di Environman di DEP ku es numero di telifoni menxionadu di baixo.

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Department of Environmental Protection

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Phone: 617-292-5500

Русский Russian

Это чрезвычайно важный документ, и он должен быть немедленно переведен. Если вам нужен перевод этого документа, обратитесь к директору Департамента экологического правосудия MassDEP (MassDEP's Director of Environmental Justice) по телефону, указанному ниже.

العربية Arabic

هذه الوثيقة مهمة وتجب ترجمتها على الفور.

إذا كنت بحاجة إلى ترجمة هذه الوثيقة، فيرجى الاتصال بمدير العدالة البيئية في MassDEP على رقم الهاتف المذكور أدناه.

한국어 Korean

이 문서는 중대하므로 즉시 번역되어야 합니다.
본 문서 번역이 필요하신 경우, 매사추세츠 환경보호부의 "환경정의" 담당자 분께 문의하십시오. 전화번호는 아래와 같습니다.

հայերեն Armenian

Այս փաստաթուղթը կարևոր է, և պետք է անհապաղ թարգմանել այն:
Եթե Ձեզ անհրաժեշտ է թարգմանել այս փաստաթուղթը, դիմեք Մասաչուսեթսի շրջակա միջավայրի պահպանության նախարարության (MassDEP) Բնապահպանական հարցերով արդարադատության ղեկավարին (Director of Environmental Justice)՝ ստորև նշված հեռախոսահամարով

فارسی Farsi Persian

این نوشتار بسیار مهمی است و باید فوراً ترجمه شود.
اگر نیاز به ترجمه این نوشتار دارید لطفاً با مدیر عدالت محیط زیستی MassDEP در شماره تلفن ذکر شده زیر تماس بگیرید.

Français French

Ce document est important et doit être traduit immédiatement. Si vous avez besoin d'une traduction de ce document, veuillez contacter le directeur de la justice environnementale du MassDEP au numéro de téléphone indiqué ci-dessous.

Deutsch German

Dieses Dokument ist wichtig und muss sofort übersetzt werden. Wenn Sie eine Übersetzung dieses Dokuments benötigen, wenden Sie sich bitte an MassDEP's Director of Environmental Justice *(Direktor für Umweltgerechtigkeit in Massachusetts)* unter der unten angegebenen Telefonnummer.

Ελληνική Greek

Το έγγραφο αυτό είναι πολύ σημαντικό και πρέπει να μεταφραστεί αμέσως. Αν χρειάζεστε μετάφραση του εγγράφου αυτού, παρακαλώ επικοινωνήστε με τον Διευθυντή του Τμήματος Περιβαλλοντικής Δικαιοσύνης της Μασαχουσέτης στον αριθμό τηλεφώνου που αναγράφεται παρακάτω

Italiano Italian

Questo documento è importante e deve essere tradotto immediatamente. Se hai bisogno di tradurre questo documento, contatta il Direttore della Giustizia Ambientale di MassDEP al numero di telefono sotto indicato.

Język Polski Polish

Ten dokument jest ważny i powinien zostać niezwłocznie przetłumaczony. Jeśli potrzebne jest tłumaczenie tego dokumentu, należy skontaktować się z dyrektorem ds. sprawiedliwości środowiskowej MassDEP pod numerem telefonu podanym poniżej.

हिन्दी Hindi

यह दस्तावेज महत्वपूर्ण है और इसका अनुवाद तुरंत किया जाना चाहिए। यदि आपको इस दस्तावेज का अनुवाद कराने की जरूरत है, तो कृपया नीचे दिए गए टेलीफोन नंबर पर MassDEP के पर्यावरणीय न्याय निदेशक से संपर्क करें।

DOCUMENT A00832

DEPARTMENT OF THE ARMY

General Permits for the Commonwealth of Massachusetts

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General Permit No.: NAE-2022-02649 Final Effective Date: June 2, 2023
Applicant: General Public, Commonwealth of Massachusetts Expiration Date: June 1, 2028

Department of the Army
General Permits for the Commonwealth of Massachusetts

The New England District of the U.S. Army Corps of Engineers (USACE) hereby issues twenty-five (25) regional general permits (GPs) for activities subject to USACE jurisdiction in waters of the U.S., including wetlands, navigable waters within the Commonwealth of Massachusetts and adjacent ocean waters to the seaward limit of the outer continental shelf. The Massachusetts GPs (hereafter referred to as the MA GP or GP) are issued in accordance with USACE regulations at 33 CFR 320 – 332 [see 33 CFR 325.5(c)(1)]. These GPs establish criteria and contain permit conditions to ensure that the authorized activities have no more than minimal individual and cumulative adverse impacts to the environment.

This document contains the following sections:		Pages
SECTION I	Statutory Authorities & Regulated Activities	2
SECTION II	Review Categories & Application Procedures	3-7
SECTION III	Massachusetts General Permits	8-34
SECTION IV	General Conditions	35-51
SECTION V	Mitigation Standards	52-54
SECTION VI	Federal & State Agency Contact Information & Websites	55-56
SECTION VII	Definitions & Acronyms	57-66
APPENDIX A	Guidance for Section 106 NHPA Compliance in Massachusetts	67-71
APPENDIX B	Pre-Construction Notification	72-77
APPENDIX C	Self-Verification Notification	78-81
APPENDIX D	Pre-Construction Notification Application Checklist	82-88

In issuing these GPs, the Federal Government does not assume any liability for the following: (a) damages to the permitted project or uses thereof as a result of other permitted or unpermitted activities or from natural causes; (b) damages to the permitted project or uses thereof as a result of current or future activities undertaken by or on behalf of the U.S. in the public interest; (c) damages to persons, property or to other permitted or unpermitted activities or structures caused by the activity authorized by any of the GPs; (d) design or construction deficiencies associated with the permitted work; or (e) damage claims associated with any future modification, suspension or revocation of these permits.

Tammy R. Turley 02 June 2023

Tammy R. Turley Date
Chief, Regulatory Division

SECTION I. STATUTORY AUTHORITES & REGULATED ACTIVITIES

1. Work Requiring USACE Authorization

a. Section 10: Work and structures that are located in, over, under or that affect navigable waters of the United States (U.S.) (see 33 CFR 329). The USACE regulates these activities under section 10 of the Rivers and Harbors Act of 1899 (see 33 CFR 322).

b. Section 404: The discharge of dredged or fill material into waters of the U.S (see 33 CFR 328). The USACE regulates these activities under Section 404 of the Clean Water Act (CWA). The term "discharge of dredged or fill material" also includes certain discharges resulting from excavation. Applicants should contact USACE to determine if a particular excavation discharge occurring within waters of the U.S., is a regulated activity. See 33 CFR 323.4 of the CWA for exempted activities.

For additional information on the limits of USACE jurisdiction, please see: https://www.nae.usace.army.mil/Portals/74/docs/regulatory/JurisdictionalLimits/Jurisdictional_Limits_Brochure.pdf

2. Authority to Issue General Permits

a. In accordance with 33 CFR 322.2(f), 325.2(e)(2), and 325.5(c), USACE may issue regional general permits authorizing activities under Section 10 of the RHA.

b. In accordance with Section 404(e) of the CWA, 33 USC 1344(e), and 33 CFR 323.2(h), 325.2(e)(2), and 325.5(c), after notice and opportunity for public hearing, USACE may issue regional general permits for any category of activities involving discharges of dredged or fill material if the activities in such category are similar in nature, will cause only minimal adverse environmental effects when performed separately, and will only have minimal cumulative adverse effect on the environment.

3. Related Laws

33 CFR 320.3 includes a list of related laws including, but not limited to, Section 408 of the Rivers and Harbors Act of 1899, Section 401 of the Clean Water Act, Section 402 of the Clean Water Act, Section 307(c) of the Coastal Zone Management Act of 1972, Section 106 of the National Historic Preservation Act of 1966, Section 7 of the Endangered Species Act, the Fish and Wildlife Coordination Act of 1956, the Magnuson-Stevens Fishery Conservation and Management Act, the Fish and Wildlife Coordination Act, Section 302 of the Marine Protection, Research and Sanctuaries Act of 1972, Section 7(a) of the Wild and Scenic Rivers Act, the Golden Eagle Protection Act, and the Migratory Bird Treaty Act.

SECTION II. REVIEW CATEGORIES & APPLICATION PROCEDURES

To qualify under these GPs, the design, construction, and maintenance associated with each proposed activity must meet the terms and eligibility criteria listed in Section III, all applicable general conditions (GCs) in Section IV, and any specific mitigation requirements in Section V. Applicants should first review the GPs to see if a project is eligible for authorization under one or more of the GPs within this document. Any activity not specifically listed may still be eligible for authorization under these GPs; applicants are advised to contact USACE for specific eligibility determination.

Please note that these GPs allow for Self-Verification (SV) contingent upon meeting all criteria and with full adherence to all GCs. Projects that do not qualify for SV, may meet criteria for Pre-Constriction Notification (PCN). Tables are provided under each activity, which outline criteria for SV and PCN. Activities that do not meet criteria for SV or PCN may require review as an Individual Permit (IP). Activities may require a PCN or IP as noted in Sections III and/or IV of this GP. Notwithstanding compliance with the terms of these GPs, USACE retains discretionary authority to require either PCN review or IP review on a case-by-case basis for any project based on concerns for the environment or for any of the other public interest factors found in 33 CFR 320.4(a). These GPs also do not replace or change those activities identified as exempt from USACE regulation (33 CFR 323.4).

1. Pre-Application Assistance

Prospective applicants may request a pre-application meeting to address any questions they may have. USACE may also request a pre-application meeting or additional information to facilitate review of the request. Pre-application meetings and/or site visits help streamline the authorization process by alerting the prospective applicant to potentially time-consuming factors that may arise during the evaluation of their project (e.g., avoidance, minimization and compensatory mitigation requirements, historic properties, endangered species, essential fish habitat, impacts to federal projects, and/or dredging of contaminated sediments).

To schedule a pre-application meeting, present questions, or if you need further assistance, please contact USACE at:

Email: cenae-r-ma@usace.army.mil (strongly preferred) Phone: (978) 318-8338

Mail: U.S. Army Corps of Engineers
New England District
Regulatory Division, Massachusetts Section
696 Virginia Road
Concord, MA 01742

2. Submitting a Request

Please follow the procedures outlined in Sections II.2-5 when requesting an SV or applying for PCN authorization for activities covered by these GPs. The GPs are provided in Section III below. For SV-eligible projects, the Self-Verification Notification (SVN) must be submitted within 30 days of commencing work. Otherwise, a Pre-Construction Notification (PCN) must be submitted for work that is not SV-eligible. Please include appropriate drawings and attachments and submit your request using the mailbox identified in Section II.4 or II.5 below. USACE will promptly confirm receipt of your request and notify you in the event additional information is required. Guidance on

how to submit electronic correspondence is located on the NAE Regulatory website here: https://www.nae.usace.army.mil/Missions/Regulatory/Submitting-Electronic-Correspondence.

3. Local, State & Federal Approvals

Applicants are responsible for applying for and obtaining any required local, state, and federal permits or approvals. These must be obtained prior to the commencement of work in waters. Such authorizations may include a Water Quality Certification, a Coastal Zone Management Act consistency determination, and other approvals as noted below. Authorization under these GPs does not obviate the need for the permittee to obtain other Federal, State, or local permits, approvals, or authorizations required by law.

I. Water Quality Certification under Section 401 of the Federal Clean Water Act (33 USC 1341).
Applicants are responsible for determining the appropriate 401 Water quality Certification (WQC) requirements and submitting this information to the USACE at the time of their PCN application or when completing their SVN. Applicants that are unsure of whether their activity has been certified should contact MassDEP, or EPA Region 1 when the activity is located on tribal lands, for a determination. The 401 WQC requirement must be satisfied by acquiring one of the following WQCs from MassDEP (see GC 8):

General 401 WQC: The MassDEP issued a WQC on April 21, 2023 conditionally certifies all activities in GPs 1 – 24 eligible for SV and PCN so long as the activity is described in 314 CMR 9.03, and is not an activity described in 314 CMR 9.04, and so long as the activity meets all other requirements, terms and conditions of this WQC. The MassDEP WQC also conditionally certifies activities described in GP 25 so long as the activity meets all other conditions of the WQC. Emergency projects described in GP 25 must obtain an emergency certification or otherwise be authorized pursuant to 310 CMR 10.06, qualify under a Severe Weather Emergency Declaration pursuant to 310 CMR 10.06(8) issued by the MassDEP, or meet the requirements of 9.12(2) or (3) in order to be certified under the WQC

Applicants should refer to the following link to determine if their activity is eligible: *https://www.nae.usace.army.mil/Missions/Regulatory/ State-General-Permits/ Massachusetts-General-Permit/*. If eligible, you must comply with all applicable WQC conditions. Activities listed in 314 CMR 9.03 that are not exempt from the Wetland Protection Act must have a valid Final Order of Conditions (OOC) or Final Restoration Order of Conditions pursuant to 310 CMR 10.00 to be eligible under the General 401 WQC.

Individual 401 WQC: In the event the proposed activity is not covered by the general WQC, applicants shall contact MassDEP and apply for an individual 401 WQC if their activity does not qualify for a General 401 WQC as outlined above. MassDEP may issue, waive, or deny the individual 401 WQC on a case-by-case basis. All activities listed in 314 CMR 9.04 must obtain an individual 401 WQC from MassDEP to be eligible under these GPs. When an Individual 401 WQC is required for *PCN activities*, the applicant shall submit their Individual 401 WQC application concurrently to MassDEP and the USACE to comply with 40 CFR 121.

Activities Proposed on Tribal Lands: When an activity is proposed on Tribal lands, the applicant shall refer to the general 401 WQCs granted by the Environmental Protection Agency (EPA), Region 1 on May 15, 2023. These 401 WQCs are located on the USACE Regulatory website: https://www.nae.usace.army.mil/Missions/Regulatory/State-General-Permits/Massachusetts-General-Permit/.

II. Coastal Zone Management Act Federal Consistency Concurrence pursuant to Section 307 of the CZMA of 1972, as amended. Federal consistency concurrence is required for all activities located within the coastal zone, unless determined otherwise by the Massachusetts Office of Coastal Zone Management (MA CZM) (see GC 9). As applicable, this requirement must be satisfied by acquiring one of the following from the MA CZM:

General CZM Federal Consistency Concurrence (General Concurrence): MA CZM has granted General Concurrence for all SV and PCN activities for GPs 1-25 and this can be found at: https://www.nae.usace.army.mil/Missions/Regulatory/State-General-Permits/Massachusetts-General-Permit/. The applicant must obtain all applicable permits and approvals prior to the commencement of work in USACE jurisdiction (i.e., construction begins on site). For SVs, General Concurrence is automatically granted and no further action is required from the applicant. For PCNs, the USACE will coordinate with MA CZM to acquire General Concurrence as part of the PCN application review. During review of the PCN application, USACE may request additional information from the applicant to support CZM's evaluation of the activity.

Individual CZM Federal Consistency Concurrence (Individual Concurrence): In certain cases, MA CZM may elevate any GP activity 1-25 to require Individual Concurrence. The applicant must contact MA CZM and follow the procedures to obtain Individual Concurrence as determined appropriate by MA CZM.

The MA CZM program includes five regional offices that serve 78 coastal municipalities. The following map provides more information about these offices: https://www.mass.gov/service-details/czm-regions-coastal-communities-and-coastal-zone-boundary

III. Other Approvals: Approvals typically required in Massachusetts include, but are not limited to, a Chapter 91 Permit/License, Massachusetts Environmental Protection Act (MEPA) review, Wetlands Protection Act Order of Conditions, and/or Aquaculture Certification. *Applicants should also be aware that USACE may not be able to render a permit decision in the event the proposed activity is denied by another local, state and/or federal agency.*

4. Procedures for Self-Verification (SV) Eligible Projects

If the activity is eligible for an SV, the Self-Verification Notification (SVN) must be completed prior to the start of project construction and submitted to USACE within 30 days of commencing work. The purpose of the SVN is to provide applicants with a tool to assist them when determining if the activity as proposed is SV-eligible. The following GPs do not require submission of the SVN: GP 1 (SV #1), GP 3 (SV #2-3), GP 4 (SV #2), GP 11, GP 12 (note #2), GP 14 (see note), GP 15 (see note), and GP 24 (SV #3). **For the activities not listed above, the SVN must be completed prior to the start of work and be kept on site at all times during project construction.** The applicant shall not begin work for SV-eligible activities until they have completely verified the bulleted items below.

Digital submittals by email are **strongly encouraged** to facilitate the most efficient processing of the SVN submittal. Please communicate with USACE staff if you are unable to provide a digital copy. Addresses are cenae-r-ma-sv@usace.army.mil (email) or Regulatory Division, U.S. Army Corps of Engineers, New England District, 696 Virginia Road, Concord, MA 01742-2751 (mail).

Eligible SV Activities:

- Are subject to USACE jurisdiction (see GC 2); and
- Qualify for one or more of the GPs within this document (Section III); and
- Meet the GCs within this document (Section IV); and

- When required, are supported by a complete SVN (Appendix C); and
- Receive all other required local, State, and/or Federal approvals.

5. Procedures for Pre-Construction Notification (PCN) Eligible Projects

For activities that require a PCN, an application to and written authorization from USACE is required. *No work requiring a PCN may proceed until the applicant receives written authorization from USACE verifying that the activity is authorized.* The verification letter may include special conditions that the applicant must comply with. When possible, it is *highly* recommended that PCN application materials are submitted at least 90 days before the target start date to allow for USACE evaluation and any necessary agency consultations. PCN applications shall demonstrate in writing how the proposed activity complies with all GCs, as applicable to their activity.

Digital submittals by email are **strongly encouraged** to facilitate the most efficient processing of the PCN application. Please communicate with USACE staff if you are unable to provide a digital copy. Addresses are cenae-r-ma@usace.army.mil or Regulatory Division, U.S. Army Corps of Engineers, New England District, 696 Virginia Road, Concord, MA 01742-2751 (mail).

Eligible PCN Activities:

- Are subject to USACE jurisdiction (see GC 2); and
- Qualify for one or more of the GPs within this document (Section III); and
- Meet the GCs within this document (Section IV); and
- Comply with the Mitigation Standards within this document (Section V); and
- Are supported by a complete PCN document (Appendix B); and
- When required, are supported by the submittal of project information to the appropriate parties identified in Appendix A; and
- Receive all other required local, State, and/or Federal approvals.

6. Interagency Review Procedures

The USACE reserves the opportunity to coordinate PCN activities with Federal and State agencies to ensure that the proposed activity results in no more than a minimal impact to the aquatic environment. In some cases, USACE may require project modifications involving avoidance, minimization, and/or compensatory mitigation for unavoidable impacts to ensure the net effects of a project are minimal. The USACE determines, after review and coordination with the agencies and/or the applicant, if PCN applications:

a. Meet the terms and conditions of the GP as proposed;
b. Require additional information;
c. Require avoidance, minimization, compensatory mitigation, construction sequencing, project modification, or other special conditions to avoid or minimize adverse impacts to the aquatic environment;
d. Require individual permit review regardless of whether the terms and GCs of these GPs are met, based on concerns for the aquatic environment or any other factor of the public interest (see Section 9 below).

For activities requiring a PCN, the applicant must wait for written authorization from USACE before commencing activities in waters of the U.S. Beginning work for PCN required activities without a USACE written authorization is a violation of these GPs, and the terms and conditions of this document. The applicant may be subjected to an enforcement action by USACE and/or the Environmental Protection Agency (EPA).

7. Construction of Solid Fill Structures and Fills Along the Coastline or Baseline from Which the Territorial Sea is Measured.

Projects involving the construction of solid fill structures or discharge of fill that may extend beyond the coastline or the baseline from which the territorial sea is measured (i.e., mean low water) will require a PCN. The USACE will submit a description of the proposed work and a copy of the plans to the Solicitor, Department of the Interior, Washington, DC 20240, and request comments concerning the effects of the proposed work on the outer continental rights of the United States. These comments will be included in the administrative record of the application. After completion of permit review, the record will be forwarded to the Chief of Engineers. The decision on the application will be made by the Secretary of the Army after coordination with the Attorney General.

8. Emergency Activities

Per 33 CFR 325.2(e)(4), an emergency is limited to a situation that would result in an unacceptable hazard to life, a significant loss of property, or an immediate, unforeseen, and significant economic hardship if corrective action requiring a permit is not undertaken within a time period less than the normal time needed to process an application under standard procedures. Emergency work shall be limited to that which is necessary to stabilize and secure the situation. Additional work needed for final repairs shall not be completed until approval is obtained through the appropriate, non-emergency process. Emergency work is subject to the same terms and conditions of these GPs as non-emergency work, and similarly, must qualify for authorization under these GPs; otherwise, an IP is required. *See GP 25 Emergency Situations for additional information.*

9. Individual Permit

Projects that do not meet the terms and conditions of this GP may require review as an IP (33 CFR 325.5 (b)). Proposed work in this category will require a separate Federal application for an individual permit from USACE (33 CFR 325.1). In addition, USACE retains discretionary authority on a case-by-case basis to elevate GP-eligible activities to an IP based on concerns for the environment or any other factor of the public interest (33 CFR 320.4 (a)). Applicants are required to submit the appropriate application materials directly to USACE as early as possible to expedite the permit review process. General information and application forms can be obtained at our website or by contacting our office at cenae-r-ma@usace.army.mil or (978) 318-8338. Individual 401 WQC and/or CZMA Federal consistency concurrence from the appropriate MA agencies are required before USACE can issue an individual permit. Applying for an IP does not relieve the applicant from their obligation to obtain all required Federal, State and/or local approvals.

10. Compliance

Applicants shall ensure compliance with all applicable GPs in Section III, GCs in Section IV, and any special conditions included in USACE verification letters. Noncompliance with these GPs, GCs, and special conditions may subject the applicant to criminal, civil, or administrative penalties, and/or an ordered restoration, and/or the permit may be modified, suspended or revoked by USACE. The USACE will consider any activity requiring USACE authorization to be noncompliant if that activity does not comply with all GP terms and conditions at all times, including while the project is under construction and when work is completed.

SECTION III. MASSACHUSETTS GENERAL PERMITS

Applicants are encouraged to review Sections I & II prior to submitting an application to confirm that the activity as proposed complies with all terms and conditions of the 2023 MA GPs. Applicants are also encouraged to review the definitions in Section VII, Definitions & Acronyms, of this document. Several terms are frequently used throughout the GPs, and it is important for the reader to understand these terms. If seeking verification for an activity previously verified under the 2018 MA GPs, please contact the USACE to discuss permitting needs in advance of submitting an application.

General Permits

1. Aids to Navigation and Temporary Recreational Structures
2. Maintenance
3. Moorings
4. Structures in Navigable Waters of the U.S.
5. Boat Ramps and Marine Railways
6. Utility Lines, Oil or Natural Gas Pipelines, Outfall Or Intake Structures, and Appurtenant Features
7. Dredging, Disposal of Dredged Material, Beach Nourishment, Rock Removal and Rock Relocation
8. U.S. Coast Guard Approved Bridges
9. Bank and Shoreline Stabilization
10. Aquatic Habitat Restoration, Enhancement, and Establishment Activities
11. Fish and Wildlife Harvesting and Attraction Devices and Activities
12. Response Operations, Oil and Hazardous Substances
13. Cleanup of Hazardous and Toxic Waste
14. Scientific Measurement Devices
15. Survey Activities
16. Land and Water-Based Renewable Energy Generation Facilities and Hydropower Projects
17. Residential, Commercial and Institutional Developments, and Recreational Facilities
18. Aquaculture
19. Mining Activities
20. Living Shorelines
21. Agricultural Activities
22. Reshaping Existing Drainage Ditches, Construction of New Ditches, and Mosquito Management
23. Linear Transportation Projects and Wetland/Stream Crossings
24. Temporary Construction, Access, and Dewatering
25. Emergency Situations

GP 1. AIDS TO NAVIGATION AND TEMPORARY RECREATIONAL STRUCTURES (Authority: §10)

(a) The placement of aids to navigation and regulatory markers that are approved by and installed in accordance with the requirements of the U.S. Coast Guard (USCG). See 33 CFR, Part 66; and (b) Temporary buoys, markers, and similar structures placed for recreational use during specific events such as water skiing competitions and boat races or seasonal use. See GC 16.

Self-Verification Eligible	**Pre-Construction Notification Required**
1. Aids to navigation and regulatory markers approved by and installed in accordance with the requirements of the USCG. 2. Temporary buoys, markers and similar structures that are: (a) placed for recreational use during specific events and removed within 30 days after event; or (b) placed during winter events on ice and removed before spring thaw. These structures must be authorized by the local harbormaster, not located within an FNP or its buffer zone, and not located in saltmarsh or tidal vegetated shallows.	1. Impacts in saltmarsh or tidal vegetated shallows. 2. Activities that are not SV eligible.

Note: An SVN submittal to USACE is not required for work authorized under SV #1 above.

GP 2. MAINTENANCE (Authorities: §10 and §404)

Repair, rehabilitation, or replacement of any previously authorized[1], currently serviceable structure, or fill, or of any currently serviceable structure or fill authorized by 33 CFR 330.3 (activities occurring before certain dates), provided that the structure or fill is not to be put to uses differing from those uses specified or contemplated for it in the original permit or the most recently authorized modification. Minor deviations in the structure's configuration or filled area, including those due to changes in materials, construction technique requirements of other regulatory agencies, or current construction codes or safety standards that are necessary to make the repair, rehabilitation, or replacement are authorized. This GP also authorizes temporary structures, fills, and work, including the use of temporary mats, necessary to conduct the activities above. Maintenance dredging and beach nourishment are not eligible under GP 2 (see GP 7). Stream crossing modifications (including sliplining), replacements or extensions are not eligible under GP 2 (see GPs 6, 17, 23). *See GP 25 Emergency Situations for expedited review of emergency activities.*

Not authorized under GP 2 (IP required): (a) Permanent impacts in >1 acre in non-tidal waters and/or wetlands; or (b) Permanent impacts >1/2 acre in tidal waters; >1000 SF in saltmarsh, mud flats, riffle and pool complexes, or non-tidal vegetated shallows; or >100 SF in tidal vegetated shallows; or (c) Temporary impacts >1 acre in tidal waters; >5000 SF in saltmarsh, mud flats, riffle and pool complexes, or non-tidal vegetated shallows; or >1000 SF in vegetated shallows; (d) New stream channelization or stream relocation projects (e.g., those in response to storm or flood events).

Self-Verification Eligible

Maintenance activities that meet all of the following terms:

1. In non-tidal waters, the combined permanent and temporary impacts extending beyond the original footprint are ≤5,000 SF[2] and not located in vegetated shallows or riffle and pool complexes.

2. In tidal waters, the combined permanent and temporary impacts extending beyond the original footprint are ≤5,000 SF, ≤1,000 SF in mudflats and/or natural rocky habitat, and not located in saltmarsh and tidal vegetated shallows.

3. Minor deviations in the repair, rehabilitation, or replacement of previously authorized, currently serviceable structures or fills.

4. Bulkhead replacement in tidal and non-tidal waters via installation of new bulkhead within 18 inches of the existing bulkhead and associated backfill.

5. Drawdown of an impoundment for dam/levee repair provided it does not exceed 18 months and one growing season (April through September).

Pre-Construction Notification Required

1. Discharges associated with removal of accumulated sediments and debris in the vicinity of existing structures, including intake and outfall structures and associated canals.

2. The removal of sediment outside the immediate vicinity of existing structures (e.g., bridges, culverted road crossings, water intake structures, etc.) that is ≥200 linear feet. This activity is limited to the minimum necessary to restore the waterway in the vicinity of the structure to the approximate dimensions existing when the structure was built.

3. Dam and flood control or levee repair, rehabilitation, or replacement involves:
   a. A change in the flood elevation or permanent water surface elevation of the impoundment; or
   b. Drawdown of impoundment for construction exceeding one growing season (see SV eligible #5);
   c. Any modification that changes the character, scope, or size of the original fill design; or
   d. Does not meet SV eligible 1-7.

4. Installation of steel piles, including steel sheet piles, that cannot be done in the dry and where NOAA-ESA listed species are mapped as present.

[1] Some maintenance activities may not be subject to regulation under Section 404 of the CWA in accordance with 33 CFR 323.4(a)(2). Per 33 CFR 330.3, Vested dates are: a) Work performed and structures installed before December 18, 1968 (Section 10); and b) Fill placed before July 25, 1975 (Section 404).
[2] This excludes dam projects that may require a temporary drawdown with impacts >5,000 SF in non-tidal waters. Instead, the drawdown shall comply with SV #5 to be eligible under Self-Verification.

6. Any stream channel modification is limited to the minimum necessary for the repair, rehabilitation, or replacement of the structure or fill; such modifications, including the removal of material from the stream channel, must be immediately adjacent to the project or within the boundaries of the structure or fill. 7. Work to previously approved tide gates not affecting upstream tidal resource areas.	5. Activities located in the Connecticut River or Merrimack River, unless they are completed in the dry or when the tide is waterward of the work area. 6. Activities on USACE properties & USACE-controlled easements. 7. Activities that do not require an IP. Activities that do not require a PCN or an IP may be SV eligible.
Notes: 1. This authorizes the repair, rehabilitation, or replacement of any previously authorized structure or fill that does not qualify for the CWA §404(f) exemption for maintenance. See 33 CFR 323.4(a)(2). Prior USACE permits may have included authorization to maintain the activity, in which case authorization under this GP is not necessary. 2. See GC 22 for information on temporary construction mats.	

GP 3. MOORINGS (Authority: §10)

New moorings and mooring fields; the relocation of previously authorized moorings; expansions, boundary reconfigurations or modifications of previously authorized mooring fields; and maintenance and replacement of moorings.

Not authorized under GP 3 (IP required): (a) Moorings or mooring fields converted to or associated with a new boating facility[1]; or (b) Moorings in a USACE Federal Navigation Anchorage or USACE Federal Navigation Channel, except municipal-operated mooring fields.

Self-Verification Eligible	Pre-Construction Notification Required
1. New or relocated moorings that meet all the following terms: a. Authorized by a local harbormaster/ municipality under MGL Chapter 91 §10A; and b. No interference with navigation; and c. Single boat, single-point and non-commercial; and d. Not associated with a boating facility, and e. Neither placed within nor impact tidal vegetated shallows (e.g., eelgrass); and f. Not located within a USACE Federal navigation project (FNP) or the FNP buffer zone. 2. Existing, authorized moorings are converted from traditional moorings to low impact mooring technology (see note below) and/or helical anchors. 3. Maintenance and replacement of moorings authorized by the USACE.	1. New mooring fields; or expansions, boundary reconfigurations or modifications of existing, authorized mooring fields. 2. Moorings located such that they, and/or vessels docked or moored at them, are within the buffer zone of the horizontal limits of a Federal Anchorage. The buffer zone is equal to 3 times the authorized depth of that channel (see GC 15). 3. New individual moorings located in saltmarsh, mudflats, natural rocky habitat, and tidal vegetated shallows. Locating moorings these areas should be avoided to the maximum extent practicable. If these areas cannot be avoided, plans should show conservation mooring or low-impact mooring systems that prevent mooring chains from resting or dragging on the bottom substrate at all tides, where practicable. USACE may require a survey in areas previously mapped as containing eelgrass or within 100 ft. of existing eelgrass beds to document presence or absence of eelgrass and to determine the appropriate type and amount of compensatory mitigation for impacts to eelgrass. 4. Replacement moorings located in tidal vegetated shallows. 5. Moorings that are not SV eligible and do not require an IP.

Notes:

1. Low impact mooring systems, including conservation moorings, are encouraged to minimize impacts of chain scouring from conventional moorings during the tidal cycle.
2. An SVN submittal to USACE is not required for work authorized under SV #2-3 above.

[1] Boating facilities are marinas, yacht clubs, boat clubs, boat yards, dockominiums, town facilities, land/homeowner's associations, etc. that provide for a fee, rent or sell mooring or docking space. Not classified as boating facilities are municipal moorings or municipal mooring fields that charge an equitable user fee based only on the actual costs incurred.

GP 4. STRUCTURES IN NAVIGABLE WATERS OF THE U.S. (Authority: §10 & §404)

New, expansions, reconfigurations or modifications of structures for navigational access in waters of the U.S. including but not limited to temporary/seasonal or permanent pile and pole-supported piers, floats, stairs, shore outhauls, and boat and float lifts.

Not authorized under GP 4 (IP required): (a) Structures associated with a new boating facility; (b) Structures in a USACE Federal anchorage or channel; or (c) Artificial reefs.

Self-Verification Eligible

1. Private, non-commercial piers, floats and lifts that meet all the following terms:

a. Piers and floats in: (i) Tidal waters total ≤600 SF combined; and (ii) Non-tidal navigable waters of the U.S. total ≤600 SF combined; and

b. Piers are ≤4 feet wide and ≥6 feet above the marsh substrate (the height is measured from the marsh substrate to the bottom of the lowest longitudinal support); and

c. Floats and lifts in tidal waters and non-tidal navigable waters of the U.S. are ≥24 inches above the substrate during all tidal cycles. Float stops are preferred when site conditions warrant them (i.e., low tide exposes substrate), and skids can only be used in areas where piles are not feasible and on sandy or hard bottom substrates; and

d. Piers, floats and lifts: (i) Are ≥25 feet from previously mapped or existing vegetated shallows, or riparian property line extensions; (ii) Extend ≤25% of the waterway width in non-tidal navigable waters of the U.S. or MHW in tidal navigable waters of the U.S.

e. Installation of ≤12-inch diameter timber piles. Installation of ≥12-inch diameter piles of any material type when installed in the dry.

2. Fenders and similar structures.

Pre-Construction Notification Required

1. Shore outhauls.
2. Expansions, modifications, or new reconfiguration zones at any authorized boating facility.
3. New, expansions, reconfigurations, reconfiguration zones, or modifications of structures that provide public, community or government recreational uses such as boating, fishing, swimming, access, etc.
4. Installation of steel piles, including steel sheet piles, that cannot be done in the dry and where NOAA-ESA listed species are mapped as present.
5. Located within the buffer zone of the horizontal limits of an FNP (GC 15).
6. Miscellaneous structures.
7. Impacts in tidal vegetated shallows.
8. Structures that are not SV eligible and do not require an IP.

Notes:

1. See GC 19 regarding pile driving and pile removal in navigable waters and
2. See GC 20 regarding time of year restrictions in tidal waters.
3. Boating facilities are facilities that provide for a fee, rent, or sell mooring space, such as marinas, yacht clubs, boat clubs, boat yards, town facilities, dockominiums, etc. Pile supported structures with no discharges of dredged or fill material are not regulated by USACE in non-navigable waters.
4. A SVN submittal to USACE is not required for SV #2 above.

GP 5. BOAT RAMPS AND MARINE RAILWAYS (Authorities: §10 and §404)

Activities required for the construction of boat ramps and marine railways, including excavation and fill.

Not authorized under GP 5 (IP required): (a) Permanent impacts that are >1 acre in non-tidal waters of the U.S., >½ acre in tidal waters; >1000 SF in saltmarsh, mud flats, riffle and pool complexes, or non-tidal vegetated shallows; or >100 SF in tidal vegetated shallows; (b) Temporary impacts in tidal waters that are >1 acre; >5000 SF in saltmarsh, mud flats, or riffle and pool complexes; or >1000 SF in vegetated shallows[1]; or (c) dredging in navigable waters of the U.S. (see GP 7).

Self-Verification Eligible	Pre-Construction Notification Required
1. In non-tidal waters, the combined permanent and temporary impacts are (a) ≤5,000 SF, and (b) not located in riffle and pool complexes and non-tidal vegetated shallows.	1. Boat ramps are located within 25 feet of property line extensions unless the properties are owned by the same owner. The USACE may require a letter of no objection from the abutter(s).
2. In tidal waters, the combined permanent and temporary impacts are (a) ≤5,000 SF, (b) ≤1,000 SF in mudflats and/or natural rocky habitat, and (c), not located in saltmarsh and tidal vegetated shallows.	2. Activities that are not eligible for SV and do not require an IP.

GP 6. UTILITY LINES, OIL OR NATURAL GAS PIPELINES, OUTFALL OR INTAKE STRUCTURES, AND APPURTENANT FEATURES (Authorities: §10 & §404)

Activities required for: (a) The construction, maintenance, repair or removal of utility lines, oil or natural gas pipelines[1], outfall or intake structures[2], and appurtenant features including the associated excavation, backfill, or bedding for these structures. (b) The construction, maintenance, or expansion of substations and other appurtenant facilities associated with a utility line, oil or natural gas pipeline, and outfall or intake structure in non-tidal waters of the U.S.; and (c) The construction and maintenance of foundations for overhead utility line towers, poles, and anchors in tidal and non-tidal waters of the U.S., provided the foundations are the minimum size necessary and separate footings for each tower leg (rather than a larger single pad) are used where feasible. This GP authorizes the construction of access roads to facilitate construction of the above activities provided the activity, in combination with all other activities included in one single and complete project, does not exceed the thresholds identified below (IP required). Access roads used solely for construction of the utility line must be removed upon completion of the work. This GP also authorizes temporary structures, fills, and work, including the use of temporary mats, necessary to conduct the activities above.[3]

Not authorized under GP 6 (IP required): (a) Permanent impacts for any single and complete project that are >1 acre in non-tidal waters of the U.S.; >½ acre in tidal waters; >1000 SF in saltmarsh, mud flats, riffle and pool complexes, or non-tidal vegetated shallows; or >100 SF in tidal vegetated shallows; (b) Temporary impacts in tidal waters that are >1 acre; >5000 SF in saltmarsh, mud flats, or riffle and pool complexes; or >1000 SF in vegetated shallows; (c) Stormwater treatment or detention systems, or subsurface sewage disposal systems in waters of the U.S.; or (d) New tide gates that do not meet SV criteria below.

Self-Verification Eligible	Pre-Construction Notification Required
1. In non-tidal waters, the combined permanent and temporary impacts are (a) ≤5,000 SF, and (b) not located in riffle and pool complexes and non-tidal vegetated shallows. 2. In tidal waters, the combined permanent and temporary impacts are (a) ≤5,000 SF, (b) ≤1,000 SF in mudflats and/or natural rocky habitat, and (c), not located in saltmarsh and tidal vegetated shallows. 3. Intake structures that are dry hydrants used exclusively for firefighting activities with no stream impoundments. 4. New tide gates on outfall structures for pipes conveying stormwater and/or industrial NPDES-permitted discharges from waters that are not waters of the U.S.	1. New outfall and/or intake structures. 2. Unconfined work or silt producing activities in streams with diadromous fish. 3. Submarine cables, conduits, or pipelines that occur in, over or under navigable waters of the U.S. 4. Stream channelization, relocation, impoundment, or loss of streambed occurs. 5. The activity is placed within and runs parallel to or along a streambed within waters of the U.S. 6. There is a permanent change in preconstruction contours in waters of the U.S. 7. Installation of utility lines or gas/oil pipelines using trench excavation where material is temporarily sidecast into waters of the U.S. for >3 months. Applicants must demonstrate how the material would not be dispersed by currents or other forces. 8. Activities that are not SV eligible and do not require an IP.

[1] See the definitions of a “utility line” and “oil or natural gas pipeline” in Section VII.
[2] Outfall structures must be in compliance with regulations issued under the National Pollutant Discharge Elimination System Program (Section 402 of the Clean Water Act).
[3] Temporary impacts shall comply with all GCs, including GC 32 Utility Line Installation and Removal.

GP 7. DREDGING (Authority: §10), DISPOSAL OF DREDGED MATERIAL (Authorities: §10, §404), BEACH NOURISHMENT (Authorities: §10 & §404), ROCK REMOVAL (Authority: §10) AND ROCK RELOCATION (Authorities: §10 & §404)

New, improvement and maintenance dredging (see notes below) including: (a) Disposal of dredged material at a confined aquatic disposal cell, beach nourishment location, near shore site, or ocean disposal site selected under Section 404 of the Clean Water Act pursuant to the 404(b)(1) Guidelines, provided the dredged material meets the requirements for such disposal; (b) Beach nourishment not associated with dredging; and (c) Rock removal and relocation for navigation.

Not authorized under GP 7 (IP required): (a) Dredging where ocean disposal is required for the disposal of dredged material (Section 103); New dredging >½ acre; ≥10,000 CY; >1000 SF permanent impacts to intertidal areas, saltmarsh, mud flats, riffle and pool complexes, or non-tidal vegetated shallows; or >100 SF permanent impacts to tidal vegetated shallows; (b) Maintenance or improvement dredging and/or disposal with >1 acre of impacts to intertidal areas, saltmarsh, mudflats, riffle and pool complexes, or non-tidal vegetated shallows; (c) New dredging where the primary purpose is sand mining for beach nourishment; (d) Beach scraping; (e) Boulder removal and relocation for navigation >½ acre; or (f) Blasting.

Self-Verification Eligible

1. Maintenance dredging of previously dredged areas, with upland disposal, that meet all of the following terms:
   a. Dredged area ≤1/2 acre; and
   b. Activities comply with GC 20, TOY Restrictions. The time-of-year restriction(s) stated in Appendix B of the MA Division of Marine Fisheries (DMF) Technical Report TR-47[1] can apply instead if the general TOY restriction if a TOY is provided for a specific waterbody and is less restrictive. This is to protect endangered species, EFH, and other species; and
   c. The dredge footprint is located >25' from salt marsh or >100' from vegetated shallows; and
   d. Combined permanent and temporary impacts that are (i) ≤1,000 SF in mudflats or natural rocky habitat, or (ii) ≤5,000 SF within intertidal habitat and areas containing shellfish (an area contains shellfish unless: it is verified that minimal shellfish are present per the local shellfish constable or a shellfish survey; or it is not mapped as a MassGIS shellfish suitability area).
   e. No return water from upland disposal areas.

2. Boulder relocation with ≤1,000 SF of impacts, relocated to a similar depth and substrate.

Pre-Construction Notification Required

1. Maintenance dredging where the primary purpose is sand mining for beach nourishment.

2. New dredging and associated disposal ≤1/2 acre or <10,000 cubic yards.

3. Improvement dredging.

4. Beach nourishment in waters of the U.S. not associated with dredging.

5. Activities that are located in saltmarsh and tidal vegetated shallows.

6. Dredging in a Federal Navigation Project or within the buffer zone (see GC 15).

7. Activities that are not eligible for SV and do not require an IP.

Notes:

1. See Section VII for definitions of improvement and maintenance dredging.
2. For PCN activities, the USACE may waive or adjust the time of year requirement on a case-by-case basis after consultation with resource agencies.
3. Disposal site of any dredged material must be identified prior to obtaining USACE authorization.
4. Contact the USACE if a ten-year authorization to maintain an area is desired.

[1] The MA DMF Technical Report TR-47: https://www.nae.usace.army.mil/Missions/Regulatory/State-General-Permits/Massachusetts-General-Permit/

GP 8. U.S. COAST GUARD APPROVED BRIDGES (Authorities: §404)

Discharges of dredged or fill material incidental to the construction and modification of bridges across navigable waters of the U.S., including cofferdams, abutments, foundation seals, piers, and temporary construction and access fills provided that the USCG authorizes the construction of the bridge structure under Section 9 of the Rivers and Harbors Act of 1899 or other applicable laws. A USCG Authorization Act Exemption or a Surface Transportation and Uniform Relocation Assistance Act (STURRA) (144h) exemption do not constitute USCG authorization.

Not authorized under GP 8 (IP Required): Causeways and approach fills (see GP 23).

Self-Verification Eligible	**Pre-Construction Notification Required**
1. Discharges of dredged or fill material that are incidental to the construction of bridges across navigable waters and meet all of the following: a. Combined permanent and temporary impacts that are ≤5,000 SF. b. Combined permanent and temporary impacts that are ≤1,000 SF in mudflats and natural rocky habitat. c. Not located in saltmarsh and tidal vegetated shallows.	1. Activities on USACE properties & USACE controlled easements.2. Installation of steel piles, including steel sheet piles, that cannot be done in the dry and where NOAA-ESA listed species are mapped as present. 3. Activities that are not eligible for SV and do not require an IP.

Notes:

1. GP 8 is not applicable to bridges over inland waters or wetlands that are not tidally influenced or regulated as navigable under Section 10.
2. See eligibility criteria for GPs 2 & 23 for projects that are not subject to USCG regulations.

GP 9. BANK AND SHORELINE STABILIZATION (Authorities: §10 & §404)

Bank stabilization activities necessary for erosion protection along the banks of lakes, ponds, streams, estuarine and ocean waters, and any other open waters. Includes bulkheads, seawalls, riprap, revetments, living seawalls, or slope protection & similar structures, specifically for the purpose of shoreline protection. This GP also authorizes temporary structures, fills, and work, including the use of temporary mats, necessary to conduct the activities above.

Activities must meet the following criteria: (a) No material is placed in excess of the minimum needed for erosion protection; (b) No material is of a type, or is placed in any location, or in any manner, that will impair surface water flow into or out of any waters of the U.S.; (c) No material is placed in a manner that will be eroded by normal or expected high flows (properly anchored native trees and treetops may be used in low energy areas); (d) Native plants appropriate for current site conditions, including salinity, must be used for bioengineering or vegetative bank stabilization; (e) The activity is not a stream channelization activity; and (f) The activity must be properly maintained, which may require repairing it after severe storms or erosion events. This GP authorizes those maintenance and repair activities if they require authorization. This GP also authorizes temporary structures, fills, and work, including the use of temporary mats, necessary to construct the bank stabilization activity. See GP 20 for living shoreline stabilization structures or fills.

Not authorized under GP 9 (IP required): (a) New bank stabilization >500 feet in total length (>1,000 linear feet in total length when necessary to protect transportation infrastructure) or permanent loss of saltmarsh >1,000 SF, unless the District Engineer waives this criterion by making a written determination concluding that the discharge of dredged or fill material will result in no more than minimal adverse environmental effects (an exception is for bulkheads – the district engineer cannot issue a waiver for a new bulkhead that is >1,000 feet in length along the bank); (b) Stream channelization or relocation activities; or (c) Breakwaters, groins or jetties.

Self-Verification Eligible

1. Activities in tidal and non-tidal waters that are:
   a. <200 feet in length.
   b. <400 feet in length when necessary to protect transportation infrastructure.
   c. ≤1 cubic yard of fill per linear foot average along the bank waterward of the plane of OHW or HTL.
   d. Not located in non-tidal wetlands, saltmarsh, vegetated shallows.

Pre-Construction Notification Required

1. Activities in tidal and non-tidal waters that are:
   a. ≥200 feet to ≤500 feet in total length. Activities >500 feet in total length must have a written waiver from USACE.
   b. ≥400 feet to ≤1,000 feet in total length when necessary to protect transportation infrastructure. Activities >1,000 feet in total length must have a written waiver from USACE.
   c. >1 cubic yard of fill per linear foot average along the bank waterward of the plane of OHW or HTL.
   d. Located in non-tidal wetlands, saltmarsh, vegetated shallows.
2. Activities with permanent loss of tidal or non-tidal waters that is (a) ≥5,000 SF or (b) ≥1,000 SF in mudflats and natural rocky habitat.
3. Activities that are (a) located in the Connecticut River or Merrimack River and/or (b) require installation of steel piles/steel sheet piles that cannot be done in the dry where NOAA ESA-listed species are mapped as present.
4. Activities on USACE properties & USACE-controlled easements.
5. Activities that require grouted riprap and/or poured/unformed concrete.
6. Activities that are not eligible for SV and do not require an IP.

Note: The applicant shall comply with GC 24. This includes utilization of bioengineering techniques in lieu of hard armoring to the maximum extent practicable as site conditions allow.

GP 10. AQUATIC HABITAT RESTORATION, ENHANCEMENT, AND ESTABLISHMENT ACTIVITIES (Authorities: §10 and §404)

Activities for the restoration, enhancement and establishment of non-tidal and tidal wetlands and riparian areas, including invasive, non-native or nuisance species control; the restoration and enhancement of non-tidal streams and other non-tidal open waters; the relocation of non-tidal waters, including non-tidal streams & associated wetlands for reestablishment of a natural stream morphology and reconnection of the floodplain; the restoration and enhancement of shellfish, finfish and wildlife; and the rehabilitation or enhancement of tidal streams, tidal wetlands and tidal open waters; provided those activities result in net increases in aquatic resource functions and services. See GP 9 for bank and shoreline stabilization. See GP 20 for living shorelines.

Not authorized under GP 10 (IP required): Stream channelization activities and artificial reefs.

Self-Verification Eligible	**Pre-Construction Notification Required**
1. In tidal and non-tidal waters excluding tidal vegetated shallows, the combined permanent and temporary impacts are ≤5,000 SF. 2. Eelgrass (vegetated shallows) planting and transplanting ≤100 SF in tidal waters.	1. In tidal and non-tidal waters excluding tidal vegetated shallows, the combined permanent and temporary impacts are >5,000 SF. 2. Eelgrass (vegetated shallows) planting and transplanting >100 SF in tidal waters. 3. Permanent water impoundments, dam removal, fish ladders, or tide gates. 4. Stream relocation, impoundment, or loss of streambed occurs. 5. Runneling projects with the purpose of restoring saltmarsh by removing excess water that ponds on the saltmarsh surface. 6. The conversion of: (a) a stream or natural wetlands to another aquatic habitat type (e.g., stream to wetland or vice versa, wetland to pond, etc.) or uplands, (b) one wetland type to another (e.g., forested wetland to an emergent wetland). 7. Activities in the Connecticut River from the Turners Falls Dam to the MA/CT border, or Merrimack River from the Essex Dam to the mouth, involving permanent or temporary impacts unless they are performed <5 feet waterward from OHW or HTL and in the dry. This is to protect endangered species. 8. Activities on USACE properties & USACE-controlled easements. 9. Activities that are not eligible for SV and do not require an IP.

Notes:

1. Changes in wetland plant communities that occur when wetland hydrology is more fully restored during wetland rehabilitation activities are not considered a conversion to another aquatic habitat type.
2. See RGL 18-01 for guidance on removal of obsolete dams and other structures from rivers and streams. https://www.usace.army.mil/missions/civil-works/regulatory-program-and-permits/guidance-letters/
3. An ecological reference site may be used for a design basis of the restoration activity. The reference site should possess characteristics of an intact aquatic habitat or riparian area that exists in the region. The reference site shall represent the target habitat type of the proposed activity. A reference site may be required at the discretion of USACE.

GP 11. FISH AND WILDLIFE HARVESTING AND ATTRACTION DEVICES AND ACTIVITIES (Authorities: §10 and §404)

Fish and wildlife harvesting and attraction devices and activities in waters of the U.S. such as pound nets, crab traps, crab and shellfish dredging, eel pots, lobster traps, duck blinds, clam and oyster digging, fish aggregating devices, and small fish attraction devices such as open-water fish concentrators (sea kites, etc.).

Not authorized under GP 11 (IP required): Artificial reefs; or new, or expansions of, impoundments and semi-impoundments of waters of the U.S. for the culture or holding of motile species such as lobster with an impounded area >½ acre.

Self-Verification Eligible	**Pre-Construction Notification Required**
1. In non-tidal waters, the combined permanent and temporary impacts are (a) ≤1/2 acre, and (b) not located in riffle and pool complexes and non-tidal vegetated shallows. 2. Fish and wildlife harvesting and attraction devices and activities that do not require a PCN or IP.	1. Pound nets, impoundments or semi-impoundments of waters of the U.S. for the culture or holding of motile species such as lobster with an impounded area ≤½ acre, fish aggregating devices, or small fish attraction devices. 2. Devices and activities that are located in tidal vegetated shallows, mud flats, or saltmarsh. 3. Devices and activities that do not require an IP.

Note: An SVN submittal to USACE is not required for work authorized under GP 11.

GP 12. RESPONSE OPERATIONS, OIL AND HAZARDOUS SUBSTANCES (Authorities: §10 & §404)

(a) Activities conducted in response to a discharge or release of oil and hazardous substances that are subject to the National Oil and Hazardous Substances Pollution Contingency Plan (40 CFR 300) including containment, cleanup, and mitigation efforts, provided that the activities are done under either: (i) The Spill Prevention, Control and Countermeasure Plan required by 40 CFR 112.3; (ii) The direction or oversight of the Federal on-scene coordinator designated by 40 CFR 300; or (iii) Any approved existing State, regional or local contingency plan provided that the Regional Response Team concurs with the proposed response efforts or does not object to the response effort; (b) Activities required for the cleanup of oil releases in waters of the U.S. from electrical equipment that are governed by EPA's polychlorinated biphenyl (PCB) spill response regulations at 40 CFR 761; (c) Booms placed in navigable waters of the U.S. for oil and hazardous substance containment, absorption and prevention; and (d) The use of structures and fills for spill response training exercises. Wetlands, vegetated shallows, mudflats, and riffle and pool complexes should be restored in place at the same elevation.

Self-Verification Eligible	**Pre-Construction Notification Required**
1. Activities are conducted in accordance with (a) or (b) above that are not planned or scheduled, but an emergency response (see Note 1). 2. Booms placed in navigable waters of the U.S. for oil and hazardous substance containment, absorption and prevention. 3. Temporary impacts for spill response training exercises ≤5000 SF in non-tidal waters and ≤1000 SF in tidal waters with no impacts to wetlands, saltmarsh, mudflats, or vegetated shallows. 4. Temporary structures in tidal waters with no impacts to wetlands, saltmarsh, mudflats, vegetated shallows, or riffle and pool complexes and in place ≤30 days.	1. Activities (a) or (b) above are planned or scheduled, not an emergency response; or 2. Activities that are not eligible for SV and do not require an IP.

Notes:

1. For emergency response activities in the Connecticut River from the Turners Falls Dam to the MA/CT border, Merrimack River from the Essex Dam to the mouth, and remaining tidal waters that are not rivers, the permittee must contact the USACE at (978) 318-8338 before or as soon as possible after the work authorized under GP 12(a) - (c) commences for the USACE to address effects under the Endangered Species Act.
2. An SVN submittal to USACE is not required for booms used for spill prevention, or properly contained and cleaned de minimus oil or hazardous substance discharges into navigable waters of the U.S.

GP 13. CLEANUP OF HAZARDOUS AND TOXIC WASTE (Authorities: §10 and §404)

Specific activities required to affect the containment, stabilization, or removal of hazardous or toxic waste materials, including court ordered remedial action plans or related settlements, which are performed, ordered or sponsored by a government agency with established legal or regulatory authority.

Not authorized under GP 13: (a) Establishment of new disposal sites; or (b) Expansion of existing sites used for the disposal of hazardous or toxic waste.

Self-Verification Eligible	Pre-Construction Notification Required
1. In non-tidal waters, the combined permanent and temporary impacts are (a) ≤5,000 SF, and (b) not located in vegetated shallows and riffle and pool complexes.	1. In non-tidal waters, the combined permanent and temporary impacts are (a) >5,000 SF, and (b) located in vegetated shallows and riffle and pool complexes. 2. Permanent and temporary impacts in tidal waters or navigable waters of the U.S. 3. Stream channelization, relocation, impoundment, or loss of streambed occurs. 4. Activities that are not eligible for SV and do not require an IP.

Notes:

1. Wetlands, vegetated shallows, mudflats, and riffle and pool complexes should be restored in place at the same elevation to the maximum extent practicable.
2. Activities undertaken entirely on a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) site by authority of CERCLA, are not required to obtain permits under Section 404 of the CWA or Section 10 of the Rivers and Harbors Act.

GP 14. SCIENTIFIC MEASUREMENT DEVICES (Authorities: §10 and §404)

Scientific measurement devices for measuring and recording scientific data, such as staff gauges, tide and current gauges, meteorological stations, water recording and biological observation devices, water quality testing and improvement devices, and similar structures. Also eligible are small weirs and flumes constructed primarily to record water elevation, flow and/or velocity. Upon completion of the use of the device to measure and record scientific data, the measuring device and any other structures or fills associated with that device (e.g., foundations, anchors, buoys, lines, etc.) must be removed to the maximum extent practicable and the site restored to preconstruction elevations.

Not authorized under GP 14 (IP required): (a) Permanent impacts that are >5,000 SF in tidal and non-tidal waters of the U.S.; >1000 SF in tidal saltmarsh, mud flats, riffle and pool complexes; or >100 SF in tidal vegetated shallows; or (b) Temporary impacts in tidal waters that are >1 acre, unless the District Engineer waives this criterion by making a written determination concluding that the discharge of dredged or fill material will result in no more than minimal adverse environmental effects; >5000 SF in saltmarsh, mud flats, or riffle and pool complexes; or >1000 SF in vegetated shallows.

Self-Verification Eligible

1. In non-tidal waters, the combined permanent and temporary impacts are (a) ≤5,000 SF, (b) not located in riffle and pool complexes and non-tidal vegetated shallows.

2. In tidal waters, the combined permanent and temporary impacts are (a) ≤5,000 SF, (b) ≤1,000 SF in mudflats and/or natural rocky habitat, (c) not located in saltmarsh and tidal vegetated shallows.

3. Temporary, non-biological sampling devices in waters that do not restrict or concentrate movement of aquatic organisms and will not adversely affect the course, condition, or capacity of a waterway for navigation.

4. Scientific measurement devices, and small weirs and flumes constructed primarily to record water quantity and velocity provided the discharge of fill is limited to 25 cubic yards. These cannot obstruct or restrict the waterway course, condition, capacity, and location.

5. Temporary measuring devices and associated structures (e.g., anchors, buoys, etc.) in tidal and non-tidal waters that do not require a PCN or IP.

Pre-Construction Notification Required

1. Biological sampling devices, weirs or flumes, or the activity restricts or concentrates movement of aquatic organisms.

2. Permanent towers located in navigable waters that record and measure scientific data.

3. Devices that are not eligible for SV and do not require an IP.

Note: An SVN submittal to USACE is not required for temporary measuring devices with a footprint of <10 SF, with a profile of <3 feet high measured from the substrate and located in water deeper than -10 feet MLW.

GP 15. SURVEY ACTIVITIES (Authorities: §10 and §404)

Survey activities such as soil borings, core sampling, seismic exploratory operations, plugging of seismic shot holes and other exploratory-type bore holes, exploratory trenching, soil surveys, sampling, sample plots or transects for wetland delineations, and historic resources surveys.

Not authorized under GP 15 (IP required): (a) Permanent impacts that are >1 acre in tidal and non-tidal waters; >1000 SF in tidal saltmarsh, mud flats, or riffle and pool complexes; or >100 SF in tidal vegetated shallows; or (b) Temporary impacts in tidal waters that are >1 acre, unless the District Engineer waives this criterion by making a written determination concluding that the discharge of dredged or fill material will result in no more than minimal adverse environmental effects; >5000 SF in saltmarsh, mud flats, or riffle and pool complexes; or >1000 SF in vegetated shallows.

Self-Verification Eligible	**Pre-Construction Notification Required**
1. In non-tidal waters, the combined permanent and temporary impacts are (a) ≤5,000 SF, (b) not located in riffle and pool complexes and non-tidal vegetated shallows. 2. In tidal waters, the combined permanent and temporary impacts are (a) ≤5,000 SF, (b) ≤1,000 SF in mudflats and/or natural rocky habitat, (c) not located in saltmarsh and tidal vegetated shallows.	1. Exploratory trenching (see Note 2) occurs in waterways (e.g., streams, tidal waters). 2. Activities associated with the recovery of historic resources, and the drilling and discharge of excavated material from test wells for oil and gas exploration. 3. Seismic exploratory operations occur in tidal waters, the Connecticut River from the Turners Falls Dam to the MA/CT border, or the Merrimack River from the Essex Dam to the mouth. This is to protect endangered species. 4. Activities that are not eligible for SV and do not require an IP.

Notes:

1. An SVN submittal is not required for wetland delineations, and core sampling conducted for preliminary evaluation of dredge project analysis.
2. For the purposes of GP 15, the term “exploratory trenching” means mechanical land or underwater clearing of the upper soil profile to expose bedrock or substrate for the purpose of mapping or sampling the exposed material.
3. The discharge of drilling mud and cuttings may require a permit under §402 of the CWA.

GP 16. LAND AND WATER-BASED RENEWABLE ENERGY GENERATION FACILITIES (Authorities: §10 and §404), AND HYDROPOWER PROJECTS (Authority: §10 and §404)

Structures and work in tidal waters and discharges of dredged or fill material into tidal and non-tidal waters for the construction, expansion, modification or removal of: (a) Land-based renewable energy production facilities (e.g., solar, wind, biomass, geothermal) and their attendant features; (b) Water-based wind or hydrokinetic renewable energy generation projects and their attendant features; and (c) Discharges of dredged or fill material associated with hydropower projects. Attendant features may include, but are not limited to, land-based collection and distribution facilities, control facilities, and parking lots. For each single and complete project in (b) above, no more than 10 generation units (e.g., wind turbines or hydrokinetic devices) are authorized in navigable waters of the U.S. Upon completion of the pilot project (see note 2), the generation units, transmission lines, and other structures or fills associated with the pilot project must be removed to the maximum extent practicable.

Not authorized under GP 16 (IP required): (a) Permanent impacts that are >1 acre in non-tidal waters, >½ acre in tidal waters; >1000 SF in saltmarsh, mud flats, riffle and pool complexes, or non-tidal vegetated shallows; or >100 SF in vegetated shallows; or (b) Temporary impacts in tidal waters that are >1 acre; >5000 SF in saltmarsh, mud flats, or riffle and pool complexes; or >1000 SF in vegetated shallows.

Self-Verification Eligible	**Pre-Construction Notification Required**
In non-tidal waters, the combined permanent and temporary impacts for land-based activities are (a) ≤5,000 SF, (b) not located in riffle and pool complexes and non-tidal vegetated shallows.	1. In non-tidal waters, the combined permanent and temporary impacts for land-based activities are (a) >5000 SF, or (b) located in vegetated shallows or riffle and pool complexes. 2. Permanent and temporary impacts in tidal waters. 3. Water-based wind or hydrokinetic renewable energy generation projects, and hydropower projects. 4. For all activities eligible for authorization under GP 16: a. The activity occurs in tidal waters or in, over or under navigable waters. b. Stream channelization, relocation, impoundment, or loss of streambed occurs. 5. Activities that are not eligible for SV and do not require an IP.

Notes:

1. Utility lines constructed to transfer the energy from the land-based renewable generation or collection facility to a distribution system, regional grid, or other facility may be authorized by GP 6.
2. For the purposes of this GP, the term “pilot project” means an experimental project where the renewable energy generation units will be monitored to collect information on their performance and environmental effects at the project site.

GP 17. RESIDENTIAL, COMMERCIAL AND INSTITUTIONAL DEVELOPMENTS AND RECREATIONAL FACILITIES (AUTHORITIES: §404)

Discharges of dredged or fill material into non-tidal waters for the construction or expansion of: (a) Residences and residential subdivisions; (b) Residential, commercial and institutional building foundations and building pads; and (c) Recreational facilities such as playgrounds, playing fields, bikeways, trails, etc. This GP also authorizes attendant features that include, but are not limited to, roads, parking lots, garages, yards, and utility lines, and stormwater management facilities. This GP authorizes attendant features if they are necessary for the use of the project purpose.

Not authorized under GP 17 (IP required): (a) Permanent impacts that result in loss of non-tidal waters >1/2 acre; >1000 SF in riffle and pool complexes or vegetated shallows; or (b) Subsurface sewerage disposal systems in non-tidal waters.

Self-Verification Eligible	**Pre-Construction Notification Required**
1. In non-tidal waters, the combined permanent and temporary impacts are (a) <5,000 SF, and (b) not located in riffle and pool complexes and non-tidal vegetated shallows. 2. Stream channelization or relocation resulting in loss of streambed that is <200 LF.	1. In non-tidal waters, the combined permanent and temporary impacts are (a) ≥5,000 SF, or (b) located in riffle and pool complexes or non-tidal vegetated shallows. 2. Stream and wetland crossings that require a PCN per GCs 20 TOY Restrictions and GC 31 Stream Work and Crossings & Wetland Crossings. 3. Stream channelization or relocation resulting in loss of streambed that is ≥200 LF. Stream impoundment activities of any kind. 4. Activities on USACE properties & USACE-controlled easements. 5. Activities that are not SV eligible and do not require an IP.

Notes:

1. Stream and wetland crossings (permanent and temporary), including those built with construction mats; and modifications (including sliplining), replacements or extensions to existing crossings.
2. See GC 22 for information on temporary construction mats.
3. Subdivisions: For residential subdivisions, the aggregate total loss of waters of United States authorized by this GP cannot exceed 1/2-acre. This includes any loss of waters of the United States associated with development of individual subdivision lots.

GP 18. AQUACULTURE (Authorities: §10 and §404)

(a) The installation of buoys, floats, racks, trays, nets, lines, tubes, containers, and other structures into navigable waters of the U.S.; (b) Discharges of dredged or fill material into tidal and non-tidal waters necessary for shellfish seeding, rearing, cultivating, transplanting, and harvesting activities; and (c) Shellfish seeding or brushing the flats projects. Any fill material imported to the project from offsite (this is limited to mineral growth medium used in culture trays) shall be clean and of comparable grain size to the native substrate. Activities authorized under this GP must have (a) their MA DMF Aquaculture Certificate letter for licensed shellfish aquaculture sites, (b) documentation that the applicant has coordinated with the U.S. Coast Guard regarding USCG Private Aids to Navigation standards, (c) their MEPA Certificate (if required), and (d) documentation that the applicant has contacted their local authorities (ex. harbormaster, select board, shellfish constable) for authorization of their facility.

Not authorized under GP 18 (IP required): (a) New, or expansions of, impoundments and semi-impoundments of tidal and non-tidal waters for the culture or holding of motile species such as lobster with an impounded area >½ acre; (b) Cultivation of a nonindigenous species (see Note 1) unless that species has been previously cultivated in the waterbody; (c) Cultivation of an aquatic nuisance species (see Note 1); (d) Attendant features such as docks, piers, boat ramps (see GP 4); (e) stockpiles, staging areas, or the deposition of shell material back into tidal and non-tidal waters as waste.

Self-Verification Eligible

1. In tidal waters, a new lease site area is (a) ≤2-acre, (b) not located in salt marsh, natural rocky habitat, or tidal vegetated shallows.

2. In tidal waters, *expansions* of existing lease sites not to exceed 2 acres for the entire site (e.g. 1 acre lease site increasing to a 2 acre lease site may qualify as SV). A PCN is required for expansions in salt marsh, natural rocky habitat, and tidal vegetated shallows.

3. Cages, racks that are elevated ≥2 feet above the ocean floor with legs within a lease site with ≤4 buoys marking the corners.

4. Floating cage strings with a single connecting line, ≤2 anchors and ≤2 end marker buoys per string within a lease site with ≤4 buoys marking the corners.

5. No activities located within 25 feet of tidal vegetated shallows.

6. Culture only indigenous species.

7. Not located in FNP or within a distance of three times the authorized depth of an FNP (see GC 15).

8. Not located in or impinge upon the value of any National Lands or Federal Properties.

9. Floating upweller docks that total ≤600 SF in area.

Pre-Construction Notification Required

1. Discharges of fill material associated with aquaculture >5,000 SF.

2. Research, educational, commercial-viability or experimental aquaculture gear activities >1,000 SF.

3. Kelp or finfish aquaculture.

4. Land-based hatchery intakes >3 inches in diameter.

5. Activities in water depths >10 feet mean low lower water (MLLW).

6. Activities with in-water lines, ropes or chains that are not SV eligible (see #3-4).

7. Activities occur in the Connecticut River from the Turners Falls Dam to the MA/CT border or the Merrimack River from the Essex Dam to the mouth. This is to protect endangered species.

8. New, or expansions of, impoundments and semi-impoundments for the culture or holding of motile species such as lobster with an impounded area ≤1/2 acre.

9. Activities that do not require an IP. Activities that do not require a PCN or an IP may be SV eligible.

Note: The Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 defines: (a) nonindigenous species as “any species or other viable biological material that enters an ecosystem beyond its historic range, including any such organism transferred from one country into another”; and (b) aquatic nuisance species as “a nonindigenous species that threatens the diversity or abundance of native species or the ecological stability of infested waters, or commercial, agricultural, aquacultural, or recreational activities dependent on such waters.”

GP 19. MINING ACTIVITIES (Authorities: §10 and §404)

Discharges of dredged or fill material into non-tidal waters for mining activities, except for coal mining and metallic mineral mining activities.

Not authorized under GP 19 (IP required): (a) Permanent impacts >1 acre in non-tidal waters; or (b) Activities in tidal waters.

Self-Verification Eligible	Pre-Construction Notification Required
In non-tidal waters, the combined permanent and temporary impacts are (a) ≤5,000 SF, and (b) not located in riffle and pool complexes, non-tidal vegetated shallows, and streams.	1. In non-tidal waters, the combined permanent and temporary impacts are (a) >5,000 SF, or (b) located in riffle and pool complexes, non-tidal vegetated shallows, and streams. 2. The activity occurs in non-tidal navigable waters of the U.S. 3. Stream channelization, relocation, impoundment, loss of streambed, or discharge of tailings into streams occurs. 4. Work on USACE properties & USACE-controlled easements. 5. Activities that are not eligible for SV and do not require an IP.

GP 20. LIVING SHORELINES[1] (Authorities: §10 and §404)

Construction and maintenance of living shorelines to stabilize banks and shores in tidal waters. In non-tidal waters that are not subject to the ebb and flow of the tide, nature-based bank stabilization techniques such as bioengineering and vegetative stabilization may be authorized by GP 9. This GP authorizes those maintenance and repair activities in-kind that are necessary to address changing environmental conditions.

The following terms must be met for both SVs and PCNs as applicable: (a) Coir logs, coir mats, stone, native oyster shell, native wood debris, and other structural materials must be adequately anchored, of sufficient weight, or installed in a manner that prevents relocation in most wave action or water flow conditions, except for extremely severe storms; (b) For living shorelines consisting of tidal fringe wetlands, native plants appropriate for current site conditions, including salinity and elevation, must be used if the site is planted by the permittee; (c) Discharges of dredged or fill material into waters of the U.S., and oyster or mussel reef structures in navigable waters, must be the minimum necessary for the establishment and maintenance of the living shoreline; (d) If sills or other structural materials per PCN #4 must be constructed to protect fringe wetlands for the living shoreline, those structures must be the minimum size necessary to protect those fringe wetlands; (e) The activity must be designed, constructed, and maintained so that it has no more than minimal adverse effects on water and sediment movement between the waterbody and the shore and the movement of aquatic organisms between the waterbody and the shore; and (f) The living shoreline must be properly maintained and monitored, which may require periodic repair of sills, bioengineered components, or replacing sand fills after severe storms or erosion events. Vegetation may be replanted to maintain the living shoreline.

Not authorized under GP 20 (IP required): (a) The activity is ≥1000 feet in length along the bank (≥2000 LF both banks) unless waived by the District Engineer; or (b) The activity is >30 feet channel ward of mean low water in tidal waters; or (c) Upland reclamation activities; or (d) Stream channelization or relocation activities; or (e) Breakwaters, groins, jetties, or artificial reefs; or (f) Permanent impacts >1,000 SF in existing saltmarsh; >100 SF in existing tidal vegetated shallows.

Self-Verification Eligible	**Pre-Construction Notification Required**
1. Tidal and non-tidal living shorelines ≤100 LF for each bank (≤200 LF for both banks). 2. Combined permanent and temporary impacts ≤5,000 SF in tidal waters, excluding existing salt marsh, tidal vegetated shallows, natural rocky habitat, and mudflats.	1. Tidal and non-tidal living shorelines >100 LF to <1000 LF (>200 LF to <2000 LF for both banks). 2. Permanent and temporary impacts in existing salt marsh, tidal vegetated shallows, or mudflats. 3. Work on USACE properties & USACE-controlled easements. 4. Use of stone sills, native oyster shell, native wood debris, or other structural materials.

Notes:

1. PCNs require monitoring for a minimum of 5 years in accordance with an approved restoration plan, unless otherwise determined by the USACE. The first year of monitoring will be the first year that the site has been through a full growing period after completion of construction and planting.
2. Applicants are encouraged to obtain a MEPA certificate prior to submitting a USACE permit application.

[1] A living shoreline has a footprint that is made up mostly of native material. It incorporates vegetation or other living, natural "soft" elements alone or in combination with some type of harder shoreline structure (e.g., oyster or mussel reefs or rock sills) for added protection and stability. Living shorelines should maintain the natural continuity of the land-water interface and retain or enhance shoreline ecological processes. Living shorelines must have a substantial biological component, either tidal or lacustrine fringe wetlands or oyster or mussel reef structures.

GP 21. AGRICULTURAL ACTIVITIES (Authority: §404)

Discharges of dredged or fill material in non-tidal waters for agricultural activities, including the construction of building pads for farm buildings. Authorized activities include: (a) installation, placement, or construction of drainage tiles, ditches, or levees; mechanized land clearing; land leveling; the relocation of existing serviceable drainage ditches; and similar activities; (b) construction of farm ponds, excluding perennial streams, provided the farm pond is used solely for agricultural purposes; and (c) discharges of dredged or fill material to relocate existing serviceable drainage ditches constructed in non-tidal streams.

Not authorized under GP 21 (IP required): (a) Permanent impacts that are >1 acre in non-tidal waters; or >1000 SF in riffle and pool complexes, or non-tidal vegetated shallows; (b) Work in tidal waters; or (c) Construction of farm ponds in perennial streams.

Self-Verification Eligible	**Pre-Construction Notification Required**
In non-tidal waters, the combined permanent and temporary impacts are (a) ≤5,000 SF, and (b) not located in riffle and pool complexes and non-tidal vegetated shallows.	1. In non-tidal waters, the combined permanent and temporary impacts are (a) >5,000 SF, or (b) located in riffle and pool complexes and non-tidal vegetated shallows. 2. Activities occur in non-tidal navigable waters of the U.S. 3. Stream channelization, relocation, impoundment, loss of streambed, or farm ponds in non-perennial streams occurs. 4. Activities that are not eligible for SV and do not require an IP.

Note: Some discharges for agricultural activities may qualify for an exemption under Section 404(f) of the CWA (see 33 CFR 323.4). This GP authorizes the construction of farm ponds that do not qualify for the CWA §404(f)(1)(C) exemption because of the recapture provision at §404(f)(2).

GP 22. RESHAPING EXISTING DRAINAGE DITCHES, CONSTRUCTION OF NEW DITCHES, AND MOSQUITO MANAGEMENT (Authorities: §10 and §404)

Discharges to modify the cross-sectional configuration of currently serviceable drainage ditches constructed in tidal and non-tidal waters, for the purpose of improving water quality by regrading the drainage ditch with gentler slopes, which can reduce erosion, increase growth of vegetation, and increase uptake of nutrients and other substances by vegetation. Also authorized are mosquito reduction activities.

Not authorized under GP 22 (IP required): Stream channelization, relocation, impoundments, or loss of streambed.

Self-Verification Eligible	**Pre-Construction Notification Required**
≤500 linear feet of drainage ditch will be reshaped provided excavated material is deposited in an upland area.	1. >500 linear feet of drainage ditch will be reshaped, excavated material is deposited in a water of the U.S., or the reshaping of the ditch increases the drainage capacity beyond the original as-built capacity or expands the area drained by the ditch as originally constructed (i.e., the capacity of the ditch is not the same as originally constructed or drains additional wetlands or other waters of the U.S.). 2. Permanent and temporary impacts in tidal vegetated shallows. 3. New ditches or relocation of drainage ditches constructed in waters of the U.S. (i.e., the location of the centerline of the reshaped drainage ditch is not approximately the same as the location of the centerline of the original drainage ditch). 4. Activities that are not eligible for SV and do not require an IP.

Note: Some ditch activities are exempt under Section 404(f) of the CWA (see 33 CFR 323.4).

GP 23. LINEAR TRANSPORTATION PROJECTS AND WETLAND/STREAM CROSSINGS (Authorities: §10 & §404)

Activities[1] required for the construction, expansion, modification, or improvement of linear transportation projects (e.g., driveways, roads, highways, railways, trails, airport runways, and taxiways) and attendant features. This GP also authorizes temporary structures, fills, and work, including the use of temporary mats (see Note 1), necessary to construct the linear transportation project.

Not authorized under GP 23 (IP required): (a) Permanent impacts for any single and complete project that are >1 acre in non-tidal waters; >½ acre in tidal waters; >1000 SF in saltmarsh, mud flats, riffle and pool complexes, or non-tidal vegetated shallows; or >100 SF in tidal vegetated shallows; (b) Temporary impacts in tidal waters that are >1 acre; >5000 SF in saltmarsh, mud flats, or riffle and pool complexes; or >1000 SF in vegetated shallows; (c) Non-linear features commonly associated with transportation projects, such as vehicle maintenance or storage buildings, parking lots, train stations, or aircraft hangars (see GP 17); or (d) New tide gates.

Self-Verification Eligible

1. In non-tidal waters, the combined permanent and temporary impacts are a) ≤5,000 SF; b) not located in riffle and pool complexes and non-tidal vegetated shallows; and c) meet the Massachusetts River and Stream Crossing Standards

2. Existing crossings (e.g., culverts, elliptical or arch pipes, etc.) are not modified by (a) decreasing the diameter of the crossing or (b) changing the friction coefficient, such as through slip lining (retrofitting an existing culvert by inserting a smaller diameter pipe), culvert relining or invert lining.

3. Stream channelization or relocation resulting in loss of streambed that is <200 LF.

Pre-Construction Notification Required

1. In non-tidal waters, the combined permanent and temporary impacts are a) >5,000 SF; b) located in vegetated shallows or riffle and pool complexes; or c) do not meet the Massachusetts River and Stream Crossing Standards (see note 4).

2. The activity occurs in tidal waters, salt marsh, or in, over or under navigable waters of the U.S.

3. Stream and wetland crossings that require a PCN per GC 20 TOY Restrictions and GC 31 Stream Work and Crossings & Wetland Crossings.

4. Stream channelization or relocation resulting in loss of streambed that is ≥200 LF. Stream impoundment activities of any kind.

5. Work on USACE properties & USACE-controlled easements.

6. Activities that are not eligible for SV and do not require an IP.

Notes:

1. See GC 22 for information on temporary construction mats.
2. Discharges of dredged or fill material incidental to the construction of bridges across navigable waters of the U.S. may be authorized under GP 8.
3. Loss of streambed does not require a PCN when bridge piers or similar supports are used.
4. In their PCN application submission to the USACE, applicants must explain why they are unable to meet the Massachusetts River and Stream Crossing Standards.
5. For tidal crossings, modeling is encouraged as a method to verify the proposed crossing would not be undersized and resilient to the effects of sea level rise.

[1] Stream crossings must conform with the MA Stream Crossing Guidelines when practicable and comply with all applicable GCs of this document (Section IV).

GP 24. TEMPORARY CONSTRUCTION, ACCESS, AND DEWATERING (Authorities: §10 and §404)

Temporary structures, work, and discharges, including cofferdams, necessary for construction activities or access fills or dewatering of construction sites that are not authorized under another GP activity.

Not authorized under GP 24 (IP required): (a) Permanent structures or impacts; (b) Temporary impacts in tidal waters that are >1 acre; >5000 SF in saltmarsh, mud flats, or riffle and pool complexes; or >1000 SF in vegetated shallows; (c) Use of cofferdams to dewater wetlands or other aquatic areas to change their use; (d) Temporary stream crossings (see GPs 6, 17, 23); (e) Structures or fill left in place after construction is completed.

Self-Verification Eligible	**Pre-Construction Notification Required**
1. In non-tidal waters, temporary impacts are a) ≤5,000 SF; b) not located in riffle and pool complexes and non-tidal vegetated shallows. 2. In tidal waters, temporary impacts are a) ≤5,000 SF, b) ≤1,000 SF in mudflats and/or natural rocky habitat, and c) not located in saltmarsh and tidal vegetated shallows. 3. Structures in navigable waters of the U.S. provided impacts do not require a PCN and they are left in place ≤30 days.	1. In non-tidal waters, temporary impacts are a) >5,000 SF; b) located in riffle and pool complexes or non-tidal vegetated shallows. 2. In tidal waters, temporary impacts are a) >5,000 SF; b) >1,000 SF in mudflats and/or natural rocky habitat, or (c) located in saltmarsh and tidal vegetated shallows. 3. Activities in the Connecticut River from the Turners Falls Dam to the MA/CT border, or Merrimack River from the Essex Dam to the mouth, involving temporary impacts unless they are performed <5 feet waterward from OHW or HTL and in the dry. This is to protect endangered species; or 4. Activities not eligible for SV and do not require an IP.

Notes:

1. Turbidity or sediment resuspension is generally not considered to occur when properly using management techniques to work in dry conditions. See GC 25.
2. Total impact areas under SV Eligible 1-2 exclude use of temporary construction mats. See GC 22 for information on temporary construction mats.
3. An SVN submittal to USACE is not required for SV #3 above.

GP 25. EMERGENCY SITUATIONS (Authorities: §10 and §404)

Structures or work in or affecting navigable waters of the U.S. and the discharge of dredged or fill material into waters of the U.S., including wetlands, necessary for repair or protection measures associated with an emergency situation[1], MassDEP Emergency Declaration/Certification, or FEMA Declared Disaster. The activity shall be the minimum necessary to alleviate the immediate emergency unless that additional work would result in no more than minimal effects to aquatic environment and is necessary to reduce the potential for future failure or loss of the structure or site. Typical activities authorized under this GP include, but are not limited to, restoration of damaged areas; bank stabilization; temporary fills for staging, access, and dewatering; and, repair, replacement, or rehabilitation of existing structures and/or fills (i.e., roads, bridges, utility pipelines and flood control structures, including attendant features, and other existing structures located in waters of the U.S.).

For the restoration of areas damaged by storms floods, or other discrete events: (a) The restored area must not extend waterward of the ordinary high-water mark or high tide line that existed prior to the damage. (b) The slope of the restored area below the ordinary high-water mark or high tide line must not exceed the slope that existed prior to the damage. (c) The bottom elevation of the restored area must not exceed the bottom elevation that existed prior to the damage (i.e., the restored area must not result in a reduction in the depth of the waterbody that existed prior to the damage). (d) Except in cases of FEMA reimbursement, the activity must be initiated, under contract to commence, or funds shall be allocated for the activity within 30 days of authorization under GP 25.

Not authorized under GP 25 (IP required): (a) Permanent impacts for a single and complete project >1/2 acre in tidal waters, unless the district engineer waives this criterion by making a written determination concluding that the activity will result in no more than minimal adverse environmental effects; >1,000 SF in saltmarsh, mud flats, riffle and pool complexes, or non-tidal vegetated shallows; or >100 SF in tidal vegetated shallows; (b) Temporary impacts in tidal waters that are >5,000 SF in saltmarsh, mud flats, or riffle and pool complexes; or >1,000 SF in vegetated shallows; (c) New structures or fills that did not previously exist before the storm event or other discrete event (see other GPs).

Self-Verification Eligible	**Pre-Construction Notification Required**
1. Activities that qualify under a Severe Weather Emergency Declaration pursuant to 310 CMR 10.06(8) and/or receive an Emergency Certification pursuant to 310 CMR 10.06 and/or meet the requirements of 314 CMR 9.12(2) or (3); and 2. Activities eligible under a FEMA Declared Disaster that also comply with #1 above.	1. Activities that are eligible under a FEMA Declared Disaster and do not qualify under SV #1. 2. Minor deviations in the structure or fill area, including those to existing structures or fills are authorized due to changes in materials, construction techniques, requirements of other regulatory agencies, or current construction codes or safety standards that are necessary to alleviate the emergency. 3. Activities that are not eligible for SV and do not require an IP.

Notes:

1. Review the GCs (Section IV) to confirm if a PCN is not required elsewhere in this document.
2. If the activity is not a MassDEP Emergency Declaration/Certification, does not meet the requirements of 314 CMR 9.12(2) or (3), or is not a FEMA Declared Disaster, applicants must explain in writing why their activity qualifies as an emergency (see footnote) to be eligible under GP 25.
3. SV eligible activities qualify under the general 401 WQC MassDEP issued for the 2023 MA GPs (GC 9).

[1] An emergency, as determined by this office and 33 CFR 325.2(e)(4), is one which would result in an unacceptable hazard to life, a significant loss of property, or an immediate, unforeseen, and significant economic hardship if corrective action requiring a Department of the Army permit is not undertaken within a time period less than the normal time to process the request under standard processing procedures.

SECTION IV. GENERAL CONDITIONS:

To qualify for GP authorization, the applicant must comply with the following general conditions, as applicable, in addition to authorization-specific conditions imposed by the division or district engineer.

1. Other Permits
2. Federal Jurisdictional Boundaries
3. Single and Complete Projects
4. Use of Multiple General Permits
5. Suitable Material
6. Tribal Rights & Burial Sites
7. Avoidance, Minimization, and Compensatory Mitigation
8. Water Quality & Stormwater Management
9. Coastal Zone Management
10. Federal Threatened and Endangered Species
11. Essential Fish Habitat
12. National Lands
13. Wild and Scenic Rivers
14. Historic Properties
15. USACE Property and Federal Projects (§408)
16. Navigation
17. Permit/Authorization Letter On-Site
18. Storage of Seasonal Structures
19. Pile Driving and Pile Removal in Navigable Waters
20. Time of Year Restrictions
21. Heavy Equipment in Wetlands
22. Temporary Fill & Construction Mats
23. Restoration of Wetland Areas
24. Bank Stabilization
25. Soil Erosion and Sediment Controls
26. Aquatic Life Movements and Management of Water Flows
27. Spawning, Breeding, and Migratory Areas
28. Vernal Pools
29. Invasive Species
30. Fills Within 100-Year Floodplains
31. Stream Work and Crossings & Wetland Crossings
32. Utility Line Installation and Removal
33. Water Supply Intakes
34. Coral Reefs
35. Blasting
36. Inspections
37. Maintenance
38. Property Rights
39. Transfer of GP Verifications
40. Modification, Suspension, and Revocation
41. Special Conditions
42. False or Incomplete Information
43. Abandonment
44. Enforcement Cases
45. Previously Authorized Activities
46. Duration of Authorization

1. Other Permits. Authorization under these GPs does not obviate the need for the permittee to obtain other Federal, State, or local permits, approvals, or authorizations required by law. Permittees are responsible for obtaining all required permits, approvals, or authorizations. Activities that are not regulated by the State, but subject to USACE jurisdiction, may still be eligible for these GPs.

2. Federal Jurisdictional Boundaries.
a. Applicability of these GPs shall be evaluated with reference to Federal jurisdictional boundaries. Activities shall be evaluated with reference to "waters of the U.S." under the CWA (33 CFR 328) and "navigable waters of the U.S." under §10 of the Rivers and Harbors Act of 1899 (33 CFR 329). Permittees are responsible for ensuring that the boundaries used satisfy the Federal criteria defined at 33 CFR 328-329. These sections prescribe the policy, practice, and procedures to be used in determining the extent of the USACE jurisdiction. Note: Waters of the U.S. includes all waters pursuant to 33 CFR 328.3(a), and adjacent wetlands as the term is defined in 33 CFR 328.3(c).
b. Wetlands shall be delineated in accordance with the USACE Wetlands Delineation Manual and the most recent Northcentral/Northeast Regional Supplement. Wetland delineation and jurisdiction information is located at: www.nae.usace.army.mil/missions/regulatory/jurisdiction-and-wetlands and maps are located at www.nae.usace.army.mil/missions/regulatory/state-general-permits/massachusetts-general-permit.
c. Vegetated shallows shall be delineated when present on the project site. Vegetated shallow survey guidance and maps are located at: www.nae.usace.army.mil/missions/regulatory/state-general-permits/massachusetts-general-permit.
d. Natural rocky habitats shall be delineated when present on the project site. The definition of natural rocky habitats is in Section VII of the MA GP. Natural rocky habitat survey guidance and maps are located at: www.nae.usace.army.mil/ missions/regulatory/state-general-permits/massachusetts-general-permit.

3. Single and Complete Projects. The MA GP shall not be used for piecemeal work and shall be applied to single and complete projects. The term "single and complete project" is defined at 33 CFR 330.2(i) as the total project proposed or accomplished by one owner/developer or partnership or other association of owners/developers.
a. For non-linear projects, a single and complete project must have independent utility. Portions of a multi-phase project that depend upon other phases of the project do not have independent utility. Phases of a project that would be constructed, even if the other phases were not built, can be considered as separate single and complete projects with independent utility.
b. Unless USACE determines the activity has independent utility, all components of a single project and/or all planned phases of a multi-phased project (e.g., subdivisions should include all work such as roads, utilities, and lot development) shall be evaluated as one single and complete project.
c. For linear projects such as power lines or pipelines with multiple crossings, a "single and complete project" is all crossings of a single water of the U.S. (i.e., single waterbody) at a specific location. For linear projects crossing a single waterbody several times at separate and distant locations, each crossing is considered a single and complete project. However, individual channels in a braided stream or river, or individual arms of a large, irregularly shaped wetland or lake, etc., are not separate waterbodies, and crossings of such features cannot be considered separately. If any crossing requires a PCN review or an individual permit review, then the entire linear project shall be reviewed as one project under PCN or the individual permit procedures.

4. Use of Multiple General Permits. The use of more than one GP for a single and complete project is prohibited, except when the acreage loss of waters of the U.S. authorized by the GPs does not exceed the acreage limit of the GPs with the highest specified acreage limit. For example, if a road crossing over waters is constructed under GP 23, with an associated utility line

crossing authorized by GP 6, if the maximum acreage loss of waters of the U.S. for the total project is ≥1 acre it shall be evaluated as an IP.

5. Suitable Material & Discharge of Pollutants. No activity may use unsuitable material (e.g., trash, debris, car bodies, asphalt, etc.). All activities involving any discharge into waters of the U.S. authorized under these GPs shall be consistent with applicable water quality standards, effluent limitations, standards of performance, prohibitions, and pretreatment standards and management practices established pursuant to the CWA (33 U.S.C. 1251), and applicable state and local laws. If applicable water quality standards, limitations, etc., are revised or modified during the term of this GP, the authorized work shall be modified to conform with these standards within six months from the effective date of such revision or modification, or within a longer period of time deemed reasonable by the District Engineer in consultation with the Regional Administrator of the EPA. Unless monitoring data indicates otherwise, applicants may presume that their activity complies with state water quality standards provided they are in compliance with the Section 401 WQC (Applicable only to the Section 404 activity).

6. Tribal Rights & Burial Sites

a. For all SV and PCN applications, prospective permittees shall follow the guidance set forth in Appendix A, Guidance for NHPA Section 106 Compliance in Massachusetts.

b. No activity or its operation may impair reserved tribal rights, including, but not limited to, reserved water rights and treaty fishing and hunting rights.

c. Many tribal resources are not listed on the National Register of Historic Places (NRHP) and may require identification and evaluation in collaboration with the identifying tribe and by qualified professionals. The Tribal Historic Preservation Officer (THPO) and State Historic Preservation Officer (SHPO) may be able to assist with locating information on:

i. Previously identified tribal resources; and

ii. Areas with potential for the presence of tribal resources.

d. Discovery of Previously Unknown Remains and Artifacts: If any previously unidentified human remains, cultural deposits, or artifacts are discovered while accomplishing the activity authorized by this permit, you must immediately notify the USACE of what you have found, and to the maximum extent practicable, cease work and avoid construction activities that may affect the remains and artifacts until the required coordination has been completed. The USACE will initiate the appropriate the Federal, Tribal, and state coordination required to determine if the items or remains are eligible for listing in the NRHP and warrant a recovery effort or can be avoided.

e. Burial Sites: Burial sites, marked or unmarked, are subject to state law (Massachusetts Unmarked Burial Law). Native American burial sites on federal or tribal land are subject to the provisions of Native American Graves Protection and Repatriation Act (NAGPRA). Regulated activities may not result in disturbance or removal of human remains until disposition of the remains has been determined by the appropriate authority under these laws, and the work is authorized by the USACE. Regulated activities which result in an inadvertent discovery of human remains must stop immediately, and the USACE, as well as the appropriate state and tribal authority, must be notified. Regulated work at inadvertent discovery sites requires compliance with state law or NAGPRA, as appropriate, prior to re-starting work.

7. Avoidance, Minimization, and Compensatory Mitigation. To qualify under the MA GP, activities must comply with Section V Mitigation Standards and the following as applicable:

a. Avoid and Minimize: Activities must be designed and constructed to avoid and minimize adverse effects, both temporary and permanent, to waters of the U.S. to the maximum extent practicable at the project site. Avoidance and minimization are required to the extent necessary to ensure that the adverse effects to the aquatic environment (both area and function) are no more than minimal.

b. Compensatory mitigation for unavoidable impacts to waters of the U.S., including direct, indirect, secondary, and temporal loss, will generally be required for permanent impacts that exceed the thresholds identified in Section V, and may be required for temporary impacts, to offset unavoidable impacts which remain after all appropriate and practicable avoidance and minimization has been achieved and to ensure that the adverse effects to the aquatic environment are no more than minimal. Proactive restoration projects or temporary impact work with no secondary effects may generally be excluded from this requirement.
c. Mitigation proposals shall follow the guidelines found in the Compensatory Mitigation for Losses of Aquatic Resources; Final Rule April 10, 2008; 33 CFR 332. Prospective permittees may purchase mitigation credits in-lieu of permittee-responsible mitigation as compensation for unavoidable impacts to waters of the U.S. in the Commonwealth of Massachusetts.

8. Water Quality & Stormwater Management. The 401 WQC requirement applies to all activities listed under GPs 1-25, unless determined otherwise by MassDEP. Permittees shall also satisfy stormwater management requirements in Massachusetts.

a. General 401 WQC: MassDEP issued a WQC on April 21, 2023 which conditionally certifies all activities in GPs 1 – 24 eligible for SV and PCN so long as the activity is described in 314 CMR 9.03, and is not an activity described in 314 CMR 9.04, and so long as the activity meets all other requirements, terms and conditions of the WQC. The MassDEP WQC also conditionally certifies activities described in GP 25 so long as the activity meets all other conditions of the WQC. Emergency projects described in GP 25 must obtain an emergency certification or otherwise be authorized pursuant to 310 CMR 10.06, qualify under a Severe Weather Emergency Declaration pursuant to 310 CMR 10.06(8) issued by the MassDEP, or meet the requirements of 9.12(2) or (3) in order to be certified under the WQC. Prospective permittees may refer to the following link to determine if their activity is eligible: https://www.nae.usace.army.mil/Missions/Regulatory/State-General-Permits/ Massachusetts-General-Permit/. The General 401 WQC is located here, and it provides detailed information regarding what activities are certified and the conditions for certification. Activities listed in 314 CMR 9.03 that are not exempt from the Wetland Protection Act must have a valid Final Order of Conditions (OOC) or Final Restoration Order of Conditions pursuant to 310 CMR 10.00 to be eligible under the General 401 WQC.
b. Individual 401 WQC: Prospective permittees shall contact MassDEP and apply for an individual 401 WQC if their activity does not qualify for a General 401 WQC as outlined above. MassDEP may issue, waive, or deny the individual 401 WQC on a case-by-case basis. All activities listed in 314 CMR 9.04 must obtain an individual 401 WQC from MassDEP to be eligible under these GPs. When an Individual 401 WQC is required for *PCN activities*, the prospective permittee shall submit their Individual 401 WQC application concurrently to MassDEP and USACE to comply with 40 CFR 121.
c. The prospective permittee is responsible for determining the appropriate 401 WQC requirement and submitting this information to the USACE at the time of their PCN application or when completing their SVN. Prospective permittees that are unsure of whether their activity has been certified should contact MassDEP for a determination.
d. As applicable, all activities shall be compliant with the Massachusetts Stormwater Handbook. The Stormwater Handbook can be accessed on the NAE Regulatory website here: https://www.nae.usace.army.mil/Missions/Regulatory/State-General-Permits/Massachusetts-General-Permit/.
e. No work requiring authorization under Section 404 of the CWA may be performed unless (1) the prospective permittee qualifies for coverage under the April 21, 2023 General 401 WQC, (2) the prospective permittee receives an individual Section 401 WQC from the MassDEP, or (3) the MassDEP waives individual Section 401 WQC.

9. Coastal Zone Management. The permittee must obtain CZM consistency concurrence when an activity is located in the coastal zone in order to be eligible under the MA GP. This requirement

shall be satisfied by acquiring one of the following from the Massachusetts Office of Coastal Zone Management (MA CZM):

a. General CZM Federal Consistency Concurrence (General Concurrence): MA CZM has granted General Concurrence for all SV and PCN activities for GPs 1-25. The prospective permittee must obtain all applicable permits and approvals before construction of the authorized activity begins (e.g., before work begins on site). For SVs, General Concurrence is automatically granted and no further action is required from the prospective permittee. For PCNs, the USACE will coordinate with MA CZM to acquire General Concurrence as part of the PCN application review.
b. Individual CZM Federal Consistency Concurrence (Individual Concurrence): In certain cases, MA CZM may elevate any GP activity 1-25 and require Individual Concurrence. The prospective permittee must contact MA CZM and follow the procedures to obtain Individual Concurrence as determined appropriate by MA CZM.
c. Permittees must obtain CZM consistency concurrence as outlined above before commencing work authorized under these GPs.

10. Federal Threatened and Endangered Species

a. No activity is authorized under any GP which is likely to directly or indirectly jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation, as identified under the Federal Endangered Species Act (ESA), or which will directly or indirectly destroy or adversely modify designated critical habitat or critical habitat proposed for such designation. No activity is authorized under any GP which "may affect" a listed species or critical habitat, unless ESA section 7 consultation addressing the consequences of the proposed activity on listed species or critical habitat has been completed. See 50 CFR 402.02 for the definition of "effects of the action" for the purposes of ESA section 7 consultation, as well as 50 CFR 402.17, which provides further explanation under ESA section 7 regarding "activities that are reasonably certain to occur" and "consequences caused by the proposed action."
b. Other Federal agencies should follow their own procedures for complying with the requirements of the ESA (see 33 CFR 330.4(f)(1)). If a PCN is required for the proposed activity, the Federal permittee must provide USACE with the appropriate documentation to demonstrate compliance with those requirements. The USACE will verify that the appropriate documentation has been submitted. If the appropriate documentation has not been submitted, additional ESA section 7 consultation may be necessary for the activity and the respective federal agency would be responsible for fulfilling its obligation under section 7 of the ESA.
c. USFWS ESA-Listed Species: Non-federal applicants shall use the USFWS website, Information for Planning and Consultation (IPAC), to determine if their activity is located within the ESA-listed species range. The IPAC website can be accessed on the NAE Regulatory website: https://www. nae.usace.army.mil/Missions/Regulatory/State-General-Permits/Massachusetts-General-Permit/. Applicants shall ensure they have an updated, valid species list before construction begins. This may require applicants to update their species list in IPAC before the start of construction. Note: Applicants should refer to the NAE Regulatory Website at the link above to determine if they have been designated as a non-federal representative. Applicants shall complete Section 7 consultation according to the guidance document located on the NAE Regulatory Website. After completing the Rangewide Determination Key and reaching the outcome "may affect, not likely to adversely affect", you may be required to wait up to 15 days before that outcome is final and compliance under Section 7 of the ESA is fulfilled.

i. *Self-Verification Criteria*: The activity is SV-eligible if:
   1) The activity is not located within the ESA-listed species range;
   2) Another (lead) Federal agency has completed Section 7 consultation; or
   3) The activity is located within the ESA-listed species range ***and*** USACE has designated the applicant as a non-federal representative under 50 CFR 402.08 of the ESA for all

species within the project's action area. As the non-federal representative, the applicant shall complete consultation through IPAC and reach the outcome of "no effect" or "not likely to adversely affect".

ii. *Pre-Construction Notification Criteria*: The activity requires a PCN if:

1) The activity is located within the ESA-listed species range ***and*** USACE has NOT designated the applicant as a non-federal representative under 50 CFR 402.08 of the ESA for all species within the project's action area;

2) The activity is located in designated or proposed critical habitat; or

3) The activity is located within the ESA-listed species range and completion of the IPAC determination key has resulted in the outcome of "may affect" or "may affect, likely to adversely affect"; or

4) A PCN is required elsewhere in this document.

d. NOAA-Listed Species: Non-federal applicants shall refer to the Section 7 Mapper for federally listed species to determine if any species are mapped as present. When NOAA-listed species are present, the applicant shall generate a species report through the mapper and submit this document as part of their PCN or SVN submission. The NOAA Fisheries' Section 7 Mapper can be accessed here on the NAE Regulatory website here: https://www.nae.usace.army.mil/Missions/Regulatory/State-General-Permits/Massachusetts-General-Permit/.

e. Authorization of an activity by an GP does not authorize the "take" of a threatened or endangered species as defined under the ESA. In the absence of separate authorization (e.g., an ESA Section 10 Permit, a Biological Opinion with "incidental take" provisions, etc.) from the FWS or the NMFS, the Endangered Species Act prohibits any person subject to the jurisdiction of the United States to take a listed species, where "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. The word "harm" in the definition of "take" means an act which actually kills or injures wildlife. Such an act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering.

11. Essential Fish Habitat (EFH).

a. SV eligible activities have been determined to result in no more than minimal adverse effects, provided the permittee complies with all terms and conditions of the MA GP as appliable to the activity. NMFS has granted General Concurrence [50 CFR 600.920(g)] for all SV eligible activities. These activities do not require project specific EFH consultation.

b. For PCN required activities, the applicant is required to describe and identify potential adverse effects to EFH and should refer to NOAA Fisheries' EFH Mapper (http://www.fisheries.noaa.gov/resource/map/essential-fish-habitat-mapper) and Omnibus Essential Fish Habitat Amendment 2 Volume 2: EFH and HAPC Designation Alternatives and Environmental Impacts (https://www.habitat.noaa.gov/application/efhmapper/oa2_efh_hapc.pdf). If an activity is located within EFH, the PCN application must contain:

1. A description of the action located in EFH.
2. An analysis of the potential adverse effects of the action on EFH and the managed Species.
3. Conclusions regarding the effects of the action on EFH.
4. Proposed mitigation, if applicable (refer to the mitigation thresholds located in Section V).

c. Federal agencies shall follow their own procedures for complying with the EFH requirements of the Magnuson-Stevens Fishery Conservation and Management Act. For activities requiring a PCN, the applicant is responsible for furnishing documentation that demonstrates consultation for EFH has been completed.

d. For PCN activities, no work may commence until EFH consultation as required by the Magnuson-Stevens Act has been completed.

12. National Lands. Activities that impinge upon the value of any National Wildlife Refuge, National Forest, National Marine Sanctuary, National Historic Landmarks or any other area administered by the National Park Service, U. S. Fish and Wildlife Service (USFWS) or U.S. Forest Service (USFS) require a PCN or Individual Permit. Federal land managers seeking authorization for activities located in the above listed National Lands may proceed under SV, unless a PCN is required elsewhere in this document.

13. Wild and Scenic Rivers. The following activities in designated river or study river segments in the National Wild and Scenic River (WSR) System require a PCN unless the Federal agency with direct management responsibility for such river, in Massachusetts this is generally the National Park Service, has determined in writing to the proponent that the proposed work will not adversely affect the WSR designation or study status:

a. Activities that occur in WSR segments, in and 0.25 miles up or downstream of WSR segments, or in tributaries within 0.25 miles of WSR segments;
b. Activities that occur in wetlands within 0.25 miles of WSR segments;
c. Activities that have the potential to alter free-flowing characteristics in WSR segments.

No GP activity may occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a “study river” for possible inclusion in the system while the river is in an official study status, unless the appropriate Federal agency with direct management responsibility for such river, has determined in writing that the proposed activity will not adversely affect the Wild and Scenic River designation or study status.

As of May 10, 2023, affected rivers in Massachusetts include: the Taunton River (40 miles), Sudbury River (16.6 miles), Assabet River (4.4 miles), Concord River (8 miles), Nashua River (27 miles), Squannacook River (16.3 miles), Nissitissit River (4.7 miles), and the Westfield River, including West Branch, Middle Branch, Gendale Brook, East Branch, Drowned Land Brook, Center Brook, Windsor Jambs Brook, Shaker Mill Brook, Depot Brook, Savery Brook, Watson Brook, Center Pond Brook (78.1 miles). The most up to date list of designated and study rivers and their descriptions may be obtained from the appropriate Federal land management agency responsible for the designated Wild and Scenic River or study river (e.g., National Park Service, U.S. Forest Service, Bureau of Land Management, U.S. Fish and Wildlife Service). Information on these rivers is also available at: http://www.rivers.gov/.

14. Historic Properties

a. For all SV and PCN applications, permittees shall follow the guidance set forth in Appendix A, Guidance for NHPA Section 106 Compliance in Massachusetts.

b. No undertaking authorized by these GPs shall cause effects[1] (defined in 36 CFR Part 800 and 33 CFR Part 325, Appendix C, and its Interim Guidance) on properties listed on, determined to be eligible for listing on, or potentially eligible for listing on the National Register of Historic Places (NRHP)[2], including previously unknown historic properties within the permit area, unless the USACE or another Federal action agency has satisfied the consultation requirements of Section 106 of the National Historic Preservation Act (Section 106). If another Federal agency is determined the lead federal agency for compliance with Section 106, applicant must obtain the appropriate documentation and provide this information to the USACE to demonstrate compliance with Section 106. The applicant shall not begin the activity until the USACE notifies them in writing that the documentation provided satisfies Section 106 requirements.

[1] Effect means the alteration to the characteristics of a historic property qualifying it for inclusion in or eligibility for the National Register of Historic Properties.
[2] See the NAE Regulatory website, National Register of Historic Places link here: https://www.nae.usace.army.mil/Missions/Regulatory/State-General-Permits/Massachusetts-General-Permit/.

c. Many historic properties are not listed on the NRHP and may require identification and evaluation by qualified historic preservation and/or archaeological consultants. The State Historic Preservation Officer (SHPO), Massachusetts Board of Underwater Archaeological Resources (BUAR), local historical societies, certified local governments, general public, and NRHP may also be able to assist with locating information on:

i. Previously identified historic properties; and
ii. Areas with potential for the presence of historic properties.

d. Discovery of Previously Unknown Remains and Artifacts: If any previously unidentified human remains, cultural deposits, or artifacts are discovered while accomplishing the activity authorized by this permit, you must immediately notify the USACE of what you have found, and to the maximum extent practicable, cease work and avoid construction activities that may affect the remains and artifacts until the required coordination has been completed. The USACE will initiate the Federal, State and tribal coordination required to determine if the items or remains warrant a recovery effort and/or if the site is eligible for listing in the National Register of Historic Places.

e. Section 110k: Prospective permittees should be aware that section 110k of the NHPA (54 U.S.C. § 306113) prevents the USACE from granting a permit or other assistance to an applicant who, with intent to avoid the requirements of Section 106, has intentionally significantly adversely effected a historic property to which the permit would relate, or having legal power to prevent it, allowed such significant adverse effect to occur, unless the USACE, after consultation with the Advisory Council on Historic Preservation (ACHP), determines that circumstances justify granting such assistance despite the adverse effect created or permitted by the applicant. If circumstances justify granting the assistance, the USACE is required to notify the ACHP and provide documentation specifying the circumstances, the degree of damage to the integrity of any historic properties effected, and proposed mitigation. This documentation must include any views obtained from the applicant, SHPO/THPO, appropriate Indian tribes if the undertaking occurs on or effects historic properties on tribal lands or effects properties of interest to those tribes, and other parties known to have a legitimate interest in the impacts to the permitted activity on historic properties.

f. Underwater Archaeological Resources: Under Massachusetts General Law Ch. 6, s.'s 179-180, and Ch. 91, s. 63, the BUAR has statutory jurisdiction within state waters and is the sole trustee of the Commonwealth's underwater heritage, charged with the responsibility of encouraging the discovery and reporting, as well as the preservation and protection, of underwater archaeological resources. Underwater archaeological resources located within the waters of the Commonwealth of Massachusetts are property of the Commonwealth, which holds title to these resources and retains regulatory authority over their use. Under Massachusetts General Law, no person, organization or corporation may "remove, displace, damage, or destroy" any underwater archaeological resources located within the Commonwealth's submerged lands except through consultation with the BUAR and in conformity with the permits it issues. https://www.mass.gov/orgs/board-of-underwater-archaeological-resources.

15. USACE Property and Federal Projects. (33 USC §408)

a. USACE projects and property can be found at: https://www.nae.usace.army.mil/Missions/Civil-Works/.

b. In addition to any authorization under these GPs, prospective permittee shall contact the USACE Real Estate Division (https://www.nae.usace.army.mil/Missions/Real-Estate-Division/) at (978) 318-8585 for work occurring on or potentially affecting USACE properties and/or USACE-controlled easements. Work may not commence on USACE properties and/or USACE-controlled easements until they have received any required USACE real estate documents evidencing site-specific permission to work.

c. Any proposed temporary or permanent occupation or alteration of a Federal project (including, but not limited to, a levee, dike, floodwall, channel, anchorage, breakwater, seawall, bulkhead, jetty, wharf, pier, or other work built or maintained but not necessarily owned by the United States),

is not eligible for SV and requires a PCN. This includes all proposed structures and work in, over, or under a USACE federal navigation project (FNP) or in the FNP's buffer zone. The buffer zone is an area that extends from the horizontal limits of the FNP to a distance of three times the FNP's authorized depth. The activity also requires review and approval by the USACE pursuant to 33 USC 408 (Section 408 Permission). The prospective permittee may reach out to the POCs located here: https://www.nae.usace.army.mil/ Missions/Section-408/.
d. Any structure or work constructed in a FNP or its buffer zone shall be subject to removal at the owner's expense prior to any future USACE dredging or the performance of periodic hydrographic surveys.
e. Where a Section 408 permission is required, written verification for the PCN will not be issued prior to the decision on the Section 408 permission request.

16. Navigation
a. No activity may cause more than a minimal adverse effect on navigation.
b. Any safety lights and signals prescribed by the U.S. Coast Guard, must be installed, and maintained at the permittee's expense on authorized facilities in navigable waters of the U.S.
c. There shall be no unreasonable interference with navigation by the existence or use of the activity authorized herein, and no attempt shall be made by the permittee to prevent the full and free use by the public of all navigable waters at or adjacent to the activity authorized herein.
d. The permittee understands and agrees that if future U.S. operations require the removal, relocation, or other alteration of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from USACE, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the U.S. No claim shall be made against the U.S. on account of any such removal or alteration.

17. Permit/Authorization Letter On-Site. For PCNs, the permittee shall ensure that a copy of these GPs and the accompanying authorization letter are at the work site (and the project office) whenever work is being performed, and that all personnel with operational control of the site ensure that all appropriate personnel performing work are fully aware of its terms and conditions. The entire permit authorization shall be made a part of any and all contracts and sub-contracts for work that affects areas of USACE jurisdiction at the site of the work authorized by these GPs. This shall be achieved by including the entire permit authorization in the specifications for work. The term "entire permit authorization" means these GPs, including GCs and the authorization letter (including its drawings, plans, appendices, special conditions, and other attachments), and any permit modifications. If the authorization letter is issued after the construction specifications, but before receipt of bids or quotes, the entire permit authorization shall be included as an addendum to the specifications. If the authorization letter is issued after receipt of bids or quotes, the entire permit authorization shall be included in the contract or sub-contract as a change order. Although the permittee may assign various aspects of the work to different contractors or sub-contractors, all contractors and sub-contractors shall be obligated by contract to comply with all environmental protection provisions contained within the entire authorization letter, and no contract or sub-contract shall require or allow unauthorized work in areas of USACE jurisdiction. For SVs, the permittee shall ensure that a complete and signed copy of the SVN is present on site during construction and is made available for review at any time by USACE and other Federal, State, & Local regulatory agencies. A complete and signed copy of the SVN must be submitted to USACE Regulatory within 30 days of initiating construction of the authorized activity, unless stated otherwise in the applicable GP.

18. Storage of Seasonal Structures. Coastal structures such as pier sections, floats, etc., that

are removed from the waterway for a portion of the year (often referred to as seasonal structures) shall be stored in an upland location, located above MHW and not in tidal wetlands. These seasonal structures may be stored on the fixed, pile-supported portion of the structure that is seaward of MHW. This is intended to prevent structures from being stored on the marsh substrate and the substrate seaward of MHW.

19. Pile Driving and Pile Removal in Navigable Waters.
a. Derelict, degraded or abandoned piles and sheet piles in navigable waters of the U.S., except for those inside existing work footprints for piers, must be completely removed, cut and/or driven to 3 feet below the substrate to prevent interference with navigation, and existing creosote piles that are affected by project activities shall be completely removed if practicable. In areas of fine-grained substrates, piles must be removed by the direct, vibratory or clamshell pull method[1] to minimize sedimentation and turbidity impacts and prevent interference with navigation from cut piles. Removed piles shall be disposed of in an upland location landward of MHW or OHW and not in wetlands, tidal wetlands or mudflats.
b. A PCN is required for the installation or removal of structures with jetting techniques.
c. A PCN is required for the installation of >12 inch-diameter piles of any material type or steel piles of any size in tidal waters, unless they are installed in the dry. If piles are not installed in the dry:
i. Impact pile driving shall commence with an initial set of three strikes by the hammer at 40% energy, followed by a one-minute wait period, then two subsequent 3-strike sets at 40% energy, with one minute waiting periods, before initiating continuous impact driving.
ii. Vibratory pile driving shall be initiated for 15 seconds at reduced energy followed by a one-minute waiting period. This sequence of 15 seconds of reduced energy driving, one-minute waiting period shall be repeated two more times, followed immediately by pile-driving at full rate and energy.
iii. In addition to using a soft start at the beginning of the workday for pile driving as described in 19c(i-ii), a soft start must also be used at any time following a cessation of pile driving for a period of 30 minutes or longer.
d. Bubble curtains may be used to reduce sound pressure levels during vibratory or impact hammer pile driving.

20. Time-of-Year (TOY) Restrictions. Activities that include in-water work must comply with the TOY Restrictions below to be SV eligible, otherwise a PCN is required. PCN submittals shall contain written justification for deviation from the TOY Restrictions. The term “in-water work” does not include conditions where the work site is “in-the-dry” (e.g., intertidal areas exposed at low tide). The term “in-the-dry” includes work contained within a cofferdam so long as the cofferdam is installed and subsequently removed outside the TOY Restriction. The TOY restrictions stated in Appendix B of the MA DMF Technical Report TR-47[2] can apply instead for activities in tidal waters if (1) TOYs are provided for a specific waterbody where the activity is proposed and (2) the TOYs are less restrictive than below. The activity must also not require a PCN elsewhere in this document to be SV eligible.

[1] Direct Pull: Each piling is wrapped with a choker cable or chain that is attached at the top to a crane. The crane then pulls the piling directly upward, removing the piling from the sediment. Vibratory Pull: The vibratory hammer is a large mechanical device (5-16 tons) that is suspended from a crane by a cable. The vibrating hammer loosens the piling while the crane pulls up. Clamshell Pull: This can remove intact, broken or damaged pilings. The clamshell bucket is a hinged steel apparatus that operates like a set of steel jaws. The bucket is lowered from a crane and the jaws grasp the piling stub as the crane pulls up. The size of the clamshell bucket is minimized to reduce turbidity during piling removal.
[2] The MA DMF Technical Report TR-47: https://www.nae.usace.army.mil/Missions/Regulatory/State-General-Permits/Massachusetts-General-Permit/

	TOY Restriction (No work)
Non-tidal Waters	Defer to TR-47
Tidal Waters	January 15 – November 15

Alternate work windows proposed under a PCN will generally be coordinated with the USFWS and NMFS. Resulting written verifications may include species-specific work allowed windows.

21. Heavy Equipment in Wetlands. Operating heavy equipment (drill rigs, fixed cranes, etc.) within wetlands shall be minimized, and such equipment shall not be stored, maintained, or repaired in wetlands, to the maximum extent practicable. Where construction requires heavy equipment operation in wetlands, the equipment shall:

i. Have low ground pressure (typically ≤3 psi);

ii. Be placed on swamp/construction/timber mats (herein referred to as "construction mats" or "mats") that are adequate to support the equipment in such a way as to minimize disturbance of wetland soil and vegetation. See GC 22 for information on the placement of construction mats; or

iii. Be operated on adequately dry or frozen wetlands such that shear pressure does not cause subsidence of the wetlands immediately beneath the equipment and upheaval of adjacent wetlands. Construction mats are to be placed in the wetland from the upland or from equipment positioned on mats if working within a wetland. Dragging construction mats into position is prohibited. Other support structures that are capable of safely supporting equipment may be used with written USACE authorization.

22. Temporary Fill, Work & Construction Mats.

a. *Construction mats in non-tidal waters*: Temporary construction mats shall be in place ≤1 year *and* for one growing season or less to be SV eligible. A PCN is required if construction mats are in place >1 year *or* for more than one growing season. Construction mats can be placed in an area of any size in non-tidal waters. The activity may occur in segments to ensure the requirements for SV above are met, otherwise a PCN is required.

b. *Construction mats in tidal waters*: Temporary construction mats placed in an area <5,000 SF in tidal waters are SV eligible, provided those mats are in place ≤6 months. Temporary construction mats placed in an area ≥5,000 SF or in place >6 months in tidal waters require a PCN.

c. *Management of construction mats:* At a minimum, construction mats shall be managed in accordance with the following construction mat best management practices (BMPs):

1. Mats shall be in good condition to ensure proper installation, use, and removal.
2. As feasible, mats shall be placed in a location that will minimize the amount of mats needed for the wetland crossing(s).
3. Inspect mats prior to their re-use and remove any plant debris. Mats are to be thoroughly cleaned before re-use to prevent the spread of invasive plant species.
4. Impacts to wetland areas shall be minimized during installation, use, and removal of the mats.
5. Adequate erosion & sediment controls shall be installed at approaches to mats to promote a smooth transition to, and minimize sediment tracking onto, the mats.
6. In most cases, mats should be placed along the travel area so that the individual boards are resting perpendicular to the direction of traffic. No gaps should exist between mats. Place mats far enough on either side of the resource area to rest on firm ground.

d. A PCN is required for temporary fills in place >2 years. All temporary fills and disturbed soils shall be stabilized to prevent the material from eroding into waters of the U.S. where it is not authorized. Work shall include phased or staged development to ensure only areas under active development are exposed and to allow for stabilization practices as soon as practicable. Temporary fill must be placed in a manner that will prevent it from being eroded by expected high flows.

e. Activities that require unconfined temporary fill and are authorized for discharge into waters of the U.S. shall consist of material that minimizes effects to water quality.
f. Appropriate measures must be taken to maintain normal downstream flows and minimize flooding to the maximum extent practicable when temporary structures, work, and discharges of dredged or fill material, including cofferdams, are necessary for construction activities, access fills, or dewatering of construction sites. Materials shall be placed in a location and manner that does not adversely impact surface or subsurface water flow into or out of the wetland. Temporary fill authorized for discharge into wetlands shall be placed on geotextile fabric or other appropriate material laid on the pre-construction wetland grade where practicable to minimize impacts and to facilitate restoration to the original grade. Construction mats are excluded from this requirement.
g. Construction debris and deteriorated materials shall not be located in waters of the U.S.
h. Temporary fills, construction mats, and corduroy roads shall be entirely removed as soon as they are no longer needed to construct the authorized activity and the disturbed areas be restored to pre-construction contours and conditions.
i. Construction equipment, such as temporary barges in tidal waters, shall provide clearance above the substrate to avoid grounding onto the substrate during all tides.

23. Restoration of Wetland Areas.
a. Upon completion of construction, all disturbed wetland areas shall be stabilized with a wetland seed mix or plant plugs containing only plant species native to New England, and be appropriate for site conditions, including salinity and frequency of inundation, and shall not contain any species listed in the “Invasive and Other Unacceptable Plant Species” Appendix K of the New England District “Compensatory Mitigation Standard Operating Procedures” found at https://www.nae.usace.army.mil/Missions/Regulatory/Mitigation.aspx.
b. The introduction or spread of invasive plant species in disturbed areas shall be prevented and controlled. Equipment shall be thoroughly cleaned before and after project construction to prevent the spread of invasive species. This includes, but is not limited to, tire treads and construction mats.
c. In areas of authorized temporary disturbance, if trees are cut in USACE jurisdiction, they shall be cut at or above ground level and not uprooted in order to prevent disruption of any kind to the wetland soil structure and to allow stump sprouts to revegetate the work area, unless otherwise authorized.
d. Wetland areas where permanent disturbance is not authorized shall be restored to their original condition and elevation, which under no circumstances shall be higher than the pre-construction elevation. Original condition means careful protection and/or removal of existing soil and vegetation, and replacement back to the original location such that the original soil layering and vegetation schemes are approximately the same, unless otherwise authorized.

24. Bank Stabilization.
a. Projects involving construction or reconstruction/maintenance of bank stabilization within USACE jurisdiction shall be designed to minimize environmental effects, effects to neighboring properties, scour, conversion of natural shoreline to hard armoring, etc. to the maximum extent practicable.
b. Projects involving the construction of new bank stabilization within USACE jurisdiction shall use bioengineering techniques and natural materials in the project design to the maximum extent practicable. Use of hard structures shall be eliminated or minimized unless the prospective permittee can demonstrate that use of bioengineering techniques is not practicable due to site conditions.
c. Where possible, bank stabilization projects shall optimize the natural function of the shoreline, including self-sustaining stability to attenuate flood flows, fishery, wildlife habitat and water quality protection, while protecting upland infrastructure from storm events that can cause erosion as well as impacts to public and private property.
d. No material shall be placed in excess of the minimum needed for erosion protection.
e. No material shall be placed in a manner that will be eroded by normal or expected high flows (properly anchored native trees and treetops may be used in low energy areas).

f. Native plants appropriate for current site conditions, including salinity, must be used for bioengineering or vegetative bank stabilization.
g. The activity must be properly maintained, which may require repairing it after severe storms or erosion events.

25. Soil Erosion and Sediment Controls.
a. Appropriate soil erosion and sediment controls[1] (hereinafter referred to as "controls") must installed prior to earth disturbance and maintained in effective operating condition during construction. Biodegradable wildlife friendly erosion controls should be used whenever practicable to minimize effects to water quality.
b. Activities in streams (rivers, streams, brooks, etc.) and tidal waters that are capable of producing sedimentation or turbidity should be done during periods of low-flow or no-flow, when the stream or tide is waterward of the work area. Controls may also be used to obtain dry work conditions (e.g., coffer dam, turbidity curtain). The prospective permittee must demonstrate in the project plans where the controls are proposed and how these controls would avoid and/or minimize turbidity or sedimentation.
c. A PCN is required for controls that encroach: i) >25% of the stream width measured from OHW in non-tidal diadromous streams from March 15 to June 30; or ii) >25% of the waterway width measured from MHW in tidal waters from Feb. 1 to June 30, or >50% of the waterway width measured from MHW in tidal waters from July 1 to Jan. 14. This is to protect upstream fish passage. Proponents must also maintain downstream fish passage throughout the project.
d. No dewatering shall occur with direct discharge to waters or wetlands. Excess water in isolated work areas shall be pumped or directed to a sedimentation basin, tank or other dewatering structures in an upland area adequately separated from waters or wetlands. Suspended solids shall be removed prior to discharge back into waters or wetlands from these dewatering structures. All discharge points back into waters and wetlands shall use appropriate energy dissipaters and erosion and sedimentation control BMPs.
e. Temporary controls shall be removed upon completion of work, but not until all exposed soil and other fills, as well as any work waterward of OHW or the HTL, are permanently stabilized at the earliest practicable date. Sediment and debris collected by these devices shall be removed and placed at an upland location in a manner that will prevent its later erosion into a waterway or wetland. Controls may be left in place if they are biodegradable and flows and aquatic life movements are not disrupted.

26. Aquatic Life Movements and Management of Water Flows.
a. No activity may substantially disrupt the necessary life cycle movements of those species of aquatic life indigenous to the waterbody, including those species that normally migrate through the area, unless the activity's primary purpose is to impound water. All permanent and temporary crossings of waterbodies and wetlands shall be:
   i. Suitably spanned, bridged, culverted, or otherwise designed and constructed to maintain low flows to sustain the movement of those aquatic species; and
   ii. Properly aligned and constructed to prevent bank erosion or streambed scour both adjacent to and inside the crossing.

[1] Appropriate soil erosion, sediment and turbidity controls include cofferdams, bypass pumping around barriers immediately up and downstream of the work footprint (i.e., dam and pump), installation of sediment control barriers (i.e., silt fence, vegetated filter strips, geotextile silt fences, filter tubes, erosion control mixes, hay bales or other devices) downhill of all exposed areas, stream fords, retention of existing vegetated buffers, application of temporary mulching during construction, phased construction, and permanent seeding and stabilization, etc.

b. To avoid adverse impacts on aquatic organisms, the low flow channel/thalweg shall remain unobstructed during periods of low flow, except when necessary to perform the authorized work.
c. For work in tidal waters, in-stream controls (e.g., cofferdams) should be installed in such a way as to not obstruct fish passage.
d. Riprap and other stream bed materials shall be installed in a manner that avoids organism entrapment in rock voids or water displaced to subterranean flow with crushed stone and riprap.
e. To the maximum extent practicable, the preconstruction course, condition, capacity, and location of open waters must be maintained for each activity, including stream channelization, storm water management activities, and temporary and permanent road crossings, except as provided below. The activity must be constructed to withstand expected high flows. The activity shall not restrict or impede the passage of normal or high flows unless the primary purpose of the activity is to impound water or manage high flows. The activity may alter the pre-construction course, condition, capacity, and location of open waters if it benefits the aquatic environment (e.g., stream restoration or relocation activities).

27. Spawning, Breeding, and Migratory Areas.
a. Activities in spawning areas during spawning seasons must be avoided to the maximum extent practicable. Activities that result in the physical destruction (e.g., through excavation, fill, or downstream smothering by substantial turbidity) of an important spawning area are not authorized under these GPs.
b. Activities in waters of the U.S. that serve as breeding areas for migratory birds must be avoided to the maximum extent practicable.
c. The applicant is responsible for obtaining any "take" permits required under the USFWS's regulations governing compliance with the Migratory Bird Treaty Act or the Bald and Golden Eagle Protection Act. The applicant should contact the appropriate local office of the USFWS to determine if such "take" permits are required for a particular activity.
d. Information on spawning habitat for species managed under the Magnuson-Stevens Fishery Conservation and Management Act (i.e., EFH for spawning adults) can be obtained from NAE Regulatory website, Essential Fish Habitat section, at: https://www.nae.usace.army.mil/Missions/Regulatory/State-General-Permits/Massachusetts-General-Permit/.
e. Information regarding diadromous fish habitat can be obtained from the following DMF website at: https://www.mass.gov/info-details/massgis-data-diadromous-fish.

28. Vernal Pools.
a. A PCN is required if a discharge of dredged or fill material is proposed within a vernal pool depression that is also a water of the U.S.
b. Vernal pools must be identified on the plans that show aquatic resource delineations.
c. Adverse impacts to vernal pools shall be avoided & minimized to the maximum extent practicable.

29. Invasive Species.
a. The introduction, spread or the increased risk of invasion of invasive plant or animal species on the project site, into new or disturbed areas, or areas adjacent to the project site caused by the site work shall be avoided. Construction mats shall be thoroughly cleaned before reuse to avoid spread of invasive species.
b. Unless otherwise directed by USACE, all applications for PCN non-tidal projects proposing fill in USACE jurisdiction shall include an Invasive Species Control Plan. Additional information can be found at: https://www.nae.usace.army.mil/Missions/Regulatory/Invasive-Species/, https://www.nae.usace.army.mil/Missions/Regulatory/Mitigation/.

30. Fills Within 100-Year Floodplains. The activity shall comply with applicable Federal Emergency Management Agency (FEMA) approved, Massachusetts Emergency Management

Agency (MEMA) approved and/or local floodplain management requirements. Applicants should contact FEMA and/or MEMA regarding floodplain management requirements.

31. Stream Work and Crossings & Wetland Crossings.
a. When feasible, all temporary and permanent crossings of waterbodies and wetlands (hereinafter referred to as "crossings") shall conform to the "Massachusetts River and Stream Crossing Standards" located at: https://www.mass.gov/doc/massachusetts-river-and-stream-crossing-standards/download or https://www.nae.usace.army.mil/Missions/Regulatory/State-General-Permits/Massachusetts-General-Permit/. Projects that do not conform to these guidelines shall be reviewed under PCN or IP procedures.
b. Crossings shall be suitably culverted, bridged, or otherwise designed to withstand and to prevent the restriction of high flows, to maintain existing low flows, maintain water quality, and not obstruct the movement of aquatic life indigenous to the waterbody beyond the duration of construction.
c. Crossings shall be installed in such a manner as to preserve hydraulic capacity and flow, sediment transport, and organism passage at its present level, between the wetlands on either side of the road. The applicant shall take necessary measures to correct any wetland damage resulting from deficiencies in hydraulic capacity, sediment transport and organism passage.
d. Stream crossings shall utilize a natural mixed grain-size streambed material composition that matches upstream and downstream substrates to create a stable streambed. Substrate should function appropriately during normal and high flows without washing out. If natural streambed material is not utilized, a PCN is required.
e. Activities involving open trench excavation in flowing waters require a PCN. Work should not occur in flowing waters (requires using management techniques such as temporary flume pipes, culverts, cofferdams, etc.). Normal flows should be maintained within the stream boundary's confines when practicable. Projects utilizing these management techniques must meet all applicable terms and conditions of the GP, including the GCs in Section IV.

32. Utility Line Installation and Removal
a. Subsurface utility lines must be installed at a sufficient depth to avoid damage from anchors, dredging, etc., and to prevent exposure from erosion and stream adjustment.
b. When utility lines are installed via horizontal directional drilling, a frac-out contingency plan shall be present on site for the duration of construction. As necessary, the applicant shall immediately contain, control, recover, and remove drilling fluids released into the environment.
c. Abandoned or inactive utility lines must be removed and faulty lines (e.g., leaking hazardous substances, petroleum products, etc.) must be removed or repaired. A written verification from the USACE is required if they are to remain in place, e.g., to protect sensitive areas or ensure safety.
d. Utility lines shall not adversely alter existing hydrology, and trenches cannot be constructed or backfilled in such a manner as to drain waters of the U.S. (e.g., backfilling with extensive gravel layers, creating a French drain effect). In wetland areas, structures such as ditch plugs, cut-off walls, clay blocks, bentonite, or other suitable material shall be used within utility trenches to ensure that the trench through which the utility line is installed does not drain waters of the U.S. including wetlands.
e. Stockpiling of tree debris, to the extent where it has the effect of fill material, shall not occur in waters of the U.S. Tree debris shall be removed from waters of the U.S. and placed in uplands without causing additional disturbance to aquatic resources. Failure to meet this condition could change the bottom elevation of the wetland and be considered a discharge of fill material, and depending on the area of alteration, may require a PCN or IP.

33. Water Supply Intakes. No activity may occur in the proximity of a public water supply intake, except where the activity is for the repair or improvement of public water supply intake structures or adjacent bank stabilization.

34. Coral Reefs. Impacts to coral reefs are not authorized under these GPs. Coral reefs consist of the skeletal deposit, usually of calcareous or silicaceous materials, produced by the vital activities of anthozoan polyps or other invertebrate organisms present in growing portions of the reef.

35. Blasting. Blasting in waters of the U.S. associated with work such as dredging, trenching, pile installation, etc. is not authorized under these GPs.

36. Inspections. The permittee shall allow USACE to make periodic inspections at any time deemed necessary to ensure that the work is being or has been performed in accordance with the terms and conditions of this permit. To facilitate these inspections, for activities requiring a PCN, the permittee shall complete and return the Certificate of Compliance when it is provided with a PCN verification letter. For SV-eligible activities, the permittee shall complete and submit the SVN to USACE within 30 days of initiating project construction, at which point, USACE may opt to inspect the activity to verify compliance with the terms and conditions of the GP. Post-construction engineering drawings may be required by USACE for completed work. This includes post-dredging survey drawings for any dredging work.

37. Maintenance. The permittee shall maintain the activity authorized by these GPs in good condition and in conformance with the terms and conditions of this permit. Some maintenance activities may not be subject to federal regulation under Section 404 in accordance with 33 CFR 323.4(a)(2). This condition is not applicable to maintenance of dredging projects. Prospective permittees should contact USACE to inquire about maintenance of dredging projects, and its eligibility under these GPs. Maintenance dredging is subject to the review thresholds in GP #7 as well as any conditions included in a written USACE authorization. Maintenance dredging includes only those areas and depths previously authorized and dredged.

38. Property Rights. Per 33 CFR 320.4(g)(6), these GPs do not convey any property rights, either in real estate or material, or any exclusive privileges, nor do they authorize any injury to property or invasion of rights or any infringement of Federal, State, or local laws or regulations.

39. Transfer of GP Verifications. When the work authorized by these GPs is still in existence at the time the property is transferred, the terms and conditions of these GPs, including any special conditions, will continue to be binding on the entity or individual who received the GP authorizations, as well as the new owner(s) of the property. If the permittee sells the property associated with a GP authorization, the applicant may transfer the GP authorization to the new owner by submitting a letter to USACE to validate the transfer. A copy of the GP authorization letter must be attached to the letter, and the letter must include the following statement: “The terms and conditions of these general permits, including any special conditions, will continue to be binding on the new owner(s) of the property.” This letter shall be signed by both the seller and new property owner(s).

40. Modification, Suspension, and Revocation. These GPs and any individual authorization issued thereof may be either modified, suspended, or revoked in whole or in part pursuant to the policies and procedures of 33 CFR 325.7; and any such action shall not be the basis for any claim for damages against the U.S.

41. Special Conditions. The USACE may impose other special conditions on a project authorized pursuant to these GPs that are determined necessary to minimize adverse navigational and/or environmental effects or based on any other factor of the public interest. Failure to comply with all conditions of the authorization, including special conditions, constitutes a permit violation and may subject the applicant to criminal, civil, or administrative penalties or restoration.

42. False or Incomplete Information. If USACE makes a determination regarding the eligibility of a project under these GPs, and subsequently discovers that it has relied on false, incomplete, or inaccurate information provided by the applicant, the authorization will not be valid, and the U.S. Government may institute appropriate legal proceedings.

43. Abandonment. If the permittee decides to abandon the activity authorized under these GPs, unless such abandonment is merely the transfer of property to a third party, he/she/they may be required to restore the area to the satisfaction of USACE.

44. Enforcement cases. These GPs do not apply to any existing or proposed activity in USACE jurisdiction associated with an on-going USACE or EPA enforcement action, until such time as the enforcement action is resolved or USACE or EPA determines that the activity may proceed independently without compromising the enforcement action.

45. Previously Authorized Activities.

a. Completed projects that received prior authorization from USACE (SV or PCN), shall remain authorized in accordance with the original terms and conditions of those authorizations, including their terms, GCs, and any special conditions provided in a written verification.

b. Activities authorized pursuant to 33 CFR 330.3 (activities occurring before certain dates) are not affected by these GPs.

46. Duration of Authorization.

These GPs expire on June 1, 2028. Activities authorized under these GPs will remain authorized until the GPs expire, unless discretionary authority has been exercised on a case-by-case basis to modify, suspend, or revoke the authorization in accordance with 33 CFR 325.2(e)(2). Activities authorized under GPs 1-25 that have either commenced (i.e., are under construction) or are under contract to commence in reliance upon this authorization will have until June 1, 2029 to complete the work. If requested by USACE, the permittee shall furnish documentation that demonstrates the project was under construction or under contract to commence by June 1, 2028. If work is not completed before June 1, 2029, the permittee must contact USACE. The USACE may issue a new authorization provided the project meets the terms and conditions of the MA GPs in effect at the time. Activities completed under the SV or PCN authorizations of these GPs will continue to be authorized after their expiration date.

SECTION V: MITIGATION STANDARDS

1. Mitigation Types

For all activities, applicants must (a) demonstrate how the project has been designed to avoid or minimize impacts to aquatic resources; and (b) describe measures taken to avoid or minimize impacts to aquatic resources through construction techniques and/or site access. Please see https://www.nae.usace.army.mil/Missions/Regulatory/Mitigation/ for assistance with preparing mitigation in accordance with the 2008 Compensatory Mitigation for Losses of Aquatic Resources; Final Rule (33 CFR 332.3), hereafter referred to as "2008 Mitigation Rule."

Avoidance - Avoidance of impacts (direct and indirect) to aquatic resources means that project activities would not result in the placement of fill material or installation of a structure that could impact the resource area. Avoidance can include, but is not limited to, designing the project to avoid impacts to all or a portion of the aquatic resource areas.

Minimization - Minimization of impacts (direct and indirect) to aquatic resources means that measures are taken to ensure the amount and duration of impacts are limited to the maximum extent practicable. There are many minimization measures that could be implemented, prior to, during, or after the proposed activity, to ensure impacts are minimized. Examples include, but are not limited to:

- Permanent preservation of avoided aquatic features and buffer zone, in perpetuity. In these cases, the preserved area would be under a conservation easement and managed by conservation oriented third-party manager.
- Utilization of best management practices (BMPs) to ensure impacts are limited, and do not result in adverse impacts to the integrity and long-term functions of preserved/avoided features.

Compensatory Mitigation - Compensatory mitigation is generally required for PCN activities in which the impacts to the aquatic resources have been avoided and minimized to the maximum extent practicable but would still result in unavoidable adverse effects to the environment that are considered more than minimal or are contrary to the public interest. *Whatever the case may be, compensatory mitigation is no substitute for avoidance and minimization.*

2. Thresholds for Compensatory Mitigation

The basic objective of compensatory mitigation in the USACE Regulatory Program is to offset environmental losses resulting from unavoidable impacts to waters of the U.S. authorized by Department of the Army permits. **The following compensatory mitigation thresholds apply to all PCN activities that result in loss[1] of the resource area types listed below. Activities[2] in waters of the U.S. associated with the restoration, enhancement, and establishment of tidal and non-tidal aquatic resources are not considered loss and are not subject to the thresholds below.** Thresholds for different resource areas may not be combined to exceed 5,000 SF of total loss of all waters. The USACE will continue to evaluate projects on a case-by-case basis, and may in some cases require compensatory mitigation below these thresholds (e.g. minor impacts that add to a cumulative loss).

[1] See definition of loss in Section VII.
[2] These activities must result in net increases in aquatic resource functions and services to be exempted from the thresholds above.

Compensatory Mitigation Thresholds in Massachusetts		
Resource Area	**Non-Tidal Threshold**	**Tidal Threshold**
Stream	200 LF	200 LF
Bank Stabilization	500 LF	500 LF
Open Water	Project Dependent	Project Dependent
Wetland	5,000 SF	500 SF
Vernal Pool	All	N/A
SAV	Project dependent	25 SF
Mudflat	N/A	1,000 SF
Intertidal	N/A	1,000 SF

These thresholds can be utilized to determine at what point compensatory mitigation is required but are not used to determine how much mitigation may be needed to offset impacts to resources. Per the 2008 Mitigation Rule (33 CFR 332.3(f)(1)) "the amount of required compensatory mitigation must be, to the extent practicable, sufficient to replace lost aquatic resource functions. In cases where appropriate functional or condition assessment methods or other suitable metrics are available, these methods should be used where practicable to determine how much compensatory mitigation is required. If a functional or condition assessment or other suitable metric is not used, a minimum one-to-one acreage or linear foot compensation ratios must be used."

3. Compensatory Mitigation Hierarchy

Compensatory mitigation should follow the hierarchy as outlined in 33 CFR 332.3(b)(2-6) or current regulation. This hierarchy in order of preference includes: (1) Mitigation Bank credits, (2) In-Lieu Fee program credits, (3) permittee-responsible mitigation under a watershed approach, (4) permittee-responsible mitigation through on-site and in-kind mitigation, and (5) permittee-responsible mitigation through off-site and/or out-of-kind mitigation. If the proposed mitigation deviates from this mitigation hierarchy, the applicant **must** justify in writing why the proposed mitigation is environmentally preferable to the preferred method of compensatory mitigation (See 2008 Mitigation Rule). **In order for your application to be considered complete, you must provide a statement that discusses how your project will compensate for the loss or impact to aquatic resources.** If you are proposing permittee responsible mitigation, the 12 components of a mitigation plan (33 CFR 332.4(c)(2-14) must be addressed for your application to be considered complete. Prospective applicants are encouraged to contact USACE with questions at any time. Addressing the 12 components of a mitigation plan is commensurate with the amount of compensatory mitigation required, and USACE can assist prospective applicants with the level of information needed to satisfy each component.

For activities resulting in the loss of marine or estuarine resources, permittee-responsible mitigation may be environmentally preferable if there are no mitigation banks or in-lieu fee programs in the area that have marine or estuarine credits available for sale or transfer to the permittee.

4. In-Lieu Fee (ILF)

The purchase of credits from the Massachusetts In-Lieu Fee Program (MA ILFP) is the ***preferred*** method of compensatory mitigation in Massachusetts since, as of the issuance date of this GP, there are no mitigation banks available in Massachusetts. The applicant shall develop a mitigation plan that addresses the baseline conditions at the impact site and the number of credits to be provided (see 33 CFR 332.4(c)(1)(ii)).

The MA ILFP is administered by the Massachusetts Department of Fish & Game (DFG) in accordance with the 2008 Mitigation Rule at 33 CFR 332. The Mitigation Rule governs in-lieu fee compensatory mitigation associated with USACE permits under §404 of the Clean Water Act and/or §9 or §10 of the Rivers and Harbors Act of 1899.

MA ILFP Website: https://www.mass.gov/in-lieu-fee-program

Acceptance of an ILF payment into the ILFP established by the 2014 MA ILFP Instrument (link below) is an acknowledgement by DFG that it assumes all legal responsibility for satisfying the mitigation requirements of the USACE (i.e., the implementation, performance, and long-term management and monitoring of the compensatory mitigation project(s) approved under this Instrument and subsequent Compensatory Mitigation Plans). This transfer of legal responsibility is established by: 1) the approval of this In-Lieu Fee Instrument; 2) receipt by the district engineer of a Notice of Credit Sale and Transfer of Legal Responsibility to DFG that is signed by the DFG and the permittee and dated; and 3) the transfer of fees from the permittee to DFG.

MA ILFP Fact Sheet: https://www.mass.gov/files/documents/2017/01/sj/ilfp-fact-sheet-ma-ilfp-fees.pdf

MA ILFP Instrument: https://www.mass.gov/files/documents/2016/08/nd/ilfp-final-instrument-dfg.pdf

5. Permittee-Responsible

The USACE may determine that the proposed permittee-responsible compensatory mitigation is appropriate on a case-by-case basis. As described in the Compensatory Mitigation Hierarchy section above, applicants must justify in writing why the proposed mitigation is environmentally preferable to the purchase of ILF credits. Applicants are encouraged to contact the USACE prior to submission of a permit application to seek further guidance regarding USACE mitigation requirements.

Applicants will demonstrate their proposed compensatory mitigation in writing by addressing the 12 components of a mitigation plan (33 CFR 332.4(c)(2-14). *Please note that all elements must be addressed, or the permit application will be deemed incomplete.* In certain circumstances, the district engineer may determine that prior approval of the final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation (see 33 CFR 332.3(k)(3)). Guidance on how to address these components can be found on the New England District Mitigation webpage: https://www.nae.usace.army.mil/Missions/Regulatory/Mitigation/

Performance standards will be used to measure the successfulness of the mitigation project. A successful mitigation project is one that is self-sustaining. For a mitigation project that will restore, enhance, or create wetlands, proper performance standards must address hydrology, hydric soils, and hydrophytic vegetation. The mitigation proposal must include an explanation of quantitative methods used to measure the success of performance standards (i.e., percent cover may be measured using vegetation plots, hydrology may be measured using data loggers, soil cores may be taken and evaluated for hydric soil indicators).

Monitoring methods should include quantitative sampling methods following established, scientific protocols. Sampling documentation, as part of monitoring reports, should include maps and coordinates (also shapefiles, if available) showing locations of sampling points, transects, quadrats, etc. In addition, permanent photo stations should be established coincident with sampling locations.

SECTION VI: FEDERAL & STATE AGENCY CONTACT INFORMATION & ORGANIZATIONAL WEBSITES

Federal Agencies

U.S. Army Corps of Engineers
Regulatory Division
696 Virginia Road
Concord, Massachusetts 01742-2751
(978) 318-8338 (phone); (978) 318-8303 (fax)
www.nae.usace.army.mil/missions/regulatory

U.S. Army Corps of Engineers
Navigation Division – Section 408
696 Virginia Road
Concord, Massachusetts 01742-2751
See link below for contact information:
https://www.nae.usace.army.mil/Missions/Section-408/

National Marine Fisheries Service
55 Great Republic Drive
Gloucester, Massachusetts 01930
(978) 281-9300 (phone)
(*Federal endangered species & EFH)*

U.S. Fish & Wildlife Service
70 Commercial Street, Suite 300
Concord, New Hampshire 03301
(603) 223-2541 (phone)
(Federal endangered species)

National Park Service
15 State Street
Boston, Massachusetts 02109
(617) 223-5191 (phone)
(*Wild and Scenic Rivers*)

Bureau of Ocean and Energy Management
1849 C Street, NW
Washington D.C. 20240
202-208-6474 (phone)
(*Offshore Wind Facilities)*

Chief, Risk Analysis Branch
FEMA Region 1
99 High Street, 6th Floor
U.S. Department of Homeland Security
Boston, Massachusetts 02110
(617) 956-7576 (phone)

Commander (dpb)
First Coast Guard District
Battery Building
One South Street
New York, New York 10004-1466
(212) 514-4331 (phone); (212) 514-4337 (fax)
(*Bridge permits*)

U.S. Environmental Protection Agency
5 Post Office Square
Suite 100 (OEP06–3)
Boston, Massachusetts 02109-3912
(617) 918-1692 (phone)

State Agencies in Massachusetts

Massachusetts Department of Environmental Protection (MassDEP)	
DEP Division of Wetlands & Waterways	100 Cambridge Street, Suite 900 Boston, Massachusetts 02114 (617) 292-5695
Northeast Region	150 Presidential Way, Suite 300 Woburn, Massachusetts 01801 (978) 694-3200
Southeast Region	20 Riverside Drive, Route 105 Lakeville, Massachusetts 02347 (508) 946-2800
Central Region	8 New Bond Street Worcester, Massachusetts 01606 (508) 792-7650
Western Region	436 Dwight Street Springfield, Massachusetts 01103 (413) 784-1100

Massachusetts Office of Coastal Zone Management (CZM) Emails may be sent to: czm@mass.gov	
MA Office of Coastal Zone Management	100 Cambridge Street, Suite 900 Boston, Massachusetts 02114 (617) 626-1200
North Shore Region	2 State Fish Pier Gloucester, Massachusetts 01930 (978) 281-3972
South Shore Region	175 Edward Foster Road Scituate, Massachusetts 02066
Cape Cod and Islands Region	3195 Main Street, P.O. Box 220 Barnstable, MA 02630
South Coastal Region	81-B County Road, Suite E Mattapoisett, MA 02739

Massachusetts Historical Commission (MHC)	
Office Location:	220 Morrisey Boulevard Boston, Massachusetts 02125 (617) 727-8470

Massachusetts Board of Underwater Archaeological Resources (BUAR) Emails may be sent to: david.s.robinson@mass.gov	
Office Location:	100 Cambridge Street, Suite 900 Boston, Massachusetts 02114 (617) 626-1014

SECTION VII: Definitions & Acronyms

Artificial or Living Reef: A structure which is constructed or placed in waters for the purpose of enhancing fishery resources and commercial and recreational fishing opportunities.
Attendant Features: Occurring with or as a result of; accompanying.
Biodegradable: A material that decomposes into elements found in nature within a reasonably short period of time and will not leave a residue of plastic or a petroleum derivative in the environment after degradation. In contrast, degradable plastics break down into plastic fragments that remain in the environment after degradation. Examples of biodegradable materials include jute, sisal, cotton, straw, burlap, coconut husk fiber (coir) or excelsior. In contrast, degradable plastics break down into plastic fragments that remain in the environment after degradation. Photodegradable, UV degradable or Oxo-(bio)degradable plastics are not considered biodegradable under this GP.
Boating facilities: These provide, rent or sell mooring space, such as marinas, yacht clubs, boat yards, dockominiums, municipal facilities, land/home owners, etc. Not classified as boating facilities are piers shared between two abutting properties or municipal mooring fields that charge an equitable user fee based on the actual costs incurred.
Compensatory mitigation: The restoration (re-establishment or rehabilitation), establishment (creation), enhancement, and/or in certain circumstances preservation of aquatic resources for the purposes of offsetting unavoidable adverse impacts which remain after all appropriate and practicable avoidance and minimization has been achieved. Must comply with the applicable provisions of 33 CFR 332. See also the New England District Compensatory Mitigation Guidance at http://www.nae.usace.army.mil/Missions/Regulatory/Mitigation.aspx.
Construction mats: Constructions, swamp and timber mats (herein referred to as “construction mats”) are generic terms used to describe structures that distribute equipment weight to prevent wetland damage while facilitating passage and providing work platforms for workers and equipment. They are comprised of sheets or mats made from a variety of materials in various sizes. A timber mat consists of large timbers bolted or cabled together. Corduroy roads, which are not considered to be construction mats, are cut trees and/or saplings with the crowns and branches removed, and the trunks lined up next to one another. Corduroy roads are typically installed as permanent structures. Like construction mats, they are considered as fill whether they are installed temporarily or permanently.
Cumulative Impacts: The impact on the environment, which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR 1508.1). Although the impact of a particular discharge may constitute a minor change in itself, the cumulative effect of numerous such piecemeal changes can result in a major impairment of the water resources and interfere with the productivity and water quality of existing aquatic ecosystems. See 40 CFR 230.11(g).
Currently serviceable: Useable as is or with some maintenance, but not so degraded as to essentially require reconstruction.
Dredging:
Improvement Dredging: For the purposes of these GPs, this is dredging deeper than previously authorized by the USACE and dredged under that authorization.
Maintenance Dredging: For the purposes of these GPs, this is dredging from an area previously authorized by the USACE and dredged under that authorization. The USACE may require proof of authorization and dredging. Maintenance dredging typically refers to the routine removal of accumulated sediment to maintain the design depths of serviceable navigation channels, harbors, marinas, boat launches and port facilities. Maintenance dredging is conducted for navigational purposes and does not include any expansion of the previously dredged area. The USACE may

review a maintenance dredging activity as new dredging if sufficient time has elapsed to allow for the colonization of SAS, shellfish, etc.

New Dredging: For the purposes of these GPs, this is a) first time the USACE authorizes dredging of a particular location or b) dredging has not occurred for an extended period of time, and this has allowed for aquatic resources (i.e., eelgrass, shellfish, etc.) to redevelop in the area.

Dredged material & discharge of dredged material: These are defined at 33 CFR 323.2(c) and (d). The term dredged material means material that is excavated or dredged from waters of the U.S.

Enhancement: The manipulation of the physical, chemical, or biological characteristics of an aquatic resource to heighten, intensify, or improve a specific aquatic resource function(s). Enhancement results in the gain of selected aquatic resource function(s) but may also lead to a decline in other aquatic resource function(s). Enhancement does not result in a gain in aquatic resource area.

Ephemeral stream: A stream with flowing water only during, and for a short duration, after precipitation events in a typical year. Ephemeral stream beds are located above the water table year-round. Groundwater is not a source of water for the stream. Runoff from rainfall is the primary source of water for stream flow.

Erosion Controls: Appropriate soil erosion, sediment and turbidity controls include cofferdams, bypass pumping around barriers immediately up and downstream of the work footprint (i.e., dam and pump), installation of sediment control barriers (i.e., silt fence, vegetated filter strips, geotextile silt fences, filter tubes, erosion control mixes, hay bales or other devices) downhill of all exposed areas, stream fords, retention of existing vegetated buffers, application of temporary mulching during construction, phased construction, and permanent seeding and stabilization, etc.

Establishment (creation): The manipulation of the physical, chemical, or biological characteristics present to develop an aquatic resource that did not previously exist at an upland site. Establishment results in a gain in aquatic resource area (33 CFR 332.2).

Expansions: Work that increases the footprint of fill, structures, depth of basin or drainage features, or floats, or slip capacity.

Essential Fish Habitat (EFH): The Federal Magnuson-Stevens Fishery Management and Conservation Act broadly defines EFH to include those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. See www.greateratlantic.fisheries.noaa.gov/habitat for more information.

Fill material & discharge of fill material: Material placed in waters of the U.S. where the material has the effect of either replacing any portion of a water of the U.S. with dry land or changing the bottom elevation of any portion of a water of the U.S. Fill material does not include any pollutant discharged into the water primarily to dispose of waste. These are defined at 33 CFR 323.2 (e) & (f).

Federal navigation projects (FNPs): These areas are maintained by the USACE; authorized, constructed and maintained on the premise that they will be accessible and available to all on equal terms; and comprised of USACE Federal anchorages, Federal channels and Federal turning basins. The buffer zone is equal to three times the authorized depth of a FNP. The following are FNPs in MA and more information, including the limits, is provided at www.nae.usace.army.mil/missions/navigation >> Navigation Projects:

- Andrews River, Harwich, MA
- Aunt Lydia's Cove
- Beverly Harbor
- Boston Harbor
- Buttermilk Bay Channel
- Canapitsit Channel
- Cape Cod Canal
- Chatham Harbor
- Cohasset Harbor
- Cross Rip Shoals, Nantucket Sound
- Cuttyhunk Harbor
- Dorchester Bay and Neponset River
- Duxbury Harbor
- Edgartown Harbor
- Essex River
- Fall River Harbor
- Falmouth Harbor
- Gloucester Harbor and Annisquam River
- Green Harbor
- Hingham Harbor
- Hyannis Harbor
- Ipswich River
- Island End River (Chelsea, MA)
- Kingston Harbor
- Lagoon Pond
- Little Harbor Woods Hole

Lynn Harbor
Malden River
Menemsha Creek
Merrimack River
Mystic River
Nantucket Harbor of Refuge
New Bedford and Fairhaven Harbor
Newburyport Harbor
Oak Bluffs Harbor
Pigeon Cove Harbor
Plymouth Harbor
Pollock Rip Shoals, Nantucket Sound
Provincetown Harbor
Red Brook Harbor
Rockport Harbor
Salem Harbor
Sandy Bay Harbor of Refuge
Saugus River
Scituate Harbor
Sesuit Harbor
Taunton River
Vineyard Haven Harbor
Wareham Harbor
Wellfleet Harbor
Westport River and Harbor
Weymouth Back River
Weymouth Fore and Town Rivers
Winthrop Harbor
Woods Hole Channel

Flume: An open artificial water channel, in the form of a gravity chute, which leads water from a diversion dam or weir alongside a natural flow. A flume can be used to measure the rate of flow.
FNP buffer zone: The buffer zone of a USACE Federal Navigation Project (FNP) is equal to three times the authorized depth of the FNP.
Frac out: During horizontal directional drilling (HDD) operations, drilling fluid travels up the borehole into a pit. When the borehole becomes obstructed or the pressure becomes too great inside the borehole, the ground fractures and fluid escapes to the surface and may affect surface waters.
Ground disturbance: Any activity that compacts, relocates, overturns, removes, mixes, or otherwise disturbs the ground, including under water. Ground disturbance can be caused by the use of hand tools (shovels, pick axe, posthole digger, etc.), heavy equipment (excavators, backhoes, bulldozers, dredgers, trenching and earthmoving equipment, etc.), and heavy trucks (large four wheel drive trucks, dump trucks and tractor trailers, etc.). Trenching, bulldozing, dredging, excavating, scraping, and plowing are typical examples of ground disturbance activities.
Height:width ratio: The height of structures shall at all points be equal to or exceed the width of the deck. For the purpose of this definition, height shall be measured from the marsh substrate to the bottom of the longitudinal support beam.
High Tide Line (HTL): The line of intersection of the land with the water's surface at the maximum height reached by a rising tide. The high tide line may be determined, in the absence of actual data, by a line of oil or scum along shore objects, a more or less continuous deposit of fine shell or debris on the foreshore or berm, other physical markings or characteristics, vegetation lines, tidal gages, or other suitable means that delineate the general height reached by a rising tide. The line encompasses spring high tides and other high tides 58 that occur with periodic frequency but does not include storm surges in which there is a departure from the normal or predicted reach of the tide due to the piling up of water against a coast by strong winds. (33 CFR 328). Refer to the highest predicted tide for the current year at the nearest NOAA tide gage. https://tidesandcurrents.noaa.gov/map/index.html
Historic Property: Any prehistoric or historic site (including archaeological sites), district, building, structure, or other object included in, or eligible for inclusion in, the National Register of Historic Places maintained by the Secretary of the Interior. This term includes artifacts, records, and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization and that meet the National Register criteria (36 CFR part 60).
Impacts:
Direct Impacts: Effects that are caused by the activity and occur at the same time and place (40 CFR 1508.7).
Indirect impacts: Effects that are caused by the activity and are later in time or farther removed in distance, but are still reasonably foreseeable.
Secondary impacts: Effects on an aquatic ecosystem that are associated with a discharge of dredged or fill materials, but do not result from the actual placement of the dredged or fill material.

Information about secondary effects on aquatic ecosystems shall be considered prior to the time final section 404 action is taken by permitting authorities. Some examples of secondary effects on an aquatic ecosystem are: aquatic areas drained, flooded, fragmented; fluctuating water levels in an impoundment and downstream associated with the operation of a dam; septic tank leaching and surface runoff from residential or commercial developments on fill; and leachate and runoff from a sanitary landfill located in waters of the U.S. See 40 CFR 230.11(h).

Incidental Fallback: Incidental fallback is the redeposit of small volumes of dredged material that is incidental to excavation activity in waters of the U.S. when such material falls back to substantially the same place as the initial removal (33 CFR 323.2(d)(2)(iii)).

In the dry: Work that is done under dry conditions, e.g., work behind cofferdams or when the stream or tide is waterward of the work.

Independent utility: A test to determine what constitutes a single and complete non-linear project in the USACE Regulatory Program. A project is considered to have independent utility if it would be constructed absent the construction of other projects in the project area. Portions of a multi-phase project that depend upon other phases of the project do not have independent utility. Phases of a project that would be constructed even if the other phases were not built can be considered as separate single and complete projects with independent utility.

Individual permit: A Department of the Army authorization that is issued following a case-by-case evaluation of a specific structure or work in accordance with the procedures of 33 CFR 322, or a specific project involving the proposed discharge(s) in accordance with the procedures of 33 CFR 323, and in accordance with the procedures of 33 CFR 325 and a determination that the proposed discharge is in the public interest pursuant to 33 CFR 320.

Intermittent stream: An intermittent stream has flowing water during certain times of the year, when groundwater provides water for stream flow. During dry periods, intermittent streams may not have flowing water. Runoff from rainfall is a supplemental source of water for stream flow.

Intertidal: The area in between mean low water and the high tide line.

Living reef: See the definition of “artificial or living reef.”

Living shoreline: A term used to describe a low-impact approach with a substantial biological component to shoreline protection and restoration along coastal shores, riparian zones, lacustrine fringe wetlands, or oyster or mussel reef structures. This approach integrates natural features to restore, enhance, maintain, or create habitat, functions, and processes while also functioning to mitigate flooding or shoreline erosion. Living shorelines may stabilize banks and shores with small fetch and gentle slopes that are subject to low-to mid-energy waves. A living shoreline has a footprint that is made up mostly of native material. It incorporates vegetation or other living, natural “soft” elements alone or in combination with some type of harder shoreline structure (e.g., oyster or mussel reefs or rock sills) for added protection and stability. Living shorelines should maintain the natural continuity of the land-water interface and retain or enhance shoreline ecological processes.

Loss of waters of the United States: Waters of the U.S. that are permanently adversely affected by filling, flooding, excavation, or drainage because of the regulated activity. The loss of stream bed includes the acres of stream bed that are permanently adversely affected by filling or excavation because of the regulated activity. Permanent adverse effects include permanent discharges of dredged or fill material that change an aquatic area to dry land, increase the bottom elevation of a waterbody, or change the use of a waterbody. The acreage of loss of waters of the U.S. is a threshold measurement of the impact to jurisdictional waters or wetlands for determining whether a project may qualify for a GP; it is not a net threshold that is calculated after considering compensatory mitigation that maybe used to offset losses of aquatic functions and services. Waters of the U.S. temporarily filled, flooded, excavated, or drained, but restored to pre-construction contours and elevations after construction, are not included in the measurement of loss of waters of the U.S. Impacts resulting from activities that do not require Department of the Army authorization, such as activities eligible for exemptions under section 404(f) of the Clean Water Act, are not considered when calculating the loss of waters of the U.S.

Maintenance: The repair, rehabilitation, or in-kind replacement of any previously authorized, currently serviceable structure or fill, or of any currently serviceable structure or fill authorized by 33 CFR 330.3 – "Activities occurring before certain dates," provided that the structure or fill is not to be put to uses differing from those uses specified or contemplated for it in the original permit or the most recently authorized modification. Maintenance includes minor deviations in the structure's configuration or filled area, including those due to changes in materials, construction techniques, or current construction codes or safety standards that are necessary to make repair, rehabilitation, or replacement are authorized. Currently serviceable means useable as is or with some maintenance, but not so degraded as to essentially require reconstruction.
Maintenance Exemption: In accordance with 33 CFR 323.4(a)(2), any discharge of dredged or fill material that may result from any of the following activities is not prohibited by or otherwise subject to regulation under Section 404 of the CWA: "Maintenance, including emergency reconstruction of recently damaged parts, of currently serviceable structures such as dikes, dams, levees, groins, riprap, breakwaters, causeways, bridge abutments or approaches, and transportation structures. Maintenance does not include any modification that changes the character, scope, or size of the original fill design."
Mean high water: Line on the shore reached by the plane of the average high water. Where precise determination of the actual location of the line becomes necessary, it must be established by survey with reference to the available tidal datum, preferably averaged over a period of 18.6 years. Less precise methods, such as observation of the "apparent shoreline" which is determined by reference to physical markings, lines of vegetation, or changes in type of vegetation, may be used only where an estimate is needed of the line reached by the mean high water.
Mechanized land clearing: Land clearing activities using mechanized equipment such as backhoes or bulldozers with sheer blades, rakes or discs constitute point source discharges and are subject to section 404 jurisdiction when they take place in wetlands or waters of the U.S (Regulatory Guidance Letter 90-05).
Metallic mineral: Any ore or material to be excavated from the natural deposits on or in the earth for its metallic mineral content to be used for commercial or industrial purposes. "Metallic mineral" does not include thorium or uranium.
Minor deviations: Deviations in the structure's configuration or filled area, including those due to changes in materials, construction techniques, or current construction codes or safety standards, which are necessary to make repair, rehabilitation, or replacement are permitted, provided the adverse environmental effects resulting from such repair, rehabilitation, or replacement are minimal.
Natural Rocky Habitats: Intertidal and subtidal substrates of pebble-gravel, cobble, boulder, or rock ledge and outcrops. Manufactured stone (e.g., cur or engineered riprap) is not considered a natural rocky habitat. Natural rocky habitats are either found as pavement (consolidated pebble-gravel, cobble, or boulder areas) or as a mixture with fines (i.e., clay and sand) and other substrates. Rocky habitats as EFH are defined as follows: (1) All pebble-gravel, cobble, or boulder pavements; (2) Pebble-gravel mixed with fines: mixed substrate of pebble-gravel and fines where pebble-gravel is an evident component of the substrate (either through visual observation or within sediment samples). Sediment samples with a content of 10% or more of pebble-gravel in the top layer (6-12 inches) should be delineated; (3) Scattered cobble, scattered boulder, scattered cobble/boulder: mixed substate of cobble and/or boulder and other substrates. The aerial extent of cobbles and/or boulders should be delineated; and (4) All rock ledge outcrops: area should be delineated along the edge of the ledge/outcrop (as defined by NMFS Habitat and Ecosystems Services Branch, Gloucester, MA).
Navigable waters or Navigable waters of the U.S.: These waters are subject to section 10 of the Rivers and Harbors Act of 1899 and are defined as those waters that are subject to the ebb and flow of the tide and/or are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce (33 CFR Part 329). Work or structures in navigable

waters require permits pursuant to §9 and §10 of the Rivers and Harbors Act of 1899. Also see the definition of “waters of the U.S.” below.
Note: Currently the following non-tidal waters have been determined to be navigable waters of the U.S. subject to permit jurisdiction in Massachusetts: Merrimack River, Connecticut River, and Charles River to the Watertown Dam.
Nearshore disposal: This is defined in the USACE Coastal Engineering Manual as “(1) In beach terminology an indefinite zone extending seaward from the shoreline well beyond the breaker zone. (2) The zone which extends from the swash zone to the position marking the start of the offshore zone, typically at water depths of the order of 20m.” A nearshore berm is an artificial berm built in shallow water using dredged material. Often, the berm is intended to renourish the adjacent and downdrift shore over time under the influence of waves and currents.
Non-regulated activity: Only structures or fills that were previously authorized and are in compliance with the terms and condition of the original authorization can be maintained as a non-regulated activity under 33 CFR 323.4(a)(2). Minor deviations from the previously authorized footprint do not qualify as a non-regulated activity and require new authorization from the USACE. The state’s maintenance provisions may differ from the USACE and a project may require reporting and written authorization from the state.
Non-tidal wetlands: A non-tidal wetland is a wetland that is not subject to the ebb and flow of tidal waters. Non-tidal wetlands contiguous to tidal waters are located landward of the HTL (*i.e.,* spring HTL). Also see the definition of “Waters of the U.S.” below.
Oil or natural gas pipeline: Any pipe or pipeline for the transportation of any form of oil or natural gas, including products derived from oil or natural gas, such as gasoline, jet fuel, diesel fuel. heating oil, petrochemical feedstocks, waxes, lubricating oils, and asphalt.
Ordinary High Water Mark (OHWM): A line on the shore established by the fluctuations of water and indicated by physical characteristics, or by other appropriate means that consider the characteristics of the surrounding areas. See 33 CFR 328.3(e).
Overall project: The overall project, for purposes of these GPs, includes all regulated activities that are reasonably related and necessary to accomplish the project purpose. Also see the definition of “single and complete linear project.”
Perennial stream: A perennial stream has flowing water year-round during a typical year. The water table is located above the stream bed for most of the year. Groundwater is the primary source of water for stream flow. Runoff from rainfall is a supplemental source of water for stream flow.
Practicable: Available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes.
Permanent impacts: Permanent impacts means waters of the U.S. that are permanently affected by filling, flooding, excavation, or drainage because of the regulated activity. Permanent impacts include permanent discharges of dredged or fill material that change an aquatic area to dry land, increase the bottom elevation of a waterbody, or change the use of a waterbody.
Preconstruction notification (PCN): A request submitted by the applicant to the USACE for confirmation that a particular activity is authorized by these GPs. The request may be a permit application, letter, or similar document that includes information about the proposed work and its anticipated environmental effects. Preconstruction notification may be required by the terms and conditions of these GPs. A PCN may be voluntarily submitted in cases where PCN is not required and the applicant wants confirmation that the activity is authorized under these GPs.
Preservation: The removal of a threat to, or preventing the decline of, aquatic resources by an action in or near those aquatic resources. This term includes activities commonly associated with the protection and maintenance of aquatic resources through the implementation of appropriate legal and physical mechanisms. Preservation does not result in a gain of aquatic resource area or functions (33 CFR 332.2).
Real estate subdivision: Includes circumstances where a landowner or developer divides a tract of land into smaller parcels for the purpose of selling, conveying, transferring, leasing, or

developing said parcels. This would include the entire area of a residential, commercial or other real estate subdivision, including all parcels and parts thereof

Reconfiguration zone: A USACE authorized area in which permittees may rearrange pile-supported structures and floats without additional authorizations. A reconfiguration zone does not grant exclusive privileges to an area or an increase in structure or float area.

Re-establishment: The manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/ historic functions to a former aquatic resource. Re-establishment results in rebuilding a former aquatic resource and results in again in aquatic resource area and functions (33 CFR 332.2).

Reference Site: Reference sites - Compensatory restoration, rehabilitation, and creation mitigation projects should seek to duplicate the features of reference aquatic resources or enhance connectivity with adjacent natural upland and aquatic resource landscape elements. Performance standards related to reference sites are encouraged. Mitigation project sites must be selected based on their ability to be, and continue to be, resistant to disturbance from the surrounding landscape, by locating them adjacent to refuges, buffers, green spaces, and other preserved natural elements of the landscape. In general, aquatic resource mitigation projects must be designed to be self-sustaining, natural systems within the landscape and climate in which they are located, with little or no ongoing maintenance and/or hydrologic manipulation.

Rehabilitation: The manipulation of the physical, chemical, or biological characteristics of a site with the goal of repairing natural/historic functions to a degraded aquatic resource. Rehabilitation results in a gain in aquatic resource function, but does not result in a gain in aquatic resource area (33 CFR 332.2).

Restoration: The manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former or degraded aquatic resource. For the purpose of tracking net gains in aquatic resource area, restoration is divided into two categories: re-establishment and rehabilitation (33 CFR 332.2).

Riffle and pool complex: Riffle and pool complexes are special aquatic sites under the 404(b)(1) Guidelines. Riffle and pool complexes sometimes characterize steep gradient sections of streams. Such stream sections are recognizable by their hydraulic characteristics. The rapid movement of water over a course substrate in riffles results in a rough flow, a turbulent surface, and high dissolved oxygen levels in the water. Pools are deeper areas associated with riffles. A slower stream velocity, a streaming flow, a smooth surface, and a finer substrate characterize pools.

Sedimentation: Sedimentation is defined as the process of deposition of a solid material from a state of suspension. Deposited sediments may accumulate and have temporal impacts to aquatic resource areas. See secondary effects definition above. For the purposes of this document, “greater than minimal sedimentation” is generally not considered to occur when using proper erosion controls (GC 25) or when sedimentation is considered “de minimis” 33 CFR 323.2(d)(5).

Single and complete linear project: A linear project is a project constructed for the purpose of getting people, goods, or services from a point of origin to a terminal point, which often involves multiple crossings of one or more waterbodies at separate and distant locations. The term “single and complete project” is defined as that portion of the total linear project proposed or accomplished by one owner/ developer or partnership or other association of owners/developers that includes all crossings of a single water of the U.S. (i.e., a single waterbody) at a specific location. For linear projects crossing a single or multiple waterbodies several times at separate and distant locations, each crossing is considered a single and complete project for the purposes of these GPs. However, individual channels in a braided stream or river, or individual arms of a large, irregularly shaped wetland or lake, etc., are not separate waterbodies, and crossings of such features cannot be considered separately.

Single and complete non-linear project: For non-linear projects, the term “single and complete project” is defined at 33 CFR 330.2(i) as the total project proposed or accomplished by one owner/developer or partnership or other association of owners/developers. A single and complete

non-linear project must have independent utility (see the definition of “independent utility”). Single and complete non-linear projects may not be “piecemealed” to avoid the limits in a GP authorization.
Special aquatic sites (SAS): These include inland and saltmarsh wetlands, mud flats, vegetated shallows, sanctuaries and refuges, coral reefs, and riffle and pool complexes. These are defined at 40 CFR 230.3 and listed in 40 CFR 230 Subpart E.
Streambed: The stream substrate between the OHW marks on each side. The substrate may be bedrock or inorganic particles that range in size from clay to boulders. Wetlands contiguous to the streambed, but outside of the OHW marks, are not considered part of the streambed.
Stream channelization: The manipulation of a stream’s course, condition, capacity, or location that causes more than minimal interruption of normal stream processes. A channelized stream remains a water of the U.S.
Structure: An object that is arranged in a definite pattern of organization. Examples of structures include, without limitation, any pier, boat dock, boat ramp, wharf, dolphin, weir, boom, breakwater, bulkhead, revetment, riprap, jetty, artificial island, artificial reef, permanent mooring structure, power transmission line, permanently moored floating vessel, piling, aid to navigation, or any other manmade obstacle or obstruction.
Temporal loss: The time lag between the loss of aquatic resource functions caused by the permitted impacts and the replacement of aquatic resource functions at the compensatory mitigation site(s) (33 CFR 332.2).
Temporary impacts: Temporary impacts include, but are not limited to, jurisdictional waters that are temporarily filled, flooded, excavated, or drained because of the regulated activity. Impacts are considered temporary when they are removed immediately upon completion of the activity. Note: An impact is considered temporary when the aquatic resource is restored to pre-project conditions, but effects to archaeological and/or cultural resources may be permanent in duration.
Tidal wetlands: A wetland that is subject to the ebb and flow of the tide. See the definition of “Waters of the U.S.” below.
Tide gates: Structures such as duckbills, flap gates, manual and self-regulating tide gates, etc. that regulate or prevent upstream tidal flows.
Turbidity: A measure of the level of particles such as sediment, plankton, or organic by-products, in a body of water. As the turbidity of water increases, it becomes denser and less clear due to a higher concentration of these light-blocking particles. Suspended solids are more likely to carry toxic chemicals, and can also negatively affect aquatic organisms, water temperature, and dissolved oxygen levels.
Utility line: Any pipe or pipeline for the transportation of any gaseous, liquid, liquescent, or slurry substance, for any purpose that is not oil, natural gas, or petrochemicals. A utility line also includes any cable, line, or wire for the transmission for any purpose of electrical energy, telephone, and telegraph messages, and radio and television communication. The term ‘utility line’ does not include activities that drain a water of the U.S., such as drainage tile or French drains, but it does apply to pipes conveying drainage from another area.
Vegetated shallows: Permanently inundated areas that under normal circumstances support communities of rooted aquatic vegetation, such as eelgrass *(Zostera marina)* and widgeon grass (*Rupia maritima*) in marine systems (does not include salt marsh) as well as a number of freshwater species in rivers and lakes. These are a type of SAS defined at 40 CFR 230.43. Vegetated shallows are commonly referred to as submerged aquatic vegetation or SAV. Vegetated shallow survey guidance is located at www.nae.usace.army.mil/missions/regulatory /jurisdiction-and-wetlands. Maps of vegetated shallows in Massachusetts are located at www.nae.usace.army.mil/missions/regulatory/state-general-permits/massachusetts-general-permit.
Vernal pools: For the purposes of these GPs, vernal pools are depressional wetland basins that typically dry up in most years and may contain inlets or outlets, typically of intermittent flow. Vernal pools range in both size and depth depending upon landscape position and parent material(s). In

most years, vernal pools support one or more of the following obligate indicator species: wood frog, spotted salamander, blue-spotted salamander, marbled salamander, Jefferson's salamander and fairy shrimp. However, they should preclude sustainable populations of predatory fish.

Water diversions: Water diversions are activities such as bypass pumping (e.g., "dam and pump") or water withdrawals. Temporary flume pipes, culverts or cofferdams where normal flows are maintained within the stream boundary's confines aren't water diversions. "Normal flows" are defined as no change in flow from pre-project conditions.

Waters of the United States (U.S.) These waterbodies are the waters where permits are required for the discharge of dredged or fill material pursuant to §404 of the CWA. These waters include but are not limited to navigable waters of the U.S. and tidal wetlands and include many non-tidal wetlands and other waterbodies. See definitions for navigable waters of the U.S., tidal wetlands, waterbody, and non-tidal wetlands. (33 CFR 328)

Waterbody: Examples of "waterbodies" include oceans, coastal waters, rivers, streams, ditches, lakes, ponds, and wetlands. If a wetland is adjacent to a waterbody determined to be a water of the U.S., that waterbody and any adjacent wetlands are considered together as a single aquatic unit (see 33 CFR 328.4(c)(2)).

Weir: A barrier across a river designed to alter the flow characteristics. In most cases, weirs take the form of a barrier, smaller than most conventional dams, across a river that causes water to pool behind the structure and allows water to flow over the top. Weirs are commonly used to alter the flow regime of a river, prevent flooding, measure discharge and help render a river navigable.

Wetland: Wetlands are areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas. The Corps of Engineers Wetlands Delineation Manual in conjunction with the associated regional supplement should be used to determine if a wetland is present and delineate wetland boundaries.

Acronyms

BMPs	Best Management Practices
BUAR	Massachusetts Board of Underwater Archaeological Resources
CWA	Clean Water Act
CZM	Coastal Zone Management
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
EFH	Essential Fish Habitat
FNP	Federal Navigation Project
GC	General Condition
GP	General Permit
HTL	High Tide Line
IP	Individual Permit
LID	Low impact development
MassDEP	Massachusetts Department of Environmental Protection
MA DMF	Massachusetts Division of Marine Fisheries
MHC	Massachusetts Historical Commission
MHW	Mean High Water
MLLW	Mean Lower Low Water
MLW	Mean Low Water
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
OHW	Ordinary High Water Mark
PCN	Preconstruction Notification
SAS	Special Aquatic Sites
SF	Square Feet
SV	Self-Verification
SHPO	State Historic Preservation Officer
THPO	Tribal Historic Preservation Officer
USFWS	U.S. Fish and Wildlife Service
USCG	U.S. Coast Guard
USFS	U.S. Forest Service
USGS	U.S. Geological Service
WQC	Water Quality Certification

Appendix A: Guidance for NHPA Section 106 Compliance in Massachusetts

1. Purpose & Applicability

Section 106 of the National Historic Preservation Act of 1966, as amended (NHPA) (54 U.S.C § 306108), requires Federal agencies to take into account the effects of their undertakings on Historic Properties and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment on such undertakings. Therefore, in order for an activity to be eligible for authorization under the 2023 Massachusetts General Permit, the USACE must consider the effect the activity may have on historic properties. Historic properties may include, but are not limited to, historic districts, archaeological districts, sites, buildings, structures, objects, sacred sites, traditional cultural places, and traditional cultural landscapes that are included in, or eligible for inclusion in, the National Register of Historic Places (NRHP).

This guidance applies to projects that require authorization under Section 404 of the Clean Water Act (33 U.S.C. § 1344) and/or Section 10 of the Rivers and Harbors Act (33 U.S.C. §403) and will assist applicants when evaluating and documenting the presence of historic properties within or near their project site(s). The prospective applicant will evaluate their proposed project using the criteria below to determine if their project has the potential to affect historic properties and if so, whether or not historic properties are present or are likely to be present. All activities authorized under these GPs shall follow the terms outlined in General Condition 14: Historic Properties and General Condition 6: Tribal Rights & Burial Sites. Prospective applicants shall complete their due diligence according to the procedures below for their application to be deemed complete.

2. No Potential to Affect Historic Properties

Certain activities do not have the potential to cause effects on historic properties, assuming such historic properties were present, based on the nature of the activity and site-specific conditions. Therefore, these activities **do not** require historic property identification efforts or notification of the SHPO, THPOs, and/or BUAR under Section 106. The USACE has determined the following activities within the stated parameters have no potential to affect historic properties:

General Permit	Activity Parameters
1	Temporary buoys, markers and similar structures that are placed during winter events on ice and removed before spring thaw.
2	Repair or rehabilitation of structures that are less than 45 years in age. Any temporary structures or fills or work necessary to complete repairs or rehabilitation must not result in any ground disturbance.
3	Maintenance and replacement of moorings that are less than 45 years in age.
6	Maintenance, repair, replacement, or removal of utility lines, oil or natural gas pipelines, outfall or intake structures, and/or appurtenant features that are less than 45 years in age when all access, staging, and ground disturbance is strictly limited to previously disturbed areas (including any previous ground disturbance). Replacement must be in kind or smaller in size. Installation of tide gates on outfall structures that are less than 45 years in age.
7	Maintenance dredging of previously dredged areas where dredging does not extend beyond the original bottom elevations.

	Disposal of dredged material at an existing established and USACE-approved confined aquatic disposal cell. Beach nourishment in ongoing existing nourishment areas.
11	Fish and wildlife harvesting and attraction devices and activities.
13	Cleanup of hazardous and toxic waste materials, including contaminated sediments, that are less than 45 years in age.
16	Removal of land-based and water-based renewable energy generation facilities and hydropower projects that are less than 45 years in age.
18	Installation of buoys, floats, racks, trays, nets, lines, tubes, containers, and other structures for previously authorized by the USACE and ongoing aquaculture activities. Discharges of dredged or fill material into tidal or non-tidal waters necessary for shellfish seeding, rearing, cultivating, transplanting, and harvesting activities for previously authorized and ongoing aquaculture activities.
20	Maintenance activities for existing living shorelines excluding maintenance activities that require new ground disturbance such as excavation or re-sloping of the bank/shoreline.
22	Reshaping or maintenance of existing drainage ditches less than 45 years in age excluding ditch enlargement.
23	Placement of temporary and removable linear transportation and wetland/stream crossings that have no ground disturbance prior to placement, during placement, and during removal (i.e., placed on the surface and subsequently removed within one year of placement).
24	Placement of temporary and removable crossings and cofferdams that have no ground disturbance prior to placement, during placement, and during removal (i.e., placed on the surface and subsequently removed within one year of placement).
25	Emergency repair of existing structures and/or fills less than 45 years in age.

3. Historic Property Identification

If the activity does not fit under the criteria above, the following historic property identification efforts must be completed to demonstrate compliance with Section 106 of the NHPA. This includes documenting previously identified and unidentified historic properties in the project area.

a. Previously Identified Historic Properties: The prospective applicant shall document if previously identified historic properties are present on or adjacent to the project site by notifying the Massachusetts Historical Commission (MHC) and the Massachusetts Board of Underwater Archaeological Resources (BUAR), as appropriate, of the proposed project. The MHC and BUAR will check their records for the presence of any previously identified historic properties. The following outlines how prospective applicants should notify the MHC and BUAR.

i. The prospective applicant will notify the SHPO and BUAR to identify any previously recorded cultural resources. Applicants shall mail a completed Project Notification Form[18], project narrative, location (coordinates), plans, soil maps, and information on known cultural resources to the MHC. The MHC does not accept submissions via email. Applicants shall email or mail this information to the BUAR when the activity is located in lakes, ponds, rivers, and/or navigable waters in MA. Emailed file attachments should be <10MB. Any files >10MB shall be delivered via a file exchange system or the hard copy documents shall be mailed. Preferred contact information is listed below.

ii. **When sending this information, applicants must also document proof of receipt OR proof the information was delivered.** Proof of receipt constitutes a certified mail receipt, read email receipt, or other mail/email/online tracking services that document the information has reached the intended recipient(s). Proof the information was delivered constitutes a certificate of mailing, email delivery receipt, or other mail/email/online services that document the information was sent at a particular time. When using proof of delivery such (e.g., certificate of mailing), applicants should add 5 days to the 30-day notification period so the mail has time to reach its intended recipient. When using proof of receipt, the applicant may begin the 30-day notification period from the date received by the intended recipient.

iii. When mailing or emailing the application materials, applicants should include the following statement: “Please send responses to this notification directly to the USACE via email: cenae-r-ma@usace.army.mil or address regular mail responses to: Regulatory Division, U.S. Army Corps of Engineers, New England District, 696 Virginia Road, Concord, Massachusetts 01742-2751.” Email responses to the USACE are strongly preferred. The SHPO and BUAR will contact the USACE and cc the applicant(s) within 30 days of receiving the notification if their records indicate that historic properties are located in the project vicinity, and if additional review and/or surveys are recommended to ensure NHPA compliance. If the SHPO and/or BUAR do not respond within 30 days of receiving the notification, is it presumed that no known historic properties are present.

b. Previously Unidentified Historic Properties: The prospective applicant shall evaluate the project site and determine the sensitivity for the presence of historic properties if the project site has not been previously surveyed for cultural resources within the last 10 years. If the sensitivity is determined to be moderate to high, an intensive archaeological and/or architectural survey is required to investigate the potential presence of historic properties. The individual conducting this survey must meet the Secretary of the Interior’s Standards for Professional Qualifications (48 FR 44738-44739) in the discipline relevant to a particular resource type. For example, archeologists should not document and evaluate buildings or structures and architectural historians should not document and evaluate archaeological sites. The identification and qualifications for those participating in any survey and evaluation of resources should be included with the survey results. The criteria listed below are indicators of low sensitivity for the presence of historic properties for consideration when determining if an archaeological or architectural survey is needed.

Low sensitivity indicators:

- Previous archaeological and/or architectural survey within the last 10 years with negative results.
- In a location created in modern times (i.e., built on fill placed within the last 45 years or within an area excavated within the last 45 years).
- USACE has reviewed the project description and determined that a survey is not warranted based on the proposed activity and its location.

State survey guidance and standards are provided in the September 1995 Historic Properties Survey Manual Guidelines for the Identification of Historical and Archaeological Resources in Massachusetts available. State survey guidance and standards for underwater surveys are provided

[18] https://www.sec.state.ma.us/mhc/mhcform/formidx.htm

in the Board of Underwater Archaeological Resources' 2022 Policy Guidance on Archaeological Investigations and Related Survey Standards for the Discovery of Underwater Archaeological Resources. This guidance is available on the NAE Regulatory website: https://www.nae.usace.army.mil/Missions/Regulatory/State-General-Permits/Massachusetts-General-Permit/.

Please note, a negative result from MHC and/or BUAR does not necessarily mean no historic properties are present. Often proposed project sites have not been previously subject to a survey, so historic properties which may be present have not been previously recorded.

4. Tribal Coordination

Prospective applicants shall mail the Project Notification Form, project narrative, location (coordinates), plans with locus map, soil maps, and information on cultural resources to the Wampanoag Tribe of Gay Head (Aquinnah), Mashpee Wampanoag Tribe, Narragansett Indian Tribe, and/or Stockbridge-Munsee Community Band of Mohican Indians with interests in the project location. Preferred tribal contact information, including their respective areas of interest, can be found below. Applicants shall follow the same procedures as identified in Section 3(a)i-iii above when notifying Tribes of the proposed activity. Applicants shall provide the USACE with any responses received from the tribe(s) with their PCN application. If a tribe does not respond within 30 days of receiving the notification, the applicant shall provide USACE with all documentation of tribal outreach with their SV or PCN submission (e.g., emails, letters, phone call log, etc.). If the tribe indicates the presence of a previously unrecorded cultural resource, including a traditional cultural property (TCP) or traditional cultural landscape (TCL), a PCN is required.

5. Effect Determination

The project may have the potential to affect historic properties and/or tribal resources if 1) notification recipients respond within 30 calendar days of notification with concerns, 2) historic properties eligible for listing, or potentially eligible for listing in the NRHP, are present or 3) tribal resources are known to be present. The USACE may need to further review the project to confirm potential effects to historic properties and/or tribal resources. A PCN is required for any activity that may affect a historic property.

The USACE may determine the project will have 'no effect' on historic properties (i.e., no historic properties affected) when procedures outlined in Section 3 above are followed and no cultural resources are identified. Similarly, if historic properties are identified and will be completely avoided, the USACE may determine 'no effect.'

6. Contact Information:

Massachusetts Historical Commission

The Massachusetts Archives Building
220 Morrissey Boulevard
Boston, Massachusetts 02125

No email. Applicants or their representatives must send project information via certified mail and submit the certified mail receipt to the USACE or send via regular mail and submit proof of delivery.

Area of concern: All of Massachusetts.

Massachusetts Board of Underwater Archaeological Resources (BUAR)

100 Cambridge Street, Suite 900
Boston, Massachusetts 02114
Email: david.s.robinson@mass.gov

Applicants or their representatives must send project information via email (***strongly preferred***) or regular mail and provide proof of receipt or proof of delivery.

Area of concern: All waterbodies in Massachusetts.

Wampanoag Tribe of Gay Head (Aquinnah)

Bettina Washington
Tribal Historic Preservation Officer (THPO)
20 Black Brook Road
Aquinnah, Massachusetts 02535
Email: thpo@wampanoagtribe-nsn.gov

Applicants or their representative must send project information via email (***preferred***) or regular mail and provide proof of receipt or proof of delivery.

Area of concern: All of Massachusetts.

Mashpee Wampanoag Tribe

ATTN: David Weeden
Tribal Historic Preservation Officer (THPO)
483 Great Neck Road South
Mashpee, Massachusetts 02649
Email: 106review@mwtribe-nsn.gov
Cc: David.weeden@mwtribe-nsn.gov

Applicants or their representative must send project information via email (***preferred***) or regular mail and provide proof of receipt or proof of delivery.

Area of concern: All of Massachusetts.

Narragansett Indian Tribe

ATTN: John Brown
Tribal Historic Preservation Officer (THPO)
Narragansett Indian Longhouse
4425 South County Trail
Charlestown, Rhode Island 02813
Email: tashtesook@aol.com

Applicants or their representative must send project information via email (***preferred***) or regular mail and provide proof of receipt or proof of delivery.

Area of concern: Massachusetts east of the Connecticut River.

Stockbridge-Munsee Community Band of Mohican Indians

ATTN: Jeff Bendremer
Tribal Historic Preservation Manager
Stockbridge-Munsee Community
Tribal Historic Preservation Extension office
86 Spring Street
Williamstown, Massachusetts 01267
Email: thpo@mohican-nsn.gov

Applicants or their representative must send project information via email (***preferred***) or regular mail and provide proof of receipt or proof of delivery.

Area of concern: West of the Connecticut River and Northfield, Montague, Miller's Falls, Turner's Falls, Sunderland, Amherst, Hadley, South Hadley, Chicopee, Springfield and Longmeadow.

APPENDIX B PRE-CONSTRUCTION NOTIFICATION

U.S. Army Corps of Engineers (USACE), New England District (NAE)

PRE-CONSTRUCTION NOTIFICATION (PCN)

DATA REQUIRED BY THE PRIVACY ACT OF 1974

Authority Rivers and Harbors Act, Section 10, 33 USC 403; Clean Water Act, Section 404, 33 USC 1344; Regulatory Programs of the Corps of Engineers; Final Rule 33 CFR 320-332.

Principal Purpose The information provided will be used in evaluating activities under Pre-Construction Notification procedures within New England.

Routine Uses This information may be shared with other federal, state, and local government agencies during the application review process. Submission

Disclosure of requested information is voluntary. However, if information is not provided the PCN application cannot be fully evaluated nor can USACE render a permit decision.

Instructions The applicant must complete ALL required sections of this document before their submission to USACE. The PCN submission to USACE shall include one set of drawings which show the location and character of the proposed activity, statements that address each required field below, and documentation that supports each field (e.g., emails, letters, description/narrative, phone calls, surveys, reports, etc.). Electronic submissions to the following address are strongly preferred: cenae-r-ma@usace.army.mil. The email subject line shall contain the following: General Permit #, PCN, City/Town, and date submitted. An application that is not completed in full will be returned.

(ITEMS 1 THRU 4 TO BE FILLED BY USACE)

1. APPLICATION NO.	2. FIELD OFFICE CODE	3. DATE RECEIVED	4. DATE APPLICATION COMPLETE

(ITEMS BELOW TO BE FILLED BY APPLICANT)

5. APPLICANT'S NAME
First - Courtney Middle - Last - Walker
Company - MassDOT - Highway Division
E-mail Address - courtney.l.walker@dot.state.ma.us

8. AUTHORIZED AGENT'S NAME AND TITLE (*agent is not required*)
First - Thomas Middle - Last - Liddy
Company - Lucas Environmental, LLC
E-mail Address - tel@lucasenviro.com

6. APPLICANT'S ADDRESS:
Address- 10 Park Plaza, Room 7360
City - Boston State - MA Zip - 02116 Country -

9. AGENT'S ADDRESS:
Address- 500A Washington Street
City - Quincy State - MA Zip - 0216 Country - USA

7. APPLICANT'S PHONE NOs. with AREA CODE
a. Residence b. Business c. Fax d. Mobile
857.262.0757

10. AGENT'S PHONE NOs. with AREA CODE
a. Residence b. Business c. Fax d. Mobile
617.405.405

STATEMENT OF AUTHORIZATION

11. I hereby authorize, Thomas Liddy to act on my behalf as my agent in the processing of this general permit PCN application and to furnish, upon request, supplemental information in support of this general permit PCN application.

SIGNATURE OF APPLICANT DATE

NAME, LOCATION, AND DESCRIPTION OF PROJECT OR ACTIVITY

12. PROJECT NAME or TITLE (*see instructions*)

Bridge No. B-10-001 (12D) Replacement
Church Street (Route 10)
Bernardston, MA

13. NAME OF WATERBODY, IF KNOWN (*if applicable*)
Fall River

14. PROPOSED ACTIVITY STREET ADDRESS (*if applicable*)
Church Street Bridge
City: Bernardston State: MA Zip: 01337

15. LOCATION OF PROPOSED ACTIVITY (*see instructions*)
Latitude: 42.67069 °N Longitude: -72.54594 °W

16. OTHER LOCATION DESCRIPTIONS, IF KNOWN (*see instructions*)

State Tax Parcel ID: Municipality:

Section: Township: Range:

17. DIRECTIONS TO THE SITE.

Interstate 91 to Exit 50B (Route 10 South). Fall River is immediately west of the interchange.

18. IDENTIFY THE SPECIFIC GENERAL PERMIT(S) YOU PROPOSE TO USE:

GP 2. Maintenance; GP 23. Linear Transportation Projects and Wetland/Stream Crossings.

19. DESCRIPTION OF PROPOSED GENERAL PERMIT ACTIVITY (*see instructions*)

The project proposes to demolish the existing Church Street Bridge over the Fall River and construct a new bridge superstructure. The replacement structure will be constructed upgradient, spanning the Fall River. Additional work includes grading and repaving Church Street in the vicinity of the bridge and stormwater improvements.

20. DESCRIPTION OF PROPOSED MITIGATION MEASURES (*see instructions*)

Sedimentation and erosion controls will be installed below the work areas to prevent impacts to Waters of the US. Placement of riprap scour protection along the side slopes is also proposed.

21. PURPOSE OF GENERAL PERMIT ACTIVITY (*Describe the reason or purpose of the project, see instructions*)

The proposed project is necessary to replace the Church Street bridge.

22. Quantity of Wetlands, Streams, or Other Types of Waters Directly Affected by Proposed General Permit Activity (*see instructions*)

Area (square feet)	Length (linear feet)	Volume (cubic yards)	Duration	Purpose
331	112 (OHW/Bank)	35 dredge	Perm	Due to stream armoring
		36 fill	Perm	Addition of riprap
	212 (OHW/Bank)	N/A	Temp	
2,064			Temp	Due to use of sandbags for water control

Each PCN must include a delineation of wetlands, other special aquatic sites, and other waters, such as lakes and ponds, and perennial, intermittent, and ephemeral streams, on the project site.

23. List any other GP(s), regional general permit(s), or individual permit(s) used or intended to be used to authorize any part of the proposed project on any related activity (*see instructions*)

401 Water Quality Certification.

24. If the proposed activity will result in the loss of aquatic resources that exceed those identified in the New England District Compensatory Mitigation Thresholds, explain how the compensatory mitigation requirement will be satisfied. (*see instructions*)

No loss of aquatic resources.

25. Is Any Portion of the General Permit Activity Already Complete? [ ] Yes [X] No If Yes, describe the completed work:

26. List the name(s) of any species listed as endangered or threatened under the Endangered Species Act that might be affected by the proposed GP activity or utilize the designated critical habitat that might be affected by the proposed GP activity. (*see instructions*)

Northern Long-eared Bat

27. List any historic properties that have the potential to be affected by the proposed GP activity or include a vicinity map indicating the location of the historic property or properties. Attach relevant project information, along with any responses received from project notifications to this submittal. (*see instructions*)

BER.A - Bernardston Center Historic Area

28. For a proposed GP activity that will occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a "study river" for possible inclusion in the system while the river is in an official study status, identify the Wild and Scenic River or the "study river":

N/A

29. If the proposed GP activity also requires permission from the USACE pursuant to 33 U.S.C. 408 because it will alter or temporarily or permanently occupy or use a U.S. Army Corps of Engineers federally authorized civil works project, have you submitted a written request for section 408 permission from the USACE district having jurisdiction over that project? [ ] Yes [X] No

If "yes", please provide the date your request was submitted to the USACE District:

30. Does the activity require a 401 Water Quality Certification (WQC)? If so, specify the type of 401 WQC that is required (general or individual). In cases where an individual 401 WQC is required, provide the date the 401 WQC certification request was submitted to the certifying authority and their contact information.

Yes, an individual minor 401 Water Quality Certificate Fill/Excavation permit application will be submitted to MassDEP.

31. If the terms of the GP(s) you want to use require additional information to be included in the PCN (i.e. sampling and analysis plan), please include that information in this space or provide it on an additional sheet of paper marked Block 30. (*see instructions*)

32. I certify that the information in this pre-construction notification is complete and accurate. I further certify that I possess the authority to undertake the work described herein or am acting as the duly authorized agent of the applicant.

			06/13/25
SIGNATURE OF APPLICANT	DATE	SIGNATURE OF AGENT	DATE

The Pre-Construction Notification must be signed by the person who desires to undertake the proposed activity (applicant) and, if the statement in block 11 has been filled out and signed, the authorized agent.

18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals, or covers up any trick, scheme, or disguises a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statements or entry, shall be fined not more than $10,000 or imprisoned not more than five years or both.

Instructions for Preparing a

Department of the Army

General Permit (GP) Pre-Construction Notification (PCN)

Blocks 1 through 4. To be completed by the U.S. Army Corps of Engineers.

Block 5. Applicant' Name. Enter the name and the e-mail address of the responsible party or parties. If the responsible party is an agency, company, corporation, or other organization, indicate the name of the organization and responsible officer and title. If more than one party is associated with the PCN, please attach a sheet of paper with the necessary information marked Block 5.

Block 6. Address of Applicant. Please provide the full address of the party or parties responsible for the PCN. If more space is needed, attach an extra sheet of paper marked Block 6.

Block 7. Applicant Telephone Number(s). Please provide the telephone number where you can usually be reached during normal business hours.

Blocks 8 through 11. To be completed, if you choose to have an agent.

Block 8. Authorized Agent's Name and Title. Indicate name of individual or agency, designated by you, to represent you in this process. An agent can be an attorney, builder, contractor, engineer, consultant, or any other person or organization. Note: An agent is not required.

Blocks 9 and 10. Agent's Address and Telephone Number. Please provide the complete mailing address of the agent, along with the telephone number where they can be reached during normal business hours.

Block 11. Statement of Authorization. To be completed by the applicant, if an agent is to be employed.

Block 12. Proposed General Permit Activity Name or Title. Please provide a name identifying the proposed GP activity, e.g., Windward Marina, Rolling Hills Subdivision, or Smith Commercial Center.

Block 13. Name of Waterbody. Please provide the name (if it has a name) of any stream, lake, marsh, or other waterway to be directly impacted by the GP activity. If it is a minor (no name) stream, identify the waterbody the minor stream enters.

Block 14. Proposed Activity Street Address. If the proposed GP activity is located at a site having a street address (not a box number), enter it in Block 14.

Block 15. Location of Proposed Activity. Enter the latitude and longitude of where the proposed GP activity is located. Indicate whether the project location provided is the center of the project or whether the project location is provided as the latitude and longitude for each of the "corners" of the project area requiring evaluation. If there are multiple sites, please list the latitude and longitude of each site (center or corners) on a separate sheet of paper and mark as Block 15.

Block 16. Other Location Descriptions. If available, provide the Tax Parcel Identification number of the site, Section, Township, and Range of the site (if known), and / or local Municipality where the site is located.

Block 17. Directions to the Site. Provide directions to the site from a known location or landmark. Include highway and street numbers as well as names. Also provide distances from known locations and any other information that would assist in locating the site. You may also provide a description of the location of the proposed GP activity, such as lot numbers, tract numbers, or you may choose to locate the proposed GP activity site from a known point (such as the right descending bank of Smith Creek, one mile downstream from the Highway 14 bridge). If a large river or stream, include the river mile of the proposed GP activity site if known. If there are multiple locations, please indicate directions to each location on a separate sheet of paper and mark as Block 17.

Block 18. Identify the Specific General Permit(s) You Propose to Use. List the number(s) of the General Permit(s) you want to use to authorize the proposed activity (e.g., GP 4).

Block 19. Description of the Proposed General Permit Activity. Describe the proposed GP activity, including the direct and indirect adverse environmental effects of the proposed activity. The description of the proposed activity should be sufficiently detailed for USACE to determine that the adverse environmental effects of the activity will be no more than minimal. Identify the materials to be used in construction, as well as the methods by which the work is to be done.

Provide drawings to show that the proposed GP activity complies with the terms of the applicable GP(s). Drawings should contain sufficient detail to provide an illustrative description of the proposed GP activity, but do not need to be detailed engineering plans. The written descriptions and illustrations are an important part of the application. Please describe, in detail, what you wish to do. If more space is needed, attach an extra sheet of paper marked Block 19.

Block 20: Description of Proposed Mitigation Measures. Describe any proposed mitigation measures intended to reduce the adverse environmental effects caused by the proposed GP activity. The description of any proposed mitigation measures should be sufficiently detailed for USACE to determine how the measures would avoid and minimize adverse environmental effects. If adverse effects exceed the New England District compensatory mitigation thresholds, you must document how compensatory mitigation would be satisfied in Block 24.

Block 21. Purpose of General Permit Activity. Describe the purpose and need for the proposed GP activity. What will it be used for and why? Also include a brief description of any related activities associated with the proposed project. Provide the approximate dates you plan to begin and complete all work.

Block 22. Quantity of Wetlands, Streams, or Other Types of Waters Directly Affected by the Proposed General Permit Activity. For discharges of dredged or fill material into Waters of the U.S., provide the amount of wetlands, streams, or other types of waters filled, flooded, excavated, or drained by the proposed GP activity. For structures or work in Navigable Waters of the U.S. subject to Section 10 of the Rivers and Harbors Act of 1899, provide the amount of navigable waters filled, dredged, occupied by one or more structures (e.g., aids to navigation, mooring buoys) by the proposed GP activity. The area of impact includes the structures or fills with direct or indirect effects to waters of the U.S. The length of impact includes the length of a stream, including is banks, that are directly affected by the structures or fills. The duration of impact should be identified as temporary (xx days) or permanent. The impact purpose should briefly describe what structure or fill is responsible for the impact.

Block 23. Identify Any Other General Permit(s), Regional General Permit(s), or Individual Permit(s) Used to Authorize Any Part of Proposed Activity or Any Related Activity. List any other GP(s) or individual permit(s) used or intended to be used to authorize any part of the proposed project or any related activity. For linear projects, list other separate and distant crossings of waters and wetlands authorized by these GPs that do not require PCNs. If more space is needed, attach an extra sheet of paper marked Block 23.

Block 24. Compensatory Mitigation Statement for Losses Greater Than the New England District Compensatory Mitigation Thresholds. New England District requires compensatory mitigation at a minimum one for one replacement ratio or greater for all aquatic resource losses that require a PCN and exceed the New England District Compensatory Mitigation Thresholds, unless USACE determines in writing that either some other form of mitigation is more environmentally appropriate or the adverse environmental effects of the proposed GP activity are no more than minimal without compensatory mitigation, and provides an activity specific waiver of this requirement. Describe the proposed compensatory mitigation for wetland losses greater than the New England District Compensatory Mitigation Thresholds or provide an explanation of why USACE should not require wetland compensatory mitigation for the proposed GP activity. If more space is needed, attach an extra sheet of paper marked Block 24.

Block 25. Is Any Portion of the General Permit Activity Already Complete? Describe any work that has already been completed for the GP activity.

Block 26. List the Name(s) of Any Species Listed As Endangered or Threatened under the Endangered Species Act that Might be Affected by the General Permit Activity. If you are not a federal agency, and if any listed species or designated critical habitat might be affected or is in the vicinity of the proposed GP activity, or if the proposed GP activity is located in designated critical habitat, list the name(s) of those endangered or threatened species that might be affected by the proposed GP activity or utilize the designated critical habitat that might be affected by the proposed GP activity. If you are a Federal agency, and the proposed GP activity requires a PCN, you must provide documentation demonstrating compliance with Section 7 of the Endangered Species Act.

Block 27. List Any Historic Properties that Have the Potential to be Affected by the General Permit Activity. If you are not a federal agency, and if any historic properties have the potential to be affected by the proposed GP activity, list the name(s) of those historic properties that have the potential to be affected by the proposed GP activity. Provide all relevant documentation about these historic properties in the PCN submittal. If you are a Federal agency, and the proposed GP activity requires a PCN, you must provide documentation demonstrating compliance with Section 106 of the National Historic Preservation Act.

Block 28. List the Wild and Scenic River or Congressionally Designated Study River if the General Permit Activity Would Occur in such a River. If the proposed GP activity will occur in a river in the National Wild and Scenic River System or in a river officially designated by Congress as a “study river” under the Wild and Scenic Rivers Act, provide the name of the river. For a list of Wild and Scenic Rivers and study rivers, please visit http://www.rivers.gov/

Block 29. General Permit Activities that also Require Permission from the USACE Under 33 U.S.C. 408. If the proposed GP activity also requires permission from the USACE under 33 U.S.C. 408 because it will temporarily or permanently alter, occupy, or use a USACE federal authorized civil works project, indicate whether you have submitted a written request for section 408 permission from the USACE district having jurisdiction over that project.

Block 30. 401 Water Quality Certification. As described above, specify if the activity requires a 401 WQC from the certifying authority.

Block 31. Other Information Required For General Permit Pre Construction Notifications. The terms of some of the General Permits include additional information requirements for preconstruction notifications:

* Maintenance – information regarding the original design capacities and configurations of the outfalls, intakes, small impoundments, and canals.
* Temporary Construction, Access, and Dewatering – a restoration plan showing how all temporary fills and structures will be removed and the area restored to pre-project conditions.
* Repair of Uplands Damaged by Discrete Events – documentation, such as a recent topographic survey or photographs, to justify the extent of the proposed restoration.
* Commercial Shellfish Aquaculture Activities – (1) a map showing the boundaries of the project area, with latitude and longitude coordinates for each corner of the project area; (2) the name(s) of the species that will be cultivated during the period this GP is in effect; (3) whether canopy predator nets will be used; (4) whether suspended cultivation techniques will be used; and (5) general water depths in the project area (a detailed survey is not required).Dredging – (1) a proposed sampling and analysis plan shall be provided to USACE for approval prior to its execution. Pre-application meetings are encouraged.
* Beach Nourishment – sediment grain size should be determined for the length of the beach where nourishment is proposed. The frequency and locations of sediment sampling shall be sufficient to identify the sediment composition of the beach profile. This data shall be consolidated to generate a sediment gradation curve for each sampled transect. Each sampled transect should also be identified on the project plans (drawings).

If more space is needed, attach an extra sheet of paper marked Box 31.

Block 32. Signature of Applicant or Agent. The PCN must be signed by the person proposing to undertake the GP activity, and if applicable, the authorized party (agent) that prepared the PCN. The signature of the person proposing to undertake the GP activity shall be an affirmation that the party submitting the PCN possesses the requisite property rights to undertake the GP activity (including compliance with special conditions, mitigation, etc.).

DELINEATION OF WETLANDS, OTHER SPECIAL AQUATIC SITES, AND OTHER WATERS

Each PCN must include a delineation of wetlands, other special aquatic sites, and other waters, such as lakes and ponds, and perennial, intermittent, and ephemeral streams, on the project site. Wetland delineations must be prepared in accordance with the current wetland delineation manual and regional supplement published by the USACE. The permittee may ask the USACE to delineate the special aquatic sites and other waters on the project site, but there may be a delay if the USACE does the delineation, especially if the project site is large or contains many wetlands, other special aquatic sites, and other waters. The 60-day PCN review period will not start until a delineation has been completed.

DRAWINGS AND ILLUSTRATIONS

General Information.

Three types of illustrations are needed to properly depict the work to be undertaken. These illustrations or drawings are identified as a Vicinity Map, a Plan View or a Typical Cross Section Map. Identify each illustration with a figure or attachment number. For linear projects (e.g. roads, subsurface utility lines, etc.) gradient drawings should also be included. Please submit one copy of all drawings on 8½ x 11 inch plain white paper (electronic submissions preferred). Use the fewest number of sheets necessary for your drawings or illustrations. Each illustration should identify the project, the applicant, and the type of illustration (vicinity map, plan view, or cross section). While illustrations need not be professional (many small, private project illustrations are prepared by hand), they should be clear, accurate, and contain all necessary information.

ADDITIONAL INFORMATION AND REQUIREMENTS

For proposed GP activities that involve discharges into waters of the United States, water quality certification from the State, Tribe, or EPA must be obtained or waived. Some States, Tribes, or EPA have issued water quality certification for one or more GPs. Please check the New England District website to see if water quality certification has already been issued for the GP(s) you wish to use. For proposed GP activities in coastal states, state Coastal Zone Management Act consistency concurrence must be obtained, or a presumption of concurrence must occur. Some States have issued Coastal Zone Management Act consistency concurrences for one or more GPs. Please check the New England District website to see if Coastal Zone Management Act consistency concurrence has already been issued for the GP(s) you wish to use.

APPENDIX C SELF-VERIFICATION NOTIFICATION

U.S. Army Corps of Engineers (USACE)

SELF-VERIFICATION NOTIFICATION (SVN)

DATA REQUIRED BY THE PRIVACY ACT OF 1974

Authority Rivers and Harbors Act, Section 10, 33 USC 403; Clean Water Act, Section 404, 33 USC 1344; Regulatory Programs of the Corps of Engineers; Final Rule 33 CFR 320-332.

Principal Purpose This information will be used in evaluating activities under Self-Verification procedures within Massachusetts.

Routine Uses Routine uses will include: (1) Documenting compliance with the terms and conditions of the General Permit (GP) for activities that may require authorization pursuant to one or more of USACE's Regulatory authorities. (2) Records may be referred to other Federal, State, and local agencies for evaluation and enforcement purposes.

Disclosure Failure to fully comply and abide by the GP terms and conditions prior to commencing work and after completion project may result in formal enforcement action, up to and including monetary penalties and/or legal action, pursuant to 33 CFR Part 326.

Instructions The permittee must complete ALL required sections of this document before commencing USACE-regulated activities. A copy of this completed SVN must be kept on site during construction and be made available for review by USACE and other Federal, State, & Local regulatory authorities at any time. Within 30 days of initiating project construction, the permittee shall submit the completed SVN to USACE. The SVN shall be submitted to USACE as **ONE signed document** that includes project plans and documentation that supports each field (e.g., emails, letters, description, phone calls, surveys). Electronic submissions to the following address are strongly preferred: cenae-r-ma-sv@usace.army.mil. The email subject line shall contain the following: GP #, SVN, City/Town, and date submitted.

(ITEMS 1 THRU 3 TO BE FILLED BY USACE)

1. APPLICATION NO.	2. FIELD OFFICE CODE	3. DATE RECEIVED

APPLICANT AND AGENT INFORMATION

4. APPLICANT'S NAME	7. AGENT'S ADDRESS:
First - Courtney Middle - Last - Walker	First - Thomas Middle - Last - Liddy
Company - MassDOT - Highway Division	Company - Lucas Environmental, LLC
E-mail Address - courtney.l.walker@dot.state.ma.us	E-mail Address - tel@lucasenviro.com
5. APPLICANT'S ADDRESS:	8. AGENT'S ADDRESS:
Address- 10 Park Plaza, Room 7360	Address- 500A Washington Street
City - Boston State - MA Zip - 02116 Country -	City - Quincy State - MA Zip - 0216 Country - U
6. APPLICANT'S PHONE NOs. w/AREA CODE	9. AGENTS PHONE NOs. w/AREA CODE
a. Residence b. Business c. Fax	a. Residence b. Business c. Fax
857.262.0757	617.405.40

NAME, LOCATION, AND DESCRIPTION OF PROJECT SITE

10. PROJECT NAME OR TITLE

11. FILE NUMBER(S) OF PREVIOUS USACE ACTIONS ON THE SITE (if applicable)	12. NAME OF WATERBODY

13. PROJECT COORDINATES (in decimal degrees)	14. PROJECT STREET ADDRESS (if applicable)
Latitude: ◦N Longitude: ◦W	Address Church Street Bridge
42.67069 -72.54594	City - Bernardston State - MA Zip - 01337

ACTIVITY TYPE, PROJECT IMPACTS, AVOIDANCE & MINIMIZATION

15. GENERAL PERMIT ACTIVITIES (CHECK ALL THAT APPLY)

1 ☐	6 ☐	11 ☐	16 ☐	21 ☐
2 ☐	7 ☐	12 ☐	17 ☐	22 ☐
3 ☐	8 ☐	13 ☐	18 ☐	23 ☐
4 ☐	9 ☐	14 ☐	19 ☐	24 ☐
5 ☐	10 ☐	15 ☐	20 ☐	25 ☐

16. SUMMARY OF PROJECT IMPACTS (*see instructions*)

Area (square feet)	Length (linear feet)	Volume (cubic yards)	Duration

17. PROJECT PLANS (BY CHECKING THE BOXES BELOW, YOU CERTIFY THESE ITEMS ARE COMPLETE) (*see instructions*)

- ☐ a. Plans shall at least contain the following: Vicinity Map, Plan View, and Typical Cross Section View of the proposed activity.
- ☐ b. All direct, indirect and secondary impacts from USACE regulated activities are shown on the project plans.
- ☐ c. The size of the impact area for each activity (acre, square feet, linear feet) are shown on the project plans.
- ☐ d. For discharges of fill material (§404), the volume of fill material is identified on the project plans.
- ☐ e. The duration of each impact, permanent or temporary (X days), is identified on the project plans.
- ☐ f. Do activities with permanent impacts result in the loss of waters? If so, this is identified on the project plans.
- ☐ g. All aquatic resources in the vicinity of the USACE regulated activities are delineated on the project plans.

18. AVOIDANCE & MINIMIZATION (BY CHECKING THE BOXES BELOW, YOU CERTIFY THESE CRITERIA ARE MET) (*see instructions*)

- ☐ a. The project has been designed to avoid and minimize impacts to aquatic resources.
- ☐ b. The footprint of activities in waters of the U.S. has been reduced to only what is necessary to achieve the overall project purpose.
- ☐ c. All practicable measures have been taken to avoid and minimize impacts to aquatic resources through construction techniques and site access (e.g., Best Management Practices, Time of Year Restrictions).
- ☐ d. All temporary impacts from USACE regulated activities will be restored upon completion of construction and the project area will be returned to pre-construction contours and conditions.

COMPLIANCE WITH FEDERAL REGULATIONS & SUPPLEMENTAL INFORMATION

19. DUE DILIGENCE (*see instructions*)

Complete the entries below to document compliance with the following Federal requirements. Construction may NOT begin if a PCN is/may be required, and you must contact USACE to determine permitting requirements. Documentation that demonstrates how the activity complies with each field below shall be submitted to the USACE as noted in the instructions block. See each General Condition (GC) in the GP for how to comply with each requirement.

a. State Historic Preservation Officer	Select Option
b. Massachusetts BUAR	Select Option
c. Tribal Historic Preservation Officers	Select Option
d. Endangered Species Act - NOAA	Select Option
e. Endangered Species Act - USFWS	Select Option
f. Northern Long Eared Bat (ESA)	Select Option
g. Essential Fish Habitat	Select Option
h. Wild & Scenic Rivers	Select Option
i. 401 Water Quality Certification 401	Select Option
	401 WQC/OOC File Number: OOC issued: 401 issued:
j. Section 408 Permission	Select Option
k. Coastal Zone	Select Option
l. Construction Mats	Select Option
m.Time of Year Restrictions	Select Option
n. Vernal Pools	Select Option
o. Sediment & Erosion Controls	Select Option
p. Stream/Wetland Crossings	Select Option

20. AQUACULTURE ACTIVITIES - GP 18 (*see instructions*)

- ☐ a. If required, an Aquaculture Certification from the Massachusetts Division of Marine Fisheries was obtained prior to commencing work.
- ☐ b. Coordination with the U.S. Coast Guard pursuant to Private Aids to Navigation has occurred prior to commencing work.
- ☐ c. If required, a MEPA Certificate was obtained from the Massachusetts Environmental Protection Agency prior to commencing work. Select Option
- ☐ d. The prospective permittee contacted local authorities (e.g. harbormaster, select board, shellfish constable) for authorization of their facility prior to commencing work.

21. ADDITIONAL INFORMATION/ATTACHMENTS (*see instructions*)

- ☐ a. The project plans are enclosed in this SVN submittal (see block 17).
- ☐ b. The activity Select Option funded through the Bipartisan Infrastructure Bill (also known as the Infrastructure Investment and Jobs Act).
- ☐ c. All required state, local and federal approvals were acquired prior to starting construction in USACE jurisdiction.
- ☐ d. After construction of the activity is completed, a complete Certificate of Compliance will be submitted to USACE.

22. IS THERE ANOTHER LEAD FEDERAL AGENCY:

☐ YES ☐ NO

23. STATEMENT OF AUTHORIZATION *(see instructions)*

I certify that I possess the authority to undertake the work described herein or am acting as the duly authorized agent of the applicant.

SIGNATURE OF APPLICANT	DATE	SIGNATURE OF AGENT	DATE

24. SIGNATURES *(see instructions)*

I hereby certify that the information in this Self-Verification Notification is complete and accurate. As the applicant or their duly authorized agent, I certify the activity was completed in accordance with the terms and conditions of the GP. This includes all applicable terms, general conditions, and activity-specific GP criteria. I agree to allow the duly authorized representatives of the Corps of Engineers Regulatory Program and other regulatory or advisory agencies to enter upon the premises of the project site at reasonable times to evaluate inspect and photograph site conditions. This consent to enter the property is superior to, takes precedence over, and waives any communication to the contrary. For example, if the property is posted as “no trespassing” this consent specifically supersedes and waives that prohibition and grants permission to enter the property despite such posting.

SIGNATURE OF APPLICANT	DATE	SIGNATURE OF AGENT	DATE

18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals, or covers up any trick, scheme, or disguises a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statements or entry, shall be fined not more than $10,000 or imprisoned not more than five years or both.

Instructions for Preparing a
Department of the Army
General Permit (GP) Self-Verification

Blocks 1 through 3. To be completed by the Corps of Engineers.

Block 4. Applicant' Name. Enter the name and the e-mail address of the responsible party or parties. If the responsible party is an agency, company, corporation, or other organization, indicate the name of the organization and responsible officer and title. If more than one party is associated with the self-verification, please attach a sheet of paper with the necessary information marked Block 4.

Block 5. Address of Applicant. Please provide the full address of the party or parties responsible for the self-verification. If more space is needed, attach an extra sheet of paper marked Block 5.

Block 6. Applicant Telephone Number(s). Please provide the telephone number where you can usually be reached during normal business hours.

Blocks 7 through 9. To be completed, if you choose to have an agent.

Block 7. Authorized Agent's Name and Title. Indicate name of individual or agency, designated by you, to represent you in this process. An agent can be an attorney, builder, contractor, engineer, consultant, or any other person or organization. Note: An agent is not required.

Blocks 8 and 9. Agent's Address and Telephone Number. Please provide the complete mailing address of the agent, along with the telephone number where they can be reached during normal business hours.

Block 10. Proposed General Permit Activity Name or Title. Please provide a name identifying the proposed GP activity, e.g., Windward Marina, Rolling Hills Subdivision, or Smith Commercial Center.

Block 11. File Number(s) of Previous USACE Actions on the Site Please provide any known USACE file number. If the activity does not have a known USACE file number, you may state N/A.

Block 12. Name of Waterbody. Please provide the name (if it has a name) of any stream, lake, marsh, or other waterway to be directly impacted by the GP activity. If it is a minor (no name) stream, identify the waterbody the minor stream enters.

Block 13. Proposed Activity Coordinates. Please enter the latitude and longitude of where the proposed GP activity is located. Indicate whether the project location provided is the center of the project or whether the project location is provided as the latitude and longitude for each of the "corners" of the project area. If there are multiple sites, please list the latitude and longitude of each site (center or corners) on a separate sheet of paper and mark as Block 13.

Block 14. Proposed Activity Street Address. If the proposed activity is located at a site having a street address (not a box number), enter it in Block 14.

Block 15. General Permit Activity Type. Please select all GP activity types that apply to the proposed activity. A list of GP activity types can be found in Section III of the GP.

Block 16. Summary of Project Impacts. Please provide ALL proposed impacts, both temporary and permanent in duration, that are located in Waters of the United States. The area of impact shall be provided in square feet (SF). When applicable, impacts that result in conversion of stream bank or shoreline must also be identified in linear feet (LF). Dredging or the discharge of dredged or fill material shall also include the volume, cubic yards (CY), of material removed from or placed into Waters of the U.S. If more entries are required, please attach a table matching the desired format in Block 16.

Block 17. Project Plans. Please verify that items a-g are included in the project plans. Three types of illustrations are necessary to properly depict the proposed work. These illustrations or drawings are identified as a Vicinity Map, a Plan View (Aerial view) and a Cross Section Map. For linear projects (e.g. roads, subsurface utility lines, etc.) gradient drawings (longitudinal profile) should also be included. Plans must accurately depict the existing conditions and all aspects of the proposed activity located in waters of the U.S. Please submit one copy of all drawings formatted to print on 8½ x 11 inch or 11 x 17 inch plain white paper. Use the fewest number of sheets necessary for your drawings or illustrations. Each illustration should identify the project, the applicant, and the type of illustration (vicinity map, plan view, or cross section). While illustrations need not be certified engineering sheets; they should be clear, accurate, contain all necessary information, and depict all proposed work. Each submission must also include a delineation of wetlands, other special aquatic sites, and other waters, such as lakes and ponds, and perennial, intermittent, and ephemeral streams, on the project site. Wetland delineations must be prepared in accordance with the current wetland delineation manual and regional supplement published by USACE.

Block 18. Avoidance & Minimization. Please verify that items a-d have been implemented for the proposed activity.

Block 19. Due Diligence. Please complete all the fields and submit documentation to USACE to demonstrate compliance with the above requirements. This Documentation may include emails, letters, meeting notes, phone call log, project narrative, project plans, a species list from the NOAA Section 7 Mapper, a completed copy of the IPAC determination keys, etc. Documentation should be limited to what is necessary to demonstrate how the proposed activity meets each requirement. Refer to the MA GP, Appendix A, for specific guidance on the identification of previously identified historic properties and previously unidentified historic properties. Endangered Species: *The applicant must be designated as the non-federal representative for the purposes of Section 7 consultation to select the Rangewide D-Key options. Otherwise, the applicant shall select the following option when IPAC indicates the NLEB is present: "The activity IS located within the NLEB Species Range (PCN Required)."

Block 20. Aquaculture Activities. Please verify that items a-d have been obtained or completed prior to commencing work in waters of the U.S.

Block 21. Additional Information/Attachments. Please verify that items a-d have been completed prior to commencing work in waters of the U.S.

Block 22. Lead Federal Agency. Please identify if there is another lead federal agency involved with the proposed activity. Enter the lead federal agency name (e.g., the Federal Emergency Management Agency, FEMA) and the agency's designated person of contact for the activity.

Block 23. Statement of Authorization. The applicant shall sign this section for all activities. If an agent is to be employed, the agent shall sign this section.

Block 24. Signatures. The SVN must be signed by the person proposing to undertake the GP activity, and if applicable, the authorized party (agent) that prepared the SVN. The signature of the person proposing to undertake the GP activity shall be an affirmation that the party submitting the SVN possesses the requisite property rights to undertake the GP activity.

US Army Corps of Engineers®
New England District

APPENDIX D: PCN APPLICATION CHECKLIST

The following information shall be submitted for all PCNs for USACE to properly evaluate your application. Some applications may require more information and this checklist is offered as a tool to assist applicants with submitting a complete application.

SECTION 1: GENERAL APPLICATION INFORMATION

1. ☐ Complete the Pre-Construction Notification document (Appendix B).
2. ☐ Specify which local/state/federal authorizations are required for the project and if any have been obtained or applied for at the time of USACE application submittal.
3. ☐ Identify all funding sources the project will receive or has received to date. Provide any relevant information in the application submission.
4. ☐ Is this part of a larger project that is being implemented in phases? If so, describe the project schedule and how each phase will be implemented.
5. ☐ Describe the existing conditions on the site and the general land use in the vicinity of the project at the time application submittal.
6. ☐ Provide any historic information available that you may have of project area, e.g., existing USACE permit numbers, the names under which the permits were obtained if the permit numbers are unknown, construction dates and proof of prior existence (aerials, photos, town hall records, affidavits, state or local permits, etc.) to verify that the project predates regulation and is "vested".[19]
7. ☐ The anticipated start and end dates for construction.

SECTION 2: WETLAND DELINEATION

8. ☐ Data used to support aquatic resource boundary determinations (delineation forms, delineation map(s) that show the locations of each aquatic resource in the project area, aerial and ground photographs, LIDAR imagery, national wetland inventory maps, soil maps, national hydrography dataset maps, floodplain maps, historical imagery, etc.).
9. ☐ Photographs of the wetland(s) and/or waterway(s) where impacts are proposed. Photos at low tide are preferred for work in tidal waters.
10. ☐ Indicate the relationship of the project area to waters of the U.S., i.e., adjacent wetlands, tidal influence or hydraulic connectivity through culverts, or other conveyances, etc.
11. ☐ At minimum the delineation map/figure should include the following:
    a. Contour lines showing topography.
    b. North arrow.
    c. Bar and text scale.
    d. Legend.
    e. Drawn project boundary.
    f. High tide line, mean high water, mean low water, ordinary high water mark, and/or wetland boundaries.
    g. Captions with a unique name for each aquatic resource and the area or length of the aquatic resource within the project area.

[19] Vested is exempt (someone or something) from a new law or regulation.

h. Appropriate landmarks and features (e.g., culverts, special aquatic sites, etc.).
i. Points showing the paired upland and wetland delineation locations for tidal and non-tidal wetlands only.

SECTION 3: AVOIDANCE & MINIMIZATION

12. ☐ Describe specific measures taken to avoid impacts to aquatic resources or describe why aquatic resources could not be avoided while achieving the project purpose and need.
13. ☐ For impacts to aquatic resources that could not be avoided, describe specific considerations/ measures taken to minimize the area of proposed impacts to aquatic resources in designing the project.
14. ☐ Describe specific measures taken to avoid and minimize the proposed direct, indirect, and secondary impacts to aquatic resources and their functions through construction techniques and timing.
15. ☐ If applicable, provide a restoration plan that describes how all temporary fills and structures will be removed and the area restored to pre-impact conditions (see GC 22).
16. ☐ If applicable, provide an Invasive Species Control Plan (see GC 29). For sample control plans, see www.nae.usace.army.mil/missions/regulatory/invasive-species.
17. ☐ If applicable, describe how the proposed wetland/waterbody crossing is compliant with GC 31, Stream Work and Crossings, and Wetland Crossings.

SECTION 4A: PROJECT IMPACTS

18. ☐ Describe the overall project and the activities located in Waters of the U.S. (WOTUS) that you are seeking authorization for.
19. ☐ Identify the following for project impacts in WOTUS:
    a. ☐ Direct, indirect, secondary impacts[20] within WOTUS.
    b. ☐ The size of each impact (square feet or acres, or linear feet).
    c. ☐ For discharges of fill material (§404), specify the volume of fill material to be discharged (cubic yards).
    d. ☐ The impact duration from each activity, permanent or temporary (X days).

SECTION 4B: PROJECT PLANS

20. ☐ Submit project plans that depict all impacts in WOTUS. On the project plans, applicants shall provide:

General Information

    a. ☐ Plan view and typical cross-section view sheets that show the existing and proposed conditions. These illustrations should each be identified with a figure number, date of the map, the project title, the name of the applicant and the type of illustration (vicinity map, plan view, or cross section).
    b. ☐ Drawings, sketches, or plans that are legible, reproducible (color is encouraged, but features must be distinguishable in black and white), drawn to scale, and no larger than 11”x17” and 10 MB when submitted in digital format. Numeric and graphic/bar scales must agree, and plan details must be measurable using a standard engineer’s scale on printed plans. Reduced plans are not acceptable.
    c. ☐ The north arrow and remove miscellaneous non-wetland or water project related features such as conduits, utility poles, guardrails, etc.

[20] See definitions section for the definitions of direct, indirect, secondary impacts.

d. ☐ Clearly draw the overall limits of work, staging areas, disposal sites, access routes, and any permittee responsible mitigation sites. These areas may include both aquatic resources and upland areas.
e. ☐ Names or numbers of all roads in the site's vicinity and ownership and numbers of abutting parcels.
f. ☐ Datum in plan and elevation views. The horizontal datum shall be in the NAD 83 Massachusetts State Plane Coordinate System (INSERT) in U.S. survey feet. The vertical data in coastal projects shall be referenced to either MLLW or the North American Vertical Datum of 1988 (NAVD 88). Both the distance and depth units shall be U.S. survey feet and specified on the project plans.

Aquatic Resources & Project Impacts

g. ☐ Delineation of all aquatic resource types on site including salt marsh; other special aquatic sites (vegetated shallows, mudflats, riffles and pools, coral reefs, and sanctuaries and refuges); other waters, such as lakes, ponds, vernal pools, natural rocky habitat (tidal only), and perennial, intermittent, and ephemeral streams.
h. ☐ Identify the substrate type (cobble/gravel, organic detritus, sand/shell, silt, mud) and the approximate percentage of each substrate type on site. Grain sizes shall be based on Wentworth grain size classification scale for granules, pebbles, cobbles, and boulders. Sediment samples with a content of 10% or more of pebble-gravel-cobble and/or boulder in the top layer (6-12 inches) should be delineated and material with epifauna/macroalgae should be differentiated from bare pebble-gravel-cobble and boulder.
i. ☐ The direction of ebb and flood in tidal waters and direction of flow in non-tidal waters.
j. ☐ In tidal waters, the project boundary distance from special aquatic sites identified in 20g above if within 25 feet from that resource.
k. ☐ USACE jurisdictional boundaries including ordinary high-water mark (OHWM), high tide line (HTL), mean high water (MHW). Other boundaries include mean low water (MLW), mean lower low water (MLLW), as applicable.
   - Non-tidal: OHWM and/or wetland boundaries.
   - Tidal (structures/work only): MHW, MLW.
   - Tidal (Fill and Structures/work): HTL, MHW, MLW.
   - Tidal (Dredging/Beach Nourishment): HTL, MHW, MLW, MLLW.
l. ☐ Identification of each aquatic resource with a unique name (ex. Wetland 1, Wetland 2, Tributary 1, Beaver Brook, Atlantic Ocean) and the size of each aquatic resource within the project area (square feet or acres).
m. ☐ Impacts to each aquatic resource with captions denoting the size of each impact (square feet, acres, or linear feet) and the duration of the impact (ex. Permanent, Temporary (X days).

SECTION 4C: PROJECT PLANS - SPECIFIC PROJECT INFORMATION

21. ☐ For projects involving Navigation, Structures, Dredging, and/or Beach Nourishment, the applicant shall also address the following:

Navigation

a. ☐ Identify the locations of adjacent Federal navigation project (FNP) and/or state/local navigation projects on the project plans.
b. ☐ Specify the distance between the FNP and proposed project boundary, the authorized depths of the FNP, and state plane coordinates of seaward end(s) of project structures near an FNP.

Structures

a. ☐ Identification of the piling type (steel, timber, concrete) and diameter to be removed and/or installed.
b. ☐ Specify the minimal height of the structures' frame over saltmarsh. To meet the SV threshold, piers must be ≤4 feet in width and this minimal height must achieve a 1.5:1 ratio (i.e., a 4-foot-wide pier is 6 feet above a saltmarsh).
c. ☐ For floats, the methods of securing them (piles, bottom anchors) and for keeping them off substrate (skids, stops) at low water. To meet the SV threshold, a minimum depth of 18-inches of water should be maintained below a floating dock/structure at lower tide levels.

Dredging

a. ☐ The area (SF, acre) and volume (CY) of material to be dredged waterward of MHW for each dredge location.
b. ☐ Dredge boundaries.
c. ☐ Bathymetry for existing, proposed, and historical (include dates and USACE permits) dredge depths.
d. ☐ The likely final angle of repose of the side cuts based on the physical characterization of the material to be dredged and based upon the high/ medium/low, wave or current energy of the location.
e. ☐ Label area whether the dredging is new, maintenance, improvement, or a combination.
f. ☐ Location of the disposal site (include location sheet). NOTE: For projects proposing open water, nearshore disposal, or beach nourishment, contact USACE as early as possible for sampling and testing protocols. Sediment testing, including physical (e.g., grain-size analysis), chemical and biological testing may be required. Sampling/testing of sediments without such contact should not occur and if done, will be at the applicant's risk.
g. ☐ The methods and areas used to retain or prevent dredged material from running back into the wetland or waterway. Provide the capacity of the storage area and points of runback, including the overflow route, into the aquatic system.
h. ☐ For open-water disposal, explain why inland or beneficial reuse sites are not practicable.
i. ☐ Show the finished top elevation of the disposal site.

Beach Nourishment

a. ☐ For beach nourishment, identify the disposal footprint, existing and proposed nourishment profiles (multiple profiles are appropriate if the site is more than 150 feet long or non-contiguous), total fill area (SF) and volume (CY), fill area and volume waterward of the HTL, and delineation of dunes, banks, existing beach vegetation, and contours.
b. ☐ For beach nourishment identify the substrate type (fine sand, sand, cobble, boulder) and/or grain-size of existing material.

SECTION 5: STRUCTURES

22. ☐ For projects with the removal of existing pilings identify the number, type (steel, timber, concrete) and diameter of pilings to be removed and the methodology for removal (cut off at mud line, pulling, vibratory, etc.).
23. ☐ For projects with the installation of new pilings identify the number, type (steel, timber, concrete) and diameter of pilings to be installed and the methodology for installation (vibratory hammer, impact hammer etc.).
24. ☐ Identify any existing structures and moorings in waters adjacent to the proposed activity, their dimensions, and the distance to the limits and coordinates of any proposed mooring field or reconfiguration zone. For reconfiguration zone and mooring fields, provide the coordinates for all

corners based on the Massachusetts State Plane Coordinate System. Specify the maximum number of slips and/or moorings within proposed reconfiguration zones or anchorage areas.

25. ☐ The dimensions of the structure or work and extent of encroachment waterward of MHW and from affixed point on the shoreline or upland.
26. ☐ Shoreline of adjacent properties and property boundary offset for structures. In narrow waterbodies, the distance to opposite shoreline, waterway width, and structures across from proposed work.
27. ☐ For new commercial boating facilities, anchorage areas or reconfiguration zones, provide a description of the type of vessels that would use the facility, and any plans for sewage pump-out facilities, fueling facilities and contingency plans for oil spills.
28. ☐ See Sections 4A-C above.

SECTION 6: AQUACULTURE

29. ☐ Identify the coordinates for lease area corners and gear configuration area on the project plans.
30. ☐ Identify the proposed aquaculture gear type (buoys, floats, racks, trays, nets, lines, tubes, cages, containers, and other structures). Provide the impacts for each aquaculture gear type (see Section 4A 19a-d).
31. ☐ For a GP 18 to be valid, applicants must have (a) their MA DMF Aquaculture Certification letter for licensed shellfish aquaculture sites, (b) documentation that the applicant has coordinated with the U.S. Coast Guard regarding USCG Private Aids to Navigation standards, (c) their MEPA Certificate (if required), and (d) documentation that the applicant has contacted their local authorities (ex. harbormaster, select board, shellfish constable) for authorization of their facility.
32. Provide information on site the operation, maintenance, and access. Will the site be accessed via boat, kayak, etc.? Will cages be removed in the winter? How often will gear be checked on? Is there an operations plan for the proposed aquaculture area?
33. ☐ See Sections 4A-C above.

SECTION 7: DREDGING

34. ☐ Sampling plan requests for new, improvement or maintenance dredging must submit completed **Dredged Material Evaluation checklist found at Dredged Material Evaluation Checklist, Sampling and Analysis Plan Requirements from Applicant (army.mil)** and identify the method of handling/transporting the dredged material.
35. ☐ Identify grain-size of material to be dredged (e.g., silty sand) and provide any existing sediment grain size and bulk sediment chemistry data from the proposed project or nearby projects. Include information on any recent spills of oil and/or other hazardous materials and/or nearby outfalls. Document the information source, e.g., EPA database, the harbormaster or fire chief. If there are none, state “none”.
36. ☐ See Section 4A, 4B and 4C, Dredging 21(a-i) above.

SECTION 8: WETLAND/WATERBODY CROSSINGS

37. ☐ For the stream crossing, identify the crossing methodology on the project plan (e.g., dam and pump, dry, wet, etc.). Submit a waterway crossing sequencing plan with the application.
38. ☐ If the project includes a permanent crossing of a tidal waterway, your project design should be modified to match the velocity, depth, cross-sectional area, and substrate of the existing waterbody adjacent to the crossing and provide documentation (hydraulic analysis including low lying property analysis) that the size of the crossing will not restrict tidal flow over the full natural tide range and will not adversely affect abutting infrastructure.

39. ☐ If the work includes a permanent crossing of a non-tidal stream, your project design should be modified to match the culvert gradient of the existing stream channel profile, provide clearance for ≥1.2 times bank full width and conveyance should be embedded ≥1-2 feet for box culverts and pipe arches or ≥1-2 feet and at least 25 percent for rounded pipes/culverts in accordance with the Massachusetts Stream Crossing Standards. Provide the basis for any variation to this requirement.
40. ☐ If the work includes a permanent crossing of a non-tidal stream, the structure should be designed to include a natural bottom substrate within the conveyance that matches the characteristics of the substrate in the natural stream channel and the character of the banks (mobility, slope, stability, confinement, grain and rock size). The conveyance should be designed with a minimum openness ratio ≥0.82-feet (0.25-meters). For how to calculate openness ratio and stream simulation ecological approach for road and stream crossings, see https://www.nae.usace.army.mil/Missions/Regulatory/Stream-and-River-Continuity/.

SECTION 9: COMPENSATORY MITIGATION

41. ☐ Does the project require Compensatory Mitigation[21] for impacts to Waters of the U.S.? (See Section V in the 2023 Massachusetts General Permit)
42. ☐ If the project requires mitigation, does the selected compensatory mitigation option (i.e., In-Lieu Fee, permittee-responsible mitigation) deviate from the order of the options presented in §332.3(b)(2)-(6)? If so, please explain why. https://www.ecfr.gov/current/title-33/chapter-II/part-332/section-332.3
43. ☐ For any compensatory mitigation that involves preservation, the applicant must use a site protection instrument to preserve the parcel in perpetuity. (Conservation Easement, Deed Restriction, etc.) https://www.mass.gov/service-details/conservation-restriction-review-program.

SECTION 10: HISTORIC PROPERTIES & NOTIFICATIONS TO SHPO, THPOs, BUAR

44. ☐ Notify the SHPO, Massachusetts Historical Commission, of the Project via Certified Mail and include proof of delivery or receipt in the application package (See Appendix A).
45. ☐ As applicable, notify the THPOs, Narragansett Indian Tribe, Wampanoag Tribe of Gay Head (Aquinnah), and Mashpee Wampanoag Tribe, of the Project via email OR mail and include proof of delivery or receipt in the application package (See Appendix A).
46. ☐ As applicable, notify the BUAR via email (*strongly preferred*) OR mail and include proof of delivery or receipt in the application package (See Appendix A).
47. ☐ Include responses to this notification in the permit application.
48. ☐ As applicable, information on historic properties (Tribal and Archaeological) within the project area should be provided in the permit application.

SECTION 11: ENDANGERED SPECIES & ESSENTIAL FISH HABITAT

49. ☐ Provide a USFWS Information for Planning and Consultation (IPaC) Official Species List from https://ecos.fws.gov/ipac and the email of the individual who generated the list (see GC 10 of the 2023 Massachusetts General Permit for more information).
50. ☐ Provide a species list from the NMFS Section 7 Endangered Species Act mapper at https://noaa.maps.arcgis.com/apps/webappviewer/index.html.
51. ☐ Provide a species list from the NMFS Essential Fish Habitat Mapper at https://www.habitat.noaa.gov/apps/efhmapper/?page=page_3.

[21] Your mitigation proposal must be consistent with the December 29, 2020 Compensatory Mitigation Standard Operating Procedures at https://www.nae.usace.army.mil/Portals/74/docs/regulatory/Mitigation/Compensatory-Mitigation-SOP-2020.pdf and 2008 Mitigation Rule.

52. ☐ If the project will generate turbidity, describe the extent of turbidity and if erosion controls will be used to contain turbidity. If turbidity controls are not operationally feasible, explain the basis for your conclusion and identify any other measures that you will implement to minimize resuspension of sediment.
53. ☐ Identify the substrate type and any aquatic resources that will be affected by the proposed action. (SAV, salt marsh, sand, silt/clay, rocky/hard bottom)
54. ☐ For projects which will include the installation of pilings/sheet-piles, identify the substrate at the project site (sand, cobble, silt/mud/clay), the installation method (vibratory hammer, impact hammer, combination) and indicate whether the following “soft start” procedures at beginning of the workday and after a 30-minute period of rest will be deployed:
    a. ☐ Vibratory Pile Installation: pile driving will be initiated for 15 seconds at reduced energy followed by a one-minute waiting period. This sequence of 15 seconds of reduced energy driving, one-minute waiting period will be repeated two additional times, followed immediately by pile-driving at full rate and energy.
    b. ☐ Impact Pile Installation: pile driving will commence with an initial set of three strikes by the hammer at 40% energy, followed by a one-minute wait period, then two subsequent 3-strike sets at 40% energy, with one-minute waiting periods, before initiating continuous impact driving.
55. ☐ If the project involves dredging, describe any dredge history, number of dredge events to be covered by the permit, erosion/sediment controls, dredge type, intake structures (mesh screen size), dredged material disposal site.
56. ☐ For project activities associated with structures, identify the number, type (drill barge, work boat, tugboat, etc.), and size of any temporary vessels that will be used. Specify measures that will be implemented to ensure vessels are not berthed in shallow water or will “ground out” at low tide.
57. ☐ For aquaculture projects identify whether any component of the gear is seasonal (will be removed annually) or will be in place year-round. If gear will be present year-round and will be variably managed (e.g., floating in summer, bottom in winter) identify month/date for such configurations.
58. ☐ For aquaculture projects identify whether the project will involve use of an existing vessel or new vessel. Identify the length for all work vessels and identify the distance round trip from vessel berthing location and aquaculture area.
59. ☐ For project activities associated with docking structures (either commercial, industrial, or recreational) identify the number, type (motorized/non-motorized, jet-ski, sailboat, kayak, canoe, other that will be berthed there and the sizes of each.
60. ☐ Information required for Section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act:
    a. Results of an eelgrass survey completed per the INSERT.
    b. Essential Fish Habitat Assessment to determine project-related impacts to essential fish habitat, using guidance developed by the National Marine Fisheries Service.
61. ☐ A document containing the following information (requirements of 50 CFR §600.920(e)(3)):
    a. Description of proposed action.
    b. Analysis of potential adverse effects on essential fish habitat.
    c. Conclusions regarding the effects of the action on essential fish habitat.
    d. If applicable, proposed mitigation.
    e. Analysis of alternatives to the proposed action.
    f. Other:

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DOCUMENT A00841

MASSACHUSETTS
DEPARTMENT OF ENVIRONMENTAL PROTECTION

401 Water Quality Certification Amendment

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Commonwealth of Massachusetts
Executive Office of Energy and Environmental Affairs
Department of Environmental Protection
Address: 100 Cambridge Street, Suite 900, Boston MA 02114 | **Phone**: 617-292-5500

Maura T. Healey	**Kim Driscoll**	**Rebecca Tepper**	**Bonnie Heiple**
Governor	Lieutenant Governor	Secretary	Commissioner

12/3/2025

Massachusetts Department of Transportation
Highway Division
10 Park Plaza, Suite 6340
Boston, MA 02116
ATTN: Lily Collins

RE: 401 WATER QUALITY CERTIFICATION
BRP WW 11, Minor Fill Project
Church St. (Route 10) Bridge Replacement over Fall River
Bernardston, MA

401 WQC Filing Number: 25-WW11-0018-APP
USACE Application No. NAE-2005-01156
MassDOT File Number: 612159

Dear Ms. Collins:

The Massachusetts Department of Environmental Protection (MassDEP) has reviewed your application for a Water Quality Certification (WQC), as referenced above. The WQC application was deemed complete on November 3,2025. In accordance with the provisions of MGL Ch. 21, §§26-53 and Section 401 of the Federal Clean Water Act as amended (33 U.S.C. §1251 et seq.), it has been determined there is reasonable assurance the proposed project will be conducted in a manner which will not violate applicable water quality standards (314 CMR 4.00) and other applicable requirements of state law.

The project proposes a full replacement of the existing bridge (No. B-10-001(12D)) that carries Church Street/Route 10 over Fall River in Bernardston, MA (the Project). The Project also includes installation of scour protection, widening along the 0.5-mile corridor to accommodate sidewalk access over I-91, realignment of the northbound exit ramp at the I-91 interchange, and Stormwater Control Measure (SCM) installation. The bridge and substructure are stated as needing replacement due to various structural deficiencies.

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The existing bridge is oriented in an east-west direction, located immediately west of the I-91 Interchange and spanning Fall River which flows from north to south . The bridge is a three-span structure with two 4.0-foot piers at a skewed distance of approximately 20-feet from the abutments. The superstructure has a width of 60 feet and a total span of 143 feet. Church Street averages a width of 50 feet, accommodating 2 lanes of traffic and merging lanes from the I-91 ramps. No sidewalks are within the project limits. A closed drainage system of 26 catch basins discharges untreated stormwater to Fall River.

A portion of the project is within a FEMA mapped 1% annual chance of flood zone (Zone AE). Fall River is identified as essential fish habitat for Atlantic Salmon (*Salmo salar*), but the U.S. Fish & Wildlife Service along with NOAA National Marine Fisheries determined that Atlantic Salmon is not present. Bordering Vegetated Wetlands (BVW) have been identified immediately north and south of the project limits of the bridge crossing. Two additional BVWs have been delineated within the project limits; one within the I-91 southbound on-ramp and one within the I-91 northbound off-ramp.

The Project will fully replace a structurally deficient three span bridge with a new single span structure along a similar horizontal and vertical alignment. Both existing piers and abutments will be removed as part of the bridge replacement. The replacement bridge will have a span of 100 feet and a width of 64 feet. New concrete abutments will be constructed behind the existing piers and in front of the existing abutments, outside of Fall River. Access for demolition and construction will be provided with an access road on the west side of the river and a temporary trestle. For scour protection, riprap installation is proposed around the new abutments as well as the slope along the eastern side of the river, north of the bridge span. Full-depth pavement reconstruction and widening of the 0.5-mile corridor will allow for the installation of a sidewalk. Additionally, the northbound exit ramp at the I-91 interchange has been re-aligned to reflect current MassDOT standards regarding pedestrian safety. A total of 35 cubic yards of material is proposed to be dredged. All dredging will occur within water control structures and will be properly dewatered.

In total, 3,110 square feet (sf) of temporary and 331 sf of permanent impacts to Land Under Water (LUW) is required to complete the project. Bulk sandbag cofferdams will be installed within Fall River and dewatered to create dry working conditions while maintaining flow. These dewatered areas will be utilized to install the abutments and scour protection on each slope. The scour protection installation will primarily occur above ordinary high water with some within LUW accounting for the permanent impacts.

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Natural streambed material will be installed atop the riprap to fill voids within the riprap. A fluvial geomorphologist is proposed to be on site for restoration of the impacted streambed.

An alternatives analysis was completed in accordance with 314 CMR 9.00. MassDOT has stated that the existing bridge is structurally deficient and presents a risk to driver safety due to a potential bridge failure; therefore, a no-build alternative is not practicable to meet project goals. Three alternatives were considered, with the chosen alternative meeting stream crossing standards and minimizing impacts to LUW.

The Project meets the Stormwater Management Standards to the maximum extent practicable (MEP) per 314 CMR 9.06(6). The widening of the bridge and 0.5-mile corridor will increase impervious surface within the Project limits by 5,901 sf. During the course of project review, MassDOT revised the project to include a bioretention area to be located south of Church St and just west of the I-95 northbound off-ramp. Twenty-six catch basins within the project limits will be replaced with deep sump catch and two leaching basins will be installed to meet the Stormwater Management Standards to the MEP as a redevelopment project.

Despite decreasing the overall span, the new structure will still fully comply with stream crossing standards. The removal of the two piers will improve upon existing conditions.

Based on a review of information provided by the applicant, MassDEP finds that this project complies with the standards described under 314 CMR 9.06. Public notice was provided in the Greenfield Recorder on July 14, 2025. No comment letters were received during the public comment period.

Therefore, based on information currently in the record, MassDEP grants a WQC for this project subject to the following conditions to maintain water quality, to minimize impact on waters and wetlands, and to ensure compliance with appropriate state law. The Department further certifies in accordance with 314 CMR 9.00 that there is reasonable assurance the project or activity will be conducted in a manner which will not violate applicable water quality standards (314 CMR 4.00) and other applicable requirements of state law. Finally, the Department has determined that upon satisfying the conditions and mitigation requirements of this approval, the project provides a level of water quality necessary to protect existing uses and accordingly finds that the project to be implemented satisfies the Surface Water Quality Standards at 314 CMR 4.00.

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Pursuant to 314 CMR 9.09(1)(d); 314 CMR 9.06(6)(a); 310 CMR 9.06(2); 314 CMR 9.07; 314 CMR 9.07(1); 314 CMR 9.09(7)(5)(c); 314 CMR 9.11; and 314 CMR 9.09(1)(e), the following Special Conditions are necessary to ensure that construction practices and stormwater controls are implemented in such a manner as to prevent degradation to wetlands and waters; ensure that practicable steps have been taken which will avoid and minimize impacts to wetlands and waters; minimize turbidity and sediment caused by construction activities; ensure that water quality is not degraded, and that biology of the waters are not negatively impacted by potential discharges; and/or maintain a record of the dredged material for reference and to ensure accountability in its transportation.

Those Special Conditions that require direct submittals to MassDEP for either review, or review and approval, are denoted by the following notation (Submittal) at the end of the condition and are summarized in Attachment A. In addition, those conditions with the (Submittal) designation shall be included in the Special Provisions and, as applicable, reviewed at the Pre-Construction Meeting.

1. All work shall be performed in accordance with the following documents and plans:

    a. Application for Water Quality Certification. “Bridge Replacement, Bridge No. B-10-001(12D), Bernardston, MA” Prepared by TEC Inc. on behalf of MassDOT, dated July 2025, with cover letter and attachments. 401 WQC Filing Number: 25-WW11-0018-APP.

    b. MassDEP Technical Review. 401 Water Quality Certification, Minor Fill Project Certification. Church Street (Route 10) Bridge Replacement over Fall River in Bernardston, MA. Dated July 31, 2025.

    c. Responses to MassDEP Technical Review. Prepared by TEC Inc. on behalf of MassDOT. 401 Water Quality Certification, Minor Fill Project Certification. Church Street (Route 10) Bridge Replacement over Fall River in Bernardston, MA. Dated September 5, 2025.

    d. MassDEP Supplemental Technical Review. 401 Water Quality Certification, Minor Fill Project Certification. Church Street (Route 10) Bridge Replacement over Fall River in Bernardston, MA. EMAIL Dated September 16, 2025.

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e. Responses to MassDEP Supplemental Technical Review. Prepared by TEC Inc. on behalf of MassDOT. 401 Water Quality Certification, Minor Fill Project Certification. Church Street (Route 10) Bridge Replacement over Fall River in Bernardston, MA. EMAIL Dated September 26, 2025.

f. Revised Permit Cover Letter. Prepared by TEC Inc. on behalf of MassDOT. Dated October 31, 2025.

g. Revised Stormwater Management Report. Prepared by TEC Inc. on behalf of MassDOT. Dated May 23, 2024 (Revised October 30, 2025).

h. Revised Permit Plans. Prepared by TEC Inc. on behalf of MassDOT. Dated October 30, 2025.

i. DOT Specification Number 698.99 (Impermeable Liner)

j. DOT Specification Number 753.1 (Bioretention Soil)

Pre-Construction

2. A qualified **Fluvial Geomorphologist** (FGM) with a minimum of five years of relevant professional experience in stream replication and restoration projects shall be employed to oversee all LUW replication and restoration activities as proposed in the WQC application and as approved herein. The name, contact information, and qualifications of the FGM shall be provided to MassDEP for review and approval with a copy to the Bernardston Conservation Commission prior to the Pre-Construction Meeting required in Condition 5. The FGM shall either attend the Pre-Construction Meeting or a separate virtual or onsite meeting with MassDEP, MassDOT, and the Contractor prior to any LUW replacement or restoration work. **(Submittal)**

3. One individual with at least three years of experience with construction period erosion and sedimentation controls shall be employed to be responsible for CP/PP inspections (CP/PP Inspector). The name, contact information, and qualifications of the CP/PP Inspector shall be provided to MassDEP for review and approval with a copy to the Bernardston Conservation Commission prior to the Pre-Construction Meeting required in Condition 5. **(Submittal)**

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4. Prior to the Pre-Construction Meeting required in Condition 4, the applicant shall provide MassDEP with the name and contact information of the Resident Engineer (RE) responsible for ensuring that all work complies with the conditions of this WQC. **(Submittal)**

5. A minimum of 21 days prior to the start of ground disturbance or vegetation clearing, MassDOT shall contact MassDEP to schedule an onsite Pre-Construction Meeting to review the approved plans and terms and conditions of this WQC. The RE, the construction contractor (Contractor), a representative from the MassDOT Environmental Section and/or the District Environmental Engineer shall attend the Pre-Construction Meeting. **No work shall commence prior to the Pre-Construction Meeting.**

6. MassDEP shall be copied on applicable submittals to the U.S. Army Corps of Engineers (USACE). These include but are not limited to: Self-Verification Notification Form (SVNF); Pre-Construction Notification (PCN); Work-Start Notification Form; Mitigation Work-Start Notification Form; and Compliance Certification Form. The Work-Start Notification Form shall be submitted at least 14 days before the anticipated start of work and the Compliance Certification Form shall be submitted within 30 days following the completion of the authorized work. **(Submittal)**

7. A CP/PP shall be developed and implemented as required by 314 CMR 9.06(6)(a)8. A minimum of 14 days prior to the start of work, MassDOT shall submit the CP/PP for review and approval. If the U.S. Environmental Protection Agency (EPA) Construction General Permit (CGP) applies, the Stormwater Pollution Prevention Plan (SWPPP) may serve as the CP/PP, providing it includes the measures required to be in the CP/PP per these Special Conditions, in addition to the measures specifically required by the CGP. Any subsequent changes to the approved CP/PP (defined herein as including the construction period SWPPP if applicable) must be approved by MassDEP. **(Submittal)**

8. Training regarding erosion and sedimentation controls is required. The CP/PP Inspector and any other relevant personnel responsible for erosion and sedimentation controls shall complete the EPA CGP Inspector Training, or other training that meets the CGP requirements, as well as complete a comprehensive

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review of the approved CP/PP. Proof of completion of the training shall be submitted to MassDEP prior to the start of work. **(Submittal)**

9. The CP/PP shall identify, but shall not be limited to, staging and laydown areas in relation to BVWs and LUW, proposed dewatering methods and locations, proposed stockpile locations and their proximity to catch basins or other drainage conveyances that discharge to wetland resource areas, and the location of construction-period erosion and sedimentation controls. Stockpiles shall be located no less than 50 feet from BVWs, LUW, catch basins, or other drainage conveyances that discharge to BVWs or LUW.

10. A minimum of 14 days prior to the start of work, MassDOT shall submit a Control of Water Plan for review and approval. The Plan shall include a description of proposed methods to isolate and dewater work areas within streams while maintaining stream flow, including but not limited to the method of isolation (e.g., steel sheeting or sandbag cofferdam), dewatering methods and locations and specifications for stream bypass systems as applicable. The Control of Water Plan shall include a plan depicting BVW and LUW boundaries, and the location of all relevant methods and materials which shall be located within the BVW and LUW impact areas approved herein. The plan shall meet the requirements of the CP/PP and be specific to the Project. Dewatering and stream bypasses shall be conducted under the supervision of the RE or other project staff with knowledge of these practices and comply with the applicable conditions identified herein. **(Submittal)**

11. Prior to the start of work, approved erosion and sedimentation control measures shall be installed per the approved CP/PP and as applicable, the manufacturer specifications. Erosion and sedimentation control measures may consist of, but are not limited to, silt fence, staked straw bales, silt/turbidity curtains, compost filter tubes, etc.

12. Prior to the Pre-Construction Meeting, the boundaries of BVWs and LUW shall be re-flagged where they are within 50 feet of the limits of work. All boundary markers, once in place, shall remain in place throughout construction until all disturbed surfaces have been permanently stabilized. Boundary markers shall be fully evaluated annually and refreshed where needed. Implementation of and

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compliance with this requirement shall be documented by the RE. All construction personnel shall be made aware of these markers.

13. Prior to any work within the 1% annual chance of flooding zone within Project limits, including mobilization or storage of equipment and materials, a Flood Contingency Plan shall be submitted to MassDEP for review and approval that includes at a minimum the following information and provisions: **(Submittal)**

    a. The RE and/or Contractor shall monitor the National Weather Service forecast daily, and upon issuance of a flood watch or flood warning for the Project area, the Flood Contingency Plan shall be implemented.

    b. Upon implementation of the Flood Contingency Plan, all construction equipment and materials located below the Base Flood Elevation (BFE) shall be removed and placed in an upland location above the BFE and outside of BVW and LUW.

    c. Anchored stationary equipment may remain below the BFE if demonstrated to be required and upon written approval from MassDEP. In the event semi-stationary equipment cannot be feasibly removed before the arrival of the storm, they shall be adequately secured and MassDEP shall be notified prior to the storm.

    d. A requirement to inspect and maintain all erosion and sedimentation controls, and stabilize all exposed soils as needed below the BFE prior to the storm shall be included.

    e. A plan depicting at a minimum, but not limited to, BVW and LUW boundaries, the Project limits, and the BFE boundary based on ground elevations shall be included.

    f. Staff and materials must be available 24 hours per day, seven days per week to implement the Flood Contingency Plan. The name, affiliation, title, email address, and phone number of each person responsible for implementing the Flood Contingency Plan shall be included.

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g. No work shall commence until the flood watch or flood warning has ended, all areas below the BFE have been inspected, and erosion and sedimentation controls are maintained as needed.

14. The Contractor shall develop an Invasive Plant Management Strategy (IPMS) to be submitted to MassDEP for review and approval prior to the Pre-Construction Meeting. The IPMS shall be implemented as approved. **(Submittal)**

15. If needed, use of herbicides to control invasive species shall be implemented in accordance with the approved IPMS and with the following requirements:

    a. Herbicides shall only be applied by an individual with a current Massachusetts Applicator License;

    b. Only herbicides listed on the Massachusetts Department of Agriculture Rights of Way Sensitive Areas Materials List shall be applied to the targeted area/species;

    c. The manufacturer's label directions must be followed;

    d. Herbicide application shall use no more than the minimum application rate of the herbicide product for the appropriate site, species and application method; and
    e. Applicants may need to obtain a BRP WM04 Herbicide Permit from the MassDEP Wetlands Program, Dredge Unit before applying herbicides in wetlands and shall consult with the Dredge Unit regarding the applicability of a WM04 permit and shall obtain such permit if required by MassDEP. A WM04 permit is required for chemical application to open water bodies and wetlands.

16. A minimum of 21 days prior to the start of demolition work, a Demolition Plan shall be submitted for review and approval describing how the existing bridge will be demolished and what measures will be taken to ensure that demolition material, including but not limited to any pollutants, construction debris, toxic or hazardous substances, and airborne dust, is properly contained and does not enter Fall River. **(Submittal)**

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17. Final Construction Plans (the plans provided to the Contractor) shall be submitted for review at least 30 days prior to the Pre-Construction Meeting. Sufficient supporting information, explanation, and documentation shall be provided to MassDEP and the Bernardston Conservation Commission outlining any deviations from the plans approved herein, and MassDEP may at its discretion require additional supporting documentation as a condition of review. The updated set of plans shall become the "Final Plan of Record." The Plan shall be prepared and signed by a Professional Engineer in the Commonwealth of Massachusetts and shall incorporate all revisions and additions to the original plans that have been approved as discussed herein. **(Submittal)**

Construction Period

18. As noted on Sheet 14 of 16 of the project plans dated October 30, 2025, modified rock fill shall extend to the upstream riprap area shown on Sheet 3 of 16.

19. No more than **331 sf** of permanent and **3,110 sf** of temporary impacts to LUW shall occur. All work shall avoid unapproved impacts to BVW and LUW.

20. Under the direction of the CP/PP Inspector, inspection and maintenance of erosion and sediment controls in active work areas may be performed by both the Contractor and RE or other MassDOT project staff. Maintenance is the responsibility of the Contractor; however, the permittee shall be ultimately responsible for erosion and sedimentation control failure. The RE and/or contractor shall immediately notify MassDEP and the Bernardston Conservation Commission if any unauthorized discharges to BVWs or LUW occur.

21. CP/PP inspections shall occur at least once every seven calendar days and within 24 hours of a storm event that produces 0.5 inches or more of rain within a 24-hour period, or at a more stringent frequency if the CP/PP requires.

22. Copies of CP/PP Inspection and Maintenance Log Forms shall be submitted to MassDEP within 14 days upon request.

23. Disturbed areas shall be stabilized immediately after activities have permanently ceased or will be temporarily inactive for 14 or more calendar days. The installation

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of stabilization measures shall be implemented as soon as practicable, but no later than 14 calendar days after disturbed areas have been inactive.

24. Work within LUW shall be conducted in low or no-flow conditions to the extent practicable. Notice shall be provided to MassDEP and the Bernardston Conservation Commission within 24 hours prior to the commencement of dewatering. Dewatering methods and location(s) shall be approved by the RE or other project staff with knowledge of these practices prior to use to ensure consistency with the approved Control of Water Plan, and shall be documented in the CP/PP. There shall be no discharge of untreated dewatered stormwater or groundwater to BVWs or LUW. Any discharges shall be visibly free of sediment.

25. Additional erosion and sedimentation control materials shall be stored on-site at all times for emergency and routine replacement. Materials shall be kept covered, dry, and accessible at all times. The CP/PP Inspector shall be responsible for anticipating the need for and installation of additional erosion and sedimentation controls and shall have the authority to require additional erosion control measures to protect wetland resource areas beyond what is shown on the plans if field conditions or professional judgment dictate that additional protection is necessary.

26. The Contractor shall monitor the National Weather Service forecast for updates, and upon issuance of a flood watch for the 1% annual chance of flooding zone, shall implement the flood contingency plan referenced in Condition 12.

27. Any storm drains with potential to receive discharge from stockpiled materials or construction operations shall be managed to inhibit the inflow of sediment while not increasing the likelihood of roadway flooding during periods of precipitation. The CP/PP shall specify measures to implement this. Filter fabric stretched under storm drain inlet grates are not acceptable for this purpose.

28. Stockpiles shall be located no less than 50 feet from BVWs, LUW, catch basins, or other drainage conveyances that discharge to BVWs or LUW.

29. The contractor shall have designated washout areas for concrete equipment that will be comprised of impermeable material and sized to contain project concrete wastes and wash water. Concrete wash-out areas shall be located no less than 50

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feet from BVWs, LUW, and catch basins or other drainage conveyances that discharge directly or indirectly to BVWs or LUW.

30. Refueling, washing, and cleaning of vehicles and other construction equipment shall not take place within 50 feet of BVWs or LUW and any wash water shall be contained such that it does not drain toward BVWs or LUW. MassDEP shall explicitly approve in writing any deviation to this condition for oversized stationary vehicles.

31. The contractor shall have spill containment kits on site. In the event of a release of fuels and/or oils, the local fire department, MassDEP Emergency Response and MassDEP Wetlands Program Highway Unit shall be immediately contacted, and in addition, the MassDEP Bureau of Waste Site Cleanup shall be notified per the requirements of the Massachusetts Contingency Plan, 310 CMR 40.0000.

32. Construction vehicles or other vehicles or heavy equipment are prohibited from traversing over the proposed infiltration Stormwater Control Measures (SCMs) to avoid compaction of soils during construction. These areas shall be demarcated by silt fence with signage, or high visibility fencing. If access through the location of an infiltration SCM is unavoidable, MassDOT shall request written approval from MassDEP.

33. Construction vehicles and equipment shall not enter the BVW or LUW unless authorization is provided by way of this permit or amendment. The Contractor shall use equipment with boom reach capabilities and other measures to avoid inadvertent impacts to jurisdictional resource areas as a result of excavation, riprap placement, and/or bridge/pier demolition materials.

34. A temporary shielding or containment system shall be in place beneath the bridge structure prior to removal and concrete excavation to prevent debris from falling into the water below. In the event that any debris accidentally Fall River, it shall be immediately retrieved. Notice shall be provided to MassDEP if debris enters the river and that it has been removed with photo-documentation (if practicable) submitted by email.

Stream Mitigation

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35. The FGM shall oversee all LUW restoration. Placement of streambed materials shall take place in no- or low-flow conditions. The Control of Water Plan required in Condition 9 shall include measures to create no-flow conditions for this work such as a pump bypass system or other dewatering method, if needed. Placement of streambed materials during greater than low-flow conditions shall require a placement plan, with a narrative describing turbidity control measures, submitted to MassDEP for review and approval.

36. A minimum of 14 days prior to installation of the streambed materials, the FGM shall meet with the contractor to determine the suitability of stockpiled streambed material for reuse and whether there is sufficient stockpiled material to complete streambed restoration.

37. Water shall be slowly introduced back into the restored and dewatered LUW work areas as to not cause erosion and sedimentation. This work shall be overseen by the FGM. The FGM shall provide final approval of the streambed restoration upon re-wetting of banks and removal of water controls (photographs will suffice unless otherwise determined by the FGM).

38. Upon completion of the LUW restoration, the FGM shall provide photographs and a summary of the completed work to MassDEP and the Bernardston Conservation Commission. **(Submittal)**

39. MassDEP reserves the right to determine the success or failure of the LUW replication areas and reserves the right to require additional measures deemed necessary to promote success.

Post-Construction

40. All temporary erosion and sedimentation controls shall be removed at the conclusion of work once the surrounding area has achieved final stabilization.

41. Mulch used as an erosion or sedimentation control may be spread in upland areas at a depth that will not inhibit vegetative growth and shall not be spread in BVWs or LUW.

General Conditions

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42. Any proposed plan changes or amendment requests, as well as any required submittals shall be sent by email for review and approval to heidi.davis@mass.gov and tyler.lewis@mass.gov. **(Submittal)**

43. This WQC remains in effect for the same duration as the Section 404 permit that requires it.

44. No Special Condition set forth herein shall be construed or operate to prohibit MassDEP from taking enforcement against MassDOT or its contractors for any failure to comply with the terms and requirements of this WQC.

45. No activity authorized by this WQC may begin prior to expiration of the 21-day appeal period, or until a final decision is issued by MassDEP in the event of an appeal.

Failure to comply with this Certification is grounds for enforcement, including civil and criminal penalties, under MGL Ch. 21 §42, MGL Ch. 21A §16, or other possible actions/penalties as authorized by the General Laws of the Commonwealth.

This Certification does not relieve the applicant of the obligation to comply with other appropriate state or federal statutes or regulations.

NOTICE OF APPEAL RIGHTS

a.) Appeal Rights and Time Limits

Certain persons shall have a right to request an adjudicatory hearing concerning certifications by MassDEP when an application is required: (a) the applicant or property owner; (b) any person aggrieved by the decision who has submitted written comments during the public comment period; (c) any ten (10) persons of the Commonwealth pursuant to M.G.L. c.30A where a group member has submitted written comments during the public comment period; or (d) any governmental body or private organization with a mandate to protect the environment which has submitted written comments during the public comment period. Any person aggrieved, any ten (10) persons of the Commonwealth, or a governmental body or private organization with a mandate to protect the environment may appeal without having submitted written comments during the public comment period only when the claim is based on new substantive issues arising from material changes to the scope or impact of the activity and not apparent at the time of

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public notice. To request an adjudicatory hearing pursuant to M.G.L. c.30A, § 10, a Notice of Claim must be made in writing, provided that the request is made by certified mail or hand delivery to MassDEP, with the appropriate filing fee specified within 310 CMR 4.10 along with a DEP Fee Transmittal Form within twenty-one (21) days from the date of issuance of this Certificate, and addressed to:

Case Administrator
Department of Environmental Protection
100 Cambridge Street, 9th Floor
Boston, MA 02114

A copy of the request shall at the same time be sent by certified mail or hand delivery to the Department of Environmental Protection at:

Department of Environmental Protection
Wetlands Program, Highway Unit
100 Cambridge Street, 8th floor
Boston, MA 02114

b.) Contents of Hearing Request

A Notice of Claim for Adjudicatory Hearing shall comply with MassDEP's Rules for Adjudicatory Proceedings, 310 CMR 1.01(6), and shall contain the following information pursuant to 314 CMR 9.10(3):

1. the 401 Certification Transmittal Number;
2. the complete name of the applicant and address of the project;
3. the complete name, address, and fax and telephone numbers of the party filing the request, and, if represented by counsel or other representative, the name, fax and telephone numbers, and address of the attorney;
4. if claiming to be a party aggrieved, the specific facts that demonstrate that the party satisfies the definition of "aggrieved person" found at 314 CMR 9.02;
5. a clear and concise statement that an adjudicatory hearing is being requested;
6. a clear and concise statement of (1) the facts which are grounds for the proceedings, (2) the objections to this Certificate, including specifically the manner in which it is alleged to be inconsistent with the MassDEP's Water Quality Regulations, 314 CMR 9.00, and (3) the relief sought through the adjudicatory

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hearing, including specifically the changes desired in the final written Certification; and

7. a statement that a copy of the request has been sent by certified mail or hand delivery to the applicant, the owner (if different from the applicant), the conservation commission of the city or town where the activity will occur, the Department of Conservation and Recreation (when the certificate concerns projects in Areas of Critical Environmental Concern), the public or private water supplier where the project is located (when the certificate concerns projects in Outstanding Resource Waters), and any other entity with responsibility for the resource where the project is located.

c.) Filing Fee and Address

The hearing request along with a DEP Fee Transmittal Form and a valid check or money order payable to the Commonwealth of Massachusetts in the amount of one hundred dollars ($100) must be mailed to:

Commonwealth of Massachusetts
Department of Environmental Protection
Commonwealth Master Lockbox
PO Box 4062
Boston, MA 02211

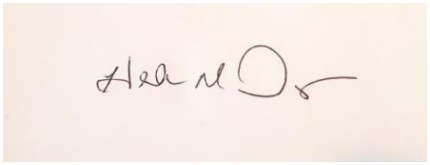
The request will be dismissed if the filing fee is not paid, unless the appellant is exempt or granted a waiver. The filing fee is not required if the appellant is a city or town (or municipal agency), county, or district of the Commonwealth of Massachusetts, or a municipal housing authority. MassDEP may waive the adjudicatory hearing filing fee pursuant to 310 CMR 4.06(2) for a person who shows that paying the fee will create an undue financial hardship. A person seeking a waiver must file an affidavit setting forth the facts believed to support the claim of undue financial hardship together with the hearing request as provided above.

Should you have any questions relative to this permit, please contact myself or at heidi.davis@mass.gov and Tyler Lewis tyler.lewis@mass.gov.

Very truly yours,

The Commonwealth of Massachusetts
Department of Environmental Protection

Address: 100 Cambridge Street, Suite 900, Boston, MA 02114
Phone: 617-292-5500



Heidi M. Davis
Highway Unit Supervisor

Ecc: DEP WERO – Michael McHugh
MassDOT – Melissa Lenker
MassDOT – Courtney Walker
MassDOT – Michael Joa
USACE – Dan Vasconcelos
USACE – Kevin Newton
USACE – cenae-r-ma@usace.army.mil
TEC Inc. – Robert Niccoli - rniccoli@theengineeringcorp.com
Bernardston ConCom – William Hill - WHill@townofbernardston.org

The Commonwealth of Massachusetts
Department of Environmental Protection

Address: 100 Cambridge Street, Suite 900, Boston, MA 02114
Phone: 617-292-5500

ATTACHMENT A

PRE-CONSTRUCTION SUBMITTAL CHECKLIST

Church Street Bridge Replacement over Fall River
Bernardston, MA

THIS CHECKLIST MUST BE COMPLETED PRIOR TO THE START OF WORK. NOTE THAT SOME CONDITIONS REQUIRE THAT INFORMATION BE SUBMITTED A SPECIFIC NUMBER OF DAYS PRIOR TO THE START OF WORK OR THE PRE-CONSTRUCTION MEETING.

Pre-Construction Meeting Date: _____

Condition	Required Submittal	Due Date	Date Submitted	Date Approved
PRE-CONSTRUCTION SUBMITTAL REQUIREMENTS				
2 and 3	Name, contact information, and qualifications of the FGM and CP/PP inspector, including specific experience and years to meet requirement	Prior to Pre-Construction Meeting		
4	Name and contact information of the RE	Prior to Pre-Construction Meeting		
6	USACE Work-Start Notification Form	14 days prior to work start		
7 & 8	CP/PP and Training Verification	14 days prior to work start		
10	Control of Water Plan	14 days prior to work start		

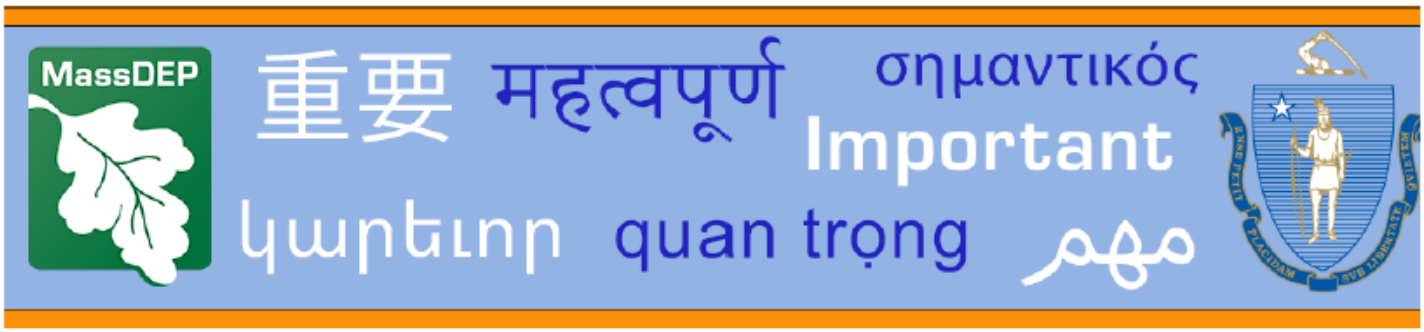
The Commonwealth of Massachusetts
Department of Environmental Protection

Address: 100 Cambridge Street, Suite 900, Boston, MA 02114
Phone: 617-292-5500

13	Flood Contingency Plan	Prior to any work within 1% annual chance of flooding zone		
14	Invasive Plant Management Strategy	Prior to Pre-Construction Meeting		
16	Demo Plan	Prior to Pre-Construction Meeting		
17	Final Construction Plans	30 days prior to Pre-Construction Meeting		

The Commonwealth of Massachusetts
Department of Environmental Protection

Address: 100 Cambridge Street, Suite 900, Boston, MA 02114
Phone: 617-292-5500



Communication for Non-English-Speaking Parties

This document is important and should be translated immediately.

If you need this document translated, please contact MassDEP's Director of Environmental Justice at the telephone number listed below.

Español Spanish

Este documento es importante y debe ser traducido inmediatamente. Si necesita traducir este documento, póngase en contacto con el Director de Justicia Ambiental de MassDEP (*MassDEP's Director of Environmental Justice*) en el número de teléfono que figura más abajo.

Português Portuguese

Este documento é importante e deve ser traduzido imediatamente. Se você precisar traduzir este documento, entre em contato com o Diretor de Justiça Ambiental do MassDEP no número de telefone listado abaixo.

繁體中文 Chinese Traditional

本文檔很重要，需要即刻進行翻譯。
如需對本文檔進行翻譯，請透過如下列示電話號碼與 MassDEP 的環境司法總監聯絡。

简体中文 Chinese Simplified

这份文件非常重要，需要立即翻译。
如果您需要翻译这份文件，请通过下方电话与 MassDEP 环境司法主任联系。

Ayisyen Kreyòl Haitian Creole

Dokiman sa a enpòtan epi yo ta dwe tradui l imedyatman. Si w bezwen tradui dokiman sa a, tanpri kontakte Direktè. Jistis Anviwònmantal MassDEP a nan nimewo telefòn ki endike anba a.

Việt Vietnamese

Tài liệu này và quan trọng và phải được dịch ngay. Nếu quý vị cần bản dịch của tài liệu này, vui lòng liên hệ với Giám Đốc Phòng Công Lý Môi Trường của MassDEP theo số điện thoại được liệt kê bên dưới.

ប្រទេសកម្ពុជា Khmer/Cambodian

ឯកសារនេះមានសារៈសំខាន់
ហើយគប្បីត្រូវត្រូវបានបកប្រែភ្លាមៗ។.
ប្រសិនបើអ្នកត្រូវការអោយឯកសារនេះបកប្រែ
សូមទាក់ទងនាយកផ្នែកយុត្តិធម៌បរិស្ថានរបស់
MassDEPតាមរយៈលេខទូរស័ព្ទដែលបានរាយដូចខាងក្រោម។

Kriolu Kabuverdianu Cape Verdean

Es dokumentu sta important i tenki ser tradusidu immediatamenti. Se nho ta presisa ke es dokumentu sta tradisidu, por favor kontata O Diretor di Justisia di Environman di DEP ku es numero di telifoni menxionadu di baixo.

The Commonwealth of Massachusetts
Department of Environmental Protection

Address: 100 Cambridge Street, Suite 900, Boston, MA 02114

Русский Russian

Это чрезвычайно важный документ, и он должен быть немедленно переведен. Если вам нужен перевод этого документа, обратитесь к директору Департамента экологического правосудия MassDEP (MassDEP's Director of Environmental Justice) по телефону, указанному ниже.

العربية Arabic

هذه الوثيقة مهمة وتجب ترجمتها على الفور.

إذا كنت بحاجة إلى ترجمة هذه الوثيقة، فيرجى الاتصال بمدير العدالة البيئية في MassDEP على رقم الهاتف المذكور أدناه.

한국어 Korean

이 문서는 중대하므로 즉시 번역되어야 합니다.
본 문서 번역이 필요하신 경우, 매사추세츠 환경보호부의 "환경정의" 담당자 분께 문의하십시오. 전화번호는 아래와 같습니다.

հայերեն Armenian

Այս փաստաթուղթը կարևոր է, և պետք է անհապաղ թարգմանել այն:
Եթե Ձեզ անհրաժեշտ է թարգմանել այս փաստաթուղթը, դիմեք Մասաչուսեթսի շրջակա միջավայրի պահպանության նախարարության (MassDEP) Բնապահպանական հարցերով արդարադատության ղեկավարին (Director of Environmental Justice)՝ ստորև նշված հեռախոսահամարով

فارسی Farsi Persian

این نوشتار بسیار مهمی است و باید فوراً ترجمه شود.
اگر نیاز به ترجمه این نوشتار دارید لطفاً با مدیر عدالت محیط زیستی MassDEP در شماره تلفن ذکر شده زیر تماس بگیرید.

Français French

Ce document est important et doit être traduit immédiatement. Si vous avez besoin d'une traduction de ce document, veuillez contacter le directeur de la justice environnementale du MassDEP au numéro de téléphone indiqué ci-dessous.

Deutsch German

Dieses Dokument ist wichtig und muss sofort übersetzt werden. Wenn Sie eine Übersetzung dieses Dokuments benötigen, wenden Sie sich bitte an MassDEP's Director of Environmental Justice *(Direktor für Umweltgerechtigkeit in Massachusetts)* unter der unten angegebenen Telefonnummer.

Ελληνική Greek

Το έγγραφο αυτό είναι πολύ σημαντικό και πρέπει να μεταφραστεί αμέσως. Αν χρειάζεστε μετάφραση του εγγράφου αυτού, παρακαλώ επικοινωνήστε με τον Διευθυντή του Τμήματος Περιβαλλοντικής Δικαιοσύνης της Μασαχουσέτης στον αριθμό τηλεφώνου που αναγράφεται παρακάτω

Italiano Italian

Questo documento è importante e deve essere tradotto immediatamente. Se hai bisogno di tradurre questo documento, contatta il Direttore della Giustizia Ambientale di MassDEP al numero di telefono sotto indicato.

Język Polski Polish

Ten dokument jest ważny i powinien zostać niezwłocznie przetłumaczony. Jeśli potrzebne jest tłumaczenie tego dokumentu, należy skontaktować się z dyrektorem ds. sprawiedliwości środowiskowej MassDEP pod numerem telefonu podanym poniżej.

हिन्दी Hindi

यह दस्तावेज महत्वपूर्ण है और इसका अनुवाद तुरंत किया जाना चाहिए। यदि आपको इस दस्तावेज का अनुवाद कराने की जरूरत है, तो कृपया नीचे दिए गए टेलीफोन नंबर पर MassDEP के पर्यावरणीय न्याय निदेशक से संपर्क करें।

Commonwealth of Massachusetts
Executive Office of Energy and Environmental Affairs
Department of Environmental Protection
Address: 100 Cambridge Street, Suite 900, Boston MA 02114 | **Phone**: 617-292-5500

Maura T. Healey	**Kim Driscoll**	**Rebecca Tepper**	**Bonnie Heiple**
Governor	Lieutenant Governor	Secretary	Commissioner

March 25, 2026

TEC Inc.
282 Merrimack St
Lawrence, MA 01843
ATTN: Michelle Thibault

RE: **AMENDED** 401 WATER QUALITY CERTIFICATION
BRP WW 11, Minor Fill Project
Church St. (Route 10) Bridge Replacement over Fall River
Bernardston, MA

401 WQC Filing Number: 25-WW11-0018-APP
USACE Application No. NAE-2005-01156
MassDOT File Number: 612159

Dear Ms. Thibault:

On December 3, 2025, the Massachusetts Department of Environmental Protection (MassDEP) issued a Water Quality Certification (WQC) to the Massachusetts Department of Transportation (MassDOT) for full replacement of the existing bridge (No. B-10-001(12D)) that carries Church Street/Route 10 over Fall River in Bernardston, MA (the Project). The Project also includes installation of scour protection, widening along the 0.5-mile corridor to accommodate sidewalk access over I-91, realignment of the northbound exit ramp at the I-91 interchange, and Stormwater Control Measure (SCM) installation. The WQC contained 45 conditions and addressed impacts to Land Under Water (LUW). This amendment addresses three changes to the originally approved plans.

Following issuance of the WQC, adjustments were made to the infiltration SCM to add a sediment forebay and to replace the originally proposed vegetation with seed mix. The addition of the sediment forebay will improve stormwater treatment onsite by providing an additional removal of 25 percent total suspended solids (TSS), bringing the subcatchment TSS removal total to 94 percent. This sediment forebay will utilize stone pavers to allow for easy sediment removal during routine maintenance. The SCM now also includes an overflow catch

basin for large storm events that will direct excess water back into the closed drainage system. The removal of the plantings within the SCM is also proposed to reduce maintenance efforts.

The third change to the plans is the removal of loam and seeding within the riprap directly below the bridge. It is anticipated that the seed mix will not be exposed to sufficient sunlight to grow and the loam within the riprap will wash away during large storm events.

In accordance with the provisions of MGL c. 21, s. 26-53 and Section 401 of the Federal Clean Water Act as amended (33 U.S.C. s. 1251 et seq.), MassDEP has reviewed this project change request and has determined that there is reasonable assurance that the project change will not violate applicable water quality standards. MassDEP hereby approves of the above-mentioned project changes and amends the WQC dated December 3, 2025, by referencing the following documents and subject to the following Special Condition:

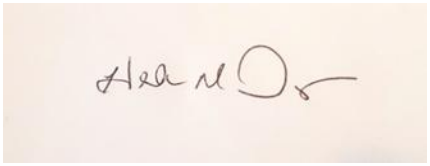
Reference Documents:

1. 401 Water Quality Certification Amendment Request, with attached revised plan set and stormwater report. Bernardston, MA. USACE File Number: NAE-2005-01156. MassDEP Filing Number: 25-WW11-0018-APP. MassDOT Project Number: 612159. Prepared by TEC Inc. on behalf of MassDOT, Dated March 4, 2026.

All other WQC Special Condition remain in effect as applicable.

Should you have any questions relative to this permit, please contact me at heidi.davis@mass.gov or Tyler Lewis at tyler.lewis@mass.gov.

Very truly yours,



Heidi M. Davis
Highway Unit Supervisor

Ecc: DEP WERO – Michael McHugh
MassDOT – Melissa Lenker
MassDOT – Courtney Walker
MassDOT – Michael Joa
MassDOT – Robin Hunter

USACE – Dan Vasconcelos
USACE – Kevin Newton
USACE – cenae-r-ma@usace.army.mil
TEC Inc. – Robert Niccoli - rniccoli@theengineeringcorp.com
Bernardston Conservation Commission – William Hill - WHill@townofbernardston.org

Failure to comply with this amended certification is grounds for enforcement, including civil and criminal penalties, under MGL Ch. 21 §42, MGL Ch. 21A §16, or other possible actions/penalties as authorized by the General Laws of the Commonwealth.

This amended certification does not relieve the applicant of the obligation to comply with other appropriate state or federal statutes or regulations.

NOTICE OF APPEAL RIGHTS

A) Appeal Rights and Time Limits
Certain persons shall have a right to request an adjudicatory hearing concerning certifications by MassDEP when an application is required: (a) the applicant or property owner; (b) any person aggrieved by the decision who has submitted written comments during the public comment period; (c) any ten (10) persons of the Commonwealth pursuant to M.G.L. c.30A where a group member has submitted written comments during the public comment period; or (d) any governmental body or private organization with a mandate to protect the environment which has submitted written comments during the public comment period. Any person aggrieved, any ten (10) persons of the Commonwealth, or a governmental body or private organization with a mandate to protect the environment may appeal without having submitted written comments during the public comment period only when the claim is based on new substantive issues arising from material changes to the scope or impact of the activity and not apparent at the time of public notice. To request an adjudicatory hearing pursuant to M.G.L. c.30A, § 10, a Notice of Claim must be made in writing, provided that the request is made by certified mail or hand delivery to MassDEP, with the appropriate filing fee specified within 310 CMR 4.10 along with a DEP Fee Transmittal Form within twenty-one (21) days from the date of issuance of this Certificate, and addressed to:

Case Administrator
Department of Environmental Protection
100 Cambridge Street, Suite 900
Boston, MA 02108

A copy of the request shall at the same time be sent by certified mail or hand delivery to the Department of Environmental Protection at:

Department of Environmental Protection
Commissioner's Office

100 Cambridge Street, Suite 900
Boston, MA 02108

B) Contents of Hearing Request

A Notice of Claim for Adjudicatory Hearing shall comply with MassDEP's Rules for Adjudicatory Proceedings, 310 CMR 1.01(6), and shall contain the following information pursuant to 314 CMR 9.10(3):

a.) the 401 Certification Transmittal Number;
b.) the complete name of the applicant and address of the project;
c.) the complete name, address, and fax and telephone numbers of the party filing the request, and, if represented by counsel or other representative, the name, fax and telephone numbers, and address of the attorney;
d.) if claiming to be a party aggrieved, the specific facts that demonstrate that the party satisfies the definition of "aggrieved person" found at 314 CMR 9.02;
e.) a clear and concise statement that an adjudicatory hearing is being requested;
f.) a clear and concise statement of (1) the facts which are grounds for the proceedings, (2) the objections to this Certificate, including specifically the manner in which it is alleged to be inconsistent with the MassDEP's Water Quality Regulations, 314 CMR 9.00, and (3) the relief sought through the adjudicatory hearing, including specifically the changes desired in the final written Certification; and
g.) a statement that a copy of the request has been sent by certified mail or hand delivery to the applicant, the owner (if different from the applicant), the conservation commission of the city or town where the activity will occur, the Department of Environmental Management (when the certificate concerns projects in Areas of Critical Environmental Concern), the public or private water supplier where the project is located (when the certificate concerns projects in Outstanding Resource Waters), and any other entity with responsibility for the resource where the project is located.

C) Filing Fee and Address

The hearing request along with a DEP Fee Transmittal Form and a valid check or money order payable to the Commonwealth of Massachusetts in the amount of one hundred dollars ($100) must be mailed to:

Commonwealth of Massachusetts
Department of Environmental Protection
Commonwealth Master Lockbox
PO Box 4062
Boston, MA 02211

The request will be dismissed if the filing fee is not paid unless the appellant is exempt or granted a waiver. The filing fee is not required if the appellant is a city or town (or municipal agency), county, or district of the Commonwealth of Massachusetts, or a municipal housing authority. MassDEP may waive the adjudicatory hearing filing fee pursuant to 310 CMR 4.06(2)

for a person who shows that paying the fee will create an undue financial hardship. A person seeking a waiver must file an affidavit setting forth the facts believed to support the claim of undue financial hardship together with the hearing request as provided above.

DOCUMENT A00842

MASSACHUSETTS
DEPARTMENT OF ENVIRONMENTAL PROTECTION

401 Water Quality Certification

Administrative Completeness and Technical Deficiency Review

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TEC, Inc.
282 Merrimack Street, 2nd Floor
Lawrence, MA 01843
978.794.1792

MEMORANDUM

TO: Massachusetts Dept. of Environmental Protection
100 Cambridge Street, Suite 900
Boston, MA 02114

DATE: September 5, 2025

FROM: TEC, INC.

RE: 401 WATER QUALITY CERTIFICATION
Administrative Completeness and Technical Deficiency Review
401 WQC Transmittal No: 25-WW11-0018-APP

To Whom It May Concern,

On behalf of the owner/Applicant, TEC is pleased to submit this response to comments letter and attached revised documents for your review. Please see below for TEC's responses. Original comments are from the Stormwater Peer Review letter received from The Massachusetts Department of Environmental Protection (MassDEP) Wetlands Program Highway Unit on July 31, 2025, and are shown in **bold**, with TEC responses in *italics*.

1. **As described in the application, the project proposal includes realignment of the northbound exit of the I-91 interchange and deck replacement of the existing I-91 Bridge (B-10-018). The application states that, "There are no wetland impacts associated with the I-91 Bridge, therefore this is not discussed further in this application." Regardless of the lack of impacts, MassDEP needs to review the project in its entirety. Please provide a narrative and complete set of plans that includes work associated with the ramp realignment and bridge deck replacement and the stormwater infrastructure throughout the Project Area in accordance with the single and complete application requirement of 314 CMR 9.05(1). Review of this complete plan set may generate additional comments.**
   TEC: The bridge deck replacement over Bridge B-10-018 involves a slight widening of the travel way by 1'-6", however the out-to-out of the bridge remains the same. The project will improve traffic, safety, and pedestrian features over the bridge. MassDOT compliant bridge railings will be installed, as well as a sidewalk and buffered bike lanes on both sides. Additionally, link slabs will be installed to eliminate the use of bridge joints which will reduce the amount of water that has corroded some beam ends. Miscellaneous steel repairs and bearing replacements are also proposed as part of the project.

   The I-91 Northbound Off-ramp (SE) to Route 10 Eastbound is being slightly realigned to improve sight distance and overall safety by decreasing the look back angle. The traffic control will change from a YIELD-controlled junction to a STOP-controlled junction in order to improve the safety characteristics along Route 10 related to the offset ramp junctions and to provide slower turning speeds where the buffered bicycle lanes will be introduced on Route 10 Eastbound.

2. **The application states that the increase in impervious area will be 5,901 square feet. Is this increase just for the Fall River bridge replacement only or does it incorporate work on the I-91 bridge and ramp realignment as well?**
   TEC: The increase in impervious area incorporates the entire scope of work. The primary area of increase is the proposed sidewalk between the Fall River bridge and the I-91 bridge. This area will provide additional pedestrian connectivity, improve the safety of the traveling public, and provide alternative modes of transportation.

3. **As noted in the application, Fall River is designated as a Cold-Water Fishery; a critical area as defined by the regulations. 314 CMR 9.06(a)6. specifies that stormwater discharges near to any critical area require the use of specific source control and pollution prevention measures to be suitable for managing discharges to such areas as provided in the MA Stormwater Handbook. Please submit a complete evaluation of all Stormwater Control Measures (SCMs) evaluated as part of the stormwater analysis.**
   Please see the attached evaluation report. The existing roadway has no infiltration BMPs and directly discharges stormwater runoff into Fall River and the adjacent wetland systems. The project proposes riprap at each outlet which will increase dissipation, representing an improvement over existing conditions. To ensure that no erosion will occur, each rip rap outfall has been sized correctly and is reflected within the Plan Set. Please see Attachment A for the updated Utility Plan and Attachment C for the Riprap Apron Sizing Computation. The Stormwater Management Memo has also been revised, please see Attachment B.

4. **The application states that, "The old ramp location will be demolished, loamed and seeded to convert it to open space land cover". Please evaluate the siting of a SCM in this location as well as in the non-wetland areas on the I-91 infields.**
   TEC: An SCM in the form of a grass swale is being sited in this location. The project seeks to reduce construction impacts to the other areas of the I-91 infields, so additional SCM's were ruled out based on the temporary impacts that would be required to construct these systems.

5. **Please provide the number of existing catch basins on site as well as the number of proposed deep sump catch basins that will be replacing the existing catch basins.**
   TEC: There are 32 existing catch basins on site and 17 deep sump catch basins will be replacing the existing catch basins.

6. **Please provide the existing span of the Fall River Bridge.**
   TEC: The existing Fall River Bridge is a 3-span simply supported bridge with concrete abutments on piles and two piers bearing on bedrock. The existing spans are 44'-6", 50'-6", and 44'-6" from West to East. The total span length is 143'-0 1/2".

7. **Is the proposed layout of supersacks for dewatering achievable with the steep slopes and riprap present? As the application notes that the existing piers are above the OHW line, could all work associated with the removal of the piers be completed without installation of a cofferdam to minimize LUW impacts?**
   TEC: Sandbag cofferdams are needed for both the removal of the piers and for the installation of the riprap slopes. Due to the shallow depth of bedrock, the riprap slopes will need a key at the base of the slope for stabilization. This key is directly adjacent to the OHW line. Additionally, the use of sandbags during the pier removal will ensure that the area is kept dry. The gabion baskets that are currently in place help to define the banks of the stream, however they must be removed for the demolition of the pier which could allow for water to infiltrate the work area if there are no sandbags in place.

8. **A MassDOT Special Provision was provided in the application for a Licensed Site Professional (LSP). If an LSP is required for this project, is it anticipated that sediments are contaminated? If so, please provide the data showing which contaminants are present.**
   TEC: Licensed Site Professionals are added as a precaution to all projects. The streambed sampling report does not indicate the presence of contaminated soils.

9. **SCM inspection and maintenance frequencies in the O&M Plan need to be in accordance with Volume 2, Chapter 2 of the MA Stormwater Handbook.**
   TEC: The O&M Plan has been revised to include maintenance frequencies for the SCM's. Please see Attachment D.

Please do not hesitate to contact me directly if you have any questions concerning our response at 978-794-1792. Thank you for your consideration.

Sincerely,
Robert Niccoli
TEC, Inc.
"The Engineering Corporation"

Attachments:
Attachment A – Utilities Plan
Attachment B – Stormwater Management Memo
    Appendix A – Stormwater Checklist
    Appendix B – O&M Plan
    Appendix C – Stormwater Calculations
Attachment C – Stormwater Control Measures Evaluation

Attachment A - Utilities Plan

BERNARDSTON
RT 10

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	42	133
PROJECT FILE NO.	612159		

UTILITY PLANS - 1 OF 5

T1217.01_HD12_UTILITY PLANS.DWG Plotted on 3-Sep-2025 4:53 PM

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N/F
TRUSTEES OF THE UNITED CHURCH OF BERNARDSTON
62 CHURCH STREET
(PARCEL ID: 029/014.A-0002-0013.1)
BK-PG 2021-108
PLAN BK-PG 62-13

DEBORAH A. DELABRUERE
68 CHURCH STREET
(PARCEL ID: 029/014.A-0002-0013.0)
BK-PG 6687-202
PLAN BK-PG 130-40

GABRIEL F. HMIELESKI AND
KRISTIN A. HMIELESKI
76 CHURCH STREET
(PARCEL ID: 029/014.0-0004-0011.0)
BK-PG 8062-215

N/F
CELT GRANT
78 CHURCH STREET
(PARCEL ID: 029/014.0-0004-0014.0)
BK-PG 6464-3
PLAN BK-PG 135-39

HARTWELL STREET

CHURCH STREET (RT 10)

RIVER STREET

1921 SHLO NO 1910

1923 SHLO NO 2139

1921 SHLO NO. 1910 | 1923 SHLO NO. 2139

1923 SHLO NO. 2139 | 1958 SHLO NO. 4698

BIT. CONC. PARKING LOT

BIT. CONC. SIDEWALK

GRAVEL

GRASS

WOOD TIE WALL

(3)4"DUCTS

(2)4"DUCTS

BCB

CONC.

CONC. PAD

CONC. WALL

BIT. CONC. DRIVE

20"MAP

24"MAP

40"OAK

4"WIRE

WOOD DECK

PORCH

PROPANE TANK

FF=358.14'

FF=360.70' (THRESH)

FF=356.48' (THRESH)

#68

#69

#77

TOWN LAYOUT

1938 COUNTY LAYOUT

200' RIVERFRONT AREA

100' WETLAND BUFFER ZONE

PROJECT END
STA 9+50
N3071236.1438
E374270.6967

9+50

10

CONST ℄

PC +71.54

11

12

13

PROP TEMP EASEMENT

RET UPL;
PROP SERVICE CONNECTION
W/ RISER, WEATHERHEAD,
AND DISCONNECT

RET HYD

PROP TEMP EASEMENT

UPGRADE UPL
IN PLACE
(BO-EVERSOURCE)

APPROX. LOCATION OF WATER MAIN
(INSUFFICIENT RECORDS FROM TOWN)

RESIDENTIAL ACCESS (PER 1958 SHLO NO. 4698)

ADJ WG

ADJ CB

REM CB & PIPE

PROP 4' - 12" DIP

PROP 24' - 12"
CLASS III RCP

PROP 106' - 12"
CLASS III RCP

PROP 7' - 12"
CLASS III RCP

REM DMH

REM CB

REM PIPE

PROP
MASONRY PLUG

ABAN PIPE

RET UPL
& GUYS

RET
TMH

PROP 4' - 12"
CLASS III RCP

PROP TEMP OHW
RELOCATION
(BO-EVERSOURCE)

PROP PERM OHW
RELOCATION
(BO-EVERSOURCE)

RET UPL

PROP 140' - 12"
CLASS III RCP

PROP 50'-12"
CLASS III RCP

REM PIPE

ADJ CB

PROP MASONRY
PLUG

ABAN PIPE

PROP TEMP
EASEMENT

PROP TEMP
EASEMENT

CONTINUED ON
SHEET NO. 43

EXISTING DRAINAGE TABLE

CB1
RIM=356.30'
I=351.9 (12")

CB2
RIM=355.60'
A=350.5 (12")
B=350.5 (12")

CB3
RIM=353.17'
A=347.7 (12")
B=347.7 (15")
C=347.2 (15")

CB4
RIM=352.48'
I=348.1 (15")

CB5
RIM=350.66'
A=346.3 (15")
B=340.3 (12")

DMH1
RIM=356.38'
A=351.0 (12")
B=350.9 (12")
C=350.8 (12")

PROPOSED DRAINAGE STRUCTURE DATA							
NO.	TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
1	PROP CBCI	10+70.25	24.2' RT	356.26	-	351.26 (2)	4' SUMP; CURVED CURB INLET
2	PROP DMH	10+76.07	14.6' RT	356.28	351.0 (EX) 350.9 (EX CB1) 351.00 (1)	350.80 (6)	
3	PROP GICI	11+82.05	22.2' LT	352.72	-	350.22 (4)	R&R CURB INLET
4	PROP CB W/ MH COVER	11+82.24	14.7' LT	352.93	349.63 (3)	349.43 (6)	4' SUMP
5	PROP CBCI	11+82.32	20.0' RT	353.31	-	349.31 (6)	4' SUMP; R&R CURB INLET
6	PROP DMH	11+86.09	13.5' RT	353.36	348.86 (2) 349.16 (4) 349.16 (5)	348.76 (8)	
7	ADJ EXIST CB	12+85.88	39.1' RT	350.66	-	340.3 (9)	CORE HOLE IN EXIST

N/F
CLARENCE RANDALL
69 CHURCH STREET
(PARCEL ID: 029/009.A-0003-0003.0)
BK-PG 2328-203

SENECA REALTY, INC.
77 CHURCH STREET
(PARCEL ID: 029/009.0-0001-0006.0)
BK-PG 6835-256
PLAN BK-PG 127-29

NOTE: ALL EXISTING CATCH BASINS AND MANHOLES LABELED "ADJ" INCLUDES REMOVING AND DISPOSING THE EXISTING F&G/F&C AND REPLACING WITH A PROPOSED F&G/F&C.

0 20 50 100
SCALE: 1" = 20'

PROPOSED DRAINAGE STRUCTURE DATA

NO.	TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
7	ADJ EXIST CB	12+85.88	39.1' RT	350.66	-	340.3 (9)	CORE HOLE IN EXIST
8	PROP DMH	13+29.39	18.2' RT	350.88	346.38 (6) 344.76 (13)	344.66 (9)	
9	PROP DMH	13+38.96	42.9' RT	349.50	339.78 (7) 344.43 (8) 345.28 (10)	339.68 (11)	5' DIAMETER
10	PROP CBCI	13+52.51	26.0' RT	350.37	-	345.87 (9)	4' SUMP; STRAIGHT CURB INLET
11	PROP FES	14+00.36	55.6' RT	-		339.03 (9)	12"
12	PROP GI	13+58.73	27.0' LT	349.48	-	346.98 (13)	
13	PROP CB W/ MH COVER	13+58.73	19.5' LT	349.70	346.70 (12)	345.20 (8)	4' SUMP
14	PROP CB	13+99.22	83.5' LT	344.57	-	340.57 (15) 339.07 (TEMP)	4' SUMP; REM EX CB
15	PROP HDWL	15+41.07	47.0' LT	-	-	319.31 (14)	SEE CONST STD DETAIL E 206.4.0

PROPOSED DRAINAGE STRUCTURE DATA

NO.	TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
15A	PROP FES	15+53.41	58.4' RT	-	-	328.00 (15B)	12"
15B	EXIST CB	16+46.49	74.1' RT	345.67	-	339.6 (15A)	
16	PROP CBCI	16+24.53	26.0' RT	347.58	-	343.31 (17)	4' SUMP; STRAIGHT CURB INLET
17	CIT TO DMH	16+53.79	24.5' RT	347.56	343.06 (16) 341.10 (19) 343.06 (20)	340.7 (EX)	CORE HOLES IN EXIST
18	PROP GI	16+48.41	27.0' LT	347.49	-	344.99 (19)	
19	ADJ EXIST CB	16+54.71	26.8' LT	347.51	343.2 (EX CB12) 344.51 (18)	342.8 (17)	CORE HOLE IN EXIST
20	PROP CBCI	17+30.25	25.0' RT	347.92		*343.29 (50) **343.79 (17)	4' SUMP; STRAIGHT CURB INLET
48	CIT TO DMH	17+86.02	81.6' RT	344.15	340.9 (49) 342.6 (EX)	340.7 (EX)	REMODEL, REPLACE EXIST DOUBLE HOLE TOP SECTION OF STRUCTURE WITH SINGLE HOLE TOP SECTION (PAID FOR UNDER ITEM 202.), CORE HOLE IN EXIST
49	PROP LEACHING BASIN	19+95.52	80.6' RT	344.05		341.0 (48)	PRECAST LEACHING BASIN W/SLAB TOP, 3' SUMP
50	PROP LEACHING BASIN W/ MH COVER	17+30.55	29.9' RT	348.49	343.19 (20)		PRECAST LEACHING BASIN W/SLAB TOP, 3' SUMP

*PRIMARY OUTLET
**SECONDARY OUTLET

BERNARDSTON
RT 10

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	43	133
PROJECT FILE NO.	612159		

UTILITY PLANS - 2 OF 5

EXISTING DRAINAGE TABLE

CB5
RIM=350.66'
A=346.3 (15")
B=340.3 (12")

CB6
RIM=349.21'
I=346.6 (12")

CB7
RIM=344.57'
A=341.8 (12")
B=341.6 (12")

CB8
RIM=345.67'
A=339.6 (15")
B=339.7 (12")
C=340.1 (12")
D=339.7 (12")

CB9
RIM=346.02'
A=341.4 (12")
B=341.5 (12")

CB10
RIM=347.37'
A=340.7 (12")
B=341.1 (12")

CB11
RIM=346.64'
A=342.8 (12")
B=343.2 (12")

CB12
RIM=348.19'
I=343.4 (12")

CB13
RIM=345.51'
I=349.4 (12")

CB14
RIM=343.79'
I=338.1 (12")

CB15
RIM=343.24
I=337.3 (12")

CB16
RIM=344.05'
A=340.7 (12")
B=342.6 (12")

DMH2
RIM=345.43'
A=336.0 (12")
B=334.0 (12")
C=337.6 (12")
D=331.4 (12")

JOHAN D. LIVINGSTONE &
CATRIN D. LIVINGSTONE
84 CHURCH STREET
(PARCEL ID: 029/014.0-0004-0012.0)
BK-PG 8479-59

N/F
REBECCA HARRISON & AUSTIN MILLER
90 CHURCH STREET
(PARCEL ID: 029/014.0-0004-0013.0)
BK-PG 8290-126

SENECA REALTY, INC.
77 CHURCH STREET
(PARCEL ID: 029/009.0-0001-0006.0)
BK-PG 6835-256
PLAN BK-PG 127-29

DAVID E. STREETER,
AN UNDIVIDED ONE-HALF INTEREST
AND THE ESTATE OF ELMORE J. STREETER,
AN UNDIVIDED ONE-HALF INTEREST
1 NORTHFIELD ROAD
(PARCEL ID: 029/009.0-0001-0001.0)
BK-PG 1204-249
BK-PG 2752-129

OWNER UNKNOWN

FALL RIVER

I-91 SB OFF-RAMP (NW)

I-91 SB ON-RAMP (NW)

NORTHFIELD ROAD (RT 10)

INDUSTRIAL DRIVE
(KRINGLE DRIVE)

1977 TOWN LAYOUT

1896 TOWN LAYOUT

1923 SHLO NO. 2139
NO ACCESS
REM EXIST FES & PIPE

1958 SHLO NO. 4698 NO ACCESS

1959 SHLO NO. 4774
NO ACCESS

LIMIT OF NO ACCESS PER 1959 SHLO NO. 4774

ACCESS (PER 1967 SHLO NO. 5662)

REM EXIST WATER PIPE
STA 14+00 TO 16+70

PROP TEMP EASEMENT

PROP TEMP STONE FOR SWALE END

TEMP ACCESS ROAD CONSTRUCTION BASELINE

PROP CHANNEL EASEMENT

PROP TEMP 50' - 12" CLASS III RCP

PROP TEMP OUTLET INTO SWALE
300+55, 12.0' LT
INVERT = 338.42

PROP 144' - 12" CLASS III RCP

PROP TEMP 1' STONE-LINED SWALE

REM PIPE

REM CB

REM FES

RET UPL

PROP 140' - 12" CLASS III RCP

PROP 4' - 12" DIP

REM CB & PIPE

PROP 11 DEGREE BENDS

PROP PERMANENT UPL #9/1 RELOCATION (BO-EVERSOURCE); PROP SERVICE CONNECTION W/ RISER, WEATHERHEAD, & DISCONNECT

PROP TEMP OHW RELOCATION (BO-EVERSOURCE)

PROP PERM OHW RELOCATION (BO-EVERSOURCE)

PROP 44' - 12" CLASS III RCP

PROP 23' - 12" CLASS III RCP

PROP 18' - 12" CLASS III RCP

PROP 61' - 12" CLASS III RCP

PROP 50'-12" CLASS III RCP

REM PIPE

ADJ CB

PROP MASONRY PLUG

ABAN PIPE

PROP TEMP EASEMENT

RET UPL

PROP TEMP 15' ANCHOR GUY (BO-EVERSOURCE)

PROP TEMPORARY UPL #9/1 RELOCATION (BO-EVERSOURCE)

PROP 15' ANCHOR GUY (BO-EVERSOURCE)

REM HDWL

PROP STONE FOR PIPE ENDS= 4' LENGTH X 1.5' DEPTH

PROP TEMP EASEMENT

PROP STONE FOR PIPE ENDS= 4' LENGTH X 1.5' DEPTH

PROP 8" DUCTILE IRON WATER PIPE

PROP 90'-12" CLASS III RCP

PROP PERMANENT UPL #8 RELOCATION (BO-EVERSOURCE)

PROP TEMP 10' ANCHOR GUY (BO-EVERSOURCE)

RET UPL

PROP TEMP EASEMENT

B-10-001(CLA)

ADJ CB

RET PIPE

PROP 2'-12" DIP

PROP 8" COUPLING

RET PIPE

RET PIPE

CONST B

PI +00.00

PROP 25' - 12" CLASS III RCP

PROP 73' - 12" CLASS III RCP

PROP TEMPORARY UPL #8 RELOCATION (BO-EVERSOURCE)

ADJ WG

ADJ CB

RET PIPES

RET CB

PROP 2' - 12" CLASS III RCP

UPGRADE UPL IN PLACE (BO-EVERSOURCE); PROP SERVICE CONNECTION W/ RISER, WEATHERHEAD, AND DISCONNECT

PROP TEMPORARY PUSH BRACE (BO-EVERSOURCE)

PROP 3" PVC CONDUIT

PROP 5' - 12" CLASS III RCP

1923 SHLO NO. 2139 | 1959 SHLO NO. 4774

CONTINUED ON SHEET NO. 42

CONTINUED ON SHEET NO. 44

NOTE: ALL EXISTING CATCH BASINS AND MANHOLES LABELED "ADJ" INCLUDES REMOVING AND DISPOSING THE EXISTING F&G/F&C AND REPLACING WITH A PROPOSED F&G/F&C.

0 20 50 100
SCALE: 1" = 20'

T1217.01_HD12_UTILITY PLANS.DWG Plotted on 3-Sep-2025 4:53 PM

Proposal No. 612159-136484

A00842 - 8

BERNARDSTON
RT 10

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	44	133
PROJECT FILE NO.	612159		

UTILITY PLANS - 3 OF 5

T1217.01_HD12_UTILITY PLANS.DWG Plotted on 3-Sep-2025 4:53 PM

N

200' RIVERFRONT AREA

WF#WFD-7 WF#WFD-8 WF#WFD-9 WF#WFD-10 WF#WFD-11 WF#WFD-12 WF#WFD-13 WF#WFD-14 WF#WFD-15 WF#WFD-16 WF#WFD-17 WF#WFD-18 WF#WFD-19 WF#WFD-20 WF#WFD-21 WF#WFD-22

WF#WFE-11 WF#WFE-12 WF#WFE-13 WF#WFE-14

INV 20" RCP EL=333.46
INV 12" RCP EL=333.59
INV 15" RCP EL=333.54
DMH RIM=343.55
CB RIM=343.06
20"RCP
12"RCP
15"RCP
EHH

INV 12" CMP EL=336.46

PROP STONE FOR PIPE ENDS= 4' LENGTH X 1.5' DEPTH

WOODED AREA

24 REM INV & PIPE

PROP 37' - 12" CLASS III RCP

21 22

RET PIPE

PROP 6' - 12" CLASS III RCP

PROP 11 DEGREE BEND

29 28

RET PIPE

PROP 6' - 12" CLASS III RCP

PROP 8" DI WATER MAIN

REPAIR CONDUITS IN PLACE (BO-VERIZON)

RET EHH

RET UPL

RET PIPE

PROP 31' - 12" CLASS III RCP

ADJ WG

REM CB & PIPE

32

ADJ DMH

30

PROP 11 DEGREE BEND

31

REM CB

RET PIPE

UPGRADE UPL IN PLACE (BO-EVERSOURCE)

CONTINUED ON SHEET NO. 43

CONTINUED ON SHEET NO. 45

19 20 PI +00.00 21 22 23 25

CONST ℄

PROP 21' - 12" CLASS III RCP

26 27

REM CB & PIPE

RET PIPE

25 REM CB

RET CB & PIPE

RET TMH

RET UPL & GUY

UPGRADE UPL IN PLACE (BO-EVERSOURCE)

10 11

PROP 3" PVC CONDUIT

PROP 3" PVC CONDUIT

I-91 SB ON-RAMP (SW)

ON RAMP

I-91 SOUTHBOUND

I-91 NORTHBOUND

NORTHFIELD ROAD (RT 10)

100' WETLAND BUFFER ZONE

B-10-018(12C)

(12)4"DUCTS

(12)4"DUCTS(ARAN.)

CONC. SIDEWALK

10'CLF

6'CLF

VGC

BRIDGE JOINT

CONC.

8"CI

SGE

SME

OHW

GRASS

EOP

METAL GUARDRAIL (TYP.)

1959 SHLO NO. 4774 NO ACCESS

1896 TOWN LAYOUT

1959 SHLO NO 4774 NO ACCESS

GRAVEL

N/F
KITTREDGE INDUSTRIES, LLC
31 KRINGLE DRIVE
(PARCEL ID: 029/009.0-0001-0003.0)
BK-PG 6079-57
PLAN BK-PG 118-66

PROPOSED DRAINAGE STRUCTURE DATA

NO.	TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
21	PROP CBCI	19+21.45	29.1' LT	351.44	-	347.50 (22)	4' SUMP; R&R CURB INLET
22	CIT TO DMH	19+30.94	26.4' LT	351.92	347.40 (21) 347.7 (28) 347.6± (EX CB19) 347.4 (25)	347.30 (24)	CORE HOLES IN EXIST
24	PROP HDWL	19+33.27	65.6' LT	-	-	336.46 (22)	SEE CONST STD DETAIL E 206.4.0
25	PROP CBCI	19+27.99	22.8' RT	351.77	-	348.2 (EX)	MATCH EXIST INVERT; 4' SUMP; R&R CURB INLET, R&R F&G
26	PROP CBCI	21+07.63	20.3' RT	357.99	-	354.49 (27)	4' SUMP; R&R CURB INLET
27	PROP DMH	21+31.47	13.5' RT	358.87	354.28 (26)	354.1± (28)	MATCH EXIST INVERT OUT
28	CIT TO DMH	21+30.61	23.1' LT	358.65	353.6 (27) 353.61 (29)	353.5 (22)	CORE HOLE IN EXIST
29	PROP CBCI	21+40.15	*25.9' LT	358.91	-	353.71 (28)	4' SUMP; OFFSET TOP; R&R CURB INLET
30	ADJ EXIST DMH	24+61.33	18.2' LT	369.12	359.2 (EX) 364.0 (31) 363.9 (32)	358.9 (EX)	CORE HOLE IN EXIST
31	PROP CBCI	24+79.70	20.3' RT	369.65	-	365.4± (30)	4' SUMP; R&R CI, R&R F&G; MATCH EXIST INVERT
32	PROP CBCI	24+95.48	*25.9' LT	370.05	-	364.25 (30)	4' SUMP; OFFSET TOP; R&R CURB INLET

*OFFSET PROVIDED IS TO CENTER OF PROPOSED STRUCTURE
NOTE: THERE IS NO PROPOSED STRUCTURE #23

EXISTING DRAINAGE TABLE

CB17
RIM=352.17'
I=348.3 (12")

CB18
RIM=351.79'
A=347.3 (12")
B=347.7 (12")
C=347.6 (12")
D=347.4 (12")

CB19
RIM=350.66'
I=348.8 (12")

CB20
RIM=358.45'
I=354.2 (12")

CB21
RIM=358.38'
A=353.5 (12")
B=353.6 (12")

CB22
RIM=343.06'

CB23
RIM=369.60'
I=365.5 (12")

CB24
RIM=369.68'
I=365.5 (12")

DMH3
RIM=343.55'

DMH4
RIM=368.92
A=358.9 (15")
B=363.9 (12")
C=359.2 (15")
D=364.0 (12")

NOTE: ALL EXISTING CATCH BASINS AND MANHOLES LABELED "ADJ" INCLUDES REMOVING AND DISPOSING THE EXISTING F&G/F&C AND REPLACING WITH A PROPOSED F&G/F&C.

0 20 50 100
SCALE: 1" = 20'

BERNARDSTON
RT 10

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	45	133
PROJECT FILE NO.	612159		

UTILITY PLANS - 4 OF 5

T1217.01_HD12_UTILITY PLANS.DWG Plotted on 3-Sep-2025 4:53 PM

N

EXISTING DRAINAGE TABLE

CB23 RIM=369.60' I=365.5 (12")
CB24 RIM=369.68' I=365.5 (12")
CB25 RIM=366.92' DI=366.8 I=361.4 (12")
CB26 DI STRUCTURE RIM=364.26' I=361.2 (12")
CB27 RIM=356.41' I=351.3 (12")
CB28 DI STRUCTURE RIM=348.24' I=342.4 (12")
CB29 RIM=342.53' I=336.8 (12")
CB30 RIM=370.42' I=365.9 (12")
CB31 RIM=379.36' I=375.9 (12")
CB32 RIM=377.88' I=373.1 (12")
CB33 RIM=378.68' A=373.4 (15") B=373.9 (12") C=373.9 (12")
CB34 RIM=380.10' A=375.4 (12") B=376.1 (12")
CB35 RIM=379.37' I=374.0 (12")
DMH4 RIM=368.92' A=358.9 (15") B=363.9 (12") C=359.2 (15") D=364.0 (12")
DMH5 RIM=366.02' A=359.9 (12") B=360.0 (12") C=360.0 (12") D=360.3 (12")
DMH6 RIM=356.18' A=350.3 (12") B=350.6 (12") C=350.3 (12")
DMH7 RIM=348.55' A=342.5 (12") B=342.3 (12") C=342.2 (12")
DMH8 RIM=378.03' A=363.8 (15") B=372.2 (12") C=364.0 (15") D=372.2 (15")
DMH9 RIM=380.10' A=365.1 (15") B=365.3 (15")

NORTHFIELD ROAD (RT 10)

I-91 NB OFF-RAMP (NE)

I-91 NB ON-RAMP (SE)

I-91 NB ON-RAMP (SE)

I-91 NB OFF-RAMP (SE)

RET EHH
RET UPL
PROP 31' - 12" CLASS III RCP
ADJ WG
REM CB & PIPE
PROP 11 DEGREE BEND
ADJ DMH
REM CB
RET PIPE
UPGRADE UPL IN PLACE (BO-EVERSOURCE)
ADJ TMH (BO-VERIZON)
RELOCATE CONDUIT TO UPL #111 RISERS (BO-VERIZON)
(12)4" DUCTS (ABAN.)
RELOCATE UPL #111 (BO-EVERSOURCE); PROP 15' GUY (BO-EVERSOURCE); RELOCATE 2 RISERS (BO-VERIZON)
PROP 36' - 12" CLASS III RCP
PROP 17' - 12" CLASS III RCP
REM CB & PIPE
ADJ DMH
RET PIPE
PROP 78' - 12" CLASS III RCP
REM CB & PIPE
RET CB & PIPES
RET UPL & GUY
PROP TEMP EASEMENT
RET
INV 12" CPP FES EL=374.45
INV 12" CPP FES EL=373.97
RET CB & PIPE
UPGRADE UPL IN PLACE (BO-EVERSOURCE)
PROP 62' - 12" CLASS III RCP
REM CB
ABAN PIPE
PROP 54' - 12" CLASS III RCP
PROP MASONRY PLUGS
REM DMH
REM PIPE
ADJ CB
PROP 2' - 12" CLASS III RCP
PROP 20' - 12" CLASS III RCP
RET PIPE
PROP 44' - 12" CLASS III RCP
ADJ CB
PROP MASONRY PLUG
ABAN PIPE
REM PIPE
CONST B
CONTINUED ON SHEET NO. 44
CONTINUED ON SHEET NO. 46
CONTINUED RIGHT
CONTINUED LEFT
100' WETLAND BUFFER ZONE
WOODED AREA
NO ACCESS 1959 SHLO NO 4774
1911 SHLO NO 1345
1959 SHLO NO. 4774 | 1911 SHLO NO. 1345
PC +33.45
65+50
PT +48.95
PC 447.74

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF TRANSPORTATION
55 NORTHFIELD ROAD
(PARCEL ID: 029/009.0-0002-0002.0)
BK-PG 962-132
PLAN BK-PG 8-56

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF TRANSPORTATION
0 NORTHFIELD ROAD
(PARCEL ID: 029/009.0-0002-0001.0)
BK-PG 1603-110

CRUMPIN FOX CLUB, INC.
c/k/a CRUMPIN-FOX CLUB, INC.
71-73 NORTHFIELD ROAD
(PARCEL ID: 029/009.0-0002-0003.0-6.0)
BK-PG 2759-120
PLAN BK-PG 84-69

OWNER UNKNOWN
0 NORTHFIELD ROAD

0 20 50 100
SCALE: 1" = 20'

NOTE: ALL EXISTING CATCH BASINS AND MANHOLES LABELED "ADJ" INCLUDES REMOVING AND DISPOSING THE EXISTING F&G/F&C AND REPLACING WITH A PROPOSED F&G/F&C.

PROPOSED DRAINAGE STRUCTURE DATA

NO.	TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
30	ADJ EXIST DMH	24+61.33	18.2' LT	369.12	359.2 (EX) 364.0 (31) 363.9 (32)	358.9 (EX)	CORE HOLE IN EXIST
31	PROP CBCI	24+79.70	20.3' RT	369.65	-	365.4± (30)	4' SUMP; R&R CI, R&R F&G; MATCH EXIST INVERT
32	PROP CBCI	24+95.48	*25.9' LT	370.05	-	364.25 (30)	4' SUMP; OFFSET TOP; R&R CURB INLET
33	PROP DEEP DMH	26+40.77	16.3' LT	374.69	370.09 (34) 361.6± (EX DMH 8)	361.5± (30)	PAID UNDER ITEM 202.2 MATCH EXIST PIPE INVERTS
34	PROP CBCI	26+54.01	21.0' RT	374.95	-	370.45 (33)	4' SUMP; STRAIGHT CURB INLET
35	PROP CBCI	64+64.00	10.0' RT	370.84	-	366.34 (37)	4' SUMP; STRAIGHT CURB INLET
36	ADJ CB	64+05.74	32.4' RT	366.73	-	361.42 (37)	CORE HOLE IN EXIST
37	PROP DMH	64+03.44	15.0' LT	368.44	363.44 (35) 360.94 (36)	360.84 (39)	
38	ADJ CB	63+46.05	20.8' LT	364.26	-	361.20 (39)	CORE HOLE IN EXIST
39	PROP DMH	63+46.00	14.5' LT	365.20	359.20 (37) 361.10 (38)	359.10 (40)	
40	PROP DMH	63+22.95	9.5' LT	363.55	358.05 (39)	357.8± (EX)	MATCH EXIST INVERT OUT
41	ADJ EXIST DMH	28+12.93	16.8' LT	378.08	373.58 (42) 372.2 (EX CB3) 364.0 (EX DMH 9)	363.8 (33)	CORE HOLE IN EXIST
42	PROP CB	28+33.17	23.7' LT	378.24	-	373.74 (41)	4' SUMP
43	PROP DMH	28+95.85	35.3' RT	379.98	374.05 (44)	373.9± (EX)	MATCH EXIST INVERT OUT
44	PROP CBCI	29+77.17	19.0' RT	379.87	-	374.87 (43)	4' SUMP; STRAIGHT CURB INLET

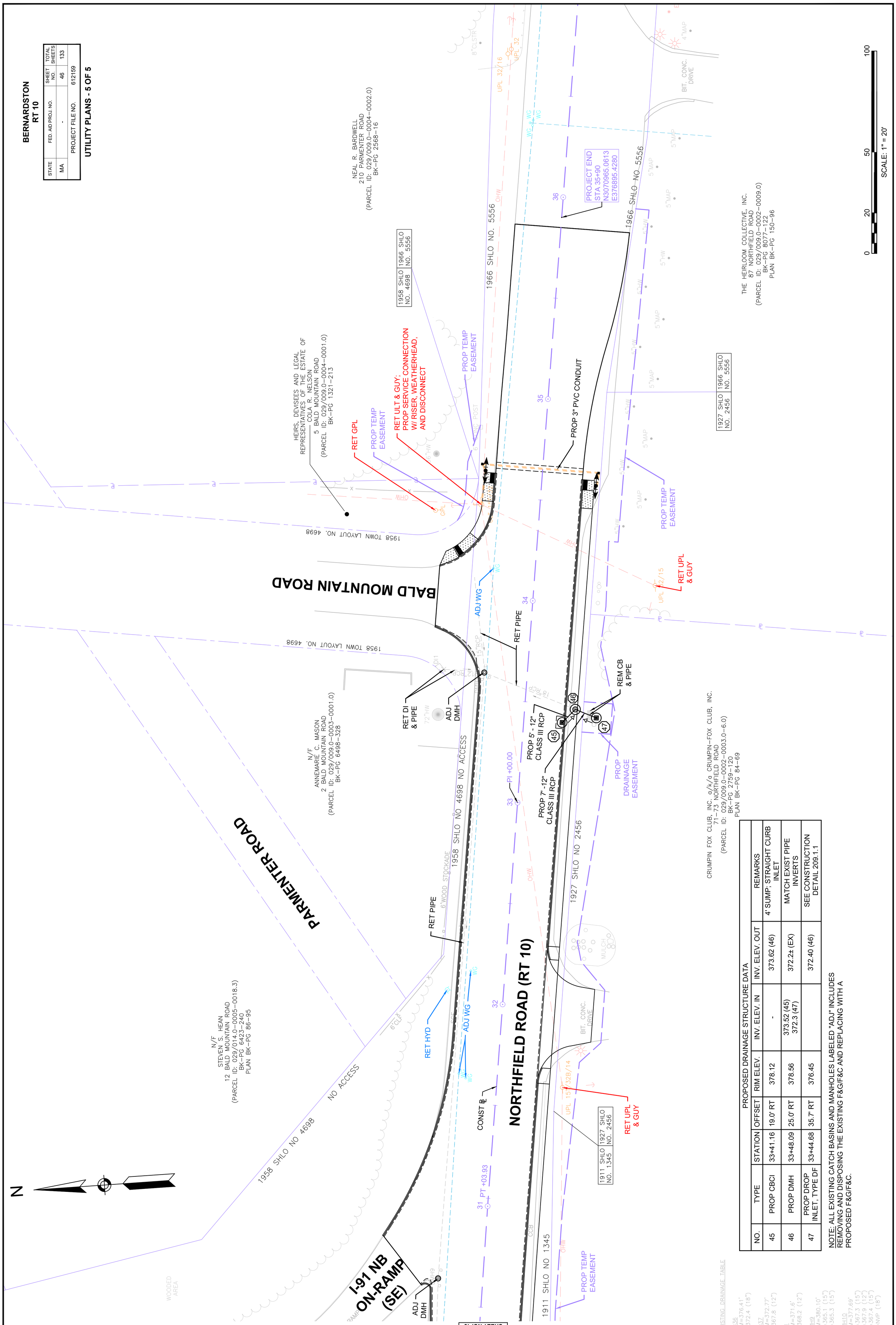
*OFFSET PROVIDED IS TO CENTER OF PROPOSED STRUCTURE

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BERNARDSTON
RT 10

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	46	133
	PROJECT FILE NO.	612159	

UTILITY PLANS - 5 OF 5



Attachment B - Stormwater Management Memo

Stormwater Memo

MassDOT Project No. 612159

Bridge Replacement Project

Bridge No. B-10-001(12D) – Route 10 (Church Street) over the Fall River Bernardston, MA

Prepared for: **MassDOT**
Highway Division
10 Park Plaza
Boston, MA 02116

Prepared by: **TEC, Inc.**
282 Merrimack Street
2nd Floor
Lawrence, MA 01843

May 23, 2024

Revised September 4, 2025

This Stormwater Management Memorandum has been prepared to show compliance with the Massachusetts Stormwater Management Standards in accordance with the Massachusetts Water Quality Certification Regulations (314 CMR 9.00) to support the Project's Section 401 Water Quality Certificate Application.

1. Project Description

The Applicant, MassDOT, is proposing Project # 612159 to construct two bridge replacements (Bridge No. B-10-001(12D) and B-10-018(12C)) on State Route 10 over the Fall River and I-91, respectively, located in Bernardston, MA. As proposed, the Project consists of the full replacement of the two bridge spans along with widening along the 0.5 mile corridor to accommodate sidewalk access along the entire stretch. Additionally, the northbound exit ramp at the I-91 interchange has been re-aligned to better reflect current MassDOT standards regarding pedestrian safety and lookback distance. Several drainage improvements will be made along the corridor as well to account for the relocated curbed gutter alignment along Route 10 and the exit ramp.

2. Existing and Proposed Drainage Conditions

The project is located in a rural area along the I-91 corridor in Bernardston, MA. Land cover within the project area is primarily well maintained grassed open space along with some wooded forest. Impervious areas are largely limited to roadway surfaces along with a few rooftops and driveways. Soils within the overall drainage area are predominantly (83%) in drainage class 'A' with the remainder being in class 'D'. The topography within the project area is mostly sloped down towards the Fall River crossing. A high point on the Route 10 corridor near the eastern terminus of the project will send a small portion of stormwater to the east, however these areas are captured in the existing stormwater network and routed back towards the west and outfall near the Fall River crossing. Any stormwater that bypasses these inlets would still find their way to an unnamed Fall River branch and eventually to the river, which firmly puts the entire project within the Fall River watershed. Stormwater falling with the project area is picked up with the existing closed drainage network that was mostly installed during the interstate's construction in 1959. While the system appears to be working as intended, there are several catch basin to catch basin connections and no stormwater control measures(SCMs) currently installed. The existing drainage system consists of several separate networks which outfall into the Fall River. All but one outfall is located within 200 ft. of the Fall River crossing and have been combined in the analysis as one design point. The remaining outfall connects to the I-91 drainage system and outfalls into the Fall River approximately a half a mile downstream.

The Project does not currently propose any major changes to the existing drainage patterns or land cover. However, the project does include a new sidewalk along the half

mile length of the project which is responsible for the 5,901 square foot increase in impervious area over the project area. The relocation of the I-91 northbound off-ramp will slightly change drainage patterns and will require a small amount of grading to accomplish but will not significantly change the overall drainage patterns. A small amount of the drainage area falling on Route 10 that would find its way to the 1-91 downstream outfall in the existing condition has been routed to the Fall River crossing outfall due to the relocation of the intersection. The existing subsurface stormwater network will be slightly modified to remove catch basin to catch basin connections in order to meet the current MassDOT stormwater standards and an undersized portion of the existing trunk line on the eastern end of the project will be upsized to meet performance standards for the 10-year 24-hour design storm. Additionally, the closed drainage system on the modified interstate exit ramp will be relocated to the new ramp location. The old ramp location will be demolished, loamed and seeded, to convert it to an "open space" land cover. Deep sump catch basins will replace existing basins where practical in order to increase sediment capture efficiency over the existing condition and two leaching basins will be added in order to help offset groundwater recharge lost with the proposed additional impervious cover. LID techniques implemented on and adjacent to the bridge span include:

- Horizonal drainage across both bridge spans will be used instead of scuppers to better treat stormwater and avoid direct outfall to resource areas.
- Minimizing additional impervious area needed to add a sidewalk through the corridor by reducing lane widths and eliminating unnecessary pavement areas.
- The limit of work for the project area has been carefully laid out to minimize impacts to any natural resources.

In addition to the LID techniques employed, the proposed design seeks to further improve water quality by including non-structural SCMs within the Operation and Maintenance Plan like catch basin cleaning and street sweeping schedules. All impacts to key features and natural resources in this Project are temporary and minimized to the greatest extent practicable.

According to the July 2, 1980 FEMA Flood Insurance Rate Maps for the Town of Bernardston, Massachusetts, Community Panel Numbers 250110 0006A and 250110 0007A, there is an area designated as Zone AE associated with Fall River. Zone AE is classified as an area subject to the 1% annual chance flood (100-year flood), where base flood elevations have been determined. The Zone AE boundary extends between elevation 325 and 327 (NAVD 88) through the Study Area.

Alternatives Analysis

Several different alternatives were evaluated to manage stormwater for the Bernardston Bridge Replacement Project. Some, like constructed gravel wetlands, bioretention areas, and wet basins, were considered but ultimately dismissed due to the space constraints within the project limits. Porous Pavement and subsurface infiltration were also contemplated, but not proposed due to long-term maintenance concerns. Adjacent building and bridge foundations, steep slopes, and wetlands prevent the installation of additional recharge SCMs. The proposed design represents the most practical strategy that can be expected of a project of this nature when taking into account space constraints and overall maintenance costs.

3. Massachusetts Department of Environmental Protection (MassDEP) – Stormwater Management Standards

As demonstrated below, the proposed Project complies with the MassDEP Stormwater Management Standards (the Standards) to the Maximum Extent Practicable. Under the Stormwater Management Standards, the Project is considered a redevelopment project because it involves maintenance and improvement of an existing roadway. The purpose of the project is the replacement of two bridge decks and the addition of sidewalk within the Route 10 corridor. The sidewalk will create an additional 5,901 square feet of impervious area over the existing project area. The increase in impervious cover has been minimized as much as possible and the public benefit to a safe crossing of this corridor would qualify this work as a limited project. The Project has been designed to meet the Stormwater Management Standards to the maximum extent practicable and to improve upon existing conditions.

Standard 1: No New Untreated Discharges

No new stormwater conveyance (e.g. outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.

No new outfalls are proposed with this project. Nineteen (19) deep sump catch basins are replacing the existing basins in order to increase water quality at the outfall points over the existing condition. Existing outfall locations will be modified to provide appropriately sized rip rap aprons to help minimize velocity and erosion.

Standard 2: Peak Rate Attenuation

Stormwater management systems shall be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates. This Standard may be waived for discharges to land subject to coastal storm flowage as defined in 310 CMR 10.04.

The Project has been designed to comply with Standard 2 to the maximum extent practicable. Table 1 includes a summary of impervious cover impacts, which can be used as a metric to understand impacts to peak discharge rates following development. As discussed previously and shown in the table below, this Project proposes an increase in the impervious area of 5,901 square feet associated with the new sidewalk. Stormwater modeling, included as Appendix C, shows a modest 0.41 cubic feet per second(cfs) increase, from 13.98 cfs to 14.39 cfs, in the 10-year 24-hour design storm flowrate. This is caused by two additional factors in addition to the increased impervious area. First, the replacement of an undersized trunk line will result in a larger flowrate to the outlet by removing the constriction that causes upstream flooding. Also, as stated previously, a portion of stormwater that lands on the Route 10 corridor that was previously routed down the I-91 northbound exit ramp has been re-routed to the Fall River crossing outfall. This change decreases the flowrate for the 10-yr 24-hour design storm at that outfall by 0.51 cfs, from 1.47 cfs to 0.96 cfs.

The increase in flowrate at the Fall River outfall will likely not cause any flooding concern as the Fall River at the outfall location has a drainage area of 25.7 square miles and a Lower 90% prediction interval flowrate of 830 cfs according to USGS's StreamStats. Meaning the project will increase the flowrate by 0.05% for the Lower 90% prediction interval for the 10-year storm event. The upper 90% prediction interval flowrate of 3,480 cfs will only increase by 0.01% for the 10-yr event. Space constraints within the road layout do not allow for more extensive rate attenuation methods. This standard has been met to the maximum extent practicable.

Table 1: Existing and proposed impervious cover

Existing Impervious Area (sq. ft)	Proposed Impervious Area (sq. ft)	Change In Impervious Area (sq. ft)	Percent Increase in Impervious Area (%)
270,537	276,438	5,901	2.18

Table 2: Peak Flowrates

	2-yr		10-yr		100-yr	
	Pre(cfs)	Post(cfs)	Pre(cfs)	Post(cfs)	Pre(cfs)	Post(cfs)
Outfall 1	6.10	7.19	13.98	14.39	25.60	27.19
Outfall 2	0.84	0.53	1.47	0.96	3.00	2.37

Standard 3: Stormwater Recharge

Loss of annual recharge to groundwater shall be eliminated or minimized through the use of environmentally sensitive site design, low impact development techniques, stormwater management practices and good operation and maintenance. At a minimum, the annual recharge from the post-development site shall approximate the annual recharge from pre-development conditions based on soil types. This Standard is met when the stormwater management system is designed to infiltrate the required recharge volume as determined in accordance with the Massachusetts Stormwater Handbook.

The 5,901 square foot increase in impervious area lies completely within Hydraulic Soil Group 'D' soils. This equates to a required recharge volume of 49 cubic feet of stormwater to fully meet Standard 3 requirements. Each of the two leaching basins provides for 170 cubic feet of recharge volume resulting in a total 340 cubic feet of recharge volume provided. Standard 3 has been fully met.

Standard 4: Water Quality

Stormwater management systems shall be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS). This Standard is met when:

a) *Suitable practices for source control and pollution prevention are identified in a long-term pollution prevention plan, and thereafter are implemented and maintained;*
b) *Structural stormwater best management practices are sized to capture the required water quality volume determined in accordance with the Massachusetts Stormwater Handbook; and*
c) *Pretreatment is provided in accordance with the Massachusetts Stormwater Handbook.*

Like most linear highway projects, there is little room within the layout to install SCMs that would fully satisfy this standard. Several existing catch basins will be replaced with deep sump catch basins that provide for 25% TSS removal which represents an improvement over the existing condition. In addition to this, new rip rap outfalls will be installed at each outlet location to help dissipate energy there and prevent erosion. All drainage that falls on the new bridge decks will travel horizontally into catch basins located just off of the approach in order to avoid scuppers discharging directly into resource areas. In addition to these improvements, the Long Term Pollution Prevention Plan(LTPPP) for this project will include regular maintenance of catch basins as well as scheduled street sweeping. The Project has been designed to comply with Standard 4 to the maximum extent practicable.

A Long-Term Pollution Prevention Plan (LTPPP) has been developed for the project in compliance with Standard 4. The Standard 9 section of this document includes this LTPPP.

Standard 5: Land Uses with Higher Potential Pollutant Loads (LUHPPLs)

For Land Uses with Higher Potential Pollutant Loads (LUHPPLs), source control and pollution prevention shall be implemented in accordance with the Massachusetts Stormwater Handbook to eliminate or reduce the discharge of stormwater runoff from such land uses to the maximum extent practicable. If through source control and/or pollution prevention all LUHPPLs cannot be completely protected from exposure to rain, snow, snow melt, and stormwater runoff, the proponent shall use the specific structural stormwater BMPs determined by the Department to be suitable for such uses as provided in the Massachusetts Stormwater Handbook. Stormwater discharges from LUHPPLs shall also comply with the

requirements of the Massachusetts Clean Waters Act, M.G.L. c. 21, §§ 26-53 and the regulations promulgated thereunder at 314 CMR 3.00, 314 CMR 4.00 and 314 CMR 5.00.

Standard 5 does not apply to the Project. There are no Land Uses with Higher Potential Pollutant Loads within the project area.

Standard 6: Critical Areas

Stormwater discharges within the Zone II or Interim Wellhead Protection Area of a public water supply and stormwater discharges near or to any other critical area require the use of the specific source control and pollution prevention measures and the specific structural stormwater best management practices determined by the Department to be suitable for managing discharges to such areas as provided in the Massachusetts Stormwater Handbook. A discharge is near a critical area if there is a strong likelihood of a significant impact occurring to said area, taking into account site-specific factors. Stormwater discharges to Outstanding Resource Waters and Special Resource Waters shall be removed and set back from the receiving water or wetland and receive the highest and best practical method of treatment. A "stormwater discharge" as defined in 314 CMR 3.04(2)(a)1 or (b), to an Outstanding Resource Water or Special Resource Water shall comply with 314 CMR 3.00 and 314 CMR 4.00. Stormwater discharges to a Zone I or Zone A are prohibited unless essential to the operation of a public water supply.

The Project has been designed to comply with Standard 6. Figure 4 shows the Critical Areas in the vicinity of the project site. The Fall River in this area is listed as a Coldwater Fishery Resource by the Massachusetts Division of Fisheries and Wildlife (DFW). No new permanent outfall will directly discharge to any of the surrounding critical areas, and existing outlets include leaching basins before the outfall where practical. Discharges are all within the buffer and will remain unchanged from the existing condition.

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the Maximum Extent Practicable

A redevelopment project is required to meet the following Stormwater Management Standards only to the maximum extent practicable: Standard 2, Standard 3, and the pretreatment and structural best management practice requirements of Standards 4, 5, and 6. Existing stormwater discharges shall comply with Standard 1 only to the maximum extent practicable. A redevelopment project shall also comply with all other requirements of the Stormwater Management Standards and improve existing conditions.

The Project is considered a redevelopment and has been designed to comply with the Stormwater Management Standards to the maximum extent practicable. Standards 1, 3, 5, and 6 have been fully met while Standards 2 and 4 have been met to the maximum extent practicable. While this project will result in a slight increase in peak stormwater flowrates, the public benefit of pedestrian access pathways outweighs the negligible change in peak rates. Additionally, while not fully meeting standard 4 for water quality, this project will represent an improvement over the existing condition.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Controls

A plan to control construction-related impacts, including erosion, sedimentation and other pollutant sources during construction and land disturbance activities (construction period erosion, sedimentation, and pollution prevention plan) shall be developed and implemented.

The implementation of erosion and sediment (E&S) controls during construction is considered a standard practice for all MassDOT projects. E&S controls will be installed before any land disturbance begins for the Project and will remain in place for the duration of the Project. The E&S controls for the Project are shown on the project plans and include filter tubes, tree protection, floating silt fence, and rip rap energy dissipation aprons.

The Project disturbs one or more acres of land; therefore, the project contractor will request coverage under the NPDES Construction General Permit (CGP) and develop a Stormwater Pollution Prevention Plan (SWPPP). The SWPPP follows the requirements of this standard and complies with the NPDES CGP.

Standard 9: Operation and Maintenance Plan

A Long-Term Operation and Maintenance (O&M) Plan shall be developed and implemented to ensure that stormwater management systems function as designed.

MassDOT O&M plans are implemented on a programmatic level by each MassDOT district. Each MassDOT district office is responsible for providing operation and maintenance for the MassDOT stormwater management systems within their respective jurisdictions. Appendix B includes the O&M Plan for this project.

Long-term pollution prevention for the Project includes litter pick-up, inspection and maintenance of stormwater assets, maintenance of landscaped areas, snow and ice management, street sweeping, prohibition of illicit discharges, and spill prevention and response.

Standard 10: Prohibition of Illicit Discharges

All illicit discharges to the stormwater management system are prohibited.

Illicit Discharge Statement

The project's stormwater management system, as shown on the plans submitted with this report, have been designed in full compliance with Standard 10. The project area does not have any known illicit connections. Any illicit connections to the stormwater management system found in the project limit of work during construction will be removed and/or resolved through MassDOT's Illicit Discharge Detention and Elimination (IDDE) Program.

Attachments:
Appendix A – Stormwater Checklist
Appendix B – O&M Plan
Appendix C – Stormwater Calculations

Figures:
Figure 1 – USGS Locus Map
Figure 2 – Soil Survey
Figure 3 – FEMA Flood Insurance Rate Map (FIRM)
Figure 4 – NHESP Estimated and Priority Habitats

Appendix A

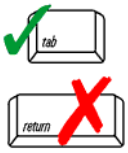
Stormwater Checklist

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

A. Introduction

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the Massachusetts Stormwater Handbook. The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.[1] This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8[2]
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

[1] The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

[2] For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

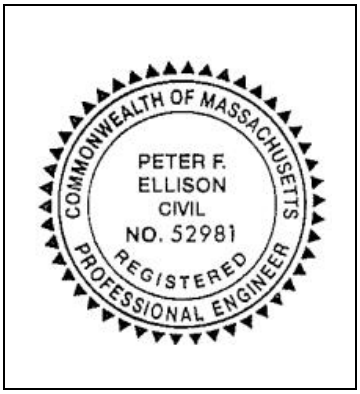
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature



Signature and Date

Checklist

Project Type: Is the application for new development, redevelopment, or a mix of new and redevelopment?

☐ New development

☒ Redevelopment

☐ Mix of New Development and Redevelopment

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

Checklist (continued)

LID Measures: Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

- ☐ No disturbance to any Wetland Resource Areas
- ☐ Site Design Practices (e.g. clustered development, reduced frontage setbacks)
- ☐ Reduced Impervious Area (Redevelopment Only)
- ☒ Minimizing disturbance to existing trees and shrubs
- ☐ LID Site Design Credit Requested:
  - ☐ Credit 1
  - ☐ Credit 2
  - ☐ Credit 3
- ☐ Use of “country drainage” versus curb and gutter conveyance and pipe
- ☐ Bioretention Cells (includes Rain Gardens)
- ☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)
- ☐ Treebox Filter
- ☐ Water Quality Swale
- ☐ Grass Channel
- ☐ Green Roof
- ☐ Other (describe): _____

Standard 1: No New Untreated Discharges

- ☒ No new untreated discharges
- ☐ Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth
- ☐ Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.

☒ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.

☐ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

☒ Soil Analysis provided.

☐ Required Recharge Volume calculation provided.

☐ Required Recharge volume reduced through use of the LID site Design Credits.

☐ Sizing the infiltration, BMPs is based on the following method: Check the method used.

☐ Static ☐ Simple Dynamic ☐ Dynamic Field[1]

☐ Runoff from all impervious areas at the site discharging to the infiltration BMP.

☐ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.

☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.

☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:

- ☐ Site is comprised solely of C and D soils and/or bedrock at the land surface
- ☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
- ☐ Solid Waste Landfill pursuant to 310 CMR 19.000
- ☐ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.

☐ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.

☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

[1] 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

☐ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.

☐ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:

- Good housekeeping practices;
- Provisions for storing materials and waste products inside or under cover;
- Vehicle washing controls;
- Requirements for routine inspections and maintenance of stormwater BMPs;
- Spill prevention and response plans;
- Provisions for maintenance of lawns, gardens, and other landscaped areas;
- Requirements for storage and use of fertilizers, herbicides, and pesticides;
- Pet waste management provisions;
- Provisions for operation and management of septic systems;
- Provisions for solid waste management;
- Snow disposal and plowing plans relative to Wetland Resource Areas;
- Winter Road Salt and/or Sand Use and Storage restrictions;
- Street sweeping schedules;
- Provisions for prevention of illicit discharges to the stormwater management system;
- Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
- Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
- List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.

☒ A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.

☐ Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:

- ☐ is within the Zone II or Interim Wellhead Protection Area
- ☐ is near or to other critical areas
- ☐ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
- ☐ involves runoff from land uses with higher potential pollutant loads.

☐ The Required Water Quality Volume is reduced through use of the LID site Design Credits.

☐ Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.

Massachusetts Department of Environmental Protection
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Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

☐ The BMP is sized (and calculations provided) based on:

- ☐ The ½" or 1" Water Quality Volume or
- ☐ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.

☐ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.

☐ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)

☐ The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.

☐ The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted ***prior to*** the discharge of stormwater to the post-construction stormwater BMPs.

☐ The NPDES Multi-Sector General Permit does ***not*** cover the land use.

☐ LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.

☐ All exposure has been eliminated.

☐ All exposure has ***not*** been eliminated and all BMPs selected are on MassDEP LUHPPL list.

☐ The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

☐ The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.

☒ Critical areas and BMPs are identified in the Stormwater Report.

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Checklist for Stormwater Report

Checklist (continued)

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

☒ The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:

- ☒ Limited Project
- ☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
- ☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
- ☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
- ☒ Bike Path and/or Foot Path
- ☒ Redevelopment Project
- ☐ Redevelopment portion of mix of new and redevelopment.

☒ Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.

☒ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
- Construction Period Operation and Maintenance Plan;
- Names of Persons or Entity Responsible for Plan Compliance;
- Construction Period Pollution Prevention Measures;
- Erosion and Sedimentation Control Plan Drawings;
- Detail drawings and specifications for erosion control BMPs, including sizing calculations;
- Vegetation Planning;
- Site Development Plan;
- Construction Sequencing Plan;
- Sequencing of Erosion and Sedimentation Controls;
- Operation and Maintenance of Erosion and Sedimentation Controls;
- Inspection Schedule;
- Maintenance Schedule;
- Inspection and Maintenance Log Form.

☐ A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

Checklist (continued)

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

☐ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has ***not*** been included in the Stormwater Report but will be submitted ***before*** land disturbance begins.

☐ The project is ***not*** covered by a NPDES Construction General Permit.

☐ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.

☒ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

☒ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:

- ☒ Name of the stormwater management system owners;
- ☒ Party responsible for operation and maintenance;
- ☒ Schedule for implementation of routine and non-routine maintenance tasks;
- ☒ Plan showing the location of all stormwater BMPs maintenance access areas;
- ☒ Description and delineation of public safety features;
- ☒ Estimated operation and maintenance budget; and
- ☒ Operation and Maintenance Log Form.

☐ The responsible party is ***not*** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:

- ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
- ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

☒ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;

☐ An Illicit Discharge Compliance Statement is attached;

☒ NO Illicit Discharge Compliance Statement is attached but will be submitted ***prior to*** the discharge of any stormwater to post-construction BMPs.

Appendix B

Operations and Maintenance(O & M) Plan

Bridge No. B-10-001 (12D) – Route 10 (Church Street) over the Fall River

Stormwater Management System Operation and Maintenance Plan and Long-Term Pollution Prevention Plan

Bernardston, MA

PREPARED FOR



10 Park Plaza
Boston, MA 02116

PREPARED BY



TEC, Inc
282 Merrimack Street
Lawrence, MA 01843

September 3, 2025

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1

Stormwater Management System Operation and Maintenance (O&M) Plan

This Stormwater Management System Operation and Maintenance (O&M) Plan describes the approach for inspection and maintenance of drainage infrastructure and structural stormwater control measures (SCMs) to minimize contaminant loading for Bridge No B-10-001(12D) – Route 10 (Church Street) over the Fall River Project in Bernardston, MA. In general, inspection and maintenance activities will be conducted consistent with the National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater Discharges from Small Municipal Separate Storm Sewer System (MS4) and MassDOT's anticipated NPDES Transportation Separate Storm Sewer System (TS4) Permit.

This document has been prepared per the requirements of Massachusetts Department of Environmental Protection (MassDEP) Regulations 310 CMR 10.05 (6)(k)(9) and satisfies the requirements of Massachusetts Stormwater Standard 9.

1.1 Responsible Party

In accordance with MassDOT procedures, the MassDOT District 2 office located in Bernardston, MA, is responsible for the maintenance of all stormwater management systems on MassDOT roads within the project area.

Questions or concerns regarding activities associated with this O&M Plan should be addressed to MassDOT's District 2 office located at 811 North King Street, Northampton, MA 01060, phone (857) 368-2000, during regular weekday hours, or to MassDOT's Highway Operations Center located in South Boston, MA at (800) 227-0608 during all other times and days, including weekends and holidays.

1.2 Inspection and Maintenance Measures and Record-Keeping

See Sheets 7-11 of the Bridge Replacement Plans for the proposed stormwater system within the project limits. The stormwater management system covered by this O&M Plan consists of the following measures:

- Deep Sump Catch Basins
- Drainage Manholes

MassDOT strives to achieve inspection and maintenance frequencies of SCMs and catch basins as outlined in MassDEP's Stormwater Handbook. However, it is a challenge for

MassDOT as a statewide agency to meet the stated inspection and maintenance frequencies set forth by MassDEP. As a result of this, MassDOT is in the process of developing a Programmatic Operations and Maintenance Plan (POMP) which will allow for the O&M of stormwater assets to be executed using a data driven approach. This POMP will implement a performance-based inspection and maintenance program for SCMs and catch basins. Once implemented, the POMP will supersede this project-specific operations and maintenance plan.

For SCMs, MassDOT's overall approach is to inspect SCMs, and based on the results of the inspections, perform maintenance to preserve functionality. For catch basins, MassDOT's approach is to perform maintenance at an interval that maintains the functionality of the catch basin (e.g., sump is less than 50% full of sediment). Catch basin inspections, including documentation of sediment accumulation, and maintenance will generally occur simultaneously.

Inspections and maintenance are recorded by personnel using hand-held tablets in the field to document sediment accumulation, maintenance action performed, and follow-up actions needed. Data is recorded in MassDOT's asset management system which is accessible in the field (mobile) or the office (desktop).

The table below summarizes data that is generally collected for each asset type. For all assets, the inspector and inspection date are recorded. Photo documentation of structure condition is taken and attached to the inspection record.

Inspection Form	Applicable Stormwater Assets	Information Collected
Inlets	› Catch basins	› Sediment accumulation › Trash/Debris accumulation › Signs of contamination › Frame and grate condition › Overall structure condition
SCMs	› Other SCMs (Drainage Manholes)	› SCM accessibility › Presence of standing water › Sediment accumulation › Trash/Debris accumulation › Overall SCM condition
Storm Discharge Points	› Outlets to SCMs	› Presence of flow › Signs of contaminated flow › Sediment accumulation › Level of erosion › Pipe condition › Overall structure condition

Inspection and maintenance records can be made available using the asset management system through request with the MassDOT District 2 Environmental Engineer. Records will be kept for at least three years. Representatives of the Town of Bernardston Conservation

Commission(s), MassDEP, and US EPA may obtain access to these records, upon request. Additionally, MassDOT will allow members and agents of MassDEP and the Conservation Commission(s) to enter and inspect the premises, upon request, to evaluate and ensure that the Operation and Maintenance Plan requirements for each SCM are being followed.

Maintenance actions will at a minimum meet the inspection and maintenance frequencies set forth by MassDEP. Additionally, frequency will be based on condition and impact to functionality. Maintenance to be performed on the stormwater system includes:

Stormwater Feature	Potential Maintenance Actions	
Underground SCMs	• Remove and properly dispose of trash, sediment, debris, and root intrusions • Clean out sumps at an interval to maintain functionality (less than 50% full of sediment) • Jet and repair pipes	• Stabilize and replace deteriorated structures
Inlets and Outlets to SCMs	• Clear inlet and remove and properly dispose of sediment, trash, leaf litter, debris, and vegetation • Repair or replace structural components • Repair damaged or eroded areas	• Remove woody growth • Stabilize or reconstruct eroded areas • Treat invasive plants according to MassDOT Vegetation Management Plan

Based on the results of the inspection, repairs will be made in accordance with MassDOT standard practices. Maintenance will be prioritized given the urgency of the required maintenance and availability of staff, contracts, etc. Maintenance may require contracting if existing contracts are unavailable to perform the work. More intensive remedial activities may require permitting and/or an engineering solution.

1.3 Erosion and Sediment Control Measures during Maintenance Activities

For maintenance activities that could result in discharges of sediments or other contaminants into wetlands, waterways, or other resource areas regulated under 310 CMR 10.00, the responsible maintenance personnel will employ measures to prevent migration of these sediments/contaminants. Such temporary measures may include, but are not necessarily limited to, the use of siltation barriers, catch basin silt sacks/filter bags, pipe plugs, cofferdams deployed within the stormwater structure, turbidity curtains, or other practices designed to prevent such discharges.

Where maintenance occurs in areas that are confined, with no risk of discharge to adjacent water bodies, no special measures may be needed. Examples include, but are not limited to: (1) cleaning of a forebay under dry conditions when the work can be completed and exposed surfaces stabilized prior to placing it back into service; and (2) catch basin cleaning where the activity is limited to removing material from a sump below the elevation of the outlet pipe.

1.4 O&M Budget

MassDOT performs maintenance for stormwater management systems as part of their routine operation and maintenance budget for roadways and bridges. Budgets are managed at the district level and vary by fiscal year, depending on funding sources.

2

Long-Term Pollution Prevention Plan

This Long-Term Pollution Prevention Plan (LTPPP) describes the approach for pollution prevention and related maintenance activities for Bridge No B-10-001(12D) – Route 10 (Church Street) over the Fall River Project in Bernardston, MA. In general, long-term pollution prevention and related maintenance activities will be conducted consistent with:

- The National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater Discharges from Small Municipal Separate Storm Sewer System (MS4),
- MassDOT's anticipated NPDES Transportation Separate Storm Sewer System (TS4) Permit, and
- Measures outlined in MassDOT's Stormwater Management Plan (SWMP).

This LTPPP satisfies the requirements related to pollution prevention under Massachusetts Stormwater Standards 4, 5, 6, and 10.

2.1 Practices for Long-Term Pollution Prevention

For the facilities covered, long-term pollution prevention includes the following measures.

- good housekeeping;
- storing materials and waste products inside or under cover;
- vehicle washing;
- routine inspections and maintenance of SCMs;
- spill prevention and response;
- maintenance of lawns, gardens, and other landscaped areas;
- storage and use of fertilizers, herbicides, and pesticides;
- pet waste management;
- operation and management of septic systems; and
- proper management of deicing chemicals and snow.

2.1.1 Litter Pick-up

MassDOT will conduct litter pick-up from the stormwater management facilities in conjunction with routine road maintenance activities.

2.1.2 Inspection and Maintenance of Stormwater Assets

MassDOT will conduct inspection and maintenance of drainage infrastructure and the stormwater control measures (SCMs) in accordance with the O&M Plan, as described in Section 1.

2.1.3 Maintenance of Landscaped Areas

Routine mowing will be conducted according to standard MassDOT practices. SCM basin bottoms and embankments designed to impound water should be mowed as required to prevent establishment of woody vegetation.

Except in rare circumstances, MassDOT does not use fertilizers, herbicides, and pesticides for the maintenance of facilities. Exceptions include using fertilizer to ensure the survival of new plantings and herbicides to control invasive plants. Use of fertilizers and herbicides is reviewed and approved by the MassDOT Landscape Design Section and District 2 Environmental Engineer prior to application. Local Conservation Commission review may also be required.

2.1.4 Snow and Ice Management

Snow and Ice Management will be conducted consistent with the practices outlined in the MassDOT Snow and Ice Control Program Environmental Status and Planning Report (ESPR), formerly known as the Snow and Ice Control Generic Environmental Impact Report (GEIR).

In accordance with the Snow and Ice Control ESPR, no sand is used on MassDOT properties for snow and ice control. The exception to this rule is within reduced salt areas where high sodium levels have been found in drinking water sources.

2.1.5 Street Sweeping

Routine highway cleaning, with a brush-type street sweeper, will be conducted in accordance with standard MassDOT practices. Sweeping will occur annually in the Spring.

2.1.6 Prohibition of Illicit Discharges

The MassDEP Stormwater Management Standard 10 prohibits illicit discharges to the stormwater management system. Illicit discharges are discharges that do not consist entirely of stormwater, except for certain specified non-stormwater discharges.

In accordance with the existing MS4 permit and anticipated TS4 permit requirements, examples of discharges from the following sources are not considered illicit discharges:

- Firefighting activities*
- Foundation drains
- Water line flushing
- Footing drains
- Landscape irrigation
- Flows from riparian habitats/wetlands
- Potable water sources
- Dechlorinated swimming pool water
- Street wash waters
- Wash water from residential buildings (no detergents)

- Individual residential car washing
- Uncontaminated groundwater
- Rising groundwater
- Diverted stream flows
- Condensation from air conditioning units
- Run-on from private driveways caused by precipitation
- Lawn watering
- Water from crawl space pumps

*Water from firefighting activities is allowed and need only be addressed where they are identified as significant sources of pollutants to waters of the United States.

Based on plan review and confirmation in the field, there are no known or proposed illicit connections associated with the Bridge No B-10-001(12D) – Route 10 (Church Street) over the Fall River Project. Should an interconnection to the stormwater management system be identified, the MassDOT PM will coordinate with the District Permits Engineer to confirm if the connections are authorized. For unauthorized connections, the MassDOT PM and/or MassDOT Environmental Services Section will investigate the connections and if they are determined to be illicit, the connections will be managed through MassDOT's Illicit Discharge Detection and Elimination (IDDE) program and/or through other agencies.

2.1.7 Spill Prevention and Response

This roadway redevelopment project discharges towards wetlands adjacent to the Fall River, a cold water fishery.

Response procedures will be implemented *at* the drainage outfalls *for* any significant release of hazardous materials such as fuels, oils, or chemical materials that have the potential of discharging to the Bordering Vegetated Wetland or the Fall River, a cold water fishery. The outlets are located north of the bridge. Spill containment measures provided nearby the site include spill kits such as booms, caps, covers, pneumatic plugs, and absorbent material.

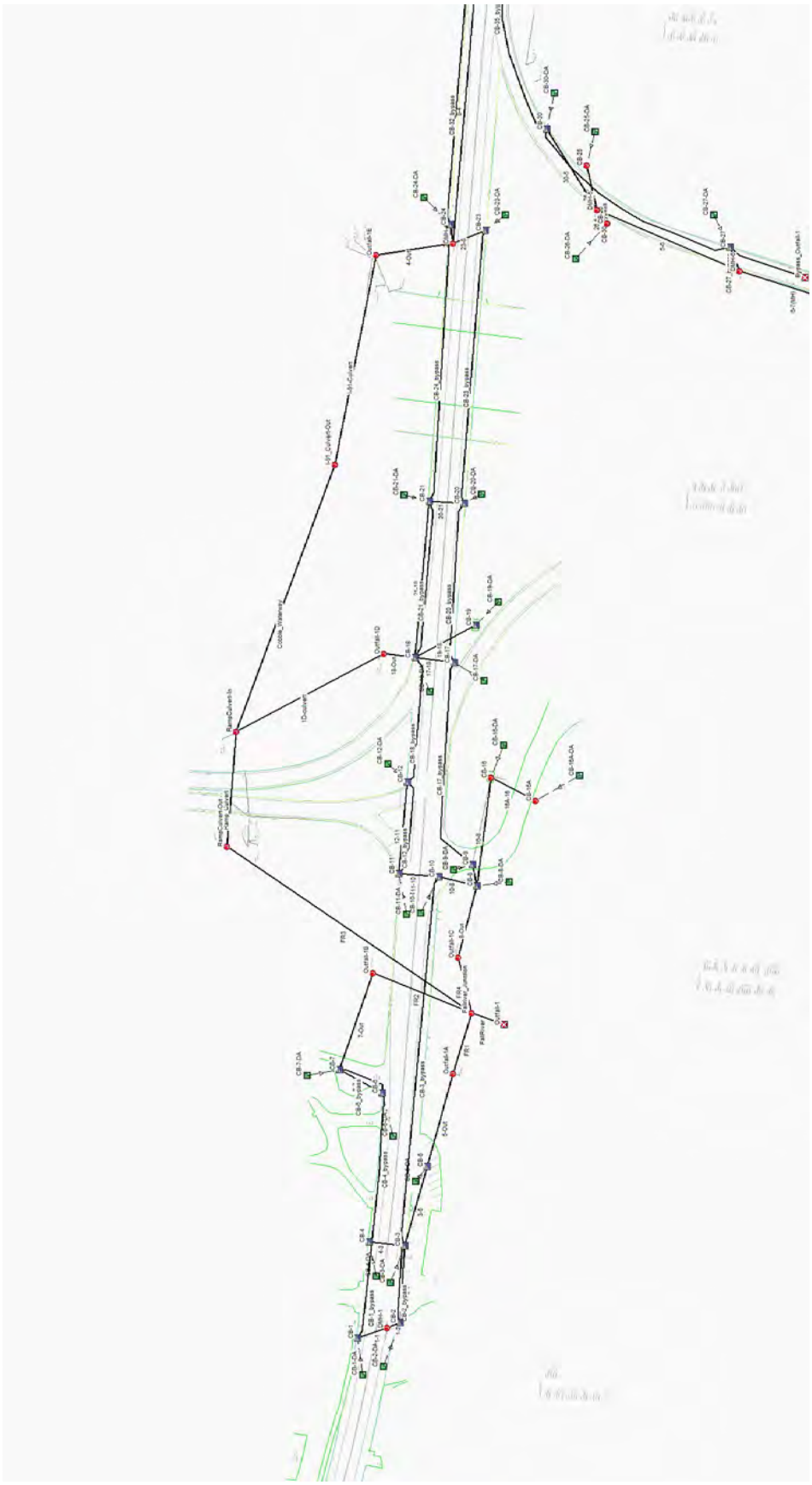
Reportable quantities will immediately be reported to the applicable Federal, State, and local agencies as required by law. Reportable quantities of chemical, fuels, or oils are established under the Clean Water Act and enforced through MassDEP. The MassDEP Emergency Response Program shall be immediately notified in accordance with required procedures for the report of a release (telephone (888) 304-1133).

MassDOT works with first responders and/or public water supply owners to determine the best approach to protect water supplies, and provides training and materials to carry out action plans. In the case of a spill, applicable containment and clean-up procedures will be performed immediately. These procedures are implemented in accordance with the Unified Response Manual at the local level by first responders, which includes the Town of Bernardston's local public safety departments (e.g., fire, police, public works, board of health). MassDOT will be on-site to aid with traffic control and to provide clean-up supplies, as necessary. Spill material collected during the response will be promptly removed and disposed of in accordance with Federal, State, and local requirements. If necessary, a licensed emergency response contractor will assist in cleanup of releases depending on the amount of the release and the ability of the responsible party to perform the required response.

Appendix C

Stormwater Calculations

Existing Conditions Node Map 1 of 2



Autodesk Storm and Sanitary Analysis



Autodesk Storm and Sanitary Analysis

Project Description

File Name ..... SSA Analysis - EX2.SPF

Rainfall Details

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
49		Time Series	2-yr	Cumulative	inches	Massachusetts	Franklin	2.00	2.90	SCS Type III 24-hr

Subbasin Summary

SN	Subbasin ID	Area (ac)	Peak Rate Factor	Weighted Curve Number	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1	Bald_Mtn-DA	5.35	484.00	70.00	2.90	0.66	3.53	2.44	0 00:18:55
2	CB-10-DA	0.27	484.00	92.00	2.90	2.07	0.55	0.55	0 00:06:00
3	CB-11-DA	0.27	484.00	95.00	2.90	2.35	0.63	0.61	0 00:06:00
4	CB-12-DA	0.05	484.00	96.00	2.90	2.42	0.13	0.12	0 00:06:00
5	CB-16A-DA	1.93	484.00	43.00	2.90	0.00	0.01	0.00	0 00:22:23
6	CB-16-DA	0.82	484.00	52.00	2.90	0.11	0.09	0.01	0 00:21:09
7	CB-17-DA	0.11	484.00	91.00	2.90	1.97	0.22	0.23	0 00:06:00
8	CB-18-DA	0.13	484.00	93.00	2.90	2.15	0.29	0.29	0 00:06:00
9	CB-19-DA	0.16	484.00	39.00	2.90	0.00	0.00	0.00	0 00:11:16
10	CB-1-DA	0.41	484.00	87.00	2.90	1.65	0.68	0.70	0 00:06:29
11	CB-20-DA	0.24	484.00	95.00	2.90	2.35	0.56	0.53	0 00:06:00
12	CB-21-DA	0.21	484.00	97.00	2.90	2.56	0.54	0.50	0 00:06:00
13	CB-23-DA	0.13	484.00	91.00	2.90	1.97	0.25	0.25	0 00:06:00
14	CB-24-DA	0.17	484.00	91.00	2.90	1.98	0.33	0.33	0 00:06:00
15	CB-25-DA	0.72	484.00	52.00	2.90	0.11	0.08	0.01	0 00:08:28
16	CB-26-DA	0.19	484.00	39.00	2.90	0.00	0.00	0.00	0 00:08:43
17	CB-27-DA	0.15	484.00	96.00	2.90	2.45	0.37	0.36	0 00:06:00
18	CB-28-DA	0.97	484.00	30.00	2.90	0.00	0.00	0.00	0 00:16:31
19	CB-2-DA	0.57	484.00	68.00	2.90	0.58	0.33	0.25	0 00:11:16
20	CB-30-DA	0.24	484.00	96.00	2.90	2.45	0.59	0.56	0 00:06:00
21	CB-32-DA	0.06	484.00	92.00	2.90	2.05	0.13	0.13	0 00:06:00
22	CB-33-DA	0.08	484.00	39.00	2.90	0.00	0.00	0.00	0 00:06:00
23	CB-34A-DA	0.14	484.00	39.00	2.90	0.00	0.00	0.00	0 00:11:01
24	CB-34-DA	0.23	484.00	75.00	2.90	0.90	0.20	0.18	0 00:12:58
25	CB-35-DA	0.25	484.00	60.00	2.90	0.30	0.08	0.04	0 00:09:21
26	CB-36-DA	0.26	484.00	73.00	2.90	0.80	0.21	0.20	0 00:06:00
27	CB-3-DA	0.06	484.00	98.00	2.90	2.65	0.17	0.15	0 00:06:00
28	CB-4-DA	0.19	484.00	77.00	2.90	1.00	0.19	0.20	0 00:06:00
29	CB-5-DA	0.16	484.00	98.00	2.90	2.67	0.44	0.40	0 00:06:00
30	CB-6-DA	0.23	484.00	85.00	2.90	1.50	0.35	0.36	0 00:06:00
31	CB-7-DA	0.75	484.00	54.00	2.90	0.15	0.11	0.03	0 00:13:13
32	CB-8-DA	0.43	484.00	64.00	2.90	0.43	0.18	0.10	0 00:17:38
33	CB-9-DA	1.02	484.00	59.00	2.90	0.27	0.27	0.11	0 00:18:15
34	DI-1-DA	1.39	484.00	65.00	2.90	0.46	0.64	0.38	0 00:18:17

Node Summary

SN	Element ID	Element Type	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Initial Water Elevation (ft)	Surcharge Elevation (ft)	Ponded Area (ft^2)	Peak Inflow (cfs)	Max HGL Elevation Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	Bald_Mtn	Junction	368.00	375.00	368.00	375.00	0.00	2.44	369.02	0.00	5.98	0 00:00	0.00	0.00
2	CB-16	Junction	340.70	344.05	340.70	344.05	0.00	0.01	340.75	0.00	3.30	0 00:00	0.00	0.00
3	CB-16A	Junction	342.00	346.00	342.00	346.00	10.00	0.00	342.02	0.00	3.98	0 00:00	0.00	0.00
4	CB-25	Junction	361.40	366.92	361.40	366.92	10.00	0.01	361.43	0.00	5.49	0 00:00	0.00	0.00
5	CB-26	Junction	361.20	364.26	361.20	364.26	10.00	0.00	361.20	0.00	3.06	0 00:00	0.00	0.00
6	CB-28	Junction	342.40	348.24	342.40	348.24	10.00	0.00	342.43	0.00	5.81	0 00:00	0.00	0.00
7	CB-33	Junction	373.40	378.68	373.40	378.68	10.00	0.20	373.54	0.00	5.14	0 00:00	0.00	0.00
8	CB-34	Junction	375.40	380.10	375.40	380.10	10.00	0.18	375.53	0.00	4.57	0 00:00	0.00	0.00
9	CB-34A	Junction	378.00	382.00	378.00	382.00	0.00	0.00	378.00	0.00	4.00	0 00:00	0.00	0.00
10	CB-36	Junction	372.40	376.41	372.40	376.41	10.00	0.20	372.49	0.00	3.92	0 00:00	0.00	0.00
11	DHM-8	Junction	363.80	378.03	363.80	378.03	0.00	3.14	364.39	0.00	13.64	0 00:00	0.00	0.00
12	DI-1	Junction	368.20	371.60	368.20	371.60	10.00	0.38	368.43	0.00	3.17	0 00:00	0.00	0.00
13	DMH-1	Junction	350.80	356.38	350.80	356.38	0.00	0.53	351.07	0.00	5.31	0 00:00	0.00	0.00
14	DMH-10	Junction	367.30	377.69	367.30	377.69	0.00	2.93	368.00	0.00	9.69	0 00:00	0.00	0.00
15	DMH-4	Junction	358.90	368.92	358.90	368.92	0.00	3.36	359.17	0.00	9.75	0 00:00	0.00	0.00
16	DMH-5	Junction	359.90	366.02	359.90	366.02	0.00	0.45	360.06	0.00	5.96	0 00:00	0.00	0.00
17	DMH-6	Junction	350.30	356.18	350.30	356.18	0.00	0.85	350.53	0.00	5.65	0 00:00	0.00	0.00
18	DMH-7	Junction	342.20	348.55	342.20	348.55	0.00	0.84	342.43	0.00	6.12	0 00:00	0.00	0.00
19	DMH-9	Junction	365.10	380.10	365.10	380.10	0.00	2.92	365.92	0.00	14.18	0 00:00	0.00	0.00
20	Fallriver_Junction	Junction	325.00	331.00	325.00	331.00	0.00	6.22	325.38	0.00	19.62	0 00:00	0.00	0.00
21	I-91_Culvert-Out	Junction	330.50	340.00	330.00	340.00	0.00	3.36	331.09	0.00	8.91	0 00:00	0.00	0.00
22	Outfall-1A	Junction	335.53	341.53	335.53	341.53	0.00	1.53	335.77	0.00	5.76	0 00:00	0.00	0.00
23	Outfall-1B	Junction	339.81	345.81	339.81	345.81	0.00	0.43	339.93	0.00	5.88	0 00:00	0.00	0.00
24	Outfall-1C	Junction	335.79	341.79	335.79	341.79	0.00	1.49	336.01	0.00	5.78	0 00:00	0.00	0.00
25	Outfall-1D	Junction	336.46	342.46	336.46	342.46	0.00	1.52	336.69	0.00	5.77	0 00:00	0.00	0.00
26	Outfall-1E	Junction	333.54	339.54	333.54	339.54	0.00	3.36	334.04	0.00	5.50	0 00:00	0.00	0.00
27	RampCulvert-In	Junction	328.72	340.00	328.72	340.00	0.00	4.01	329.43	0.00	10.57	0 00:00	0.00	0.00
28	RampCulvert-Out	Junction	327.58	340.00	327.58	340.00	0.00	3.98	327.84	0.00	12.16	0 00:00	0.00	0.00
29	Bypass_Outfall-1	Outfall	351.50					0.07	351.54					
30	Outfall-1	Outfall	324.50					6.10	324.87					
31	Outfall-2	Outfall	336.00					0.84	336.22					

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length (ft)	Inlet Invert Elevation (ft)	Outlet Invert Elevation (ft)	Average Slope (%)	Diameter or Height (in)	Manning's Roughness	Peak Flow (cfs)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Reported Condition
1	8-Oct	Pipe	CB-10	CB-8	49.56	340.70	339.70	2.0200	12.000	0.0130	1.36	5.06	0.27	5.01	0.38	0.38	0.00	Calculated
2	9-Oct	Pipe	DMH-10	DMH-9	301.09	367.30	365.30	0.6600	15.000	0.0130	2.92	5.26	0.56	4.27	0.68	0.55	0.00	Calculated
3	1-Jan	Pipe	CB-1	DMH-1	40.19	351.90	350.90	2.4900	12.000	0.0130	0.53	5.62	0.09	4.22	0.22	0.22	0.00	Calculated
4	10-Jan	Pipe	DI-1	DMH-10	19.49	368.20	367.90	1.5400	12.000	0.0130	0.38	4.42	0.09	3.11	0.21	0.21	0.00	Calculated
5	10-Nov	Pipe	CB-11	CB-10	51.81	342.80	341.10	3.2800	12.000	0.0130	0.79	6.45	0.12	5.27	0.25	0.25	0.00	Calculated
6	2-Jan	Pipe	DMH-1	CB-2	17.92	350.80	350.50	1.6700	12.000	0.0130	0.53	4.61	0.11	3.38	0.25	0.26	0.00	Calculated
7	11-Dec	Pipe	CB-12	CB-11	117.27	343.40	343.20	0.1700	12.000	0.0130	0.15	1.47	0.10	1.35	0.20	0.20	0.00	Calculated
8	16-8	Pipe	CB-16	CB-8	113.87	340.70	339.70	0.8800	12.000	0.0130	0.01	3.34	0.00	1.03	0.13	0.13	0.00	Calculated
9	16A-16	Pipe	CB-16A	CB-16	64.67	342.00	340.70	2.0100	12.000	0.0150	0.00	4.38	0.00	0.39	0.03	0.03	0.00	Calculated
10	17-18	Pipe	CB-17	CB-18	50.87	348.30	347.40	1.7700	12.000	0.0130	0.28	4.74	0.06	3.18	0.17	0.17	0.00	Calculated
11	18-Out	Pipe	CB-18	Outfall-1D	39.35	347.30	336.46	27.5500	12.000	0.0130	1.52	18.70	0.08	12.21	0.22	0.22	0.00	Calculated
12	19-18	Pipe	CB-19	CB-18	87.76	348.80	347.60	1.3700	12.000	0.0130	0.00	4.17	0.00	0.00	0.00	0.00	0.00	Calculated
13	20-21	Pipe	CB-20	CB-21	44.50	354.20	353.60	1.3500	12.000	0.0130	0.47	4.14	0.11	2.94	0.26	0.26	0.00	Calculated
14	21-18	Pipe	CB-21	CB-18	199.66	353.50	347.70	2.9000	12.000	0.0130	0.92	6.12	0.15	5.52	0.27	0.27	0.00	Calculated
15	3-Feb	Pipe	CB-2	CB-3	98.25	350.50	347.70	2.8500	12.000	0.0130	0.71	6.01	0.12	4.98	0.24	0.24	0.00	Calculated
16	23-8	Pipe	CB-23	DMH-4	44.32	365.50	364.00	3.3800	12.000	0.0130	0.21	6.55	0.03	3.68	0.12	0.12	0.00	Calculated
17	24-8	Pipe	CB-24	DMH-4	23.62	365.50	363.90	6.7700	12.000	0.0130	0.29	9.27	0.03	5.08	0.13	0.13	0.00	Calculated
18	25-5	Pipe	CB-25	DMH-5	58.23	361.40	360.00	2.4000	12.000	0.0130	0.01	5.52	0.00	1.41	0.03	0.03	0.00	Calculated
19	26-5	Pipe	CB-26	DMH-5	22.16	361.20	360.30	4.0600	12.000	0.0130	0.00	7.18	0.00	0.00	0.00	0.00	0.00	Calculated
20	27-6	Pipe	CB-27	DMH-6	32.60	351.30	350.60	2.1500	12.000	0.0130	0.39	5.22	0.08	3.67	0.19	0.19	0.00	Calculated
21	28-7	Pipe	CB-28	DMH-7	34.39	342.40	342.30	0.2900	12.000	0.0130	0.00	1.92	0.00	0.13	0.08	0.08	0.00	Calculated
22	30-5	Pipe	CB-30	DMH-5	120.67	365.90	360.00	4.8900	12.000	0.0130	0.45	7.88	0.06	5.36	0.16	0.16	0.00	Calculated
23	32-8	Pipe	CB-32	DHM-8	11.96	373.10	372.20	7.5300	12.000	0.0130	0.10	9.77	0.01	3.82	0.07	0.07	0.00	Calculated
24	33-8	Pipe	CB-33	DHM-8	88.56	373.40	372.20	1.3600	15.000	0.0130	0.20	7.52	0.03	2.58	0.14	0.11	0.00	Calculated
25	34-33	Pipe	CB-34	CB-33	60.73	375.40	373.90	2.4700	12.000	0.0130	0.18	5.60	0.03	3.17	0.12	0.12	0.00	Calculated
26	34A-34	Pipe	CB-34A	CB-34	78.21	378.00	376.10	2.4300	12.000	0.0130	0.00	5.55	0.00	0.00	0.00	0.00	0.00	Calculated
27	5-Mar	Pipe	CB-3	CB-5	105.08	347.20	346.30	0.8600	15.000	0.0130	1.15	5.98	0.19	3.59	0.38	0.31	0.00	Calculated
28	35-33	Pipe	CB-35	CB-33	89.39	374.00	373.90	0.1100	12.000	0.0130	0.03	1.19	0.02	0.71	0.10	0.10	0.00	Calculated
29	36-10	Pipe	CB-36	DMH-10	56.83	372.40	368.00	7.7400	18.000	0.0130	0.20	29.23	0.01	4.67	0.09	0.06	0.00	Calculated
30	3-Apr	Pipe	CB-4	CB-3	46.27	348.10	347.70	0.8600	15.000	0.0130	0.29	6.01	0.05	2.42	0.19	0.15	0.00	Calculated
31	4-Out	Pipe	DMH-4	Outfall-1E	98.96	358.90	333.54	25.6300	15.000	0.0130	3.36	32.70	0.10	10.47	0.38	0.31	0.00	Calculated
32	6-May	Pipe	DMH-5	DMH-6	198.15	359.90	350.30	4.8400	12.000	0.0130	0.45	7.84	0.06	4.22	0.19	0.19	0.00	Calculated
33	5-Out	Pipe	CB-5	Outfall-1A	123.22	340.30	335.53	3.8700	12.000	0.0130	1.53	7.01	0.22	7.87	0.30	0.30	0.00	Calculated
34	7-Jun	Pipe	CB-6	CB-7	62.15	346.60	341.80	7.7200	12.000	0.0130	0.33	9.90	0.03	5.70	0.13	0.13	0.00	Calculated
35	6-7(MH)	Pipe	DMH-6	DMH-7	157.05	350.30	342.50	4.9700	12.000	0.0130	0.84	7.94	0.11	6.46	0.22	0.22	0.00	Calculated
36	7(MH)-Out	Pipe	DMH-7	Outfall-2	127.60	342.20	336.00	4.8600	12.000	0.0130	0.84	7.85	0.11	6.38	0.22	0.22	0.00	Calculated
37	7-Out	Pipe	CB-7	Outfall-1B	130.52	341.60	339.81	1.3700	12.000	0.0130	0.43	4.17	0.10	4.42	0.18	0.18	0.00	Calculated
38	4-Aug	Pipe	DHM-8	DMH-4	351.98	363.80	359.20	1.3100	15.000	0.0130	3.13	7.38	0.42	5.63	0.58	0.46	0.00	Calculated
39	8-Out	Pipe	CB-8	Outfall-1C	94.37	339.60	335.79	4.0400	12.000	0.0130	1.49	7.16	0.21	8.00	0.29	0.29	0.00	Calculated
40	8-Sep	Pipe	CB-9	CB-8	27.57	341.40	340.10	4.7200	12.000	0.0150	0.13	6.70	0.02	3.24	0.10	0.10	0.00	Calculated
41	9-8(MH)	Pipe	DMH-9	DHM-8	250.42	365.10	364.00	0.4400	15.000	0.0130	2.92	4.28	0.68	3.77	0.75	0.60	0.00	Calculated
42	BMtn-10	Pipe	Bald_Mtn	DMH-10	64.81	368.50	367.40	1.7000	15.000	0.0130	2.44	8.42	0.29	4.64	0.56	0.45	0.00	Calculated
43	I-91-Culvert	Pipe	Outfall-1E	I-91_Culvert-Out	240.00	333.54	330.50	1.2700	24.000	0.0130	3.36	25.46	0.13	4.90	0.54	0.27	0.00	Calculated
44	Ramp_Culvert	Pipe	RampCulvert-In	RampCulvert-Out	134.00	328.72	327.58	0.8500	24.000	0.0130	3.98	20.87	0.19	6.75	0.49	0.24	0.00	Calculated
45	1D-culvert	Channel	Outfall-1D	RampCulvert-In	213.55	336.46	328.72	3.6200	36.000	0.0320	1.52	168.37	0.01	1.71	0.43	0.14	0.00	
46	CB-1_bypass	Channel	CB-1	CB-4	126.22	356.30	352.48	3.0300	6.000	0.0130	0.17	50.08	0.00	1.67	0.06	0.13	0.00	

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Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length (ft)	Inlet Invert Elevation (ft)	Outlet Invert Elevation (ft)	Average Slope (%)	Diameter or Height (in)	Manning's Roughness	Peak Flow (cfs)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Reported Condition
47	CB-12_bypass	Channel	CB-12	CB-11	124.46	348.19	346.64	1.2500	6.000	0.0160	0.04	26.10	0.00	0.62	0.07	0.15	0.00	
48	CB-17_bypass	Channel	CB-17	CB-9	277.20	352.17	346.02	2.2200	6.000	0.0160	0.06	34.84	0.00	1.82	0.04	0.08	0.00	
49	CB-18_bypass	Channel	CB-18	CB-12	166.98	351.79	348.19	2.1600	6.000	0.0160	0.07	33.52	0.00	1.30	0.05	0.09	0.00	
50	CB-2_bypass	Channel	CB-2	CB-3	100.68	355.60	353.17	2.4100	6.000	0.0160	0.05	36.34	0.00	1.08	0.04	0.08	0.00	
51	CB-20_bypass	Channel	CB-20	CB-17	207.40	358.45	352.17	3.0300	6.000	0.0160	0.11	39.73	0.00	1.52	0.05	0.11	0.00	
52	CB-21_bypass	Channel	CB-21	CB-18	202.68	358.38	351.79	3.2500	6.000	0.0160	0.10	41.17	0.00	1.50	0.05	0.10	0.00	
53	CB-23_bypass	Channel	CB-23	CB-20	350.32	369.60	358.45	3.1800	6.000	0.0160	0.05	40.73	0.00	0.83	0.05	0.10	0.00	
54	CB-24_bypass	Channel	CB-24	CB-21	354.71	369.68	353.60	4.5300	6.000	0.0160	0.07	45.09	0.00	0.78	0.04	0.08	0.00	
55	CB-27_bypass	Channel	CB-27	Bypass_Outfall-1	103.70	356.41	351.50	4.7300	6.000	0.0160	0.07	49.68	0.00	1.54	0.04	0.09	0.00	
56	CB-3_bypass	Channel	CB-3	CB-10	475.34	353.17	347.37	1.2200	6.000	0.0160	0.04	25.22	0.00	0.74	0.07	0.14	0.00	
57	CB-30_bypass	Channel	CB-30	CB-27	294.84	370.42	356.41	4.7500	6.000	0.0160	0.11	49.76	0.00	1.92	0.05	0.09	0.00	
58	CB-32_bypass	Channel	CB-32	CB-24	340.69	377.88	369.68	2.4100	6.000	0.0160	0.03	35.42	0.00	1.06	0.03	0.07	0.00	
59	CB-35_bypass	Channel	CB-35	CB-30	379.72	379.37	370.42	2.3600	6.000	0.0160	0.01	35.05	0.00	0.45	0.03	0.07	0.00	
60	CB-4_bypass	Channel	CB-4	CB-6	192.15	352.48	349.21	1.7000	6.000	0.0160	0.08	30.52	0.00	2.20	0.04	0.07	0.00	
61	CB-6_bypass	Channel	CB-6	CB-7	70.37	349.21	344.57	6.5900	6.000	0.0160	0.30	179.60	0.00	0.00	0.01	0.01	0.00	
62	Cobble_Waterway	Channel	I-91_Culvert-Out	RampCulvert-In	363.16	330.50	328.72	0.4900	36.000	0.0320	3.33	104.81	0.03	1.55	0.65	0.22	0.00	
63	FallRiver	Channel	Fallriver_Junction	Outfall-1	100.00	325.00	324.50	0.5000	240.000	0.0320	6.10	8532.83	0.00	1.58	0.37	0.02	0.00	
64	FR1	Channel	Outfall-1A	Fallriver_Junction	84.74	335.53	325.00	12.4300	12.000	0.0320	1.53	21.24	0.07	4.22	0.30	0.30	0.00	
65	FR2	Channel	Outfall-1B	Fallriver_Junction	138.29	339.81	325.00	10.7100	12.000	0.0320	0.43	19.71	0.02	1.67	0.24	0.24	0.00	
66	FR3	Channel	RampCulvert-Out	Fallriver_Junction	378.68	327.58	325.00	0.6800	120.000	0.0320	3.96	855.32	0.00	1.27	0.31	0.03	0.00	
67	FR4	Channel	Outfall-1C	Fallriver_Junction	71.36	335.79	325.00	15.1200	12.000	0.0320	1.49	23.43	0.06	4.29	0.30	0.30	0.00	

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Inlet Summary

SN	Element ID	Inlet Manufacturer	Manufacturer Part Number	Inlet Location	Number of Inlets	Catchbasin Invert Elevation (ft)	Max (Rim) Elevation (ft)	Initial Water Elevation (ft)	Ponded Area (ft^2)	Peak Flow (cfs)	Peak Flow Intercepted by Inlet (cfs)	Peak Flow Bypassing Inlet (cfs)	Inlet Efficiency during Peak Flow (%)	Allowable Spread (ft)	Max Gutter Spread during Peak Flow (ft)	Max Gutter Water Elev. during Peak Flow (ft)
1	CB-1	FHWA HEC-22 GENERIC	N/A	On Grade	1	351.90	356.30	351.90	N/A	0.70	0.54	0.17	76.31	10.50	5.08	356.40
2	CB-10	FHWA HEC-22 GENERIC	N/A	On Sag	1	340.70	347.37	340.70	10.00	0.59	N/A	N/A	N/A	10.50	6.12	347.47
3	CB-11	FHWA HEC-22 GENERIC	N/A	On Sag	1	342.80	346.64	342.80	10.00	0.64	N/A	N/A	N/A	10.50	6.41	346.75
4	CB-12	FHWA HEC-22 GENERIC	N/A	On Grade	1	343.40	348.19	343.40	N/A	0.19	0.18	0.01	94.41	10.50	3.14	348.25
5	CB-17	FHWA HEC-22 GENERIC	N/A	On Grade	1	348.30	352.17	348.30	N/A	0.34	0.30	0.04	87.25	10.50	3.90	352.25
6	CB-18	FHWA HEC-22 GENERIC	N/A	On Grade	1	347.30	351.79	347.30	N/A	0.39	0.33	0.06	85.37	10.50	4.10	351.87
7	CB-19	FHWA HEC-22 GENERIC	N/A	On Sag	2	348.80	350.66	348.80	10.00	0.00	N/A	N/A	N/A	10.50	1.00	350.74
8	CB-2	FHWA HEC-22 GENERIC	N/A	On Grade	1	350.50	355.60	350.60	N/A	0.25	0.23	0.02	91.37	10.50	3.47	355.67
9	CB-20	FHWA HEC-22 GENERIC	N/A	On Grade	1	354.20	358.45	354.20	N/A	0.58	0.46	0.12	79.19	10.50	4.76	358.55
10	CB-21	FHWA HEC-22 GENERIC	N/A	On Grade	1	353.60	358.38	353.60	N/A	0.56	0.45	0.12	79.54	10.50	4.72	358.47
11	CB-23	FHWA HEC-22 GENERIC	N/A	On Grade	1	365.50	369.60	365.50	N/A	0.25	0.23	0.02	91.33	10.50	3.48	369.67
12	CB-24	FHWA HEC-22 GENERIC	N/A	On Grade	1	365.50	369.68	365.50	N/A	0.36	0.31	0.05	86.58	10.50	3.97	369.76
13	CB-27	FHWA HEC-22 GENERIC	N/A	On Grade	1	351.30	356.41	351.30	N/A	0.46	0.40	0.07	85.71	10.50	4.00	356.49
14	CB-3	FHWA HEC-22 GENERIC	N/A	On Grade	1	347.20	353.17	347.20	N/A	0.19	0.18	0.01	92.59	10.50	3.40	353.24
15	CB-30	FHWA HEC-22 GENERIC	N/A	On Grade	1	365.90	370.42	365.90	N/A	0.56	0.46	0.11	81.15	10.50	4.50	370.51
16	CB-32	FHWA HEC-22 GENERIC	N/A	On Grade	1	373.10	377.88	373.10	N/A	0.13	0.13	0.01	95.24	10.50	3.13	377.94
17	CB-35	FHWA HEC-22 GENERIC	N/A	On Grade	1	374.00	379.37	374.00	N/A	0.04	0.04	0.00	99.97	10.50	2.13	379.41
18	CB-4	FHWA HEC-22 GENERIC	N/A	On Grade	1	348.10	352.48	348.10	N/A	0.37	0.31	0.06	83.60	10.50	4.39	352.57
19	CB-5	FHWA HEC-22 GENERIC	N/A	On Sag	1	340.30	350.66	340.30	10.00	0.40	N/A	N/A	N/A	10.50	4.94	350.33
20	CB-6	FHWA HEC-22 GENERIC	N/A	On Grade	1	346.60	349.21	346.60	N/A	0.44	0.34	0.09	78.25	10.50	5.31	349.32
21	CB-7	FHWA HEC-22 GENERIC	N/A	On Sag	1	341.60	344.57	341.60	10.00	0.03	N/A	N/A	N/A	10.50	1.65	344.05
22	CB-8	FHWA HEC-22 GENERIC	N/A	On Sag	1	339.60	345.67	339.60	10.00	0.10	N/A	N/A	N/A	10.50	2.61	345.79
23	CB-9	FHWA HEC-22 GENERIC	N/A	On Sag	1	341.40	346.02	341.40	0.00	0.13	N/A	N/A	N/A	10.50	2.90	346.14

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Proposal No. 612159-136484

Subbasin Hydrology

Subbasin : Bald_Mtn-DA

Input Data

Area (ac)	5.35
Peak Rate Factor	484
Weighted Curve Number	70
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	5.35	-	70
Composite Area & Weighted CN	5.35		70

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

Where :

Tc = Time of Concentration (hr)
n = Manning's roughness
Lf = Flow Length (ft)
P = 2 yr, 24 hr Rainfall (inches)
Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 * (Sf^0.5) (unpaved surface)
V = 20.3282 * (Sf^0.5) (paved surface)
V = 15.0 * (Sf^0.5) (grassed waterway surface)
V = 10.0 * (Sf^0.5) (nearly bare & untilled surface)
V = 9.0 * (Sf^0.5) (cultivated straight rows surface)
V = 7.0 * (Sf^0.5) (short grass pasture surface)
V = 5.0 * (Sf^0.5) (woodland surface)
V = 2.5 * (Sf^0.5) (forest w/heavy litter surface)
Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)

Channel Flow Equation :

V = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
R = Aq / Wp
Tc = (Lf / V) / (3600 sec/hr)

Where :

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
R = Hydraulic Radius (ft)
Aq = Flow Area (ft^2)
Wp = Wetted Perimeter (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)
n = Manning's roughness

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.8	0	0
Flow Length (ft) :	50	0	0
Slope (%) :	3.5	0	0
2 yr, 24 hr Rainfall (in) :	2.9	0	0
Velocity (ft/sec) :	0.05	0	0
Computed Flow Time (min) :	18.03	0	0

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	78	0	0
Slope (%) :	5	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	3.61	0	0
Computed Flow Time (min) :	0.36	0	0

Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0	0
Flow Length (ft) :	980	0	0
Channel Slope (%) :	5	0	0
Cross Section Area (ft^2) :	0.8	0	0
Wetted Perimeter (ft) :	0.6	0	0
Velocity (ft/sec) :	31.05	0	0
Computed Flow Time (min) :	0.53	0	0

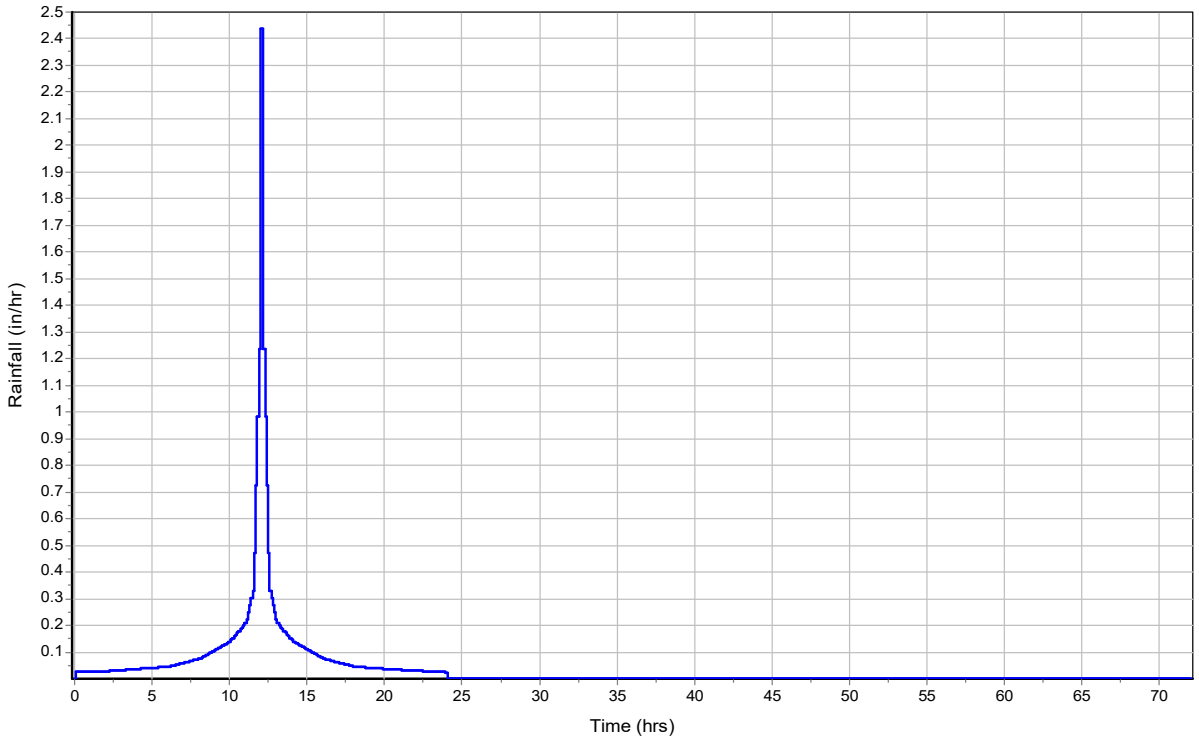
Total TOC (min) 18.92

Subbasin Runoff Results

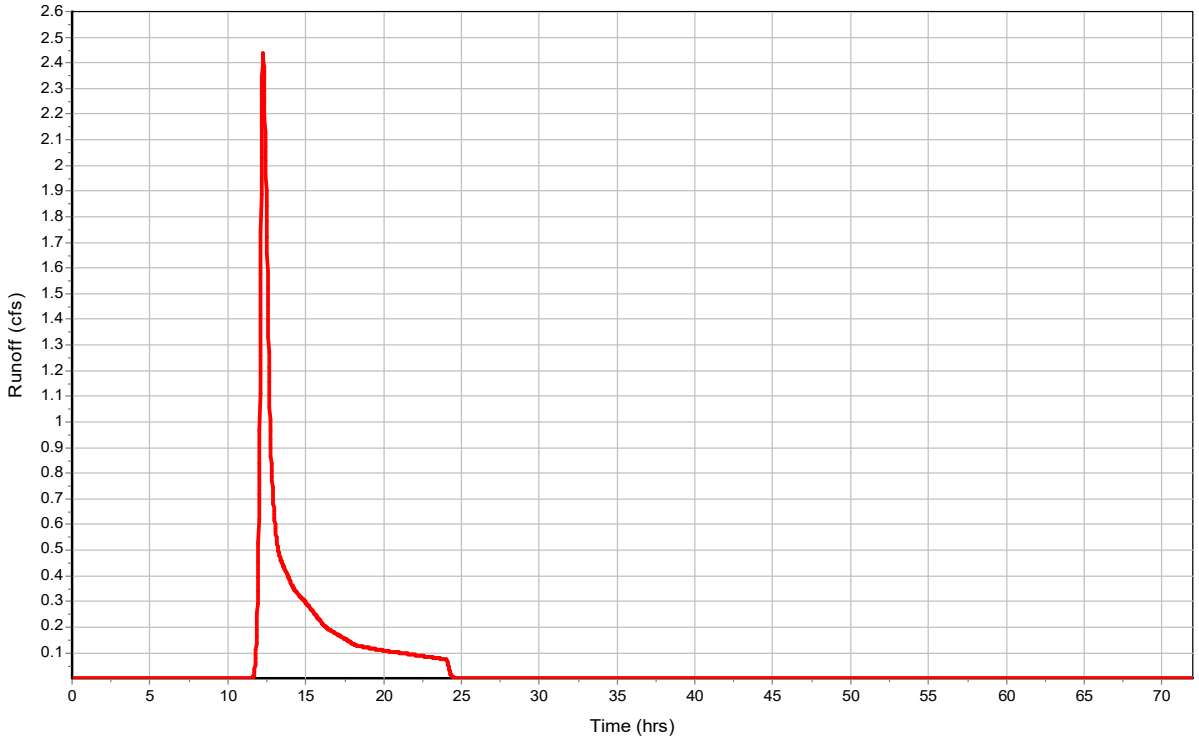
Total Rainfall (in)	2.9
Total Runoff (in)	0.66
Peak Runoff (cfs)	2.44
Weighted Curve Number	70
Time of Concentration (days hh:mm:ss)	0 00:18:55

Subbasin : Bald_Mtn-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-10-DA

Input Data

Area (ac)	0.27
Peak Rate Factor	484
Weighted Curve Number	92
Rain Gage ID	*

Composite Curve Number

32

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.27	-	92
Composite Area & Weighted CN	0.27		92

Time of Concentration

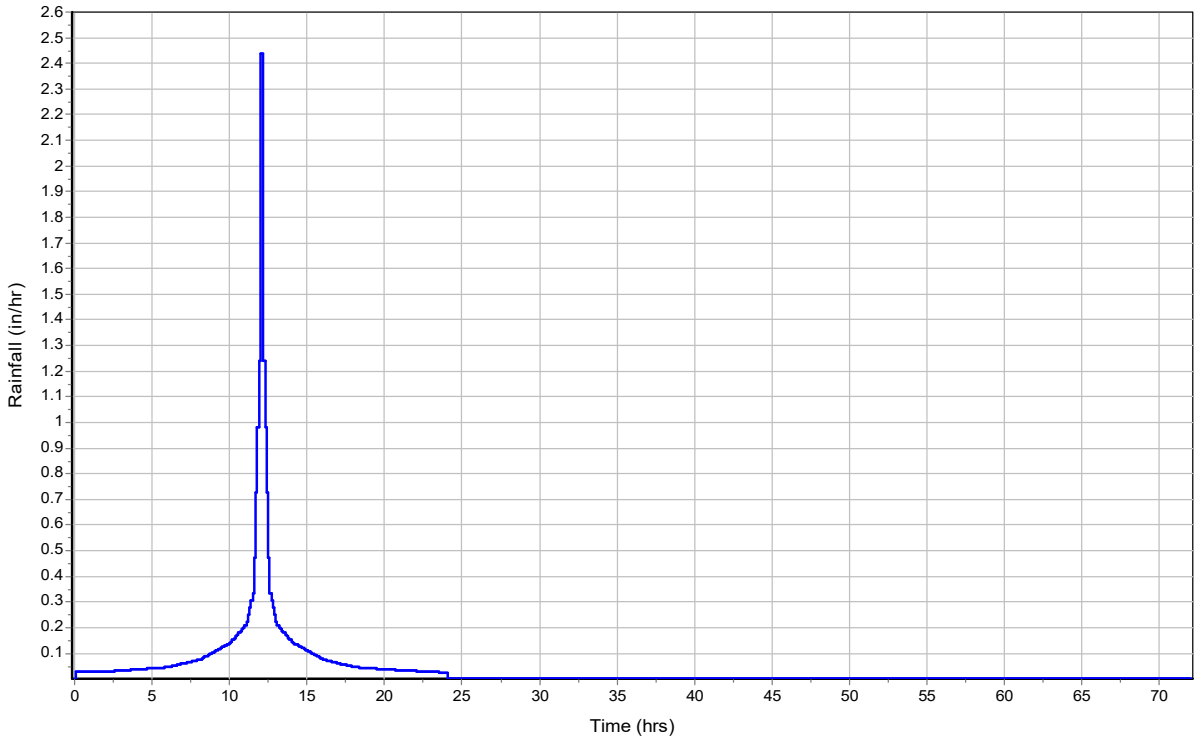
User-Defined TOC override (minutes): 6

Subbasin Runoff Results

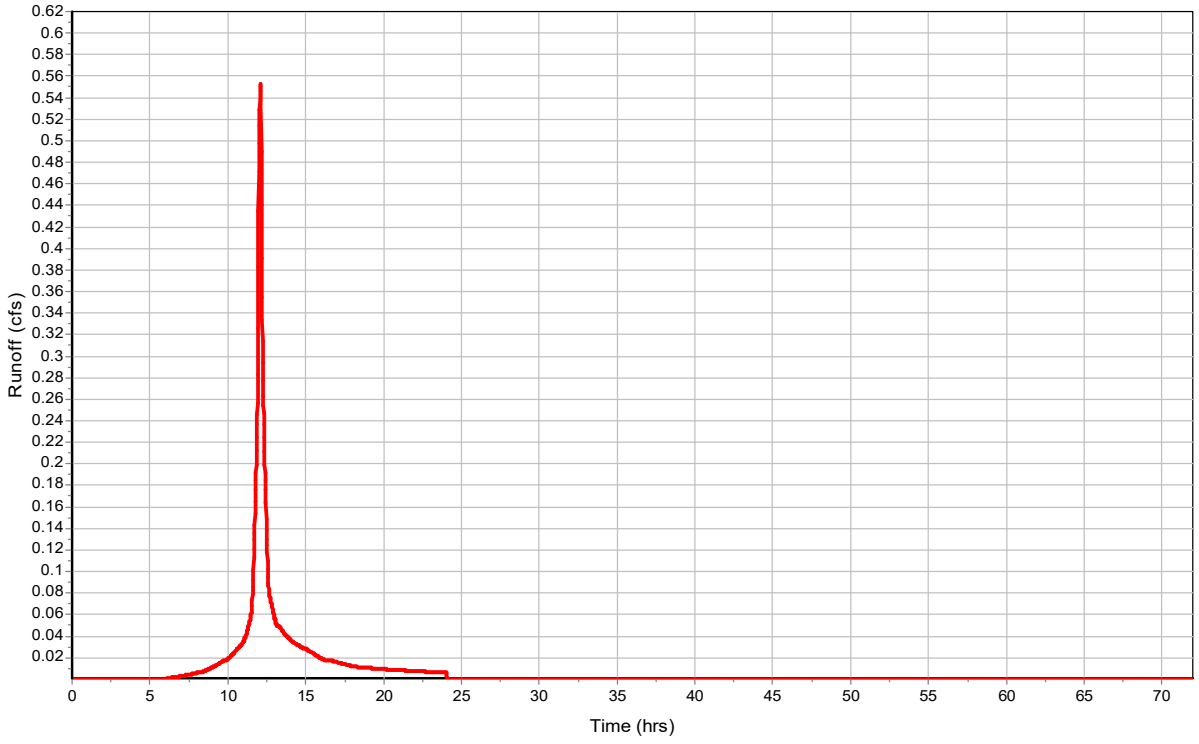
Total Rainfall (in)	2.9
Total Runoff (in)	2.07
Peak Runoff (cfs)	0.55
Weighted Curve Number	92
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : CB-10-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-11-DA

Input Data

Area (ac)	0.27
Peak Rate Factor	484
Weighted Curve Number	95
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.27	-	95
Composite Area & Weighted CN	0.27		95

Time of Concentration

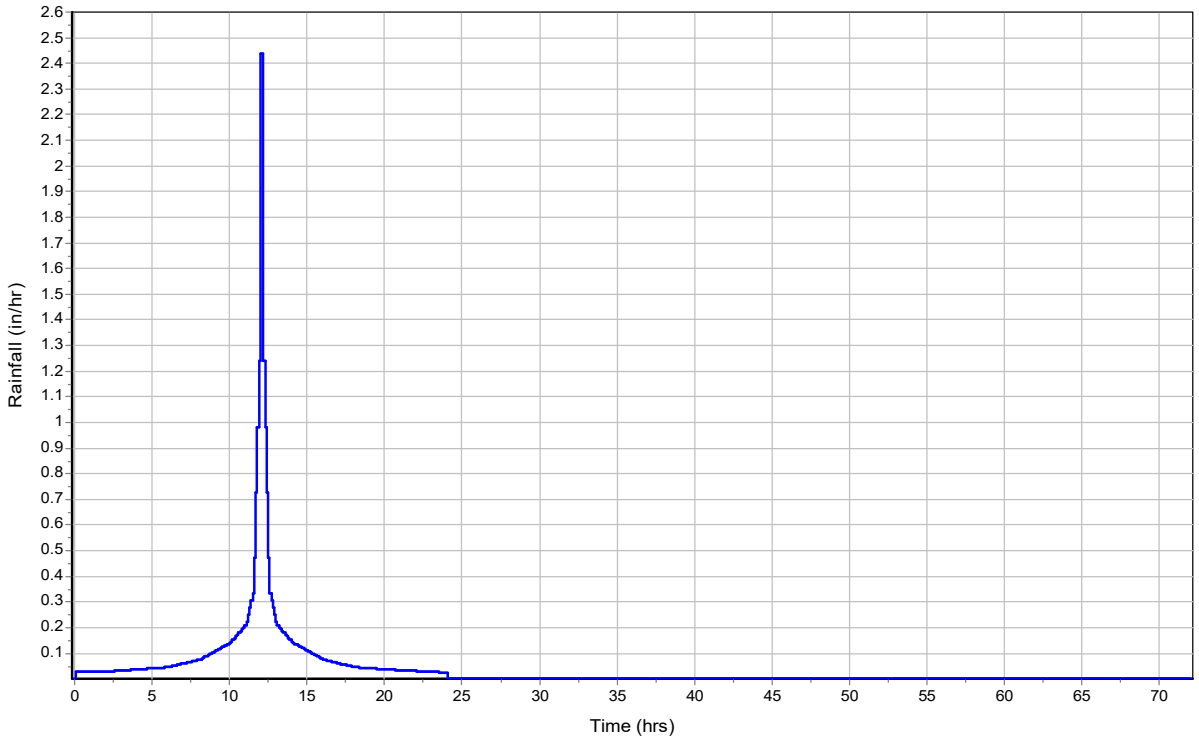
User-Defined TOC override (minutes): 6

Subbasin Runoff Results

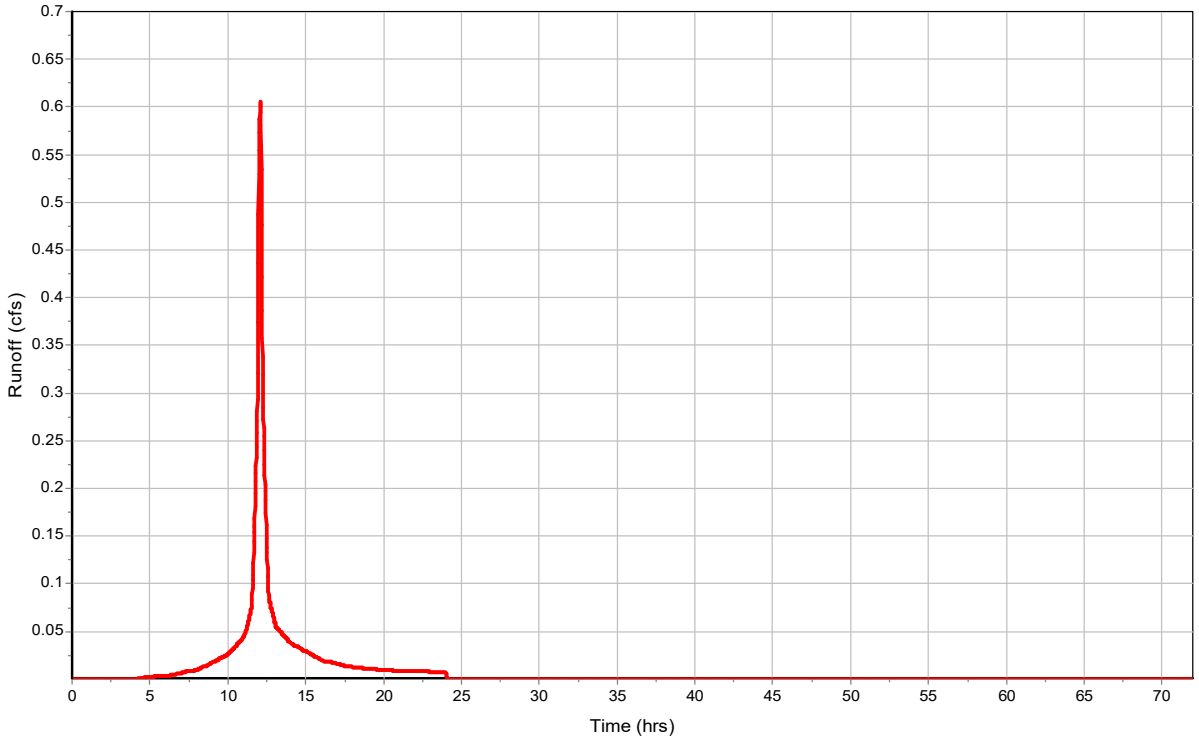
Total Rainfall (in)	2.9
Total Runoff (in)	2.35
Peak Runoff (cfs)	0.61
Weighted Curve Number	95
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : CB-11-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-12-DA

Input Data

Area (ac)	0.05
Peak Rate Factor	484
Weighted Curve Number	96
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.05	-	96
Composite Area & Weighted CN	0.05		96

Time of Concentration

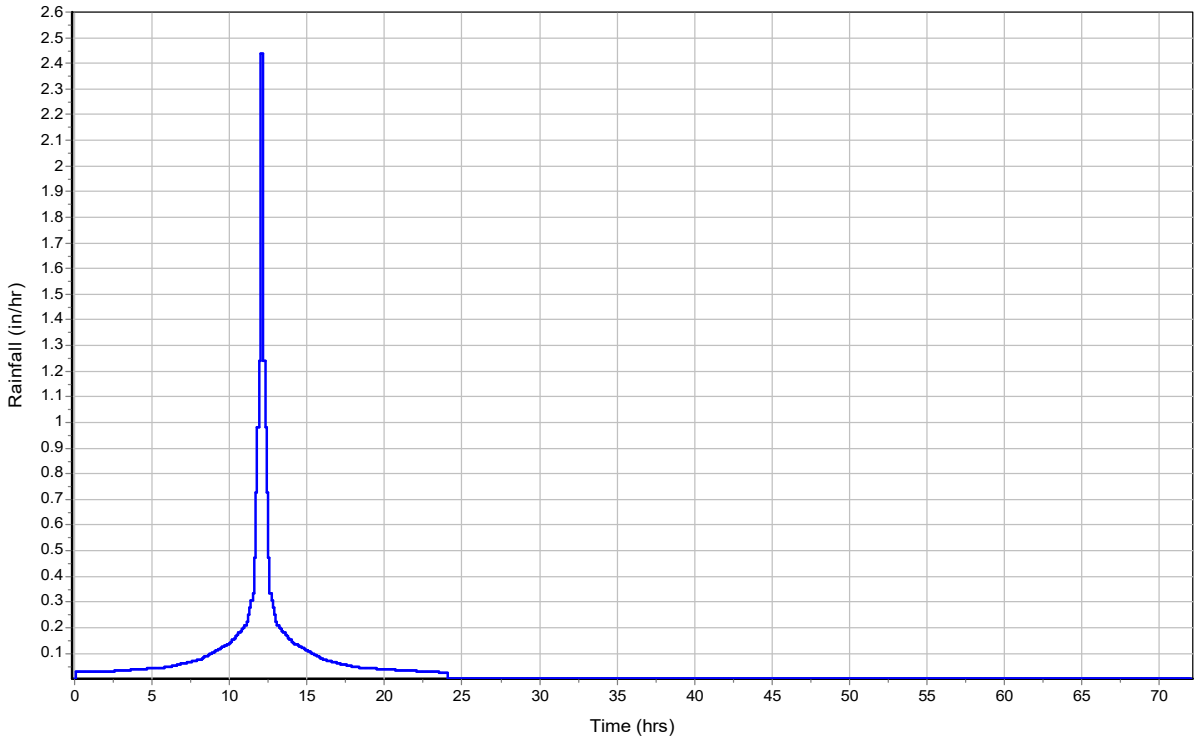
User-Defined TOC override (minutes): 6.00

Subbasin Runoff Results

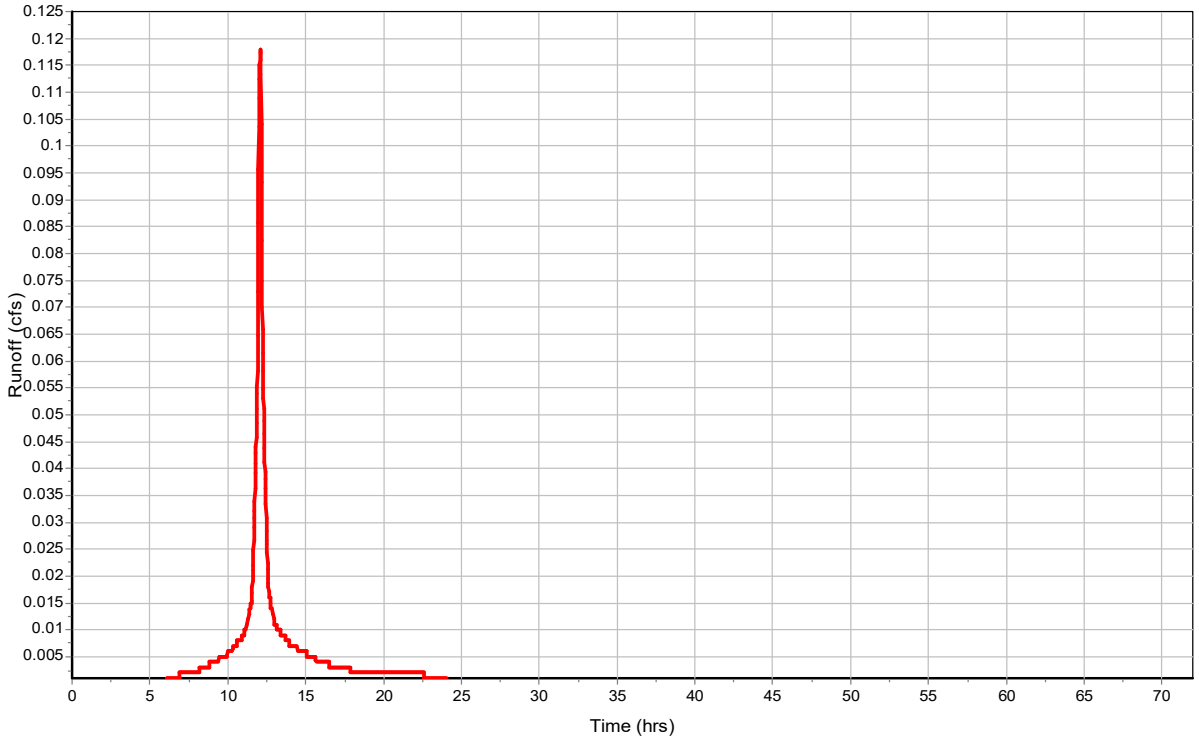
Total Rainfall (in)	2.9
Total Runoff (in)	2.42
Peak Runoff (cfs)	0.12
Weighted Curve Number	96
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : CB-12-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-16A-DA

Input Data

Area (ac) 1.93
Peak Rate Factor 484
Weighted Curve Number 43
Rain Gage ID ..... *

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	1.93	-	43
Composite Area & Weighted CN	1.93		43

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	50	0	0
Slope (%) :	1.5	0	0
2 yr, 24 hr Rainfall (in) :	2.9	0	0
Velocity (ft/sec) :	0.06	0	0
Computed Flow Time (min) :	14.54	0	0

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	350	0	0
Slope (%) :	1.5	0	0
Surface Type :	Grass pasture	Unpaved	Unpaved
Velocity (ft/sec) :	0.86	0	0
Computed Flow Time (min) :	6.78	0	0

Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.27	0	0
Flow Length (ft) :	104	0	0
Channel Slope (%) :	1	0	0
Cross Section Area (ft^2) :	2	0	0
Wetted Perimeter (ft) :	0.4	0	0
Velocity (ft/sec) :	1.61	0	0
Computed Flow Time (min) :	1.07	0	0

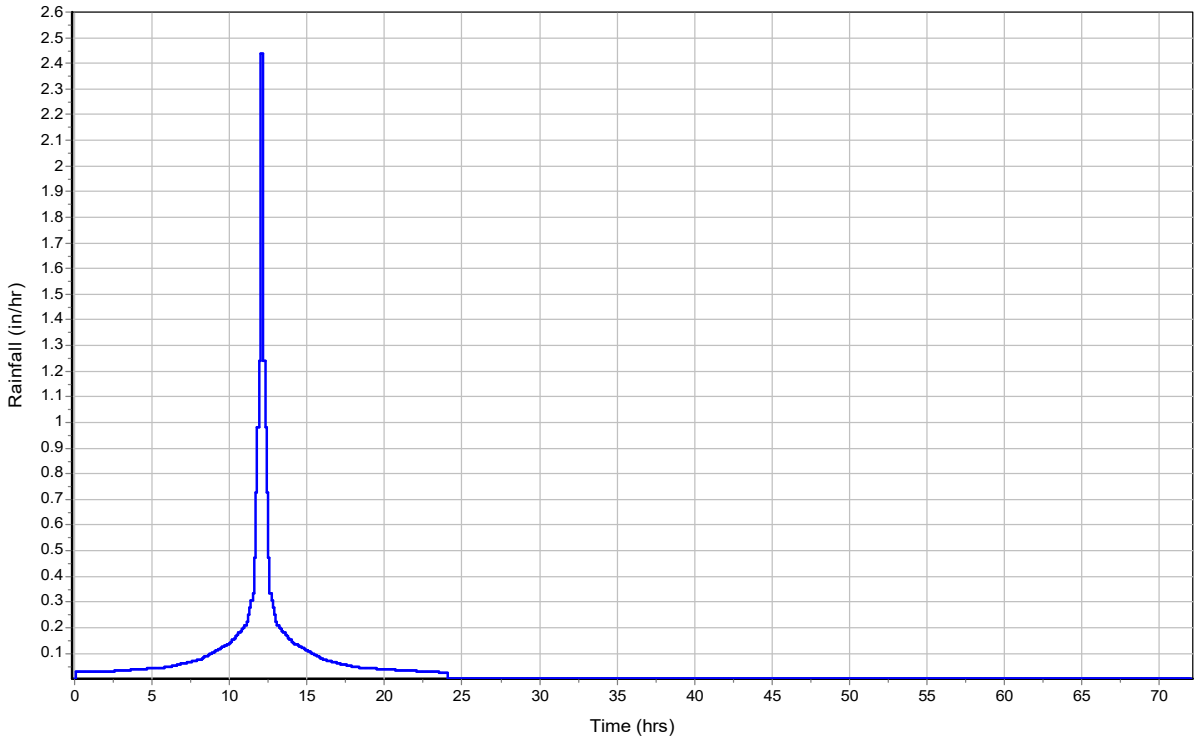
Total TOC (min) 22.39

Subbasin Runoff Results

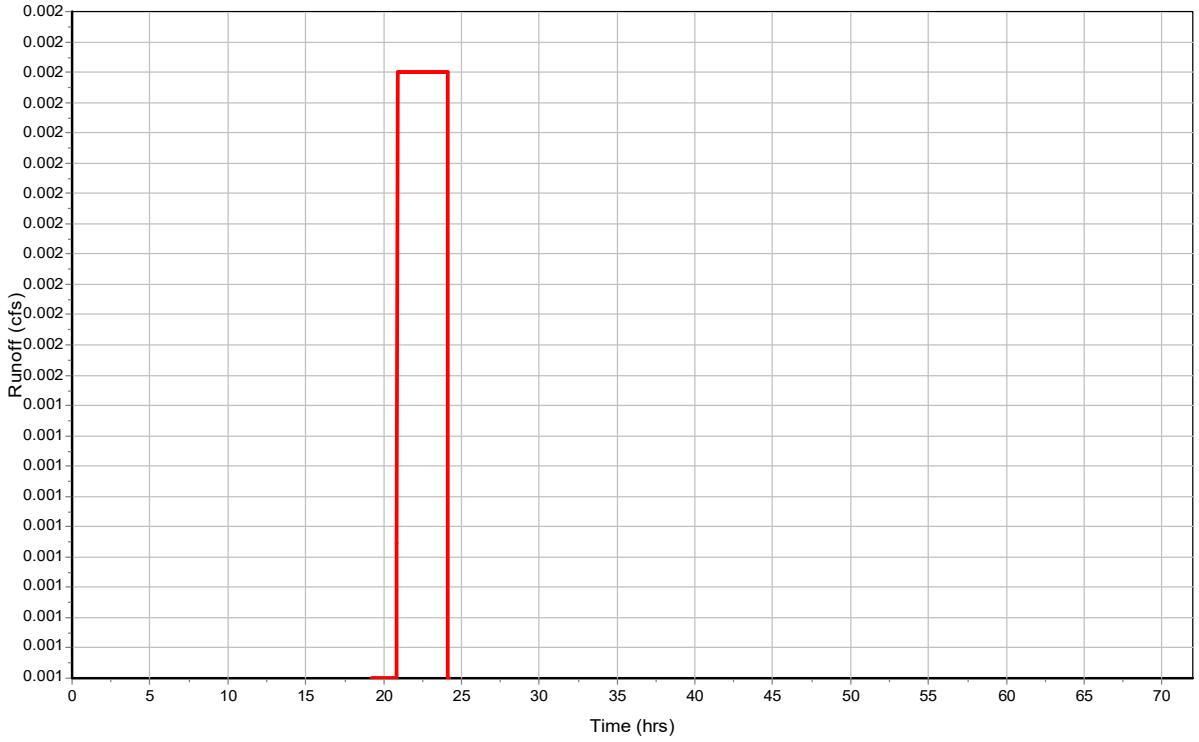
Total Rainfall (in) 2.9
Total Runoff (in) 0
Peak Runoff (cfs) 0
Weighted Curve Number 43
Time of Concentration (days hh:mm:ss) 0 00:22:23

Subbasin : CB-16A-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-16-DA

Input Data

Area (ac)	0.82
Peak Rate Factor	484
Weighted Curve Number	52
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.82	-	52
Composite Area & Weighted CN	0.82		52

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.6	0	0
Flow Length (ft) :	50	0	0
Slope (%) :	2.1	0	0
2 yr, 24 hr Rainfall (in) :	2.9	0	0
Velocity (ft/sec) :	0.05	0	0
Computed Flow Time (min) :	17.57	0	0

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	213	0	0
Slope (%) :	2	0	0
Surface Type :	Grass pasture	Unpaved	Unpaved
Velocity (ft/sec) :	0.99	0	0
Computed Flow Time (min) :	3.59	0	0

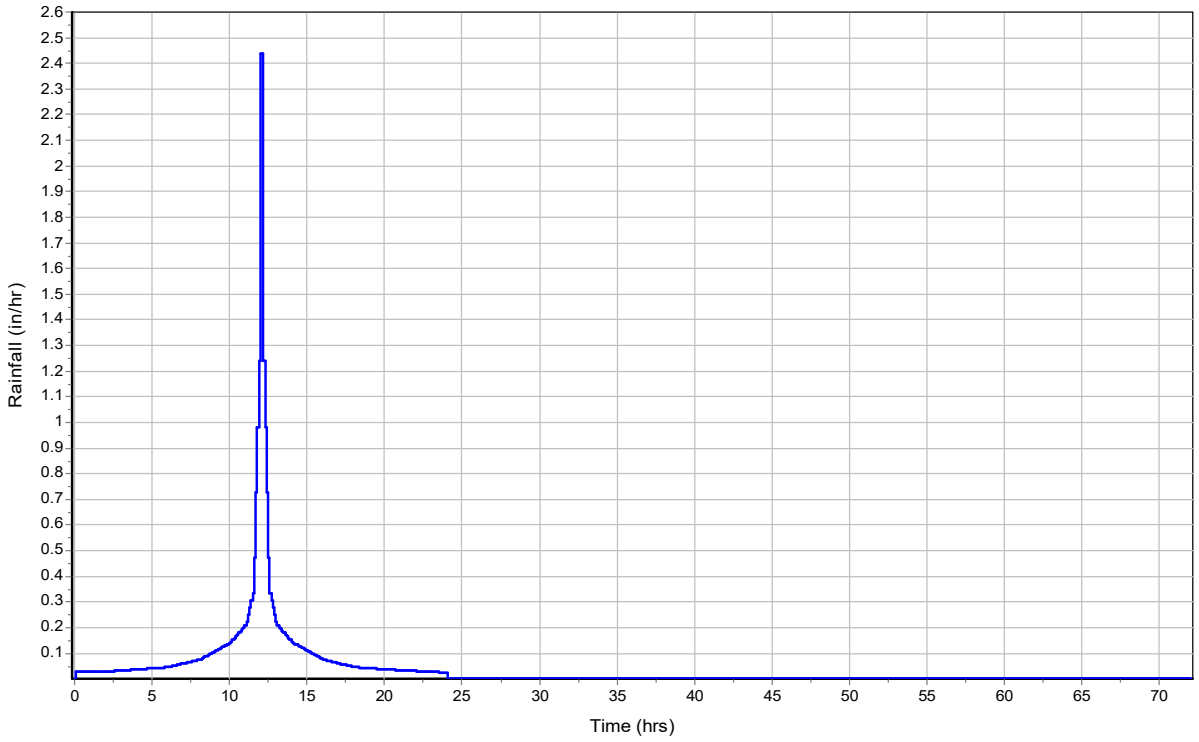
Total TOC (min) 21.16

Subbasin Runoff Results

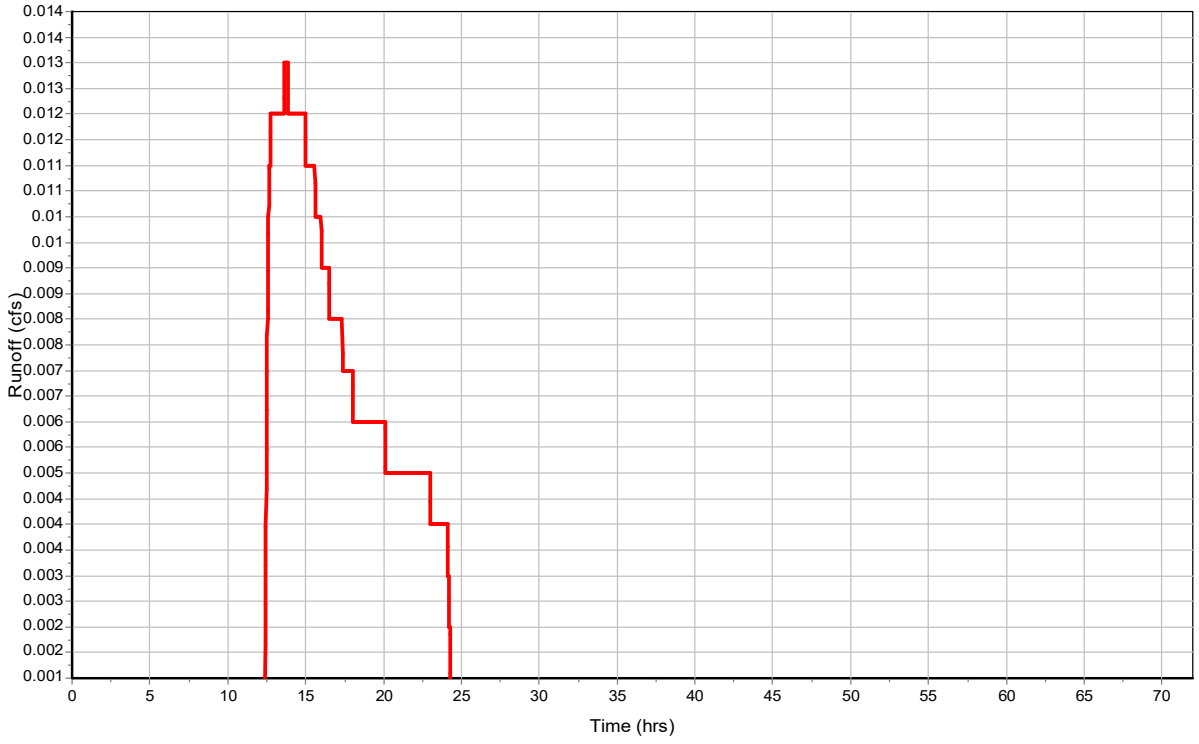
Total Rainfall (in)	2.9
Total Runoff (in)	0.11
Peak Runoff (cfs)	0.01
Weighted Curve Number	52
Time of Concentration (days hh:mm:ss)	0 00:21:10

Subbasin : CB-16-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-17-DA

Input Data

Area (ac)	0.11
Peak Rate Factor	484
Weighted Curve Number	91
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.11	-	91
Composite Area & Weighted CN	0.11		91

Time of Concentration

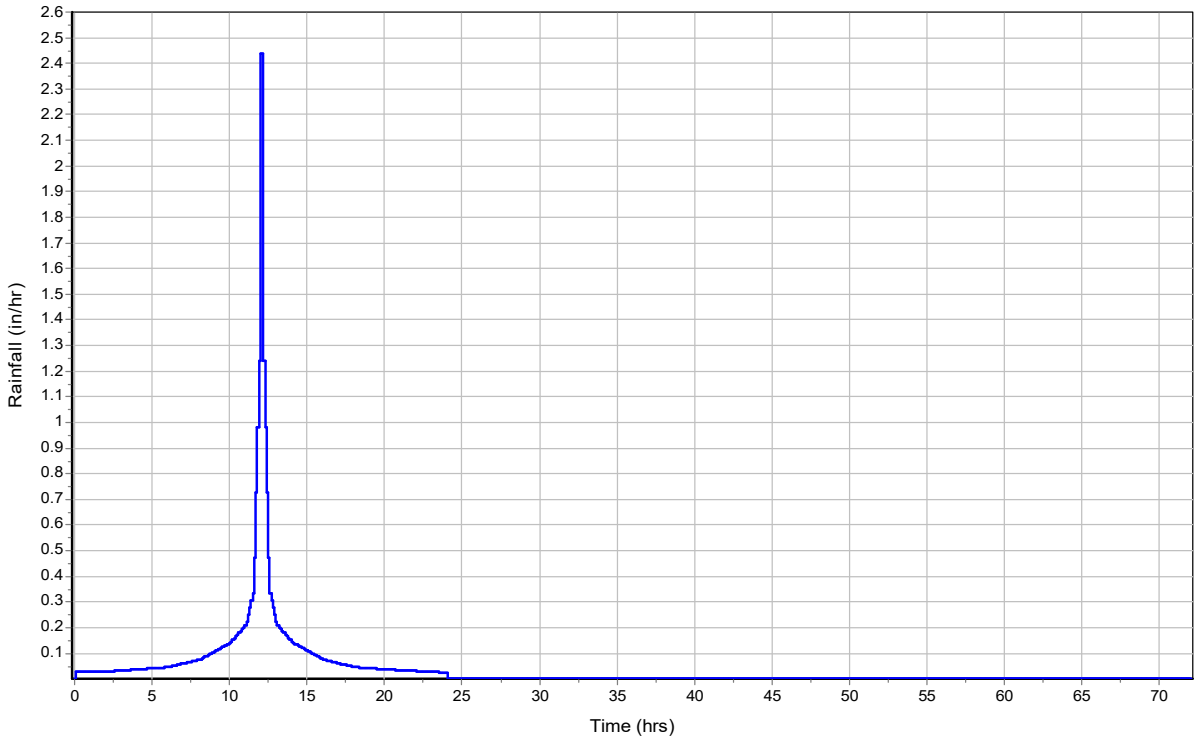
User-Defined TOC override (minutes): 6

Subbasin Runoff Results

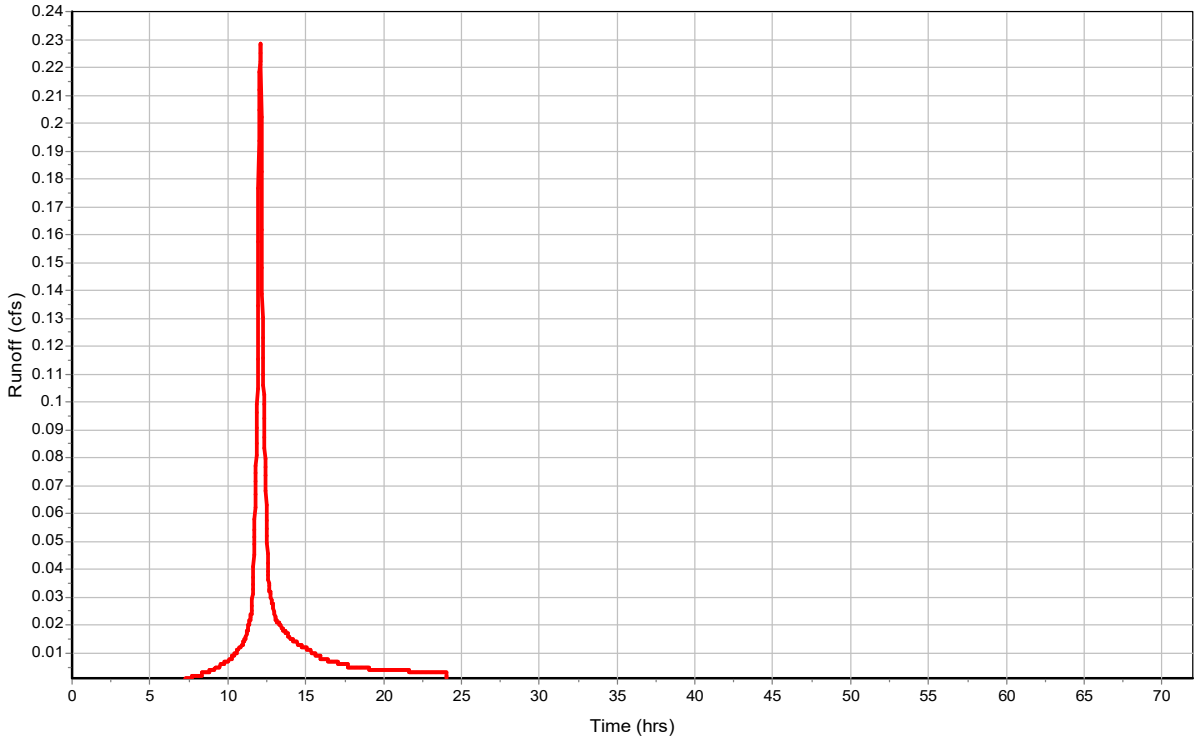
Total Rainfall (in)	2.9
Total Runoff (in)	1.97
Peak Runoff (cfs)	0.23
Weighted Curve Number	91
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : CB-17-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-18-DA

Input Data

Area (ac)	0.13
Peak Rate Factor	484
Weighted Curve Number	93
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.13	-	93
Composite Area & Weighted CN	0.13		93

Time of Concentration

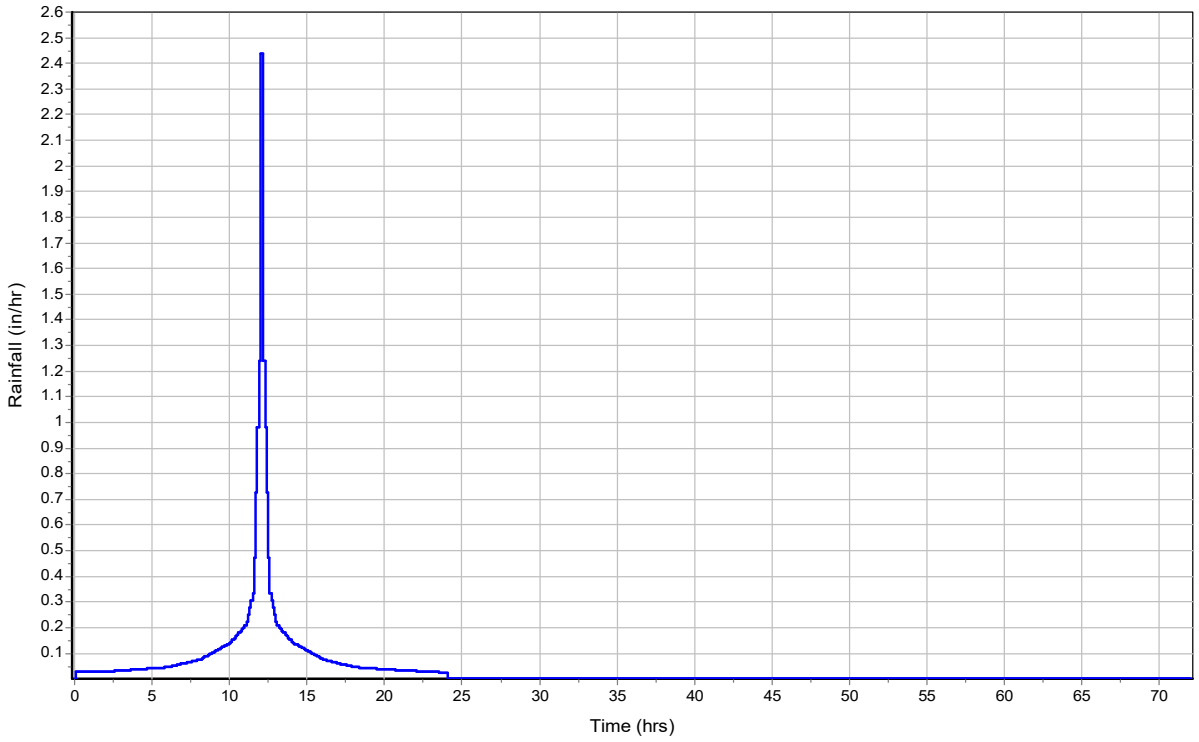
User-Defined TOC override (minutes): 6

Subbasin Runoff Results

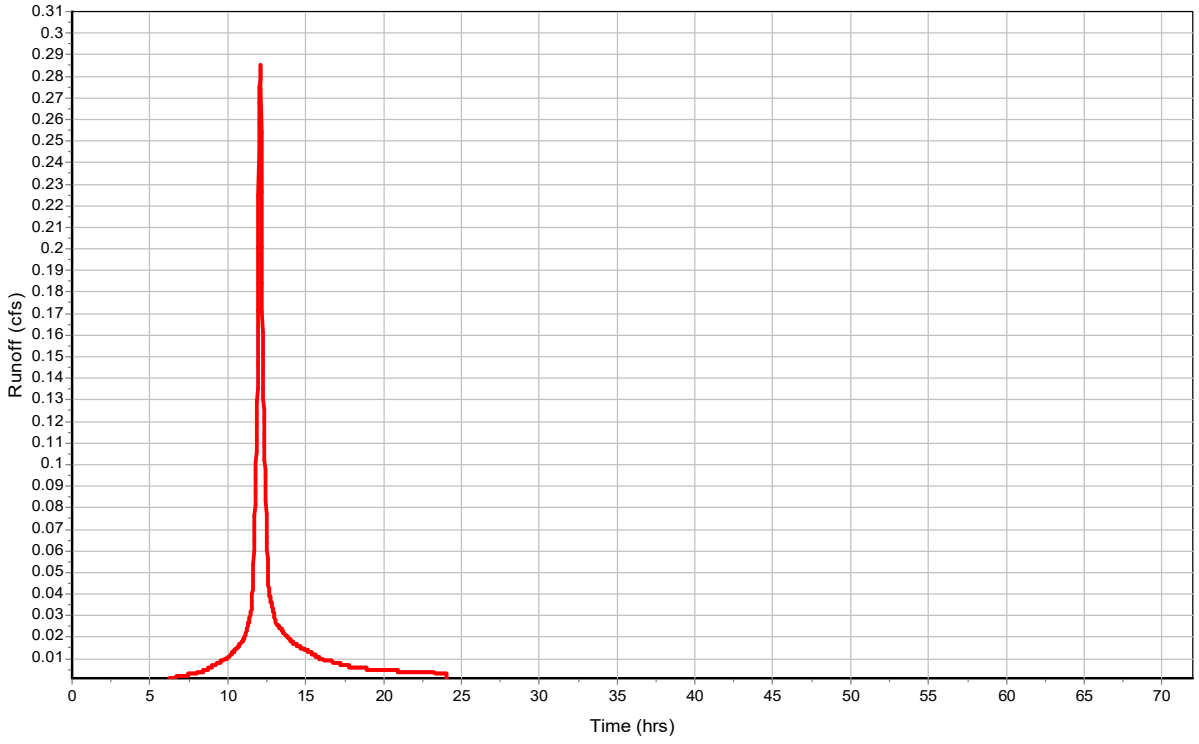
Total Rainfall (in)	2.9
Total Runoff (in)	2.15
Peak Runoff (cfs)	0.29
Weighted Curve Number	93
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : CB-18-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-19-DA

Input Data

Area (ac)	0.16
Peak Rate Factor	484
Weighted Curve Number	39
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.16	-	39
Composite Area & Weighted CN	0.16		39

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	50	0	0
Slope (%) :	4	0	0
2 yr, 24 hr Rainfall (in) :	2.9	0	0
Velocity (ft/sec) :	0.08	0	0
Computed Flow Time (min) :	9.82	0	0

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	122	0	0
Slope (%) :	4	0	0
Surface Type :	Grass pasture	Unpaved	Unpaved
Velocity (ft/sec) :	1.4	0	0
Computed Flow Time (min) :	1.45	0	0

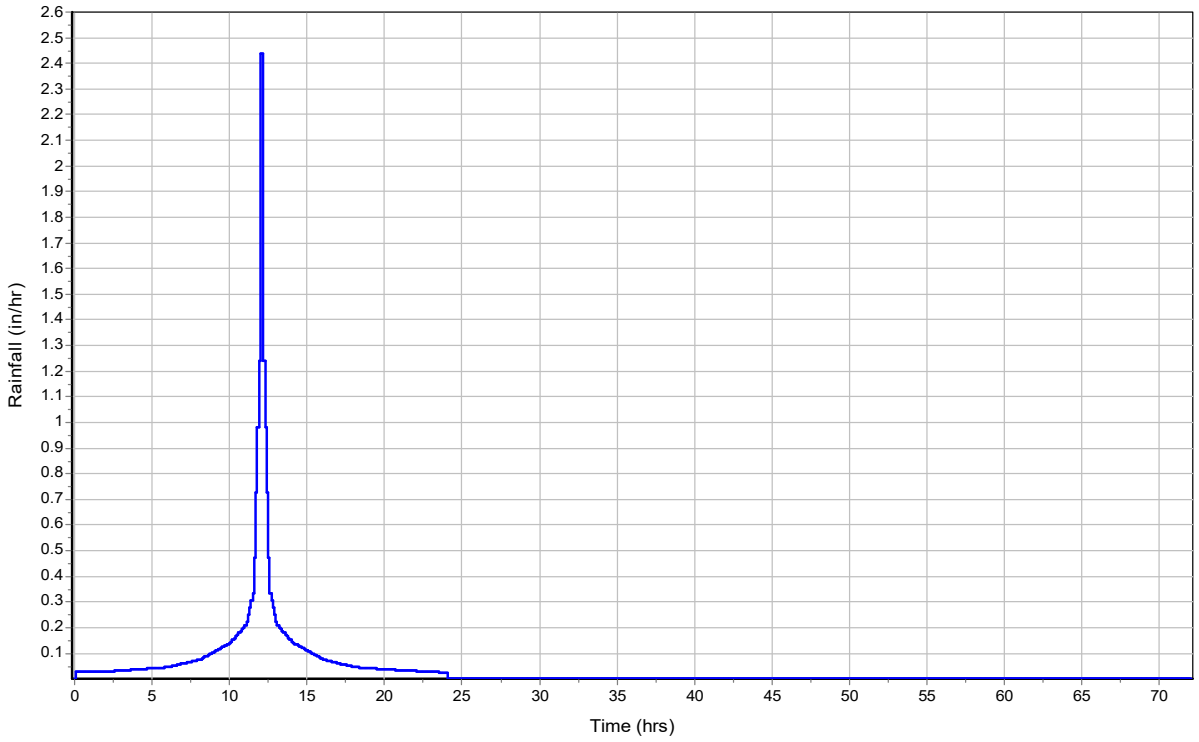
Total TOC (min) 11.27

Subbasin Runoff Results

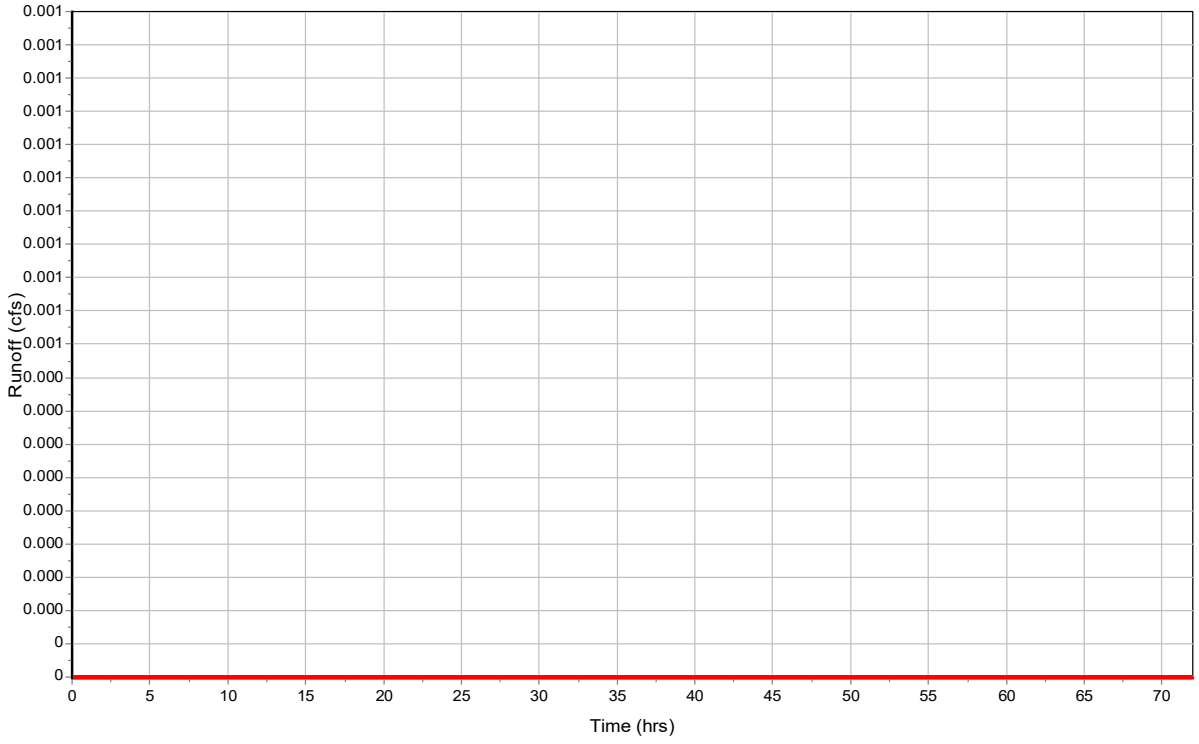
Total Rainfall (in)	2.9
Total Runoff (in)	0
Peak Runoff (cfs)	0
Weighted Curve Number	39
Time of Concentration (days hh:mm:ss)	0 00:11:16

Subbasin : CB-19-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-1-DA

Input Data

Area (ac)	0.41
Peak Rate Factor	484
Weighted Curve Number	87
Rain Gage ID	*

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	0.41	-	87
Composite Area & Weighted CN	0.41		87

Time of Concentration

	Subarea	Subarea	Subarea
Sheet Flow Computations	A	B	C
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	20	0	0
Slope (%) :	2	0	0
2 yr, 24 hr Rainfall (in) :	2.9	0	0
Velocity (ft/sec) :	0.05	0	0
Computed Flow Time (min) :	6.22	0	0

	Subarea	Subarea	Subarea
Channel Flow Computations	A	B	C
Manning's Roughness :	0.013	0	0
Flow Length (ft) :	490	0	0
Channel Slope (%) :	4	0	0
Cross Section Area (ft^2) :	0.8	0	0
Wetted Perimeter (ft) :	0.5	0	0
Velocity (ft/sec) :	31.36	0	0
Computed Flow Time (min) :	0.26	0	0

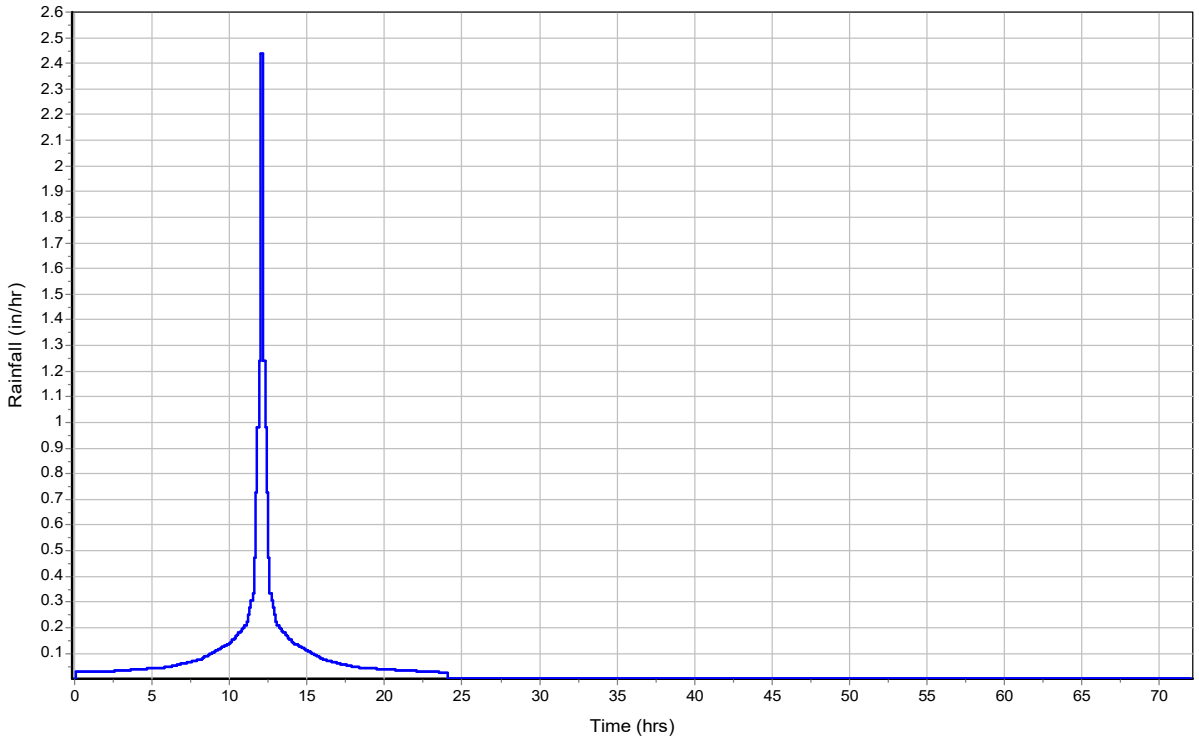
Total TOC (min) 6.49

Subbasin Runoff Results

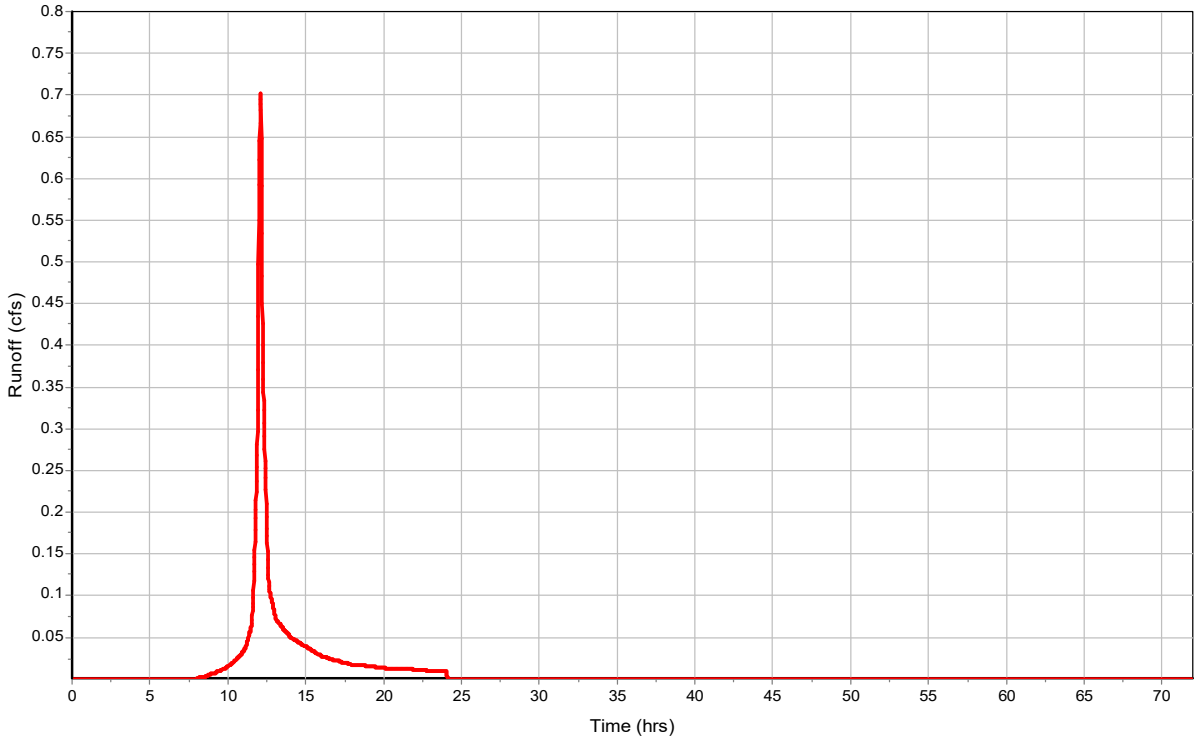
Total Rainfall (in)	2.9
Total Runoff (in)	1.65
Peak Runoff (cfs)	0.7
Weighted Curve Number	87
Time of Concentration (days hh:mm:ss)	0 00:06:29

Subbasin : CB-1-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-20-DA

Input Data

Area (ac)	0.24
Peak Rate Factor	484
Weighted Curve Number	95
Rain Gage ID	*

Composite Curve Number

Soil/Surface Description	32 Area (acres)	Soil Group	Curve Number
-	0.24	-	95
Composite Area & Weighted CN	0.24		95

Time of Concentration

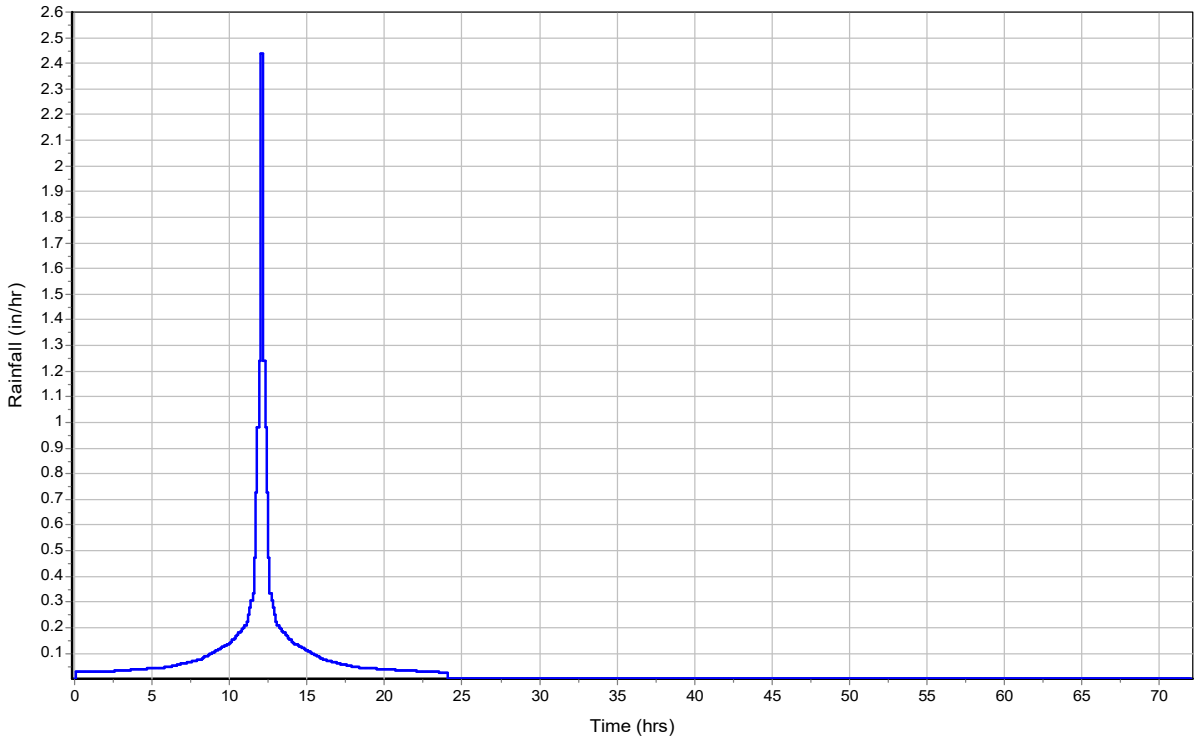
User-Defined TOC override (minutes): 6

Subbasin Runoff Results

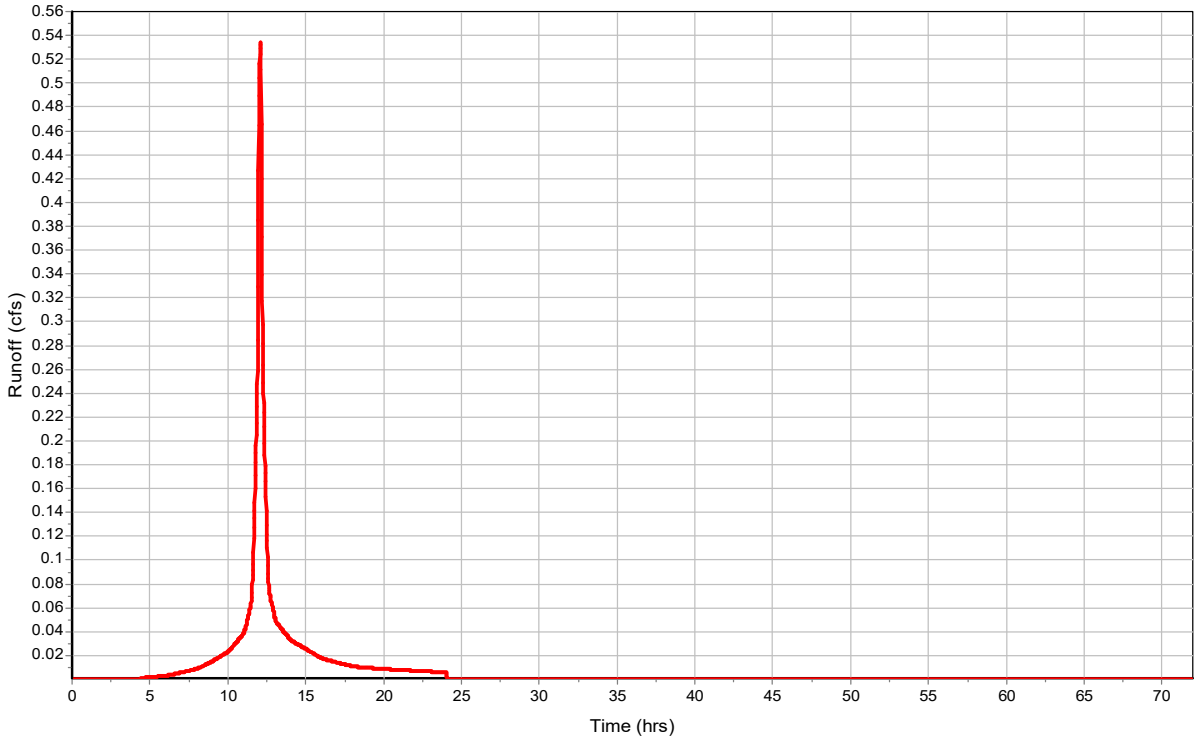
Total Rainfall (in)	2.9
Total Runoff (in)	2.35
Peak Runoff (cfs)	0.53
Weighted Curve Number	95
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : CB-20-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-21-DA

Input Data

Area (ac)	0.21
Peak Rate Factor	484
Weighted Curve Number	97
Rain Gage ID	*

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.21	-	97
Composite Area & Weighted CN	0.21		97

Time of Concentration

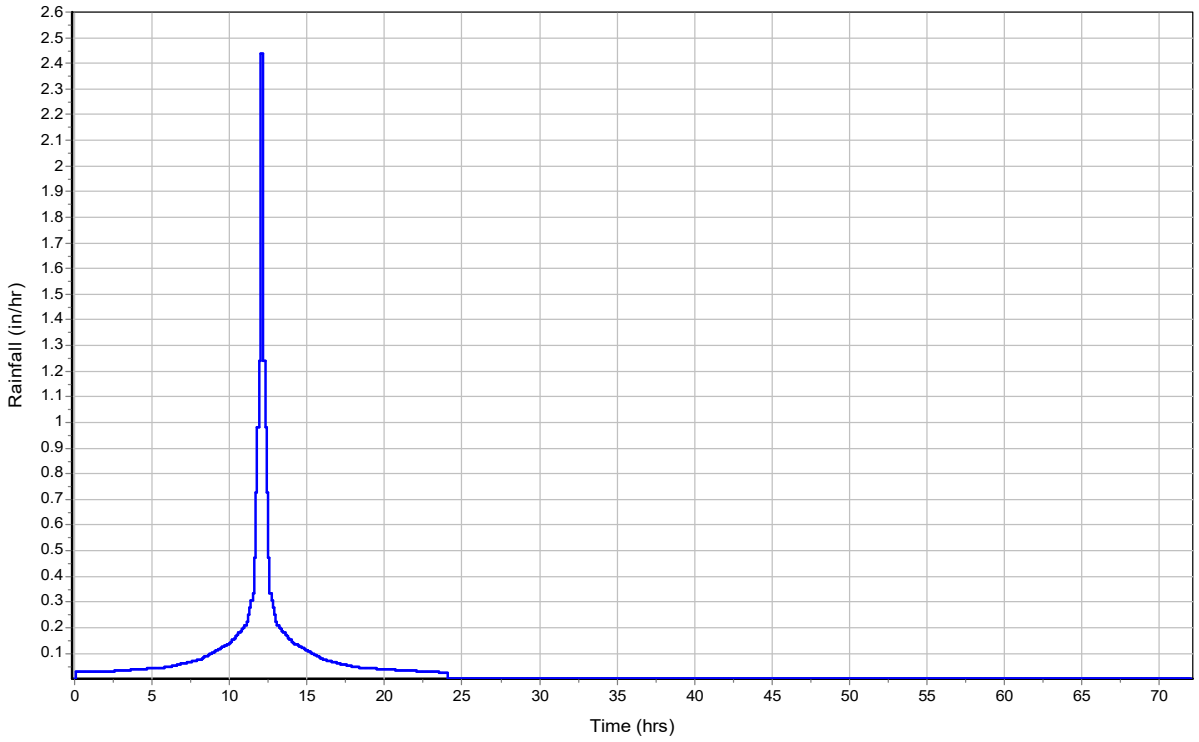
User-Defined TOC override (minutes): 6

Subbasin Runoff Results

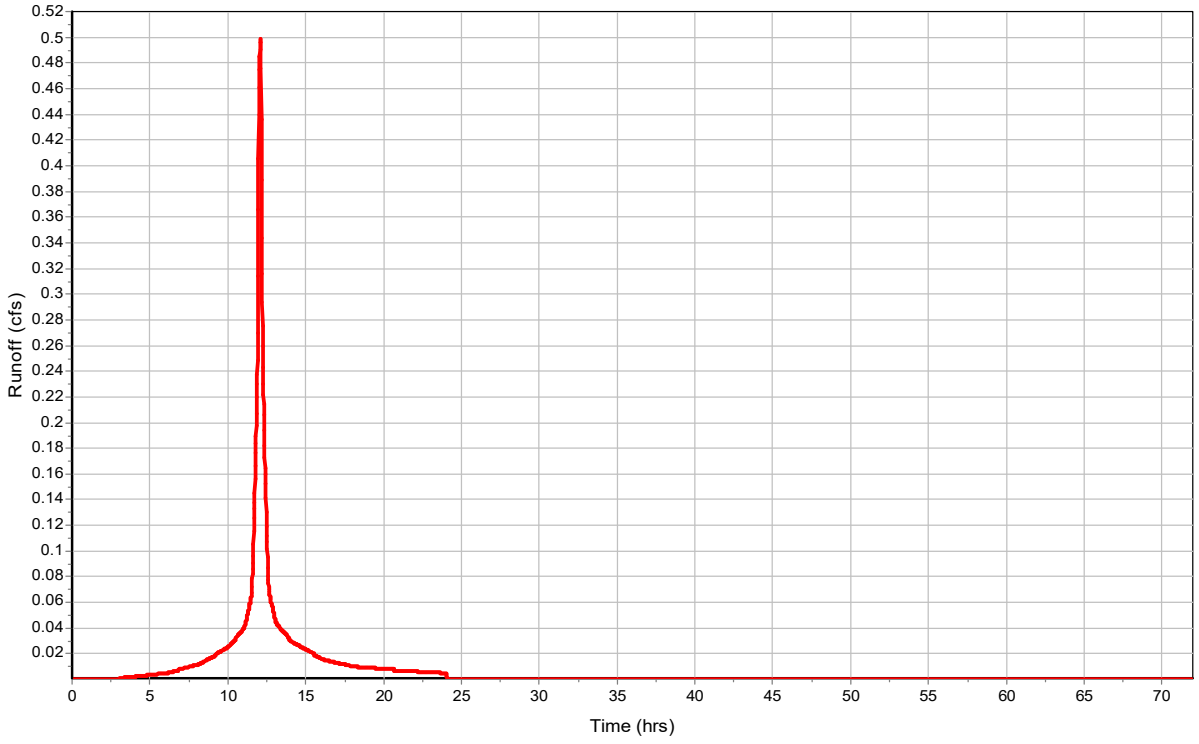
Total Rainfall (in)	2.9
Total Runoff (in)	2.56
Peak Runoff (cfs)	0.5
Weighted Curve Number	97
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : CB-21-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-23-DA

Input Data

Area (ac)	0.13
Peak Rate Factor	484
Weighted Curve Number	91
Rain Gage ID	*

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.13	-	91
Composite Area & Weighted CN	0.13		91

32

Time of Concentration

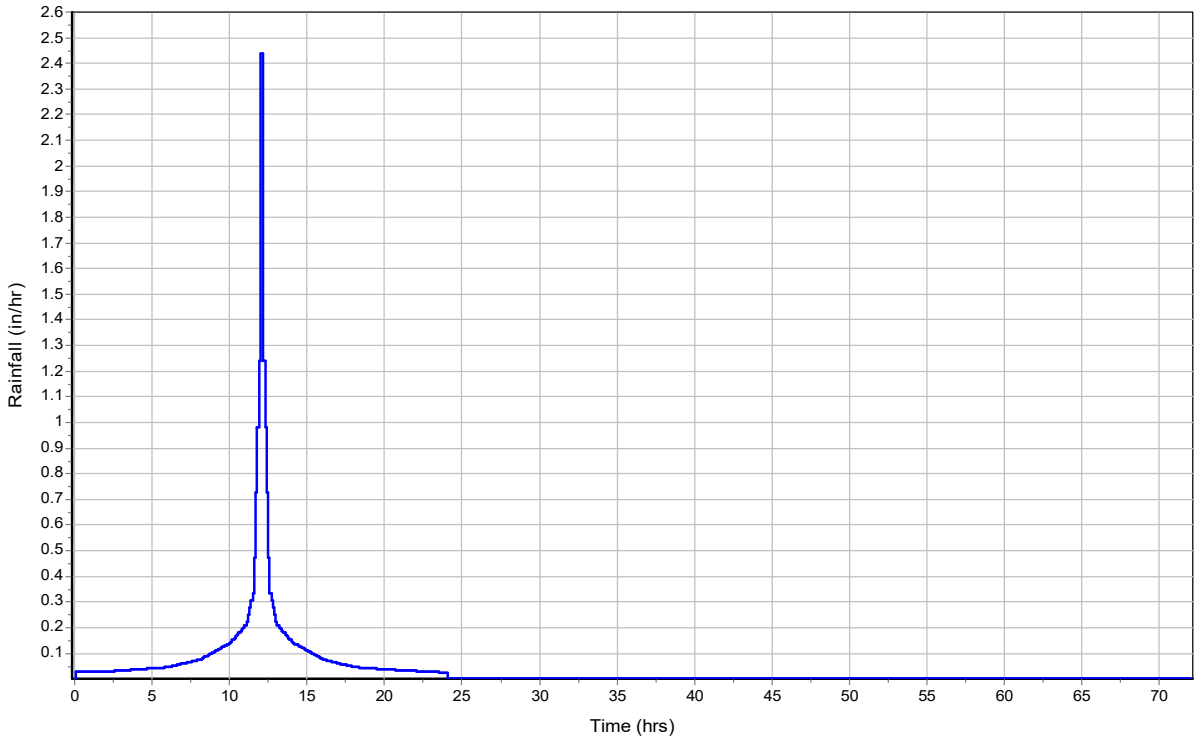
User-Defined TOC override (minutes): 6

Subbasin Runoff Results

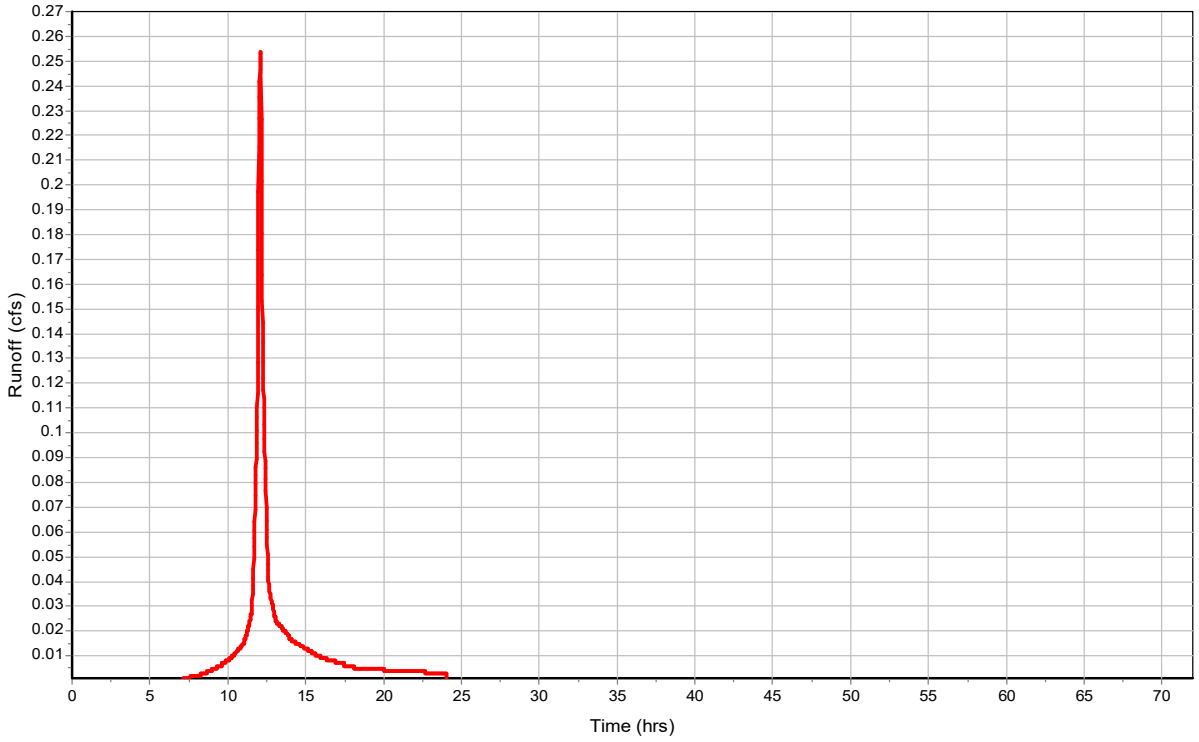
Total Rainfall (in)	2.9
Total Runoff (in)	1.97
Peak Runoff (cfs)	0.25
Weighted Curve Number	91
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : CB-23-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-24-DA

Input Data

Area (ac)	0.17
Peak Rate Factor	484
Weighted Curve Number	91
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.17	-	91
Composite Area & Weighted CN	0.17		91

Time of Concentration

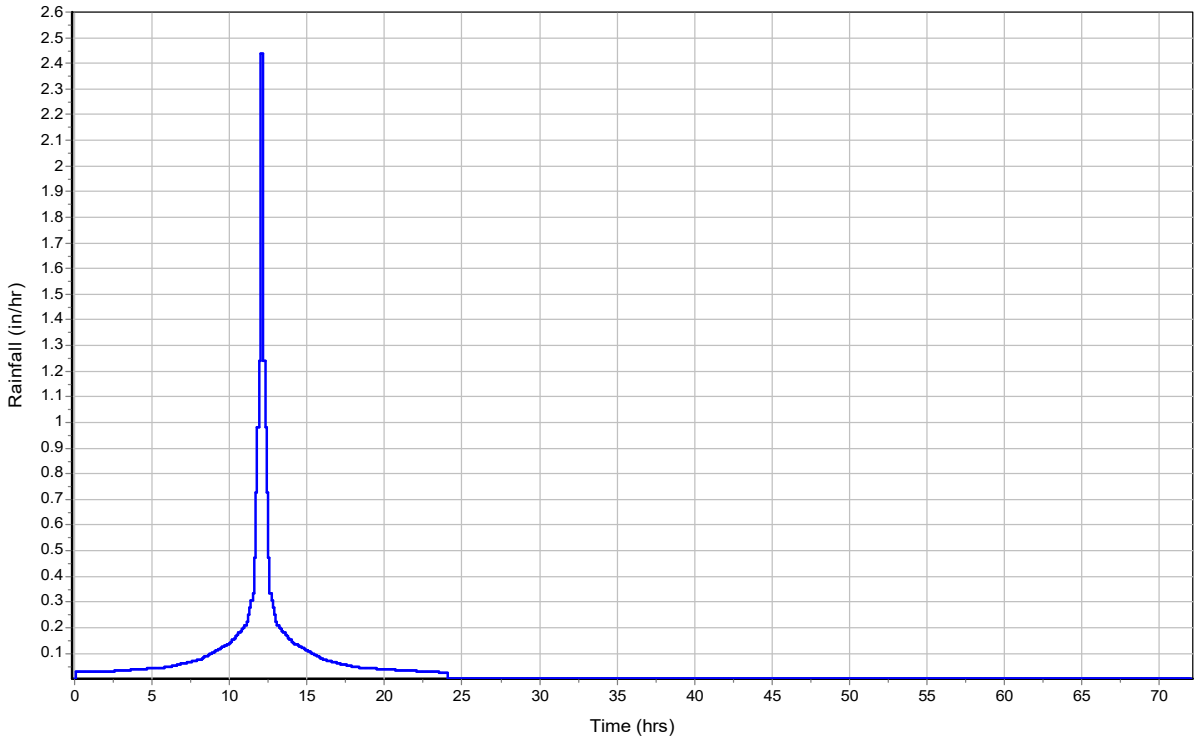
User-Defined TOC override (minutes): 6

Subbasin Runoff Results

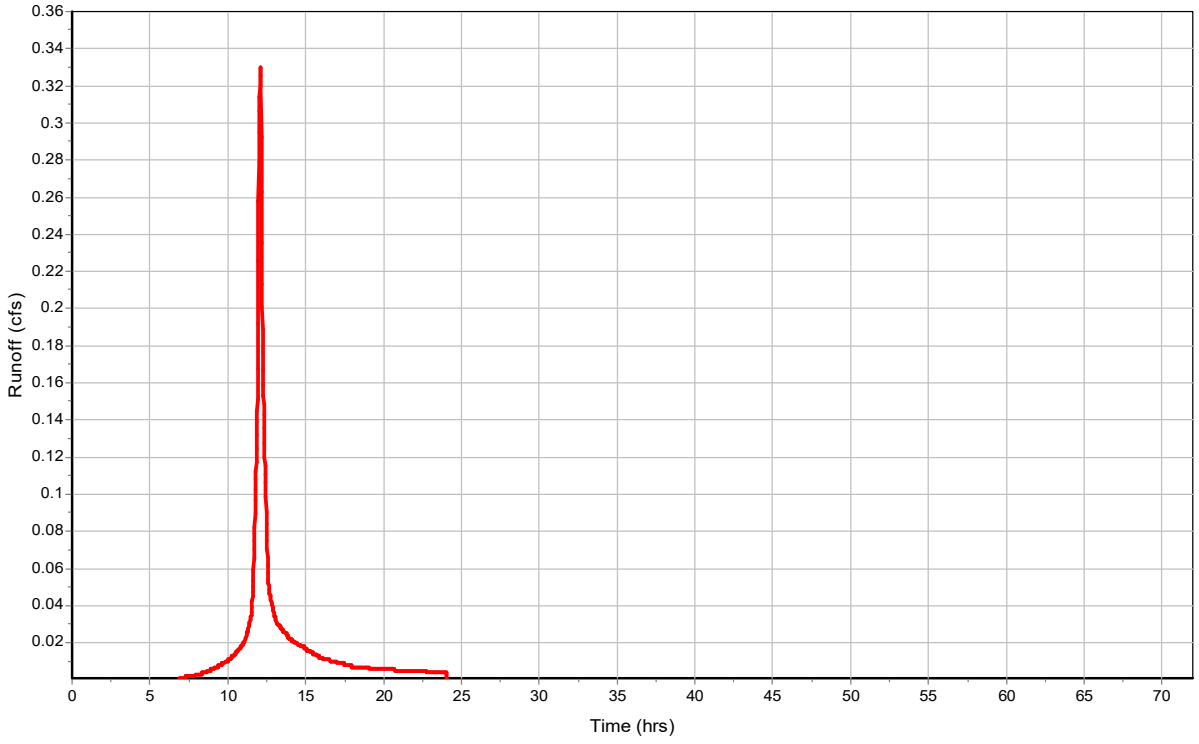
Total Rainfall (in)	2.9
Total Runoff (in)	1.98
Peak Runoff (cfs)	0.33
Weighted Curve Number	91
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : CB-24-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-25-DA

Input Data

Area (ac)	0.72
Peak Rate Factor	484
Weighted Curve Number	52
Rain Gage ID	*

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	0.72	-	52
Composite Area & Weighted CN	0.72		52

Time of Concentration

	Subarea	Subarea	Subarea
Sheet Flow Computations	A	B	C
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	50	0	0
Slope (%) :	6	0	0
2 yr, 24 hr Rainfall (in) :	2.9	0	0
Velocity (ft/sec) :	0.1	0	0
Computed Flow Time (min) :	8.35	0	0

	Subarea	Subarea	Subarea
Channel Flow Computations	A	B	C
Manning's Roughness :	0.027	0	0
Flow Length (ft) :	252	0	0
Channel Slope (%) :	5.5	0	0
Cross Section Area (ft^2) :	2.7	0	0
Wetted Perimeter (ft) :	0.7	0	0
Velocity (ft/sec) :	31.83	0	0
Computed Flow Time (min) :	0.13	0	0

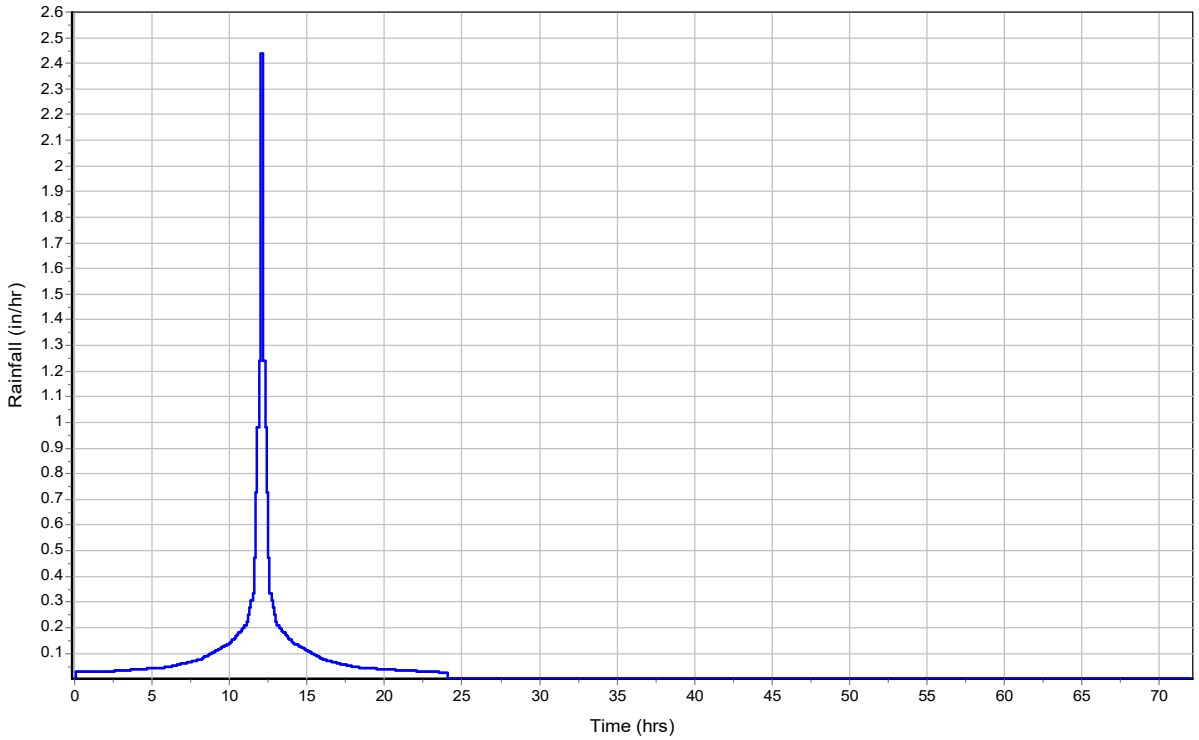
Total TOC (min) 8.48

Subbasin Runoff Results

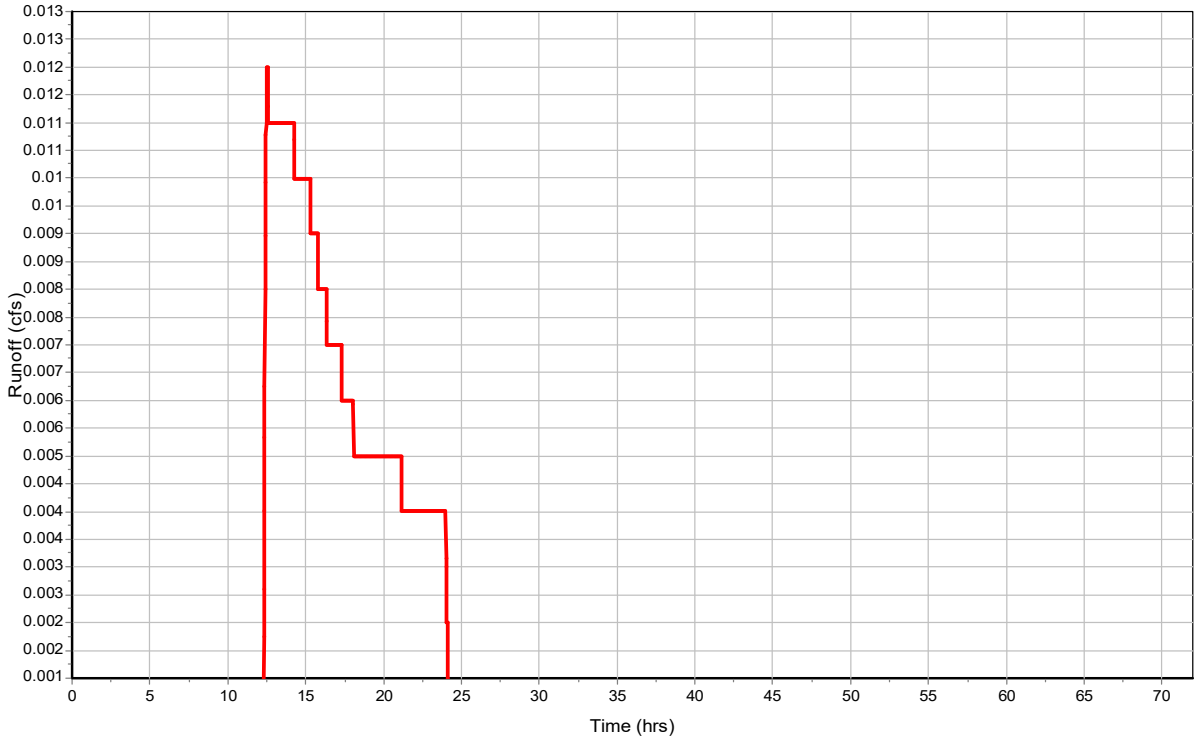
Total Rainfall (in)	2.9
Total Runoff (in)	0.11
Peak Runoff (cfs)	0.01
Weighted Curve Number	52
Time of Concentration (days hh:mm:ss)	0 00:08:29

Subbasin : CB-25-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-26-DA

Input Data

Area (ac)	0.19
Peak Rate Factor	484
Weighted Curve Number	39
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.19	-	39
Composite Area & Weighted CN	0.19		39

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	50	0	0
Slope (%) :	5.5	0	0
2 yr, 24 hr Rainfall (in) :	2.9	0	0
Velocity (ft/sec) :	0.1	0	0
Computed Flow Time (min) :	8.64	0	0

Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.027	0	0
Flow Length (ft) :	120	0	0
Channel Slope (%) :	5.2	0	0
Cross Section Area (ft^2) :	2.4	0	0
Wetted Perimeter (ft) :	0.8	0	0
Velocity (ft/sec) :	26.18	0	0
Computed Flow Time (min) :	0.08	0	0

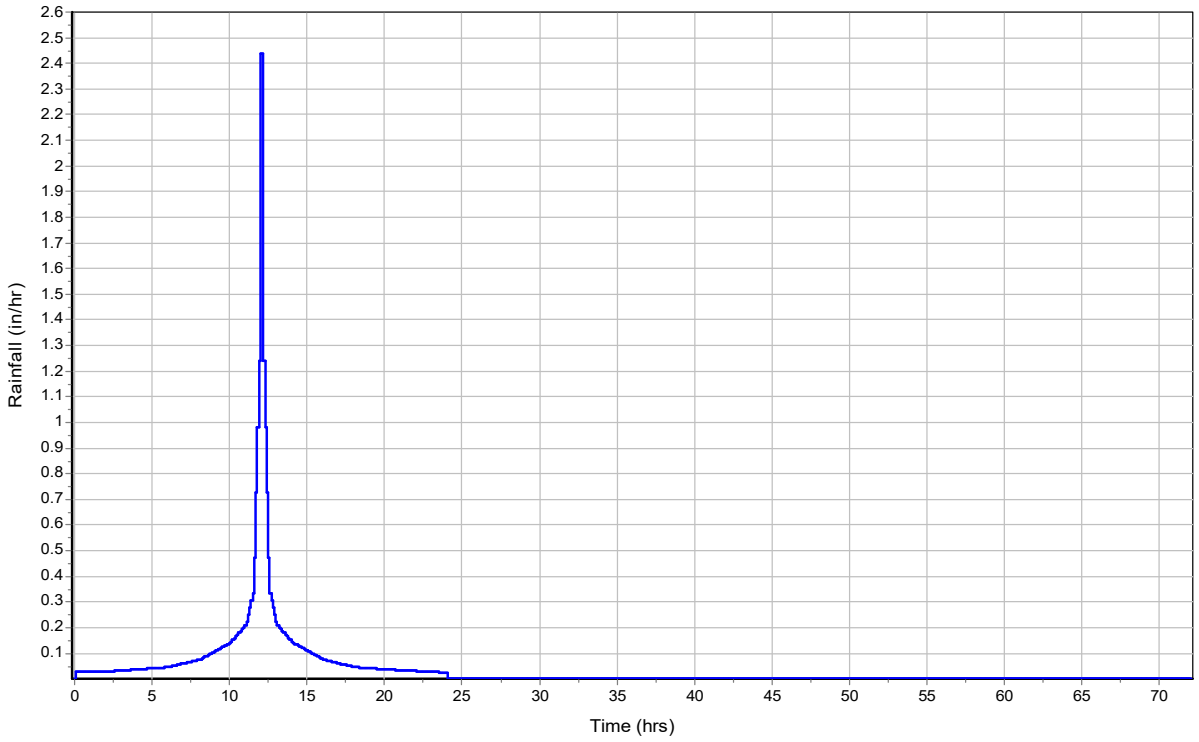
Total TOC (min) 8.72

Subbasin Runoff Results

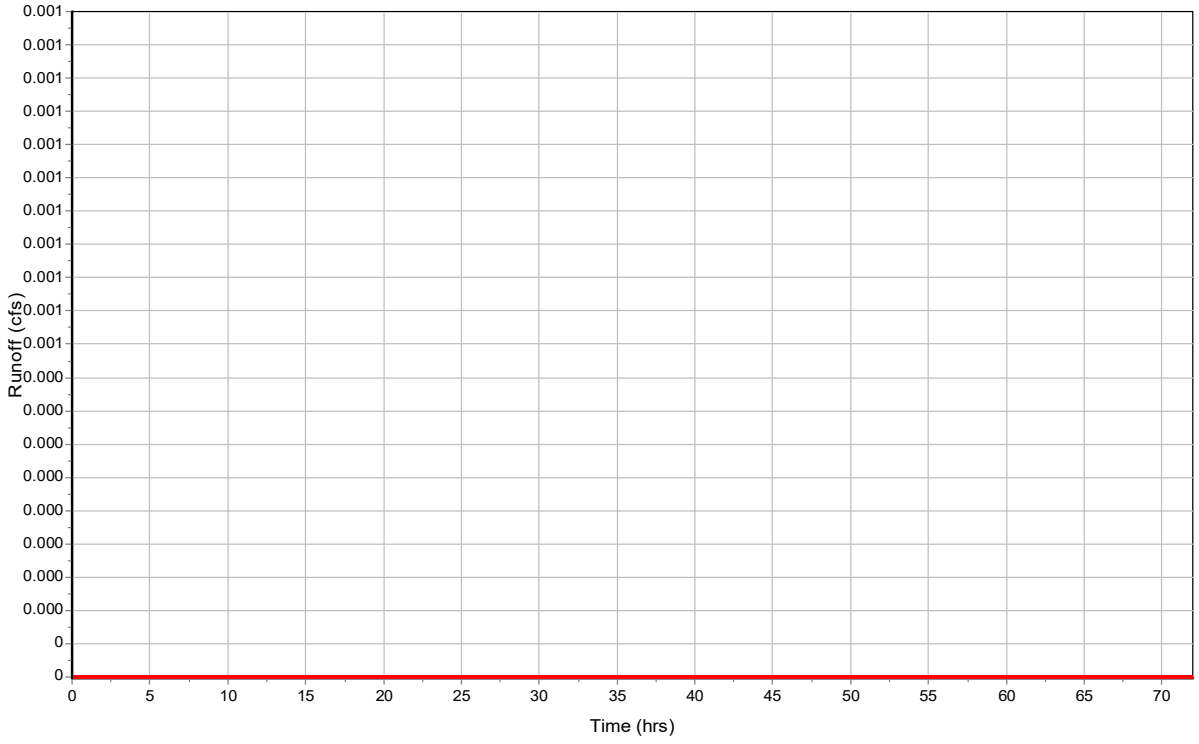
Total Rainfall (in)	2.9
Total Runoff (in)	0
Peak Runoff (cfs)	0
Weighted Curve Number	39
Time of Concentration (days hh:mm:ss)	0 00:08:43

Subbasin : CB-26-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-27-DA

Input Data

Area (ac)	0.15
Peak Rate Factor	484
Weighted Curve Number	96
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.15	-	96
Composite Area & Weighted CN	0.15		96

Time of Concentration

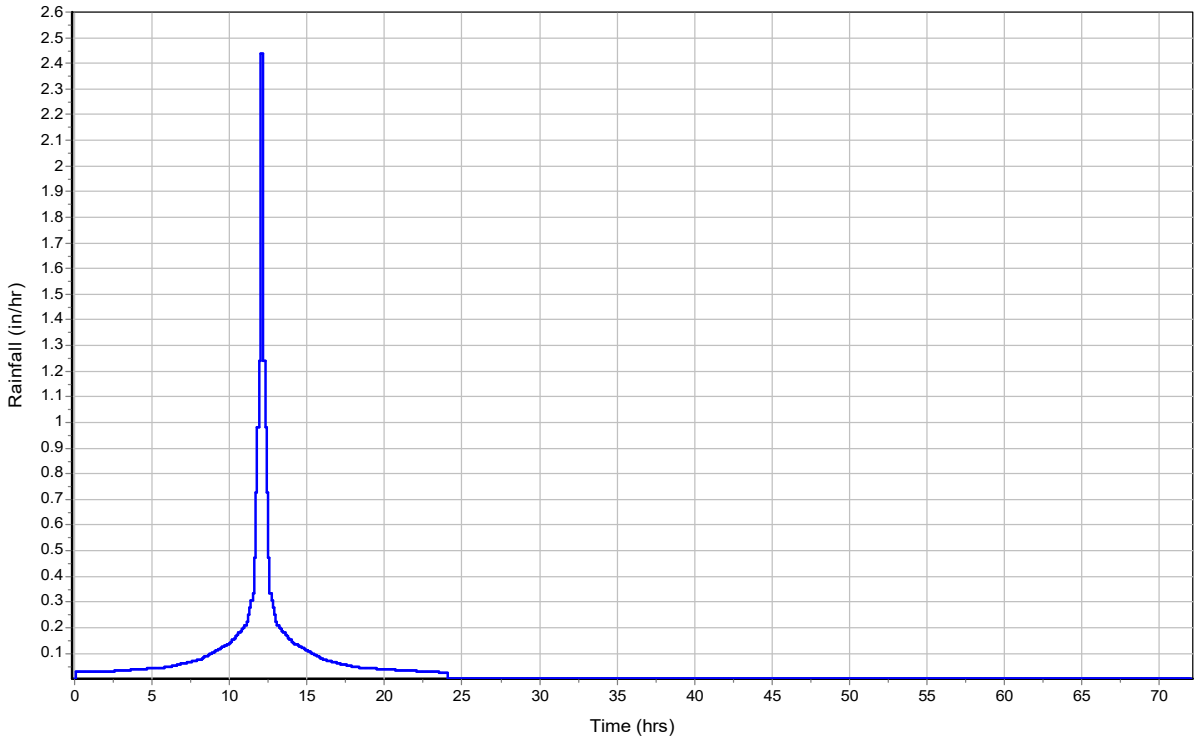
User-Defined TOC override (minutes): 6.00

Subbasin Runoff Results

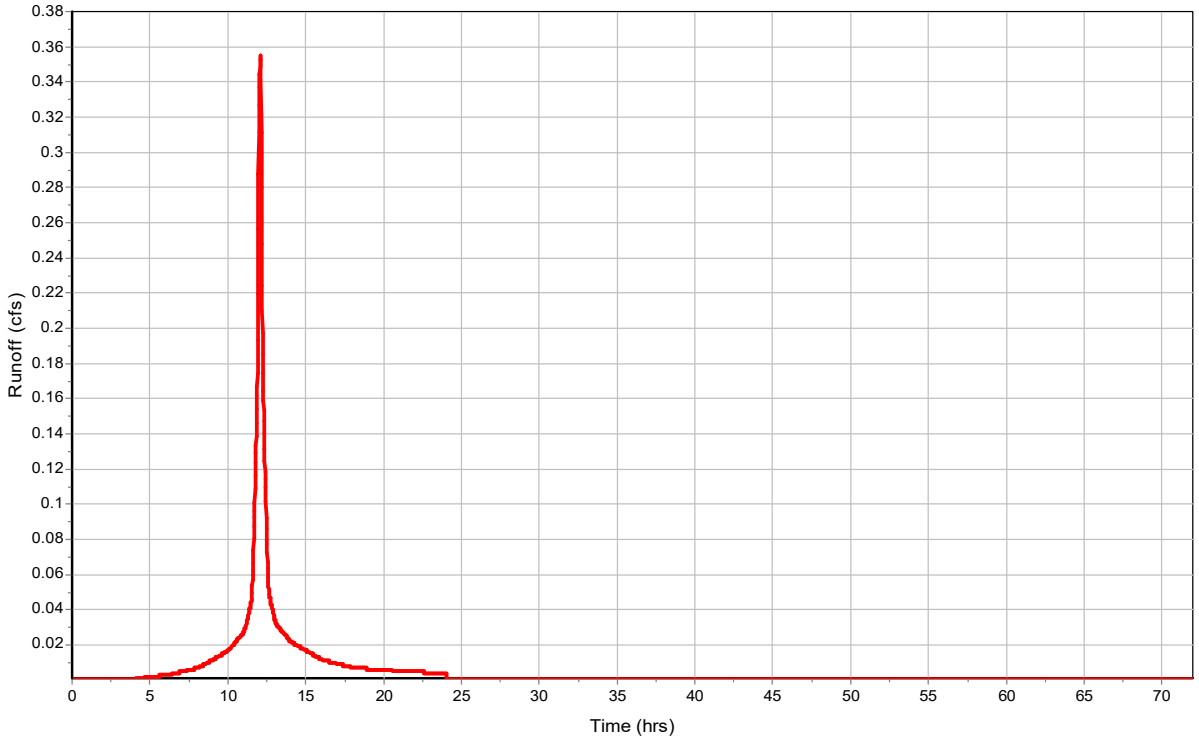
Total Rainfall (in)	2.9
Total Runoff (in)	2.45
Peak Runoff (cfs)	0.36
Weighted Curve Number	96
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : CB-27-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-28-DA

Input Data

Area (ac)	0.97
Peak Rate Factor	484
Weighted Curve Number	30
Rain Gage ID	*

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	0.97	-	30
Composite Area & Weighted CN	0.97		30

Time of Concentration

	Subarea	Subarea	Subarea
Sheet Flow Computations	A	B	C
Manning's Roughness :	0.6	0	0
Flow Length (ft) :	50	0	0
Slope (%) :	3	0	0
2 yr, 24 hr Rainfall (in) :	2.9	0	0
Velocity (ft/sec) :	0.05	0	0
Computed Flow Time (min) :	15.24	0	0

	Subarea	Subarea	Subarea
Shallow Concentrated Flow Computations	A	B	C
Flow Length (ft) :	80	0	0
Slope (%) :	5	0	0
Surface Type :	Woodland	Unpaved	Unpaved
Velocity (ft/sec) :	1.12	0	0
Computed Flow Time (min) :	1.19	0	0

	Subarea	Subarea	Subarea
Channel Flow Computations	A	B	C
Manning's Roughness :	0.027	0	0
Flow Length (ft) :	250	0	0
Channel Slope (%) :	5	0	0
Cross Section Area (ft^2) :	4	0	0
Wetted Perimeter (ft) :	0.7	0	0
Velocity (ft/sec) :	39.44	0	0
Computed Flow Time (min) :	0.11	0	0

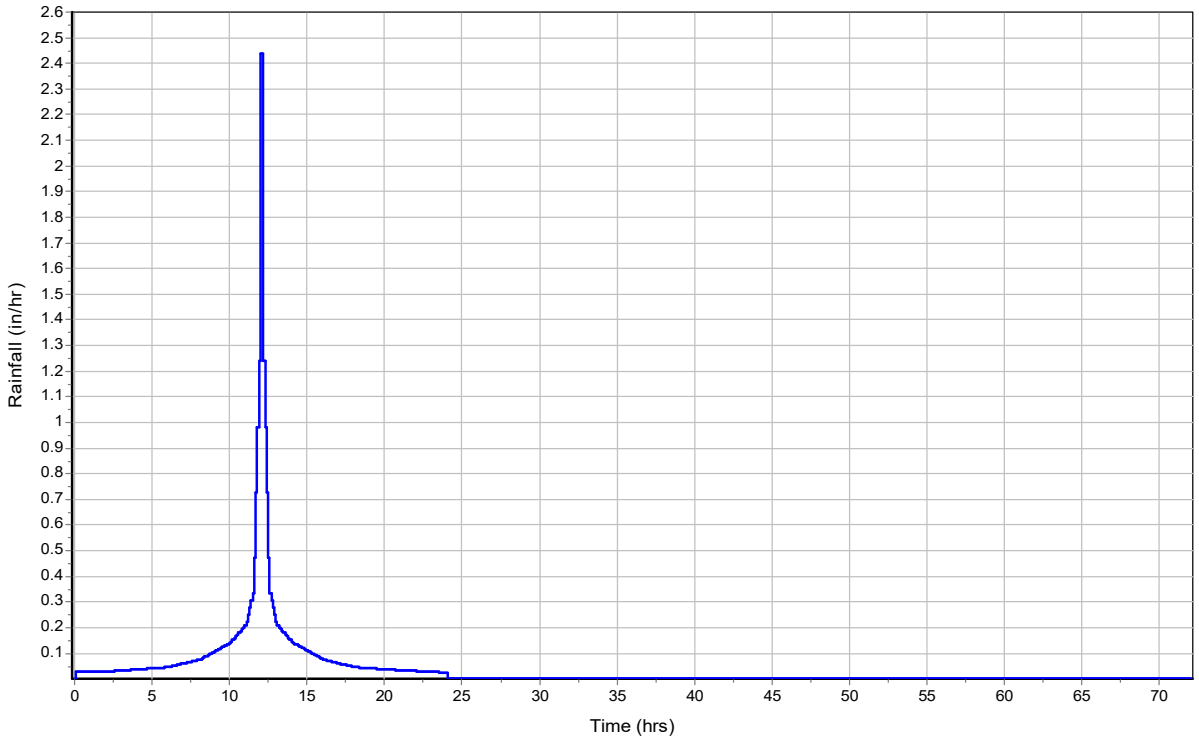
Total TOC (min) 16.53

Subbasin Runoff Results

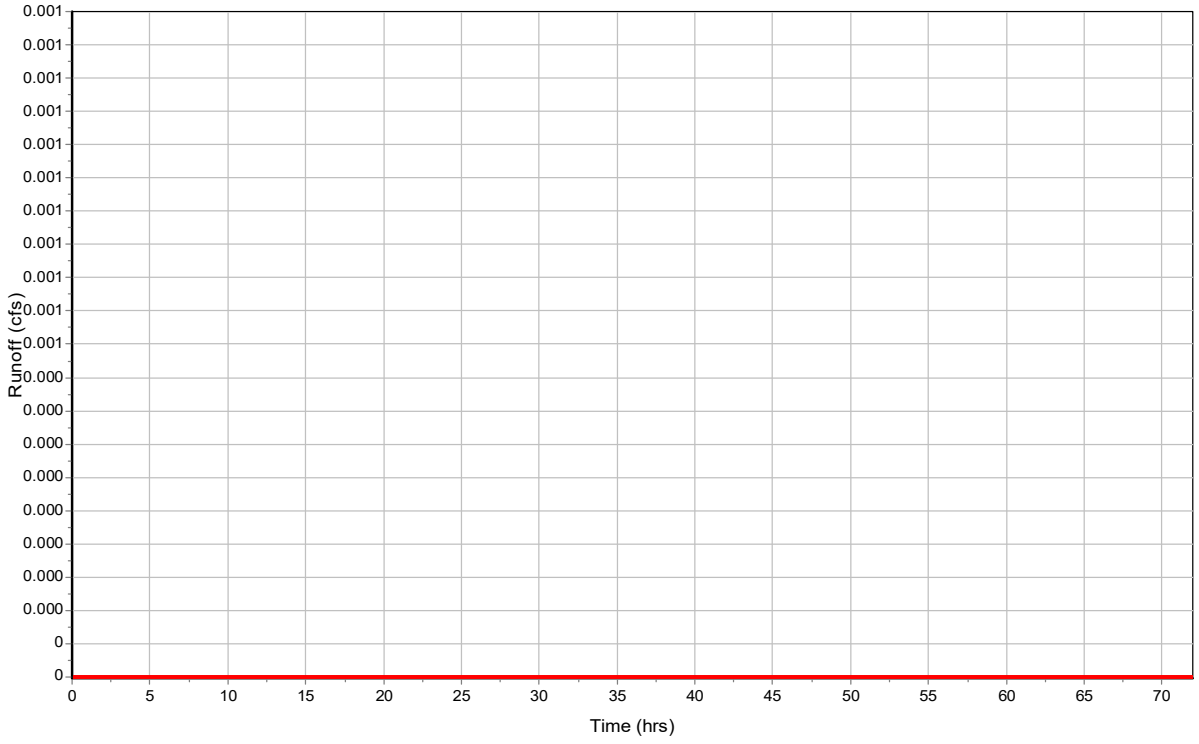
Total Rainfall (in)	2.9
Total Runoff (in)	0
Peak Runoff (cfs)	0
Weighted Curve Number	30
Time of Concentration (days hh:mm:ss)	0 00:16:32

Subbasin : CB-28-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-2-DA

Input Data

Area (ac)	0.57
Peak Rate Factor	484
Weighted Curve Number	68
Rain Gage ID	*

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	0.57	-	68
Composite Area & Weighted CN	0.57		68

Time of Concentration

	Subarea	Subarea	Subarea
Sheet Flow Computations	A	B	C
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	50	0	0
Slope (%) :	3	0	0
2 yr, 24 hr Rainfall (in) :	2.9	0	0
Velocity (ft/sec) :	0.08	0	0
Computed Flow Time (min) :	11.02	0	0

	Subarea	Subarea	Subarea
Channel Flow Computations	A	B	C
Manning's Roughness :	0.013	0	0
Flow Length (ft) :	480	0	0
Channel Slope (%) :	4	0	0
Cross Section Area (ft^2) :	0.8	0	0
Wetted Perimeter (ft) :	0.5	0	0
Velocity (ft/sec) :	31.36	0	0
Computed Flow Time (min) :	0.26	0	0

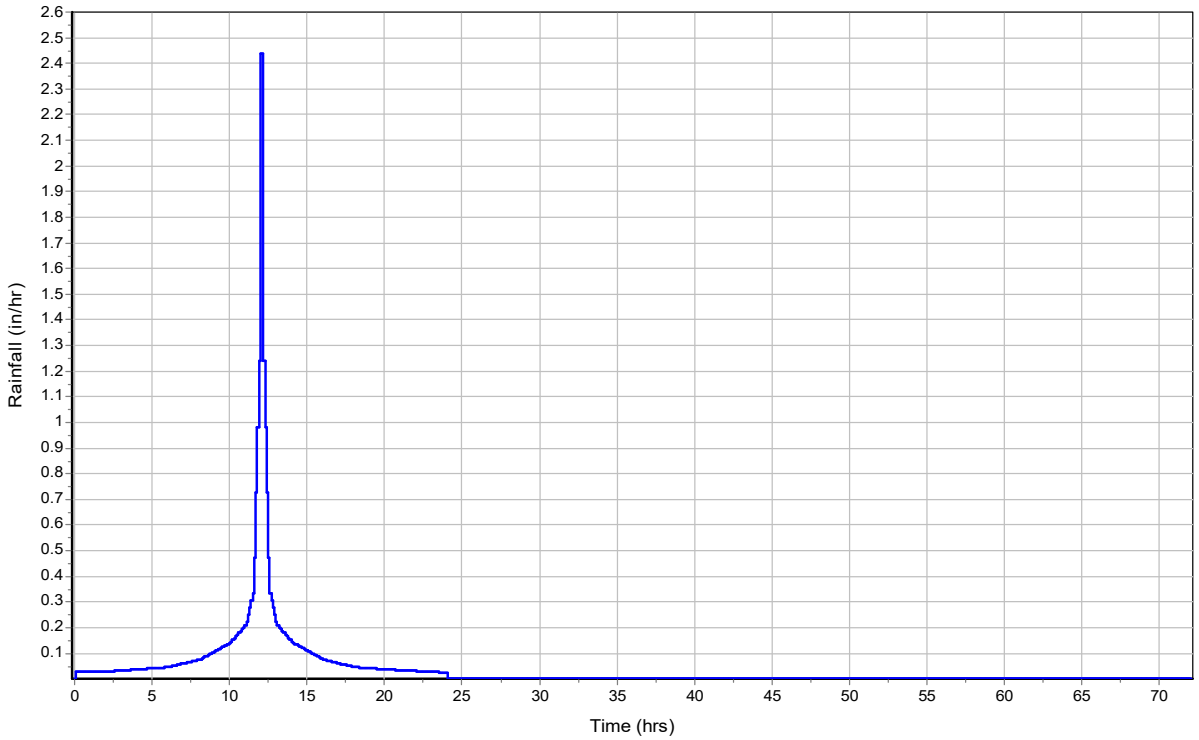
Total TOC (min) 11.27

Subbasin Runoff Results

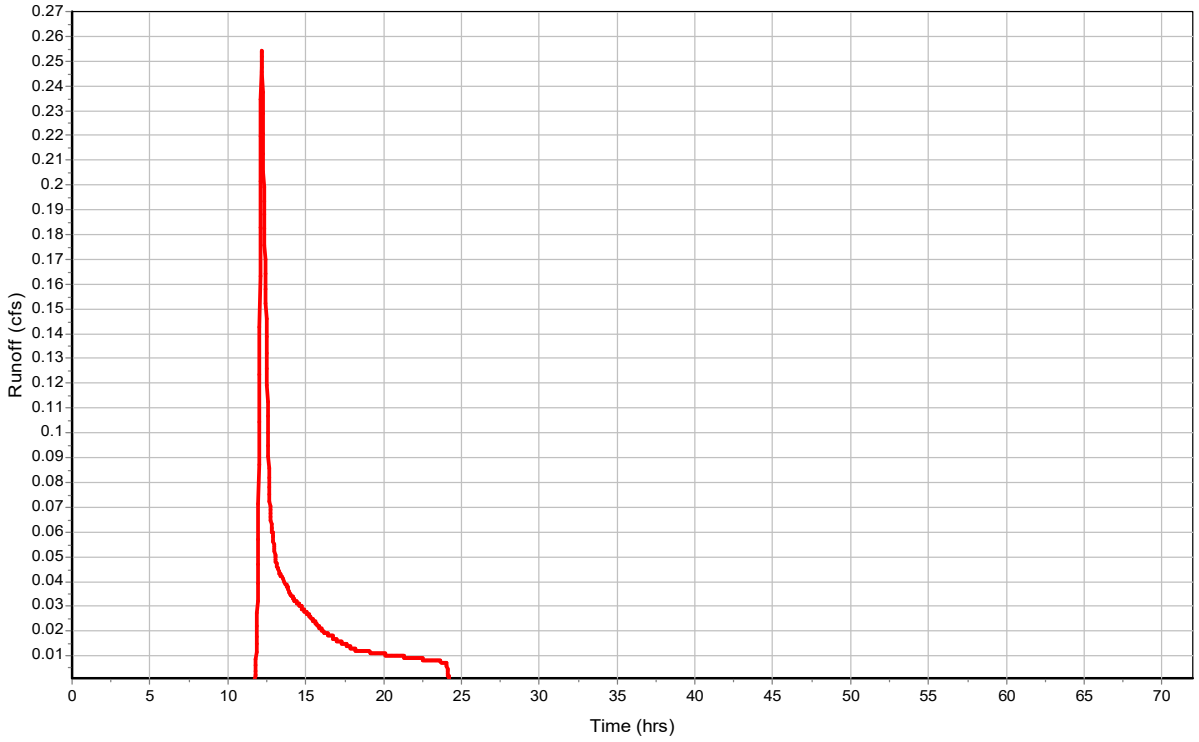
Total Rainfall (in)	2.9
Total Runoff (in)	0.58
Peak Runoff (cfs)	0.25
Weighted Curve Number	68
Time of Concentration (days hh:mm:ss)	0 00:11:16

Subbasin : CB-2-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-30-DA

Input Data

Area (ac)	0.24
Peak Rate Factor	484
Weighted Curve Number	96
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.24	-	96
Composite Area & Weighted CN	0.24		96

Time of Concentration

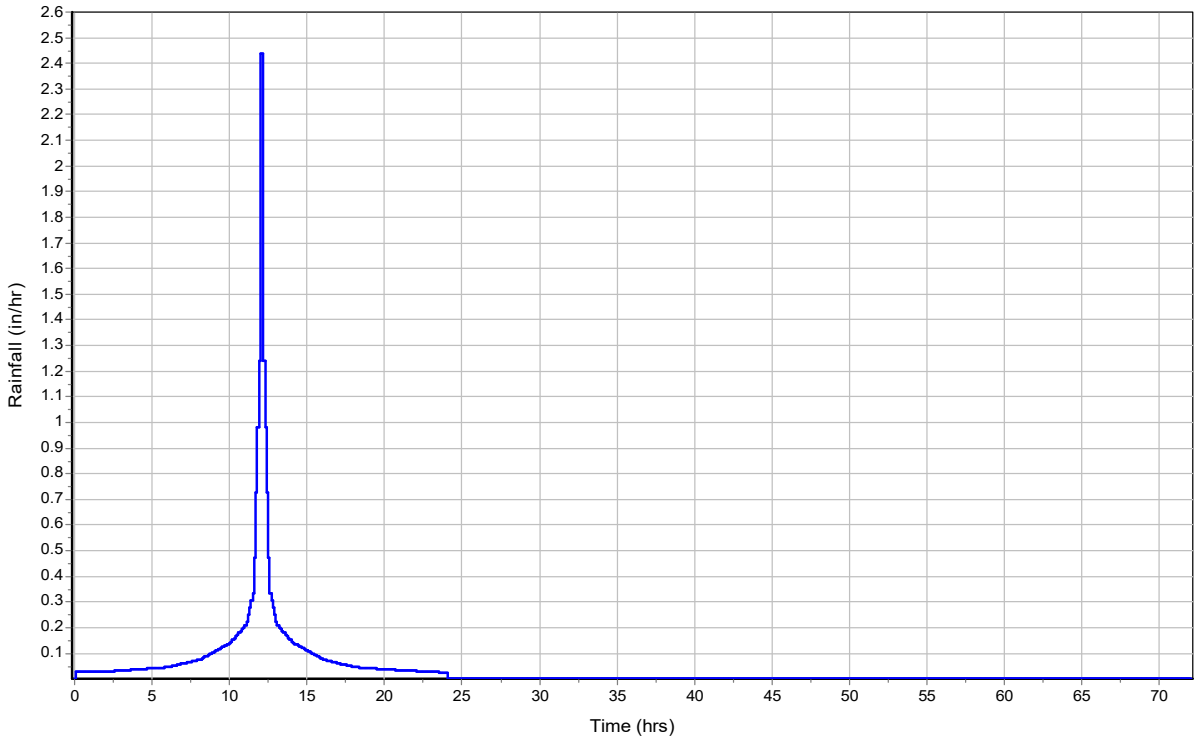
User-Defined TOC override (minutes): 6

Subbasin Runoff Results

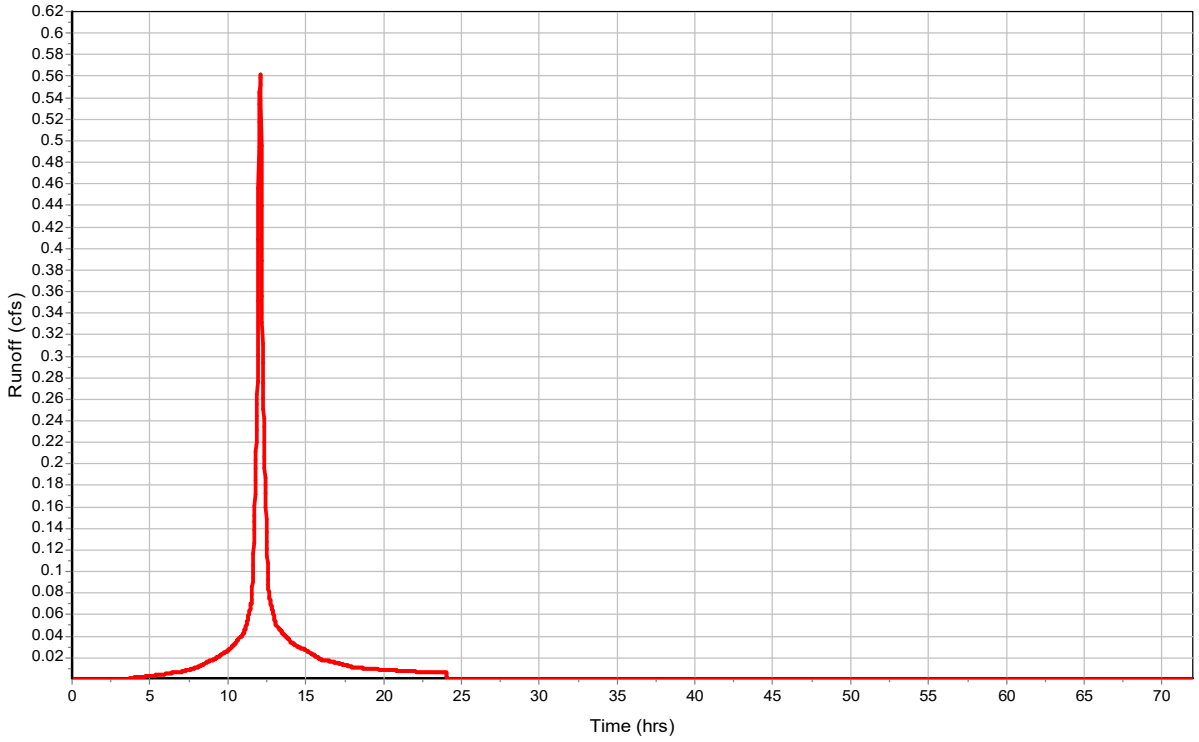
Total Rainfall (in)	2.9
Total Runoff (in)	2.45
Peak Runoff (cfs)	0.56
Weighted Curve Number	96
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : CB-30-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-32-DA

Input Data

Area (ac)	0.06
Peak Rate Factor	484
Weighted Curve Number	92
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.06	-	92
Composite Area & Weighted CN	0.06		92

Time of Concentration

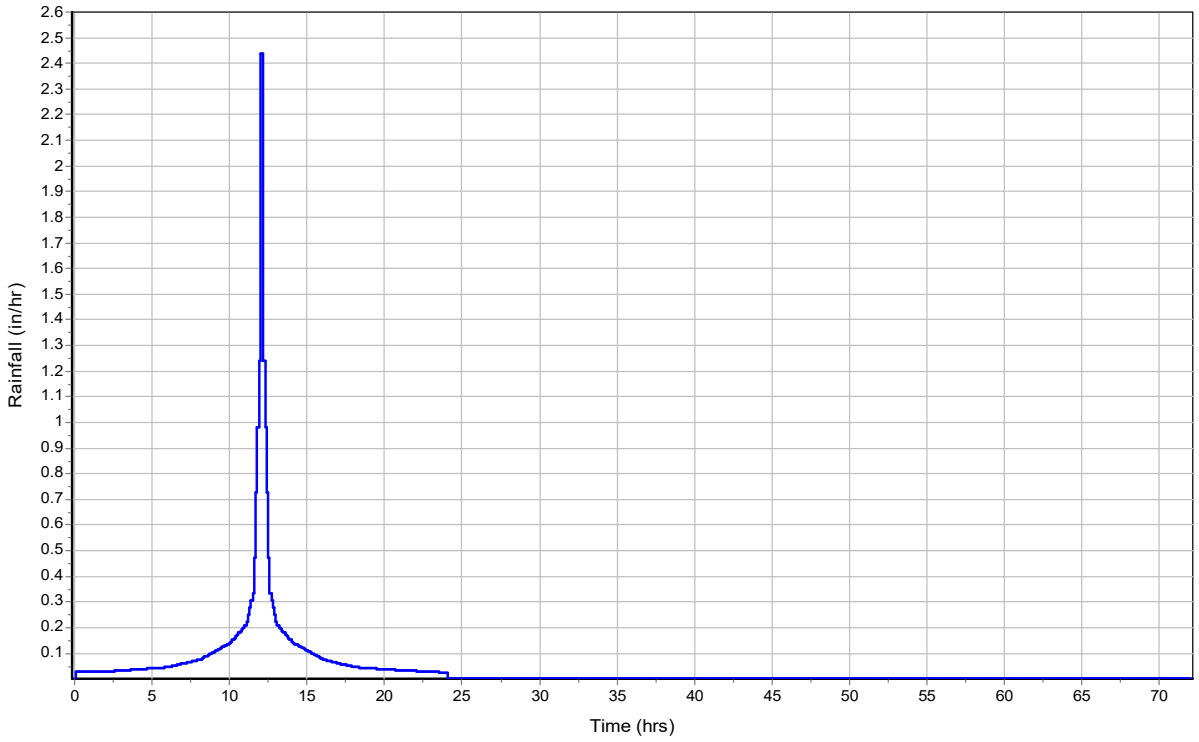
User-Defined TOC override (minutes): 6

Subbasin Runoff Results

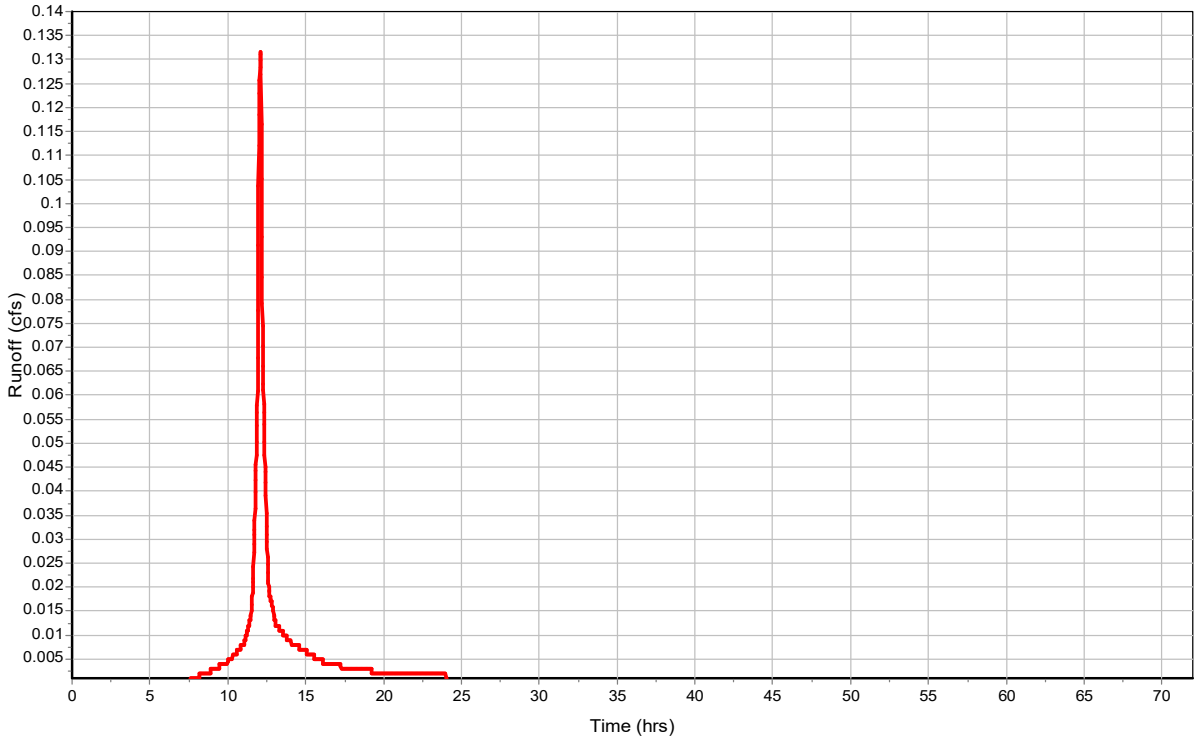
Total Rainfall (in)	2.9
Total Runoff (in)	2.05
Peak Runoff (cfs)	0.13
Weighted Curve Number	92
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : CB-32-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-33-DA

Input Data

Area (ac)		0.08
Peak Rate Factor		484
Weighted Curve Number		39
Rain Gage ID	*	

Composite Curve Number

Soil/Surface Description	32 Area (acres)	Soil Group	Curve Number
-	0.08	-	39
Composite Area & Weighted CN	0.08		39

Time of Concentration

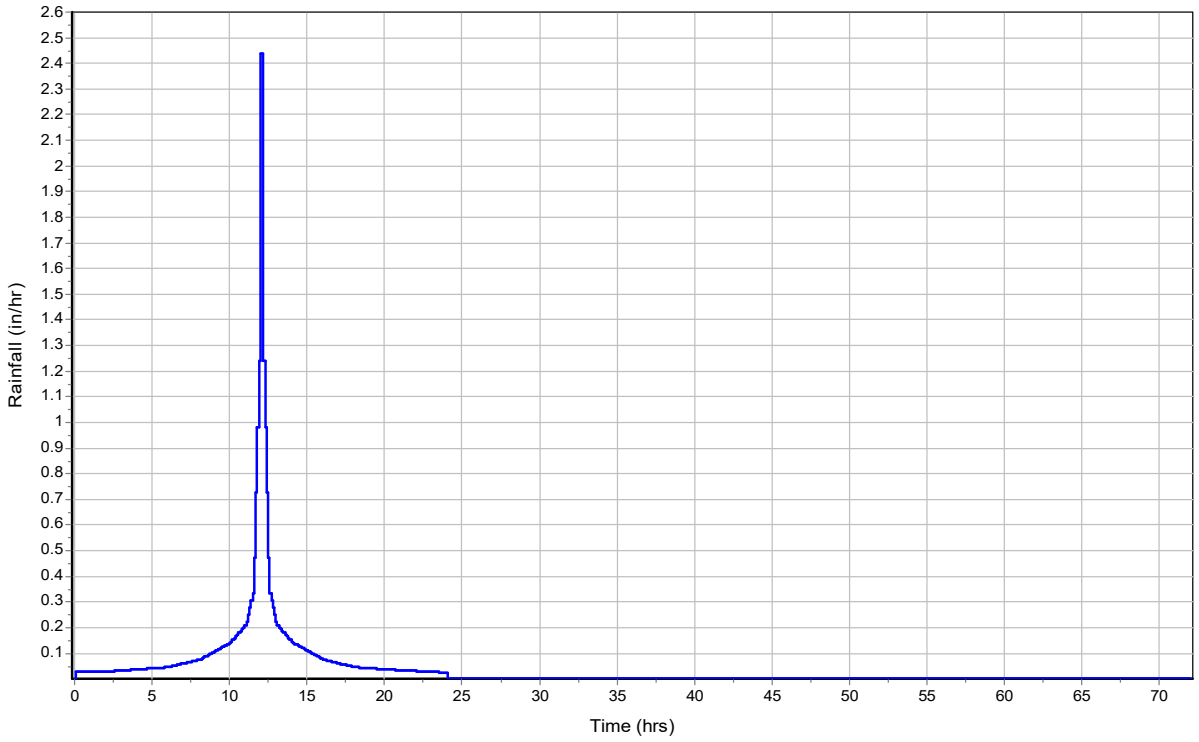
User-Defined TOC override (minutes): 6

Subbasin Runoff Results

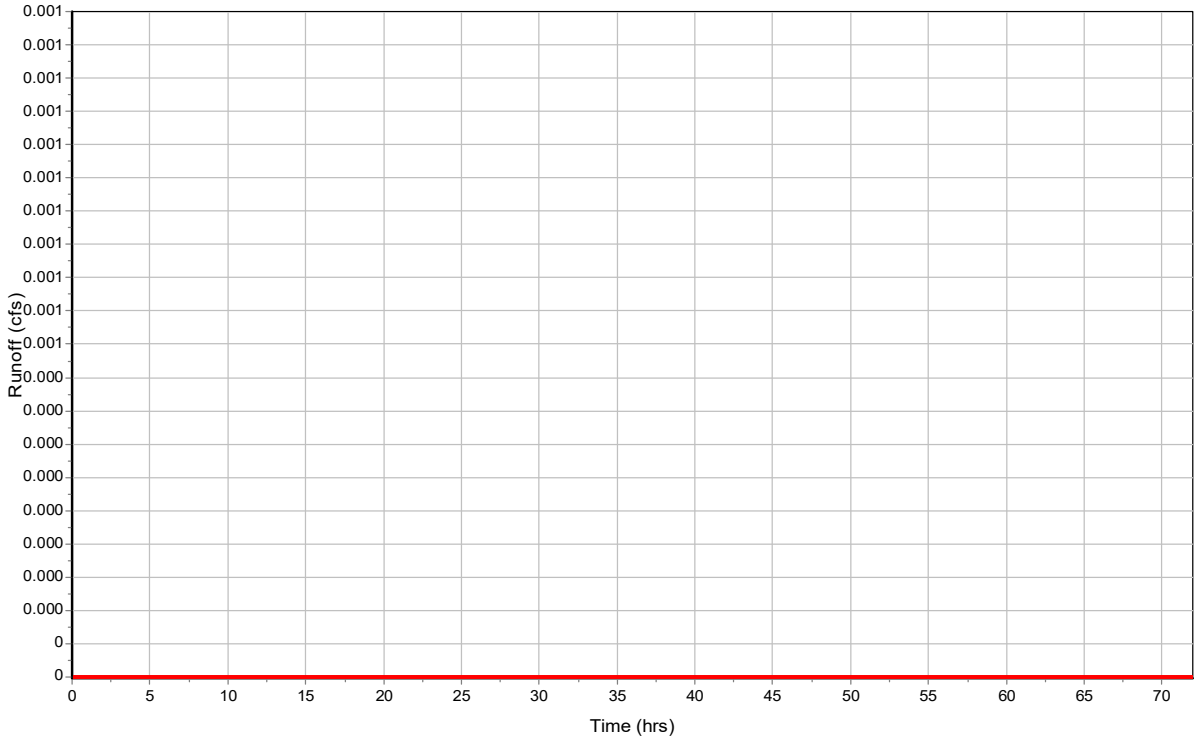
Total Rainfall (in)		2.9
Total Runoff (in)		0
Peak Runoff (cfs)		0
Weighted Curve Number		39
Time of Concentration (days hh:mm:ss)	0 00:06:00	

Subbasin : CB-33-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-34A-DA

Input Data

Area (ac)	0.14
Peak Rate Factor	484
Weighted Curve Number	39
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.14	-	39
Composite Area & Weighted CN	0.14		39

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	50	0	0
Slope (%) :	3	0	0
2 yr, 24 hr Rainfall (in) :	2.9	0	0
Velocity (ft/sec) :	0.08	0	0
Computed Flow Time (min) :	11.02	0	0

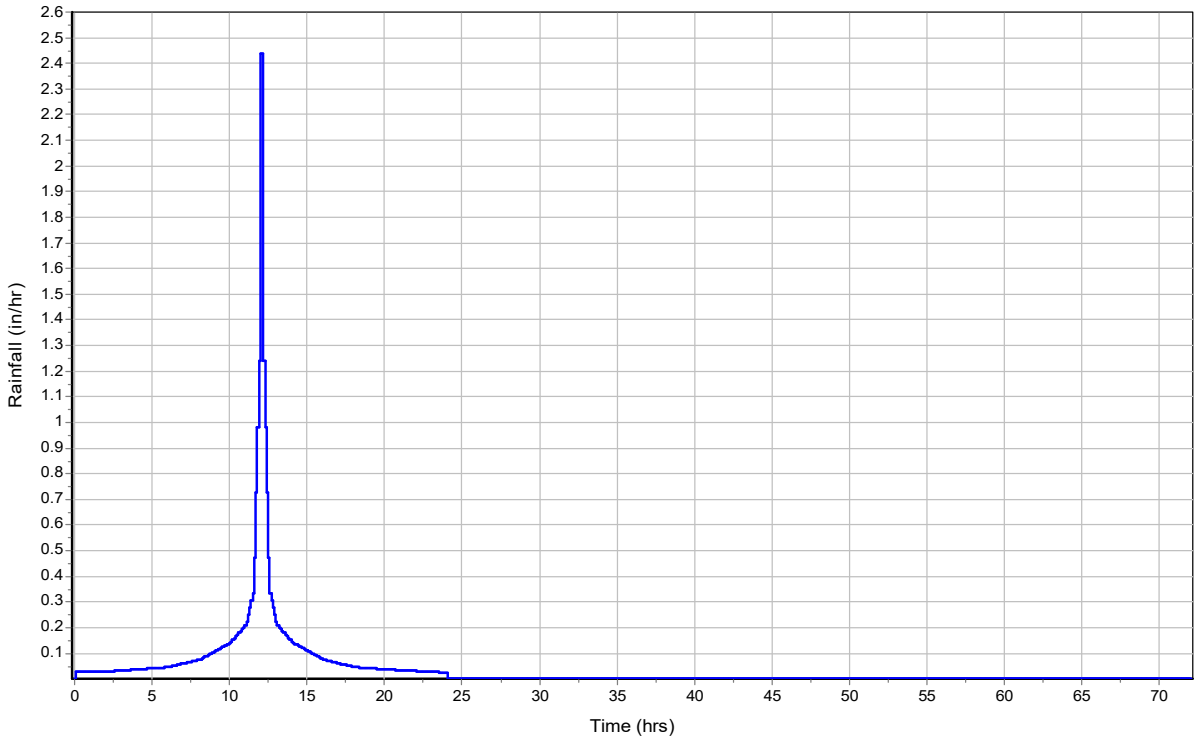
Total TOC (min) 11.02

Subbasin Runoff Results

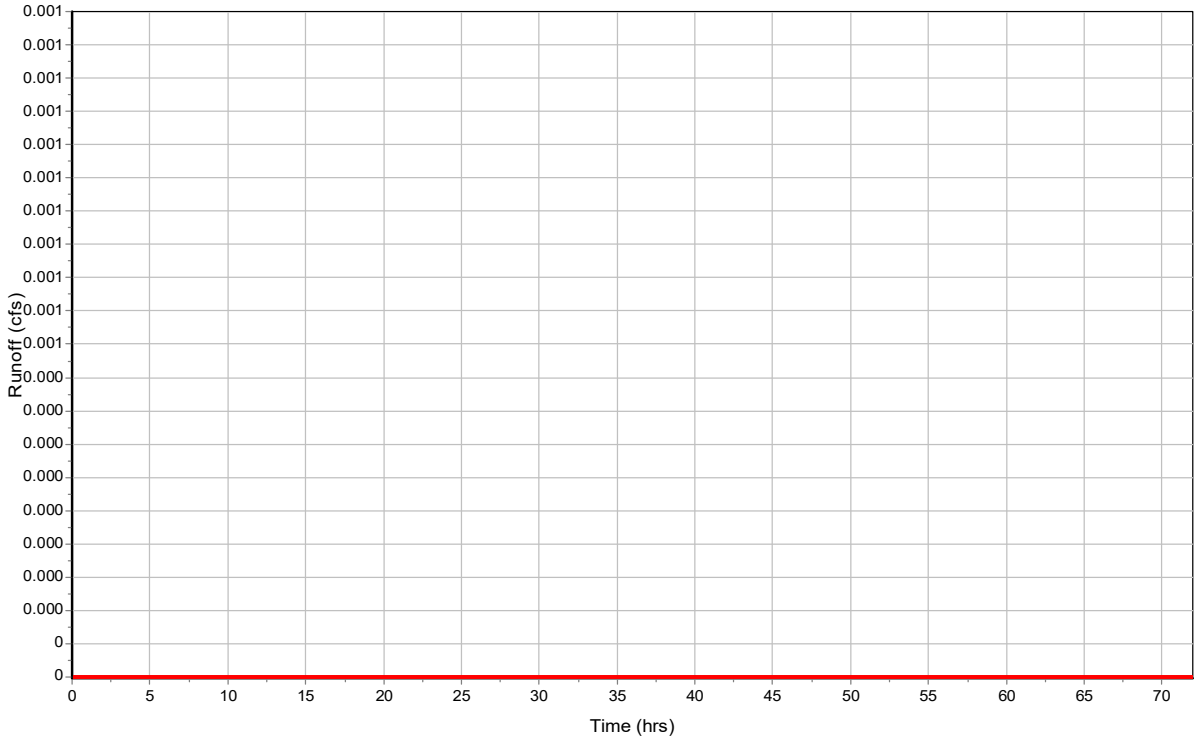
Total Rainfall (in)	2.9
Total Runoff (in)	0
Peak Runoff (cfs)	0
Weighted Curve Number	39
Time of Concentration (days hh:mm:ss)	0 00:11:01

Subbasin : CB-34A-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-34-DA

Input Data

Area (ac)	0.23
Peak Rate Factor	484
Weighted Curve Number	75
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.23	-	75
Composite Area & Weighted CN	0.23		75

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	50	0	0
Slope (%) :	2	0	0
2 yr, 24 hr Rainfall (in) :	2.9	0	0
Velocity (ft/sec) :	0.06	0	0
Computed Flow Time (min) :	12.96	0	0

Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0	0
Flow Length (ft) :	50	0	0
Channel Slope (%) :	3	0	0
Cross Section Area (ft^2) :	0.6	0	0
Wetted Perimeter (ft) :	0.3	0	0
Velocity (ft/sec) :	31.51	0	0
Computed Flow Time (min) :	0.03	0	0

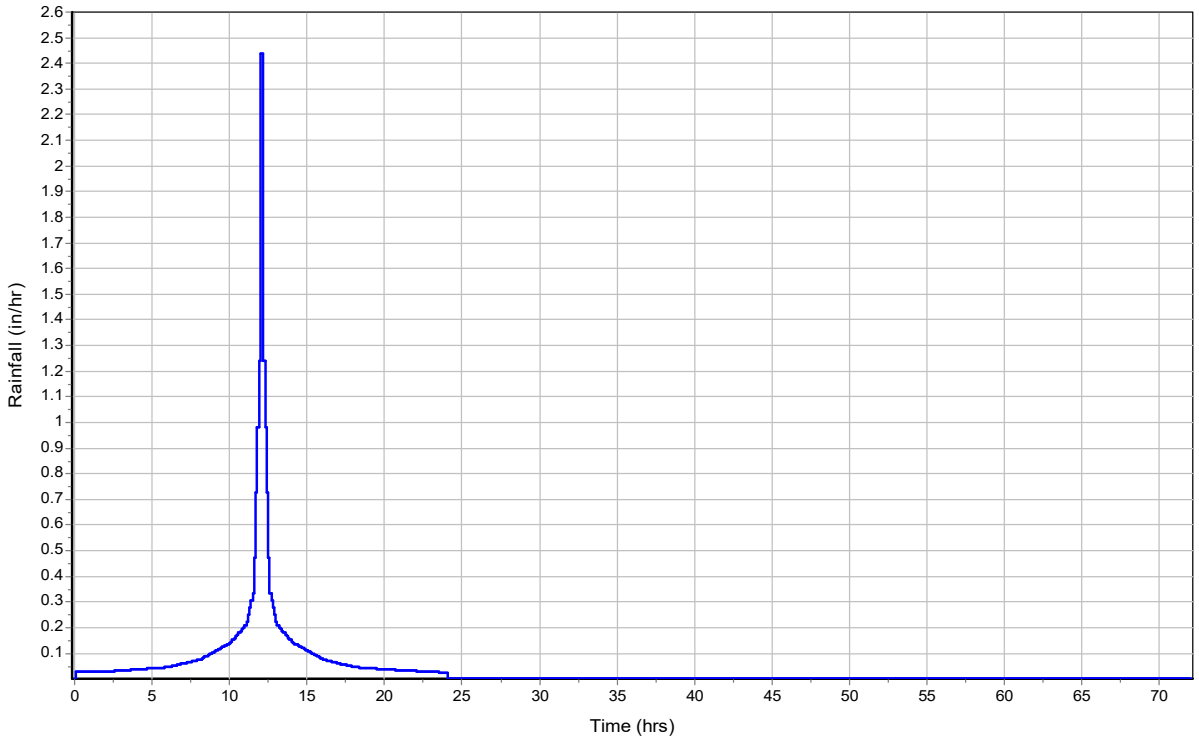
Total TOC (min) 12.98

Subbasin Runoff Results

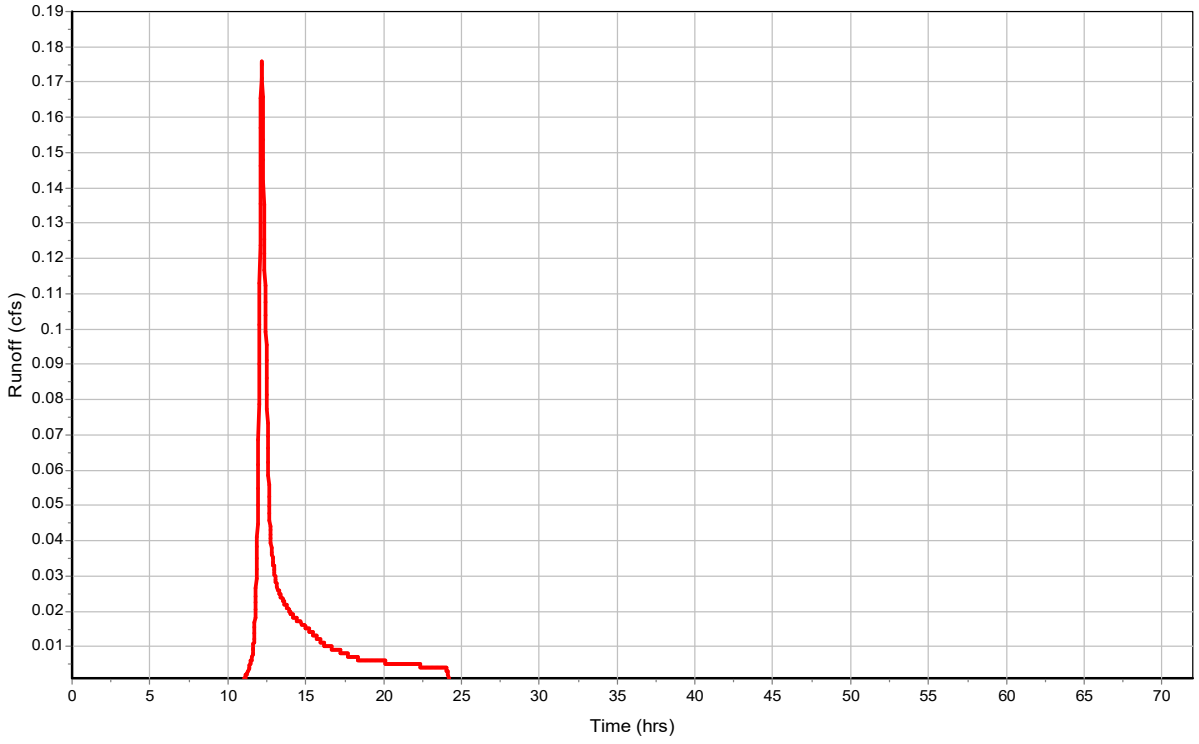
Total Rainfall (in)	2.9
Total Runoff (in)	0.9
Peak Runoff (cfs)	0.18
Weighted Curve Number	75
Time of Concentration (days hh:mm:ss)	0 00:12:59

Subbasin : CB-34-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-35-DA

Input Data

Area (ac)	0.25
Peak Rate Factor	484
Weighted Curve Number	60
Rain Gage ID	*

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	0.25	-	60
Composite Area & Weighted CN	0.25		60

Time of Concentration

	Subarea	Subarea	Subarea
Sheet Flow Computations	A	B	C
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	50	0	0
Slope (%) :	5	0	0
2 yr, 24 hr Rainfall (in) :	2.9	0	0
Velocity (ft/sec) :	0.09	0	0
Computed Flow Time (min) :	8.98	0	0

	Subarea	Subarea	Subarea
Shallow Concentrated Flow Computations	A	B	C
Flow Length (ft) :	30	0	0
Slope (%) :	5	0	0
Surface Type :	Grass pasture	Unpaved	Unpaved
Velocity (ft/sec) :	1.57	0	0
Computed Flow Time (min) :	0.32	0	0

	Subarea	Subarea	Subarea
Channel Flow Computations	A	B	C
Manning's Roughness :	0.013	0	0
Flow Length (ft) :	76	0	0
Channel Slope (%) :	1	0	0
Cross Section Area (ft^2) :	0.6	0	0
Wetted Perimeter (ft) :	0.2	0	0
Velocity (ft/sec) :	23.84	0	0
Computed Flow Time (min) :	0.05	0	0

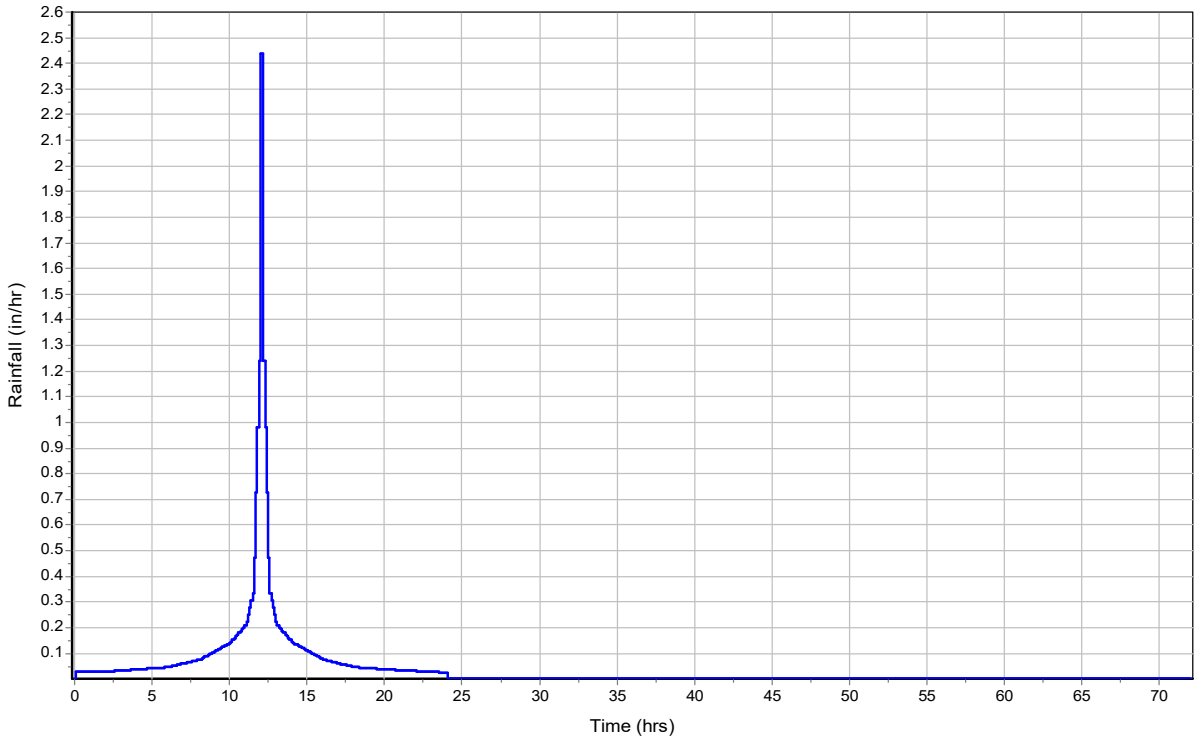
Total TOC (min) 9.35

Subbasin Runoff Results

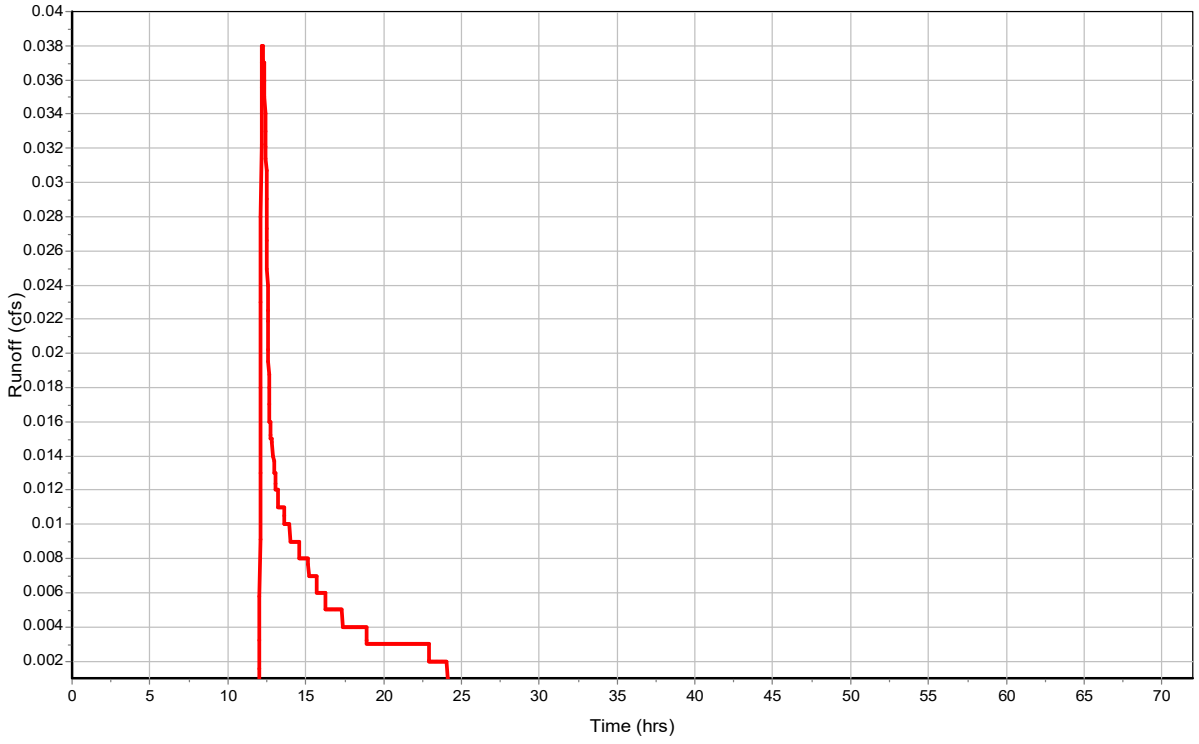
Total Rainfall (in)	2.9
Total Runoff (in)	0.3
Peak Runoff (cfs)	0.04
Weighted Curve Number	60
Time of Concentration (days hh:mm:ss)	0 00:09:21

Subbasin : CB-35-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-36-DA

Input Data

Area (ac)	0.26
Peak Rate Factor	484
Weighted Curve Number	73
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.26	-	73
Composite Area & Weighted CN	0.26		73

Time of Concentration

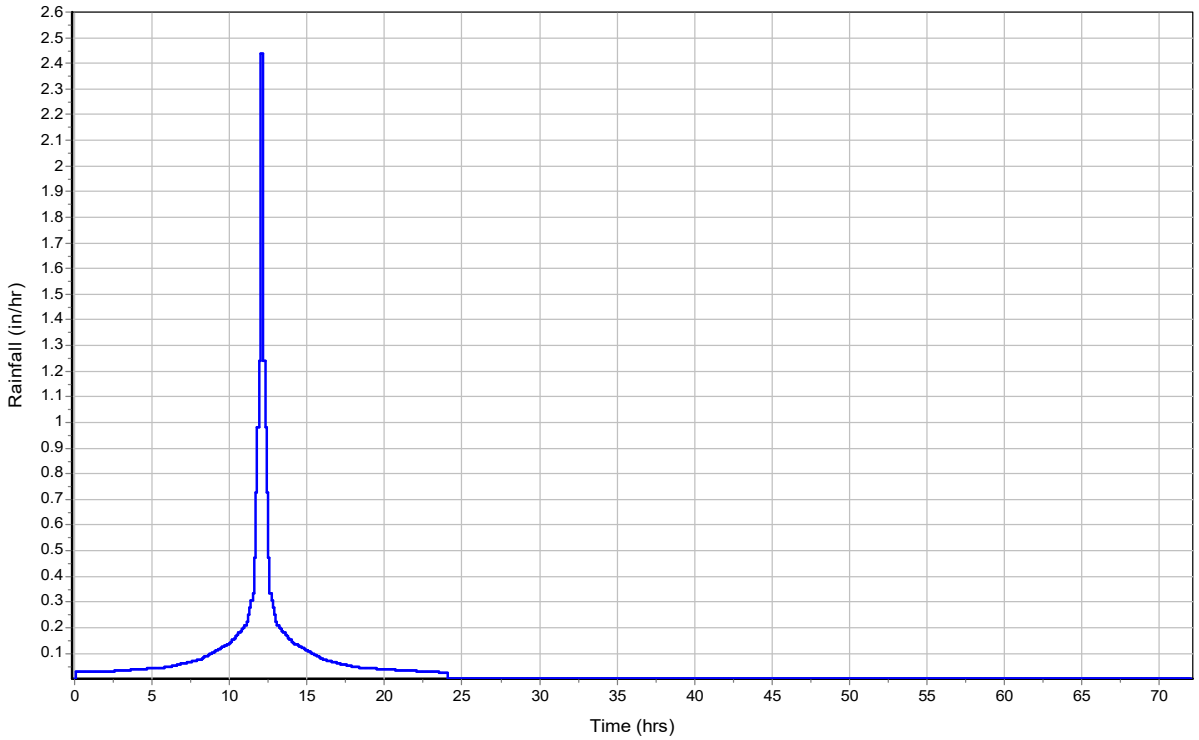
User-Defined TOC override (minutes): 6

Subbasin Runoff Results

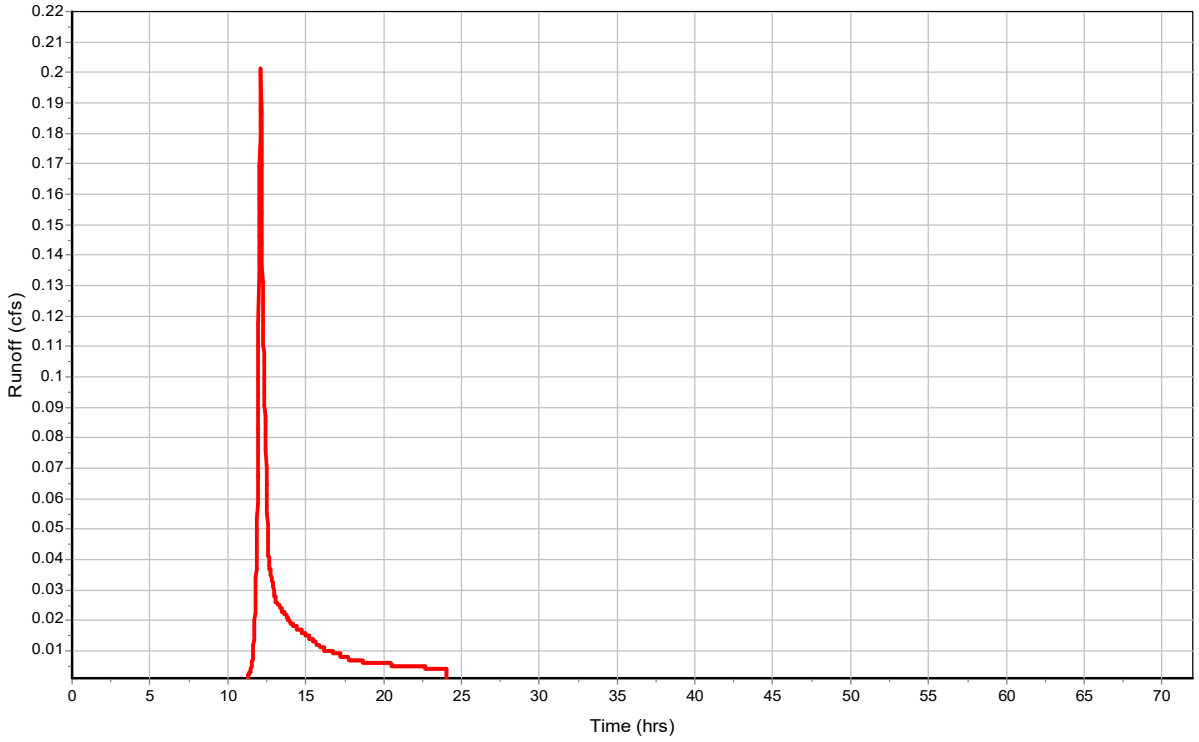
Total Rainfall (in)	2.9
Total Runoff (in)	0.8
Peak Runoff (cfs)	0.2
Weighted Curve Number	73
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : CB-36-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-3-DA

Input Data

Area (ac)	0.06
Peak Rate Factor	484
Weighted Curve Number	98
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.06	-	98
Composite Area & Weighted CN	0.06		98

Time of Concentration

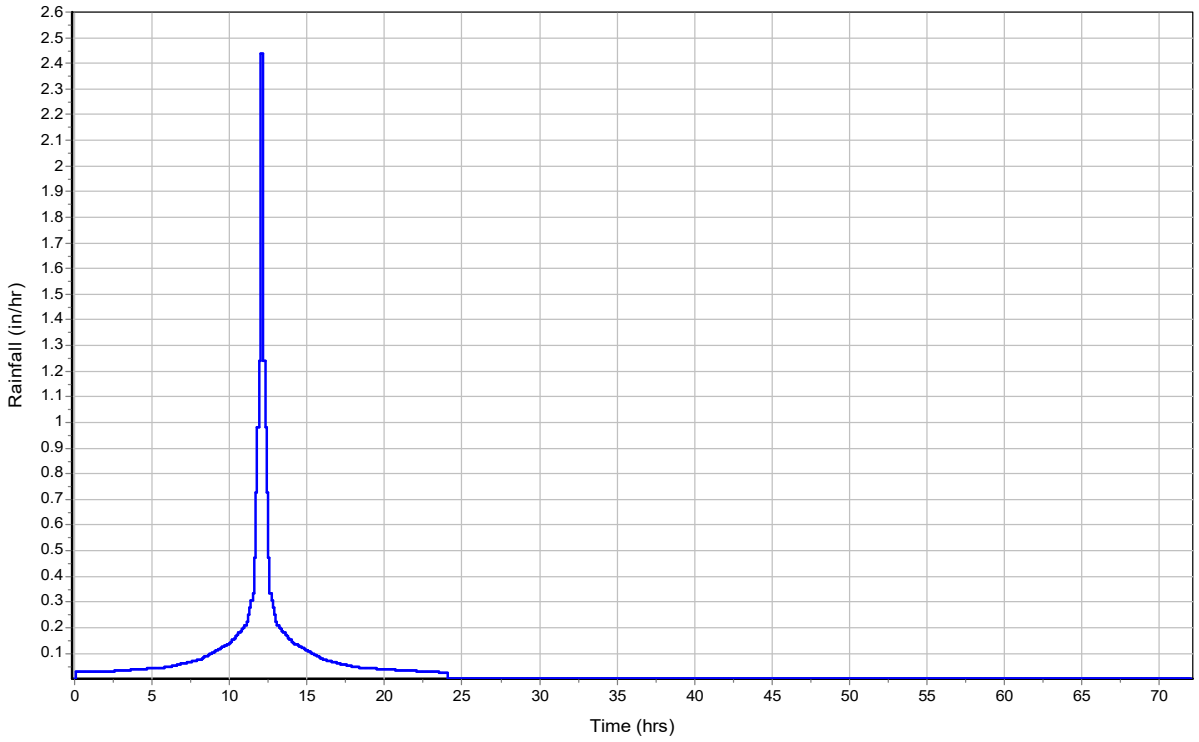
User-Defined TOC override (minutes): 6.00

Subbasin Runoff Results

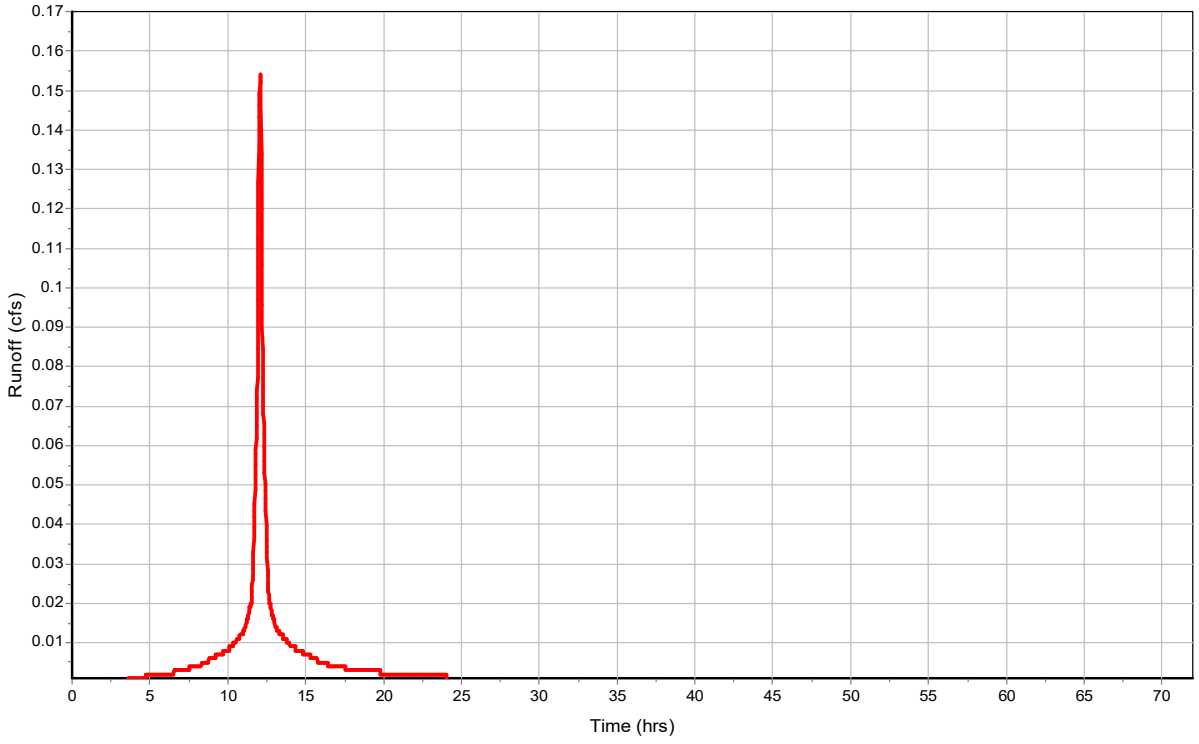
Total Rainfall (in)	2.9
Total Runoff (in)	2.65
Peak Runoff (cfs)	0.15
Weighted Curve Number	98
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : CB-3-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-4-DA

Input Data

Area (ac)	0.19
Peak Rate Factor	484
Weighted Curve Number	77
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.19	-	77
Composite Area & Weighted CN	0.19		77

Time of Concentration

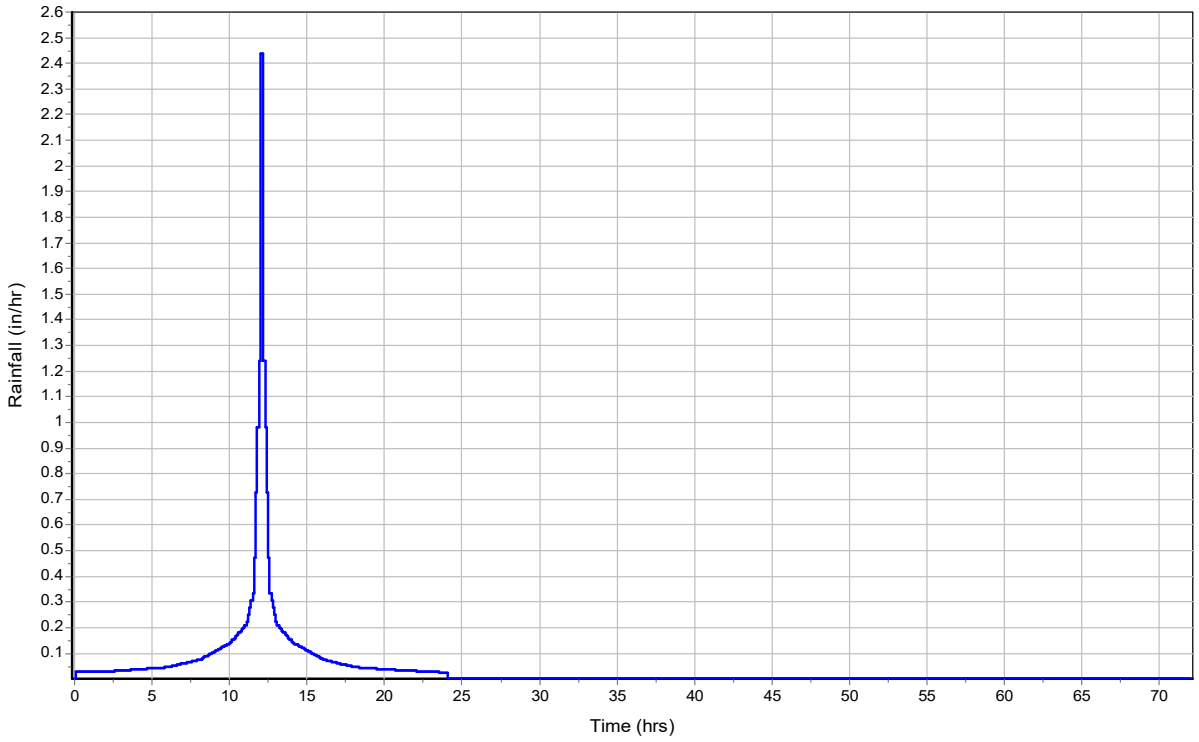
User-Defined TOC override (minutes): 6

Subbasin Runoff Results

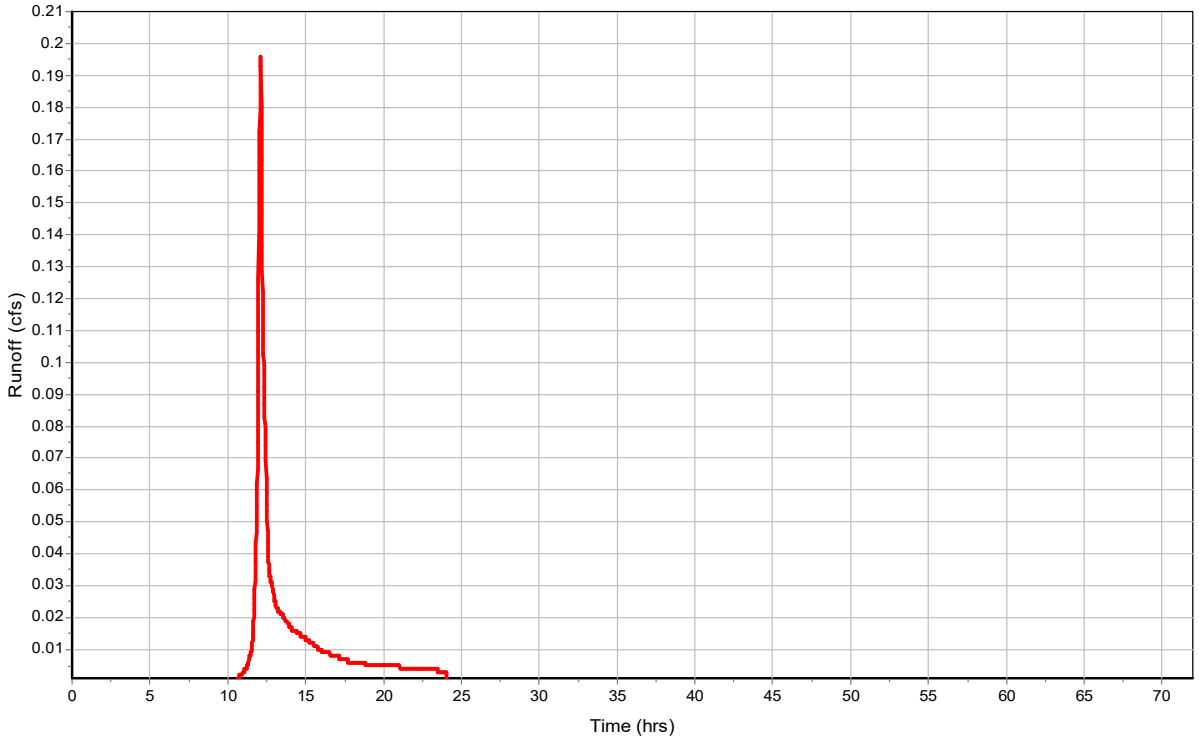
Total Rainfall (in)	2.9
Total Runoff (in)	1
Peak Runoff (cfs)	0.2
Weighted Curve Number	77
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : CB-4-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-5-DA

Input Data

Area (ac)	0.16
Peak Rate Factor	484
Weighted Curve Number	98
Rain Gage ID	*

Composite Curve Number

Soil/Surface Description (32)	Area (acres)	Soil Group	Curve Number
-	0.16	-	98
Composite Area & Weighted CN	0.16		98

Time of Concentration

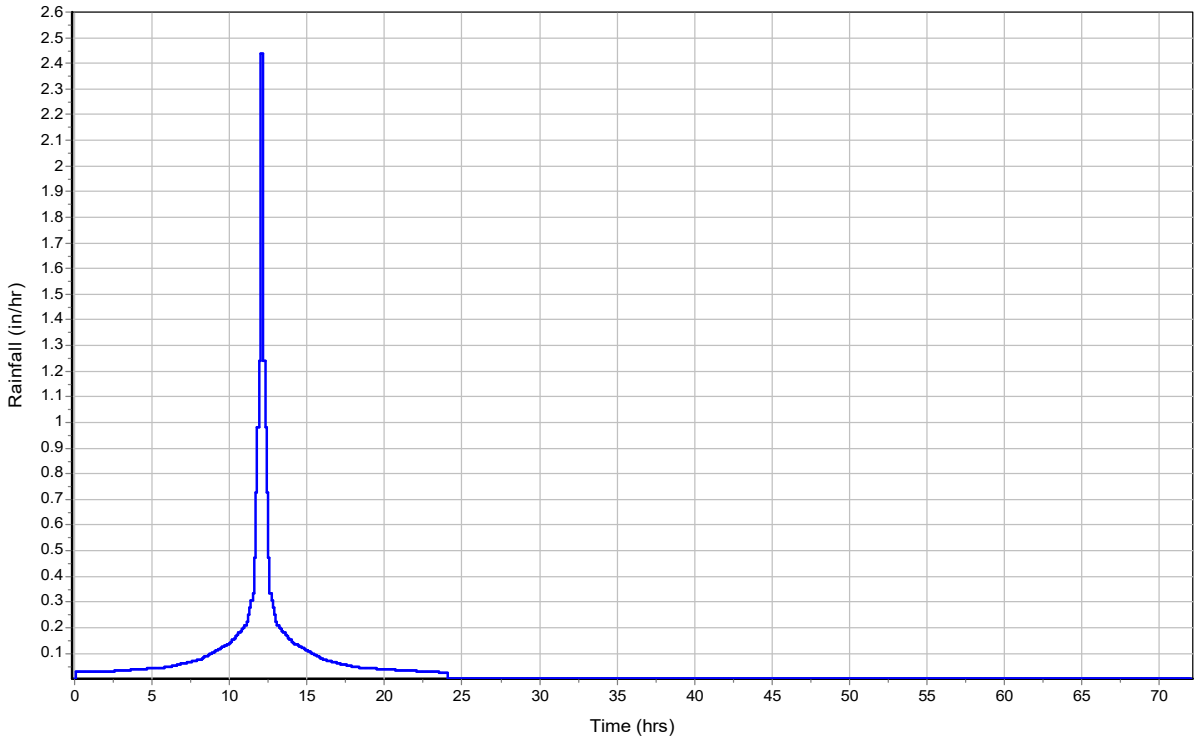
User-Defined TOC override (minutes): 6

Subbasin Runoff Results

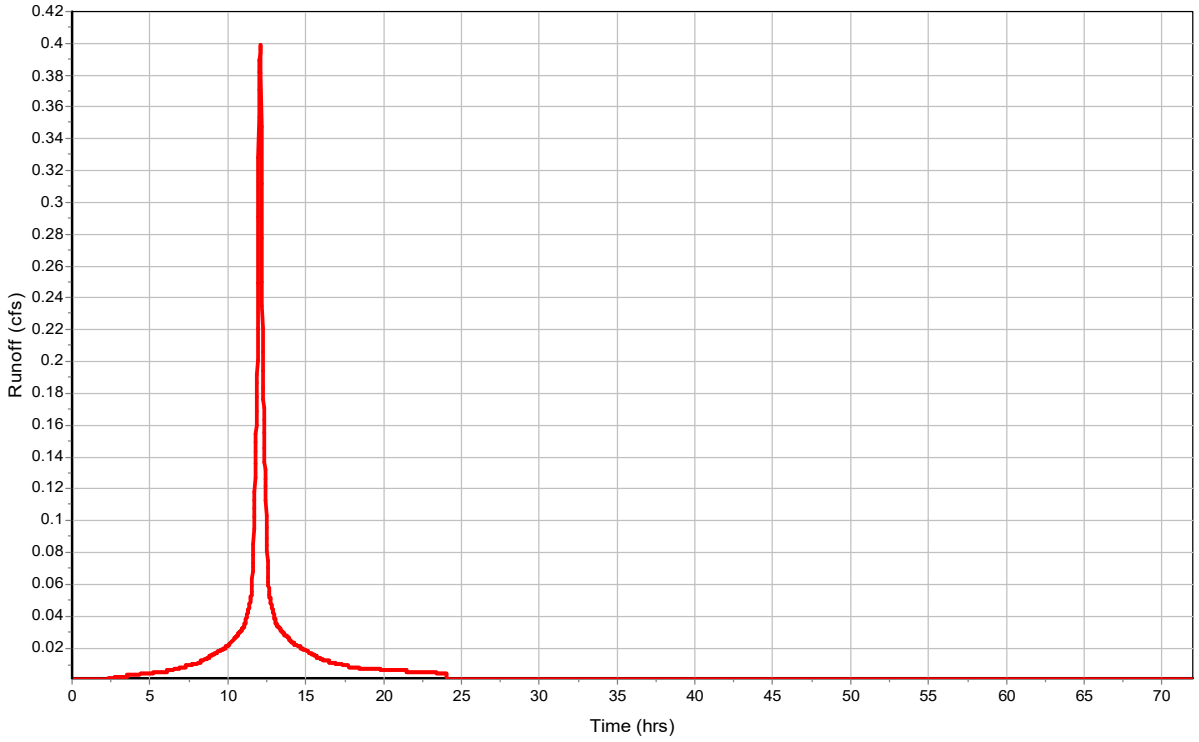
Total Rainfall (in)	2.9
Total Runoff (in)	2.67
Peak Runoff (cfs)	0.4
Weighted Curve Number	98
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : CB-5-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-6-DA

Input Data

Area (ac)	0.23
Peak Rate Factor	484
Weighted Curve Number	85
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.23	-	85
Composite Area & Weighted CN	0.23		85

Time of Concentration

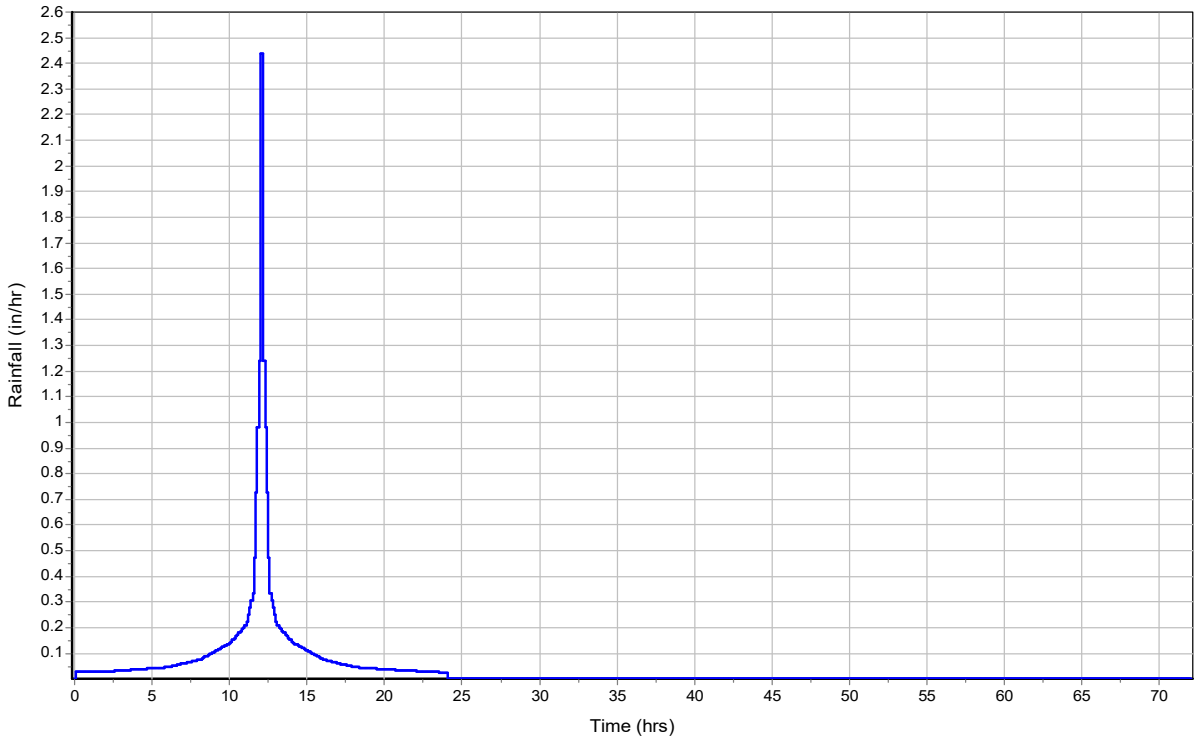
User-Defined TOC override (minutes): 6.00

Subbasin Runoff Results

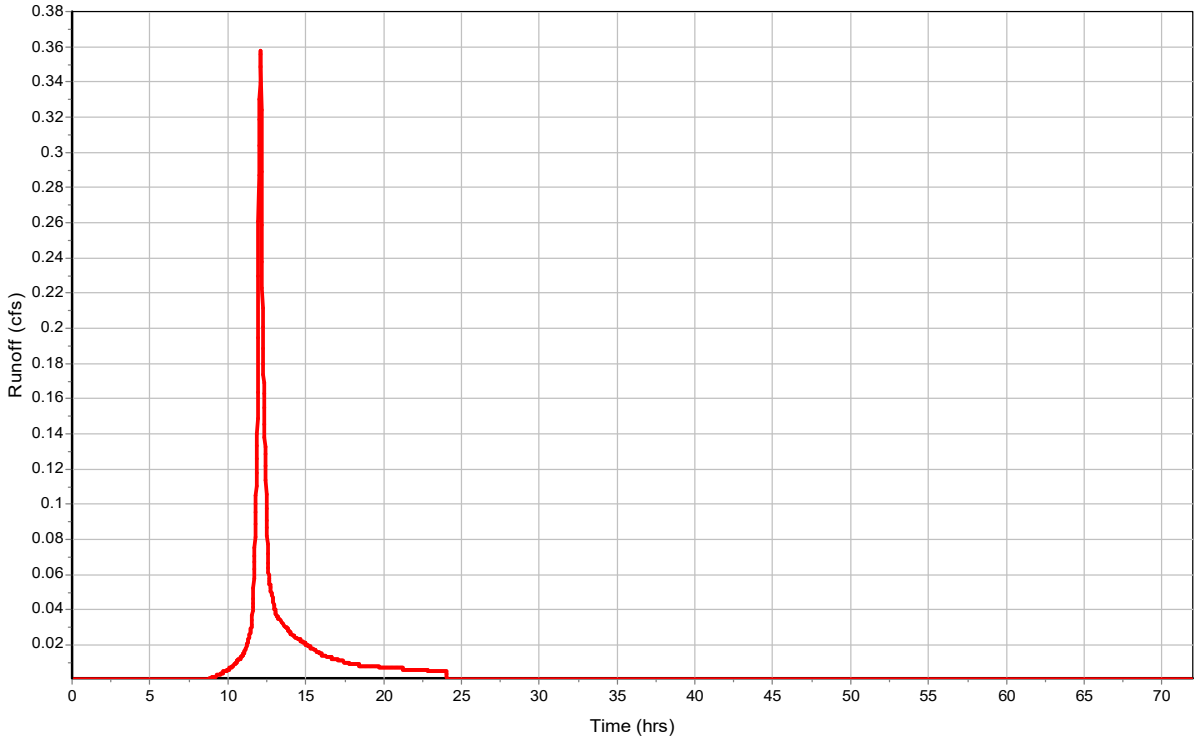
Total Rainfall (in)	2.9
Total Runoff (in)	1.5
Peak Runoff (cfs)	0.36
Weighted Curve Number	85
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : CB-6-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-7-DA

Input Data

Area (ac)	0.75
Peak Rate Factor	484
Weighted Curve Number	54
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.75	-	54
Composite Area & Weighted CN	0.75		54

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	50	0	0
Slope (%) :	2.5	0	0
2 yr, 24 hr Rainfall (in) :	2.9	0	0
Velocity (ft/sec) :	0.07	0	0
Computed Flow Time (min) :	11.85	0	0

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	230	0	0
Slope (%) :	3	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.79	0	0
Computed Flow Time (min) :	1.37	0	0

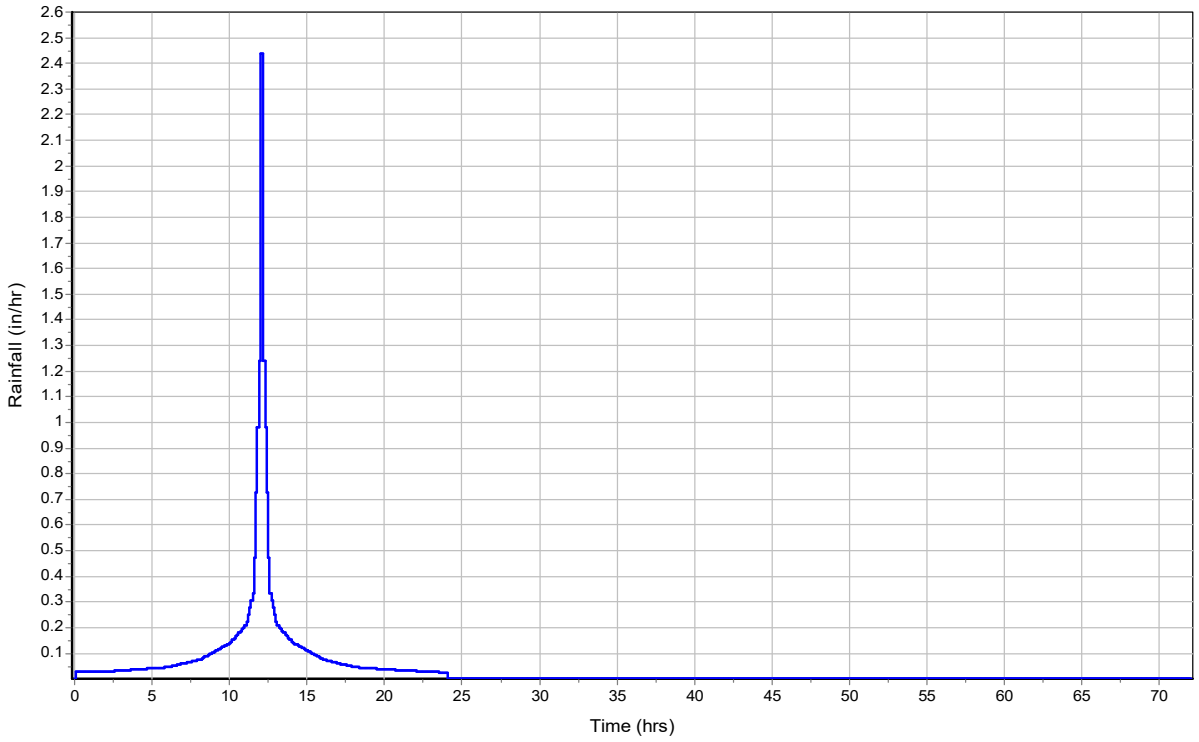
Total TOC (min) 13.22

Subbasin Runoff Results

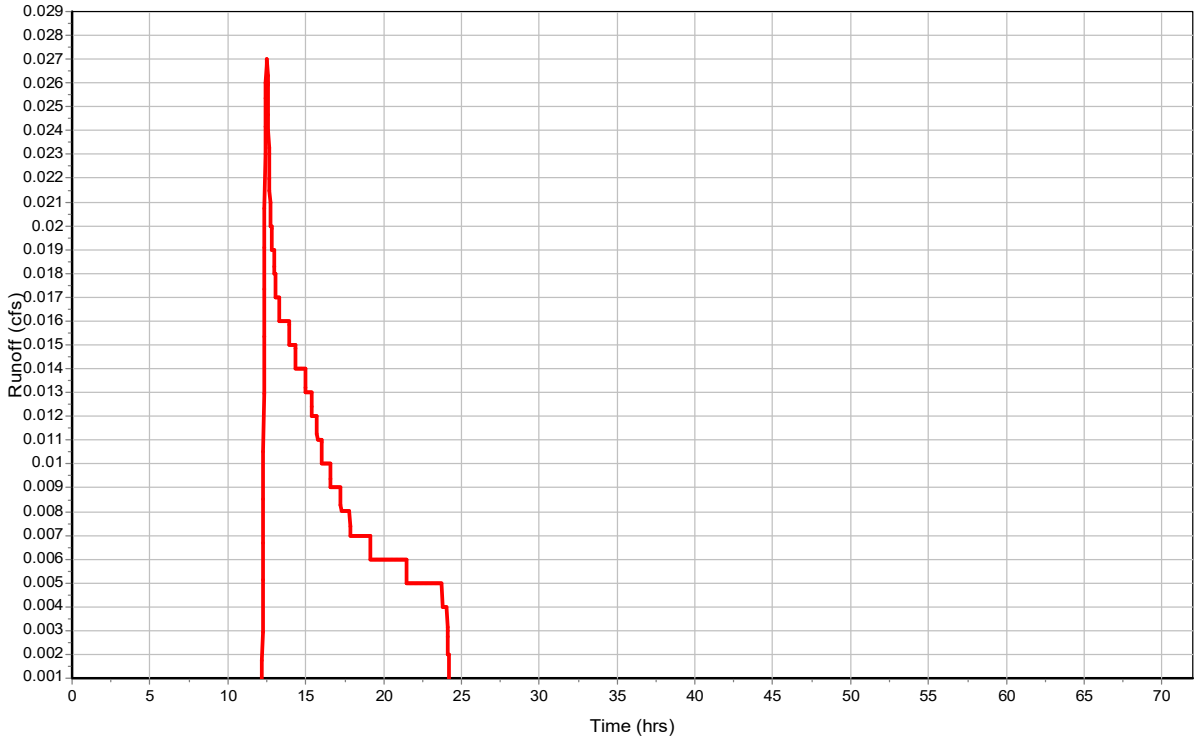
Total Rainfall (in)	2.9
Total Runoff (in)	0.15
Peak Runoff (cfs)	0.03
Weighted Curve Number	54
Time of Concentration (days hh:mm:ss)	0 00:13:13

Subbasin : CB-7-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-8-DA

Input Data

Area (ac)	0.43
Peak Rate Factor	484
Weighted Curve Number	64
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.43	-	64
Composite Area & Weighted CN	0.43		64

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	50	0	0
Slope (%) :	1.5	0	0
2 yr, 24 hr Rainfall (in) :	2.9	0	0
Velocity (ft/sec) :	0.06	0	0
Computed Flow Time (min) :	14.54	0	0

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	160	0	0
Slope (%) :	1.5	0	0
Surface Type :	Grass pasture	Unpaved	Unpaved
Velocity (ft/sec) :	0.86	0	0
Computed Flow Time (min) :	3.1	0	0

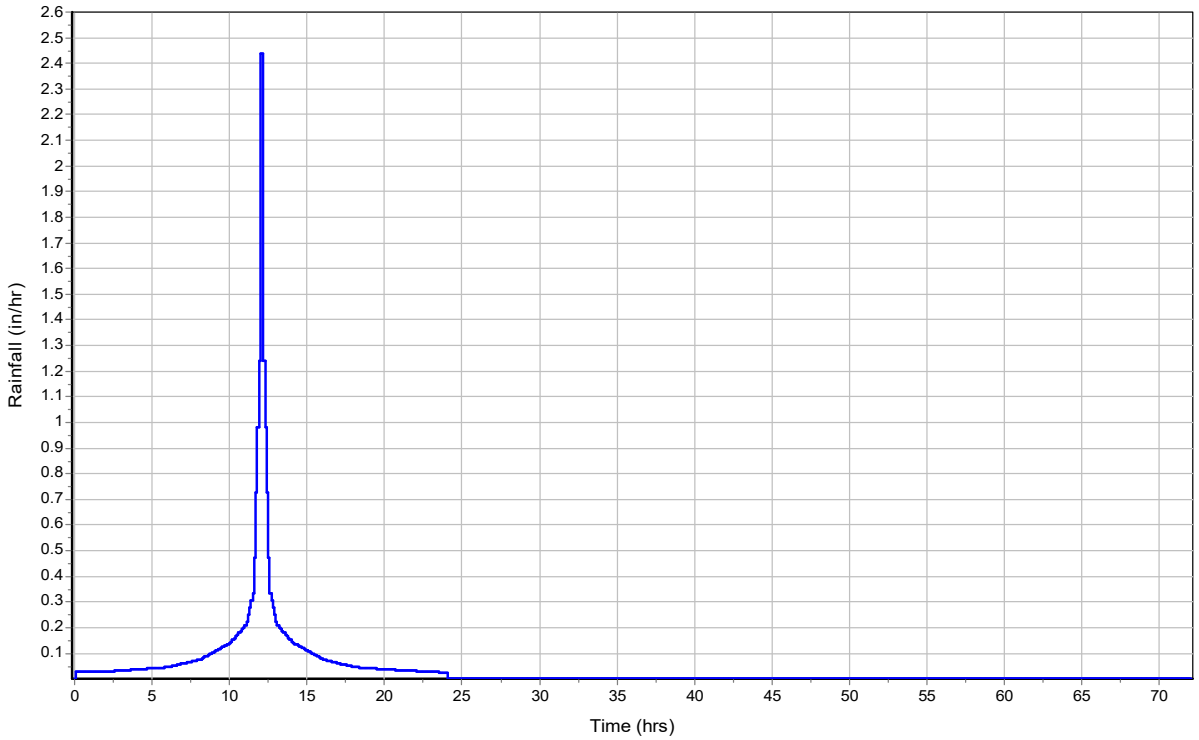
Total TOC (min) 17.64

Subbasin Runoff Results

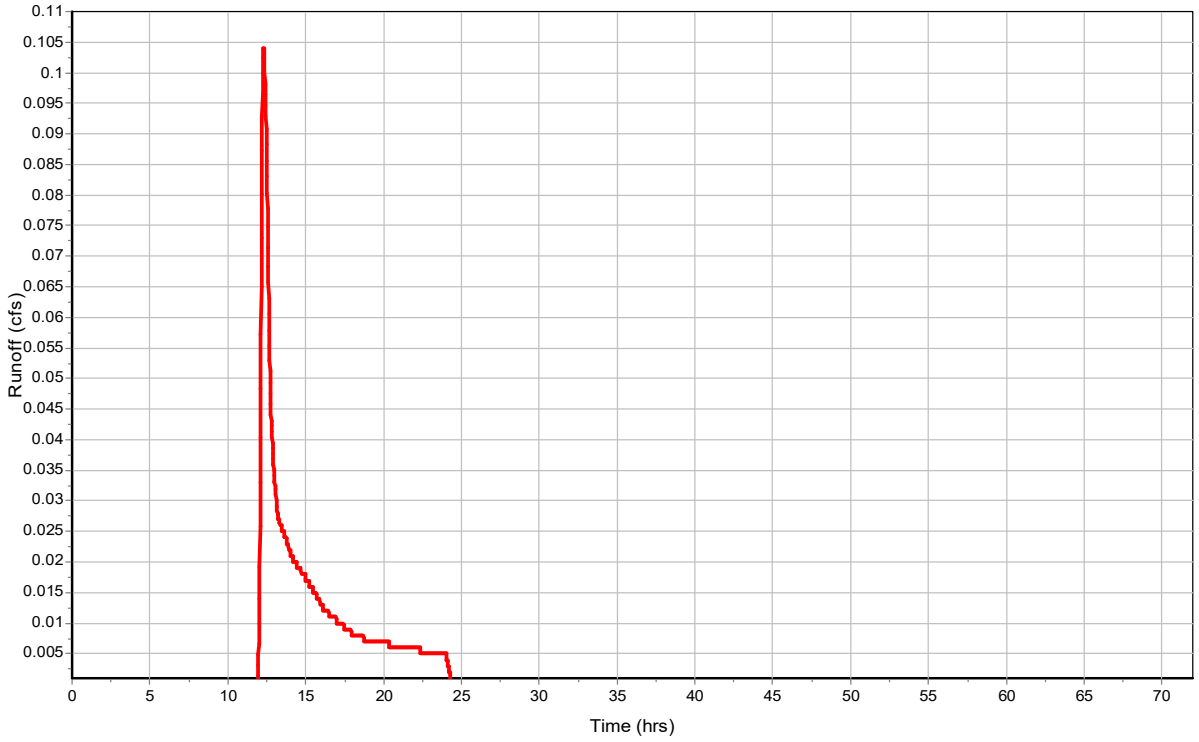
Total Rainfall (in)	2.9
Total Runoff (in)	0.43
Peak Runoff (cfs)	0.1
Weighted Curve Number	64
Time of Concentration (days hh:mm:ss)	0 00:17:38

Subbasin : CB-8-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-9-DA

Input Data

Area (ac)	1.02
Peak Rate Factor	484
Weighted Curve Number	59
Rain Gage ID	*

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	1.02	-	59
Composite Area & Weighted CN	1.02		59

Time of Concentration

	Subarea	Subarea	Subarea
Sheet Flow Computations	A	B	C
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	50	0	0
Slope (%) :	1.5	0	0
2 yr, 24 hr Rainfall (in) :	2.9	0	0
Velocity (ft/sec) :	0.06	0	0
Computed Flow Time (min) :	14.54	0	0

	Subarea	Subarea	Subarea
Shallow Concentrated Flow Computations	A	B	C
Flow Length (ft) :	270	0	0
Slope (%) :	3	0	0
Surface Type :	Grass pasture	Unpaved	Unpaved
Velocity (ft/sec) :	1.21	0	0
Computed Flow Time (min) :	3.72	0	0

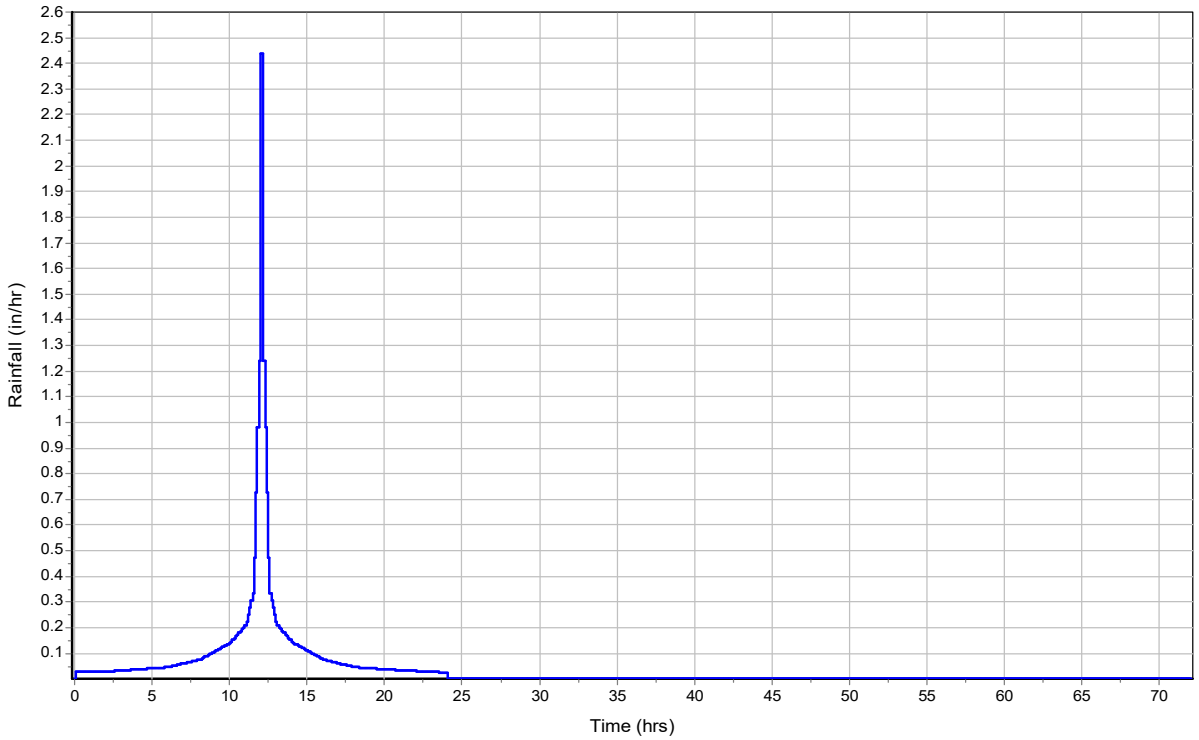
Total TOC (min) 18.25

Subbasin Runoff Results

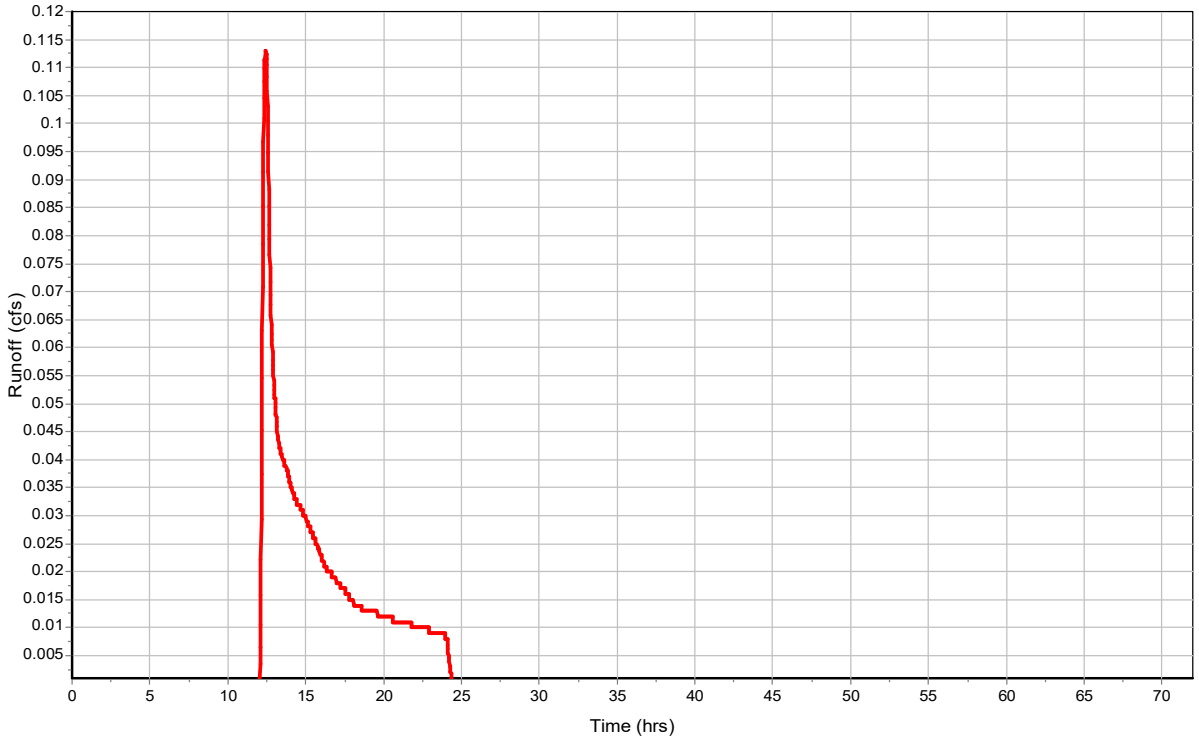
Total Rainfall (in)	2.9
Total Runoff (in)	0.27
Peak Runoff (cfs)	0.11
Weighted Curve Number	59
Time of Concentration (days hh:mm:ss)	0 00:18:15

Subbasin : CB-9-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : DI-1-DA

Input Data

Area (ac)	1.39
Peak Rate Factor	484
Weighted Curve Number	65
Rain Gage ID	*

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	1.39	-	65
Composite Area & Weighted CN	1.39		65

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.6	0	0
Flow Length (ft) :	50	0	0
Slope (%) :	4	0	0
2 yr, 24 hr Rainfall (in) :	2.9	0	0
Velocity (ft/sec) :	0.06	0	0
Computed Flow Time (min) :	13.58	0	0

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	220	0	0
Slope (%) :	2.5	0	0
Surface Type :	Woodland	Unpaved	Unpaved
Velocity (ft/sec) :	0.79	0	0
Computed Flow Time (min) :	4.64	0	0

Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.027	0	0
Flow Length (ft) :	120	0	0
Channel Slope (%) :	4	0	0
Cross Section Area (ft^2) :	3.2	0	0
Wetted Perimeter (ft) :	0.8	0	0
Velocity (ft/sec) :	27.81	0	0
Computed Flow Time (min) :	0.07	0	0

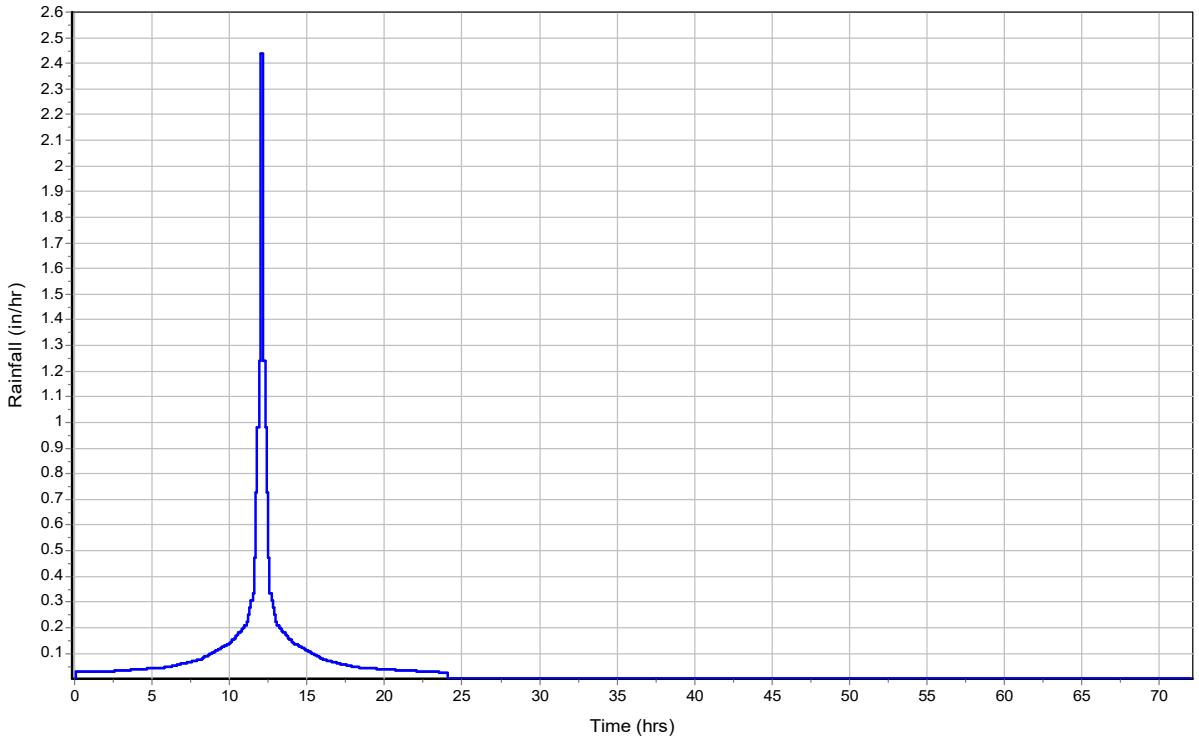
Total TOC (min) 18.29

Subbasin Runoff Results

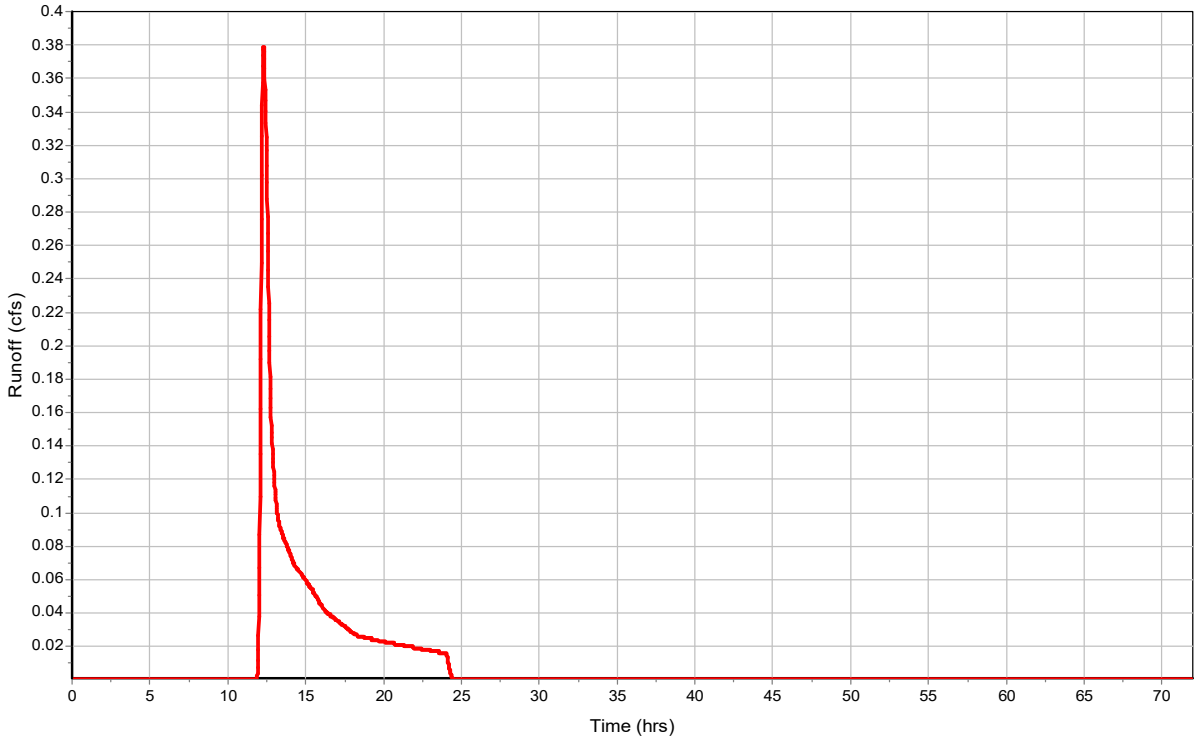
Total Rainfall (in)	2.9
Total Runoff (in)	0.46
Peak Runoff (cfs)	0.38
Weighted Curve Number	65
Time of Concentration (days hh:mm:ss)	0 00:18:17

Subbasin : DI-1-DA

Rainfall Intensity Graph



Runoff Hydrograph



Junction Input

SN	Element ID	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Ground/Rim (Max) Offset (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Surcharge Elevation (ft)	Surcharge Depth (ft)	Ponded Area (ft^2)	Minimum Pipe Cover (in)
1	Bald_Mtn	368.00	375.00	7.00	368.00	0.00	375.00	0.00	0.00	0.00
2	CB-16	340.70	344.05	3.35	340.70	0.00	344.05	0.00	0.00	0.00
3	CB-16A	342.00	346.00	4.00	342.00	0.00	346.00	0.00	10.00	0.00
4	CB-25	361.40	366.92	5.52	361.40	0.00	366.92	0.00	10.00	0.00
5	CB-26	361.20	364.26	3.06	361.20	0.00	364.26	0.00	10.00	0.00
6	CB-28	342.40	348.24	5.84	342.40	0.00	348.24	0.00	10.00	0.00
7	CB-33	373.40	378.68	5.28	373.40	0.00	378.68	0.00	10.00	0.00
8	CB-34	375.40	380.10	4.70	375.40	0.00	380.10	0.00	10.00	0.00
9	CB-34A	378.00	382.00	4.00	378.00	0.00	382.00	0.00	0.00	0.00
10	CB-36	372.40	376.41	4.01	372.40	0.00	376.41	0.00	10.00	0.00
11	DHM-8	363.80	378.03	14.23	363.80	0.00	378.03	0.00	0.00	0.00
12	DI-1	368.20	371.60	3.40	368.20	0.00	371.60	0.00	10.00	0.00
13	DMH-1	350.80	356.38	5.58	350.80	0.00	356.38	0.00	0.00	0.00
14	DMH-10	367.30	377.69	10.39	367.30	0.00	377.69	0.00	0.00	0.00
15	DMH-4	358.90	368.92	10.02	358.90	0.00	368.92	0.00	0.00	0.00
16	DMH-5	359.90	366.02	6.12	359.90	0.00	366.02	0.00	0.00	0.00
17	DMH-6	350.30	356.18	5.88	350.30	0.00	356.18	0.00	0.00	0.00
18	DMH-7	342.20	348.55	6.35	342.20	0.00	348.55	0.00	0.00	0.00
19	DMH-9	365.10	380.10	15.00	365.10	0.00	380.10	0.00	0.00	0.00
20	Fallriver_Junction	325.00	331.00	6.00	325.00	0.00	331.00	0.00	0.00	0.00
21	I-91_Culvert-Out	330.50	340.00	9.50	330.00	-0.50	340.00	0.00	0.00	0.00
22	Outfall-1A	335.53	341.53	6.00	335.53	0.00	341.53	0.00	0.00	0.00
23	Outfall-1B	339.81	345.81	6.00	339.81	0.00	345.81	0.00	0.00	0.00
24	Outfall-1C	335.79	341.79	6.00	335.79	0.00	341.79	0.00	0.00	0.00
25	Outfall-1D	336.46	342.46	6.00	336.46	0.00	342.46	0.00	0.00	0.00
26	Outfall-1E	333.54	339.54	6.00	333.54	0.00	339.54	0.00	0.00	0.00
27	RampCulvert-In	328.72	340.00	11.28	328.72	0.00	340.00	0.00	0.00	0.00
28	RampCulvert-Out	327.58	340.00	12.42	327.58	0.00	340.00	0.00	0.00	0.00

Junction Results

SN	Element ID	Peak Inflow (cfs)	Peak Lateral Inflow (cfs)	Max HGL Elevation Attained (ft)	Max HGL Depth Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Average HGL Elevation Attained (ft)	Average HGL Depth Attained (ft)	Time of Max HGL Occurrence (days hh:mm)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	Bald_Mtn	2.44	2.44	369.02	1.02	0.00	5.98	368.45	0.45	0 12:17	0 00:00	0.00	0.00
2	CB-16	0.01	0.01	340.75	0.05	0.00	3.30	340.71	0.01	0 13:52	0 00:00	0.00	0.00
3	CB-16A	0.00	0.00	342.02	0.02	0.00	3.98	342.00	0.00	0 21:32	0 00:00	0.00	0.00
4	CB-25	0.01	0.01	361.43	0.03	0.00	5.49	361.41	0.01	0 12:34	0 00:00	0.00	0.00
5	CB-26	0.00	0.00	361.20	0.00	0.00	3.06	361.20	0.00	0 00:00	0 00:00	0.00	0.00
6	CB-28	0.00	0.00	342.43	0.03	0.00	5.81	342.40	0.00	0 12:08	0 00:00	0.00	0.00
7	CB-33	0.20	0.00	373.54	0.14	0.00	5.14	373.41	0.01	0 12:13	0 00:00	0.00	0.00
8	CB-34	0.18	0.18	375.53	0.13	0.00	4.57	375.41	0.01	0 12:12	0 00:00	0.00	0.00
9	CB-34A	0.00	0.00	378.00	0.00	0.00	4.00	378.00	0.00	0 00:00	0 00:00	0.00	0.00
10	CB-36	0.20	0.20	372.49	0.09	0.00	3.92	372.41	0.01	0 12:08	0 00:00	0.00	0.00
11	DHM-8	3.14	0.00	364.39	0.59	0.00	13.64	363.84	0.04	0 12:19	0 00:00	0.00	0.00
12	DI-1	0.38	0.38	368.43	0.23	0.00	3.17	368.22	0.02	0 12:19	0 00:00	0.00	0.00
13	DMH-1	0.53	0.00	351.07	0.27	0.00	5.31	350.81	0.01	0 12:08	0 00:00	0.00	0.00
14	DMH-10	2.93	0.00	368.00	0.70	0.00	9.69	367.34	0.04	0 12:18	0 00:00	0.00	0.00
15	DMH-4	3.36	0.00	359.17	0.27	0.00	9.75	358.92	0.02	0 12:19	0 00:00	0.00	0.00
16	DMH-5	0.45	0.00	360.06	0.16	0.00	5.96	359.91	0.01	0 12:07	0 00:00	0.00	0.00
17	DMH-6	0.85	0.00	350.53	0.23	0.00	5.65	350.32	0.02	0 12:08	0 00:00	0.00	0.00
18	DMH-7	0.84	0.00	342.43	0.23	0.00	6.12	342.22	0.02	0 12:08	0 00:00	0.00	0.00
19	DMH-9	2.92	0.00	365.92	0.82	0.00	14.18	365.15	0.05	0 12:19	0 00:00	0.00	0.00
20	Fallriver_Junction	6.22	0.00	325.38	0.38	0.00	19.62	325.02	0.02	0 12:12	0 00:00	0.00	0.00
21	I-91_Culvert-Out	3.36	0.00	331.09	0.59	0.00	8.91	330.53	0.03	0 12:21	0 00:00	0.00	0.00
22	Outfall-1A	1.53	0.00	335.77	0.24	0.00	5.76	335.54	0.01	0 12:08	0 00:00	0.00	0.00
23	Outfall-1B	0.43	0.00	339.93	0.12	0.00	5.88	339.82	0.01	0 12:08	0 00:00	0.00	0.00
24	Outfall-1C	1.49	0.00	336.01	0.22	0.00	5.78	335.80	0.01	0 12:09	0 00:00	0.00	0.00
25	Outfall-1D	1.52	0.00	336.69	0.23	0.00	5.77	336.47	0.01	0 12:08	0 00:00	0.00	0.00
26	Outfall-1E	3.36	0.00	334.04	0.50	0.00	5.50	333.57	0.03	0 12:19	0 00:00	0.00	0.00
27	RampCulvert-In	4.01	0.00	329.43	0.71	0.00	10.57	328.77	0.05	0 12:22	0 00:00	0.00	0.00
28	RampCulvert-Out	3.98	0.00	327.84	0.26	0.00	12.16	327.60	0.02	0 12:23	0 00:00	0.00	0.00

Channel Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Shape	Height (ft)	Width (ft)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate
1	1D-culvert	213.55	336.46	0.00	328.72	0.00	7.74	3.6200	Trapezoidal	3.000	8.000	0.0320	0.5000	0.5000	0.0000	0.00	No
2	CB-1_bypass	126.22	356.30	4.40	352.48	4.38	3.82	3.0300	Trapezoidal	0.500	25.510	0.0130	0.5000	0.5000	0.0000	0.00	No
3	CB-12_bypass	124.46	348.19	4.79	346.64	3.84	1.55	1.2500	Trapezoidal	0.500	25.510	0.0160	0.5000	0.5000	0.0000	0.00	No
4	CB-17_bypass	277.20	352.17	3.87	346.02	4.62	6.15	2.2200	Trapezoidal	0.500	25.510	0.0160	0.5000	0.5000	0.0000	0.00	No
5	CB-18_bypass	166.98	351.79	4.49	348.19	4.79	3.60	2.1600	Trapezoidal	0.500	25.060	0.0160	0.5000	0.5000	0.0000	0.00	No
6	CB-2_bypass	100.68	355.60	5.10	353.17	5.97	2.43	2.4100	Trapezoidal	0.500	25.510	0.0160	0.5000	0.5000	0.0000	0.00	No
7	CB-20_bypass	207.40	358.45	4.25	352.17	3.87	6.28	3.0300	Trapezoidal	0.500	25.060	0.0160	0.5000	0.5000	0.0000	0.00	No
8	CB-21_bypass	202.68	358.38	4.78	351.79	4.49	6.59	3.2500	Trapezoidal	0.500	25.060	0.0160	0.5000	0.5000	0.0000	0.00	No
9	CB-23_bypass	350.32	369.60	4.10	358.45	4.25	11.15	3.1800	Trapezoidal	0.500	25.060	0.0160	0.5000	0.5000	0.0000	0.00	No
10	CB-24_bypass	354.71	369.68	4.18	353.60	0.00	16.08	4.5300	Trapezoidal	0.500	26.050	0.0160	0.5000	0.5000	0.0000	0.00	No
11	CB-27_bypass	103.70	356.41	5.11	351.50	0.00	4.91	4.7300	Trapezoidal	0.500	25.060	0.0160	0.5000	0.5000	0.0000	0.00	No
12	CB-3_bypass	475.34	353.17	5.97	347.37	6.67	5.80	1.2200	Trapezoidal	0.500	25.060	0.0160	0.5000	0.5000	0.0000	0.00	No
13	CB-30_bypass	294.84	370.42	4.52	356.41	5.11	14.01	4.7500	Trapezoidal	0.500	25.060	0.0160	0.5000	0.5000	0.0000	0.00	No
14	CB-32_bypass	340.69	377.88	4.78	369.68	4.18	8.20	2.4100	Trapezoidal	0.500	25.060	0.0160	0.5000	0.5000	0.0000	0.00	No
15	CB-35_bypass	379.72	379.37	5.37	370.42	4.52	8.95	2.3600	Trapezoidal	0.500	25.060	0.0160	0.5000	0.5000	0.0000	0.00	No
16	CB-4_bypass	192.15	352.48	4.38	349.21	2.61	3.27	1.7000	Trapezoidal	0.500	25.510	0.0160	0.5000	0.5000	0.0000	0.00	No
17	CB-6_bypass	70.37	349.21	2.61	344.57	2.97	4.64	6.5900	Trapezoidal	0.500	25.000	0.0160	0.5000	0.5000	0.0000	0.00	No
18	Cobble_Waterway	363.16	330.50	0.00	328.72	0.00	1.78	0.4900	Trapezoidal	3.000	14.000	0.0320	0.5000	0.5000	0.0000	0.00	No
19	FallRiver	100.00	325.00	0.00	324.50	0.00	0.50	0.5000	Trapezoidal	20.000	50.000	0.0320	0.5000	0.5000	0.0000	0.00	No
20	FR1	84.74	335.53	0.00	325.00	0.00	10.53	12.4300	Trapezoidal	1.000	3.000	0.0320	0.5000	0.5000	0.0000	0.00	No
21	FR2	138.29	339.81	0.00	325.00	0.00	14.81	10.7100	Trapezoidal	1.000	3.000	0.0320	0.5000	0.5000	0.0000	0.00	No
22	FR3	378.68	327.58	0.00	325.00	0.00	2.58	0.6800	Rectangular	10.000	10.000	0.0320	0.5000	0.5000	0.0000	0.00	No
23	FR4	71.36	335.79	0.00	325.00	0.00	10.79	15.1200	Trapezoidal	1.000	3.000	0.0320	0.5000	0.5000	0.0000	0.00	No

Channel Results

SN	Element ID	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Travel Time (min)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Froude Number	Reported Condition
1	1D-culvert	1.52	0 12:08	168.37	0.01	1.71	2.08	0.43	0.14	0.00		
2	CB-1_bypass	0.17	0 12:08	50.08	0.00	1.67	1.26	0.06	0.13	0.00		
3	CB-12_bypass	0.04	0 12:08	26.10	0.00	0.62	3.35	0.07	0.15	0.00		
4	CB-17_bypass	0.06	0 12:07	34.84	0.00	1.82	2.54	0.04	0.08	0.00		
5	CB-18_bypass	0.07	0 12:07	33.52	0.00	1.30	2.14	0.05	0.09	0.00		
6	CB-2_bypass	0.05	0 12:12	36.34	0.00	1.08	1.55	0.04	0.08	0.00		
7	CB-20_bypass	0.11	0 12:07	39.73	0.00	1.52	2.27	0.05	0.11	0.00		
8	CB-21_bypass	0.10	0 12:07	41.17	0.00	1.50	2.25	0.05	0.10	0.00		
9	CB-23_bypass	0.05	0 12:07	40.73	0.00	0.83	7.03	0.05	0.10	0.00		
10	CB-24_bypass	0.07	0 12:07	45.09	0.00	0.78	7.58	0.04	0.08	0.00		
11	CB-27_bypass	0.07	0 12:07	49.68	0.00	1.54	1.12	0.04	0.09	0.00		
12	CB-3_bypass	0.04	0 12:08	25.22	0.00	0.74	10.71	0.07	0.14	0.00		
13	CB-30_bypass	0.11	0 12:07	49.76	0.00	1.92	2.56	0.05	0.09	0.00		
14	CB-32_bypass	0.03	0 12:07	35.42	0.00	1.06	5.36	0.03	0.07	0.00		
15	CB-35_bypass	0.01	0 12:16	35.05	0.00	0.45	14.06	0.03	0.07	0.00		
16	CB-4_bypass	0.08	0 12:08	30.52	0.00	2.20	1.46	0.04	0.07	0.00		
17	CB-6_bypass	0.30	0 11:55	179.60	0.00	0.00		0.01	0.01	0.00		
18	Cobble_Waterway	3.33	0 12:21	104.81	0.03	1.55	3.90	0.65	0.22	0.00		
19	FallRiver	6.10	0 12:12	8532.83	0.00	1.58	1.05	0.37	0.02	0.00		
20	FR1	1.53	0 12:09	21.24	0.07	4.22	0.33	0.30	0.30	0.00		
21	FR2	0.43	0 12:08	19.71	0.02	1.67	1.38	0.24	0.24	0.00		
22	FR3	3.96	0 12:23	855.32	0.00	1.27	4.97	0.31	0.03	0.00		
23	FR4	1.49	0 12:09	23.43	0.06	4.29	0.28	0.30	0.30	0.00		

Pipe Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Pipe Shape	Pipe Diameter or Height (in)	Pipe Width (in)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate	No. of Barrels
1	8-Oct	49.56	340.70	0.00	339.70	0.10	1.00	2.0200	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
2	9-Oct	301.09	367.30	0.00	365.30	0.20	2.00	0.6600	CIRCULAR	15.000	15.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
3	1-Jan	40.19	351.90	0.00	350.90	0.10	1.00	2.4900	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
4	10-Jan	19.49	368.20	0.00	367.90	0.60	0.30	1.5400	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
5	10-Nov	51.81	342.80	0.00	341.10	0.40	1.70	3.2800	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
6	2-Jan	17.92	350.80	0.00	350.50	0.00	0.30	1.6700	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
7	11-Dec	117.27	343.40	0.00	343.20	0.40	0.20	0.1700	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
8	16-8	113.87	340.70	0.00	339.70	0.10	1.00	0.8800	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
9	16A-16	64.67	342.00	0.00	340.70	0.00	1.30	2.0100	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
10	17-18	50.87	348.30	0.00	347.40	0.10	0.90	1.7700	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
11	18-Out	39.35	347.30	0.00	336.46	0.00	10.84	27.5500	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
12	19-18	87.76	348.80	0.00	347.60	0.30	1.20	1.3700	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
13	20-21	44.50	354.20	0.00	353.60	0.00	0.60	1.3500	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
14	21-18	199.66	353.50	-0.10	347.70	0.40	5.80	2.9000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
15	3-Feb	98.25	350.50	0.00	347.70	0.50	2.80	2.8500	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
16	23-8	44.32	365.50	0.00	364.00	5.10	1.50	3.3800	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
17	24-8	23.62	365.50	0.00	363.90	5.00	1.60	6.7700	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
18	25-5	58.23	361.40	0.00	360.00	0.10	1.40	2.4000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
19	26-5	22.16	361.20	0.00	360.30	0.40	0.90	4.0600	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
20	27-6	32.60	351.30	0.00	350.60	0.30	0.70	2.1500	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
21	28-7	34.39	342.40	0.00	342.30	0.10	0.10	0.2900	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
22	30-5	120.67	365.90	0.00	360.00	0.10	5.90	4.8900	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
23	32-8	11.96	373.10	0.00	372.20	8.40	0.90	7.5300	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
24	33-8	88.56	373.40	0.00	372.20	8.40	1.20	1.3600	CIRCULAR	15.000	15.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
25	34-33	60.73	375.40	0.00	373.90	0.50	1.50	2.4700	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
26	34A-34	78.21	378.00	0.00	376.10	0.70	1.90	2.4300	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
27	5-Mar	105.08	347.20	0.00	346.30	6.00	0.90	0.8600	CIRCULAR	15.000	15.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
28	35-33	89.39	374.00	0.00	373.90	0.50	0.10	0.1100	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
29	36-10	56.83	372.40	0.00	368.00	0.70	4.40	7.7400	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
30	3-Apr	46.27	348.10	0.00	347.70	0.50	0.40	0.8600	CIRCULAR	15.000	15.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
31	4-Out	98.96	358.90	0.00	333.54	0.00	25.36	25.6300	CIRCULAR	15.000	15.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
32	6-May	198.15	359.90	0.00	350.30	0.00	9.60	4.8400	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
33	5-Out	123.22	340.30	0.00	335.53	0.00	4.77	3.8700	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
34	7-Jun	62.15	346.60	0.00	341.80	0.20	4.80	7.7200	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
35	6-7(MH)	157.05	350.30	0.00	342.50	0.30	7.80	4.9700	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
36	7(MH)-Out	127.60	342.20	0.00	336.00	0.00	6.20	4.8600	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
37	7-Out	130.52	341.60	0.00	339.81	0.00	1.79	1.3700	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
38	4-Aug	351.98	363.80	0.00	359.20	0.30	4.60	1.3100	CIRCULAR	15.000	15.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
39	8-Out	94.37	339.60	0.00	335.79	0.00	3.81	4.0400	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
40	8-Sep	27.57	341.40	0.00	340.10	0.50	1.30	4.7200	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
41	9-8(MH)	250.42	365.10	0.00	364.00	0.20	1.10	0.4400	CIRCULAR	15.000	15.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
42	BMtn-10	64.81	368.50	0.50	367.40	0.10	1.10	1.7000	CIRCULAR	15.000	15.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
43	I-91-Culvert	240.00	333.54	0.00	330.50	0.00	3.04	1.2700	CIRCULAR	24.000	24.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
44	Ramp_Culvert	134.00	328.72	0.00	327.58	0.00	1.14	0.8500	CIRCULAR	24.000	24.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1

Pipe Results

SN	Element ID	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Travel Time (min)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Froude Number	Reported Condition
1	8-Oct	1.36	0 12:08	5.06	0.27	5.01	0.16	0.38	0.38	0.00		Calculated
2	9-Oct	2.92	0 12:18	5.26	0.56	4.27	1.18	0.68	0.55	0.00		Calculated
3	1-Jan	0.53	0 12:08	5.62	0.09	4.22	0.16	0.22	0.22	0.00		Calculated
4	10-Jan	0.38	0 12:19	4.42	0.09	3.11	0.10	0.21	0.21	0.00		Calculated
5	10-Nov	0.79	0 12:08	6.45	0.12	5.27	0.16	0.25	0.25	0.00		Calculated
6	2-Jan	0.53	0 12:08	4.61	0.11	3.38	0.09	0.25	0.26	0.00		Calculated
7	11-Dec	0.15	0 12:08	1.47	0.10	1.35	1.45	0.20	0.20	0.00		Calculated
8	16-8	0.01	0 13:52	3.34	0.00	1.03	1.84	0.13	0.13	0.00		Calculated
9	16A-16	0.00	0 21:32	4.38	0.00	0.39	2.76	0.03	0.03	0.00		Calculated
10	17-18	0.28	0 12:07	4.74	0.06	3.18	0.27	0.17	0.17	0.00		Calculated
11	18-Out	1.52	0 12:07	18.70	0.08	12.21	0.05	0.22	0.22	0.00		Calculated
12	19-18	0.00	0 00:00	4.17	0.00	0.00		0.00	0.00	0.00		Calculated
13	20-21	0.47	0 12:07	4.14	0.11	2.94	0.25	0.26	0.26	0.00		Calculated
14	21-18	0.92	0 12:07	6.12	0.15	5.52	0.60	0.27	0.27	0.00		Calculated
15	3-Feb	0.71	0 12:09	6.01	0.12	4.98	0.33	0.24	0.24	0.00		Calculated
16	23-8	0.21	0 12:07	6.55	0.03	3.68	0.20	0.12	0.12	0.00		Calculated
17	24-8	0.29	0 12:07	9.27	0.03	5.08	0.08	0.13	0.13	0.00		Calculated
18	25-5	0.01	0 12:34	5.52	0.00	1.41	0.69	0.03	0.03	0.00		Calculated
19	26-5	0.00	0 00:00	7.18	0.00	0.00		0.00	0.00	0.00		Calculated
20	27-6	0.39	0 12:07	5.22	0.08	3.67	0.15	0.19	0.19	0.00		Calculated
21	28-7	0.00	0 12:02	1.92	0.00	0.13	4.41	0.08	0.08	0.00		Calculated
22	30-5	0.45	0 12:07	7.88	0.06	5.36	0.38	0.16	0.16	0.00		Calculated
23	32-8	0.10	0 12:07	9.77	0.01	3.82	0.05	0.07	0.07	0.00		Calculated
24	33-8	0.20	0 12:13	7.52	0.03	2.58	0.57	0.14	0.11	0.00		Calculated
25	34-33	0.18	0 12:12	5.60	0.03	3.17	0.32	0.12	0.12	0.00		Calculated
26	34A-34	0.00	0 00:00	5.55	0.00	0.00		0.00	0.00	0.00		Calculated
27	5-Mar	1.15	0 12:09	5.98	0.19	3.59	0.49	0.38	0.31	0.00		Calculated
28	35-33	0.03	0 12:21	1.19	0.02	0.71	2.10	0.10	0.10	0.00		Calculated
29	36-10	0.20	0 12:08	29.23	0.01	4.67	0.20	0.09	0.06	0.00		Calculated
30	3-Apr	0.29	0 12:08	6.01	0.05	2.42	0.32	0.19	0.15	0.00		Calculated
31	4-Out	3.36	0 12:19	32.70	0.10	10.47	0.16	0.38	0.31	0.00		Calculated
32	6-May	0.45	0 12:07	7.84	0.06	4.22	0.78	0.19	0.19	0.00		Calculated
33	5-Out	1.53	0 12:08	7.01	0.22	7.87	0.26	0.30	0.30	0.00		Calculated
34	7-Jun	0.33	0 12:08	9.90	0.03	5.70	0.18	0.13	0.13	0.00		Calculated
35	6-7(MH)	0.84	0 12:08	7.94	0.11	6.46	0.41	0.22	0.22	0.00		Calculated
36	7(MH)-Out	0.84	0 12:08	7.85	0.11	6.38	0.33	0.22	0.22	0.00		Calculated
37	7-Out	0.43	0 12:08	4.17	0.10	4.42	0.49	0.18	0.18	0.00		Calculated
38	4-Aug	3.13	0 12:19	7.38	0.42	5.63	1.04	0.58	0.46	0.00		Calculated
39	8-Out	1.49	0 12:09	7.16	0.21	8.00	0.20	0.29	0.29	0.00		Calculated
40	8-Sep	0.13	0 12:26	6.70	0.02	3.24	0.14	0.10	0.10	0.00		Calculated
41	9-8(MH)	2.92	0 12:19	4.28	0.68	3.77	1.11	0.75	0.60	0.00		Calculated
42	BMtn-10	2.44	0 12:17	8.42	0.29	4.64	0.23	0.56	0.45	0.00		Calculated
43	I-91-Culvert	3.36	0 12:20	25.46	0.13	4.90	0.82	0.54	0.27	0.00		Calculated
44	Ramp_Culvert	3.98	0 12:22	20.87	0.19	6.75	0.33	0.49	0.24	0.00		Calculated

Inlet Input

SN	Element ID	Inlet Manufacturer	Manufacturer Part Number	Inlet Location	Number of Inlets	Catchbasin Invert Elevation (ft)	Max (Rim) Elevation (ft)	Inlet Depth (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Ponded Area (ft^2)	Grate Clogging Factor (%)
1	CB-1	FHWA HEC-22 GENERIC	N/A	On Grade	1	351.90	356.30	4.40	351.90	0.00	N/A	0.00
2	CB-10	FHWA HEC-22 GENERIC	N/A	On Sag	1	340.70	347.37	6.67	340.70	0.00	10.00	0.00
3	CB-11	FHWA HEC-22 GENERIC	N/A	On Sag	1	342.80	346.64	3.84	342.80	0.00	10.00	0.00
4	CB-12	FHWA HEC-22 GENERIC	N/A	On Grade	1	343.40	348.19	4.79	343.40	0.00	N/A	0.00
5	CB-17	FHWA HEC-22 GENERIC	N/A	On Grade	1	348.30	352.17	3.87	348.30	0.00	N/A	0.00
6	CB-18	FHWA HEC-22 GENERIC	N/A	On Grade	1	347.30	351.79	4.49	347.30	0.00	N/A	0.00
7	CB-19	FHWA HEC-22 GENERIC	N/A	On Sag	2	348.80	350.66	1.86	348.80	0.00	10.00	0.00
8	CB-2	FHWA HEC-22 GENERIC	N/A	On Grade	1	350.50	355.60	5.10	350.60	0.10	N/A	0.00
9	CB-20	FHWA HEC-22 GENERIC	N/A	On Grade	1	354.20	358.45	4.25	354.20	0.00	N/A	0.00
10	CB-21	FHWA HEC-22 GENERIC	N/A	On Grade	1	353.60	358.38	4.78	353.60	0.00	N/A	0.00
11	CB-23	FHWA HEC-22 GENERIC	N/A	On Grade	1	365.50	369.60	4.10	365.50	0.00	N/A	0.00
12	CB-24	FHWA HEC-22 GENERIC	N/A	On Grade	1	365.50	369.68	4.18	365.50	0.00	N/A	0.00
13	CB-27	FHWA HEC-22 GENERIC	N/A	On Grade	1	351.30	356.41	5.11	351.30	0.00	N/A	0.00
14	CB-3	FHWA HEC-22 GENERIC	N/A	On Grade	1	347.20	353.17	5.97	347.20	0.00	N/A	0.00
15	CB-30	FHWA HEC-22 GENERIC	N/A	On Grade	1	365.90	370.42	4.52	365.90	0.00	N/A	0.00
16	CB-32	FHWA HEC-22 GENERIC	N/A	On Grade	1	373.10	377.88	4.78	373.10	0.00	N/A	0.00
17	CB-35	FHWA HEC-22 GENERIC	N/A	On Grade	1	374.00	379.37	5.37	374.00	0.00	N/A	0.00
18	CB-4	FHWA HEC-22 GENERIC	N/A	On Grade	1	348.10	352.48	4.38	348.10	0.00	N/A	0.00
19	CB-5	FHWA HEC-22 GENERIC	N/A	On Sag	1	340.30	350.66	10.36	340.30	0.00	10.00	0.00
20	CB-6	FHWA HEC-22 GENERIC	N/A	On Grade	1	346.60	349.21	2.61	346.60	0.00	N/A	0.00
21	CB-7	FHWA HEC-22 GENERIC	N/A	On Sag	1	341.60	344.57	2.97	341.60	0.00	10.00	0.00
22	CB-8	FHWA HEC-22 GENERIC	N/A	On Sag	1	339.60	345.67	6.07	339.60	0.00	10.00	0.00
23	CB-9	FHWA HEC-22 GENERIC	N/A	On Sag	1	341.40	346.02	4.62	341.40	0.00	0.00	0.00

Roadway & Gutter Input

SN	Element ID	Roadway Longitudinal Slope (ft/ft)	Roadway Cross Slope (ft/ft)	Roadway Manning's Roughness	Gutter Cross Slope (ft/ft)	Gutter Width (ft)	Gutter Depression (in)	Allowable Spread (ft)
1	CB-1	0.0320	0.0200	0.0160	0.0200	12.00	0.0000	10.50
2	CB-10	N/A	0.0200	0.0160	0.0200	2.00	0.0000	10.50
3	CB-11	N/A	0.0200	0.0160	0.0200	2.00	0.0000	10.50
4	CB-12	0.0300	0.0200	0.0160	0.0200	2.00	0.0000	10.50
5	CB-17	0.0314	0.0200	0.0160	0.0200	2.00	0.0656	10.50
6	CB-18	0.0314	0.0200	0.0160	0.0200	2.00	0.0000	10.50
7	CB-19	N/A	0.0200	0.0160	0.0200	2.00	0.0656	10.50
8	CB-2	0.0320	0.0200	0.0160	0.0200	2.00	0.0000	10.50
9	CB-20	0.0314	0.0200	0.0160	0.0200	2.00	0.0656	10.50
10	CB-21	0.0314	0.0200	0.0160	0.0200	2.00	0.0000	10.50
11	CB-23	0.0314	0.0200	0.0160	0.0200	2.00	0.0000	10.50
12	CB-24	0.0314	0.0200	0.0160	0.0200	2.00	0.0000	10.50
13	CB-27	0.0500	0.0200	0.0160	0.0200	2.00	0.0000	10.50
14	CB-3	0.0200	0.0200	0.0160	0.0200	2.00	0.0000	10.50
15	CB-30	0.0400	0.0200	0.0160	0.0200	2.00	0.0000	10.50
16	CB-32	0.0150	0.0200	0.0160	0.0200	2.00	0.0000	10.50
17	CB-35	0.0100	0.0200	0.0160	0.0200	2.00	0.0000	10.50
18	CB-4	0.0200	0.0200	0.0160	0.0200	2.00	0.0000	10.50
19	CB-5	N/A	0.0200	0.0160	0.0200	43.00	0.0000	10.50
20	CB-6	0.0100	0.0200	0.0160	0.0200	2.00	0.0000	10.50
21	CB-7	N/A	0.0170	0.0160	0.0200	78.00	0.0000	10.50
22	CB-8	N/A	0.0200	0.0160	0.0200	2.00	0.0656	10.50
23	CB-9	N/A	0.0200	0.0160	0.0200	2.00	0.0656	10.50

Inlet Results

SN	Element ID	Peak Flow (cfs)	Peak Lateral Inflow (cfs)	Peak Flow Intercepted by Inlet (cfs)	Peak Flow Bypassing Inlet (cfs)	Inlet Efficiency during Peak Flow (%)	Max Gutter Spread during Peak Flow (ft)	Max Gutter Water Elev. during Peak Flow (ft)	Max Gutter Water Depth during Peak Flow (ft)	Time of Max Depth Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	CB-1	0.70	0.70	0.54	0.17	76.31	5.08	356.40	0.10	0 12:08	0.00	0.00
2	CB-10	0.59	0.55	N/A	N/A	N/A	6.12	347.47	0.10	0 12:08	0.00	0.00
3	CB-11	0.64	0.61	N/A	N/A	N/A	6.41	346.75	0.11	0 12:08	0.00	0.00
4	CB-12	0.19	0.12	0.18	0.01	94.41	3.14	348.25	0.06	0 12:08	0.00	0.00
5	CB-17	0.34	0.23	0.30	0.04	87.25	3.90	352.25	0.08	0 12:07	0.00	0.00
6	CB-18	0.39	0.29	0.33	0.06	85.37	4.10	351.87	0.08	0 12:07	0.00	0.00
7	CB-19	0.00	0.00	N/A	N/A	N/A	1.00	350.74	0.08	0 00:00	0.00	0.00
8	CB-2	0.25	0.25	0.23	0.02	91.37	3.47	355.67	0.07	0 12:09	0.00	0.00
9	CB-20	0.58	0.53	0.46	0.12	79.19	4.76	358.55	0.10	0 12:07	0.00	0.00
10	CB-21	0.56	0.50	0.45	0.12	79.54	4.72	358.47	0.09	0 12:07	0.00	0.00
11	CB-23	0.25	0.25	0.23	0.02	91.33	3.48	369.67	0.07	0 12:07	0.00	0.00
12	CB-24	0.36	0.33	0.31	0.05	86.58	3.97	369.76	0.08	0 12:07	0.00	0.00
13	CB-27	0.46	0.35	0.40	0.07	85.71	4.00	356.49	0.08	0 12:07	0.00	0.00
14	CB-3	0.19	0.15	0.18	0.01	92.59	3.40	353.24	0.07	0 12:09	0.00	0.00
15	CB-30	0.56	0.56	0.46	0.11	81.15	4.50	370.51	0.09	0 12:07	0.00	0.00
16	CB-32	0.13	0.13	0.13	0.01	95.24	3.13	377.94	0.06	0 12:07	0.00	0.00
17	CB-35	0.04	0.04	0.04	0.00	99.97	2.13	379.41	0.04	0 12:21	0.00	0.00
18	CB-4	0.37	0.20	0.31	0.06	83.60	4.39	352.57	0.09	0 12:08	0.00	0.00
19	CB-5	0.40	0.40	N/A	N/A	N/A	4.94	350.33	-0.33	0 12:08	0.00	0.00
20	CB-6	0.44	0.36	0.34	0.09	78.25	5.31	349.32	0.11	0 12:08	0.00	0.00
21	CB-7	0.03	0.03	N/A	N/A	N/A	1.65	344.05	-0.52	0 12:08	0.00	0.00
22	CB-8	0.10	0.10	N/A	N/A	N/A	2.61	345.79	0.12	0 12:09	0.00	0.00
23	CB-9	0.13	0.11	N/A	N/A	N/A	2.90	346.14	0.12	0 12:26	0.00	0.00

Project Description

File Name ..... SSA Analysis - EX2.SPF

Rainfall Details

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
49		Time Series	10-yr	Cumulative	inches	Massachusetts	Franklin	10.00	4.30	SCS Type III 24-hr

Node Summary

SN	Element ID	Element Type	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Initial Water Elevation (ft)	Surcharge Elevation (ft)	Ponded Area (ft^2)	Peak Inflow (cfs)	Max HGL Elevation Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	Bald_Mtn	Junction	368.00	375.00	368.00	375.00	0.00	6.36	375.00	0.00	0.00	0 12:15	0.02	5.00
2	CB-16	Junction	340.70	344.05	340.70	344.05	0.00	0.23	340.88	0.00	3.17	0 00:00	0.00	0.00
3	CB-16A	Junction	342.00	346.00	342.00	346.00	10.00	0.06	342.08	0.00	3.92	0 00:00	0.00	0.00
4	CB-25	Junction	361.40	366.92	361.40	366.92	10.00	0.22	361.54	0.00	5.38	0 00:00	0.00	0.00
5	CB-26	Junction	361.20	364.26	361.20	364.26	10.00	0.00	361.21	0.00	3.05	0 00:00	0.00	0.00
6	CB-28	Junction	342.40	348.24	342.40	348.24	10.00	0.01	342.51	0.00	5.73	0 00:00	0.00	0.00
7	CB-33	Junction	373.40	378.68	373.40	378.68	10.00	0.54	373.64	0.00	5.04	0 00:00	0.00	0.00
8	CB-34	Junction	375.40	380.10	375.40	380.10	10.00	0.39	375.59	0.00	4.51	0 00:00	0.00	0.00
9	CB-34A	Junction	378.00	382.00	378.00	382.00	0.00	0.00	378.02	0.00	3.98	0 00:00	0.00	0.00
10	CB-36	Junction	372.40	376.41	372.40	376.41	10.00	0.46	374.10	0.00	2.31	0 00:00	0.00	0.00
11	DHM-8	Junction	363.80	378.03	363.80	378.03	0.00	8.10	365.82	0.00	12.21	0 00:00	0.00	0.00
12	DI-1	Junction	368.20	371.60	368.20	371.60	10.00	1.25	374.16	2.56	0.00	0 12:09	0.01	16.00
13	DMH-1	Junction	350.80	356.38	350.80	356.38	0.00	0.81	351.15	0.00	5.23	0 00:00	0.00	0.00
14	DMH-10	Junction	367.30	377.69	367.30	377.69	0.00	7.52	374.09	0.00	3.60	0 00:00	0.00	0.00
15	DMH-4	Junction	358.90	368.92	358.90	368.92	0.00	8.10	359.32	0.00	9.60	0 00:00	0.00	0.00
16	DMH-5	Junction	359.90	366.02	359.90	366.02	0.00	0.84	360.12	0.00	5.90	0 00:00	0.00	0.00
17	DMH-6	Junction	350.30	356.18	350.30	356.18	0.00	1.47	350.60	0.00	5.58	0 00:00	0.00	0.00
18	DMH-7	Junction	342.20	348.55	342.20	348.55	0.00	1.47	342.51	0.00	6.04	0 00:00	0.00	0.00
19	DMH-9	Junction	365.10	380.10	365.10	380.10	0.00	7.51	369.62	0.00	10.48	0 00:00	0.00	0.00
20	Fallriver_Junction	Junction	325.00	331.00	325.00	331.00	0.00	14.01	325.64	0.00	19.36	0 00:00	0.00	0.00
21	I-91_Culvert-Out	Junction	330.50	340.00	330.00	340.00	0.00	8.10	331.43	0.00	8.57	0 00:00	0.00	0.00
22	Outfall-1A	Junction	335.53	341.53	335.53	341.53	0.00	2.84	335.87	0.00	5.66	0 00:00	0.00	0.00
23	Outfall-1B	Junction	339.81	345.81	339.81	345.81	0.00	1.02	340.01	0.00	5.80	0 00:00	0.00	0.00
24	Outfall-1C	Junction	335.79	341.79	335.79	341.79	0.00	2.86	336.11	0.00	5.68	0 00:00	0.00	0.00
25	Outfall-1D	Junction	336.46	342.46	336.46	342.46	0.00	2.35	336.76	0.00	5.70	0 00:00	0.00	0.00
26	Outfall-1E	Junction	333.54	339.54	333.54	339.54	0.00	8.10	334.36	0.00	5.18	0 00:00	0.00	0.00
27	RampCulvert-In	Junction	328.72	340.00	328.72	340.00	0.00	9.17	329.85	0.00	10.15	0 00:00	0.00	0.00
28	RampCulvert-Out	Junction	327.58	340.00	327.58	340.00	0.00	9.14	328.02	0.00	11.98	0 00:00	0.00	0.00
29	Bypass_Outfall-1	Outfall	351.50					0.13	351.55					
30	Outfall-1	Outfall	324.50					13.98	325.10					
31	Outfall-2	Outfall	336.00					1.47	336.29					

Junction Results

SN	Element ID	Peak Inflow (cfs)	Peak Lateral Inflow (cfs)	Max HGL Elevation Attained (ft)	Max HGL Depth Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Average HGL Elevation Attained (ft)	Average HGL Depth Attained (ft)	Time of Max HGL Occurrence (days hh:mm)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	Bald_Mtn	6.36	6.36	375.00	7.00	0.00	0.00	368.53	0.53	0 12:14	0 12:15	0.02	5.00
2	CB-16	0.23	0.20	340.88	0.18	0.00	3.17	340.72	0.02	0 12:32	0 00:00	0.00	0.00
3	CB-16A	0.06	0.06	342.08	0.08	0.00	3.92	342.01	0.01	0 12:47	0 00:00	0.00	0.00
4	CB-25	0.22	0.22	361.54	0.14	0.00	5.38	361.41	0.01	0 12:11	0 00:00	0.00	0.00
5	CB-26	0.00	0.00	361.21	0.01	0.00	3.05	361.20	0.00	0 13:59	0 00:00	0.00	0.00
6	CB-28	0.01	0.00	342.51	0.11	0.00	5.73	342.40	0.00	0 12:09	0 00:00	0.00	0.00
7	CB-33	0.54	0.00	373.64	0.24	0.00	5.04	373.42	0.02	0 12:11	0 00:00	0.00	0.00
8	CB-34	0.39	0.39	375.59	0.19	0.00	4.51	375.41	0.01	0 12:11	0 00:00	0.00	0.00
9	CB-34A	0.00	0.00	378.02	0.02	0.00	3.98	378.00	0.00	0 15:41	0 00:00	0.00	0.00
10	CB-36	0.46	0.46	374.10	1.70	0.00	2.31	372.42	0.02	0 12:15	0 00:00	0.00	0.00
11	DHM-8	8.10	0.00	365.82	2.02	0.00	12.21	363.87	0.07	0 12:21	0 00:00	0.00	0.00
12	DI-1	1.25	1.25	374.16	5.96	2.56	0.00	368.27	0.07	0 12:15	0 12:09	0.01	16.00
13	DMH-1	0.81	0.00	351.15	0.35	0.00	5.23	350.82	0.02	0 12:08	0 00:00	0.00	0.00
14	DMH-10	7.52	0.00	374.09	6.79	0.00	3.60	367.42	0.12	0 12:15	0 00:00	0.00	0.00
15	DMH-4	8.10	0.00	359.32	0.42	0.00	9.60	358.93	0.03	0 12:20	0 00:00	0.00	0.00
16	DMH-5	0.84	0.00	360.12	0.22	0.00	5.90	359.92	0.02	0 12:09	0 00:00	0.00	0.00
17	DMH-6	1.47	0.00	350.60	0.30	0.00	5.58	350.32	0.02	0 12:08	0 00:00	0.00	0.00
18	DMH-7	1.47	0.00	342.51	0.31	0.00	6.04	342.22	0.02	0 12:08	0 00:00	0.00	0.00
19	DMH-9	7.51	0.00	369.62	4.52	0.00	10.48	365.21	0.11	0 12:20	0 00:00	0.00	0.00
20	Fallriver_Junction	14.01	0.00	325.64	0.64	0.00	19.36	325.04	0.04	0 12:15	0 00:00	0.00	0.00
21	I-91_Culvert-Out	8.10	0.00	331.43	0.93	0.00	8.57	330.56	0.06	0 12:21	0 00:00	0.00	0.00
22	Outfall-1A	2.84	0.00	335.87	0.34	0.00	5.66	335.55	0.02	0 12:08	0 00:00	0.00	0.00
23	Outfall-1B	1.02	0.00	340.01	0.20	0.00	5.80	339.82	0.01	0 12:09	0 00:00	0.00	0.00
24	Outfall-1C	2.86	0.00	336.11	0.32	0.00	5.68	335.81	0.02	0 12:10	0 00:00	0.00	0.00
25	Outfall-1D	2.35	0.00	336.76	0.30	0.00	5.70	336.48	0.02	0 12:07	0 00:00	0.00	0.00
26	Outfall-1E	8.10	0.00	334.36	0.82	0.00	5.18	333.60	0.06	0 12:20	0 00:00	0.00	0.00
27	RampCulvert-In	9.17	0.00	329.85	1.13	0.00	10.15	328.81	0.09	0 12:19	0 00:00	0.00	0.00
28	RampCulvert-Out	9.14	0.00	328.02	0.44	0.00	11.98	327.61	0.03	0 12:21	0 00:00	0.00	0.00

Channel Results

SN	Element ID	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Travel Time (min)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Froude Number	Reported Condition
1	1D-culvert	2.34	0 12:07	168.37	0.01	1.60	2.22	0.67	0.22	0.00		
2	CB-1_bypass	0.40	0 12:08	50.08	0.01	2.10	1.00	0.09	0.17	0.00		
3	CB-12_bypass	0.06	0 12:07	26.10	0.00	0.63	3.29	0.11	0.21	0.00		
4	CB-17_bypass	0.11	0 12:07	34.84	0.00	1.71	2.70	0.12	0.23	0.00		
5	CB-18_bypass	0.12	0 12:07	33.52	0.00	1.51	1.84	0.06	0.11	0.00		
6	CB-2_bypass	0.18	0 12:11	36.34	0.00	1.72	0.98	0.06	0.13	0.00		
7	CB-20_bypass	0.24	0 12:07	39.73	0.01	2.08	1.66	0.07	0.14	0.00		
8	CB-21_bypass	0.22	0 12:07	41.17	0.01	1.89	1.79	0.07	0.13	0.00		
9	CB-23_bypass	0.08	0 12:07	40.73	0.00	0.84	6.95	0.06	0.12	0.00		
10	CB-24_bypass	0.12	0 12:07	45.09	0.00	0.87	6.80	0.06	0.11	0.00		
11	CB-27_bypass	0.13	0 12:07	49.68	0.00	1.78	0.97	0.05	0.11	0.00		
12	CB-3_bypass	0.08	0 12:09	25.22	0.00	0.76	10.42	0.10	0.21	0.00		
13	CB-30_bypass	0.23	0 12:07	49.76	0.00	2.42	2.03	0.06	0.12	0.00		
14	CB-32_bypass	0.05	0 12:07	35.42	0.00	1.13	5.02	0.04	0.08	0.00		
15	CB-35_bypass	0.05	0 12:10	35.05	0.00	0.84	7.53	0.05	0.11	0.00		
16	CB-4_bypass	0.17	0 12:08	30.52	0.01	2.65	1.21	0.05	0.10	0.00		
17	CB-6_bypass	0.31	0 12:08	179.60	0.00	0.00		0.01	0.02	0.00		
18	Cobble_Waterway	8.09	0 12:21	104.81	0.08	1.94	3.12	1.03	0.34	0.00		
19	FallRiver	13.98	0 12:15	8532.83	0.00	2.13	0.78	0.62	0.03	0.00		
20	FR1	2.84	0 12:08	21.24	0.13	4.52	0.31	0.48	0.48	0.00		
21	FR2	1.02	0 12:09	19.71	0.05	1.92	1.20	0.41	0.41	0.00		
22	FR3	9.14	0 12:21	855.32	0.01	1.74	3.63	0.53	0.05	0.00		
23	FR4	2.86	0 12:10	23.43	0.12	4.32	0.28	0.47	0.47	0.00		

Pipe Results

SN	Element ID	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Travel Time (min)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Froude Number	Reported Condition
1	8-Oct	2.12	0 12:08	5.06	0.42	5.54	0.15	0.49	0.49	0.00		Calculated
2	9-Oct	7.51	0 12:15	5.26	1.43	6.12	0.82	1.25	1.00	28.00		SURCHARGED
3	1-Jan	0.81	0 12:08	5.62	0.14	4.71	0.14	0.27	0.27	0.00		Calculated
4	10-Jan	1.38	0 12:25	4.42	0.31	3.52	0.09	1.00	1.00	24.00		SURCHARGED
5	10-Nov	1.23	0 12:08	6.45	0.19	5.88	0.15	0.31	0.31	0.00		Calculated
6	2-Jan	0.81	0 12:08	4.61	0.18	3.47	0.09	0.34	0.34	0.00		Calculated
7	11-Dec	0.24	0 12:08	1.47	0.17	1.55	1.26	0.25	0.25	0.00		Calculated
8	16-8	0.23	0 12:32	3.34	0.07	2.18	0.87	0.26	0.26	0.00		Calculated
9	16A-16	0.06	0 12:47	4.38	0.01	1.24	0.87	0.12	0.12	0.00		Calculated
10	17-18	0.50	0 12:07	4.74	0.10	3.72	0.23	0.23	0.23	0.00		Calculated
11	18-Out	2.35	0 12:07	18.70	0.13	13.33	0.05	0.28	0.28	0.00		Calculated
12	19-18	0.00	0 15:16	4.17	0.00	0.92	1.59	0.01	0.01	0.00		Calculated
13	20-21	0.66	0 12:07	4.14	0.16	3.19	0.23	0.31	0.31	0.00		Calculated
14	21-18	1.31	0 12:07	6.12	0.21	6.07	0.55	0.32	0.32	0.00		Calculated
15	3-Feb	1.32	0 12:09	6.01	0.22	5.88	0.28	0.33	0.33	0.00		Calculated
16	23-8	0.34	0 12:07	6.55	0.05	4.21	0.18	0.16	0.16	0.00		Calculated
17	24-8	0.47	0 12:07	9.27	0.05	5.73	0.07	0.16	0.16	0.00		Calculated
18	25-5	0.22	0 12:11	5.52	0.04	3.35	0.29	0.14	0.14	0.00		Calculated
19	26-5	0.00	0 14:01	7.18	0.00	1.21	0.31	0.01	0.01	0.00		Calculated
20	27-6	0.64	0 12:07	5.22	0.12	4.15	0.13	0.25	0.25	0.00		Calculated
21	28-7	0.01	0 12:00	1.92	0.00	0.23	2.49	0.16	0.16	0.00		Calculated
22	30-5	0.66	0 12:08	7.88	0.08	5.97	0.34	0.20	0.20	0.00		Calculated
23	32-8	0.16	0 12:07	9.77	0.02	4.31	0.05	0.10	0.10	0.00		Calculated
24	33-8	0.54	0 12:11	7.52	0.07	3.44	0.43	0.23	0.19	0.00		Calculated
25	34-33	0.39	0 12:11	5.60	0.07	3.96	0.26	0.18	0.18	0.00		Calculated
26	34A-34	0.00	0 15:41	5.55	0.00	1.06	1.23	0.01	0.01	0.00		Calculated
27	5-Mar	2.26	0 12:08	5.98	0.38	4.26	0.41	0.56	0.45	0.00		Calculated
28	35-33	0.15	0 12:11	1.19	0.12	1.24	1.20	0.21	0.21	0.00		Calculated
29	36-10	0.55	0 12:25	29.23	0.02	5.69	0.17	1.50	1.00	7.00		SURCHARGED
30	3-Apr	0.64	0 12:08	6.01	0.11	2.98	0.26	0.29	0.23	0.00		Calculated
31	4-Out	8.10	0 12:20	32.70	0.25	13.30	0.12	0.62	0.50	0.00		Calculated
32	6-May	0.84	0 12:09	7.84	0.11	5.15	0.64	0.26	0.26	0.00		Calculated
33	5-Out	2.84	0 12:08	7.01	0.40	9.01	0.23	0.42	0.42	0.00		Calculated
34	7-Jun	0.58	0 12:08	9.90	0.06	6.62	0.16	0.18	0.18	0.00		Calculated
35	6-7(MH)	1.47	0 12:08	7.94	0.19	7.52	0.35	0.30	0.30	0.00		Calculated
36	7(MH)-Out	1.47	0 12:09	7.85	0.19	7.42	0.29	0.30	0.30	0.00		Calculated
37	7-Out	1.02	0 12:09	4.17	0.25	5.39	0.40	0.29	0.29	0.00		Calculated
38	4-Aug	7.75	0 12:21	7.38	1.05	6.63	0.88	1.18	0.94	0.00		> CAPACITY
39	8-Out	2.86	0 12:10	7.16	0.40	9.17	0.17	0.42	0.42	0.00		Calculated
40	8-Sep	0.59	0 12:22	6.70	0.09	4.92	0.09	0.21	0.21	0.00		Calculated
41	9-8(MH)	7.51	0 12:15	4.28	1.75	6.12	0.68	1.25	1.00	14.00		SURCHARGED
42	BMtn-10	6.34	0 12:14	8.42	0.75	5.17	0.21	1.25	1.00	22.00		SURCHARGED
43	I-91-Culvert	8.10	0 12:20	25.46	0.32	6.30	0.63	0.87	0.44	0.00		Calculated
44	Ramp_Culvert	9.14	0 12:19	20.87	0.44	8.01	0.28	0.78	0.39	0.00		Calculated

Inlet Results

SN	Element ID	Peak Flow (cfs)	Peak Lateral Inflow (cfs)	Peak Flow Intercepted by Inlet (cfs)	Peak Flow Bypassing Inlet (cfs)	Inlet Efficiency during Peak Flow (%)	Max Gutter Spread during Peak Flow (ft)	Max Gutter Water Elev. during Peak Flow (ft)	Max Gutter Water Depth during Peak Flow (ft)	Time of Max Depth Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	CB-1	1.21	1.21	0.81	0.40	67.15	6.24	356.42	0.12	0 12:08	0.00	0.00
2	CB-10	0.96	0.88	N/A	N/A	N/A	8.08	347.51	0.14	0 12:08	0.00	0.00
3	CB-11	0.99	0.93	N/A	N/A	N/A	8.22	346.78	0.14	0 12:08	0.00	0.00
4	CB-12	0.30	0.18	0.27	0.03	88.70	3.76	348.27	0.08	0 12:08	0.00	0.00
5	CB-17	0.61	0.37	0.48	0.13	78.38	4.85	352.27	0.10	0 12:07	0.00	0.00
6	CB-18	0.67	0.45	0.51	0.15	76.89	5.02	351.89	0.10	0 12:07	0.00	0.00
7	CB-19	0.00	0.00	N/A	N/A	N/A	1.10	350.75	0.09	0 15:54	0.00	0.00
8	CB-2	0.71	0.71	0.54	0.17	75.90	5.13	355.70	0.10	0 12:09	0.00	0.00
9	CB-20	0.90	0.82	0.65	0.25	72.09	5.59	358.56	0.11	0 12:07	0.00	0.00
10	CB-21	0.87	0.75	0.63	0.24	72.56	5.54	358.49	0.11	0 12:07	0.00	0.00
11	CB-23	0.41	0.41	0.35	0.06	84.53	4.19	369.68	0.08	0 12:07	0.00	0.00
12	CB-24	0.58	0.54	0.46	0.12	79.14	4.76	369.78	0.10	0 12:07	0.00	0.00
13	CB-27	0.77	0.54	0.60	0.17	77.54	4.85	356.51	0.10	0 12:07	0.00	0.00
14	CB-3	0.39	0.23	0.32	0.07	83.09	4.44	353.26	0.09	0 12:08	0.00	0.00
15	CB-30	0.89	0.86	0.66	0.24	73.61	5.35	370.53	0.11	0 12:08	0.00	0.00
16	CB-32	0.21	0.21	0.19	0.02	90.21	3.73	377.95	0.07	0 12:07	0.00	0.00
17	CB-35	0.20	0.20	0.18	0.02	89.45	3.94	379.45	0.08	0 12:11	0.00	0.00
18	CB-4	0.81	0.41	0.58	0.23	71.29	5.85	352.60	0.12	0 12:08	0.00	0.00
19	CB-5	0.60	0.60	N/A	N/A	N/A	6.15	350.35	-0.31	0 12:08	0.00	0.00
20	CB-6	0.81	0.64	0.55	0.25	68.53	6.65	349.34	0.13	0 12:05	0.00	0.00
21	CB-7	0.27	0.27	N/A	N/A	N/A	4.07	344.09	-0.48	0 12:08	0.00	0.00
22	CB-8	0.37	0.37	N/A	N/A	N/A	4.72	345.83	0.16	0 12:10	0.00	0.00
23	CB-9	0.63	0.58	N/A	N/A	N/A	6.35	346.21	0.19	0 12:22	0.00	0.00

Project Description

File Name ..... SSA Analysis - EX2.SPF

Rainfall Details

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
49		Time Series	100-yr	Cumulative	inches	Massachusetts	Franklin	100.00	6.53	SCS Type III 24-hr

Node Summary

SN	Element ID	Element Type	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Initial Water Elevation (ft)	Surcharge Elevation (ft)	Ponded Area (ft^2)	Peak Inflow (cfs)	Max HGL Elevation Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	Bald_Mtn	Junction	368.00	375.00	368.00	375.00	0.00	13.89	375.00	0.00	0.00	0 12:14	3.56	37.00
2	CB-16	Junction	340.70	344.05	340.70	344.05	0.00	1.68	341.64	0.00	2.41	0 00:00	0.00	0.00
3	CB-16A	Junction	342.00	346.00	342.00	346.00	10.00	0.85	342.30	0.00	3.70	0 00:00	0.00	0.00
4	CB-25	Junction	361.40	366.92	361.40	366.92	10.00	1.02	361.72	0.00	5.20	0 00:00	0.00	0.00
5	CB-26	Junction	361.20	364.26	361.20	364.26	10.00	0.05	361.26	0.00	3.00	0 00:00	0.00	0.00
6	CB-28	Junction	342.40	348.24	342.40	348.24	10.00	0.02	342.66	0.00	5.58	0 00:00	0.00	0.00
7	CB-33	Junction	373.40	378.68	373.40	378.68	10.00	1.23	373.77	0.00	4.91	0 00:00	0.00	0.00
8	CB-34	Junction	375.40	380.10	375.40	380.10	10.00	0.80	375.68	0.00	4.42	0 00:00	0.00	0.00
9	CB-34A	Junction	378.00	382.00	378.00	382.00	0.00	0.04	378.06	0.00	3.94	0 00:00	0.00	0.00
10	CB-36	Junction	372.40	376.41	372.40	376.41	10.00	0.93	374.68	0.00	1.73	0 00:00	0.00	0.00
11	DHM-8	Junction	363.80	378.03	363.80	378.03	0.00	8.70	366.86	0.00	11.17	0 00:00	0.00	0.00
12	DI-1	Junction	368.20	371.60	368.20	371.60	10.00	3.05	375.06	3.46	0.00	0 11:59	0.02	44.00
13	DMH-1	Junction	350.80	356.38	350.80	356.38	0.00	1.19	351.25	0.00	5.13	0 00:00	0.00	0.00
14	DMH-10	Junction	367.30	377.69	367.30	377.69	0.00	7.78	374.68	0.00	3.01	0 00:00	0.00	0.00
15	DMH-4	Junction	358.90	368.92	358.90	368.92	0.00	9.39	359.36	0.00	9.56	0 00:00	0.00	0.00
16	DMH-5	Junction	359.90	366.02	359.90	366.02	0.00	2.02	360.25	0.00	5.77	0 00:00	0.00	0.00
17	DMH-6	Junction	350.30	356.18	350.30	356.18	0.00	3.00	350.75	0.00	5.43	0 00:00	0.00	0.00
18	DMH-7	Junction	342.20	348.55	342.20	348.55	0.00	3.00	342.66	0.00	5.89	0 00:00	0.00	0.00
19	DMH-9	Junction	365.10	380.10	365.10	380.10	0.00	7.73	370.46	0.00	9.64	0 00:00	0.00	0.00
20	Fallriver_Junction	Junction	325.00	331.00	325.00	331.00	0.00	25.84	325.93	0.00	19.07	0 00:00	0.00	0.00
21	I-91_Culvert-Out	Junction	330.50	340.00	330.00	340.00	0.00	9.39	331.50	0.00	8.50	0 00:00	0.00	0.00
22	Outfall-1A	Junction	335.53	341.53	335.53	341.53	0.00	4.89	335.99	0.00	5.54	0 00:00	0.00	0.00
23	Outfall-1B	Junction	339.81	345.81	339.81	345.81	0.00	2.64	340.15	0.00	5.66	0 00:00	0.00	0.00
24	Outfall-1C	Junction	335.79	341.79	335.79	341.79	0.00	6.26	336.29	0.00	5.50	0 00:00	0.00	0.00
25	Outfall-1D	Junction	336.46	342.46	336.46	342.46	0.00	3.67	336.85	0.00	5.61	0 00:00	0.00	0.00
26	Outfall-1E	Junction	333.54	339.54	333.54	339.54	0.00	9.39	334.44	0.00	5.10	0 00:00	0.00	0.00
27	RampCulvert-In	Junction	328.72	340.00	328.72	340.00	0.00	12.89	330.11	0.00	9.89	0 00:00	0.00	0.00
28	RampCulvert-Out	Junction	327.58	340.00	327.58	340.00	0.00	12.70	328.12	0.00	11.88	0 00:00	0.00	0.00
29	Bypass_Outfall-1	Outfall	351.50					0.28	351.57					
30	Outfall-1	Outfall	324.50					25.60	325.37					
31	Outfall-2	Outfall	336.00					3.00	336.43					

Junction Results

SN	Element ID	Peak Inflow (cfs)	Peak Lateral Inflow (cfs)	Max HGL Elevation Attained (ft)	Max HGL Depth Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Average HGL Elevation Attained (ft)	Average HGL Depth Attained (ft)	Time of Max HGL Occurrence (days hh:mm)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	Bald_Mtn	13.89	13.89	375.00	7.00	0.00	0.00	368.66	0.66	0 12:01	0 12:14	3.56	37.00
2	CB-16	1.68	0.88	341.64	0.94	0.00	2.41	340.74	0.04	0 12:17	0 00:00	0.00	0.00
3	CB-16A	0.85	0.85	342.30	0.30	0.00	3.70	342.03	0.03	0 12:25	0 00:00	0.00	0.00
4	CB-25	1.02	1.02	361.72	0.32	0.00	5.20	361.42	0.02	0 12:10	0 00:00	0.00	0.00
5	CB-26	0.05	0.05	361.26	0.06	0.00	3.00	361.21	0.01	0 12:20	0 00:00	0.00	0.00
6	CB-28	0.02	0.02	342.66	0.26	0.00	5.58	342.42	0.02	0 12:09	0 00:00	0.00	0.00
7	CB-33	1.23	0.02	373.77	0.37	0.00	4.91	373.43	0.03	0 12:11	0 00:00	0.00	0.00
8	CB-34	0.80	0.78	375.68	0.28	0.00	4.42	375.42	0.02	0 12:11	0 00:00	0.00	0.00
9	CB-34A	0.04	0.04	378.06	0.06	0.00	3.94	378.01	0.01	0 12:23	0 00:00	0.00	0.00
10	CB-36	0.93	0.93	374.68	2.28	0.00	1.73	372.45	0.05	0 12:13	0 00:00	0.00	0.00
11	DHM-8	8.70	0.00	366.86	3.06	0.00	11.17	363.94	0.14	0 12:14	0 00:00	0.00	0.00
12	DI-1	3.05	3.05	375.06	6.86	3.46	0.00	368.39	0.19	0 12:14	0 11:59	0.02	44.00
13	DMH-1	1.19	0.00	351.25	0.45	0.00	5.13	350.83	0.03	0 12:08	0 00:00	0.00	0.00
14	DMH-10	7.78	0.00	374.68	7.38	0.00	3.01	367.56	0.26	0 12:14	0 00:00	0.00	0.00
15	DMH-4	9.39	0.00	359.36	0.46	0.00	9.56	358.95	0.05	0 12:09	0 00:00	0.00	0.00
16	DMH-5	2.02	0.00	360.25	0.35	0.00	5.77	359.93	0.03	0 12:09	0 00:00	0.00	0.00
17	DMH-6	3.00	0.00	350.75	0.45	0.00	5.43	350.34	0.04	0 12:08	0 00:00	0.00	0.00
18	DMH-7	3.00	0.00	342.66	0.46	0.00	5.89	342.24	0.04	0 12:09	0 00:00	0.00	0.00
19	DMH-9	7.73	0.00	370.46	5.36	0.00	9.64	365.32	0.22	0 12:14	0 00:00	0.00	0.00
20	Fallriver_Junction	25.84	0.00	325.93	0.93	0.00	19.07	325.07	0.07	0 12:11	0 00:00	0.00	0.00
21	I-91_Culvert-Out	9.39	0.00	331.50	1.00	0.00	8.50	330.60	0.10	0 12:11	0 00:00	0.00	0.00
22	Outfall-1A	4.89	0.00	335.99	0.46	0.00	5.54	335.56	0.03	0 12:08	0 00:00	0.00	0.00
23	Outfall-1B	2.64	0.00	340.15	0.34	0.00	5.66	339.83	0.02	0 12:08	0 00:00	0.00	0.00
24	Outfall-1C	6.26	0.00	336.29	0.50	0.00	5.50	335.83	0.04	0 12:16	0 00:00	0.00	0.00
25	Outfall-1D	3.67	0.00	336.85	0.39	0.00	5.61	336.48	0.02	0 12:07	0 00:00	0.00	0.00
26	Outfall-1E	9.39	0.00	334.44	0.90	0.00	5.10	333.63	0.09	0 12:09	0 00:00	0.00	0.00
27	RampCulvert-In	12.89	0.00	330.11	1.39	0.00	9.89	328.85	0.13	0 12:10	0 00:00	0.00	0.00
28	RampCulvert-Out	12.70	0.00	328.12	0.54	0.00	11.88	327.62	0.04	0 12:11	0 00:00	0.00	0.00

Channel Results

SN	Element ID	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Travel Time (min)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Froude Number	Reported Condition
1	1D-culvert	3.67	0 12:07	168.37	0.02	1.56	2.28	0.88	0.29	0.00		
2	CB-1_bypass	0.84	0 12:07	50.08	0.02	2.21	0.95	0.12	0.24	0.00		
3	CB-12_bypass	0.10	0 12:07	26.10	0.00	0.63	3.29	0.14	0.27	0.00		
4	CB-17_bypass	0.22	0 12:07	34.84	0.01	1.46	3.16	0.22	0.45	0.00		
5	CB-18_bypass	0.26	0 12:07	33.52	0.01	1.89	1.47	0.07	0.15	0.00		
6	CB-2_bypass	0.61	0 12:10	36.34	0.02	2.44	0.69	0.10	0.20	0.00		
7	CB-20_bypass	0.46	0 12:07	39.73	0.01	2.45	1.41	0.09	0.17	0.00		
8	CB-21_bypass	0.42	0 12:07	41.17	0.01	2.17	1.56	0.09	0.18	0.00		
9	CB-23_bypass	0.16	0 12:07	40.73	0.00	0.97	6.02	0.08	0.16	0.00		
10	CB-24_bypass	0.26	0 12:07	45.09	0.01	1.20	4.93	0.07	0.15	0.00		
11	CB-27_bypass	0.28	0 12:07	49.68	0.01	2.16	0.80	0.07	0.14	0.00		
12	CB-3_bypass	0.22	0 12:09	25.22	0.01	0.79	10.03	0.15	0.29	0.00		
13	CB-30_bypass	0.46	0 12:07	49.76	0.01	2.81	1.75	0.08	0.16	0.00		
14	CB-32_bypass	0.07	0 12:07	35.42	0.00	1.12	5.07	0.05	0.11	0.00		
15	CB-35_bypass	0.14	0 12:10	35.05	0.00	1.19	5.32	0.08	0.15	0.00		
16	CB-4_bypass	0.48	0 12:08	30.52	0.02	3.29	0.97	0.08	0.15	0.00		
17	CB-6_bypass	0.66	0 12:07	179.60	0.00	2.07	0.57	0.01	0.03	0.00		
18	Cobble_Waterway	9.36	0 12:11	104.81	0.09	1.98	3.06	1.19	0.40	0.00		
19	FallRiver	25.60	0 12:11	8532.83	0.00	2.62	0.64	0.90	0.04	0.00		
20	FR1	4.89	0 12:08	21.24	0.23	4.58	0.31	0.69	0.69	0.00		
21	FR2	2.63	0 12:08	19.71	0.13	2.60	0.89	0.63	0.63	0.00		
22	FR3	12.66	0 12:11	855.32	0.01	1.73	3.65	0.73	0.07	0.00		
23	FR4	6.26	0 12:16	23.43	0.27	5.59	0.21	0.71	0.71	0.00		

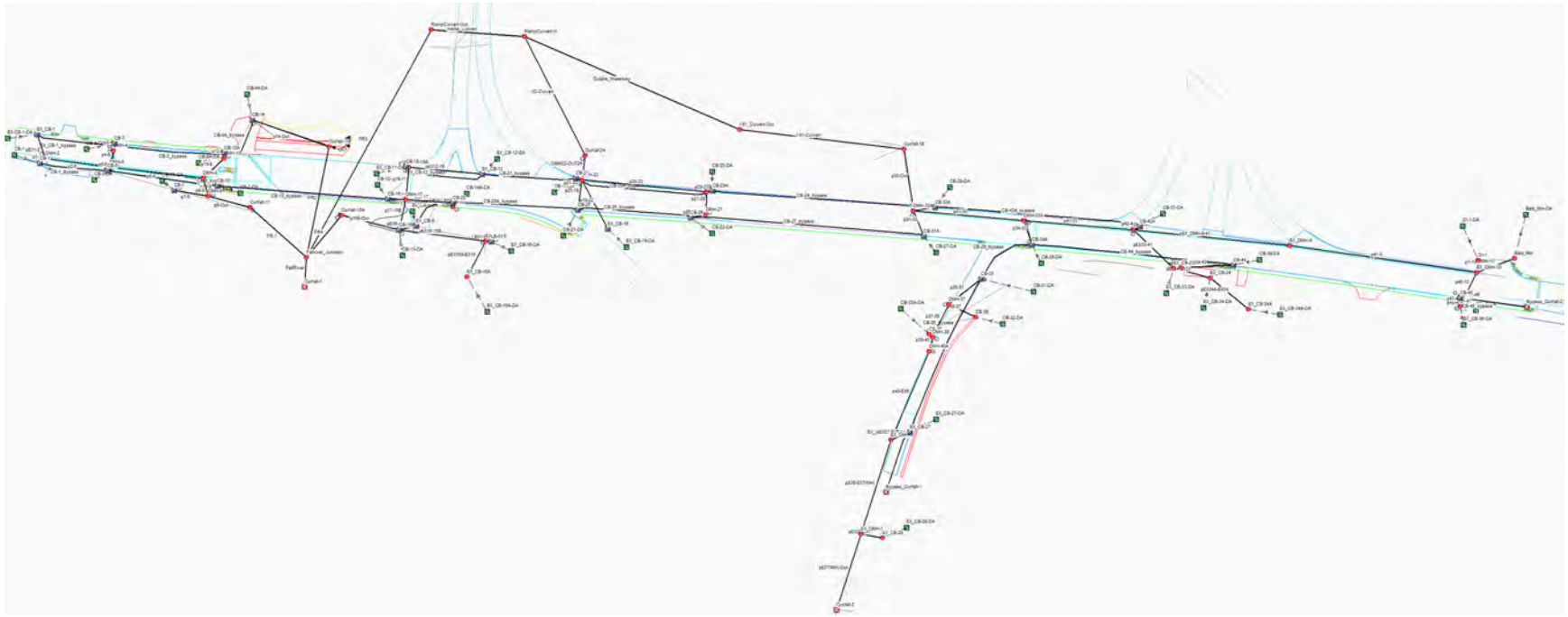
Pipe Results

SN	Element ID	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Travel Time (min)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Froude Number	Reported Condition
1	8-Oct	3.48	0 12:08	5.06	0.69	5.77	0.14	0.99	0.99	0.00		Calculated
2	9-Oct	7.73	0 12:01	5.26	1.47	6.30	0.80	1.25	1.00	54.00		SURCHARGED
3	1-Jan	1.19	0 12:08	5.62	0.21	4.86	0.14	0.35	0.35	0.00		Calculated
4	10-Jan	3.06	0 12:15	4.42	0.69	3.89	0.08	1.00	1.00	49.00		SURCHARGED
5	10-Nov	1.97	0 12:07	6.45	0.31	6.57	0.13	0.43	0.43	0.00		Calculated
6	2-Jan	1.19	0 12:08	4.61	0.26	3.56	0.08	0.45	0.45	0.00		Calculated
7	11-Dec	0.43	0 12:07	1.47	0.29	1.84	1.06	0.34	0.34	0.00		Calculated
8	16-8	1.81	0 12:23	3.34	0.54	3.61	0.53	0.97	0.97	0.00		Calculated
9	16A-16	0.85	0 12:25	4.38	0.19	2.92	0.37	0.61	0.61	0.00		Calculated
10	17-18	0.84	0 12:07	4.74	0.18	4.25	0.20	0.30	0.30	0.00		Calculated
11	18-Out	3.67	0 12:07	18.70	0.20	14.58	0.04	0.36	0.36	0.00		Calculated
12	19-18	0.04	0 12:22	4.17	0.01	1.71	0.86	0.07	0.07	0.00		Calculated
13	20-21	0.97	0 12:07	4.14	0.23	3.46	0.21	0.39	0.39	0.00		Calculated
14	21-18	1.95	0 12:07	6.12	0.32	6.74	0.49	0.40	0.40	0.00		Calculated
15	3-Feb	2.17	0 12:08	6.01	0.36	6.64	0.25	0.43	0.43	0.00		Calculated
16	23-8	0.50	0 12:07	6.55	0.08	4.70	0.16	0.19	0.19	0.00		Calculated
17	24-8	0.68	0 12:07	9.27	0.07	6.30	0.06	0.20	0.20	0.00		Calculated
18	25-5	1.02	0 12:10	5.52	0.19	5.04	0.19	0.31	0.31	0.00		Calculated
19	26-5	0.05	0 12:21	7.18	0.01	2.61	0.14	0.06	0.06	0.00		Calculated
20	27-6	1.01	0 12:07	5.22	0.19	4.64	0.12	0.32	0.32	0.00		Calculated
21	28-7	0.02	0 15:03	1.92	0.01	0.86	0.67	0.31	0.31	0.00		Calculated
22	30-5	0.99	0 12:08	7.88	0.13	6.66	0.30	0.24	0.25	0.00		Calculated
23	32-8	0.26	0 12:07	9.77	0.03	4.88	0.04	0.12	0.12	0.00		Calculated
24	33-8	1.23	0 12:11	7.52	0.16	4.29	0.34	0.35	0.28	0.00		Calculated
25	34-33	0.80	0 12:11	5.60	0.14	4.80	0.21	0.27	0.27	0.00		Calculated
26	34A-34	0.04	0 12:23	5.55	0.01	2.04	0.64	0.06	0.06	0.00		Calculated
27	5-Mar	4.00	0 12:08	5.98	0.67	4.83	0.36	0.80	0.64	0.00		Calculated
28	35-33	0.41	0 12:10	1.19	0.34	1.72	0.87	0.34	0.34	0.00		Calculated
29	36-10	0.93	0 12:07	29.23	0.03	5.15	0.18	1.50	1.00	38.00		SURCHARGED
30	3-Apr	1.14	0 12:08	6.01	0.19	3.45	0.22	0.39	0.31	0.00		Calculated
31	4-Out	9.39	0 12:09	32.70	0.29	13.82	0.12	0.68	0.54	0.00		Calculated
32	6-May	2.02	0 12:09	7.84	0.26	6.93	0.48	0.40	0.40	0.00		Calculated
33	5-Out	4.89	0 12:08	7.01	0.70	9.97	0.21	0.60	0.60	0.00		Calculated
34	7-Jun	1.05	0 12:07	9.90	0.11	6.28	0.16	0.35	0.35	0.00		Calculated
35	6-7(MH)	3.00	0 12:09	7.94	0.38	9.05	0.29	0.44	0.44	0.00		Calculated
36	7(MH)-Out	3.00	0 12:09	7.85	0.38	8.90	0.24	0.44	0.44	0.00		Calculated
37	7-Out	2.64	0 12:08	4.17	0.63	6.55	0.33	0.51	0.51	0.00		Calculated
38	4-Aug	8.43	0 12:14	7.38	1.14	6.99	0.84	1.19	0.95	0.00		> CAPACITY
39	8-Out	6.26	0 12:16	7.16	0.88	10.17	0.15	0.75	0.75	0.00		Calculated
40	8-Sep	1.75	0 12:18	6.70	0.26	6.20	0.07	0.67	0.67	0.00		Calculated
41	9-8(MH)	7.73	0 12:01	4.28	1.81	6.32	0.66	1.25	1.00	42.00		SURCHARGED
42	BMtn-10	6.50	0 12:01	8.42	0.77	5.30	0.20	1.25	1.00	48.00		SURCHARGED
43	I-91-Culvert	9.39	0 12:09	25.46	0.37	6.46	0.62	0.95	0.47	0.00		Calculated
44	Ramp_Culvert	12.70	0 12:10	20.87	0.61	8.51	0.26	0.96	0.48	0.00		Calculated

Inlet Results

SN	Element ID	Peak Flow (cfs)	Peak Lateral Inflow (cfs)	Peak Flow Intercepted by Inlet (cfs)	Peak Flow Bypassing Inlet (cfs)	Inlet Efficiency during Peak Flow (%)	Max Gutter Spread during Peak Flow (ft)	Max Gutter Water Elev. during Peak Flow (ft)	Max Gutter Water Depth during Peak Flow (ft)	Time of Max Depth Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	CB-1	2.03	2.03	1.19	0.84	58.68	7.58	356.45	0.15	0 12:07	0.00	0.00
2	CB-10	1.60	1.41	N/A	N/A	N/A	10.95	347.57	0.20	0 12:15	0.00	0.00
3	CB-11	1.54	1.45	N/A	N/A	N/A	10.72	346.83	0.19	0 12:07	0.00	0.00
4	CB-12	0.53	0.28	0.43	0.11	80.24	4.65	348.28	0.09	0 12:07	0.00	0.00
5	CB-17	1.06	0.60	0.73	0.33	69.13	5.98	352.29	0.12	0 12:07	0.00	0.00
6	CB-18	1.13	0.71	0.77	0.36	68.26	6.09	351.91	0.12	0 12:07	0.00	0.00
7	CB-19	0.04	0.04	N/A	N/A	N/A	1.75	350.76	0.10	0 12:22	0.00	0.00
8	CB-2	1.61	1.61	1.01	0.61	62.47	6.94	355.74	0.14	0 12:08	0.00	0.00
9	CB-20	1.43	1.27	0.92	0.51	64.34	6.65	358.58	0.13	0 12:07	0.00	0.00
10	CB-21	1.40	1.15	0.91	0.50	64.61	6.61	358.51	0.13	0 12:07	0.00	0.00
11	CB-23	0.66	0.66	0.51	0.15	77.16	4.98	369.70	0.10	0 12:07	0.00	0.00
12	CB-24	0.94	0.86	0.67	0.27	71.34	5.69	369.79	0.11	0 12:07	0.00	0.00
13	CB-27	1.29	0.83	0.89	0.40	69.09	5.86	356.53	0.12	0 12:07	0.00	0.00
14	CB-3	0.93	0.35	0.64	0.29	68.97	6.17	353.29	0.12	0 12:08	0.00	0.00
15	CB-30	1.44	1.32	0.95	0.49	65.73	6.37	370.55	0.13	0 12:07	0.00	0.00
16	CB-32	0.33	0.33	0.28	0.05	83.87	4.44	377.97	0.09	0 12:07	0.00	0.00
17	CB-35	0.55	0.55	0.41	0.14	74.54	5.79	379.49	0.12	0 12:10	0.00	0.00
18	CB-4	1.61	0.77	0.97	0.65	59.95	7.58	352.63	0.15	0 12:08	0.00	0.00
19	CB-5	0.91	0.91	N/A	N/A	N/A	7.83	350.39	-0.27	0 12:08	0.00	0.00
20	CB-6	1.57	1.09	0.91	0.66	57.91	8.55	349.38	0.17	0 12:07	0.00	0.00
21	CB-7	1.07	1.07	N/A	N/A	N/A	8.62	344.17	-0.40	0 12:08	0.00	0.00
22	CB-8	0.92	0.92	N/A	N/A	N/A	7.87	345.89	0.22	0 12:16	0.00	0.00
23	CB-9	1.82	1.73	N/A	N/A	N/A	11.86	346.32	0.30	0 12:25	0.00	0.00

Proposed Conditions Node Map



Project Description

File Name ..... SSA Analysis - PROP.SPF

Rainfall Details

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
49		Time Series	2-yr	Cumulative	inches	Massachusetts	Franklin	2.00	2.90	SCS Type III 24-hr

Subbasin Summary

SN	Subbasin ID	Area (ac)	Peak Rate Factor	Weighted Curve Number	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1	Bald_Mtn-DA	5.35	484.00	70.00	2.90	0.66	3.53	2.44	0 00:18:55
2	CB-12-DA	0.20	484.00	98.00	2.90	2.67	0.54	0.49	0 00:06:00
3	CB-13-DA	0.43	484.00	64.00	2.90	0.43	0.18	0.10	0 00:17:38
4	CB-14A-DA	0.22	484.00	98.00	2.90	2.67	0.58	0.52	0 00:06:00
5	CB-17-DA	0.13	484.00	98.00	2.90	2.67	0.36	0.32	0 00:06:00
6	CB-1-DA	0.57	484.00	68.00	2.90	0.58	0.33	0.25	0 00:11:16
7	CB-21-DA	0.11	484.00	98.00	2.90	2.66	0.30	0.28	0 00:06:00
8	CB-22-DA	0.24	484.00	98.00	2.90	2.67	0.63	0.57	0 00:06:00
9	CB-25-DA	0.21	484.00	98.00	2.90	2.67	0.57	0.51	0 00:06:00
10	CB-27-DA	0.06	484.00	97.00	2.90	2.54	0.15	0.14	0 00:06:00
11	CB-28-DA	0.17	484.00	95.00	2.90	2.35	0.39	0.38	0 00:06:00
12	CB-29-DA	0.20	484.00	98.00	2.90	2.67	0.53	0.48	0 00:06:00
13	CB-31-DA	0.09	484.00	93.00	2.90	2.15	0.19	0.19	0 00:06:00
14	CB-32-DA	0.88	484.00	50.00	2.90	0.07	0.06	0.01	0 00:08:28
15	CB-33A-DA	0.07	484.00	39.00	2.90	0.00	0.00	0.00	0 00:08:43
16	CB-37-DA	0.06	484.00	92.00	2.90	2.05	0.13	0.13	0 00:06:00
17	CB-39-DA	0.25	484.00	61.00	2.90	0.33	0.08	0.05	0 00:09:21
18	CB-3-DA	0.06	484.00	98.00	2.90	2.65	0.17	0.15	0 00:06:00
19	CB-42-DA	0.17	484.00	97.00	2.90	2.56	0.44	0.41	0 00:06:00
20	CB-44-DA	0.75	484.00	54.00	2.90	0.15	0.11	0.03	0 00:13:13
21	CB-4-DA	0.19	484.00	78.00	2.90	1.06	0.20	0.21	0 00:06:00
22	CB-7A-DA	0.14	484.00	98.00	2.90	2.67	0.37	0.32	0 00:06:00
23	CB-7-DA	0.09	484.00	98.00	2.90	2.66	0.24	0.22	0 00:06:00
24	CB-8A-DA	0.23	484.00	91.00	2.90	1.98	0.46	0.46	0 00:06:00
25	DI-1-DA	1.39	484.00	65.00	2.90	0.46	0.64	0.38	0 00:18:17
26	EX_CB-11-DA	0.27	484.00	95.00	2.90	2.35	0.63	0.61	0 00:06:00
27	EX_CB-12-DA	0.05	484.00	98.00	2.90	2.64	0.14	0.12	0 00:06:00
28	EX_CB-16A-DA	1.93	484.00	43.00	2.90	0.00	0.01	0.00	0 00:22:23
29	EX_CB-16-DA	0.82	484.00	52.00	2.90	0.11	0.09	0.01	0 00:21:09
30	EX_CB-19-DA	0.16	484.00	39.00	2.90	0.00	0.00	0.00	0 00:11:16
31	EX_CB-27-DA	0.14	484.00	98.00	2.90	2.67	0.36	0.32	0 00:06:00
32	EX_CB-28-DA	0.98	484.00	30.00	2.90	0.00	0.00	0.00	0 00:16:31
33	EX_CB-33-DA	0.08	484.00	39.00	2.90	0.00	0.00	0.00	0 00:06:00
34	EX_CB-34A-DA	0.14	484.00	39.00	2.90	0.00	0.00	0.00	0 00:11:01
35	EX_CB-34-DA	0.23	484.00	74.00	2.90	0.85	0.19	0.16	0 00:12:58
36	EX_CB-36-DA	0.09	484.00	39.00	2.90	0.00	0.00	0.00	0 00:06:00
37	EX_CB-9-DA	0.80	484.00	51.00	2.90	0.09	0.07	0.01	0 00:18:15
38	EX-CB-1-DA	0.41	484.00	87.00	2.90	1.65	0.68	0.70	0 00:06:29

Node Summary

SN	Element ID	Element Type	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Initial Water Elevation (ft)	Surcharge Elevation (ft)	Ponded Area (ft^2)	Peak Inflow (cfs)	Max HGL Elevation Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	Bald_Mtn	Junction	368.00	375.00	368.00	375.00	0.00	2.44	369.02	0.00	5.98	0 00:00	0.00	0.00
2	CB-36	Junction	361.42	366.73	361.42	366.73	10.00	0.01	361.46	0.00	5.27	0 00:00	0.00	0.00
3	CB-38	Junction	361.20	364.26	361.20	364.26	10.00	0.00	361.20	0.00	3.06	0 00:00	0.00	0.00
4	DHM-41	Junction	363.80	378.08	363.80	378.08	0.00	3.18	364.40	0.00	13.68	0 00:00	0.00	0.00
5	DI-1	Junction	368.20	371.60	368.20	371.60	10.00	0.38	368.43	0.00	3.17	0 00:00	0.00	0.00
6	DI-47	Junction	372.40	376.45	372.40	376.45	10.00	0.00	372.80	0.00	3.65	0 00:00	0.00	0.00
7	DMH-13	Junction	345.20	349.70	345.20	349.70	0.00	0.41	345.43	0.00	4.27	0 00:00	0.00	0.00
8	DMH-17	Junction	340.70	347.56	340.70	347.56	10.00	6.50	342.05	0.00	5.51	0 00:00	0.00	0.00
9	DMH-19A	Junction	342.80	347.51	342.80	347.51	0.00	0.82	343.08	0.00	4.43	0 00:00	0.00	0.00
10	DMH-2	Junction	350.80	356.28	350.80	356.28	0.00	0.74	351.08	0.00	5.20	0 00:00	0.00	0.00
11	DMH-22	Junction	347.30	351.92	347.30	351.92	10.00	1.60	347.50	0.00	4.42	0 00:00	0.00	0.00
12	DMH-27	Junction	354.10	358.87	354.10	358.87	10.00	0.48	354.36	0.00	4.51	0 00:00	0.00	0.00
13	DMH-28	Junction	353.50	358.65	353.50	358.65	10.00	0.96	353.78	0.00	4.87	0 00:00	0.00	0.00
14	DMH-30A	Junction	358.90	369.12	358.90	369.12	0.00	3.56	359.18	0.00	9.94	0 00:00	0.00	0.00
15	DMH-33A	Junction	361.50	374.69	361.50	374.69	0.00	3.36	362.16	0.00	12.53	0 00:00	0.00	0.00
16	DMH-37	Junction	360.84	368.44	360.84	368.44	0.00	0.23	360.98	0.00	7.46	0 00:00	0.00	0.00
17	DMH-39	Junction	359.10	365.20	359.10	365.20	0.00	0.23	359.22	0.00	5.98	0 00:00	0.00	0.00
18	DMH-4	Junction	349.43	352.93	349.43	352.93	0.00	0.30	349.64	0.00	3.29	0 00:00	0.00	0.00
19	DMH-40A	Junction	357.80	363.55	357.80	365.55	0.00	0.23	357.92	0.00	5.63	0 00:00	0.00	0.00
20	DMH-43A	Junction	373.90	379.98	373.90	379.98	0.00	0.04	374.02	0.00	5.96	0 00:00	0.00	0.00
21	DMH-46	Junction	372.20	378.56	372.20	378.56	0.00	0.32	372.80	0.00	5.76	0 00:00	0.00	0.00
22	DMH-6	Junction	348.76	353.36	348.76	353.36	0.00	1.17	349.12	0.00	4.24	0 00:00	0.00	0.00
23	DMH-8	Junction	344.66	350.88	344.66	350.88	0.00	1.57	345.23	0.00	5.65	0 00:00	0.00	0.00
24	DMH-9	Junction	339.68	349.50	339.68	349.50	0.00	2.09	342.44	0.00	7.06	0 00:00	0.00	0.00
25	EX_CB-16	Junction	340.70	344.05	340.70	344.05	0.00	0.01	340.75	0.00	3.30	0 00:00	0.00	0.00
26	EX_CB-16A	Junction	342.00	346.00	342.00	346.00	10.00	0.00	342.02	0.00	3.98	0 00:00	0.00	0.00
27	EX_CB-28	Junction	342.40	348.24	342.40	348.24	10.00	0.00	342.40	0.00	5.84	0 00:00	0.00	0.00
28	EX_CB-33	Junction	373.40	378.68	373.40	378.68	10.00	0.20	373.54	0.00	5.14	0 00:00	0.00	0.00
29	EX_CB-34	Junction	375.40	380.10	375.40	380.10	10.00	0.16	375.52	0.00	4.58	0 00:00	0.00	0.00
30	EX_CB-34A	Junction	378.00	382.00	378.00	382.00	0.00	0.00	378.00	0.00	4.00	0 00:00	0.00	0.00
31	EX_DMH-10	Junction	367.30	377.69	367.30	377.69	0.00	2.97	368.00	0.00	9.69	0 00:00	0.00	0.00
32	EX_DMH-6	Junction	350.30	356.18	350.30	356.18	0.00	0.53	350.48	0.00	5.70	0 00:00	0.00	0.00
33	EX_DMH-7	Junction	342.20	348.55	342.20	348.55	0.00	0.53	342.38	0.00	6.17	0 00:00	0.00	0.00
34	EX_DMH-9	Junction	365.10	380.10	365.10	380.10	0.00	2.96	365.93	0.00	14.17	0 00:00	0.00	0.00
35	Fallriver_Junction	Junction	325.00	331.00	325.00	331.00	0.00	7.35	325.42	0.00	19.58	0 00:00	0.00	0.00
36	I-91_Culvert-Out	Junction	330.50	340.00	330.00	340.00	0.00	3.56	331.11	0.00	8.89	0 00:00	0.00	0.00
37	LB-02	Junction	343.19	348.42	343.19	348.42	0.00	42.45	348.42	0.00	0.00	0 11:34	12.86	47.00
38	Outfall-11	Junction	338.96	339.96	338.96	339.96	0.00	2.09	339.22	0.00	0.74	0 00:00	0.00	0.00
39	Outfall-15	Junction	322.35	323.35	322.35	323.35	0.00	0.14	339.84	0.00	0.97	0 00:00	0.00	0.00
40	Outfall-15A	Junction	328.00	329.00	328.00	329.00	0.00	4.62	336.37	0.00	0.42	0 00:00	0.00	0.00
41	Outfall-1E	Junction	333.54	339.54	333.54	339.54	0.00	3.56	334.05	0.00	5.49	0 00:00	0.00	0.00
42	Outfall-24	Junction	336.46	342.46	336.46	342.46	0.00	1.60	336.70	0.00	5.76	0 00:00	0.00	0.00
43	RampCulvert-In	Junction	328.72	340.00	328.72	340.00	0.00	4.26	329.46	0.00	10.54	0 00:00	0.00	0.00
44	RampCulvert-Out	Junction	327.58	340.00	327.58	340.00	0.00	4.24	327.85	0.00	12.15	0 00:00	0.00	0.00
45	Bypass_Outfall-1	Outfall	351.50					0.06	351.54					
46	Bypass_Outfall-2	Outfall	375.40					0.08	375.45					
47	Outfall-1	Outfall	324.50					7.19	324.90					
48	Outfall-2	Outfall	336.00					0.53	336.18					

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length (ft)	Inlet Invert Elevation (ft)	Outlet Invert Elevation (ft)	Average Slope (%)	Diameter or Height (in)	Manning's Roughness	Peak Flow (cfs)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Reported Condition
1	CB20-LB02	Pipe	LB-02	CB-20	2.00	343.29	343.19	5.0000	12.000	0.0130	45.73	0.80	57.41	50.00	1.00	1.00	87.00	SURCHARGED
2	DMH22-OUT24	Pipe	DMH-22	Outfall-24	37.00	347.30	336.46	29.3000	12.000	0.0130	1.60	19.28	0.08	12.46	0.22	0.22	0.00	Calculated
3	I-91-Culvert	Pipe	Outfall-1E	I-91_Culvert-Out	240.00	333.54	330.50	1.2700	24.000	0.0130	3.56	25.46	0.14	4.96	0.56	0.28	0.00	Calculated
4	LB01-EX_CB-48	Pipe	LB-01	EX_CB-16	5.00	341.00	340.90	2.0000	12.000	0.0130	0.01	5.04	0.00	1.29	0.04	0.04	0.00	Calculated
5	p10-9	Pipe	CB-10	DMH-9	18.00	345.87	345.28	3.2800	12.000	0.0130	0.21	6.45	0.03	3.50	0.13	0.13	0.00	Calculated
6	p1-10	Pipe	DI-1	EX_DMH-10	19.49	368.20	367.90	1.5400	12.000	0.0130	0.38	4.42	0.09	3.11	0.21	0.21	0.00	Calculated
7	p1-2	Pipe	CB-1	DMH-2	7.00	351.26	351.00	3.7100	12.000	0.0130	0.21	6.87	0.03	3.40	0.13	0.13	0.00	Calculated
8	p12-8	Pipe	CB-12A	DMH-13	4.00	346.98	346.70	7.0000	12.000	0.0130	0.41	9.43	0.04	4.50	0.17	0.17	0.00	Calculated
9	p13-8	Pipe	DMH-13	DMH-8	44.00	345.20	344.76	1.0000	12.000	0.0130	0.41	3.56	0.11	1.89	0.35	0.35	0.00	Calculated
10	p14-Out	Pipe	CB-14	Outfall-15	135.00	340.57	322.35	13.5000	12.000	0.0130	0.14	13.09	0.01	1.05	0.54	0.54	0.00	Calculated
11	p15B-Out	Pipe	CB-15B	Outfall-15A	90.00	339.60	328.00	12.8900	12.000	0.0130	4.62	12.79	0.36	6.95	0.79	0.79	0.00	Calculated
12	p16-17	Pipe	CB-16	DMH-17	25.00	343.31	343.06	1.0000	12.000	0.0130	0.53	3.56	0.15	2.95	0.28	0.28	0.00	Calculated
13	p17-15B	Pipe	DMH-17	CB-15B	49.56	340.50	339.70	1.6100	12.000	0.0130	4.72	5.06	0.93	6.73	0.88	0.88	0.00	Calculated
14	p18-19A	Pipe	CB-18	DMH-19A	2.00	344.99	344.51	24.0000	12.000	0.0150	0.64	15.13	0.04	6.26	0.19	0.19	0.00	Calculated
15	p19-17	Pipe	DMH-19A	DMH-17	52.00	342.80	341.10	3.2700	12.000	0.0150	0.82	5.58	0.15	4.84	0.40	0.48	0.00	Calculated
16	p19-22	Pipe	EX_CB-19	DMH-22	87.76	348.80	347.60	1.3700	12.000	0.0130	0.00	4.17	0.00	0.00	0.00	0.00	0.00	Calculated
17	p20-17	Pipe	CB-20	DMH-17	73.00	343.79	343.06	1.0000	12.000	0.0130	6.50	3.56	1.82	50.00	0.99	1.00	1.00	SURCHARGED
18	p21-22	Pipe	CB-21	DMH-22	6.00	347.50	347.40	1.6700	12.000	0.0130	0.32	4.60	0.07	2.80	0.20	0.20	0.00	Calculated
19	p25-18	Pipe	CB-25	DMH-22	51.00	348.20	347.40	1.5700	12.000	0.0130	0.32	4.46	0.07	3.17	0.19	0.19	0.00	Calculated
20	p2-6	Pipe	DMH-2	DMH-6	106.00	350.80	348.86	1.8300	12.000	0.0130	0.73	4.82	0.15	4.29	0.27	0.27	0.00	Calculated
21	p26-27	Pipe	CB-26	DMH-27	21.00	354.49	354.28	1.0000	12.000	0.0130	0.48	3.56	0.13	2.85	0.27	0.27	0.00	Calculated
22	p27-28	Pipe	DMH-27	DMH-28	44.50	354.10	353.60	1.1200	12.000	0.0130	0.48	3.78	0.13	3.10	0.25	0.25	0.00	Calculated
23	p28-22	Pipe	DMH-28	DMH-22	200.00	353.50	347.70	2.9000	12.000	0.0130	0.96	6.07	0.16	5.54	0.27	0.27	0.00	Calculated
24	p29-28	Pipe	CB-29A	DMH-28	6.00	353.71	353.61	1.6700	12.000	0.0130	0.48	4.60	0.10	3.08	0.25	0.25	0.00	Calculated
25	p30-Out	Pipe	DMH-30A	Outfall-1E	100.00	358.90	333.54	25.3600	15.000	0.0130	3.56	32.53	0.11	10.63	0.40	0.32	0.00	Calculated
26	p31-30	Pipe	CB-31A	DMH-30A	45.00	365.40	364.00	3.1100	12.000	0.0130	0.11	6.28	0.02	2.98	0.10	0.10	0.00	Calculated
27	p32-30	Pipe	CB-32A	DMH-30A	31.00	364.25	363.90	1.1300	12.000	0.0130	0.34	3.79	0.09	2.78	0.21	0.21	0.00	Calculated
28	p33-30	Pipe	DMH-33A	DMH-30A	199.55	361.50	359.20	1.1500	15.000	0.0130	3.36	6.94	0.48	5.37	0.63	0.51	0.00	Calculated
29	p3-4	Pipe	CB-3	DMH-4	4.00	350.22	349.63	14.7500	12.000	0.0130	0.30	13.68	0.02	5.52	0.12	0.12	0.00	Calculated
30	p34-33	Pipe	CB-34A	DMH-33A	36.00	365.00	361.80	8.8900	12.000	0.0130	0.40	17.46	0.02	8.63	0.21	0.21	0.00	Calculated
31	p35-37	Pipe	CB-35	DMH-37	62.00	366.34	363.44	4.6800	12.000	0.0130	0.23	7.71	0.03	4.29	0.12	0.12	0.00	Calculated
32	p36-37	Pipe	CB-36	DMH-37	44.00	361.42	360.94	1.0900	12.000	0.0130	0.01	3.72	0.00	0.98	0.04	0.04	0.00	Calculated
33	p37-39	Pipe	DMH-37	DMH-39	54.00	360.84	359.20	3.0400	12.000	0.0130	0.23	6.21	0.04	3.66	0.13	0.13	0.00	Calculated
34	p38-39	Pipe	CB-38	DMH-39	2.00	361.20	361.10	5.0000	12.000	0.0130	0.00	7.97	0.00	0.00	0.00	0.00	0.00	Calculated
35	p39-40	Pipe	DMH-39	DMH-40A	20.00	359.10	358.05	5.2500	12.000	0.0130	0.23	8.16	0.03	4.29	0.12	0.12	0.00	Calculated
36	p40-EX6	Pipe	DMH-40A	EX_DMH-6	172.00	357.80	350.30	4.3600	12.000	0.0130	0.23	7.44	0.03	3.11	0.15	0.15	0.00	Calculated
37	p41-33	Pipe	DHM-41	DMH-33A	152.43	363.80	361.60	1.4400	15.000	0.0130	3.17	7.76	0.41	5.71	0.58	0.46	0.00	Calculated
38	p41-9	Pipe	EX_DMH-10	EX_DMH-9	301.09	367.30	365.30	0.6600	15.000	0.0130	2.96	5.26	0.56	4.28	0.69	0.55	0.00	Calculated
39	p42-41	Pipe	CB-42A	DHM-41	17.00	373.74	373.58	0.9400	12.000	0.0130	0.10	3.46	0.03	1.86	0.12	0.12	0.00	Calculated
40	p43-EX33	Pipe	DMH-43A	EX_CB-33	11.91	373.50	373.90	-3.3600	12.000	0.0130	0.04	0.33	0.11	0.87	0.10	0.10	0.00	Calculated
41	p44-43	Pipe	CB-44	DMH-43A	78.00	374.87	374.05	1.0500	12.000	0.0130	0.04	3.65	0.01	1.46	0.07	0.07	0.00	Calculated
42	p45-46	Pipe	CB-45	DMH-46	4.00	373.62	373.52	2.5000	12.000	0.0130	0.32	5.63	0.06	3.06	0.19	0.19	0.00	Calculated
43	p4-6	Pipe	DMH-4	DMH-6	24.00	349.43	349.16	1.1200	12.000	0.0130	0.30	3.78	0.08	2.65	0.20	0.20	0.00	Calculated
44	p46-10	Pipe	DMH-46	EX_DMH-10	37.55	372.70	368.00	12.5200	18.000	0.0130	0.32	37.16	0.01	6.27	0.10	0.07	0.00	Calculated
45	p47-46	Pipe	DI-47	DMH-46	7.00	372.45	372.30	2.1400	12.000	0.0130	0.00	5.22	0.00	0.09	0.43	0.43	0.00	Calculated
46	p5-6	Pipe	CB-5	DMH-6	4.00	350.22	349.16	26.5000	12.000	0.0130	0.15	18.34	0.01	6.11	0.07	0.07	0.00	Calculated

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Proposal No. 612159-136484

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length (ft)	Inlet Invert Elevation (ft)	Outlet Invert Elevation (ft)	Average Slope (%)	Diameter or Height (in)	Manning's Roughness	Peak Flow (cfs)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Reported Condition
47	p6-8	Pipe	DMH-6	DMH-8	140.00	348.76	346.38	1.7000	12.000	0.0130	1.17	4.65	0.25	4.77	0.35	0.35	0.00	Calculated
48	p7-9	Pipe	CB-7	DMH-9	50.00	340.30	339.78	1.0400	12.000	0.0130	1.27	3.63	0.35	1.62	1.00	1.00	3906.00	SURCHARGED
49	p8-9	Pipe	DMH-8	DMH-9	23.00	344.66	344.43	1.0000	12.000	0.0130	1.57	3.56	0.44	3.83	0.52	0.52	0.00	Calculated
50	p9-Out	Pipe	DMH-9	Outfall-11	79.00	342.00	335.53	8.1900	12.000	0.0130	2.09	6.99	0.30	8.46	0.35	0.35	0.00	Calculated
51	pBMtn-10	Pipe	Bald_Mtn	EX_DMH-10	64.81	368.50	367.40	1.7000	15.000	0.0130	2.44	8.42	0.29	4.59	0.56	0.45	0.00	Calculated
52	pEX_DMH-9-41	Pipe	EX_DMH-9	DHM-41	250.42	365.10	364.00	0.4400	15.000	0.0130	2.96	4.28	0.69	3.78	0.76	0.61	0.00	Calculated
53	pEX1-2	Pipe	EX_CB-1	DMH-2	40.19	351.90	350.90	2.4900	12.000	0.0130	0.55	5.62	0.10	4.26	0.22	0.22	0.00	Calculated
54	pEX12-19	Pipe	EX_CB-12	DMH-19A	110.00	343.40	343.20	0.1800	12.000	0.0130	0.18	1.52	0.12	1.44	0.22	0.22	0.00	Calculated
55	pEX16-15B	Pipe	EX_CB-16	CB-15B	113.87	340.70	339.70	0.8800	12.000	0.0130	0.01	3.34	0.00	1.03	0.26	0.26	0.00	Calculated
56	pEX16A-EX16	Pipe	EX_CB-16A	EX_CB-16	64.67	342.00	340.70	2.0100	12.000	0.0130	0.00	5.05	0.00	0.41	0.03	0.03	0.00	Calculated
57	pEX27-EX6	Pipe	EX_CB-27	EX_DMH-6	32.60	351.30	350.60	2.1500	12.000	0.0130	0.30	5.22	0.06	3.42	0.17	0.17	0.00	Calculated
58	pEX28-EX7	Pipe	EX_CB-28	EX_DMH-7	34.39	342.40	342.30	0.2900	12.000	0.0130	0.00	1.92	0.00	0.00	0.04	0.04	0.00	Calculated
59	pEX33-41	Pipe	EX_CB-33	DHM-41	88.56	373.40	372.20	1.3600	15.000	0.0130	0.20	7.52	0.03	2.58	0.14	0.11	0.00	Calculated
60	pEX34A-EX34	Pipe	EX_CB-34A	EX_CB-34	78.21	378.00	376.10	2.4300	12.000	0.0130	0.00	5.55	0.00	0.00	0.00	0.00	0.00	Calculated
61	pEX34-EX33	Pipe	EX_CB-34	EX_CB-33	60.73	375.40	373.90	2.4700	12.000	0.0130	0.16	5.60	0.03	3.10	0.12	0.12	0.00	Calculated
62	pEX6-EX7(MH)	Pipe	EX_DMH-6	EX_DMH-7	157.05	350.30	342.50	4.9700	12.000	0.0130	0.53	7.94	0.07	5.64	0.18	0.18	0.00	Calculated
63	pEX7(MH)-Out	Pipe	EX_DMH-7	Outfall-2	127.60	342.20	336.00	4.8600	12.000	0.0130	0.53	7.85	0.07	5.57	0.18	0.18	0.00	Calculated
64	pEX9-15B	Pipe	EX_CB-9	CB-15B	27.57	341.40	340.10	4.7200	12.000	0.0130	0.12	7.74	0.02	3.48	0.09	0.09	0.00	Calculated
65	Ramp_Culvert	Pipe	RampCulvert-In	RampCulvert-Out	134.00	328.72	327.58	0.8500	24.000	0.0130	4.24	20.87	0.20	6.86	0.50	0.25	0.00	Calculated
66	1D-Culvert	Channel	Outfall-24	RampCulvert-In	213.55	336.46	328.72	3.6200	36.000	0.0320	1.60	168.37	0.01	1.64	0.46	0.15	0.00	
67	CB-1_bypass	Channel	CB-1	CB-5	100.68	356.26	353.31	2.9300	6.000	0.0130	0.04	49.28	0.00	1.31	0.04	0.07	0.00	
68	CB-10_bypass	Channel	CB-10	CB-16	252.16	350.37	347.58	1.1100	6.000	0.0130	0.04	29.56	0.00	0.79	0.06	0.13	0.00	
69	CB-20_bypass	Channel	CB-20	EX_CB-9	72.73	347.92	346.02	2.6100	6.000	0.0130	0.13	139.14	0.00	0.29	0.02	0.05	0.00	
70	CB-21_bypass	Channel	CB-21	EX_CB-12	166.98	351.44	348.19	1.9500	6.000	0.0130	0.09	39.20	0.00	1.53	0.05	0.10	0.00	
71	CB-24_bypass	Channel	CB-32A	CB-29A	354.71	369.68	358.30	3.2100	6.000	0.0130	0.06	55.10	0.00	0.93	0.04	0.07	0.00	
72	CB-25A_bypass	Channel	CB-25	CB-20	277.20	352.34	347.92	1.5900	6.000	0.0130	0.06	33.93	0.00	2.18	0.03	0.07	0.00	
73	CB-26_bypass	Channel	CB-26	CB-25	207.40	357.99	352.34	2.7200	6.000	0.0130	0.11	48.66	0.00	1.46	0.05	0.11	0.00	
74	CB-27_bypass	Channel	CB-31A	CB-26	350.32	369.60	358.35	3.2100	6.000	0.0130	0.02	51.26	0.00	0.60	0.04	0.08	0.00	
75	CB-29_bypass	Channel	CB-34A	CB-35	90.00	378.24	375.05	3.5400	6.000	0.0130	0.08	60.04	0.00	2.18	0.04	0.07	0.00	
76	CB-29A_bypass	Channel	CB-29A	CB-21	202.68	358.91	351.44	3.6900	6.000	0.0130	0.09	53.94	0.00	1.49	0.05	0.10	0.00	
77	CB-3_bypass	Channel	CB-3	CB-12A	192.15	352.72	349.48	1.6900	6.000	0.0130	0.07	37.38	0.00	2.44	0.03	0.07	0.00	
78	CB-35_bypass	Channel	CB-35	EX_CB-27	295.00	370.84	356.41	4.8900	6.000	0.0130	0.04	62.14	0.00	1.33	0.03	0.07	0.00	
79	CB-42A_bypass	Channel	CB-42A	CB-32A	340.69	378.24	370.05	2.4000	6.000	0.0130	0.03	40.82	0.00	1.18	0.03	0.06	0.00	
80	CB-44_bypass	Channel	CB-44	CB-34A	291.31	379.83	374.95	1.6800	6.000	0.0130	0.01	36.52	0.00	0.55	0.03	0.06	0.00	
81	CB-45_bypass	Channel	CB-45	Bypass_Outfall-2	92.00	377.87	375.40	2.6800	6.000	0.0130	0.08	48.31	0.00	1.57	0.05	0.09	0.00	
82	CB-5_bypass	Channel	CB-5	CB-10	223.18	353.31	350.37	1.3200	6.000	0.0130	0.03	32.25	0.00	0.85	0.04	0.08	0.00	
83	CB-8A_bypass	Channel	CB-12A	CB-14	70.37	349.48	344.57	6.9800	6.000	0.0130	0.32	227.39	0.00	0.00	0.01	0.01	0.00	
84	Cobble_Waterway	Channel	I-91_Culvert-Out	RampCulvert-In	363.16	330.50	328.72	0.4900	36.000	0.0320	3.54	104.81	0.03	1.57	0.67	0.22	0.00	
85	EX_CB-1_bypass	Channel	EX_CB-1	CB-3	126.22	356.30	352.72	2.8400	6.000	0.0130	0.16	48.49	0.00	1.74	0.06	0.12	0.00	
86	EX_CB-12_bypass	Channel	EX_CB-12	CB-18	124.46	348.19	347.49	0.5600	6.000	0.0130	0.03	21.59	0.00	0.58	0.08	0.15	0.00	
87	EX_CB-27_bypass	Channel	EX_CB-27	Bypass_Outfall-1	103.70	356.41	351.50	4.7300	6.000	0.0130	0.06	61.14	0.00	1.69	0.04	0.07	0.00	
88	FallRiver	Channel	Fallriver_Junction	Outfall-1	100.00	325.00	324.50	0.5000	240.000	0.0320	7.19	8532.83	0.00	1.68	0.41	0.02	0.00	
89	FR-1	Channel	Outfall-11	Fallriver_Junction	84.74	335.53	325.00	12.4300	12.000	0.0320	2.09	24.45	0.09	5.01	0.34	0.34	0.00	
90	FR2	Channel	Outfall-15	Fallriver_Junction	138.29	339.81	325.00	10.7100	12.000	0.0320	0.03	19.71	0.00	0.60	0.21	0.21	0.00	
91	FR3	Channel	RampCulvert-Out	Fallriver_Junction	378.68	327.58	325.00	0.6800	120.000	0.0320	4.23	2308.05	0.00	1.27	0.34	0.03	0.00	
92	FR4	Channel	Outfall-15A	Fallriver_Junction	87.86	335.79	325.00	12.2800	12.000	0.0320	4.61	21.11	0.22	10.40	0.34	0.34	0.00	

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Proposal No. 612159-136484

Inlet Summary

SN	Element ID	Inlet Manufacturer	Manufacturer Part Number	Inlet Location	Number of Inlets	Catchbasin Invert Elevation (ft)	Max (Rim) Elevation (ft)	Initial Water Elevation (ft)	Ponded Area (ft^2)	Peak Flow (cfs)	Peak Flow Intercepted by Inlet (cfs)	Peak Flow Bypassing Inlet (cfs)	Inlet Efficiency during Peak Flow (%)	Allowable Spread (ft)	Max Gutter Spread during Peak Flow (ft)	Max Gutter Water Elev. during Peak Flow (ft)
1	CB-1	FHWA HEC-22 GENERIC	N/A	On Grade	1	351.26	356.26	351.26	N/A	0.25	0.24	0.02	93.34	10.50	3.22	356.32
2	CB-10	FHWA HEC-22 GENERIC	N/A	On Grade	1	345.87	350.37	345.87	N/A	0.25	0.23	0.02	92.46	10.50	3.59	350.44
3	CB-12A	FHWA HEC-22 GENERIC	N/A	On Grade	1	346.98	349.48	346.98	N/A	0.52	0.40	0.12	76.97	10.50	5.25	349.58
4	CB-14	FHWA HEC-22 GENERIC	N/A	On Sag	1	340.57	344.57	340.57	10.00	0.03	N/A	N/A	N/A	10.50	1.65	344.05
5	CB-15B	FHWA HEC-22 GENERIC	N/A	On Sag	1	339.60	345.67	339.60	10.00	0.10	N/A	N/A	N/A	10.50	2.61	345.79
6	CB-16	FHWA HEC-22 GENERIC	N/A	On Sag	1	343.31	347.58	343.31	10.00	0.53	N/A	N/A	N/A	10.50	5.77	347.68
7	CB-18	FHWA HEC-22 GENERIC	N/A	On Sag	1	344.99	347.49	342.80	10.00	0.64	N/A	N/A	N/A	10.50	6.40	347.60
8	CB-20	FHWA HEC-22 GENERIC	N/A	On Grade	1	343.29	347.92	343.29	N/A	0.58	0.44	0.14	75.28	10.50	5.46	348.03
9	CB-21	FHWA HEC-22 GENERIC	N/A	On Grade	1	347.50	351.44	347.50	N/A	0.41	0.33	0.08	80.74	10.50	4.79	351.54
10	CB-25	FHWA HEC-22 GENERIC	N/A	On Grade	1	348.20	351.77	348.20	N/A	0.38	0.34	0.05	88.03	10.50	3.77	351.85
11	CB-26	FHWA HEC-22 GENERIC	N/A	On Grade	1	354.49	357.99	354.49	N/A	0.59	0.48	0.11	81.60	10.50	4.42	358.08
12	CB-29A	FHWA HEC-22 GENERIC	N/A	On Grade	1	353.71	358.91	353.71	N/A	0.57	0.47	0.10	81.98	10.50	4.39	359.00
13	CB-3	FHWA HEC-22 GENERIC	N/A	On Grade	1	350.22	352.72	350.22	N/A	0.36	0.31	0.05	86.13	10.50	4.03	352.80
14	CB-31A	FHWA HEC-22 GENERIC	N/A	On Grade	1	365.40	369.65	365.40	N/A	0.14	0.13	0.00	98.51	10.50	2.56	369.70
15	CB-32A	FHWA HEC-22 GENERIC	N/A	On Grade	1	364.25	370.05	364.25	N/A	0.40	0.35	0.05	87.41	10.50	3.83	370.13
16	CB-34A	FHWA HEC-22 GENERIC	N/A	On Grade	1	370.45	374.95	370.45	N/A	0.48	0.41	0.07	84.73	10.50	4.10	375.03
17	CB-35	FHWA HEC-22 GENERIC	N/A	On Grade	1	366.34	370.84	366.34	N/A	0.27	0.25	0.02	94.01	10.50	3.14	370.90
18	CB-42A	FHWA HEC-22 GENERIC	N/A	On Grade	1	373.74	377.24	373.74	N/A	0.13	0.13	0.00	96.65	10.50	2.89	377.30
19	CB-44	FHWA HEC-22 GENERIC	N/A	On Grade	1	374.87	379.87	374.87	N/A	0.05	0.05	0.00	99.98	10.50	2.10	379.91
20	CB-45	FHWA HEC-22 GENERIC	N/A	On Grade	1	373.62	378.12	373.62	N/A	0.41	0.34	0.07	82.79	10.50	4.45	378.21
21	CB-5	FHWA HEC-22 GENERIC	N/A	On Grade	1	347.20	353.31	347.20	N/A	0.19	0.18	0.01	94.55	10.50	3.13	353.37
22	CB-7	FHWA HEC-22 GENERIC	N/A	On Sag	1	340.30	350.66	340.30	10.00	0.32	N/A	N/A	N/A	10.50	4.42	350.32
23	EX_CB-1	FHWA HEC-22 GENERIC	N/A	On Grade	1	351.90	356.30	351.90	N/A	0.70	0.55	0.15	78.78	10.50	4.72	356.39
24	EX_CB-12	FHWA HEC-22 GENERIC	N/A	On Grade	1	343.40	348.19	343.40	N/A	0.22	0.20	0.01	94.80	10.50	3.07	348.25
25	EX_CB-19	FHWA HEC-22 GENERIC	N/A	On Sag	2	348.80	350.66	348.80	10.00	0.00	N/A	N/A	N/A	10.50	1.00	350.74
26	EX_CB-27	FHWA HEC-22 GENERIC	N/A	On Grade	1	351.30	356.41	351.30	N/A	0.36	0.32	0.04	89.25	10.50	3.64	356.48
27	EX_CB-9	FHWA HEC-22 GENERIC	N/A	On Sag	1	341.40	346.02	341.40	0.00	0.13	N/A	N/A	N/A	10.50	2.91	346.14
28	LB-01	FHWA HEC-22 GENERIC	N/A	On Sag	1	341.00	344.05	341.00	10.00	0.01	N/A	N/A	N/A	10.50	1.40	344.06

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Proposal No. 612159-136484

Subbasin Hydrology

Subbasin : Bald_Mtn-DA

Input Data

Area (ac) 5.35
Peak Rate Factor 484
Weighted Curve Number 70
Rain Gage ID ..... *

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	5.35	-	70
Composite Area & Weighted CN	5.35		70

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

Where :

Tc = Time of Concentration (hr)
n = Manning's roughness
Lf = Flow Length (ft)
P = 2 yr, 24 hr Rainfall (inches)
Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 * (Sf^0.5) (unpaved surface)
V = 20.3282 * (Sf^0.5) (paved surface)
V = 15.0 * (Sf^0.5) (grassed waterway surface)
V = 10.0 * (Sf^0.5) (nearly bare & untilled surface)
V = 9.0 * (Sf^0.5) (cultivated straight rows surface)
V = 7.0 * (Sf^0.5) (short grass pasture surface)
V = 5.0 * (Sf^0.5) (woodland surface)
V = 2.5 * (Sf^0.5) (forest w/heavy litter surface)
Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)

Channel Flow Equation :

V = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
R = Aq / Wp
Tc = (Lf / V) / (3600 sec/hr)

Where :

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
R = Hydraulic Radius (ft)
Aq = Flow Area (ft^2)
Wp = Wetted Perimeter (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)
n = Manning's roughness

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.8	0	0
Flow Length (ft) :	50	0	0
Slope (%) :	3.5	0	0
2 yr, 24 hr Rainfall (in) :	2.9	0	0
Velocity (ft/sec) :	0.05	0	0
Computed Flow Time (min) :	18.03	0	0

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	78	0	0
Slope (%) :	5	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	3.61	0	0
Computed Flow Time (min) :	0.36	0	0

Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0	0
Flow Length (ft) :	980	0	0
Channel Slope (%) :	5	0	0
Cross Section Area (ft^2) :	0.8	0	0
Wetted Perimeter (ft) :	0.6	0	0
Velocity (ft/sec) :	31.05	0	0
Computed Flow Time (min) :	0.53	0	0

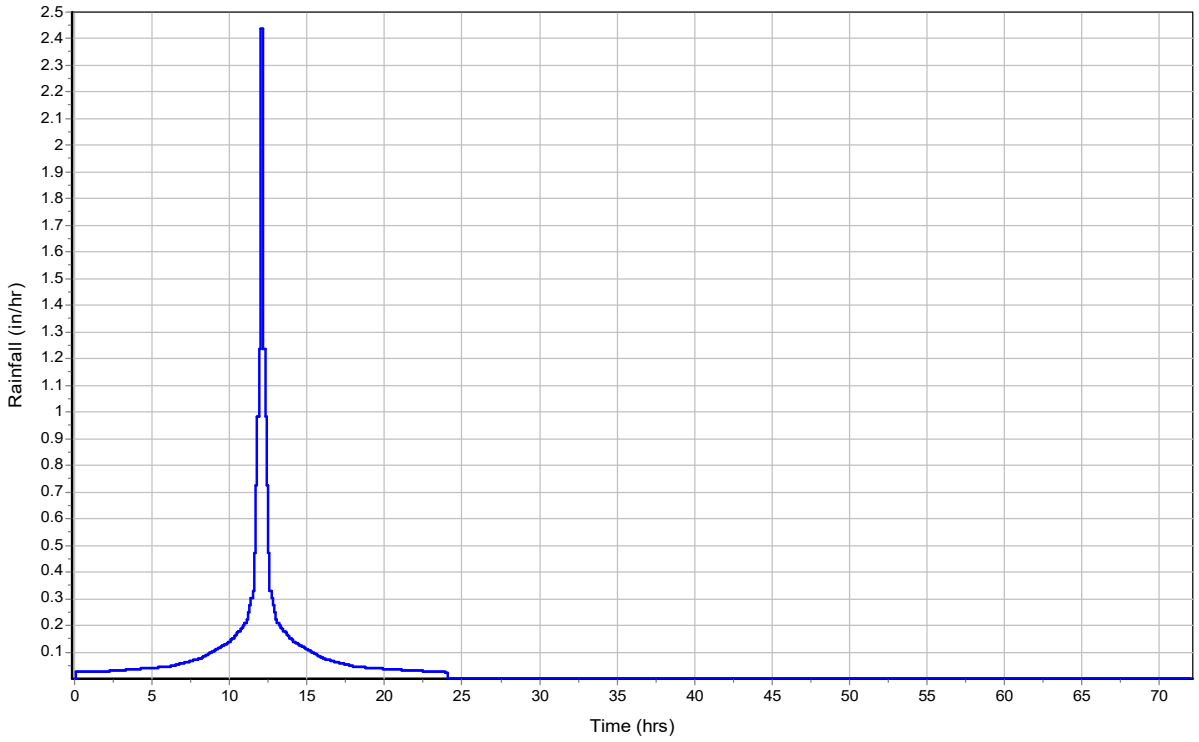
Total TOC (min) 18.92

Subbasin Runoff Results

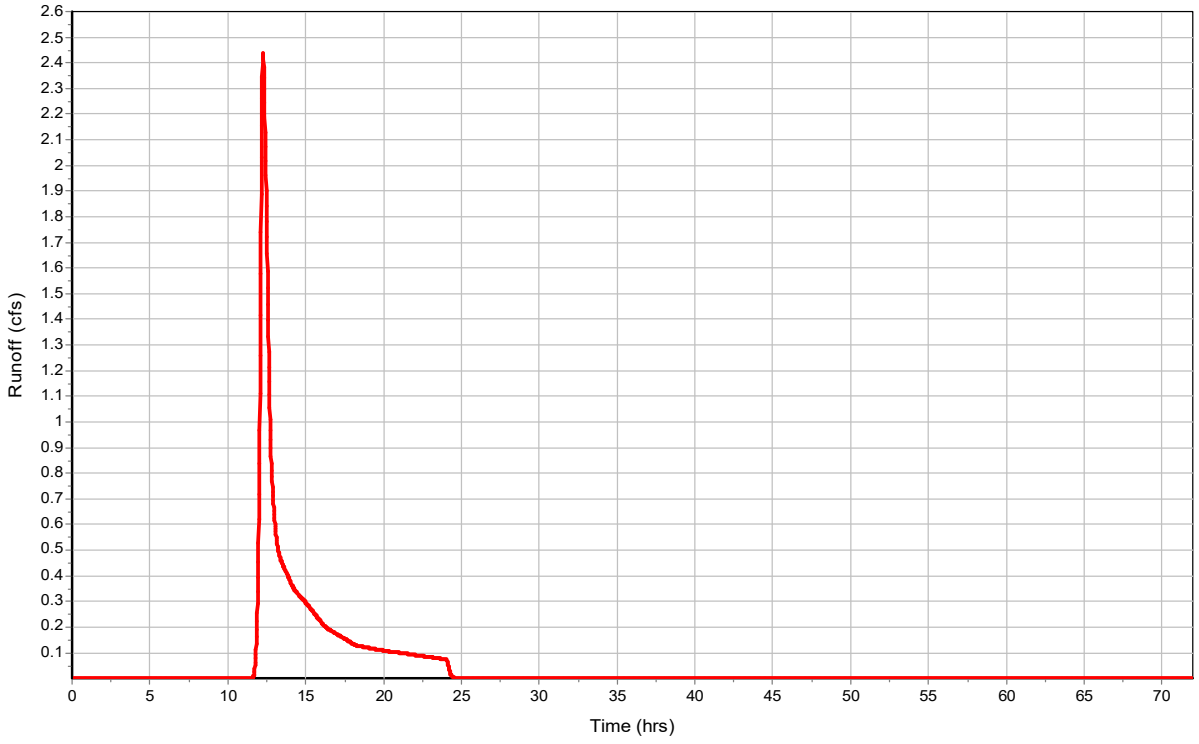
Total Rainfall (in)	2.9
Total Runoff (in)	0.66
Peak Runoff (cfs)	2.44
Weighted Curve Number	70
Time of Concentration (days hh:mm:ss)	0 00:18:55

Subbasin : Bald_Mtn-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-12-DA

Input Data

Area (ac)	0.2
Peak Rate Factor	484
Weighted Curve Number	98
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.2	-	98
Composite Area & Weighted CN	0.2		98

Time of Concentration

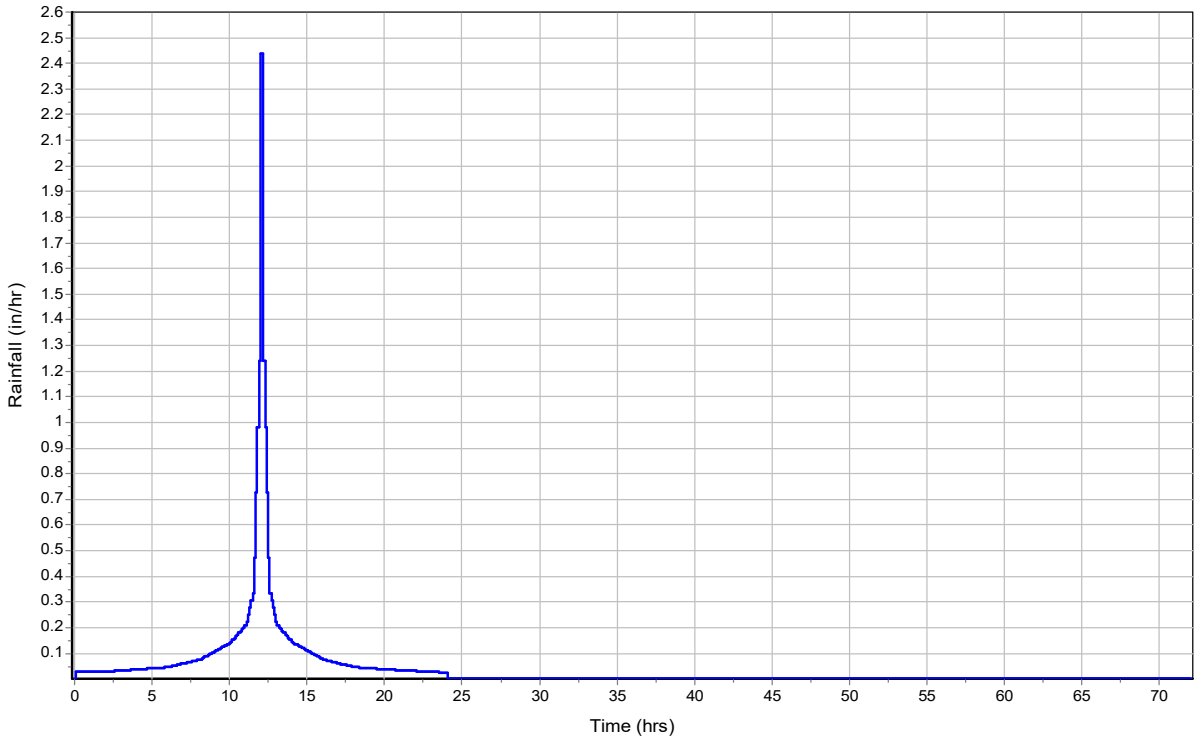
User-Defined TOC override (minutes): 6

Subbasin Runoff Results

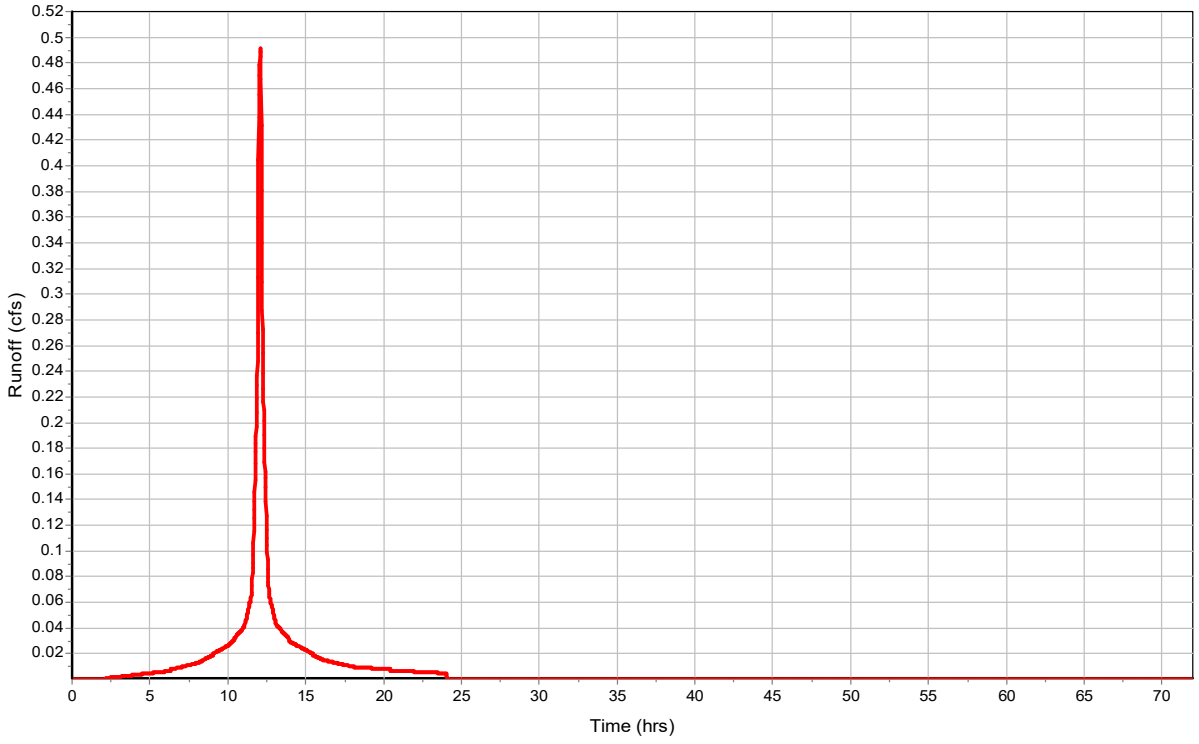
Total Rainfall (in)	2.9
Total Runoff (in)	2.67
Peak Runoff (cfs)	0.49
Weighted Curve Number	98
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : CB-12-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-13-DA

Input Data

Area (ac)	0.43
Peak Rate Factor	484
Weighted Curve Number	64
Rain Gage ID	*

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	0.43	-	64
Composite Area & Weighted CN	0.43		64

Time of Concentration

	Subarea	Subarea	Subarea
Sheet Flow Computations	A	B	C
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	50	0	0
Slope (%) :	1.5	0	0
2 yr, 24 hr Rainfall (in) :	2.9	0	0
Velocity (ft/sec) :	0.06	0	0
Computed Flow Time (min) :	14.54	0	0

	Subarea	Subarea	Subarea
Shallow Concentrated Flow Computations	A	B	C
Flow Length (ft) :	160	0	0
Slope (%) :	1.5	0	0
Surface Type :	Grass pasture	Unpaved	Unpaved
Velocity (ft/sec) :	0.86	0	0
Computed Flow Time (min) :	3.1	0	0

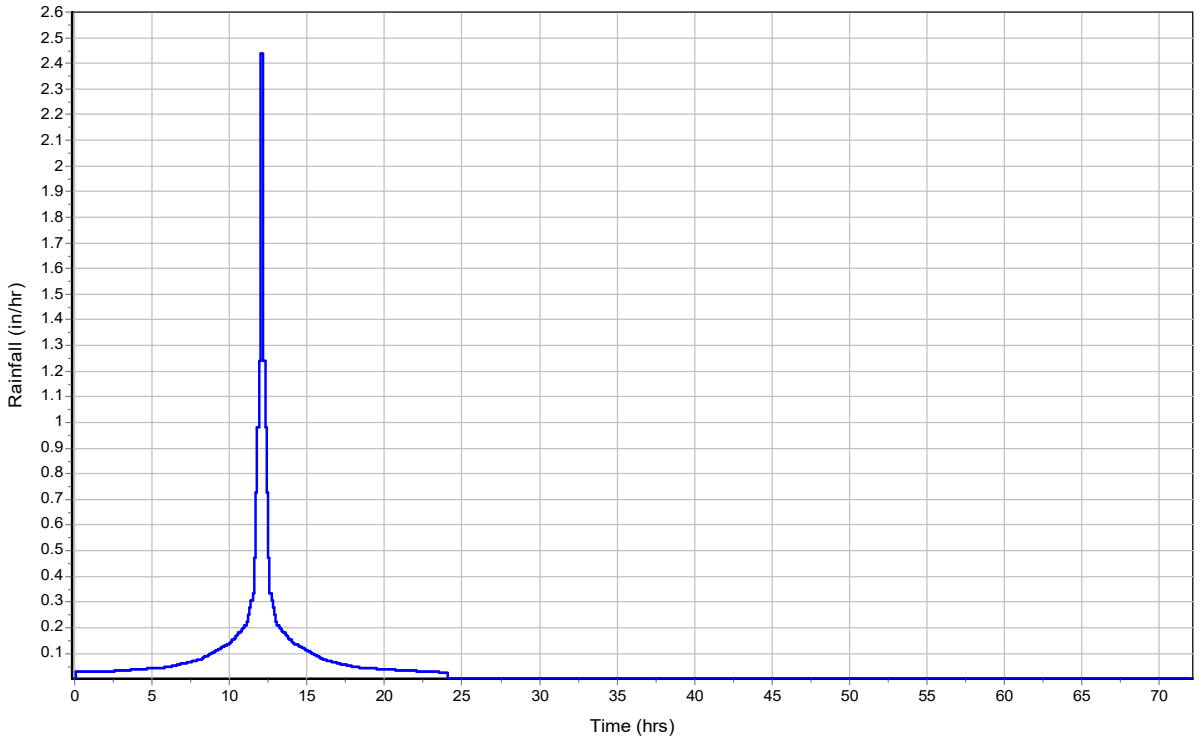
Total TOC (min) 17.64

Subbasin Runoff Results

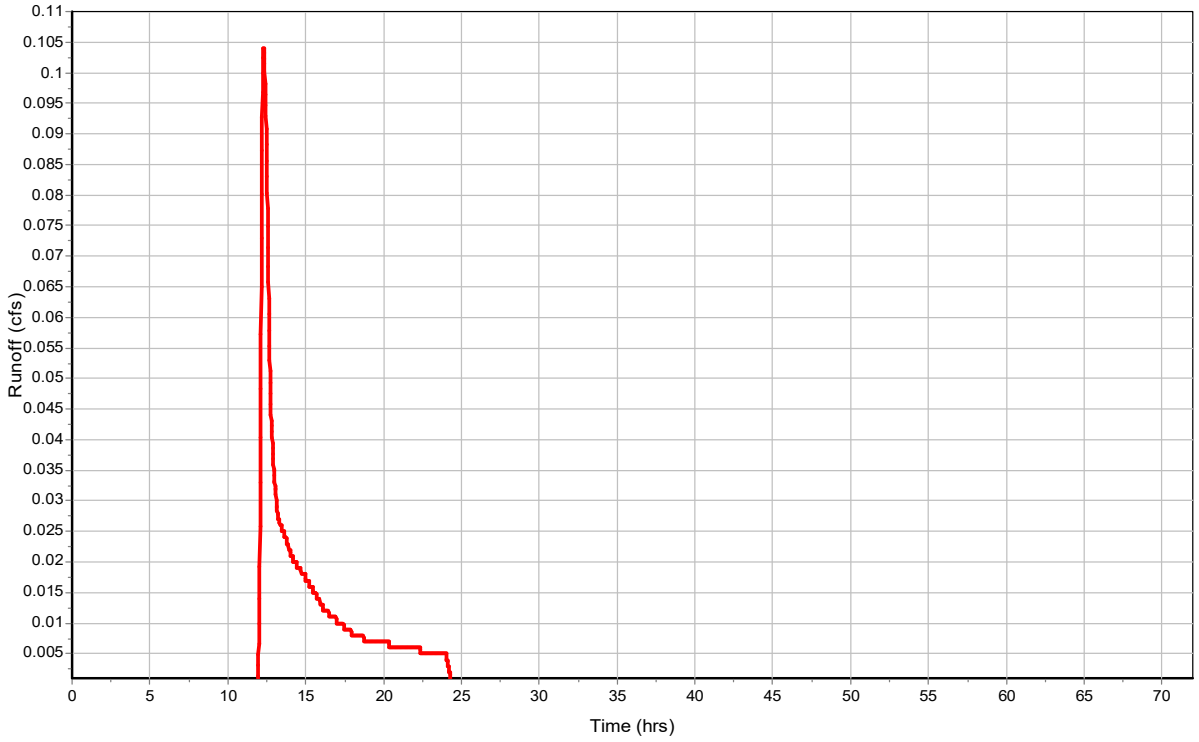
Total Rainfall (in)	2.9
Total Runoff (in)	0.43
Peak Runoff (cfs)	0.1
Weighted Curve Number	64
Time of Concentration (days hh:mm:ss)	0 00:17:38

Subbasin : CB-13-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-14A-DA

Input Data

Area (ac)	0.22
Peak Rate Factor	484
Weighted Curve Number	98
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.22	-	98
Composite Area & Weighted CN	0.22		98

Time of Concentration

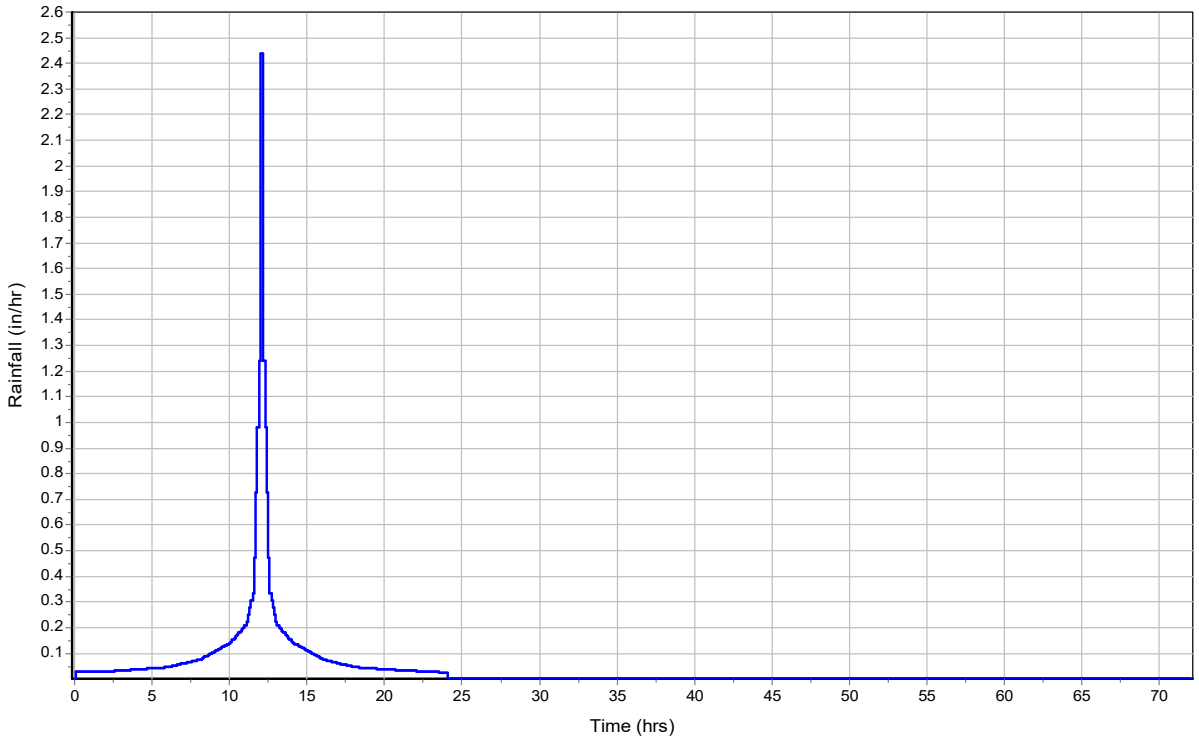
User-Defined TOC override (minutes): 6

Subbasin Runoff Results

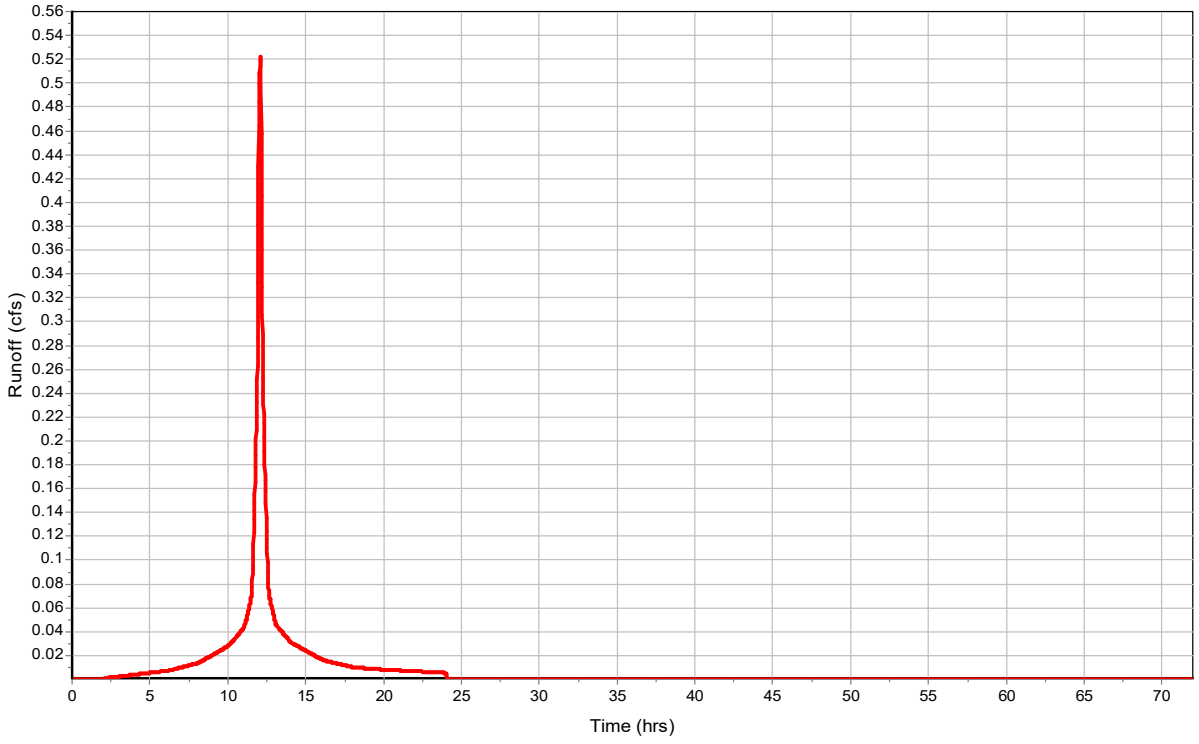
Total Rainfall (in)	2.9
Total Runoff (in)	2.67
Peak Runoff (cfs)	0.52
Weighted Curve Number	98
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : CB-14A-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-17-DA

Input Data

Area (ac) 0.13
Peak Rate Factor 484
Weighted Curve Number 98
Rain Gage ID ..... *

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.13	-	98
Composite Area & Weighted CN	0.13		98

Time of Concentration

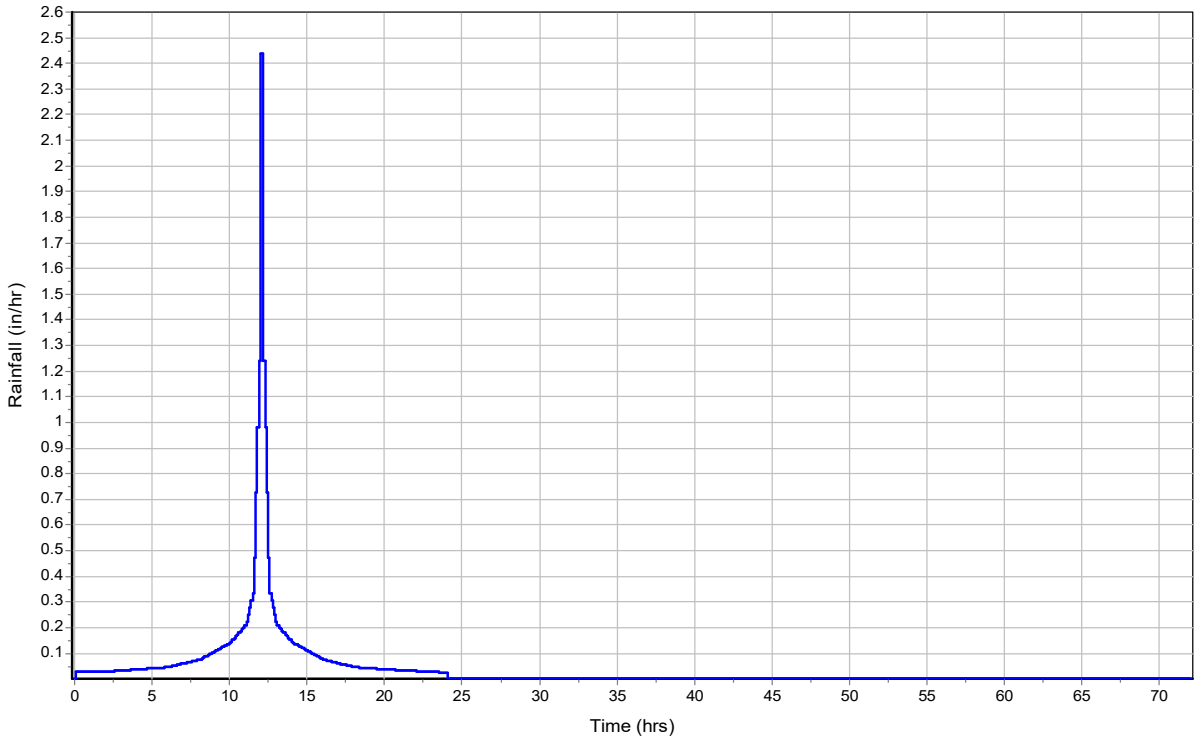
User-Defined TOC override (minutes): 6

Subbasin Runoff Results

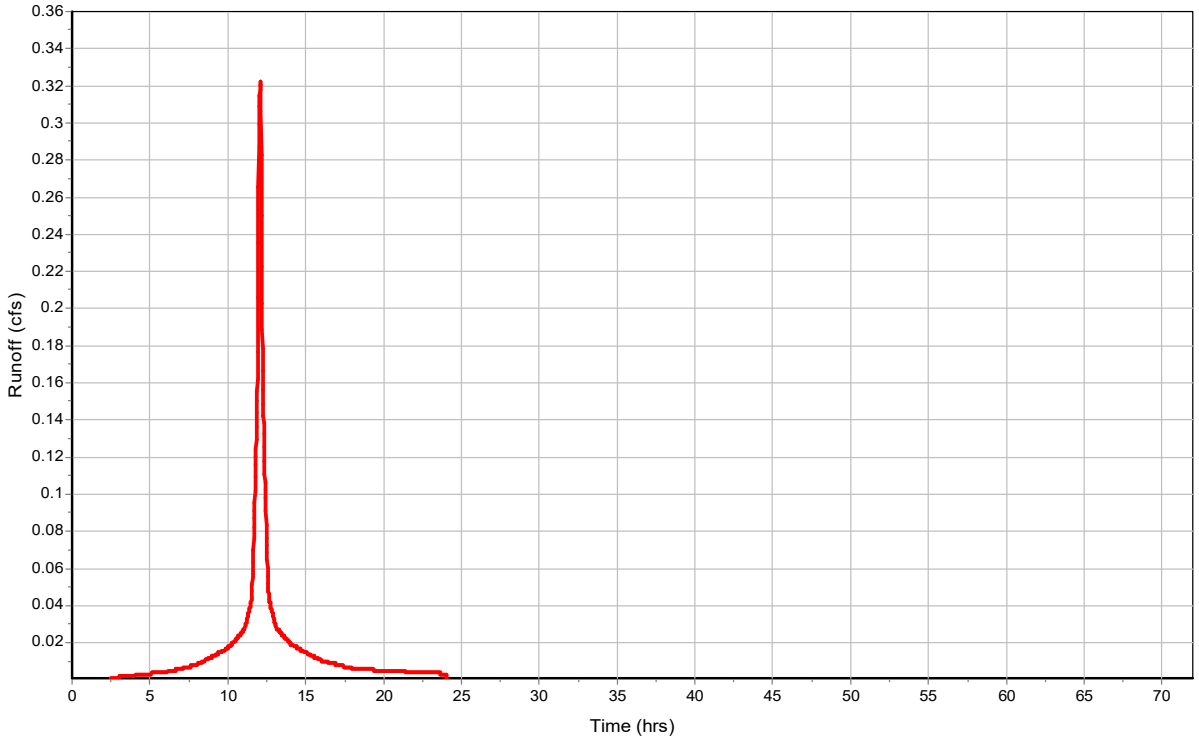
Total Rainfall (in) 2.9
Total Runoff (in) 2.67
Peak Runoff (cfs) 0.32
Weighted Curve Number 98
Time of Concentration (days hh:mm:ss) 0 00:06:00

Subbasin : CB-17-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-1-DA

Input Data

Area (ac)	0.57
Peak Rate Factor	484
Weighted Curve Number	68
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.57	-	68
Composite Area & Weighted CN	0.57		68

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	50	0	0
Slope (%) :	3	0	0
2 yr, 24 hr Rainfall (in) :	2.9	0	0
Velocity (ft/sec) :	0.08	0	0
Computed Flow Time (min) :	11.02	0	0

Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0	0
Flow Length (ft) :	480	0	0
Channel Slope (%) :	4	0	0
Cross Section Area (ft^2) :	0.8	0	0
Wetted Perimeter (ft) :	0.5	0	0
Velocity (ft/sec) :	31.36	0	0
Computed Flow Time (min) :	0.26	0	0

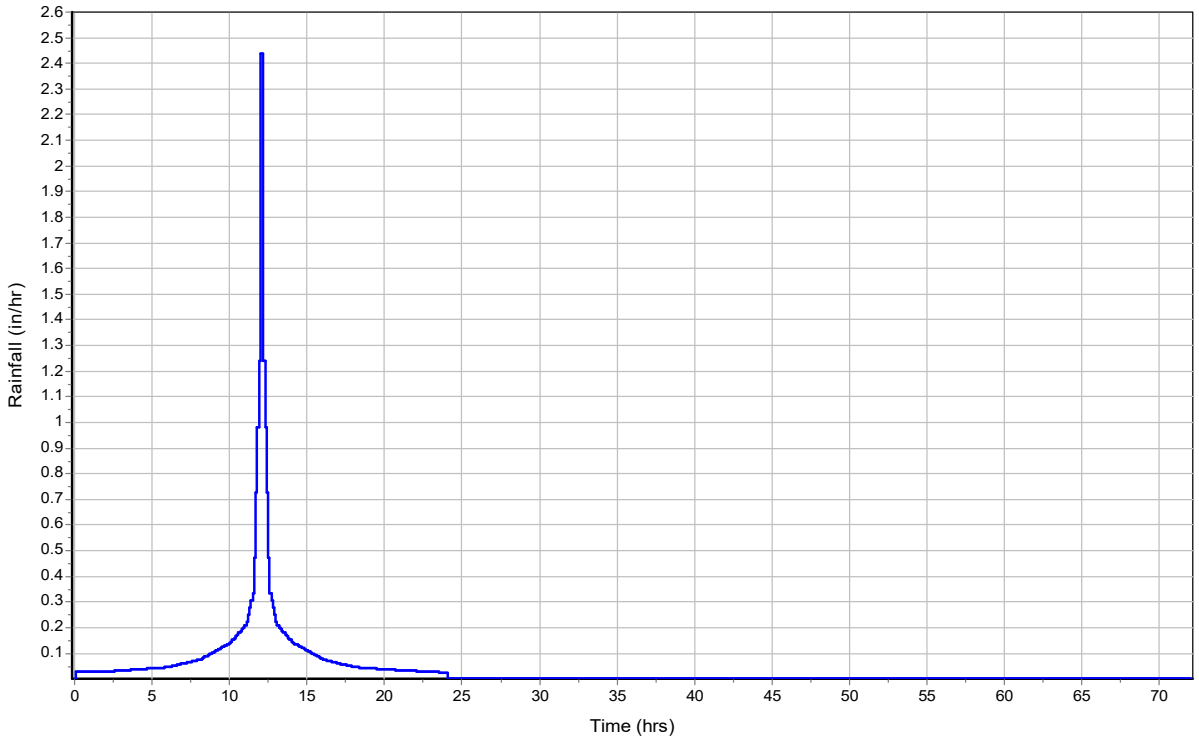
Total TOC (min) 11.27

Subbasin Runoff Results

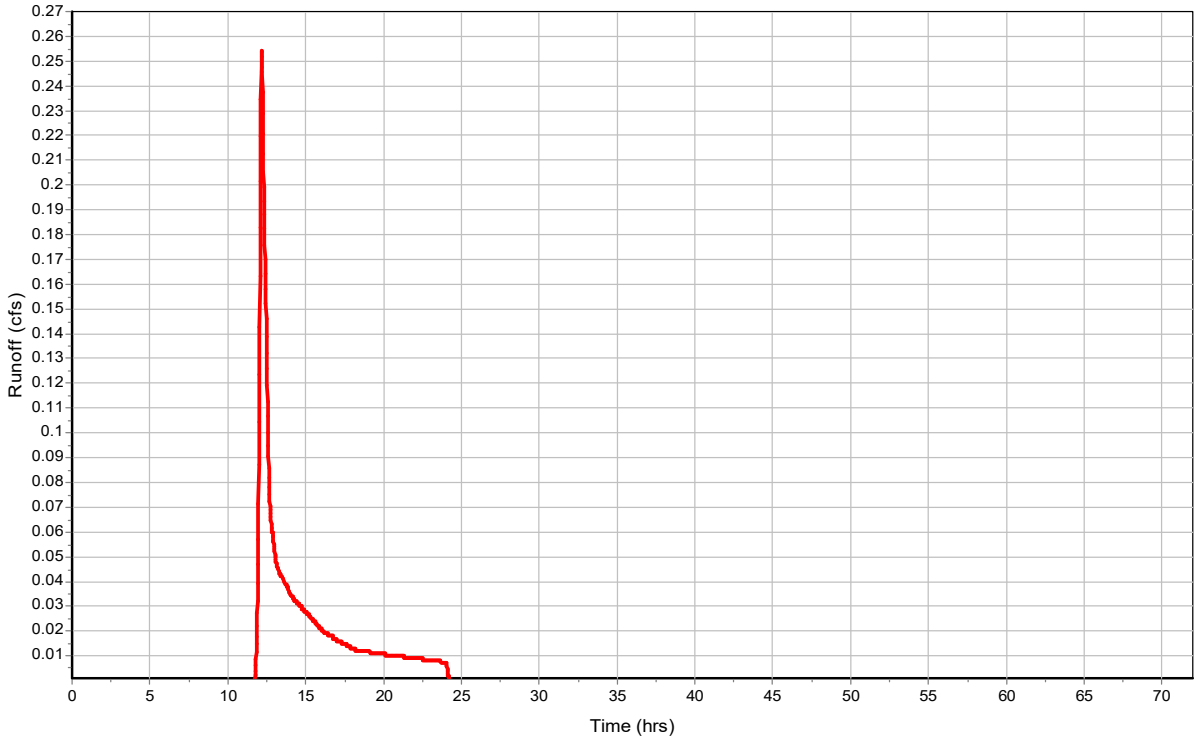
Total Rainfall (in)	2.9
Total Runoff (in)	0.58
Peak Runoff (cfs)	0.25
Weighted Curve Number	68
Time of Concentration (days hh:mm:ss)	0 00:11:16

Subbasin : CB-1-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-21-DA

Input Data

Area (ac) 0.11
Peak Rate Factor 484
Weighted Curve Number 98
Rain Gage ID ..... *

Composite Curve Number

32

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.11	-	98
Composite Area & Weighted CN	0.11		98

Time of Concentration

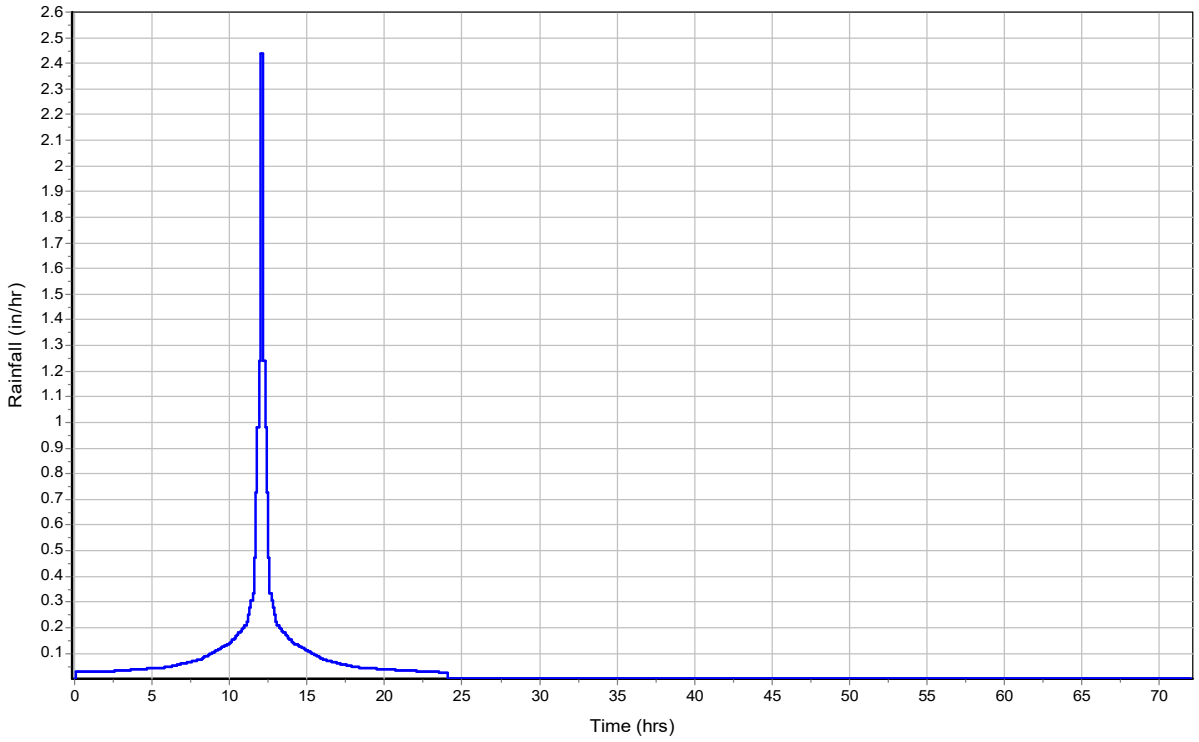
User-Defined TOC override (minutes): 6

Subbasin Runoff Results

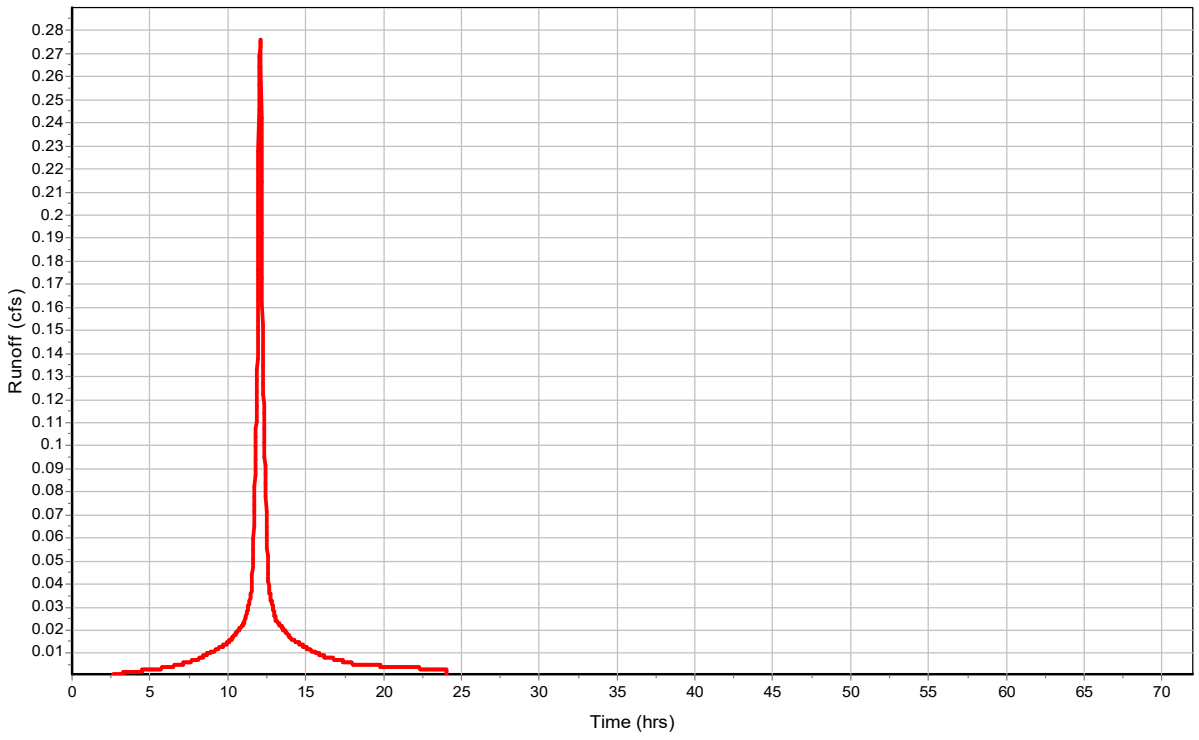
Total Rainfall (in) 2.9
Total Runoff (in) 2.66
Peak Runoff (cfs) 0.28
Weighted Curve Number 98
Time of Concentration (days hh:mm:ss) 0 00:06:00

Subbasin : CB-21-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-22-DA

Input Data

Area (ac)	0.24
Peak Rate Factor	484
Weighted Curve Number	98
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.24	-	98
Composite Area & Weighted CN	0.24		98

Time of Concentration

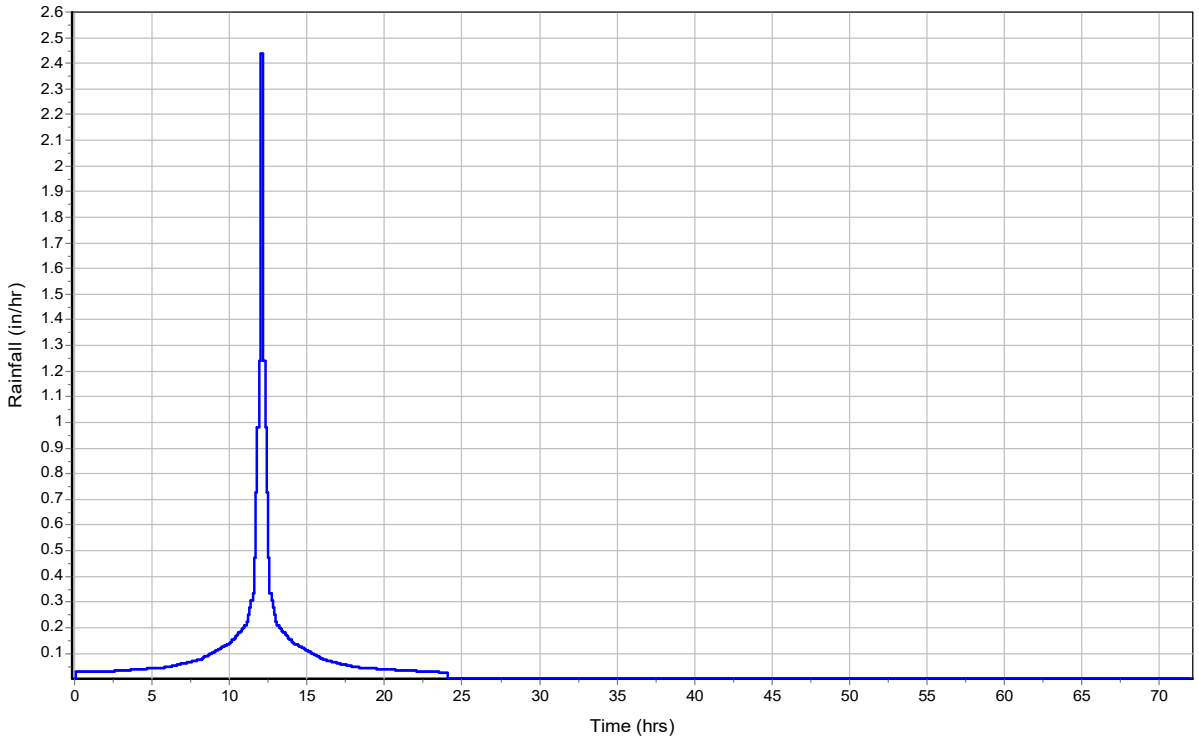
User-Defined TOC override (minutes): 6

Subbasin Runoff Results

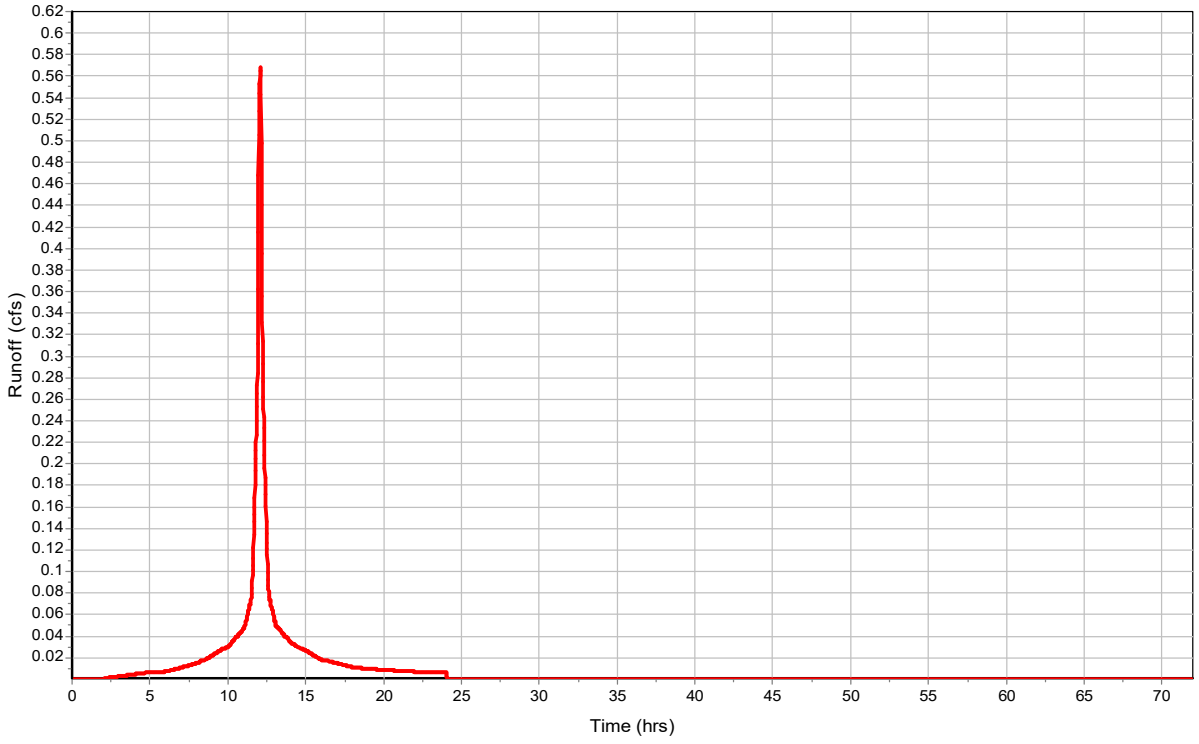
Total Rainfall (in)	2.9
Total Runoff (in)	2.67
Peak Runoff (cfs)	0.57
Weighted Curve Number	98
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : CB-22-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-25-DA

Input Data

Area (ac)	0.21
Peak Rate Factor	484
Weighted Curve Number	98
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.21	-	98
Composite Area & Weighted CN	0.21		98

Time of Concentration

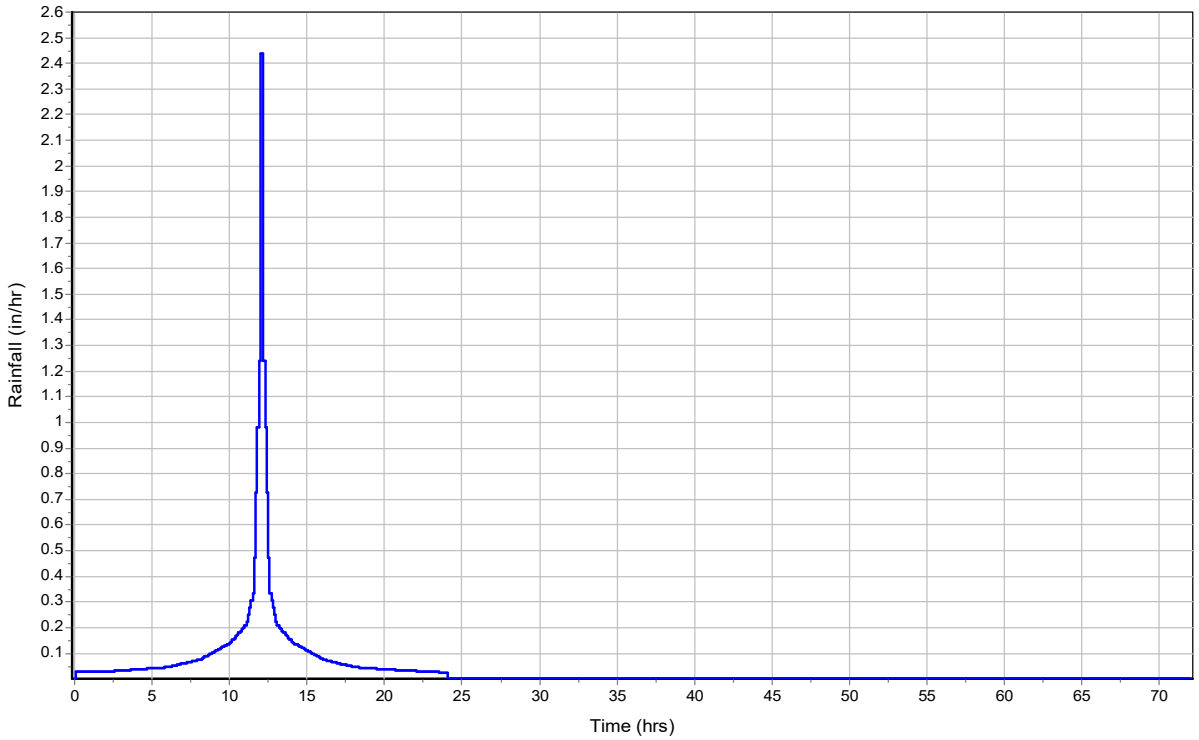
User-Defined TOC override (minutes): 6

Subbasin Runoff Results

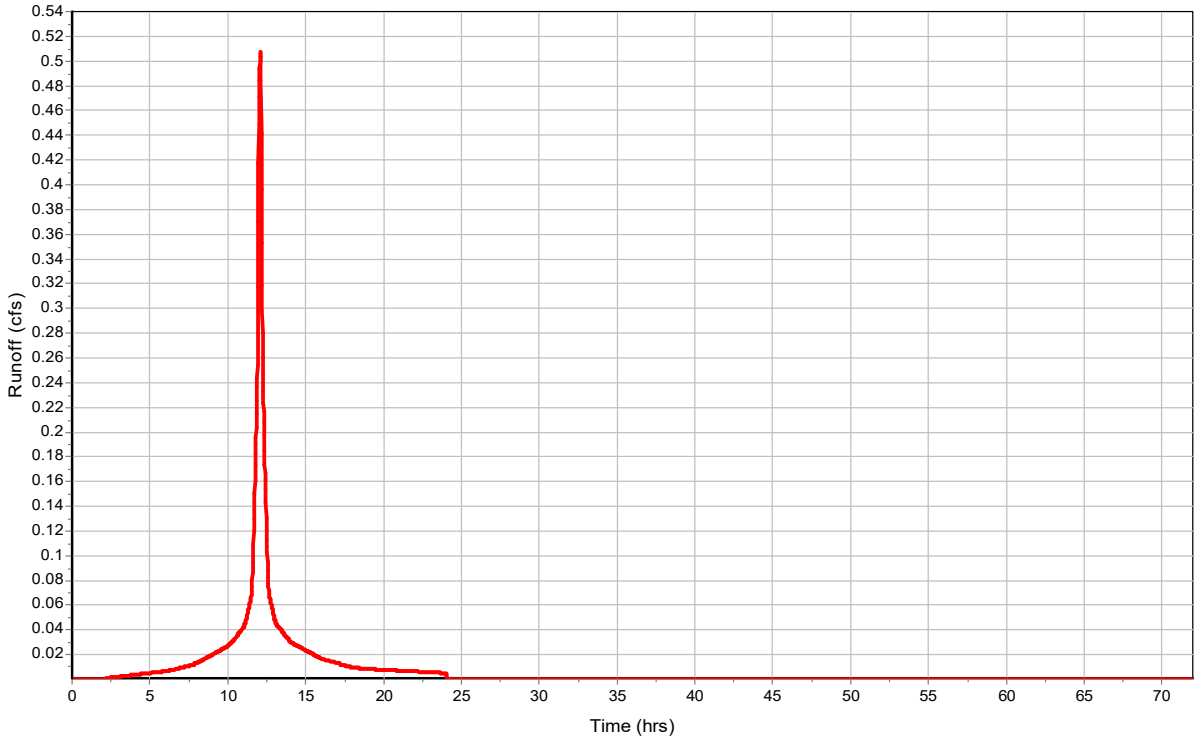
Total Rainfall (in)	2.9
Total Runoff (in)	2.67
Peak Runoff (cfs)	0.51
Weighted Curve Number	98
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : CB-25-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-27-DA

Input Data

Area (ac)	0.06
Peak Rate Factor	484
Weighted Curve Number	97
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.06	-	97
Composite Area & Weighted CN	0.06		97

Time of Concentration

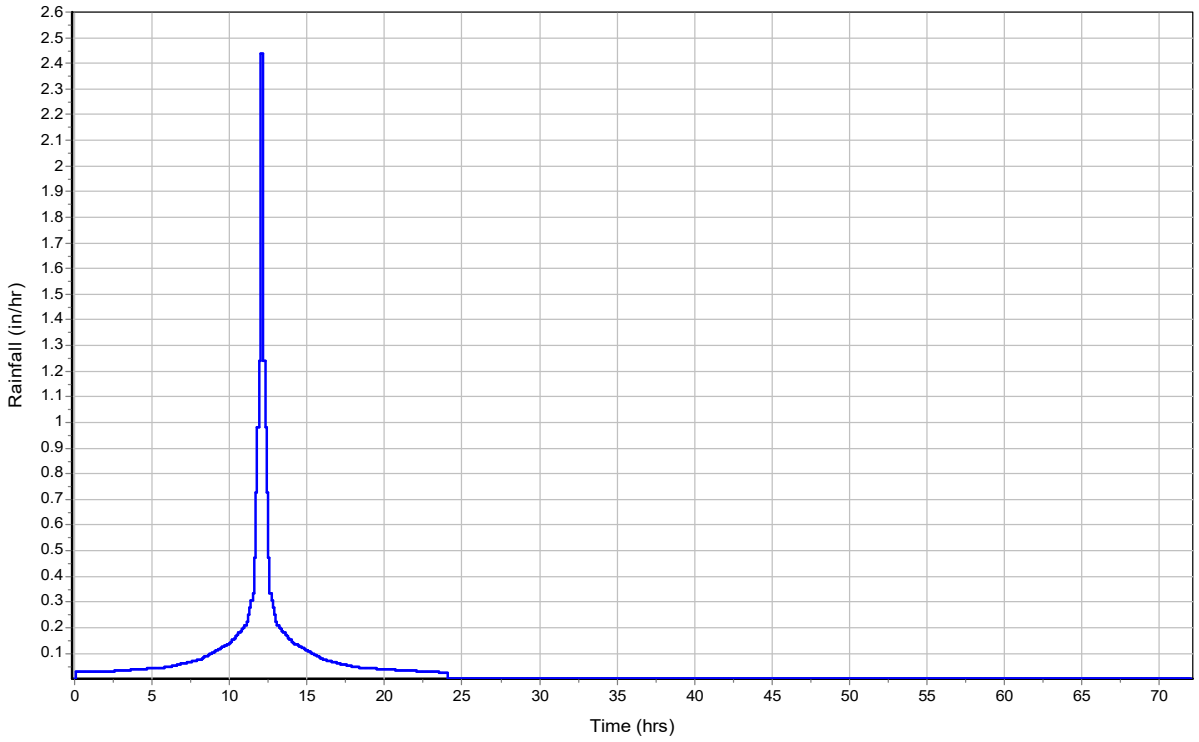
User-Defined TOC override (minutes): 6

Subbasin Runoff Results

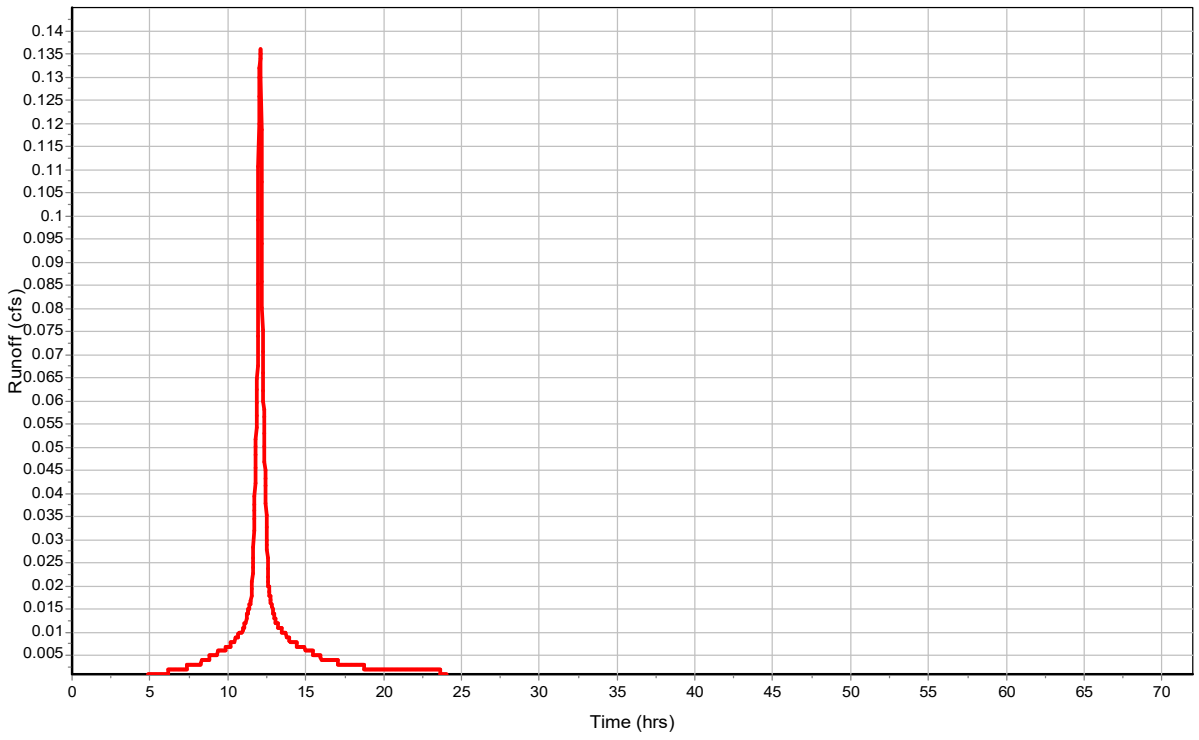
Total Rainfall (in)	2.9
Total Runoff (in)	2.54
Peak Runoff (cfs)	0.14
Weighted Curve Number	97
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : CB-27-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-28-DA

Input Data

Area (ac)	0.17
Peak Rate Factor	484
Weighted Curve Number	95
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.17	-	95
Composite Area & Weighted CN	0.17		95

Time of Concentration

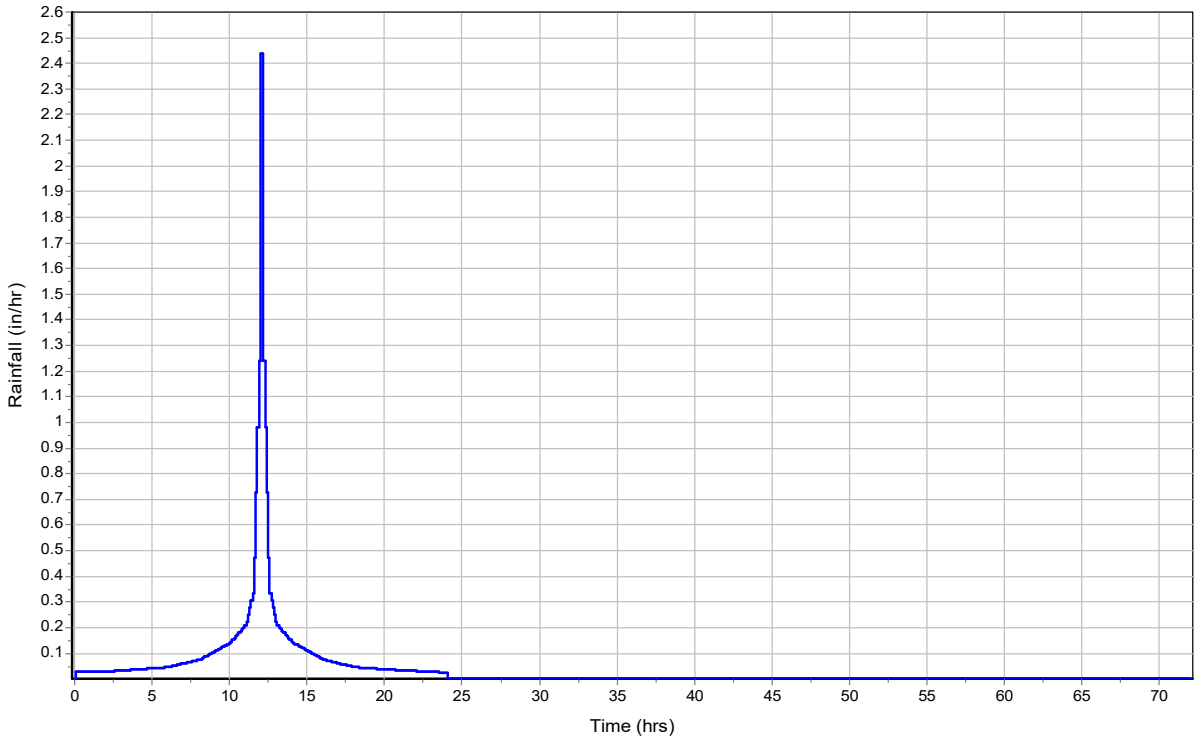
User-Defined TOC override (minutes): 6

Subbasin Runoff Results

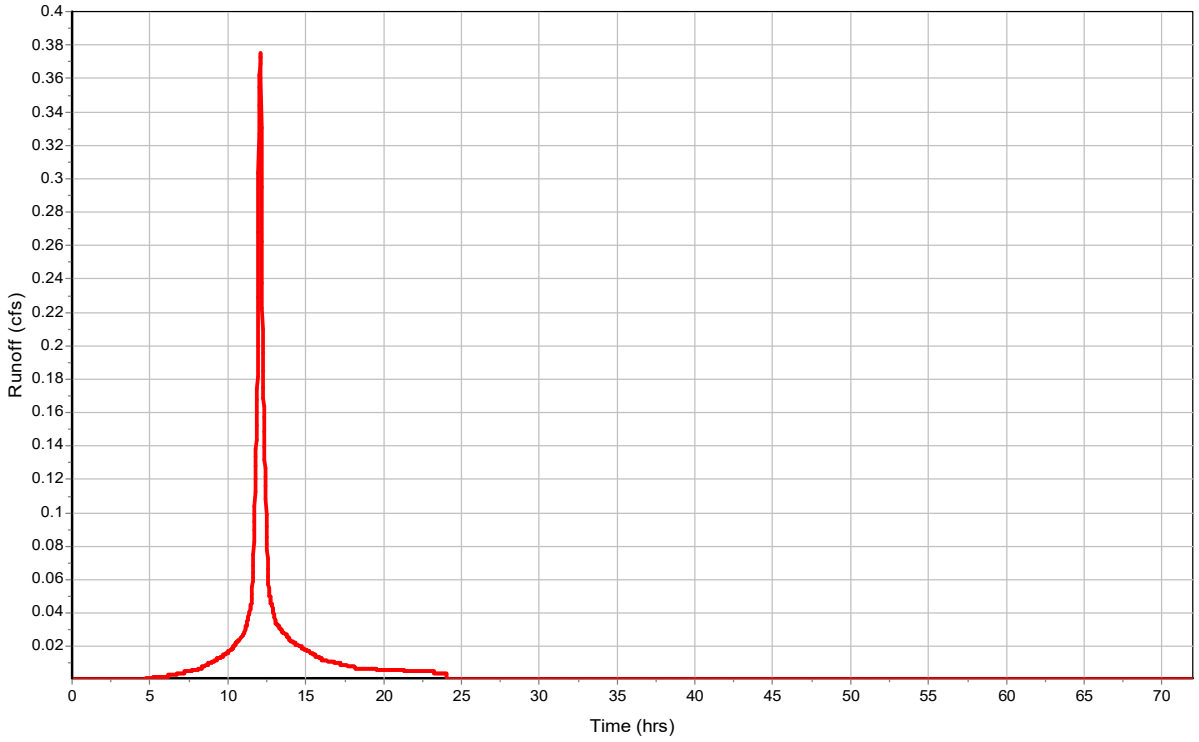
Total Rainfall (in)	2.9
Total Runoff (in)	2.35
Peak Runoff (cfs)	0.38
Weighted Curve Number	95
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : CB-28-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-29-DA

Input Data

Area (ac)	0.2
Peak Rate Factor	484
Weighted Curve Number	98
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.2	-	98
Composite Area & Weighted CN	0.2		98

Time of Concentration

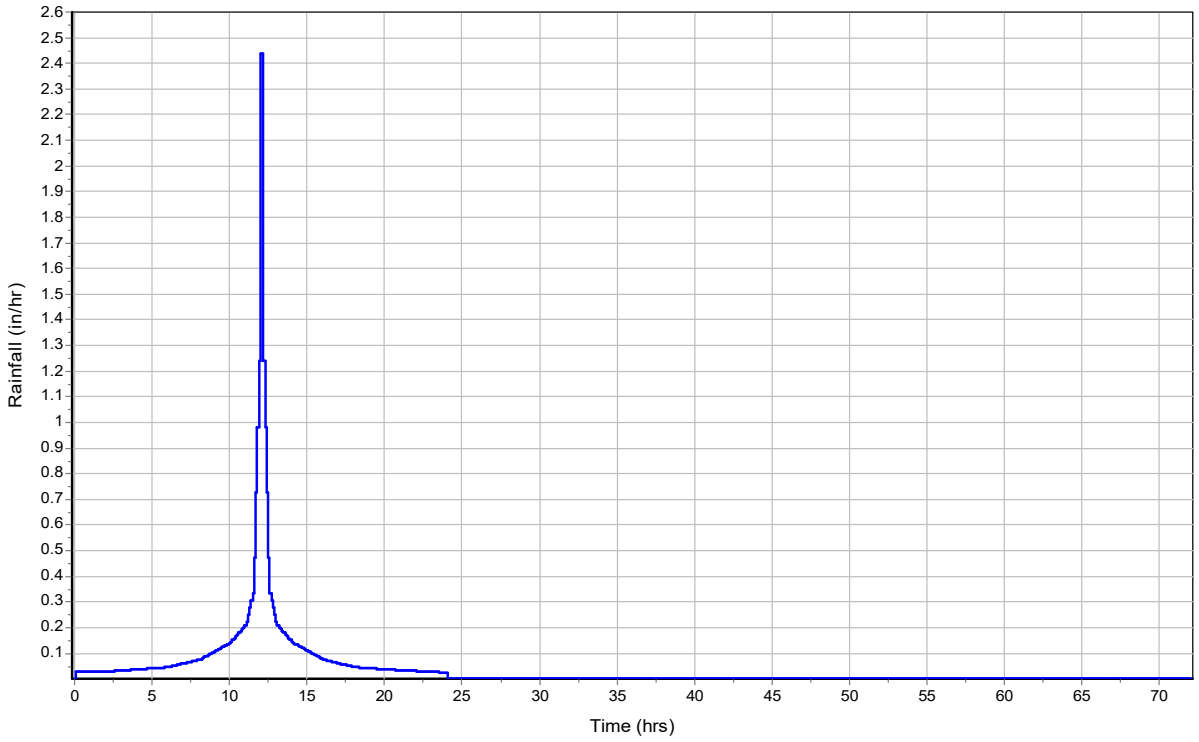
User-Defined TOC override (minutes): 6

Subbasin Runoff Results

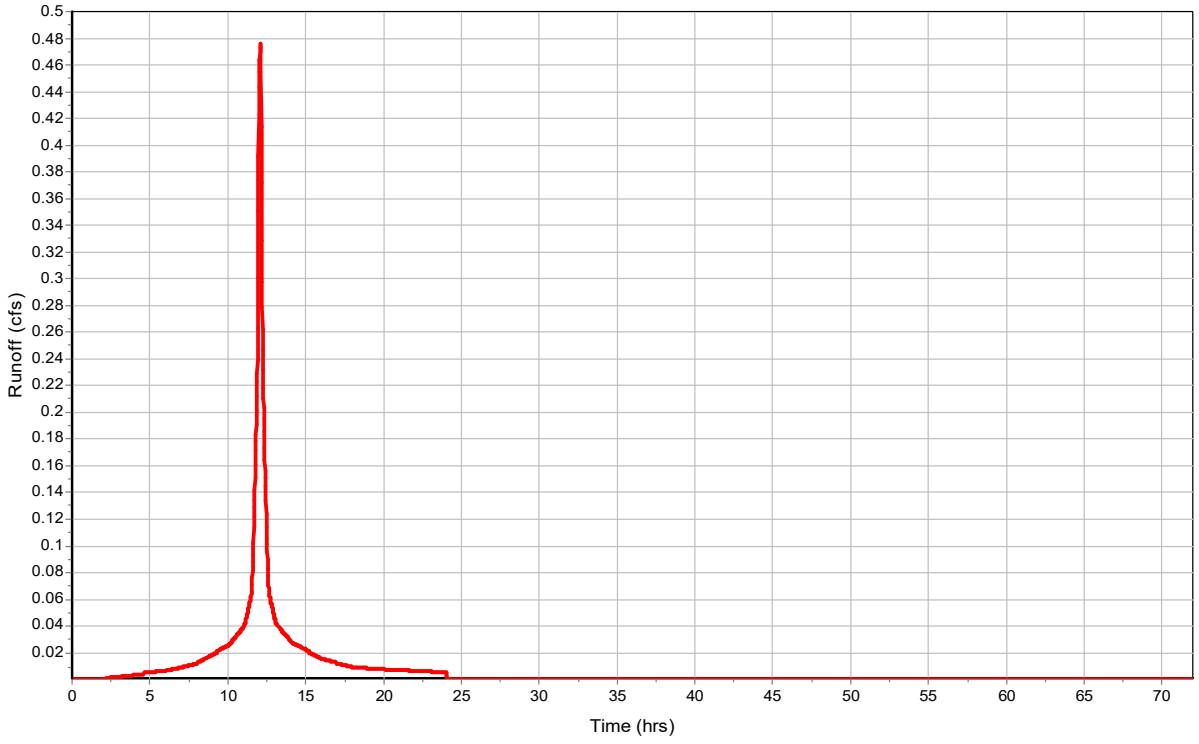
Total Rainfall (in)	2.9
Total Runoff (in)	2.67
Peak Runoff (cfs)	0.48
Weighted Curve Number	98
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : CB-29-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-31-DA

Input Data

Area (ac)	0.09
Peak Rate Factor	484
Weighted Curve Number	93
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.09	-	93
Composite Area & Weighted CN	0.09		93

Time of Concentration

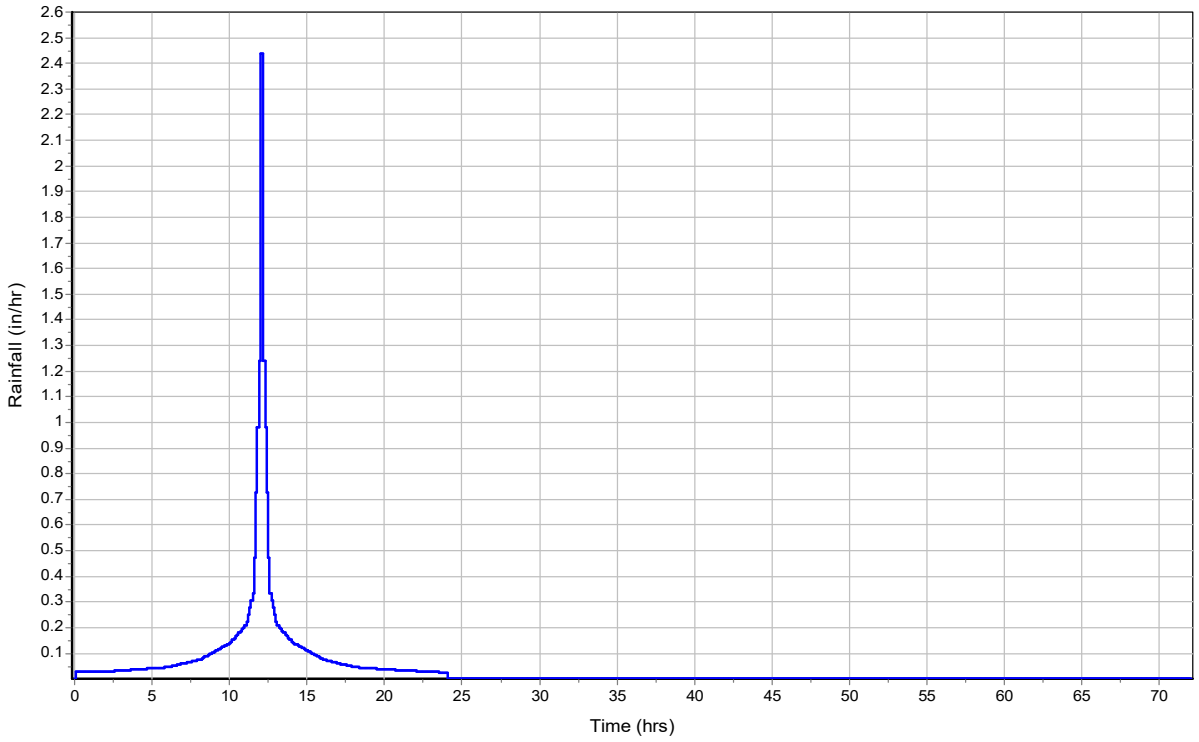
User-Defined TOC override (minutes): 6

Subbasin Runoff Results

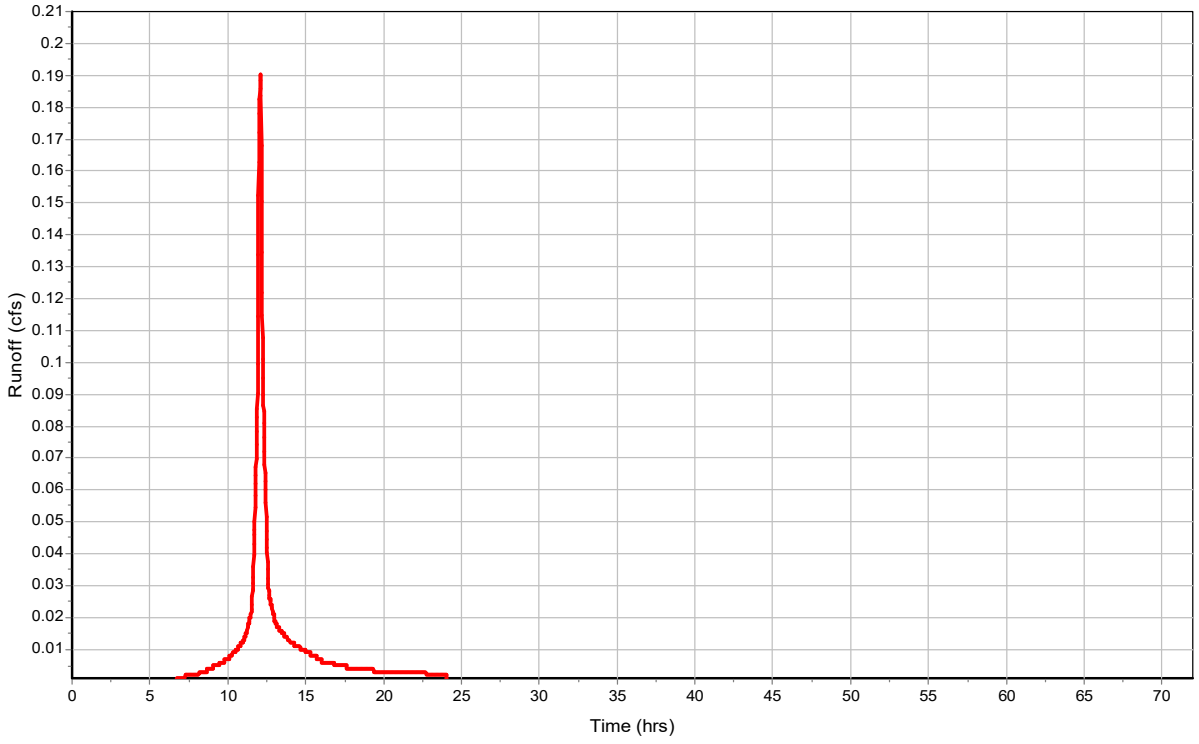
Total Rainfall (in)	2.9
Total Runoff (in)	2.15
Peak Runoff (cfs)	0.19
Weighted Curve Number	93
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : CB-31-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-32-DA

Input Data

Area (ac)	0.88
Peak Rate Factor	484
Weighted Curve Number	50
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.88	-	50
Composite Area & Weighted CN	0.88		50

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	50	0	0
Slope (%) :	6	0	0
2 yr, 24 hr Rainfall (in) :	2.9	0	0
Velocity (ft/sec) :	0.1	0	0
Computed Flow Time (min) :	8.35	0	0

Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.027	0	0
Flow Length (ft) :	252	0	0
Channel Slope (%) :	5.5	0	0
Cross Section Area (ft^2) :	2.7	0	0
Wetted Perimeter (ft) :	0.7	0	0
Velocity (ft/sec) :	31.83	0	0
Computed Flow Time (min) :	0.13	0	0

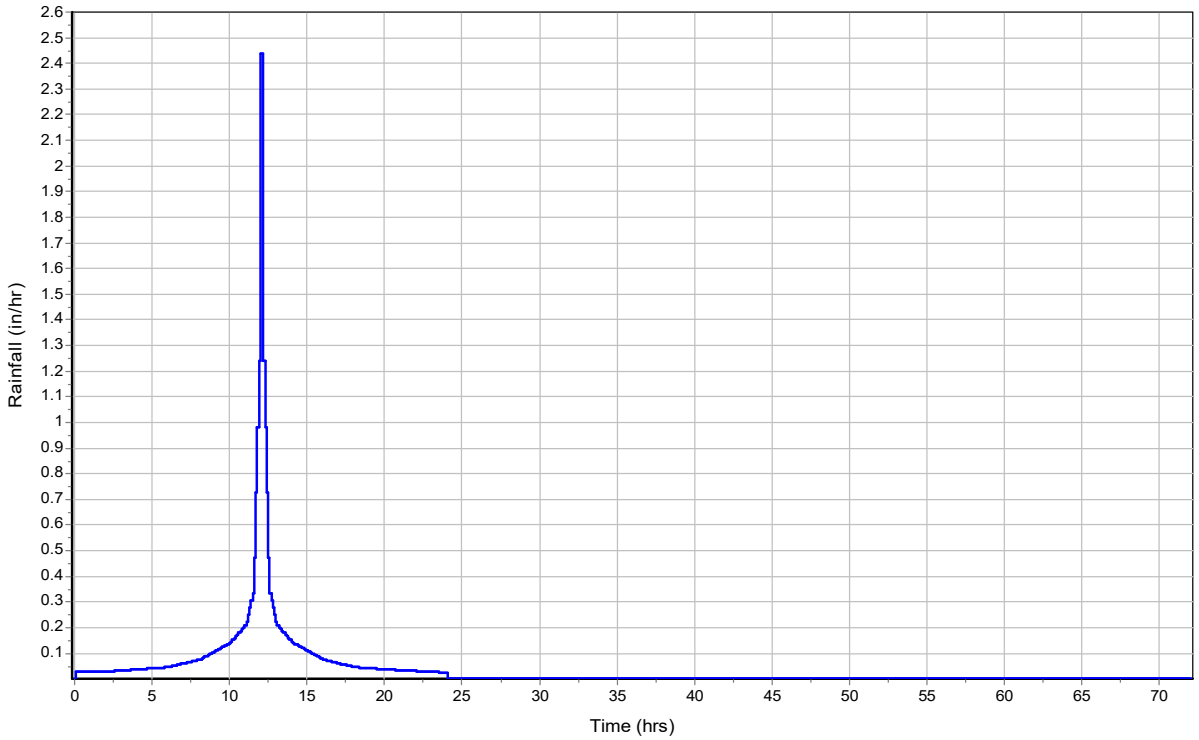
Total TOC (min) 8.48

Subbasin Runoff Results

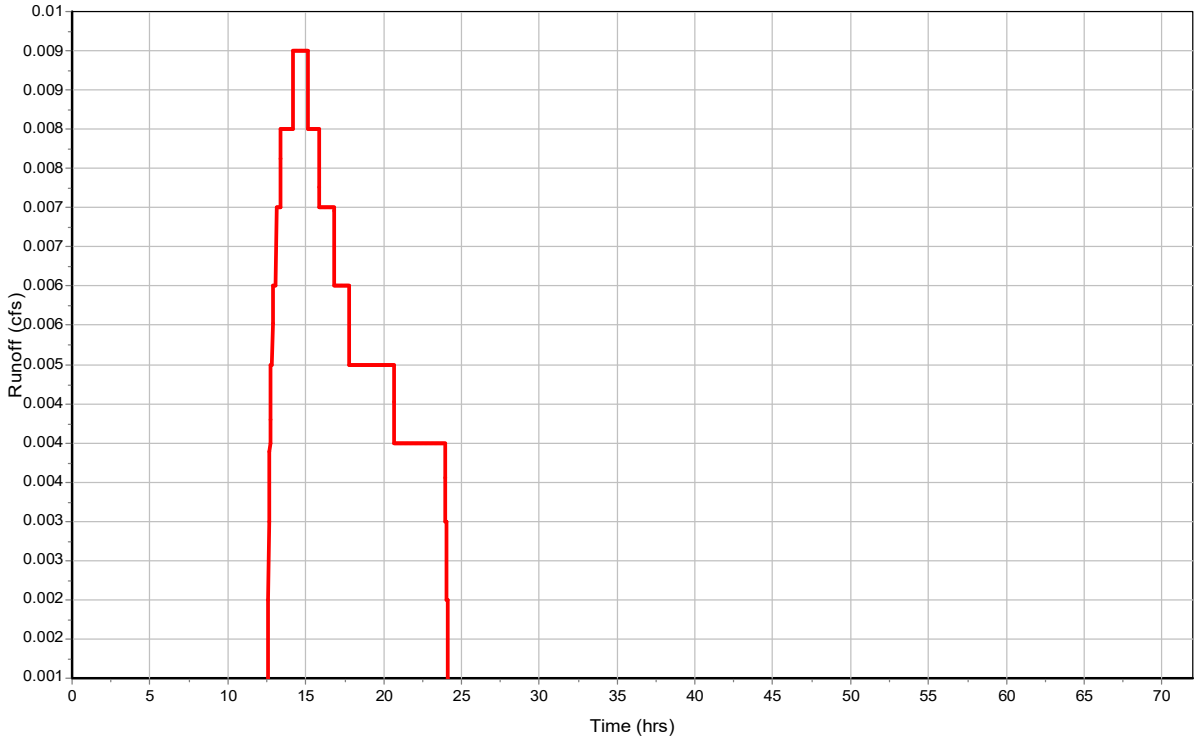
Total Rainfall (in)	2.9
Total Runoff (in)	0.07
Peak Runoff (cfs)	0.01
Weighted Curve Number	50
Time of Concentration (days hh:mm:ss)	0 00:08:29

Subbasin : CB-32-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-33A-DA

Input Data

Area (ac)	0.07
Peak Rate Factor	484
Weighted Curve Number	39
Rain Gage ID	*

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	0.07	-	39
Composite Area & Weighted CN	0.07		39

Time of Concentration

	Subarea	Subarea	Subarea
Sheet Flow Computations	A	B	C
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	50	0	0
Slope (%) :	5.5	0	0
2 yr, 24 hr Rainfall (in) :	2.9	0	0
Velocity (ft/sec) :	0.1	0	0
Computed Flow Time (min) :	8.64	0	0

	Subarea	Subarea	Subarea
Channel Flow Computations	A	B	C
Manning's Roughness :	0.027	0	0
Flow Length (ft) :	120	0	0
Channel Slope (%) :	5.2	0	0
Cross Section Area (ft^2) :	2.4	0	0
Wetted Perimeter (ft) :	0.8	0	0
Velocity (ft/sec) :	26.18	0	0
Computed Flow Time (min) :	0.08	0	0

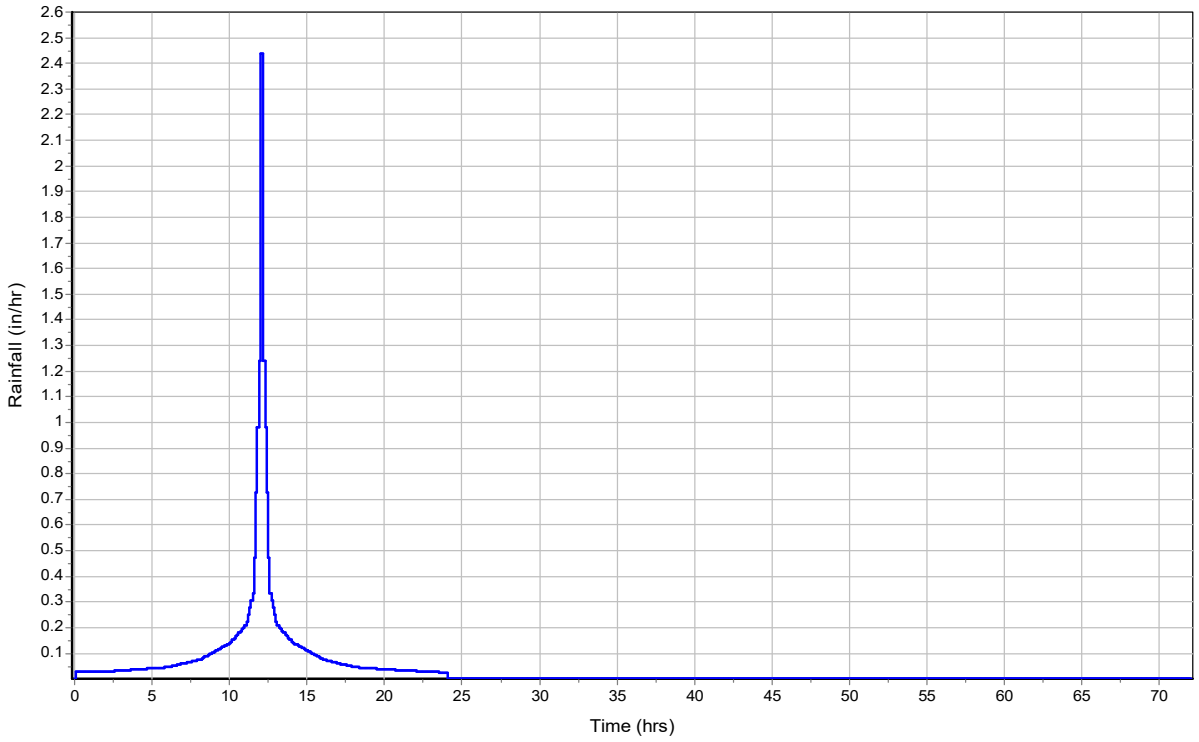
Total TOC (min) 8.72

Subbasin Runoff Results

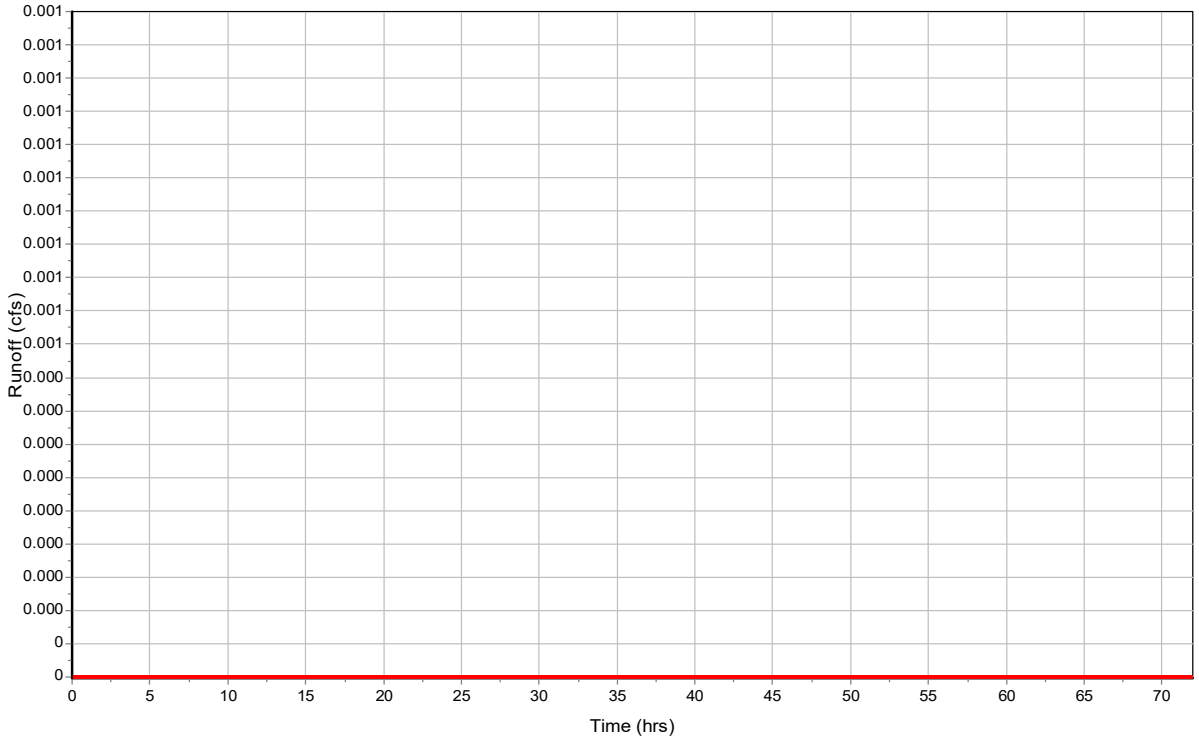
Total Rainfall (in)	2.9
Total Runoff (in)	0
Peak Runoff (cfs)	0
Weighted Curve Number	39
Time of Concentration (days hh:mm:ss)	0 00:08:43

Subbasin : CB-33A-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-37-DA

Input Data

Area (ac)	0.06
Peak Rate Factor	484
Weighted Curve Number	92
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.06	-	92
Composite Area & Weighted CN	0.06		92

Time of Concentration

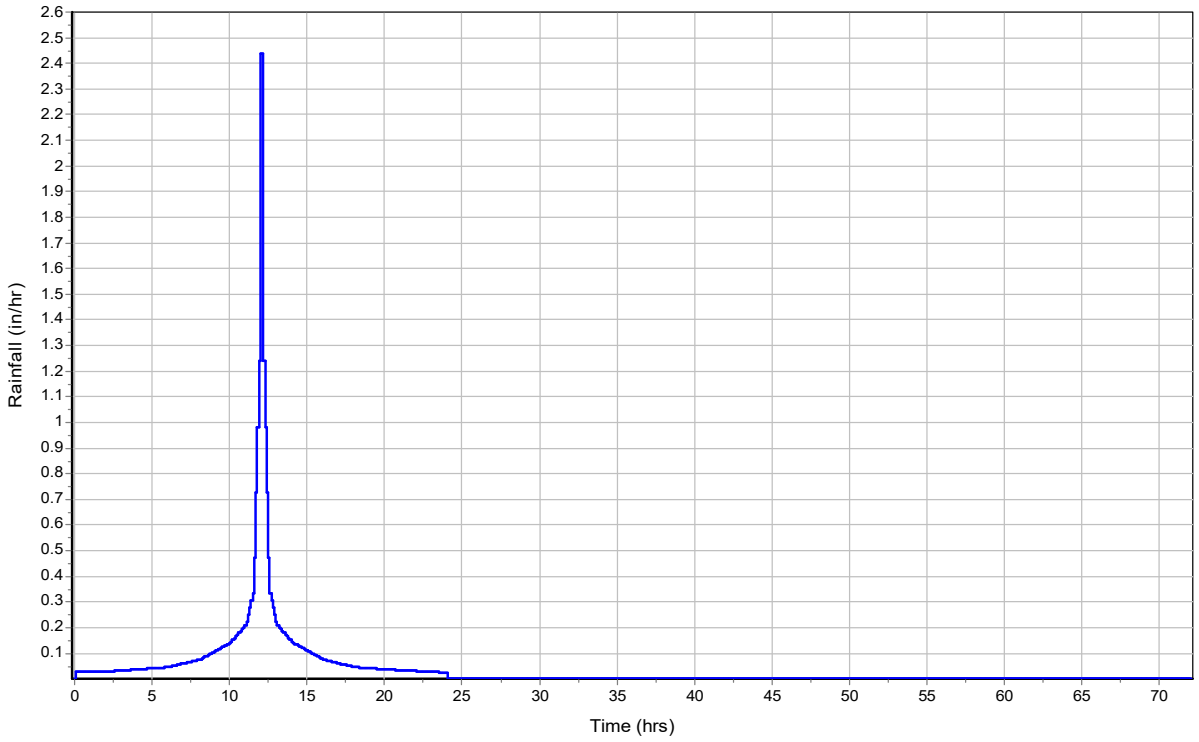
User-Defined TOC override (minutes): 6

Subbasin Runoff Results

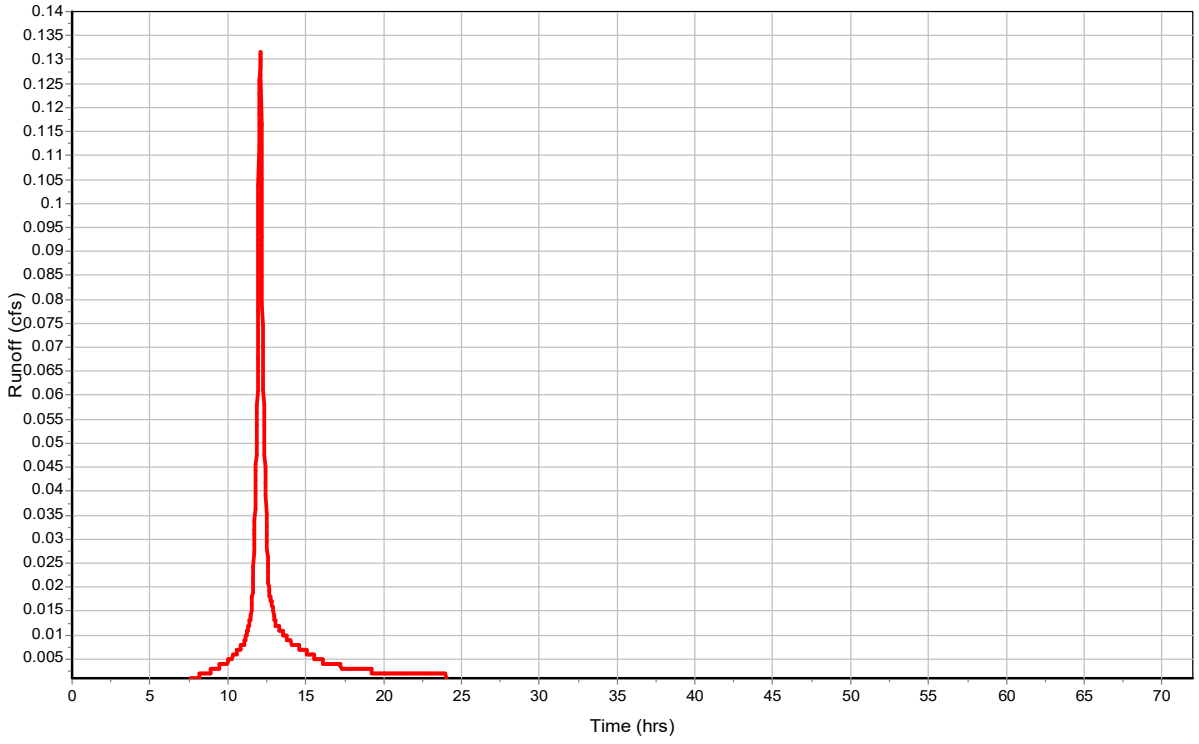
Total Rainfall (in)	2.9
Total Runoff (in)	2.05
Peak Runoff (cfs)	0.13
Weighted Curve Number	92
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : CB-37-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-39-DA

Input Data

Area (ac)	0.25
Peak Rate Factor	484
Weighted Curve Number	61
Rain Gage ID	*

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	0.25	-	61
Composite Area & Weighted CN	0.25		61

Time of Concentration

	Subarea	Subarea	Subarea
Sheet Flow Computations	A	B	C
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	50	0	0
Slope (%) :	5	0	0
2 yr, 24 hr Rainfall (in) :	2.9	0	0
Velocity (ft/sec) :	0.09	0	0
Computed Flow Time (min) :	8.98	0	0

	Subarea	Subarea	Subarea
Shallow Concentrated Flow Computations	A	B	C
Flow Length (ft) :	30	0	0
Slope (%) :	5	0	0
Surface Type :	Grass pasture	Unpaved	Unpaved
Velocity (ft/sec) :	1.57	0	0
Computed Flow Time (min) :	0.32	0	0

	Subarea	Subarea	Subarea
Channel Flow Computations	A	B	C
Manning's Roughness :	0.013	0	0
Flow Length (ft) :	76	0	0
Channel Slope (%) :	1	0	0
Cross Section Area (ft^2) :	0.6	0	0
Wetted Perimeter (ft) :	0.2	0	0
Velocity (ft/sec) :	23.84	0	0
Computed Flow Time (min) :	0.05	0	0

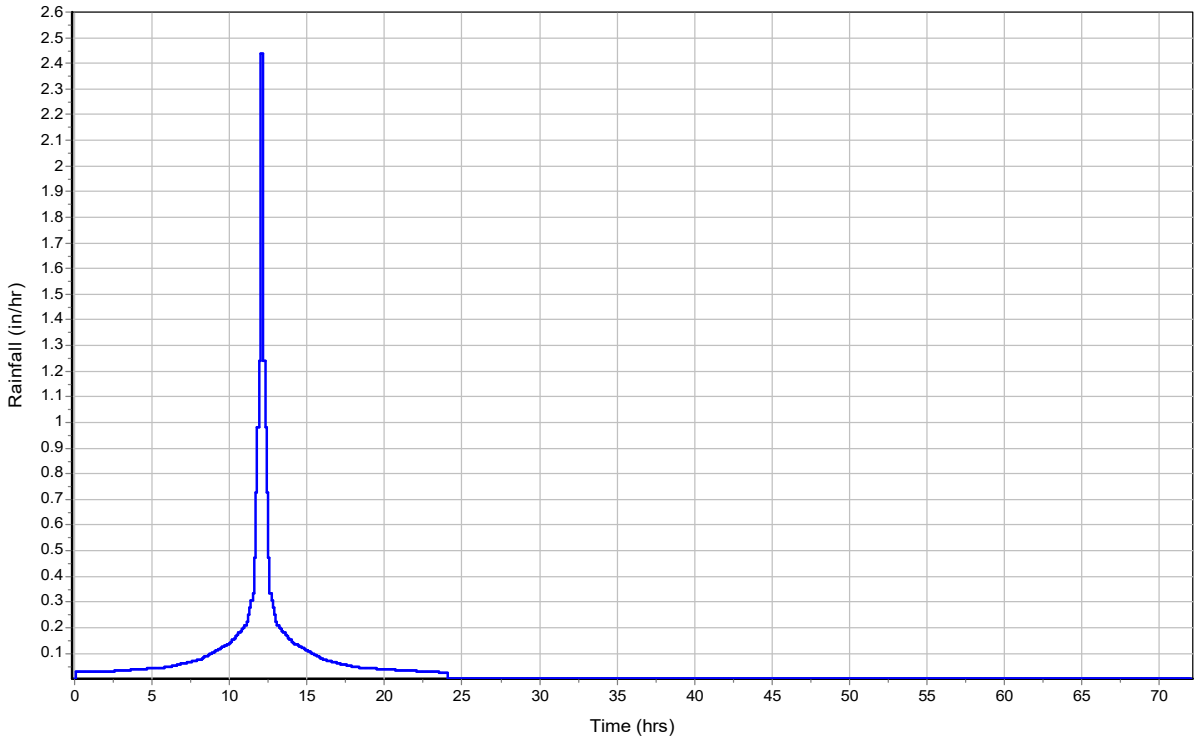
Total TOC (min) 9.35

Subbasin Runoff Results

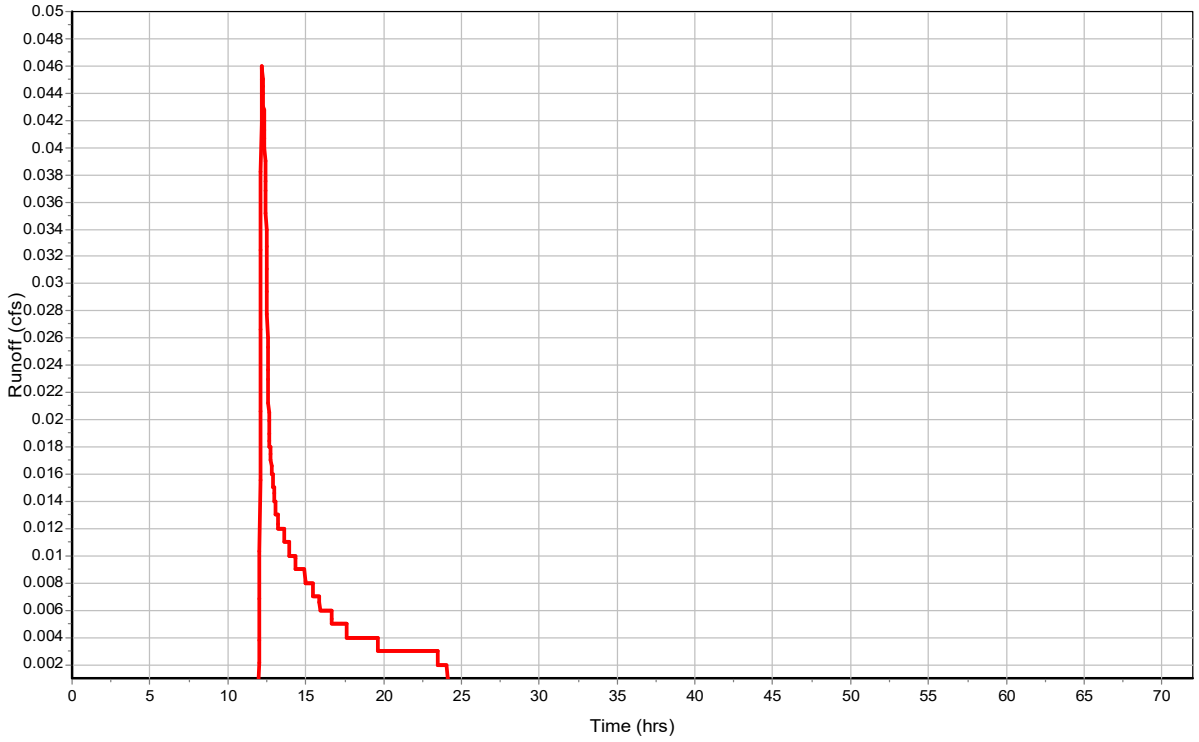
Total Rainfall (in)	2.9
Total Runoff (in)	0.33
Peak Runoff (cfs)	0.05
Weighted Curve Number	61
Time of Concentration (days hh:mm:ss)	0 00:09:21

Subbasin : CB-39-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-3-DA

Input Data

Area (ac)	0.06
Peak Rate Factor	484
Weighted Curve Number	98
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.06	-	98
Composite Area & Weighted CN	0.06		98

Time of Concentration

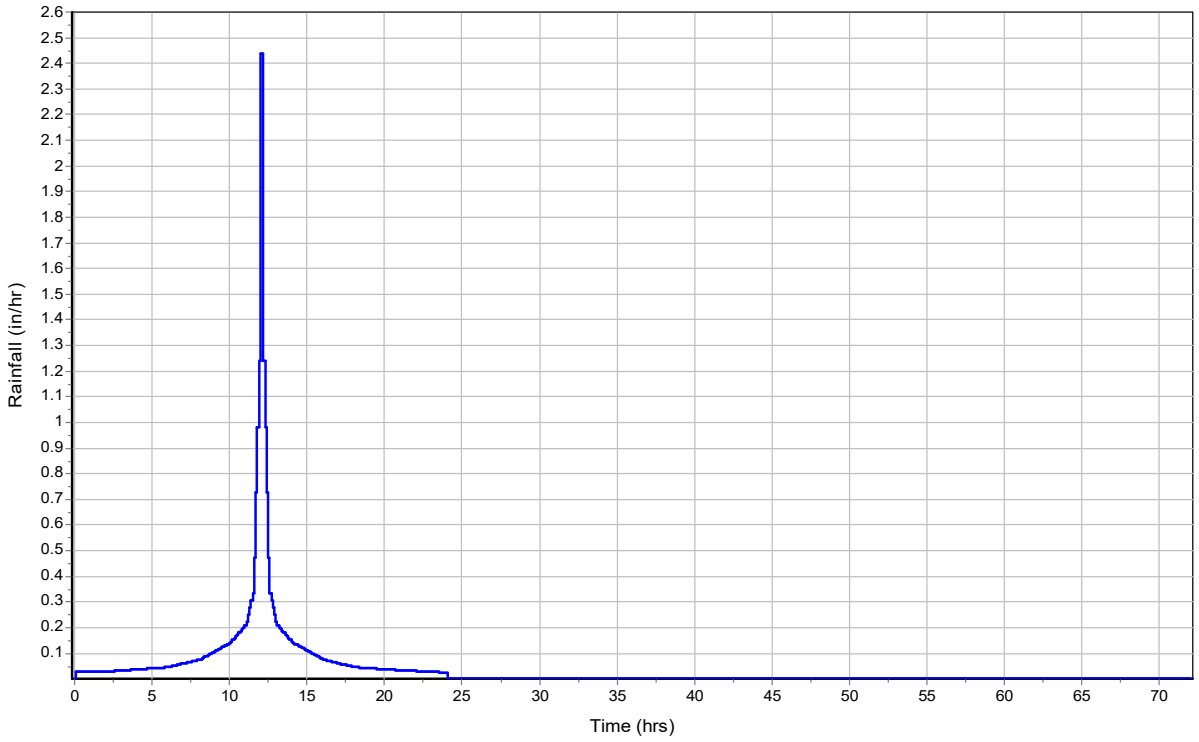
User-Defined TOC override (minutes): 6.00

Subbasin Runoff Results

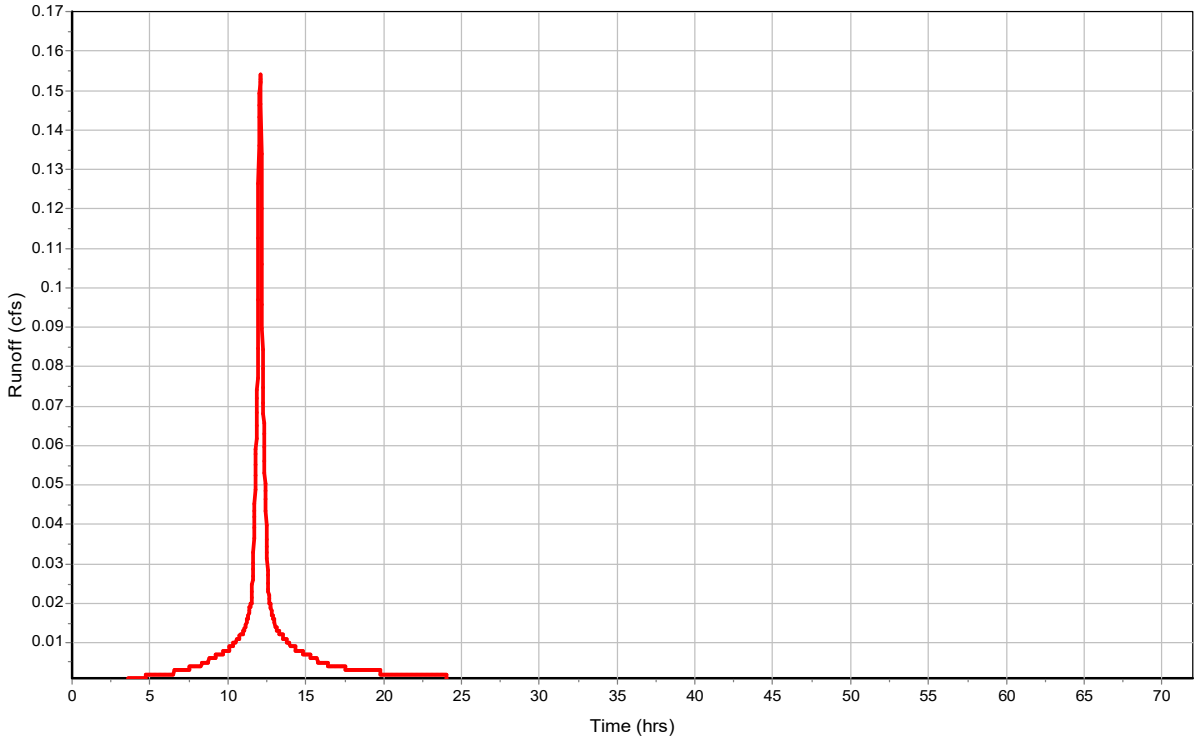
Total Rainfall (in)	2.9
Total Runoff (in)	2.65
Peak Runoff (cfs)	0.15
Weighted Curve Number	98
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : CB-3-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-42-DA

Input Data

Area (ac)	0.17
Peak Rate Factor	484
Weighted Curve Number	97
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.17	-	97
Composite Area & Weighted CN	0.17		97

Time of Concentration

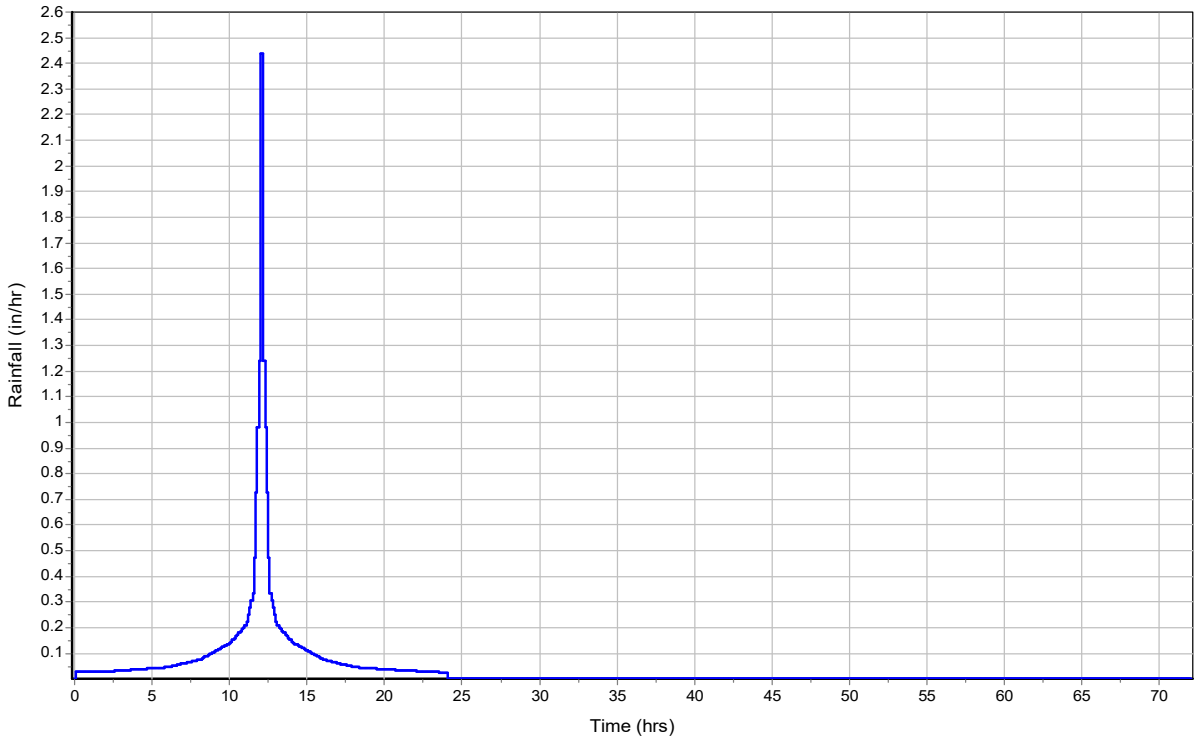
User-Defined TOC override (minutes): 6

Subbasin Runoff Results

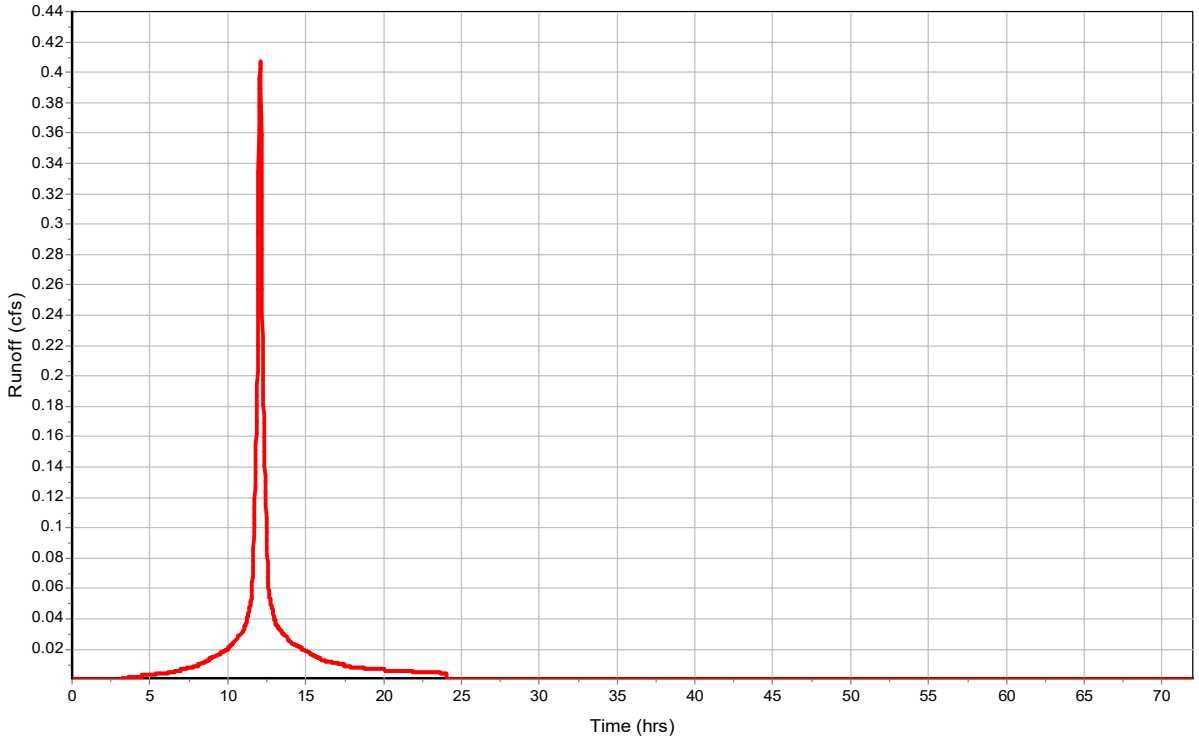
Total Rainfall (in)	2.9
Total Runoff (in)	2.56
Peak Runoff (cfs)	0.41
Weighted Curve Number	97
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : CB-42-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-44-DA

Input Data

Area (ac)	0.75
Peak Rate Factor	484
Weighted Curve Number	54
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.75	-	54
Composite Area & Weighted CN	0.75		54

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	50	0	0
Slope (%) :	2.5	0	0
2 yr, 24 hr Rainfall (in) :	2.9	0	0
Velocity (ft/sec) :	0.07	0	0
Computed Flow Time (min) :	11.85	0	0

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	230	0	0
Slope (%) :	3	0	0
Surface Type :	Unpaved	Unpaved	Unpaved
Velocity (ft/sec) :	2.79	0	0
Computed Flow Time (min) :	1.37	0	0

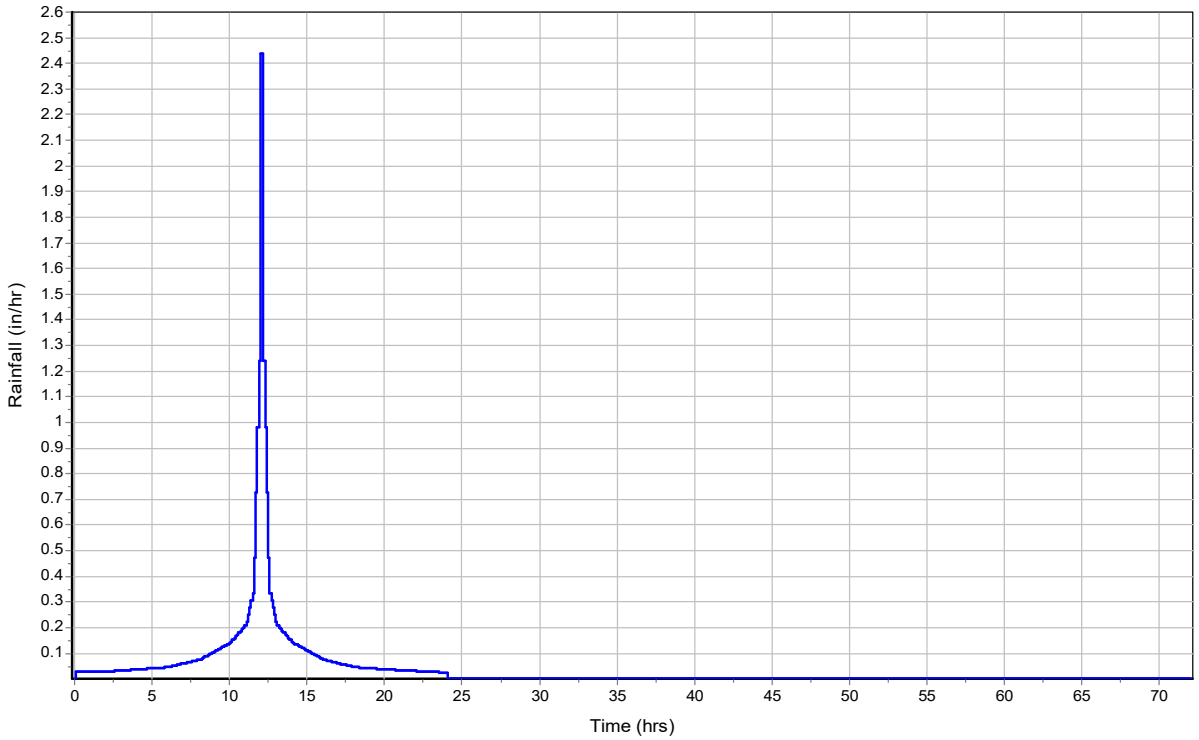
Total TOC (min) 13.22

Subbasin Runoff Results

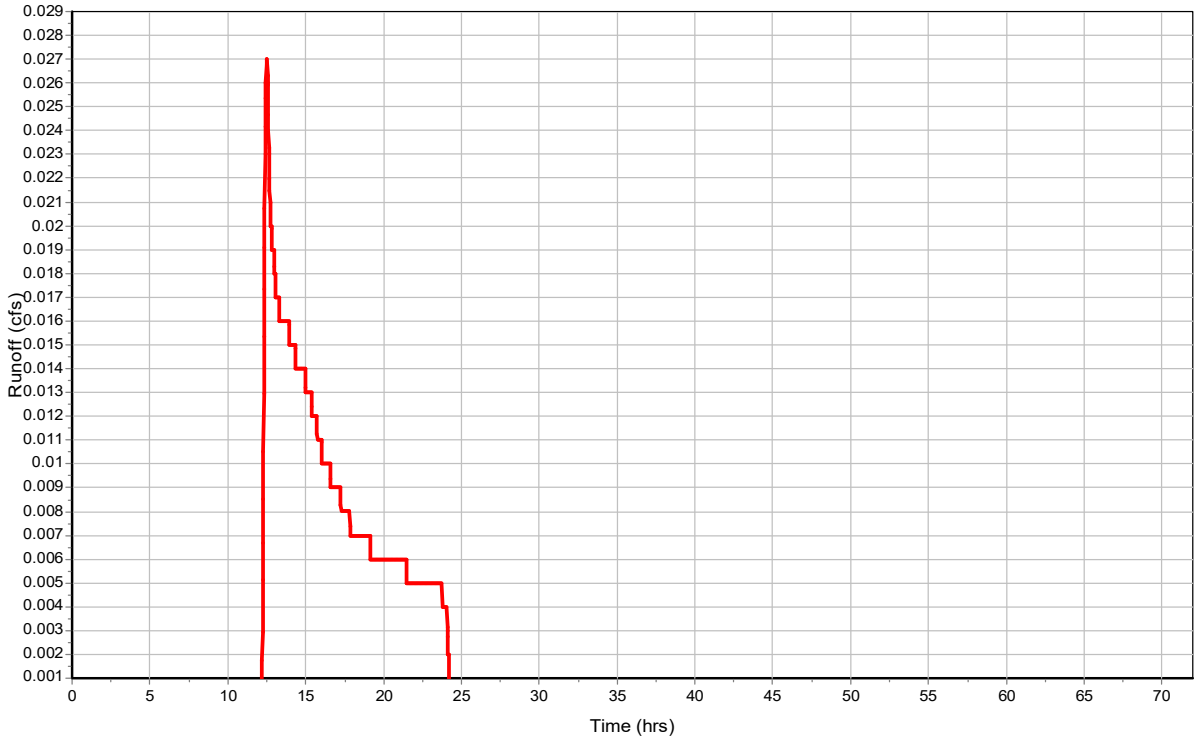
Total Rainfall (in)	2.9
Total Runoff (in)	0.15
Peak Runoff (cfs)	0.03
Weighted Curve Number	54
Time of Concentration (days hh:mm:ss)	0 00:13:13

Subbasin : CB-44-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-4-DA

Input Data

Area (ac)	0.19
Peak Rate Factor	484
Weighted Curve Number	78
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.19	-	78
Composite Area & Weighted CN	0.19		78

Time of Concentration

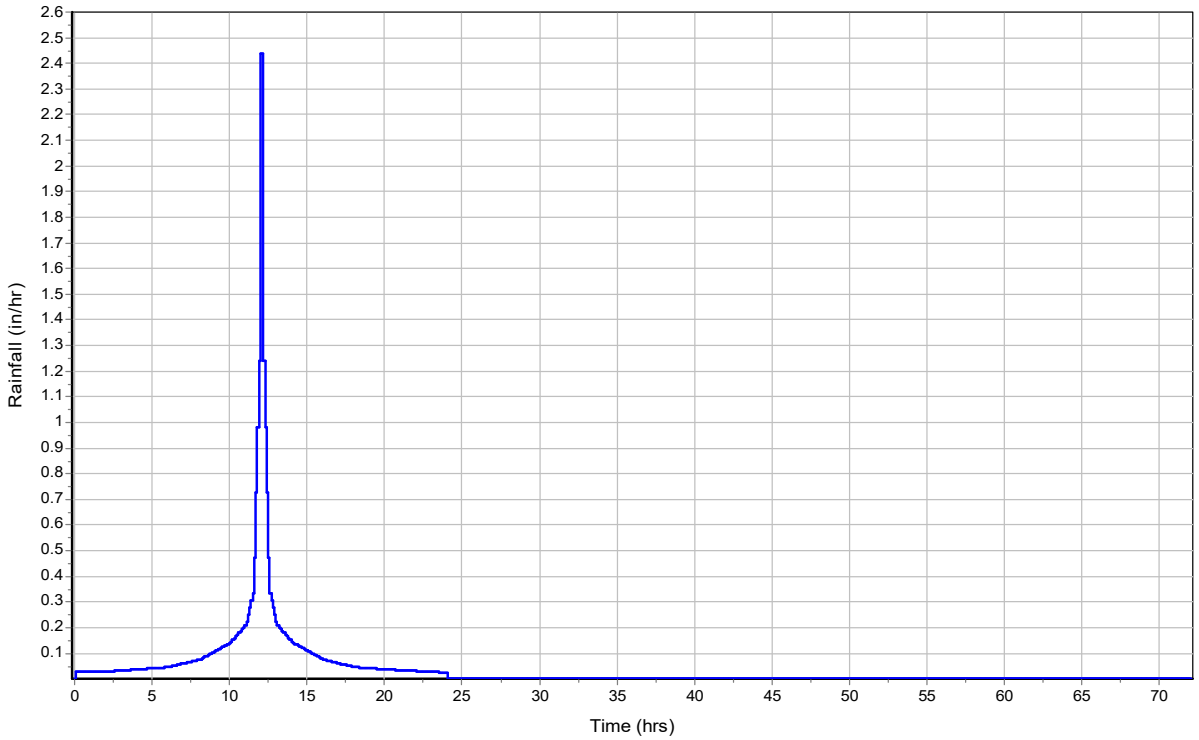
User-Defined TOC override (minutes): 6

Subbasin Runoff Results

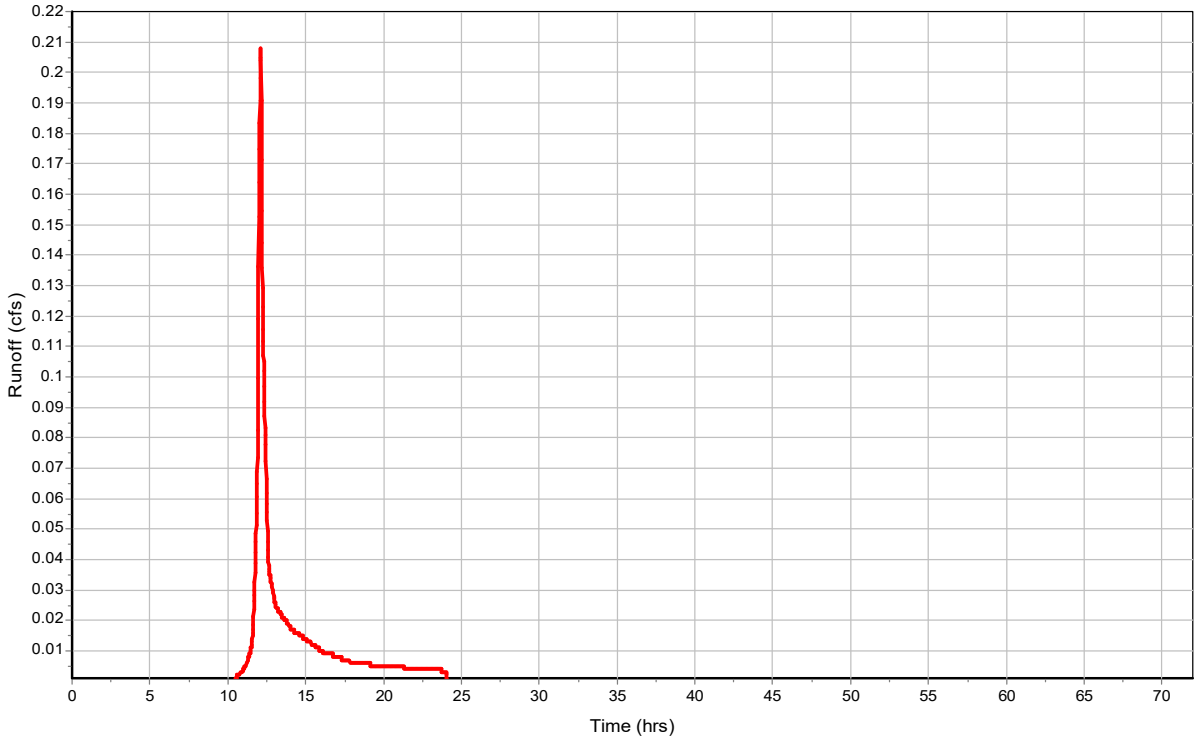
Total Rainfall (in)	2.9
Total Runoff (in)	1.06
Peak Runoff (cfs)	0.21
Weighted Curve Number	78
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : CB-4-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-7A-DA

Input Data

Area (ac)	0.14
Peak Rate Factor	484
Weighted Curve Number	98
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.14	-	98
Composite Area & Weighted CN	0.14		98

Time of Concentration

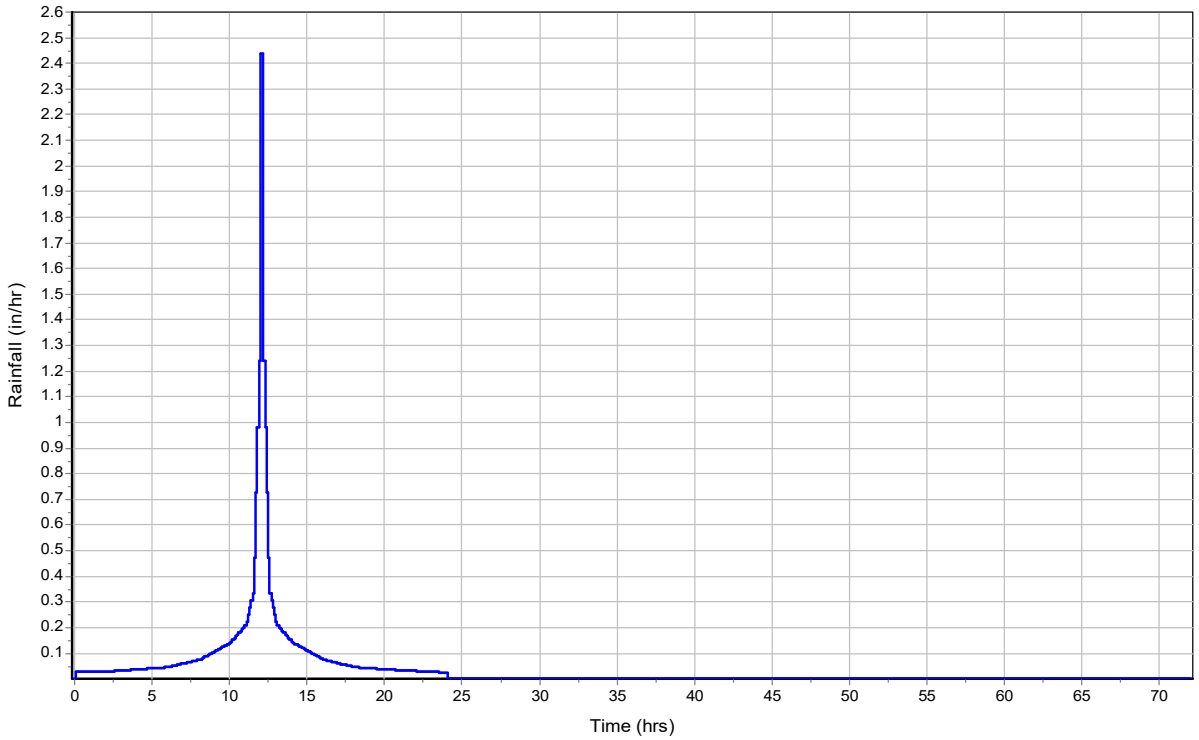
User-Defined TOC override (minutes): 6

Subbasin Runoff Results

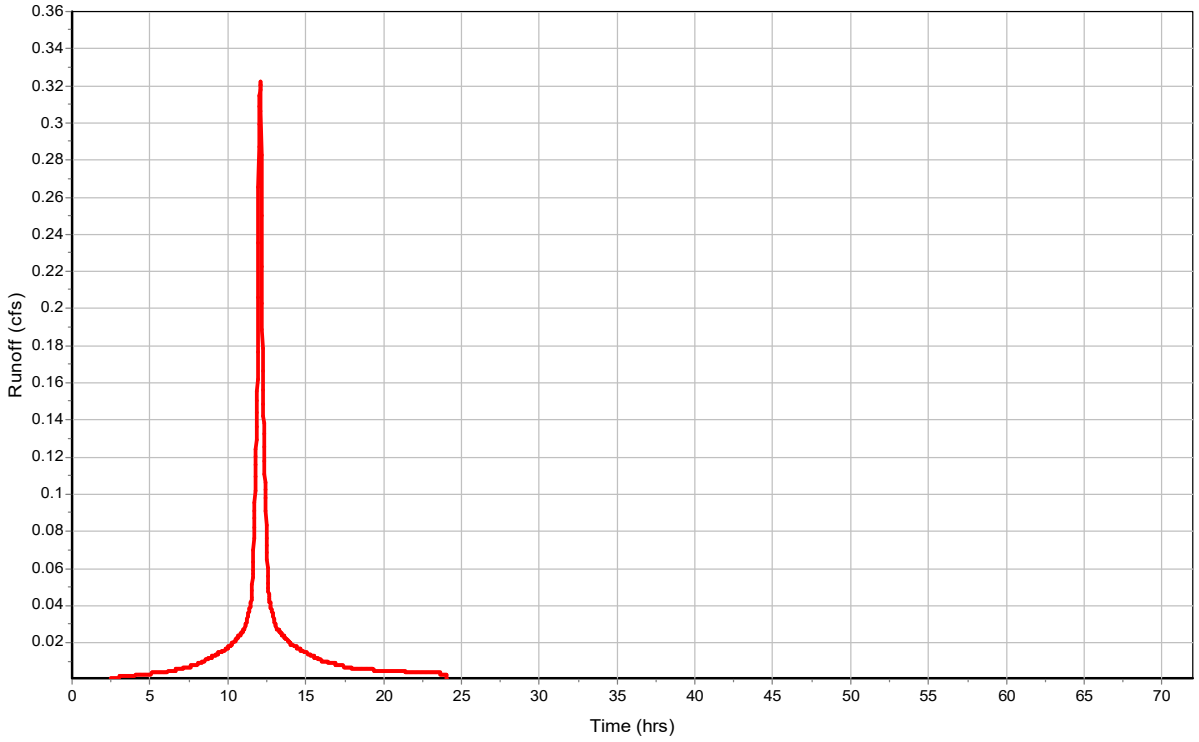
Total Rainfall (in)	2.9
Total Runoff (in)	2.67
Peak Runoff (cfs)	0.32
Weighted Curve Number	98
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : CB-7A-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-7-DA

Input Data

Area (ac)	0.09
Peak Rate Factor	484
Weighted Curve Number	98
Rain Gage ID	*

Composite Curve Number

Soil/Surface Description	32 Area (acres)	Soil Group	Curve Number
-	0.09	-	98
Composite Area & Weighted CN	0.09		98

Time of Concentration

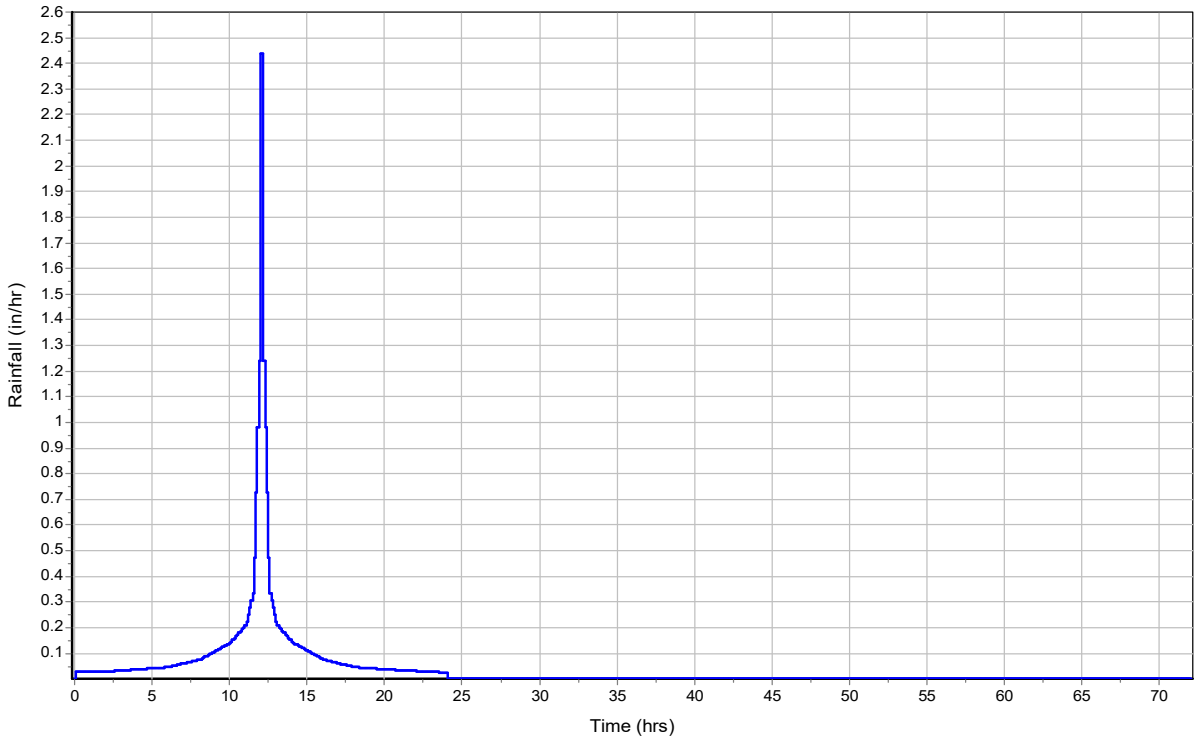
User-Defined TOC override (minutes): 6

Subbasin Runoff Results

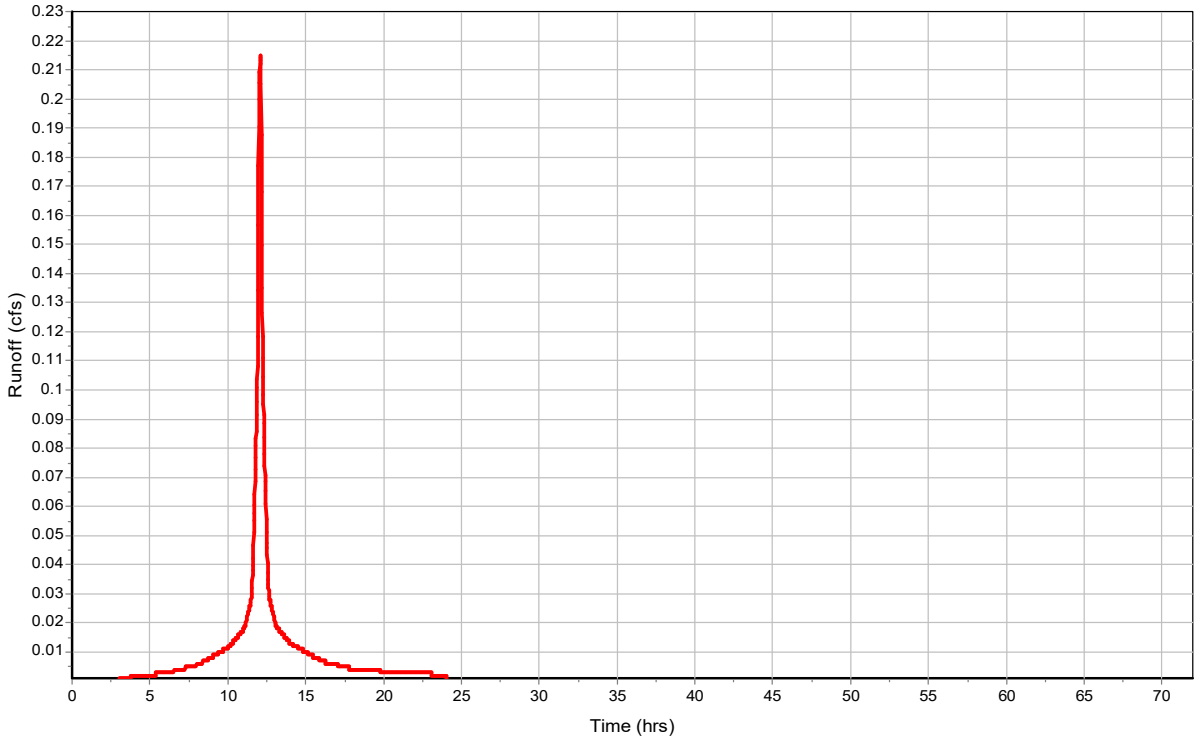
Total Rainfall (in)	2.9
Total Runoff (in)	2.66
Peak Runoff (cfs)	0.22
Weighted Curve Number	98
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : CB-7-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : CB-8A-DA

Input Data

Area (ac)	0.23
Peak Rate Factor	484
Weighted Curve Number	91
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.23	-	91
Composite Area & Weighted CN	0.23		91

Time of Concentration

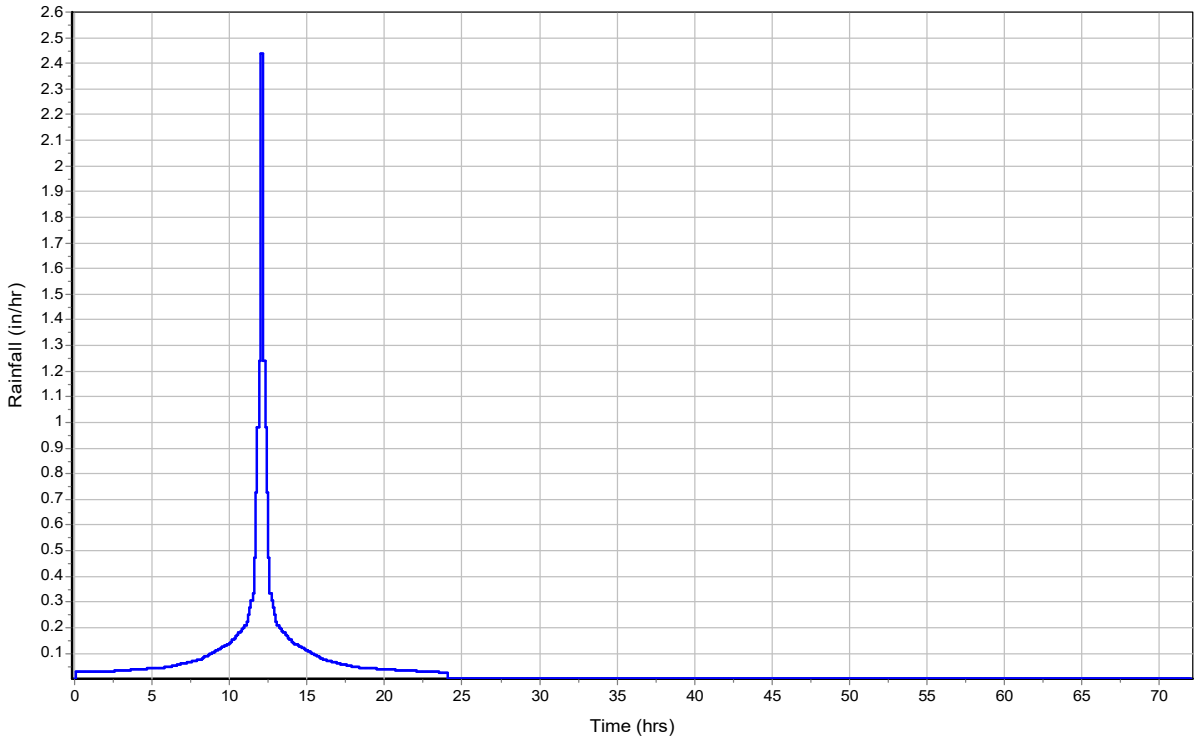
User-Defined TOC override (minutes): 6.00

Subbasin Runoff Results

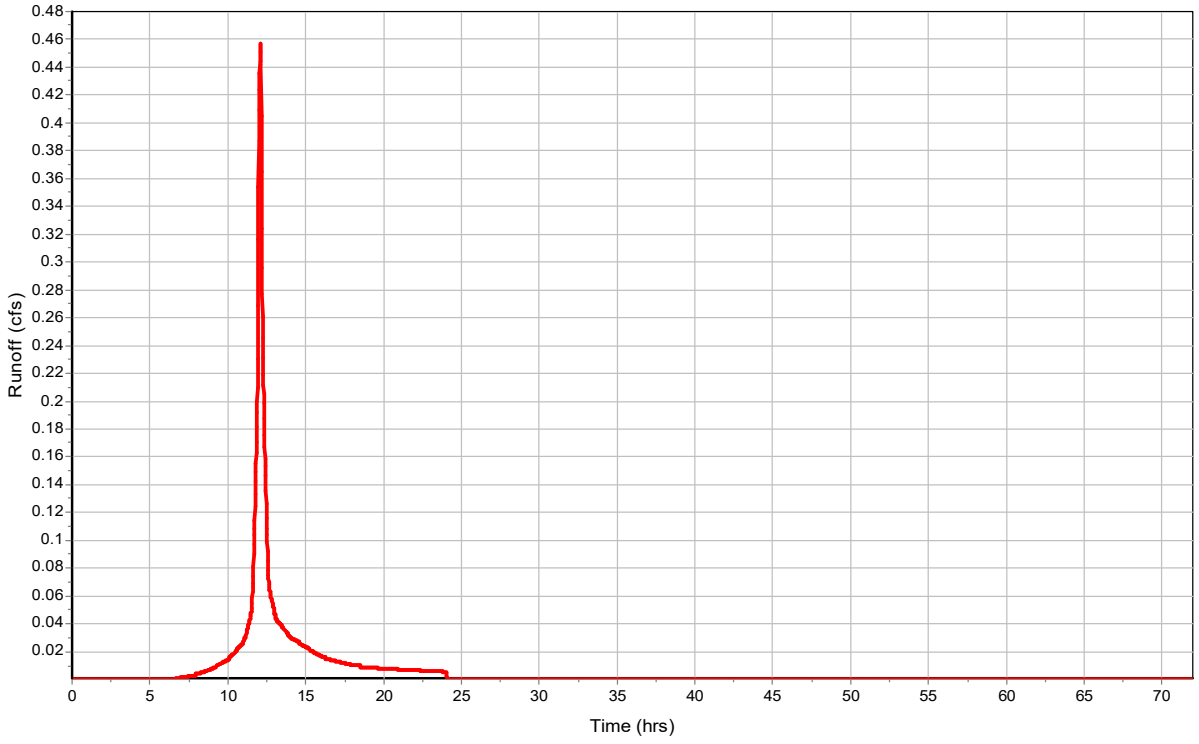
Total Rainfall (in)	2.9
Total Runoff (in)	1.98
Peak Runoff (cfs)	0.46
Weighted Curve Number	91
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : CB-8A-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : DI-1-DA

Input Data

Area (ac)	1.39
Peak Rate Factor	484
Weighted Curve Number	65
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	1.39	-	65
Composite Area & Weighted CN	1.39		65

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.6	0	0
Flow Length (ft) :	50	0	0
Slope (%) :	4	0	0
2 yr, 24 hr Rainfall (in) :	2.9	0	0
Velocity (ft/sec) :	0.06	0	0
Computed Flow Time (min) :	13.58	0	0

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	220	0	0
Slope (%) :	2.5	0	0
Surface Type :	Woodland	Unpaved	Unpaved
Velocity (ft/sec) :	0.79	0	0
Computed Flow Time (min) :	4.64	0	0

Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.027	0	0
Flow Length (ft) :	120	0	0
Channel Slope (%) :	4	0	0
Cross Section Area (ft^2) :	3.2	0	0
Wetted Perimeter (ft) :	0.8	0	0
Velocity (ft/sec) :	27.81	0	0
Computed Flow Time (min) :	0.07	0	0

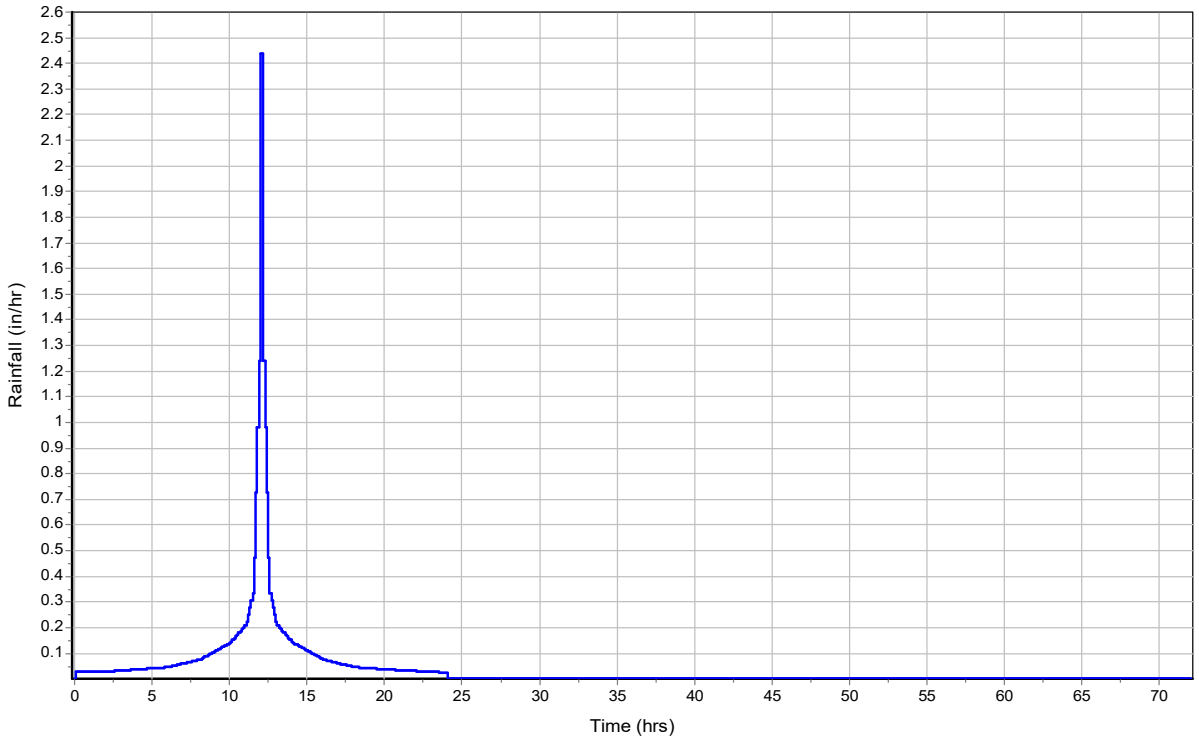
Total TOC (min) 18.29

Subbasin Runoff Results

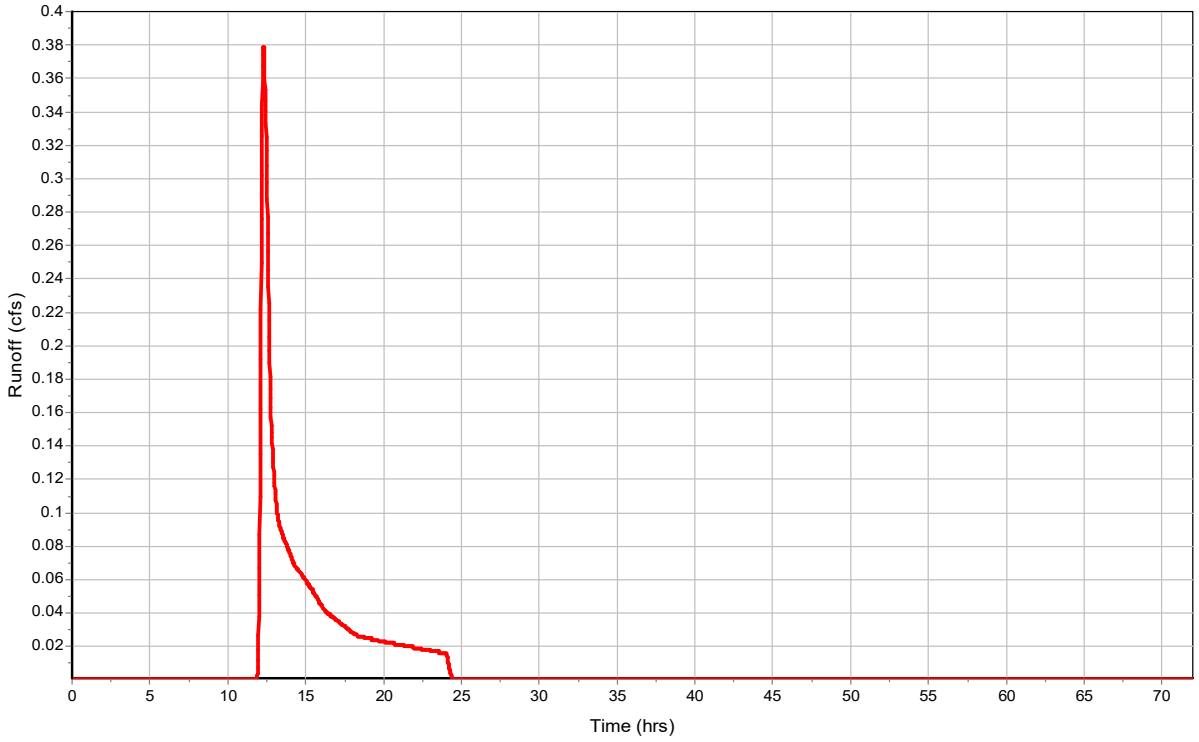
Total Rainfall (in)	2.9
Total Runoff (in)	0.46
Peak Runoff (cfs)	0.38
Weighted Curve Number	65
Time of Concentration (days hh:mm:ss)	0 00:18:17

Subbasin : DI-1-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : EX_CB-11-DA

Input Data

Area (ac)	0.27
Peak Rate Factor	484
Weighted Curve Number	95
Rain Gage ID	*

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.27	-	95
Composite Area & Weighted CN	0.27		95

Time of Concentration

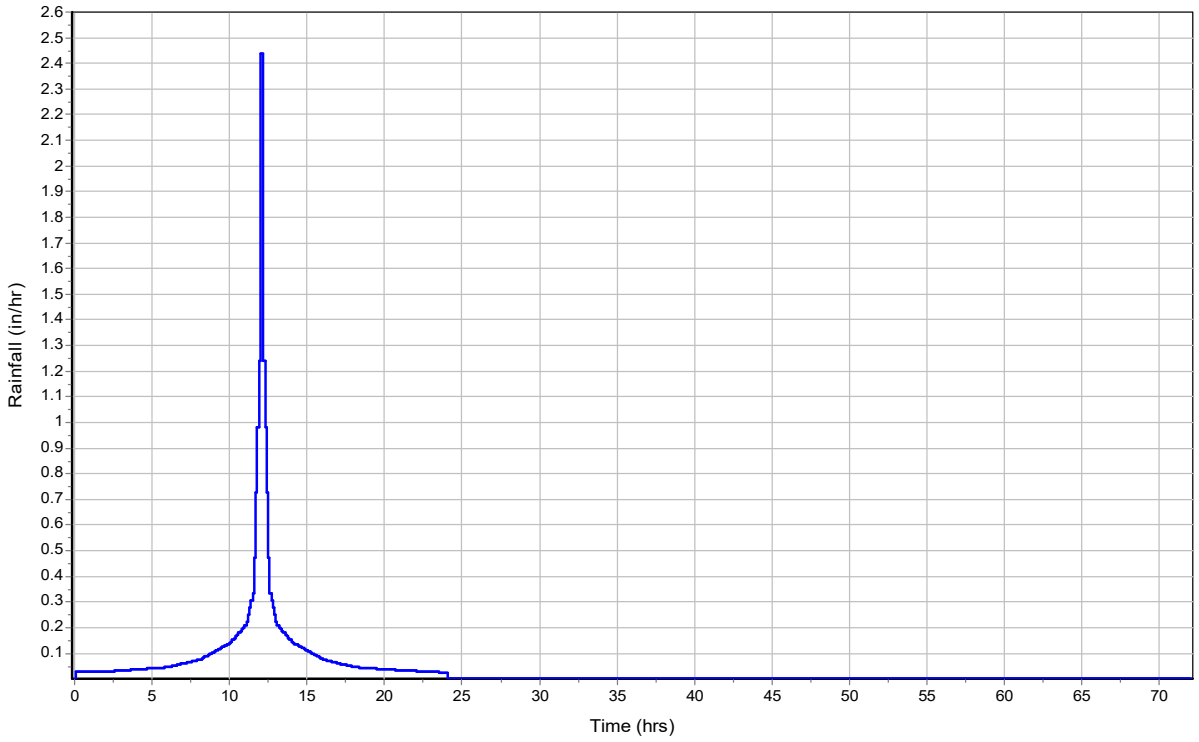
User-Defined TOC override (minutes): 6

Subbasin Runoff Results

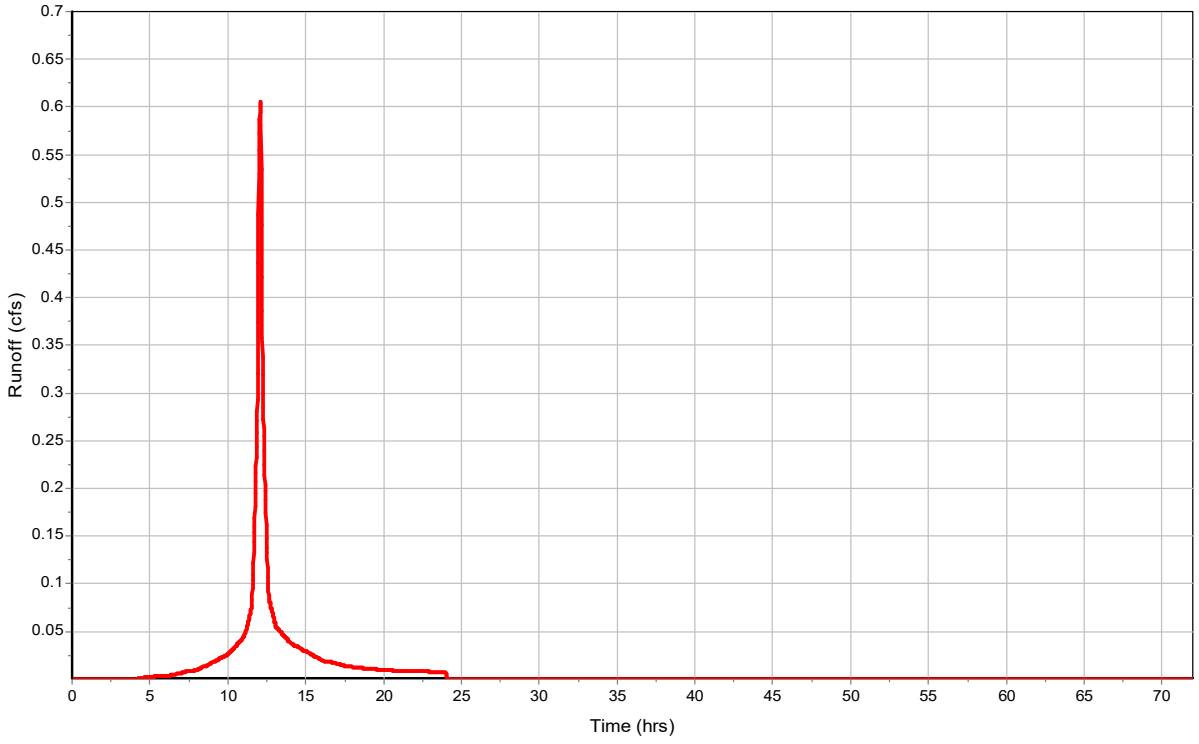
Total Rainfall (in)	2.9
Total Runoff (in)	2.35
Peak Runoff (cfs)	0.61
Weighted Curve Number	95
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : EX_CB-11-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : EX_CB-12-DA

Input Data

Area (ac)	0.05
Peak Rate Factor	484
Weighted Curve Number	98
Rain Gage ID	*

Composite Curve Number

Soil/Surface Description	32 Area (acres)	Soil Group	Curve Number
-	0.05	-	98
Composite Area & Weighted CN	0.05		98

Time of Concentration

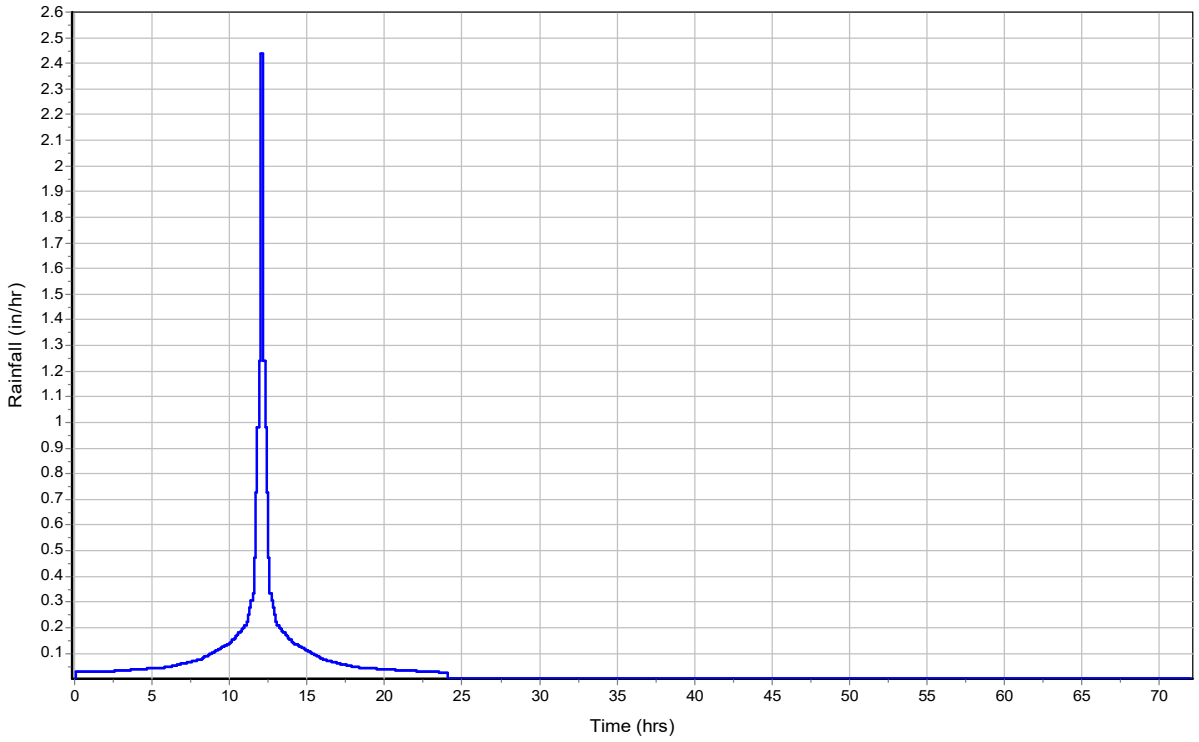
User-Defined TOC override (minutes): 6.00

Subbasin Runoff Results

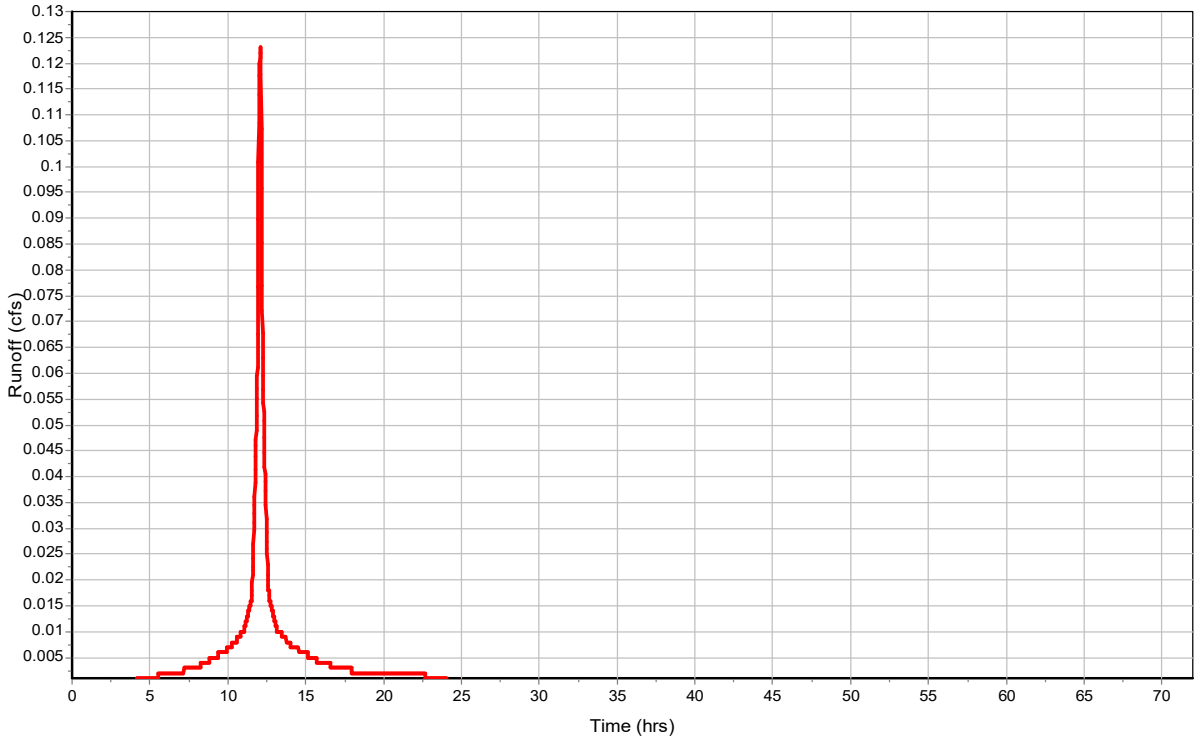
Total Rainfall (in)	2.9
Total Runoff (in)	2.64
Peak Runoff (cfs)	0.12
Weighted Curve Number	98
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : EX_CB-12-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : EX_CB-16A-DA

Input Data

Area (ac)	1.93
Peak Rate Factor	484
Weighted Curve Number	43
Rain Gage ID	*

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	1.93	-	43
Composite Area & Weighted CN	1.93		43

Time of Concentration

	Subarea	Subarea	Subarea
Sheet Flow Computations	A	B	C
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	50	0	0
Slope (%) :	1.5	0	0
2 yr, 24 hr Rainfall (in) :	2.9	0	0
Velocity (ft/sec) :	0.06	0	0
Computed Flow Time (min) :	14.54	0	0

	Subarea	Subarea	Subarea
Shallow Concentrated Flow Computations	A	B	C
Flow Length (ft) :	350	0	0
Slope (%) :	1.5	0	0
Surface Type :	Grass pasture	Unpaved	Unpaved
Velocity (ft/sec) :	0.86	0	0
Computed Flow Time (min) :	6.78	0	0

	Subarea	Subarea	Subarea
Channel Flow Computations	A	B	C
Manning's Roughness :	0.27	0	0
Flow Length (ft) :	104	0	0
Channel Slope (%) :	1	0	0
Cross Section Area (ft^2) :	2	0	0
Wetted Perimeter (ft) :	0.4	0	0
Velocity (ft/sec) :	1.61	0	0
Computed Flow Time (min) :	1.07	0	0

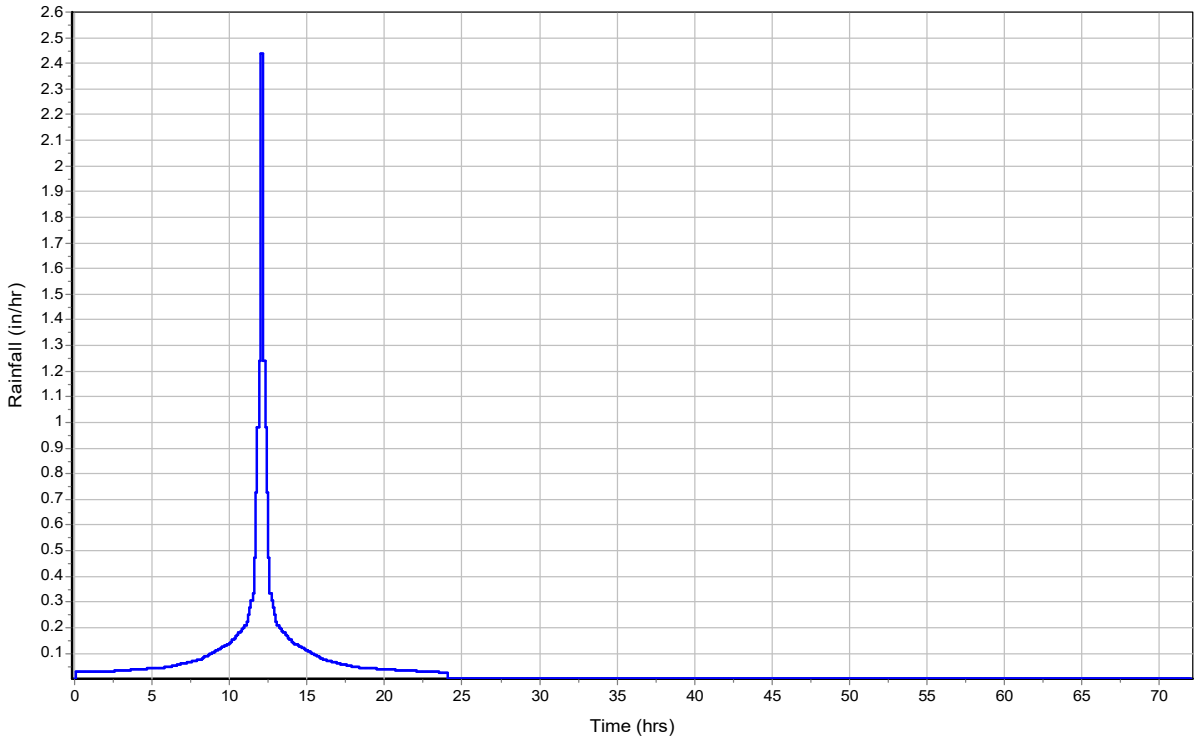
Total TOC (min) 22.39

Subbasin Runoff Results

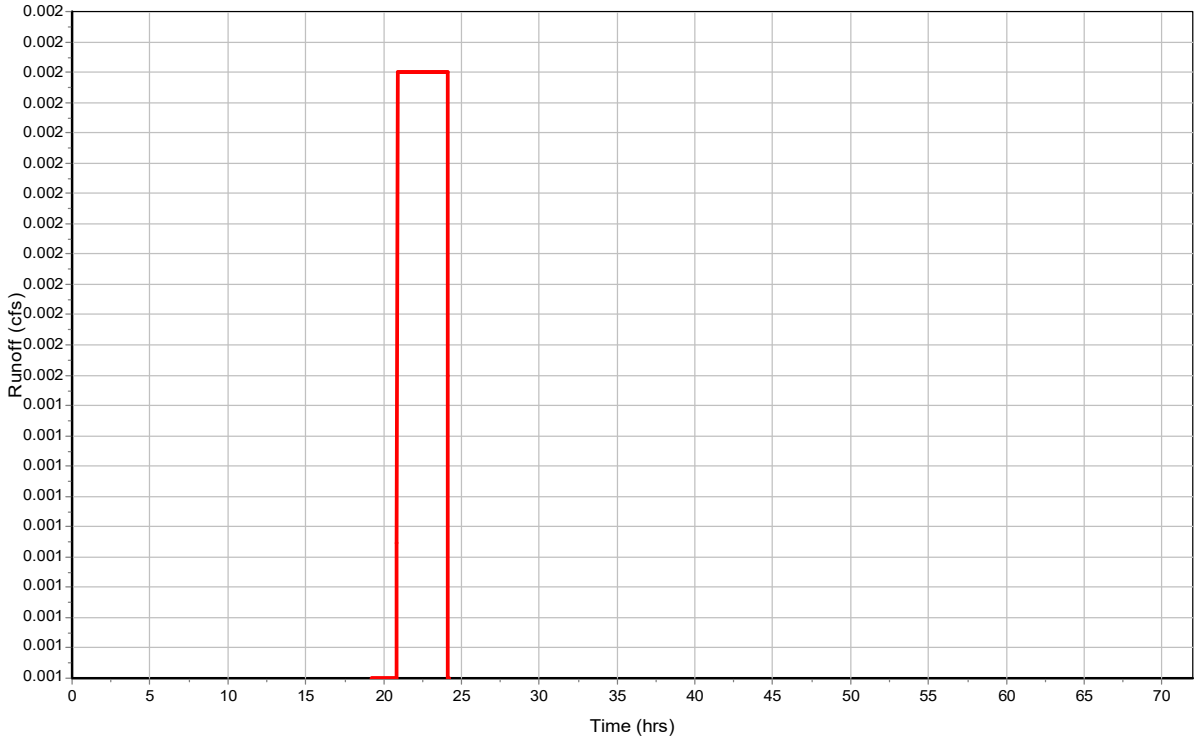
Total Rainfall (in)	2.9
Total Runoff (in)	0
Peak Runoff (cfs)	0
Weighted Curve Number	43
Time of Concentration (days hh:mm:ss)	0 00:22:23

Subbasin : EX_CB-16A-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : EX_CB-16-DA

Input Data

Area (ac)	0.82
Peak Rate Factor	484
Weighted Curve Number	52
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.82	-	52
Composite Area & Weighted CN	0.82		52

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.6	0	0
Flow Length (ft) :	50	0	0
Slope (%) :	2.1	0	0
2 yr, 24 hr Rainfall (in) :	2.9	0	0
Velocity (ft/sec) :	0.05	0	0
Computed Flow Time (min) :	17.57	0	0

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	213	0	0
Slope (%) :	2	0	0
Surface Type :	Grass pasture	Unpaved	Unpaved
Velocity (ft/sec) :	0.99	0	0
Computed Flow Time (min) :	3.59	0	0

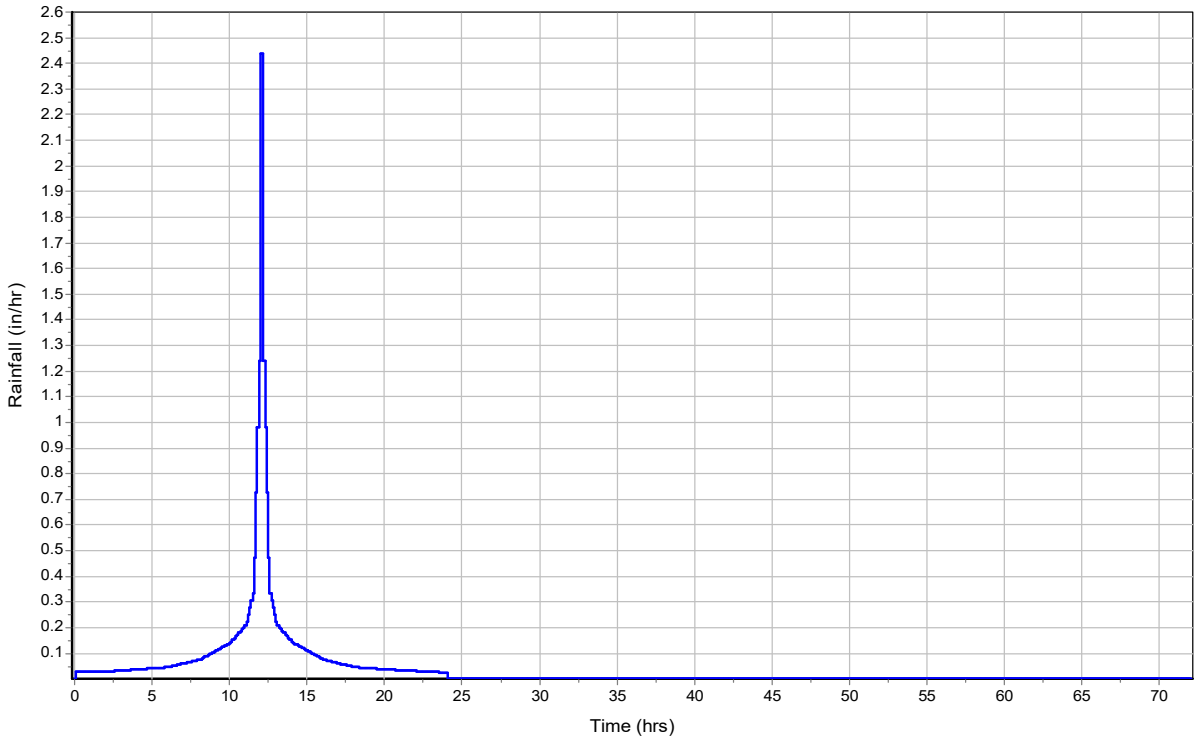
Total TOC (min) 21.16

Subbasin Runoff Results

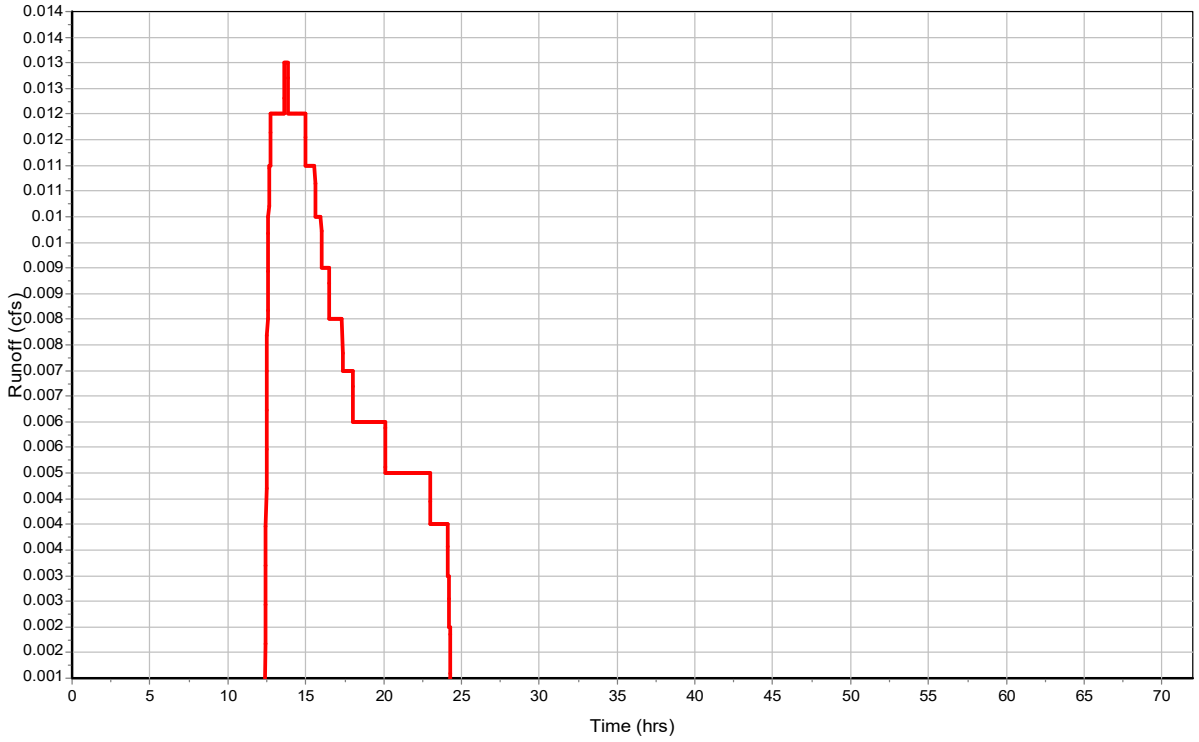
Total Rainfall (in)	2.9
Total Runoff (in)	0.11
Peak Runoff (cfs)	0.01
Weighted Curve Number	52
Time of Concentration (days hh:mm:ss)	0 00:21:10

Subbasin : EX_CB-16-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : EX_CB-19-DA

Input Data

Area (ac)	0.16
Peak Rate Factor	484
Weighted Curve Number	39
Rain Gage ID	*

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	0.16	-	39
Composite Area & Weighted CN	0.16		39

Time of Concentration

	Subarea	Subarea	Subarea
Sheet Flow Computations	A	B	C
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	50	0	0
Slope (%) :	4	0	0
2 yr, 24 hr Rainfall (in) :	2.9	0	0
Velocity (ft/sec) :	0.08	0	0
Computed Flow Time (min) :	9.82	0	0

	Subarea	Subarea	Subarea
Shallow Concentrated Flow Computations	A	B	C
Flow Length (ft) :	122	0	0
Slope (%) :	4	0	0
Surface Type :	Grass pasture	Unpaved	Unpaved
Velocity (ft/sec) :	1.4	0	0
Computed Flow Time (min) :	1.45	0	0

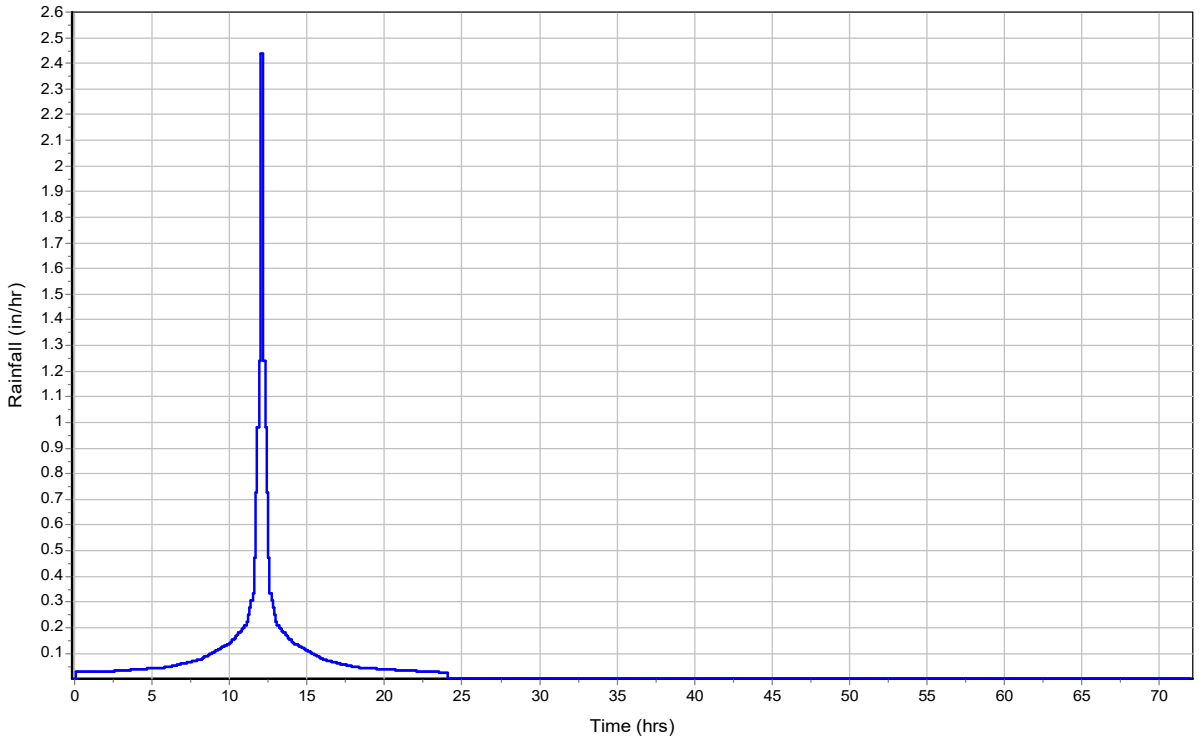
Total TOC (min) 11.27

Subbasin Runoff Results

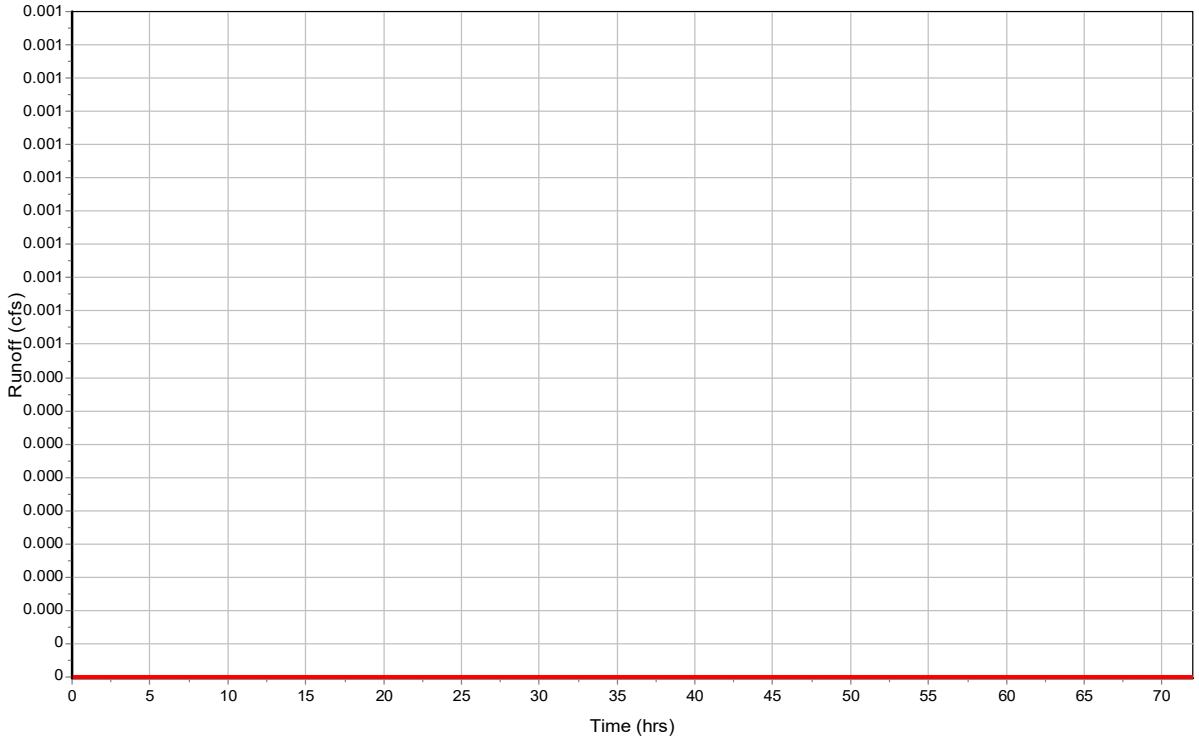
Total Rainfall (in)	2.9
Total Runoff (in)	0
Peak Runoff (cfs)	0
Weighted Curve Number	39
Time of Concentration (days hh:mm:ss)	0 00:11:16

Subbasin : EX_CB-19-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : EX_CB-27-DA

Input Data

Area (ac)	0.14
Peak Rate Factor	484
Weighted Curve Number	98
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.14	-	98
Composite Area & Weighted CN	0.14		98

Time of Concentration

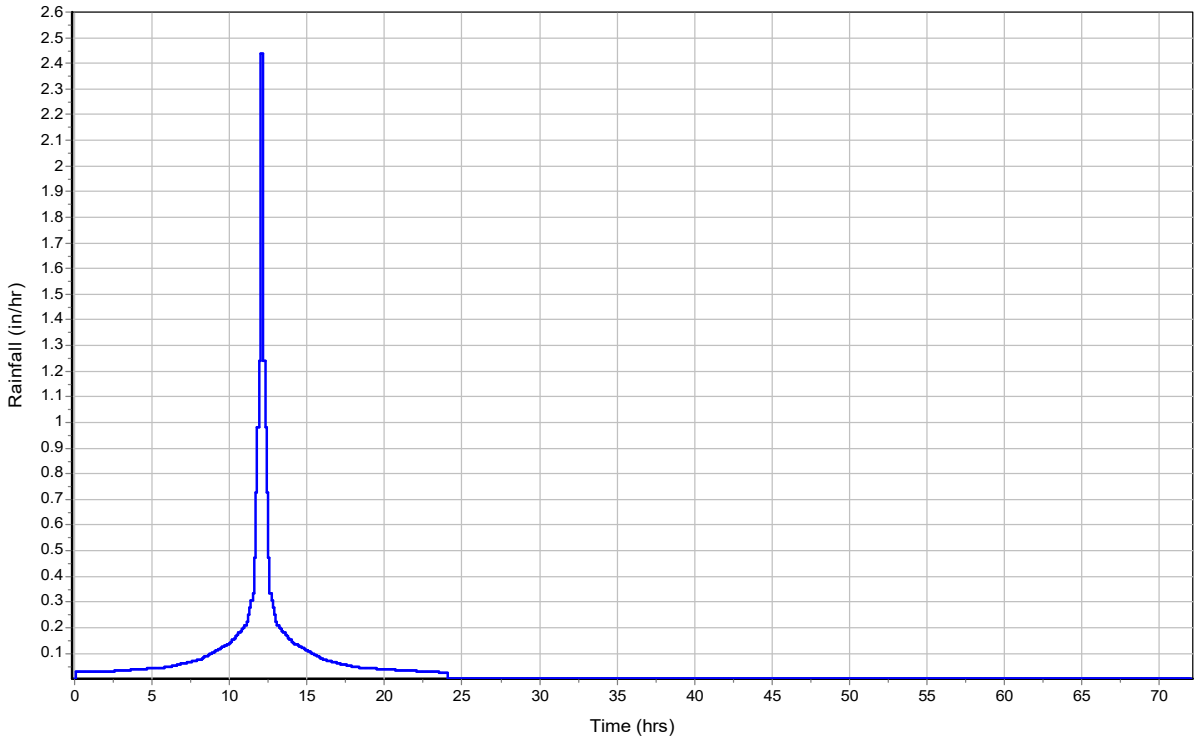
User-Defined TOC override (minutes): 6.00

Subbasin Runoff Results

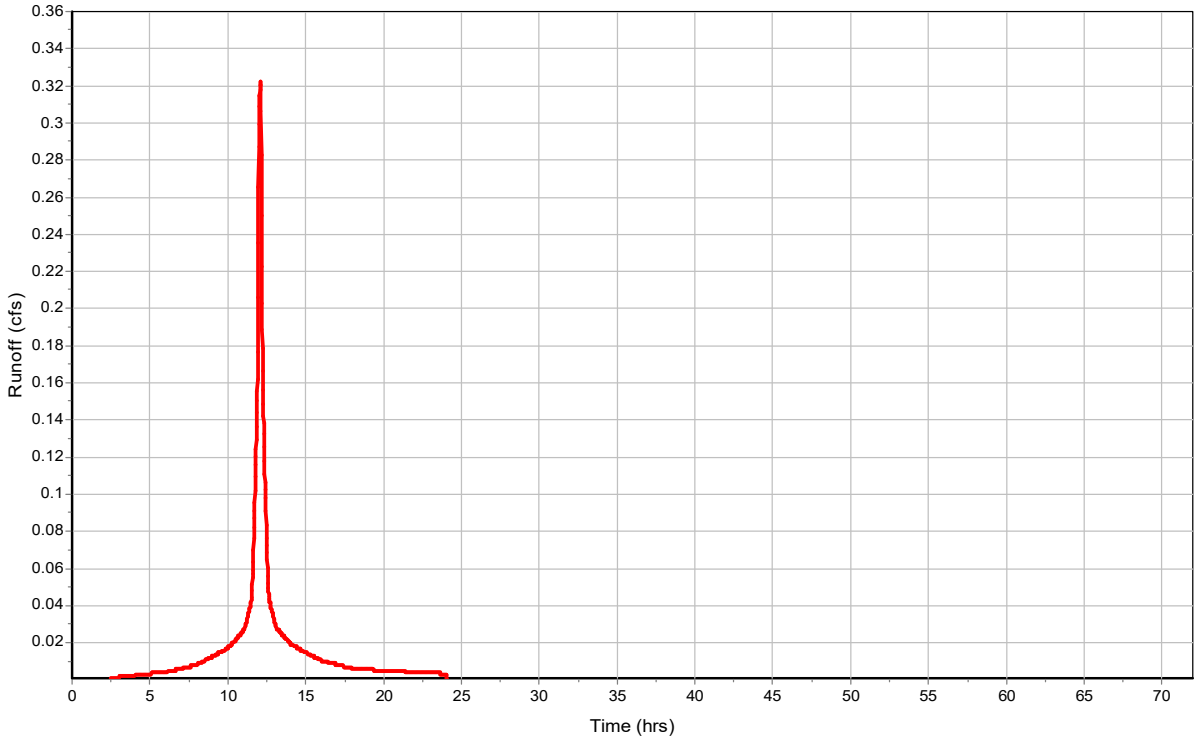
Total Rainfall (in)	2.9
Total Runoff (in)	2.67
Peak Runoff (cfs)	0.32
Weighted Curve Number	98
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : EX_CB-27-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : EX_CB-28-DA

Input Data

Area (ac)	0.98
Peak Rate Factor	484
Weighted Curve Number	30
Rain Gage ID	*

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	0.98	-	30
Composite Area & Weighted CN	0.98		30

Time of Concentration

	Subarea	Subarea	Subarea
Sheet Flow Computations	A	B	C
Manning's Roughness :	0.6	0	0
Flow Length (ft) :	50	0	0
Slope (%) :	3	0	0
2 yr, 24 hr Rainfall (in) :	2.9	0	0
Velocity (ft/sec) :	0.05	0	0
Computed Flow Time (min) :	15.24	0	0

	Subarea	Subarea	Subarea
Shallow Concentrated Flow Computations	A	B	C
Flow Length (ft) :	80	0	0
Slope (%) :	5	0	0
Surface Type :	Woodland	Unpaved	Unpaved
Velocity (ft/sec) :	1.12	0	0
Computed Flow Time (min) :	1.19	0	0

	Subarea	Subarea	Subarea
Channel Flow Computations	A	B	C
Manning's Roughness :	0.027	0	0
Flow Length (ft) :	250	0	0
Channel Slope (%) :	5	0	0
Cross Section Area (ft^2) :	4	0	0
Wetted Perimeter (ft) :	0.7	0	0
Velocity (ft/sec) :	39.44	0	0
Computed Flow Time (min) :	0.11	0	0

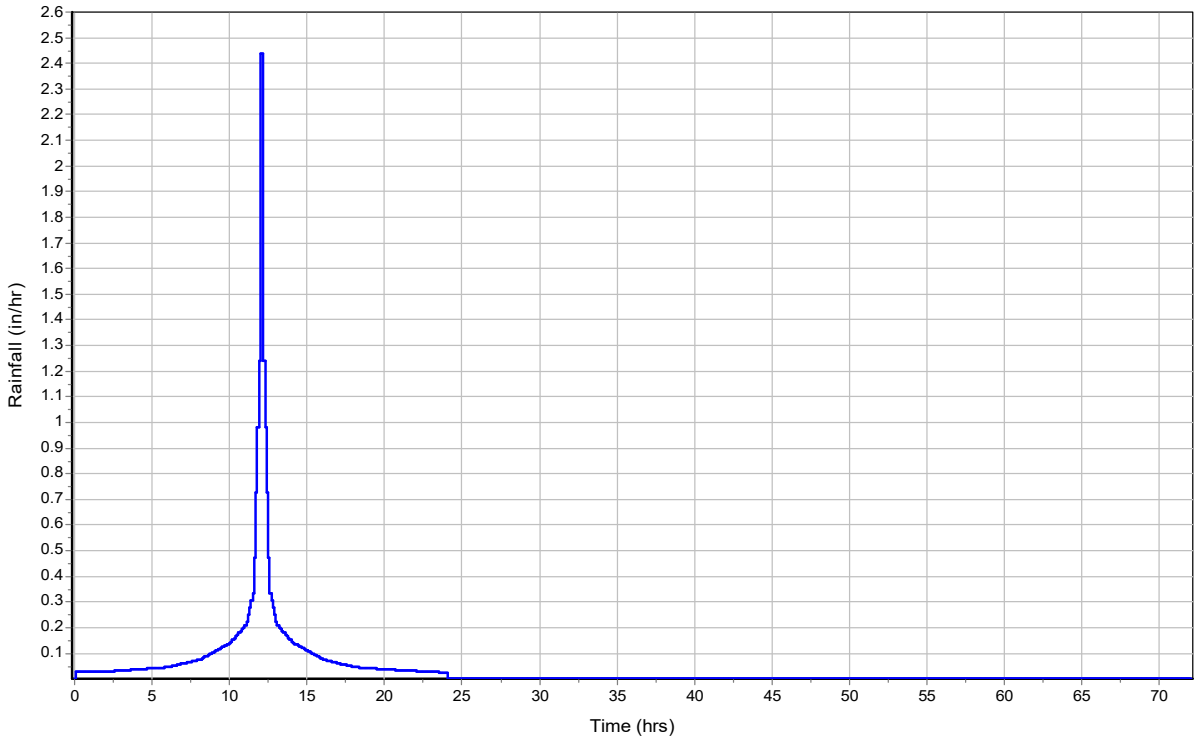
Total TOC (min) 16.53

Subbasin Runoff Results

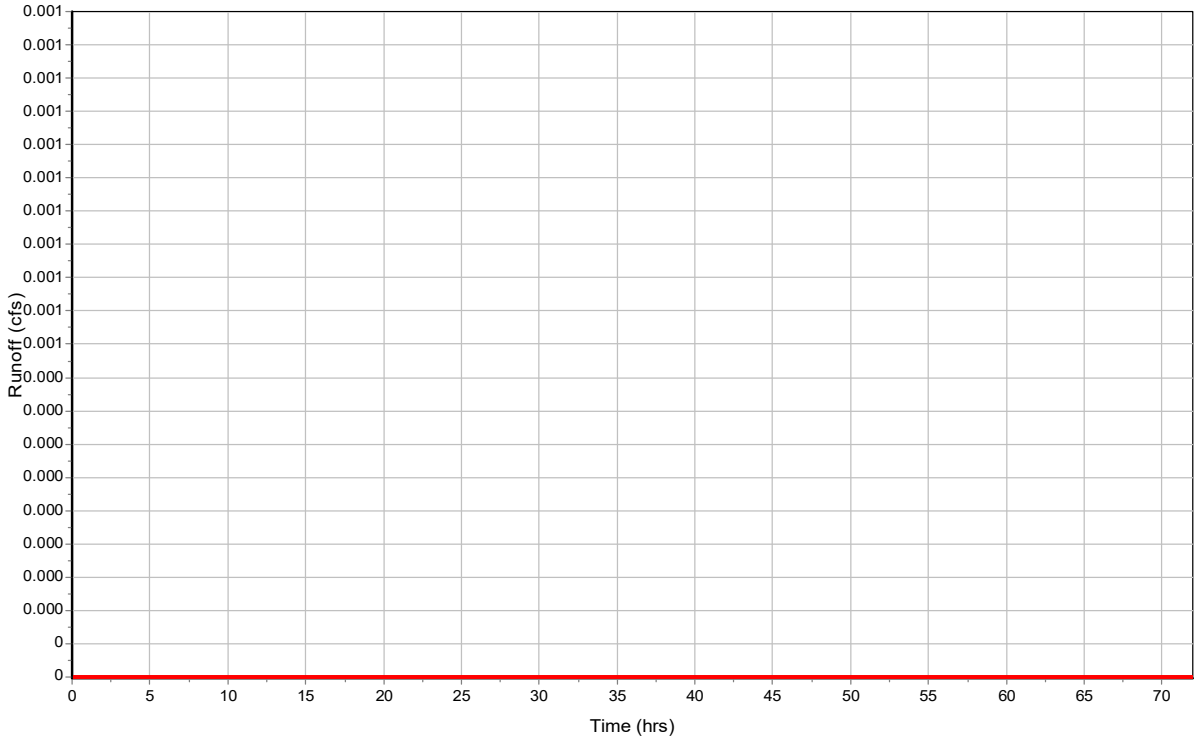
Total Rainfall (in)	2.9
Total Runoff (in)	0
Peak Runoff (cfs)	0
Weighted Curve Number	30
Time of Concentration (days hh:mm:ss)	0 00:16:32

Subbasin : EX_CB-28-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : EX_CB-33-DA

Input Data

Area (ac)	0.08
Peak Rate Factor	484
Weighted Curve Number	39
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.08	-	39
Composite Area & Weighted CN	0.08		39

Time of Concentration

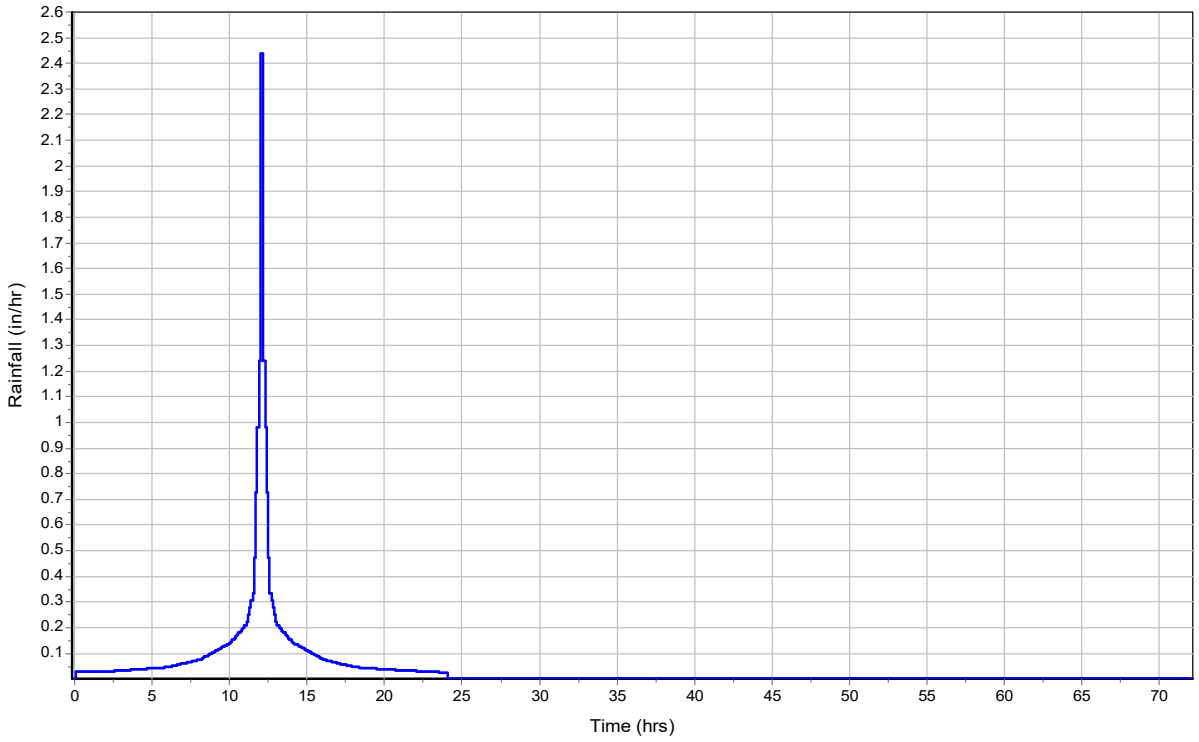
User-Defined TOC override (minutes): 6

Subbasin Runoff Results

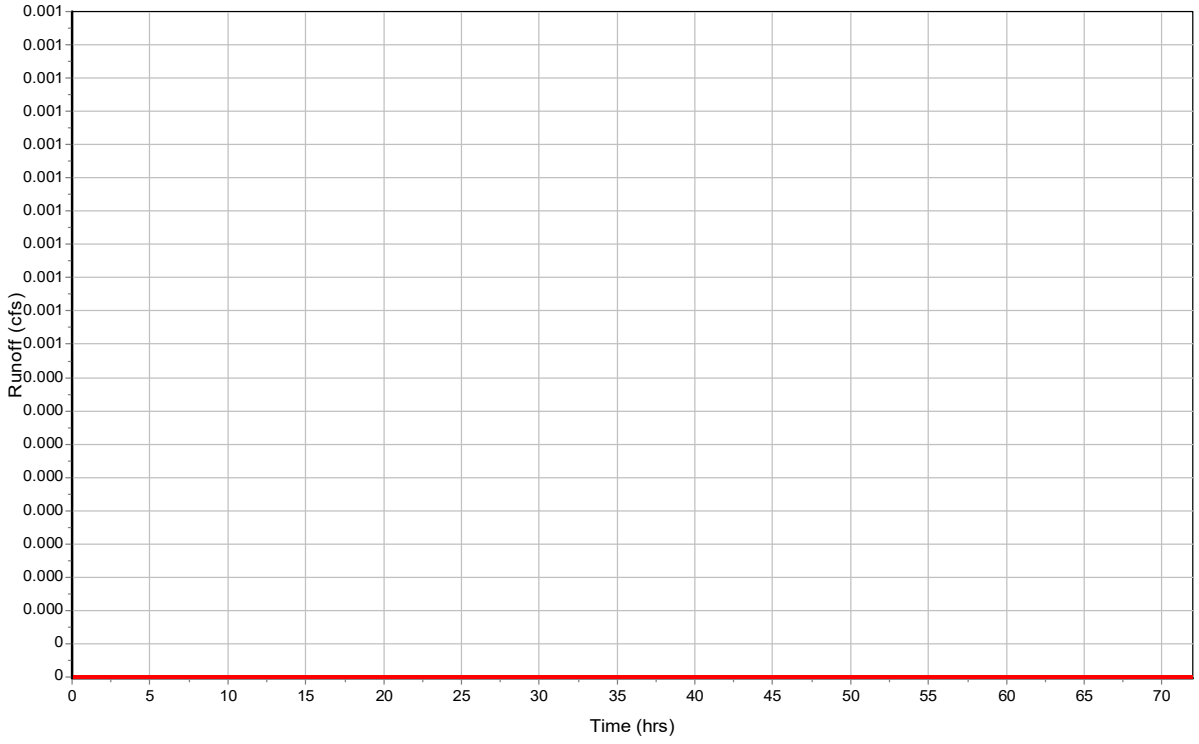
Total Rainfall (in)	2.9
Total Runoff (in)	0
Peak Runoff (cfs)	0
Weighted Curve Number	39
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : EX_CB-33-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : EX_CB-34A-DA

Input Data

Area (ac)	0.14
Peak Rate Factor	484
Weighted Curve Number	39
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.14	-	39
Composite Area & Weighted CN	0.14		39

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	50	0	0
Slope (%) :	3	0	0
2 yr, 24 hr Rainfall (in) :	2.9	0	0
Velocity (ft/sec) :	0.08	0	0
Computed Flow Time (min) :	11.02	0	0

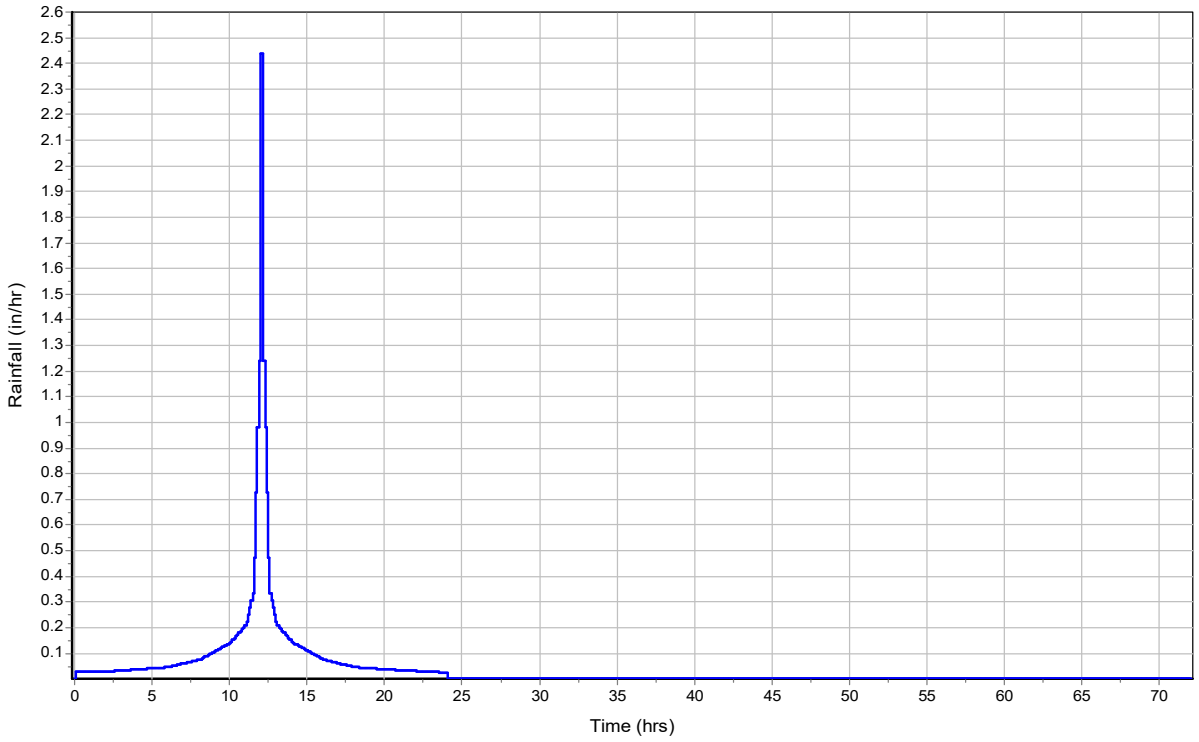
Total TOC (min) 11.02

Subbasin Runoff Results

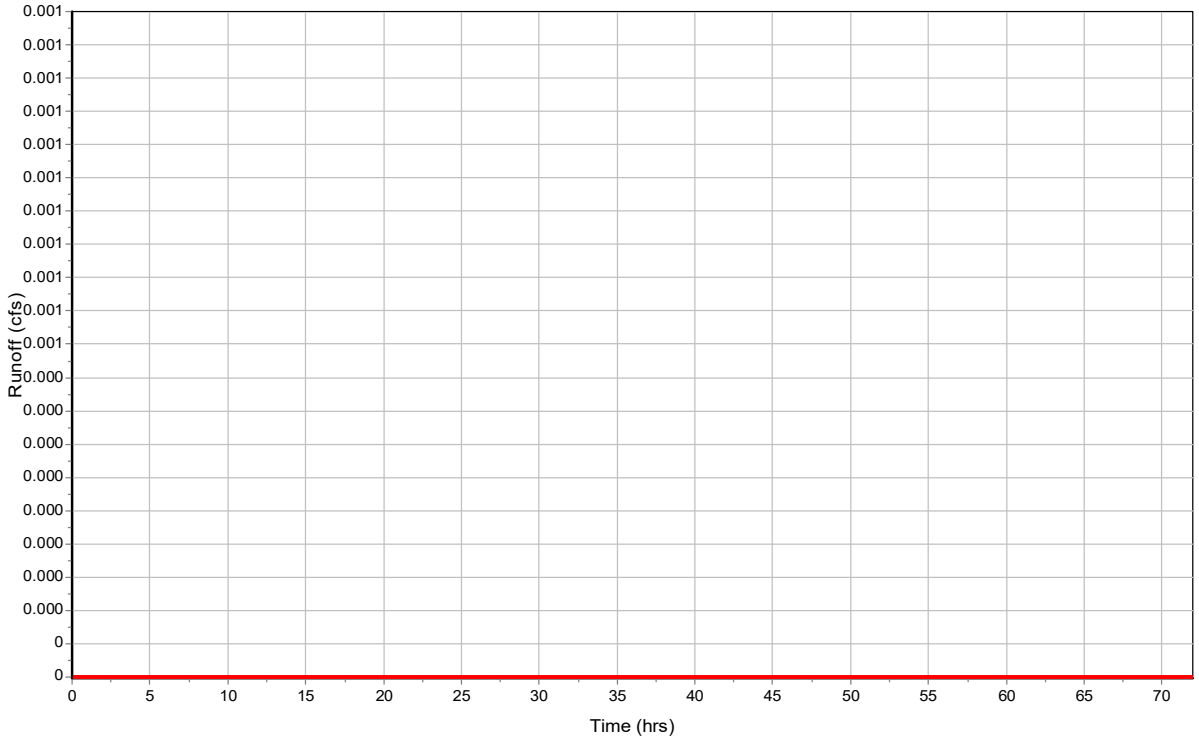
Total Rainfall (in)	2.9
Total Runoff (in)	0
Peak Runoff (cfs)	0
Weighted Curve Number	39
Time of Concentration (days hh:mm:ss)	0 00:11:01

Subbasin : EX_CB-34A-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : EX_CB-34-DA

Input Data

Area (ac)	0.23
Peak Rate Factor	484
Weighted Curve Number	74
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.23	-	74
Composite Area & Weighted CN	0.23		74

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	50	0	0
Slope (%) :	2	0	0
2 yr, 24 hr Rainfall (in) :	2.9	0	0
Velocity (ft/sec) :	0.06	0	0
Computed Flow Time (min) :	12.96	0	0

Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0	0
Flow Length (ft) :	50	0	0
Channel Slope (%) :	3	0	0
Cross Section Area (ft^2) :	0.6	0	0
Wetted Perimeter (ft) :	0.3	0	0
Velocity (ft/sec) :	31.51	0	0
Computed Flow Time (min) :	0.03	0	0

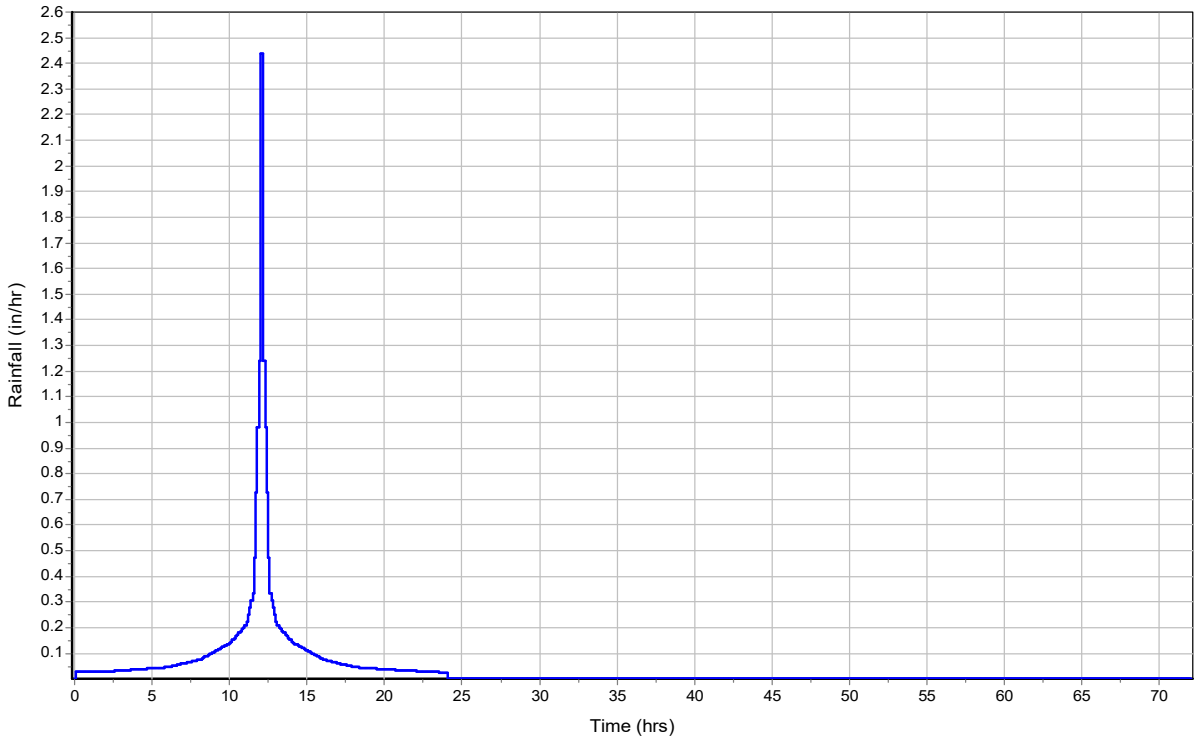
Total TOC (min) 12.98

Subbasin Runoff Results

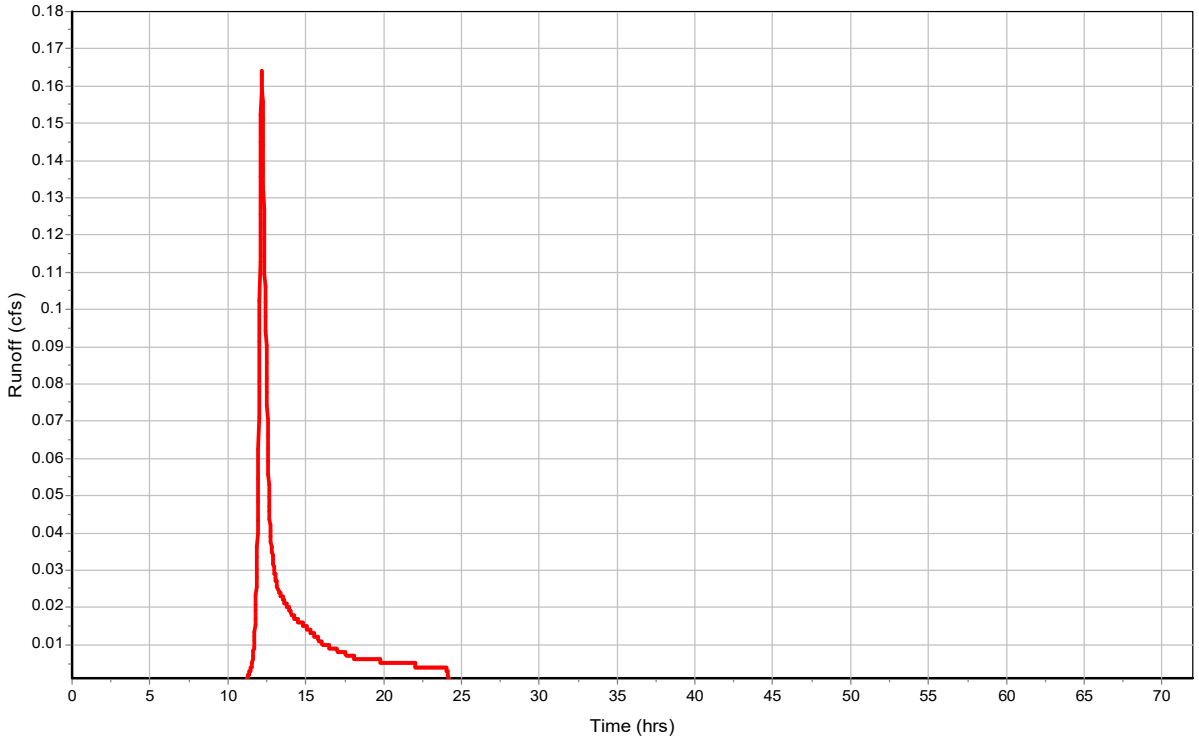
Total Rainfall (in)	2.9
Total Runoff (in)	0.85
Peak Runoff (cfs)	0.16
Weighted Curve Number	74
Time of Concentration (days hh:mm:ss)	0 00:12:59

Subbasin : EX_CB-34-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : EX_CB-36-DA

Input Data

Area (ac)	0.09
Peak Rate Factor	484
Weighted Curve Number	39
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.09	-	39
Composite Area & Weighted CN	0.09		39

Time of Concentration

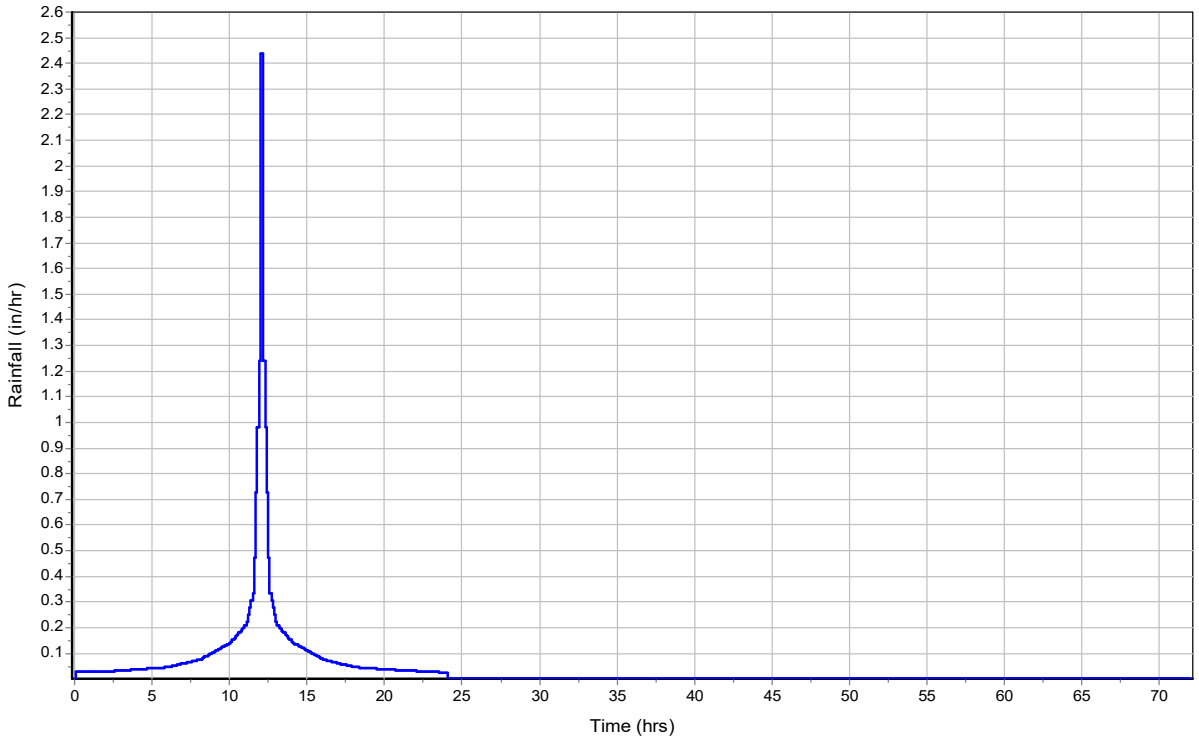
User-Defined TOC override (minutes): 6

Subbasin Runoff Results

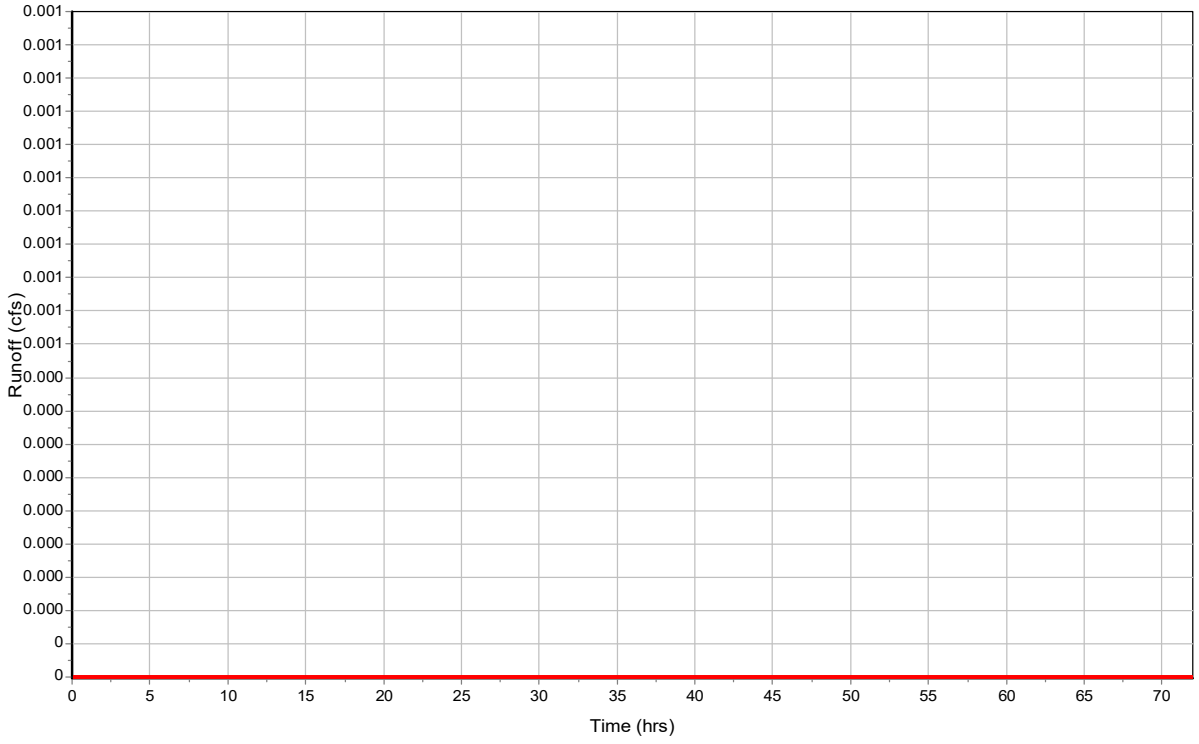
Total Rainfall (in)	2.9
Total Runoff (in)	0
Peak Runoff (cfs)	0
Weighted Curve Number	39
Time of Concentration (days hh:mm:ss)	0 00:06:00

Subbasin : EX_CB-36-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : EX_CB-9-DA

Input Data

Area (ac)	0.8
Peak Rate Factor	484
Weighted Curve Number	51
Rain Gage ID	*

Composite Curve Number

32	Area	Soil	Curve
Soil/Surface Description	(acres)	Group	Number
-	0.8	-	51
Composite Area & Weighted CN	0.8		51

Time of Concentration

	Subarea	Subarea	Subarea
Sheet Flow Computations	A	B	C
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	50	0	0
Slope (%) :	1.5	0	0
2 yr, 24 hr Rainfall (in) :	2.9	0	0
Velocity (ft/sec) :	0.06	0	0
Computed Flow Time (min) :	14.54	0	0

	Subarea	Subarea	Subarea
Shallow Concentrated Flow Computations	A	B	C
Flow Length (ft) :	270	0	0
Slope (%) :	3	0	0
Surface Type :	Grass pasture	Unpaved	Unpaved
Velocity (ft/sec) :	1.21	0	0
Computed Flow Time (min) :	3.72	0	0

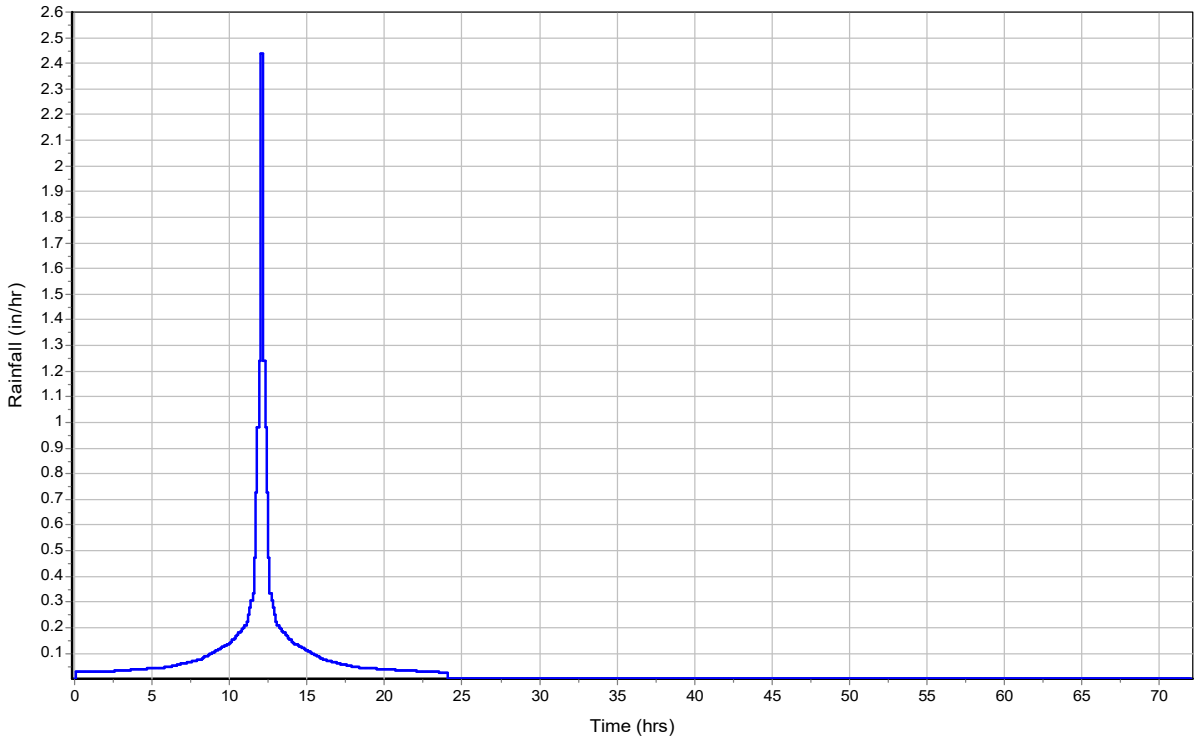
Total TOC (min) 18.25

Subbasin Runoff Results

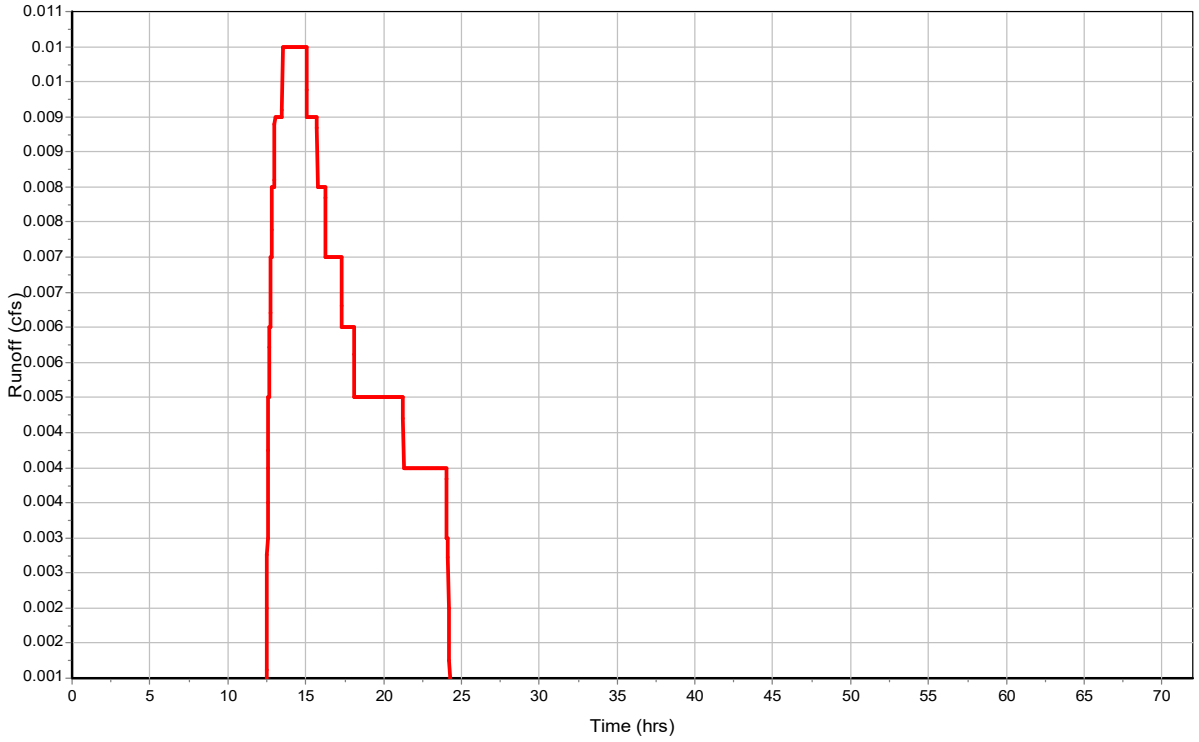
Total Rainfall (in)	2.9
Total Runoff (in)	0.09
Peak Runoff (cfs)	0.01
Weighted Curve Number	51
Time of Concentration (days hh:mm:ss)	0 00:18:15

Subbasin : EX_CB-9-DA

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : EX-CB-1-DA

Input Data

Area (ac)	0.41
Peak Rate Factor	484
Weighted Curve Number	87
Rain Gage ID	*

Composite Curve Number

32 Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	0.41	-	87
Composite Area & Weighted CN	0.41		87

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.4	0	0
Flow Length (ft) :	20	0	0
Slope (%) :	2	0	0
2 yr, 24 hr Rainfall (in) :	2.9	0	0
Velocity (ft/sec) :	0.05	0	0
Computed Flow Time (min) :	6.22	0	0

Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.013	0	0
Flow Length (ft) :	490	0	0
Channel Slope (%) :	4	0	0
Cross Section Area (ft^2) :	0.8	0	0
Wetted Perimeter (ft) :	0.5	0	0
Velocity (ft/sec) :	31.36	0	0
Computed Flow Time (min) :	0.26	0	0

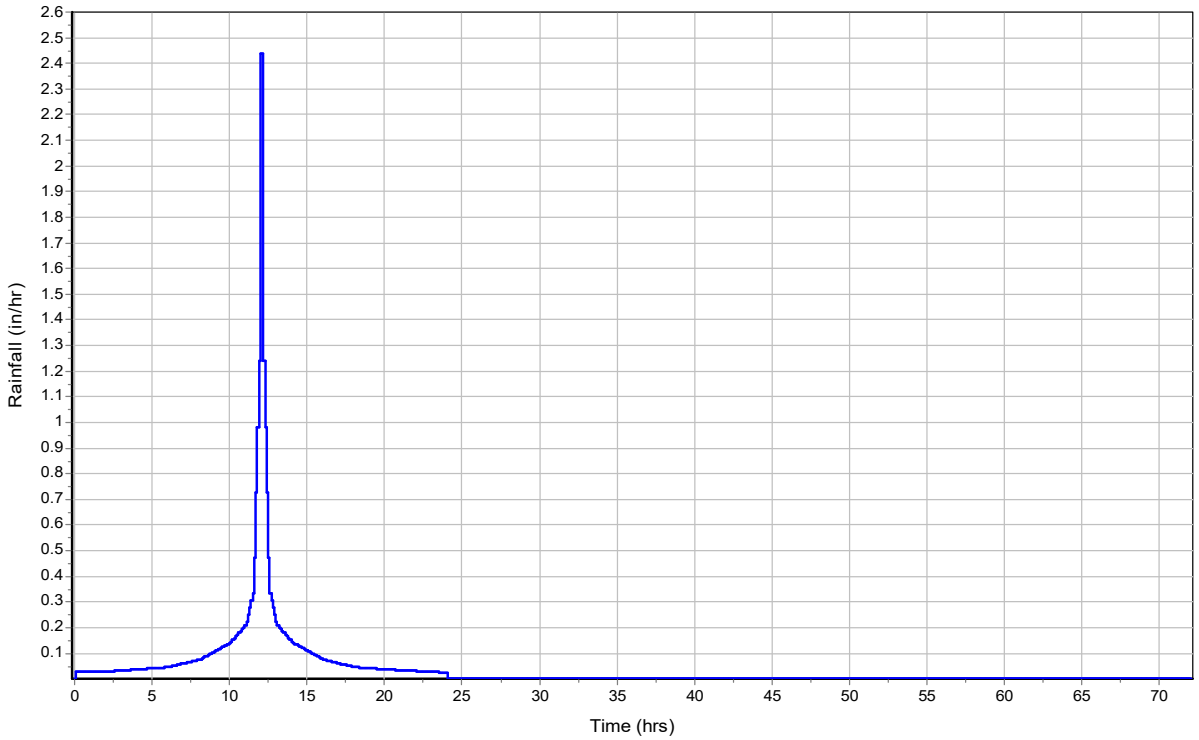
Total TOC (min) 6.49

Subbasin Runoff Results

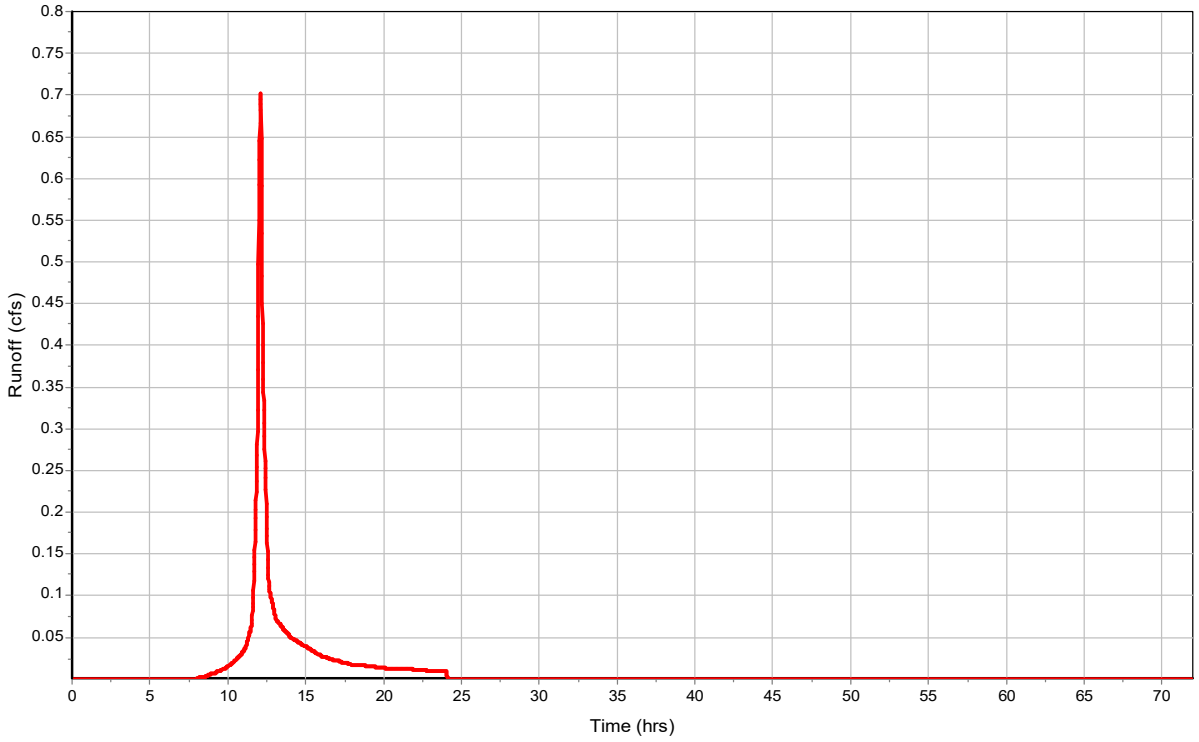
Total Rainfall (in)	2.9
Total Runoff (in)	1.65
Peak Runoff (cfs)	0.7
Weighted Curve Number	87
Time of Concentration (days hh:mm:ss)	0 00:06:29

Subbasin : EX-CB-1-DA

Rainfall Intensity Graph



Runoff Hydrograph



Junction Input

SN	Element ID	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Ground/Rim (Max) Offset (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Surcharge Elevation (ft)	Surcharge Depth (ft)	Ponded Area (ft^2)	Minimum Pipe Cover (in)
1	Bald_Mtn	368.00	375.00	7.00	368.00	0.00	375.00	0.00	0.00	0.00
2	CB-36	361.42	366.73	5.31	361.42	0.00	366.73	0.00	10.00	0.00
3	CB-38	361.20	364.26	3.06	361.20	0.00	364.26	0.00	10.00	0.00
4	DHM-41	363.80	378.08	14.28	363.80	0.00	378.08	0.00	0.00	0.00
5	DI-1	368.20	371.60	3.40	368.20	0.00	371.60	0.00	10.00	0.00
6	DI-47	372.40	376.45	4.05	372.40	0.00	376.45	0.00	10.00	0.00
7	DMH-13	345.20	349.70	4.50	345.20	0.00	349.70	0.00	0.00	0.00
8	DMH-17	340.70	347.56	6.86	340.70	0.00	347.56	0.00	10.00	0.00
9	DMH-19A	342.80	347.51	4.71	342.80	0.00	347.51	0.00	0.00	0.00
10	DMH-2	350.80	356.28	5.48	350.80	0.00	356.28	0.00	0.00	0.00
11	DMH-22	347.30	351.92	4.62	347.30	0.00	351.92	0.00	10.00	0.00
12	DMH-27	354.10	358.87	4.77	354.10	0.00	358.87	0.00	10.00	0.00
13	DMH-28	353.50	358.65	5.15	353.50	0.00	358.65	0.00	10.00	0.00
14	DMH-30A	358.90	369.12	10.22	358.90	0.00	369.12	0.00	0.00	0.00
15	DMH-33A	361.50	374.69	13.19	361.50	0.00	374.69	0.00	0.00	0.00
16	DMH-37	360.84	368.44	7.60	360.84	0.00	368.44	0.00	0.00	0.00
17	DMH-39	359.10	365.20	6.10	359.10	0.00	365.20	0.00	0.00	0.00
18	DMH-4	349.43	352.93	3.50	349.43	0.00	352.93	0.00	0.00	0.00
19	DMH-40A	357.80	363.55	5.75	357.80	0.00	365.55	2.00	0.00	0.00
20	DMH-43A	373.90	379.98	6.08	373.90	0.00	379.98	0.00	0.00	0.00
21	DMH-46	372.20	378.56	6.36	372.20	0.00	378.56	0.00	0.00	0.00
22	DMH-6	348.76	353.36	4.60	348.76	0.00	353.36	0.00	0.00	0.00
23	DMH-8	344.66	350.88	6.22	344.66	0.00	350.88	0.00	0.00	0.00
24	DMH-9	339.68	349.50	9.82	339.68	0.00	349.50	0.00	0.00	0.00
25	EX_CB-16	340.70	344.05	3.35	340.70	0.00	344.05	0.00	0.00	0.00
26	EX_CB-16A	342.00	346.00	4.00	342.00	0.00	346.00	0.00	10.00	0.00
27	EX_CB-28	342.40	348.24	5.84	342.40	0.00	348.24	0.00	10.00	0.00
28	EX_CB-33	373.40	378.68	5.28	373.40	0.00	378.68	0.00	10.00	0.00
29	EX_CB-34	375.40	380.10	4.70	375.40	0.00	380.10	0.00	10.00	0.00
30	EX_CB-34A	378.00	382.00	4.00	378.00	0.00	382.00	0.00	0.00	0.00
31	EX_DMH-10	367.30	377.69	10.39	367.30	0.00	377.69	0.00	0.00	0.00
32	EX_DMH-6	350.30	356.18	5.88	350.30	0.00	356.18	0.00	0.00	0.00
33	EX_DMH-7	342.20	348.55	6.35	342.20	0.00	348.55	0.00	0.00	0.00
34	EX_DMH-9	365.10	380.10	15.00	365.10	0.00	380.10	0.00	0.00	0.00
35	Fallriver_Junction	325.00	331.00	6.00	325.00	0.00	331.00	0.00	0.00	0.00
36	I-91_Culvert-Out	330.50	340.00	9.50	330.00	-0.50	340.00	0.00	0.00	0.00
37	LB-02	343.19	348.42	5.23	343.19	0.00	348.42	0.00	0.00	0.00
38	Outfall-11	338.96	339.96	1.00	338.96	0.00	339.96	0.00	0.00	0.00
39	Outfall-15	322.35	323.35	1.00	322.35	0.00	323.35	0.00	0.00	0.00
40	Outfall-15A	328.00	329.00	1.00	328.00	0.00	329.00	0.00	0.00	0.00
41	Outfall-1E	333.54	339.54	6.00	333.54	0.00	339.54	0.00	0.00	0.00
42	Outfall-24	336.46	342.46	6.00	336.46	0.00	342.46	0.00	0.00	0.00
43	RampCulvert-In	328.72	340.00	11.28	328.72	0.00	340.00	0.00	0.00	0.00
44	RampCulvert-Out	327.58	340.00	12.42	327.58	0.00	340.00	0.00	0.00	0.00

Junction Results

SN	Element ID	Peak Inflow (cfs)	Peak Lateral Inflow (cfs)	Max HGL Elevation Attained (ft)	Max HGL Depth Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Average HGL Elevation Attained (ft)	Average HGL Depth Attained (ft)	Time of Max HGL Occurrence (days hh:mm)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	Bald_Mtn	2.44	2.44	369.02	1.02	0.00	5.98	368.46	0.46	0 12:17	0 00:00	0.00	0.00
2	CB-36	0.01	0.01	361.46	0.04	0.00	5.27	361.43	0.01	0 14:34	0 00:00	0.00	0.00
3	CB-38	0.00	0.00	361.20	0.00	0.00	3.06	361.20	0.00	0 00:00	0 00:00	0.00	0.00
4	DHM-41	3.18	0.00	364.40	0.60	0.00	13.68	363.84	0.04	0 12:19	0 00:00	0.00	0.00
5	DI-1	0.38	0.38	368.43	0.23	0.00	3.17	368.22	0.02	0 12:19	0 00:00	0.00	0.00
6	DI-47	0.00	0.00	372.80	0.40	0.00	3.65	372.70	0.30	0 12:07	0 00:00	0.00	0.00
7	DMH-13	0.41	0.00	345.43	0.23	0.00	4.27	345.22	0.02	0 12:08	0 00:00	0.00	0.00
8	DMH-17	6.50	0.00	342.05	1.35	0.00	5.51	340.78	0.08	1 00:06	0 00:00	0.00	0.00
9	DMH-19A	0.82	0.00	343.08	0.28	0.00	4.43	342.82	0.02	0 12:08	0 00:00	0.00	0.00
10	DMH-2	0.74	0.00	351.08	0.28	0.00	5.20	350.82	0.02	0 12:09	0 00:00	0.00	0.00
11	DMH-22	1.60	0.00	347.50	0.20	0.00	4.42	347.32	0.02	0 12:07	0 00:00	0.00	0.00
12	DMH-27	0.48	0.00	354.36	0.26	0.00	4.51	354.12	0.02	0 12:07	0 00:00	0.00	0.00
13	DMH-28	0.96	0.00	353.78	0.28	0.00	4.87	353.52	0.02	0 12:07	0 00:00	0.00	0.00
14	DMH-30A	3.56	0.00	359.18	0.28	0.00	9.94	358.92	0.02	0 12:19	0 00:00	0.00	0.00
15	DMH-33A	3.36	0.00	362.16	0.66	0.00	12.53	361.55	0.05	0 12:19	0 00:00	0.00	0.00
16	DMH-37	0.23	0.00	360.98	0.14	0.00	7.46	360.85	0.01	0 12:07	0 00:00	0.00	0.00
17	DMH-39	0.23	0.00	359.22	0.12	0.00	5.98	359.11	0.01	0 12:08	0 00:00	0.00	0.00
18	DMH-4	0.30	0.00	349.64	0.21	0.00	3.29	349.44	0.01	0 12:08	0 00:00	0.00	0.00
19	DMH-40A	0.23	0.00	357.92	0.12	0.00	5.63	357.81	0.01	0 12:08	0 00:00	0.00	0.00
20	DMH-43A	0.04	0.00	374.02	0.12	0.00	5.96	373.91	0.01	0 12:14	0 00:00	0.00	0.00
21	DMH-46	0.32	0.00	372.80	0.60	0.00	5.76	372.69	0.49	0 12:07	0 00:00	0.00	0.00
22	DMH-6	1.17	0.00	349.12	0.36	0.00	4.24	348.78	0.02	0 12:09	0 00:00	0.00	0.00
23	DMH-8	1.57	0.00	345.23	0.57	0.00	5.65	344.69	0.03	0 12:08	0 00:00	0.00	0.00
24	DMH-9	2.09	0.00	342.44	2.76	0.00	7.06	341.53	1.85	0 12:08	0 00:00	0.00	0.00
25	EX_CB-16	0.01	0.00	340.75	0.05	0.00	3.30	340.71	0.01	0 13:53	0 00:00	0.00	0.00
26	EX_CB-16A	0.00	0.00	342.02	0.02	0.00	3.98	342.00	0.00	0 22:18	0 00:00	0.00	0.00
27	EX_CB-28	0.00	0.00	342.40	0.00	0.00	5.84	342.40	0.00	0 00:00	0 00:00	0.00	0.00
28	EX_CB-33	0.20	0.00	373.54	0.14	0.00	5.14	373.41	0.01	0 12:13	0 00:00	0.00	0.00
29	EX_CB-34	0.16	0.16	375.52	0.12	0.00	4.58	375.41	0.01	0 12:12	0 00:00	0.00	0.00
30	EX_CB-34A	0.00	0.00	378.00	0.00	0.00	4.00	378.00	0.00	0 00:00	0 00:00	0.00	0.00
31	EX_DMH-10	2.97	0.00	368.00	0.70	0.00	9.69	367.35	0.05	0 12:17	0 00:00	0.00	0.00
32	EX_DMH-6	0.53	0.00	350.48	0.18	0.00	5.70	350.31	0.01	0 12:08	0 00:00	0.00	0.00
33	EX_DMH-7	0.53	0.00	342.38	0.18	0.00	6.17	342.21	0.01	0 12:08	0 00:00	0.00	0.00
34	EX_DMH-9	2.96	0.00	365.93	0.83	0.00	14.17	365.15	0.05	0 12:19	0 00:00	0.00	0.00
35	Fallriver_Junction	7.35	0.00	325.42	0.42	0.00	19.58	325.05	0.05	0 12:12	0 00:00	0.00	0.00
36	I-91_Culvert-Out	3.56	0.00	331.11	0.61	0.00	8.89	330.54	0.04	0 12:21	0 00:00	0.00	0.00
37	LB-02	42.45	0.00	348.42	5.23	0.00	0.00	343.90	0.71	0 04:55	0 11:34	12.86	47.00
38	Outfall-11	2.09	0.00	339.22	0.26	0.00	0.74	338.97	0.01	0 12:08	0 00:00	0.00	0.00
39	Outfall-15	0.14	0.00	339.84	17.49	0.00	0.97	337.02	14.67	0 16:55	0 00:00	0.00	0.00
40	Outfall-15A	4.62	0.00	336.37	8.37	0.00	0.42	335.42	7.42	1 03:02	0 00:00	0.00	0.00
41	Outfall-1E	3.56	0.00	334.05	0.51	0.00	5.49	333.58	0.04	0 12:18	0 00:00	0.00	0.00
42	Outfall-24	1.60	0.00	336.70	0.24	0.00	5.76	336.47	0.01	0 12:07	0 00:00	0.00	0.00
43	RampCulvert-In	4.26	0.00	329.46	0.74	0.00	10.54	328.78	0.06	0 12:20	0 00:00	0.00	0.00
44	RampCulvert-Out	4.24	0.00	327.85	0.27	0.00	12.15	327.60	0.02	0 12:22	0 00:00	0.00	0.00

Channel Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Shape	Height (ft)	Width (ft)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate
1	1D-Culvert	213.55	336.46	0.00	328.72	0.00	7.74	3.6200	Trapezoidal	3.000	8.000	0.0320	0.5000	0.5000	0.0000	0.00	No
2	CB-1_bypass	100.68	356.26	5.00	353.31	6.11	2.95	2.9300	Trapezoidal	0.500	25.510	0.0130	0.5000	0.5000	0.0000	0.00	No
3	CB-10_bypass	252.16	350.37	4.50	347.58	4.27	2.79	1.1100	Trapezoidal	0.500	25.060	0.0130	0.5000	0.5000	0.0000	0.00	No
4	CB-20_bypass	72.73	347.92	4.63	346.02	4.62	1.90	2.6100	Trapezoidal	0.500	25.000	0.0130	0.5000	0.5000	0.0000	0.00	No
5	CB-21_bypass	166.98	351.44	3.94	348.19	4.79	3.25	1.9500	Trapezoidal	0.500	25.060	0.0130	0.5000	0.5000	0.0000	0.00	No
6	CB-24_bypass	354.71	369.68	5.43	358.30	4.59	11.38	3.2100	Trapezoidal	0.500	26.050	0.0130	0.5000	0.5000	0.0000	0.00	No
7	CB-25A_bypass	277.20	352.34	4.14	347.92	4.63	4.42	1.5900	Trapezoidal	0.500	25.510	0.0130	0.5000	0.5000	0.0000	0.00	No
8	CB-26_bypass	207.40	357.99	3.50	352.34	4.14	5.65	2.7200	Trapezoidal	0.500	25.060	0.0130	0.5000	0.5000	0.0000	0.00	No
9	CB-27_bypass	350.32	369.60	4.20	358.35	3.86	11.25	3.2100	Trapezoidal	0.500	25.060	0.0130	0.5000	0.5000	0.0000	0.00	No
10	CB-29_bypass	90.00	378.24	7.79	375.05	8.71	3.19	3.5400	Trapezoidal	0.500	25.060	0.0130	0.5000	0.5000	0.0000	0.00	No
11	CB-29A_bypass	202.68	358.91	5.20	351.44	3.94	7.47	3.6900	Trapezoidal	0.500	25.060	0.0130	0.5000	0.5000	0.0000	0.00	No
12	CB-3_bypass	192.15	352.72	2.50	349.48	2.50	3.24	1.6900	Trapezoidal	0.500	25.510	0.0130	0.5000	0.5000	0.0000	0.00	No
13	CB-35_bypass	295.00	370.84	4.50	356.41	5.11	14.43	4.8900	Trapezoidal	0.500	25.060	0.0130	0.5000	0.5000	0.0000	0.00	No
14	CB-42A_bypass	340.69	378.24	4.50	370.05	5.80	8.19	2.4000	Trapezoidal	0.500	25.060	0.0130	0.5000	0.5000	0.0000	0.00	No
15	CB-44_bypass	291.31	379.83	4.96	374.95	4.50	4.88	1.6800	Trapezoidal	0.500	25.060	0.0130	0.5000	0.5000	0.0000	0.00	No
16	CB-45_bypass	92.00	377.87	4.25	375.40	0.00	2.47	2.6800	Trapezoidal	0.500	25.060	0.0130	0.5000	0.5000	0.0000	0.00	No
17	CB-5_bypass	223.18	353.31	6.11	350.37	4.50	2.94	1.3200	Trapezoidal	0.500	25.060	0.0130	0.5000	0.5000	0.0000	0.00	No
18	CB-8A_bypass	70.37	349.48	2.50	344.57	4.00	4.91	6.9800	Trapezoidal	0.500	25.000	0.0130	0.5000	0.5000	0.0000	0.00	No
19	Cobble_Waterway	363.16	330.50	0.00	328.72	0.00	1.78	0.4900	Trapezoidal	3.000	14.000	0.0320	0.5000	0.5000	0.0000	0.00	No
20	EX_CB-1_bypass	126.22	356.30	4.40	352.72	2.50	3.58	2.8400	Trapezoidal	0.500	25.510	0.0130	0.5000	0.5000	0.0000	0.00	No
21	EX_CB-12_bypass	124.46	348.19	4.79	347.49	2.50	0.70	0.5600	Trapezoidal	0.500	25.510	0.0130	0.5000	0.5000	0.0000	0.00	No
22	EX_CB-27_bypass	103.70	356.41	5.11	351.50	0.00	4.91	4.7300	Trapezoidal	0.500	25.060	0.0130	0.5000	0.5000	0.0000	0.00	No
23	FallRiver	100.00	325.00	0.00	324.50	0.00	0.50	0.5000	Trapezoidal	20.000	50.000	0.0320	0.5000	0.5000	0.0000	0.00	No
24	FR-1	84.74	335.53	-3.43	325.00	0.00	10.53	12.4300	Trapezoidal	1.000	3.000	0.0320	0.5000	0.5000	0.0000	0.00	No
25	FR2	138.29	339.81	17.46	325.00	0.00	14.81	10.7100	Trapezoidal	1.000	3.000	0.0320	0.5000	0.5000	0.0000	0.00	No
26	FR3	378.68	327.58	0.00	325.00	0.00	2.58	0.6800	Trapezoidal	10.000	30.000	0.0320	0.5000	0.5000	0.0000	0.00	No
27	FR4	87.86	335.79	7.79	325.00	0.00	10.79	12.2800	Trapezoidal	1.000	3.000	0.0320	0.5000	0.5000	0.0000	0.00	No

Channel Results

SN	Element ID	Peak Flow	Time of Peak Flow Occurrence	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Travel Time	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged	Froude Number	Reported Condition
		(cfs)	(days hh:mm)	(cfs)		(ft/sec)	(min)	(ft)		(min)		
1	1D-Culvert	1.60	0 12:07	168.37	0.01	1.64	2.17	0.46	0.15	0.00		
2	CB-1_bypass	0.04	0 12:12	49.28	0.00	1.31	1.28	0.04	0.07	0.00		
3	CB-10_bypass	0.04	0 12:07	29.56	0.00	0.79	5.32	0.06	0.13	0.00		
4	CB-20_bypass	0.13	0 12:07	139.14	0.00	0.29	4.18	0.02	0.05	0.00		
5	CB-21_bypass	0.09	0 12:07	39.20	0.00	1.53	1.82	0.05	0.10	0.00		
6	CB-24_bypass	0.06	0 12:07	55.10	0.00	0.93	6.36	0.04	0.07	0.00		
7	CB-25A_bypass	0.06	0 12:07	33.93	0.00	2.18	2.12	0.03	0.07	0.00		
8	CB-26_bypass	0.11	0 12:07	48.66	0.00	1.46	2.37	0.05	0.11	0.00		
9	CB-27_bypass	0.02	0 12:07	51.26	0.00	0.60	9.73	0.04	0.08	0.00		
10	CB-29_bypass	0.08	0 12:07	60.04	0.00	2.18	0.69	0.04	0.07	0.00		
11	CB-29A_bypass	0.09	0 12:07	53.94	0.00	1.49	2.27	0.05	0.10	0.00		
12	CB-3_bypass	0.07	0 12:08	37.38	0.00	2.44	1.31	0.03	0.07	0.00		
13	CB-35_bypass	0.04	0 12:07	62.14	0.00	1.33	3.70	0.03	0.07	0.00		
14	CB-42A_bypass	0.03	0 12:07	40.82	0.00	1.18	4.81	0.03	0.06	0.00		
15	CB-44_bypass	0.01	0 12:14	36.52	0.00	0.55	8.83	0.03	0.06	0.00		
16	CB-45_bypass	0.08	0 12:07	48.31	0.00	1.57	0.98	0.05	0.09	0.00		
17	CB-5_bypass	0.03	0 12:08	32.25	0.00	0.85	4.38	0.04	0.08	0.00		
18	CB-8A_bypass	0.32	0 11:34	227.39	0.00	0.00		0.01	0.01	0.00		
19	Cobble_Waterway	3.54	0 12:21	104.81	0.03	1.57	3.86	0.67	0.22	0.00		
20	EX_CB-1_bypass	0.16	0 12:08	48.49	0.00	1.74	1.21	0.06	0.12	0.00		
21	EX_CB-12_bypass	0.03	0 12:07	21.59	0.00	0.58	3.58	0.08	0.15	0.00		
22	EX_CB-27_bypass	0.06	0 12:07	61.14	0.00	1.69	1.02	0.04	0.07	0.00		
23	FallRiver	7.19	0 12:12	8532.83	0.00	1.68	0.99	0.41	0.02	0.00		
24	FR-1	2.09	0 12:08	24.45	0.09	5.01	0.28	0.34	0.34	0.00		
25	FR2	0.03	0 16:55	19.71	0.00	0.60	3.84	0.21	0.21	0.00		
26	FR3	4.23	0 12:22	2308.05	0.00	1.27	4.97	0.34	0.03	0.00		
27	FR4	4.61	1 00:07	21.11	0.22	10.40	0.14	0.34	0.34	0.00		

Pipe Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Pipe Shape	Pipe Diameter or Height (in)	Pipe Width (in)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate	No. of Barrels
1	CB20-LB02	2.00	343.29	0.10	343.19	-0.10	0.10	5.0000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
2	DMH22-OUT24	37.00	347.30	0.00	336.46	0.00	10.84	29.3000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
3	I-91-Culvert	240.00	333.54	0.00	330.50	0.00	3.04	1.2700	CIRCULAR	24.000	24.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
4	LB01-EX_CB-48	5.00	341.00	0.00	340.90	0.20	0.10	2.0000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
5	p10-9	18.00	345.87	0.00	345.28	5.60	0.59	3.2800	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
6	p1-10	19.49	368.20	0.00	367.90	0.60	0.30	1.5400	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
7	p1-2	7.00	351.26	0.00	351.00	0.20	0.26	3.7100	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
8	p12-8	4.00	346.98	0.00	346.70	1.50	0.28	7.0000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
9	p13-8	44.00	345.20	0.00	344.76	0.10	0.44	1.0000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
10	p14-Out	135.00	340.57	0.00	322.35	0.00	18.22	13.5000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
11	p15B-Out	90.00	339.60	0.00	328.00	0.00	11.60	12.8900	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
12	p16-17	25.00	343.31	0.00	343.06	2.36	0.25	1.0000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
13	p17-15B	49.56	340.50	-0.20	339.70	0.10	0.80	1.6100	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
14	p18-19A	2.00	344.99	0.00	344.51	1.71	0.48	24.0000	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
15	p19-17	52.00	342.80	0.00	341.10	0.40	1.70	3.2700	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
16	p19-22	87.76	348.80	0.00	347.60	0.30	1.20	1.3700	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
17	p20-17	73.00	343.79	0.50	343.06	2.36	0.73	1.0000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
18	p21-22	6.00	347.50	0.00	347.40	0.10	0.10	1.6700	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
19	p25-18	51.00	348.20	0.00	347.40	0.10	0.80	1.5700	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
20	p2-6	106.00	350.80	0.00	348.86	0.10	1.94	1.8300	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
21	p26-27	21.00	354.49	0.00	354.28	0.18	0.21	1.0000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
22	p27-28	44.50	354.10	0.00	353.60	0.10	0.50	1.1200	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
23	p28-22	200.00	353.50	0.00	347.70	0.40	5.80	2.9000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
24	p29-28	6.00	353.71	0.00	353.61	0.11	0.10	1.6700	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
25	p30-Out	100.00	358.90	0.00	333.54	0.00	25.36	25.3600	CIRCULAR	15.000	15.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
26	p31-30	45.00	365.40	0.00	364.00	5.10	1.40	3.1100	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
27	p32-30	31.00	364.25	0.00	363.90	5.00	0.35	1.1300	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
28	p33-30	199.55	361.50	0.00	359.20	0.30	2.30	1.1500	CIRCULAR	15.000	15.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
29	p3-4	4.00	350.22	0.00	349.63	0.20	0.59	14.7500	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
30	p34-33	36.00	365.00	-5.45	361.80	0.30	3.20	8.8900	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
31	p35-37	62.00	366.34	0.00	363.44	2.60	2.90	4.6800	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
32	p36-37	44.00	361.42	0.00	360.94	0.10	0.48	1.0900	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
33	p37-39	54.00	360.84	0.00	359.20	0.10	1.64	3.0400	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
34	p38-39	2.00	361.20	0.00	361.10	2.00	0.10	5.0000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
35	p39-40	20.00	359.10	0.00	358.05	0.25	1.05	5.2500	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
36	p40-EX6	172.00	357.80	0.00	350.30	0.00	7.50	4.3600	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
37	p41-33	152.43	363.80	0.00	361.60	0.10	2.20	1.4400	CIRCULAR	15.000	15.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
38	p41-9	301.09	367.30	0.00	365.30	0.20	2.00	0.6600	CIRCULAR	15.000	15.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
39	p42-41	17.00	373.74	0.00	373.58	9.78	0.16	0.9400	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
40	p43-EX33	11.91	373.50	-0.40	373.90	0.50	-0.40	-3.3600	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
41	p44-43	78.00	374.87	0.00	374.05	0.15	0.82	1.0500	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
42	p45-46	4.00	373.62	0.00	373.52	1.32	0.10	2.5000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
43	p4-6	24.00	349.43	0.00	349.16	0.40	0.27	1.1200	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
44	p46-10	37.55	372.70	0.50	368.00	0.70	4.70	12.5200	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
45	p47-46	7.00	372.45	0.05	372.30	0.10	0.15	2.1400	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
46	p5-6	4.00	350.22	3.02	349.16	0.40	1.06	26.5000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
47	p6-8	140.00	348.76	0.00	346.38	1.72	2.38	1.7000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
48	p7-9	50.00	340.30	0.00	339.78	0.10	0.52	1.0400	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
49	p8-9	23.00	344.66	0.00	344.43	4.75	0.23	1.0000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
50	p9-Out	79.00	342.00	2.32	335.53	-3.43	6.47	8.1900	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
51	pBMtn-10	64.81	368.50	0.50	367.40	0.10	1.10	1.7000	CIRCULAR	15.000	15.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
52	pEX_DMH-9-41	250.42	365.10	0.00	364.00	0.20	1.10	0.4400	CIRCULAR	15.000	15.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
53	pEX1-2	40.19	351.90	0.00	350.90	0.10	1.00	2.4900	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
54	pEX12-19	110.00	343.40	0.00	343.20	0.40	0.20	0.1800	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
55	pEX16-15B	113.87	340.70	0.00	339.70	0.10	1.00	0.8800	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
56	pEX16A-EX16	64.67	342.00	0.00	340.70	0.00	1.30	2.0100	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
57	pEX27-EX6	32.60	351.30	0.00	350.60	0.30	0.70	2.1500	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
58	pEX28-EX7	34.39	342.40	0.00	342.30	0.10	0.10	0.2900	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
59	pEX33-41	88.56	373.40	0.00	372.20	8.40	1.20	1.3600	CIRCULAR	15.000	15.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
60	pEX34A-EX34	78.21	378.00	0.00	376.10	0.70	1.90	2.4300	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
61	pEX34-EX33	60.73	375.40	0.00	373.90	0.50	1.50	2.4700	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
62	pEX6-EX7(MH)	157.05	350.30	0.00	342.50	0.30	7.80	4.9700	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
63	pEX7(MH)-Out	127.60	342.20	0.00	336.00	0.00	6.20	4.8600	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
64	pEX9-15B	27.57	341.40	0.00	340.10	0.50	1.30	4.7200	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
65	Ramp_Culvert	134.00	328.72	0.00	327.58	0.00	1.14	0.8500	CIRCULAR	24.000	24.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1

Pipe Results

SN	Element ID	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Travel Time (min)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Froude Number	Reported Condition
1	CB20-LB02	45.73	1 00:20	0.80	57.41	50.00	0.00	1.00	1.00	87.00		SURCHARGED
2	DMH22-OUT24	1.60	0 12:07	19.28	0.08	12.46	0.05	0.22	0.22	0.00		Calculated
3	I-91-Culvert	3.56	0 12:19	25.46	0.14	4.96	0.81	0.56	0.28	0.00		Calculated
4	LB01-EX_CB-48	0.01	0 13:53	5.04	0.00	1.29	0.06	0.04	0.04	0.00		Calculated
5	p10-9	0.21	0 12:07	6.45	0.03	3.50	0.09	0.13	0.13	0.00		Calculated
6	p1-10	0.38	0 12:19	4.42	0.09	3.11	0.10	0.21	0.21	0.00		Calculated
7	p1-2	0.21	0 12:12	6.87	0.03	3.40	0.03	0.13	0.13	0.00		Calculated
8	p12-8	0.41	0 12:08	9.43	0.04	4.50	0.01	0.17	0.17	0.00		Calculated
9	p13-8	0.41	0 12:08	3.56	0.11	1.89	0.39	0.35	0.35	0.00		Calculated
10	p14-Out	0.14	0 12:34	13.09	0.01	1.05	2.14	0.54	0.54	0.00		Calculated
11	p15B-Out	4.62	1 00:07	12.79	0.36	6.95	0.22	0.79	0.79	0.00		Calculated
12	p16-17	0.53	0 12:08	3.56	0.15	2.95	0.14	0.28	0.28	0.00		Calculated
13	p17-15B	4.72	1 00:06	5.06	0.93	6.73	0.12	0.88	0.88	0.00		Calculated
14	p18-19A	0.64	0 12:08	15.13	0.04	6.26	0.01	0.19	0.19	0.00		Calculated
15	p19-17	0.82	0 12:08	5.58	0.15	4.84	0.18	0.40	0.48	0.00		Calculated
16	p19-22	0.00	0 00:00	4.17	0.00	0.00		0.00	0.00	0.00		Calculated
17	p20-17	6.50	1 12:57	3.56	1.82	50.00	0.02	0.99	1.00	1.00		SURCHARGED
18	p21-22	0.32	0 12:07	4.60	0.07	2.80	0.04	0.20	0.20	0.00		Calculated
19	p25-18	0.32	0 12:07	4.46	0.07	3.17	0.27	0.19	0.19	0.00		Calculated
20	p2-6	0.73	0 12:09	4.82	0.15	4.29	0.41	0.27	0.27	0.00		Calculated
21	p26-27	0.48	0 12:07	3.56	0.13	2.85	0.12	0.27	0.27	0.00		Calculated
22	p27-28	0.48	0 12:07	3.78	0.13	3.10	0.24	0.25	0.25	0.00		Calculated
23	p28-22	0.96	0 12:07	6.07	0.16	5.54	0.60	0.27	0.27	0.00		Calculated
24	p29-28	0.48	0 12:07	4.60	0.10	3.08	0.03	0.25	0.25	0.00		Calculated
25	p30-Out	3.56	0 12:19	32.53	0.11	10.63	0.16	0.40	0.32	0.00		Calculated
26	p31-30	0.11	0 12:07	6.28	0.02	2.98	0.25	0.10	0.10	0.00		Calculated
27	p32-30	0.34	0 12:07	3.79	0.09	2.78	0.19	0.21	0.21	0.00		Calculated
28	p33-30	3.36	0 12:19	6.94	0.48	5.37	0.62	0.63	0.51	0.00		Calculated
29	p3-4	0.30	0 12:08	13.68	0.02	5.52	0.01	0.12	0.12	0.00		Calculated
30	p34-33	0.40	0 12:07	17.46	0.02	8.63	0.07	0.21	0.21	0.00		Calculated
31	p35-37	0.23	0 12:07	7.71	0.03	4.29	0.24	0.12	0.12	0.00		Calculated
32	p36-37	0.01	0 14:35	3.72	0.00	0.98	0.75	0.04	0.04	0.00		Calculated
33	p37-39	0.23	0 12:07	6.21	0.04	3.66	0.25	0.13	0.13	0.00		Calculated
34	p38-39	0.00	0 00:00	7.97	0.00	0.00		0.00	0.00	0.00		Calculated
35	p39-40	0.23	0 12:08	8.16	0.03	4.29	0.08	0.12	0.12	0.00		Calculated
36	p40-EX6	0.23	0 12:08	7.44	0.03	3.11	0.92	0.15	0.15	0.00		Calculated
37	p41-33	3.17	0 12:19	7.76	0.41	5.71	0.44	0.58	0.46	0.00		Calculated
38	p41-9	2.96	0 12:18	5.26	0.56	4.28	1.17	0.69	0.55	0.00		Calculated
39	p42-41	0.10	0 12:07	3.46	0.03	1.86	0.15	0.12	0.12	0.00		Calculated
40	p43-EX33	0.04	0 12:14	0.33	0.11	0.87	0.23	0.10	0.10	0.00		Calculated
41	p44-43	0.04	0 12:14	3.65	0.01	1.46	0.89	0.07	0.07	0.00		Calculated
42	p45-46	0.32	0 12:07	5.63	0.06	3.06	0.02	0.19	0.19	0.00		Calculated
43	p4-6	0.30	0 12:08	3.78	0.08	2.65	0.15	0.20	0.20	0.00		Calculated
44	p46-10	0.32	0 12:07	37.16	0.01	6.27	0.10	0.10	0.07	0.00		Calculated
45	p47-46	0.00	0 04:07	5.22	0.00	0.09	1.30	0.43	0.43	0.00		Calculated
46	p5-6	0.15	0 12:08	18.34	0.01	6.11	0.01	0.07	0.07	0.00		Calculated
47	p6-8	1.17	0 12:09	4.65	0.25	4.77	0.49	0.35	0.35	0.00		Calculated
48	p7-9	1.27	0 19:18	3.63	0.35	1.62	0.51	1.00	1.00	3906.00		SURCHARGED
49	p8-9	1.57	0 12:08	3.56	0.44	3.83	0.10	0.52	0.52	0.00		Calculated
50	p9-Out	2.09	0 12:08	6.99	0.30	8.46	0.16	0.35	0.35	0.00		Calculated
51	pBMtn-10	2.44	0 12:17	8.42	0.29	4.59	0.24	0.56	0.45	0.00		Calculated
52	pEX_DMH-9-41	2.96	0 12:19	4.28	0.69	3.78	1.10	0.76	0.61	0.00		Calculated
53	pEX1-2	0.55	0 12:08	5.62	0.10	4.26	0.16	0.22	0.22	0.00		Calculated
54	pEX12-19	0.18	0 12:08	1.52	0.12	1.44	1.27	0.22	0.22	0.00		Calculated
55	pEX16-15B	0.01	0 13:48	3.34	0.00	1.03	1.84	0.26	0.26	0.00		Calculated
56	pEX16A-EX16	0.00	0 21:29	5.05	0.00	0.41	2.63	0.03	0.03	0.00		Calculated
57	pEX27-EX6	0.30	0 12:07	5.22	0.06	3.42	0.16	0.17	0.17	0.00		Calculated
58	pEX28-EX7	0.00	0 00:00	1.92	0.00	0.00		0.04	0.04	0.00		Calculated
59	pEX33-41	0.20	0 12:13	7.52	0.03	2.58	0.57	0.14	0.11	0.00		Calculated
60	pEX34A-EX34	0.00	0 00:00	5.55	0.00	0.00		0.00	0.00	0.00		Calculated
61	pEX34-EX33	0.16	0 12:12	5.60	0.03	3.10	0.33	0.12	0.12	0.00		Calculated
62	pEX6-EX7(MH)	0.53	0 12:08	7.94	0.07	5.64	0.46	0.18	0.18	0.00		Calculated
63	pEX7(MH)-Out	0.53	0 12:08	7.85	0.07	5.57	0.38	0.18	0.18	0.00		Calculated
64	pEX9-15B	0.12	0 12:09	7.74	0.02	3.48	0.13	0.09	0.09	0.00		Calculated

Pipe Results

SN	Element ID	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Travel Time (min)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Froude Number	Reported Condition
65	Ramp_Culvert	4.24	0 12:21	20.87	0.20	6.86	0.33	0.50	0.25	0.00		Calculated

Inlet Input

SN	Element ID	Inlet Manufacturer	Manufacturer Part Number	Inlet Location	Number of Inlets	Catchbasin Invert Elevation (ft)	Max (Rim) Elevation (ft)	Inlet Depth (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Ponded Area (ft^2)	Grate Clogging Factor (%)
1	CB-1	FHWA HEC-22 GENERIC	N/A	On Grade	1	351.26	356.26	5.00	351.26	0.00	N/A	0.00
2	CB-10	FHWA HEC-22 GENERIC	N/A	On Grade	1	345.87	350.37	4.50	345.87	0.00	N/A	0.00
3	CB-12A	FHWA HEC-22 GENERIC	N/A	On Grade	1	346.98	349.48	2.50	346.98	0.00	N/A	0.00
4	CB-14	FHWA HEC-22 GENERIC	N/A	On Sag	1	340.57	344.57	4.00	340.57	0.00	10.00	0.00
5	CB-15B	FHWA HEC-22 GENERIC	N/A	On Sag	1	339.60	345.67	6.07	339.60	0.00	10.00	0.00
6	CB-16	FHWA HEC-22 GENERIC	N/A	On Sag	1	343.31	347.58	4.27	343.31	0.00	10.00	0.00
7	CB-18	FHWA HEC-22 GENERIC	N/A	On Sag	1	344.99	347.49	2.50	342.80	-2.19	10.00	0.00
8	CB-20	FHWA HEC-22 GENERIC	N/A	On Grade	1	343.29	347.92	4.63	343.29	0.00	N/A	0.00
9	CB-21	FHWA HEC-22 GENERIC	N/A	On Grade	1	347.50	351.44	3.94	347.50	0.00	N/A	0.00
10	CB-25	FHWA HEC-22 GENERIC	N/A	On Grade	1	348.20	351.77	3.57	348.20	0.00	N/A	0.00
11	CB-26	FHWA HEC-22 GENERIC	N/A	On Grade	1	354.49	357.99	3.50	354.49	0.00	N/A	0.00
12	CB-29A	FHWA HEC-22 GENERIC	N/A	On Grade	1	353.71	358.91	5.20	353.71	0.00	N/A	0.00
13	CB-3	FHWA HEC-22 GENERIC	N/A	On Grade	1	350.22	352.72	2.50	350.22	0.00	N/A	0.00
14	CB-31A	FHWA HEC-22 GENERIC	N/A	On Grade	1	365.40	369.65	4.25	365.40	0.00	N/A	0.00
15	CB-32A	FHWA HEC-22 GENERIC	N/A	On Grade	1	364.25	370.05	5.80	364.25	0.00	N/A	0.00
16	CB-34A	FHWA HEC-22 GENERIC	N/A	On Grade	1	370.45	374.95	4.50	370.45	0.00	N/A	0.00
17	CB-35	FHWA HEC-22 GENERIC	N/A	On Grade	1	366.34	370.84	4.50	366.34	0.00	N/A	0.00
18	CB-42A	FHWA HEC-22 GENERIC	N/A	On Grade	1	373.74	377.24	3.50	373.74	0.00	N/A	0.00
19	CB-44	FHWA HEC-22 GENERIC	N/A	On Grade	1	374.87	379.87	5.00	374.87	0.00	N/A	0.00
20	CB-45	FHWA HEC-22 GENERIC	N/A	On Grade	1	373.62	378.12	4.50	373.62	0.00	N/A	0.00
21	CB-5	FHWA HEC-22 GENERIC	N/A	On Grade	1	347.20	353.31	6.11	347.20	0.00	N/A	0.00
22	CB-7	FHWA HEC-22 GENERIC	N/A	On Sag	1	340.30	350.66	10.36	340.30	0.00	10.00	0.00
23	EX_CB-1	FHWA HEC-22 GENERIC	N/A	On Grade	1	351.90	356.30	4.40	351.90	0.00	N/A	0.00
24	EX_CB-12	FHWA HEC-22 GENERIC	N/A	On Grade	1	343.40	348.19	4.79	343.40	0.00	N/A	0.00
25	EX_CB-19	FHWA HEC-22 GENERIC	N/A	On Sag	2	348.80	350.66	1.86	348.80	0.00	10.00	0.00
26	EX_CB-27	FHWA HEC-22 GENERIC	N/A	On Grade	1	351.30	356.41	5.11	351.30	0.00	N/A	0.00
27	EX_CB-9	FHWA HEC-22 GENERIC	N/A	On Sag	1	341.40	346.02	4.62	341.40	0.00	0.00	0.00
28	LB-01	FHWA HEC-22 GENERIC	N/A	On Sag	1	341.00	344.05	3.05	341.00	0.00	10.00	0.00

Roadway & Gutter Input

SN	Element ID	Roadway Longitudinal Slope (ft/ft)	Roadway Cross Slope (ft/ft)	Roadway Manning's Roughness	Gutter Cross Slope (ft/ft)	Gutter Width (ft)	Gutter Depression (in)	Allowable Spread (ft)
1	CB-1	0.0320	0.0200	0.0130	0.0200	2.00	0.0000	10.50
2	CB-10	0.0170	0.0200	0.0130	0.0200	2.00	0.0000	10.50
3	CB-12A	0.0100	0.0200	0.0130	0.0200	2.00	0.0000	10.50
4	CB-14	N/A	0.0170	0.0130	0.0200	78.00	0.0000	10.50
5	CB-15B	N/A	0.0200	0.0130	0.0200	2.00	0.0656	10.50
6	CB-16	N/A	0.0200	0.0130	0.0200	2.00	0.0000	10.50
7	CB-18	N/A	0.0200	0.0130	0.0200	2.00	0.0000	10.50
8	CB-20	0.0100	0.0200	0.0130	0.0200	2.00	0.0000	10.50
9	CB-21	0.0100	0.0200	0.0130	0.0200	2.00	0.0000	10.50
10	CB-25	0.0314	0.0200	0.0130	0.0200	2.00	0.0000	10.50
11	CB-26	0.0314	0.0200	0.0130	0.0200	2.00	0.0000	10.50
12	CB-29A	0.0314	0.0200	0.0130	0.0200	2.00	0.0000	10.50
13	CB-3	0.0200	0.0200	0.0130	0.0200	2.00	0.0000	10.50
14	CB-31A	0.0314	0.0200	0.0130	0.0200	2.00	0.0000	10.50
15	CB-32A	0.0314	0.0200	0.0130	0.0200	2.00	0.0000	10.50
16	CB-34A	0.0314	0.0200	0.0130	0.0200	2.00	0.0000	10.50
17	CB-35	0.0400	0.0200	0.0130	0.0200	2.00	0.0000	10.50
18	CB-42A	0.0150	0.0200	0.0130	0.0200	2.00	0.0000	10.50
19	CB-44	0.0100	0.0200	0.0130	0.0200	2.00	0.0000	10.50
20	CB-45	0.0144	0.0200	0.0130	0.0200	2.00	0.0000	10.50
21	CB-5	0.0200	0.0200	0.0130	0.0200	2.00	0.0000	10.50
22	CB-7	N/A	0.0200	0.0130	0.0200	43.00	0.0000	10.50
23	EX_CB-1	0.0320	0.0200	0.0130	0.0200	2.00	0.0000	10.50
24	EX_CB-12	0.0300	0.0200	0.0130	0.0200	2.00	0.0000	10.50
25	EX_CB-19	N/A	0.0200	0.0130	0.0200	2.00	0.0656	10.50
26	EX_CB-27	0.0500	0.0200	0.0160	0.0200	2.00	0.0000	10.50
27	EX_CB-9	N/A	0.0200	0.0130	0.0200	2.00	0.0656	10.50
28	LB-01	N/A	0.0200	0.0270	0.0200	2.00	0.0000	10.50

Inlet Results

SN	Element ID	Peak Flow (cfs)	Peak Lateral Inflow (cfs)	Peak Flow Intercepted by Inlet (cfs)	Peak Flow Bypassing Inlet (cfs)	Inlet Efficiency during Peak Flow (%)	Max Gutter Spread during Peak Flow (ft)	Max Gutter Water Elev. during Peak Flow (ft)	Max Gutter Water Depth during Peak Flow (ft)	Time of Max Depth Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	CB-1	0.25	0.25	0.24	0.02	93.34	3.22	356.32	0.06	0 12:12	0.00	0.00
2	CB-10	0.25	0.21	0.23	0.02	92.46	3.59	350.44	0.07	0 12:07	0.00	0.00
3	CB-12A	0.52	0.46	0.40	0.12	76.97	5.25	349.58	0.10	0 12:08	0.00	0.00
4	CB-14	0.03	0.03	N/A	N/A	N/A	1.65	344.05	-0.52	0 11:54	0.00	0.00
5	CB-15B	0.10	0.10	N/A	N/A	N/A	2.61	345.79	0.12	1 00:07	0.00	0.00
6	CB-16	0.53	0.49	N/A	N/A	N/A	5.77	347.68	0.10	0 12:08	0.00	0.00
7	CB-18	0.64	0.61	N/A	N/A	N/A	6.40	347.60	0.11	0 12:08	0.00	0.00
8	CB-20	0.58	0.52	0.44	0.14	75.28	5.46	348.03	0.11	1 08:08	0.00	0.00
9	CB-21	0.41	0.32	0.33	0.08	80.74	4.79	351.54	0.10	0 12:07	0.00	0.00
10	CB-25	0.38	0.28	0.34	0.05	88.03	3.77	351.85	0.08	0 12:07	0.00	0.00
11	CB-26	0.59	0.57	0.48	0.11	81.60	4.42	358.08	0.09	0 12:07	0.00	0.00
12	CB-29A	0.57	0.51	0.47	0.10	81.98	4.39	359.00	0.09	0 12:07	0.00	0.00
13	CB-3	0.36	0.21	0.31	0.05	86.13	4.03	352.80	0.08	0 12:08	0.00	0.00
14	CB-31A	0.14	0.14	0.13	0.00	98.51	2.56	369.70	0.05	0 12:07	0.00	0.00
15	CB-32A	0.40	0.37	0.35	0.05	87.41	3.83	370.13	0.08	0 12:07	0.00	0.00
16	CB-34A	0.48	0.48	0.41	0.07	84.73	4.10	375.03	0.08	0 12:04	0.00	0.00
17	CB-35	0.27	0.19	0.25	0.02	94.01	3.14	370.90	0.06	0 12:07	0.00	0.00
18	CB-42A	0.13	0.13	0.13	0.00	96.65	2.89	377.30	0.06	0 12:07	0.00	0.00
19	CB-44	0.05	0.05	0.05	0.00	99.98	2.10	379.91	0.04	0 12:14	0.00	0.00
20	CB-45	0.41	0.41	0.34	0.07	82.79	4.45	378.21	0.09	0 12:07	0.00	0.00
21	CB-5	0.19	0.15	0.18	0.01	94.55	3.13	353.37	0.06	0 12:08	0.00	0.00
22	CB-7	0.32	0.32	N/A	N/A	N/A	4.42	350.32	-0.34	0 19:29	0.00	0.00
23	EX_CB-1	0.70	0.70	0.55	0.15	78.78	4.72	356.39	0.09	0 12:08	0.00	0.00
24	EX_CB-12	0.22	0.12	0.20	0.01	94.80	3.07	348.25	0.06	0 12:07	0.00	0.00
25	EX_CB-19	0.00	0.00	N/A	N/A	N/A	1.00	350.74	0.08	0 00:00	0.00	0.00
26	EX_CB-27	0.36	0.32	0.32	0.04	89.25	3.64	356.48	0.07	0 12:07	0.00	0.00
27	EX_CB-9	0.13	0.01	N/A	N/A	N/A	2.91	346.14	0.12	0 12:09	0.00	0.00
28	LB-01	0.01	0.01	N/A	N/A	N/A	1.40	344.06	0.01	0 13:50	0.00	0.00

Project Description

File Name ..... SSA Analysis - PROP.SPF

Rainfall Details

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
49		Time Series	10-yr	Cumulative	inches	Massachusetts	Franklin	10.00	4.30	SCS Type III 24-hr

Node Summary

SN	Element ID	Element Type	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Initial Water Elevation (ft)	Surcharge Elevation (ft)	Ponded Area (ft^2)	Peak Inflow (cfs)	Max HGL Elevation Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	Bald_Mtn	Junction	368.00	375.00	368.00	375.00	0.00	6.36	375.00	0.00	0.00	0 12:16	0.07	8.00
2	CB-36	Junction	361.42	366.73	361.42	366.73	10.00	0.18	361.58	0.00	5.15	0 00:00	0.00	0.00
3	CB-38	Junction	361.20	364.26	361.20	364.26	10.00	0.00	361.20	0.00	3.06	0 00:00	0.00	0.00
4	DHM-41	Junction	363.80	378.08	363.80	378.08	0.00	7.79	366.57	0.00	11.51	0 00:00	0.00	0.00
5	DI-1	Junction	368.20	371.60	368.20	371.60	10.00	1.25	374.26	2.66	0.00	0 12:09	0.01	17.00
6	DI-47	Junction	372.40	376.45	372.40	376.45	10.00	0.15	374.20	0.00	2.25	0 00:00	0.00	0.00
7	DMH-13	Junction	345.20	349.70	345.20	349.70	0.00	0.64	345.62	0.00	4.08	0 00:00	0.00	0.00
8	DMH-17	Junction	340.70	347.56	340.70	347.56	10.00	6.50	341.90	0.00	5.66	0 00:00	0.00	0.00
9	DMH-19A	Junction	342.80	347.51	342.80	347.51	0.00	1.26	343.15	0.00	4.36	0 00:00	0.00	0.00
10	DMH-2	Junction	350.80	356.28	350.80	356.28	0.00	1.37	351.18	0.00	5.10	0 00:00	0.00	0.00
11	DMH-22	Junction	347.30	351.92	347.30	351.92	10.00	2.39	347.55	0.00	4.37	0 00:00	0.00	0.00
12	DMH-27	Junction	354.10	358.87	354.10	358.87	10.00	0.66	354.41	0.00	4.46	0 00:00	0.00	0.00
13	DMH-28	Junction	353.50	358.65	353.50	358.65	10.00	1.34	353.83	0.00	4.82	0 00:00	0.00	0.00
14	DMH-30A	Junction	358.90	369.12	358.90	369.12	0.00	8.27	359.33	0.00	9.79	0 00:00	0.00	0.00
15	DMH-33A	Junction	361.50	374.69	361.50	374.69	0.00	7.91	366.27	0.00	8.42	0 00:00	0.00	0.00
16	DMH-37	Junction	360.84	368.44	360.84	368.44	0.00	0.52	361.05	0.00	7.39	0 00:00	0.00	0.00
17	DMH-39	Junction	359.10	365.20	359.10	365.20	0.00	0.52	359.30	0.00	5.90	0 00:00	0.00	0.00
18	DMH-4	Junction	349.43	352.93	349.43	352.93	0.00	0.65	349.75	0.00	3.18	0 00:00	0.00	0.00
19	DMH-40A	Junction	357.80	363.55	357.80	365.55	0.00	0.52	357.98	0.00	5.57	0 00:00	0.00	0.00
20	DMH-43A	Junction	373.90	379.98	373.90	379.98	0.00	0.17	374.14	0.00	5.84	0 00:00	0.00	0.00
21	DMH-46	Junction	372.20	378.56	372.20	378.56	0.00	0.50	374.20	0.00	4.36	0 00:00	0.00	0.00
22	DMH-6	Junction	348.76	353.36	348.76	353.36	0.00	2.31	349.30	0.00	4.06	0 00:00	0.00	0.00
23	DMH-8	Junction	344.66	350.88	344.66	350.88	0.00	2.93	345.61	0.00	5.27	0 00:00	0.00	0.00
24	DMH-9	Junction	339.68	349.50	339.68	349.50	0.00	3.71	342.63	0.00	6.87	0 00:00	0.00	0.00
25	EX_CB-16	Junction	340.70	344.05	340.70	344.05	0.00	0.23	340.88	0.00	3.17	0 00:00	0.00	0.00
26	EX_CB-16A	Junction	342.00	346.00	342.00	346.00	10.00	0.06	342.07	0.00	3.93	0 00:00	0.00	0.00
27	EX_CB-28	Junction	342.40	348.24	342.40	348.24	10.00	0.00	342.45	0.00	5.79	0 00:00	0.00	0.00
28	EX_CB-33	Junction	373.40	378.68	373.40	378.68	10.00	0.54	373.64	0.00	5.04	0 00:00	0.00	0.00
29	EX_CB-34	Junction	375.40	380.10	375.40	380.10	10.00	0.37	375.58	0.00	4.52	0 00:00	0.00	0.00
30	EX_CB-34A	Junction	378.00	382.00	378.00	382.00	0.00	0.00	378.02	0.00	3.98	0 00:00	0.00	0.00
31	EX_DMH-10	Junction	367.30	377.69	367.30	377.69	0.00	7.34	374.20	0.00	3.49	0 00:00	0.00	0.00
32	EX_DMH-6	Junction	350.30	356.18	350.30	356.18	0.00	0.96	350.54	0.00	5.64	0 00:00	0.00	0.00
33	EX_DMH-7	Junction	342.20	348.55	342.20	348.55	0.00	0.96	342.44	0.00	6.11	0 00:00	0.00	0.00
34	EX_DMH-9	Junction	365.10	380.10	365.10	380.10	0.00	7.17	370.08	0.00	10.02	0 00:00	0.00	0.00
35	Fallriver_Junction	Junction	325.00	331.00	325.00	331.00	0.00	14.57	325.65	0.00	19.35	0 00:00	0.00	0.00
36	I-91_Culvert-Out	Junction	330.50	340.00	330.00	340.00	0.00	8.27	331.44	0.00	8.56	0 00:00	0.00	0.00
37	LB-02	Junction	343.19	348.42	343.19	348.42	0.00	43.20	348.42	0.00	0.00	0 15:22	13.36	47.00
38	Outfall-11	Junction	338.96	339.96	338.96	339.96	0.00	3.71	339.33	0.00	0.63	0 00:00	0.00	0.00
39	Outfall-15	Junction	322.35	323.35	322.35	323.35	0.00	0.47	339.90	0.00	0.91	0 00:00	0.00	0.00
40	Outfall-15A	Junction	328.00	329.00	328.00	329.00	0.00	4.36	336.37	0.00	0.42	0 00:00	0.00	0.00
41	Outfall-1E	Junction	333.54	339.54	333.54	339.54	0.00	8.27	334.37	0.00	5.17	0 00:00	0.00	0.00
42	Outfall-24	Junction	336.46	342.46	336.46	342.46	0.00	2.39	336.76	0.00	5.70	0 00:00	0.00	0.00
43	RampCulvert-In	Junction	328.72	340.00	328.72	340.00	0.00	9.50	329.88	0.00	10.12	0 00:00	0.00	0.00
44	RampCulvert-Out	Junction	327.58	340.00	327.58	340.00	0.00	9.43	328.01	0.00	11.99	0 00:00	0.00	0.00
45	Bypass_Outfall-1	Outfall	351.50					0.10	351.54					
46	Bypass_Outfall-2	Outfall	375.40					0.15	375.46					
47	Outfall-1	Outfall	324.50					14.39	325.11					
48	Outfall-2	Outfall	336.00					0.96	336.24					

Junction Results

SN	Element ID	Peak Inflow (cfs)	Peak Lateral Inflow (cfs)	Max HGL Elevation Attained (ft)	Max HGL Depth Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Average HGL Elevation Attained (ft)	Average HGL Depth Attained (ft)	Time of Max HGL Occurrence (days hh:mm)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	Bald_Mtn	6.36	6.36	375.00	7.00	0.00	0.00	368.56	0.56	0 12:13	0 12:16	0.07	8.00
2	CB-36	0.18	0.18	361.58	0.16	0.00	5.15	361.43	0.01	0 12:14	0 00:00	0.00	0.00
3	CB-38	0.00	0.00	361.20	0.00	0.00	3.06	361.20	0.00	0 00:00	0 00:00	0.00	0.00
4	DHM-41	7.79	0.00	366.57	2.77	0.00	11.51	363.89	0.09	0 12:17	0 00:00	0.00	0.00
5	DI-1	1.25	1.25	374.26	6.06	2.66	0.00	368.30	0.10	0 12:16	0 12:09	0.01	17.00
6	DI-47	0.15	0.00	374.20	1.80	0.00	2.25	372.71	0.31	0 12:16	0 00:00	0.00	0.00
7	DMH-13	0.64	0.00	345.62	0.42	0.00	4.08	345.22	0.02	0 12:09	0 00:00	0.00	0.00
8	DMH-17	6.50	0.00	341.90	1.20	0.00	5.66	340.79	0.09	2 02:18	0 00:00	0.00	0.00
9	DMH-19A	1.26	0.00	343.15	0.35	0.00	4.36	342.83	0.03	0 12:08	0 00:00	0.00	0.00
10	DMH-2	1.37	0.00	351.18	0.38	0.00	5.10	350.83	0.03	0 12:09	0 00:00	0.00	0.00
11	DMH-22	2.39	0.00	347.55	0.25	0.00	4.37	347.32	0.02	0 12:07	0 00:00	0.00	0.00
12	DMH-27	0.66	0.00	354.41	0.31	0.00	4.46	354.13	0.03	0 12:07	0 00:00	0.00	0.00
13	DMH-28	1.34	0.00	353.83	0.33	0.00	4.82	353.53	0.03	0 12:07	0 00:00	0.00	0.00
14	DMH-30A	8.27	0.00	359.33	0.43	0.00	9.79	358.94	0.04	0 12:16	0 00:00	0.00	0.00
15	DMH-33A	7.91	0.00	366.27	4.77	0.00	8.42	361.59	0.09	0 12:10	0 00:00	0.00	0.00
16	DMH-37	0.52	0.00	361.05	0.21	0.00	7.39	360.86	0.02	0 12:09	0 00:00	0.00	0.00
17	DMH-39	0.52	0.00	359.30	0.20	0.00	5.90	359.12	0.02	0 12:09	0 00:00	0.00	0.00
18	DMH-4	0.65	0.00	349.75	0.32	0.00	3.18	349.45	0.02	0 12:08	0 00:00	0.00	0.00
19	DMH-40A	0.52	0.00	357.98	0.18	0.00	5.57	357.82	0.02	0 12:09	0 00:00	0.00	0.00
20	DMH-43A	0.17	0.00	374.14	0.24	0.00	5.84	373.92	0.02	0 12:11	0 00:00	0.00	0.00
21	DMH-46	0.50	0.00	374.20	2.00	0.00	4.36	372.71	0.51	0 12:16	0 00:00	0.00	0.00
22	DMH-6	2.31	0.00	349.30	0.54	0.00	4.06	348.80	0.04	0 12:08	0 00:00	0.00	0.00
23	DMH-8	2.93	0.00	345.61	0.95	0.00	5.27	344.71	0.05	0 12:09	0 00:00	0.00	0.00
24	DMH-9	3.71	0.00	342.63	2.95	0.00	6.87	341.58	1.90	0 12:08	0 00:00	0.00	0.00
25	EX_CB-16	0.23	0.00	340.88	0.18	0.00	3.17	340.72	0.02	0 12:33	0 00:00	0.00	0.00
26	EX_CB-16A	0.06	0.06	342.07	0.07	0.00	3.93	342.01	0.01	0 12:48	0 00:00	0.00	0.00
27	EX_CB-28	0.00	0.00	342.45	0.05	0.00	5.79	342.40	0.00	0 12:09	0 00:00	0.00	0.00
28	EX_CB-33	0.54	0.00	373.64	0.24	0.00	5.04	373.42	0.02	0 12:11	0 00:00	0.00	0.00
29	EX_CB-34	0.37	0.37	375.58	0.18	0.00	4.52	375.41	0.01	0 12:11	0 00:00	0.00	0.00
30	EX_CB-34A	0.00	0.00	378.02	0.02	0.00	3.98	378.00	0.00	0 15:41	0 00:00	0.00	0.00
31	EX_DMH-10	7.34	0.00	374.20	6.90	0.00	3.49	367.45	0.15	0 12:16	0 00:00	0.00	0.00
32	EX_DMH-6	0.96	0.00	350.54	0.24	0.00	5.64	350.32	0.02	0 12:09	0 00:00	0.00	0.00
33	EX_DMH-7	0.96	0.00	342.44	0.24	0.00	6.11	342.22	0.02	0 12:09	0 00:00	0.00	0.00
34	EX_DMH-9	7.17	0.00	370.08	4.98	0.00	10.02	365.24	0.14	0 12:17	0 00:00	0.00	0.00
35	Fallriver_Junction	14.57	0.00	325.65	0.65	0.00	19.35	325.06	0.06	0 12:12	0 00:00	0.00	0.00
36	I-91_Culvert-Out	8.27	0.00	331.44	0.94	0.00	8.56	330.57	0.07	0 12:18	0 00:00	0.00	0.00
37	LB-02	43.20	0.00	348.42	5.23	0.00	0.00	343.91	0.72	0 03:16	0 15:22	13.36	47.00
38	Outfall-11	3.71	0.00	339.33	0.37	0.00	0.63	338.98	0.02	0 12:08	0 00:00	0.00	0.00
39	Outfall-15	0.47	0.00	339.90	17.55	0.00	0.91	337.26	14.91	0 12:25	0 00:00	0.00	0.00
40	Outfall-15A	4.36	0.00	336.37	8.37	0.00	0.42	335.54	7.54	2 12:58	0 00:00	0.00	0.00
41	Outfall-1E	8.27	0.00	334.37	0.83	0.00	5.17	333.61	0.07	0 12:16	0 00:00	0.00	0.00
42	Outfall-24	2.39	0.00	336.76	0.30	0.00	5.70	336.48	0.02	0 12:07	0 00:00	0.00	0.00
43	RampCulvert-In	9.50	0.00	329.88	1.16	0.00	10.12	328.82	0.10	0 12:17	0 00:00	0.00	0.00
44	RampCulvert-Out	9.43	0.00	328.01	0.43	0.00	11.99	327.61	0.03	0 12:19	0 00:00	0.00	0.00

Channel Results

SN	Element ID	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Travel Time (min)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Froude Number	Reported Condition
1	1D-Culvert	2.39	0 12:07	168.37	0.01	1.56	2.28	0.68	0.23	0.00		
2	CB-1_bypass	0.16	0 12:11	49.28	0.00	2.10	0.80	0.05	0.11	0.00		
3	CB-10_bypass	0.06	0 12:08	29.56	0.00	0.79	5.32	0.09	0.18	0.00		
4	CB-20_bypass	0.26	0 12:07	139.14	0.00	0.34	3.57	0.05	0.10	0.00		
5	CB-21_bypass	0.15	0 12:07	39.20	0.00	1.75	1.59	0.06	0.12	0.00		
6	CB-24_bypass	0.12	0 12:07	55.10	0.00	1.08	5.47	0.05	0.10	0.00		
7	CB-25A_bypass	0.10	0 12:07	33.93	0.00	2.40	1.93	0.04	0.08	0.00		
8	CB-26_bypass	0.22	0 12:07	48.66	0.00	1.91	1.81	0.07	0.13	0.00		
9	CB-27_bypass	0.03	0 12:07	51.26	0.00	0.60	9.73	0.05	0.10	0.00		
10	CB-29_bypass	0.17	0 12:07	60.04	0.00	2.78	0.54	0.05	0.10	0.00		
11	CB-29A_bypass	0.20	0 12:07	53.94	0.00	1.99	1.70	0.06	0.13	0.00		
12	CB-3_bypass	0.16	0 12:09	37.38	0.00	2.98	1.07	0.04	0.09	0.00		
13	CB-35_bypass	0.07	0 12:07	62.14	0.00	1.63	3.02	0.04	0.08	0.00		
14	CB-42A_bypass	0.04	0 12:07	40.82	0.00	1.26	4.51	0.04	0.07	0.00		
15	CB-44_bypass	0.05	0 12:10	36.52	0.00	1.00	4.86	0.05	0.10	0.00		
16	CB-45_bypass	0.15	0 12:07	48.31	0.00	1.82	0.84	0.06	0.12	0.00		
17	CB-5_bypass	0.07	0 12:09	32.25	0.00	1.12	3.32	0.05	0.10	0.00		
18	CB-8A_bypass	0.34	0 11:10	227.39	0.00	0.00		0.01	0.02	0.00		
19	Cobble_Waterway	8.24	0 12:18	104.81	0.08	1.93	3.14	1.05	0.35	0.00		
20	EX_CB-1_bypass	0.37	0 12:08	48.49	0.01	2.22	0.95	0.08	0.16	0.00		
21	EX_CB-12_bypass	0.05	0 12:07	21.59	0.00	0.57	3.64	0.11	0.21	0.00		
22	EX_CB-27_bypass	0.10	0 12:07	61.14	0.00	2.03	0.85	0.04	0.09	0.00		
23	FallRiver	14.39	0 12:12	8532.83	0.00	2.15	0.78	0.63	0.03	0.00		
24	FR-1	3.71	0 12:08	24.45	0.15	5.49	0.26	0.50	0.50	0.00		
25	FR2	0.30	0 12:25	19.71	0.02	0.88	2.62	0.35	0.35	0.00		
26	FR3	9.41	0 12:19	2308.05	0.00	1.70	3.71	0.53	0.05	0.00		
27	FR4	4.27	2 12:58	21.11	0.20	10.40	0.14	0.50	0.50	0.00		

Pipe Results

SN	Element ID	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Travel Time (min)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Froude Number	Reported Condition
1	CB20-LB02	46.37	1 00:17	0.80	58.20	50.00	0.00	1.00	1.00	83.00		SURCHARGED
2	DMH22-OUT24	2.39	0 12:07	19.28	0.12	13.51	0.05	0.28	0.28	0.00		Calculated
3	I-91-Culvert	8.27	0 12:16	25.46	0.32	6.24	0.64	0.88	0.44	0.00		Calculated
4	LB01-EX_CB-48	0.20	0 12:25	5.04	0.04	2.60	0.03	0.15	0.15	0.00		Calculated
5	p10-9	0.32	0 12:08	6.45	0.05	3.92	0.08	0.16	0.16	0.00		Calculated
6	p1-10	1.41	0 12:26	4.42	0.32	3.53	0.09	1.00	1.00	23.00		SURCHARGED
7	p1-2	0.55	0 12:11	6.87	0.08	4.18	0.03	0.23	0.23	0.00		Calculated
8	p12-8	0.64	0 12:08	9.43	0.07	4.87	0.01	0.22	0.22	0.00		Calculated
9	p13-8	0.63	0 12:08	3.56	0.18	1.76	0.42	0.64	0.64	0.00		Calculated
10	p14-Out	0.47	0 12:09	13.09	0.04	1.03	2.18	0.56	0.56	0.00		Calculated
11	p15B-Out	4.36	1 00:37	12.79	0.34	6.68	0.22	0.78	0.78	0.00		Calculated
12	p16-17	0.79	0 12:08	3.56	0.22	3.26	0.13	0.35	0.35	0.00		Calculated
13	p17-15B	4.50	2 05:04	5.06	0.89	6.66	0.12	0.87	0.87	0.00		Calculated
14	p18-19A	0.98	0 12:08	15.13	0.06	6.63	0.01	0.24	0.24	0.00		Calculated
15	p19-17	1.26	0 12:08	5.58	0.23	5.41	0.16	0.40	0.40	0.00		Calculated
16	p19-22	0.00	0 15:44	4.17	0.00	0.92	1.59	0.01	0.01	0.00		Calculated
17	p20-17	6.50	2 02:18	3.56	1.82	8.27	0.15	0.99	1.00	1.00		SURCHARGED
18	p21-22	0.53	0 12:07	4.60	0.11	3.15	0.03	0.27	0.27	0.00		Calculated
19	p25-18	0.53	0 12:07	4.46	0.12	3.61	0.24	0.24	0.24	0.00		Calculated
20	p2-6	1.37	0 12:09	4.82	0.28	4.60	0.38	0.41	0.41	0.00		Calculated
21	p26-27	0.66	0 12:07	3.56	0.19	3.09	0.11	0.32	0.32	0.00		Calculated
22	p27-28	0.66	0 12:07	3.78	0.18	3.37	0.22	0.30	0.30	0.00		Calculated
23	p28-22	1.34	0 12:07	6.07	0.22	6.06	0.55	0.32	0.32	0.00		Calculated
24	p29-28	0.68	0 12:07	4.60	0.15	3.36	0.03	0.30	0.30	0.00		Calculated
25	p30-Out	8.27	0 12:16	32.53	0.25	13.36	0.12	0.63	0.50	0.00		Calculated
26	p31-30	0.17	0 12:07	6.28	0.03	3.39	0.22	0.12	0.12	0.00		Calculated
27	p32-30	0.50	0 12:07	3.79	0.13	3.09	0.17	0.26	0.26	0.00		Calculated
28	p33-30	7.91	0 12:16	6.94	1.14	6.59	0.50	1.18	0.94	0.00		> CAPACITY
29	p3-4	0.65	0 12:08	13.68	0.05	6.41	0.01	0.19	0.19	0.00		Calculated
30	p34-33	0.58	0 12:07	17.46	0.03	7.61	0.08	0.56	0.56	0.00		Calculated
31	p35-37	0.40	0 12:07	7.71	0.05	5.02	0.21	0.16	0.16	0.00		Calculated
32	p36-37	0.18	0 12:14	3.72	0.05	2.37	0.31	0.15	0.15	0.00		Calculated
33	p37-39	0.52	0 12:09	6.21	0.08	4.60	0.20	0.20	0.20	0.00		Calculated
34	p38-39	0.00	0 00:00	7.97	0.00	0.00		0.00	0.00	0.00		Calculated
35	p39-40	0.52	0 12:09	8.16	0.06	5.27	0.06	0.18	0.18	0.00		Calculated
36	p40-EX6	0.52	0 12:09	7.44	0.07	4.36	0.66	0.21	0.21	0.00		Calculated
37	p41-33	7.60	0 12:18	7.76	0.98	6.19	0.41	1.25	1.00	18.00		SURCHARGED
38	p41-9	7.17	0 12:14	5.26	1.36	5.85	0.86	1.25	1.00	28.00		SURCHARGED
39	p42-41	0.17	0 12:07	3.46	0.05	2.11	0.13	0.16	0.16	0.00		Calculated
40	p43-EX33	0.17	0 12:11	0.33	0.51	1.43	0.14	0.20	0.20	0.00		Calculated
41	p44-43	0.17	0 12:10	3.65	0.05	2.31	0.56	0.15	0.15	0.00		Calculated
42	p45-46	0.46	0 12:07	5.63	0.08	3.33	0.02	0.63	0.63	0.00		Calculated
43	p4-6	0.65	0 12:08	3.78	0.17	3.22	0.12	0.30	0.30	0.00		Calculated
44	p46-10	0.57	0 12:25	37.16	0.02	6.89	0.09	1.50	1.00	0.00		Calculated
45	p47-46	0.15	0 12:11	5.22	0.03	0.39	0.30	1.00	1.00	12.00		SURCHARGED
46	p5-6	0.30	0 12:09	18.34	0.02	6.80	0.01	0.12	0.12	0.00		Calculated
47	p6-8	2.31	0 12:08	4.65	0.50	5.63	0.41	0.52	0.52	0.00		Calculated
48	p7-9	1.37	0 12:28	3.63	0.38	1.75	0.48	1.00	1.00	4012.00		SURCHARGED
49	p8-9	2.93	0 12:09	3.56	0.82	4.25	0.09	0.82	0.82	0.00		Calculated
50	p9-Out	3.71	0 12:08	6.99	0.53	9.43	0.14	0.50	0.50	0.00		Calculated
51	pBMtn-10	6.24	0 12:13	8.42	0.74	5.08	0.21	1.25	1.00	22.00		SURCHARGED
52	pEX_DMH-9-41	7.17	0 12:14	4.28	1.68	5.86	0.71	1.25	1.00	17.00		SURCHARGED
53	pEX1-2	0.84	0 12:08	5.62	0.15	4.68	0.14	0.28	0.28	0.00		Calculated
54	pEX12-19	0.28	0 12:07	1.52	0.18	1.65	1.11	0.27	0.27	0.00		Calculated
55	pEX16-15B	0.23	0 12:33	3.34	0.07	2.37	0.80	0.23	0.24	0.00		Calculated
56	pEX16A-EX16	0.06	0 12:48	5.05	0.01	1.29	0.84	0.12	0.12	0.00		Calculated
57	pEX27-EX6	0.46	0 12:07	5.22	0.09	3.82	0.14	0.21	0.21	0.00		Calculated
58	pEX28-EX7	0.00	0 12:03	1.92	0.00	0.14	4.09	0.09	0.09	0.00		Calculated
59	pEX33-41	0.54	0 12:11	7.52	0.07	3.44	0.43	0.23	0.19	0.00		Calculated
60	pEX34A-EX34	0.00	0 15:41	5.55	0.00	1.06	1.23	0.01	0.01	0.00		Calculated
61	pEX34-EX33	0.37	0 12:11	5.60	0.07	3.89	0.26	0.18	0.18	0.00		Calculated
62	pEX6-EX7(MH)	0.96	0 12:09	7.94	0.12	6.69	0.39	0.24	0.24	0.00		Calculated
63	pEX7(MH)-Out	0.96	0 12:09	7.85	0.12	6.62	0.32	0.24	0.24	0.00		Calculated
64	pEX9-15B	0.26	0 12:11	7.74	0.03	4.34	0.11	0.13	0.13	0.00		Calculated

Pipe Results

SN	Element ID	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Travel Time (min)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Froude Number	Reported Condition
65	Ramp_Culvert	9.43	0 12:18	20.87	0.45	8.11	0.28	0.79	0.40	0.00		Calculated

Inlet Results

SN	Element ID	Peak Flow (cfs)	Peak Lateral Inflow (cfs)	Peak Flow Intercepted by Inlet (cfs)	Peak Flow Bypassing Inlet (cfs)	Inlet Efficiency during Peak Flow (%)	Max Gutter Spread during Peak Flow (ft)	Max Gutter Water Elev. during Peak Flow (ft)	Max Gutter Water Depth during Peak Flow (ft)	Time of Max Depth Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	CB-1	0.71	0.71	0.56	0.15	78.56	4.75	356.35	0.09	0 12:11	0.00	0.00
2	CB-10	0.39	0.32	0.34	0.05	87.12	4.25	350.46	0.09	0 12:08	0.00	0.00
3	CB-12A	0.89	0.74	0.61	0.28	68.47	6.37	349.61	0.13	0 12:08	0.00	0.00
4	CB-14	0.27	0.27	N/A	N/A	N/A	4.07	344.09	-0.48	0 12:09	0.00	0.00
5	CB-15B	0.37	0.37	N/A	N/A	N/A	4.72	345.83	0.16	2 12:57	0.00	0.00
6	CB-16	0.80	0.73	N/A	N/A	N/A	7.25	347.71	0.13	0 12:08	0.00	0.00
7	CB-18	0.99	0.93	N/A	N/A	N/A	8.21	347.63	0.14	0 12:08	0.00	0.00
8	CB-20	0.88	0.78	0.60	0.28	68.62	6.36	348.05	0.13	1 09:04	0.00	0.00
9	CB-21	0.68	0.48	0.49	0.18	72.79	5.78	351.56	0.12	0 12:07	0.00	0.00
10	CB-25	0.63	0.41	0.51	0.12	80.37	4.56	351.86	0.09	0 12:07	0.00	0.00
11	CB-26	0.88	0.85	0.66	0.22	75.02	5.14	358.09	0.10	0 12:07	0.00	0.00
12	CB-29A	0.87	0.76	0.66	0.22	75.15	5.13	359.01	0.10	0 12:07	0.00	0.00
13	CB-3	0.79	0.42	0.59	0.21	73.92	5.37	352.83	0.11	0 12:08	0.00	0.00
14	CB-31A	0.20	0.20	0.20	0.01	95.53	2.98	369.71	0.06	0 12:07	0.00	0.00
15	CB-32A	0.62	0.58	0.50	0.12	80.80	4.51	370.14	0.09	0 12:07	0.00	0.00
16	CB-34A	0.75	0.71	0.58	0.17	77.64	4.85	375.05	0.10	0 12:07	0.00	0.00
17	CB-35	0.47	0.30	0.41	0.06	86.64	3.89	370.92	0.08	0 12:07	0.00	0.00
18	CB-42A	0.21	0.21	0.19	0.02	91.93	3.46	377.31	0.07	0 12:07	0.00	0.00
19	CB-44	0.21	0.21	0.19	0.02	89.99	3.75	379.95	0.08	0 12:10	0.00	0.00
20	CB-45	0.61	0.61	0.47	0.15	76.30	5.18	378.22	0.10	0 12:16	0.00	0.00
21	CB-5	0.37	0.23	0.32	0.05	85.90	4.05	353.39	0.08	0 12:08	0.00	0.00
22	CB-7	0.48	0.48	N/A	N/A	N/A	5.47	350.34	-0.32	1 00:32	0.00	0.00
23	EX_CB-1	1.21	1.21	0.85	0.37	69.76	5.78	356.42	0.12	0 12:08	0.00	0.00
24	EX_CB-12	0.33	0.18	0.30	0.03	89.75	3.60	348.26	0.07	0 12:07	0.00	0.00
25	EX_CB-19	0.00	0.00	N/A	N/A	N/A	1.10	350.75	0.09	0 15:40	0.00	0.00
26	EX_CB-27	0.55	0.48	0.46	0.09	83.06	4.27	356.50	0.09	0 12:07	0.00	0.00
27	EX_CB-9	0.30	0.18	N/A	N/A	N/A	4.25	346.17	0.15	0 12:11	0.00	0.00
28	LB-01	0.20	0.20	N/A	N/A	N/A	3.49	344.10	0.05	0 12:25	0.00	0.00

Project Description

File Name ..... SSA Analysis - PROP.SPF

Rainfall Details

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
49		Time Series	100-yr	Cumulative	inches	Massachusetts	Franklin	100.00	6.53	SCS Type III 24-hr

Node Summary

SN	Element ID	Element Type	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Initial Water Elevation (ft)	Surcharge Elevation (ft)	Ponded Area (ft^2)	Peak Inflow (cfs)	Max HGL Elevation Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	Bald_Mtn	Junction	368.00	375.00	368.00	375.00	0.00	13.89	375.00	0.00	0.00	0 12:14	3.70	37.00
2	CB-36	Junction	361.42	366.73	361.42	366.73	10.00	1.08	361.84	0.00	4.89	0 00:00	0.00	0.00
3	CB-38	Junction	361.20	364.26	361.20	364.26	10.00	0.02	361.24	0.00	3.02	0 00:00	0.00	0.00
4	DHM-41	Junction	363.80	378.08	363.80	378.08	0.00	8.15	367.90	0.00	10.18	0 00:00	0.00	0.00
5	DI-1	Junction	368.20	371.60	368.20	371.60	10.00	3.05	375.11	3.51	0.00	0 11:59	0.02	44.00
6	DI-47	Junction	372.40	376.45	372.40	376.45	10.00	0.21	374.73	0.00	1.72	0 00:00	0.00	0.00
7	DMH-13	Junction	345.20	349.70	345.20	349.70	0.00	1.08	346.58	0.00	3.12	0 00:00	0.00	0.00
8	DMH-17	Junction	340.70	347.56	340.70	347.56	10.00	6.50	341.90	0.00	5.66	0 00:00	0.00	0.00
9	DMH-19A	Junction	342.80	347.51	342.80	347.51	0.00	2.02	343.26	0.00	4.25	0 00:00	0.00	0.00
10	DMH-2	Junction	350.80	356.28	350.80	356.28	0.00	2.26	351.30	0.00	4.98	0 00:00	0.00	0.00
11	DMH-22	Junction	347.30	351.92	347.30	351.92	10.00	3.61	347.62	0.00	4.30	0 00:00	0.00	0.00
12	DMH-27	Junction	354.10	358.87	354.10	358.87	10.00	0.92	354.48	0.00	4.39	0 00:00	0.00	0.00
13	DMH-28	Junction	353.50	358.65	353.50	358.65	10.00	1.94	353.90	0.00	4.75	0 00:00	0.00	0.00
14	DMH-30A	Junction	358.90	369.12	358.90	369.12	0.00	9.83	359.37	0.00	9.75	0 00:00	0.00	0.00
15	DMH-33A	Junction	361.50	374.69	361.50	374.69	0.00	8.89	369.00	0.00	5.69	0 00:00	0.00	0.00
16	DMH-37	Junction	360.84	368.44	360.84	368.44	0.00	1.72	361.25	0.00	7.19	0 00:00	0.00	0.00
17	DMH-39	Junction	359.10	365.20	359.10	365.20	0.00	1.73	359.50	0.00	5.70	0 00:00	0.00	0.00
18	DMH-4	Junction	349.43	352.93	349.43	352.93	0.00	1.15	349.89	0.00	3.04	0 00:00	0.00	0.00
19	DMH-40A	Junction	357.80	363.55	357.80	365.55	0.00	1.73	358.13	0.00	5.42	0 00:00	0.00	0.00
20	DMH-43A	Junction	373.90	379.98	373.90	379.98	0.00	0.43	374.28	0.00	5.70	0 00:00	0.00	0.00
21	DMH-46	Junction	372.20	378.56	372.20	378.56	0.00	0.90	374.73	0.00	3.83	0 00:00	0.00	0.00
22	DMH-6	Junction	348.76	353.36	348.76	353.36	0.00	4.11	349.59	0.00	3.77	0 00:00	0.00	0.00
23	DMH-8	Junction	344.66	350.88	344.66	350.88	0.00	5.16	346.52	0.00	4.36	0 00:00	0.00	0.00
24	DMH-9	Junction	339.68	349.50	339.68	349.50	0.00	6.41	344.15	0.00	5.35	0 00:00	0.00	0.00
25	EX_CB-16	Junction	340.70	344.05	340.70	344.05	0.00	1.69	341.24	0.00	2.81	0 00:00	0.00	0.00
26	EX_CB-16A	Junction	342.00	346.00	342.00	346.00	10.00	0.85	342.28	0.00	3.72	0 00:00	0.00	0.00
27	EX_CB-28	Junction	342.40	348.24	342.40	348.24	10.00	0.02	342.60	0.00	5.64	0 00:00	0.00	0.00
28	EX_CB-33	Junction	373.40	378.68	373.40	378.68	10.00	1.23	373.77	0.00	4.91	0 00:00	0.00	0.00
29	EX_CB-34	Junction	375.40	380.10	375.40	380.10	10.00	0.78	375.67	0.00	4.43	0 00:00	0.00	0.00
30	EX_CB-34A	Junction	378.00	382.00	378.00	382.00	0.00	0.04	378.06	0.00	3.94	0 00:00	0.00	0.00
31	EX_DMH-10	Junction	367.30	377.69	367.30	377.69	0.00	7.44	374.73	0.00	2.96	0 00:00	0.00	0.00
32	EX_DMH-6	Junction	350.30	356.18	350.30	356.18	0.00	2.37	350.69	0.00	5.49	0 00:00	0.00	0.00
33	EX_DMH-7	Junction	342.20	348.55	342.20	348.55	0.00	2.37	342.60	0.00	5.95	0 00:00	0.00	0.00
34	EX_DMH-9	Junction	365.10	380.10	365.10	380.10	0.00	7.23	371.04	0.00	9.06	0 00:00	0.00	0.00
35	Fallriver_Junction	Junction	325.00	331.00	325.00	331.00	0.00	27.44	325.97	0.00	19.03	0 00:00	0.00	0.00
36	I-91_Culvert-Out	Junction	330.50	340.00	330.00	340.00	0.00	9.83	331.52	0.00	8.48	0 00:00	0.00	0.00
37	LB-02	Junction	343.19	348.42	343.19	348.42	0.00	42.49	348.42	0.00	0.00	0 09:24	10.81	39.00
38	Outfall-11	Junction	338.96	339.96	338.96	339.96	0.00	6.37	339.46	0.00	0.50	0 00:00	0.00	0.00
39	Outfall-15	Junction	322.35	323.35	322.35	323.35	0.00	1.60	340.07	0.00	0.74	0 00:00	0.00	0.00
40	Outfall-15A	Junction	328.00	329.00	328.00	329.00	0.00	6.54	336.37	0.00	0.42	0 00:00	0.00	0.00
41	Outfall-1E	Junction	333.54	339.54	333.54	339.54	0.00	9.83	334.46	0.00	5.08	0 00:00	0.00	0.00
42	Outfall-24	Junction	336.46	342.46	336.46	342.46	0.00	3.61	336.84	0.00	5.62	0 00:00	0.00	0.00
43	RampCulvert-In	Junction	328.72	340.00	328.72	340.00	0.00	13.32	330.15	0.00	9.85	0 00:00	0.00	0.00
44	RampCulvert-Out	Junction	327.58	340.00	327.58	340.00	0.00	13.12	328.11	0.00	11.89	0 00:00	0.00	0.00
45	Bypass_Outfall-1	Outfall	351.50					0.21	351.56					
46	Bypass_Outfall-2	Outfall	375.40					0.29	375.47					
47	Outfall-1	Outfall	324.50					27.18	325.40					
48	Outfall-2	Outfall	336.00					2.37	336.38					

Junction Results

SN	Element ID	Peak Inflow (cfs)	Peak Lateral Inflow (cfs)	Max HGL Elevation Attained (ft)	Max HGL Depth Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Average HGL Elevation Attained (ft)	Average HGL Depth Attained (ft)	Time of Max HGL Occurrence (days hh:mm)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	Bald_Mtn	13.89	13.89	375.00	7.00	0.00	0.00	368.81	0.81	0 12:01	0 12:14	3.70	37.00
2	CB-36	1.08	1.08	361.84	0.42	0.00	4.89	361.45	0.03	0 12:10	0 00:00	0.00	0.00
3	CB-38	0.02	0.02	361.24	0.04	0.00	3.02	361.20	0.00	0 12:20	0 00:00	0.00	0.00
4	DHM-41	8.15	0.00	367.90	4.10	0.00	10.18	364.03	0.23	0 12:11	0 00:00	0.00	0.00
5	DI-1	3.05	3.05	375.11	6.91	3.51	0.00	368.54	0.34	0 12:14	0 11:59	0.02	44.00
6	DI-47	0.21	0.02	374.73	2.33	0.00	1.72	372.78	0.38	0 12:13	0 00:00	0.00	0.00
7	DMH-13	1.08	0.00	346.58	1.38	0.00	3.12	345.25	0.05	0 12:08	0 00:00	0.00	0.00
8	DMH-17	6.50	0.00	341.90	1.20	0.00	5.66	340.80	0.10	1 10:11	0 00:00	0.00	0.00
9	DMH-19A	2.02	0.00	343.26	0.46	0.00	4.25	342.84	0.04	0 12:07	0 00:00	0.00	0.00
10	DMH-2	2.26	0.00	351.30	0.50	0.00	4.98	350.85	0.05	0 12:08	0 00:00	0.00	0.00
11	DMH-22	3.61	0.00	347.62	0.32	0.00	4.30	347.33	0.03	0 12:07	0 00:00	0.00	0.00
12	DMH-27	0.92	0.00	354.48	0.38	0.00	4.39	354.14	0.04	0 12:07	0 00:00	0.00	0.00
13	DMH-28	1.94	0.00	353.90	0.40	0.00	4.75	353.54	0.04	0 12:07	0 00:00	0.00	0.00
14	DMH-30A	9.83	0.00	359.37	0.47	0.00	9.75	358.96	0.06	0 12:09	0 00:00	0.00	0.00
15	DMH-33A	8.89	0.00	369.00	7.50	0.00	5.69	361.71	0.21	0 12:00	0 00:00	0.00	0.00
16	DMH-37	1.72	0.00	361.25	0.41	0.00	7.19	360.87	0.03	0 12:09	0 00:00	0.00	0.00
17	DMH-39	1.73	0.00	359.50	0.40	0.00	5.70	359.13	0.03	0 12:09	0 00:00	0.00	0.00
18	DMH-4	1.15	0.00	349.89	0.46	0.00	3.04	349.46	0.03	0 12:08	0 00:00	0.00	0.00
19	DMH-40A	1.73	0.00	358.13	0.33	0.00	5.42	357.83	0.03	0 12:09	0 00:00	0.00	0.00
20	DMH-43A	0.43	0.00	374.28	0.38	0.00	5.70	373.93	0.03	0 12:10	0 00:00	0.00	0.00
21	DMH-46	0.90	0.00	374.73	2.53	0.00	3.83	372.78	0.58	0 12:13	0 00:00	0.00	0.00
22	DMH-6	4.11	0.00	349.59	0.83	0.00	3.77	348.82	0.06	0 12:08	0 00:00	0.00	0.00
23	DMH-8	5.16	0.00	346.52	1.86	0.00	4.36	344.76	0.10	0 12:08	0 00:00	0.00	0.00
24	DMH-9	6.41	0.00	344.15	4.47	0.00	5.35	341.64	1.96	0 12:09	0 00:00	0.00	0.00
25	EX_CB-16	1.69	0.00	341.24	0.54	0.00	2.81	340.75	0.05	0 12:22	0 00:00	0.00	0.00
26	EX_CB-16A	0.85	0.85	342.28	0.28	0.00	3.72	342.03	0.03	0 12:25	0 00:00	0.00	0.00
27	EX_CB-28	0.02	0.02	342.60	0.20	0.00	5.64	342.41	0.01	0 12:09	0 00:00	0.00	0.00
28	EX_CB-33	1.23	0.02	373.77	0.37	0.00	4.91	373.43	0.03	0 12:11	0 00:00	0.00	0.00
29	EX_CB-34	0.78	0.76	375.67	0.27	0.00	4.43	375.42	0.02	0 12:11	0 00:00	0.00	0.00
30	EX_CB-34A	0.04	0.04	378.06	0.06	0.00	3.94	378.01	0.01	0 12:23	0 00:00	0.00	0.00
31	EX_DMH-10	7.44	0.00	374.73	7.43	0.00	2.96	367.73	0.43	0 12:13	0 00:00	0.00	0.00
32	EX_DMH-6	2.37	0.00	350.69	0.39	0.00	5.49	350.34	0.04	0 12:09	0 00:00	0.00	0.00
33	EX_DMH-7	2.37	0.00	342.60	0.40	0.00	5.95	342.24	0.04	0 12:09	0 00:00	0.00	0.00
34	EX_DMH-9	7.23	0.00	371.04	5.94	0.00	9.06	365.46	0.36	0 12:11	0 00:00	0.00	0.00
35	Fallriver_Junction	27.44	0.00	325.97	0.97	0.00	19.03	325.10	0.10	0 12:11	0 00:00	0.00	0.00
36	I-91_Culvert-Out	9.83	0.00	331.52	1.02	0.00	8.48	330.62	0.12	0 12:10	0 00:00	0.00	0.00
37	LB-02	42.49	0.00	348.42	5.23	0.00	0.00	343.91	0.72	0 01:57	0 09:24	10.81	39.00
38	Outfall-11	6.37	0.00	339.46	0.50	0.00	0.50	339.00	0.04	0 12:09	0 00:00	0.00	0.00
39	Outfall-15	1.60	0.00	340.07	17.72	0.00	0.74	337.59	15.24	0 12:09	0 00:00	0.00	0.00
40	Outfall-15A	6.54	0.00	336.37	8.37	0.00	0.42	335.63	7.63	2 05:17	0 00:00	0.00	0.00
41	Outfall-1E	9.83	0.00	334.46	0.92	0.00	5.08	333.65	0.11	0 12:08	0 00:00	0.00	0.00
42	Outfall-24	3.61	0.00	336.84	0.38	0.00	5.62	336.49	0.03	0 12:07	0 00:00	0.00	0.00
43	RampCulvert-In	13.32	0.00	330.15	1.43	0.00	9.85	328.88	0.16	0 12:10	0 00:00	0.00	0.00
44	RampCulvert-Out	13.12	0.00	328.11	0.53	0.00	11.89	327.63	0.05	0 12:11	0 00:00	0.00	0.00

Channel Results

SN	Element ID	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Travel Time (min)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Froude Number	Reported Condition
1	1D-Culvert	3.61	0 12:07	168.37	0.02	1.52	2.34	0.90	0.30	0.00		
2	CB-1_bypass	0.57	0 12:10	49.28	0.01	2.98	0.56	0.09	0.17	0.00		
3	CB-10_bypass	0.11	0 12:08	29.56	0.00	0.80	5.25	0.12	0.24	0.00		
4	CB-20_bypass	0.48	0 12:07	139.14	0.00	0.25	4.85	0.17	0.34	0.00		
5	CB-21_bypass	0.30	0 12:07	39.20	0.01	2.15	1.29	0.07	0.15	0.00		
6	CB-24_bypass	0.24	0 12:07	55.10	0.00	1.43	4.13	0.06	0.13	0.00		
7	CB-25A_bypass	0.20	0 12:07	33.93	0.01	2.77	1.67	0.05	0.10	0.00		
8	CB-26_bypass	0.42	0 12:07	48.66	0.01	2.25	1.54	0.09	0.17	0.00		
9	CB-27_bypass	0.05	0 12:07	51.26	0.00	0.60	9.73	0.06	0.12	0.00		
10	CB-29_bypass	0.33	0 12:07	60.04	0.01	3.40	0.44	0.06	0.12	0.00		
11	CB-29A_bypass	0.38	0 12:07	53.94	0.01	2.31	1.46	0.08	0.16	0.00		
12	CB-3_bypass	0.43	0 12:08	37.38	0.01	3.60	0.89	0.07	0.14	0.00		
13	CB-35_bypass	0.12	0 12:07	62.14	0.00	1.71	2.88	0.05	0.10	0.00		
14	CB-42A_bypass	0.07	0 12:07	40.82	0.00	1.28	4.44	0.05	0.10	0.00		
15	CB-44_bypass	0.15	0 12:10	36.52	0.00	1.38	3.52	0.07	0.14	0.00		
16	CB-45_bypass	0.29	0 12:07	48.31	0.01	2.14	0.72	0.07	0.15	0.00		
17	CB-5_bypass	0.18	0 12:09	32.25	0.01	1.60	2.32	0.07	0.13	0.00		
18	CB-8A_bypass	0.67	0 12:07	227.39	0.00	2.27	0.52	0.01	0.02	0.00		
19	Cobble_Waterway	9.79	0 12:10	104.81	0.09	1.96	3.09	1.22	0.41	0.00		
20	EX_CB-1_bypass	0.79	0 12:08	48.49	0.02	2.31	0.91	0.12	0.23	0.00		
21	EX_CB-12_bypass	0.09	0 12:07	21.59	0.00	0.57	3.64	0.14	0.28	0.00		
22	EX_CB-27_bypass	0.21	0 12:07	61.14	0.00	2.49	0.69	0.06	0.12	0.00		
23	FallRiver	27.18	0 12:11	8532.83	0.00	2.67	0.62	0.93	0.05	0.00		
24	FR-1	6.37	0 12:09	24.45	0.26	5.61	0.25	0.73	0.73	0.00		
25	FR2	1.60	0 12:09	19.71	0.08	1.66	1.39	0.61	0.61	0.00		
26	FR3	13.07	0 12:11	2308.05	0.01	1.63	3.87	0.75	0.07	0.00		
27	FR4	6.54	0 12:10	21.11	0.31	10.40	0.14	0.75	0.75	0.00		

Pipe Results

SN	Element ID	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Travel Time (min)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Froude Number	Reported Condition
1	CB20-LB02	45.67	1 22:01	0.80	57.33	50.00	0.00	1.00	1.00	72.00		SURCHARGED
2	DMH22-OUT24	3.61	0 12:07	19.28	0.19	14.66	0.04	0.35	0.35	0.00		Calculated
3	I-91-Culvert	9.83	0 12:09	25.46	0.39	6.51	0.61	0.97	0.49	0.00		Calculated
4	LB01-EX_CB-48	0.87	0 12:19	5.04	0.17	3.68	0.02	0.38	0.38	0.00		Calculated
5	p10-9	0.55	0 12:08	6.45	0.09	4.45	0.07	0.21	0.21	0.00		Calculated
6	p1-10	3.06	0 12:15	4.42	0.69	3.89	0.08	1.00	1.00	49.00		SURCHARGED
7	p1-2	1.05	0 12:10	6.87	0.15	4.73	0.02	0.34	0.34	0.00		Calculated
8	p12-8	1.08	0 12:07	9.43	0.12	5.39	0.01	0.30	0.30	0.00		Calculated
9	p13-8	1.07	0 12:08	3.56	0.30	1.66	0.44	1.00	1.00	10.00		SURCHARGED
10	p14-Out	1.60	0 12:09	13.09	0.12	2.94	0.77	0.65	0.65	0.00		Calculated
11	p15B-Out	6.54	0 12:10	12.79	0.51	8.71	0.17	0.91	0.91	0.00		Calculated
12	p16-17	1.21	0 12:08	3.56	0.34	3.62	0.12	0.44	0.44	0.00		Calculated
13	p17-15B	4.50	1 10:11	5.06	0.89	6.66	0.12	0.87	0.87	0.00		Calculated
14	p18-19A	1.53	0 12:07	15.13	0.10	7.06	0.00	0.32	0.32	0.00		Calculated
15	p19-17	2.02	0 12:07	5.58	0.36	5.90	0.15	0.48	0.48	0.00		Calculated
16	p19-22	0.04	0 12:22	4.17	0.01	1.71	0.86	0.07	0.07	0.00		Calculated
17	p20-17	6.50	2 11:07	3.56	1.82	8.27	0.15	1.00	1.00	1.00		SURCHARGED
18	p21-22	0.82	0 12:07	4.60	0.18	3.51	0.03	0.34	0.34	0.00		Calculated
19	p25-18	0.85	0 12:07	4.46	0.19	4.09	0.21	0.31	0.31	0.00		Calculated
20	p2-6	2.26	0 12:08	4.82	0.47	4.68	0.38	0.62	0.62	0.00		Calculated
21	p26-27	0.92	0 12:07	3.56	0.26	3.35	0.10	0.38	0.38	0.00		Calculated
22	p27-28	0.92	0 12:07	3.78	0.24	3.66	0.20	0.36	0.36	0.00		Calculated
23	p28-22	1.93	0 12:07	6.07	0.32	6.68	0.50	0.40	0.40	0.00		Calculated
24	p29-28	1.01	0 12:07	4.60	0.22	3.71	0.03	0.38	0.38	0.00		Calculated
25	p30-Out	9.83	0 12:09	32.53	0.30	13.97	0.12	0.70	0.56	0.00		Calculated
26	p31-30	0.26	0 12:07	6.28	0.04	3.83	0.20	0.14	0.14	0.00		Calculated
27	p32-30	0.72	0 12:07	3.79	0.19	3.37	0.15	0.32	0.32	0.00		Calculated
28	p33-30	8.89	0 12:10	6.94	1.28	7.34	0.45	1.20	0.96	0.00		> CAPACITY
29	p3-4	1.15	0 12:08	13.68	0.08	6.61	0.01	0.29	0.29	0.00		Calculated
30	p34-33	0.88	0 12:08	17.46	0.05	6.00	0.10	0.58	0.58	0.00		Calculated
31	p35-37	0.69	0 12:07	7.71	0.09	5.83	0.18	0.21	0.21	0.00		Calculated
32	p36-37	1.07	0 12:10	3.72	0.29	3.75	0.20	0.39	0.39	0.00		Calculated
33	p37-39	1.72	0 12:09	6.21	0.28	6.21	0.14	0.38	0.38	0.00		Calculated
34	p38-39	0.02	0 12:20	7.97	0.00	1.89	0.02	0.04	0.04	0.00		Calculated
35	p39-40	1.73	0 12:09	8.16	0.21	6.90	0.05	0.36	0.36	0.00		Calculated
36	p40-EX6	1.73	0 12:09	7.44	0.23	6.78	0.42	0.36	0.36	0.00		Calculated
37	p41-33	8.16	0 12:13	7.76	1.05	6.65	0.38	1.25	1.00	44.00		SURCHARGED
38	p41-9	7.23	0 12:00	5.26	1.37	5.89	0.85	1.25	1.00	54.00		SURCHARGED
39	p42-41	0.27	0 12:07	3.46	0.08	2.38	0.12	0.20	0.20	0.00		Calculated
40	p43-EX33	0.43	0 12:10	0.33	1.32	1.92	0.10	0.33	0.33	0.00		> CAPACITY
41	p44-43	0.43	0 12:10	3.65	0.12	3.00	0.43	0.24	0.24	0.00		Calculated
42	p45-46	0.64	0 12:07	5.63	0.11	3.53	0.02	1.00	1.00	14.00		SURCHARGED
43	p4-6	1.15	0 12:08	3.78	0.30	3.68	0.11	0.45	0.45	0.00		Calculated
44	p46-10	0.66	0 12:08	37.16	0.02	6.09	0.10	1.50	1.00	35.00		SURCHARGED
45	p47-46	0.21	0 12:00	5.22	0.04	0.47	0.25	1.00	1.00	40.00		SURCHARGED
46	p5-6	0.71	0 12:09	18.34	0.04	7.01	0.01	0.30	0.30	0.00		Calculated
47	p6-8	4.10	0 12:08	4.65	0.88	6.23	0.37	0.78	0.78	0.00		Calculated
48	p7-9	1.88	0 11:59	3.63	0.52	2.40	0.35	1.00	1.00	4100.00		SURCHARGED
49	p8-9	5.15	0 12:08	3.56	1.45	6.65	0.06	0.96	0.96	0.00		> CAPACITY
50	p9-Out	6.37	0 12:09	6.99	0.91	10.12	0.13	0.75	0.75	0.00		Calculated
51	pBMtn-10	6.43	0 12:01	8.42	0.76	5.24	0.21	1.25	1.00	48.00		SURCHARGED
52	pEX_DMH-9-41	7.23	0 12:00	4.28	1.69	5.94	0.70	1.25	1.00	44.00		SURCHARGED
53	pEX1-2	1.24	0 12:08	5.62	0.22	4.73	0.14	0.38	0.38	0.00		Calculated
54	pEX12-19	0.49	0 12:07	1.52	0.32	1.94	0.95	0.36	0.36	0.00		Calculated
55	pEX16-15B	1.68	0 12:22	3.34	0.50	4.03	0.47	0.55	0.55	0.00		Calculated
56	pEX16A-EX16	0.85	0 12:25	5.05	0.17	2.85	0.38	0.41	0.41	0.00		Calculated
57	pEX27-EX6	0.66	0 12:07	5.22	0.13	4.19	0.13	0.26	0.26	0.00		Calculated
58	pEX28-EX7	0.02	0 15:01	1.92	0.01	0.86	0.67	0.25	0.25	0.00		Calculated
59	pEX33-41	1.23	0 12:11	7.52	0.16	4.29	0.34	0.35	0.28	0.00		Calculated
60	pEX34A-EX34	0.04	0 12:23	5.55	0.01	2.04	0.64	0.06	0.06	0.00		Calculated
61	pEX34-EX33	0.78	0 12:11	5.60	0.14	4.77	0.21	0.26	0.26	0.00		Calculated
62	pEX6-EX7(MH)	2.37	0 12:09	7.94	0.30	8.53	0.31	0.38	0.38	0.00		Calculated
63	pEX7(MH)-Out	2.37	0 12:09	7.85	0.30	8.40	0.25	0.39	0.39	0.00		Calculated
64	pEX9-15B	0.99	0 12:17	7.74	0.13	6.09	0.08	0.28	0.28	0.00		Calculated

Pipe Results

SN	Element ID	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Travel Time (min)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Froude Number	Reported Condition
65	Ramp_Culvert	13.12	0 12:10	20.87	0.63	8.61	0.26	0.98	0.49	0.00		Calculated

Inlet Results

SN	Element ID	Peak Flow (cfs)	Peak Lateral Inflow (cfs)	Peak Flow Intercepted by Inlet (cfs)	Peak Flow Bypassing Inlet (cfs)	Inlet Efficiency during Peak Flow (%)	Max Gutter Spread during Peak Flow (ft)	Max Gutter Water Elev. during Peak Flow (ft)	Max Gutter Water Depth during Peak Flow (ft)	Time of Max Depth Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	CB-1	1.61	1.61	1.05	0.57	64.98	6.43	356.39	0.13	0 12:10	0.00	0.00
2	CB-10	0.66	0.49	0.52	0.13	79.67	5.16	350.47	0.10	0 12:08	0.00	0.00
3	CB-12A	1.62	1.19	0.95	0.67	58.75	7.99	349.64	0.16	0 12:07	0.00	0.00
4	CB-14	1.07	1.07	N/A	N/A	N/A	8.62	344.17	-0.40	0 12:09	0.00	0.00
5	CB-15B	0.92	0.92	N/A	N/A	N/A	7.87	345.89	0.22	0 12:10	0.00	0.00
6	CB-16	1.23	1.12	N/A	N/A	N/A	9.33	347.75	0.17	0 12:08	0.00	0.00
7	CB-18	1.54	1.45	N/A	N/A	N/A	10.70	347.68	0.19	0 12:07	0.00	0.00
8	CB-20	1.39	1.19	0.85	0.54	61.18	7.55	348.07	0.15	2 23:10	0.00	0.00
9	CB-21	1.12	0.73	0.72	0.40	64.69	6.95	351.58	0.14	0 12:07	0.00	0.00
10	CB-25	1.05	0.63	0.76	0.29	71.95	5.51	351.88	0.11	0 12:07	0.00	0.00
11	CB-26	1.34	1.29	0.91	0.43	67.89	6.03	358.11	0.12	0 12:07	0.00	0.00
12	CB-29A	1.40	1.15	0.94	0.46	67.38	6.10	359.03	0.12	0 12:07	0.00	0.00
13	CB-3	1.58	0.79	0.99	0.59	62.52	6.95	352.86	0.14	0 12:07	0.00	0.00
14	CB-31A	0.31	0.31	0.28	0.03	90.68	3.50	369.72	0.07	0 12:07	0.00	0.00
15	CB-32A	0.96	0.89	0.71	0.26	73.48	5.33	370.16	0.11	0 12:07	0.00	0.00
16	CB-34A	1.21	1.08	0.85	0.37	69.65	5.80	375.07	0.12	0 12:08	0.00	0.00
17	CB-35	0.81	0.47	0.63	0.18	78.14	4.76	370.94	0.10	0 12:07	0.00	0.00
18	CB-42A	0.33	0.33	0.29	0.05	85.83	4.11	377.32	0.08	0 12:07	0.00	0.00
19	CB-44	0.58	0.58	0.44	0.14	75.41	5.44	379.98	0.11	0 12:10	0.00	0.00
20	CB-45	0.94	0.94	0.65	0.29	69.25	6.09	378.24	0.12	0 12:13	0.00	0.00
21	CB-5	0.89	0.35	0.64	0.25	72.04	5.60	353.42	0.11	0 12:09	0.00	0.00
22	CB-7	0.73	0.73	N/A	N/A	N/A	6.92	350.37	-0.29	0 11:59	0.00	0.00
23	EX_CB-1	2.03	2.03	1.24	0.79	61.18	7.01	356.44	0.14	0 12:07	0.00	0.00
24	EX_CB-12	0.58	0.28	0.47	0.11	81.54	4.44	348.28	0.09	0 12:07	0.00	0.00
25	EX_CB-19	0.04	0.04	N/A	N/A	N/A	1.75	350.76	0.10	0 12:22	0.00	0.00
26	EX_CB-27	0.85	0.73	0.65	0.20	75.93	5.03	356.51	0.10	0 12:07	0.00	0.00
27	EX_CB-9	1.07	0.84	N/A	N/A	N/A	8.60	346.26	0.24	0 12:17	0.00	0.00
28	LB-01	0.88	0.88	N/A	N/A	N/A	7.65	344.18	0.13	0 12:20	0.00	0.00

Riprap Apron Sizing Computation

Sizing calculations based on guidance from Federal Highway Administration Hydraulic Engineering Circular No. 14, 3rd edition, dated July 2006

By: J McIntire TEC, Inc. 08/05/2025

$$D_{50} = 0.2D\left(\frac{Q}{\sqrt{gD^{2.5}}}\right)^{4/3}\left(\frac{D}{TW}\right)$$

$$D_{50} = riprap\ size\ (ft)$$

$$Q = design\ discharge\ \left(\frac{ft^3}{s}\right)$$

$$D = culvert\ diameter\ (ft)$$

$$TW = tailwater\ depth\ (ft)$$

$$g = acceleration\ due\ to\ gravity\ \left(32.2\ \frac{ft}{s^2}\right)$$

Table 10.1. Example Riprap Classes and Apron Dimensions

Class	D_{50} (mm)	D_{50} (in)	Apron Length[1]	Apron Depth
1	125	5	4D	$3.5D_{50}$
2	150	6	4D	$3.3D_{50}$
3	250	10	5D	$2.4D_{50}$
4	350	14	6D	$2.2D_{50}$
5	500	20	7D	$2.0D_{50}$
6	550	22	8D	$2.0D_{50}$

[1]D is the culvert rise.

Proposed FES 11

$$D_{50} = 0.2(1.0\ ft)\left(\frac{6.37\ \frac{ft^3}{s}}{\sqrt{(32.2\ \frac{ft}{s^2})(1.0ft)^{2.5}}}\right)^{4/3}\left(\frac{1.0ft}{0.4(1.0ft)}\right) = 0.289\ ft = 3.46\ inches$$

$$= Class\ 1\ (Table\ 10.1)$$

$$Length = 4D = 4(1.0\ ft) = 4\ ft$$

$$Depth = 3.5(D_{50}) = 3.5(5\ in) = 17.5\ inches$$

Note: Design flow from hydrocad was estimated to be 6.37 cfs (toward the riprap, during a 100-year storm). Based on this low flow rate, FES has been designed with the minimum recommended length and depth of rip rap apron.

Proposed FES 15

$$D_{50} = 0.2(1.0\ ft)\left(\frac{1.60\ \frac{ft^3}{s}}{\sqrt{(32.2\ \frac{ft}{s^2})(1.0ft)^{2.5}}}\right)^{4/3}\left(\frac{1.0ft}{0.4(1.0ft)}\right) = 0.046\ ft = 0.55\ inches$$
$$= Class\ 1\ (Table\ 10.1)$$

$$Length = 4D = 4(1.0\ ft) = 4\ ft$$

$$Depth = 3.5(D_{50}) = 3.5(5\ in) = 17.5\ inches$$

Note: Design flow from hydrocad was estimated to be 1.60 cfs (toward the riprap, during a 100-year storm). Based on this low flow rate, FES has been designed with the minimum recommended length and depth of rip rap apron.

Proposed FES 24

$$D_{50} = 0.2(1.0\ ft)\left(\frac{3.60\ \frac{ft^3}{s}}{\sqrt{(32.2\ \frac{ft}{s^2})(1.0ft)^{2.5}}}\right)^{4/3}\left(\frac{1.0ft}{0.4(1.0ft)}\right) = 0.135\ ft = 1.62\ inches$$
$$= Class\ 1\ (Table\ 10.1)$$

$$Length = 4D = 4(1.0\ ft) = 4\ ft$$

$$Depth = 3.5(D_{50}) = 3.5(5\ in) = 17.5\ inches$$

Note: Design flow from hydrocad was estimated to be 3.60 cfs (toward the riprap, during a 100-year storm). Based on this low flow rate, FES has been designed with the minimum recommended length and depth of rip rap apron.

Figures

Figure 1 – USGS Locus Map

Figure 2 – Soil Survey

Figure 3 – FEMA Flood Insurance Rate Map (FIRM)

Figure 4 – NHESP Estimated and Priority Habitats

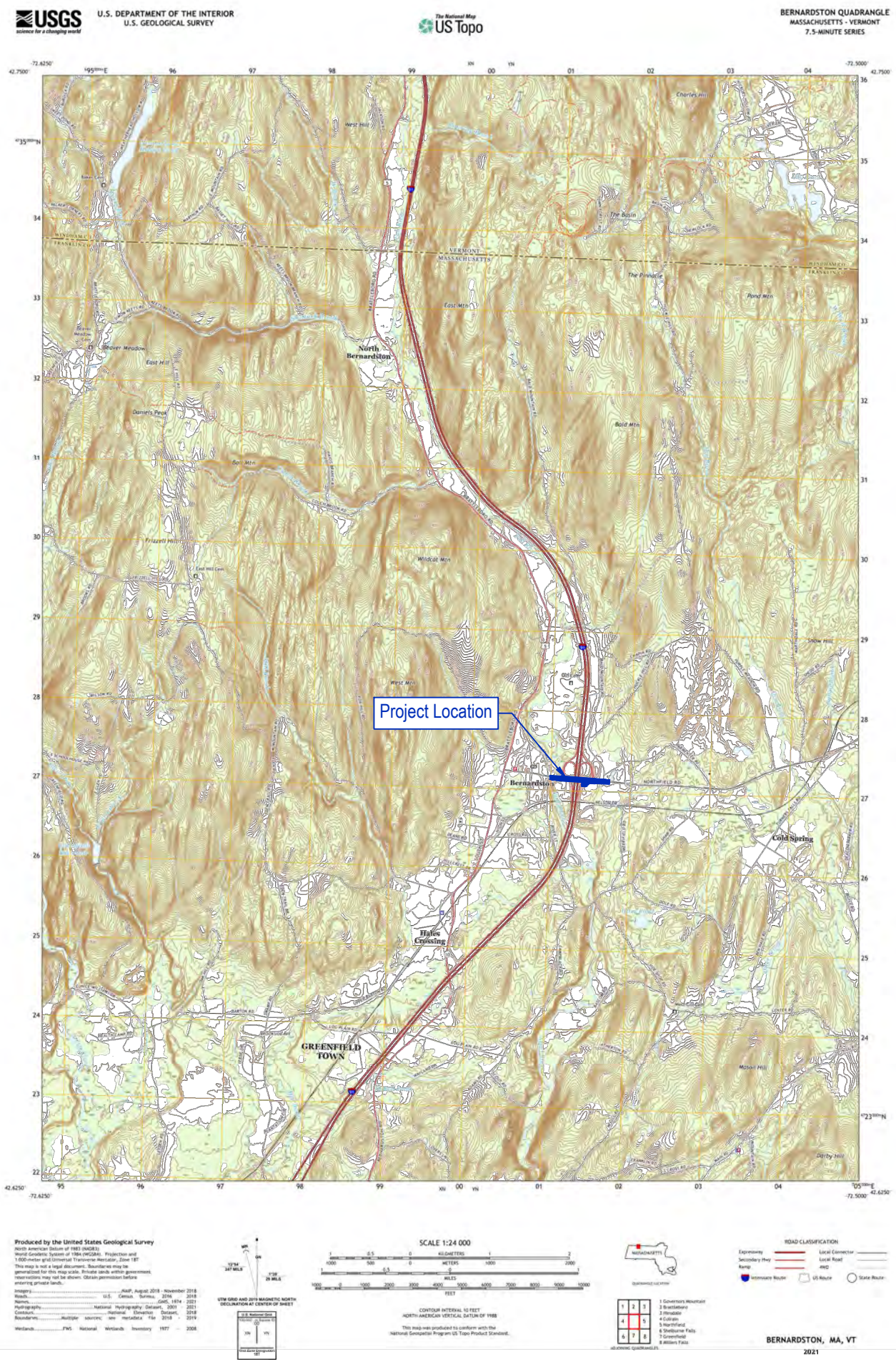
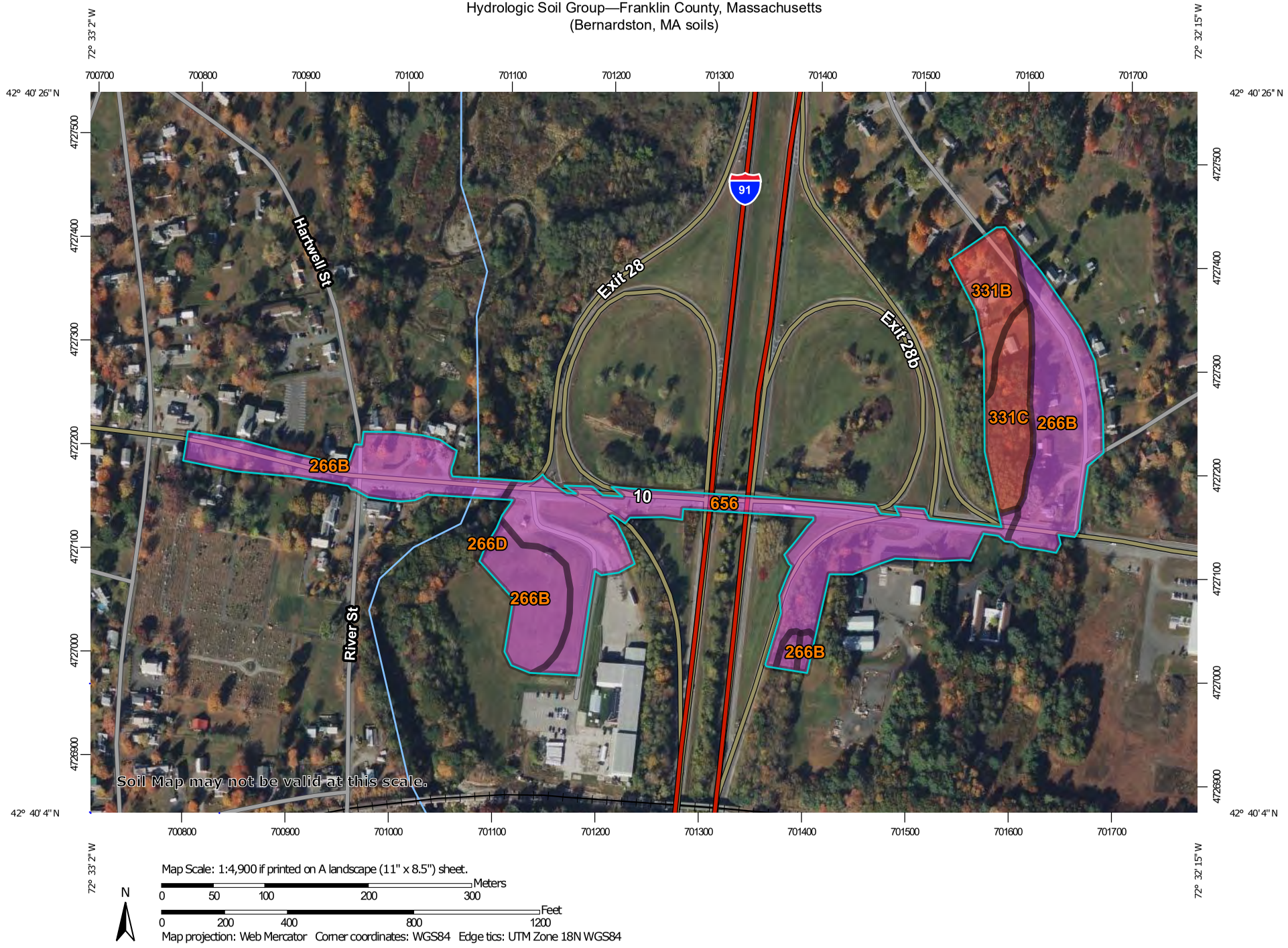


Figure 1 - USGS Locus Map

Hydrologic Soil Group—Franklin County, Massachusetts
(Bernardston, MA soils)



Map Scale: 1:4,900 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 200 400 800 1200

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

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Proposal No. 612159-136484

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Franklin County, Massachusetts
Survey Area Data: Version 18, Sep 12, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Oct 15, 2020—Oct 31, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

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Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
262F	Quonset fine sandy loam, 25 to 45 percent slopes	A	0.2	0.8%
266B	Warwick channery fine sandy loam, 3 to 8 percent slopes	A	8.5	46.3%
266D	Warwick channery fine sandy loam, 15 to 25 percent slopes	A	0.0	0.0%
331B	Bernardston silt loam, 3 to 8 percent slopes, very stony	D	1.4	7.4%
331C	Bernardston silt loam, 8 to 15 percent slopes, very stony	D	1.7	9.4%
656	Udorthents-Urban land complex	A	6.6	36.0%
Totals for Area of Interest			**18.4**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher



KEY TO MAP

500-Year Flood Boundary
100-Year Flood Boundary
Zone Designations* With Date of Identification e.g., 12/2/74
100-Year Flood Boundary
500-Year Flood Boundary
ZONE B
ZONE B
Base Flood Elevation Line With Elevation In Feet**
513
Base Flood Elevation In Feet Where Uniform Within Zone**
(EL 987)
Elevation Reference Mark
RM7 ×
River Mile
• M1.5

**Referenced to the National Geodetic Vertical Datum of 1929

*EXPLANATION OF ZONE DESIGNATIONS

ZONE	EXPLANATION
A	Areas of 100-year flood; base flood elevations and flood hazard factors not determined.
AO	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; average depths of inundation are shown, but no flood hazard factors are determined.
AH	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown, but no flood hazard factors are determined.
A1-A30	Areas of 100-year flood; base flood elevations and flood hazard factors determined.
A99	Areas of 100-year flood to be protected by flood protection system under construction; base flood elevations and flood hazard factors not determined.
B	Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood. (Medium shading)
C	Areas of minimal flooding. (No shading)
D	Areas of undetermined, but possible, flood hazards.
V	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined.
V1-V30	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined.

NOTES TO USER

Certain areas not in the special flood hazard areas (zones A and V) may be protected by flood control structures.

This map is for flood insurance purposes only; it does not necessarily show all areas subject to flooding in the community or all planimetric features outside special flood hazard areas.

For adjoining map panels, see separately printed Index To Map Panels.

INITIAL IDENTIFICATION: DECEMBER 10, 1976

FLOOD HAZARD BOUNDARY MAP REVISIONS:

FLOOD INSURANCE RATE MAP EFFECTIVE: JULY 2, 1980

FLOOD INSURANCE RATE MAP REVISIONS:

Refer to the FLOOD INSURANCE RATE MAP EFFECTIVE shown on this map to determine when actuarial rates apply to structures in the zones where elevations or depths have been established.

To determine if flood insurance is available in this community, contact your insurance agent, or call the National Flood Insurance Program, at (800) 638-6620, or (800) 424-8872.

APPROXIMATE SCALE
400 0 400 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

TOWN OF
BERNARDSTON, MASSACHUSETTS
FRANKLIN COUNTY

PANEL 6 OF 7
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
250110 0006 A

EFFECTIVE DATE:
JULY 2, 1980

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
FEDERAL INSURANCE ADMINISTRATION

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Figure 4 - NHESP Estimated and Priority habitats



DFW Coldwater Fisheries Resources

NHESP Estimated Habitats of Rare Wildlife

NHESP Priority Habitats of Rare Species

NHESP Certified Vernal Pools

Property Tax Parcels

Attachment C - Stormwater Control Measures Evaluation

TEC, Inc.
282 Merrimack Street, 2nd Floor
Lawrence, MA 01843
978.794.1792

STORMWATER CONTROLS EVALUATION

This document seeks to outline the evaluation criteria and applicability of Stormwater Control Measures (SCM's) adjacent to the Fall River in Bernardston, MA as part of MassDOT Project 612159. The project as a whole seeks to replace the existing structurally deficient bridge carrying Route 10 over Fall River and replace the bridge deck of the bridge carrying Route 10 over I-91 Northbound and Southbound. This report summarizes areas of the project that were evaluated for potential SCM's. The report begins at the west end of the project, nearest to the Fall River and works east.

The site as a whole is a constrained corridor near an existing highway interchange. Several adjacent parcels of land are privately owned for residences and businesses. This limits the space available for various SCM's. In addition, due to the extreme topography adjacent to the river, there are limited opportunities for SCM's that require flat open space and space for infiltration. Finally, the existing drainage patterns and systems make certain pretreatment options unfeasible. The following are specific evaluations of potential SCM locations.

Location 1 from STA 9+50 to STA 15+50 – West side of Fall River
The proposed stormwater at this location sheet flows from the road to deep sump catch basins for pretreatment. On the south side of the road, the drainage is piped through proper manhole to manhole connections (with deep sump catch basins offline) before discharging through a flared end section. The design team reviewed potential measures for this location such as rain gardens, bio-retention areas, leaching basins, wet/dry basins, and infiltration basins. However, these infiltration measures were deemed unfeasible due to the location of the adjacent wingwall foundations, resource areas and slopes. And, due to the extreme topography and the fact that the drainage pipe is 10' below grade at this location, these SCM's were not deemed feasible. The use of subsurface structures at this location was also eliminated due to the proximity to the slope and the high bedrock elevation at this location. Ultimately, deep sump catch basins will improve drainage conditions to the maximum extent practical at this location.

The design team also reviewed potential SCM's on the north side of the road. However, due to the presence of the dwelling at 90 Church Street and the similar steep topography, resource areas and adjacent wingwall foundations, swales were deemed to be not feasible or practical. According to Massachusetts Stormwater Handbook Volume 2 Chapter 2, infiltration SCM's would not meet the required setback criteria due to the distance from any slope greater than 15% as well as being located within 100' upslope of a building foundation.

Location 2 from STA 15+50 to STA 19+00 – East Side of Fall River
The proposed stormwater at this location sheet flows from the road to deep sump catch basins for pretreatment. Similar to Location 1, this area does not have adequate space for other Low Impact Development alternatives including rain gardens or bioretention areas due to the steep grading, high bedrock and right of way constraints.

The design team implemented the same infiltration SCM setback criteria in this location, and the majority of the site was deemed infeasible due to the proximity of steep slopes, resource areas, and wingwall foundations. Two leaching catch basins are proposed in the remaining feasible area between Route 10 and Industrial drive. One leaching basin is proposed within the grassed depression and will receive pretreatment by means of vegetated filter strip. The second leaching

basin is proposed adjacent to the southern Route 10 sidewalk and will receive pretreatment from a deep sump catch basin.

Location 3 from STA 15+00 to STA 22+00 – West Side I-91 Interchange
The proposed stormwater at this location sheet flows from the road to deep sump catch basins for pretreatment. Then, this flow is conveyed to the through proper manhole to manhole connections and ultimately being discharged through a new headwall into the already existing wetland area within the northwest infield of I-91. The design team reviewed potential SCM's and LID measures to install between the end of the headwall and the existing wetland, but due to the limited space and potential groundwater concerns, these measures (sediment forebay, check dams, etc.) were deemed not feasible without significantly altering the existing wetlands.

Location 4 from STA 25+00 to STA 28+00 – East Side I-91 – South Side/Off Ramp
The proposed stormwater at this location sheet flows from the I-91 NB off ramp to deep sump catch basins for pretreatment. In addition, the stormwater that falls within the grassed area (including the area that has been loamed and seeded from the old ramp) travels through a drainage channel for temperature reduction before reaching a catch basin that is part of the I-91 drainage system. The size of this channel is limited due to the small drainage area that enters this swale. The construction plans refer to the area as a grass swale as this is typical MassDOT construction nomenclature. There is insufficient space for a biofilter swale or water quality swale due to the topography on the east side of the swale (large slope and wooded area).

BRIDGE REPLACEMENT PROJECT

PLAN AND PROFILE OF

ST 10 (CHURCH STREET) OVER FALL RIVER

BRIDGE NO. B-10-001 (CLA)

IN THE TOWN OF

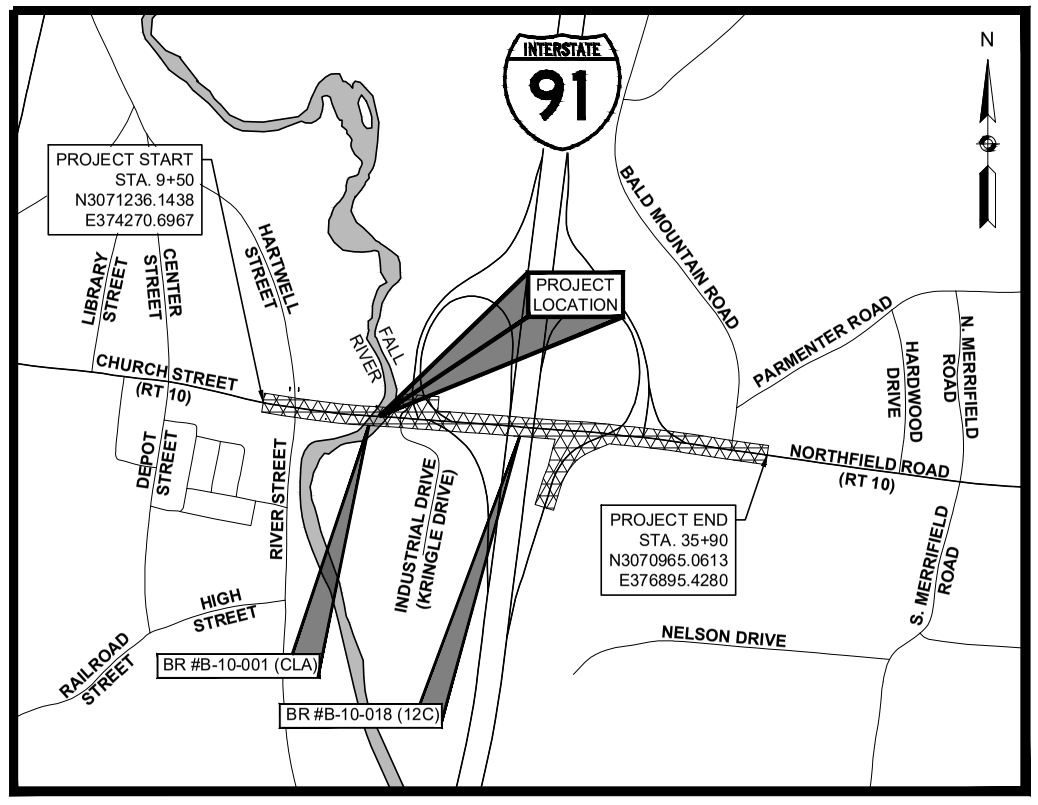
BERNARDSTON

FRANKLIN COUNTY

PERMIT APPLICATION

INDEX

SHEET NO.	DESCRIPTION
1	TITLE SHEET & INDEX
2	CONSTRUCTION PLAN (1 OF 5)
3	CONSTRUCTION PLAN (2 OF 5)
4	CONSTRUCTION PLAN (3 OF 5)
5	CONSTRUCTION PLAN (4 OF 5)
6	CONSTRUCTION PLAN (5 OF 5)
7	DRAINAGE DETAILS
8	ELEVATION & GRADING DETAILS
9	STREAMBED RESTORATION PLAN
10	PROFILES
11	BANK & LUW IMPACT PLAN
12	BLSF IMPACT PLAN
13	CONTROL OF WATER PLAN
14	CONSTRUCTION DETAILS



0 1000 2000 3000 4000

SCALE: 1" = 1000'

SHEET 1 OF 14

WATER QUALITY CERTIFICATE APPLICATION
BERNARDSTON, MASSACHUSETTS
ST 10 (CHURCH ST) OVER FALL RIVER
BRIDGE B-10-001
SEPTEMBER 2025

A008 42 - 263

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Proposal No. 612159-136484

GUARDRAIL DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

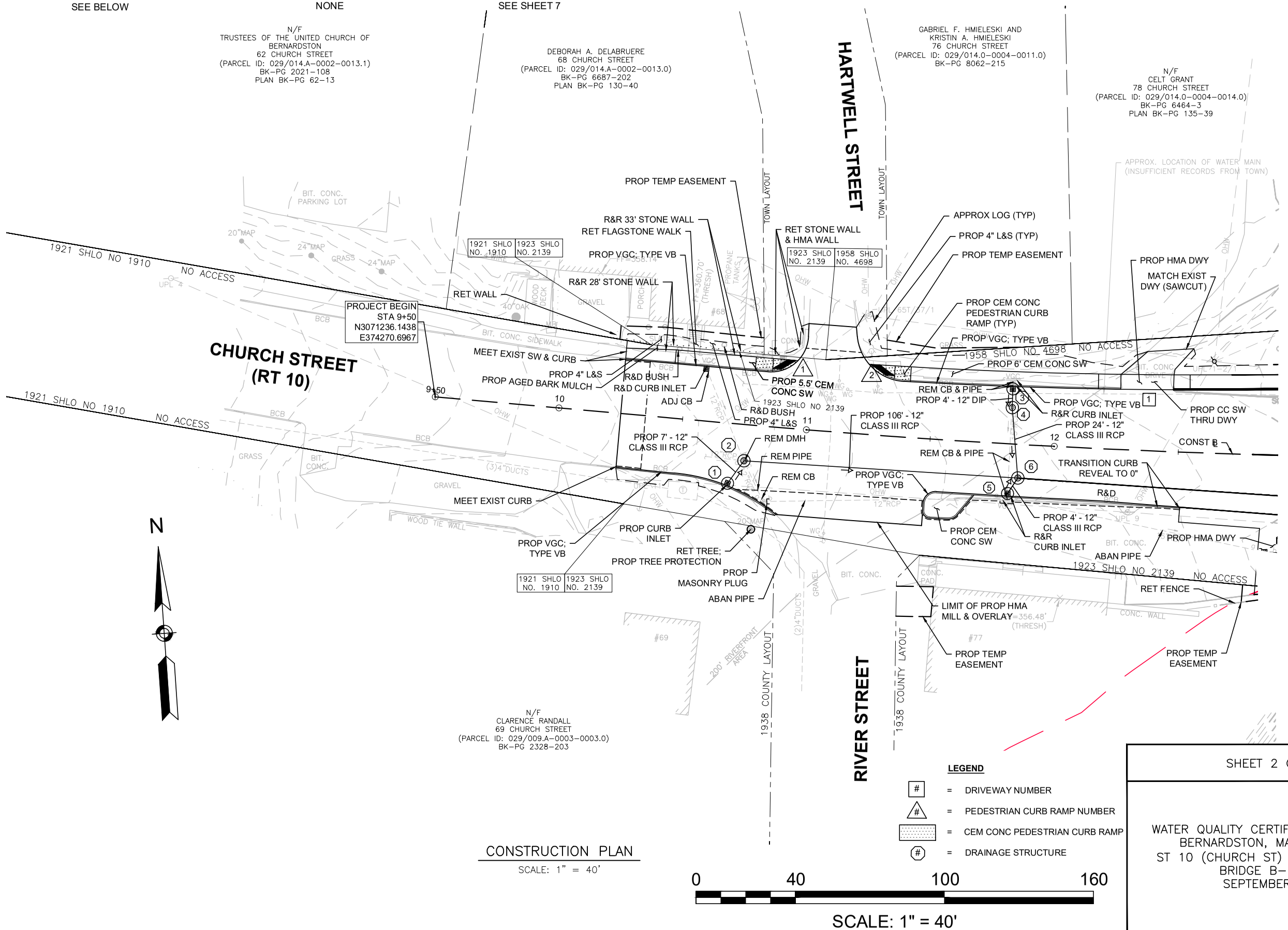
SEE BELOW

WATER SUPPLY ALTERATIONS

NONE

DRAINAGE DETAILS

SEE SHEET 7



CONSTRUCTION PLAN

SCALE: 1" = 40'

SHEET 2 OF 14

WATER QUALITY CERTIFICATE APPLICATION
BERNARDSTON, MASSACHUSETTS
ST 10 (CHURCH ST) OVER FALL RIVER
BRIDGE B-10-001
SEPTEMBER 2025

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Proposal No. 612159-136484

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WATER QUALITY CERTIFICATE APPLICATION
BERNARDSTON, MASSACHUSETTS
ST 10 (CHURCH ST) OVER FALL RIVER
BRIDGE B-10-001
SEPTEMBER 2025

SHEET 3 OF 14

CONSTRUCTION PLAN
SCALE: 1" = 40'

SCALE: 1" = 40'
0 40 100 160

50FT WETLAND OFFSET
50FT SLOPE OFFSET
100FT FOUNDATION OFFSET
50FT SLOPE OFFSET
TOP OF SLOPE

I-91 SB ON-RAMP (NW)
I-91 SB OFF-RAMP (NW)
NORTHFIELD ROAD (RT 10)
FALL RIVER
1923 SHLO NO 2139
1959 TOWN LAYOUT NO 4774

DRAINAGE DETAILS
SEE SHEET 7

GUARDRAIL DETAILS
SEE CONSTRUCTION DRAWINGS

TRAFFIC SIGNAL CONDUIT
NONE

WATER SUPPLY ALTERATIONS
NONE

LEGEND
= DRIVEWAY NUMBER
= PEDESTRIAN CURB RAMP NUMBER
= CEM CONC PEDESTRIAN CURB RAMP
= PROP MODIFIED ROCKFILL SLOPE STABILIZATION/RIPRAP
= DRAINAGE STRUCTURE

NOTES:
1. THE HORIZONTAL DATUM IS THE NORTH AMERICAN DATUM OF 1983 (NAD83) MASSACHUSETTS STATE PLANE COORDINATE SYSTEM IN U.S. SURVEY FEET.
2. THE VERTICAL DATUM IS THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAV88) IN FEET.

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WATER QUALITY CERTIFICATE APPLICATION
BERNARDSTON, MASSACHUSETTS
ST 10 (CHURCH ST) OVER FALL RIVER
BRIDGE B-10-001
SEPTEMBER 2025

SHEET 4 OF 14

CONSTRUCTION PLAN
SCALE: 1" = 40'

SCALE: 1" = 40'

LEGEND
= DRIVEWAY NUMBER
= PEDESTRIAN CURB RAMP NUMBER
= CEM CONC PEDESTRIAN CURB RAMP
= DRAINAGE STRUCTURE

NORTHFIELD ROAD (RT 10)
I-91 NORTHBOUND
I-91 SOUTHBOUND
I-91 SB ON-RAMP (SW)
B-10-018(12C)
PROP BRIDGE PAVEMENT
RET PIPE
PROP APPROACH SLAB
RET FENCE
PROP VGC; TYPE VB
R&R CURB INLET
PROP 6' - 12" CLASS III RCP
PROP SPLAYED END
PROP 21' - 12" CLASS III RCP
PROP 37' - 12" CLASS III RCP
REM CB & PIPE
R&R CURB INLET
PROP 6' CEM CONC SW
REM EXIST GUARDRAIL (105')
PROP GUARDRAIL (TYP)
RET EXIST PVMT
LIMIT OF PROP HMA MILL & OVERLAY
MEET EXIST SGE
LIMIT OF PROP FDP; PROP SAWCUT
PROP 3" PVC CONDUIT
PROP 4" L&S
PROP VGC; TYPE VB
RET CB & PIPE
REM CB
R&R CURB INLET
PROP 6' - 12" CLASS III RCP
PROP SPLAYED END
PROP 21' - 12" CLASS III RCP
RET PIPE
PROP APPROACH SLAB
PROP SGE; TYPE SB
PROP STONE FOR PIPE ENDS= 4' LENGTH X 1.5' DEPTH
REM INV & PIPE
PROP CLEARING & GRUBBING (578 SF)
R&R CURB INLET
RET PIPE
CONST ℄
RET PIPE
PROP SEDIMENT CONTROL BARRIER (TYP)
APPROX LOG (TYP)
PROP 4" L&S (TYP)
BEGIN CLEARING & GRUBBING
MEET EXIST SGE
LIMIT OF PROP FDP; PROP SAWCUT
50FT SLOPE OFFSET FROM RAMP
BOTTOM OF SLOPE
28% SLOPE
100' WETLAND BUFFER ZONE
PROP 6' CEM CONC SW
PROP VGC; TYPE VB
PROP 3" PVC CONDUIT
PROP 4" L&S
RET CB & PIPE
REM CB
PROP 37' - 12" CLASS III RCP
PROP CLEARING & GRUBBING (578 SF)
REM INV & PIPE
PROP STONE FOR PIPE ENDS= 4' LENGTH X 1.5' DEPTH
PROP SGE; TYPE SB
PROP SPLAYED END PROP 6' - 12" CLASS III RCP
RET PIPE
R&R CURB INLET
PROP VGC; TYPE VB
PROP 6' - 12" CLASS III RCP
PROP APPROACH SLAB
RET PIPE
REM CB & PIPE
R&R CURB INLET
PROP VGC; TYPE VB
RET FENCE
PROP BRIDGE PAVEMENT
B-10-018(12C)
RET FENCE
PROP SEDIMENT CONTROL BARRIER (TYP)
PROP 4" L&S (TYP)
APPROX LOG (TYP)
PROP 6' CEM CONC SW
REM EXIST GUARDRAIL (105')
PROP GUARDRAIL (TYP)
RET EXIST PVMT
LIMIT OF PROP HMA MILL & OVERLAY
MEET EXIST SGE
LIMIT OF PROP FDP; PROP SAWCUT
PROP 3" PVC CONDUIT
PROP 6' CEM CONC SW
PROP VGC; TYPE VB
PROP 4" L&S

GUARDRAIL DETAILS
SEE CONSTRUCTION DRAWINGS

TRAFFIC SIGNAL CONDUIT
NONE

WATER SUPPLY ALTERATIONS
NONE

DRAINAGE DETAILS
SEE SHEET 7

RET FENCE
R&R CURB INLET
PROP VGC; TYPE VB
PROP SPLAYED END
REM EXIST GUARDRAIL (269')
PROP SEDIMENT CONTROL BARRIER (TYP)
R&R SGE
PROP GUARDRAIL (TYP); SEE DETAILS ABOVE
100' WETLAND BUFFER ZONE
APPROX LOG (TYP)
PROP 4" L&S (TYP)
METAL GUARDRAIL (TYP.)
REM CB & PIPE
PROP 31' - 12" CLASS III RCP
ADJ DMH
PROP FULL DEPTH PVMT
PROP CEM CONC PEDESTRIAN CURB RAMP (TYP)
PROP 36' - 12" CLASS III RCP
65+50
LIMIT OF PROP HMA MILL & OVERLAY, STA 26+60
PROP CURB INLET
PROP 6' CEM CONC SW
CONST ℄
NORTHFIELD ROAD (RT 10)
LIMIT OF PROP HMA MILL & OVERLAY
REM CB & PIPE
PROP 17' - 12" CLASS III RCP
RET PIPE
R&R CURB INLET
ADJ DMH
PROP SPLAYED END
PROP 4" L&S
R&R SGE
RET EXIST PAVEMENT
RET EXIST PAVEMENT
I-91 NB OFF-RAMP (NE)
I-91 NB ON-RAMP (NE)
I-91 NB ON-RAMP (NE)
LIMIT OF PROP HMA MILL & OVERLAY
PROP 4" L&S
PROP SAWCUT (TYP)
MEET EXIST SGE
RET PIPE
PROP 78' - 12" CLASS III RCP
REM CB & PIPE
PROP 6' CEM CONC SW
PROP 6' CEM CONC SW
PROP VGC; TYPE VB
REM CB & R&R CURB INLET
RET PIPE
PROP 6' CEM CONC SW
PROP VGC; TYPE VB
REM EXIST GUARDRAIL (102')
RET FENCE
50' SLOPE OFFSET (FROM 1-91)
PROP 4" L&S
PROP SGE; TYPE SB
PROP 4" L&S
MEET EXIST VGC
RET FENCE
RET CB & PIPE
1959 SHLO NO. 4774
1911 SHLO NO. 1345
RET CB & PIPES
RET FENCE
PROP HMA DWY
MATCH EXIST DWY (SAWCUT) (TYP)
RET CB & PIPES
PROP CC SW THRU DWY
PROP HMA DWY
PROP CURB INLET
PROP TEMP EASEMENT
PROP TEMP EASEMENT
PROP SPLAYED END
PROP CURB INLET
REM EXIST PVMT; PROP 4" L&S
R&D CURB INLET
REM CB
ABAN PIPE
BOTTOM OF SLOPE
I-91 NB OFF-RAMP
PROP 62' - 12" CLASS III RCP
PROP FULL DEPTH PAVEMENT
PROP 54' - 12" CLASS III RCP
PROP 44' - 12" CLASS III RCP
PROP MASONRY PLUGS
REM DMH
REM PIPE
ADJ CB
PROP MASONRY PLUG
ABAN PIPE
ADJ CB
PROP 2' - 12" CLASS III RCP
PROP 20' - 12" CLASS III RCP
RET PIPE
PROP 3' GRASS SWALE
REM PIPE
REM EXIST PVMT; PROP 4" L&S
50FT SLOPE OFFSET FROM RAMP
NO ACCESS
1959 SHLO NO 4774
COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF TRANSPORTATION
0 NORTHFIELD ROAD
(PARCEL ID: 029/009.0-0002-0001.0)
BK-PG 1603-110
COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF TRANSPORTATION
NORTHFIELD ROAD
029/009.0-0002-0002.0)
-PG 962-132
PLAN BK-PG 8-56
OWNER UNKNOWN
0 NORTHFIELD ROAD
CONTINUED ON SHEET NO. 4
CONTINUED ON SHEET NO. 6
CONTINUED LEFT
CONTINUED RIGHT

N
RET PIPE
ADJ DMH
I-91 NB OFF-RAMP (SE)
PROP SPLAYED END
ADJ CB
R&R CURB INLET
PROP SPLAYED END
RET PIPE
PROP 3' GRASS SWALE
PROP SAWCUT (TYP)
APPROX LOG (TYP)
RET PIPE
MEET EXIST SGE
MEET EXIST SWALE
MEET EXIST SGE
LIMIT OF PROP HMA MILL & OVERLAY STA 61+20
LIMIT OF PROP FDP; PROP SAWCUT, STA 61+30
RET EXIST PAVEMENT
NO ACCESS
1959 SHLO NO 4774

CONSTRUCTION PLAN
SCALE: 1" = 40'

N

LEGEND
= DRIVEWAY NUMBER
= PEDESTRIAN CURB RAMP NUMBER
= CEM CONC PEDESTRIAN CURB RAMP
= DRAINAGE STRUCTURE

0 40 100 160
SCALE: 1" = 40'

SHEET 5 OF 14

WATER QUALITY CERTIFICATE APPLICATION
BERNARDSTON, MASSACHUSETTS
ST 10 (CHURCH ST) OVER FALL RIVER
BRIDGE B-10-001
SEPTEMBER 2025

A00842 - 267

Proposal No. 612159-136484

T1217.01_HD1(GENPLAN).DWG Plotted on 4-Sep-2025 2:16 PM

T1217.01_HD1(GENPLAN).DWG Plotted on 4-Sep-2025 2:16 PM

WATER QUALITY CERTIFICATE APPLICATION
BERNARDSTON, MASSACHUSETTS
ST 10 (CHURCH ST) OVER FALL RIVER
BRIDGE B-10-001
SEPTEMBER 2025

SHEET 6 OF 14

CONSTRUCTION PLAN
SCALE: 1" = 40'

SCALE: 1" = 40'
0 40 100 160

LEGEND
- # = DRIVEWAY NUMBER
- # = PEDESTRIAN CURB RAMP NUMBER
- = CEM CONC PEDESTRIAN CURB RAMP
- = DRAINAGE STRUCTURE

DRAINAGE DETAILS
SEE SHEET 7

WATER SUPPLY ALTERATIONS
NONE

TRAFFIC SIGNAL CONDUIT
SEE BELOW

GUARDRAIL DETAILS
NONE

BALD MOUNTAIN ROAD

PARMENTER ROAD

NORTHFIELD ROAD (RT 10)

NEAL R. BARDWELL
210 PARMENTER ROAD
(PARCEL ID: 029/009.0-0004-0002.0)
BK-PG 2568-16

HEIRS, DEVISEES AND LEGAL REPRESENTATIVES OF THE ESTATE OF COLA R. NELSON
5 BALD MOUNTAIN ROAD
(PARCEL ID: 029/009.0-0004-0001.0)
BK-PG 1321-213

N/F
ANNEMARIE C. MASON
2 BALD MOUNTAIN ROAD
(PARCEL ID: 029/009.0-0003-0001.0)
BK-PG 6498-328

N/F
STEVEN S. HEAN
12 BALD MOUNTAIN ROAD
(PARCEL ID: 029/014.0-0005-0018.3)
BK-PG 6423-240
PLAN BK-PG 86-95

CRUMPIN FOX CLUB, INC. a/k/a CRUMPIN-FOX CLUB, INC.
71-73 NORTHFIELD ROAD
(PARCEL ID: 029/009.0-0002-0003.0-6.0)
BK-PG 2759-120
PLAN BK-PG 84-69

CRUMPIN FOX CLUB, INC. a/k/a CRUMPIN-FOX CLUB, INC.
71-73 NORTHFIELD ROAD
(PARCEL ID: 029/009.0-0002-0003.0-6.0)
BK-PG 2759-120
PLAN BK-PG 84-69

1966 SHLO NO. 5556 NO ACCESS
1958 SHLO NO 4698 NO ACCESS
1927 SHLO NO 2456 NO ACCESS
1911 SHLO NO 1345 NO ACCESS

1958 SHLO NO. 4698
1966 SHLO NO. 5556
1927 SHLO NO. 2456
1911 SHLO NO. 1345

1958 TOWN LAYOUT NO. 4698

PROJECT END
STA 35+90
N3070965.0613
E376895.4280

LIMIT OF PROP HMA MILL & OVERLAY; STA 35+85

LIMIT OF PROP HMA MILL & OVERLAY

PROP TEMP EASEMENT

PROP EOP

PROP 3" PVC CONDUIT

PROP RRFB

PROP 5.5' CEM CONC SW

PROP SAWCUT (TYP)

PROP CURB INLET

PROP PERM EASEMENT

RET POST

RET PIPE

RET DI & PIPE

ADJ DMH

PROP 5' - 12" CLASS III RCP

PROP 7' -12" CLASS III RCP

REM CB & PIPE

RET TREES (TYP)

PROP TREE PROTECTION FENCE

RET FENCE

REM EXIST PVMT; PROP 4" L&S

R&R SGE

PROP 4" L&S (TYP)

APPROX LOG (TYP)

PROP AGED BARK MULCH

RET BUSHES

R&D WOOD POST (4)

PROP CEM CONC PEDESTRIAN CURB RAMP (TYP)

REM EXIST PVMT; PROP 4" L&S

PROP TEMP EASEMENT

PROP HMA MILL & OVERLAY

PROP VGC; TYPE VB

PROP 6' CEM CONC SW (TYP)

RET LP

PROP TEMP EASEMENT

PROP CC SW THRU DWY

PROP HMA DWY

MATCH EXIST DWY (SAWCUT)

MEET EXIST SGE

RET EXIST PAVEMENT

MEET EXIST SGE

R&R SGE

LIMIT OF PROP HMA MILL & OVERLAY

ADJ DMH

WOODED AREA

CONTINUED ON SHEET NO. 5

GUARDRAIL DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

SEE BELOW

WATER SUPPLY ALTERATIONS

NONE

DRAINAGE DETAILS

THIS SHEET

PROPOSED DRAINAGE STRUCTURE DATA

NO.	TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
1	PROP CBCI	10+70.25	24.2' RT	356.26	-	351.26 (2)	4' SUMP; CURVED CURB INLET
2	PROP DMH	10+76.07	14.6' RT	356.28	351.0 (EX) 350.9 (EX CB1) 351.00 (1)	350.80 (6)	
3	PROP GICI	11+82.05	22.2' LT	352.72	-	350.22 (4)	R&R CURB INLET
4	PROP CB W/ MH COVER	11+82.24	14.7' LT	352.93	349.63 (3)	349.43 (6)	4' SUMP
5	PROP CBCI	11+82.32	20.0' RT	353.31	-	349.31 (6)	4' SUMP; R&R CURB INLET
6	PROP DMH	11+86.09	13.5' RT	353.36	348.86 (2) 349.16 (4) 349.16 (5)	348.76 (8)	
7	ADJ EXIST CB	12+85.88	39.1' RT	350.66	-	340.3 (9)	CORE HOLE IN EXIST
8	PROP DMH	13+29.39	18.2' RT	350.88	346.38 (6) 344.76 (13)	344.66 (9)	
9	PROP DMH	13+38.96	42.9' RT	349.50	339.78 (7) 344.43 (8) 345.28 (10)	339.68 (11)	5' DIAMETER
10	PROP CBCI	13+52.51	26.0' RT	350.37	-	345.87 (9)	4' SUMP; STRAIGHT CURB INLET
11	PROP FES	14+00.36	55.6' RT	-		339.03 (9)	12"
12	PROP GI	13+58.73	27.0' LT	349.48	-	346.98 (13)	
13	PROP CB W/ MH COVER	13+58.73	19.5' LT	349.70	346.70 (12)	345.20 (8)	4' SUMP
14	PROP CB	13+99.22	83.5' LT	344.57	-	340.57 (15) 339.07 (TEMP)	4' SUMP; REM EX CB
15	PROP HDWL	15+41.07	47.0' LT	-	-	319.31 (14)	SEE CONST STD DETAIL E 206.4.0
15A	PROP FES	15+53.41	58.4' RT	-	-	328.00 (15B)	12"
15B	EXIST CB	16+46.49	74.1' RT	345.67	-	339.6 (15A)	
16	PROP CBCI	16+24.53	26.0' RT	347.58	-	343.31 (17)	4' SUMP; STRAIGHT CURB INLET
17	CIT TO DMH	16+53.79	24.5' RT	347.56	343.06 (16) 341.10 (19) 343.06 (20)	340.7 (EX)	CORE HOLES IN EXIST
18	PROP GI	16+48.41	27.0' LT	347.49	-	344.99 (19)	
19	ADJ EXIST CB	16+54.71	26.8' LT	347.51	343.2 (EX CB12) 344.51 (18)	342.8 (17)	CORE HOLE IN EXIST
20	PROP CBCI	17+30.25	25.0' RT	347.92		*343.29 (50) **343.79 (17)	4' SUMP; STRAIGHT CURB INLET
21	PROP CBCI	19+21.45	29.1' LT	351.44	-	347.50 (22)	4' SUMP; R&R CURB INLET
22	CIT TO DMH	19+30.94	26.4' LT	351.92	347.40 (21) 347.7 (28) 347.6± (EX CB19) 347.4 (25)	347.30 (24)	CORE HOLES IN EXIST
24	PROP HDWL	19+33.27	65.6' LT	-	-	336.46 (22)	SEE CONST STD DETAIL E 206.4.0
25	PROP CBCI	19+27.99	22.8' RT	351.77	-	348.2 (EX)	MATCH EXIST INVERT; 4' SUMP; R&R CURB INLET, R&R F&G

NOTE: THERE IS NO PROPOSED STRUCTURE 23

*PRIMARY OUTLET
**SECONDARY OUTLET

PROPOSED DRAINAGE STRUCTURE DATA

NO.	TYPE	STATION	OFFSET	RIM ELEV.	INV. ELEV. IN	INV. ELEV. OUT	REMARKS
26	PROP CBCI	21+07.63	20.3' RT	357.99	-	354.49 (27)	4' SUMP; R&R CURB INLET
27	PROP DMH	21+31.47	13.5' RT	358.87	354.28 (26)	354.1± (28)	MATCH EXIST INVERT OUT
28	CIT TO DMH	21+30.61	23.1' LT	358.65	353.6 (27) 353.61 (29)	353.5 (22)	CORE HOLE IN EXIST
29	PROP CBCI	21+40.15	*25.9' LT	358.91	-	353.71 (28)	4' SUMP; OFFSET TOP; R&R CURB INLET
30	ADJ EXIST DMH	24+61.33	18.2' LT	369.12	359.2 (EX) 364.0 (31) 363.9 (32)	358.9 (EX)	CORE HOLE IN EXIST
31	PROP CBCI	24+79.70	20.3' RT	369.65	-	365.4± (30)	4' SUMP; R&R CI, R&R F&G; MATCH EXIST INVERT
32	PROP CBCI	24+95.48	*25.9' LT	370.05	-	364.25 (30)	4' SUMP; OFFSET TOP; R&R CURB INLET
32	PROP CBCI	24+95.48	*25.9' LT	370.05	-	364.25 (30)	4' SUMP; OFFSET TOP; R&R CURB INLET
33	PROP DEEP DMH	26+40.77	16.3' LT	374.69	370.09 (34) 361.6± (EX DMH 8)	361.5± (30)	PAID UNDER ITEM 202.2 MATCH EXIST PIPE INVERTS
34	PROP CBCI	26+54.01	21.0' RT	374.95	-	370.45 (33)	4' SUMP; STRAIGHT CURB INLET
35	PROP CBCI	64+64.00	10.0' RT	370.84	-	366.34 (37)	4' SUMP; STRAIGHT CURB INLET
36	ADJ CB	64+05.74	32.4' RT	366.73	-	361.42 (37)	CORE HOLE IN EXIST
37	PROP DMH	64+03.44	15.0' LT	368.44	363.44 (35) 360.94 (36)	360.84 (39)	
38	ADJ CB	63+46.05	20.8' LT	364.26	-	361.20 (39)	CORE HOLE IN EXIST
39	PROP DMH	63+46.00	14.5' LT	365.20	359.20 (37) 361.10 (38)	359.10 (40)	
40	PROP DMH	63+22.95	9.5' LT	363.55	358.05 (39)	357.8± (EX)	MATCH EXIST INVERT OUT
41	ADJ EXIST DMH	28+12.93	16.8' LT	378.08	373.58 (42) 372.2 (EX CB3) 364.0 (EX DMH 9)	363.8 (33)	CORE HOLE IN EXIST
42	PROP CB	28+33.17	23.7' LT	378.24	-	373.74 (41)	4' SUMP
43	PROP DMH	28+95.85	35.3' RT	379.98	374.05 (44)	373.9± (EX)	MATCH EXIST INVERT OUT
44	PROP CBCI	29+77.17	19.0' RT	379.87	-	374.87 (43)	4' SUMP; STRAIGHT CURB INLET
45	PROP CBCI	33+41.16	19.0' RT	378.12	-	373.62 (46)	4' SUMP; STRAIGHT CURB INLET
46	PROP DMH	33+48.09	25.0' RT	378.56	373.52 (45) 372.3 (47)	372.2± (EX)	MATCH EXIST PIPE INVERTS
47	PROP DROP INLET, TYPE DF	33+44.68	35.7' RT	376.45		372.40 (46)	SEE CONSTRUCTION DETAIL 209.1.1
48	CIT TO DMH	17+86.02	81.6' RT	344.15	340.9 (49) 342.6 (EX)	340.7 (EX)	REMODEL, REPLACE EXIST DOUBLE HOLE TOP SECTION OF STRUCTURE WITH SINGLE HOLE TOP SECTION (PAID FOR UNDER ITEM 202.), CORE HOLE IN EXIST
49	PROP LEACHING BASIN	19+95.52	80.6' RT	344.05		341.0 (48)	PRECAST LEACHING BASIN W/SLAB TOP, 3' SUMP
50	PROP LEACHING BASIN W/ MH COVER	17+30.55	29.9' RT	348.49	343.19 (20)	347.10 (24)	PRECAST LEACHING BASIN W/SLAB TOP, 3' SUMP

SHEET 7 OF 14

WATER QUALITY CERTIFICATE APPLICATION
BERNARDSTON, MASSACHUSETTS
ST 10 (CHURCH ST) OVER FALL RIVER
BRIDGE B-10-001
SEPTEMBER 2025

T1217.01_HD1(GENPLAN).DWG Plotted on 4-Sep-2025 2:18 PM

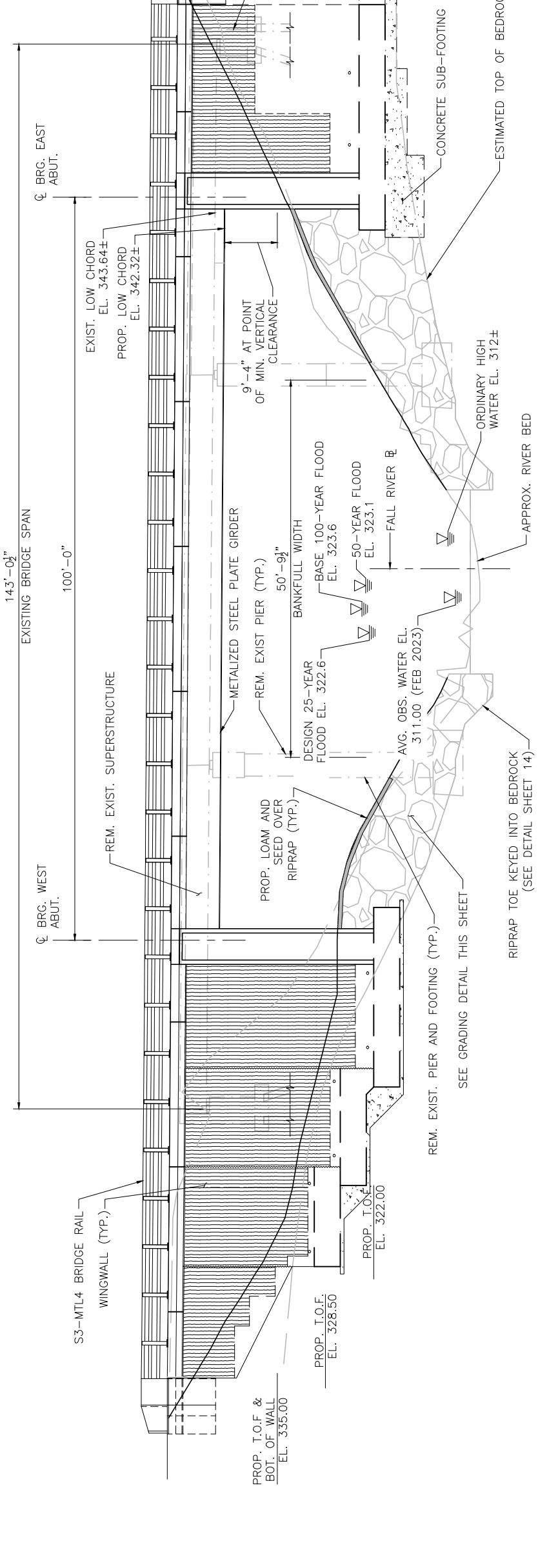
Proposal No. 612159-136484

A0084 2 - 269

612159_BR2(ELEVATION).DWG Plotted on 4-Sep-2025 2:18 PM

WATER QUALITY CERTIFICATE APPLICATION
BERNARDSTON, MASSACHUSETTS
ST 10 (CHURCH ST) OVER FALL RIVER
BRIDGE B-10-001
SEPTEMBER 2025

SHEET 8 OF 14

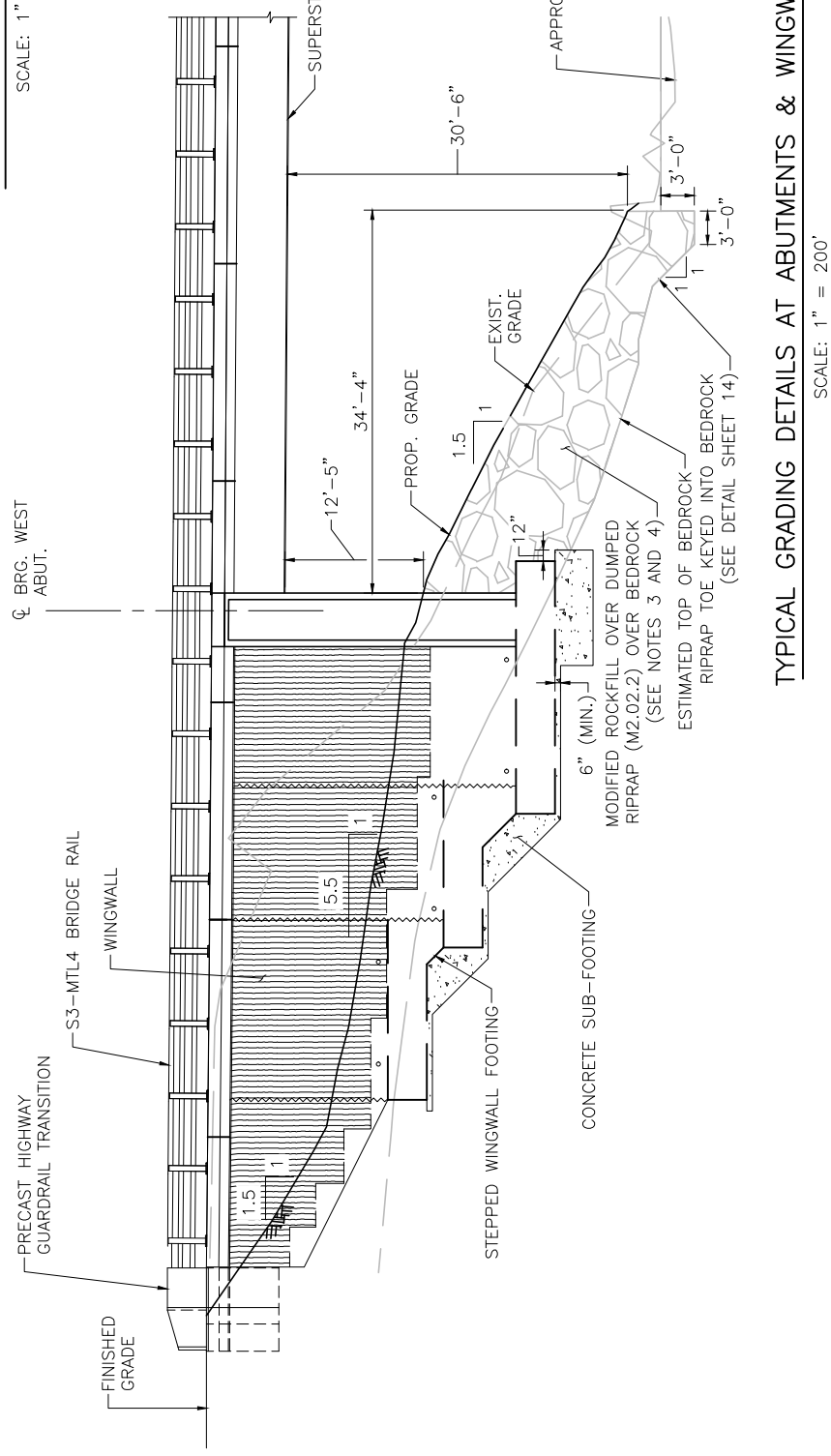


BRIDGE GENERAL ELEVATION

SCALE: 1" = 200'

NOTES:

1. THE HORIZONTAL DATUM IS THE NORTH AMERICAN DATUM OF 1983 (NAD83) MASSACHUSETTS STATE PLANE COORDINATE SYSTEM IN U.S. SURVEY FEET.
2. THE VERTICAL DATUM IS THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) IN FEET.
3. LOAM AND SEED SHALL BE PLACED ON TOP OF RIPRAP/MODIFIED ROCKFILL ABOVE THE 100-YEAR FLOOD ELEVATION (EL. 323.60).
4. STREAMBED MATERIAL IN ACCORDANCE WITH ITEM 983.521 – STREAMBED RESTORATION SHALL BE USED TO FILL RIPRAP VOIDS BELOW THE 100-YEAR FLOOD ELEVATION.

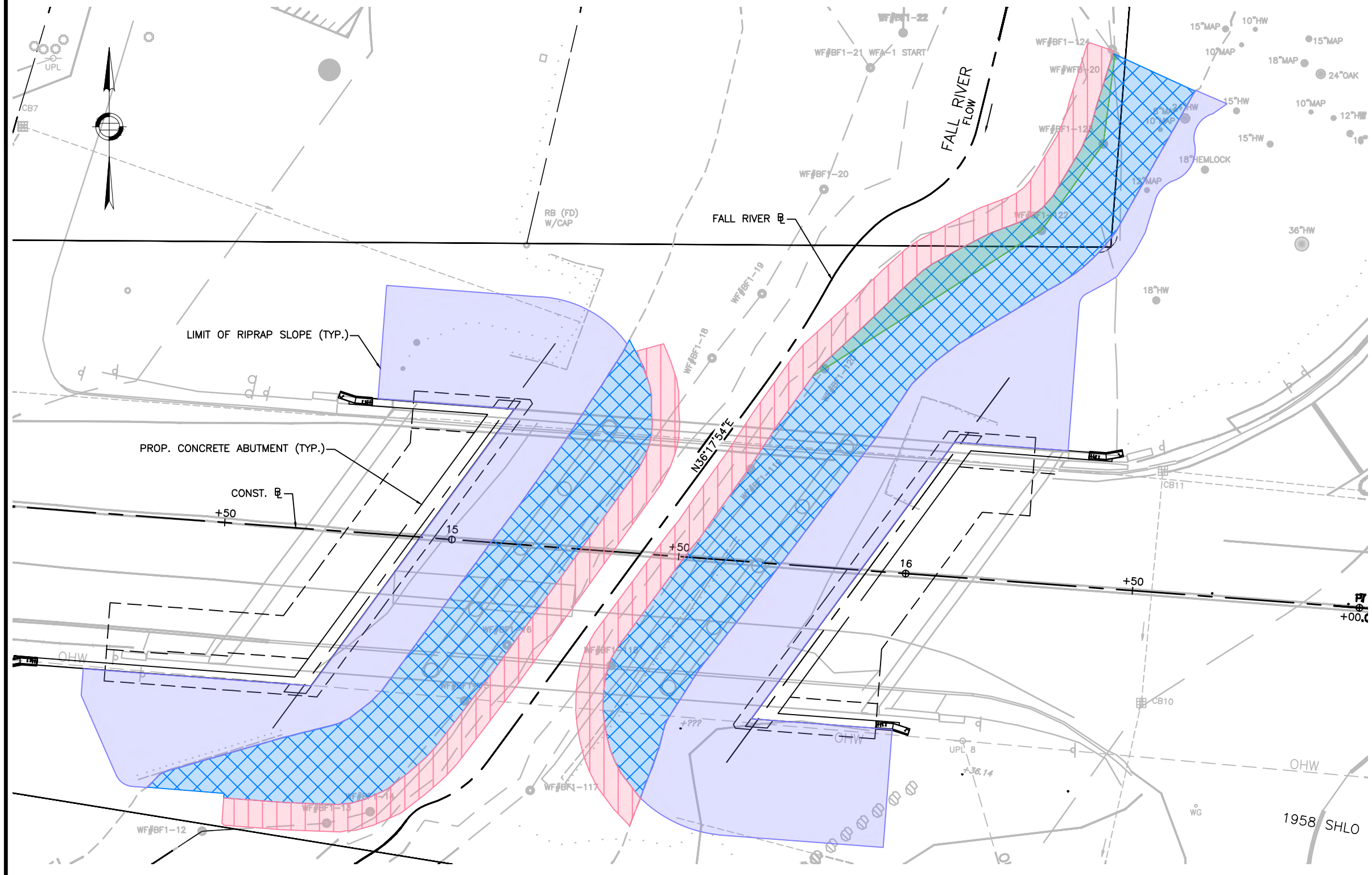


TYPICAL GRADING DETAILS AT ABUTMENTS & WINGWALLS

SCALE: 1" = 200'

0 200 500 1000

SCALE: 1" = 200'



STREAMBED RESTORATION PLAN

SCALE: 1" = 1'-0"

LEGEND:

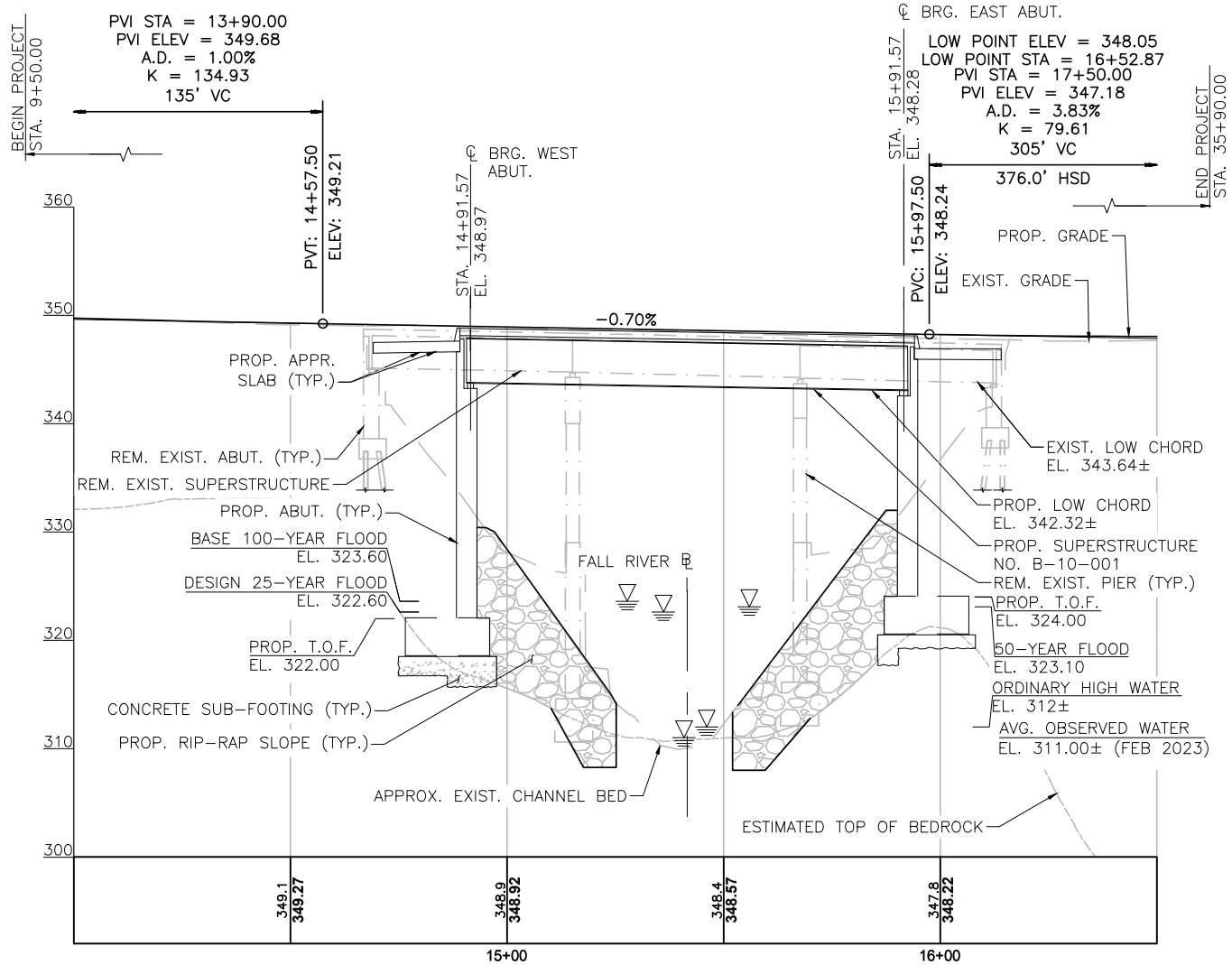
- LOAM AND SEED OVER RIPRAP ABOVE 100-YEAR FLOOD ELEVATION.
- STREAMBED MATERIAL OVER RIPRAP BELOW 100-YEAR FLOOD ELEVATION AND ABOVE BANK FLAGS.
- STREAMBED RESTORATION BELOW SANDBAGS. (ONLY DISTURBANCE IS THE PLACEMENT AND REMOVAL OF SANDBAGS)
- DREDGE AREA BELOW BANK FLAGS. RE-USE DREDGE MATERIAL TO FILL VOIDS IN BLUE AREA. THIS AREA WILL BE RIPRAP WITH STREAMBED MATERIAL IN THE VOIDS IN ITS FINAL CONDITION

SHEET 9 OF 14

WATER QUALITY CERTIFICATE APPLICATION
BERNARDSTON, MASSACHUSETTS
ST 10 (CHURCH ST) OVER FALL RIVER
BRIDGE B-10-001
SEPTEMBER 2025

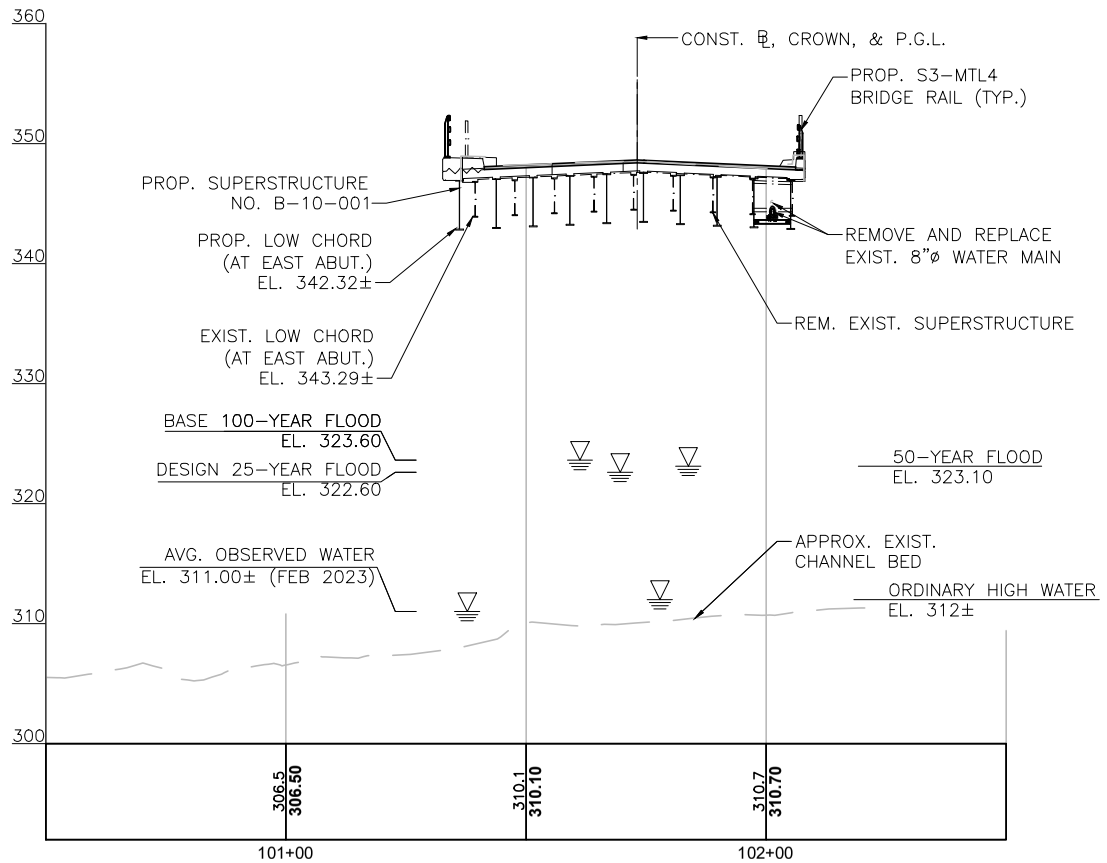
A00842 - 271

612159-136484
612159_BR4(STREAMBED RESTORATION).DWG Plotted on 4-Sep-2025 2:18 PM



PROFILE – ST 10 (CHURCH ST)

HORIZONTAL SCALE: 1" = 40'
VERTICAL SCALE: $\frac{1}{8}$" = 1'-0"



PROFILE – FALL RIVER

HORIZONTAL SCALE: 1" = 40'
VERTICAL SCALE: $\frac{1}{8}$" = 1'-0"

NOTES:

1. THE HORIZONTAL DATUM IS THE NORTH AMERICAN DATUM OF 1983 (NAD83) MASSACHUSETTS STATE PLANE COORDINATE SYSTEM IN U.S. SURVEY FEET.
2. THE VERTICAL DATUM IS THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) IN FEET.

HOR. SCALE: 1" = 40'
40 0 40 80
VER. SCALE: $\frac{1}{8}$" = 1'-0"
8 0 8 16

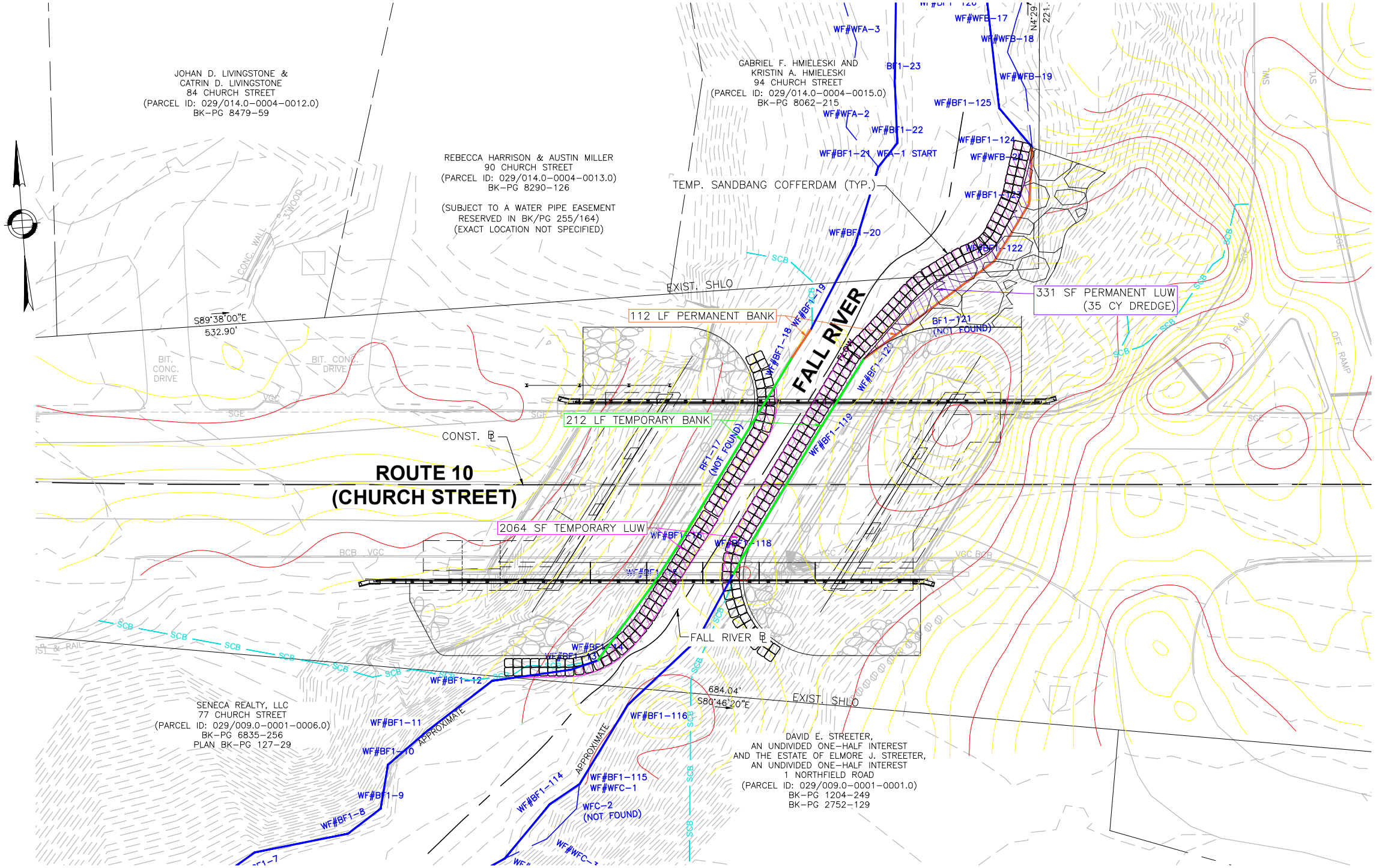
SHEET 10 OF 14

WATER QUALITY CERTIFICATE APPLICATION
BERNARDSTON, MASSACHUSETTS
ST 10 (CHURCH ST) OVER FALL RIVER
BRIDGE B-10-001
SEPTEMBER 2025

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612159_BR3(PROFILE).DWG Plotted on 4-Sep-2025 2:16 PM



WOTUS IMPACT PLAN

SCALE: 1" = 40'

SUMMARY OF RESOURCE AREA IMPACTS			
LEGEND	TYPE	IMPACTS	SURFACE AREA (SF) LINEAR FEET (LF)
	IMPACTS TO WATERS OF THE U.S. (WOTUS)	TEMPORARY	2064 SF
		PERMANENT	331 SF (35 CY DREDGE)
	BANK/OHW	TEMPORARY	212 LF
		PERMANENT	112 LF
	VEGETATED WETLAND		
	ORDINARY HIGH WATER/BANK (OHW)		
SCB	SEDIMENT CONTROL BARRIER		

NOTES:

1. THE HORIZONTAL DATUM IS THE NORTH AMERICAN DATUM OF 1983 (NAD83) MASSACHUSETTS STATE PLANE COORDINATE SYSTEM IN U.S. SURVEY FEET.
2. THE VERTICAL DATUM IS THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) IN FEET.

0 40 100 160

SCALE: 1" = 40'

SHEET 11 OF 14

WATER QUALITY CERTIFICATE APPLICATION
BERNARDSTON, MASSACHUSETTS
ST 10 (CHURCH ST) OVER FALL RIVER
BRIDGE B-10-001
SEPTEMBER 2025

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612159_BR4(IMPACTS).DWG Plotted on 4-Sep-2025 2:17 PM

Proposal No. 612159-136484

612159_BR4(IMPACTS).DWG Plotted on 4-Sep-2025 2:18 PM

WATER QUALITY CERTIFICATE APPLICATION
BERNARDSTON, MASSACHUSETTS
ST 10 (CHURCH ST) OVER FALL RIVER
BRIDGE B-10-001
SEPTEMBER 2025

SHEET 12 OF 14

SUMMARY OF RESOURCE AREA IMPACTS			
LEGEND	TYPE	IMPACTS	SURFACE AREA (SF) LINEAR FEET (LF)
	IMPACTS WITHIN 100-YEAR FLOODPLAINS (FLOODPLAIN)	TEMPORARY	4274 SF
		PERMANENT	1651 SF
		ADDED	1547 SF
	EXISTING FLOODPLAIN (323.7')		
	PROPOSED FLOODPLAIN (323.6')		
	VEGETATED WETLAND		
	ORDINARY HIGH WATER/BANK (OHW)		
SCB	SEDIMENT CONTROL BARRIER		

100-YEAR FLOODPLAIN IMPACT PLAN

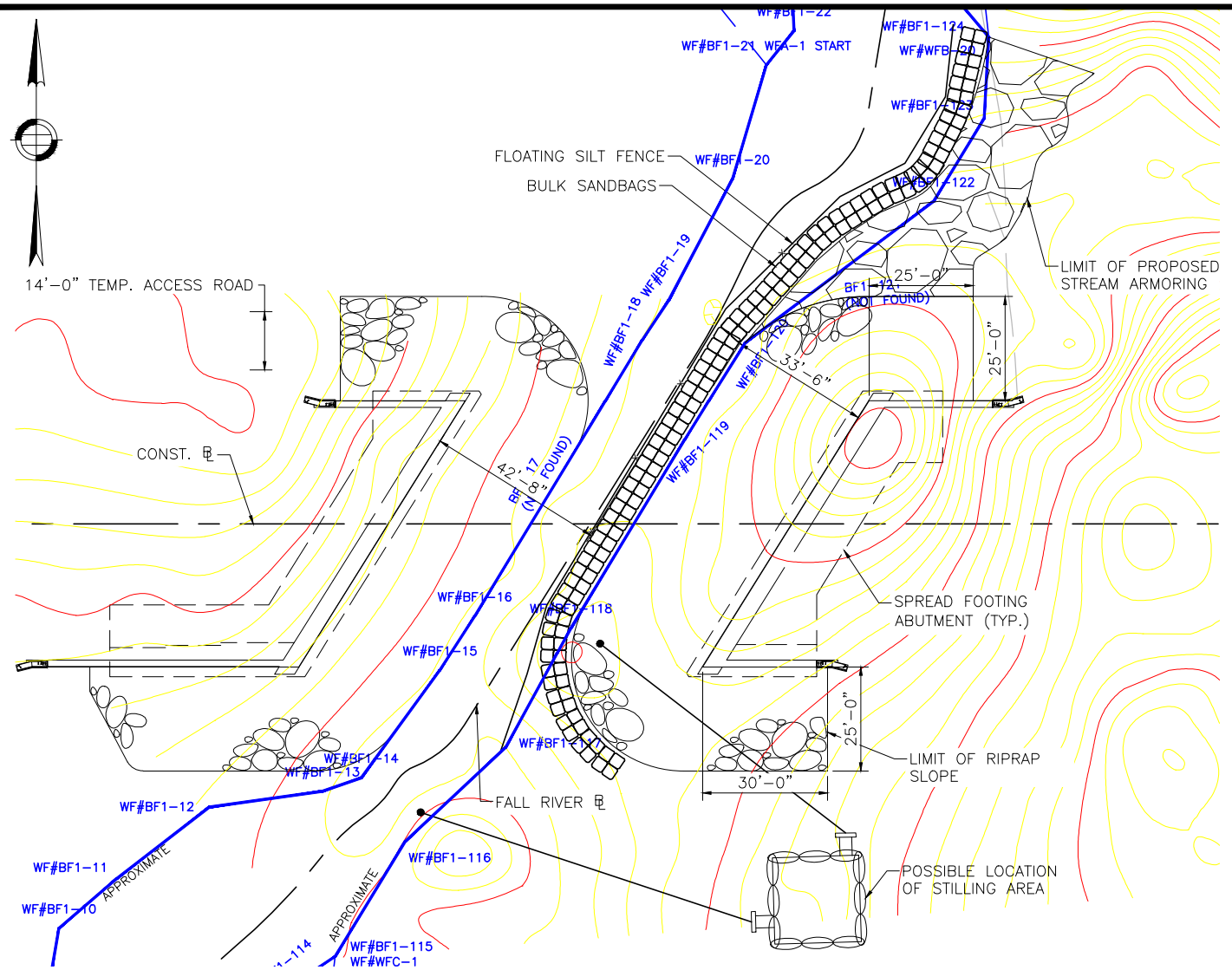
SCALE: 1" = 40'

0 40 100 160

SCALE: 1" = 40'

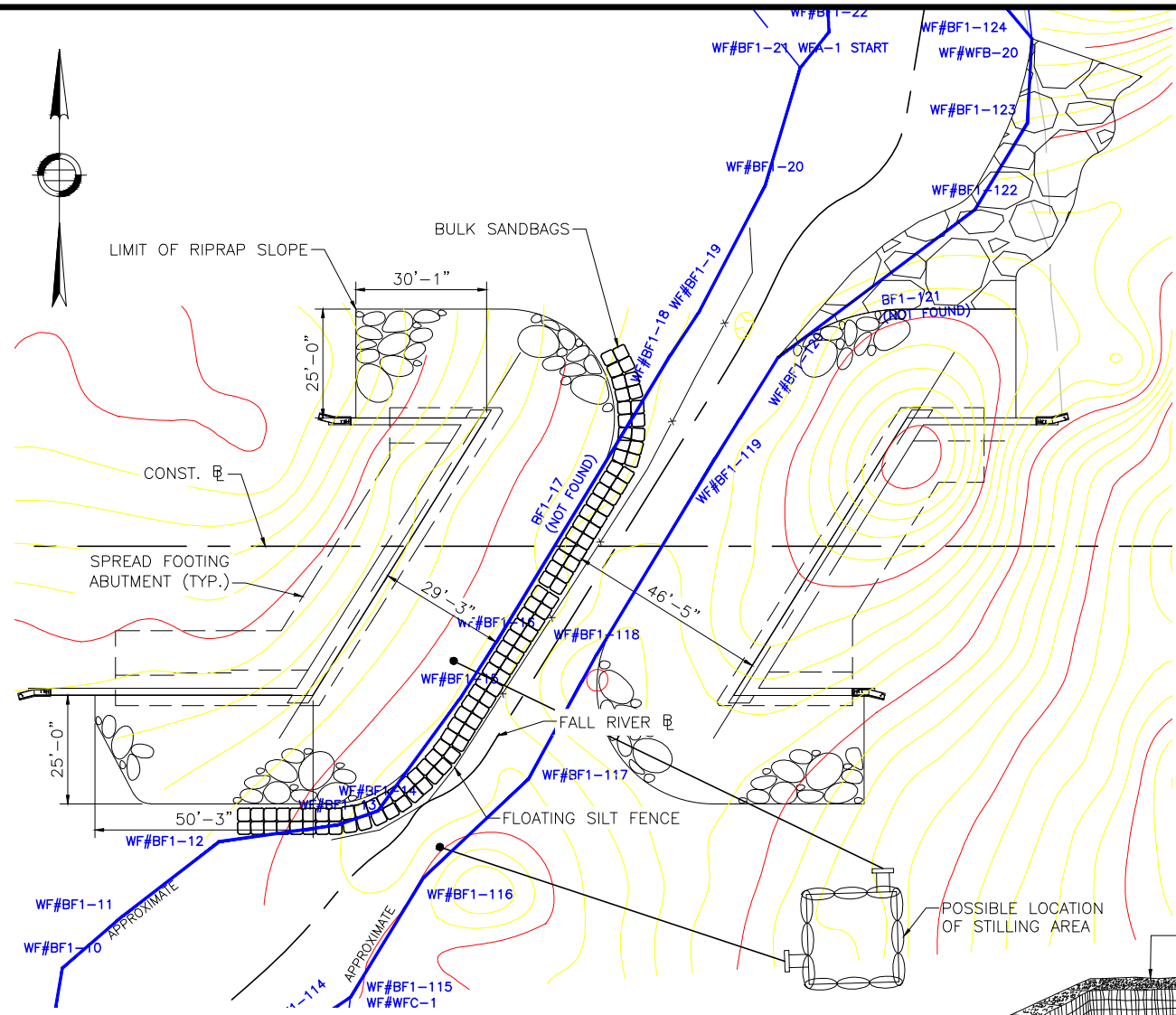
NOTES:

1. THE HORIZONTAL DATUM IS THE NORTH AMERICAN DATUM OF 1983 (NAD83) MASSACHUSETTS STATE PLANE COORDINATE SYSTEM IN U.S. SURVEY FEET.
2. THE VERTICAL DATUM IS THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) IN FEET.



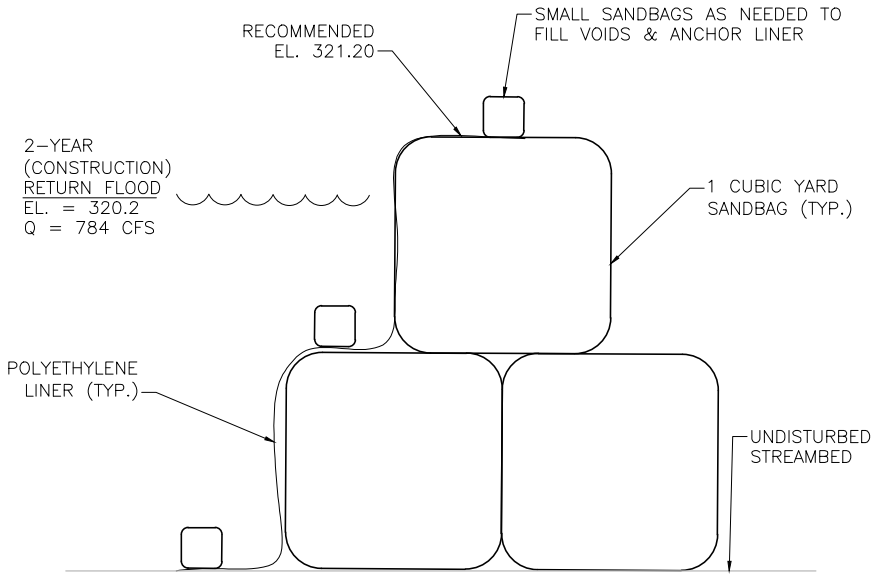
CONTROL OF WATER PLAN – EAST BANK

SCALE: 1" = 40'



CONTROL OF WATER PLAN – WEST BANK

SCALE: 1" = 40'



SANDBAG COFFERDAM

NOT TO SCALE

CONTROL OF WATER NOTES:

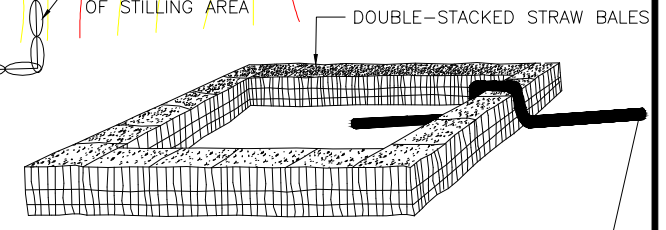
1. PROPOSED BRIDGE SUPERSTRUCTURE NOT SHOWN FOR CLARITY.
2. THE C.O.W. SYSTEM SHOW IN THESE PLANS IS CONCEPTUAL. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DESIGN OF THE CONTROL OF WATER (C.O.W.) SYSTEM AND SHALL SUBMIT A CONTROL OF WATER PLAN TO THE ENGINEER FOR APPROVAL.
3. ALL DEWATERING SHALL BE DIVERTED TO A TEMPORARY STILLING BASIN PRIOR TO BEING PUMPED BACK INTO THE STREAM. NO CONTAMINATED WATER IS PERMITTED TO ENTER THE STREAM
4. C.O.W. SYSTEM SHALL BE DESIGNED USING A 2-YEAR (CONSTRUCTION) RETURN FREQUENCY FLOOD EVENT OF 784 CFS. PROVIDED SYSTEM SHALL EXTEND 12" (MIN.) ABOVE STORM ELEVATION. IF THE C.O.W. SYSTEM WILL BE IN PLACE FOR GREATER THAN 1-YEAR, THE C.O.W. SYSTEM SHALL BE DESIGNED USING A 5-YEAR (CONSTRUCTION) RETURN FREQUENCY FLOOD EVENT OF 1290 CFS.
5. C.O.W. SYSTEM SHALL BE INSPECTED DAILY FOR WATER LEAKS OR EROSION AND REPAIR PROCEDURES SHALL BE IMPLEMENTED ACCORDINGLY.

SUGGESTED SEQUENCE OF CONSTRUCTION:

1. CONSTRUCT THE PROPOSED BRIDGE AS SHOWN ON THE STAGE CONSTRUCTION SEQUENCING PLANS.
2. FOR EACH STAGE OF CONSTRUCTION INSTALL CONTROL OF WATER SYSTEM TO SHIFT THE STREAM TO THE EAST OR WEST AS REQUIRED FOR THE GIVEN STAGE. C.O.W. SYSTEM SHALL CONSIST OF A SANDBAG COFFERDAM OR APPROVED EQUIVALENT.
3. DEWATER THE WORK AREA TO REMOVE EXISTING BOULDER/RIP RAP SCOUR PROTECTION STONES AS REQUIRED FOR CONSTRUCTION OF THE GIVEN STAGE.
4. PLACE RIPRAP SLOPE FOR SCOUR PROTECTION TO THE EXTENTS PRACTICAL FOR THAT CONSTRUCTION STAGE. RIPRAP TOE SHALL BE KEYED INTO BEDROCK.
5. SHIFT CONTROL OF WATER SYSTEM TO MOVE THE FALL RIVER FLOW TO THE EAST OR WEST AS NEEDED FOR EACH GIVEN STAGE AND REPEAT SEQUENCE.
6. REMOVE SANDBAG COFFERDAM AND RESTORE NORMAL RIVER FLOW AFTER RIPRAP SLOPES FOR ALL STAGES OF CONSTRUCTION HAVE BEEN INSTALLED.

0 40 100 160

SCALE: 1" = 40'



NOTES:
DISCHARGE TO SEDIMENTATION BASIN (AS SHOWN) OR TO SILTATION/ DEWATERING BAG SUCH AS FLOGARD DEWATERING BAG MODEL SC-DW1215Z, OR APPROVED EQUAL. SYSTEM SHOWN IS CONCEPTUAL ONLY AND IS TO BE DESIGNED BY CONTRACTOR.

TEMPORARY STILLING AREA

SCALE: N.T.S.

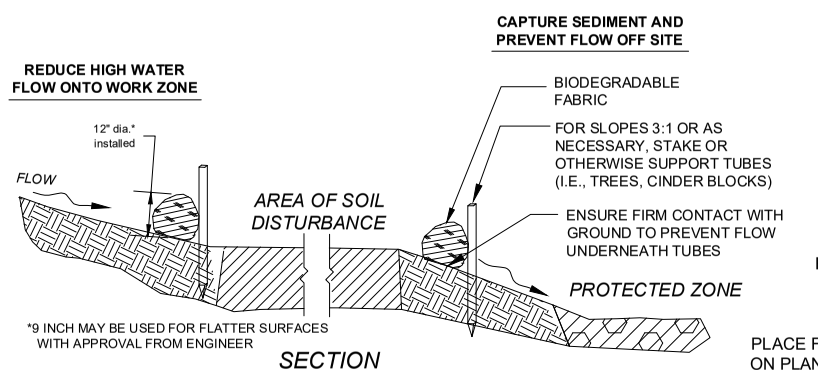
SHEET 13 OF 14

WATER QUALITY CERTIFICATE APPLICATION
BERNARDSTON, MASSACHUSETTS
ST 10 (CHURCH ST) OVER FALL RIVER
BRIDGE B-10-001
SEPTEMBER 2025

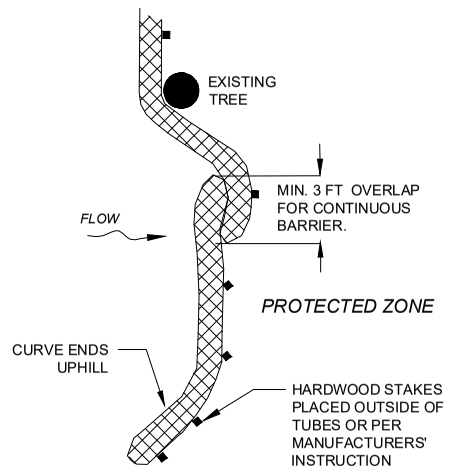
A00842 - 275

612159_BR4(IMPACTS).DWG Plotted on 4-Sep-2025 2:17 PM

Proposal No. 612159-136484



SECTION



PLACE TUBE ALONG CONTOURS AND PERPENDICULAR TO FLOW.

PLACE AS CLOSE TO LIMIT OF SOIL DISTURBANCE AS POSSIBLE

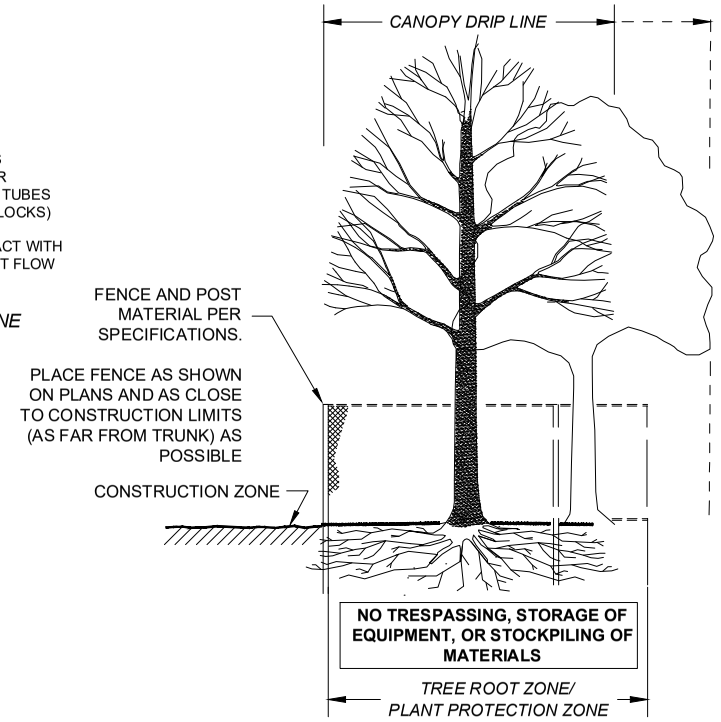
ADJUST LOCATION AS REQUIRED FOR OPTIMUM EFFECTIVENESS.
DO NOT INSTALL IN WATERWAYS.

PLACE STAKES AS NEEDED TO SECURE TUBES IN PLACE.

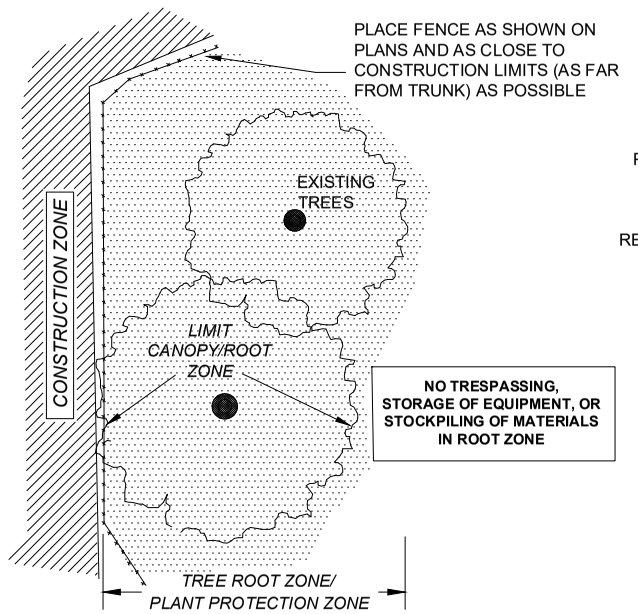
PLAN VIEW

SEDIMENT BARRIER - COMPOST FILTER TUBES

N.T.S.



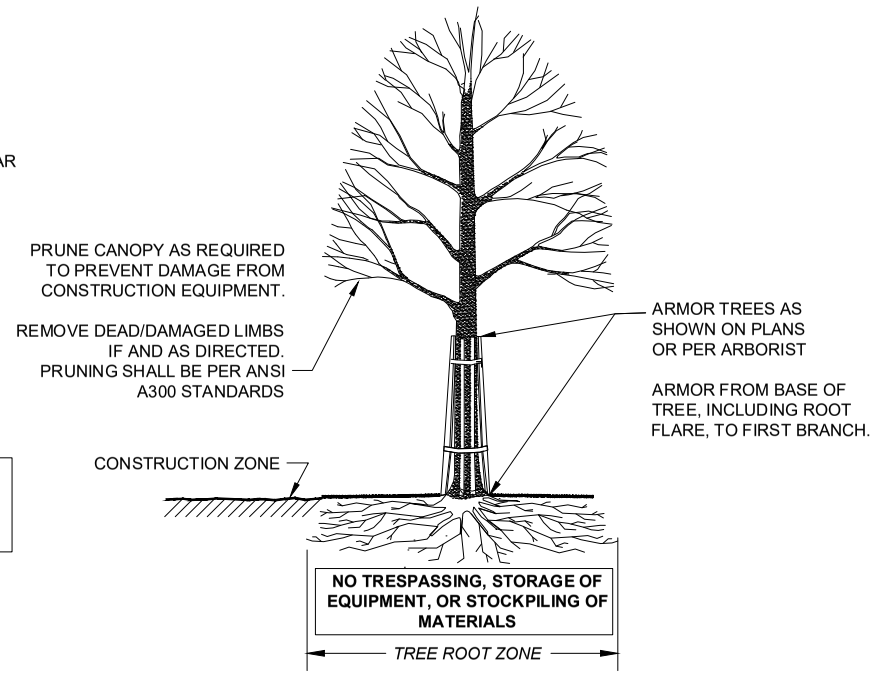
SECTION - FENCE PROTECTION OF ROOT ZONE



PLAN VIEW - FENCE PROTECTION OF ROOT ZONE

TREE PROTECTION - ROOT ZONE

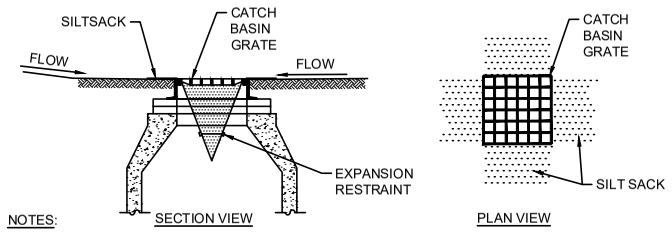
N.T.S.



SECTION - TRUNK ARMORING & PRUNING

TREE PROTECTION - TRUNK

N.T.S.

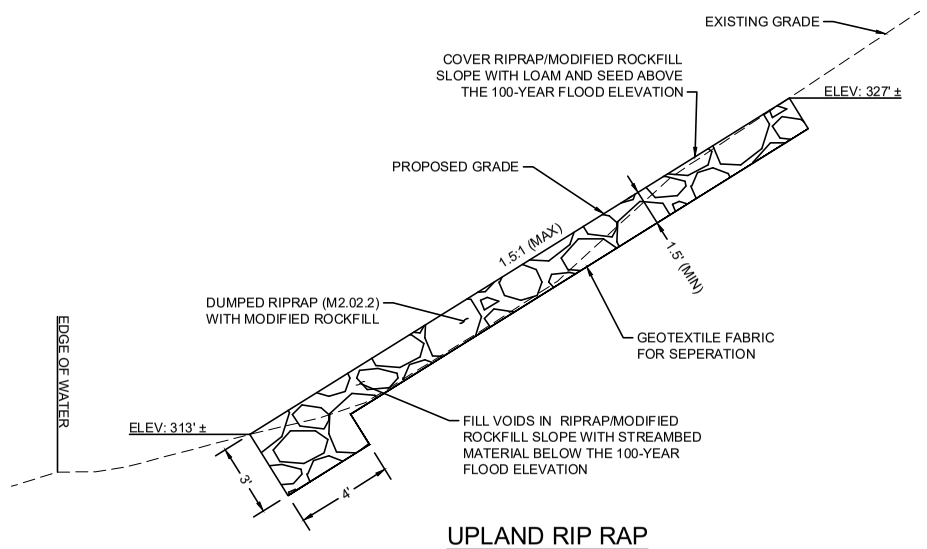


NOTES:

1. INSTALL SILT SACK IN EXISTING CATCH BASINS BEFORE COMMENCING WORK, AND IN NEW CATCH BASINS IMMEDIATELY AFTER INSTALLATION OF STRUCTURE. MAINTAIN UNTIL BINDER COURSE PAVING IS COMPLETE OR A PERMANENT STAND OF GRASS HAS BEEN ESTABLISHED.
2. GRATE TO BE PLACED OVER SILT SACK.
3. SILT SACK SHALL BE INSPECTED PERIODICALLY AND AFTER ALL STORM EVENTS AND CLEANING OR REPLACEMENT SHALL BE PERFORMED PROMPTLY AS NEEDED.

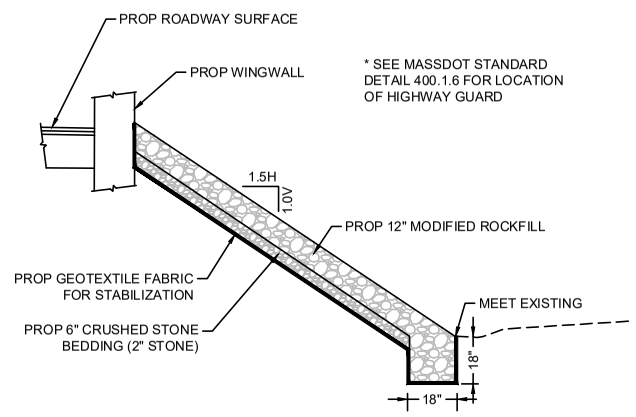
INLET PROTECTION SILT SACK IN CATCH BASIN

N.T.S.



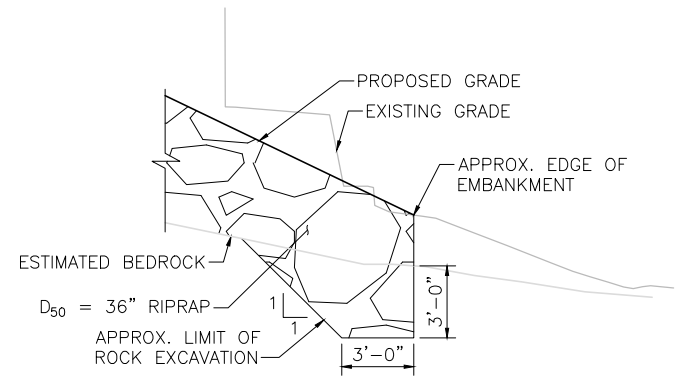
UPLAND RIP RAP

N.T.S.



MODIFIED ROCKFILL SLOPE STABILIZATION

N.T.S.



RIPRAP TOE – AT BEDROCK

NOT TO SCALE

SHEET 14 OF 14

WATER QUALITY CERTIFICATE APPLICATION
BERNARDSTON, MASSACHUSETTS
ST 10 (CHURCH ST) OVER FALL RIVER
BRIDGE B–10–001
SEPTEMBER 2025

A00842 - 276
612159_BR5(DETAILS).DWG Plotted on 4-Sep-2025 2:15 PM
Proposal No. 612159-136484

From:	Robert Niccoli
To:	Davis, Heidi (DEP)
Cc:	Lewis, Tyler (DEP); Walker, Courtney L. (DOT); Lenker, Melissa (DOT); Collins, Lily R. (DOT); Joa, Michael A. (DOT); Thomas Liddy; Thibault, Michelle (EXT); McHugh, Michael (DEP); Vasconcelos, Daniel B CIV USARMY CENAE (USA); WHill
Subject:	Re: 401 WATER QUALITY CERTIFICATION Administrative Completeness and Technical Deficiency Review/Church Street (Route 10) Bridge Replacement, Bernardston SUPPLEMENTAL TECH DEF
Date:	Friday, September 26, 2025 12:10:52 PM
Attachments:	image002.png image003.png image001.png Wet WQS.pdf 612159 - Bernardston - Basin Sketch.pdf

CAUTION: This email originated from a sender outside of the Commonwealth of Massachusetts mail system. Do not click on links or open attachments unless you recognize the sender and know the content is safe.

Good afternoon Heidi,

Please see our responses below and the attached sketches. Please let us know if you have any questions. If you agree with the overall approach here, we can refresh our permit applications and get them sent over. If there is anything you would like to discuss further, we can surely setup a quick call.

Thank you and have a great weekend!
Bob

1. It has not been sufficiently demonstrated that additional Stormwater Control Measures (SCMs) or Low Impact Development (LID) techniques are infeasible or impracticable. The response to comment #4 states that additional SCMs were not considered in the infields to avoid temporary impacts to wetlands. Temporary impacts to wetlands do not necessarily preclude the installation of stormwater control measures. Additionally, the remaining infields of the highway ramps should also be evaluated for SCMS. We have evaluated the project area further and determined that it is feasible to install a bioretention area within one of the infields. The bioretention area will be sized to offset the increase in impervious area of the project. Please see the attached sketch.

2. Response 4 states that a grass swale is proposed. If practicable, all proposed swales should be installed as water quality swales for additional stormwater treatment. The existing grass swale is located within the clear zone of the ramp. Because of this, check dams, as recommended for water quality swales, are not feasible. We will incorporate certain other aspects of water quality swales. Please see the attached cross section sketch.

3. Response 5 states that 17 of the 32 catch basins will be replaced with deep sump catch basins. Please explain why only 17 are being replaced. Any existing catch basins proposed to remain should be replaced with deep sump catch basins unless demonstrated to be impracticable. We will replace the existing CBs within the project area with deep sump CBs.

Please note, there are actually 26 deep sump catch basins within the project limits. These will all be replaced with deep sump catch basins.

Bob Niccoli, PE
Practice Leader - Structures
C: 440-655-9515
T: 978-794-1792
rniccoli@theengineeringcorp.com

From: Davis, Heidi (DEP) <heidi.davis@mass.gov>
Sent: Tuesday, September 16, 2025 11:37 AM
To: Robert Niccoli <rniccoli@theengineeringcorp.com>
Cc: Lewis, Tyler (DEP) <Tyler.Lewis@mass.gov>; Walker, Courtney L. (DOT) <Courtney.L.Walker@dot.state.ma.us>; Lenker, Melissa (DOT) <Melissa.Lenker@dot.state.ma.us>; Collins, Lily R. (DOT) <lily.r.collins@dot.state.ma.us>; Joa, Michael A. (DOT) <Michael.A.Joa@dot.state.ma.us>; Thomas Liddy <tel@lucasenviro.com>; Michelle Thibault <mthibault@theengineeringcorp.com>; McHugh, Michael (DEP) <michael.mchugh@mass.gov>; Vasconcelos, Daniel B CIV USARMY CENAE (USA) <daniel.b.vasconcelos@usace.army.mil>; WHill <WHill@townofbernardston.org>
Subject: 401 WATER QUALITY CERTIFICATION Administrative Completeness and Technical Deficiency Review/Church Street (Route 10) Bridge Replacement, Bernardston SUPPLEMENTAL TECH DEF

Good morning, Bob –

Thank you for the responses to MassDEP's Administrative Completeness and Technical Review letter. Several of the responses clarify the project scope and address our questions. However, we have the following supplemental inquiries:

1. It has not been sufficiently demonstrated that additional Stormwater Control Measures (SCMs) or Low Impact Development (LID) techniques are infeasible or impracticable. The response to comment #4 states that additional SCMs were not considered in the infields to avoid temporary impacts to wetlands. Temporary impacts to wetlands do not necessarily preclude the installation of stormwater control measures. Additionally, the remaining infields of the highway ramps should also be evaluated for SCMS.

2. Response 4 states that a grass swale is proposed. If practicable, all proposed swales should be installed as water quality swales for additional stormwater treatment.

3. Response 5 states that 17 of the 32 catch basins will be replaced with deep sump catch

basins. Please explain why only 17 are being replaced. Any existing catch basins proposed to remain should be replaced with deep sump catch basins unless demonstrated to be impracticable.

Please reach out to me or Tyler Lewis with any questions. We would be happy to meet with the design team to discuss these supplemental comments.

Thank you,
Heidi

Heidi M. Davis
Senior Wetland Analyst
Highway Unit Supervisor
Wetlands Program, Boston Office
MassDEP
339-225-2332

MassDEP
Department of Environmental Protection

From: Robert Niccoli <rniccoli@theengineeringcorp.com>
Sent: Monday, September 8, 2025 8:20 AM
To: Thomas Liddy <tel@lucasenviro.com>; Thibault, Michelle (EXT) <mthibault@theengineeringcorp.com>; Davis, Heidi (DEP) <heidi.davis@mass.gov>; Vasconcelos, Daniel B CIV USARMY CENAE (USA) <daniel.b.vasconcelos@usace.army.mil>; WHill <WHill@townofbernardston.org>; McHugh, Michael (DEP) <michael.mchugh@mass.gov>
Cc: Lewis, Tyler (DEP) <Tyler.Lewis@mass.gov>; Walker, Courtney L. (DOT) <Courtney.L.Walker@dot.state.ma.us>; Lenker, Melissa (DOT) <Melissa.Lenker@dot.state.ma.us>; Collins, Lily R. (DOT) <lily.r.collins@dot.state.ma.us>; Joa, Michael A. (DOT) <Michael.A.Joa@dot.state.ma.us>
Subject: Re: 401 WATER QUALITY CERTIFICATION Administrative Completeness and Technical Deficiency Review/Church Street (Route 10) Bridge Replacement, Bernardston

CAUTION: This email originated from a sender outside of the Commonwealth of Massachusetts mail system. Do not click on links or open attachments unless you recognize the sender and know the content is safe.

Hello All,

On behalf of MassDOT Highway, please see the dropbox link below for the responses to the

Administrative Completeness and Technical Review for the aforementioned project. Please let us know once you are able to retrieve the documents and let us know if you have any questions.

https://www.dropbox.com/scl/fo/2fgf13qs6a110tttq7czp/AMxVHhWX9am53Tv-igu3DPs?rlkey=enr5qldjwhyour2kyetbwbufg&st=sy62756k&dl=0

Thank you,
Bob

Bob Niccoli, PE, SE

Practice Area Lead - Structures

T 978-794-1792 **C** 440-655-9515

rniccoli@theengineeringcorp.com

The Engineering Corp

Interested in joining our team? Apply here!

From: Davis, Heidi (DEP) <heidi.davis@mass.gov>
Sent: Thursday, July 31, 2025 4:46 PM
To: Thomas Liddy <tel@lucasenviro.com>
Cc: McHugh, Michael (DEP) <michael.mchugh@mass.gov>; Vasconcelos, Daniel B CIV USARMY CENAE (USA) <daniel.b.vasconcelos@usace.army.mil>; Lenker, Melissa (DOT) <Melissa.Lenker@dot.state.ma.us>; Walker, Courtney L. (DOT) <Courtney.L.Walker@dot.state.ma.us>; Joa, Michael A. (DOT) <Michael.A.Joa@dot.state.ma.us>; Collins, Lily R. (DOT) <lily.r.collins@dot.state.ma.us>; WHill <WHill@townofbernardston.org>; Lewis, Tyler (DEP) <Tyler.Lewis@mass.gov>
Subject: 401 WATER QUALITY CERTIFICATION Administrative Completeness and Technical Deficiency Review/Church Street (Route 10) Bridge Replacement, Bernardston

Good afternoon, Tom –

Attached is the Administrative Completeness and Technical Deficiency letter for the Church Street (Route 10) Bridge Replacement Project over Fall River in Bernardston.

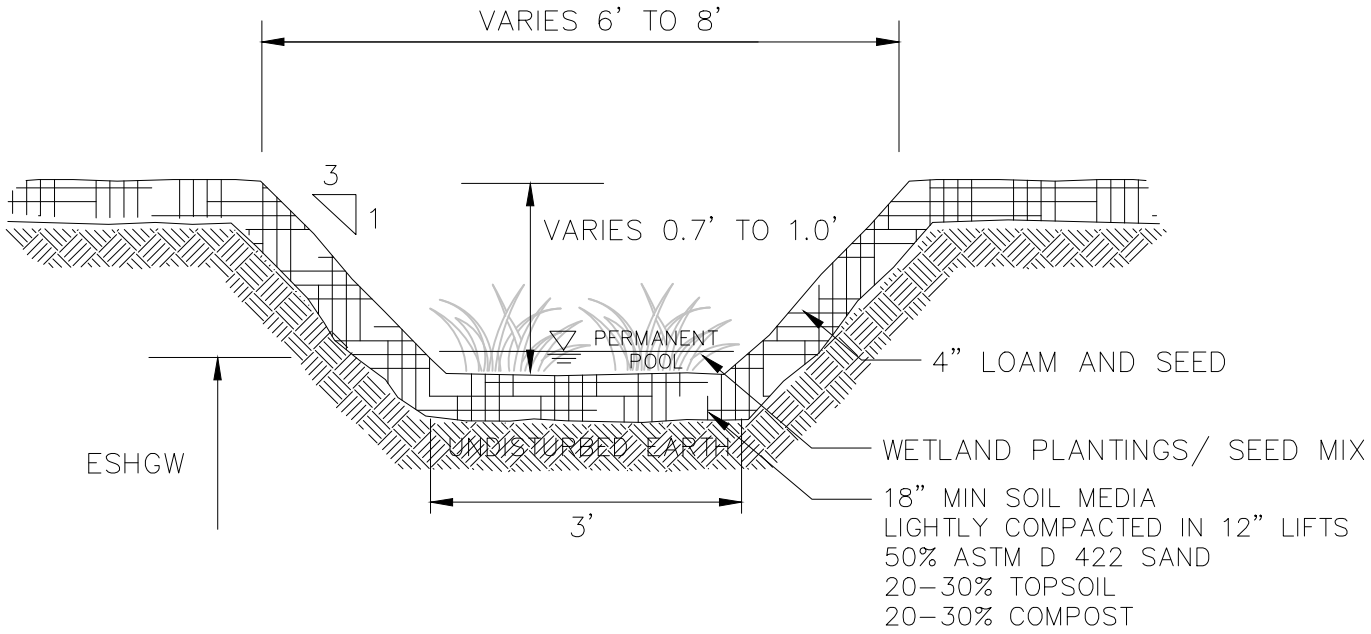
Please contact me at heidi.davis@mass.gov or Tyler Lewis at tyler.lewis@mass.gov if you have any questions concerning this document.

Best regards,

Heidi

Heidi M. Davis
Senior Wetland Analyst
Highway Unit Supervisor
Wetlands Program, Boston Office
MassDEP
339-225-2332





WATER QUALITY SWALE (WET) DETAIL

NOT TO SCALE

T1217.01_HD12_UTILITY PLANS - TEMP BIORETENTION.DWG Plotted on 26-Sep-2025 10:52 AM

BERNARDSTON
RT 10

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	43	133
	PROJECT FILE NO. 612159		

UTILITY PLANS - 2 OF 5

N

SCALE: 1" = 20'

0 20 50 100

CONTINUED ON SHEET NO. 44

CONTINUED ON SHEET NO. 42

NOTE: ALL EXISTING CATCH BASINS AND MANHOLES LABELED "ADJ" INCLUDES REMOVING AND DISPOSING THE EXISTING F&G/F&C AND REPLACING WITH A PROPOSED F&G/F&C.

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DOCUMENT A00843

MASSACHUSETTS
DEPARTMENT OF ENVIRONMENTAL PROTECTION

401 Water Quality Certification

Administrative Completeness and Technical Deficiency Review Amendment

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TEC, Inc.
282 Merrimack Street, 2nd Floor
Lawrence, MA 01843
978.794.1792

MEMORANDUM

TO: Massachusetts Dept. of Environmental Protection
100 Cambridge Street, Suite 900
Boston, MA 02114

DATE: February 17, 2026

FROM: TEC, INC. and MassDOT Environmental

RE: 401 WATER QUALITY CERTIFICATION
Administrative Completeness and Technical Deficiency Review
401 WQC Transmittal No: 25-WW11-0018-APP
USACE Application No. NAE-2005-01156
MassDOT File Number 612159

To Whom It May Concern,

On behalf of the owner/Applicant, TEC is submitting this request for an amendment to the Water Quality Certification (WQC) as referenced above. The following revisions have been made since the permit was approved on December 3, 2025. These revisions have been made to the plans due to final design changes. These changes were primarily driven by a desire to reduce necessary ongoing maintenance.

1. **Addition of sediment forebay with stone pavers to the bioretention basin.**

   The amended design will receive an additional 25% Total Suspended Solids removal credit through the addition of a sediment forebay, bringing the subcatchment area total to 94% removal. The forebay will capture floatables and debris prior to discharge to the bioretention area. Its storage has been sized to exceed the 0.1-inch/impervious acre rule. Additionally, the forebay will prevent storm velocity scouring within the planted bioretention area.

   The use of stone pavers in the sediment forebay is the preferred option by the MassDOT Stormwater division. Stone pavers allow for sediment to be easily removed from the area when compared to riprap stone, where the voids will get filled with sediment.

   The bioretention basin is sized to accommodate flows from the 100-year storm. Any stormwater discharge via the outlet control structure or emergency spillway will be directed to a back into the closed drainage system.

2. **Removal of plantings from bioretention basin.**

   Plantings are shown within the bioretention basin in the approved permit plans. In an effort reduce ongoing maintenance efforts, these planting were removed. Native wetland seed will be provided instead. The entire bioretention basin will instead be seeded with native seed.

3. **Removal of seeding directly underneath the Fall River bridge.**

   The approved permit plans show a layer of compost and seed over bridge riprap above the 100-Year Flood elevation. Through coordination with MassDOT Landscape and MassDOT Environmental divisions, the decision was made to remove the compost and seed layer beneath the bridge. Discussions resulted in the determination that seeding below the bridge will experience little to no sunlight and therefore will not grow in that area. It should be noted that the compost and seed will still be placed over bridge riprap in all areas that are not directly covered by the bridge.

Please do not hesitate to contact me directly if you have any questions concerning our response at 978-794-1792. Thank you for your consideration.

Sincerely,
Robert Niccoli
TEC, Inc.
"The Engineering Corporation"

Attachments:
Attachment A – Landscape Plans
Attachment B – Special Provisions
*Note: Revised Stormwater report has been submitted as a separate file.

ATTACHEMENT A

LEGEND

SURFACE TREATMENTS:

= AGED BARK MULCH

= LOAM AND SEED
(MIX ITEM 765. - SEEDING)

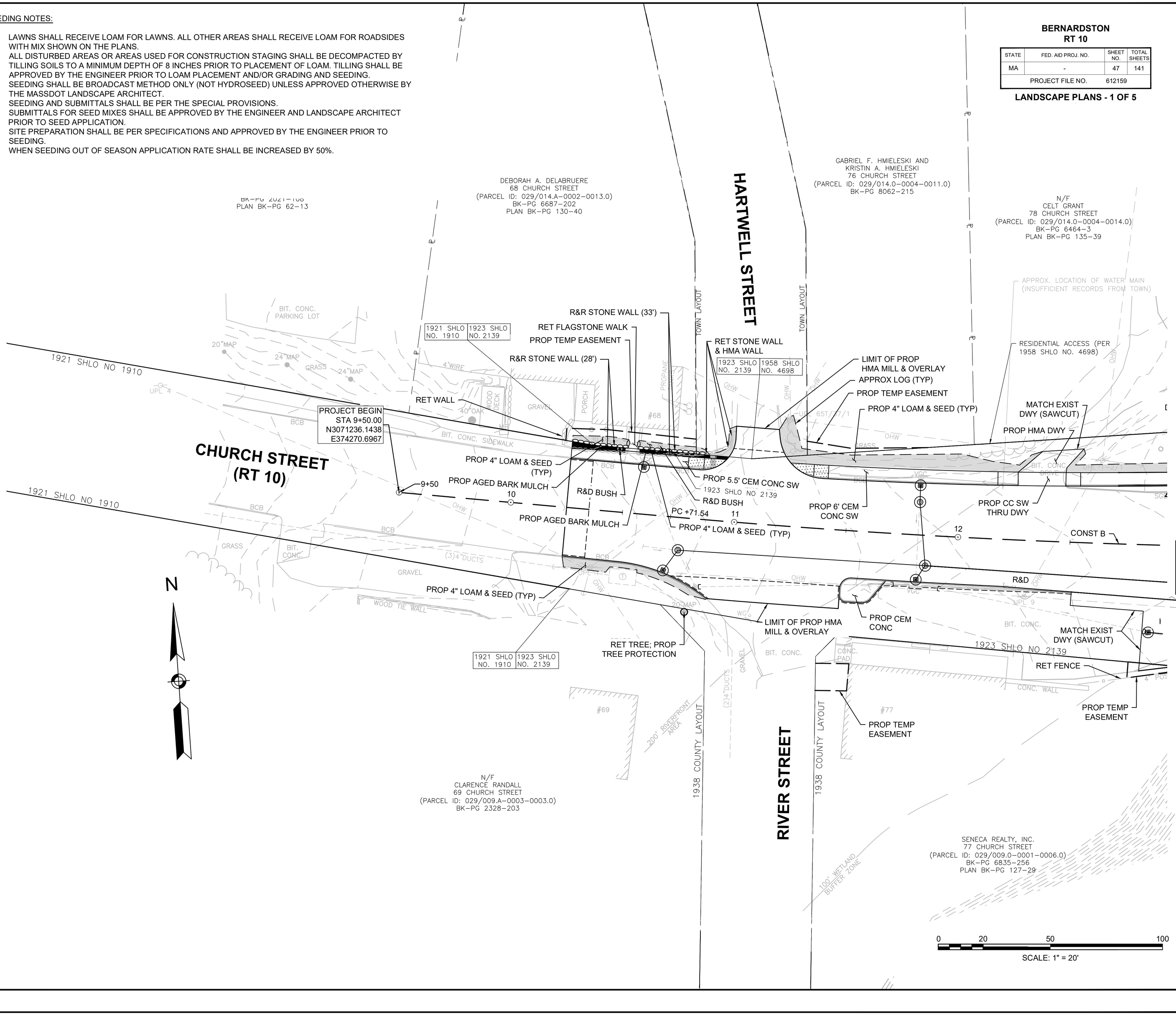
SEEDING NOTES:

1. LAWNS SHALL RECEIVE LOAM FOR LAWNS. ALL OTHER AREAS SHALL RECEIVE LOAM FOR ROADSIDES WITH MIX SHOWN ON THE PLANS.
2. ALL DISTURBED AREAS OR AREAS USED FOR CONSTRUCTION STAGING SHALL BE DECOMPACTED BY TILLING SOILS TO A MINIMUM DEPTH OF 8 INCHES PRIOR TO PLACEMENT OF LOAM. TILLING SHALL BE APPROVED BY THE ENGINEER PRIOR TO LOAM PLACEMENT AND/OR GRADING AND SEEDING.
3. SEEDING SHALL BE BROADCAST METHOD ONLY (NOT HYDROSEED) UNLESS APPROVED OTHERWISE BY THE MASSDOT LANDSCAPE ARCHITECT.
4. SEEDING AND SUBMITTALS SHALL BE PER THE SPECIAL PROVISIONS.
5. SUBMITTALS FOR SEED MIXES SHALL BE APPROVED BY THE ENGINEER AND LANDSCAPE ARCHITECT PRIOR TO SEED APPLICATION.
6. SITE PREPARATION SHALL BE PER SPECIFICATIONS AND APPROVED BY THE ENGINEER PRIOR TO SEEDING.
7. WHEN SEEDING OUT OF SEASON APPLICATION RATE SHALL BE INCREASED BY 50%.

BERNARDSTON
RT 10

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	47	141
PROJECT FILE NO.	612159		

LANDSCAPE PLANS - 1 OF 5



T1217.01_HD13_LANDSCAPE PLANS.DWG Plotted on 23-Feb-2026 2:21 PM

Proposal No. 612159-136484

LEGEND

- = STREAMBED MATERIAL OVER ROCK
- = COMPOST AND SEED OVER ROCK (MIX ITEM 765.442 - ROADSIDE RIVERBANK MIX)
- = LOAM AND SEED (MIX ITEM 765. - SEEDING)
- = COMPOST BLANKET AND SEED (MIX ITEM 765.442 - ROADSIDE RIVERBANK MIX)
- = LOAM FOR LAWNS AND LAWN SEED (MIX ITEM 765. - SEEDING)
- = LOAM AND SEED (MIX ITEM 765.411 - SHORT GRASSLAND MIX)

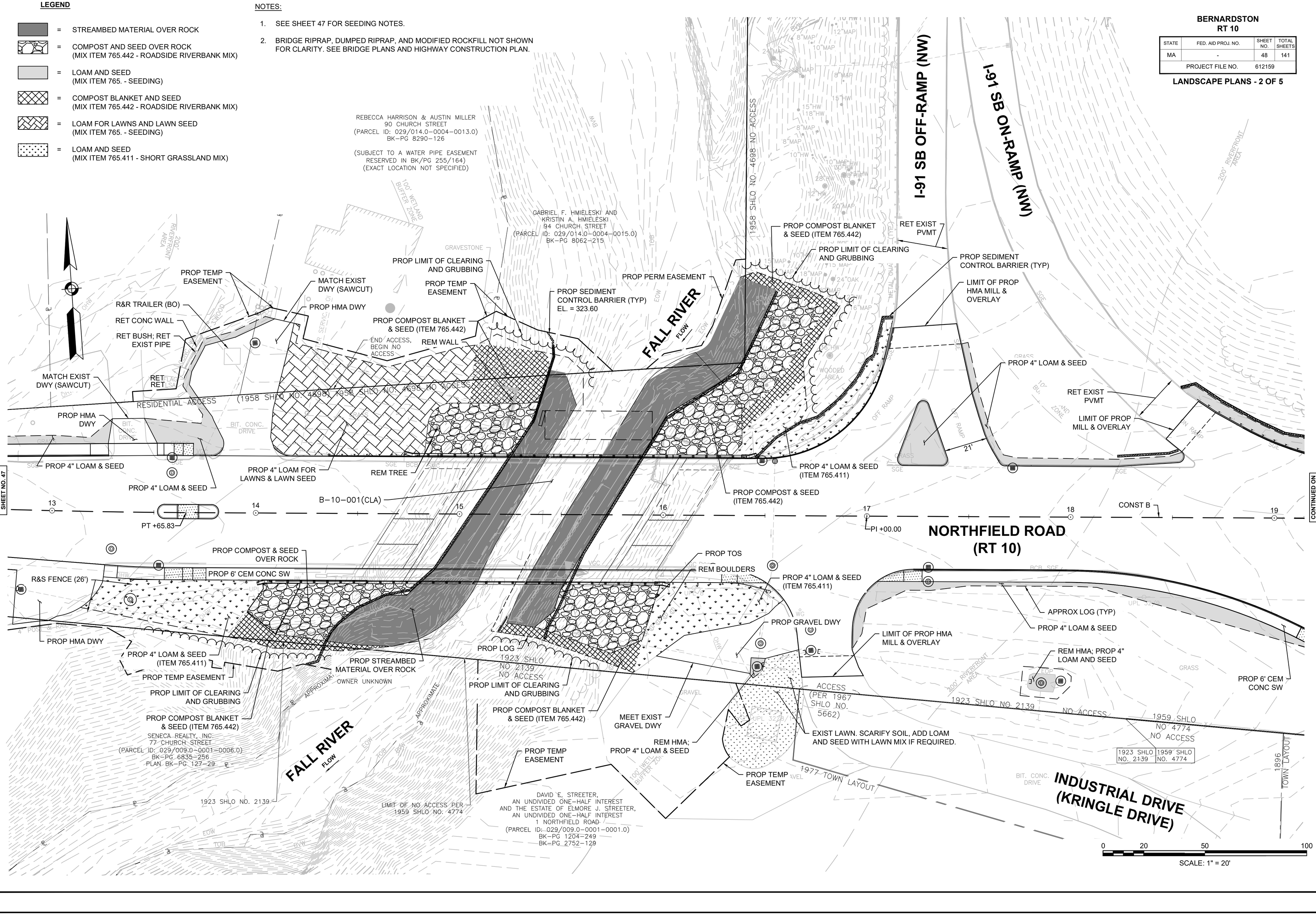
NOTES:

1. SEE SHEET 47 FOR SEEDING NOTES.
2. BRIDGE RIPRAP, DUMPED RIPRAP, AND MODIFIED ROCKFILL NOT SHOWN FOR CLARITY. SEE BRIDGE PLANS AND HIGHWAY CONSTRUCTION PLAN.

BERNARDSTON
RT 10

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	48	141
PROJECT FILE NO.	612159		

LANDSCAPE PLANS - 2 OF 5



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Proposal No. 612159-136484

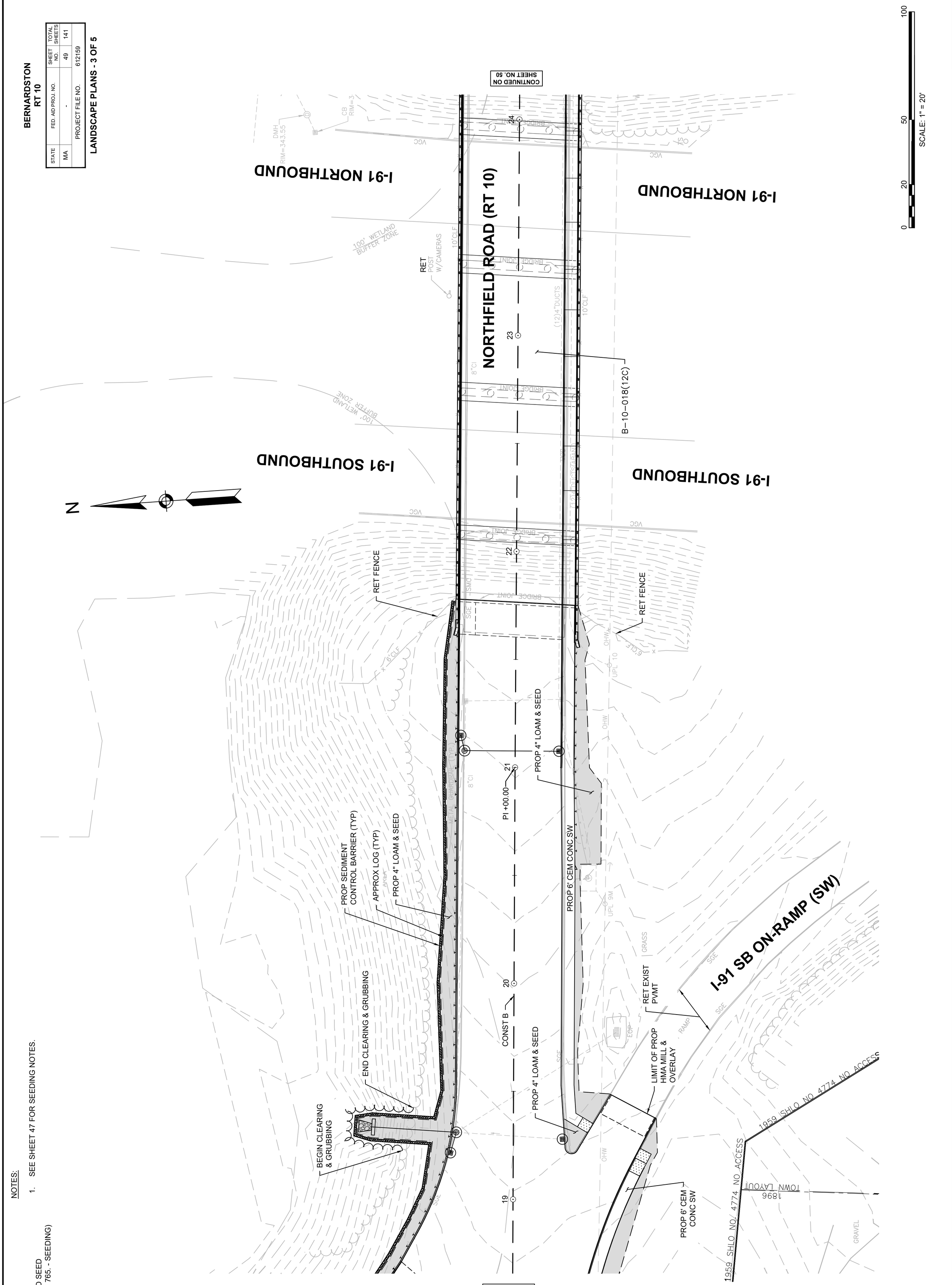
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BERNARDSTON
RT 10

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	49	141
	PROJECT FILE NO.	612159	

LANDSCAPE PLANS - 3 OF 5



NOTES:

1. SEE SHEET 47 FOR SEEDING NOTES.

LEGEND

SURFACE TREATMENTS:

= LOAM AND SEED (MIX ITEM 765. - SEEDING)

LEGEND

SUBSURFACES:

= MODIFIED ROCKFILL

= LOAM AND SEED
(MIX ITEM 765. - SEEDING)

= LOAM AND SEED
(MIX ITEM 765.411 - SHORT GRASSLAND MIX)

= SOIL MEDIA AND SEED
(MIX ITEM 765.554 - WETLAND SEED - SEASONALLY FLOODED MIX)

= STONE PAVERS

NOTES:

1. SEE SHEET 47 FOR SEEDING NOTES.
2. ALL SLOPES WITHIN THE BIORETENTION BASIN SHALL BE STABILIZED USING JUTE MESH.
3. TEMPORARY CHAIN LINK FENCE TO PROTECT BASIN AREA SOILS SHALL BE INSTALLED PRIOR TO CONSTRUCTION ACTIVITIES. AREA WITHIN THE FENCE SHALL NOT BE USED FOR STAGING EQUIPMENT AND SHALL BE PROTECTED FOR THE DURATION OF THE PROJECT.

BERNARDSTON
RT 10

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	50	141
PROJECT FILE NO.		612159	

LANDSCAPE PLANS - 4 OF 5

N

26+04.82 CHURCH STREET (RT 10) BL =
65+50.00 I-91 NB OFF-RAMP (SE)

PROP SEDIMENT CONTROL BARRIER (TYP)

PROP 4" LOAM & SEED

APPROX LOG (TYP)

LIMIT OF PROP HMA MILL & OVERLAY

RET EXIST PAVEMENT

I-91 NB OFF-RAMP (NE)

I-91 NB ON-RAMP (NE)

RET EXIST PAVEMENT

LIMIT OF PROP HMA MILL & OVERLAY

PROP 4" LOAM & SEED

PROP 4" LOAM & SEED

NORTHFIELD ROAD (RT 10)

CONTINUED ON SHEET NO. 49

TEMP CHAIN LINK FENCE FOR CONSTRUCTION

PC +33.45

65+50

PROP 4" LOAM & SEED (ITEM 765.411)

PROP 6' CEM CONC SW

CONST B

PROP HMA MILL & OVERLAY

PROP 4" LOAM & SEED

PROP 6' CEM CONC SW

PROP 6' CEM CONC SW

CONTINUED ON SHEET NO. 11

6.5' WIDE BY 6' LONG MODIFIED ROCKFILL

RET FENCE

MODIFIED ROCKFILL CHECK DAM

I-91 NB OFF-RAMP (SE)

PT +48.95

REM EXIST PVMT; PROP 4" LOAM & SEED

RET FENCE

1959 SHLO NO. 4774

1911 SHLO NO. 1345

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF TRANSPORTATION
55 NORTHFIELD ROAD
(PARCEL ID: 029/009.0-0002-0002.0)
BK-PG 962-132
PLAN BK-PG 8-56

RET FENCE

PROP HMA DWY

MATCH EXIST DWY (SAWCUT) (TYP)

PROP TEMP EASEMENT

PROP TEMP EASEMENT

PROP CC SW THRU DWY

PROP HMA DWY

UNKNOWN ID ROAD

PROP SOIL MEDIA & SEED (ITEM 765.554) BELOW EL 367 (SEE NOTE 2)

PROP BIORETENTION BASIN (845 SF) (SEE DETAIL ON SHEET 52)

PROP OCS (SEE DETAIL ON SHEET ##)

APPROX. LOG

5' WIDE BY 15' LONG MODIFIED ROCKFILL

PROP 4' GRASS SWALE

PROP 3' GRASS SWALE

CONST B

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF TRANSPORTATION
0 NORTHFIELD ROAD
(PARCEL ID: 029/009.0-0002-0001.0)
BK-PG 1603-110

REM EXIST PVMT; PROP 4" LOAM & SEED

NO ACCESS 1959 SHLO NO 4774

CONTINUED RIGHT

CONTINUED LEFT

N

I-91 NB OFF-RAMP (SE)

PROP 4" LOAM & SEED

PROP HMA MILL & OVERLAY

PROP 3' GRASS SWALE

CONST B PC +47.74

APPROX LOG (TYP)

MEET EXIST SWALE

1959 SHLO NO 4774 NO ACCESS

LIMIT OF PROP HMA MILL & OVERLAY STA 61+20

RET EXIST PAVEMENT

0 20 50 100

SCALE: 1" = 20'

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Proposal No. 612159-136484

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T1217.01_HD13_LANDSCAPE PLANS.DWG Plotted on 23-Feb-2026 2:22 PM

BERNARDSTON
RT 10

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	51	141
PROJECT FILE NO.	612159		

LANDSCAPE PLANS - 5 OF 5

SCALE: 1" = 20'

NOTES:
1. SEE SHEET 47 FOR SEEDING NOTES.

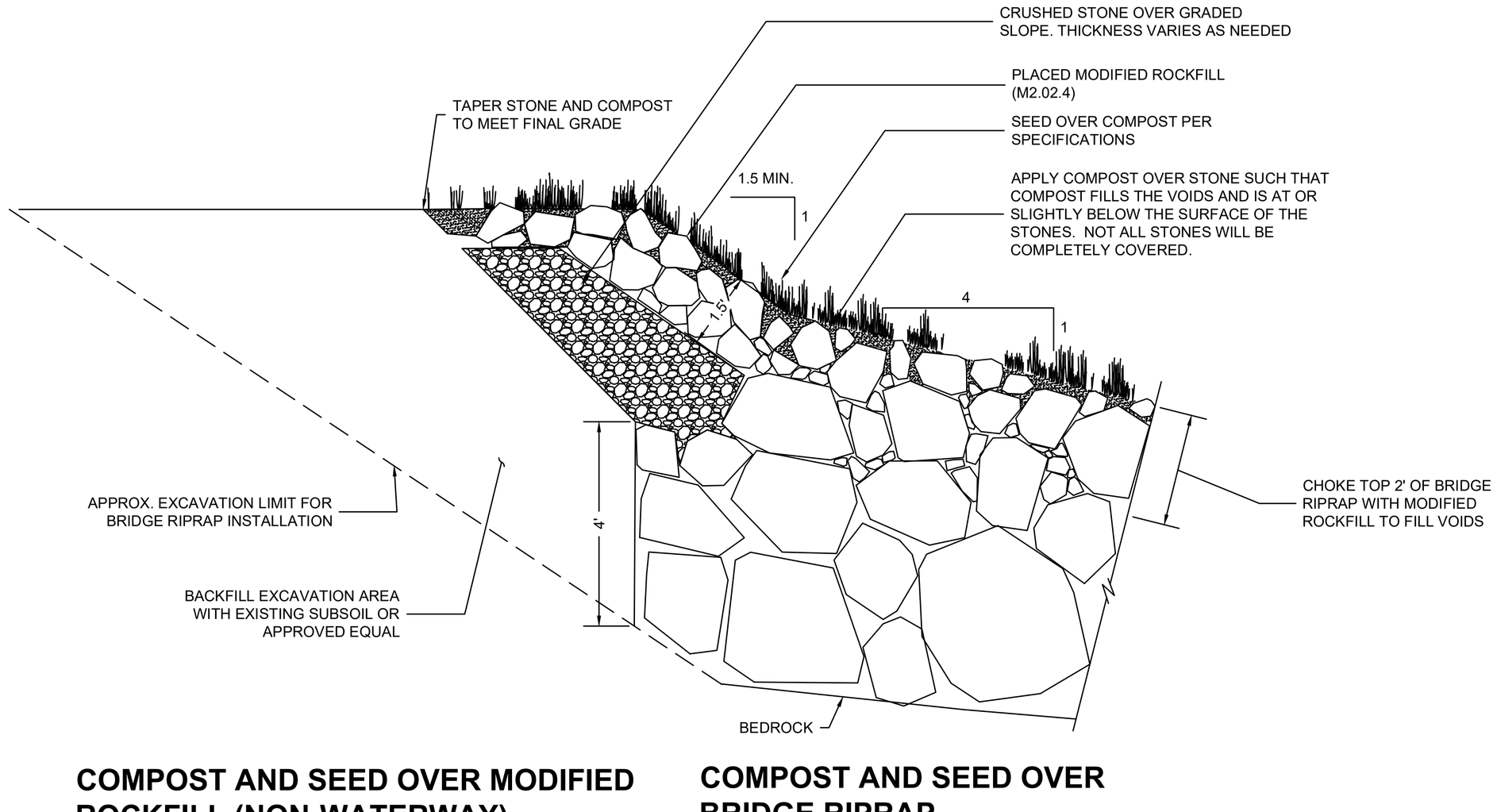
LEGEND
SURFACE TREATMENTS:
= AGED BARK MULCH
= LOAM AND SEED (MIX ITEM 765. - SEEDING)

BALD MOUNTAIN ROAD
PARMENTER ROAD
NORTHFIELD ROAD (RT 10)
CONST ℄
1958 SHLO NO 4698 — NO ACCESS
1966 SHLO NO. 5556
1927 SHLO NO 2456
1911 SHLO NO. 1345
1958 TOWN LAYOUT NO. 4698
PROJECT END STA 35+90.00 N3070965.0613 E376895.4280
PI +00.00
PT +03.93
PROP HMA MILL & OVERLAY
LIMIT OF PROP HMA MILL & OVERLAY STA 35+85; PROP SAWCUT
PROP EOP
PROP 5.5' CEM CONC SW
PROP CC SW THRU DWY
PROP 4" LOAM & SEED
PROP TEMP EASEMENT
RET POST
RET TREES (TYP)
PROP TREE PROTECTION FENCE
R&D WOOD POST (4)
REM EXIST PVMT; PROP 4" LOAM & SEED
RET FENCE
RET LP
RET BUSHES
APPROX LOG (TYP)
PROP AGED BARK MULCH
PROP PERM EASEMENT
MATCH EXIST DWY (SAWCUT)
PROP 6' CEM CONC SW (TYP)
RET EXIST PAVEMENT
LIMIT OF PROP HMA MILL & OVERLAY
HEIRS, DEVISEES AND LEGAL REPRESENTATIVES OF THE ESTATE OF COLA R. NELSON
5 BALD MOUNTAIN ROAD
(PARCEL ID: 029/009.0-0004-0001.0)
BK-PG 1321-213
NEAL R. BARDWELL
210 PARMENTER RD
(PARCEL ID: 029/009.0-00(
BK-PG 2568-16
THE HEIRLOOM COLLECTIVE, INC.
87 NORTHFIELD ROAD
(PARCEL ID: 029/009.0-0002-0009.0)
BK-PG 8077-122
PLAN BK-PG 150-96
N/F
STEVEN S. HEAN
12 BALD MOUNTAIN ROAD
(PARCEL ID: 029/014.0-0005-0018.3)
BK-PG 6423-240
PLAN BK-PG 86-95
N/F
ANNEMARIE C. MASON
2 BALD MOUNTAIN ROAD
(PARCEL ID: 029/009.0-0003-0001.0)
BK-PG 6498-328
CRUMPIN FOX CLUB, INC. a/k/a CRUMPIN-FOX CLUB, INC.
71-73 NORTHFIELD ROAD
(PARCEL ID: 029/009.0-0002-0003.0-6.0)
BK-PG 2759-120
PLAN BK-PG 84-69
CONTINUED ON SHEET NO. 50

BERNARDSTON
RT 10

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	11	141
PROJECT FILE NO.	612159		

LANDSCAPE DETAILS

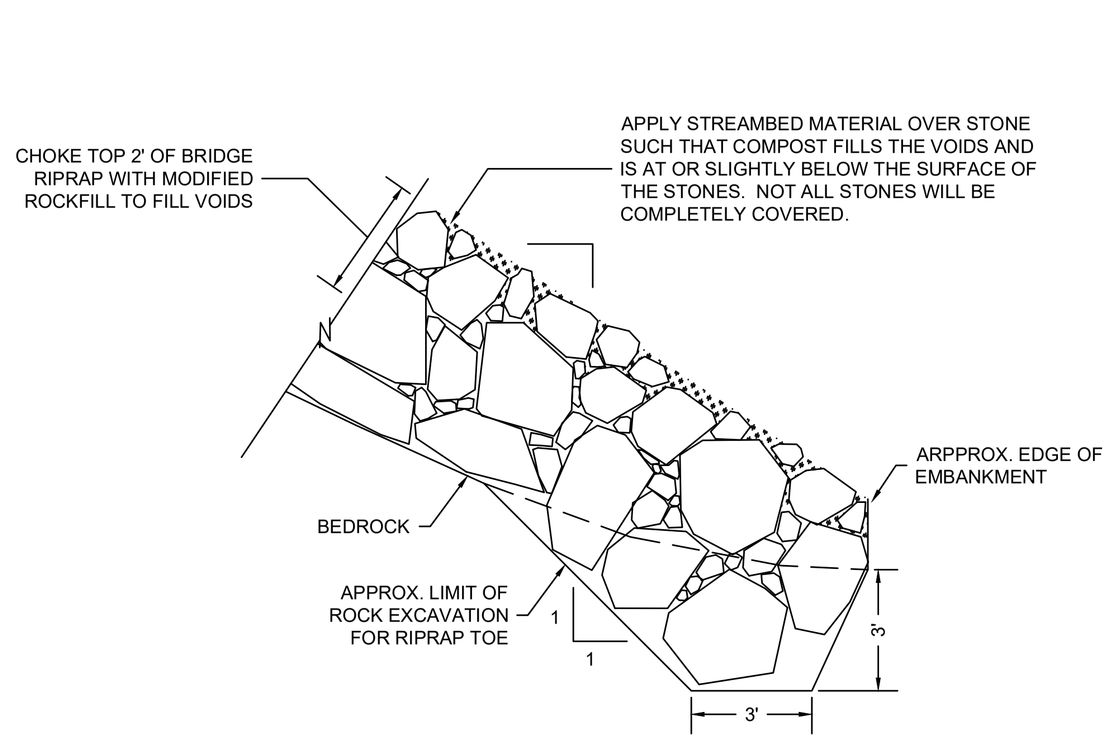


COMPOST AND SEED OVER MODIFIED ROCKFILL (NON-WATERWAY)

NOT TO SCALE

COMPOST AND SEED OVER BRIDGE RIPRAP

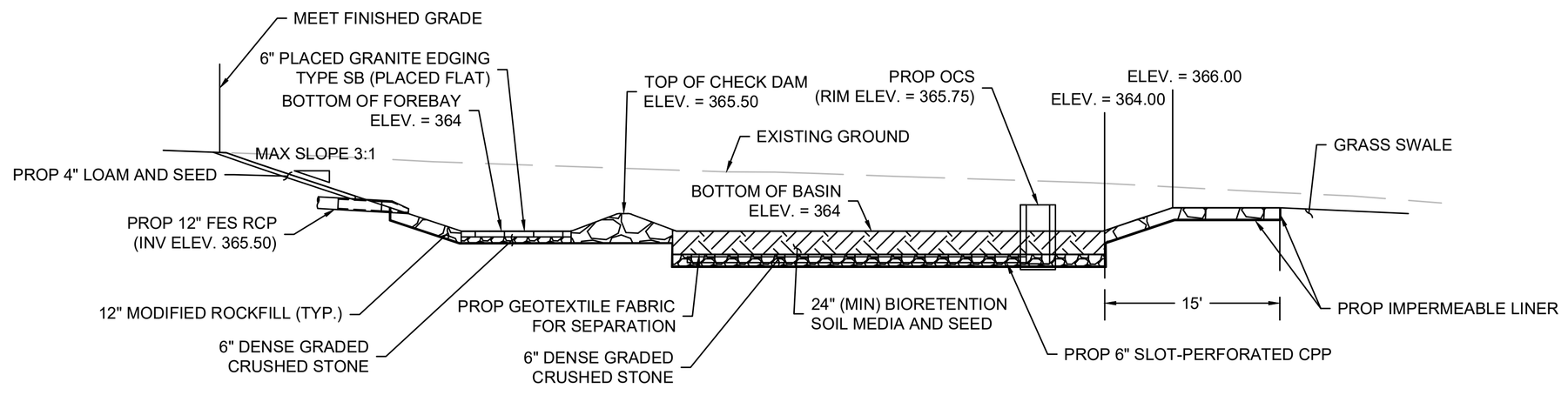
NOT TO SCALE



NOTE: STREAMBED MATERIAL OVER BRIDGE RIPRAP SHOWN. STREAMBED MATERIAL OVER DUMPED RIPRAP SIMILAR, EXCEPT THAT THE STONES DO NOT NEED TO BE CHOCKED WITH MODIFIED ROCKFILL.

STREAMBED MATERIAL OVER BRIDGE RIPRAP AND BRIDGE RIPRAP TOE

NOT TO SCALE



BIORETENTION BASIN TYPICAL SECTION (STA 25+05)

SCALE: 1" = 8'

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Proposal No. 612159-136484
A00843 - 11

ATTACHEMENT B

ITEM 698.1	**GEOTEXTILE FABRIC FOR STABILIZATION**	**SQUARE YARD**
ITEM 698.2	**GEOTEXTILE FABRIC FOR SUBSURFACE DRAINAGE**	**SQUARE YARD**
ITEM 698.3	**GEOTEXTILE FABRIC FOR SEPARATION**	**SQUARE YARD**
ITEM 698.4	**GEOTEXTILE FABRIC FOR PERMANENT ERIOSION CONTROL**	**SQUARE YARD**

GENERAL

This work consists of furnishing and placing geotextile fabric for stabilization, subsurface drainage, separation and permanent erosion control at the locations and grades shown on the Plans or as required by the Engineer.

MATERIALS

Submitted fabrics shall be listed on the MassDOT Quality Construction Materials List (QCML) for the intended application.

CONSTRUCTION METHODS

Geotextile Fabric for Stabilization, Subsurface Drainage, Separation and Permanent Erosion Control shall be installed according to the manufacturer's instructions and in reasonable close conformity with the location, lines and grades indicated on the Plans.

Any section of fabric that is damaged shall be repaired in accordance with the manufacturer's requirements and AASHTO M 288 and as required by the Engineer or it shall be replaced at no cost to the Department.

METHOD OF MEASUREMENT

Geotextile Fabric for Stabilization, Subsurface Drainage, Separation and Permanent Erosion Control will be measured for payment by the number of square yards installed at the locations shown on the Plans, in accordance with these specifications, or as required by the Engineer. Overlapping for seams and joints will be measured as one layer of fabric. Any embedment or wrapping at the toe or top of the slope will be measured for payment.

BASIS OF PAYMENT

Geotextile Fabric for Stabilization, Subsurface Drainage, Separation and Permanent Erosion Control will be paid for at the Contract unit price per Square Yard, which price shall include furnishing and installing geotextile fabric, all miscellaneous associated assembly material, and all other labor, equipment, material, and incidental costs required to complete the work as specified and as required by the Engineer.

ITEM 699.1 IMPERMEABLE LINER SQUARE YARD

GENERAL

This work consists of furnishing and placing PVC liner material for stormwater containment at the locations and grades shown on the Plans or as required by the Engineer.

MATERIALS

Submitted product shall be minimum 20±1 mil (0.51±0.03 mm) polyvinyl chloride or polyethylene liner.

CONSTRUCTION METHODS

Impermeable liner shall be placed immediately after approval of subgrade preparation. Liner shall be folded over and overlapped on top of the bed to prevent soil intrusion into the aggregate bed.

Impermeable liner shall be placed in accordance with manufacturer's instructions and in reasonable close conformity with the location, lines and grades indicated on the Plans. All seams and openings in the liner shall be sealed according to manufacturer's recommendations and specifications. Adjacent strips of impermeable liner shall overlap a minimum of 18 inches or per manufacturer specifications, whichever is greater.

Any section of fabric that is damaged shall be repaired in accordance with the manufacturer's requirements and to the satisfaction of the Engineer or it shall be replaced at no cost to the Department.

METHOD OF MEASUREMENT

Impermeable Liner will be measured for payment by the number of square yards installed, complete in place. Overlapping for seams and joints will be measured as one layer of fabric. Any embedment or wrapping at the toe or top of the slope will be measured for payment.

BASIS OF PAYMENT

Impermeable Liner will be paid for at the Contract unit price per Square Yard of liner installed, complete in place, which price shall include all labor, materials, equipment, and incidental costs required to complete the work as required by the Engineer.

No additional compensation will be provided for all miscellaneous associated assembly material.

ITEM 751.765 **COMPOST AND SEED OVER MODIFIED ROCKFILL** **CUBICY YARD**

ITEM 751.766 **COMPOST AND SEED OVER RIPRAP** **CUBICY YARD**

GENERAL

The work under this Item shall conform to the relevant provisions of Subsection 751, 767, and 765 of the Standard Specifications and the following.

Work shall consist of furnishing and pneumatically applying compost in conjunction with the specified native seed on designated areas of modified rockfill, bridge riprap, and dumped riprap and achieving satisfactory establishment of seeded species as specified herein.

QUALIFICATIONS

Compost application and seeding shall be done by a company having a minimum of five years of experience with native seed establishment. Prior to beginning work, the seeding Contractor shall furnish proof of qualifications to the Engineer for approval. Proof of qualifications shall include providing documentation (photos and contacts) to demonstrate knowledge and expertise with native seeding and establishment and proof of having completed successful native seeding projects.

MATERIAL AND SUBMITTALS

Compost

Compost shall meet the relevant provisions for Type 2 Compost, found in Section M1.06 of the Supplemental Standard Specifications.

The Engineer shall approve the Contractor's equipment for application.

Seed Mix

Seed Mixes and Submittals shall be per the item(s) for the permanent seed mix. Mix shall be:

Item 765.442 – Roadside Riverbank Mix

SEEDING SEASON

The season for seeding native mixes is April 1 - May 15 and October 1 - December 1 for dormant seeding. Written approval must be obtained for seeding outside the seeding season and, if approved, the permanent seed rate shall be increased by 50%

CONSTRUCTION METHODS

Method of application and equipment to be used shall be reviewed and approved by the Engineer prior to placement of material.

ITEM 751.765 and 751.766 (Continued)

Placement of Compost

Compost shall be placed as shown on the Plans and in the Detail and as required by the Engineer. Material shall be placed so that settled material is at or slightly below the surface plane of the stone. The Contractor shall ensure that there will be adequate quantity, including adjustment for settlement.

For purposes of estimation, required compost quantities should be 300 cubic yards per acre to achieve the target depth.

Seeding

For areas smaller than half an acre, unless otherwise approved by the Engineer, seeding shall be done by broadcast method. Seeding shall be done in conjunction with or immediately following Compost application. Alternative seeding methods must be submitted and approved by the Engineer 14 days in advance of compost and seed application.

Hydroseeding

Hydroseeding may be used for sites over half an acre in size or when the rock slope does not permit safe application via a broadcasting method. Hydroseed shall be per the manufacturer's directions and as follows.

Tank and hoses shall be cleaned from all previous hydroseeding and hydromulching projects. Seed shall be mixed into the slurry immediately before application and slurry applied within 30 minutes after seeds have been placed in the tank. Once seed has been placed in the tank, tank shall be agitated only enough to mix the seeds and keep slurry from separating.

When Seeding Occurs after Application of Compost or after December 1

When seeding is done more than 3 days after Compost application or when Compost is applied after December 1, seeding rate shall be increased by 50%.

Over-Seeding

Large extents of bare area (greater than 5-6 feet and depending on modified rock slope conditions) shall be over-seeded with the specified mix during the appropriate season for seeding. Rates, methods, and submittals shall be as specified under the relevant Seed Mix Item and Materials above.

Over-seeding, mulch, watering, and all work for over-seeding shall be incidental.

ITEM 751.765 and 751.766 (Continued)

Determining Satisfactory Establishment

A reasonably well-established stand of the specified seeded species as determined by the Engineer and the MassDOT Landscape Architect or designated Specialist will be required for Final Acceptance. The expectation is that an acceptable number and variety of the desired permanent seeded species will be visible. For seeding with compost over modified rock this shall generally be:

A minimum of 50% coverage by the specified permanent seeded species after one growing season (considered June-September 15). Of that percentage, generally, depending on the mix species:
At least 2 types of permanent seeded grass species shall be visible.
At least 2 species of wildflowers shall be visible.
There will be no more than 25% coverage by weed species.
There will be no invasive or aggressive species within the stand at the time of acceptance.
There shall be no evidence of seed from non-native mixes (ex., clover) due to using an incorrect or modified mix or due to failure to clean the hydroseeding tank if a hydroseeder is used.

Invasive and aggressive weeds (such as mugwort, vetch, knapweed, and chicory) must be cut, pulled with roots removed, or treated with herbicide by a licensed and approved applicator prior to going to seed for Interim Acceptance. Weed removal shall be coordinated with MassDOT Landscape Architect. No herbicides shall be used without approval and coordination with MassDOT Landscape Design Section.

Acceptance of Seeding and Establishment Work

Conditional Acceptance shall be based on approval of seed mix submittals and proper application of seed as specified herein.

Final Acceptance of Seed Establishment shall be given upon satisfactory Establishment as described above. If the seeded area fails to meet the requirements of Establishment by the end of the growing season, contractor shall propose and implement remediations and site shall be inspected during the following growing season after July 1st. Otherwise, Contractor shall forego the payment for Final Acceptance. All remediation shall be at the contractor's expense.

METHOD OF MEASUREMENT

Compost and Seed over Modified Rockfill and Compost and Seed over Bridge Riprap will be measured for payment by the Cubic Yard.

ITEM 751.765 and 751.766 (Continued)

BASIS OF PAYMENT

Compost and Seed over Modified Rockfill and Compost and Seed over Riprap will be paid for at the Contract unit price per Cubic Yard, which price shall include all labor, materials, equipment, site preparation, and all incidental costs required to complete the work.

Roadside Riverbank Mix will be compensated at the bid price per the specified seed mix item by pound.

Schedule of payment shall be as follows:
60% upon approval of Compost application and Conditional Acceptance of seeding as specified above
40% upon Final Acceptance of Seed Establishment

ITEM 761.1 BIORETENTION SOIL CUBIC YARD

The work under this item shall conform to the relevant provisions of Subsections 750 and 760 of the Standard Specifications and the following:

The work shall include all materials, labor, equipment and other incidental items required to furnish and install the bioretention soil at the I-91 northbound off-ramp as shown on the plans. The work under this item shall include grading of the bioretention soil as shown on the plans.

As native hydric soils are not anticipated to be available for use, a soil mixture will be used for bioretention soil. Bioretention soil that is not purchased pre-blended shall consist of a 1:1 mixture (or equal volumes) of organic and mineral soil material (loam, loamy sand to silt loam range) that contains 7-12 percent organic matter content by weight. Clean leaf or commercially available compost is the preferred amendment to achieve this standard, though other materials may be used if approved by the Engineer. Pre-blended bioretention soil shall also contain 7-12 percent organic matter content by weight.

MATERIALS

The acceptable material to be used in the bioretention area is provided in the following table:

Parameter	**Specification**	**Notes**
Bioretention Soil	40% sand 20%-30% topsoil 30%-40% compost	USDA soil types loamy sand. Volume of filter media based on 110% of plan volume to account for settling or compaction. Organic matter shall be well aged (6-12 months), well aerated, leaf compost, or approved equivalent. Provide Engineer with 1-gallon sample prior to ordering.

Sand

The sand component of the Bioretention Soil shall be gravely sand that meets ASTM D 422 with a Fines Modulus Index of 2.75 or greater and shall conform to the following gradation:

Sieve Size	Percent Passing
2-inch	100
¾-inch	70-100
¼-inch	50-80
No. 40	15-40
No. 200	0-3

ITEM 761.1 (Continued)

Topsoil

The USDA textural classification of the Topsoil for the Bioretention Soil shall be LOAMY SAND or SANDY LOAM. The Topsoil shall be fertile, friable soil, uncontaminated by salt water, foreign matter, or substances harmful to plant growth. There should be no course fragments over 1-inch in size. The soil shall have at least 4 percent organic matter but not more than 8 percent on a dry weight basis, soil moisture content less than 8 percent by weight for installation, and a pH range between 5.5 to 6.5. The Topsoil shall be test and meet the following criteria:

Sieve Size	Percent Passing
No. 10	85-100
No. 40	35-85
No. 200	10-35
<20µm	<5

Compost

Compost mixed into offsite stockpiled soils shall be derived from organic wastes including sawdust, clean ground wood, leaf and yard residues, and biosolids that meet the Massachusetts Department of Environmental Protection (DEP) requirements for composting facilities and use of biosolids. The product shall be well composted, free of viable weed seeds and contain material of a generally humus nature capable of sustaining growth of vegetation, with no materials toxic to plant growth.

Compost shall have the following properties:

Parameters	Range
pH	5.5 - 8.0
Moisture Content	35% - 55%
Soluble Salts	< 4.0 mmhos (dS)
C:N Ratio	15 - 30:1
Particle Size	< ¾”
Organic Matter Content	> 20%
Bulk Density	< 1200 lbs./cubic yard
Foreign Matter	< 1% (dry weight)

Compost generator shall also provide minimum available nitrogen and other macro and micro nutrients to determine fertilizer requirements. Generator shall supply documentation for approval for intended use of composted materials.

The infiltration rate of the Bioretention Soil Layer within the bioretention area after installation shall be between 4 and 10 inches per hour.

ITEM 761.1 (Continued)

The Bioretention Soil shall be a uniform mix, free of plant residue, stones, stumps, roots or other similar objects larger than two inches. No other materials or substances shall be mixed or dumped within the bioretention area that may be harmful to plant growth or prove a hinderance to the planting or maintenance operations. The Bioretention Soil shall be tested and meet the following criteria:

Item	Criteria
Corrected pH	5.5-6.5
Magnesium	Minimum 32 ppm
Phosphorus (Phosphate P_2O_5)	Not to exceed 69 ppm
Potassium (K_2O)	Minimum 78 ppm
Soluble Salts	Not to exceed 500 ppm

Should the pH fall outside of the acceptable range, the Bioretention Soil may be modified with lime or iron sulfate plus sulfur. The lime or iron sulfate must be mixed uniformly into the Bioretention Soil prior to use in bioretention facilities.

Should the Bioretention Soil not meet the minimum requirement for magnesium, it may be modified with magnesium sulfate. Likewise, should the Bioretention Soil not meet the minimum requirement for potassium, it may be modified with potash. Magnesium sulfate and potash must be mixed uniformly into the Bioretention Soil prior to use in bioretention facilities.

Bioretention Soil that fails to meet the minimum requirements shall be replaced at the Contractor's expense. Mixing of the corrective additives to Bioretention Soil is incidental and shall be done at no additional cost.

Mixing of the Bioretention Soil to a homogeneous consistency shall be done as required by the Engineer. Contractor shall not install Bioretention soil without approval from the Engineer and Bioretention soil shall be installed within 30 days of testing.

Samples and Submittals

The Contractor shall submit manufacturer’s product data sheet, supplier information, applicable dimensions, materials and installation instructions, as applicable, to the Engineer prior to ordering.

ITEM 761.1 (Continued)

CONSTRUCTION METHODS

All items listed below shall be constructed as indicated on the drawings and details and as further described below:

Installation Schedule

Conduct operations not to interfere with, interrupt, damage, destroy, or endanger integrity of surface structures or utilities, in immediate or adjacent areas.

Weather limitations: Proceed with Bioretention Soil installation only when existing and forecasted weather conditions permit. Do not install during inclement weather, but not limited to heavy rain, high winds, frost and similar conditions.

Coordinate Bioretention Soil installation periods with planting and seeding periods and initial maintenance periods to provide required maintenance from date of Substantial Completion.

Spring Planting: April 1 to June 1
Fall Planting: August 15 to October 15

METHOD OF MEASUREMENT

Bioretention soil will be measured for payment by the cubic yard, complete in place.

BASIS OF PAYMENT

Bioretention Soil will be paid for at the Contract unit price per cubic yard, which price shall include all labor, materials, equipment, and incidental costs required to complete the work.

No additional compensation will be provided for cost of material, compaction, verification and documentation of organic matter content, transport, site preparation, and placement of Bioretention Soil.

ITEM 765.411	**SHORT GRASSLAND MIX**	**POUND**
ITEM 765.442	**ROADSIDE RIVERBANK MIX**	**POUND**
ITEM 765.554	**WETLAND SEED – SEASONALLY FLOODED**	**POUND**

Work under this item shall consist of furnishing the mix specified below in the required quantity.

SUBMITTALS

1) Pre-Verification of Seed Availability. Within 30 days after the Notice to Proceed, the Contractor shall submit to the Engineer the supplier's verification of availability of seed species in the required quantities and for the anticipated date of seeding. Verification shall be on the supplier's letterhead and notarized by the supplier's notary. Species not expected to be available should be noted and substitutions recommended.

2) Final Verification of Seed Availability. No earlier than 21 days prior to ordering, the Contractor shall submit to the Engineer the supplier's verification of availability of seed species and in the required quantities. Verification shall be on the supplier's letterhead and notarized by the supplier's notary. A copy of this submittal shall be forwarded to the MassDOT Landscape Design Section. Substitutions or changes in the mix at this time must be approved by MassDOT Landscape Design Section.

3) Seed Worksheet provided herein shall be submitted to the Engineer prior to ordering seed to determine the number of pounds of Pure Live Seed required.

4) Seed Tags. The contractor shall submit original seed tags from each bag of seed used on the project or ensure that each tag is photo documented by the Engineer while on the unopened bag.

   Number of tags submitted must correspond to number of bags delivered.

   Species listed on the seed tag shall match the Final Verification of Seed Availability (Submittal #2) unless approved otherwise. Tag must include: variety and species name; lot number; purity; percentage of inert matter; percentage of weeds, noxious seeds, and other crop seeds; germination, dormant or hard seed; total viability; origin of seed; germination test date, net weight, and name and address of seller. The origin of seed must be listed on the seed tag for all species in the mix to provide verification of original (generation 0) seed source. The smallest known geographic area (township, county, ecotype region, etc.) shall be listed. Ecotypes and cultivars shall be as close to Massachusetts as possible and appropriate to the site conditions.

   A copy of this submittal shall be forwarded to the MassDOT Landscape Design Section.

ITEMS 765.411, 765.442, 765.554 (Continued)

5) Verification of Seed Delivery. Prior to payment, contractor shall submit the Seed Delivery Verification form contained within the contract or the Supplier's Verification on company letterhead or a bill of lading. Supplier verification must include all information requested on the Verification form within this contract. The bill of lading must include variety and species name, lot number, net weight shipped, date of sale, invoice, project or seeding location, and name and address of Supplier. All information must be filled in and complete for acceptance. Information must match the seed tags and quantity of seed used on the job. A copy of this submittal shall be forwarded to the MassDOT Landscape Design Section.

6) Seed Sample. If requested or if seed is from a previously opened bag, the contractor may be asked to submit to the Engineer a sample of seed from the seed bag (1-2 cups) at the time of seeding.

SEEDING SEASON

The appropriate seeding seasons are:

Spring: April 1 - May 15
Fall: October 1 - December 1 for dormant seeding

PERMANENT SEED MIXES

Calculating Pure Live Seed (PLS)

Quantities specified are PURE LIVE SEED. Greater quantities of ordered seed may be required to achieve actual specified seeding rates.

Pure Live Seed (PLS) is defined as a percentage calculated by multiplying the percent of pure seed by the percent of viable seed (total germination, hard seed, and dormant seed). For example:

If a seed label indicates 90% purity, 78% germination, 10% hard seed, and 2% dormancy, it is calculated to be 90% x [78 + 10 + 2]% = 81% PLS.

Therefore, each pound of PLS would need 1 pound / 0.81 = 1.2 pounds of seed with a 90% purity and 90% total germination

Seed Mix(es) shall be as specified below. Ecotypes and cultivars shall be as close to Massachusetts as possible and appropriate to the site conditions.

ITEMS 765.411, 765.442, 765.554 (Continued)

765.411 Short Grassland Mix

To be used on naturalized roadside slopes and around the bioretention basin area as shown on the Plans.

	Botanical Name	Common Name	% PLS by Weight
Grass	Schizachyrium scoparium	Little Bluestem	55.10%
	Elymus virginicus	Virginia Wild Rye	27.60%
	Festuca rubra	Creeping Red Fescue	7.00%
	Agrostis perennans	Upland Bentgrass	1.50%
	Eragrostis spectabilis 'RI Ecotype'	Purple Lovegrass 'RI Ecotype'	1.50%
	Dichanthelium clandestinum 'Tioga'	Deertongue grass 'Tioga'	1.0%
			93.60%
Herb/Forb	Chamaecrista fasciculata	Partridge Pea	3.00%
	Penstemon digitalis	Beard-tongue	1.50%
	Achillea millefolium	Common Yarrow	0.40%
	Solidago nemoralis	Grey Goldenrod	0.30%
	Aster laevis NY Ecotype	Smooth Aster NY Ecotype	0.20%
	Smooth Aster NY Ecotype	Slender Mountain Mint	0.20%
	Aster lateriflorus	Calico Aster	0.20%
	Solidago bicolor	White Goldenrod	0.20%
	Aster pilosus	Heath Aster	0.20%
	Zizia aurea	Golden Alexanders	0.10%
	Euthamia graminifolia	Grass-leaved Goldenrod	0.10%
			6.4%
			100.00%

ITEMS 765.411, 765.442, 765.554 (Continued)

765.442 Roadside Riverbank Mix

To be used on slopes adjacent to the Fall River, compost and seed over riprap, and compost and seed over modified rockfill as shown on the Plans.

	Botanical Name	Common Name	% PLS by Weight
Grass	Elymus virginicus	Virginia Wild Rye	27.00%
	Schizachyrium scoparium 'Albany Pine'	Little Bluestem 'Albany Pine'	22.5%
	Andropogon gerardii NY Eco	Big Bluestem NY Eco	14.0%
	Elymus riparius	Riverbank Wild Rye	14.0%
	Panicum virgatum	Switch Grass	5.0%
	Dichanthelium clandestinum 'Tioga'	Deertongue grass 'Tioga'	5.0%
	Carex vulpinoidea	Fox Sedge	2.5%
	Agrostis perennans	Upland Bentgrass	1.5%
	Poa palustris	Fowl Bluegrass	0.3%
	Juncus effusus	Soft Rush	0.1%
	Juncus tenuis	Path Rush	0.1%
			92.00%
Herb/Forb	Chamaecrista fasciculata	Partridge Pea	3.00%
	Penstemon digitalis	Beard-tongue	1.00%
	Vernonia noveboracensis	New York Ironweed	0.60%
	Helenium autumnale	Common Sneezeweed	0.50%
	Verbena hastata	Blue Vervain	0.40%
	Aster puniceus	Aster - Swamp	0.40%
	Aster cordifolius	Blue Wood Aster	0.30%
	Asclepias incarnata	Swamp Milkweed	0.30%
	Monarda fistulosa	Wild Bergamot	0.20%
	Aster novae-angliae	New England Aster	0.20%
	Solidago odora	Licorice Scented Goldenrod	0.20%
	Desmodium canadense	Showy Tick Trefoil	0.20%
	Eupatorium perfoliatum	Boneset	0.20%
	Eupatorium maculatum	Spotted Joe Pye Weed	0.20%
	Solidago juncea	Early Goldenrod	0.10%
	Euthamia graminifolia	Grass-leaved Goldenrod	0.10%
	Lobelia cardinalis	Cardinal Flower	0.10%
			8.00%
			100.00%

ITEMS 765.411, 765.442, 765.554 (Continued)

765.554 Wetland – Seasonally Flooded Mix

To be used within the bioretention basin as shown on the Plans.

	Botanical Name	Common Name	% PLS by Weight
Grass	Elymus riparius	Riverbank Wild Rye	20.00%
	Andropogon gerardii NY Eco	Big Bluestem NY Eco	12.00%
	Carex lupulina	Hop Sedge	10.00%
	Panicum clandestinum 'Tioga'	Deer Tongue 'Tioga'	10.00%
	Carex vulpinoidea	Fox Sedge	10.00%
	Carex scoparia	Broom sedge	8.00%
	Sorghastrum nutans NY Eco	Indiangrass NY Ecotype	8.00%
	Panicum virgatum	Switch Grass	8.00%
	Juncus effusus	Soft Rush	2.00%
	Juncus tenuis	Path Rush	1.00%
			89.00%
Herb/Forb	Verbena hastata	Blue Vervain	4.00%
	Desmodium canadense	Showy Tick Trefoil	2.00%
	Eupatorium maculatum	Joe-pye Weed	1.00%
	Asclepias incarnata	Swamp Milkweed	1.00%
	Aster novae-angliae	New England Aster	1.00%
	Eupatorium perfoliatum	Boneset	0.70%
	Helenium autumnale	Common Sneezeweed	0.50%
	Aster puniceus	Aster - Swamp	0.50%
	Mimulus ringens	Monkey Flower	0.20%
	Vernonia noveboracensis	New York Ironweed	0.10%
			11.00%
			100.00%

Application Rate:

765.411 – Short Grassland Mix: 15lbs/acre PLS.
In addition, apply 30 pounds of cover crop (grain oats or grain rye) as appropriate to the season.

765.442**:** Roadside Riverbank Mix: 15 lbs/acre PLS. No cover crop shall be applied.

765.554**:** Wetland Seed – Seasonally Flooded Mix: Species ecotype shall be as native to New England region as possible. Apply this mix at 20 lbs PLS/acre.

Any species substitutions shall be with a species having similar characteristics and function. Substitutions must be approved by MassDOT Landscape Design Section per the documentation submittal process.

ITEMS 765.411, 765.442, 765.554 (Continued)

50% Increase Adjustment for Field Conditions

Seeding under the following conditions requires a 50% increase in the permanent mix at the time of construction:

- Seeding out of season
  OR
- Seeding after Compost Blanket has been applied (unless already increased for out of season).

METHOD OF MEASUREMENT

Short Grassland Mix, and Roadside Riverbank Mix, and Wetland Seed – Seasonally Flooded Mix will be measured for payment by the pound of Pure Live Seed delivered and complete in place.

BASIS OF PAYMENT

Short Grassland Mix, and Roadside Riverbank Mix, and Wetland Seed – Seasonally Flooded Mix will be paid at the Contract unit price per pound of Pure Live Seed delivered upon approval of all Seed Submittal Documentation. Overseeding required to correct poor germination or establishment shall be incidental to this item. Application and care of native seed mix will be paid for separately under Item 765.635.

NATIVE SEED WORKSHEET

Project Description: _____ Project No: _____

Contractor: _____ Contract No: _____

Seed Mix Number & Description: _____

Contractor: Complete Prior To Ordering

Pounds of Seed Required Per Contract:

_____lbs./acre for _____Acre(s) OR _____ SY

Additional 50% increase if required (out of season or seeding over compost blanket):

_____**lbs. Total Seed Required**

Calculated Quantity for **P**ure **L**ive **S**eed (PLS[1]):

_____ **Total Pounds PLS**

Engineer: Verification at Time of Application

Number pounds delivered to site[2]: _____ Date(s): _____

Actual Seed Bag Tag/s Received or photo documented by Engineer: _____

[1] *PLS=% pure seed x % viable seed (total germination, hard seed, and dormant seed).*
[2] *Quantity delivered should match pounds* ***Total Pounds PLS*** *and* ***Verification of Seed Delivery****. Pounds should be shown on each Seed Tag.*

ITEM 983.12 BRIDGE RIPRAP TON

Bridge Riprap shall be placed in accordance with the requirements of section 983 of the Standard Specifications and the following.

Limits for riprap stones under this item are delineated on the bridge plans within the Contract Drawings as all riprap in front of the bridge abutments and wingwalls. Limits for Dumped Riprap, paid for under item 983., are delineated within the highway plans as all riprap needed for the armoring of the northeast riverbank.

The gradation of Bridge Riprap shall conform to a D_{50} of 36" and a D_{100} of 72". The thickness of the riprap layer shall be a minimum of 12 feet thick for scour protection. The thickness of the riprap layer is permitted to be less than 12 feet thick only if bedrock is encountered prior to completing excavation. In locations where bedrock is encountered, the bottom of the riprap slope shall be keyed into rock as show in the Plans. The Contractor shall be responsible for ensuring that the riprap slopes are stabilized.

Compost and seed and streambed material shall be placed over bridge riprap in locations shown in the Plans and in accordance with Items 751.766 and 983.521, respectively. The top two feet of the bridge riprap layer shall be choked with smaller stones to ensure there are no large voids. The cost of the smaller stones used to choke riprap shall be considered incidental to this item.

Fill voids by shaking stone with the teeth of an excavator bucket, hand tamping with metal tamping rods, and by spraying water to settle fines between large stones. Plate compactors shall not be used.

BASIS OF PAYMENT

Bridge Riprap will be paid for at the Contract price per Ton. Payment will be full compensation for placing the material specified and for furnishing all labor, materials, tools, equipment, testing, and incidentals necessary to complete the work.

ITEM 983.521 STREAMBED RESTORATION LUMP SUM

DESCRIPTION

This work shall consist of restoring riverbed material underneath and behind the sandbags for Control of Water for the proposed bridge replacement within the limits of work. In addition, this item covers filling riprap voids with streambed material. The streambed restoration shall replicate/maintain the existing natural channel bed outside the work area in terms of material, roughness, shape, profile, and appearance. The ultimate product will, to the extent possible, replicate the function and appearance of the natural stream channel.

The streambed restoration includes the reuse of material which is to be removed at the east river bank upstream of the bridge to the extents shown on the plans. All removed material shall be stockpiled for reuse under Item 148.01. The material stockpiled for reuse shall be used to restore the areas of the streambed which are impacted by the use of sandbag cofferdams to the limits shown on the plans and to fill riprap voids below the 100-Year Flood Elevation (323.6).

The Contractor shall coordinate with his/her sub-contractors to ensure all required equipment is available on-site to complete the work in this manner. The streambed restoration is required to comply with environmental permits issued for the project. MassDOT Environmental Services will provide a Fluvial Geomorphologist (Geomorphologist) to provide on-site oversight and assistance during streambed restoration construction to ensure the restoration is constructed as shown on the Plans, as required by these Special Provisions and in accordance with permit requirements.

At least 30 days prior to the commencement of construction, the Contractor shall coordinate with David Paulson (MassDOT Wetlands & Wildlife Unit Supervisor, (857) 262-3378 / david.j.paulson@state.ma.us) to set up an initial (virtual or in person) meeting with MassDOT's Geomorphologist, Contractor, and Resident Engineer. At this meeting, the Geomorphologist will provide an overview of the restoration work. The Contractor should be prepared to discuss the anticipated means, methods, and schedule.

Process Approval:

In lieu of a mockup, the Contractor shall schedule an additional onsite meeting to discuss the streambed restoration with the Geomorphologist and respective parties from MassDOT. The Geomorphologist shall be onsite during sandbag cofferdam removal. The Contractor shall provide the Geomorphologist adequate access to observe, direct, and inspect the channel and restoration work throughout the duration of the removal, stockpile, and reinstallation of the existing streambed material, if needed.

MATERIAL

Streambed material will likely be sourced from the excavated streambed material on the east upstream bank. The larger stones and cobbles in this area to be removed are likely not suitable for use in the streambed restoration. The material shall be removed, stockpiled and reused to fill the voids in the proposed riprap placed in front of the abutments and below elevation 323.6. The removal and stockpiling of this material shall be paid for under item 148.01.

ITEM 983.521 (Continued)

In the event that there is not enough available suitable material, additional streambed restoration material shall be locally sourced that matches the composition of the existing native river bed along the reach of Fall River where the project is located. The dominant particle size under the bridge is cobble and boulder in the main flow area. Note that the upstream further away from the structure is dominated by gravel while the downstream channel has areas of bedrock.

Stream Bed Material Gradation

Particle	% Composition
Boulder	15
Cobble	60
Gravel	15
Sand	10

The streambed material shall be approved by the Resident Engineer and Geomorphologist prior to use. Any additional streambed needed in addition to the stockpiled streambed material shall be considered incidental to this item.

Related Items

Dredging and Stockpiling of Material shall conform to the requirements of item 148.01 and shall be paid for under that item. The cost for re-installing stockpiled material shall be incidental to this item.

Riprap Stone shall conform to the requirements of Items 983. Dumped Riprap and 983.12 Bridge Riprap and will be paid for under those items. Limits for riprap stones under item 983.12 are delineated on the bridge plans within the Contract Drawings as all riprap in front of the bridge abutments and wingwalls. Limits for riprap stones under item 983. are delineated within the highway plans as all riprap needed for the armoring of the northeast riverbank.

Compost and Seed over Bridge Riprap shall conform to the requirements of Item 751.766.

Native Short Grassland Mix shall conform to the requirements of Item 765.415 and shall be installed overall areas which receive Compost and Seed.

CONSTRUCTION

Channel Banks Above 100-Year Flood Elevation
Bridge Riprap shall be placed in accordance with item 983.12 and Dumped Riprap shall be placed in accordance with the requirements of section 983 of the Standard Specifications. Fill voids by shaking stone with the teeth of an excavator bucket, hand tamping with metal tamping rods, and by spraying water to settle fines between large stones. Plate compactors shall not be used.

ITEM 983.521 (Continued)

Compost and Seed over Bridge Riprap (Item 751.766) shall be installed over riprap (Items 983.and 983.12) to fill small voids, as depicted on the plans, to an average thickness of 4 inches above the riprap, with variations in thickness as necessary to meet grading requirements.

Seed mix shall be installed in this area and shall be in accordance with and paid for under Item 765.442.

Channel Banks Below 100-Year Flood Elevation and above bank flags

Bridge Riprap and Dumped Riprap shall be placed in accordance with the requirements of item 983.12 and section 983 of the Standard Specifications. Fill voids by shaking stone with the teeth of an excavator bucket, hand tamping with metal tamping rods, and by spraying water to settle fines between large stones. Plate compactors shall not be used. The purpose of filling the voids is to prevent subsurface flow where surface water disappears into large voids between the stone fill below the channel bed surface during low flow conditions. The final riprap shape and appearance shall be finalized in the field as required by the Geomorphologist.

Streambed material shall which has been stockpiled under item 148.01 or an approved equal shall be reinstalled over riprap (Items 983. and 983.12) to fill small voids, as depicted on the plans, to an average thickness of 4 inches above the riprap, with variations in thickness as necessary to replicate existing channel conditions. Reinstallation of the stockpiled streambed material shall be placed on top of the riprap to restore streambed habitat and fish passage. The streambed materials shall be installed during normal low water conditions behind cofferdams in accordance with the environmental permits.

Channel Below Bank Flags

The Contractor shall remove the sandbag cofferdams in such a way as to slowly wet the stream to minimize the initial sediment pulse. Every attempt shall be made to minimize the downstream movement of sediment. Sandbags cofferdams shall be removed once riprap voids have been filled.

The final streambed shall maintain the general configuration of the existing streambed and there shall be minimal to no subsurface flow upon final inspection by the Resident Engineer and Geomorphologist.

Completion

Once all material has been placed in the stream channel and approved by the Geomorphologist and Resident Engineer, the Contractor shall remove the cofferdams in such a way as to slowly wet the stream to minimize the initial sediment pulse. Every attempt shall be made to minimize the downstream movement of sediment.

The final streambed shall maintain the general configuration of the existing streambed bedform and there shall be minimal to no subsurface flow upon final inspection by the Resident Engineer and Geomorphologist. The project must be passable by fish and other aquatic organisms following construction.

ITEM 983.521 (Continued)

The streambed restoration to be measured for payment will be the complete and accepted work for restoration of the streambed within the limits shown on the Plans as approved by the Resident Engineer and Geomorphologist.

BASIS OF PAYMENT

Streambed Restoration will be paid for at the Contract Lump Sum price. Payment will be full compensation for placing the material specified and for furnishing all labor, materials, tools, equipment, testing, and incidentals necessary to complete the work.

The cost for dredging and stockpiling streambed material will be paid for under Item 148.01, and the cost for the materials and installation of Bridge Riprap and Dumped riprap will be paid for under items 983.12 and 983., respectively.

The Geomorphologist will be provided by MassDOT at no cost to the Contractor.

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DOCUMENT A00844

STORMWATER MEMO

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TEC, Inc.
282 Merrimack Street, 2nd Floor
Lawrence, MA 01843
978.794.1792

MEMORANDUM

TO: Tyler Lewis
MassDEP

DATE: November 18, 2025

FROM: Sydney Lewis

PROJECT NO.: 612159

RE: Stormwater Memo

Supplementary to "Stormwater Memo MassDOT Project No. 612159" revised October 30, 2025

Standard 4: Water Quality

The existing roadway drainage consists of catch basins without sumps that do not provide any TSS removal.

The project proposes two TSS treatment trains. The first includes treatment via deep sump catch basins, and the second consists of deep sump catch basins that outlet to a filtering bioretention area. An additional TSS removal practice that is not included in the calculations includes scheduled street sweeping. The two proposed treatment trains are as follows:

Treatment Train #1
1 Deep sump catch basins with hoods (25%)
Total TSS removal = 25%
Treatment Train #2
2 Deep sump catch basins with hoods (25%)
3 Bioretention Area (Filtration Only) (90%)
Total TSS removal = 93%

$$Weighted\ Average = \frac{(18.1)(25\%)+(0.26)(93\%)}{(18.1+0.26)} = \mathbf{25.96\%}$$

The weighted average was calculated for the entire limit of work, approximately 18.36 acres. The proposed project will receive a TSS removal rate of **25.96%**, an improvement over the existing rate of 0%. The proposed design has met Standard 4 to the maximum extent practicable.

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DOCUMENT A00871

United States Department of the Interior

U.S. FISH AND WILDLIFE SERVICE

NLAA CONCURRENCE VERIFICATION LETTER

(USFWS NLAA)

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
New England Ecological Services Field Office
70 Commercial Street, Suite 300
Concord, NH 3301-5094
Phone: (603) 223-2541 Fax: (603) 223-0104

In Reply Refer To: 03/03/2026 17:48:15 UTC
Project code: 2026-0057363
Project Name: BERNARDSTON- BRIDGE REPLACEMENT, B-10-001, AND DECK REPLACEMENT, B-10-018

Subject: Not Likely to Adversely Affect Concurrence verification letter for the 'BERNARDSTON- BRIDGE REPLACEMENT, B-10-001, AND DECK REPLACEMENT, B-10-018' project under the December 13, 2024, FHWA, FRA, FTA Programmatic Biological Opinion for Transportation Projects within the Range of the Indiana Bat, Northern Long-eared Bat, and Tricolored Bat.

To whom it may concern:

This letter records the determination of effects to federally listed (or proposed) bat species anticipated to result from the BERNARDSTON- BRIDGE REPLACEMENT, B-10-001, AND DECK REPLACEMENT, B-10-018 (the Project). This determination is based upon information you entered into the assisted determination key (Dkey) associated with the above referenced Programmatic Biological Opinion/Conference Opinion (PBO/PCO) in the U.S. Fish and Wildlife Service's (Service) Information for Planning and Consultation (IPaC) system on the date listed above to verify that the Project may rely on the concurrence provided in the PBO/PCO to satisfy requirements under section 7(a)(2) of the Endangered Species Act of 1973 (ESA) (16 USC 1536), as amended.

Ensuring Accurate Determinations When Using IPaC:

The Service developed the IPaC system and this Dkey in accordance with the ESA and based on the PBO/PCO. All information submitted by the project proponent into IPaC must accurately represent the full scope and details of the Project.

Failure to accurately represent or implement the Project as detailed in the Dkey invalidates this letter. Answers to certain questions in the Dkey commit the project proponent to implementation of conservation measures that must be followed for the ESA determinations to remain valid. Carefully review this letter, your ESA requirements are <u>NOT</u> yet complete.

Determinations:

Based on the information you provided (Project Description shown below), you have determined that the Project is within the scope and adheres to the criteria of the PBO/PCO, including the adoption of applicable avoidance and minimization measures. Based on your IPaC submission and the PBO/PCO, the Project is consistent with the following effect determinations:

Species	Listing Status	Determination
Tricolored Bat (*Perimyotis subflavus*)	Proposed Endangered	NLAA

The tricolored bat is proposed for listing as endangered under the ESA, but not yet listed. For actions that may affect a proposed species, agencies cannot consult, but they can confer under the authority of section 7(a)(4) of the ESA. Such conferences can follow the procedures for a consultation and be adopted as such if the proposed species is listed. Should the tricolored bat be listed, agencies must review projects that are not yet complete, or projects with ongoing effects within the tricolored bat range that previously received a no effect or not likely to adversely affect (NLAA) determination from the key to confirm that the determination is still accurate.

The Service has 14 calendar days to notify the lead Federal action agency or designated non-federal representative if we determine that the Project does not meet the criteria for a NLAA determination under the PBO/PCO. **If the Service does <u>not</u> notify the lead Federal action agency or designated non-federal representative within that timeframe, you may proceed with the Project under the terms of the NLAA concurrence provided in the PBO/PCO**. This verification period allows Service Field Offices to apply local knowledge to implementation of the PBO, as we may identify a small subset of actions having impacts that were unanticipated. In such instances, Service Field Offices may request additional information that is necessary to verify inclusion of the proposed action under the PBO/PCO.

If the Project is modified, or new information reveals that it may affect the Indiana bat, northern long-eared bat, or tricolored bat in a manner or to an extent not considered in the PBO/PCO, further review to conclude the requirements of ESA section 7(a)(2) may be required.

For Proposed Actions that include bridge/culvert or structure removal, replacement, and/or maintenance activities:

If your initial bridge, culvert, or structure assessment failed to detect Indiana bat, northern long-eared bat, or tricolored bat use or occupancy, yet bats are later detected prior to, or during construction, promptly notify the local Service Field Office within 2 working days of the discovery. In addition, please document whether incidental take occurred, and if so, the type (i.e. kill or harm) and amount (i.e. number of individuals) and submit documentation to the local Service Field Office within 5 working days from the completion of the bridge, culvert, or structure construction (use Appendix E - Post Assessment Discovery of Bats at Bridge/Culvert or Structure Form in the User's Guide). In these instances, potential incidental take of Indiana bats, northern long-eared bats, or tricolored bats may be exempted provided that the take is reported to the Service. In these instances, potential incidental take of Indiana bats, northern long-eared bats, or tricolored bats may be exempted provided that the take is reported to the Service.

If the Project may affect any other federally listed or proposed species and/or designated critical habitat, additional consultation between the lead Federal action agency and this Service Field Office is required for those species/designated critical habitat. If the Project has the potential to take bald or golden eagles, additional coordination with the Service under the Bald and Golden Eagle Protection Act may also be required. In either of these circumstances, please advise the lead Federal action agency to contact this Service Field Office

The following species may occur in your project area and **are not** covered by this determination:

- Monarch Butterfly *Danaus plexippus* Proposed Threatened

PROJECT DESCRIPTION

The following project name and description was collected in IPaC as part of the endangered species review process.

NAME

BERNARDSTON- BRIDGE REPLACEMENT, B-10-001, AND DECK REPLACEMENT, B-10-018

DESCRIPTION

BERNARDSTON- BRIDGE REPLACEMENT, B-10-001, ROUTE 10 OVER FALL RIVER AND DECK REPLACEMENT, B-10-018, ROUTE 10 OVER I-91
The project will consist of the full replacement of the bridge carrying Route 10 over Fall River and the preservation of the bridge carrying Route 10 over I-91 in the town of Bernardston. Work includes pavement milling and overlay and improvements to bicycle and pedestrian accommodations on Route 10.

Monarch Butterfly: Proposed Threatened Species. Due to MassDOT's enrollment in the Monarch Butterfly Nationwide CCAA, the action is Not Likely to Jeopardize the continued existence of the monarch butterfly.

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@42.67016275,-72.53866843755549,14z



DETERMINATION KEY RESULT

Based on your answers provided, this project(s) may affect, but is not likely to adversely affect the Indiana bat, northern long-eared bat or tricolored bat, therefore, consultation with the U.S. Fish and Wildlife Service pursuant to Section 7(a)(2) of the Endangered Species Act of 1973 (ESA) (87 Stat. 884, as amended 16 U.S.C. 1531 et seq.) is required. However, also based on your answers provided, this project may rely on the concurrence provided in the Programmatic Biological Opinion/Conference Opinion for Transportation Projects in the Range of the Indiana bat, northern long-eared bat, and tricolored bat, dated December 13, 2024.

QUALIFICATION INTERVIEW

1. Which Federal Agency is the lead federal agency the action?

   A) Federal Highway Administration (FHWA)

2. Does the Action Area intersect the species list area of the tricolored Bat (TCB)?

   Automatically answered
   Yes

3. [Semantic] Is any portion of the action area within a 0.5 mile radius of an entrance/opening to any known NLEB or TCB hibernacula?

   Note: The map queried for this question contains proprietary information and cannot be displayed. If you need additional information, please contact the Field Office listed in the letterhead of this letter.

   Automatically answered
   No

4. Does your project's activities include raising the road profile above the tree canopy in documented habitat for the Indiana bat, NLEB, or TCB?

   Note: For the definition of documented habitat, refer to Appendix A: https://www.fws.gov/media/users-guide-range-wide-programmatic-consultation-indiana-bat-and-northern-long-eared-bat

   No

5. Is your project located within a karst area?

   No

6. Will the project include bridge, culvert, or structure removal, replacement, and/or alteration activities?

   Note: For definitions of bridge, culvert, and structure, refer to Appendix A: https://www.fws.gov/media/users-guide-range-wide-programmatic-consultation-indiana-bat-and-northern-long-eared-bat.

   Yes

7. Do your project’s activities involve tree removal/trimming, temporary lighting, new/additional permanent lighting, ground disturbance, percussives that involves noise/vibration above existing background levels, vibrations, or slash pile burning?

   Yes

8. Is there suitable summer habitat for the Indiana bat, NLEB, or TCB within the project action area?

   Note: See the Service's summer survey guidance for current definitions of suitable habitat [https://www.fws.gov/midwest/endangered/mammals/inba/inbasummersurveyguidance.html].

   Yes

9. Have P/A surveys for the Indiana bat, NLEB, or TCB been conducted within the suitable summer habitat located within your project action area? This refers to mist-netting or acoustic surveys, not bridge assessments.

   Note: See the Service's survey guidance https://www.fws.gov/midwest/endangered/mammals/inba/inbasummersurveyguidance.html

   Yes

   SUBMITTED DOCUMENTS

   - *612159_bernardston_nleb_survey_20231103.pdf https://ipac.ecosphere.fws.gov/project/T2H5GIPTDVFZPFG2SAZJPPMJ2Y/projectDocuments/177603280*

10. Did the P/A surveys detect Indiana bats, NLEBs, or TCBs?

    Note: If Indiana bats, NLEBs, or TCBs are detected, the action area is considered **documented habitat.**

    No

11. Did the local Service Field Office verify that this P/A survey can be used to determine Indiana bat, NLEB, and TCB are **not likely to be present** within the suitable summer habitat located within your project area?

    Yes

12. Will the project include **bridge** removal, replacement, and/or alteration activities?

    Yes

13. Has a Bridge Bat Assessment been conducted **within the last 24 months** to determine if the bridge is being used by the Indiana bat, NLEB, or TCB? If yes, upload assessment.

    Note: Refer to the Service's current survey guidance for acceptable assessment practices and validity timeframe of bridge/culvert and structure bat assessments: https://www.fws.gov/library/collections/range-wide-indiana-bat-and-northern-long-eared-bat-survey-guidelines.

    Yes

    SUBMITTED DOCUMENTS

    - *Benardston_612159_Bridge_Inspection_20251017.pdf https://ipac.ecosphere.fws.gov/project/T2H5GIPTDVFZPFG2SAZJPPMJ2Y/projectDocuments/177603320*

14. Please select one of the following results of the Bridge Bat Assessment:

    c) *Indicates the* ***absence*** *of Indiana bats, NLEBs, or TCBs roosting in/under the bridge (no bats, guano, etc.)?*

15. Does the project include **culvert** removal, replacement, and/or alteration activities?

    No

16. Does the project include **structure** removal, replacement, and/or alteration activities?

    No

17. Does the Action Area intersect the species list area of the tricolored Bat (TCB)?

    Automatically answered
    Yes

PROJECT QUESTIONNAIRE

1. Have you made a No Effect determinations for all other species included on the FWS IPaC generated species list?

   No

2. Have you made a May Affect determination for any other species on the FWS IPaC generated list?

   Yes

3. Please enter the date of the bridge assessment.

   8/6/2025

AVOIDANCE AND MINIMIZATION MEASURES (AMMS)

This determination key result includes the commitment to implement the following Avoidance and Minimization Measures (AMMs):

GAMM1

Ensure all operators, employees, and contractors working in areas of Indiana bat, NLEB, or TCB suitable habitat are aware of all Transportation Agency environmental commitments, including all applicable AMMs.

DETERMINATION KEY DESCRIPTION: FHWA, FRA, FTA PROGRAMMATIC CONSULTATION FOR TRANSPORTATION PROJECTS AFFECTING IBAT, NLEB, OR TCB

This key was last updated in IPaC on February 24, 2026. Keys are subject to periodic revision.

This decision key is intended for projects/activities funded or authorized by the Federal Highway Administration (FHWA), Federal Railroad Administration (FRA), and/or Federal Transit Administration (FTA), which may require consultation with the U.S. Fish and Wildlife Service (Service) under Section 7 of the Endangered Species Act (ESA) and may affect the federally listed endangered Indiana bat (*Myotis sodalis*), northern long-eared bat (*Myotis septentrionalis*), and/or federally proposed endangered tricolored bat (*Perimyotis subflavus*).

This decision key should only be used to verify project applicability with the Service's Programmatic Biological Opinion/Conference Opinion for Transportation Projects in the Range of the Indiana bat, northern long-eared bat, and tricolored bat, dated December 13, 2024. The programmatic consultation limited transportation activities that may affect the covered bat species and addresses situations that are both likely and not likely to adversely affect the covered bat species. This decision key will assist in identifying the effect of a specific project/activity and the applicability of the programmatic consultation. The programmatic consultation is not intended to cover all types of transportation actions. Activities outside the scope of the programmatic consultation, or that may affect ESA-listed species other than the Indiana bat, northern long-eared bat, or tricolored bat, or their designated critical habitat, may require additional ESA Section 7 consultation.

IPAC USER CONTACT INFORMATION

Agency: Massachusetts Department of Transportation
Name: Emily Puglisi
Address: 10 Park Plaza
City: Boston
State: MA
Zip: 02116
Email emily.a.puglisi@dot.state.ma.us
Phone: 6178964424

LEAD AGENCY CONTACT INFORMATION

Lead Agency: Federal Highway Administration

DOCUMENT A00875

POLICY DIRECTIVE P-22-001
AND
POLICY DIRECTIVE P-22-002

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massDOT Massachusetts Department of Transportation Highway Division

Number: P-22-001
Date: 9/23/22

POLICY DIRECTIVE

Jonathan Gulliver (signature on original)
HIGHWAY ADMINISTRATOR

Off-Site Stockpiling of Soil from MassDOT Construction Projects

Purpose

The purpose of this Policy Directive is to formally establish a policy and procedures for managing and stockpiling soil generated and transported from MassDOT construction projects. This Policy Directive does not supersede any Federal, State, or Local regulations.

Date of Effect

This Policy Directive is effective immediately for all projects, including active construction projects.

For active construction projects and for other projects advertised prior to October 15, 2022, changes to the contract documents needed to implement the requirements of this Policy Directive will be considered on a case-by-case basis and shall be approved by the District Highway Director, as necessary.

For projects advertised on or after October 15, 2022, MassDOT will include the requirements and implementation procedures of this Policy Directive in the construction contract documents.

Policy Requirements

This policy is intended to prevent the off-site relocation of excavated soil generated from MassDOT projects to areas near residential receptors and to control potential fugitive dusts and/or contaminants. To that end, excavated soil may not be moved from the project site without knowledge of the content of the material. Knowledge may include visual field observations for presence of staining, odor, and/or debris, screening with a photoionization detector (PID), laboratory analysis, and/or site history. Pavement millings and other non-soil materials are not subject to the requirements of this Policy Directive.

Moving soil from a MassDOT project site to a temporary off-site storage location must be approved in writing by the District Highway Director.

The Contractor must select a storage location that is at least 500 feet away from residential receptors, as defined herein to include, but not be limited to, residential dwellings, residentially

zoned property, schools, daycare facilities, playgrounds, parks, recreational areas, hospitals, elderly housing and convalescent facilities.

Temporary off-site storage of excavated soil from a MassDOT project is only permissible at a location approved and permitted by MassDOT. The temporary storage location should be located within the same municipality where the soil was excavated, where possible. Stockpiled soil must be securely covered, and appropriate measures must be taken to minimize fugitive dust and erosion.

Signs indicating the source of the soil, the date the soil was generated, and contact information must be erected and maintained until the stockpiled soils are transported to a disposal facility or reused on the project site.

Implementation Procedures

To ensure that off-site storage of excavated soils is managed properly on MassDOT projects, this policy requires the following:

1. **Off-Site Stockpile Storage Locations**
    a. The Contractor shall provide proposed off-site storage locations to the Engineer for approval at least 30 days prior to transporting soil off site. Off-site storage locations should be in the same municipality as the work site.
    b. The Contractor shall keep excavated soil on site until adequately characterized to the satisfaction of the Engineer.
    c. The Contractor shall provide notification of the approved off-site storage location to the local Board of Health and the Town Manager's/Mayor's Office at least 7-days prior to transporting soil off site.
    d. The Contractor shall provide the Engineer with at least 3-days' notice prior to transporting soil off site.
    e. For off-site storage locations on MassDOT property, the Contractor is required to obtain an Access Permit through the District Permits Office prior to storage of soil or other materials. MassDOT will issue these permits at no cost to the Contractor. Information to be submitted by the Contractor as part of the permit application shall include:
        i. A description of material to be stored off-site, including available analytical data;
        ii. A figure of the location with distances to residences and residential receptors; and
        iii. Anticipated duration of temporary storage.
    f. Stockpile locations should not be within 500 feet of residential receptors (e.g., residential dwellings, residentially zoned property, schools, daycare facilities, playgrounds, parks, recreational areas, hospitals, elderly housing and convalescent facilities).
        i. If the stockpile location must be within 500 feet of residential receptors, then soil must be less than RCS-1 (per 310 CMR 40.1600) and free of potentially hazardous or regulated items.

g. For off-site storage locations on non-MassDOT property, the Contractor must notify the property owner(s) at least 7 days prior to transporting material.
h. Exceptions to these rules will be reviewed by MassDOT and may be approved by the District Highway Director on a case-by-case basis.

2. Off-Site Stockpile Management

a. The Contractor shall keep soil stockpiles on impermeable surfaces (e.g., asphalt or concrete) or on 10-mil polyethylene sheeting.
b. The Contractor shall cover soil stockpiles with 10-mil polyethylene sheeting and surround with a berm made of hay bales, straw wattles, or similar.
    i. Piles that are actively being worked on must be covered and re-secured at the end of the work shift.
c. The Contractor shall label stockpiles with signs, including:
    i. Location of origin (including any Release Tracking Numbers)
    ii. Stockpile ID number (including MassDOT District office-assigned tracking ID, if different)
    iii. Date of initial accumulation
    iv. Applicable telephone numbers for the Contractor and MassDOT.
d. The Contractor shall mitigate fugitive dust at storage locations under the direction of an appropriately trained/certified environmental professional.
e. The Contractor shall remedy noncompliance with this policy within 48 hours.
f. The Contractor shall remedy noncompliance with this policy on the SAME DAY for potentially hazardous material, as determined by the Engineer.
g. The Contractor shall handle excavated soil according to federal, state, and local regulations.
h. The Contractor shall use appropriate shipping documents for all movements of excavated soil on public roadways (e.g., Bill of Lading, Material Shipping Record, Manifest, Asbestos Waste Shipment Record, etc.).

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massDOT Massachusetts Department of Transportation Highway Division

Number: P-22-002
Date: 9/23/22

POLICY DIRECTIVE

Jonathan Gulliver (signature on original)
HIGHWAY ADMINISTRATOR

Use of MassDOT Property for Staging and other Construction-Related Operations

Purpose

This Policy Directive is intended to address the use of MassDOT property by MassDOT Contractors for construction staging and other construction-related operations that are not specifically defined in the construction contract. Such use of MassDOT property will only be allowed if permitted by the District Office in accordance with 700 CMR 13.00, Approval of Access to MassDOT Highways and Other Property. This includes the use of MassDOT property for staging, laydown, and storage of equipment and materials, including soil excavated from a project site.

This Policy Directive requires the Contractor/applicant to obtain a Non-Vehicular Access Permit from MassDOT to use MassDOT property for these purposes.

This Policy Directive is effective immediately and applies to all MassDOT construction projects.

General Permit Considerations and Conditions

In addition to other normal MassDOT Access Permit procedures, MassDOT shall consider the following during the application, review, implementation and monitoring processes of Access Permits required by this Policy Directive:

- Storage and placement of the Contractor's equipment and materials should not be allowed within the clear zone of the roadway.
- Stockpiled soils should not be located within 500 feet of residential receptors, as defined herein to include, but not be limited to, residential dwellings, residentially zoned property, schools, daycare facilities, playgrounds, parks, recreational areas, hospitals, elderly housing and convalescent facilities.
- The Contractor/applicant shall identify the access/egress locations of the proposed storage areas. MassDOT will only approve locations determined to be safe for roadway users, construction workers and the general public.
- The Contractor may be required to submit a Traffic Management Plan and/or Lighting Plan for MassDOT review and approval as part of the permit application, depending on the proposed use of the area.

- The Contractor shall submit the permit application through MassDOT's online State Highway Access Permit System (SHAPS).
- MassDOT will waive the permit application fee for any application received from a MassDOT Contractor for any permit required by this Policy Directive and will waive any subsequent amendment and extension fees that may otherwise be required.
- MassDOT will review the permit application in accordance with applicable standard procedures and will apply standard permit terms and conditions, as necessary.
- The Resident Engineer will verify that the permit is approved before allowing the Contractor to use the affected area for the requested purpose.
- Areas permitted are for use by the approved applicant only and are not to be shared with or used by other vendors. Subcontractors specifically engaged with the applicant working on the specific MassDOT project will be allowed to use the area in accordance with the terms of the permit.
- Permits are issued on an annual basis and will require the Contractor to file for an extension each year to continue use.

Exemptions from Permit Requirements

Equipment and materials being used for active construction operations and located within the work zone of the construction contract are exempt from this permit requirement, provided they do not interfere with the safety or operation of the roadway or the work zone. Examples of these types of exempt uses are:

- Equipment and materials parked or stored within a protected (barriered) work zone.
- Materials placed in the work zone prior to same-day installation or use.
- Soils excavated temporarily and scheduled to be replaced, such as for trenching operations or for installation of drainage structures.

DOCUMENT B00420

PROPOSAL

BERNARDSTON

For: **Bridge Replacement, B-10-001, Route 10 over Fall River and Deck Replacement, B-10-018, Route 10 over I-91**

COMMONWEALTH OF MASSACHUSETTS

LOCATION

The work referred to herein is in the Town of BERNARDSTON in Franklin County, in the Commonwealth of Massachusetts, and is shown by the locus map (Document 00331) in the Proposal Pamphlet, the work locations extend as follows:

Route 10

Beginning – Station 9+50.00 +/-

Bridge # B-10-001 (CLA)

Bridge # B-10-018 (12C)

Ending –Station 350+90.00 +/-

I-91 NB Off-Ramp to Route 10

Limit of Work – Station 59+80.00 +/-

The contract prices shall include the furnishing of all materials (except as otherwise herein specified), the performing of all the labor requisite or proper, the providing of all necessary machinery, tools, apparatus and other means of construction, the doing of all the abovementioned work in the manner set forth, described and shown in the specifications and on the drawings for the work, and in the form of contract, and the completion thereof within **1958 CALENDAR DAYS** upon receipt of a Notice to Proceed, except that if the completion date falls between December 1 and March 15 then the same number of days beyond December 1st will be extended after March 15th.

The Work of this project is described by the following Items and quantities.

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massDOT Massachusetts Department of Transportation Highway Division

CMS Contract Management System

Project # 612159	Contract # 136484			
Location : BERNARDSTON				
Description : Bridge Replacement, B-10-001, Route 10 over Fall River and Deck Replacement, B-10-018, Route 10 over I-91				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
100.9	1	PRE AND POST-CONSTRUCTION SURVEY AND GEOTECHNICAL MONITORING AND INSTRUMENTATION AT _____ LUMP SUM		
101.	0.5	CLEARING AND GRUBBING AT _____ PER ACRE		
102.3	8	HERBICIDE TREATMENT OF INVASIVE PLANTS AT _____ PER HOUR		
102.33	8	INVASIVE PLANT MANAGEMENT STRATEGY AT _____ PER HOUR		
102.511	2	TREE PROTECTION - ARMORING AND PRUNING AT _____ EACH		
102.521	160	TREE AND PLANT PROTECTION FENCE AT _____ PER FOOT		
106.88	40	JACKING AND SHORING AT _____ EACH		
107.97	2,000	STRUCTURAL STEEL REPAIRS AT _____ PER POUND		
113.1	1	DEMOLITION OF DECK OF BRIDGE N0.B-10-018 (12C) AT _____ LUMP SUM		

Project # 612159	Contract # 136484			
Location : BERNARDSTON				
Description : Bridge Replacement, B-10-001, Route 10 over Fall River and Deck Replacement, B-10-018, Route 10 over I-91				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
114.11	1	DEMOLITION OF SUPERSTRUCTURE OF BRIDGE NO. B-10-001 AT _____ LUMP SUM		
120.	17,000	EARTH EXCAVATION AT _____ PER CUBIC YARD		
121.	20	CLASS A ROCK EXCAVATION AT _____ PER CUBIC YARD		
127.12	90	REINFORCED CONCRETE EXCAVATION - BRIDGE NO. B-10-018 AT _____ PER CUBIC YARD		
127.13	950	REINFORCED CONCRETE EXCAVATION - BRIDGE NO. B-10-001 AT _____ PER CUBIC YARD		
127.4	70	REINFORCED CONCRETE DECK EXCAVATION (FULL DEPTH) AT _____ PER SQUARE YARD		
127.41	15	REINFORCED CONCRETE DECK EXCAVATION (PARTIAL DEPTH) AT _____ PER CUBIC YARD		
140.	3,025	BRIDGE EXCAVATION AT _____ PER CUBIC YARD		
140.2	1	TIMBER SHORING REMOVED AND STACKED AT _____ LUMP SUM		

Project # 612159	Contract # 136484			
Location : BERNARDSTON				
Description : Bridge Replacement, B-10-001, Route 10 over Fall River and Deck Replacement, B-10-018, Route 10 over I-91				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
141.	140	CLASS A TRENCH EXCAVATION AT _____ PER CUBIC YARD		
141.1	50	TEST PIT FOR EXPLORATION AT _____ PER CUBIC YARD		
142.	280	CLASS B TRENCH EXCAVATION AT _____ PER CUBIC YARD		
144.	320	CLASS B ROCK EXCAVATION AT _____ PER CUBIC YARD		
146.	17	DRAINAGE STRUCTURE REMOVED AT _____ EACH		
148.	9	DREDGING AND DISPOSING OF MATERIAL AT _____ PER CUBIC YARD		
148.01	30	DREDGING AND STOCKPILING OF MATERIAL AT _____ PER CUBIC YARD		
151.	3,950	GRAVEL BORROW AT _____ PER CUBIC YARD		
151.1	90	GRAVEL BORROW FOR BRIDGE FOUNDATION AT _____ PER CUBIC YARD		

Project # 612159	Contract # 136484			
Location : BERNARDSTON				
Description : Bridge Replacement, B-10-001, Route 10 over Fall River and Deck Replacement, B-10-018, Route 10 over I-91				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
151.2	2,605	GRAVEL BORROW FOR BACKFILLING STRUCTURES AND PIPES AT _____ PER CUBIC YARD		
156.	780	CRUSHED STONE AT _____ PER TON		
160.1	20	CONTROLLED LOW-STRENGTH MATERIAL - MANUAL EXCAVATABLE (<= 100 PSI) AT _____ PER CUBIC YARD		
170.	13,000	FINE GRADING AND COMPACTING - SUBGRADE AREA AT _____ PER SQUARE YARD		
180.01	1	ENVIRONMENTAL HEALTH AND SAFETY PROGRAM AT _____ LUMP SUM		
180.02	40	PERSONAL PROTECTION LEVEL C UPGRADE AT _____ PER HOUR		
180.03	40	LICENSED SITE PROFESSIONAL SERVICES AT _____ PER HOUR		
181.11	29,400	DISPOSAL OF UNREGULATED SOIL AT _____ PER TON		
181.12	670	DISPOSAL OF REGULATED SOIL - IN-STATE FACILITY AT _____ PER TON		

Project # 612159	Contract # 136484			
Location : BERNARDSTON				
Description : Bridge Replacement, B-10-001, Route 10 over Fall River and Deck Replacement, B-10-018, Route 10 over I-91				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
181.13	670	DISPOSAL OF REGULATED SOIL - OUT-OF-STATE FACILITY AT _____ PER TON		
181.14	320	DISPOSAL OF HAZARDOUS WASTE AT _____ PER TON		
182.1	1	INSPECTION AND TESTING FOR ASBESTOS AT _____ LUMP SUM		
182.2	50	REMOVAL OF ASBESTOS AT _____ PER FOOT		
201.	36	CATCH BASIN AT _____ EACH		
202.	16	MANHOLE AT _____ EACH		
202.2	2	MANHOLE (9 TO 14 FOOT DEPTH) AT _____ EACH		
204.	4	GUTTER INLET AT _____ EACH		
205.	2	LEACHING BASIN AT _____ EACH		

Project # 612159	Contract # 136484			
Location : BERNARDSTON				
Description : Bridge Replacement, B-10-001, Route 10 over Fall River and Deck Replacement, B-10-018, Route 10 over I-91				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
209.1	2	DROP INLET, TYPE DF AT _____ EACH		
220.	5	DRAINAGE STRUCTURE ADJUSTED AT _____ EACH		
220.2	10	DRAINAGE STRUCTURE REBUILT AT _____ PER FOOT		
220.3	3	DRAINAGE STRUCTURE CHANGE IN TYPE AT _____ EACH		
220.5	1	DRAINAGE STRUCTURE REMODELED AT _____ EACH		
221.	15	FRAME AND COVER AT _____ EACH		
221.1	13	FRAME AND COVER - SECURED AT _____ EACH		
222.	1	FRAME AND GRATE - MASSDOT BAR TYPE AT _____ EACH		
222.1	27	FRAME AND GRATE - MASSDOT CASCADE TYPE AT _____ EACH		

Project # 612159	Contract # 136484			
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ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
222.11	2	FRAME AND GRATE (OR COVER) REMOVED AND RESET AT _____ EACH		
222.2	1	FRAME AND GRATE - MASSDOT DROP INLET AT _____ EACH		
223.2	22	FRAME AND GRATE (OR COVER) REMOVED AND DISCARDED AT _____ EACH		
227.3	50	REMOVAL OF DRAINAGE STRUCTURE SEDIMENT AT _____ PER CUBIC YARD		
227.31	200	REMOVAL OF DRAINAGE PIPE SEDIMENT AT _____ PER FOOT		
227.4	10	MASONRY PLUG AT _____ PER SQUARE FOOT		
238.12	200	12 INCH DUCTILE IRON PIPE AT _____ PER FOOT		
241.12	1,500	12 INCH REINFORCED CONCRETE PIPE CLASS III AT _____ PER FOOT		
242.12	3	12 INCH REINFORCED CONCRETE PIPE FLARED END AT _____ EACH		

Project # 612159	Contract # 136484			
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ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
252.12	50	12 INCH CORRUGATED PLASTIC PIPE AT _____ PER FOOT		
258.	25	STONE FOR PIPE ENDS AT _____ PER SQUARE YARD		
269.06	150	6 INCH SLOT-PERFORATED CORRUGATED PLASTIC PIPE (SUBDRAIN) AT _____ PER FOOT		
302.08	270	8 INCH DUCTILE IRON WATER PIPE (RUBBER GASKET) AT _____ PER FOOT		
302.081	300	8 INCH DUCTILE IRON WATER PIPE (RUBBER GASKET) WITH TEMPORARY SUPPORTS AT _____ PER FOOT		
309.	2,030	DUCTILE IRON FITTINGS FOR WATER PIPE AT _____ PER POUND		
325.16	20	16 INCH STEEL PIPE CASING FOR WATER PIPE AT _____ PER FOOT		
347.1	50	1 INCH COPPER TUBING TYPE K AT _____ PER FOOT		
357.08	4	8 INCH GATE BOX AT _____ EACH		

Project # 612159	Contract # 136484			
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ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
358.	12	GATE BOX ADJUSTED AT _____ EACH		
363.1	1	1 INCH CORPORATION COCK AT _____ EACH		
371.08	2	8 INCH COUPLING AT _____ EACH		
373.08	375	8 INCH WATER PIPE INSULATION AT _____ PER FOOT		
381.	1	SERVICE BOX AT _____ EACH		
384.	1	CURB STOP AT _____ EACH		
402.	1,010	DENSE GRADED CRUSHED STONE FOR SUB-BASE AT _____ PER CUBIC YARD		
415.2	5,600	PAVEMENT FINE MILLING AT _____ PER SQUARE YARD		
431.	55	HIGH EARLY STRENGTH CEMENT CONCRETE BASE COURSE AT _____ PER SQUARE YARD		

Project # 612159	Contract # 136484			
Location : BERNARDSTON				
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ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
443.	95	WATER FOR ROADWAY DUST CONTROL AT _____ PER 1000 GALLONS		
450.231	625	SUPERPAVE SURFACE COURSE - 12.5 POLYMER (SSC - 12.5 - P) AT _____ PER TON		
450.31	1,030	SUPERPAVE INTERMEDIATE COURSE - 12.5 (SIC -12.5) AT _____ PER TON		
450.42	2,050	SUPERPAVE BASE COURSE - 37.5 (SBC - 37.5) AT _____ PER TON		
450.601	980	SUPERPAVE BRIDGE SURFACE COURSE - 9.5 POLYMER (SSC-B - 9.5 - P) AT _____ PER TON		
450.701	210	SUPERPAVE BRIDGE PROTECTIVE COURSE - 9.5 POLYMER (SPC-B - 9.5 - P) AT _____ PER TON		
450.71	25	SUPERPAVE BRIDGE PROTECTIVE COURSE - 12.5 (SPC-B - 12.5) AT _____ PER TON		
451.	125	HMA FOR PATCHING AT _____ PER TON		
452.	2,250	ASPHALT EMULSION FOR TACK COAT AT _____ PER GALLON		

Project # 612159	Contract # 136484			
Location : BERNARDSTON				
Description : Bridge Replacement, B-10-001, Route 10 over Fall River and Deck Replacement, B-10-018, Route 10 over I-91				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
453.	8,600	HMA JOINT ADHESIVE AT _____ PER FOOT		
472.	700	TEMPORARY ASPHALT PATCHING AT _____ PER TON		
477.2	3,500	MILLED RUMBLE STRIP (TYPE C) AT _____ PER FOOT		
482.5	300	SAWCUTTING ASPHALT PAVEMENT FOR BOX WIDENING AT _____ PER FOOT		
504.2	13	GRANITE CURB TYPE VA4 - SPLAYED END AT _____ EACH		
506.	1,700	GRANITE CURB TYPE VB - STRAIGHT AT _____ PER FOOT		
506.1	170	GRANITE CURB TYPE VB - CURVED AT _____ PER FOOT		
509.	155	GRANITE TRANSITION CURB FOR PEDESTRIAN CURB RAMPS - STRAIGHT AT _____ PER FOOT		
509.1	150	GRANITE TRANSITION CURB FOR PEDESTRIAN CURB RAMPS - CURVED AT _____ PER FOOT		

Project # 612159	Contract # 136484			
Location : BERNARDSTON				
Description : Bridge Replacement, B-10-001, Route 10 over Fall River and Deck Replacement, B-10-018, Route 10 over I-91				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
511.1	785	GRANITE EDGING TYPE SB - STRAIGHT AT _____ PER FOOT		
512.1	55	GRANITE EDGING TYPE SB (RADIUS 10 FEET OR LESS) AT _____ PER FOOT		
514.	8	GRANITE CURB INLET - STRAIGHT AT _____ EACH		
515.	1	GRANITE CURB INLET - CURVED AT _____ EACH		
580.	90	CURB REMOVED AND RESET AT _____ PER FOOT		
581.	10	CURB INLET REMOVED AND RESET AT _____ EACH		
583.	2,050	EDGING REMOVED AND RESET AT _____ PER FOOT		
594.	125	CURB REMOVED AND DISCARDED AT _____ PER FOOT		
595.	4	CURB INLET REMOVED AND DISCARDED AT _____ EACH		

Project # 612159	Contract # 136484			
Location : BERNARDSTON				
Description : Bridge Replacement, B-10-001, Route 10 over Fall River and Deck Replacement, B-10-018, Route 10 over I-91				
ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
597.	1,800	EDGING REMOVED AND DISCARDED AT _____ PER FOOT		
620.12	445	GUARDRAIL, TL-2 (SINGLE FACED) AT _____ PER FOOT		
620.32	135	GUARDRAIL - CURVED, TL-2 (SINGLE FACED) AT _____ PER FOOT		
627.1	4	TRAILING ANCHORAGE AT _____ EACH		
627.82	3	GUARDRAIL TANGENT END TREATMENT, TL-2 AT _____ EACH		
628.21	1	TRANSITION TO NCHRP 350 GUARDRAIL AT _____ EACH		
628.24	8	TRANSITION TO BRIDGE RAIL AT _____ EACH		
628.315	8	TEMPORARY IMPACT ATTENUATOR, REDIRECTIVE, TL-3 AT _____ EACH		
628.4	8	TEMPORARY IMPACT ATTENUATOR, REMOVED AND RESET AT _____ EACH		

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630.2	1,100	HIGHWAY GUARD REMOVED AND DISCARDED AT _____ PER FOOT		
632.4	4	INDIVIDUAL POST REMOVED AND DISCARDED AT _____ EACH		
657.	425	TEMPORARY FENCE AT _____ PER FOOT		
666.	10	CHAIN LINK FENCE REMOVED AND RESET AT _____ PER FOOT		
669.	130	FENCE REMOVED AND STACKED AT _____ PER FOOT		
691.	65	BALANCE STONE WALL REMOVED AND REBUILT AT _____ PER FOOT		
697.11	35	INLET SEDIMENTATION FILTER DEVICES AT _____ EACH		
697.2	350	FLOATING SILT FENCE AT _____ PER FOOT		
698.1	400	GEOTEXTILE FABRIC FOR STABILIZATION AT _____ PER SQUARE YARD		

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ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
698.2	50	GEOTEXTILE FABRIC FOR SUBSURFACE DRAINAGE AT _____ PER SQUARE YARD		
698.3	25	GEOTEXTILE FABRIC FOR SEPARATION AT _____ PER SQUARE YARD		
698.4	550	GEOTEXTILE FABRIC FOR PERMANENT EROSION CONTROL AT _____ PER SQUARE YARD		
699.1	370	IMPERMEABLE LINER AT _____ PER SQUARE YARD		
701.	950	CEMENT CONCRETE SIDEWALK AT _____ PER SQUARE YARD		
701.1	115	CEMENT CONCRETE SIDEWALK AT DRIVEWAYS AT _____ PER SQUARE YARD		
701.2	150	CEMENT CONCRETE PEDESTRIAN CURB RAMP AT _____ PER SQUARE YARD		
701.4	7	TEMPORARY DETECTABLE WARNING PANEL AT _____ EACH		
702.	165	HOT MIX ASPHALT SIDEWALK OR DRIVEWAY AT _____ PER TON		

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ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
722.1	1	SCHEDULE OF OPERATIONS (TYPE A) - FIXED PRICE $135000 AT One Hundred Thirty Five Thousand Dollars LUMP SUM	$135,000.00	$135,000.00
740.	65	ENGINEER'S FIELD OFFICE AND EQUIPMENT (TYPE A) AT _____ PER MONTH		
748.	1	MOBILIZATION AT _____ LUMP SUM		
751.	775	LOAM FOR ROADSIDES AT _____ PER CUBIC YARD		
751.1	85	LOAM FOR LAWNS AT _____ PER CUBIC YARD		
751.766	105	COMPOST AND SEED OVER MODIFIED ROCKFILL AND RIPRAP AT _____ PER CUBIC YARD		
756.	1	NPDES STORMWATER POLLUTION PREVENTION PLAN AT _____ LUMP SUM		
761.1	150	BIORETENTION SOIL AT _____ PER CUBIC YARD		
765.	7,500	SEEDING AT _____ PER SQUARE YARD		

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ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
765.21	16	ANNUAL COVER CROP FOR NATIVE SEEDING AT _____ PER POUND		
765.411	5	SHORT GRASSLAND MIX AT _____ PER POUND		
765.442	5	ROADSIDE RIVERBANK MIX AT _____ PER POUND		
765.554	2	WETLAND SEED - SEASONALLY FLOODED AT _____ PER POUND		
765.635	3,800	NATIVE SEEDING AND ESTABLISHMENT AT _____ PER SQUARE YARD		
767.121	1,400	SEDIMENT CONTROL BARRIER AT _____ PER FOOT		
767.6	5	AGED PINE BARK MULCH AT _____ PER CUBIC YARD		
767.9	550	JUTE MESH AT _____ PER SQUARE YARD		
769.	1,050	PAVEMENT MILLING MULCH UNDER GUARD RAIL AT _____ PER FOOT		

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ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
804.3	335	3 INCH ELECTRICAL CONDUIT TYPE NM - PLASTIC -(UL) AT _____ PER FOOT		
811.31	8	PULL BOX 12 X 12 INCHES - SD2.031 AT _____ EACH		
825.21	2	RRFB-AC POWERED (2 POST ASSEMBLY SYSTEM) AT _____ EACH		
825.31	1	RRFB-AC POWERED (3 POST ASSEMBLY SYSTEM) AT _____ EACH		
831.	125	ROADSIDE GUIDE SIGN (D6/D8) - ALUMINUM PANEL (TYPE A) AT _____ PER SQUARE FOOT		
832.	245	WARNING-REGULATORY AND ROUTE MARKER - ALUMINUM PANEL (TYPE A) AT _____ PER SQUARE FOOT		
834.17	6	REFLECTORIZED FLEXIBLE DELINEATOR POST (AMBER) AT _____ EACH		
834.18	6	REFLECTORIZED FLEXIBLE DELINEATOR POST (WHITE) AT _____ EACH		
841.1	2	SUPPORTS FOR GUIDE SIGN (D6 W/ D8-5 INCH TUBULAR POST) STEEL AT _____ EACH		

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841.2	1	SUPPORTS FOR GUIDE SIGN (D6-5 INCH TUBULAR POST) STEEL AT _____ EACH		
847.1	48	SIGN SUP (NOT GUIDE)+RTE MKR W/1 BRKWAY POST ASSEMBLY - STEEL AT _____ EACH		
848.1	9	SIGN SUP (NOT GUIDE)+RTE MKR W/2 BRKWAY POST ASSEMBLIES-STEEL AT _____ EACH		
850.41	320	ROADWAY FLAGGER AT _____ PER HOUR		
852.	2,900	SAFETY SIGNING FOR TRAFFIC MANAGEMENT AT _____ PER SQUARE FOOT		
852.11	350	TEMPORARY PEDESTRIAN BARRICADE AT _____ PER FOOT		
852.12	3	TEMPORARY PEDESTRIAN CURB RAMP AT _____ EACH		
853.1	6	PORTABLE BREAKAWAY BARRICADE TYPE III AT _____ EACH		
853.2	100	TEMPORARY BARRIER (TL-2) AT _____ PER FOOT		

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ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
853.21	950	TEMPORARY BARRIER REMOVED AND RESET AT _____ PER FOOT		
853.22	1,350	TEMPORARY BOLT-DOWN BARRIER REMOVED AND RESET AT _____ PER FOOT		
853.23	425	TEMPORARY BARRIER (TL-3) AT _____ PER FOOT		
853.33	590	TEMPORARY BARRIER - LIMITED DEFLECTION (TL-3) AT _____ PER FOOT		
853.34	875	TEMPORARY BARRIER - LIMITED DEFLECTION (TL-4) AT _____ PER FOOT		
853.35	8	TEMPORARY BARRIER TRANSITION AT _____ EACH		
853.403	250	TRUCK MOUNTED ATTENUATOR AT _____ PER DAY		
853.8	30	TEMPORARY ILLUMINATION FOR WORK ZONE AT _____ PER DAY		
854.016	9,500	TEMPORARY PAVING MARKINGS - 6 INCH (PAINTED) AT _____ PER FOOT		

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ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
854.036	23,000	TEMPORARY PAVING MARKINGS - 6 INCH (TAPE) AT _____ PER FOOT		
854.0412	570	12-IN. TEMPORARY WHITE LINE (MC, UFD) AT _____ PER FOOT		
854.046	4,500	6-IN. TEMPORARY WHITE LINE (MC,UFD) AT _____ PER FOOT		
854.1	13,000	PAVEMENT MARKING REMOVAL AT _____ PER SQUARE FOOT		
855.046	4,500	6-IN. TEMPORARY YELLOW LINE (MC,UFD) AT _____ PER FOOT		
856.096	900	ARROW BOARD (TYPE C) AT _____ PER DAY		
856.12	825	PORTABLE CHANGEABLE MESSAGE SIGN AT _____ PER DAY		
859.	109,500	REFLECTORIZED DRUM AT _____ PER DAY		
859.1	2,000	REFLECTORIZED DRUMS WITH SEQUENTIAL FLASHING WARNING LIGHTS AT _____ PER DAY		

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ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
862.406	10,000	6 INCH RECESSED WHITE LINE (MC, UFD, WR) AT _____ PER FOOT		
862.412	3,800	12 INCH RECESSED WHITE LINE (MC, UFD, WR) AT _____ PER FOOT		
863.406	9,000	6 INCH RECESSED YELLOW LINE (MC, UFD, WR) AT _____ PER FOOT		
863.412	390	12 INCH RECESSED YELLOW LINE (MC, UFD, WR) AT _____ PER FOOT		
864.04	415	PAVEMENT ARROWS AND LEGENDS REFLECTORIZED WHITE (THERMOPLASTIC) AT _____ PER SQUARE FOOT		
864.34	13	SLOTTED PAVEMENT MARKER TWO-WAY YELLOW/RED AT _____ EACH		
864.35	50	SLOTTED PAVEMENT MARKER TWO-WAY YELLOW/YELLOW AT _____ EACH		
864.41	4,600	GREEN COLORIZED PAVEMENT MARKINGS AT _____ PER SQUARE FOOT		
874.	16	STREET NAME SIGN AT _____ EACH		

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ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
874.2	20	TRAFFIC SIGN REMOVED AND RESET AT _____ EACH		
874.4	29	TRAFFIC SIGN REMOVED AND STACKED AT _____ EACH		
874.41	1	GUIDE SIGN REMOVED AND STACKED AT _____ EACH		
874.8	20	TRAFFIC SIGN REMOVED AND DISCARDED AT _____ EACH		
874.81	2	GUIDE SIGN REMOVED AND DISCARDED AT _____ EACH		
877.1	5	SIGN POST REMOVED AND DISCARDED AT _____ EACH		
877.2	6	SIGN POST REMOVED AND STACKED AT _____ EACH		
903.	15	3000 PSI, 1.5 INCH, 470 CEMENT CONCRETE AT _____ PER CUBIC YARD		
903.1	1,400	3000 PSI CEMENT CONCRETE AT _____ PER CUBIC YARD		

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ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
904.	4	4000 PSI, 3/4 INCH, 610 CEMENT CONCRETE AT _____ PER CUBIC YARD		
905.	5	4000 PSI, 3/8 INCH, 660 CEMENT CONCRETE AT _____ PER CUBIC YARD		
909.5	30	RAPID SETTING CONCRETE AT _____ PER CUBIC YARD		
910.	60	STEEL REINFORCEMENT FOR STRUCTURES AT _____ PER POUND		
911.1	1,800	SHEAR CONNECTORS AT _____ EACH		
912.	650	DRILLING AND GROUTING DOWELS AT _____ EACH		
913.21	2	ANCHOR BOLT CORRECTIVE ACTION AT BEARINGS NOT SCHEDULED FOR REPLACEMENT AT _____ EACH		
950.11	1	TEMPORARY SHORING AT _____ EACH		
953.30	1	TEMPORARY EARTH SUPPORT SYSTEM AT _____ LUMP SUM		

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ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
961.201	1	CLEAN (FULL REMOVAL) AND PAINT STEEL BRIDGE NO. B-10-001 AT _____ LUMP SUM		
983.	200	DUMPED RIPRAP AT _____ PER TON		
983.12	7,400	BRIDGE RIPRAP AT _____ PER TON		
983.521	1	STREAMBED RESTORATION AT _____ LUMP SUM		
986.	110	MODIFIED ROCKFILL AT _____ PER TON		
991.1	1	CONTROL OF WATER - STRUCTURE NO. B-10-001 (CLA) AT _____ LUMP SUM		
992.1	1	ALTERATION TO BRIDGE STRUCTURE NO. B-10-018 (12C) AT _____ LUMP SUM		
993.2	1	TEMPORARY ACCESS TRESTLE AND SUPPORTS AT _____ LUMP SUM		
994.01	1	TEMPORARY PROTECTIVE SHIELDING BRIDGE NO. B-10-001 (CLA) AT _____ LUMP SUM		

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ITEM #	**QUANTITY**	**ITEM WITH UNIT BID PRICE WRITTEN IN WORDS**	**UNIT PRICE**	**AMOUNT**
994.02	1	TEMPORARY PROTECTIVE SHIELDING BRIDGE NO. B-10-018 (12C) AT _____ LUMP SUM		
995.01	1	BRIDGE STRUCTURE, BRIDGE NO. B-10-001 (CLA) AT _____ LUMP SUM		
Total Qty:	353,884.5			